Clp

1.14

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Contents

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1.1 Class Hierarchy

This inheritance list is sorted roughly, but not completely, alphabetically:

std::basic_fstream< char >
std::basic_fstream< wchar_t >
std::basic_ifstream< char >
std::basic_ifstream< wchar_t >
std::basic_ios< char >
std::basic_ios< wchar_t >
std::basic_iostream< char >
std::basic_iostream< wchar_t >
std::basic_istream< char >
std::basic_istream< wchar_t >
std::basic_istringstream< char >
std::basic_istringstream< wchar_t >
std::basic_ofstream< char >
std::basic_ofstream< wchar_t >
std::basic_ostream< char >
std::basic_ostream< wchar_t >
std::basic_ostringstream< char >
std::basic_ostringstream< wchar_t >
std::basic_string< char >
std::basic_string< wchar_t >
std::basic_stringstream< char >
std::basic_stringstream< wchar_t >

2 Class Index

2.1 Class List

Here are the classes, structs, unions and interfaces with brief descriptions:

3 Class Documentation

3.1 blockStruct Struct Reference

3.1.1 Detailed Description

Definition at line 565 of file ClpPackedMatrix.hpp.

The documentation for this struct was generated from the following file:

- ClpPackedMatrix.hpp

3.2 ClpNode::branchState Struct Reference

3.2.1 Detailed Description

Definition at line 121 of file ClpNode.hpp.

The documentation for this struct was generated from the following file:

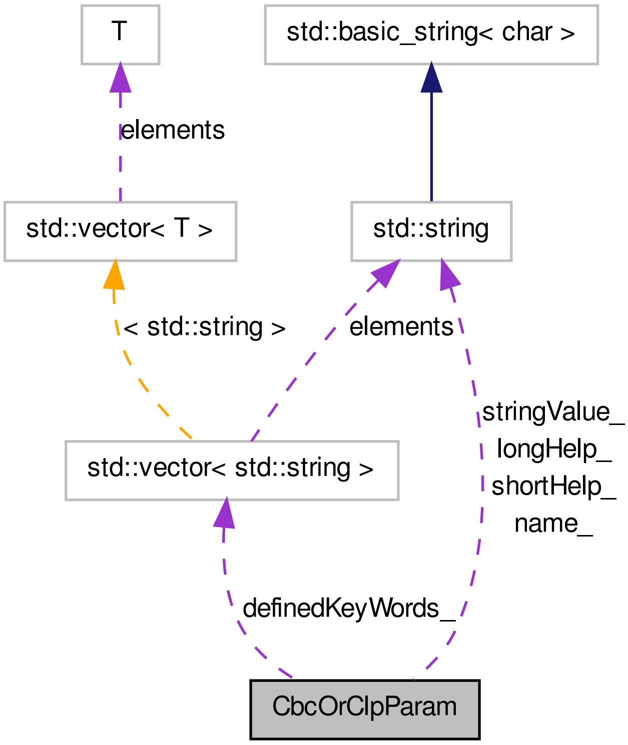
- ClpNode.hpp

3.3 CbcOrClpParam Class Reference

Very simple class for setting parameters.

`#include <CbcOrClpParam.hpp>`

Collaboration diagram for CbcOrClpParam:



Public Member Functions

Constructor and destructor

- CbcOrClpParam ()

  Constructors.
- **CbcOrClpParam** (std::string name, std::string help, double lower, double upper, CbcOrClpParameterType type, int display=2)
- **CbcOrClpParam** (std::string name, std::string help, int lower, int upper, CbcOrClpParameterType type, int display=2)
- **CbcOrClpParam** (std::string name, std::string help, std::string firstValue, CbcOrClpParameterType type, int whereUsed=7, int display=2)
- **CbcOrClpParam** (std::string name, std::string help, CbcOrClpParameterType type, int whereUsed=7, int display=2)
- CbcOrClpParam (const CbcOrClpParam &)

  Copy constructor.

- CbcOrClpParam & operator= (const CbcOrClpParam &rhs)

  Assignment operator. This copies the data.
- ∼CbcOrClpParam ()

  Destructor.

stuff

- void append (std::string keyWord)

  Insert string (only valid for keywords)
- void addHelp (std::string keyWord)

  Adds one help line.
- std::string name () const

  Returns name.
- std::string shortHelp () const

  Returns short help.
- int setDoubleParameter (CbcModel &model, double value)

  Sets a double parameter (nonzero code if error)
- const char ∗ setDoubleParameterWithMessage (CbcModel &model, double value, int &returnCode)

  Sets double parameter and returns printable string and error code.
- double doubleParameter (CbcModel &model) const

  Gets a double parameter.
- int setIntParameter (CbcModel &model, int value)

  Sets a int parameter (nonzero code if error)
- const char ∗ setIntParameterWithMessage (CbcModel &model, int value, int &returnCode)

  Sets int parameter and returns printable string and error code.
- int intParameter (CbcModel &model) const

  Gets a int parameter.
- int setDoubleParameter (ClpSimplex ∗model, double value)

  Sets a double parameter (nonzero code if error)
- double doubleParameter (ClpSimplex ∗model) const

  Gets a double parameter.
- const char ∗ setDoubleParameterWithMessage (ClpSimplex ∗model, double value, int &returnCode)

  Sets double parameter and returns printable string and error code.
- int setIntParameter (ClpSimplex ∗model, int value)

  Sets a int parameter (nonzero code if error)
- const char ∗ setIntParameterWithMessage (ClpSimplex ∗model, int value, int &returnCode)

  Sets int parameter and returns printable string and error code.
- int intParameter (ClpSimplex ∗model) const

  Gets a int parameter.
- int setDoubleParameter (OsiSolverInterface ∗model, double value)

Sets a double parameter (nonzero code if error)

- const char ∗ setDoubleParameterWithMessage (OsiSolverInterface ∗model, double value, int &returnCode)

  Sets double parameter and returns printable string and error code.
- double doubleParameter (OsiSolverInterface ∗model) const

  Gets a double parameter.
- int setIntParameter (OsiSolverInterface ∗model, int value)

  Sets a int parameter (nonzero code if error)
- const char ∗ setIntParameterWithMessage (OsiSolverInterface ∗model, int value, int &returnCode)

  Sets int parameter and returns printable string and error code.
- int intParameter (OsiSolverInterface ∗model) const

  Gets a int parameter.
- int checkDoubleParameter (double value) const

  Checks a double parameter (nonzero code if error)
- std::string matchName () const

  Returns name which could match.
- int lengthMatchName () const

  Returns length of name for ptinting.
- int parameterOption (std::string check) const

  Returns parameter option which matches (-1 if none)
- void printOptions () const

  Prints parameter options.
- std::string currentOption () const

  Returns current parameter option.
- void setCurrentOption (int value, bool printIt=false)

  Sets current parameter option.
- const char ∗ setCurrentOptionWithMessage (int value)

  Sets current parameter option and returns printable string.
- void setCurrentOption (const std::string value)

  Sets current parameter option using string.
- int currentOptionAsInteger () const

  Returns current parameter option position.
- void setIntValue (int value)

  Sets int value.
- int **intValue** () const
- void setDoubleValue (double value)

  Sets double value.
- double **doubleValue** () const
- void setStringValue (std::string value)

  Sets string value.
- std::string **stringValue** () const
- int matches (std::string input) const

  Returns 1 if matches minimum, 2 if matches less, 0 if not matched.

- CbcOrClpParameterType type () const

  type
- int displayThis () const

  whether to display
- void setLonghelp (const std::string help)

  Set Long help.
- void printLongHelp () const

  Print Long help.
- void printString () const

  Print action and string.
- int whereUsed () const

  7 if used everywhere, 1 - used by clp 2 - used by cbc 4 - used by ampl

3.3.1 Detailed Description

Very simple class for setting parameters.

Definition at line 272 of file CbcOrClpParam.hpp.

The documentation for this class was generated from the following file:

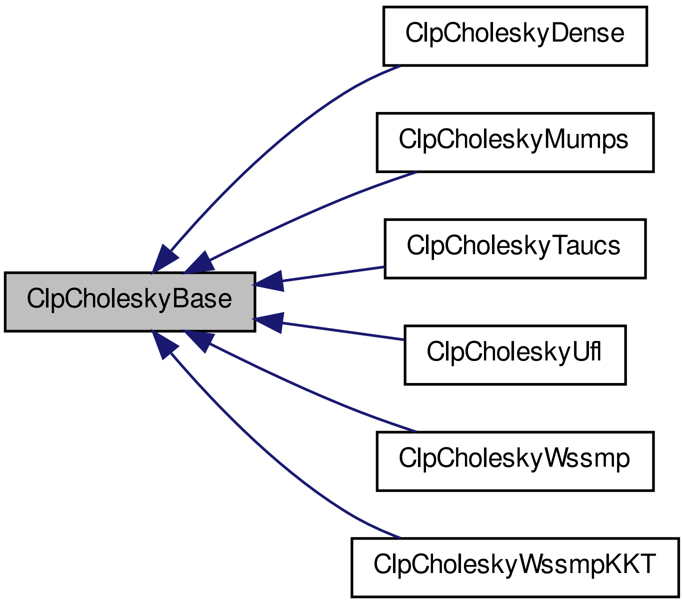
- CbcOrClpParam.hpp

3.4 ClpCholeskyBase Class Reference

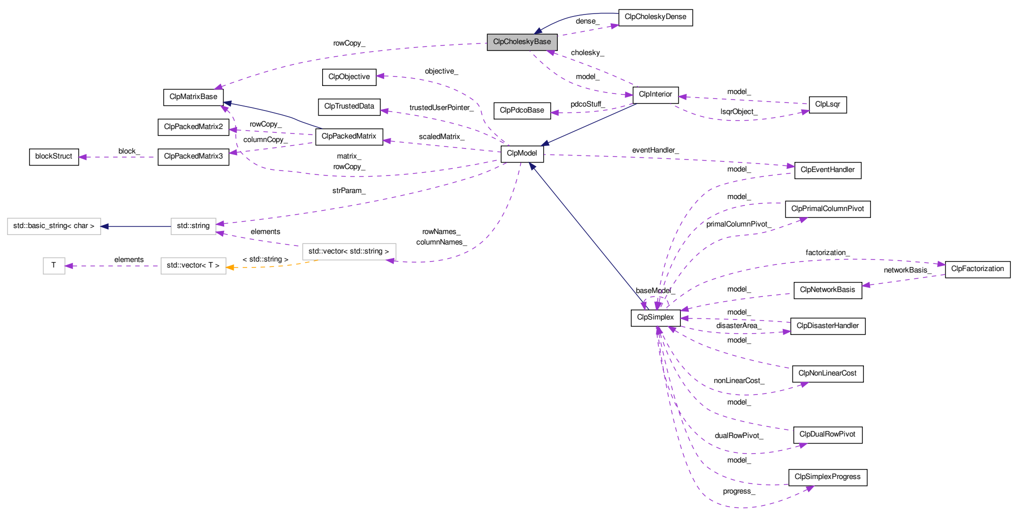
Base class for Clp Cholesky factorization Will do better factorization.

```
#include <ClpCholeskyBase.hpp>
```

Inheritance diagram for ClpCholeskyBase:



Collaboration diagram for ClpCholeskyBase:



Public Member Functions

Gets

- int status () const
  status. Returns status
- int numberRowsDropped () const
  numberRowsDropped. Number of rows gone
- void resetRowsDropped ()
  reset numberRowsDropped and rowsDropped.
- char $*$ rowsDropped () const
  rowsDropped - which rows are gone
- double choleskyCondition () const
  choleskyCondition.
- double goDense () const
  goDense i.e. use dense factoriaztion if $>$ this (default 0.7).
- void setGoDense (double value)
  goDense i.e. use dense factoriaztion if $>$ this (default 0.7).
- int rank () const
  rank. Returns rank
- int numberRows () const
  Return number of rows.
- CoinBigIndex size () const
  Return size.
- longDouble $*$ sparseFactor () const
  Return sparseFactor.
- longDouble $*$ diagonal () const
  Return diagonal.
- longDouble $*$ workDouble () const
  Return workDouble.
- bool kkt () const
  If KKT on.
- void setKKT (bool yesNo)
  Set KKT.
- void setIntegerParameter (int i, int value)
  Set integer parameter.
- int getIntegerParameter (int i)
  get integer parameter
- void setDoubleParameter (int i, double value)
  Set double parameter.
- double getDoubleParameter (int i)
  get double parameter

Constructors, destructor

- ClpCholeskyBase (int denseThreshold=-1)
  Constructor which has dense columns activated.
- virtual ∼ClpCholeskyBase ()
  Destructor (has to be public)
- ClpCholeskyBase (const ClpCholeskyBase &)
  Copy.
- ClpCholeskyBase & operator= (const ClpCholeskyBase &)
  Assignment.

Protected Member Functions

Symbolic, factor and solve

- int symbolic1 (const CoinBigIndex ∗Astart, const int ∗Arow)

  Symbolic1 - works out size without clever stuff.
- void symbolic2 (const CoinBigIndex ∗Astart, const int ∗Arow)

  Symbolic2 - Fills in indices Uses lower triangular so can do cliques etc.
- void factorizePart2 (int ∗rowsDropped)

  Factorize - filling in rowsDropped and returning number dropped in integerParam.
- void solve (CoinWorkDouble ∗region, int type)

  solve - 1 just first half, 2 just second half - 3 both.
- int preOrder (bool lowerTriangular, bool includeDiagonal, bool doKKT)

  Forms ADAT - returns nonzero if not enough memory.
- void updateDense (longDouble ∗d, int ∗first)

  Updates dense part (broken out for profiling)

Protected Attributes

Data members

The data members are protected to allow access for derived classes.

- int type_

  type (may be useful) if $>$ 20 do KKT
- bool doKKT_

  Doing full KKT (only used if default symbolic and factorization)
- double goDense_

  Go dense at this fraction.
- double choleskyCondition_

  choleskyCondition.
- ClpInterior ∗ model_

  model.
- int numberTrials_

  numberTrials. Number of trials before rejection
- int numberRows_

  numberRows. Number of Rows in factorization
- int status_

  status. Status of factorization
- char ∗ rowsDropped_

  rowsDropped
- int ∗ permuteInverse_

  permute inverse.
- int ∗ permute_

  main permute.
- int numberRowsDropped_

  numberRowsDropped. Number of rows gone
- longDouble ∗ sparseFactor_

sparseFactor.
- CoinBigIndex ∗ choleskyStart_

  choleskyStart - element starts
- int ∗ choleskyRow_

  choleskyRow (can be shorter than sparsefactor)
- CoinBigIndex ∗ indexStart_

  Index starts.
- longDouble ∗ diagonal_

  Diagonal.
- longDouble ∗ workDouble_

  double work array
- int ∗ link_

  link array
- CoinBigIndex ∗ **workInteger_**
- int ∗ **clique_**
- CoinBigIndex sizeFactor_

  sizeFactor.
- CoinBigIndex sizeIndex_

  Size of index array.
- int firstDense_

  First dense row.
- int integerParameters_ [64]

  integerParameters
- double doubleParameters_ [64]

  doubleParameters;
- ClpMatrixBase ∗ rowCopy_

  Row copy of matrix.
- char ∗ whichDense_

  Dense indicators.
- longDouble ∗ denseColumn_

  Dense columns (updated)
- ClpCholeskyDense ∗ dense_

  Dense cholesky.
- int denseThreshold_

  Dense threshold (for taking out of Cholesky)

Virtual methods that the derived classes may provide

- virtual int order (ClpInterior ∗model)

  Orders rows and saves pointer to matrix.and model.
- virtual int symbolic ()

  Does Symbolic factorization given permutation.
- virtual int factorize (const CoinWorkDouble ∗diagonal, int ∗rowsDropped)

  Factorize - filling in rowsDropped and returning number dropped.
- virtual void solve (CoinWorkDouble ∗region)

  Uses factorization to solve.
- virtual void solveKKT (CoinWorkDouble ∗region1, CoinWorkDouble ∗region2, const CoinWorkDouble ∗diagonal, CoinWorkDouble diagonalScaleFactor)

  Uses factorization to solve.

Other

Clone

- virtual ClpCholeskyBase ∗ **clone** () const
- int type () const

  Returns type.
- void setType (int type)

  Sets type.
- void setModel (ClpInterior ∗model)

  model.

3.4.1 Detailed Description

Base class for Clp Cholesky factorization Will do better factorization.

very crude ordering

Derived classes may be using more sophisticated methods

Definition at line 53 of file ClpCholeskyBase.hpp.

3.4.2 Constructor & Destructor Documentation

3.4.2.1 ClpCholeskyBase::ClpCholeskyBase (int *denseThreshold* = -1)

Constructor which has dense columns activated.

Default is off.

3.4.3 Member Function Documentation

3.4.3.1 virtual int ClpCholeskyBase::order (ClpInterior ∗ *model*) [virtual]

Orders rows and saves pointer to matrix.and model.

returns non-zero if not enough memory. You can use preOrder to set up ADAT If using default symbolic etc then must set sizeFactor_ to size of input matrix to order (and to symbolic). Also just permute_ and permuteInverse_ should be created

Reimplemented in ClpCholeskyDense, ClpCholeskyMumps, ClpCholeskyTaucs, ClpCholeskyUfl, ClpCholeskyWssmp, and ClpCholeskyWssmpKKT.

3.4.3.2 virtual int ClpCholeskyBase::symbolic ( ) [virtual]

Does Symbolic factorization given permutation.

This is called immediately after order. If user provides this then user must provide factorize and solve. Otherwise the default factorization is used returns non-zero if not enough memory

Reimplemented in ClpCholeskyDense, ClpCholeskyMumps, ClpCholeskyTaucs, ClpCholeskyUfl, ClpCholeskyWssmp, and ClpCholeskyWssmpKKT.

3.4.3.3 virtual int ClpCholeskyBase::factorize (const CoinWorkDouble * *diagonal*, int * *rowsDropped*) [virtual]

Factorize - filling in rowsDropped and returning number dropped.

If return code negative then out of memory

Reimplemented in ClpCholeskyDense.

3.4.3.4 virtual void ClpCholeskyBase::solve (CoinWorkDouble * *region*) [virtual]

Uses factorization to solve.

Reimplemented in ClpCholeskyDense.

3.4.3.5 virtual void ClpCholeskyBase::solveKKT (CoinWorkDouble * *region1*, CoinWorkDouble * *region2*, const CoinWorkDouble * *diagonal*, CoinWorkDouble *diagonalScaleFactor*) [virtual]

Uses factorization to solve.

- given as if KKT. region1 is rows+columns, region2 is rows

3.4.3.6 int ClpCholeskyBase::symbolic1 (const CoinBigIndex * *Astart*, const int * *Arow*) [protected]

Symbolic1 - works out size without clever stuff.

Uses upper triangular as much easier. Returns size

3.4.3.7 void ClpCholeskyBase::solve (CoinWorkDouble * *region*, int *type*) [protected]

solve - 1 just first half, 2 just second half - 3 both.

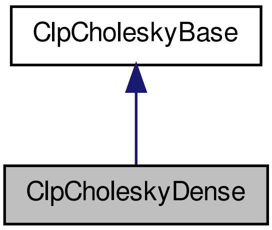
If 1 and 2 then diagonal has sqrt of inverse otherwise inverse

The documentation for this class was generated from the following file:

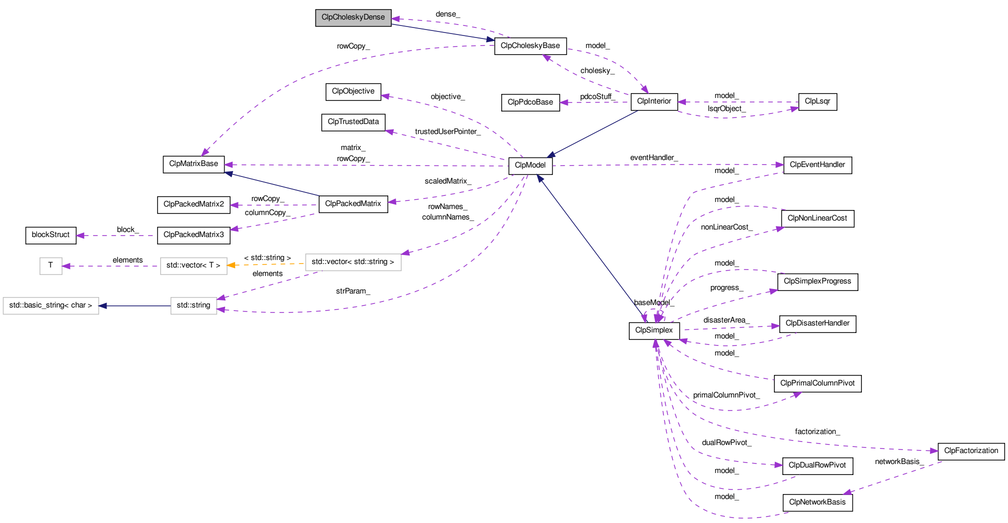
- ClpCholeskyBase.hpp

3.5 ClpCholeskyDense Class Reference

Inheritance diagram for ClpCholeskyDense:



Collaboration diagram for ClpCholeskyDense:



Public Member Functions

Virtual methods that the derived classes provides

- virtual int order (ClpInterior ∗model)

  Orders rows and saves pointer to matrix.and model.
- virtual int symbolic ()

Does Symbolic factorization given permutation.
- virtual int factorize (const CoinWorkDouble ∗diagonal, int ∗rowsDropped)

  Factorize - filling in rowsDropped and returning number dropped.
- virtual void solve (CoinWorkDouble ∗region)

  Uses factorization to solve.

Non virtual methods for ClpCholeskyDense

- int reserveSpace (const ClpCholeskyBase ∗factor, int numberRows)

  Reserves space.
- CoinBigIndex space (int numberRows) const

  Returns space needed.
- void factorizePart2 (int ∗rowsDropped)

  part 2 of Factorize - filling in rowsDropped
- void factorizePart3 (int ∗rowsDropped)

  part 2 of Factorize - filling in rowsDropped - blocked
- void solveF1 (longDouble ∗a, int n, CoinWorkDouble ∗region)

  Forward part of solve.
- void **solveF2** (longDouble ∗a, int n, CoinWorkDouble ∗region, CoinWorkDouble ∗region2)
- void solveB1 (longDouble ∗a, int n, CoinWorkDouble ∗region)

  Backward part of solve.
- void **solveB2** (longDouble ∗a, int n, CoinWorkDouble ∗region, CoinWorkDouble ∗region2)
- int **bNumber** (const longDouble ∗array, int &, int &)
- longDouble ∗ aMatrix () const

  A.
- longDouble ∗ diagonal () const

  Diagonal.

Constructors, destructor

- ClpCholeskyDense ()

  Default constructor.
- virtual ∼ClpCholeskyDense ()

  Destructor.
- ClpCholeskyDense (const ClpCholeskyDense &)

  Copy.
- ClpCholeskyDense & operator= (const ClpCholeskyDense &)

  Assignment.
- virtual ClpCholeskyBase ∗ clone () const

  Clone.

3.5.1 Detailed Description

Definition at line 14 of file ClpCholeskyDense.hpp.

3.5.2 Constructor & Destructor Documentation

3.5.2.1 ClpCholeskyDense::ClpCholeskyDense ( )

Default constructor.

3.5.3 Member Function Documentation

3.5.3.1 virtual int ClpCholeskyDense::order (ClpInterior * *model*) [virtual]

Orders rows and saves pointer to matrix.and model.

Returns non-zero if not enough memory

Reimplemented from ClpCholeskyBase.

3.5.3.2 virtual int ClpCholeskyDense::symbolic ( ) [virtual]

Does Symbolic factorization given permutation.

This is called immediately after order. If user provides this then user must provide factorize and solve. Otherwise the default factorization is used returns non-zero if not enough memory

Reimplemented from ClpCholeskyBase.

3.5.3.3 virtual int ClpCholeskyDense::factorize (const CoinWorkDouble * *diagonal*, int * *rowsDropped*) [virtual]

Factorize - filling in rowsDropped and returning number dropped.

If return code negative then out of memory

Reimplemented from ClpCholeskyBase.

3.5.3.4 virtual void ClpCholeskyDense::solve (CoinWorkDouble * *region*) [virtual]

Uses factorization to solve.

Reimplemented from ClpCholeskyBase.

3.5.3.5 int ClpCholeskyDense::reserveSpace (const ClpCholeskyBase * *factor*, int *numberRows*)

Reserves space.

If factor not NULL then just uses passed space Returns non-zero if not enough memory

The documentation for this class was generated from the following file:

- ClpCholeskyDense.hpp

3.6 ClpCholeskyDenseC Struct Reference

3.6.1 Detailed Description

Definition at line 88 of file ClpCholeskyDense.hpp.

The documentation for this struct was generated from the following file:

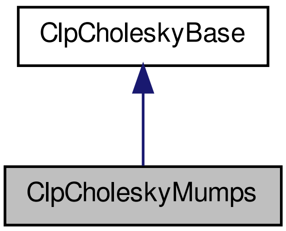
- ClpCholeskyDense.hpp

3.7 ClpCholeskyMumps Class Reference

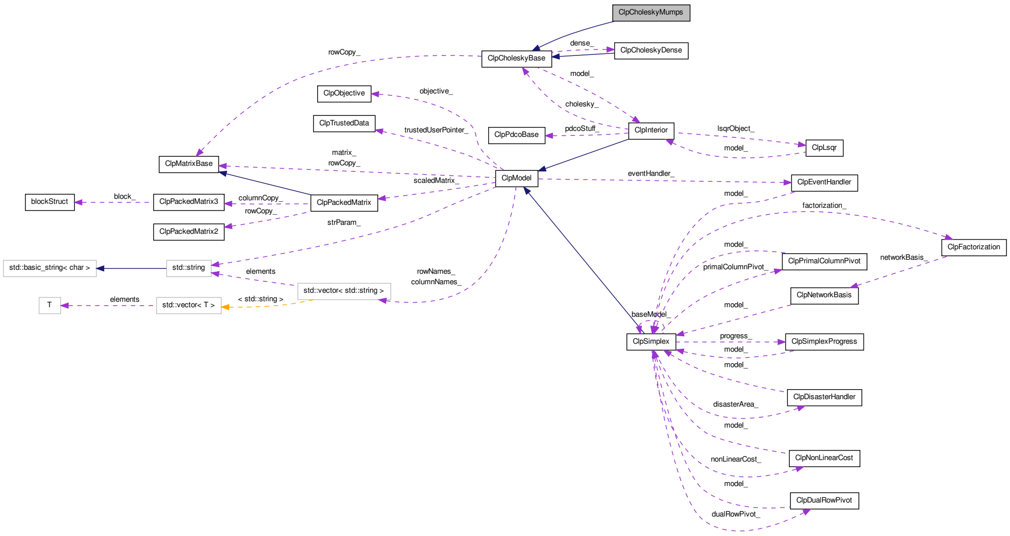
Mumps class for Clp Cholesky factorization.

`#include <ClpCholeskyMumps.hpp>`

Inheritance diagram for ClpCholeskyMumps:



Collaboration diagram for ClpCholeskyMumps:



Public Member Functions

Virtual methods that the derived classes provides

- virtual int order (ClpInterior ∗model)

  Orders rows and saves pointer to matrix.and model.
- virtual int symbolic ()

  Does Symbolic factorization given permutation.
- virtual int factorize (const double ∗diagonal, int ∗rowsDropped)

  Factorize - filling in rowsDropped and returning number dropped.
- virtual void solve (double ∗region)

  Uses factorization to solve.

Constructors, destructor

- ClpCholeskyMumps (int denseThreshold=-1)

  Constructor which has dense columns activated.
- virtual ∼ClpCholeskyMumps ()

  Destructor.
- virtual ClpCholeskyBase ∗ clone () const

  Clone.

3.7.1 Detailed Description

Mumps class for Clp Cholesky factorization.

Definition at line 21 of file ClpCholeskyMumps.hpp.

3.7.2 Constructor & Destructor Documentation

3.7.2.1 ClpCholeskyMumps::ClpCholeskyMumps (int *denseThreshold* = `-1`)

Constructor which has dense columns activated.

Default is off.

3.7.3 Member Function Documentation

3.7.3.1 virtual int ClpCholeskyMumps::order (ClpInterior * *model*) `[virtual]`

Orders rows and saves pointer to matrix.and model.

Returns non-zero if not enough memory

Reimplemented from ClpCholeskyBase.

3.7.3.2 virtual int ClpCholeskyMumps::symbolic ( ) `[virtual]`

Does Symbolic factorization given permutation.

This is called immediately after order. If user provides this then user must provide factorize and solve. Otherwise the default factorization is used returns non-zero if not enough memory

Reimplemented from ClpCholeskyBase.

3.7.3.3 virtual int ClpCholeskyMumps::factorize (const double * *diagonal*, int * *rowsDropped*) `[virtual]`

Factorize - filling in rowsDropped and returning number dropped.

If return code negative then out of memory

3.7.3.4 virtual void ClpCholeskyMumps::solve (double * *region*) `[virtual]`

Uses factorization to solve.

The documentation for this class was generated from the following file:

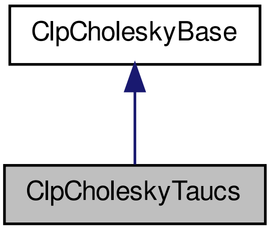
- ClpCholeskyMumps.hpp

3.8 ClpCholeskyTaucs Class Reference

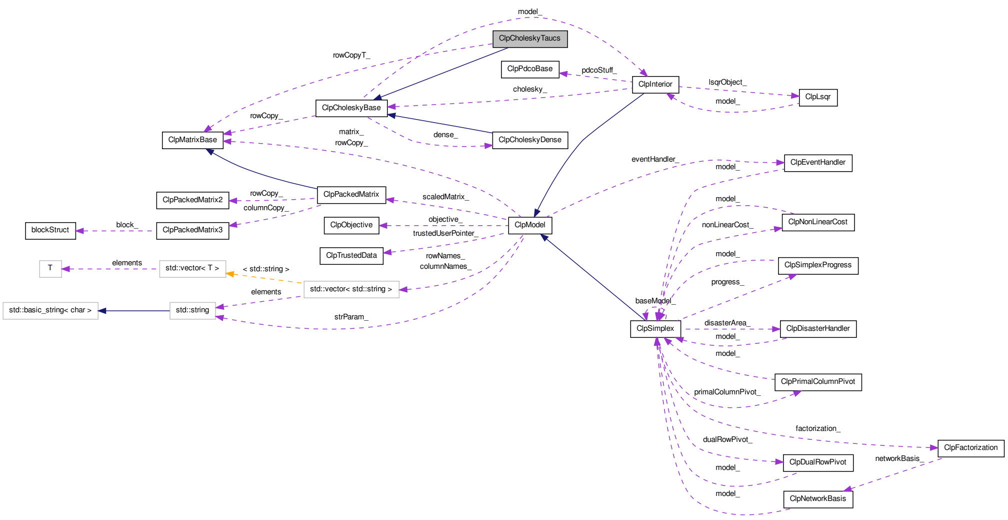
Taucs class for Clp Cholesky factorization.

```
#include <ClpCholeskyTaucs.hpp>
```

Inheritance diagram for ClpCholeskyTaucs:



Collaboration diagram for ClpCholeskyTaucs:



Public Member Functions

Virtual methods that the derived classes provides

- virtual int order (ClpInterior ∗model)

  Orders rows and saves pointer to matrix.and model.
- virtual int symbolic ()

  Dummy.
- virtual int factorize (const double ∗diagonal, int ∗rowsDropped)

Factorize - filling in rowsDropped and returning number dropped.
- virtual void solve (double *region)

  Uses factorization to solve.

Constructors, destructor

- ClpCholeskyTaucs ()

  Default constructor.
- virtual ~ClpCholeskyTaucs ()

  Destructor.
- **ClpCholeskyTaucs** (const ClpCholeskyTaucs &)
- ClpCholeskyTaucs & **operator=** (const ClpCholeskyTaucs &)
- virtual ClpCholeskyBase * clone () const

  Clone.

3.8.1 Detailed Description

Taucs class for Clp Cholesky factorization.

If you wish to use Sivan Toledo's TAUCS code see

http://www.tau.ac.il/~stoledo/taucs/

for terms of use

The taucs.h file was modified to put

#ifdef __cplusplus extern "C"{ #endif after line 440 (#endif) and #ifdef __cplusplus } #endif at end

I also modified LAPACK dpotf2.f (two places) to change the GO TO 30 on AJJ.Lt.0.0

to

IF(AJJ.LE.1.0e-20) THEN AJJ = 1.0e100; ELSE AJJ = SQRT(AJJ) END IF

Definition at line 43 of file ClpCholeskyTaucs.hpp.

3.8.2 Constructor & Destructor Documentation

3.8.2.1 ClpCholeskyTaucs::ClpCholeskyTaucs ( )

Default constructor.

3.8.3 Member Function Documentation

3.8.3.1 virtual int ClpCholeskyTaucs::order (ClpInterior * *model*) [virtual]

Orders rows and saves pointer to matrix.and model.

Returns non-zero if not enough memory

Reimplemented from ClpCholeskyBase.

3.8.3.2 virtual int ClpCholeskyTaucs::factorize (const double * *diagonal*, int * *rowsDropped*) [virtual]

Factorize - filling in rowsDropped and returning number dropped.

If return code negative then out of memory

3.8.3.3 virtual void ClpCholeskyTaucs::solve (double * *region*) [virtual]

Uses factorization to solve.

The documentation for this class was generated from the following file:

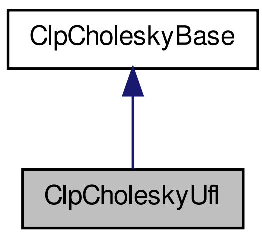
- ClpCholeskyTaucs.hpp

3.9 ClpCholeskyUfl Class Reference

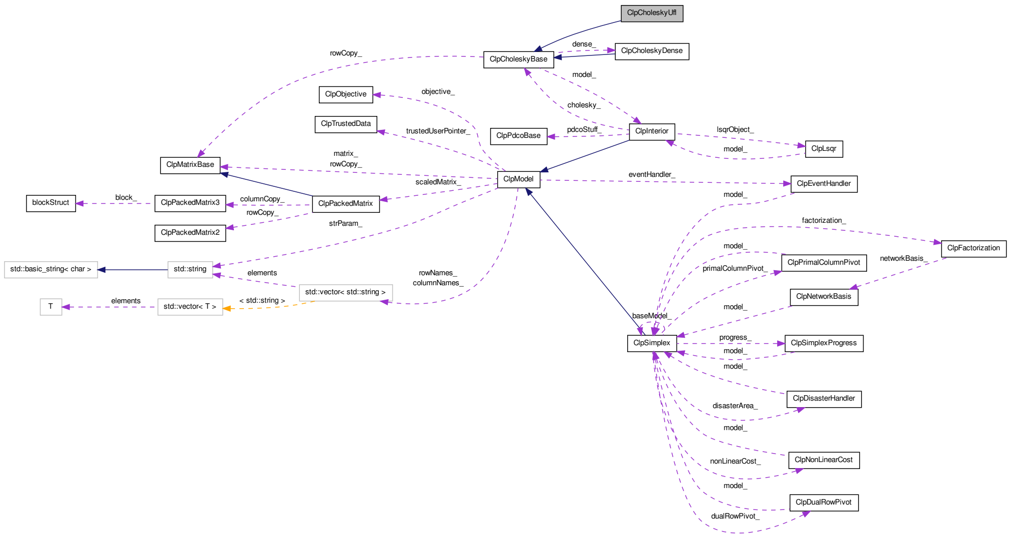
Ufl class for Clp Cholesky factorization.

`#include <ClpCholeskyUfl.hpp>`

Inheritance diagram for ClpCholeskyUfl:



Collaboration diagram for ClpCholeskyUfl:



Public Member Functions

Virtual methods that the derived classes provides

- virtual int order (ClpInterior ∗model)

  Orders rows and saves pointer to matrix.and model.
- virtual int symbolic ()

  Does Symbolic factorization given permutation using CHOLMOD (if available).
- virtual int factorize (const double ∗diagonal, int ∗rowsDropped)

  Factorize - filling in rowsDropped and returning number dropped using CHOLMOD (if available).
- virtual void solve (double ∗region)

  Uses factorization to solve.

Constructors, destructor

- ClpCholeskyUfl (int denseThreshold=-1)

  Constructor which has dense columns activated.
- virtual ∼ClpCholeskyUfl ()

  Destructor.
- virtual ClpCholeskyBase ∗ clone () const

  Clone.

3.9.1 Detailed Description

Ufl class for Clp Cholesky factorization.

If you wish to use AMD code from University of Florida see

http://www.cise.ufl.edu/research/sparse/amd

for terms of use

If you wish to use CHOLMOD code from University of Florida see

http://www.cise.ufl.edu/research/sparse/cholmod

for terms of use

Definition at line 32 of file ClpCholeskyUfl.hpp.

3.9.2 Constructor & Destructor Documentation

3.9.2.1 ClpCholeskyUfl::ClpCholeskyUfl (int *denseThreshold* = `-1`)

Constructor which has dense columns activated.

Default is off.

3.9.3 Member Function Documentation

3.9.3.1 virtual int ClpCholeskyUfl::order (ClpInterior * *model*) `[virtual]`

Orders rows and saves pointer to matrix.and model.

Returns non-zero if not enough memory

Reimplemented from ClpCholeskyBase.

3.9.3.2 virtual int ClpCholeskyUfl::symbolic ( ) `[virtual]`

Does Symbolic factorization given permutation using CHOLMOD (if available).

This is called immediately after order. If user provides this then user must provide factorize and solve. Otherwise the default factorization is used returns non-zero if not enough memory.

Reimplemented from ClpCholeskyBase.

3.9.3.3 virtual int ClpCholeskyUfl::factorize (const double * *diagonal*, int * *rowsDropped*) `[virtual]`

Factorize - filling in rowsDropped and returning number dropped using CHOLMOD (if available).

If return code negative then out of memory

3.9.3.4 virtual void ClpCholeskyUfl::solve (double * *region*) `[virtual]`

Uses factorization to solve.

Uses CHOLMOD (if available).

The documentation for this class was generated from the following file:

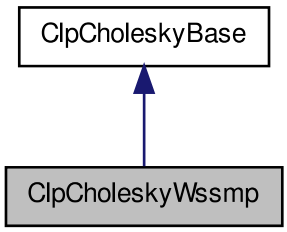
- ClpCholeskyUfl.hpp

3.10 ClpCholeskyWssmp Class Reference

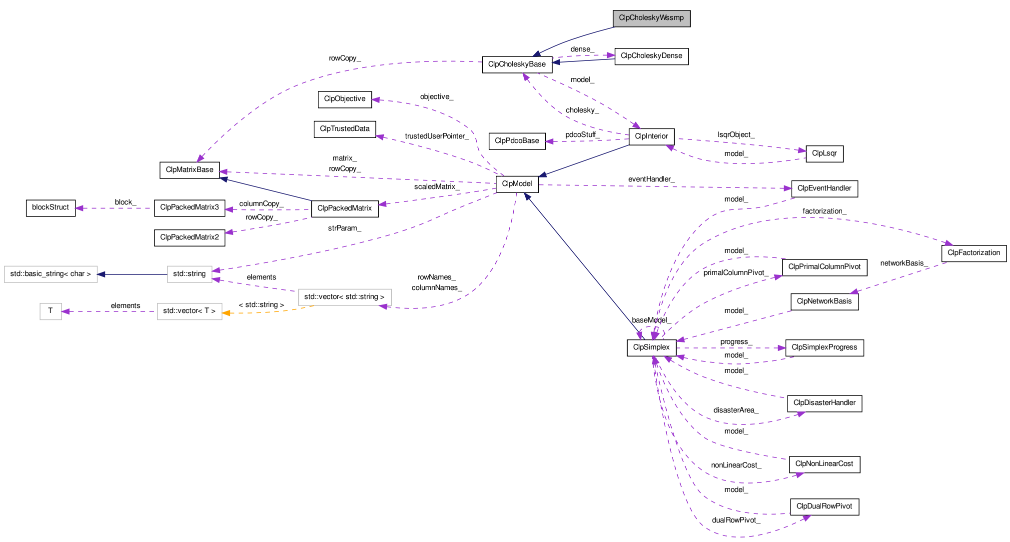
Wssmp class for Clp Cholesky factorization.

`#include <ClpCholeskyWssmp.hpp>`

Inheritance diagram for ClpCholeskyWssmp:



Collaboration diagram for ClpCholeskyWssmp:



Public Member Functions

Virtual methods that the derived classes provides

- virtual int order (ClpInterior ∗model)

  Orders rows and saves pointer to matrix.and model.
- virtual int symbolic ()

  Does Symbolic factorization given permutation.
- virtual int factorize (const double ∗diagonal, int ∗rowsDropped)

  Factorize - filling in rowsDropped and returning number dropped.
- virtual void solve (double ∗region)

  Uses factorization to solve.

Constructors, destructor

- ClpCholeskyWssmp (int denseThreshold=-1)

  Constructor which has dense columns activated.
- virtual ~ClpCholeskyWssmp ()

  Destructor.
- **ClpCholeskyWssmp** (const ClpCholeskyWssmp &)
- ClpCholeskyWssmp & **operator=** (const ClpCholeskyWssmp &)
- virtual ClpCholeskyBase ∗ clone () const

  Clone.

3.10.1 Detailed Description

Wssmp class for Clp Cholesky factorization.

Definition at line 17 of file ClpCholeskyWssmp.hpp.

3.10.2 Constructor & Destructor Documentation

3.10.2.1 ClpCholeskyWssmp::ClpCholeskyWssmp (int *denseThreshold* = -1)

Constructor which has dense columns activated.

Default is off.

3.10.3 Member Function Documentation

3.10.3.1 virtual int ClpCholeskyWssmp::order (ClpInterior ∗ *model*) [virtual]

Orders rows and saves pointer to matrix.and model.

Returns non-zero if not enough memory

Reimplemented from ClpCholeskyBase.

3.10.3.2 virtual int ClpCholeskyWssmp::symbolic ( ) [virtual]

Does Symbolic factorization given permutation.

This is called immediately after order. If user provides this then user must provide factorize and solve. Otherwise the default factorization is used returns non-zero if not enough memory

Reimplemented from ClpCholeskyBase.

3.10.3.3 virtual int ClpCholeskyWssmp::factorize (const double ∗ *diagonal,* int ∗ *rowsDropped*) [virtual]

Factorize - filling in rowsDropped and returning number dropped.

If return code negative then out of memory

3.10.3.4 virtual void ClpCholeskyWssmp::solve (double ∗ *region*) [virtual]

Uses factorization to solve.

The documentation for this class was generated from the following file:

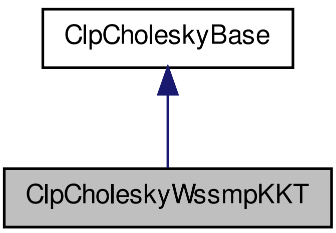
- ClpCholeskyWssmp.hpp

3.11 ClpCholeskyWssmpKKT Class Reference

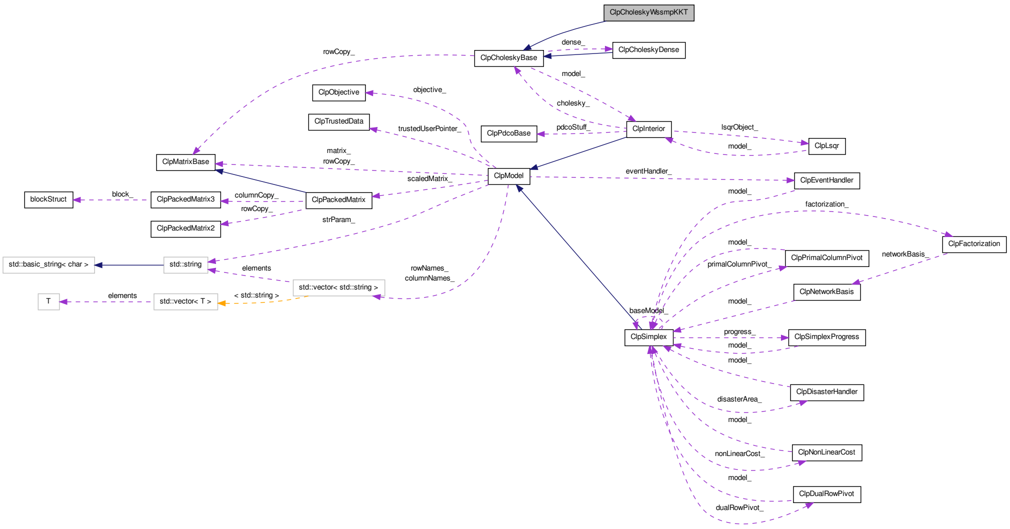
WssmpKKT class for Clp Cholesky factorization.

`#include <ClpCholeskyWssmpKKT.hpp>`

Inheritance diagram for ClpCholeskyWssmpKKT:



Collaboration diagram for ClpCholeskyWssmpKKT:



Public Member Functions

Virtual methods that the derived classes provides

- virtual int order (ClpInterior ∗model)

  Orders rows and saves pointer to matrix.and model.
- virtual int symbolic ()

  Does Symbolic factorization given permutation.
- virtual int factorize (const double ∗diagonal, int ∗rowsDropped)

  Factorize - filling in rowsDropped and returning number dropped.
- virtual void solve (double ∗region)

  Uses factorization to solve.
- virtual void solveKKT (double ∗region1, double ∗region2, const double ∗diagonal, double diagonalScaleFactor)

  Uses factorization to solve.

Constructors, destructor

- ClpCholeskyWssmpKKT (int denseThreshold=-1)

  Constructor which has dense columns activated.
- virtual ∼ClpCholeskyWssmpKKT ()

  Destructor.
- **ClpCholeskyWssmpKKT** (const ClpCholeskyWssmpKKT &)
- ClpCholeskyWssmpKKT & **operator=** (const ClpCholeskyWssmpKKT &)
- virtual ClpCholeskyBase ∗ clone () const

  Clone.

3.11.1 Detailed Description

WssmpKKT class for Clp Cholesky factorization.

Definition at line 17 of file ClpCholeskyWssmpKKT.hpp.

3.11.2 Constructor & Destructor Documentation

3.11.2.1 ClpCholeskyWssmpKKT::ClpCholeskyWssmpKKT (int *denseThreshold* = `-1`)

Constructor which has dense columns activated.

Default is off.

3.11.3 Member Function Documentation

3.11.3.1 virtual int ClpCholeskyWssmpKKT::order (ClpInterior * *model*) `[virtual]`

Orders rows and saves pointer to matrix.and model.

Returns non-zero if not enough memory

Reimplemented from ClpCholeskyBase.

3.11.3.2 virtual int ClpCholeskyWssmpKKT::symbolic ( ) `[virtual]`

Does Symbolic factorization given permutation.

This is called immediately after order. If user provides this then user must provide factorize and solve. Otherwise the default factorization is used returns non-zero if not enough memory

Reimplemented from ClpCholeskyBase.

3.11.3.3 virtual int ClpCholeskyWssmpKKT::factorize (const double * *diagonal,* int * *rowsDropped*) `[virtual]`

Factorize - filling in rowsDropped and returning number dropped.

If return code negative then out of memory

3.11.3.4 virtual void ClpCholeskyWssmpKKT::solve (double * *region*) `[virtual]`

Uses factorization to solve.

3.11.3.5 virtual void ClpCholeskyWssmpKKT::solveKKT (double * *region1,* double * *region2,* const double * *diagonal,* double *diagonalScaleFactor*) `[virtual]`

Uses factorization to solve.

- given as if KKT. region1 is rows+columns, region2 is rows

The documentation for this class was generated from the following file:

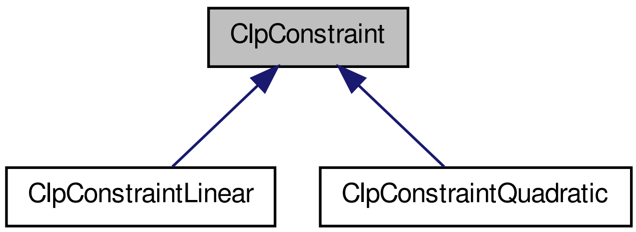
- ClpCholeskyWssmpKKT.hpp

3.12 ClpConstraint Class Reference

Constraint Abstract Base Class.

`#include <ClpConstraint.hpp>`

Inheritance diagram for ClpConstraint:



Public Member Functions

Stuff

- virtual int gradient (const ClpSimplex ∗model, const double ∗solution, double ∗gradient, double &functionValue, double &offset, bool useScaling=false, bool refresh=true) const =0

  Fills gradient.
- virtual double functionValue (const ClpSimplex ∗model, const double ∗solution, bool useScaling=false, bool refresh=true) const

  Constraint function value.
- virtual void resize (int newNumberColumns)=0

  Resize constraint.
- virtual void deleteSome (int numberToDelete, const int ∗which)=0

  Delete columns in constraint.
- virtual void reallyScale (const double ∗columnScale)=0

  Scale constraint.
- virtual int markNonlinear (char ∗which) const =0

  Given a zeroed array sets nonlinear columns to 1.
- virtual int markNonzero (char ∗which) const =0

  Given a zeroed array sets possible nonzero coefficients to 1.

Constructors and destructors

- ClpConstraint ()
  Default Constructor.
- ClpConstraint (const ClpConstraint &)
  Copy constructor.
- ClpConstraint & operator= (const ClpConstraint &rhs)
  Assignment operator.
- virtual ∼ClpConstraint ()
  Destructor.
- virtual ClpConstraint ∗ clone () const =0
  Clone.

Other

- int type ()
  Returns type, 0 linear, 1 nonlinear.
- int rowNumber () const
  Row number (-1 is objective)
- virtual int numberCoefficients () const =0
  Number of possible coefficients in gradient.
- double functionValue () const
  Stored constraint function value.
- double offset () const
  Constraint offset.
- virtual void newXValues ()
  Say we have new primal solution - so may need to recompute.

Protected Attributes

Protected member data

- double ∗ lastGradient_
  Gradient at last evaluation.
- double functionValue_
  Value of non-linear part of constraint.
- double offset_
  Value of offset for constraint.
- int type_
  Type of constraint - linear is 1.
- int rowNumber_
  Row number (-1 is objective)

3.12.1 Detailed Description

Constraint Abstract Base Class.

Abstract Base Class for describing a constraint or objective function

Definition at line 19 of file ClpConstraint.hpp.

3.12.2 Member Function Documentation

3.12.2.1 virtual int ClpConstraint::gradient (const ClpSimplex * *model*, const double * *solution*, double * *gradient*, double & *functionValue*, double & *offset*, bool *useScaling* = false, bool *refresh* = true) const [pure virtual]

Fills gradient.

If Linear then solution may be NULL, also returns true value of function and offset so we can use x not deltaX in constraint If refresh is false then uses last solution Uses model for scaling Returns non-zero if gradient undefined at current solution

Implemented in ClpConstraintLinear, and ClpConstraintQuadratic.

3.12.2.2 virtual int ClpConstraint::markNonlinear (char * *which*) const [pure virtual]

Given a zeroed array sets nonlinear columns to 1.

Returns number of nonlinear columns

Implemented in ClpConstraintLinear, and ClpConstraintQuadratic.

3.12.2.3 virtual int ClpConstraint::markNonzero (char * *which*) const [pure virtual]

Given a zeroed array sets possible nonzero coefficients to 1.

Returns number of nonzeros

Implemented in ClpConstraintLinear, and ClpConstraintQuadratic.

The documentation for this class was generated from the following file:

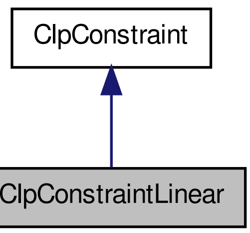
- ClpConstraint.hpp

3.13 ClpConstraintLinear Class Reference

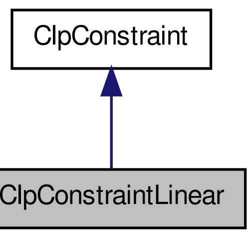
Linear Constraint Class.

```
#include <ClpConstraintLinear.hpp>
```

Inheritance diagram for ClpConstraintLinear:



Collaboration diagram for ClpConstraintLinear:



Public Member Functions

Stuff

- virtual int gradient (const ClpSimplex ∗model, const double ∗solution, double ∗gradient, double &functionValue, double &offset, bool useScaling=false, bool refresh=true) const

  Fills gradient.
- virtual void resize (int newNumberColumns)

  Resize constraint.
- virtual void deleteSome (int numberToDelete, const int ∗which)

  Delete columns in constraint.
- virtual void reallyScale (const double ∗columnScale)

Scale constraint.
- virtual int markNonlinear (char ∗which) const
  Given a zeroed array sets nonlinear columns to 1.
- virtual int markNonzero (char ∗which) const
  Given a zeroed array sets possible nonzero coefficients to 1.

Constructors and destructors

- ClpConstraintLinear ()
  Default Constructor.
- ClpConstraintLinear (int row, int numberCoefficients, int numberColumns, const int ∗column, const double ∗element)
  Constructor from constraint.
- ClpConstraintLinear (const ClpConstraintLinear &rhs)
  Copy constructor .
- ClpConstraintLinear & operator= (const ClpConstraintLinear &rhs)
  Assignment operator.
- virtual ∼ClpConstraintLinear ()
  Destructor.
- virtual ClpConstraint ∗ clone () const
  Clone.

Gets and sets

- virtual int numberCoefficients () const
  Number of coefficients.
- int numberColumns () const
  Number of columns in linear constraint.
- const int ∗ column () const
  Columns.
- const double ∗ coefficient () const
  Coefficients.

3.13.1 Detailed Description

Linear Constraint Class.

Definition at line 17 of file ClpConstraintLinear.hpp.

3.13.2 Member Function Documentation

3.13.2.1 virtual int ClpConstraintLinear::gradient (const ClpSimplex ∗ *model*, const double ∗ *solution*, double ∗ *gradient*, double & *functionValue*, double & *offset*, bool *useScaling* = `false`, bool *refresh* = `true`) const [virtual]

Fills gradient.

If Linear then solution may be NULL, also returns true value of function and offset so we can use x not deltaX in constraint If refresh is false then uses last solution Uses model for scaling Returns non-zero if gradient udefined at current solution

Implements ClpConstraint.

3.13.2.2 virtual int ClpConstraintLinear::markNonlinear (char * *which*) const [virtual]

Given a zeroed array sets nonlinear columns to 1.

Returns number of nonlinear columns

Implements ClpConstraint.

3.13.2.3 virtual int ClpConstraintLinear::markNonzero (char * *which*) const [virtual]

Given a zeroed array sets possible nonzero coefficients to 1.

Returns number of nonzeros

Implements ClpConstraint.

The documentation for this class was generated from the following file:

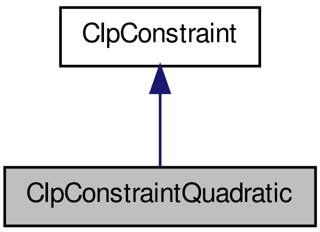
- ClpConstraintLinear.hpp

3.14 ClpConstraintQuadratic Class Reference

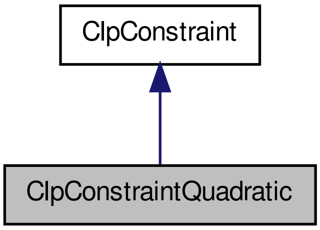
Quadratic Constraint Class.

`#include <ClpConstraintQuadratic.hpp>`

Inheritance diagram for ClpConstraintQuadratic:



Collaboration diagram for ClpConstraintQuadratic:



Public Member Functions

Stuff

- virtual int gradient (const ClpSimplex ∗model, const double ∗solution, double ∗gradient, double &functionValue, double &offset, bool useScaling=false, bool refresh=true) const
  Fills gradient.
- virtual void resize (int newNumberColumns)
  Resize constraint.
- virtual void deleteSome (int numberToDelete, const int ∗which)
  Delete columns in constraint.
- virtual void reallyScale (const double ∗columnScale)
  Scale constraint.
- virtual int markNonlinear (char ∗which) const
  Given a zeroed array sets nonquadratic columns to 1.
- virtual int markNonzero (char ∗which) const
  Given a zeroed array sets possible nonzero coefficients to 1.

Constructors and destructors

- ClpConstraintQuadratic ()
  Default Constructor.
- ClpConstraintQuadratic (int row, int numberQuadraticColumns, int numberColumns, const CoinBigIndex ∗start, const int ∗column, const double ∗element)
  Constructor from quadratic.
- ClpConstraintQuadratic (const ClpConstraintQuadratic &rhs)
  Copy constructor .
- ClpConstraintQuadratic & operator= (const ClpConstraintQuadratic &rhs)
  Assignment operator.

- virtual ~ClpConstraintQuadratic ()

  Destructor.
- virtual ClpConstraint * clone () const

  Clone.

Gets and sets

- virtual int numberCoefficients () const

  Number of coefficients.
- int numberColumns () const

  Number of columns in constraint.
- CoinBigIndex * start () const

  Column starts.
- const int * column () const

  Columns.
- const double * coefficient () const

  Coefficients.

3.14.1 Detailed Description

Quadratic Constraint Class.

Definition at line 17 of file ClpConstraintQuadratic.hpp.

3.14.2 Member Function Documentation

3.14.2.1 virtual int ClpConstraintQuadratic::gradient (const ClpSimplex * *model*, const double * *solution*, double * *gradient*, double & *functionValue*, double & *offset*, bool *useScaling* = `false`, bool *refresh* = `true`) const [virtual]

Fills gradient.

If Quadratic then solution may be NULL, also returns true value of function and offset so we can use x not deltaX in constraint If refresh is false then uses last solution Uses model for scaling Returns non-zero if gradient udefined at current solution

Implements ClpConstraint.

3.14.2.2 virtual int ClpConstraintQuadratic::markNonlinear (char * *which*) const [virtual]

Given a zeroed array sets nonquadratic columns to 1.

Returns number of nonquadratic columns

Implements ClpConstraint.

3.14.2.3 virtual int ClpConstraintQuadratic::markNonzero (char * *which*) const [virtual]

Given a zeroed array sets possible nonzero coefficients to 1.

Returns number of nonzeros

Implements ClpConstraint.

The documentation for this class was generated from the following file:

- ClpConstraintQuadratic.hpp

3.15 ClpDataSave Class Reference

This is a tiny class where data can be saved round calls.

`#include <ClpModel.hpp>`

Public Member Functions

Constructors and destructor

- ClpDataSave ()
  Default constructor.
- ClpDataSave (const ClpDataSave &)
  Copy constructor.
- ClpDataSave & operator= (const ClpDataSave &rhs)
  Assignment operator. This copies the data.
- ~ClpDataSave ()
  Destructor.

Public Attributes

data - with same names as in other classes

- double **dualBound_**
- double **infeasibilityCost_**
- double **pivotTolerance_**
- double **zeroFactorizationTolerance_**
- double **zeroSimplexTolerance_**
- double **acceptablePivot_**
- double **objectiveScale_**
- int **sparseThreshold_**
- int **perturbation_**
- int **forceFactorization_**
- int **scalingFlag_**
- unsigned int **specialOptions_**

3.15.1 Detailed Description

This is a tiny class where data can be saved round calls.

Definition at line 1229 of file ClpModel.hpp.

The documentation for this class was generated from the following file:

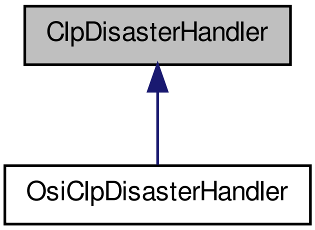
- ClpModel.hpp

3.16 ClpDisasterHandler Class Reference

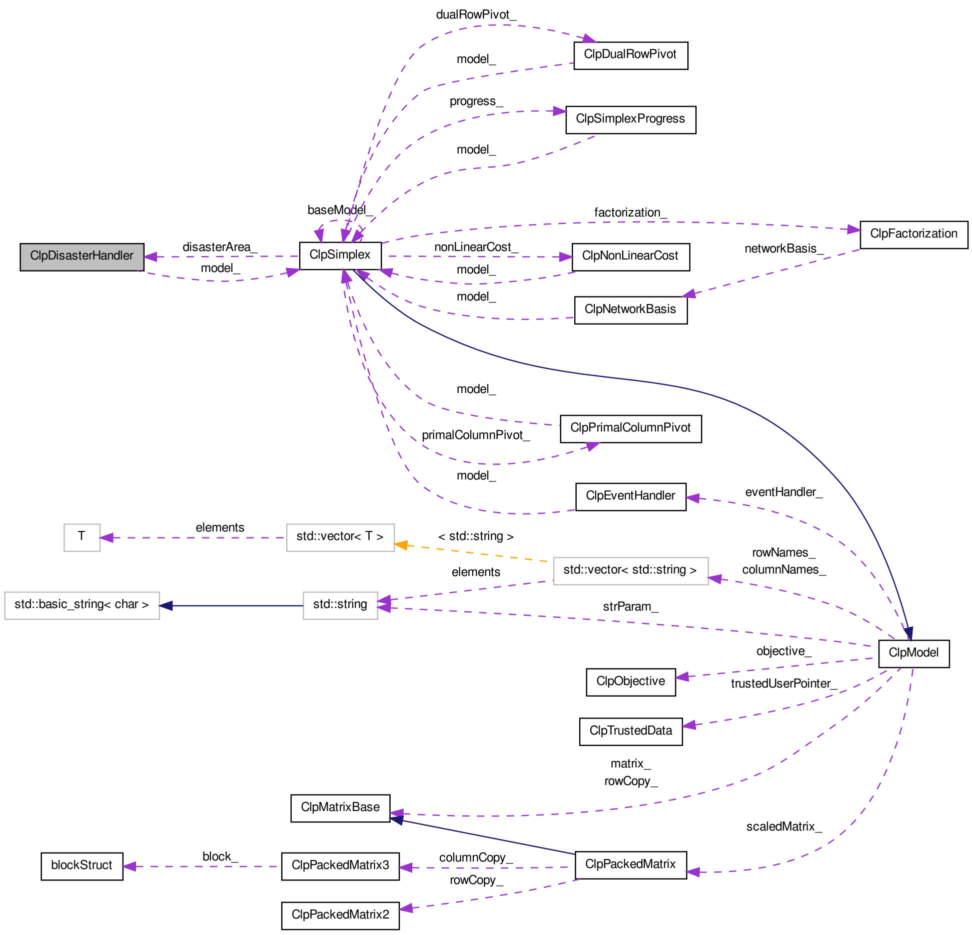
Base class for Clp disaster handling.

`#include <ClpEventHandler.hpp>`

Inheritance diagram for ClpDisasterHandler:



Collaboration diagram for ClpDisasterHandler:



Public Member Functions

Virtual methods that the derived classe should provide.

- virtual void intoSimplex ()=0

  Into simplex.
- virtual bool check () const =0

  Checks if disaster.
- virtual void saveInfo ()=0

  saves information for next attempt
- virtual int typeOfDisaster ()

  Type of disaster 0 can fix, 1 abort.

Constructors, destructor

- ClpDisasterHandler (ClpSimplex ∗model=NULL)
  Default constructor.
- virtual ∼ClpDisasterHandler ()
  Destructor.
- **ClpDisasterHandler** (const ClpDisasterHandler &)
- ClpDisasterHandler & **operator=** (const ClpDisasterHandler &)
- virtual ClpDisasterHandler ∗ clone () const =0
  Clone.

Sets/gets

- void setSimplex (ClpSimplex ∗model)
  set model.
- ClpSimplex ∗ simplex () const
  Get model.

Protected Attributes

Data members

The data members are protected to allow access for derived classes.

- ClpSimplex ∗ model_
  Pointer to simplex.

3.16.1 Detailed Description

Base class for Clp disaster handling.

This is here to allow for disaster handling. By disaster I mean that Clp would otherwise give up

Definition at line 108 of file ClpEventHandler.hpp.

3.16.2 Constructor & Destructor Documentation

3.16.2.1 ClpDisasterHandler::ClpDisasterHandler (ClpSimplex ∗ *model* = `NULL`)

Default constructor.

3.16.3 Member Function Documentation

3.16.3.1 void ClpDisasterHandler::setSimplex (ClpSimplex ∗ *model*)

set model.

The documentation for this class was generated from the following file:

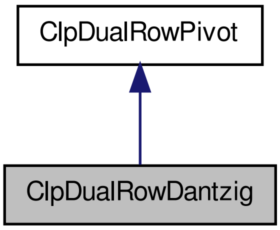
- ClpEventHandler.hpp

3.17 ClpDualRowDantzig Class Reference

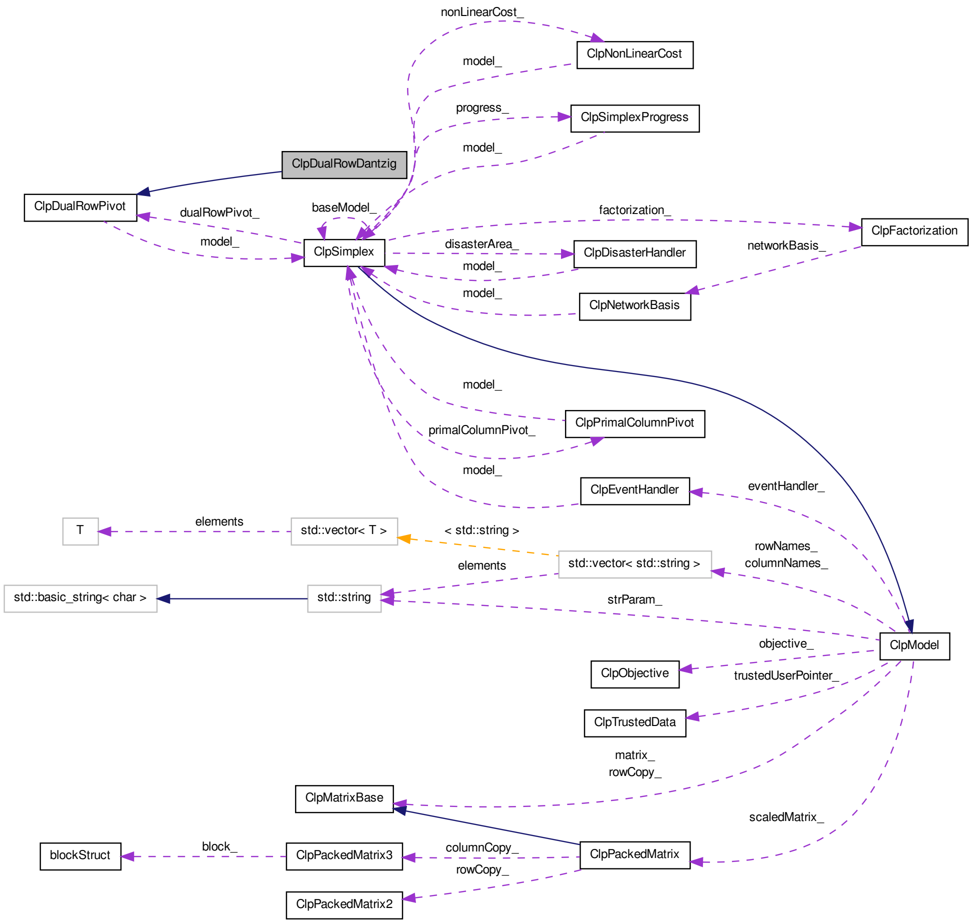
Dual Row Pivot Dantzig Algorithm Class.

`#include <ClpDualRowDantzig.hpp>`

Inheritance diagram for ClpDualRowDantzig:



Collaboration diagram for ClpDualRowDantzig:



Public Member Functions

Algorithmic methods

- virtual int pivotRow ()

  Returns pivot row, -1 if none.
- virtual double updateWeights (CoinIndexedVector ∗input, CoinIndexedVector ∗spare, CoinIndexedVector ∗spare2, CoinIndexedVector ∗updatedColumn)

  Updates weights and returns pivot alpha.
- virtual void updatePrimalSolution (CoinIndexedVector ∗input, double theta, double &changeInObjective)

  Updates primal solution (and maybe list of candidates) Uses input vector which it deletes Computes change in objective function.

Constructors and destructors

- ClpDualRowDantzig ()
  Default Constructor.
- ClpDualRowDantzig (const ClpDualRowDantzig &)
  Copy constructor.
- ClpDualRowDantzig & operator= (const ClpDualRowDantzig &rhs)
  Assignment operator.
- virtual ∼ClpDualRowDantzig ()
  Destructor.
- virtual ClpDualRowPivot ∗ clone (bool copyData=true) const
  Clone.

3.17.1 Detailed Description

Dual Row Pivot Dantzig Algorithm Class.

This is simplest choice - choose largest infeasibility

Definition at line 19 of file ClpDualRowDantzig.hpp.

3.17.2 Member Function Documentation

3.17.2.1 virtual double ClpDualRowDantzig::updateWeights (CoinIndexedVector ∗ *input*, CoinIndexedVector ∗ *spare*, CoinIndexedVector ∗ *spare2*, CoinIndexedVector ∗ *updatedColumn*) `[virtual]`

Updates weights and returns pivot alpha.

Also does FT update

Implements ClpDualRowPivot.

The documentation for this class was generated from the following file:

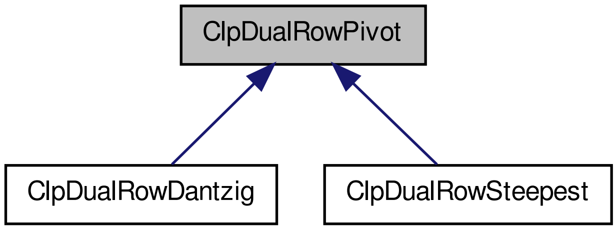
- ClpDualRowDantzig.hpp

3.18 ClpDualRowPivot Class Reference

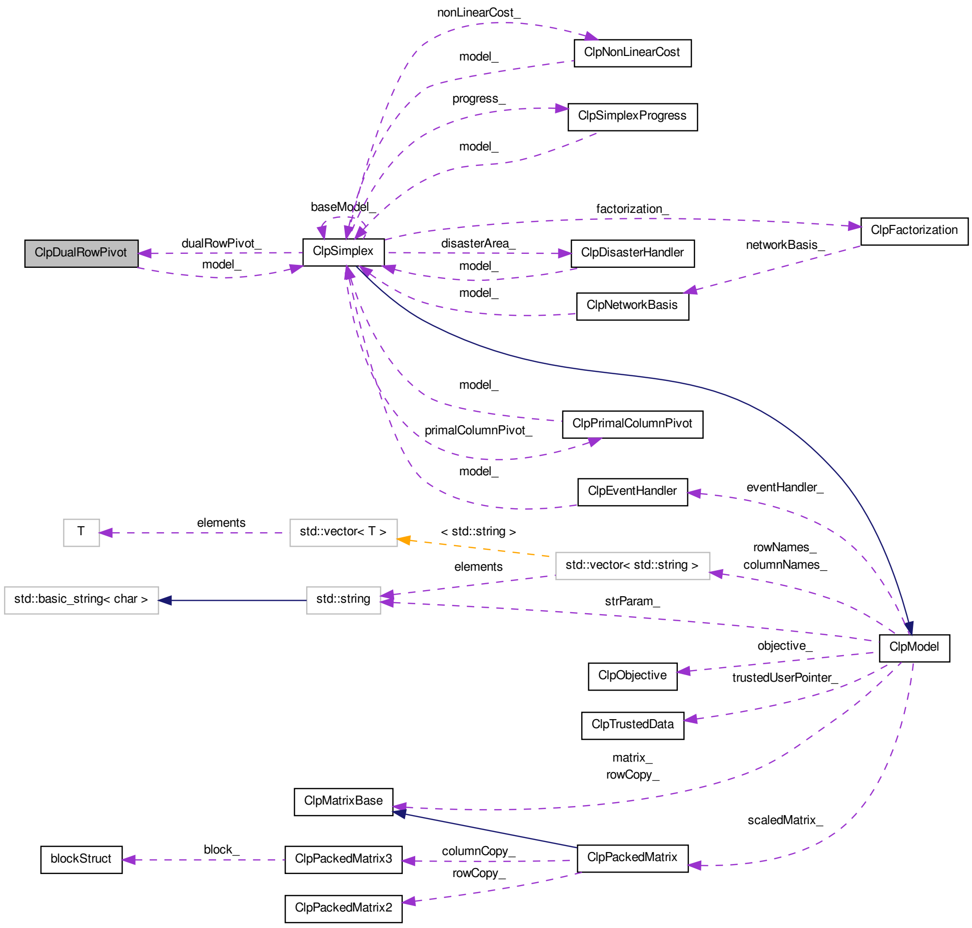
Dual Row Pivot Abstract Base Class.

```
#include <ClpDualRowPivot.hpp>
```

Inheritance diagram for ClpDualRowPivot:



Collaboration diagram for ClpDualRowPivot:



Public Member Functions

Algorithmic methods

- virtual int pivotRow ()=0

  Returns pivot row, -1 if none.
- virtual double updateWeights (CoinIndexedVector ∗input, CoinIndexedVector ∗spare, CoinIndexedVector ∗spare2, CoinIndexedVector ∗updatedColumn)=0

  Updates weights and returns pivot alpha.
- virtual void updatePrimalSolution (CoinIndexedVector ∗input, double theta, double &changeInObjective)=0

Updates primal solution (and maybe list of candidates) Uses input vector which it deletes Computes change in objective function Would be faster if we kept basic regions, but on other hand it means everything is always in sync.

- virtual void saveWeights (ClpSimplex ∗model, int mode)

  Saves any weights round factorization as pivot rows may change Will be empty unless steepest edge (will save model) May also recompute infeasibility stuff 1) before factorization 2) after good factorization (if weights empty may initialize) 3) after something happened but no factorization (e.g.
- virtual void checkAccuracy ()

  checks accuracy and may re-initialize (may be empty)
- virtual void unrollWeights ()

  Gets rid of last update (may be empty)
- virtual void clearArrays ()

  Gets rid of all arrays (may be empty)
- virtual bool looksOptimal () const

  Returns true if would not find any row.
- virtual void maximumPivotsChanged ()

  Called when maximum pivots changes.

Constructors and destructors

- ClpDualRowPivot ()

  Default Constructor.
- ClpDualRowPivot (const ClpDualRowPivot &)

  Copy constructor.
- ClpDualRowPivot & operator= (const ClpDualRowPivot &rhs)

  Assignment operator.
- virtual ∼ClpDualRowPivot ()

  Destructor.
- virtual ClpDualRowPivot ∗ clone (bool copyData=true) const =0

  Clone.

Other

- ClpSimplex ∗ model ()

  Returns model.
- void setModel (ClpSimplex ∗newmodel)

  Sets model (normally to NULL)
- int type ()

  Returns type (above 63 is extra information)

Protected Attributes

Protected member data

- ClpSimplex ∗ model_

  Pointer to model.
- int type_

  Type of row pivot algorithm.

3.18.1 Detailed Description

Dual Row Pivot Abstract Base Class.

Abstract Base Class for describing an interface to an algorithm to choose row pivot in dual simplex algorithm. For some algorithms e.g. Dantzig choice then some functions may be null.

Definition at line 22 of file ClpDualRowPivot.hpp.

3.18.2 Member Function Documentation

3.18.2.1 virtual double ClpDualRowPivot::updateWeights (CoinIndexedVector ∗ *input*, CoinIndexedVector ∗ *spare*, CoinIndexedVector ∗ *spare2*, CoinIndexedVector ∗ *updatedColumn*) `[pure virtual]`

Updates weights and returns pivot alpha.

Also does FT update

Implemented in ClpDualRowDantzig, and ClpDualRowSteepest.

3.18.2.2 virtual void ClpDualRowPivot::saveWeights (ClpSimplex ∗ *model*, int *mode*) `[virtual]`

Saves any weights round factorization as pivot rows may change Will be empty unless steepest edge (will save model) May also recompute infeasibility stuff 1) before factorization 2) after good factorization (if weights empty may initialize) 3) after something happened but no factorization (e.g.

check for infeasible) 4) as 2 but restore weights from previous snapshot 5) for strong branching - initialize , infeasibilities

Reimplemented in ClpDualRowSteepest.

The documentation for this class was generated from the following file:

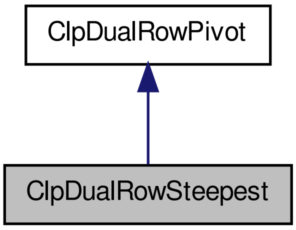
- ClpDualRowPivot.hpp

3.19 ClpDualRowSteepest Class Reference

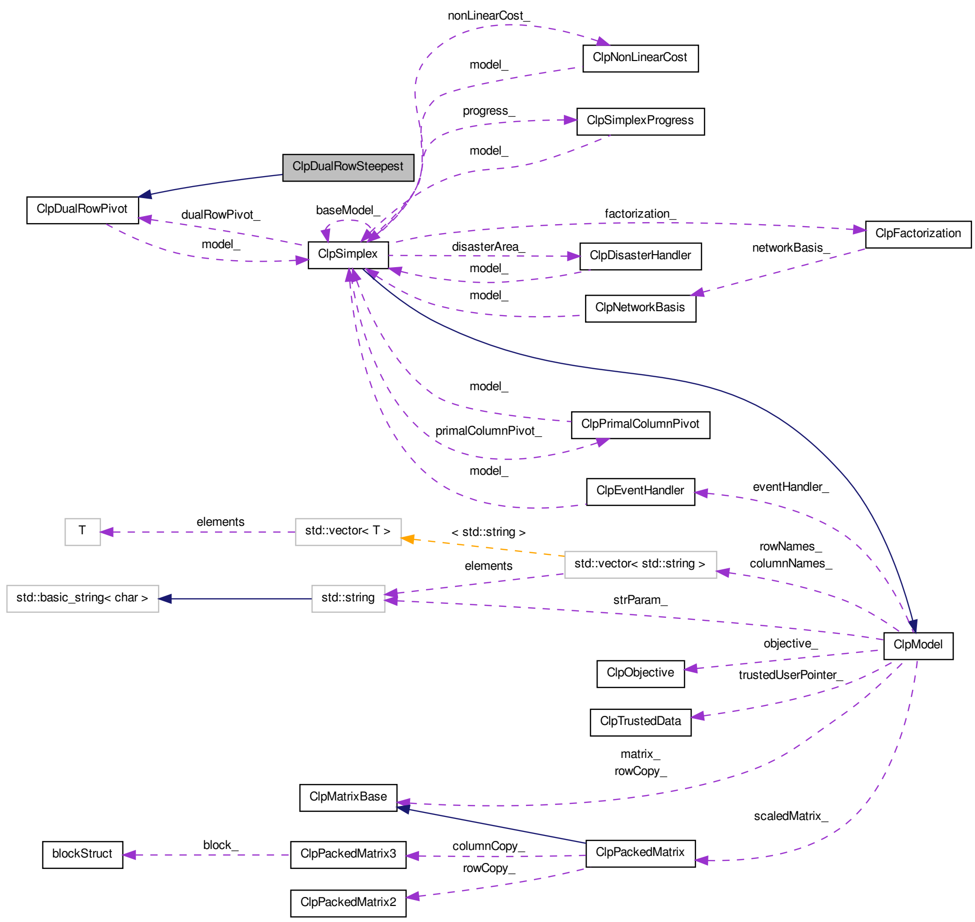
Dual Row Pivot Steepest Edge Algorithm Class.

```
#include <ClpDualRowSteepest.hpp>
```

Inheritance diagram for ClpDualRowSteepest:



Collaboration diagram for ClpDualRowSteepest:



Public Types

- enum Persistence

  enums for persistence

Public Member Functions

Algorithmic methods

- virtual int pivotRow ()

  Returns pivot row, -1 if none.
- virtual double updateWeights (CoinIndexedVector ∗input, CoinIndexedVector ∗spare, CoinIndexedVector ∗spare2, CoinIndexedVector ∗updatedColumn)

Updates weights and returns pivot alpha.

- virtual void updatePrimalSolution (CoinIndexedVector ∗input, double theta, double &changeInObjective)

  Updates primal solution (and maybe list of candidates) Uses input vector which it deletes Computes change in objective function.
- virtual void saveWeights (ClpSimplex ∗model, int mode)

  Saves any weights round factorization as pivot rows may change Save model May also recompute infeasibility stuff 1) before factorization 2) after good factorization (if weights empty may initialize) 3) after something happened but no factorization (e.g.
- virtual void unrollWeights ()

  Gets rid of last update.
- virtual void clearArrays ()

  Gets rid of all arrays.
- virtual bool looksOptimal () const

  Returns true if would not find any row.
- virtual void maximumPivotsChanged ()

  Called when maximum pivots changes.

Constructors and destructors

- ClpDualRowSteepest (int mode=3)

  Default Constructor 0 is uninitialized, 1 full, 2 is partial uninitialized, 3 starts as 2 but may switch to 1.
- ClpDualRowSteepest (const ClpDualRowSteepest &)

  Copy constructor.
- ClpDualRowSteepest & operator= (const ClpDualRowSteepest &rhs)

  Assignment operator.
- void fill (const ClpDualRowSteepest &rhs)

  Fill most values.
- virtual ∼ClpDualRowSteepest ()

  Destructor.
- virtual ClpDualRowPivot ∗ clone (bool copyData=true) const

  Clone.

gets and sets

- int mode () const

  Mode.
- void setPersistence (Persistence life)

  Set/ get persistence.
- Persistence **persistence** () const

3.19.1 Detailed Description

Dual Row Pivot Steepest Edge Algorithm Class.

See Forrest-Goldfarb paper for algorithm

Definition at line 21 of file ClpDualRowSteepest.hpp.

3.19.2 Constructor & Destructor Documentation

3.19.2.1 ClpDualRowSteepest::ClpDualRowSteepest (int *mode* = 3)

Default Constructor 0 is uninitialized, 1 full, 2 is partial uninitialized, 3 starts as 2 but may switch to 1.

By partial is meant that the weights are updated as normal but only part of the infeasible basic variables are scanned. This can be faster on very easy problems.

3.19.3 Member Function Documentation

3.19.3.1 virtual double ClpDualRowSteepest::updateWeights (CoinIndexedVector * *input*, CoinIndexedVector * *spare*, CoinIndexedVector * *spare2*, CoinIndexedVector * *updatedColumn*) [virtual]

Updates weights and returns pivot alpha.

Also does FT update

Implements ClpDualRowPivot.

3.19.3.2 virtual void ClpDualRowSteepest::saveWeights (ClpSimplex * *model*, int *mode*) [virtual]

Saves any weights round factorization as pivot rows may change Save model May also recompute infeasibility stuff 1) before factorization 2) after good factorization (if weights empty may initialize) 3) after something happened but no factorization (e.g.

check for infeasible) 4) as 2 but restore weights from previous snapshot 5) for strong branching - initialize (uninitialized) , infeasibilities

Reimplemented from ClpDualRowPivot.

The documentation for this class was generated from the following file:

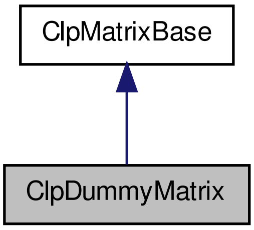
- ClpDualRowSteepest.hpp

3.20 ClpDummyMatrix Class Reference

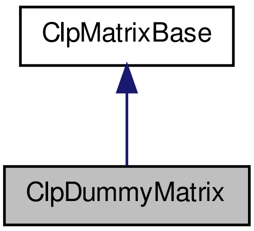
This implements a dummy matrix as derived from ClpMatrixBase.

`#include <ClpDummyMatrix.hpp>`

Inheritance diagram for ClpDummyMatrix:



Collaboration diagram for ClpDummyMatrix:



Public Member Functions

Useful methods

- virtual CoinPackedMatrix ∗ getPackedMatrix () const

    Return a complete CoinPackedMatrix.
- virtual bool isColOrdered () const

    Whether the packed matrix is column major ordered or not.
- virtual CoinBigIndex getNumElements () const

    Number of entries in the packed matrix.
- virtual int getNumCols () const

    Number of columns.
- virtual int getNumRows () const

Number of rows.
- virtual const double * getElements () const
  A vector containing the elements in the packed matrix.
- virtual const int * getIndices () const
  A vector containing the minor indices of the elements in the packed matrix.
- virtual const CoinBigIndex * **getVectorStarts** () const
- virtual const int * getVectorLengths () const
  The lengths of the major-dimension vectors.
- virtual void deleteCols (const int numDel, const int *indDel)
  Delete the columns whose indices are listed in `indDel`.
- virtual void deleteRows (const int numDel, const int *indDel)
  Delete the rows whose indices are listed in `indDel`.
- virtual ClpMatrixBase * reverseOrderedCopy () const
  Returns a new matrix in reverse order without gaps.
- virtual CoinBigIndex countBasis (const int *whichColumn, int &numberColumnBasic)
  Returns number of elements in column part of basis.
- virtual void fillBasis (ClpSimplex *model, const int *whichColumn, int &numberColumnBasic, int *row, int *start, int *rowCount, int *columnCount, CoinFactorizationDouble *element)
  Fills in column part of basis.
- virtual void unpack (const ClpSimplex *model, CoinIndexedVector *rowArray, int column) const
  Unpacks a column into an CoinIndexedvector.
- virtual void unpackPacked (ClpSimplex *model, CoinIndexedVector *rowArray, int column) const
  Unpacks a column into an CoinIndexedvector in packed foramt Note that model is NOT const.
- virtual void add (const ClpSimplex *model, CoinIndexedVector *rowArray, int column, double multiplier) const
  Adds multiple of a column into an CoinIndexedvector You can use quickAdd to add to vector.
- virtual void add (const ClpSimplex *model, double *array, int column, double multiplier) const
  Adds multiple of a column into an array.
- virtual void releasePackedMatrix () const
  Allow any parts of a created CoinMatrix to be deleted Allow any parts of a created CoinPackedMatrix to be deleted.

Matrix times vector methods

- virtual void times (double scalar, const double *x, double *y) const
  Return $y + A * scalar * x$ *in* y.
- virtual void times (double scalar, const double *x, double *y, const double *rowScale, const double *columnScale) const
  And for scaling.
- virtual void transposeTimes (double scalar, const double *x, double *y) const
  Return $y + x * scalar * A$ *in* y.
- virtual void transposeTimes (double scalar, const double *x, double *y, const double *rowScale, const double *columnScale) const

And for scaling.

- virtual void transposeTimes (const ClpSimplex *model, double scalar, const CoinIndexedVector *x, CoinIndexedVector *y, CoinIndexedVector *z) const

  Return $x * scalar * A + y$ *in* z*.*
- virtual void subsetTransposeTimes (const ClpSimplex *model, const CoinIndexedVector *x, const CoinIndexedVector *y, CoinIndexedVector *z) const

  Return $x *A$ *in* z *but just for indices in y.*

Constructors, destructor

- ClpDummyMatrix ()

  Default constructor.
- ClpDummyMatrix (int numberColumns, int numberRows, int numberElements)

  Constructor with data.
- virtual ~ClpDummyMatrix ()

  Destructor.

Copy method

- ClpDummyMatrix (const ClpDummyMatrix &)

  The copy constructor.
- ClpDummyMatrix (const CoinPackedMatrix &)

  The copy constructor from an CoinDummyMatrix.
- ClpDummyMatrix & **operator=** (const ClpDummyMatrix &)
- virtual ClpMatrixBase * clone () const

  Clone.

Protected Attributes

Data members

The data members are protected to allow access for derived classes.

- int numberRows_

  Number of rows.
- int numberColumns_

  Number of columns.
- int numberElements_

  Number of elements.

3.20.1 Detailed Description

This implements a dummy matrix as derived from ClpMatrixBase.

This is so you can do ClpPdco but may come in useful elsewhere. It just has dimensions but no data

Definition at line 20 of file ClpDummyMatrix.hpp.

3.20.2 Constructor & Destructor Documentation

3.20.2.1 ClpDummyMatrix::ClpDummyMatrix ( )

Default constructor.

3.20.2.2 ClpDummyMatrix::ClpDummyMatrix (const ClpDummyMatrix &)

The copy constructor.

3.20.2.3 ClpDummyMatrix::ClpDummyMatrix (const CoinPackedMatrix &)

The copy constructor from an CoinDummyMatrix.

3.20.3 Member Function Documentation

3.20.3.1 virtual bool ClpDummyMatrix::isColOrdered ( ) const [inline, virtual]

Whether the packed matrix is column major ordered or not.

Implements ClpMatrixBase.

Definition at line 28 of file ClpDummyMatrix.hpp.

3.20.3.2 virtual CoinBigIndex ClpDummyMatrix::getNumElements ( ) const [inline, virtual]

Number of entries in the packed matrix.

Implements ClpMatrixBase.

Definition at line 32 of file ClpDummyMatrix.hpp.

3.20.3.3 virtual int ClpDummyMatrix::getNumCols ( ) const [inline, virtual]

Number of columns.

Implements ClpMatrixBase.

Definition at line 36 of file ClpDummyMatrix.hpp.

3.20.3.4 virtual int ClpDummyMatrix::getNumRows ( ) const [inline, virtual]

Number of rows.

Implements ClpMatrixBase.

Definition at line 40 of file ClpDummyMatrix.hpp.

3.20.3.5 virtual const double* ClpDummyMatrix::getElements ( ) const [virtual]

A vector containing the elements in the packed matrix.

Note that there might be gaps in this list, entries that do not belong to any major-dimension vector. To get the actual elements one should look at this vector together with vectorStarts and vectorLengths.

Implements ClpMatrixBase.

3.20.3.6 virtual const int∗ ClpDummyMatrix::getIndices ( ) const [virtual]

A vector containing the minor indices of the elements in the packed matrix.

Note that there might be gaps in this list, entries that do not belong to any major-dimension vector. To get the actual elements one should look at this vector together with vectorStarts and vectorLengths.

Implements ClpMatrixBase.

3.20.3.7 virtual const int∗ ClpDummyMatrix::getVectorLengths ( ) const [virtual]

The lengths of the major-dimension vectors.

Implements ClpMatrixBase.

3.20.3.8 virtual void ClpDummyMatrix::deleteCols (const int *numDel*, const int ∗ *indDel*) [virtual]

Delete the columns whose indices are listed in `indDel`.

Implements ClpMatrixBase.

3.20.3.9 virtual void ClpDummyMatrix::deleteRows (const int *numDel*, const int ∗ *indDel*) [virtual]

Delete the rows whose indices are listed in `indDel`.

Implements ClpMatrixBase.

3.20.3.10 virtual void ClpDummyMatrix::unpackPacked (ClpSimplex ∗ *model*, CoinIndexedVector ∗ *rowArray*, int *column*) const [virtual]

Unpacks a column into an CoinIndexedvector in packed foramt Note that model is NOT const.

Bounds and objective could be modified if doing column generation (just for this variable)

Implements ClpMatrixBase.

3.20.3.11 virtual void ClpDummyMatrix::times (double *scalar*, const double ∗ *x*, double ∗ *y*) const [virtual]

Return `y + A * scalar *x` in `y`.

Precondition

`x` must be of size `numColumns()`
`y` must be of size `numRows()`

Implements ClpMatrixBase.

3.20.3.12 virtual void ClpDummyMatrix::transposeTimes (double *scalar*, const double * *x*, double * *y*) const [virtual]

Return `y + x * scalar * A` in `y`.

Precondition

`x` must be of size `numRows()`
`y` must be of size `numColumns()`

Implements ClpMatrixBase.

3.20.3.13 virtual void ClpDummyMatrix::transposeTimes (const ClpSimplex * *model*, double *scalar*, const CoinIndexedVector * *x*, CoinIndexedVector * *y*, CoinIndexedVector * *z*) const [virtual]

Return `x * scalar * A + y` in `z`.

Can use y as temporary array (will be empty at end) Note - If x packed mode - then z packed mode

Implements ClpMatrixBase.

3.20.3.14 virtual void ClpDummyMatrix::subsetTransposeTimes (const ClpSimplex * *model*, const CoinIndexedVector * *x*, const CoinIndexedVector * *y*, CoinIndexedVector * *z*) const [virtual]

Return `x *A` in `z` but just for indices in y.

Note - If x packed mode - then z packed mode Squashes small elements and knows about ClpSimplex

Implements ClpMatrixBase.

The documentation for this class was generated from the following file:

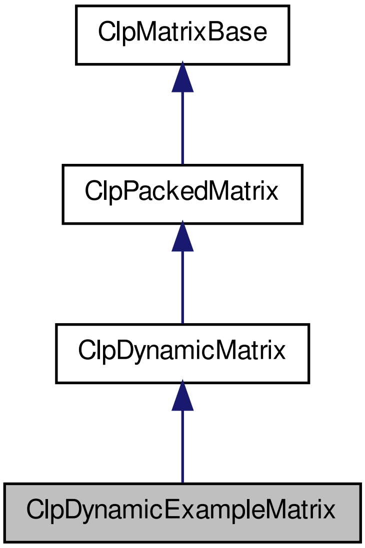
- ClpDummyMatrix.hpp

3.21 ClpDynamicExampleMatrix Class Reference

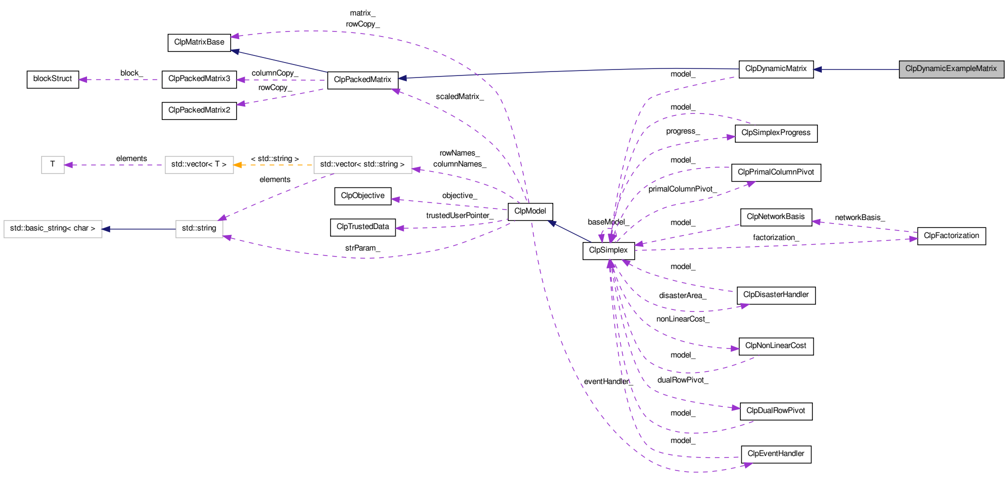
This implements a dynamic matrix when we have a limit on the number of "interesting rows".

```
#include <ClpDynamicExampleMatrix.hpp>
```

Inheritance diagram for ClpDynamicExampleMatrix:



Collaboration diagram for ClpDynamicExampleMatrix:



Public Member Functions

Main functions provided

- virtual void partialPricing (ClpSimplex ∗model, double start, double end, int &bestSequence, int &numberWanted)

  Partial pricing.
- virtual void createVariable (ClpSimplex ∗model, int &bestSequence)

  Creates a variable.
- virtual void packDown (const int ∗in, int numberToPack)

  If addColumn forces compression then this allows descendant to know what to do.

Constructors, destructor

- ClpDynamicExampleMatrix ()

  Default constructor.
- ClpDynamicExampleMatrix (ClpSimplex ∗model, int numberSets, int numberColumns, const int ∗starts, const double ∗lower, const double ∗upper, const int ∗startColumn, const int ∗row, const double ∗element, const double ∗cost, const double ∗columnLower=NULL, const double ∗columnUpper=NULL, const unsigned char ∗status=NULL, const unsigned char ∗dynamicStatus=NULL, int numberIds=0, const int ∗ids=NULL)

  This is the real constructor.
- ClpDynamicExampleMatrix (ClpSimplex ∗model, int numberSets, int numberColumns, int ∗starts, const double ∗lower, const double ∗upper, int ∗startColumn, int ∗row, double ∗element, double ∗cost, double ∗columnLower=NULL, double ∗columnUpper=NULL, const unsigned char ∗status=NULL, const unsigned char ∗dynamicStatus=NULL, int numberIds=0, const int ∗ids=NULL)

  This constructor just takes over ownership (except for lower, upper)
- virtual ∼ClpDynamicExampleMatrix ()

  Destructor.

Copy method

- ClpDynamicExampleMatrix (const ClpDynamicExampleMatrix &)

  The copy constructor.
- ClpDynamicExampleMatrix & **operator=** (const ClpDynamicExampleMatrix &)
- virtual ClpMatrixBase ∗ clone () const

  Clone.

gets and sets

- CoinBigIndex ∗ startColumnGen () const

  Starts of each column.
- int ∗ rowGen () const

  rows
- double ∗ elementGen () const

  elements
- double ∗ costGen () const

costs
- int ∗ fullStartGen () const

  full starts
- int ∗ idGen () const

  ids in next level matrix
- double ∗ columnLowerGen () const

  Optional lower bounds on columns.
- double ∗ columnUpperGen () const

  Optional upper bounds on columns.
- int numberColumns () const

  size
- void **setDynamicStatusGen** (int sequence, DynamicStatus status)
- DynamicStatus **getDynamicStatusGen** (int sequence) const
- bool flaggedGen (int i) const

  Whether flagged.
- void **setFlaggedGen** (int i)
- void **unsetFlagged** (int i)

Protected Attributes

Data members

The data members are protected to allow access for derived classes.

- int numberColumns_

  size
- CoinBigIndex ∗ startColumnGen_

  Starts of each column.
- int ∗ rowGen_

  rows
- double ∗ elementGen_

  elements
- double ∗ costGen_

  costs
- int ∗ fullStartGen_

  start of each set
- unsigned char ∗ dynamicStatusGen_

  for status and which bound
- int ∗ idGen_

  identifier for each variable up one level (startColumn_, etc).
- double ∗ columnLowerGen_

  Optional lower bounds on columns.
- double ∗ columnUpperGen_

  Optional upper bounds on columns.

3.21.1 Detailed Description

This implements a dynamic matrix when we have a limit on the number of "interesting rows".

This version inherits from ClpDynamicMatrix and knows that the real matrix is gub. This acts just like ClpDynamicMatrix but generates columns. This "generates" columns by choosing from stored set. It is maent as a starting point as to how you could use shortest path to generate columns.

So it has its own copy of all data needed. It populates ClpDynamicWatrix with enough to allow for gub keys and active variables. In turn ClpDynamicMatrix populates a CoinPackedMatrix with active columns and rows.

As there is one copy here and one in ClpDynamicmatrix these names end in Gen_

It is obviously more efficient to just use ClpDynamicMatrix but the ideas is to show how much code a user would have to write.

This does not work very well with bounds

Definition at line 33 of file ClpDynamicExampleMatrix.hpp.

3.21.2 Constructor & Destructor Documentation

3.21.2.1 ClpDynamicExampleMatrix::ClpDynamicExampleMatrix ( )

Default constructor.

3.21.2.2 ClpDynamicExampleMatrix::ClpDynamicExampleMatrix (ClpSimplex * *model*, int *numberSets*, int *numberColumns*, const int * *starts*, const double * *lower*, const double * *upper*, const int * *startColumn*, const int * *row*, const double * *element*, const double * *cost*, const double * *columnLower* = NULL, const double * *columnUpper* = NULL, const unsigned char * *status* = NULL, const unsigned char * *dynamicStatus* = NULL, int *numberIds* = 0, const int * *ids* = NULL)

This is the real constructor.

It assumes factorization frequency will not be changed. This resizes model !!!! The contents of original matrix in model will be taken over and original matrix will be sanitized so can be deleted (to avoid a very small memory leak)

3.21.2.3 ClpDynamicExampleMatrix::ClpDynamicExampleMatrix (const ClpDynamicExampleMatrix &)

The copy constructor.

3.21.3 Member Function Documentation

3.21.3.1 virtual void ClpDynamicExampleMatrix::createVariable (ClpSimplex * *model,* int & *bestSequence*) [virtual]

Creates a variable.

This is called after partial pricing and will modify matrix. Will update bestSequence.

Reimplemented from ClpDynamicMatrix.

3.21.3.2 virtual void ClpDynamicExampleMatrix::packDown (const int * *in,* int *numberToPack*) [virtual]

If addColumn forces compression then this allows descendant to know what to do.

If >= then entry stayed in, if -1 then entry went out to lower bound.of zero. Entries at upper bound (really nonzero) never go out (at present).

Reimplemented from ClpDynamicMatrix.

3.21.4 Member Data Documentation

3.21.4.1 int* ClpDynamicExampleMatrix::idGen_ [protected]

identifier for each variable up one level (startColumn_, etc).

This is of length maximumGubColumns_. For this version it is just sequence number at this level

Definition at line 177 of file ClpDynamicExampleMatrix.hpp.

The documentation for this class was generated from the following file:

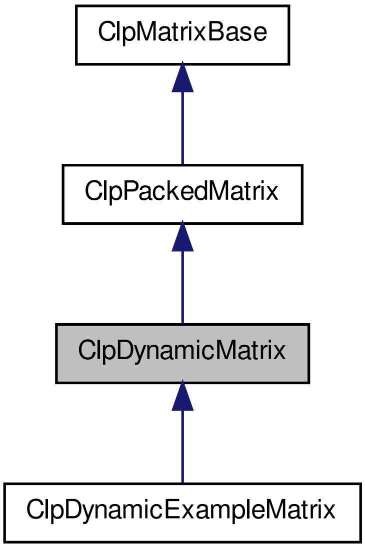
- ClpDynamicExampleMatrix.hpp

3.22 ClpDynamicMatrix Class Reference

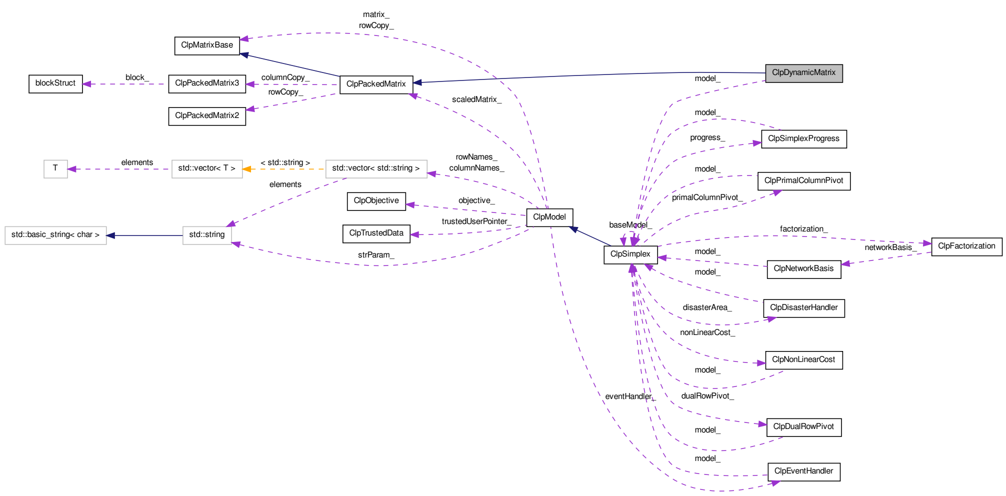
This implements a dynamic matrix when we have a limit on the number of "interesting rows".

`#include <ClpDynamicMatrix.hpp>`

Inheritance diagram for ClpDynamicMatrix:



Collaboration diagram for ClpDynamicMatrix:



Public Types

- enum DynamicStatus

  enums for status of various sorts

Public Member Functions

Main functions provided

- virtual void partialPricing (ClpSimplex ∗model, double start, double end, int &bestSequence, int &numberWanted)

  Partial pricing.
- virtual int updatePivot (ClpSimplex ∗model, double oldInValue, double oldOutValue)

  update information for a pivot (and effective rhs)
- virtual double ∗ rhsOffset (ClpSimplex ∗model, bool forceRefresh=false, bool check=false)

  Returns effective RHS offset if it is being used.
- virtual void times (double scalar, const double ∗x, double ∗y) const

  Return $y + A * scalar *x$ *in* y.
- void modifyOffset (int sequence, double amount)

  Modifies rhs offset.
- double keyValue (int iSet) const

  Gets key value when none in small.
- virtual void dualExpanded (ClpSimplex ∗model, CoinIndexedVector ∗array, double ∗other, int mode)

  mode=0 - Set up before "updateTranspose" and "transposeTimes" for duals using extended updates array (and may use other if dual values pass) mode=1 - Update dual solution after "transposeTimes" using extended rows.
- virtual int generalExpanded (ClpSimplex ∗model, int mode, int &number)

  mode=0 - Create list of non-key basics in pivotVariable_ using number as numberBasic in and out mode=1 - Set all key variables as basic mode=2 - return number extra rows needed, number gives maximum number basic mode=3 - before replaceColumn mode=4 - return 1 if can do primal, 2 if dual, 3 if both mode=5 - save any status stuff (when in good state) mode=6 - restore status stuff mode=7 - flag given variable (normally sequenceIn) mode=8 - unflag all variables mode=9 - synchronize costs mode=10 - return 1 if there may be changing bounds on variable (column generation) mode=11 - make sure set is clean (used when a variable rejected - but not flagged) mode=12 - after factorize but before permute stuff mode=13 - at end of simplex to delete stuff
- virtual int refresh (ClpSimplex ∗model)

  Purely for column generation and similar ideas.
- virtual void createVariable (ClpSimplex ∗model, int &bestSequence)

  Creates a variable.
- virtual double reducedCost (ClpSimplex ∗model, int sequence) const

  Returns reduced cost of a variable.
- void gubCrash ()

  Does gub crash.
- void writeMps (const char ∗name)

Writes out model (without names)
- void initialProblem ()

  Populates initial matrix from dynamic status.
- int addColumn (int numberEntries, const int ∗row, const double ∗element, double cost, double lower, double upper, int iSet, DynamicStatus status)

  Adds in a column to gub structure (called from descendant) and returns sequence.
- virtual void packDown (const int ∗, int)

  If addColumn forces compression then this allows descendant to know what to do.
- double columnLower (int sequence) const

  Gets lower bound (to simplify coding)
- double columnUpper (int sequence) const

  Gets upper bound (to simplify coding)

Constructors, destructor

- ClpDynamicMatrix ()

  Default constructor.
- ClpDynamicMatrix (ClpSimplex ∗model, int numberSets, int numberColumns, const int ∗starts, const double ∗lower, const double ∗upper, const CoinBigIndex ∗startColumn, const int ∗row, const double ∗element, const double ∗cost, const double ∗columnLower=NULL, const double ∗columnUpper=NULL, const unsigned char ∗status=NULL, const unsigned char ∗dynamicStatus=NULL)

  This is the real constructor.
- virtual ∼ClpDynamicMatrix ()

  Destructor.

Copy method

- ClpDynamicMatrix (const ClpDynamicMatrix &)

  The copy constructor.
- ClpDynamicMatrix (const CoinPackedMatrix &)

  The copy constructor from an CoinPackedMatrix.
- ClpDynamicMatrix & **operator=** (const ClpDynamicMatrix &)
- virtual ClpMatrixBase ∗ clone () const

  Clone.

gets and sets

- ClpSimplex::Status getStatus (int sequence) const

  Status of row slacks.
- void **setStatus** (int sequence, ClpSimplex::Status status)
- bool flaggedSlack (int i) const

  Whether flagged slack.
- void **setFlaggedSlack** (int i)
- void **unsetFlaggedSlack** (int i)
- int numberSets () const

  Number of sets (dynamic rows)
- int numberGubEntries () const

  Number of possible gub variables.
- int ∗ startSets () const

Sets.

- bool flagged (int i) const

  Whether flagged.

- void **setFlagged** (int i)
- void **unsetFlagged** (int i)
- void **setDynamicStatus** (int sequence, DynamicStatus status)
- DynamicStatus **getDynamicStatus** (int sequence) const
- double objectiveOffset () const

  Saved value of objective offset.

- CoinBigIndex * startColumn () const

  Starts of each column.

- int * row () const

  rows

- double * element () const

  elements

- double * cost () const

  costs

- int * id () const

  ids of active columns (just index here)

- double * columnLower () const

  Optional lower bounds on columns.

- double * columnUpper () const

  Optional upper bounds on columns.

- double * lowerSet () const

  Lower bounds on sets.

- double * upperSet () const

  Upper bounds on sets.

- int numberGubColumns () const

  size

- int firstAvailable () const

  first free

- int firstDynamic () const

  first dynamic

- int lastDynamic () const

  number of columns in dynamic model

- int numberStaticRows () const

  number of rows in original model

- int numberElements () const

  size of working matrix (max)

- int * **keyVariable** () const
- void switchOffCheck ()

  Switches off dj checking each factorization (for BIG models)

- unsigned char * gubRowStatus () const

  Status region for gub slacks.

- unsigned char * dynamicStatus () const

  Status region for gub variables.

- int whichSet (int sequence) const

  Returns which set a variable is in.

Protected Attributes

Data members

The data members are protected to allow access for derived classes.

- double sumDualInfeasibilities_

  Sum of dual infeasibilities.
- double sumPrimalInfeasibilities_

  Sum of primal infeasibilities.
- double sumOfRelaxedDualInfeasibilities_

  Sum of Dual infeasibilities using tolerance based on error in duals.
- double sumOfRelaxedPrimalInfeasibilities_

  Sum of Primal infeasibilities using tolerance based on error in primals.
- double savedBestGubDual_

  Saved best dual on gub row in pricing.
- int savedBestSet_

  Saved best set in pricing.
- int ∗ backToPivotRow_

  Backward pointer to pivot row !!!
- int ∗ keyVariable_

  Key variable of set (only accurate if none in small problem)
- int ∗ toIndex_

  Backward pointer to extra row.
- int ∗ **fromIndex_**
- int numberSets_

  Number of sets (dynamic rows)
- int numberActiveSets_

  Number of active sets.
- double objectiveOffset_

  Saved value of objective offset.
- double ∗ lowerSet_

  Lower bounds on sets.
- double ∗ upperSet_

  Upper bounds on sets.
- unsigned char ∗ status_

  Status of slack on set.
- ClpSimplex ∗ model_

  Pointer back to model.
- int firstAvailable_

  first free
- int firstAvailableBefore_

  first free when iteration started
- int firstDynamic_

  first dynamic
- int lastDynamic_

  number of columns in dynamic model
- int numberStaticRows_

number of rows in original model
- int numberElements_

  size of working matrix (max)
- int numberDualInfeasibilities_

  Number of dual infeasibilities.
- int numberPrimalInfeasibilities_

  Number of primal infeasibilities.
- int noCheck_

  If pricing will declare victory (i.e.
- double infeasibilityWeight_

  Infeasibility weight when last full pass done.
- int numberGubColumns_

  size
- int maximumGubColumns_

  current maximum number of columns (then compress)
- int maximumElements_

  current maximum number of elemnts (then compress)
- int ∗ startSet_

  Start of each set.
- int ∗ next_

  next in chain
- CoinBigIndex ∗ startColumn_

  Starts of each column.
- int ∗ row_

  rows
- double ∗ element_

  elements
- double ∗ cost_

  costs
- int ∗ id_

  ids of active columns (just index here)
- unsigned char ∗ dynamicStatus_

  for status and which bound
- double ∗ columnLower_

  Optional lower bounds on columns.
- double ∗ columnUpper_

  Optional upper bounds on columns.

3.22.1 Detailed Description

This implements a dynamic matrix when we have a limit on the number of "interesting rows".

This version inherits from ClpPackedMatrix and knows that the real matrix is gub. A later version could use shortest path to generate columns.

Definition at line 20 of file ClpDynamicMatrix.hpp.

3.22.2 Constructor & Destructor Documentation

3.22.2.1 ClpDynamicMatrix::ClpDynamicMatrix ( )

Default constructor.

3.22.2.2 ClpDynamicMatrix::ClpDynamicMatrix (ClpSimplex * *model*, int *numberSets*, int *numberColumns*, const int * *starts*, const double * *lower*, const double * *upper*, const CoinBigIndex * *startColumn*, const int * *row*, const double * *element*, const double * *cost*, const double * *columnLower* = NULL, const double * *columnUpper* = NULL, const unsigned char * *status* = NULL, const unsigned char * *dynamicStatus* = NULL)

This is the real constructor.

It assumes factorization frequency will not be changed. This resizes model !!!! The contents of original matrix in model will be taken over and original matrix will be sanitized so can be deleted (to avoid a very small memory leak)

3.22.2.3 ClpDynamicMatrix::ClpDynamicMatrix (const ClpDynamicMatrix &)

The copy constructor.

3.22.2.4 ClpDynamicMatrix::ClpDynamicMatrix (const CoinPackedMatrix &)

The copy constructor from an CoinPackedMatrix.

3.22.3 Member Function Documentation

3.22.3.1 virtual double* ClpDynamicMatrix::rhsOffset (ClpSimplex * *model*, bool *forceRefresh* = false, bool *check* = false) [virtual]

Returns effective RHS offset if it is being used.

This is used for long problems or big dynamic or anywhere where going through full columns is expensive. This may re-compute

Reimplemented from ClpMatrixBase.

3.22.3.2 virtual void ClpDynamicMatrix::times (double *scalar*, const double * *x*, double * *y*) const [virtual]

Return `y + A * scalar *x` in `y`.

Precondition

`x` must be of size `numColumns()`
`y` must be of size `numRows()`

Reimplemented from ClpPackedMatrix.

3.22.3.3 virtual void ClpDynamicMatrix::dualExpanded (ClpSimplex * *model*, CoinIndexedVector * *array*, double * *other*, int *mode*) [virtual]

mode=0 - Set up before "updateTranspose" and "transposeTimes" for duals using extended updates array (and may use other if dual values pass) mode=1 - Update dual solution after "transposeTimes" using extended rows.

mode=2 - Compute all djs and compute key dual infeasibilities mode=3 - Report on key dual infeasibilities mode=4 - Modify before updateTranspose in partial pricing

Reimplemented from ClpMatrixBase.

3.22.3.4 virtual int ClpDynamicMatrix::refresh (ClpSimplex * *model*) [virtual]

Purely for column generation and similar ideas.

Allows matrix and any bounds or costs to be updated (sensibly). Returns non-zero if any changes.

Reimplemented from ClpPackedMatrix.

3.22.3.5 virtual void ClpDynamicMatrix::createVariable (ClpSimplex * *model*, int & *bestSequence*) [virtual]

Creates a variable.

This is called after partial pricing and will modify matrix. Will update bestSequence.

Reimplemented from ClpMatrixBase.

Reimplemented in ClpDynamicExampleMatrix.

3.22.3.6 virtual void ClpDynamicMatrix::packDown (const int * , int) [inline, virtual]

If addColumn forces compression then this allows descendant to know what to do.

If >=0 then entry stayed in, if -1 then entry went out to lower bound.of zero. Entries at upper bound (really nonzero) never go out (at present).

Reimplemented in ClpDynamicExampleMatrix.

Definition at line 109 of file ClpDynamicMatrix.hpp.

3.22.4 Member Data Documentation

3.22.4.1 int ClpDynamicMatrix::noCheck_ [protected]

If pricing will declare victory (i.e.

no check every factorization). -1 - always check 0 - don't check 1 - in don't check mode but looks optimal

Definition at line 349 of file ClpDynamicMatrix.hpp.

The documentation for this class was generated from the following file:

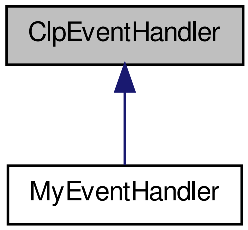
- ClpDynamicMatrix.hpp

3.23 ClpEventHandler Class Reference

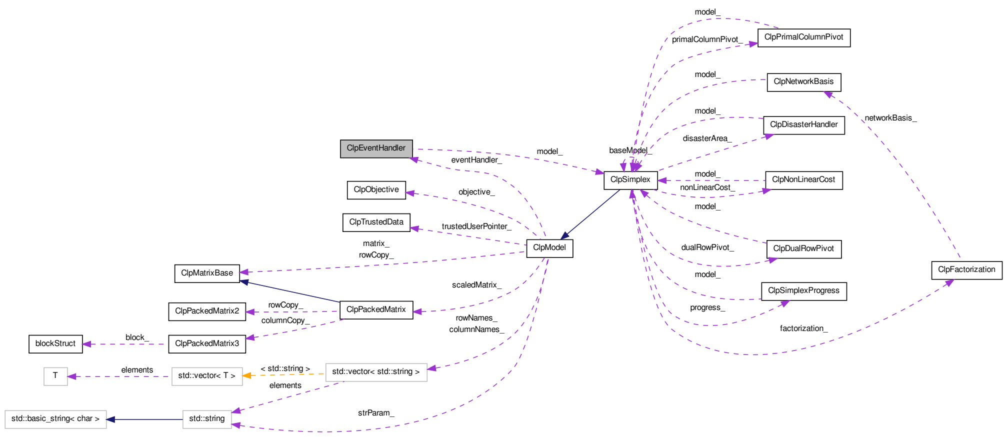
Base class for Clp event handling.

`#include <ClpEventHandler.hpp>`

Inheritance diagram for ClpEventHandler:



Collaboration diagram for ClpEventHandler:



Public Types

- enum Event

    enums for what sort of event.

Public Member Functions

Virtual method that the derived classes should provide.

The base class instance does nothing and as event() is only useful method it would not be very useful NOT providing one!

- virtual int event (Event whichEvent)
  This can do whatever it likes.

Constructors, destructor

- ClpEventHandler (ClpSimplex ∗model=NULL)
  Default constructor.
- virtual ∼ClpEventHandler ()
  Destructor.
- **ClpEventHandler** (const ClpEventHandler &)
- ClpEventHandler & **operator=** (const ClpEventHandler &)
- virtual ClpEventHandler ∗ clone () const
  Clone.

Sets/gets

- void setSimplex (ClpSimplex ∗model)
  set model.
- ClpSimplex ∗ simplex () const
  Get model.

Protected Attributes

Data members

The data members are protected to allow access for derived classes.

- ClpSimplex ∗ model_
  Pointer to simplex.

3.23.1 Detailed Description

Base class for Clp event handling.

This is just here to allow for event handling. By event I mean a Clp event e.g. end of values pass.

One use would be to let a user handle a system event e.g. Control-C. This could be done by deriving a class MyEventHandler which knows about such events. If one occurs MyEventHandler::event() could clear event status and return 3 (stopped).

Clp would then return to user code.

As it is called every iteration this should be fine grained enough.

User can derive and construct from CbcModel - not pretty

Definition at line 27 of file ClpEventHandler.hpp.

3.23.2 Member Enumeration Documentation

3.23.2.1 enum ClpEventHandler::Event

enums for what sort of event.

These will also be returned in ClpModel::secondaryStatus() as int

Definition at line 34 of file ClpEventHandler.hpp.

3.23.3 Constructor & Destructor Documentation

3.23.3.1 ClpEventHandler::ClpEventHandler (ClpSimplex * *model* = NULL)

Default constructor.

3.23.4 Member Function Documentation

3.23.4.1 virtual int ClpEventHandler::event (Event *whichEvent*) [virtual]

This can do whatever it likes.

If return code -1 then carries on if 0 sets ClpModel::status() to 5 (stopped by event) and will return to user. At present if <-1 carries on and if >0 acts as if 0 - this may change. For ClpSolve 2 -> too big return status of -2 and -> too small 3

Reimplemented in MyEventHandler.

3.23.4.2 void ClpEventHandler::setSimplex (ClpSimplex * *model*)

set model.

The documentation for this class was generated from the following file:

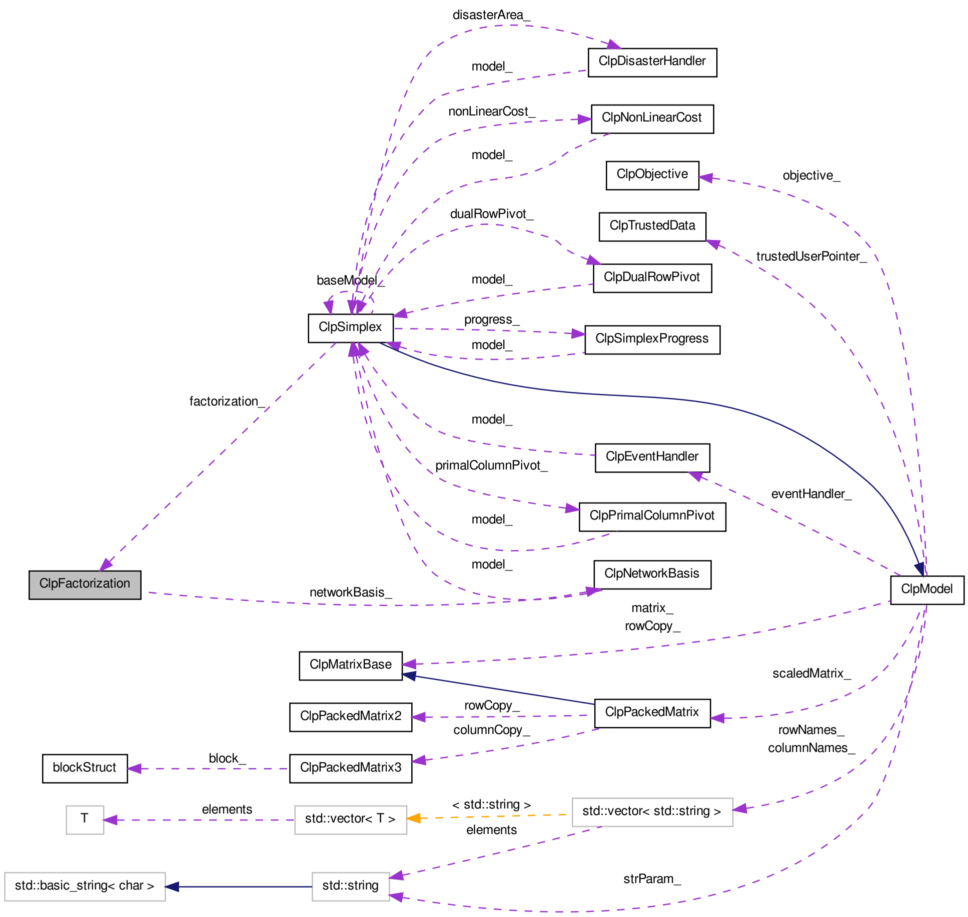
- ClpEventHandler.hpp

3.24 ClpFactorization Class Reference

This just implements CoinFactorization when an ClpMatrixBase object is passed.

`#include <ClpFactorization.hpp>`

Collaboration diagram for ClpFactorization:



Public Member Functions

factorization

- int factorize (ClpSimplex ∗model, int solveType, bool valuesPass)
  When part of LP - given by basic variables.

Constructors, destructor

- ClpFactorization ()
  Default constructor.
- ∼ClpFactorization ()
  Destructor.

Copy method

- ClpFactorization (const CoinFactorization &)

  The copy constructor from an CoinFactorization.
- ClpFactorization (const ClpFactorization &, int denseIfSmaller=0)

  The copy constructor.
- ClpFactorization (const CoinOtherFactorization &)

  The copy constructor from an CoinOtherFactorization.
- ClpFactorization & **operator=** (const ClpFactorization &)

rank one updates which do exist

- int replaceColumn (const ClpSimplex *model, CoinIndexedVector *regionSparse, CoinIndexedVector *tableauColumn, int pivotRow, double pivotCheck, bool checkBeforeModifying=false, double acceptablePivot=1.0e-8)

  Replaces one Column to basis, returns 0=OK, 1=Probably OK, 2=singular, 3=no room If checkBeforeModifying is true will do all accuracy checks before modifying factorization.

various uses of factorization (return code number elements)

which user may want to know about

- int updateColumnFT (CoinIndexedVector *regionSparse, CoinIndexedVector *regionSparse2)

  Updates one column (FTRAN) from region2 Tries to do FT update number returned is negative if no room region1 starts as zero and is zero at end.
- int updateColumn (CoinIndexedVector *regionSparse, CoinIndexedVector *regionSparse2, bool noPermute=false) const

  Updates one column (FTRAN) from region2 region1 starts as zero and is zero at end.
- int updateTwoColumnsFT (CoinIndexedVector *regionSparse1, CoinIndexedVector *regionSparse2, CoinIndexedVector *regionSparse3, bool noPermuteRegion3=false)

  Updates one column (FTRAN) from region2 Tries to do FT update number returned is negative if no room.
- int updateColumnForDebug (CoinIndexedVector *regionSparse, CoinIndexedVector *regionSparse2, bool noPermute=false) const

  For debug (no statistics update)
- int updateColumnTranspose (CoinIndexedVector *regionSparse, CoinIndexedVector *regionSparse2) const

  Updates one column (BTRAN) from region2 region1 starts as zero and is zero at end.

Lifted from CoinFactorization

- int numberElements () const

  Total number of elements in factorization.
- int * permute () const

  Returns address of permute region.
- int * pivotColumn () const

Returns address of pivotColumn region (also used for permuting)
- int maximumPivots () const

  Maximum number of pivots between factorizations.
- void maximumPivots (int value)

  Set maximum number of pivots between factorizations.
- int pivots () const

  Returns number of pivots since factorization.
- double areaFactor () const

  Whether larger areas needed.
- void areaFactor (double value)

  Set whether larger areas needed.
- double zeroTolerance () const

  Zero tolerance.
- void zeroTolerance (double value)

  Set zero tolerance.
- void saferTolerances (double zeroTolerance, double pivotTolerance)

  Set tolerances to safer of existing and given.
- int sparseThreshold () const

  get sparse threshold
- void sparseThreshold (int value)

  Set sparse threshold.
- int status () const

  Returns status.
- void setStatus (int value)

  Sets status.
- int numberDense () const

  Returns number of dense rows.
- CoinBigIndex numberElementsU () const

  Returns number in U area.
- CoinBigIndex numberElementsL () const

  Returns number in L area.
- CoinBigIndex numberElementsR () const

  Returns number in R area.
- bool **timeToRefactorize** () const
- int messageLevel () const

  Level of detail of messages.
- void messageLevel (int value)

  Set level of detail of messages.
- void clearArrays ()

  Get rid of all memory.
- int numberRows () const

  Number of Rows after factorization.
- int denseThreshold () const

  Gets dense threshold.
- void setDenseThreshold (int value)

  Sets dense threshold.
- double pivotTolerance () const

Pivot tolerance.
- void pivotTolerance (double value)
  Set pivot tolerance.
- void relaxAccuracyCheck (double value)
  Allows change of pivot accuracy check 1.0 == none >1.0 relaxed.
- int persistenceFlag () const
  Array persistence flag If 0 then as now (delete/new) 1 then only do arrays if bigger needed 2 as 1 but give a bit extra if bigger needed.
- void **setPersistenceFlag** (int value)
- void almostDestructor ()
  Delete all stuff (leaves as after CoinFactorization())
- double adjustedAreaFactor () const
  Returns areaFactor but adjusted for dense.
- void **setBiasLU** (int value)
- void setForrestTomlin (bool value)
  true if Forrest Tomlin update, false if PFI
- void setDefaultValues ()
  Sets default values.
- void forceOtherFactorization (int which)
  If nonzero force use of 1,dense 2,small 3,osl.
- int goOslThreshold () const
  Get switch to osl if number rows <= this.
- void setGoOslThreshold (int value)
  Set switch to osl if number rows <= this.
- int goDenseThreshold () const
  Get switch to dense if number rows <= this.
- void setGoDenseThreshold (int value)
  Set switch to dense if number rows <= this.
- int goSmallThreshold () const
  Get switch to small if number rows <= this.
- void setGoSmallThreshold (int value)
  Set switch to small if number rows <= this.
- void goDenseOrSmall (int numberRows)
  Go over to dense or small code if small enough.
- void setFactorization (ClpFactorization &factorization)
  Sets factorization.
- int isDenseOrSmall () const
  Return 1 if dense code.

other stuff

- void goSparse ()
  makes a row copy of L for speed and to allow very sparse problems
- void cleanUp ()
  Cleans up i.e. gets rid of network basis.
- bool needToReorder () const
  Says whether to redo pivot order.
- bool networkBasis () const
  Says if a network basis.
- void getWeights (int ∗weights) const
  Fills weighted row list.

3.24.1 Detailed Description

This just implements CoinFactorization when an ClpMatrixBase object is passed.

If a network then has a dummy CoinFactorization and a genuine ClpNetworkBasis object

Definition at line 32 of file ClpFactorization.hpp.

3.24.2 Constructor & Destructor Documentation

3.24.2.1 ClpFactorization::ClpFactorization ( )

Default constructor.

3.24.2.2 ClpFactorization::ClpFactorization (const CoinFactorization &)

The copy constructor from an CoinFactorization.

3.24.2.3 ClpFactorization::ClpFactorization (const **ClpFactorization** & , int *denseIfSmaller* = `0`)

The copy constructor.

3.24.2.4 ClpFactorization::ClpFactorization (const CoinOtherFactorization &)

The copy constructor from an CoinOtherFactorization.

3.24.3 Member Function Documentation

3.24.3.1 int ClpFactorization::factorize (**ClpSimplex** * *model*, int *solveType*, bool *valuesPass*)

When part of LP - given by basic variables.

Actually does factorization. Arrays passed in have non negative value to say basic. If status is okay, basic variables have pivot row - this is only needed if increasingRows_ >1. Allows scaling If status is singular, then basic variables have pivot row and ones thrown out have -1 returns 0 -okay, -1 singular, -2 too many in basis, -99 memory

3.24.3.2 int ClpFactorization::replaceColumn (const **ClpSimplex** * *model*, CoinIndexedVector * *regionSparse*, CoinIndexedVector * *tableauColumn*, int *pivotRow*, double *pivotCheck*, bool *checkBeforeModifying* = `false`, double *acceptablePivot* = `1.0e-8`)

Replaces one Column to basis, returns 0=OK, 1=Probably OK, 2=singular, 3=no room If checkBeforeModifying is true will do all accuracy checks before modifying factorization.

Whether to set this depends on speed considerations. You could just do this on first iteration after factorization and thereafter re-factorize partial update already in U

3.24.3.3 int ClpFactorization::updateTwoColumnsFT (CoinIndexedVector ∗ *regionSparse1*, CoinIndexedVector ∗ *regionSparse2*, CoinIndexedVector ∗ *regionSparse3*, bool *noPermuteRegion3* = false)

Updates one column (FTRAN) from region2 Tries to do FT update number returned is negative if no room.

Also updates region3 region1 starts as zero and is zero at end

The documentation for this class was generated from the following file:

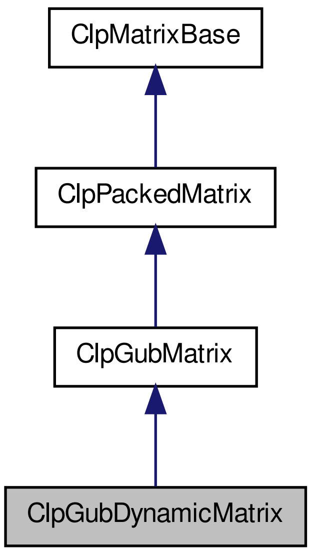
- ClpFactorization.hpp

3.25 ClpGubDynamicMatrix Class Reference

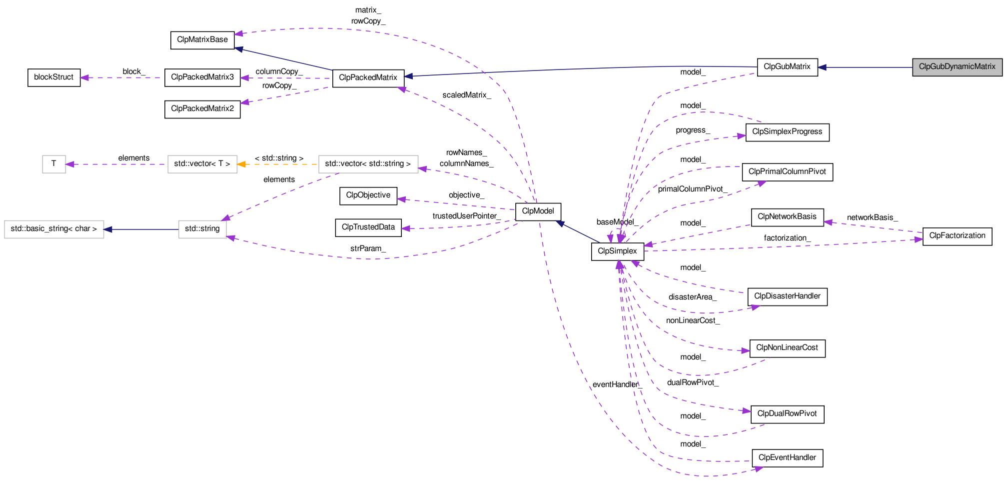
This implements Gub rows plus a ClpPackedMatrix.

`#include <ClpGubDynamicMatrix.hpp>`

Inheritance diagram for ClpGubDynamicMatrix:



Collaboration diagram for ClpGubDynamicMatrix:



Public Member Functions

Main functions provided

- virtual void partialPricing (ClpSimplex ∗model, double start, double end, int &bestSequence, int &numberWanted)

  Partial pricing.
- virtual int synchronize (ClpSimplex ∗model, int mode)

  This is local to Gub to allow synchronization: mode=0 when status of basis is good mode=1 when variable is flagged mode=2 when all variables unflagged (returns number flagged) mode=3 just reset costs (primal) mode=4 correct number of dual infeasibilities mode=5 return 4 if time to re-factorize mode=8 - make sure set is clean mode=9 - adjust lower, upper on set by incoming.
- virtual void useEffectiveRhs (ClpSimplex ∗model, bool cheapest=true)

  Sets up an effective RHS and does gub crash if needed.
- virtual int updatePivot (ClpSimplex ∗model, double oldInValue, double oldOutValue)

  update information for a pivot (and effective rhs)
- void insertNonBasic (int sequence, int iSet)

  Add a new variable to a set.
- virtual double ∗ rhsOffset (ClpSimplex ∗model, bool forceRefresh=false, bool check=false)

  Returns effective RHS offset if it is being used.
- virtual void times (double scalar, const double ∗x, double ∗y) const

  Return $y + A * scalar * x$ *in* y.
- virtual int checkFeasible (ClpSimplex ∗model, double &sum) const

  Just for debug Returns sum and number of primal infeasibilities.
- void cleanData (ClpSimplex ∗model)

  Cleans data after setWarmStart.

Constructors, destructor

- ClpGubDynamicMatrix ()
  Default constructor.
- virtual ~ClpGubDynamicMatrix ()
  Destructor.

Copy method

- ClpGubDynamicMatrix (const ClpGubDynamicMatrix &)
  The copy constructor.
- ClpGubDynamicMatrix (ClpSimplex *model, int numberSets, int numberColumns, const int *starts, const double *lower, const double *upper, const int *startColumn, const int *row, const double *element, const double *cost, const double *lowerColumn=NULL, const double *upperColumn=NULL, const unsigned char *status=NULL)
  This is the real constructor.
- ClpGubDynamicMatrix & **operator=** (const ClpGubDynamicMatrix &)
- virtual ClpMatrixBase * clone () const
  Clone.

Protected Attributes

Data members

The data members are protected to allow access for derived classes.

- double objectiveOffset_
  Saved value of objective offset.
- CoinBigIndex * startColumn_
  Starts of each column.
- int * row_
  rows
- double * element_
  elements
- double * cost_
  costs
- int * fullStart_
  full starts
- int * id_
  ids of active columns (just index here)
- unsigned char * dynamicStatus_
  for status and which bound
- double * lowerColumn_
  Optional lower bounds on columns.
- double * upperColumn_
  Optional upper bounds on columns.
- double * lowerSet_
  Optional true lower bounds on sets.
- double * upperSet_

Optional true upper bounds on sets.
- int numberGubColumns_

  size
- int firstAvailable_

  first free
- int savedFirstAvailable_

  saved first free
- int firstDynamic_

  first dynamic
- int lastDynamic_

  number of columns in dynamic model
- int numberElements_

  size of working matrix (max)

gets and sets

- enum DynamicStatus

  enums for status of various sorts
- bool flagged (int i) const

  Whether flagged.
- void setFlagged (int i)

  To flag a variable.
- void **unsetFlagged** (int i)
- void **setDynamicStatus** (int sequence, DynamicStatus status)
- DynamicStatus **getDynamicStatus** (int sequence) const
- double objectiveOffset () const

  Saved value of objective offset.
- CoinBigIndex * startColumn () const

  Starts of each column.
- int * row () const

  rows
- double * element () const

  elements
- double * cost () const

  costs
- int * fullStart () const

  full starts
- int * id () const

  ids of active columns (just index here)
- double * lowerColumn () const

  Optional lower bounds on columns.
- double * upperColumn () const

  Optional upper bounds on columns.
- double * lowerSet () const

Optional true lower bounds on sets.

- double ∗ upperSet () const

  Optional true upper bounds on sets.
- int numberGubColumns () const

  size
- int firstAvailable () const

  first free
- void setFirstAvailable (int value)

  set first free
- int firstDynamic () const

  first dynamic
- int lastDynamic () const

  number of columns in dynamic model
- int numberElements () const

  size of working matrix (max)
- unsigned char ∗ gubRowStatus () const

  Status region for gub slacks.
- unsigned char ∗ dynamicStatus () const

  Status region for gub variables.
- int whichSet (int sequence) const

  Returns which set a variable is in.

3.25.1 Detailed Description

This implements Gub rows plus a ClpPackedMatrix.

This a dynamic version which stores the gub part and dynamically creates matrix. All bounds are assumed to be zero and infinity

This is just a simple example for real column generation

Definition at line 20 of file ClpGubDynamicMatrix.hpp.

3.25.2 Constructor & Destructor Documentation

3.25.2.1 ClpGubDynamicMatrix::ClpGubDynamicMatrix ( )

Default constructor.

3.25.2.2 ClpGubDynamicMatrix::ClpGubDynamicMatrix (const ClpGubDynamicMatrix &)

The copy constructor.

3.25.2.3 ClpGubDynamicMatrix::ClpGubDynamicMatrix (ClpSimplex * *model*, int *numberSets*, int *numberColumns*, const int * *starts*, const double * *lower*, const double * *upper*, const int * *startColumn*, const int * *row*, const double * *element*, const double * *cost*, const double * *lowerColumn* = NULL, const double * *upperColumn* = NULL, const unsigned char * *status* = NULL)

This is the real constructor.

It assumes factorization frequency will not be changed. This resizes model !!!!

3.25.3 Member Function Documentation

3.25.3.1 virtual double* ClpGubDynamicMatrix::rhsOffset (ClpSimplex * *model*, bool *forceRefresh* = false, bool *check* = false) [virtual]

Returns effective RHS offset if it is being used.

This is used for long problems or big gub or anywhere where going through full columns is expensive. This may re-compute

Reimplemented from ClpGubMatrix.

3.25.3.2 virtual void ClpGubDynamicMatrix::times (double *scalar*, const double * *x*, double * *y*) const [virtual]

Return `y + A * scalar *x` in `y`.

Precondition

`x` must be of size `numColumns()`
`y` must be of size `numRows()`

Reimplemented from ClpPackedMatrix.

3.25.3.3 virtual int ClpGubDynamicMatrix::checkFeasible (ClpSimplex * *model*, double & *sum*) const [virtual]

Just for debug Returns sum and number of primal infeasibilities.

Recomputes keys

Reimplemented from ClpMatrixBase.

The documentation for this class was generated from the following file:

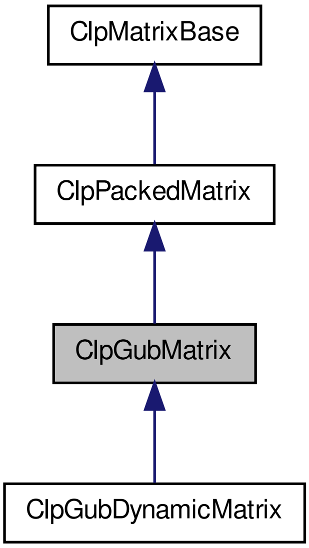
- ClpGubDynamicMatrix.hpp

3.26 ClpGubMatrix Class Reference

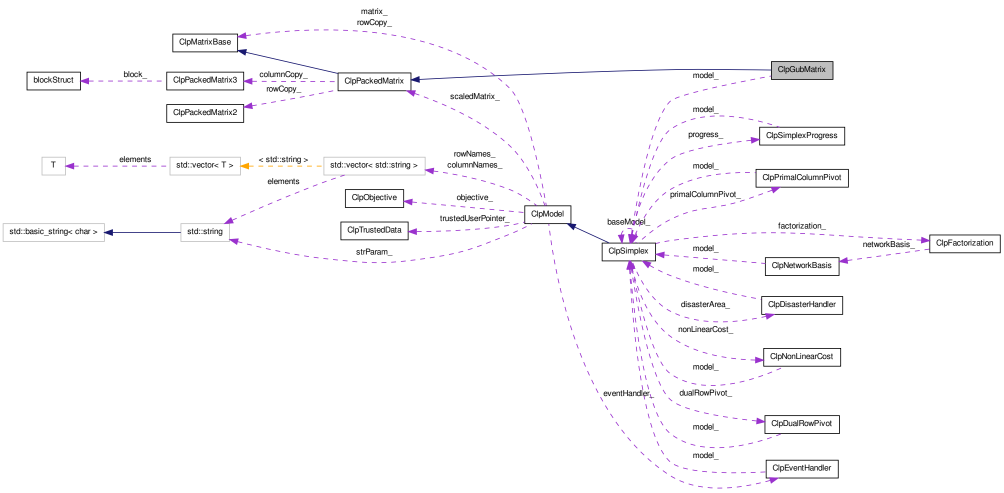
This implements Gub rows plus a ClpPackedMatrix.

`#include <ClpGubMatrix.hpp>`

Inheritance diagram for ClpGubMatrix:



Collaboration diagram for ClpGubMatrix:



Public Member Functions

Main functions provided

- virtual ClpMatrixBase ∗ reverseOrderedCopy () const

  Returns a new matrix in reverse order without gaps (GUB wants NULL)
- virtual CoinBigIndex countBasis (const int ∗whichColumn, int &numberColumnBasic)

  Returns number of elements in column part of basis.
- virtual void fillBasis (ClpSimplex ∗model, const int ∗whichColumn, int &numberColumnBasic, int ∗row, int ∗start, int ∗rowCount, int ∗columnCount, CoinFactorizationDouble ∗element)

  Fills in column part of basis.
- virtual void unpack (const ClpSimplex ∗model, CoinIndexedVector ∗rowArray, int column) const

  Unpacks a column into an CoinIndexedvector.
- virtual void unpackPacked (ClpSimplex ∗model, CoinIndexedVector ∗rowArray, int column) const

  Unpacks a column into an CoinIndexedvector in packed foramt Note that model is NOT const.
- virtual void add (const ClpSimplex ∗model, CoinIndexedVector ∗rowArray, int column, double multiplier) const

  Adds multiple of a column into an CoinIndexedvector You can use quickAdd to add to vector.
- virtual void add (const ClpSimplex ∗model, double ∗array, int column, double multiplier) const

  Adds multiple of a column into an array.
- virtual void partialPricing (ClpSimplex ∗model, double start, double end, int &bestSequence, int &numberWanted)

  Partial pricing.
- virtual int hiddenRows () const

  Returns number of hidden rows e.g. gub.

Matrix times vector methods

- virtual void transposeTimes (const ClpSimplex ∗model, double scalar, const CoinIndexedVector ∗x, CoinIndexedVector ∗y, CoinIndexedVector ∗z) const

  Return $x * scalar * A + y$ *in* z.
- virtual void transposeTimesByRow (const ClpSimplex ∗model, double scalar, const CoinIndexedVector ∗x, CoinIndexedVector ∗y, CoinIndexedVector ∗z) const

  Return $x * scalar * A + y$ *in* z.
- virtual void subsetTransposeTimes (const ClpSimplex ∗model, const CoinIndexedVector ∗x, const CoinIndexedVector ∗y, CoinIndexedVector ∗z) const

  Return $x * A$ *in* z *but just for indices in y.*
- virtual int extendUpdated (ClpSimplex ∗model, CoinIndexedVector ∗update, int mode)

  expands an updated column to allow for extra rows which the main solver does not know about and returns number added if mode 0.
- virtual void primalExpanded (ClpSimplex ∗model, int mode)

mode=0 - Set up before "update" and "times" for primal solution using extended rows mode=1 - Cleanup primal solution after "times" using extended rows.

- virtual void dualExpanded (ClpSimplex ∗model, CoinIndexedVector ∗array, double ∗other, int mode)

  mode=0 - Set up before "updateTranspose" and "transposeTimes" for duals using extended updates array (and may use other if dual values pass) mode=1 - Update dual solution after "transposeTimes" using extended rows.
- virtual int generalExpanded (ClpSimplex ∗model, int mode, int &number)

  mode=0 - Create list of non-key basics in pivotVariable_ using number as numberBasic in and out mode=1 - Set all key variables as basic mode=2 - return number extra rows needed, number gives maximum number basic mode=3 - before replaceColumn mode=4 - return 1 if can do primal, 2 if dual, 3 if both mode=5 - save any status stuff (when in good state) mode=6 - restore status stuff mode=7 - flag given variable (normally sequenceIn) mode=8 - unflag all variables mode=9 - synchronize costs mode=10 - return 1 if there may be changing bounds on variable (column generation) mode=11 - make sure set is clean (used when a variable rejected - but not flagged) mode=12 - after factorize but before permute stuff mode=13 - at end of simplex to delete stuff
- virtual int updatePivot (ClpSimplex ∗model, double oldInValue, double oldOutValue)

  update information for a pivot (and effective rhs)
- virtual void useEffectiveRhs (ClpSimplex ∗model, bool cheapest=true)

  Sets up an effective RHS and does gub crash if needed.
- virtual double ∗ rhsOffset (ClpSimplex ∗model, bool forceRefresh=false, bool check=false)

  Returns effective RHS offset if it is being used.
- virtual int synchronize (ClpSimplex ∗model, int mode)

  This is local to Gub to allow synchronization: mode=0 when status of basis is good mode=1 when variable is flagged mode=2 when all variables unflagged (returns number flagged) mode=3 just reset costs (primal) mode=4 correct number of dual infeasibilities mode=5 return 4 if time to re-factorize mode=6 - return 1 if there may be changing bounds on variable (column generation) mode=7 - do extra restores for column generation mode=8 - make sure set is clean mode=9 - adjust lower, upper on set by incoming.
- virtual void correctSequence (const ClpSimplex ∗model, int &sequenceIn, int &sequenceOut)

  Correct sequence in and out to give true value.

Constructors, destructor

- ClpGubMatrix ()

  Default constructor.
- virtual ∼ClpGubMatrix ()

  Destructor.

Copy method

- ClpGubMatrix (const ClpGubMatrix &)

  The copy constructor.
- ClpGubMatrix (const CoinPackedMatrix &)

  The copy constructor from an CoinPackedMatrix.

- ClpGubMatrix (const ClpGubMatrix &wholeModel, int numberRows, const int *whichRows, int numberColumns, const int *whichColumns)
  Subset constructor (without gaps).
- **ClpGubMatrix** (const CoinPackedMatrix &wholeModel, int numberRows, const int *whichRows, int numberColumns, const int *whichColumns)
- ClpGubMatrix (CoinPackedMatrix *matrix)
  This takes over ownership (for space reasons)
- ClpGubMatrix (ClpPackedMatrix *matrix, int numberSets, const int *start, const int *end, const double *lower, const double *upper, const unsigned char *status=NULL)
  This takes over ownership (for space reasons) and is the real constructor.
- ClpGubMatrix & **operator=** (const ClpGubMatrix &)
- virtual ClpMatrixBase * clone () const
  Clone.
- virtual ClpMatrixBase * subsetClone (int numberRows, const int *whichRows, int numberColumns, const int *whichColumns) const
  Subset clone (without gaps).
- void redoSet (ClpSimplex *model, int newKey, int oldKey, int iSet)
  redoes next_ for a set.

gets and sets

- ClpSimplex::Status getStatus (int sequence) const
  Status.
- void **setStatus** (int sequence, ClpSimplex::Status status)
- void setFlagged (int sequence)
  To flag a variable.
- void **clearFlagged** (int sequence)
- bool **flagged** (int sequence) const
- void setAbove (int sequence)
  To say key is above ub.
- void setFeasible (int sequence)
  To say key is feasible.
- void setBelow (int sequence)
  To say key is below lb.
- double **weight** (int sequence) const
- int * start () const
  Starts.
- int * end () const
  End.
- double * lower () const
  Lower bounds on sets.
- double * upper () const
  Upper bounds on sets.
- int * keyVariable () const
  Key variable of set.
- int * backward () const
  Backward pointer to set number.
- int numberSets () const
  Number of sets (gub rows)
- void switchOffCheck ()
  Switches off dj checking each factorization (for BIG models)

Protected Attributes

Data members

The data members are protected to allow access for derived classes.

- double sumDualInfeasibilities_

  Sum of dual infeasibilities.
- double sumPrimalInfeasibilities_

  Sum of primal infeasibilities.
- double sumOfRelaxedDualInfeasibilities_

  Sum of Dual infeasibilities using tolerance based on error in duals.
- double sumOfRelaxedPrimalInfeasibilities_

  Sum of Primal infeasibilities using tolerance based on error in primals.
- double infeasibilityWeight_

  Infeasibility weight when last full pass done.
- int ∗ start_

  Starts.
- int ∗ end_

  End.
- double ∗ lower_

  Lower bounds on sets.
- double ∗ upper_

  Upper bounds on sets.
- unsigned char ∗ status_

  Status of slacks.
- unsigned char ∗ saveStatus_

  Saved status of slacks.
- int ∗ savedKeyVariable_

  Saved key variables.
- int ∗ backward_

  Backward pointer to set number.
- int ∗ backToPivotRow_

  Backward pointer to pivot row !!!
- double ∗ changeCost_

  Change in costs for keys.
- int ∗ keyVariable_

  Key variable of set.
- int ∗ next_

  Next basic variable in set - starts at key and end with -(set+1).
- int ∗ toIndex_

  Backward pointer to index in CoinIndexedVector.
- int ∗ **fromIndex_**
- ClpSimplex ∗ model_

  Pointer back to model.
- int numberDualInfeasibilities_

  Number of dual infeasibilities.
- int numberPrimalInfeasibilities_

Number of primal infeasibilities.
- int noCheck_
  If pricing will declare victory (i.e.
- int numberSets_
  Number of sets (gub rows)
- int saveNumber_
  Number in vector without gub extension.
- int possiblePivotKey_
  Pivot row of possible next key.
- int gubSlackIn_
  Gub slack in (set number or -1)
- int firstGub_
  First gub variables (same as start_[0] at present)
- int lastGub_
  last gub variable (same as end_[numberSets_-1] at present)
- int gubType_
  type of gub - 0 not contiguous, 1 contiguous add 8 bit to say no ubs on individual variables

3.26.1 Detailed Description

This implements Gub rows plus a ClpPackedMatrix.

There will be a version using ClpPlusMinusOne matrix but there is no point doing one with ClpNetworkMatrix (although an embedded network is attractive).

Definition at line 22 of file ClpGubMatrix.hpp.

3.26.2 Constructor & Destructor Documentation

3.26.2.1 ClpGubMatrix::ClpGubMatrix ( )

Default constructor.

3.26.2.2 ClpGubMatrix::ClpGubMatrix (const **ClpGubMatrix** &)

The copy constructor.

3.26.2.3 ClpGubMatrix::ClpGubMatrix (const CoinPackedMatrix &)

The copy constructor from an CoinPackedMatrix.

3.26.2.4 ClpGubMatrix::ClpGubMatrix (const **ClpGubMatrix** & *wholeModel*, int *numberRows*, const int ∗ *whichRows*, int *numberColumns*, const int ∗ *whichColumns*)

Subset constructor (without gaps).

Duplicates are allowed and order is as given

3.26.3 Member Function Documentation

3.26.3.1 virtual void ClpGubMatrix::unpackPacked (ClpSimplex * *model*, CoinIndexedVector * *rowArray*, int *column*) const [virtual]

Unpacks a column into an CoinIndexedvector in packed foramt Note that model is NOT const.

Bounds and objective could be modified if doing column generation (just for this variable)

Reimplemented from ClpPackedMatrix.

3.26.3.2 virtual void ClpGubMatrix::transposeTimes (const ClpSimplex * *model*, double *scalar*, const CoinIndexedVector * *x*, CoinIndexedVector * *y*, CoinIndexedVector * *z*) const [virtual]

Return `x * scalar * A + y` in `z`.

Can use y as temporary array (will be empty at end) Note - If x packed mode - then z packed mode Squashes small elements and knows about ClpSimplex

Reimplemented from ClpPackedMatrix.

3.26.3.3 virtual void ClpGubMatrix::transposeTimesByRow (const ClpSimplex * *model*, double *scalar*, const CoinIndexedVector * *x*, CoinIndexedVector * *y*, CoinIndexedVector * *z*) const [virtual]

Return `x * scalar * A + y` in `z`.

Can use y as temporary array (will be empty at end) Note - If x packed mode - then z packed mode Squashes small elements and knows about ClpSimplex. This version uses row copy

Reimplemented from ClpPackedMatrix.

3.26.3.4 virtual void ClpGubMatrix::subsetTransposeTimes (const ClpSimplex * *model*, const CoinIndexedVector * *x*, const CoinIndexedVector * *y*, CoinIndexedVector * *z*) const [virtual]

Return `x *A` in `z` but just for indices in y.

Note - z always packed mode

Reimplemented from ClpPackedMatrix.

3.26.3.5 virtual int ClpGubMatrix::extendUpdated (ClpSimplex * *model*, CoinIndexedVector * *update*, int *mode*) [virtual]

expands an updated column to allow for extra rows which the main solver does not know about and returns number added if mode 0.

If mode 1 deletes extra entries

This active in Gub

Reimplemented from ClpMatrixBase.

3.26.3.6 virtual void ClpGubMatrix::primalExpanded (ClpSimplex ∗ *model,* int *mode*) [virtual]

mode=0 - Set up before "update" and "times" for primal solution using extended rows mode=1 - Cleanup primal solution after "times" using extended rows.

mode=2 - Check (or report on) primal infeasibilities

Reimplemented from ClpMatrixBase.

3.26.3.7 virtual void ClpGubMatrix::dualExpanded (ClpSimplex ∗ *model,* CoinIndexedVector ∗ *array,* double ∗ *other,* int *mode*) [virtual]

mode=0 - Set up before "updateTranspose" and "transposeTimes" for duals using extended updates array (and may use other if dual values pass) mode=1 - Update dual solution after "transposeTimes" using extended rows.

mode=2 - Compute all djs and compute key dual infeasibilities mode=3 - Report on key dual infeasibilities mode=4 - Modify before updateTranspose in partial pricing

Reimplemented from ClpMatrixBase.

3.26.3.8 virtual double∗ ClpGubMatrix::rhsOffset (ClpSimplex ∗ *model,* bool *forceRefresh =* false, bool *check =* false) [virtual]

Returns effective RHS offset if it is being used.

This is used for long problems or big gub or anywhere where going through full columns is expensive. This may re-compute

Reimplemented from ClpMatrixBase.

Reimplemented in ClpGubDynamicMatrix.

3.26.3.9 virtual ClpMatrixBase∗ ClpGubMatrix::subsetClone (int *numberRows,* const int ∗ *whichRows,* int *numberColumns,* const int ∗ *whichColumns*) const [virtual]

Subset clone (without gaps).

Duplicates are allowed and order is as given

Reimplemented from ClpPackedMatrix.

3.26.3.10 void ClpGubMatrix::redoSet (ClpSimplex ∗ *model,* int *newKey,* int *oldKey,* int *iSet*)

redoes next_ for a set.

3.26.4 Member Data Documentation

3.26.4.1 int∗ ClpGubMatrix::next_ [mutable, protected]

Next basic variable in set - starts at key and end with -(set+1).

Now changes to -(nonbasic+1). next_ has extra space for 2∗ longest set

Definition at line 323 of file ClpGubMatrix.hpp.

3.26.4.2 int ClpGubMatrix::noCheck_ [protected]

If pricing will declare victory (i.e.

no check every factorization). -1 - always check 0 - don't check 1 - in don't check mode but looks optimal

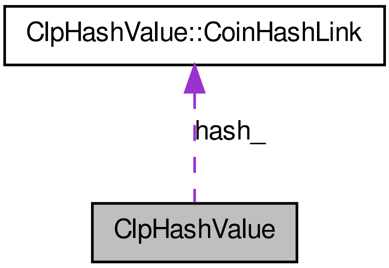
Definition at line 339 of file ClpGubMatrix.hpp.

The documentation for this class was generated from the following file:

- ClpGubMatrix.hpp

3.27 ClpHashValue Class Reference

Collaboration diagram for ClpHashValue:



Classes

- struct CoinHashLink

  Data.

Public Member Functions

Useful methods

- int index (double value) const

  Return index or -1 if not found.
- int addValue (double value)

  Add value to list and return index.

- int numberEntries () const
  Number of different entries.

Constructors, destructor

- ClpHashValue ()
  Default constructor.
- ClpHashValue (ClpSimplex *model)
  Useful constructor.
- virtual ~ClpHashValue ()
  Destructor.

Copy method

- ClpHashValue (const ClpHashValue &)
  The copy constructor.
- ClpHashValue & operator= (const ClpHashValue &)
  =

Protected Attributes

Data members

The data members are protected to allow access for derived classes.

- CoinHashLink * hash_
  Hash table.
- int numberHash_
  Number of entries in hash table.
- int maxHash_
  Maximum number of entries in hash table i.e. size.
- int lastUsed_
  Last used space.

3.27.1 Detailed Description

Definition at line 288 of file ClpNode.hpp.

3.27.2 Constructor & Destructor Documentation

3.27.2.1 ClpHashValue::ClpHashValue ( )

Default constructor.

3.27.2.2 ClpHashValue::ClpHashValue (ClpSimplex * *model*)

Useful constructor.

3.27.2.3 ClpHashValue::ClpHashValue (const ClpHashValue &)

The copy constructor.

The documentation for this class was generated from the following file:

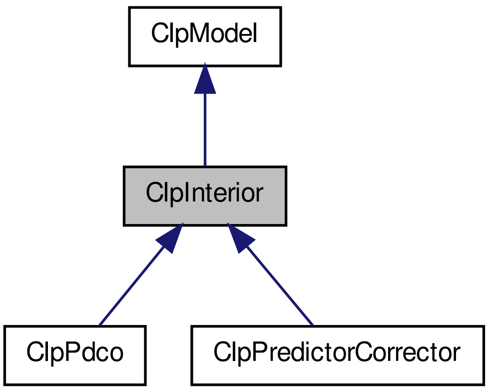
- ClpNode.hpp

3.28 ClpInterior Class Reference

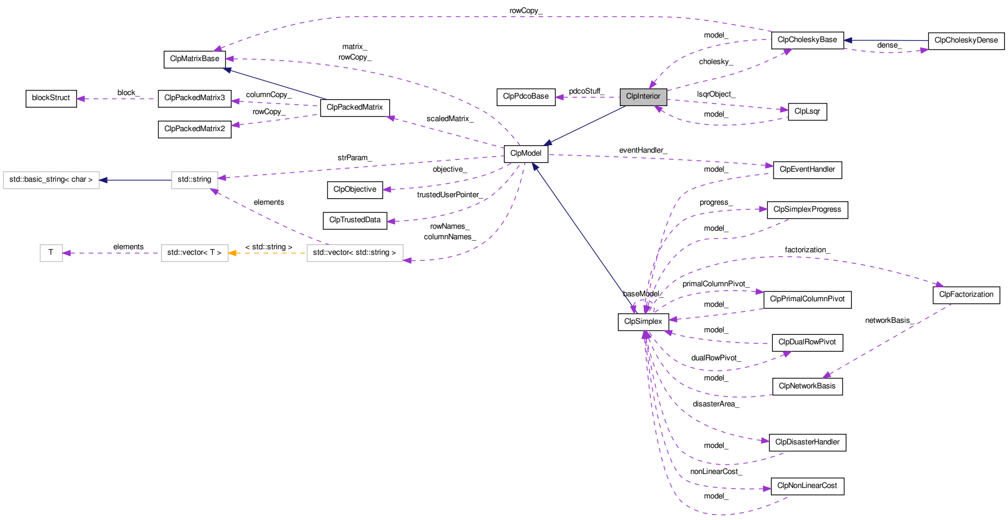
This solves LPs using interior point methods.

`#include <ClpInterior.hpp>`

Inheritance diagram for ClpInterior:



Collaboration diagram for ClpInterior:



Public Member Functions

Constructors and destructor and copy

- ClpInterior ()

  Default constructor.
- ClpInterior (const ClpInterior &)

  Copy constructor.
- ClpInterior (const ClpModel &)

  Copy constructor from model.
- ClpInterior (const ClpModel ∗wholeModel, int numberRows, const int ∗whichRows, int numberColumns, const int ∗whichColumns, bool dropNames=true, bool dropIntegers=true)

  Subproblem constructor.
- ClpInterior & operator= (const ClpInterior &rhs)

  Assignment operator. This copies the data.
- ∼ClpInterior ()

  Destructor.
- void loadProblem (const ClpMatrixBase &matrix, const double ∗collb, const double ∗colub, const double ∗obj, const double ∗rowlb, const double ∗rowub, const double ∗rowObjective=NULL)

  Loads a problem (the constraints on the rows are given by lower and upper bounds).
- void **loadProblem** (const CoinPackedMatrix &matrix, const double ∗collb, const double ∗colub, const double ∗obj, const double ∗rowlb, const double ∗rowub, const double ∗rowObjective=NULL)
- void loadProblem (const int numcols, const int numrows, const CoinBigIndex ∗start, const int ∗index, const double ∗value, const double ∗collb, const double

∗colub, const double ∗obj, const double ∗rowlb, const double ∗rowub, const double ∗rowObjective=NULL)

Just like the other loadProblem() method except that the matrix is given in a standard column major ordered format (without gaps).

- void loadProblem (const int numcols, const int numrows, const CoinBigIndex ∗start, const int ∗index, const double ∗value, const int ∗length, const double ∗collb, const double ∗colub, const double ∗obj, const double ∗rowlb, const double ∗rowub, const double ∗rowObjective=NULL)

  This one is for after presolve to save memory.
- int readMps (const char ∗filename, bool keepNames=false, bool ignoreErrors=false)

  Read an mps file from the given filename.
- void borrowModel (ClpModel &otherModel)

  Borrow model.
- void returnModel (ClpModel &otherModel)

  Return model - updates any scalars.

Functions most useful to user

- int pdco ()

  Pdco algorithm - see ClpPdco.hpp for method.
- int **pdco** (ClpPdcoBase ∗stuff, Options &options, Info &info, Outfo &outfo)
- int primalDual ()

  Primal-Dual Predictor-Corrector barrier.

most useful gets and sets

- bool primalFeasible () const

  If problem is primal feasible.
- bool dualFeasible () const

  If problem is dual feasible.
- int algorithm () const

  Current (or last) algorithm.
- void setAlgorithm (int value)

  Set algorithm.
- CoinWorkDouble sumDualInfeasibilities () const

  Sum of dual infeasibilities.
- CoinWorkDouble sumPrimalInfeasibilities () const

  Sum of primal infeasibilities.
- CoinWorkDouble dualObjective () const

  dualObjective.
- CoinWorkDouble primalObjective () const

  primalObjective.
- CoinWorkDouble diagonalNorm () const

  diagonalNorm
- CoinWorkDouble linearPerturbation () const

  linearPerturbation
- void **setLinearPerturbation** (CoinWorkDouble value)
- CoinWorkDouble projectionTolerance () const

projectionTolerance
- void **setProjectionTolerance** (CoinWorkDouble value)
- CoinWorkDouble diagonalPerturbation () const

  diagonalPerturbation
- void **setDiagonalPerturbation** (CoinWorkDouble value)
- CoinWorkDouble gamma () const

  gamma
- void **setGamma** (CoinWorkDouble value)
- CoinWorkDouble delta () const

  delta
- void **setDelta** (CoinWorkDouble value)
- CoinWorkDouble complementarityGap () const

  ComplementarityGap.
- CoinWorkDouble largestPrimalError () const

  Largest error on Ax-b.
- CoinWorkDouble largestDualError () const

  Largest error on basic duals.
- int maximumBarrierIterations () const

  Maximum iterations.
- void **setMaximumBarrierIterations** (int value)
- void setCholesky (ClpCholeskyBase *cholesky)

  Set cholesky (and delete present one)
- int numberFixed () const

  Return number fixed to see if worth presolving.
- void fixFixed (bool reallyFix=true)

  fix variables interior says should be.
- CoinWorkDouble * primalR () const

  Primal erturbation vector.
- CoinWorkDouble * dualR () const

  Dual erturbation vector.

public methods

- CoinWorkDouble rawObjectiveValue () const

  Raw objective value (so always minimize)
- int isColumn (int sequence) const

  Returns 1 if sequence indicates column.
- int sequenceWithin (int sequence) const

  Returns sequence number within section.
- void checkSolution ()

  Checks solution.
- CoinWorkDouble quadraticDjs (CoinWorkDouble *djRegion, const CoinWorkDouble *solution, CoinWorkDouble scaleFactor)

  Modifies djs to allow for quadratic.
- void setFixed (int sequence)

  To say a variable is fixed.
- void **clearFixed** (int sequence)
- bool **fixed** (int sequence) const
- void setFlagged (int sequence)

To flag a variable.
- void **clearFlagged** (int sequence)
- bool **flagged** (int sequence) const
- void setFixedOrFree (int sequence)

    To say a variable is fixed OR free.
- void **clearFixedOrFree** (int sequence)
- bool **fixedOrFree** (int sequence) const
- void setLowerBound (int sequence)

    To say a variable has lower bound.
- void **clearLowerBound** (int sequence)
- bool **lowerBound** (int sequence) const
- void setUpperBound (int sequence)

    To say a variable has upper bound.
- void **clearUpperBound** (int sequence)
- bool **upperBound** (int sequence) const
- void setFakeLower (int sequence)

    To say a variable has fake lower bound.
- void **clearFakeLower** (int sequence)
- bool **fakeLower** (int sequence) const
- void setFakeUpper (int sequence)

    To say a variable has fake upper bound.
- void **clearFakeUpper** (int sequence)
- bool **fakeUpper** (int sequence) const

Protected Member Functions

protected methods

- void gutsOfDelete ()

    Does most of deletion.
- void gutsOfCopy (const ClpInterior &rhs)

    Does most of copying.
- bool createWorkingData ()

    Returns true if data looks okay, false if not.
- void **deleteWorkingData** ()
- bool sanityCheck ()

    Sanity check on input rim data.
- int housekeeping ()

    This does housekeeping.

Friends

- void ClpInteriorUnitTest (const std::string &mpsDir, const std::string &netlibDir)

    A function that tests the methods in the ClpInterior class.

data. Many arrays have a row part and a column part.

There is a single array with both - columns then rows and then normally two arrays pointing to rows and columns.

The single array is the owner of memory

- CoinWorkDouble largestPrimalError_

  Largest error on Ax-b.
- CoinWorkDouble largestDualError_

  Largest error on basic duals.
- CoinWorkDouble sumDualInfeasibilities_

  Sum of dual infeasibilities.
- CoinWorkDouble sumPrimalInfeasibilities_

  Sum of primal infeasibilities.
- CoinWorkDouble worstComplementarity_

  Worst complementarity.
- CoinWorkDouble ∗ lower_

  Working copy of lower bounds (Owner of arrays below)
- CoinWorkDouble ∗ rowLowerWork_

  Row lower bounds - working copy.
- CoinWorkDouble ∗ columnLowerWork_

  Column lower bounds - working copy.
- CoinWorkDouble ∗ upper_

  Working copy of upper bounds (Owner of arrays below)
- CoinWorkDouble ∗ rowUpperWork_

  Row upper bounds - working copy.
- CoinWorkDouble ∗ columnUpperWork_

  Column upper bounds - working copy.
- CoinWorkDouble ∗ cost_

  Working copy of objective.
- ClpLsqr ∗ lsqrObject_

  Pointer to Lsqr object.
- ClpPdcoBase ∗ pdcoStuff_

  Pointer to stuff.
- CoinWorkDouble mu_

  Below here is standard barrier stuff mu.
- CoinWorkDouble objectiveNorm_

  objectiveNorm.
- CoinWorkDouble rhsNorm_

  rhsNorm.
- CoinWorkDouble solutionNorm_

  solutionNorm.
- CoinWorkDouble dualObjective_

dualObjective.

- CoinWorkDouble primalObjective_

  primalObjective.
- CoinWorkDouble diagonalNorm_

  diagonalNorm.
- CoinWorkDouble stepLength_

  stepLength
- CoinWorkDouble linearPerturbation_

  linearPerturbation
- CoinWorkDouble diagonalPerturbation_

  diagonalPerturbation
- CoinWorkDouble **gamma_**
- CoinWorkDouble **delta_**
- CoinWorkDouble targetGap_

  targetGap
- CoinWorkDouble projectionTolerance_

  projectionTolerance
- CoinWorkDouble maximumRHSError_

  maximumRHSError. maximum Ax
- CoinWorkDouble maximumBoundInfeasibility_

  maximumBoundInfeasibility.
- CoinWorkDouble maximumDualError_

  maximumDualError.
- CoinWorkDouble diagonalScaleFactor_

  diagonalScaleFactor.
- CoinWorkDouble scaleFactor_

  scaleFactor. For scaling objective
- CoinWorkDouble actualPrimalStep_

  actualPrimalStep
- CoinWorkDouble actualDualStep_

  actualDualStep
- CoinWorkDouble smallestInfeasibility_

  smallestInfeasibility
- CoinWorkDouble **historyInfeasibility_** [LENGTH_HISTORY]
- CoinWorkDouble complementarityGap_

  complementarityGap.
- CoinWorkDouble baseObjectiveNorm_

  baseObjectiveNorm
- CoinWorkDouble worstDirectionAccuracy_

  worstDirectionAccuracy
- CoinWorkDouble maximumRHSChange_

  maximumRHSChange
- CoinWorkDouble ∗ errorRegion_

errorRegion. i.e. Ax

- CoinWorkDouble ∗ rhsFixRegion_

  rhsFixRegion.
- CoinWorkDouble ∗ upperSlack_

  upperSlack
- CoinWorkDouble ∗ lowerSlack_

  lowerSlack
- CoinWorkDouble ∗ diagonal_

  diagonal
- CoinWorkDouble ∗ solution_

  solution
- CoinWorkDouble ∗ workArray_

  work array
- CoinWorkDouble ∗ deltaX_

  delta X
- CoinWorkDouble ∗ deltaY_

  delta Y
- CoinWorkDouble ∗ deltaZ_

  deltaZ.
- CoinWorkDouble ∗ deltaW_

  deltaW.
- CoinWorkDouble ∗ deltaSU_

  deltaS.
- CoinWorkDouble ∗ **deltaSL_**
- CoinWorkDouble ∗ primalR_

  Primal regularization array.
- CoinWorkDouble ∗ dualR_

  Dual regularization array.
- CoinWorkDouble ∗ rhsB_

  rhs B
- CoinWorkDouble ∗ rhsU_

  rhsU.
- CoinWorkDouble ∗ rhsL_

  rhsL.
- CoinWorkDouble ∗ rhsZ_

  rhsZ.
- CoinWorkDouble ∗ rhsW_

  rhsW.
- CoinWorkDouble ∗ rhsC_

  rhs C
- CoinWorkDouble ∗ zVec_

  zVec
- CoinWorkDouble ∗ wVec_

wVec

- ClpCholeskyBase * cholesky_

  cholesky.
- int numberComplementarityPairs_

  numberComplementarityPairs i.e. ones with lower and/or upper bounds (not fixed)
- int numberComplementarityItems_

  numberComplementarityItems_ i.e. number of active bounds
- int maximumBarrierIterations_

  Maximum iterations.
- bool gonePrimalFeasible_

  gonePrimalFeasible.
- bool goneDualFeasible_

  goneDualFeasible.
- int algorithm_

  Which algorithm being used.
- CoinWorkDouble **xsize_**
- CoinWorkDouble **zsize_**
- CoinWorkDouble * rhs_

  Rhs.
- CoinWorkDouble * **x_**
- CoinWorkDouble * **y_**
- CoinWorkDouble * **dj_**

3.28.1 Detailed Description

This solves LPs using interior point methods.

It inherits from ClpModel and all its arrays are created at algorithm time.

Definition at line 72 of file ClpInterior.hpp.

3.28.2 Constructor & Destructor Documentation

3.28.2.1 ClpInterior::ClpInterior (const **ClpModel** * *wholeModel*, int *numberRows*, const int * *whichRows*, int *numberColumns*, const int * *whichColumns*, bool *dropNames* = `true`, bool *dropIntegers* = `true`)

Subproblem constructor.

A subset of whole model is created from the row and column lists given. The new order is given by list order and duplicates are allowed. Name and integer information can be dropped

3.28.3 Member Function Documentation

3.28.3.1 void ClpInterior::loadProblem (const ClpMatrixBase & *matrix*, const double ∗ *collb*, const double ∗ *colub*, const double ∗ *obj*, const double ∗ *rowlb*, const double ∗ *rowub*, const double ∗ *rowObjective* = NULL)

Loads a problem (the constraints on the rows are given by lower and upper bounds).

If a pointer is 0 then the following values are the default:

- `colub`: all columns have upper bound infinity
- `collb`: all columns have lower bound 0
- `rowub`: all rows have upper bound infinity
- `rowlb`: all rows have lower bound -infinity
- `obj`: all variables have 0 objective coefficient

Reimplemented from ClpModel.

3.28.3.2 void ClpInterior::loadProblem (const int *numcols*, const int *numrows*, const CoinBigIndex ∗ *start*, const int ∗ *index*, const double ∗ *value*, const double ∗ *collb*, const double ∗ *colub*, const double ∗ *obj*, const double ∗ *rowlb*, const double ∗ *rowub*, const double ∗ *rowObjective* = NULL)

Just like the other loadProblem() method except that the matrix is given in a standard column major ordered format (without gaps).

Reimplemented from ClpModel.

3.28.3.3 void ClpInterior::borrowModel (ClpModel & *otherModel*)

Borrow model.

This is so we dont have to copy large amounts of data around. It assumes a derived class wants to overwrite an empty model with a real one - while it does an algorithm. This is same as ClpModel one.

Reimplemented from ClpModel.

3.28.3.4 void ClpInterior::fixFixed (bool *reallyFix* = `true`)

fix variables interior says should be.

If reallyFix false then just set values to exact bounds

3.28.3.5 CoinWorkDouble ClpInterior::quadraticDjs (CoinWorkDouble ∗ *djRegion*, const CoinWorkDouble ∗ *solution*, CoinWorkDouble *scaleFactor*)

Modifies djs to allow for quadratic.

returns quadratic offset

3.28.4 Friends And Related Function Documentation

3.28.4.1 void ClpInteriorUnitTest (const std::string & *mpsDir*, const std::string & *netlibDir*) [friend]

A function that tests the methods in the ClpInterior class.

The only reason for it not to be a member method is that this way it doesn't have to be compiled into the library. And that's a gain, because the library should be compiled with optimization on, but this method should be compiled with debugging.

It also does some testing of ClpFactorization class

3.28.5 Member Data Documentation

3.28.5.1 CoinWorkDouble ClpInterior::mu_ [protected]

Below here is standard barrier stuff mu.

Definition at line 441 of file ClpInterior.hpp.

The documentation for this class was generated from the following file:

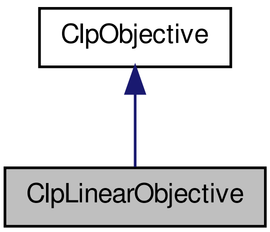
- ClpInterior.hpp

3.29 ClpLinearObjective Class Reference

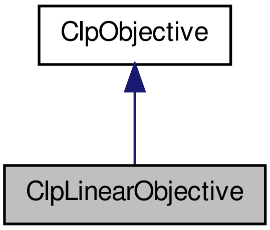
Linear Objective Class.

#include <ClpLinearObjective.hpp>

Inheritance diagram for ClpLinearObjective:



Collaboration diagram for ClpLinearObjective:



Public Member Functions

Stuff

- virtual double * gradient (const ClpSimplex *model, const double *solution, double &offset, bool refresh, int includeLinear=2)

  Returns objective coefficients.
- virtual double reducedGradient (ClpSimplex *model, double *region, bool useFeasibleCosts)

  Returns reduced gradient.Returns an offset (to be added to current one).
- virtual double stepLength (ClpSimplex *model, const double *solution, const double *change, double maximumTheta, double &currentObj, double &predictedObj, double &thetaObj)

  *Returns step length which gives minimum of objective for solution + theta * change vector up to maximum theta.*
- virtual double objectiveValue (const ClpSimplex *model, const double *solution) const

  Return objective value (without any ClpModel offset) (model may be NULL)
- virtual void resize (int newNumberColumns)

  Resize objective.
- virtual void deleteSome (int numberToDelete, const int *which)

  Delete columns in objective.
- virtual void reallyScale (const double *columnScale)

  Scale objective.

Constructors and destructors

- ClpLinearObjective ()

  Default Constructor.
- ClpLinearObjective (const double *objective, int numberColumns)

  Constructor from objective.

- ClpLinearObjective (const ClpLinearObjective &)
  Copy constructor.
- ClpLinearObjective (const ClpLinearObjective &rhs, int numberColumns, const int ∗whichColumns)
  Subset constructor.
- ClpLinearObjective & operator= (const ClpLinearObjective &rhs)
  Assignment operator.
- virtual ∼ClpLinearObjective ()
  Destructor.
- virtual ClpObjective ∗ clone () const
  Clone.
- virtual ClpObjective ∗ subsetClone (int numberColumns, const int ∗whichColumns) const
  Subset clone.

3.29.1 Detailed Description

Linear Objective Class.

Definition at line 17 of file ClpLinearObjective.hpp.

3.29.2 Constructor & Destructor Documentation

3.29.2.1 ClpLinearObjective::ClpLinearObjective (const ClpLinearObjective & *rhs*, int *numberColumns*, const int ∗ *whichColumns*)

Subset constructor.

Duplicates are allowed and order is as given.

3.29.3 Member Function Documentation

3.29.3.1 virtual double∗ ClpLinearObjective::gradient (const ClpSimplex ∗ *model*, const double ∗ *solution*, double & *offset*, bool *refresh*, int *includeLinear* = 2) [virtual]

Returns objective coefficients.

Offset is always set to 0.0. All other parameters unused.

Implements ClpObjective.

3.29.3.2 virtual double ClpLinearObjective::stepLength (ClpSimplex ∗ *model*, const double ∗ *solution*, const double ∗ *change*, double *maximumTheta*, double & *currentObj*, double & *predictedObj*, double & *thetaObj*) [virtual]

Returns step length which gives minimum of objective for solution + theta ∗ change vector up to maximum theta.

arrays are numberColumns+numberRows Also sets current objective, predicted and at maximumTheta

Implements ClpObjective.

3.29.3.3 virtual ClpObjective∗ ClpLinearObjective::subsetClone (int *numberColumns*, const int ∗ *whichColumns*) const [virtual]

Subset clone.

Duplicates are allowed and order is as given.

Reimplemented from ClpObjective.

The documentation for this class was generated from the following file:

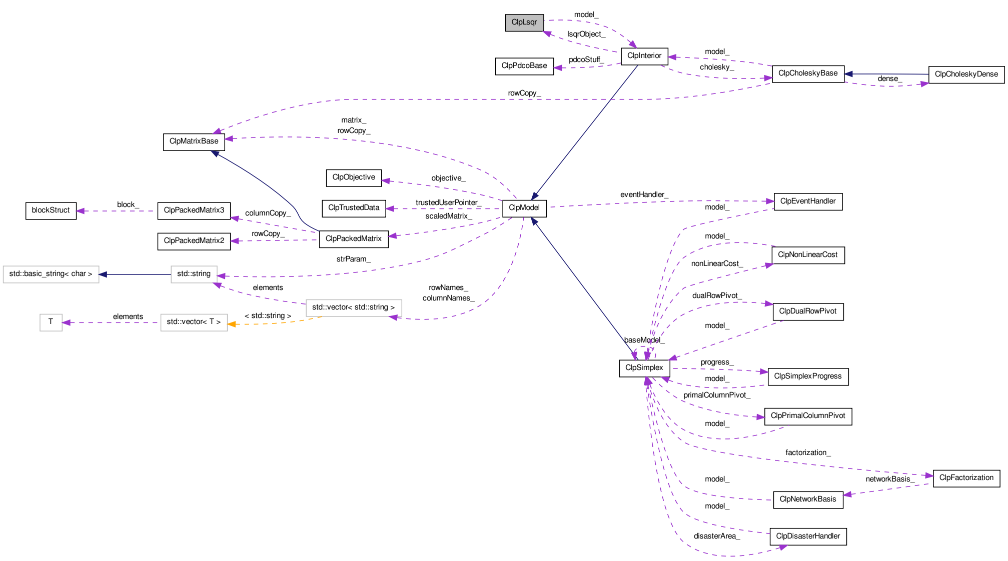
- ClpLinearObjective.hpp

3.30 ClpLsqr Class Reference

This class implements LSQR.

`#include <ClpLsqr.hpp>`

Collaboration diagram for ClpLsqr:



Public Member Functions

Constructors and destructors

- ClpLsqr ()

  Default constructor.
- ClpLsqr (ClpInterior ∗model)

Constructor for use with Pdco model (note modified for pdco!!!!)

- ClpLsqr (const ClpLsqr &)

  Copy constructor.

- ClpLsqr & operator= (const ClpLsqr &rhs)

  Assignment operator. This copies the data.

- ~ClpLsqr ()

  Destructor.

Methods

- bool setParam (char ∗parmName, int parmValue)

  Set an int parameter.

- void do_lsqr (CoinDenseVector< double > &b, double damp, double atol, double btol, double conlim, int itnlim, bool show, Info info, CoinDenseVector< double > &x, int ∗istop, int ∗itn, Outfo ∗outfo, bool precon, CoinDenseVector< double > &Pr)

  Call the Lsqr algorithm.

- void matVecMult (int, CoinDenseVector< double > ∗, CoinDenseVector< double > ∗)

  Matrix-vector multiply - implemented by user.

- void **matVecMult** (int, CoinDenseVector< double > &, CoinDenseVector< double > &)
- void borrowDiag1 (double ∗array)

  diag1 - we just borrow as it is part of a CoinDenseVector<double>

Public Attributes

Public member data

- int nrows_

  Row dimension of matrix.

- int ncols_

  Column dimension of matrix.

- ClpInterior ∗ model_

  Pointer to Model object for this instance.

- double ∗ diag1_

  Diagonal array 1.

- double diag2_

  Constant diagonal 2.

3.30.1 Detailed Description

This class implements LSQR.

```
LSQR solves  Ax = b  or  min ||b - Ax||_2  if damp = 0,
or   min || (b)   -  (  A    )x ||   otherwise.
         || (0)      (damp I)   ||2
A  is an m by n matrix defined by user provided routines
```

```
matVecMult(mode, y, x)
which performs the matrix-vector operations where y and x
are references or pointers to CoinDenseVector objects.
If mode = 1, matVecMult  must return  y = Ax   without altering x.
If mode = 2, matVecMult  must return  y = A'x  without altering x.

-----------------------------------------------------------------------
LSQR uses an iterative (conjugate-gradient-like) method.
For further information, see
1. C. C. Paige and M. A. Saunders (1982a).
   LSQR: An algorithm for sparse linear equations and sparse least squares,
   ACM TOMS 8(1), 43-71.
2. C. C. Paige and M. A. Saunders (1982b).
   Algorithm 583.  LSQR: Sparse linear equations and least squares problems,
   ACM TOMS 8(2), 195-209.
3. M. A. Saunders (1995).  Solution of sparse rectangular systems using
   LSQR and CRAIG, BIT 35, 588-604.

Input parameters:

atol, btol  are stopping tolerances.  If both are 1.0e-9 (say),
            the final residual norm should be accurate to about 9 digits.
            (The final x will usually have fewer correct digits,
            depending on cond(A) and the size of damp.)
conlim      is also a stopping tolerance.  lsqr terminates if an estimate
            of cond(A) exceeds conlim.  For compatible systems Ax = b,
            conlim could be as large as 1.0e+12 (say).  For least-squares
            problems, conlim should be less than 1.0e+8.
            Maximum precision can be obtained by setting
            atol = btol = conlim = zero, but the number of iterations
            may then be excessive.
itnlim      is an explicit limit on iterations (for safety).
show = 1    gives an iteration log,
show = 0    suppresses output.
info        is a structure special to pdco.m, used to test if
            was small enough, and continuing if necessary with smaller atol.


Output parameters:
x           is the final solution.
*istop       gives the reason for termination.
*istop       = 1 means x is an approximate solution to Ax = b.
            = 2 means x approximately solves the least-squares problem.
rnorm       = norm(r) if damp = 0, where r = b - Ax,
            = sqrt( norm(r)**2  +  damp**2 * norm(x)**2 ) otherwise.
xnorm       = norm(x).
var         estimates diag( inv(A'A) ).  Omitted in this special version.
outfo       is a structure special to pdco.m, returning information
            about whether atol had to be reduced.

Other potential output parameters:
anorm, acond, arnorm, xnorm
```

Definition at line 76 of file ClpLsqr.hpp.

The documentation for this class was generated from the following file:

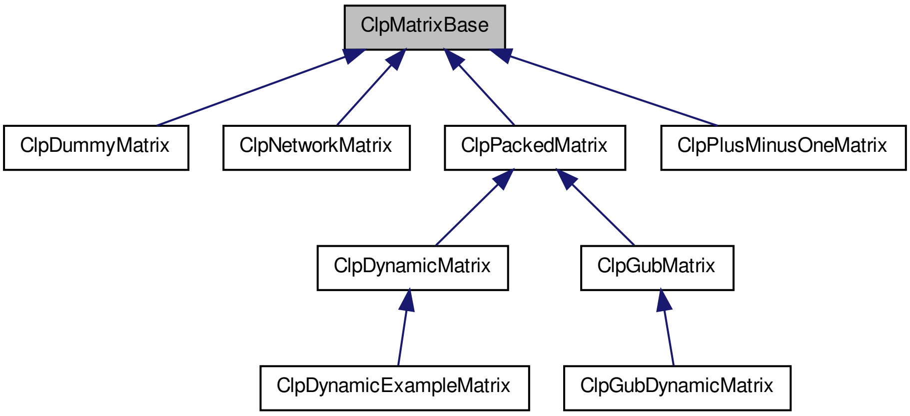
- ClpLsqr.hpp

3.31 ClpMatrixBase Class Reference

Abstract base class for Clp Matrices.

`#include <ClpMatrixBase.hpp>`

Inheritance diagram for ClpMatrixBase:



Public Member Functions

Virtual methods that the derived classes must provide

- virtual CoinPackedMatrix ∗ getPackedMatrix () const =0

  Return a complete CoinPackedMatrix.
- virtual bool isColOrdered () const =0

  Whether the packed matrix is column major ordered or not.
- virtual CoinBigIndex getNumElements () const =0

  Number of entries in the packed matrix.
- virtual int getNumCols () const =0

  Number of columns.
- virtual int getNumRows () const =0

  Number of rows.
- virtual const double ∗ getElements () const =0

  A vector containing the elements in the packed matrix.
- virtual const int ∗ getIndices () const =0

  A vector containing the minor indices of the elements in the packed matrix.
- virtual const CoinBigIndex ∗ **getVectorStarts** () const =0
- virtual const int ∗ getVectorLengths () const =0

  The lengths of the major-dimension vectors.
- virtual int getVectorLength (int index) const

The length of a single major-dimension vector.
- virtual void deleteCols (const int numDel, const int ∗indDel)=0

  Delete the columns whose indices are listed in `indDel`*.*
- virtual void deleteRows (const int numDel, const int ∗indDel)=0

  Delete the rows whose indices are listed in `indDel`*.*
- virtual void appendCols (int number, const CoinPackedVectorBase ∗const ∗columns)

  Append Columns.
- virtual void appendRows (int number, const CoinPackedVectorBase ∗const ∗rows)

  Append Rows.
- virtual void modifyCoefficient (int row, int column, double newElement, bool keepZero=false)

  Modify one element of packed matrix.
- virtual int appendMatrix (int number, int type, const CoinBigIndex ∗starts, const int ∗index, const double ∗element, int numberOther=-1)

  Append a set of rows/columns to the end of the matrix.
- virtual ClpMatrixBase ∗ reverseOrderedCopy () const

  Returns a new matrix in reverse order without gaps Is allowed to return NULL if doesn't want to have row copy.
- virtual CoinBigIndex countBasis (const int ∗whichColumn, int &numberColumnBasic)=0

  Returns number of elements in column part of basis.
- virtual void fillBasis (ClpSimplex ∗model, const int ∗whichColumn, int &numberColumnBasic, int ∗row, int ∗start, int ∗rowCount, int ∗columnCount, CoinFactorizationDouble ∗element)=0

  Fills in column part of basis.
- virtual int scale (ClpModel ∗, const ClpSimplex ∗=NULL) const

  Creates scales for column copy (rowCopy in model may be modified) default does not allow scaling returns non-zero if no scaling done.
- virtual void scaleRowCopy (ClpModel ∗) const

  Scales rowCopy if column copy scaled Only called if scales already exist.
- virtual bool canGetRowCopy () const

  Returns true if can create row copy.
- virtual ClpMatrixBase ∗ scaledColumnCopy (ClpModel ∗) const

  Realy really scales column copy Only called if scales already exist.
- virtual bool allElementsInRange (ClpModel ∗, double, double, int=15)

  Checks if all elements are in valid range.
- virtual void setDimensions (int numrows, int numcols)

  Set the dimensions of the matrix.
- virtual void rangeOfElements (double &smallestNegative, double &largestNegative, double &smallestPositive, double &largestPositive)

  Returns largest and smallest elements of both signs.
- virtual void unpack (const ClpSimplex ∗model, CoinIndexedVector ∗rowArray, int column) const =0

  Unpacks a column into an CoinIndexedvector.
- virtual void unpackPacked (ClpSimplex ∗model, CoinIndexedVector ∗rowArray, int column) const =0

  Unpacks a column into an CoinIndexedvector in packed format Note that model is NOT const.

- virtual int refresh (ClpSimplex ∗)

  Purely for column generation and similar ideas.
- virtual void **reallyScale** (const double ∗rowScale, const double ∗columnScale)

- virtual CoinBigIndex ∗ dubiousWeights (const ClpSimplex ∗model, int ∗inputWeights) const

  Given positive integer weights for each row fills in sum of weights for each column (and slack).
- virtual void add (const ClpSimplex ∗model, CoinIndexedVector ∗rowArray, int column, double multiplier) const =0

  Adds multiple of a column into an CoinIndexedvector You can use quickAdd to add to vector.
- virtual void add (const ClpSimplex ∗model, double ∗array, int column, double multiplier) const =0

  Adds multiple of a column into an array.
- virtual void releasePackedMatrix () const =0

  Allow any parts of a created CoinPackedMatrix to be deleted.
- virtual bool canDoPartialPricing () const

  Says whether it can do partial pricing.
- virtual int hiddenRows () const

  Returns number of hidden rows e.g. gub.
- virtual void partialPricing (ClpSimplex ∗model, double start, double end, int &bestSequence, int &numberWanted)

  Partial pricing.
- virtual int extendUpdated (ClpSimplex ∗model, CoinIndexedVector ∗update, int mode)

  expands an updated column to allow for extra rows which the main solver does not know about and returns number added.
- virtual void primalExpanded (ClpSimplex ∗model, int mode)

  utility primal function for dealing with dynamic constraints mode=0 - Set up before "update" and "times" for primal solution using extended rows mode=1 - Cleanup primal solution after "times" using extended rows.
- virtual void dualExpanded (ClpSimplex ∗model, CoinIndexedVector ∗array, double ∗other, int mode)

  utility dual function for dealing with dynamic constraints mode=0 - Set up before "updateTranspose" and "transposeTimes" for duals using extended updates array (and may use other if dual values pass) mode=1 - Update dual solution after "transposeTimes" using extended rows.
- virtual int generalExpanded (ClpSimplex ∗model, int mode, int &number)

  general utility function for dealing with dynamic constraints mode=0 - Create list of non-key basics in pivotVariable_ using number as numberBasic in and out mode=1 - Set all key variables as basic mode=2 - return number extra rows needed, number gives maximum number basic mode=3 - before replaceColumn mode=4 - return 1 if can do primal, 2 if dual, 3 if both mode=5 - save any status stuff (when in good state) mode=6 - restore status stuff mode=7 - flag given variable (normally sequenceIn) mode=8 - unflag all variables mode=9 - synchronize costs and bounds mode=10 - return 1 if there may be changing bounds on variable (column generation) mode=11 - make sure set is clean (used when a variable rejected - but not flagged) mode=12 - after factorize but before permute stuff mode=13 - at end of simplex to delete stuff
- virtual int updatePivot (ClpSimplex ∗model, double oldInValue, double oldOutValue)

update information for a pivot (and effective rhs)

- virtual void createVariable (ClpSimplex ∗model, int &bestSequence)

  Creates a variable.
- virtual int checkFeasible (ClpSimplex ∗model, double &sum) const

  Just for debug if odd type matrix.
- double reducedCost (ClpSimplex ∗model, int sequence) const

  Returns reduced cost of a variable.
- virtual void correctSequence (const ClpSimplex ∗model, int &sequenceIn, int &sequenceOut)

  Correct sequence in and out to give true value (if both -1 maybe do whole matrix)

Matrix times vector methods

They can be faster if scalar is +- 1 Also for simplex I am not using basic/non-basic split

- virtual void times (double scalar, const double ∗x, double ∗y) const =0

  Return $y + A * x * scalar$ *in* y.
- virtual void times (double scalar, const double ∗x, double ∗y, const double ∗rowScale, const double ∗columnScale) const

  And for scaling - default aborts for when scaling not supported (unless pointers NULL when as normal)
- virtual void transposeTimes (double scalar, const double ∗x, double ∗y) const =0

  Return $y + x * scalar * A$ *in* y.
- virtual void transposeTimes (double scalar, const double ∗x, double ∗y, const double ∗rowScale, const double ∗columnScale, double ∗spare=NULL) const

  And for scaling - default aborts for when scaling not supported (unless pointers NULL when as normal)
- virtual void transposeTimes (const ClpSimplex ∗model, double scalar, const CoinIndexedVector ∗x, CoinIndexedVector ∗y, CoinIndexedVector ∗z) const =0

  Return $x * scalar *A + y$ *in* z.
- virtual void subsetTransposeTimes (const ClpSimplex ∗model, const CoinIndexedVector ∗x, const CoinIndexedVector ∗y, CoinIndexedVector ∗z) const =0

  Return $x *A$ *in* z *but just for indices in y.*
- virtual bool canCombine (const ClpSimplex ∗, const CoinIndexedVector ∗) const

  Returns true if can combine transposeTimes and subsetTransposeTimes and if it would be faster.
- virtual void transposeTimes2 (const ClpSimplex ∗model, const CoinIndexedVector ∗pi1, CoinIndexedVector ∗dj1, const CoinIndexedVector ∗pi2, CoinIndexedVector ∗spare, double referenceIn, double devex, unsigned int ∗reference, double ∗weights, double scaleFactor)

  Updates two arrays for steepest and does devex weights (need not be coded)
- virtual void subsetTimes2 (const ClpSimplex ∗model, CoinIndexedVector ∗dj1, const CoinIndexedVector ∗pi2, CoinIndexedVector ∗dj2, double referenceIn, double devex, unsigned int ∗reference, double ∗weights, double scaleFactor)

  Updates second array for steepest and does devex weights (need not be coded)
- virtual void listTransposeTimes (const ClpSimplex ∗model, double ∗x, int ∗y, int number, double ∗z) const

  Return $x *A$ *in* z *but just for number indices in y.*

Other

Clone

- virtual ClpMatrixBase ∗ **clone** () const =0
- virtual ClpMatrixBase ∗ subsetClone (int numberRows, const int ∗whichRows, int numberColumns, const int ∗whichColumns) const

  Subset clone (without gaps).
- virtual void backToBasics ()

  Gets rid of any mutable by products.
- int type () const

  Returns type.
- void setType (int newtype)

  Sets type.
- void useEffectiveRhs (ClpSimplex ∗model)

  Sets up an effective RHS.
- virtual double ∗ rhsOffset (ClpSimplex ∗model, bool forceRefresh=false, bool check=false)

  Returns effective RHS offset if it is being used.
- int lastRefresh () const

  If rhsOffset used this is iteration last refreshed.
- int refreshFrequency () const

  If rhsOffset used this is refresh frequency (0==off)
- void **setRefreshFrequency** (int value)
- bool skipDualCheck () const

  whether to skip dual checks most of time
- void **setSkipDualCheck** (bool yes)
- int minimumObjectsScan () const

  Partial pricing tuning parameter - minimum number of "objects" to scan.
- void **setMinimumObjectsScan** (int value)
- int minimumGoodReducedCosts () const

  Partial pricing tuning parameter - minimum number of negative reduced costs to get.
- void **setMinimumGoodReducedCosts** (int value)
- double startFraction () const

  Current start of search space in matrix (as fraction)
- void **setStartFraction** (double value)
- double endFraction () const

  Current end of search space in matrix (as fraction)
- void **setEndFraction** (double value)
- double savedBestDj () const

  Current best reduced cost.
- void **setSavedBestDj** (double value)
- int originalWanted () const

  Initial number of negative reduced costs wanted.
- void **setOriginalWanted** (int value)
- int currentWanted () const

  Current number of negative reduced costs which we still need.
- void **setCurrentWanted** (int value)
- int savedBestSequence () const

  Current best sequence.
- void **setSavedBestSequence** (int value)

Protected Attributes

Data members

The data members are protected to allow access for derived classes.

- double ∗ rhsOffset_
  Effective RHS offset if it is being used.
- double startFraction_
  Current start of search space in matrix (as fraction)
- double endFraction_
  Current end of search space in matrix (as fraction)
- double savedBestDj_
  Best reduced cost so far.
- int originalWanted_
  Initial number of negative reduced costs wanted.
- int currentWanted_
  Current number of negative reduced costs which we still need.
- int savedBestSequence_
  Saved best sequence in pricing.
- int type_
  type (may be useful)
- int lastRefresh_
  If rhsOffset used this is iteration last refreshed.
- int refreshFrequency_
  If rhsOffset used this is refresh frequency (0==off)
- int minimumObjectsScan_
  Partial pricing tuning parameter - minimum number of "objects" to scan.
- int minimumGoodReducedCosts_
  Partial pricing tuning parameter - minimum number of negative reduced costs to get.
- int trueSequenceIn_
  True sequence in (i.e. from larger problem)
- int trueSequenceOut_
  True sequence out (i.e. from larger problem)
- bool skipDualCheck_
  whether to skip dual checks most of time

Constructors, destructor

NOTE: All constructors are protected.

There's no need to expose them, after all, this is an abstract class.

- virtual ∼ClpMatrixBase ()
  Destructor (has to be public)
- ClpMatrixBase ()
  Default constructor.
- **ClpMatrixBase** (const ClpMatrixBase &)
- ClpMatrixBase & **operator=** (const ClpMatrixBase &)

3.31.1 Detailed Description

Abstract base class for Clp Matrices.

Since this class is abstract, no object of this type can be created.

If a derived class provides all methods then all Clp algorithms should work. Some can be very inefficient e.g. getElements etc is only used for tightening bounds for dual and the copies are deleted. Many methods can just be dummy i.e. abort(); if not all features are being used. So if column generation was being done then it makes no sense to do steepest edge so there would be no point providing subsetTransposeTimes.

Definition at line 30 of file ClpMatrixBase.hpp.

3.31.2 Constructor & Destructor Documentation

3.31.2.1 ClpMatrixBase::ClpMatrixBase ( ) [protected]

Default constructor.

3.31.3 Member Function Documentation

3.31.3.1 virtual bool ClpMatrixBase::isColOrdered ( ) const [pure virtual]

Whether the packed matrix is column major ordered or not.

Implemented in ClpDummyMatrix, ClpNetworkMatrix, ClpPackedMatrix, and ClpPlusMinusOneMatrix.

3.31.3.2 virtual CoinBigIndex ClpMatrixBase::getNumElements ( ) const [pure virtual]

Number of entries in the packed matrix.

Implemented in ClpDummyMatrix, ClpNetworkMatrix, ClpPackedMatrix, and ClpPlusMinusOneMatrix.

3.31.3.3 virtual int ClpMatrixBase::getNumCols ( ) const [pure virtual]

Number of columns.

Implemented in ClpDummyMatrix, ClpNetworkMatrix, ClpPackedMatrix, and ClpPlusMinusOneMatrix.

3.31.3.4 virtual int ClpMatrixBase::getNumRows ( ) const [pure virtual]

Number of rows.

Implemented in ClpDummyMatrix, ClpNetworkMatrix, ClpPackedMatrix, and ClpPlusMinusOneMatrix.

3.31.3.5 virtual const double∗ ClpMatrixBase::getElements ( ) const [pure virtual]

A vector containing the elements in the packed matrix.

Note that there might be gaps in this list, entries that do not belong to any major-dimension vector. To get the actual elements one should look at this vector together with vectorStarts and vectorLengths.

Implemented in ClpDummyMatrix, ClpNetworkMatrix, ClpPackedMatrix, and ClpPlusMinusOneMatrix.

3.31.3.6 virtual const int∗ ClpMatrixBase::getIndices ( ) const [pure virtual]

A vector containing the minor indices of the elements in the packed matrix.

Note that there might be gaps in this list, entries that do not belong to any major-dimension vector. To get the actual elements one should look at this vector together with vectorStarts and vectorLengths.

Implemented in ClpDummyMatrix, ClpNetworkMatrix, ClpPackedMatrix, and ClpPlusMinusOneMatrix.

3.31.3.7 virtual const int∗ ClpMatrixBase::getVectorLengths ( ) const [pure virtual]

The lengths of the major-dimension vectors.

Implemented in ClpDummyMatrix, ClpNetworkMatrix, ClpPackedMatrix, and ClpPlusMinusOneMatrix.

3.31.3.8 virtual int ClpMatrixBase::getVectorLength (int *index*) const [virtual]

The length of a single major-dimension vector.

Reimplemented in ClpPackedMatrix.

3.31.3.9 virtual void ClpMatrixBase::deleteCols (const int *numDel,* const int ∗ *indDel*) [pure virtual]

Delete the columns whose indices are listed in `indDel`.

Implemented in ClpDummyMatrix, ClpNetworkMatrix, ClpPackedMatrix, and ClpPlusMinusOneMatrix.

3.31.3.10 virtual void ClpMatrixBase::deleteRows (const int *numDel,* const int ∗ *indDel*) [pure virtual]

Delete the rows whose indices are listed in `indDel`.

Implemented in ClpDummyMatrix, ClpNetworkMatrix, ClpPackedMatrix, and ClpPlusMinusOneMatrix.

3.31.3.11 virtual void ClpMatrixBase::modifyCoefficient (int *row,* int *column,* double *newElement,* bool *keepZero* = false) [virtual]

Modify one element of packed matrix.

An element may be added. This works for either ordering If the new element is zero it will be deleted unless keepZero true

Reimplemented in ClpPackedMatrix.

3.31.3.12 virtual int ClpMatrixBase::appendMatrix (int *number*, int *type*, const CoinBigIndex ∗ *starts*, const int ∗ *index*, const double ∗ *element*, int *numberOther* = -1) [virtual]

Append a set of rows/columns to the end of the matrix.

Returns number of errors i.e. if any of the new rows/columns contain an index that's larger than the number of columns-1/rows-1 (if numberOther>0) or duplicates If 0 then rows, 1 if columns

Reimplemented in ClpNetworkMatrix, ClpPackedMatrix, and ClpPlusMinusOneMatrix.

3.31.3.13 virtual ClpMatrixBase∗ ClpMatrixBase::scaledColumnCopy (ClpModel ∗) const [inline, virtual]

Realy really scales column copy Only called if scales already exist.

Up to user to delete

Reimplemented in ClpPackedMatrix.

Definition at line 118 of file ClpMatrixBase.hpp.

3.31.3.14 virtual bool ClpMatrixBase::allElementsInRange (ClpModel ∗ , double , double , int = 15) [inline, virtual]

Checks if all elements are in valid range.

Can just return true if you are not paranoid. For Clp I will probably expect no zeros. Code can modify matrix to get rid of small elements. check bits (can be turned off to save time) : 1 - check if matrix has gaps 2 - check if zero elements 4 - check and compress duplicates 8 - report on large and small

Reimplemented in ClpPackedMatrix.

Definition at line 132 of file ClpMatrixBase.hpp.

3.31.3.15 virtual void ClpMatrixBase::setDimensions (int *numrows*, int *numcols*) [virtual]

Set the dimensions of the matrix.

In effect, append new empty columns/rows to the matrix. A negative number for either dimension means that that dimension doesn't change. Otherwise the new dimensions MUST be at least as large as the current ones otherwise an exception is thrown.

Reimplemented in ClpPackedMatrix, and ClpPlusMinusOneMatrix.

3.31.3.16 virtual void ClpMatrixBase::rangeOfElements (double & *smallestNegative*, double & *largestNegative*, double & *smallestPositive*, double & *largestPositive*) [virtual]

Returns largest and smallest elements of both signs.

Largest refers to largest absolute value. If returns zeros then can't tell anything

Reimplemented in ClpNetworkMatrix, ClpPackedMatrix, and ClpPlusMinusOneMatrix.

3.31.3.17 virtual void ClpMatrixBase::unpackPacked (ClpSimplex * *model*, CoinIndexedVector * *rowArray*, int *column*) const [pure virtual]

Unpacks a column into an CoinIndexedvector in packed format Note that model is NOT const.

Bounds and objective could be modified if doing column generation (just for this variable)

Implemented in ClpDummyMatrix, ClpGubMatrix, ClpNetworkMatrix, ClpPackedMatrix, and ClpPlusMinusOneMatrix.

3.31.3.18 virtual int ClpMatrixBase::refresh (ClpSimplex *) [inline, virtual]

Purely for column generation and similar ideas.

Allows matrix and any bounds or costs to be updated (sensibly). Returns non-zero if any changes.

Reimplemented in ClpDynamicMatrix, and ClpPackedMatrix.

Definition at line 164 of file ClpMatrixBase.hpp.

3.31.3.19 virtual CoinBigIndex* ClpMatrixBase::dubiousWeights (const ClpSimplex * *model*, int * *inputWeights*) const [virtual]

Given positive integer weights for each row fills in sum of weights for each column (and slack).

Returns weights vector Default returns vector of ones

Reimplemented in ClpNetworkMatrix, ClpPackedMatrix, and ClpPlusMinusOneMatrix.

3.31.3.20 virtual int ClpMatrixBase::extendUpdated (ClpSimplex * *model*, CoinIndexedVector * *update*, int *mode*) [virtual]

expands an updated column to allow for extra rows which the main solver does not know about and returns number added.

This will normally be a no-op - it is in for GUB but may get extended to general non-overlapping and embedded networks.

mode 0 - extend mode 1 - delete etc

Reimplemented in ClpGubMatrix.

3.31.3.21 virtual void ClpMatrixBase::primalExpanded (ClpSimplex * *model*, int *mode*) [virtual]

utility primal function for dealing with dynamic constraints mode=0 - Set up before "update" and "times" for primal solution using extended rows mode=1 - Cleanup primal solution after "times" using extended rows.

mode=2 - Check (or report on) primal infeasibilities

Reimplemented in ClpGubMatrix.

3.31.3.22 virtual void ClpMatrixBase::dualExpanded (ClpSimplex * *model*, CoinIndexedVector * *array*, double * *other*, int *mode*) [virtual]

utility dual function for dealing with dynamic constraints mode=0 - Set up before "updateTranspose" and "transposeTimes" for duals using extended updates array (and may use other if dual values pass) mode=1 - Update dual solution after "transposeTimes" using extended rows.

mode=2 - Compute all djs and compute key dual infeasibilities mode=3 - Report on key dual infeasibilities mode=4 - Modify before updateTranspose in partial pricing

Reimplemented in ClpDynamicMatrix, and ClpGubMatrix.

3.31.3.23 virtual int ClpMatrixBase::generalExpanded (ClpSimplex * *model*, int *mode*, int & *number*) [virtual]

general utility function for dealing with dynamic constraints mode=0 - Create list of non-key basics in pivotVariable_ using number as numberBasic in and out mode=1 - Set all key variables as basic mode=2 - return number extra rows needed, number gives maximum number basic mode=3 - before replaceColumn mode=4 - return 1 if can do primal, 2 if dual, 3 if both mode=5 - save any status stuff (when in good state) mode=6 - restore status stuff mode=7 - flag given variable (normally sequenceIn) mode=8 - unflag all variables mode=9 - synchronize costs and bounds mode=10 - return 1 if there may be changing bounds on variable (column generation) mode=11 - make sure set is clean (used when a variable rejected - but not flagged) mode=12 - after factorize but before permute stuff mode=13 - at end of simplex to delete stuff

Reimplemented in ClpDynamicMatrix, and ClpGubMatrix.

3.31.3.24 virtual void ClpMatrixBase::createVariable (ClpSimplex * *model*, int & *bestSequence*) [virtual]

Creates a variable.

This is called after partial pricing and may modify matrix. May update bestSequence.

Reimplemented in ClpDynamicExampleMatrix, and ClpDynamicMatrix.

3.31.3.25 virtual int ClpMatrixBase::checkFeasible (ClpSimplex * *model*, double & *sum*) const [virtual]

Just for debug if odd type matrix.

Returns number of primal infeasibilities.

Reimplemented in ClpGubDynamicMatrix.

3.31.3.26 virtual void ClpMatrixBase::times (double *scalar*, const double * *x*, double * *y*) const [pure virtual]

Return `y + A * x * scalar` in `y`.

Precondition

`x` must be of size `numColumns()`
`y` must be of size `numRows()`

Implemented in ClpDummyMatrix, ClpDynamicMatrix, ClpGubDynamicMatrix, ClpNetworkMatrix, ClpPackedMatrix, and ClpPlusMinusOneMatrix.

3.31.3.27 virtual void ClpMatrixBase::transposeTimes (double *scalar*, const double * *x*, double * *y*) const [pure virtual]

Return `y + x * scalar * A` in `y`.

Precondition

`x` must be of size `numRows()`
`y` must be of size `numColumns()`

Implemented in ClpDummyMatrix, ClpNetworkMatrix, ClpPackedMatrix, and ClpPlusMinusOneMatrix.

3.31.3.28 virtual void ClpMatrixBase::transposeTimes (const **ClpSimplex** * *model*, double *scalar*, const CoinIndexedVector * *x*, CoinIndexedVector * *y*, CoinIndexedVector * *z*) const [pure virtual]

Return `x * scalar *A + y` in `z`.

Can use y as temporary array (will be empty at end) Note - If x packed mode - then z packed mode Squashes small elements and knows about ClpSimplex

Implemented in ClpDummyMatrix, ClpGubMatrix, ClpNetworkMatrix, ClpPackedMatrix, and ClpPlusMinusOneMatrix.

3.31.3.29 virtual void ClpMatrixBase::subsetTransposeTimes (const **ClpSimplex** * *model*, const CoinIndexedVector * *x*, const CoinIndexedVector * *y*, CoinIndexedVector * *z*) const [pure virtual]

Return `x *A` in `z` but just for indices in y.

This is only needed for primal steepest edge. Note - z always packed mode

Implemented in ClpDummyMatrix, ClpGubMatrix, ClpNetworkMatrix, ClpPackedMatrix, and ClpPlusMinusOneMatrix.

3.31.3.30 virtual void ClpMatrixBase::listTransposeTimes (const **ClpSimplex** * *model*, double * *x*, int * *y*, int *number*, double * *z*) const [virtual]

Return `x *A` in `z` but just for number indices in y.

Default cheats with fake CoinIndexedVector and then calls subsetTransposeTimes

3.31.3.31 virtual ClpMatrixBase* ClpMatrixBase::subsetClone (int *numberRows*, const int * *whichRows*, int *numberColumns*, const int * *whichColumns*) const [virtual]

Subset clone (without gaps).

Duplicates are allowed and order is as given. Derived classes need not provide this as it may not always make sense

Reimplemented in ClpGubMatrix, ClpNetworkMatrix, ClpPackedMatrix, and ClpPlusMinusOneMatrix.

3.31.3.32 int ClpMatrixBase::type ( ) const [inline]

Returns type.

The types which code may need to know about are: 1 - ClpPackedMatrix 11 - ClpNetworkMatrix 12 - ClpPlusMinusOneMatrix

Definition at line 362 of file ClpMatrixBase.hpp.

3.31.3.33 virtual double* ClpMatrixBase::rhsOffset (ClpSimplex * *model*, bool *forceRefresh* = false, bool *check* = false) [virtual]

Returns effective RHS offset if it is being used.

This is used for long problems or big gub or anywhere where going through full columns is expensive. This may re-compute

Reimplemented in ClpDynamicMatrix, ClpGubDynamicMatrix, and ClpGubMatrix.

3.31.3.34 int ClpMatrixBase::minimumObjectsScan ( ) const [inline]

Partial pricing tuning parameter - minimum number of "objects" to scan.

e.g. number of Gub sets but could be number of variables

Definition at line 396 of file ClpMatrixBase.hpp.

3.31.4 Member Data Documentation

3.31.4.1 double* ClpMatrixBase::rhsOffset_ [protected]

Effective RHS offset if it is being used.

This is used for long problems or big gub or anywhere where going through full columns is expensive

Definition at line 480 of file ClpMatrixBase.hpp.

The documentation for this class was generated from the following file:

- ClpMatrixBase.hpp

3.32 ClpMessage Class Reference

This deals with Clp messages (as against Osi messages etc)

`#include <ClpMessage.hpp>`

Public Member Functions

Constructors etc

- ClpMessage (Language language=us_en)
  Constructor.

3.32.1 Detailed Description

This deals with Clp messages (as against Osi messages etc)

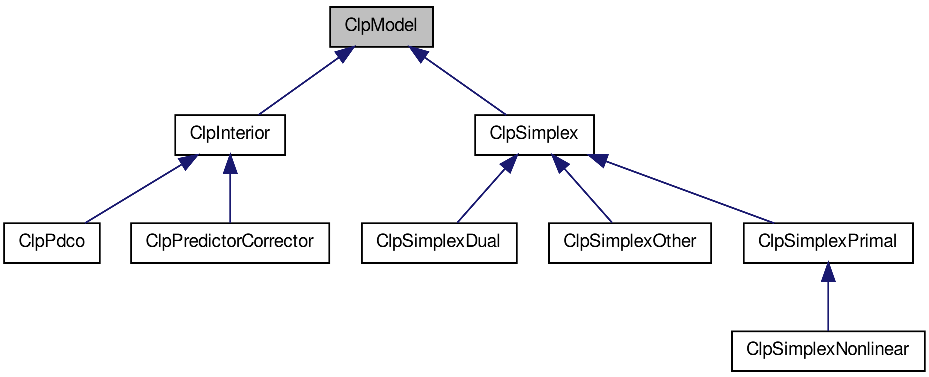
Definition at line 118 of file ClpMessage.hpp.

The documentation for this class was generated from the following file:

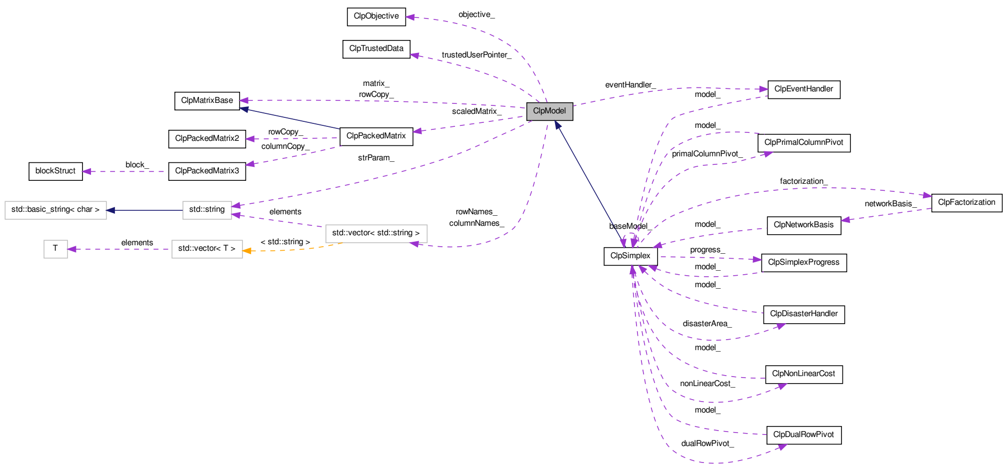
- ClpMessage.hpp

3.33 ClpModel Class Reference

Inheritance diagram for ClpModel:



Collaboration diagram for ClpModel:



Public Member Functions

- const double ∗ rowScale () const

  Scaling.
- double objectiveScale () const

  Scaling of objective.
- double rhsScale () const

  Scaling of rhs and bounds.
- void scaling (int mode=1)

  Sets or unsets scaling, 0 -off, 1 equilibrium, 2 geometric, 3 auto, 4 auto-but-as-initialSolve-in-bab.
- void unscale ()

  If we constructed a "really" scaled model then this reverses the operation.
- int scalingFlag () const

  Gets scalingFlag.
- double ∗ objective () const

  Objective.
- double ∗ rowObjective () const

  Row Objective.
- double ∗ columnLower () const

  Column Lower.
- double ∗ columnUpper () const

  Column Upper.
- CoinPackedMatrix ∗ matrix () const

  Matrix (if not ClpPackedmatrix be careful about memory leak.

- int getNumElements () const

  Number of elements in matrix.
- double getSmallElementValue () const

  Small element value - elements less than this set to zero, default is 1.0e-20.
- ClpMatrixBase ∗ rowCopy () const

  Row Matrix.
- void setNewRowCopy (ClpMatrixBase ∗newCopy)

  Set new row matrix.
- ClpMatrixBase ∗ clpMatrix () const

  Clp Matrix.
- ClpPackedMatrix ∗ clpScaledMatrix () const

  Scaled ClpPackedMatrix.
- void setClpScaledMatrix (ClpPackedMatrix ∗scaledMatrix)

  Sets pointer to scaled ClpPackedMatrix.
- void replaceMatrix (ClpMatrixBase ∗matrix, bool deleteCurrent=false)

  Replace Clp Matrix (current is not deleted unless told to and new is used) So up to user to delete current.
- void replaceMatrix (CoinPackedMatrix ∗newmatrix, bool deleteCurrent=false)

  Replace Clp Matrix (current is not deleted unless told to and new is used) So up to user to delete current.
- double objectiveValue () const

  Objective value.
- char ∗ integerInformation () const

  Integer information.
- double ∗ infeasibilityRay () const

  Infeasibility/unbounded ray (NULL returned if none/wrong) Up to user to use delete [] on these arrays.
- bool rayExists () const

  just test if infeasibility or unbounded Ray exists
- void deleteRay ()

  just delete ray if exists
- bool statusExists () const

  See if status (i.e. basis) array exists (partly for OsiClp)
- unsigned char ∗ statusArray () const

  Return address of status (i.e. basis) array (char[numberRows+numberColumns])
- unsigned char ∗ statusCopy () const

  Return copy of status (i.e.
- void copyinStatus (const unsigned char ∗statusArray)

  Copy in status (basis) vector.
- void setUserPointer (void ∗pointer)

  User pointer for whatever reason.
- void setTrustedUserPointer (ClpTrustedData ∗pointer)

  Trusted user pointer.
- int whatsChanged () const

What has changed in model (only for masochistic users)
- int numberThreads () const

  Number of threads (not really being used)

Constructors and destructor

Note - copy methods copy ALL data so can chew up memory until other copy is freed

- ClpModel (bool emptyMessages=false)

  Default constructor.
- ClpModel (const ClpModel &rhs, int scalingMode=-1)

  Copy constructor.
- ClpModel & operator= (const ClpModel &rhs)

  Assignment operator. This copies the data.
- ClpModel (const ClpModel ∗wholeModel, int numberRows, const int ∗whichRows, int numberColumns, const int ∗whichColumns, bool dropNames=true, bool dropIntegers=true)

  Subproblem constructor.
- ∼ClpModel ()

  Destructor.

Load model - loads some stuff and initializes others

- void loadProblem (const ClpMatrixBase &matrix, const double ∗collb, const double ∗colub, const double ∗obj, const double ∗rowlb, const double ∗rowub, const double ∗rowObjective=NULL)

  Loads a problem (the constraints on the rows are given by lower and upper bounds).
- void **loadProblem** (const CoinPackedMatrix &matrix, const double ∗collb, const double ∗colub, const double ∗obj, const double ∗rowlb, const double ∗rowub, const double ∗rowObjective=NULL)
- void loadProblem (const int numcols, const int numrows, const CoinBigIndex ∗start, const int ∗index, const double ∗value, const double ∗collb, const double ∗colub, const double ∗obj, const double ∗rowlb, const double ∗rowub, const double ∗rowObjective=NULL)

  Just like the other loadProblem() method except that the matrix is given in a standard column major ordered format (without gaps).
- int loadProblem (CoinModel &modelObject, bool tryPlusMinusOne=false)

  This loads a model from a coinModel object - returns number of errors.
- void loadProblem (const int numcols, const int numrows, const CoinBigIndex ∗start, const int ∗index, const double ∗value, const int ∗length, const double ∗collb, const double ∗colub, const double ∗obj, const double ∗rowlb, const double ∗rowub, const double ∗rowObjective=NULL)

  This one is for after presolve to save memory.
- void loadQuadraticObjective (const int numberColumns, const CoinBigIndex ∗start, const int ∗column, const double ∗element)

  Load up quadratic objective.
- void **loadQuadraticObjective** (const CoinPackedMatrix &matrix)
- void deleteQuadraticObjective ()

  Get rid of quadratic objective.

- void setRowObjective (const double ∗rowObjective)

  This just loads up a row objective.
- int readMps (const char ∗filename, bool keepNames=false, bool ignoreErrors=false)

  Read an mps file from the given filename.
- int readGMPL (const char ∗filename, const char ∗dataName, bool keepNames=false)

  Read GMPL files from the given filenames.
- void copyInIntegerInformation (const char ∗information)

  Copy in integer informations.
- void deleteIntegerInformation ()

  Drop integer informations.
- void setContinuous (int index)

  Set the index-th variable to be a continuous variable.
- void setInteger (int index)

  Set the index-th variable to be an integer variable.
- bool isInteger (int index) const

  Return true if the index-th variable is an integer variable.
- void resize (int newNumberRows, int newNumberColumns)

  Resizes rim part of model.
- void deleteRows (int number, const int ∗which)

  Deletes rows.
- void addRow (int numberInRow, const int ∗columns, const double ∗elements, double rowLower=-COIN_DBL_MAX, double rowUpper=COIN_DBL_MAX)

  Add one row.
- void addRows (int number, const double ∗rowLower, const double ∗rowUpper, const CoinBigIndex ∗rowStarts, const int ∗columns, const double ∗elements)

  Add rows.
- void addRows (int number, const double ∗rowLower, const double ∗rowUpper, const CoinBigIndex ∗rowStarts, const int ∗rowLengths, const int ∗columns, const double ∗elements)

  Add rows.
- void **addRows** (int number, const double ∗rowLower, const double ∗rowUpper, const CoinPackedVectorBase ∗const ∗rows)
- int addRows (const CoinBuild &buildObject, bool tryPlusMinusOne=false, bool checkDuplicates=true)

  Add rows from a build object.
- int addRows (CoinModel &modelObject, bool tryPlusMinusOne=false, bool checkDuplicates=true)

  Add rows from a model object.
- void deleteColumns (int number, const int ∗which)

  Deletes columns.
- void addColumn (int numberInColumn, const int ∗rows, const double ∗elements, double columnLower=0.0, double columnUpper=COIN_DBL_MAX, double objective=0.0)

  Add one column.
- void addColumns (int number, const double ∗columnLower, const double ∗columnUpper, const double ∗objective, const CoinBigIndex ∗columnStarts, const int ∗rows, const double ∗elements)

Add columns.

- void **addColumns** (int number, const double ∗columnLower, const double ∗columnUpper, const double ∗objective, const CoinBigIndex ∗columnStarts, const int ∗columnLengths, const int ∗rows, const double ∗elements)
- void **addColumns** (int number, const double ∗columnLower, const double ∗columnUpper, const double ∗objective, const CoinPackedVectorBase ∗const ∗columns)
- int addColumns (const CoinBuild &buildObject, bool tryPlusMinusOne=false, bool checkDuplicates=true)

  Add columns from a build object If tryPlusMinusOne then will try adding as +-1 matrix if no matrix exists.
- int addColumns (CoinModel &modelObject, bool tryPlusMinusOne=false, bool checkDuplicates=true)

  Add columns from a model object.
- void modifyCoefficient (int row, int column, double newElement, bool keepZero=false)

  Modify one element of a matrix.
- void chgRowLower (const double ∗rowLower)

  Change row lower bounds.
- void chgRowUpper (const double ∗rowUpper)

  Change row upper bounds.
- void chgColumnLower (const double ∗columnLower)

  Change column lower bounds.
- void chgColumnUpper (const double ∗columnUpper)

  Change column upper bounds.
- void chgObjCoefficients (const double ∗objIn)

  Change objective coefficients.
- void borrowModel (ClpModel &otherModel)

  Borrow model.
- void returnModel (ClpModel &otherModel)

  Return model - nulls all arrays so can be deleted safely also updates any scalars.
- void createEmptyMatrix ()

  Create empty ClpPackedMatrix.
- int cleanMatrix (double threshold=1.0e-20)

  Really clean up matrix (if ClpPackedMatrix).
- void copy (const ClpMatrixBase ∗from, ClpMatrixBase ∗&to)

  Copy contents - resizing if necessary - otherwise re-use memory.
- void dropNames ()

  Drops names - makes lengthnames 0 and names empty.
- void copyNames (std::vector< std::string > &rowNames, std::vector< std::string > &columnNames)

  Copies in names.
- void copyRowNames (const std::vector< std::string > &rowNames, int first, int last)

  Copies in Row names - modifies names first .. last-1.
- void copyColumnNames (const std::vector< std::string > &columnNames, int first, int last)

  Copies in Column names - modifies names first .. last-1.
- void copyRowNames (const char ∗const ∗rowNames, int first, int last)

Copies in Row names - modifies names first .. last-1.
- void copyColumnNames (const char ∗const ∗columnNames, int first, int last)

  Copies in Column names - modifies names first .. last-1.
- void setRowName (int rowIndex, std::string &name)

  Set name of row.
- void setColumnName (int colIndex, std::string &name)

  Set name of col.
- int findNetwork (char ∗rotate, double fractionNeeded=0.75)

  Find a network subset.
- CoinModel ∗ createCoinModel () const

  This creates a coinModel object.
- int writeMps (const char ∗filename, int formatType=0, int numberAcross=2, double objSense=0.0) const

  Write the problem in MPS format to the specified file.

gets and sets

- int numberRows () const

  Number of rows.
- int **getNumRows** () const
- int getNumCols () const

  Number of columns.
- int **numberColumns** () const
- double primalTolerance () const

  Primal tolerance to use.
- void **setPrimalTolerance** (double value)
- double dualTolerance () const

  Dual tolerance to use.
- void **setDualTolerance** (double value)
- double primalObjectiveLimit () const

  Primal objective limit.
- void **setPrimalObjectiveLimit** (double value)
- double dualObjectiveLimit () const

  Dual objective limit.
- void **setDualObjectiveLimit** (double value)
- double objectiveOffset () const

  Objective offset.
- void **setObjectiveOffset** (double value)
- double presolveTolerance () const

  Presolve tolerance to use.
- std::string **problemName** () const
- int numberIterations () const

  Number of iterations.
- int **getIterationCount** () const
- void **setNumberIterations** (int numberIterationsNew)
- int solveType () const

  Solve type - 1 simplex, 2 simplex interface, 3 Interior.
- void **setSolveType** (int type)
- int maximumIterations () const

Maximum number of iterations.

- void **setMaximumIterations** (int value)
- double maximumSeconds () const

    Maximum time in seconds (from when set called)
- void **setMaximumSeconds** (double value)
- bool hitMaximumIterations () const

    Returns true if hit maximum iterations (or time)
- int status () const

    Status of problem:
- int **problemStatus** () const
- void setProblemStatus (int problemStatusNew)

    Set problem status.
- int secondaryStatus () const

    Secondary status of problem - may get extended 0 - none 1 - primal infeasible because dual limit reached OR (probably primal infeasible but can't prove it - main status was 4) 2 - scaled problem optimal - unscaled problem has primal infeasibilities 3 - scaled problem optimal - unscaled problem has dual infeasibilities 4 - scaled problem optimal - unscaled problem has primal and dual infeasibilities 5 - giving up in primal with flagged variables 6 - failed due to empty problem check 7 - postSolve says not optimal 8 - failed due to bad element check 9 - status was 3 and stopped on time 100 up - translation of enum from ClpEventHandler.
- void **setSecondaryStatus** (int newstatus)
- bool isAbandoned () const

    Are there a numerical difficulties?
- bool isProvenOptimal () const

    Is optimality proven?
- bool isProvenPrimalInfeasible () const

    Is primal infeasiblity proven?
- bool isProvenDualInfeasible () const

    Is dual infeasiblity proven?
- bool isPrimalObjectiveLimitReached () const

    Is the given primal objective limit reached?
- bool isDualObjectiveLimitReached () const

    Is the given dual objective limit reached?
- bool isIterationLimitReached () const

    Iteration limit reached?
- double optimizationDirection () const

    Direction of optimization (1 - minimize, -1 - maximize, 0 - ignore.
- double **getObjSense** () const
- void **setOptimizationDirection** (double value)
- double ∗ primalRowSolution () const

    Primal row solution.
- const double ∗ **getRowActivity** () const
- double ∗ primalColumnSolution () const

    Primal column solution.
- const double ∗ **getColSolution** () const
- void **setColSolution** (const double ∗input)
- double ∗ dualRowSolution () const

    Dual row solution.

- const double ∗ **getRowPrice** () const
- double ∗ dualColumnSolution () const

  Reduced costs.
- const double ∗ **getReducedCost** () const
- double ∗ rowLower () const

  Row lower.
- const double ∗ **getRowLower** () const
- double ∗ rowUpper () const

  Row upper.
- const double ∗ **getRowUpper** () const

Changing bounds on variables and constraints

- void setObjectiveCoefficient (int elementIndex, double elementValue)

  Set an objective function coefficient.
- void setObjCoeff (int elementIndex, double elementValue)

  Set an objective function coefficient.
- void setColumnLower (int elementIndex, double elementValue)

  Set a single column lower bound
  Use -DBL_MAX for -infinity.
- void setColumnUpper (int elementIndex, double elementValue)

  Set a single column upper bound
  Use DBL_MAX for infinity.
- void setColumnBounds (int elementIndex, double lower, double upper)

  Set a single column lower and upper bound.
- void setColumnSetBounds (const int ∗indexFirst, const int ∗indexLast, const double ∗boundList)

  Set the bounds on a number of columns simultaneously
  The default implementation just invokes setColLower() and setColUpper() over and over again.
- void setColLower (int elementIndex, double elementValue)

  Set a single column lower bound
  Use -DBL_MAX for -infinity.
- void setColUpper (int elementIndex, double elementValue)

  Set a single column upper bound
  Use DBL_MAX for infinity.
- void setColBounds (int elementIndex, double lower, double upper)

  Set a single column lower and upper bound.
- void setColSetBounds (const int ∗indexFirst, const int ∗indexLast, const double ∗boundList)

  Set the bounds on a number of columns simultaneously
- void setRowLower (int elementIndex, double elementValue)

  Set a single row lower bound
  Use -DBL_MAX for -infinity.
- void setRowUpper (int elementIndex, double elementValue)

  Set a single row upper bound
  Use DBL_MAX for infinity.
- void setRowBounds (int elementIndex, double lower, double upper)

  Set a single row lower and upper bound.
- void setRowSetBounds (const int ∗indexFirst, const int ∗indexLast, const double ∗boundList)

  Set the bounds on a number of rows simultaneously

Message handling

- void passInMessageHandler (CoinMessageHandler ∗handler)

  Pass in Message handler (not deleted at end)
- CoinMessageHandler ∗ pushMessageHandler (CoinMessageHandler ∗handler, bool &oldDefault)

  Pass in Message handler (not deleted at end) and return current.
- void popMessageHandler (CoinMessageHandler ∗oldHandler, bool oldDefault)

  back to previous message handler
- void newLanguage (CoinMessages::Language language)

  Set language.
- void **setLanguage** (CoinMessages::Language language)
- CoinMessageHandler ∗ messageHandler () const

  Return handler.
- CoinMessages messages () const

  Return messages.
- CoinMessages ∗ messagesPointer ()

  Return pointer to messages.
- CoinMessages coinMessages () const

  Return Coin messages.
- CoinMessages ∗ coinMessagesPointer ()

  Return pointer to Coin messages.
- void setLogLevel (int value)

  Amount of print out: 0 - none 1 - just final 2 - just factorizations 3 - as 2 plus a bit more 4 - verbose above that 8,16,32 etc just for selective debug.
- int **logLevel** () const
- bool defaultHandler () const

  Return true if default handler.
- void passInEventHandler (const ClpEventHandler ∗eventHandler)

  Pass in Event handler (cloned and deleted at end)
- ClpEventHandler ∗ eventHandler () const

  Event handler.
- CoinThreadRandom ∗ randomNumberGenerator ()

  Thread specific random number generator.
- CoinThreadRandom & mutableRandomNumberGenerator ()

  Thread specific random number generator.
- void setRandomSeed (int value)

  Set seed for thread specific random number generator.
- int lengthNames () const

  length of names (0 means no names0
- void setLengthNames (int value)

  length of names (0 means no names0
- const std::vector< std::string > ∗ rowNames () const

  Row names.
- const std::string & **rowName** (int iRow) const
- std::string getRowName (int iRow) const

  Return name or Rnnnnnnn.

- const std::vector< std::string > * columnNames () const

  Column names.
- const std::string & **columnName** (int iColumn) const
- std::string getColumnName (int iColumn) const

  Return name or Cnnnnnnn.
- ClpObjective * objectiveAsObject () const

  Objective methods.
- void **setObjective** (ClpObjective *objective)
- void **setObjectivePointer** (ClpObjective *newobjective)
- int emptyProblem (int *infeasNumber=NULL, double *infeasSum=NULL, bool printMessage=true)

  Solve a problem with no elements - return status and dual and primal infeasibilites.

Matrix times vector methods

They can be faster if scalar is +- 1 These are covers so user need not worry about scaling Also for simplex I am not using basic/non-basic split

- void times (double scalar, const double *x, double *y) const

  Return $y + A * x * scalar$ *in* y.
- void transposeTimes (double scalar, const double *x, double *y) const

  Return $y + x * scalar * A$ *in* y.

Parameter set/get methods

The set methods return true if the parameter was set to the given value, false otherwise.

There can be various reasons for failure: the given parameter is not applicable for the solver (e.g., refactorization frequency for the volume algorithm), the parameter is not yet implemented for the solver or simply the value of the parameter is out of the range the solver accepts. If a parameter setting call returns false check the details of your solver.

The get methods return true if the given parameter is applicable for the solver and is implemented. In this case the value of the parameter is returned in the second argument. Otherwise they return false.

once it has been decided where solver sits this may be redone

- bool setIntParam (ClpIntParam key, int value)

  Set an integer parameter.
- bool setDblParam (ClpDblParam key, double value)

  Set an double parameter.
- bool setStrParam (ClpStrParam key, const std::string &value)

  Set an string parameter.
- bool **getIntParam** (ClpIntParam key, int &value) const
- bool **getDblParam** (ClpDblParam key, double &value) const
- bool **getStrParam** (ClpStrParam key, std::string &value) const
- void generateCpp (FILE *fp)

  Create C++ lines to get to current state.
- unsigned int specialOptions () const

For advanced options 1 - Don't keep changing infeasibility weight 2 - Keep non-LinearCost round solves 4 - Force outgoing variables to exact bound (primal) 8 - Safe to use dense initial factorization 16 -Just use basic variables for operation if column generation 32 -Create ray even in BAB 64 -Treat problem as feasible until last minute (i.e.

- void **setSpecialOptions** (unsigned int value)
- bool **inCbcBranchAndBound** () const

Protected Member Functions

private or protected methods

- void gutsOfDelete (int type)

  Does most of deletion (0 = all, 1 = most)
- void gutsOfCopy (const ClpModel &rhs, int trueCopy=1)

  Does most of copying If trueCopy 0 then just points to arrays If -1 leaves as much as possible.
- void getRowBound (int iRow, double &lower, double &upper) const

  gets lower and upper bounds on rows
- void gutsOfLoadModel (int numberRows, int numberColumns, const double ∗collb, const double ∗colub, const double ∗obj, const double ∗rowlb, const double ∗rowub, const double ∗rowObjective=NULL)

  puts in format I like - 4 array matrix - may make row copy
- void gutsOfScaling ()

  Does much of scaling.
- double rawObjectiveValue () const

  Objective value - always minimize.
- bool permanentArrays () const

  If we are using maximumRows_ and Columns_.
- void startPermanentArrays ()

  Start using maximumRows_ and Columns_.
- void stopPermanentArrays ()

  Stop using maximumRows_ and Columns_.
- const char ∗const rowNamesAsChar () const

  Create row names as char ∗∗.
- const char ∗const columnNamesAsChar () const

  Create column names as char ∗∗.
- void deleteNamesAsChar (const char ∗const ∗names, int number) const

  Delete char ∗ version of names.
- void onStopped ()

  On stopped - sets secondary status.

Protected Attributes

data

- double optimizationDirection_

  Direction of optimization (1 - minimize, -1 - maximize, 0 - ignore.

- double dblParam_ [ClpLastDblParam]

  Array of double parameters.
- double objectiveValue_

  Objective value.
- double smallElement_

  Small element value.
- double objectiveScale_

  Scaling of objective.
- double rhsScale_

  Scaling of rhs and bounds.
- int numberRows_

  Number of rows.
- int numberColumns_

  Number of columns.
- double ∗ rowActivity_

  Row activities.
- double ∗ columnActivity_

  Column activities.
- double ∗ dual_

  Duals.
- double ∗ reducedCost_

  Reduced costs.
- double ∗ rowLower_

  Row lower.
- double ∗ rowUpper_

  Row upper.
- ClpObjective ∗ objective_

  Objective.
- double ∗ rowObjective_

  Row Objective (? sign) - may be NULL.
- double ∗ columnLower_

  Column Lower.
- double ∗ columnUpper_

  Column Upper.
- ClpMatrixBase ∗ matrix_

  Packed matrix.
- ClpMatrixBase ∗ rowCopy_

  Row copy if wanted.
- ClpPackedMatrix ∗ scaledMatrix_

  Scaled packed matrix.
- double ∗ ray_

  Infeasible/unbounded ray.
- double ∗ rowScale_

  Row scale factors for matrix.
- double ∗ columnScale_

  Column scale factors.
- double ∗ inverseRowScale_

Inverse row scale factors for matrix (end of rowScale_)
- double ∗ inverseColumnScale_

  Inverse column scale factors for matrix (end of columnScale_)
- int scalingFlag_

  Scale flag, 0 none, 1 equilibrium, 2 geometric, 3, auto, 4 dynamic, 5 geometric on rows.
- unsigned char ∗ status_

  Status (i.e.
- char ∗ integerType_

  Integer information.
- void ∗ userPointer_

  User pointer for whatever reason.
- ClpTrustedData ∗ trustedUserPointer_

  Trusted user pointer e.g. for heuristics.
- int intParam_ [ClpLastIntParam]

  Array of integer parameters.
- int numberIterations_

  Number of iterations.
- int solveType_

  Solve type - 1 simplex, 2 simplex interface, 3 Interior.
- unsigned int whatsChanged_

  Whats changed since last solve.
- int problemStatus_

  Status of problem.
- int secondaryStatus_

  Secondary status of problem.
- int lengthNames_

  length of names (0 means no names)
- int numberThreads_

  Number of threads (not very operational)
- unsigned int specialOptions_

  For advanced options See get and set for meaning.
- CoinMessageHandler ∗ handler_

  Message handler.
- bool defaultHandler_

  Flag to say if default handler (so delete)
- CoinThreadRandom randomNumberGenerator_

  Thread specific random number generator.
- ClpEventHandler ∗ eventHandler_

  Event handler.
- std::vector< std::string > rowNames_

  Row names.
- std::vector< std::string > columnNames_

  Column names.
- CoinMessages messages_

  Messages.
- CoinMessages coinMessages_

Coin messages.
- int maximumColumns_

  Maximum number of columns in model.
- int maximumRows_

  Maximum number of rows in model.
- int maximumInternalColumns_

  Maximum number of columns (internal arrays) in model.
- int maximumInternalRows_

  Maximum number of rows (internal arrays) in model.
- CoinPackedMatrix baseMatrix_

  Base packed matrix.
- CoinPackedMatrix baseRowCopy_

  Base row copy.
- double ∗ savedRowScale_

  Saved row scale factors for matrix.
- double ∗ savedColumnScale_

  Saved column scale factors.
- std::string strParam_ [ClpLastStrParam]

  Array of string parameters.

3.33.1 Detailed Description

Definition at line 38 of file ClpModel.hpp.

3.33.2 Constructor & Destructor Documentation

3.33.2.1 ClpModel::ClpModel (const **ClpModel** & *rhs*, int *scalingMode* = `-1`)

Copy constructor.

May scale depending on mode -1 leave mode as is 0 -off, 1 equilibrium, 2 geometric, 3, auto, 4 auto-but-as-initialSolve-in-bab

3.33.2.2 ClpModel::ClpModel (const **ClpModel** ∗ *wholeModel*, int *numberRows*, const int ∗ *whichRows*, int *numberColumns*, const int ∗ *whichColumns*, bool *dropNames* = `true`, bool *dropIntegers* = `true`)

Subproblem constructor.

A subset of whole model is created from the row and column lists given. The new order is given by list order and duplicates are allowed. Name and integer information can be dropped

3.33.3 Member Function Documentation

3.33.3.1 void ClpModel::loadProblem (const **ClpMatrixBase** & *matrix*, const double ∗ *collb*, const double ∗ *colub*, const double ∗ *obj*, const double ∗ *rowlb*, const double ∗ *rowub*, const double ∗ *rowObjective* = `NULL`)

Loads a problem (the constraints on the rows are given by lower and upper bounds).

If a pointer is 0 then the following values are the default:

- `colub`: all columns have upper bound infinity
- `collb`: all columns have lower bound 0
- `rowub`: all rows have upper bound infinity
- `rowlb`: all rows have lower bound -infinity
- `obj`: all variables have 0 objective coefficient

Reimplemented in ClpInterior, and ClpSimplex.

3.33.3.2 void ClpModel::loadProblem (const int *numcols,* const int *numrows,* const CoinBigIndex ∗ *start,* const int ∗ *index,* const double ∗ *value,* const double ∗ *collb,* const double ∗ *colub,* const double ∗ *obj,* const double ∗ *rowlb,* const double ∗ *rowub,* const double ∗ *rowObjective* = `NULL`)

Just like the other loadProblem() method except that the matrix is given in a standard column major ordered format (without gaps).

Reimplemented in ClpInterior, and ClpSimplex.

3.33.3.3 int ClpModel::loadProblem (CoinModel & *modelObject,* bool *tryPlusMinusOne* = `false`)

This loads a model from a coinModel object - returns number of errors.

modelObject not const as may be changed as part of process If tryPlusMinusOne then will try adding as +-1 matrix

Reimplemented in ClpSimplex.

3.33.3.4 void ClpModel::loadQuadraticObjective (const int *numberColumns,* const CoinBigIndex ∗ *start,* const int ∗ *column,* const double ∗ *element*)

Load up quadratic objective.

This is stored as a CoinPackedMatrix

3.33.3.5 int ClpModel::addRows (const CoinBuild & *buildObject,* bool *tryPlusMinusOne* = `false`, bool *checkDuplicates* = `true`)

Add rows from a build object.

If tryPlusMinusOne then will try adding as +-1 matrix if no matrix exists. Returns number of errors e.g. duplicates

3.33.3.6 int ClpModel::addRows (CoinModel & *modelObject,* bool *tryPlusMinusOne* = `false`, bool *checkDuplicates* = `true`)

Add rows from a model object.

returns -1 if object in bad state (i.e. has column information) otherwise number of errors.

modelObject non const as can be regularized as part of build If tryPlusMinusOne then will try adding as +-1 matrix if no matrix exists.

3.33.3.7 int ClpModel::addColumns (const CoinBuild & *buildObject*, bool *tryPlusMinusOne* = false, bool *checkDuplicates* = true)

Add columns from a build object If tryPlusMinusOne then will try adding as +-1 matrix if no matrix exists.

Returns number of errors e.g. duplicates

3.33.3.8 int ClpModel::addColumns (CoinModel & *modelObject*, bool *tryPlusMinusOne* = false, bool *checkDuplicates* = true)

Add columns from a model object.

returns -1 if object in bad state (i.e. has row information) otherwise number of errors modelObject non const as can be regularized as part of build If tryPlusMinusOne then will try adding as +-1 matrix if no matrix exists.

3.33.3.9 void ClpModel::borrowModel (ClpModel & *otherModel*)

Borrow model.

This is so we don't have to copy large amounts of data around. It assumes a derived class wants to overwrite an empty model with a real one - while it does an algorithm

Reimplemented in ClpInterior, and ClpSimplex.

3.33.3.10 int ClpModel::cleanMatrix (double *threshold* = 1.0e-20)

Really clean up matrix (if ClpPackedMatrix).

a) eliminate all duplicate AND small elements in matrix b) remove all gaps and set extraGap_ and extraMajor_ to 0.0 c) reallocate arrays and make max lengths equal to lengths d) orders elements returns number of elements eliminated or -1 if not ClpPackedMatrix

3.33.3.11 int ClpModel::findNetwork (char ∗ *rotate*, double *fractionNeeded* = 0.75)

Find a network subset.

rotate array should be numberRows. On output -1 not in network 0 in network as is 1 in network with signs swapped Returns number of network rows

3.33.3.12 int ClpModel::writeMps (const char ∗ *filename*, int *formatType* = 0, int *numberAcross* = 2, double *objSense* = 0.0) const

Write the problem in MPS format to the specified file.

Row and column names may be null. formatType is

- 0 - normal
- 1 - extra accuracy

- 2 - IEEE hex

Returns non-zero on I/O error

3.33.3.13 int ClpModel::solveType ( ) const [inline]

Solve type - 1 simplex, 2 simplex interface, 3 Interior.

Definition at line 370 of file ClpModel.hpp.

3.33.3.14 int ClpModel::status ( ) const [inline]

Status of problem:

-1 - unknown e.g. before solve or if postSolve says not optimal 0 - optimal 1 - primal infeasible 2 - dual infeasible 3 - stopped on iterations or time 4 - stopped due to errors 5 - stopped by event handler (virtual int ClpEventHandler::event())

Definition at line 397 of file ClpModel.hpp.

3.33.3.15 void ClpModel::setColumnLower (int *elementIndex*, double *elementValue*)

Set a single column lower bound

Use -DBL_MAX for -infinity.

Reimplemented in ClpSimplex.

3.33.3.16 void ClpModel::setColumnUpper (int *elementIndex*, double *elementValue*)

Set a single column upper bound

Use DBL_MAX for infinity.

Reimplemented in ClpSimplex.

3.33.3.17 void ClpModel::setColumnSetBounds (const int * *indexFirst*, const int * *indexLast*, const double * *boundList*)

Set the bounds on a number of columns simultaneously

The default implementation just invokes setColLower() and setColUpper() over and over again.

Parameters

indexFirst,indexLast	pointers to the beginning and after the end of the array of the indices of the variables whose *either* bound changes
boundList	the new lower/upper bound pairs for the variables

Reimplemented in ClpSimplex.

3.33.3.18 void ClpModel::setColLower (int *elementIndex*, double *elementValue*) [inline]

Set a single column lower bound

Use -DBL_MAX for -infinity.

Reimplemented in ClpSimplex.

Definition at line 540 of file ClpModel.hpp.

3.33.3.19 void ClpModel::setColUpper (int *elementIndex*, double *elementValue*) [inline]

Set a single column upper bound

Use DBL_MAX for infinity.

Reimplemented in ClpSimplex.

Definition at line 545 of file ClpModel.hpp.

3.33.3.20 void ClpModel::setColSetBounds (const int ∗ *indexFirst*, const int ∗ *indexLast*, const double ∗ *boundList*) [inline]

Set the bounds on a number of columns simultaneously

Parameters

index-First,indexLast	pointers to the beginning and after the end of the array of the indices of the variables whose *either* bound changes
boundList	the new lower/upper bound pairs for the variables

Reimplemented in ClpSimplex.

Definition at line 561 of file ClpModel.hpp.

3.33.3.21 void ClpModel::setRowLower (int *elementIndex*, double *elementValue*)

Set a single row lower bound

Use -DBL_MAX for -infinity.

Reimplemented in ClpSimplex.

3.33.3.22 void ClpModel::setRowUpper (int *elementIndex*, double *elementValue*)

Set a single row upper bound

Use DBL_MAX for infinity.

Reimplemented in ClpSimplex.

3.33.3.23 void ClpModel::setRowSetBounds (const int ∗ *indexFirst*, const int ∗ *indexLast*, const double ∗ *boundList*)

Set the bounds on a number of rows simultaneously

Parameters

index-First,indexLast	pointers to the beginning and after the end of the array of the indices of the constraints whose *either* bound changes
boundList	the new lower/upper bound pairs for the constraints

Reimplemented in ClpSimplex.

3.33.3.24 void ClpModel::unscale ( )

If we constructed a "really" scaled model then this reverses the operation.

Quantities may not be exactly as they were before due to rounding errors

3.33.3.25 void ClpModel::replaceMatrix (ClpMatrixBase * *matrix*, bool *deleteCurrent* = false)

Replace Clp Matrix (current is not deleted unless told to and new is used) So up to user to delete current.

This was used where matrices were being rotated. ClpModel takes ownership.

3.33.3.26 void ClpModel::replaceMatrix (CoinPackedMatrix * *newmatrix*, bool *deleteCurrent* = false) [inline]

Replace Clp Matrix (current is not deleted unless told to and new is used) So up to user to delete current.

This was used where matrices were being rotated. This version changes CoinPackedMatrix to ClpPackedMatrix. ClpModel takes ownership.

Definition at line 733 of file ClpModel.hpp.

3.33.3.27 double* ClpModel::infeasibilityRay ( ) const

Infeasibility/unbounded ray (NULL returned if none/wrong) Up to user to use delete [] on these arrays.

3.33.3.28 unsigned char* ClpModel::statusCopy ( ) const

Return copy of status (i.e.

basis) array (char[numberRows+numberColumns]), use delete []

3.33.3.29 void ClpModel::times (double *scalar*, const double * *x*, double * *y*) const

Return `y + A * x * scalar` in `y`.

Precondition

`x` must be of size `numColumns()`
`y` must be of size `numRows()`

3.33.3.30 void ClpModel::transposeTimes (double *scalar*, const double * *x*, double * *y*) const

Return `y + x * scalar * A` in `y`.

Precondition

`x` must be of size `numRows()`
`y` must be of size `numColumns()`

3.33.3.31 unsigned int ClpModel::specialOptions ( ) const [inline]

For advanced options 1 - Don't keep changing infeasibility weight 2 - Keep nonLinearCost round solves 4 - Force outgoing variables to exact bound (primal) 8 - Safe to use dense initial factorization 16 -Just use basic variables for operation if column generation 32 -Create ray even in BAB 64 -Treat problem as feasible until last minute (i.e.

minimize infeasibilities) 128 - Switch off all matrix sanity checks 256 - No row copy 512 - If not in values pass, solution guaranteed, skip as much as possible 1024 - In branch and bound 2048 - Don't bother to re-factorize if $<$ 20 iterations 4096 - Skip some optimality checks 8192 - Do Primal when cleaning up primal 16384 - In fast dual (so we can switch off things) 32768 - called from Osi 65536 - keep arrays around as much as possible (also use maximumR/C) 131072 - transposeTimes is -1.0 and can skip basic and fixed 262144 - extra copy of scaled matrix 524288 - Clp fast dual 1048576 - don't need to finish dual (can return 3) NOTE - many applications can call Clp but there may be some short cuts which are taken which are not guaranteed safe from all applications. Vetted applications will have a bit set and the code may test this At present I expect a few such applications - if too many I will have to re-think. It is up to application owner to change the code if she/he needs these short cuts. I will not debug unless in Coin repository. See COIN_CLP_VETTED comments. 0x01000000 is Cbc (and in branch and bound) 0x02000000 is in a different branch and bound

Definition at line 1026 of file ClpModel.hpp.

3.33.4 Member Data Documentation

3.33.4.1 unsigned char* ClpModel::status_ [protected]

Status (i.e.

basis) Region. I know that not all algorithms need a status array, but it made sense for things like crossover and put all permanent stuff in one place. No assumption is made about what is in status array (although it might be good to reserve bottom 3 bits (i.e. 0-7 numeric) for classic status). This is number of columns + number of rows long (in that order).

Definition at line 1145 of file ClpModel.hpp.

3.33.4.2 int ClpModel::solveType_ [protected]

Solve type - 1 simplex, 2 simplex interface, 3 Interior.

Definition at line 1157 of file ClpModel.hpp.

3.33.4.3 unsigned int ClpModel::whatsChanged_ [protected]

Whats changed since last solve.

This is a work in progress It is designed so careful people can make go faster. It is only used when startFinishOptions used in dual or primal. Bit 1 - number of rows/columns has not changed (so work arrays valid) 2 - matrix has not changed 4 - if matrix has changed only by adding rows 8 - if matrix has changed only by adding columns 16 - row lbs not changed 32 - row ubs not changed 64 - column objective not changed 128

- column lbs not changed 256 - column ubs not changed 512 - basis not changed (up to user to set this to 0) top bits may be used internally shift by 65336 is 3 all same, 1 all except col bounds

Definition at line 1174 of file ClpModel.hpp.

The documentation for this class was generated from the following file:

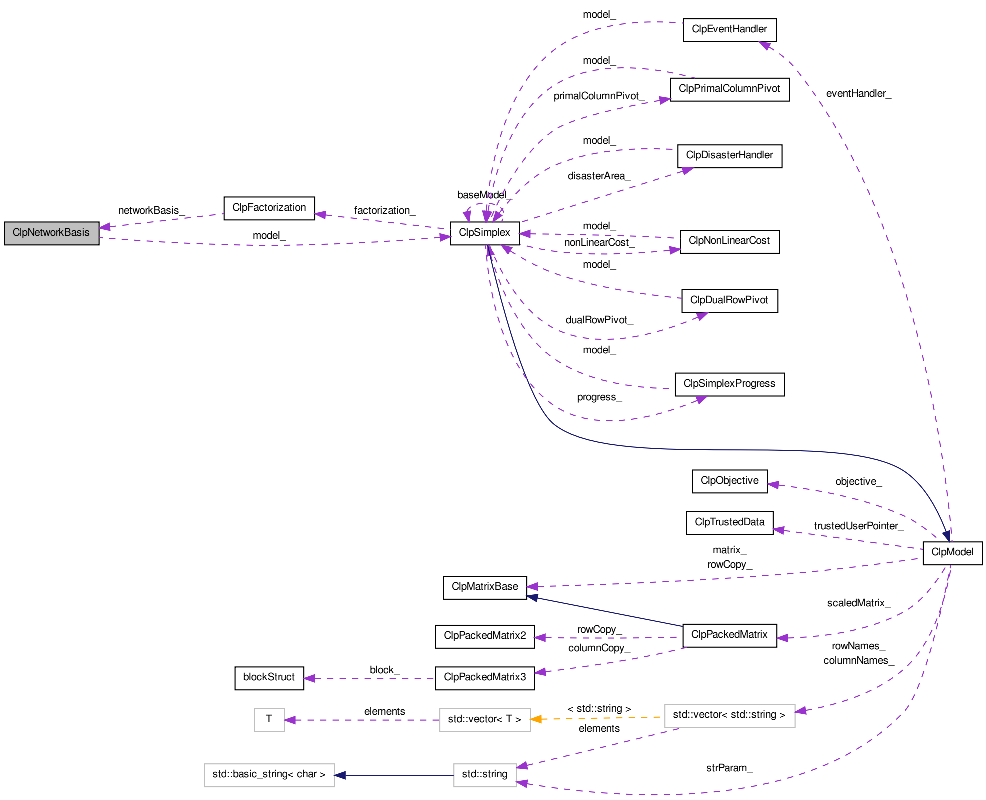
- ClpModel.hpp

3.34 ClpNetworkBasis Class Reference

This deals with Factorization and Updates for network structures.

`#include <ClpNetworkBasis.hpp>`

Collaboration diagram for ClpNetworkBasis:



Public Member Functions

Constructors and destructor and copy

- ClpNetworkBasis ()
  Default constructor.
- ClpNetworkBasis (const ClpSimplex ∗model, int numberRows, const CoinFactorizationDouble ∗pivotRegion, const int ∗permuteBack, const CoinBigIndex ∗startColumn, const int ∗numberInColumn, const int ∗indexRow, const CoinFactorizationDouble ∗element)
  Constructor from CoinFactorization.
- ClpNetworkBasis (const ClpNetworkBasis &other)
  Copy constructor.
- ∼ClpNetworkBasis ()
  Destructor.
- ClpNetworkBasis & operator= (const ClpNetworkBasis &other)
  = copy

Do factorization

- int factorize (const ClpMatrixBase ∗matrix, int rowIsBasic[ ], int columnIsBasic[ ])

  When part of LP - given by basic variables.

rank one updates which do exist

- int replaceColumn (CoinIndexedVector ∗column, int pivotRow)
  Replaces one Column to basis, returns 0=OK, 1=Probably OK, 2=singular!!

various uses of factorization (return code number elements)

which user may want to know about

- double updateColumn (CoinIndexedVector ∗regionSparse, CoinIndexedVector ∗regionSparse2, int pivotRow)
  Updates one column (FTRAN) from region, Returns pivot value if "pivotRow">=0.
- int updateColumn (CoinIndexedVector ∗regionSparse, double array[ ]) const
  Updates one column (FTRAN) to/from array For large problems you should ALWAYS know where the nonzeros are, so please try and migrate to previous method after you have got code working using this simple method - thank you! (the only exception is if you know input is dense e.g.
- int updateColumnTranspose (CoinIndexedVector ∗regionSparse, double array[ ]) const
  Updates one column transpose (BTRAN) For large problems you should ALWAYS know where the nonzeros are, so please try and migrate to previous method after you have got code working using this simple method - thank you! (the only exception is if you know input is dense e.g.
- int updateColumnTranspose (CoinIndexedVector ∗regionSparse, CoinIndexedVector ∗regionSparse2) const
  Updates one column (BTRAN) from region2.

3.34.1 Detailed Description

This deals with Factorization and Updates for network structures.

Definition at line 26 of file ClpNetworkBasis.hpp.

3.34.2 Member Function Documentation

3.34.2.1 int ClpNetworkBasis::factorize (const ClpMatrixBase ∗ *matrix,* int *rowIsBasic[ ],* int *columnIsBasic[ ]*)

When part of LP - given by basic variables.

Actually does factorization. Arrays passed in have non negative value to say basic. If status is okay, basic variables have pivot row - this is only needed if increasingRows_ >1. If status is singular, then basic variables have pivot row and ones thrown out have -1 returns 0 -okay, -1 singular, -2 too many in basis

3.34.2.2 int ClpNetworkBasis::updateColumn (CoinIndexedVector ∗ *regionSparse,* double *array[ ]*) const

Updates one column (FTRAN) to/from array For large problems you should ALWAYS know where the nonzeros are, so please try and migrate to previous method after you have got code working using this simple method - thank you! (the only exception is if you know input is dense e.g.

rhs)

3.34.2.3 int ClpNetworkBasis::updateColumnTranspose (CoinIndexedVector ∗ *regionSparse,* double *array[ ]*) const

Updates one column transpose (BTRAN) For large problems you should ALWAYS know where the nonzeros are, so please try and migrate to previous method after you have got code working using this simple method - thank you! (the only exception is if you know input is dense e.g.

dense objective) returns number of nonzeros

The documentation for this class was generated from the following file:

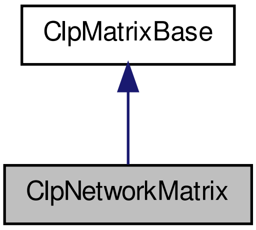
- ClpNetworkBasis.hpp

3.35 ClpNetworkMatrix Class Reference

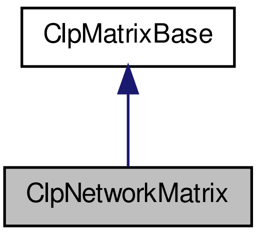
This implements a simple network matrix as derived from ClpMatrixBase.

```
#include <ClpNetworkMatrix.hpp>
```

Inheritance diagram for ClpNetworkMatrix:



Collaboration diagram for ClpNetworkMatrix:



Public Member Functions

Useful methods

- virtual CoinPackedMatrix ∗ getPackedMatrix () const

  Return a complete CoinPackedMatrix.
- virtual bool isColOrdered () const

  Whether the packed matrix is column major ordered or not.
- virtual CoinBigIndex getNumElements () const

  Number of entries in the packed matrix.
- virtual int getNumCols () const

  Number of columns.
- virtual int getNumRows () const

Number of rows.
- virtual const double ∗ getElements () const

  A vector containing the elements in the packed matrix.
- virtual const int ∗ getIndices () const

  A vector containing the minor indices of the elements in the packed matrix.
- virtual const CoinBigIndex ∗ **getVectorStarts** () const
- virtual const int ∗ getVectorLengths () const

  The lengths of the major-dimension vectors.
- virtual void deleteCols (const int numDel, const int ∗indDel)

  Delete the columns whose indices are listed in `indDel`.
- virtual void deleteRows (const int numDel, const int ∗indDel)

  Delete the rows whose indices are listed in `indDel`.
- virtual void appendCols (int number, const CoinPackedVectorBase ∗const ∗columns)

  Append Columns.
- virtual void appendRows (int number, const CoinPackedVectorBase ∗const ∗rows)

  Append Rows.
- virtual int appendMatrix (int number, int type, const CoinBigIndex ∗starts, const int ∗index, const double ∗element, int numberOther=-1)

  Append a set of rows/columns to the end of the matrix.
- virtual ClpMatrixBase ∗ reverseOrderedCopy () const

  Returns a new matrix in reverse order without gaps.
- virtual CoinBigIndex countBasis (const int ∗whichColumn, int &numberColumnBasic)

  Returns number of elements in column part of basis.
- virtual void fillBasis (ClpSimplex ∗model, const int ∗whichColumn, int &numberColumnBasic, int ∗row, int ∗start, int ∗rowCount, int ∗columnCount, CoinFactorizationDouble ∗element)

  Fills in column part of basis.
- virtual CoinBigIndex ∗ dubiousWeights (const ClpSimplex ∗model, int ∗inputWeights) const

  Given positive integer weights for each row fills in sum of weights for each column (and slack).
- virtual void rangeOfElements (double &smallestNegative, double &largestNegative, double &smallestPositive, double &largestPositive)

  Returns largest and smallest elements of both signs.
- virtual void unpack (const ClpSimplex ∗model, CoinIndexedVector ∗rowArray, int column) const

  Unpacks a column into an CoinIndexedvector.
- virtual void unpackPacked (ClpSimplex ∗model, CoinIndexedVector ∗rowArray, int column) const

  Unpacks a column into an CoinIndexedvector in packed format Note that model is NOT const.
- virtual void add (const ClpSimplex ∗model, CoinIndexedVector ∗rowArray, int column, double multiplier) const

  Adds multiple of a column into an CoinIndexedvector You can use quickAdd to add to vector.
- virtual void add (const ClpSimplex ∗model, double ∗array, int column, double multiplier) const

Adds multiple of a column into an array.
- virtual void releasePackedMatrix () const

  Allow any parts of a created CoinMatrix to be deleted.
- virtual bool canDoPartialPricing () const

  Says whether it can do partial pricing.
- virtual void partialPricing (ClpSimplex *model, double start, double end, int &bestSequence, int &numberWanted)

  Partial pricing.

Matrix times vector methods

- virtual void times (double scalar, const double *x, double *y) const

  Return $y + A * scalar *x$ *in* y.
- virtual void times (double scalar, const double *x, double *y, const double *rowScale, const double *columnScale) const

  And for scaling.
- virtual void transposeTimes (double scalar, const double *x, double *y) const

  Return $y + x * scalar * A$ *in* y.
- virtual void transposeTimes (double scalar, const double *x, double *y, const double *rowScale, const double *columnScale, double *spare=NULL) const

  And for scaling.
- virtual void transposeTimes (const ClpSimplex *model, double scalar, const CoinIndexedVector *x, CoinIndexedVector *y, CoinIndexedVector *z) const

  Return $x * scalar * A + y$ *in* z.
- virtual void subsetTransposeTimes (const ClpSimplex *model, const CoinIndexedVector *x, const CoinIndexedVector *y, CoinIndexedVector *z) const

  Return $x *A$ *in* z *but just for indices in y.*

Other

- bool trueNetwork () const

  Return true if really network, false if has slacks.

Constructors, destructor

- ClpNetworkMatrix ()

  Default constructor.
- ClpNetworkMatrix (int numberColumns, const int *head, const int *tail)

  Constructor from two arrays.
- virtual ∼ClpNetworkMatrix ()

  Destructor.

Copy method

- ClpNetworkMatrix (const ClpNetworkMatrix &)

  The copy constructor.
- ClpNetworkMatrix (const CoinPackedMatrix &)

  The copy constructor from an CoinNetworkMatrix.
- ClpNetworkMatrix & **operator=** (const ClpNetworkMatrix &)
- virtual ClpMatrixBase * clone () const

Clone.

- ClpNetworkMatrix (const ClpNetworkMatrix &wholeModel, int numberRows, const int ∗whichRows, int numberColumns, const int ∗whichColumns)

  Subset constructor (without gaps).
- virtual ClpMatrixBase ∗ subsetClone (int numberRows, const int ∗whichRows, int numberColumns, const int ∗whichColumns) const

  Subset clone (without gaps).

Protected Attributes

Data members

The data members are protected to allow access for derived classes.

- CoinPackedMatrix ∗ matrix_

  For fake CoinPackedMatrix.
- int ∗ **lengths_**
- int ∗ indices_

  Data -1, then +1 rows in pairs (row==-1 if one entry)
- int numberRows_

  Number of rows.
- int numberColumns_

  Number of columns.
- bool trueNetwork_

  True if all entries have two elements.

3.35.1 Detailed Description

This implements a simple network matrix as derived from ClpMatrixBase.

If you want more sophisticated version then you could inherit from this. Also you might want to allow networks with gain

Definition at line 19 of file ClpNetworkMatrix.hpp.

3.35.2 Constructor & Destructor Documentation

3.35.2.1 ClpNetworkMatrix::ClpNetworkMatrix ( )

Default constructor.

3.35.2.2 ClpNetworkMatrix::ClpNetworkMatrix (const ClpNetworkMatrix &)

The copy constructor.

3.35.2.3 ClpNetworkMatrix::ClpNetworkMatrix (const CoinPackedMatrix &)

The copy constructor from an CoinNetworkMatrix.

3.35.2.4 ClpNetworkMatrix::ClpNetworkMatrix (const **ClpNetworkMatrix** & *wholeModel*, int *numberRows*, const int ∗ *whichRows*, int *numberColumns*, const int ∗ *whichColumns*)

Subset constructor (without gaps).

Duplicates are allowed and order is as given

3.35.3 Member Function Documentation

3.35.3.1 virtual bool ClpNetworkMatrix::isColOrdered ( ) const [inline, virtual]

Whether the packed matrix is column major ordered or not.

Implements ClpMatrixBase.

Definition at line 27 of file ClpNetworkMatrix.hpp.

3.35.3.2 virtual CoinBigIndex ClpNetworkMatrix::getNumElements ( ) const [inline, virtual]

Number of entries in the packed matrix.

Implements ClpMatrixBase.

Definition at line 31 of file ClpNetworkMatrix.hpp.

3.35.3.3 virtual int ClpNetworkMatrix::getNumCols ( ) const [inline, virtual]

Number of columns.

Implements ClpMatrixBase.

Definition at line 35 of file ClpNetworkMatrix.hpp.

3.35.3.4 virtual int ClpNetworkMatrix::getNumRows ( ) const [inline, virtual]

Number of rows.

Implements ClpMatrixBase.

Definition at line 39 of file ClpNetworkMatrix.hpp.

3.35.3.5 virtual const double∗ ClpNetworkMatrix::getElements ( ) const [virtual]

A vector containing the elements in the packed matrix.

Note that there might be gaps in this list, entries that do not belong to any major-dimension vector. To get the actual elements one should look at this vector together with vectorStarts and vectorLengths.

Implements ClpMatrixBase.

3.35.3.6 virtual const int* ClpNetworkMatrix::getIndices ( ) const [inline, virtual]

A vector containing the minor indices of the elements in the packed matrix.

Note that there might be gaps in this list, entries that do not belong to any major-dimension vector. To get the actual elements one should look at this vector together with vectorStarts and vectorLengths.

Implements ClpMatrixBase.

Definition at line 53 of file ClpNetworkMatrix.hpp.

3.35.3.7 virtual const int* ClpNetworkMatrix::getVectorLengths ( ) const [virtual]

The lengths of the major-dimension vectors.

Implements ClpMatrixBase.

3.35.3.8 virtual void ClpNetworkMatrix::deleteCols (const int *numDel*, const int * *indDel*) [virtual]

Delete the columns whose indices are listed in `indDel`.

Implements ClpMatrixBase.

3.35.3.9 virtual void ClpNetworkMatrix::deleteRows (const int *numDel*, const int * *indDel*) [virtual]

Delete the rows whose indices are listed in `indDel`.

Implements ClpMatrixBase.

3.35.3.10 virtual int ClpNetworkMatrix::appendMatrix (int *number*, int *type*, const CoinBigIndex * *starts*, const int * *index*, const double * *element*, int *numberOther* = -1) [virtual]

Append a set of rows/columns to the end of the matrix.

Returns number of errors i.e. if any of the new rows/columns contain an index that's larger than the number of columns-1/rows-1 (if numberOther>0) or duplicates If 0 then rows, 1 if columns

Reimplemented from ClpMatrixBase.

3.35.3.11 virtual CoinBigIndex* ClpNetworkMatrix::dubiousWeights (const ClpSimplex * *model*, int * *inputWeights*) const [virtual]

Given positive integer weights for each row fills in sum of weights for each column (and slack).

Returns weights vector

Reimplemented from ClpMatrixBase.

3.35.3.12 virtual void ClpNetworkMatrix::rangeOfElements (double & *smallestNegative,* double & *largestNegative,* double & *smallestPositive,* double & *largestPositive*) [virtual]

Returns largest and smallest elements of both signs.

Largest refers to largest absolute value.

Reimplemented from ClpMatrixBase.

3.35.3.13 virtual void ClpNetworkMatrix::unpackPacked (ClpSimplex ∗ *model,* CoinIndexedVector ∗ *rowArray,* int *column*) const [virtual]

Unpacks a column into an CoinIndexedvector in packed format Note that model is NOT const.

Bounds and objective could be modified if doing column generation (just for this variable)

Implements ClpMatrixBase.

3.35.3.14 virtual void ClpNetworkMatrix::times (double *scalar,* const double ∗ *x,* double ∗ *y*) const [virtual]

Return `y + A * scalar *x` in `y`.

Precondition

`x` must be of size `numColumns()`
`y` must be of size `numRows()`

Implements ClpMatrixBase.

3.35.3.15 virtual void ClpNetworkMatrix::transposeTimes (double *scalar,* const double ∗ *x,* double ∗ *y*) const [virtual]

Return `y + x * scalar * A` in `y`.

Precondition

`x` must be of size `numRows()`
`y` must be of size `numColumns()`

Implements ClpMatrixBase.

3.35.3.16 virtual void ClpNetworkMatrix::transposeTimes (const ClpSimplex ∗ *model,* double *scalar,* const CoinIndexedVector ∗ *x,* CoinIndexedVector ∗ *y,* CoinIndexedVector ∗ *z*) const [virtual]

Return `x * scalar * A + y` in `z`.

Can use y as temporary array (will be empty at end) Note - If x packed mode - then z packed mode Squashes small elements and knows about ClpSimplex

Implements ClpMatrixBase.

3.35.3.17 virtual void ClpNetworkMatrix::subsetTransposeTimes (const ClpSimplex * model, const CoinIndexedVector * x, const CoinIndexedVector * y, CoinIndexedVector * z) const [virtual]

Return `x *A` in `z` but just for indices in y.

Note - z always packed mode

Implements ClpMatrixBase.

3.35.3.18 virtual ClpMatrixBase* ClpNetworkMatrix::subsetClone (int numberRows, const int * whichRows, int numberColumns, const int * whichColumns) const [virtual]

Subset clone (without gaps).

Duplicates are allowed and order is as given

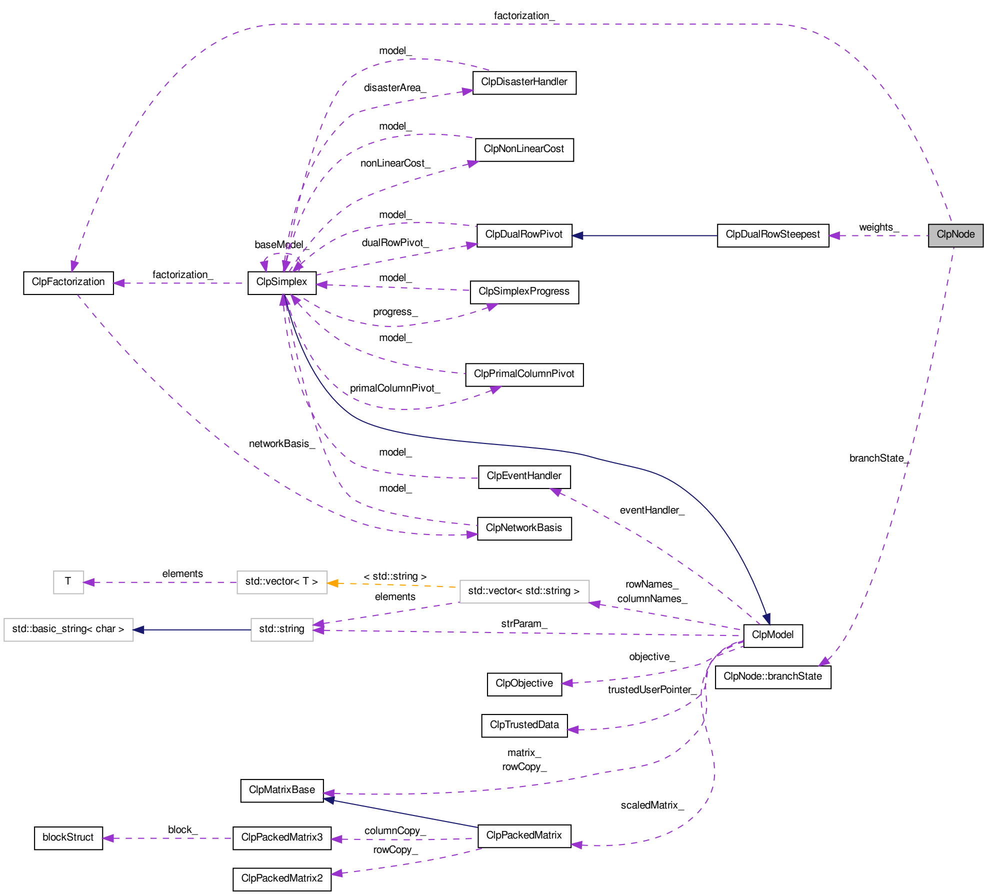
Reimplemented from ClpMatrixBase.

The documentation for this class was generated from the following file:

- ClpNetworkMatrix.hpp

3.36 ClpNode Class Reference

Collaboration diagram for ClpNode:



Classes

- struct branchState

Public Member Functions

Useful methods

- void applyNode (ClpSimplex ∗model, int doBoundsEtc)

  Applies node to model 0 - just tree bounds 1 - tree bounds and basis etc 2 - saved bounds and basis etc.
- void chooseVariable (ClpSimplex ∗model, ClpNodeStuff ∗info)

Choose a new variable.
- int fixOnReducedCosts (ClpSimplex ∗model)
  Fix on reduced costs.
- void createArrays (ClpSimplex ∗model)
  Create odd arrays.
- void cleanUpForCrunch ()
  Clean up as crunch is different model.

Gets and sets

- double objectiveValue () const
  Objective value.
- void setObjectiveValue (double value)
  Set objective value.
- const double ∗ primalSolution () const
  Primal solution.
- const double ∗ dualSolution () const
  Dual solution.
- double branchingValue () const
  Initial value of integer variable.
- double sumInfeasibilities () const
  Sum infeasibilities.
- int numberInfeasibilities () const
  Number infeasibilities.
- int depth () const
  Relative depth.
- double estimatedSolution () const
  Estimated solution value.
- int way () const
  Way for integer variable -1 down , +1 up.
- bool fathomed () const
  Return true if branch exhausted.
- void changeState ()
  Change state of variable i.e. go other way.
- int sequence () const
  Sequence number of integer variable (-1 if none)
- bool oddArraysExist () const
  If odd arrays exist.
- const unsigned char ∗ statusArray () const
  Status array.

Constructors, destructor

- ClpNode ()
  Default constructor.
- ClpNode (ClpSimplex ∗model, const ClpNodeStuff ∗stuff, int depth)
  Constructor from model.
- void gutsOfConstructor (ClpSimplex ∗model, const ClpNodeStuff ∗stuff, int arraysExist, int depth)
  Does work of constructor (partly so gdb will work)
- virtual ∼ClpNode ()
  Destructor.

Copy methods (at present illegal - will abort)

- ClpNode (const ClpNode &)

    The copy constructor.
- ClpNode & operator= (const ClpNode &)

    Operator =.

Protected Attributes

Data

- double branchingValue_

    Initial value of integer variable.
- double objectiveValue_

    Value of objective.
- double sumInfeasibilities_

    Sum of infeasibilities.
- double estimatedSolution_

    Estimated solution value.
- ClpFactorization ∗ factorization_

    Factorization.
- ClpDualRowSteepest ∗ weights_

    Steepest edge weights.
- unsigned char ∗ status_

    Status vector.
- double ∗ primalSolution_

    Primal solution.
- double ∗ dualSolution_

    Dual solution.
- int ∗ lower_

    Integer lower bounds (only used in fathomMany)
- int ∗ upper_

    Integer upper bounds (only used in fathomMany)
- int ∗ pivotVariables_

    Pivot variables for factorization.
- int ∗ fixed_

    Variables fixed by reduced costs (at end of branch) 0x10000000 added if fixed to UB.
- branchState branchState_

    State of branch.
- int sequence_

    Sequence number of integer variable (-1 if none)
- int numberInfeasibilities_

    Number of infeasibilities.
- int depth_

    Relative depth.
- int numberFixed_

    Number fixed by reduced cost.

- int flags_

  Flags - 1 duals scaled.
- int maximumFixed_

  Maximum number fixed by reduced cost.
- int maximumRows_

  Maximum rows so far.
- int maximumColumns_

  Maximum columns so far.
- int maximumIntegers_

  Maximum Integers so far.

3.36.1 Detailed Description

Definition at line 19 of file ClpNode.hpp.

3.36.2 Constructor & Destructor Documentation

3.36.2.1 ClpNode::ClpNode ( )

Default constructor.

3.36.2.2 ClpNode::ClpNode (const ClpNode &)

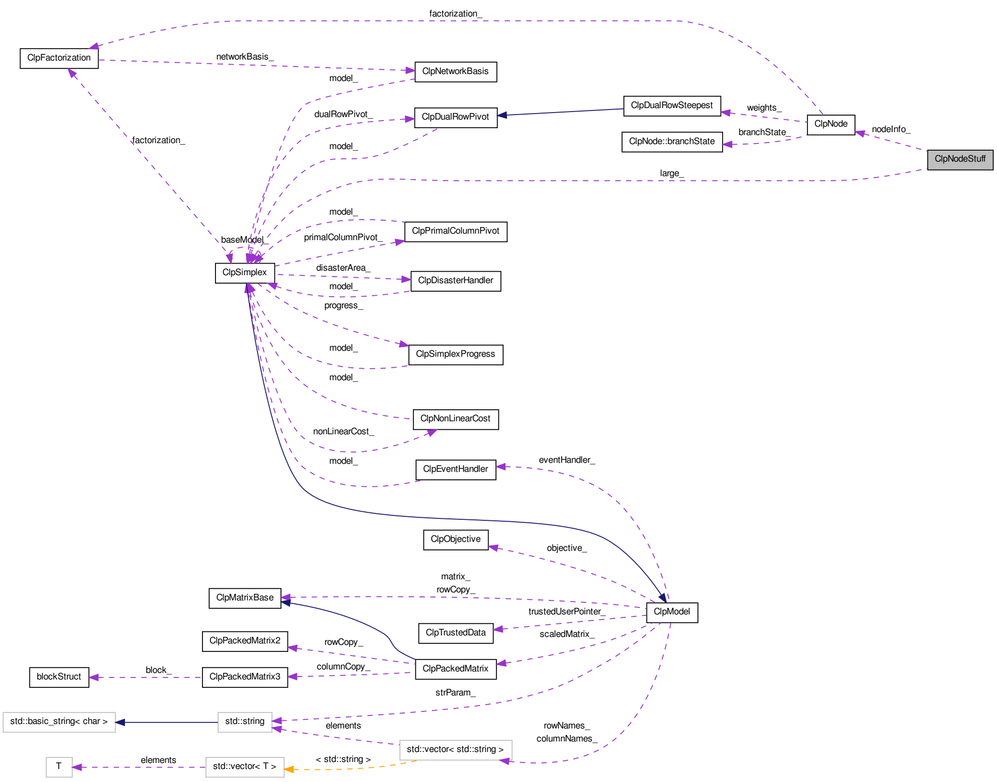
The copy constructor.

The documentation for this class was generated from the following file:

- ClpNode.hpp

3.37 ClpNodeStuff Class Reference

Collaboration diagram for ClpNodeStuff:



Public Member Functions

Constructors, destructor

- ClpNodeStuff ()

  Default constructor.
- virtual ∼ClpNodeStuff ()

  Destructor.

Copy methods (only copies ints etc, nulls arrays)

- ClpNodeStuff (const ClpNodeStuff &)

  The copy constructor.
- ClpNodeStuff & operator= (const ClpNodeStuff &)

  Operator =.
- void zap (int type)

  Zaps stuff 1 - arrays, 2 ints, 3 both.

Fill methods

- void fillPseudoCosts (const double ∗down, const double ∗up, const int ∗priority, const int ∗numberDown, const int ∗numberUp, const int ∗numberDownInfeasible, const int ∗numberUpInfeasible, int number)

  Fill with pseudocosts.
- void update (int way, int sequence, double change, bool feasible)

  Update pseudo costs.
- int maximumNodes () const

  Return maximum number of nodes.
- int maximumSpace () const

  Return maximum space for nodes.

Public Attributes

Data

- double integerTolerance_

  Integer tolerance.
- double integerIncrement_

  Integer increment.
- double smallChange_

  Small change in branch.
- double ∗ downPseudo_

  Down pseudo costs.
- double ∗ upPseudo_

  Up pseudo costs.
- int ∗ priority_

  Priority.
- int ∗ numberDown_

  Number of times down.
- int ∗ numberUp_

  Number of times up.
- int ∗ numberDownInfeasible_

  Number of times down infeasible.
- int ∗ numberUpInfeasible_

  Number of times up infeasible.
- double ∗ saveCosts_

  Copy of costs (local)
- ClpNode ∗∗ nodeInfo_

  Array of ClpNodes.
- ClpSimplex ∗ large_

  Large model if crunched.
- int ∗ whichRow_

  Which rows in large model.
- int ∗ whichColumn_

  Which columns in large model.
- CoinMessageHandler ∗ handler_

Cbc's message handler.
- int nBound_

  Number bounds in large model.
- int saveOptions_

  Save of specialOptions_ (local)
- int solverOptions_

  Options to pass to solver 1 - create external reduced costs for columns 2 - create external reduced costs for rows 4 - create external row activity (columns always done) Above only done if feasible 32 - just create up to nDepth_+1 nodes 65536 - set if activated.
- int maximumNodes_

  Maximum number of nodes to do.
- int numberBeforeTrust_

  Number before trust from CbcModel.
- int stateOfSearch_

  State of search from CbcModel.
- int nDepth_

  Number deep.
- int nNodes_

  Number nodes returned (-1 if fathom aborted)
- int numberNodesExplored_

  Number of nodes explored.
- int numberIterations_

  Number of iterations.
- int presolveType_

  Type of presolve - 0 none, 1 crunch.
- int startingDepth_

  Depth passed in.
- int nodeCalled_

  Node at which called.

3.37.1 Detailed Description

Definition at line 176 of file ClpNode.hpp.

3.37.2 Constructor & Destructor Documentation

3.37.2.1 ClpNodeStuff::ClpNodeStuff ( )

Default constructor.

3.37.2.2 ClpNodeStuff::ClpNodeStuff (const ClpNodeStuff &)

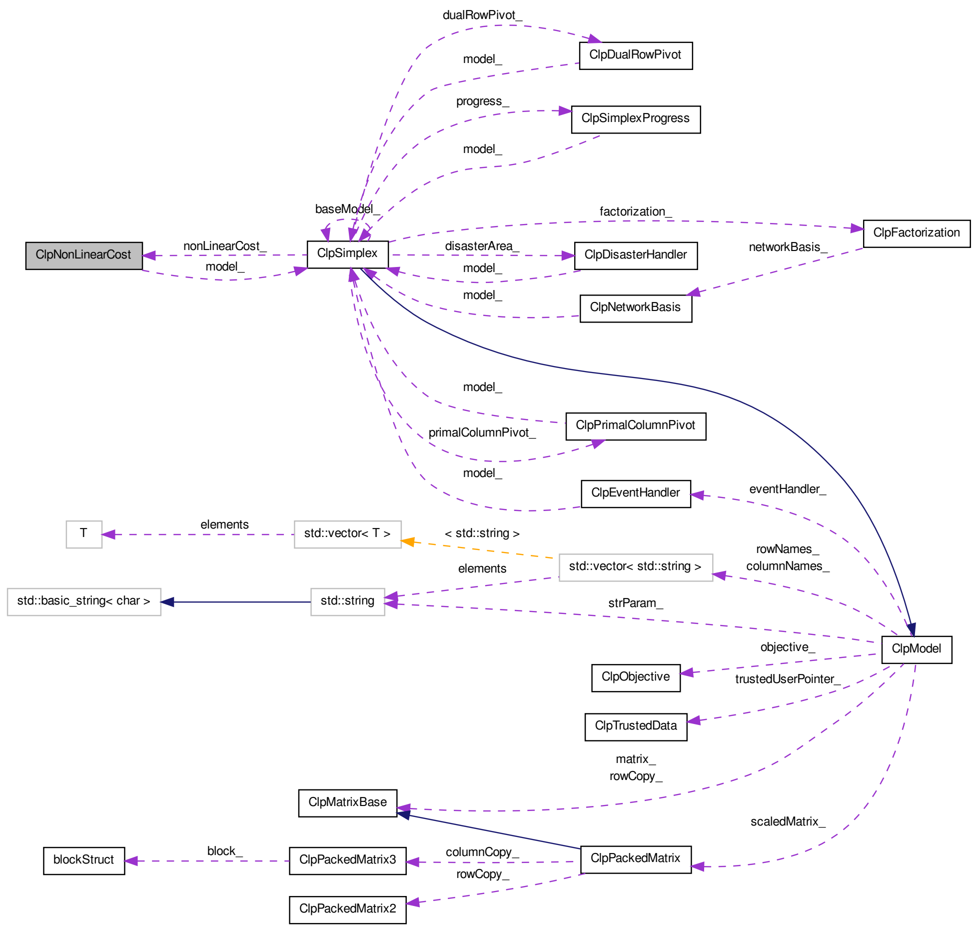
The copy constructor.

The documentation for this class was generated from the following file:

- ClpNode.hpp

3.38 ClpNonLinearCost Class Reference

Collaboration diagram for ClpNonLinearCost:



Public Member Functions

Constructors, destructor

- ClpNonLinearCost ()

  Default constructor.
- ClpNonLinearCost (ClpSimplex ∗model, int method=1)

  Constructor from simplex.
- ClpNonLinearCost (ClpSimplex ∗model, const int ∗starts, const double ∗lower, const double ∗cost)

Constructor from simplex and list of non-linearities (columns only) First lower of each column has to match real lower Last lower has to be <= upper (if == then cost ignored) This could obviously be changed to make more user friendly.
- ∼ClpNonLinearCost ()

  Destructor.
- **ClpNonLinearCost** (const ClpNonLinearCost &)
- ClpNonLinearCost & **operator=** (const ClpNonLinearCost &)

Actual work in primal

- void checkInfeasibilities (double oldTolerance=0.0)

  Changes infeasible costs and computes number and cost of infeas Puts all non-basic (non free) variables to bounds and all free variables to zero if oldTolerance is non-zero.
- void checkInfeasibilities (int numberInArray, const int ∗index)

  Changes infeasible costs for each variable The indices are row indices and need converting to sequences.
- void checkChanged (int numberInArray, CoinIndexedVector ∗update)

  Puts back correct infeasible costs for each variable The input indices are row indices and need converting to sequences for costs.
- void goThru (int numberInArray, double multiplier, const int ∗index, const double ∗work, double ∗rhs)

  Goes through one bound for each variable.
- void goBack (int numberInArray, const int ∗index, double ∗rhs)

  Takes off last iteration (i.e.
- void goBackAll (const CoinIndexedVector ∗update)

  Puts back correct infeasible costs for each variable The input indices are row indices and need converting to sequences for costs.
- void zapCosts ()

  Temporary zeroing of feasible costs.
- void refreshCosts (const double ∗columnCosts)

  Refreshes costs always makes row costs zero.
- void feasibleBounds ()

  Puts feasible bounds into lower and upper.
- double setOne (int sequence, double solutionValue)

  Sets bounds and cost for one variable Returns change in cost May need to be inline for speed.
- void setOne (int sequence, double solutionValue, double lowerValue, double upperValue, double costValue=0.0)

  Sets bounds and infeasible cost and true cost for one variable This is for gub and column generation etc.
- int setOneOutgoing (int sequence, double &solutionValue)

  Sets bounds and cost for outgoing variable may change value Returns direction.
- double nearest (int sequence, double solutionValue)

  Returns nearest bound.
- double changeInCost (int sequence, double alpha) const

  Returns change in cost - one down if alpha >0.0, up if <0.0 Value is current - new.
- double **changeUpInCost** (int sequence) const
- double **changeDownInCost** (int sequence) const
- double changeInCost (int sequence, double alpha, double &rhs)

This also updates next bound.
- double lower (int sequence) const

  Returns current lower bound.
- double upper (int sequence) const

  Returns current upper bound.
- double cost (int sequence) const

  Returns current cost.

Gets and sets

- int numberInfeasibilities () const

  Number of infeasibilities.
- double changeInCost () const

  Change in cost.
- double feasibleCost () const

  Feasible cost.
- double feasibleReportCost () const

  Feasible cost with offset and direction (i.e. for reporting)
- double sumInfeasibilities () const

  Sum of infeasibilities.
- double largestInfeasibility () const

  Largest infeasibility.
- double averageTheta () const

  Average theta.
- void **setAverageTheta** (double value)
- void **setChangeInCost** (double value)
- void **setMethod** (int value)
- bool lookBothWays () const

  See if may want to look both ways.

Private functions to deal with infeasible regions

- bool **infeasible** (int i) const
- void **setInfeasible** (int i, bool trueFalse)
- unsigned char * **statusArray** () const
- void validate ()

  For debug.

3.38.1 Detailed Description

Definition at line 78 of file ClpNonLinearCost.hpp.

3.38.2 Constructor & Destructor Documentation

3.38.2.1 ClpNonLinearCost::ClpNonLinearCost (ClpSimplex * *model*, int *method* = 1)

Constructor from simplex.

This will just set up wasteful arrays for linear, but later may do dual analysis and even finding duplicate columns .

3.38.3 Member Function Documentation

3.38.3.1 void ClpNonLinearCost::checkInfeasibilities (double *oldTolerance =* `0.0`)

Changes infeasible costs and computes number and cost of infeas Puts all non-basic (non free) variables to bounds and all free variables to zero if oldTolerance is non-zero.

- but does not move those <= oldTolerance away

3.38.3.2 void ClpNonLinearCost::checkChanged (int *numberInArray,* CoinIndexedVector ∗ *update*)

Puts back correct infeasible costs for each variable The input indices are row indices and need converting to sequences for costs.

On input array is empty (but indices exist). On exit just changed costs will be stored as normal CoinIndexedVector

3.38.3.3 void ClpNonLinearCost::goThru (int *numberInArray,* double *multiplier,* const int ∗ *index,* const double ∗ *work,* double ∗ *rhs*)

Goes through one bound for each variable.

If multiplier∗work[iRow]>0 goes down, otherwise up. The indices are row indices and need converting to sequences Temporary offsets may be set Rhs entries are increased

3.38.3.4 void ClpNonLinearCost::goBack (int *numberInArray,* const int ∗ *index,* double ∗ *rhs*)

Takes off last iteration (i.e.

offsets closer to 0)

3.38.3.5 void ClpNonLinearCost::goBackAll (const CoinIndexedVector ∗ *update*)

Puts back correct infeasible costs for each variable The input indices are row indices and need converting to sequences for costs.

At the end of this all temporary offsets are zero

The documentation for this class was generated from the following file:

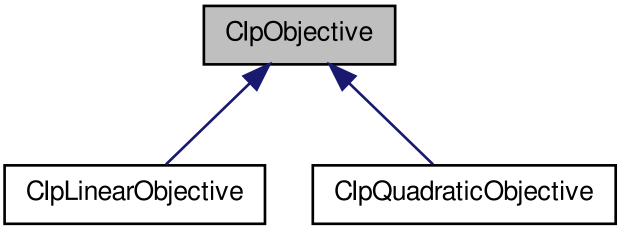
- ClpNonLinearCost.hpp

3.39 ClpObjective Class Reference

Objective Abstract Base Class.

`#include <ClpObjective.hpp>`

Inheritance diagram for ClpObjective:



Public Member Functions

Stuff

- virtual double ∗ gradient (const ClpSimplex ∗model, const double ∗solution, double &offset, bool refresh, int includeLinear=2)=0

  Returns gradient.
- virtual double reducedGradient (ClpSimplex ∗model, double ∗region, bool useFeasibleCosts)=0

  Returns reduced gradient.Returns an offset (to be added to current one).
- virtual double stepLength (ClpSimplex ∗model, const double ∗solution, const double ∗change, double maximumTheta, double &currentObj, double &predictedObj, double &thetaObj)=0

  Returns step length which gives minimum of objective for solution + theta ∗ change vector up to maximum theta.
- virtual double objectiveValue (const ClpSimplex ∗model, const double ∗solution) const =0

  Return objective value (without any ClpModel offset) (model may be NULL)
- virtual void resize (int newNumberColumns)=0

  Resize objective.
- virtual void deleteSome (int numberToDelete, const int ∗which)=0

  Delete columns in objective.
- virtual void reallyScale (const double ∗columnScale)=0

  Scale objective.
- virtual int markNonlinear (char ∗which)

  Given a zeroed array sets nonlinear columns to 1.
- virtual void newXValues ()

  Say we have new primal solution - so may need to recompute.

Constructors and destructors

- ClpObjective ()

  Default Constructor.
- ClpObjective (const ClpObjective &)

  Copy constructor.
- ClpObjective & operator= (const ClpObjective &rhs)

  Assignment operator.
- virtual ∼ClpObjective ()

  Destructor.
- virtual ClpObjective ∗ clone () const =0

  Clone.
- virtual ClpObjective ∗ subsetClone (int numberColumns, const int ∗whichColumns) const

  Subset clone.

Other

- int type ()

  Returns type (above 63 is extra information)
- int activated () const

  Whether activated.
- void setActivated (int value)

  Set whether activated.
- double nonlinearOffset () const

  Objective offset.

Protected Attributes

Protected member data

- double offset_

  Value of non-linear part of objective.
- int type_

  Type of objective - linear is 1.
- int activated_

  Whether activated.

3.39.1 Detailed Description

Objective Abstract Base Class.

Abstract Base Class for describing an objective function

Definition at line 19 of file ClpObjective.hpp.

3.39.2 Member Function Documentation

3.39.2.1 virtual double* ClpObjective::gradient (const ClpSimplex * *model*, const double * *solution*, double & *offset*, bool *refresh*, int *includeLinear* = 2) [pure virtual]

Returns gradient.

If Linear then solution may be NULL, also returns an offset (to be added to current one) If refresh is false then uses last solution Uses model for scaling includeLinear 0 - no, 1 as is, 2 as feasible

Implemented in ClpLinearObjective, and ClpQuadraticObjective.

3.39.2.2 virtual double ClpObjective::stepLength (ClpSimplex * *model*, const double * *solution*, const double * *change*, double *maximumTheta*, double & *currentObj*, double & *predictedObj*, double & *thetaObj*) [pure virtual]

Returns step length which gives minimum of objective for solution + theta * change vector up to maximum theta.

arrays are numberColumns+numberRows Also sets current objective, predicted and at maximumTheta

Implemented in ClpLinearObjective, and ClpQuadraticObjective.

3.39.2.3 virtual int ClpObjective::markNonlinear (char * *which*) [virtual]

Given a zeroed array sets nonlinear columns to 1.

Returns number of nonlinear columns

Reimplemented in ClpQuadraticObjective.

3.39.2.4 virtual ClpObjective* ClpObjective::subsetClone (int *numberColumns*, const int * *whichColumns*) const [virtual]

Subset clone.

Duplicates are allowed and order is as given. Derived classes need not provide this as it may not always make sense

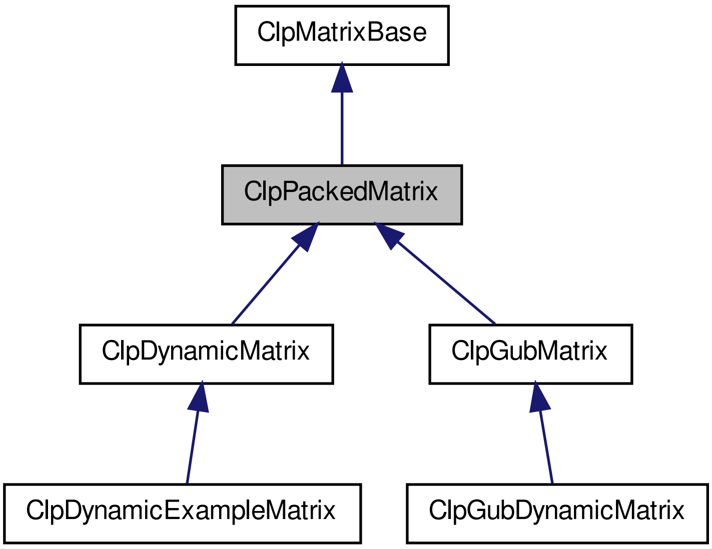
Reimplemented in ClpLinearObjective, and ClpQuadraticObjective.

The documentation for this class was generated from the following file:

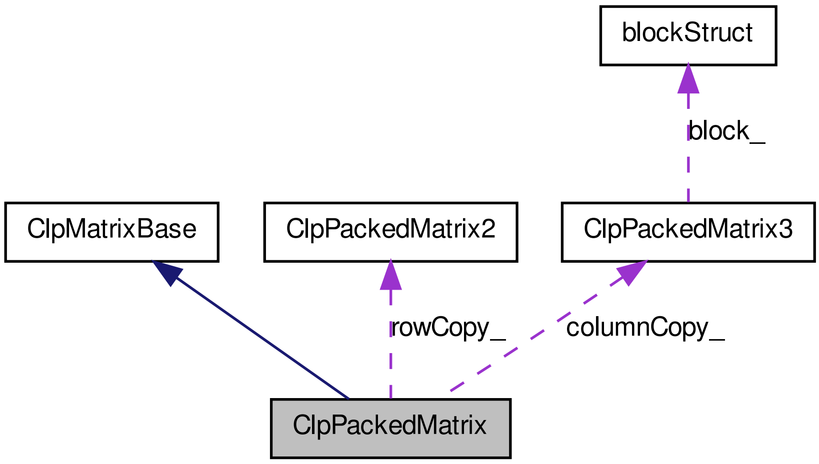
- ClpObjective.hpp

3.40 ClpPackedMatrix Class Reference

Inheritance diagram for ClpPackedMatrix:



Collaboration diagram for ClpPackedMatrix:



Public Member Functions

Useful methods

- virtual CoinPackedMatrix ∗ getPackedMatrix () const
  Return a complete CoinPackedMatrix.
- virtual bool isColOrdered () const
  Whether the packed matrix is column major ordered or not.
- virtual CoinBigIndex getNumElements () const
  Number of entries in the packed matrix.
- virtual int getNumCols () const
  Number of columns.
- virtual int getNumRows () const
  Number of rows.
- virtual const double ∗ getElements () const
  A vector containing the elements in the packed matrix.
- double ∗ getMutableElements () const
  Mutable elements.
- virtual const int ∗ getIndices () const
  A vector containing the minor indices of the elements in the packed matrix.
- virtual const CoinBigIndex ∗ **getVectorStarts** () const
- virtual const int ∗ getVectorLengths () const
  The lengths of the major-dimension vectors.
- virtual int getVectorLength (int index) const

The length of a single major-dimension vector.

- virtual void deleteCols (const int numDel, const int *indDel)

  Delete the columns whose indices are listed in `indDel`.
- virtual void deleteRows (const int numDel, const int *indDel)

  Delete the rows whose indices are listed in `indDel`.
- virtual void appendCols (int number, const CoinPackedVectorBase *const *columns)

  Append Columns.
- virtual void appendRows (int number, const CoinPackedVectorBase *const *rows)

  Append Rows.
- virtual int appendMatrix (int number, int type, const CoinBigIndex *starts, const int *index, const double *element, int numberOther=-1)

  Append a set of rows/columns to the end of the matrix.
- virtual void replaceVector (const int index, const int numReplace, const double *newElements)

  Replace the elements of a vector.
- virtual void modifyCoefficient (int row, int column, double newElement, bool keepZero=false)

  Modify one element of packed matrix.
- virtual ClpMatrixBase * reverseOrderedCopy () const

  Returns a new matrix in reverse order without gaps.
- virtual CoinBigIndex countBasis (const int *whichColumn, int &numberColumnBasic)

  Returns number of elements in column part of basis.
- virtual void fillBasis (ClpSimplex *model, const int *whichColumn, int &numberColumnBasic, int *row, int *start, int *rowCount, int *columnCount, CoinFactorizationDouble *element)

  Fills in column part of basis.
- virtual int scale (ClpModel *model, const ClpSimplex *baseModel=NULL) const

  Creates scales for column copy (rowCopy in model may be modified) returns non-zero if no scaling done.
- virtual void scaleRowCopy (ClpModel *model) const

  Scales rowCopy if column copy scaled Only called if scales already exist.
- void createScaledMatrix (ClpSimplex *model) const

  Creates scaled column copy if scales exist.
- virtual ClpMatrixBase * scaledColumnCopy (ClpModel *model) const

  Realy really scales column copy Only called if scales already exist.
- virtual bool allElementsInRange (ClpModel *model, double smallest, double largest, int check=15)

  Checks if all elements are in valid range.
- virtual void rangeOfElements (double &smallestNegative, double &largestNegative, double &smallestPositive, double &largestPositive)

  Returns largest and smallest elements of both signs.
- virtual void unpack (const ClpSimplex *model, CoinIndexedVector *rowArray, int column) const

  Unpacks a column into an CoinIndexedvector.

- virtual void unpackPacked (ClpSimplex ∗model, CoinIndexedVector ∗rowArray, int column) const

  Unpacks a column into an CoinIndexedvector in packed foramt Note that model is NOT const.
- virtual void add (const ClpSimplex ∗model, CoinIndexedVector ∗rowArray, int column, double multiplier) const

  Adds multiple of a column into an CoinIndexedvector You can use quickAdd to add to vector.
- virtual void add (const ClpSimplex ∗model, double ∗array, int column, double multiplier) const

  Adds multiple of a column into an array.
- virtual void releasePackedMatrix () const

  Allow any parts of a created CoinPackedMatrix to be deleted.
- virtual CoinBigIndex ∗ dubiousWeights (const ClpSimplex ∗model, int ∗inputWeights) const

  Given positive integer weights for each row fills in sum of weights for each column (and slack).
- virtual bool canDoPartialPricing () const

  Says whether it can do partial pricing.
- virtual void partialPricing (ClpSimplex ∗model, double start, double end, int &bestSequence, int &numberWanted)

  Partial pricing.
- virtual int refresh (ClpSimplex ∗model)

  makes sure active columns correct
- virtual void **reallyScale** (const double ∗rowScale, const double ∗columnScale)
- virtual void setDimensions (int numrows, int numcols)

  Set the dimensions of the matrix.

Matrix times vector methods

- virtual void times (double scalar, const double ∗x, double ∗y) const

  Return $y + A * scalar *x$ *in* y.
- virtual void times (double scalar, const double ∗x, double ∗y, const double ∗rowScale, const double ∗columnScale) const

  And for scaling.
- virtual void transposeTimes (double scalar, const double ∗x, double ∗y) const

  Return $y + x * scalar * A$ *in* y.
- virtual void transposeTimes (double scalar, const double ∗x, double ∗y, const double ∗rowScale, const double ∗columnScale, double ∗spare=NULL) const

  And for scaling.
- void transposeTimesSubset (int number, const int ∗which, const double ∗pi, double ∗y, const double ∗rowScale, const double ∗columnScale, double ∗spare=NULL) const

  Return $y - pi * A$ *in* y.
- virtual void transposeTimes (const ClpSimplex ∗model, double scalar, const CoinIndexedVector ∗x, CoinIndexedVector ∗y, CoinIndexedVector ∗z) const

  Return $x * scalar * A + y$ *in* z.
- void transposeTimesByColumn (const ClpSimplex ∗model, double scalar, const CoinIndexedVector ∗x, CoinIndexedVector ∗y, CoinIndexedVector ∗z) const

Return $x * scalar * A + y$ *in* z.

- virtual void transposeTimesByRow (const ClpSimplex ∗model, double scalar, const CoinIndexedVector ∗x, CoinIndexedVector ∗y, CoinIndexedVector ∗z) const

  Return $x * scalar * A + y$ *in* z.
- virtual void subsetTransposeTimes (const ClpSimplex ∗model, const CoinIndexedVector ∗x, const CoinIndexedVector ∗y, CoinIndexedVector ∗z) const

  Return $x * A$ *in* z *but just for indices in y.*
- virtual bool canCombine (const ClpSimplex ∗model, const CoinIndexedVector ∗pi) const

  Returns true if can combine transposeTimes and subsetTransposeTimes and if it would be faster.
- virtual void transposeTimes2 (const ClpSimplex ∗model, const CoinIndexedVector ∗pi1, CoinIndexedVector ∗dj1, const CoinIndexedVector ∗pi2, CoinIndexedVector ∗spare, double referenceIn, double devex, unsigned int ∗reference, double ∗weights, double scaleFactor)

  Updates two arrays for steepest.
- virtual void subsetTimes2 (const ClpSimplex ∗model, CoinIndexedVector ∗dj1, const CoinIndexedVector ∗pi2, CoinIndexedVector ∗dj2, double referenceIn, double devex, unsigned int ∗reference, double ∗weights, double scaleFactor)

  Updates second array for steepest and does devex weights.
- void useEffectiveRhs (ClpSimplex ∗model)

  Sets up an effective RHS.

Other

- CoinPackedMatrix ∗ matrix () const

  Returns CoinPackedMatrix (non const)
- void setMatrixNull ()

  Just sets matrix_ to NULL so it can be used elsewhere.
- void makeSpecialColumnCopy ()

  Say we want special column copy.
- void releaseSpecialColumnCopy ()

  Say we don't want special column copy.
- bool zeros () const

  Are there zeros?
- bool wantsSpecialColumnCopy () const

  Do we want special column copy.
- int flags () const

  Flags.
- void checkGaps ()

  Sets flags_ correctly.

Constructors, destructor

- ClpPackedMatrix ()

  Default constructor.
- virtual ∼ClpPackedMatrix ()

  Destructor.

Copy method

- ClpPackedMatrix (const ClpPackedMatrix &)
  The copy constructor.
- ClpPackedMatrix (const CoinPackedMatrix &)
  The copy constructor from an CoinPackedMatrix.
- ClpPackedMatrix (const ClpPackedMatrix &wholeModel, int numberRows, const int ∗whichRows, int numberColumns, const int ∗whichColumns)
  Subset constructor (without gaps).
- **ClpPackedMatrix** (const CoinPackedMatrix &wholeModel, int numberRows, const int ∗whichRows, int numberColumns, const int ∗whichColumns)
- ClpPackedMatrix (CoinPackedMatrix ∗matrix)
  This takes over ownership (for space reasons)
- ClpPackedMatrix & **operator=** (const ClpPackedMatrix &)
- virtual ClpMatrixBase ∗ clone () const
  Clone.
- virtual void copy (const ClpPackedMatrix ∗from)
  Copy contents - resizing if necessary - otherwise re-use memory.
- virtual ClpMatrixBase ∗ subsetClone (int numberRows, const int ∗whichRows, int numberColumns, const int ∗whichColumns) const
  Subset clone (without gaps).
- void specialRowCopy (ClpSimplex ∗model, const ClpMatrixBase ∗rowCopy)
  make special row copy
- void specialColumnCopy (ClpSimplex ∗model)
  make special column copy
- virtual void correctSequence (const ClpSimplex ∗model, int &sequenceIn, int &sequenceOut)
  Correct sequence in and out to give true value.

Protected Member Functions

- void checkFlags (int type) const
  Check validity.

Protected Attributes

Data members

The data members are protected to allow access for derived classes.

- CoinPackedMatrix ∗ matrix_
  Data.
- int numberActiveColumns_
  number of active columns (normally same as number of columns)
- int flags_
  Flags - 1 - has zero elements 2 - has gaps 4 - has special row copy 8 - has special column copy 16 - wants special column copy.
- ClpPackedMatrix2 ∗ rowCopy_
  Special row copy.
- ClpPackedMatrix3 ∗ columnCopy_
  Special column copy.

3.40.1 Detailed Description

Definition at line 30 of file ClpPackedMatrix.hpp.

3.40.2 Constructor & Destructor Documentation

3.40.2.1 ClpPackedMatrix::ClpPackedMatrix ( )

Default constructor.

3.40.2.2 ClpPackedMatrix::ClpPackedMatrix (const ClpPackedMatrix &)

The copy constructor.

3.40.2.3 ClpPackedMatrix::ClpPackedMatrix (const CoinPackedMatrix &)

The copy constructor from an CoinPackedMatrix.

3.40.2.4 ClpPackedMatrix::ClpPackedMatrix (const ClpPackedMatrix & *wholeModel*, int *numberRows*, const int * *whichRows*, int *numberColumns*, const int * *whichColumns*)

Subset constructor (without gaps).

Duplicates are allowed and order is as given

3.40.3 Member Function Documentation

3.40.3.1 virtual bool ClpPackedMatrix::isColOrdered ( ) const [inline, virtual]

Whether the packed matrix is column major ordered or not.

Implements ClpMatrixBase.

Definition at line 40 of file ClpPackedMatrix.hpp.

3.40.3.2 virtual CoinBigIndex ClpPackedMatrix::getNumElements ( ) const [inline, virtual]

Number of entries in the packed matrix.

Implements ClpMatrixBase.

Definition at line 44 of file ClpPackedMatrix.hpp.

3.40.3.3 virtual int ClpPackedMatrix::getNumCols ( ) const [inline, virtual]

Number of columns.

Implements ClpMatrixBase.

Definition at line 48 of file ClpPackedMatrix.hpp.

3.40.3.4 virtual int ClpPackedMatrix::getNumRows ( ) const [inline, virtual]

Number of rows.

Implements ClpMatrixBase.

Definition at line 52 of file ClpPackedMatrix.hpp.

3.40.3.5 virtual const double* ClpPackedMatrix::getElements ( ) const [inline, virtual]

A vector containing the elements in the packed matrix.

Note that there might be gaps in this list, entries that do not belong to any major-dimension vector. To get the actual elements one should look at this vector together with vectorStarts and vectorLengths.

Implements ClpMatrixBase.

Definition at line 60 of file ClpPackedMatrix.hpp.

3.40.3.6 virtual const int* ClpPackedMatrix::getIndices ( ) const [inline, virtual]

A vector containing the minor indices of the elements in the packed matrix.

Note that there might be gaps in this list, entries that do not belong to any major-dimension vector. To get the actual elements one should look at this vector together with vectorStarts and vectorLengths.

Implements ClpMatrixBase.

Definition at line 72 of file ClpPackedMatrix.hpp.

3.40.3.7 virtual const int* ClpPackedMatrix::getVectorLengths ( ) const [inline, virtual]

The lengths of the major-dimension vectors.

Implements ClpMatrixBase.

Definition at line 80 of file ClpPackedMatrix.hpp.

3.40.3.8 virtual int ClpPackedMatrix::getVectorLength (int *index*) const [inline, virtual]

The length of a single major-dimension vector.

Reimplemented from ClpMatrixBase.

Definition at line 84 of file ClpPackedMatrix.hpp.

3.40.3.9 virtual void ClpPackedMatrix::deleteCols (const int *numDel*, const int * *indDel*) [virtual]

Delete the columns whose indices are listed in `indDel`.

Implements ClpMatrixBase.

3.40.3.10 virtual void ClpPackedMatrix::deleteRows (const int *numDel*, const int * *indDel*) [virtual]

Delete the rows whose indices are listed in `indDel`.

Implements ClpMatrixBase.

3.40.3.11 virtual int ClpPackedMatrix::appendMatrix (int *number*, int *type*, const CoinBigIndex * *starts*, const int * *index*, const double * *element*, int *numberOther* = -1) [virtual]

Append a set of rows/columns to the end of the matrix.

Returns number of errors i.e. if any of the new rows/columns contain an index that's larger than the number of columns-1/rows-1 (if numberOther>0) or duplicates If 0 then rows, 1 if columns

Reimplemented from ClpMatrixBase.

3.40.3.12 virtual void ClpPackedMatrix::replaceVector (const int *index*, const int *numReplace*, const double * *newElements*) [inline, virtual]

Replace the elements of a vector.

The indices remain the same. This is only needed if scaling and a row copy is used. At most the number specified will be replaced. The index is between 0 and major dimension of matrix

Definition at line 109 of file ClpPackedMatrix.hpp.

3.40.3.13 virtual void ClpPackedMatrix::modifyCoefficient (int *row*, int *column*, double *newElement*, bool *keepZero* = false) [inline, virtual]

Modify one element of packed matrix.

An element may be added. This works for either ordering If the new element is zero it will be deleted unless keepZero true

Reimplemented from ClpMatrixBase.

Definition at line 116 of file ClpPackedMatrix.hpp.

3.40.3.14 virtual ClpMatrixBase* ClpPackedMatrix::scaledColumnCopy (ClpModel * *model*) const [virtual]

Realy really scales column copy Only called if scales already exist.

Up to user ro delete

Reimplemented from ClpMatrixBase.

3.40.3.15 virtual bool ClpPackedMatrix::allElementsInRange (ClpModel * *model*, double *smallest*, double *largest*, int *check* = 15) [virtual]

Checks if all elements are in valid range.

Can just return true if you are not paranoid. For Clp I will probably expect no zeros.

Code can modify matrix to get rid of small elements. check bits (can be turned off to save time) : 1 - check if matrix has gaps 2 - check if zero elements 4 - check and compress duplicates 8 - report on large and small

Reimplemented from ClpMatrixBase.

3.40.3.16 virtual void ClpPackedMatrix::rangeOfElements (double & *smallestNegative*, double & *largestNegative*, double & *smallestPositive*, double & *largestPositive*) [virtual]

Returns largest and smallest elements of both signs.

Largest refers to largest absolute value.

Reimplemented from ClpMatrixBase.

3.40.3.17 virtual void ClpPackedMatrix::unpackPacked (ClpSimplex * *model*, CoinIndexedVector * *rowArray*, int *column*) const [virtual]

Unpacks a column into an CoinIndexedvector in packed foramt Note that model is NOT const.

Bounds and objective could be modified if doing column generation (just for this variable)

Implements ClpMatrixBase.

Reimplemented in ClpGubMatrix.

3.40.3.18 virtual CoinBigIndex* ClpPackedMatrix::dubiousWeights (const ClpSimplex * *model*, int * *inputWeights*) const [virtual]

Given positive integer weights for each row fills in sum of weights for each column (and slack).

Returns weights vector

Reimplemented from ClpMatrixBase.

3.40.3.19 virtual void ClpPackedMatrix::setDimensions (int *numrows*, int *numcols*) [virtual]

Set the dimensions of the matrix.

In effect, append new empty columns/rows to the matrix. A negative number for either dimension means that that dimension doesn't change. Otherwise the new dimensions MUST be at least as large as the current ones otherwise an exception is thrown.

Reimplemented from ClpMatrixBase.

3.40.3.20 virtual void ClpPackedMatrix::times (double *scalar*, const double * *x*, double * *y*) const [virtual]

Return `y + A * scalar *x` in `y`.

Precondition

`x` must be of size `numColumns()`

`y` must be of size `numRows()`

Implements ClpMatrixBase.

Reimplemented in ClpDynamicMatrix, and ClpGubDynamicMatrix.

3.40.3.21 virtual void ClpPackedMatrix::transposeTimes (double *scalar*, const double * *x*, double * *y*) const [virtual]

Return `y + x * scalar * A` in `y`.

Precondition

`x` must be of size `numRows()`
`y` must be of size `numColumns()`

Implements ClpMatrixBase.

3.40.3.22 void ClpPackedMatrix::transposeTimesSubset (int *number*, const int * *which*, const double * *pi*, double * *y*, const double * *rowScale*, const double * *columnScale*, double * *spare* = NULL) const

Return `y - pi * A` in `y`.

Precondition

`pi` must be of size `numRows()`
`y` must be of size `numColumns()` This just does subset (but puts in correct place in y)

3.40.3.23 virtual void ClpPackedMatrix::transposeTimes (const ClpSimplex * *model*, double *scalar*, const CoinIndexedVector * *x*, CoinIndexedVector * *y*, CoinIndexedVector * *z*) const [virtual]

Return `x * scalar * A + y` in `z`.

Can use y as temporary array (will be empty at end) Note - If x packed mode - then z packed mode Squashes small elements and knows about ClpSimplex

Implements ClpMatrixBase.

Reimplemented in ClpGubMatrix.

3.40.3.24 void ClpPackedMatrix::transposeTimesByColumn (const ClpSimplex * *model*, double *scalar*, const CoinIndexedVector * *x*, CoinIndexedVector * *y*, CoinIndexedVector * *z*) const

Return `x * scalar * A + y` in `z`.

Note - If x packed mode - then z packed mode This does by column and knows no gaps Squashes small elements and knows about ClpSimplex

3.40.3.25 virtual void ClpPackedMatrix::transposeTimesByRow (const **ClpSimplex** ∗ *model*, double *scalar*, const CoinIndexedVector ∗ *x*, CoinIndexedVector ∗ *y*, CoinIndexedVector ∗ *z*) const [virtual]

Return `x * scalar * A + y` in `z`.

Can use y as temporary array (will be empty at end) Note - If x packed mode - then z packed mode Squashes small elements and knows about ClpSimplex. This version uses row copy

Reimplemented in ClpGubMatrix.

3.40.3.26 virtual void ClpPackedMatrix::subsetTransposeTimes (const **ClpSimplex** ∗ *model*, const CoinIndexedVector ∗ *x*, const CoinIndexedVector ∗ *y*, CoinIndexedVector ∗ *z*) const [virtual]

Return `x *A` in `z` but just for indices in y.

Note - z always packed mode

Implements ClpMatrixBase.

Reimplemented in ClpGubMatrix.

3.40.3.27 void ClpPackedMatrix::setMatrixNull ( ) [inline]

Just sets matrix_ to NULL so it can be used elsewhere.

used in GUB

Definition at line 311 of file ClpPackedMatrix.hpp.

3.40.3.28 virtual **ClpMatrixBase**∗ ClpPackedMatrix::subsetClone (int *numberRows*, const int ∗ *whichRows*, int *numberColumns*, const int ∗ *whichColumns*) const [virtual]

Subset clone (without gaps).

Duplicates are allowed and order is as given

Reimplemented from ClpMatrixBase.

Reimplemented in ClpGubMatrix.

The documentation for this class was generated from the following file:

- ClpPackedMatrix.hpp

3.41 ClpPackedMatrix2 Class Reference

Public Member Functions

Useful methods

- void transposeTimes (const ClpSimplex ∗model, const CoinPackedMatrix ∗rowCopy, const CoinIndexedVector ∗x, CoinIndexedVector ∗spareArray, CoinIndexed-

Vector ∗z) const

Return $x * -1 * A \text{ in } z.$

- bool usefulInfo () const

  Returns true if copy has useful information.

Constructors, destructor

- ClpPackedMatrix2 ()

  Default constructor.
- ClpPackedMatrix2 (ClpSimplex ∗model, const CoinPackedMatrix ∗rowCopy)

  Constructor from copy.
- virtual ∼ClpPackedMatrix2 ()

  Destructor.

Copy method

- ClpPackedMatrix2 (const ClpPackedMatrix2 &)

  The copy constructor.
- ClpPackedMatrix2 & **operator=** (const ClpPackedMatrix2 &)

Protected Attributes

Data members

The data members are protected to allow access for derived classes.

- int numberBlocks_

  Number of blocks.
- int numberRows_

  Number of rows.
- int ∗ offset_

  Column offset for each block (plus one at end)
- unsigned short ∗ count_

  Counts of elements in each part of row.
- CoinBigIndex ∗ rowStart_

  Row starts.
- unsigned short ∗ column_

  columns within block
- double ∗ work_

  work arrays

3.41.1 Detailed Description

Definition at line 503 of file ClpPackedMatrix.hpp.

3.41.2 Constructor & Destructor Documentation

3.41.2.1 ClpPackedMatrix2::ClpPackedMatrix2 ( )

Default constructor.

3.41.2.2 ClpPackedMatrix2::ClpPackedMatrix2 (ClpSimplex * *model*, const CoinPackedMatrix * *rowCopy*)

Constructor from copy.

3.41.2.3 ClpPackedMatrix2::ClpPackedMatrix2 (const ClpPackedMatrix2 &)

The copy constructor.

3.41.3 Member Function Documentation

3.41.3.1 void ClpPackedMatrix2::transposeTimes (const ClpSimplex * *model*, const CoinPackedMatrix * *rowCopy*, const CoinIndexedVector * *x*, CoinIndexedVector * *spareArray*, CoinIndexedVector * *z*) const

Return `x * -1 * A in z.`

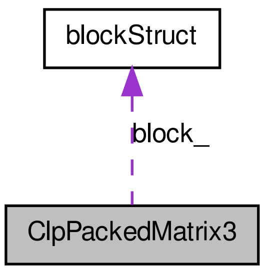
Note - x packed and z will be packed mode Squashes small elements and knows about ClpSimplex

The documentation for this class was generated from the following file:

- ClpPackedMatrix.hpp

3.42 ClpPackedMatrix3 Class Reference

Collaboration diagram for ClpPackedMatrix3:



Public Member Functions

Useful methods

- void transposeTimes (const ClpSimplex *model, const double *pi, CoinIndexedVector *output) const
  Return $x * -1 * A \text{ in } z.$
- void transposeTimes2 (const ClpSimplex *model, const double *pi, CoinIndexedVector *dj1, const double *piWeight, double referenceIn, double devex, unsigned int *reference, double *weights, double scaleFactor)
  Updates two arrays for steepest.

Constructors, destructor

- ClpPackedMatrix3 ()
  Default constructor.
- ClpPackedMatrix3 (ClpSimplex *model, const CoinPackedMatrix *columnCopy)
  Constructor from copy.
- virtual ~ClpPackedMatrix3 ()
  Destructor.

Copy method

- ClpPackedMatrix3 (const ClpPackedMatrix3 &)
  The copy constructor.
- ClpPackedMatrix3 & **operator=** (const ClpPackedMatrix3 &)

Sort methods

- void sortBlocks (const ClpSimplex *model)
  Sort blocks.
- void swapOne (const ClpSimplex *model, const ClpPackedMatrix *matrix, int iColumn)
  Swap one variable.

Protected Attributes

Data members

The data members are protected to allow access for derived classes.

- int numberBlocks_
  Number of blocks.
- int numberColumns_
  Number of columns.
- int * column_
  Column indices and reverse lookup (within block)
- CoinBigIndex * start_
  Starts for odd/long vectors.
- int * row_
  Rows.
- double * element_
  Elements.
- blockStruct * block_
  Blocks (ordinary start at 0 and go to first block)

3.42.1 Detailed Description

Definition at line 572 of file ClpPackedMatrix.hpp.

3.42.2 Constructor & Destructor Documentation

3.42.2.1 ClpPackedMatrix3::ClpPackedMatrix3 ( )

Default constructor.

3.42.2.2 ClpPackedMatrix3::ClpPackedMatrix3 (**ClpSimplex** * *model*, const CoinPackedMatrix * *columnCopy*)

Constructor from copy.

3.42.2.3 ClpPackedMatrix3::ClpPackedMatrix3 (const **ClpPackedMatrix3** &)

The copy constructor.

3.42.3 Member Function Documentation

3.42.3.1 void ClpPackedMatrix3::transposeTimes (const **ClpSimplex** * *model*, const double * *pi*, CoinIndexedVector * *output*) const

Return `x * -1 * A in z.`

Note - x packed and z will be packed mode Squashes small elements and knows about ClpSimplex

The documentation for this class was generated from the following file:

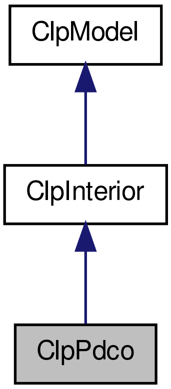
- ClpPackedMatrix.hpp

3.43 ClpPdco Class Reference

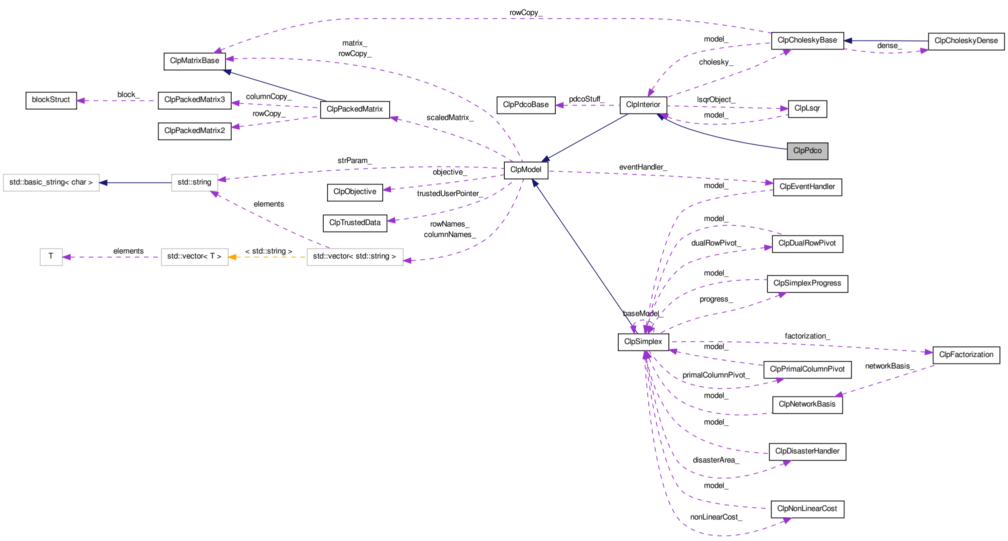
This solves problems in Primal Dual Convex Optimization.

`#include <ClpPdco.hpp>`

Inheritance diagram for ClpPdco:



Collaboration diagram for ClpPdco:



Public Member Functions

Description of algorithm

- int pdco ()
  Pdco algorithm.
- int **pdco** (ClpPdcoBase ∗stuff, Options &options, Info &info, Outfo &outfo)

Functions used in pdco

- void lsqr ()
  LSQR.
- void **matVecMult** (int, double ∗, double ∗)
- void **matVecMult** (int, CoinDenseVector< double > &, double ∗)
- void **matVecMult** (int, CoinDenseVector< double > &, CoinDenseVector< double > &)
- void **matVecMult** (int, CoinDenseVector< double > ∗, CoinDenseVector< double > ∗)
- void **getBoundTypes** (int ∗, int ∗, int ∗, int ∗∗)
- void **getGrad** (CoinDenseVector< double > &x, CoinDenseVector< double > &grad)
- void **getHessian** (CoinDenseVector< double > &x, CoinDenseVector< double > &H)
- double **getObj** (CoinDenseVector< double > &x)
- void **matPrecon** (double, double ∗, double ∗)
- void **matPrecon** (double, CoinDenseVector< double > &, double ∗)
- void **matPrecon** (double, CoinDenseVector< double > &, CoinDenseVector< double > &)
- void **matPrecon** (double, CoinDenseVector< double > ∗, CoinDenseVector< double > ∗)

3.43.1 Detailed Description

This solves problems in Primal Dual Convex Optimization.

It inherits from ClpInterior. It has no data of its own and is never created - only cast from a ClpInterior object at algorithm time.

Definition at line 22 of file ClpPdco.hpp.

3.43.2 Member Function Documentation

3.43.2.1 int ClpPdco::pdco ( )

Pdco algorithm.

Method

Reimplemented from ClpInterior.

The documentation for this class was generated from the following file:

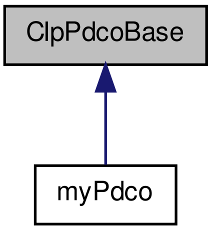
- ClpPdco.hpp

3.44 ClpPdcoBase Class Reference

Abstract base class for tailoring everything for Pcdo.

`#include <ClpPdcoBase.hpp>`

Inheritance diagram for ClpPdcoBase:



Public Member Functions

Virtual methods that the derived classes must provide

- virtual void **matVecMult** (ClpInterior ∗model, int mode, double ∗x, double ∗y) const =0
- virtual void **getGrad** (ClpInterior ∗model, CoinDenseVector< double > &x, CoinDenseVector< double > &grad) const =0
- virtual void **getHessian** (ClpInterior ∗model, CoinDenseVector< double > &x, CoinDenseVector< double > &H) const =0
- virtual double **getObj** (ClpInterior ∗model, CoinDenseVector< double > &x) const =0
- virtual void **matPrecon** (ClpInterior ∗model, double delta, double ∗x, double ∗y) const =0

Other

Clone

- virtual ClpPdcoBase ∗ **clone** () const =0
- int type () const

  Returns type.
- void setType (int type)

  Sets type.
- int sizeD1 () const

  Returns size of d1.
- double getD1 () const

Returns d1 as scalar.
- int sizeD2 () const

  Returns size of d2.
- double getD2 () const

  Returns d2 as scalar.

Protected Attributes

Data members

The data members are protected to allow access for derived classes.

- double d1_

  Should be dense vectors.
- double **d2_**
- int type_

  type (may be useful)

Constructors, destructor

NOTE: All constructors are protected.

There's no need to expose them, after all, this is an abstract class.

- virtual ~ClpPdcoBase ()

  Destructor (has to be public)
- ClpPdcoBase ()

  Default constructor.
- **ClpPdcoBase** (const ClpPdcoBase &)
- ClpPdcoBase & **operator=** (const ClpPdcoBase &)

3.44.1 Detailed Description

Abstract base class for tailoring everything for Pcdo.

Since this class is abstract, no object of this type can be created.

If a derived class provides all methods then all ClpPcdo algorithms should work.

Eventually we should be able to use ClpObjective and ClpMatrixBase.

Definition at line 25 of file ClpPdcoBase.hpp.

3.44.2 Constructor & Destructor Documentation

3.44.2.1 ClpPdcoBase::ClpPdcoBase ( ) [protected]

Default constructor.

The documentation for this class was generated from the following file:

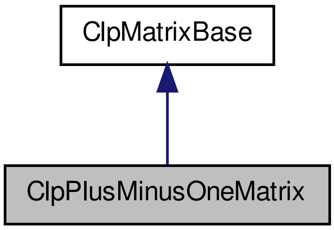
- ClpPdcoBase.hpp

3.45 ClpPlusMinusOneMatrix Class Reference

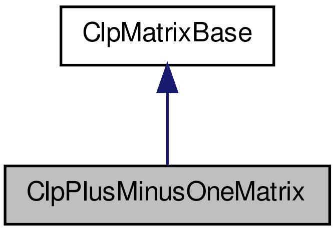
This implements a simple +- one matrix as derived from ClpMatrixBase.

`#include <ClpPlusMinusOneMatrix.hpp>`

Inheritance diagram for ClpPlusMinusOneMatrix:



Collaboration diagram for ClpPlusMinusOneMatrix:



Public Member Functions

Useful methods

- virtual CoinPackedMatrix * getPackedMatrix () const

  Return a complete CoinPackedMatrix.
- virtual bool isColOrdered () const

  Whether the packed matrix is column major ordered or not.

- virtual CoinBigIndex getNumElements () const

  Number of entries in the packed matrix.
- virtual int getNumCols () const

  Number of columns.
- virtual int getNumRows () const

  Number of rows.
- virtual const double ∗ getElements () const

  A vector containing the elements in the packed matrix.
- virtual const int ∗ getIndices () const

  A vector containing the minor indices of the elements in the packed matrix.
- int ∗ **getMutableIndices** () const
- virtual const CoinBigIndex ∗ **getVectorStarts** () const
- virtual const int ∗ getVectorLengths () const

  The lengths of the major-dimension vectors.
- virtual void deleteCols (const int numDel, const int ∗indDel)

  Delete the columns whose indices are listed in `indDel`.
- virtual void deleteRows (const int numDel, const int ∗indDel)

  Delete the rows whose indices are listed in `indDel`.
- virtual void appendCols (int number, const CoinPackedVectorBase ∗const ∗columns)

  Append Columns.
- virtual void appendRows (int number, const CoinPackedVectorBase ∗const ∗rows)

  Append Rows.
- virtual int appendMatrix (int number, int type, const CoinBigIndex ∗starts, const int ∗index, const double ∗element, int numberOther=-1)

  Append a set of rows/columns to the end of the matrix.
- virtual ClpMatrixBase ∗ reverseOrderedCopy () const

  Returns a new matrix in reverse order without gaps.
- virtual CoinBigIndex countBasis (const int ∗whichColumn, int &numberColumnBasic)

  Returns number of elements in column part of basis.
- virtual void fillBasis (ClpSimplex ∗model, const int ∗whichColumn, int &numberColumnBasic, int ∗row, int ∗start, int ∗rowCount, int ∗columnCount, CoinFactorizationDouble ∗element)

  Fills in column part of basis.
- virtual CoinBigIndex ∗ dubiousWeights (const ClpSimplex ∗model, int ∗inputWeights) const

  Given positive integer weights for each row fills in sum of weights for each column (and slack).
- virtual void rangeOfElements (double &smallestNegative, double &largestNegative, double &smallestPositive, double &largestPositive)

  Returns largest and smallest elements of both signs.
- virtual void unpack (const ClpSimplex ∗model, CoinIndexedVector ∗rowArray, int column) const

  Unpacks a column into an CoinIndexedvector.
- virtual void unpackPacked (ClpSimplex ∗model, CoinIndexedVector ∗rowArray, int column) const

  Unpacks a column into an CoinIndexedvector in packed foramt Note that model is NOT const.

- virtual void add (const ClpSimplex *model, CoinIndexedVector *rowArray, int column, double multiplier) const

    Adds multiple of a column into an CoinIndexedvector You can use quickAdd to add to vector.
- virtual void add (const ClpSimplex *model, double *array, int column, double multiplier) const

    Adds multiple of a column into an array.
- virtual void releasePackedMatrix () const

    Allow any parts of a created CoinMatrix to be deleted.
- virtual void setDimensions (int numrows, int numcols)

    Set the dimensions of the matrix.
- void checkValid (bool detail) const

    Just checks matrix valid - will say if dimensions not quite right if detail.

Matrix times vector methods

- virtual void times (double scalar, const double *x, double *y) const

    Return $y + A * scalar * x$ *in* y.
- virtual void times (double scalar, const double *x, double *y, const double *rowScale, const double *columnScale) const

    And for scaling.
- virtual void transposeTimes (double scalar, const double *x, double *y) const

    Return $y + x * scalar * A$ *in* y.
- virtual void transposeTimes (double scalar, const double *x, double *y, const double *rowScale, const double *columnScale, double *spare=NULL) const

    And for scaling.
- virtual void transposeTimes (const ClpSimplex *model, double scalar, const CoinIndexedVector *x, CoinIndexedVector *y, CoinIndexedVector *z) const

    Return $x * scalar * A + y$ *in* z.
- virtual void transposeTimesByRow (const ClpSimplex *model, double scalar, const CoinIndexedVector *x, CoinIndexedVector *y, CoinIndexedVector *z) const

    Return $x * scalar * A + y$ *in* z.
- virtual void subsetTransposeTimes (const ClpSimplex *model, const CoinIndexedVector *x, const CoinIndexedVector *y, CoinIndexedVector *z) const

    Return $x *A$ *in* z *but just for indices in y.*
- virtual bool canCombine (const ClpSimplex *model, const CoinIndexedVector *pi) const

    Returns true if can combine transposeTimes and subsetTransposeTimes and if it would be faster.
- virtual void transposeTimes2 (const ClpSimplex *model, const CoinIndexedVector *pi1, CoinIndexedVector *dj1, const CoinIndexedVector *pi2, CoinIndexedVector *spare, double referenceIn, double devex, unsigned int *reference, double *weights, double scaleFactor)

    Updates two arrays for steepest.
- virtual void subsetTimes2 (const ClpSimplex *model, CoinIndexedVector *dj1, const CoinIndexedVector *pi2, CoinIndexedVector *dj2, double referenceIn, double devex, unsigned int *reference, double *weights, double scaleFactor)

    Updates second array for steepest and does devex weights.

Other

- CoinBigIndex ∗ startPositive () const

  Return starts of +1s.
- CoinBigIndex ∗ startNegative () const

  Return starts of -1s.

Constructors, destructor

- ClpPlusMinusOneMatrix ()

  Default constructor.
- virtual ∼ClpPlusMinusOneMatrix ()

  Destructor.

Copy method

- ClpPlusMinusOneMatrix (const ClpPlusMinusOneMatrix &)

  The copy constructor.
- ClpPlusMinusOneMatrix (const CoinPackedMatrix &)

  The copy constructor from an CoinPlusMinusOneMatrix.
- ClpPlusMinusOneMatrix (int numberRows, int numberColumns, bool columnOrdered, const int ∗indices, const CoinBigIndex ∗startPositive, const CoinBigIndex ∗startNegative)

  Constructor from arrays.
- ClpPlusMinusOneMatrix (const ClpPlusMinusOneMatrix &wholeModel, int numberRows, const int ∗whichRows, int numberColumns, const int ∗whichColumns)

  Subset constructor (without gaps).
- ClpPlusMinusOneMatrix & **operator=** (const ClpPlusMinusOneMatrix &)
- virtual ClpMatrixBase ∗ clone () const

  Clone.
- virtual ClpMatrixBase ∗ subsetClone (int numberRows, const int ∗whichRows, int numberColumns, const int ∗whichColumns) const

  Subset clone (without gaps).
- void passInCopy (int numberRows, int numberColumns, bool columnOrdered, int ∗indices, CoinBigIndex ∗startPositive, CoinBigIndex ∗startNegative)

  pass in copy (object takes ownership)
- virtual bool canDoPartialPricing () const

  Says whether it can do partial pricing.
- virtual void partialPricing (ClpSimplex ∗model, double start, double end, int &bestSequence, int &numberWanted)

  Partial pricing.

Protected Attributes

Data members

The data members are protected to allow access for derived classes.

- CoinPackedMatrix ∗ matrix_

For fake CoinPackedMatrix.
- int ∗ **lengths_**
- CoinBigIndex ∗ startPositive_

  Start of +1's for each.
- CoinBigIndex ∗ startNegative_

  Start of -1's for each.
- int ∗ indices_

  Data -1, then +1 rows in pairs (row==-1 if one entry)
- int numberRows_

  Number of rows.
- int numberColumns_

  Number of columns.
- bool columnOrdered_

  True if column ordered.

3.45.1 Detailed Description

This implements a simple +- one matrix as derived from ClpMatrixBase.

Definition at line 18 of file ClpPlusMinusOneMatrix.hpp.

3.45.2 Constructor & Destructor Documentation

3.45.2.1 ClpPlusMinusOneMatrix::ClpPlusMinusOneMatrix ( )

Default constructor.

3.45.2.2 ClpPlusMinusOneMatrix::ClpPlusMinusOneMatrix (const **ClpPlusMinusOneMatrix** &)

The copy constructor.

3.45.2.3 ClpPlusMinusOneMatrix::ClpPlusMinusOneMatrix (const CoinPackedMatrix &)

The copy constructor from an CoinPlusMinusOneMatrix.

If not a valid matrix then getIndices will be NULL and startPositive[0] will have number of +1, startPositive[1] will have number of -1, startPositive[2] will have number of others,

3.45.2.4 ClpPlusMinusOneMatrix::ClpPlusMinusOneMatrix (const **ClpPlusMinusOneMatrix** & *wholeModel*, int *numberRows*, const int ∗ *whichRows*, int *numberColumns*, const int ∗ *whichColumns*)

Subset constructor (without gaps).

Duplicates are allowed and order is as given

3.45.3 Member Function Documentation

3.45.3.1 virtual bool ClpPlusMinusOneMatrix::isColOrdered ( ) const [virtual]

Whether the packed matrix is column major ordered or not.

Implements ClpMatrixBase.

3.45.3.2 virtual CoinBigIndex ClpPlusMinusOneMatrix::getNumElements ( ) const [virtual]

Number of entries in the packed matrix.

Implements ClpMatrixBase.

3.45.3.3 virtual int ClpPlusMinusOneMatrix::getNumCols ( ) const [inline, virtual]

Number of columns.

Implements ClpMatrixBase.

Definition at line 30 of file ClpPlusMinusOneMatrix.hpp.

3.45.3.4 virtual int ClpPlusMinusOneMatrix::getNumRows ( ) const [inline, virtual]

Number of rows.

Implements ClpMatrixBase.

Definition at line 34 of file ClpPlusMinusOneMatrix.hpp.

3.45.3.5 virtual const double* ClpPlusMinusOneMatrix::getElements ( ) const [virtual]

A vector containing the elements in the packed matrix.

Note that there might be gaps in this list, entries that do not belong to any major-dimension vector. To get the actual elements one should look at this vector together with vectorStarts and vectorLengths.

Implements ClpMatrixBase.

3.45.3.6 virtual const int* ClpPlusMinusOneMatrix::getIndices ( ) const [inline, virtual]

A vector containing the minor indices of the elements in the packed matrix.

Note that there might be gaps in this list, entries that do not belong to any major-dimension vector. To get the actual elements one should look at this vector together with vectorStarts and vectorLengths.

Implements ClpMatrixBase.

Definition at line 48 of file ClpPlusMinusOneMatrix.hpp.

3.45.3.7 virtual const int* ClpPlusMinusOneMatrix::getVectorLengths ( ) const [virtual]

The lengths of the major-dimension vectors.

Implements ClpMatrixBase.

3.45.3.8 virtual void ClpPlusMinusOneMatrix::deleteCols (const int *numDel*, const int * *indDel*) [virtual]

Delete the columns whose indices are listed in `indDel`.

Implements ClpMatrixBase.

3.45.3.9 virtual void ClpPlusMinusOneMatrix::deleteRows (const int *numDel*, const int * *indDel*) [virtual]

Delete the rows whose indices are listed in `indDel`.

Implements ClpMatrixBase.

3.45.3.10 virtual int ClpPlusMinusOneMatrix::appendMatrix (int *number*, int *type*, const CoinBigIndex * *starts*, const int * *index*, const double * *element*, int *numberOther* = -1) [virtual]

Append a set of rows/columns to the end of the matrix.

Returns number of errors i.e. if any of the new rows/columns contain an index that's larger than the number of columns-1/rows-1 (if numberOther>0) or duplicates If 0 then rows, 1 if columns

Reimplemented from ClpMatrixBase.

3.45.3.11 virtual CoinBigIndex* ClpPlusMinusOneMatrix::dubiousWeights (const ClpSimplex * *model*, int * *inputWeights*) const [virtual]

Given positive integer weights for each row fills in sum of weights for each column (and slack).

Returns weights vector

Reimplemented from ClpMatrixBase.

3.45.3.12 virtual void ClpPlusMinusOneMatrix::rangeOfElements (double & *smallestNegative*, double & *largestNegative*, double & *smallestPositive*, double & *largestPositive*) [virtual]

Returns largest and smallest elements of both signs.

Largest refers to largest absolute value.

Reimplemented from ClpMatrixBase.

3.45.3.13 virtual void ClpPlusMinusOneMatrix::unpackPacked (ClpSimplex ∗ *model*, CoinIndexedVector ∗ *rowArray*, int *column*) const [virtual]

Unpacks a column into an CoinIndexedvector in packed foramt Note that model is NOT const.

Bounds and objective could be modified if doing column generation (just for this variable)

Implements ClpMatrixBase.

3.45.3.14 virtual void ClpPlusMinusOneMatrix::setDimensions (int *numrows*, int *numcols*) [virtual]

Set the dimensions of the matrix.

In effect, append new empty columns/rows to the matrix. A negative number for either dimension means that that dimension doesn't change. Otherwise the new dimensions MUST be at least as large as the current ones otherwise an exception is thrown.

Reimplemented from ClpMatrixBase.

3.45.3.15 virtual void ClpPlusMinusOneMatrix::times (double *scalar*, const double ∗ *x*, double ∗ *y*) const [virtual]

Return `y + A * scalar *x` in `y`.

Precondition

`x` must be of size `numColumns()`
`y` must be of size `numRows()`

Implements ClpMatrixBase.

3.45.3.16 virtual void ClpPlusMinusOneMatrix::transposeTimes (double *scalar*, const double ∗ *x*, double ∗ *y*) const [virtual]

Return `y + x * scalar * A` in `y`.

Precondition

`x` must be of size `numRows()`
`y` must be of size `numColumns()`

Implements ClpMatrixBase.

3.45.3.17 virtual void ClpPlusMinusOneMatrix::transposeTimes (const ClpSimplex ∗ *model*, double *scalar*, const CoinIndexedVector ∗ *x*, CoinIndexedVector ∗ *y*, CoinIndexedVector ∗ *z*) const [virtual]

Return `x * scalar * A + y` in `z`.

Can use y as temporary array (will be empty at end) Note - If x packed mode - then z packed mode Squashes small elements and knows about ClpSimplex

Implements ClpMatrixBase.

3.45.3.18 virtual void ClpPlusMinusOneMatrix::transposeTimesByRow (const ClpSimplex * *model*, double *scalar*, const CoinIndexedVector * *x*, CoinIndexedVector * *y*, CoinIndexedVector * *z*) const [virtual]

Return `x * scalar * A + y` in `z`.

Can use y as temporary array (will be empty at end) Note - If x packed mode - then z packed mode Squashes small elements and knows about ClpSimplex. This version uses row copy

3.45.3.19 virtual void ClpPlusMinusOneMatrix::subsetTransposeTimes (const ClpSimplex * *model*, const CoinIndexedVector * *x*, const CoinIndexedVector * *y*, CoinIndexedVector * *z*) const [virtual]

Return `x *A` in `z` but just for indices in y.

Note - z always packed mode

Implements ClpMatrixBase.

3.45.3.20 virtual ClpMatrixBase* ClpPlusMinusOneMatrix::subsetClone (int *numberRows*, const int * *whichRows*, int *numberColumns*, const int * *whichColumns*) const [virtual]

Subset clone (without gaps).

Duplicates are allowed and order is as given

Reimplemented from ClpMatrixBase.

The documentation for this class was generated from the following file:

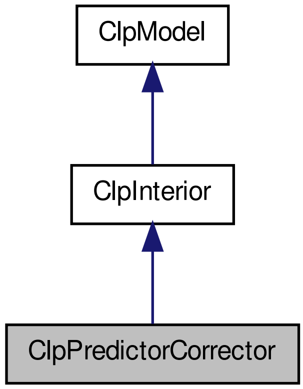
- ClpPlusMinusOneMatrix.hpp

3.46 ClpPredictorCorrector Class Reference

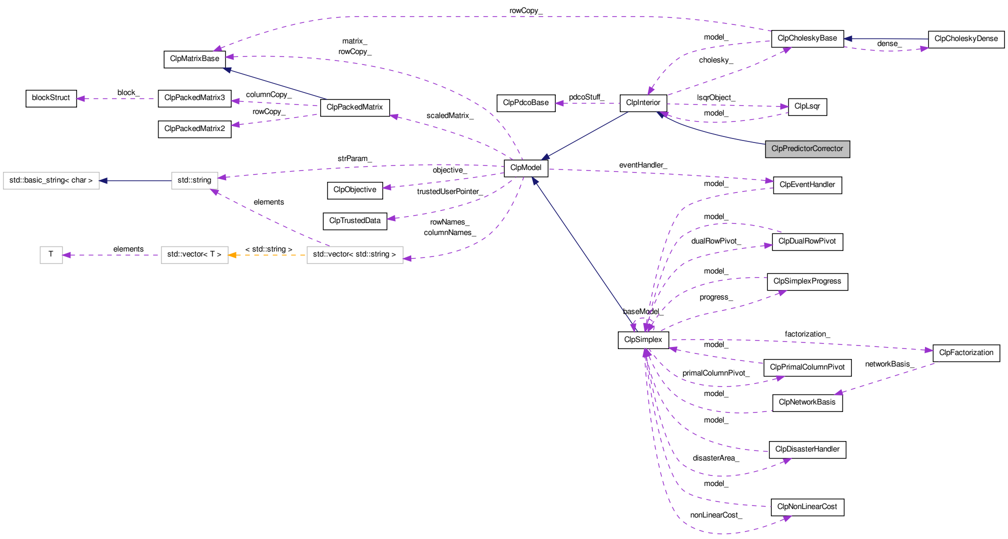
This solves LPs using the predictor-corrector method due to Mehrotra.

`#include <ClpPredictorCorrector.hpp>`

Inheritance diagram for ClpPredictorCorrector:



Collaboration diagram for ClpPredictorCorrector:



Public Member Functions

Description of algorithm

- int solve ()

  Primal Dual Predictor Corrector algorithm.

Functions used in algorithm

- CoinWorkDouble findStepLength (int phase)

  findStepLength.
- CoinWorkDouble findDirectionVector (const int phase)

  findDirectionVector.
- int createSolution ()

  createSolution. Creates solution from scratch (- code if no memory)
- CoinWorkDouble complementarityGap (int &numberComplementarityPairs, int &numberComplementarityItems, const int phase)

  complementarityGap. Computes gap
- void setupForSolve (const int phase)

  setupForSolve.
- void solveSystem (CoinWorkDouble *region1, CoinWorkDouble *region2, const CoinWorkDouble *region1In, const CoinWorkDouble *region2In, const CoinWorkDouble *saveRegion1, const CoinWorkDouble *saveRegion2, bool gentleRefine)

  Does solve.
- bool checkGoodMove (const bool doCorrector, CoinWorkDouble &bestNextGap, bool allowIncreasingGap)

  sees if looks plausible change in complementarity
- bool checkGoodMove2 (CoinWorkDouble move, CoinWorkDouble &bestNextGap, bool allowIncreasingGap)

  : checks for one step size
- int updateSolution (CoinWorkDouble nextGap)

  updateSolution. Updates solution at end of iteration
- CoinWorkDouble affineProduct ()

  *Save info on products of affine deltaT*deltaW and deltaS*deltaZ.*
- void debugMove (int phase, CoinWorkDouble primalStep, CoinWorkDouble dualStep)

  See exactly what would happen given current deltas.

3.46.1 Detailed Description

This solves LPs using the predictor-corrector method due to Mehrotra.

It also uses multiple centrality corrections as in Gondzio.

See; S. Mehrotra, "On the implementation of a primal-dual interior point method", SIAM Journal on optimization, 2 (1992) J. Gondzio, "Multiple centraility corrections in a primal-dual method for linear programming", Computational Optimization and Applications",6 (1996)

It is rather basic as Interior point is not my speciality

It inherits from ClpInterior. It has no data of its own and is never created - only cast from a ClpInterior object at algorithm time.

It can also solve QPs

Definition at line 37 of file ClpPredictorCorrector.hpp.

3.46.2 Member Function Documentation

3.46.2.1 int ClpPredictorCorrector::solve ( )

Primal Dual Predictor Corrector algorithm.

Method

Big TODO

3.46.2.2 void ClpPredictorCorrector::solveSystem (CoinWorkDouble ∗ *region1*, CoinWorkDouble ∗ *region2*, const CoinWorkDouble ∗ *region1In*, const CoinWorkDouble ∗ *region2In*, const CoinWorkDouble ∗ *saveRegion1*, const CoinWorkDouble ∗ *saveRegion2*, bool *gentleRefine*)

Does solve.

region1 is for deltaX (columns+rows), region2 for deltaPi (rows)

The documentation for this class was generated from the following file:

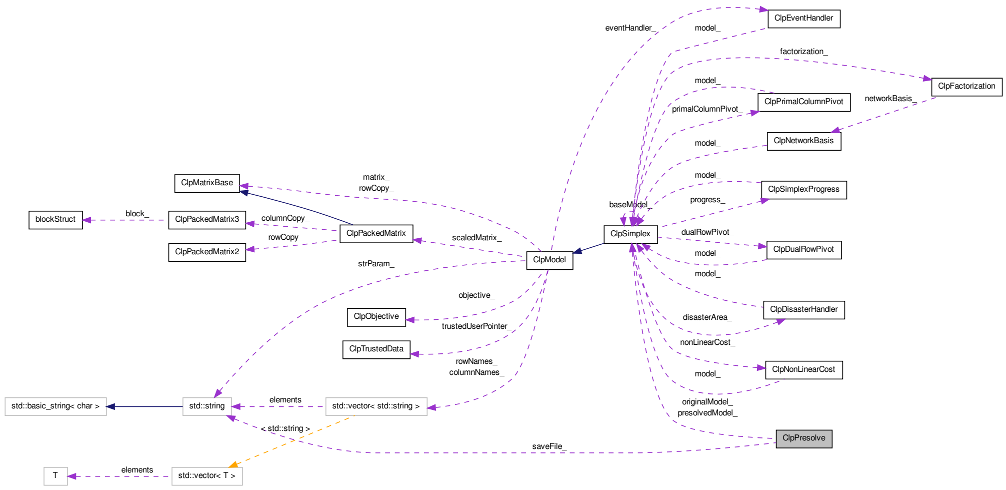
- ClpPredictorCorrector.hpp

3.47 ClpPresolve Class Reference

This is the Clp interface to CoinPresolve.

```
#include <ClpPresolve.hpp>
```

Collaboration diagram for ClpPresolve:



Public Member Functions

Main Constructor, destructor

- ClpPresolve ()

  Default constructor.
- virtual ∼ClpPresolve ()

  Virtual destructor.

presolve - presolves a model, transforming the model

and saving information in the ClpPresolve object needed for postsolving.

This underlying (protected) method is virtual; the idea is that in the future, one could override this method to customize how the various presolve techniques are applied.

This version of presolve returns a pointer to a new presolved model. NULL if infeasible or unbounded. This should be paired with postsolve below. The advantage of going back to original model is that it will be exactly as it was i.e. 0.0 will not become 1.0e-19. If keepIntegers is true then bounds may be tightened in original. Bounds will be moved by up to feasibilityTolerance to try and stay feasible. Names will be dropped in presolved model if asked

- ClpSimplex ∗ **presolvedModel** (ClpSimplex &si, double feasibilityTolerance=0.0, bool keepIntegers=true, int numberPasses=5, bool dropNames=false, bool doRowObjective=false)
- int presolvedModelToFile (ClpSimplex &si, std::string fileName, double feasibilityTolerance=0.0, bool keepIntegers=true, int numberPasses=5, bool dropNames=false, bool doRowObjective=false)

  This version saves data in a file.

- ClpSimplex ∗ model () const

    Return pointer to presolved model, Up to user to destroy.
- ClpSimplex ∗ originalModel () const

    Return pointer to original model.
- void setOriginalModel (ClpSimplex ∗model)

    Set pointer to original model.
- const int ∗ originalColumns () const

    return pointer to original columns
- const int ∗ originalRows () const

    return pointer to original rows
- void setNonLinearValue (double value)

    "Magic" number.
- double **nonLinearValue** () const
- bool doDual () const

    Whether we want to do dual part of presolve.
- void **setDoDual** (bool doDual)
- bool doSingleton () const

    Whether we want to do singleton part of presolve.
- void **setDoSingleton** (bool doSingleton)
- bool doDoubleton () const

    Whether we want to do doubleton part of presolve.
- void **setDoDoubleton** (bool doDoubleton)
- bool doTripleton () const

    Whether we want to do tripleton part of presolve.
- void **setDoTripleton** (bool doTripleton)
- bool doTighten () const

    Whether we want to do tighten part of presolve.
- void **setDoTighten** (bool doTighten)
- bool doForcing () const

    Whether we want to do forcing part of presolve.
- void **setDoForcing** (bool doForcing)
- bool doImpliedFree () const

    Whether we want to do impliedfree part of presolve.
- void **setDoImpliedFree** (bool doImpliedfree)
- bool doDupcol () const

    Whether we want to do dupcol part of presolve.
- void **setDoDupcol** (bool doDupcol)
- bool doDuprow () const

    Whether we want to do duprow part of presolve.
- void **setDoDuprow** (bool doDuprow)
- bool doSingletonColumn () const

    Whether we want to do singleton column part of presolve.
- void **setDoSingletonColumn** (bool doSingleton)
- bool doGubrow () const

    Whether we want to do gubrow part of presolve.
- void **setDoGubrow** (bool doGubrow)
- int presolveActions () const

    Set whole group.
- void **setPresolveActions** (int action)
- void setSubstitution (int value)

    Substitution level.
- void statistics ()

    Asks for statistics.
- int presolveStatus () const

    Return presolve status (0,1,2)

postsolve - postsolve the problem. If the problem

has not been solved to optimality, there are no guarantees.

If you are using an algorithm like simplex that has a concept of "basic" rows/cols, then set updateStatus

Note that if you modified the original problem after presolving, then you must "undo" these modifications before calling postsolve. This version updates original

- virtual void **postsolve** (bool updateStatus=true)
- void destroyPresolve ()

  Gets rid of presolve actions (e.g.when infeasible)

private or protected data

- virtual const CoinPresolveAction ∗ presolve (CoinPresolveMatrix ∗prob)

  If you want to apply the individual presolve routines differently, or perhaps add your own to the mix, define a derived class and override this method.
- virtual void postsolve (CoinPostsolveMatrix &prob)

  Postsolving is pretty generic; just apply the transformations in reverse order.
- virtual ClpSimplex ∗ gutsOfPresolvedModel (ClpSimplex ∗originalModel, double feasibilityTolerance, bool keepIntegers, int numberPasses, bool dropNames, bool doRowObjective)

  This is main part of Presolve.

3.47.1 Detailed Description

This is the Clp interface to CoinPresolve.

Definition at line 15 of file ClpPresolve.hpp.

3.47.2 Member Function Documentation

3.47.2.1 int ClpPresolve::presolvedModelToFile (ClpSimplex & *si*, std::string *fileName*, double *feasibilityTolerance* = 0.0, bool *keepIntegers* = true, int *numberPasses* = 5, bool *dropNames* = false, bool *doRowObjective* = false)

This version saves data in a file.

The passed in model is updated to be presolved model. Returns non-zero if infeasible

3.47.2.2 void ClpPresolve::setNonLinearValue (double *value*) [inline]

"Magic" number.

If this is non-zero then any elements with this value may change and so presolve is very limited in what can be done to the row and column. This is for non-linear problems.

Definition at line 74 of file ClpPresolve.hpp.

3.47.2.3 virtual void ClpPresolve::postsolve (CoinPostsolveMatrix & *prob*) [protected, virtual]

Postsolving is pretty generic; just apply the transformations in reverse order.

You will probably only be interested in overriding this method if you want to add code to test for consistency while debugging new presolve techniques.

The documentation for this class was generated from the following file:

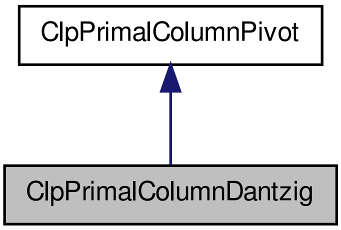
- ClpPresolve.hpp

3.48 ClpPrimalColumnDantzig Class Reference

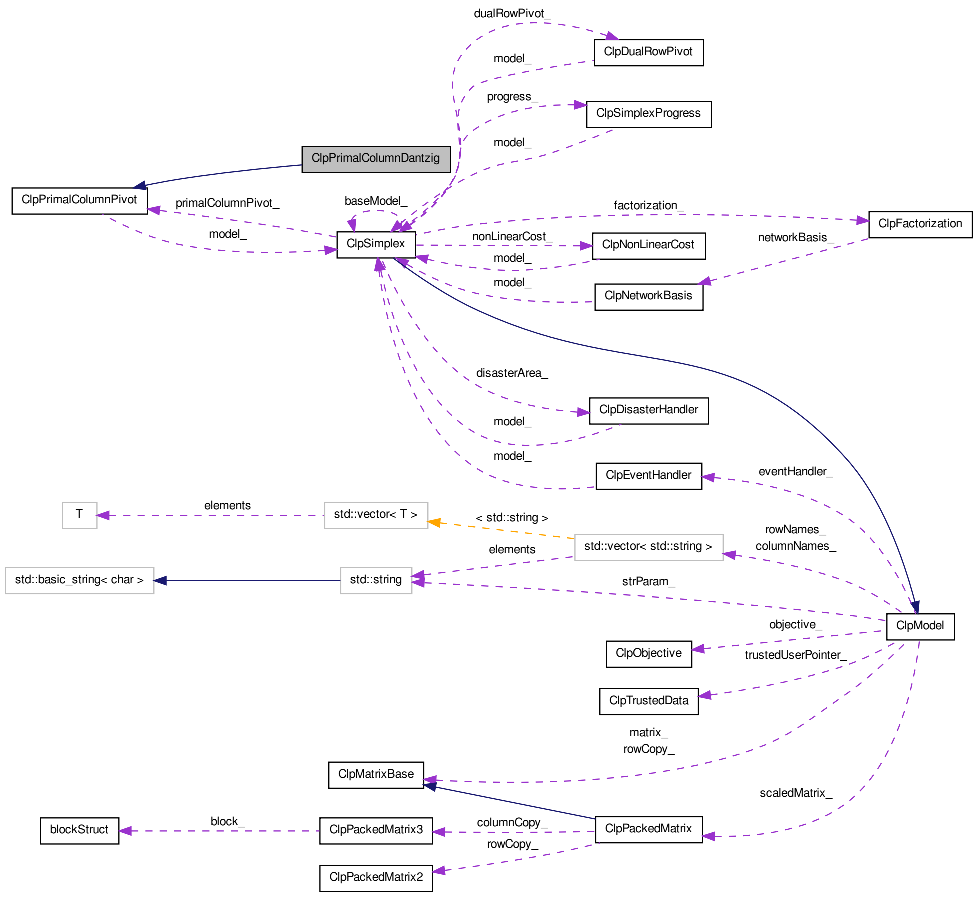
Primal Column Pivot Dantzig Algorithm Class.

`#include <ClpPrimalColumnDantzig.hpp>`

Inheritance diagram for ClpPrimalColumnDantzig:



Collaboration diagram for ClpPrimalColumnDantzig:



Public Member Functions

Algorithmic methods

- virtual int pivotColumn (CoinIndexedVector ∗updates, CoinIndexedVector ∗spareRow1, CoinIndexedVector ∗spareRow2, CoinIndexedVector ∗spareColumn1, CoinIndexedVector ∗spareColumn2)

  Returns pivot column, -1 if none.
- virtual void saveWeights (ClpSimplex ∗model, int)

  Just sets model.

Constructors and destructors

- ClpPrimalColumnDantzig ()

  Default Constructor.

- ClpPrimalColumnDantzig (const ClpPrimalColumnDantzig &)

    Copy constructor.
- ClpPrimalColumnDantzig & operator= (const ClpPrimalColumnDantzig &rhs)

    Assignment operator.
- virtual ∼ClpPrimalColumnDantzig ()

    Destructor.
- virtual ClpPrimalColumnPivot ∗ clone (bool copyData=true) const

    Clone.

3.48.1 Detailed Description

Primal Column Pivot Dantzig Algorithm Class.

This is simplest choice - choose largest infeasibility

Definition at line 19 of file ClpPrimalColumnDantzig.hpp.

3.48.2 Member Function Documentation

3.48.2.1 virtual int ClpPrimalColumnDantzig::pivotColumn (CoinIndexedVector ∗ *updates,* CoinIndexedVector ∗ *spareRow1,* CoinIndexedVector ∗ *spareRow2,* CoinIndexedVector ∗ *spareColumn1,* CoinIndexedVector ∗ *spareColumn2*) [virtual]

Returns pivot column, -1 if none.

Lumbers over all columns - slow The Packed CoinIndexedVector updates has cost updates - for normal LP that is just +-weight where a feasibility changed. It also has reduced cost from last iteration in pivot row Can just do full price if you really want to be slow

Implements ClpPrimalColumnPivot.

The documentation for this class was generated from the following file:

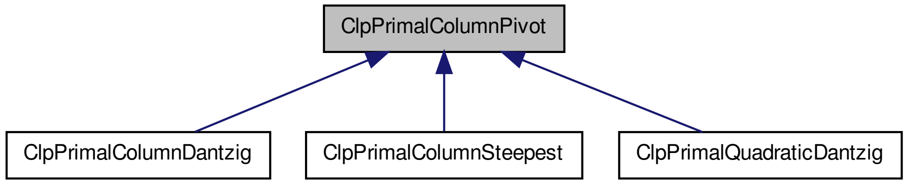
- ClpPrimalColumnDantzig.hpp

3.49 ClpPrimalColumnPivot Class Reference

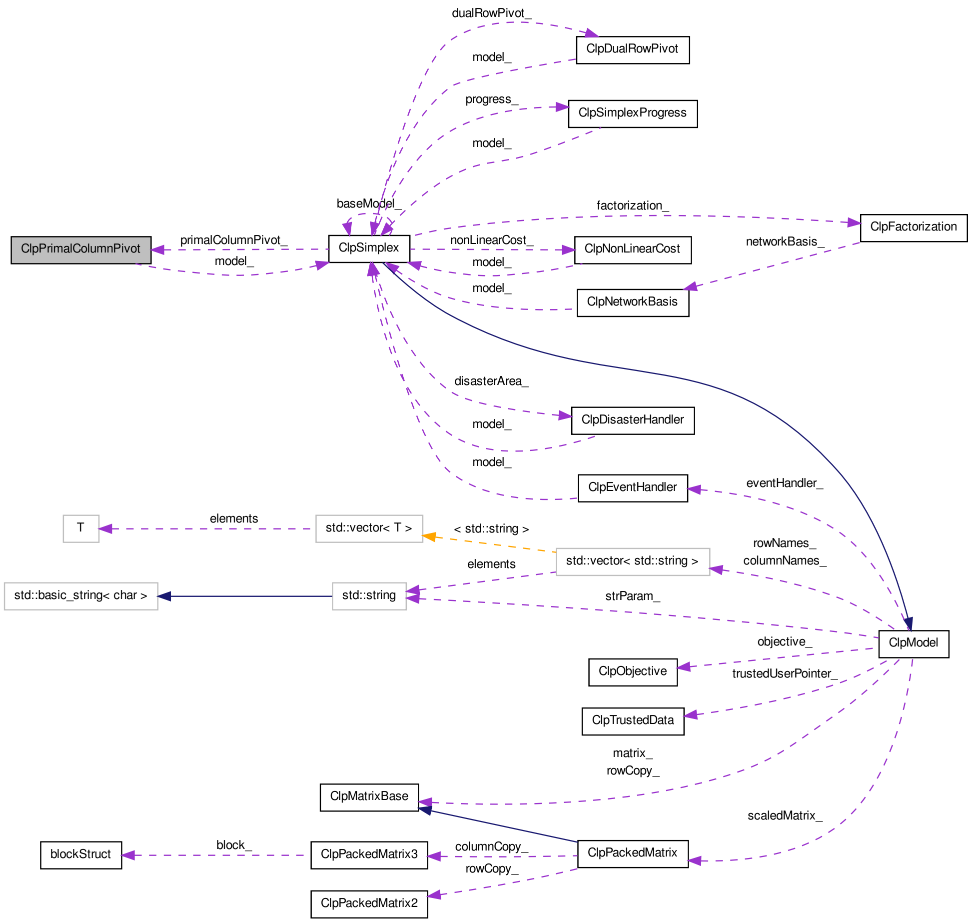
Primal Column Pivot Abstract Base Class.

`#include <ClpPrimalColumnPivot.hpp>`

Inheritance diagram for ClpPrimalColumnPivot:



Collaboration diagram for ClpPrimalColumnPivot:



Public Member Functions

Algorithmic methods

- virtual int pivotColumn (CoinIndexedVector *updates, CoinIndexedVector *spareRow1, CoinIndexedVector *spareRow2, CoinIndexedVector *spareColumn1, CoinIndexedVector *spareColumn2)=0

  Returns pivot column, -1 if none.
- virtual void updateWeights (CoinIndexedVector *input)

  Updates weights - part 1 (may be empty)
- virtual void saveWeights (ClpSimplex *model, int mode)=0

  Saves any weights round factorization as pivot rows may change Will be empty unless steepest edge (will save model) May also recompute infeasibility stuff 1) before factorization 2) after good factorization (if weights empty may initialize) 3) after something happened but no factorization (e.g.
- virtual int pivotRow (double &way)

  Signals pivot row choice:
- virtual void clearArrays ()

  Gets rid of all arrays (may be empty)
- virtual bool looksOptimal () const

  Returns true if would not find any column.
- virtual void setLooksOptimal (bool flag)

  Sets optimality flag (for advanced use)

Constructors and destructors

- ClpPrimalColumnPivot ()

  Default Constructor.
- ClpPrimalColumnPivot (const ClpPrimalColumnPivot &)

  Copy constructor.
- ClpPrimalColumnPivot & operator= (const ClpPrimalColumnPivot &rhs)

  Assignment operator.
- virtual ∼ClpPrimalColumnPivot ()

  Destructor.
- virtual ClpPrimalColumnPivot * clone (bool copyData=true) const =0

  Clone.

Other

- ClpSimplex * model ()

  Returns model.
- void setModel (ClpSimplex *newmodel)

  Sets model.
- int type ()

  Returns type (above 63 is extra information)
- virtual int numberSprintColumns (int &numberIterations) const

  Returns number of extra columns for sprint algorithm - 0 means off.
- virtual void switchOffSprint ()

  Switch off sprint idea.
- virtual void maximumPivotsChanged ()

  Called when maximum pivots changes.

Protected Attributes

Protected member data

- ClpSimplex * model_
  Pointer to model.
- int type_
  Type of column pivot algorithm.
- bool looksOptimal_
  Says if looks optimal (normally computed)

3.49.1 Detailed Description

Primal Column Pivot Abstract Base Class.

Abstract Base Class for describing an interface to an algorithm to choose column pivot in primal simplex algorithm. For some algorithms e.g. Dantzig choice then some functions may be null. For Dantzig the only one of any importance is pivotColumn.

If you wish to inherit from this look at ClpPrimalColumnDantzig.cpp as that is simplest version.

Definition at line 25 of file ClpPrimalColumnPivot.hpp.

3.49.2 Member Function Documentation

3.49.2.1 virtual int ClpPrimalColumnPivot::pivotColumn (CoinIndexedVector * *updates*, CoinIndexedVector * *spareRow1*, CoinIndexedVector * *spareRow2*, CoinIndexedVector * *spareColumn1*, CoinIndexedVector * *spareColumn2*) [pure virtual]

Returns pivot column, -1 if none.

Normally updates reduced costs using result of last iteration before selecting incoming column.

The Packed CoinIndexedVector updates has cost updates - for normal LP that is just +-weight where a feasibility changed. It also has reduced cost from last iteration in pivot row

Inside pivotColumn the pivotRow_ and reduced cost from last iteration are also used.

So in the simplest case i.e. feasible we compute the row of the tableau corresponding to last pivot and add a multiple of this to current reduced costs.

We can use other arrays to help updates

Implemented in ClpPrimalColumnDantzig, ClpPrimalColumnSteepest, and ClpPrimalQuadraticDantzig.

3.49.2.2 virtual void ClpPrimalColumnPivot::saveWeights (ClpSimplex * *model*, int *mode*) [pure virtual]

Saves any weights round factorization as pivot rows may change Will be empty unless steepest edge (will save model) May also recompute infeasibility stuff 1) before factorization 2) after good factorization (if weights empty may initialize) 3) after something happened but no factorization (e.g.

check for infeasible) 4) as 2 but restore weights from previous snapshot 5) forces some initialization e.g. weights Also sets model

Implemented in ClpPrimalColumnDantzig, ClpPrimalColumnSteepest, and ClpPrimalQuadraticDantzig.

3.49.2.3 virtual int ClpPrimalColumnPivot::pivotRow (double & *way*) [inline, virtual]

Signals pivot row choice:

-2 (default) - use normal pivot row choice -1 to numberRows-1 - use this (will be checked) way should be -1 to go to lower bound, +1 to upper bound

Definition at line 76 of file ClpPrimalColumnPivot.hpp.

3.49.2.4 virtual int ClpPrimalColumnPivot::numberSprintColumns (int & *numberIterations*) const [virtual]

Returns number of extra columns for sprint algorithm - 0 means off.

Also number of iterations before recompute

Reimplemented in ClpPrimalColumnSteepest.

The documentation for this class was generated from the following file:

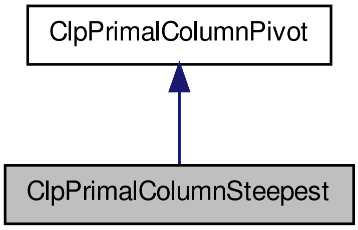
- ClpPrimalColumnPivot.hpp

3.50 ClpPrimalColumnSteepest Class Reference

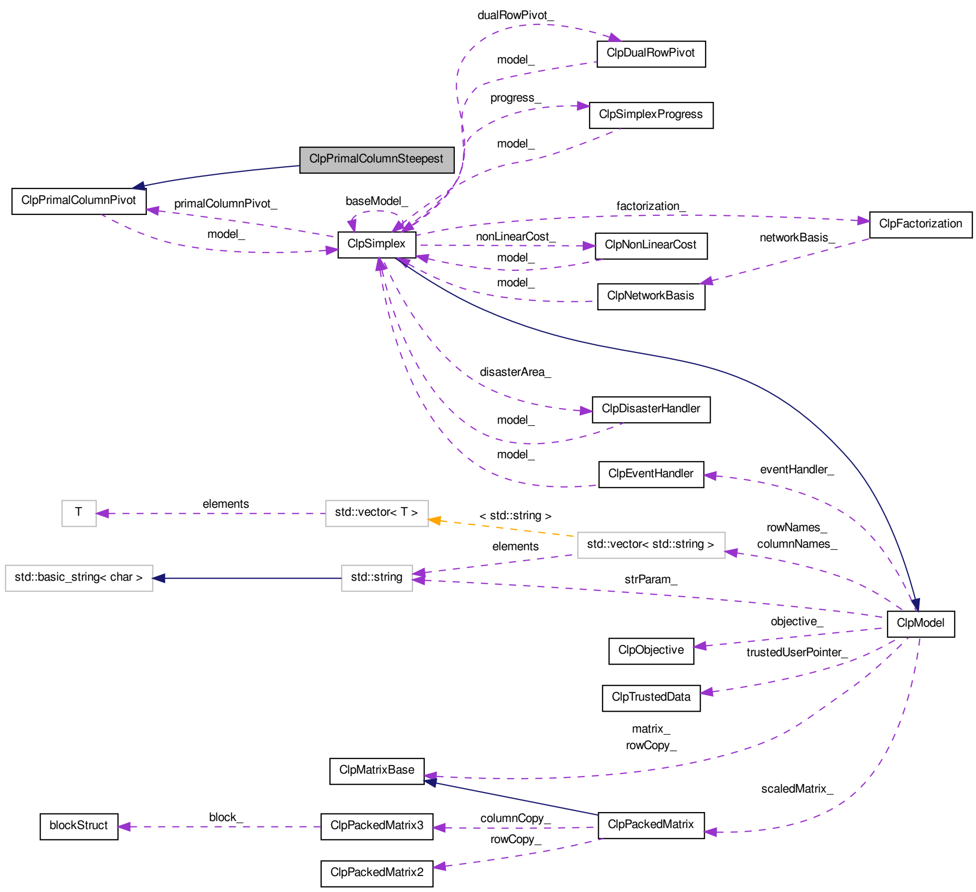
Primal Column Pivot Steepest Edge Algorithm Class.

```
#include <ClpPrimalColumnSteepest.hpp>
```

Inheritance diagram for ClpPrimalColumnSteepest:



Collaboration diagram for ClpPrimalColumnSteepest:



Public Types

- enum Persistence

  enums for persistence

Public Member Functions

Algorithmic methods

- virtual int pivotColumn (CoinIndexedVector ∗updates, CoinIndexedVector ∗spareRow1, CoinIndexedVector ∗spareRow2, CoinIndexedVector ∗spareColumn1, CoinIndexedVector ∗spareColumn2)

  Returns pivot column, -1 if none.

- int pivotColumnOldMethod (CoinIndexedVector ∗updates, CoinIndexedVector ∗spareRow1, CoinIndexedVector ∗spareRow2, CoinIndexedVector ∗spareColumn1, CoinIndexedVector ∗spareColumn2)

  For quadratic or funny nonlinearities.
- void justDjs (CoinIndexedVector ∗updates, CoinIndexedVector ∗spareRow2, CoinIndexedVector ∗spareColumn1, CoinIndexedVector ∗spareColumn2)

  Just update djs.
- int partialPricing (CoinIndexedVector ∗updates, CoinIndexedVector ∗spareRow2, int numberWanted, int numberLook)

  Update djs doing partial pricing (dantzig)
- void djsAndDevex (CoinIndexedVector ∗updates, CoinIndexedVector ∗spareRow2, CoinIndexedVector ∗spareColumn1, CoinIndexedVector ∗spareColumn2)

  Update djs, weights for Devex using djs.
- void djsAndSteepest (CoinIndexedVector ∗updates, CoinIndexedVector ∗spareRow2, CoinIndexedVector ∗spareColumn1, CoinIndexedVector ∗spareColumn2)

  Update djs, weights for Steepest using djs.
- void djsAndDevex2 (CoinIndexedVector ∗updates, CoinIndexedVector ∗spareRow2, CoinIndexedVector ∗spareColumn1, CoinIndexedVector ∗spareColumn2)

  Update djs, weights for Devex using pivot row.
- void djsAndSteepest2 (CoinIndexedVector ∗updates, CoinIndexedVector ∗spareRow2, CoinIndexedVector ∗spareColumn1, CoinIndexedVector ∗spareColumn2)

  Update djs, weights for Steepest using pivot row.
- void justDevex (CoinIndexedVector ∗updates, CoinIndexedVector ∗spareRow2, CoinIndexedVector ∗spareColumn1, CoinIndexedVector ∗spareColumn2)

  Update weights for Devex.
- void justSteepest (CoinIndexedVector ∗updates, CoinIndexedVector ∗spareRow2, CoinIndexedVector ∗spareColumn1, CoinIndexedVector ∗spareColumn2)

  Update weights for Steepest.
- void transposeTimes2 (const CoinIndexedVector ∗pi1, CoinIndexedVector ∗dj1, const CoinIndexedVector ∗pi2, CoinIndexedVector ∗dj2, CoinIndexedVector ∗spare, double scaleFactor)

  Updates two arrays for steepest.
- virtual void updateWeights (CoinIndexedVector ∗input)

  Updates weights - part 1 - also checks accuracy.
- void checkAccuracy (int sequence, double relativeTolerance, CoinIndexedVector ∗rowArray1, CoinIndexedVector ∗rowArray2)

  Checks accuracy - just for debug.
- void initializeWeights ()

  Initialize weights.
- virtual void saveWeights (ClpSimplex ∗model, int mode)

  Save weights - this may initialize weights as well mode is - 1) before factorization 2) after factorization 3) just redo infeasibilities 4) restore weights 5) at end of values pass (so need initialization)
- virtual void unrollWeights ()

  Gets rid of last update.
- virtual void clearArrays ()

  Gets rid of all arrays.
- virtual bool looksOptimal () const

  Returns true if would not find any column.
- virtual void maximumPivotsChanged ()

  Called when maximum pivots changes.

gets and sets

- int mode () const
  Mode.
- virtual int numberSprintColumns (int &numberIterations) const
  Returns number of extra columns for sprint algorithm - 0 means off.
- virtual void switchOffSprint ()
  Switch off sprint idea.

Constructors and destructors

- ClpPrimalColumnSteepest (int mode=3)
  Default Constructor 0 is exact devex, 1 full steepest, 2 is partial exact devex 3 switches between 0 and 2 depending on factorization 4 starts as partial dantzig/devex but then may switch between 0 and 2.
- ClpPrimalColumnSteepest (const ClpPrimalColumnSteepest &rhs)
  Copy constructor.
- ClpPrimalColumnSteepest & operator= (const ClpPrimalColumnSteepest &rhs)

  Assignment operator.
- virtual ∼ClpPrimalColumnSteepest ()
  Destructor.
- virtual ClpPrimalColumnPivot ∗ clone (bool copyData=true) const
  Clone.

Private functions to deal with devex

- bool reference (int i) const
  reference would be faster using ClpSimplex's status_, but I prefer to keep modularity.
- void **setReference** (int i, bool trueFalse)
- void setPersistence (Persistence life)
  Set/ get persistence.
- Persistence **persistence** () const

3.50.1 Detailed Description

Primal Column Pivot Steepest Edge Algorithm Class.

See Forrest-Goldfarb paper for algorithm

Definition at line 23 of file ClpPrimalColumnSteepest.hpp.

3.50.2 Constructor & Destructor Documentation

3.50.2.1 ClpPrimalColumnSteepest::ClpPrimalColumnSteepest (int *mode* = 3)

Default Constructor 0 is exact devex, 1 full steepest, 2 is partial exact devex 3 switches between 0 and 2 depending on factorization 4 starts as partial dantzig/devex but then may switch between 0 and 2.

By partial exact devex is meant that the weights are updated as normal but only part of the nonbasic variables are scanned. This can be faster on very easy problems.

3.50.3 Member Function Documentation

3.50.3.1 virtual int ClpPrimalColumnSteepest::pivotColumn (CoinIndexedVector * *updates*, CoinIndexedVector * *spareRow1*, CoinIndexedVector * *spareRow2*, CoinIndexedVector * *spareColumn1*, CoinIndexedVector * *spareColumn2*) [virtual]

Returns pivot column, -1 if none.

The Packed CoinIndexedVector updates has cost updates - for normal LP that is just +-weight where a feasibility changed. It also has reduced cost from last iteration in pivot row Parts of operation split out into separate functions for profiling and speed

Implements ClpPrimalColumnPivot.

3.50.3.2 virtual int ClpPrimalColumnSteepest::numberSprintColumns (int & *numberIterations*) const [virtual]

Returns number of extra columns for sprint algorithm - 0 means off.

Also number of iterations before recompute

Reimplemented from ClpPrimalColumnPivot.

The documentation for this class was generated from the following file:

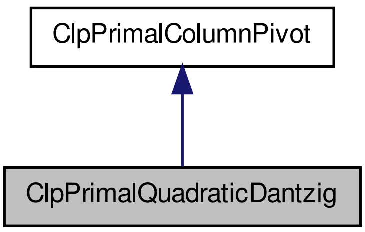
- ClpPrimalColumnSteepest.hpp

3.51 ClpPrimalQuadraticDantzig Class Reference

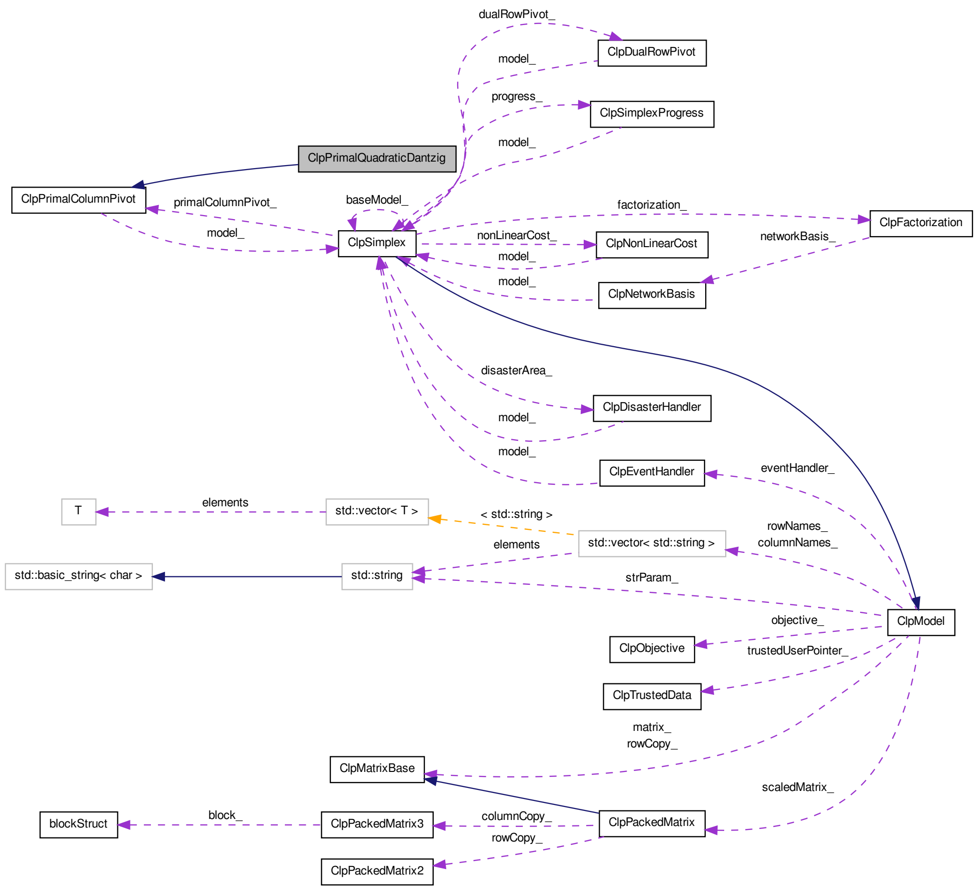
Primal Column Pivot Dantzig Algorithm Class.

`#include <ClpPrimalQuadraticDantzig.hpp>`

Inheritance diagram for ClpPrimalQuadraticDantzig:



Collaboration diagram for ClpPrimalQuadraticDantzig:



Public Member Functions

Algorithmic methods

- virtual int pivotColumn (CoinIndexedVector ∗updates, CoinIndexedVector ∗spareRow1, CoinIndexedVector ∗spareRow2, CoinIndexedVector ∗spareColumn1, CoinIndexedVector ∗spareColumn2)

  Returns pivot column, -1 if none.
- virtual void saveWeights (ClpSimplex ∗model, int mode)

  Just sets model.

Constructors and destructors

- ClpPrimalQuadraticDantzig ()

  Default Constructor.

- ClpPrimalQuadraticDantzig (const ClpPrimalQuadraticDantzig &)

    Copy constructor.
- ClpPrimalQuadraticDantzig (ClpSimplexPrimalQuadratic ∗model, ClpQuadraticInfo ∗info)

    Constructor from model.
- ClpPrimalQuadraticDantzig & operator= (const ClpPrimalQuadraticDantzig &rhs)

    Assignment operator.
- virtual ∼ClpPrimalQuadraticDantzig ()

    Destructor.
- virtual ClpPrimalColumnPivot ∗ clone (bool copyData=true) const

    Clone.

3.51.1 Detailed Description

Primal Column Pivot Dantzig Algorithm Class.

This is simplest choice - choose largest infeasibility

Definition at line 20 of file ClpPrimalQuadraticDantzig.hpp.

3.51.2 Member Function Documentation

3.51.2.1 virtual int ClpPrimalQuadraticDantzig::pivotColumn (CoinIndexedVector ∗ *updates*, CoinIndexedVector ∗ *spareRow1*, CoinIndexedVector ∗ *spareRow2*, CoinIndexedVector ∗ *spareColumn1*, CoinIndexedVector ∗ *spareColumn2*) [virtual]

Returns pivot column, -1 if none.

Lumbers over all columns - slow updateArray has cost updates (also use pivotRow_ from last iteration) Can just do full price if you really want to be slow

Implements ClpPrimalColumnPivot.

The documentation for this class was generated from the following file:

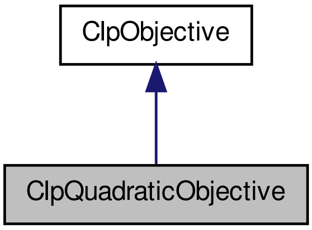
- ClpPrimalQuadraticDantzig.hpp

3.52 ClpQuadraticObjective Class Reference

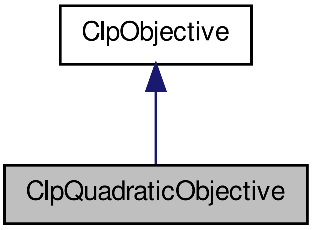
Quadratic Objective Class.

```
#include <ClpQuadraticObjective.hpp>
```

Inheritance diagram for ClpQuadraticObjective:



Collaboration diagram for ClpQuadraticObjective:



Public Member Functions

Stuff

- virtual double ∗ gradient (const ClpSimplex ∗model, const double ∗solution, double &offset, bool refresh, int includeLinear=2)

  Returns gradient.
- virtual double reducedGradient (ClpSimplex ∗model, double ∗region, bool useFeasibleCosts)

  Resize objective.
- virtual double stepLength (ClpSimplex ∗model, const double ∗solution, const double ∗change, double maximumTheta, double &currentObj, double &predictedObj, double &thetaObj)

Returns step length which gives minimum of objective for solution + theta ∗ change vector up to maximum theta.

- virtual double objectiveValue (const ClpSimplex ∗model, const double ∗solution) const

  Return objective value (without any ClpModel offset) (model may be NULL)
- virtual void resize (int newNumberColumns)

  Resize objective.
- virtual void deleteSome (int numberToDelete, const int ∗which)

  Delete columns in objective.
- virtual void reallyScale (const double ∗columnScale)

  Scale objective.
- virtual int markNonlinear (char ∗which)

  Given a zeroed array sets nonlinear columns to 1.

Constructors and destructors

- ClpQuadraticObjective ()

  Default Constructor.
- ClpQuadraticObjective (const double ∗linearObjective, int numberColumns, const CoinBigIndex ∗start, const int ∗column, const double ∗element, int numberExtendedColumns_-=-1)

  Constructor from objective.
- ClpQuadraticObjective (const ClpQuadraticObjective &rhs, int type=0)

  Copy constructor .
- ClpQuadraticObjective (const ClpQuadraticObjective &rhs, int numberColumns, const int ∗whichColumns)

  Subset constructor.
- ClpQuadraticObjective & operator= (const ClpQuadraticObjective &rhs)

  Assignment operator.
- virtual ∼ClpQuadraticObjective ()

  Destructor.
- virtual ClpObjective ∗ clone () const

  Clone.
- virtual ClpObjective ∗ subsetClone (int numberColumns, const int ∗whichColumns) const

  Subset clone.
- void loadQuadraticObjective (const int numberColumns, const CoinBigIndex ∗start, const int ∗column, const double ∗element, int numberExtendedColumns=-1)

  Load up quadratic objective.
- void **loadQuadraticObjective** (const CoinPackedMatrix &matrix)
- void deleteQuadraticObjective ()

  Get rid of quadratic objective.

Gets and sets

- CoinPackedMatrix ∗ quadraticObjective () const

  Quadratic objective.
- double ∗ linearObjective () const

Linear objective.
- int numberExtendedColumns () const
  Length of linear objective which could be bigger.
- int numberColumns () const
  Number of columns in quadratic objective.
- bool fullMatrix () const
  If a full or half matrix.

3.52.1 Detailed Description

Quadratic Objective Class.

Definition at line 18 of file ClpQuadraticObjective.hpp.

3.52.2 Constructor & Destructor Documentation

3.52.2.1 ClpQuadraticObjective::ClpQuadraticObjective (const ClpQuadraticObjective & *rhs*, int *type* = 0)

Copy constructor .

If type is -1 then make sure half symmetric, if +1 then make sure full

3.52.2.2 ClpQuadraticObjective::ClpQuadraticObjective (const ClpQuadraticObjective & *rhs*, int *numberColumns*, const int * *whichColumns*)

Subset constructor.

Duplicates are allowed and order is as given.

3.52.3 Member Function Documentation

3.52.3.1 virtual double* ClpQuadraticObjective::gradient (const ClpSimplex * *model*, const double * *solution*, double & *offset*, bool *refresh*, int *includeLinear* = 2) [virtual]

Returns gradient.

If Quadratic then solution may be NULL, also returns an offset (to be added to current one) If refresh is false then uses last solution Uses model for scaling includeLinear 0 - no, 1 as is, 2 as feasible

Implements ClpObjective.

3.52.3.2 virtual double ClpQuadraticObjective::reducedGradient (ClpSimplex * *model*, double * *region*, bool *useFeasibleCosts*) [virtual]

Resize objective.

Returns reduced gradient.Returns an offset (to be added to current one).

Implements ClpObjective.

3.52.3.3 virtual double ClpQuadraticObjective::stepLength (ClpSimplex * *model*, const double * *solution*, const double * *change*, double *maximumTheta*, double & *currentObj*, double & *predictedObj*, double & *thetaObj*) [virtual]

Returns step length which gives minimum of objective for solution + theta * change vector up to maximum theta.

arrays are numberColumns+numberRows Also sets current objective, predicted and at maximumTheta

Implements ClpObjective.

3.52.3.4 virtual int ClpQuadraticObjective::markNonlinear (char * *which*) [virtual]

Given a zeroed array sets nonlinear columns to 1.

Returns number of nonlinear columns

Reimplemented from ClpObjective.

3.52.3.5 virtual ClpObjective* ClpQuadraticObjective::subsetClone (int *numberColumns*, const int * *whichColumns*) const [virtual]

Subset clone.

Duplicates are allowed and order is as given.

Reimplemented from ClpObjective.

3.52.3.6 void ClpQuadraticObjective::loadQuadraticObjective (const int *numberColumns*, const CoinBigIndex * *start*, const int * *column*, const double * *element*, int *numberExtendedColumns* = -1)

Load up quadratic objective.

This is stored as a CoinPackedMatrix

The documentation for this class was generated from the following file:

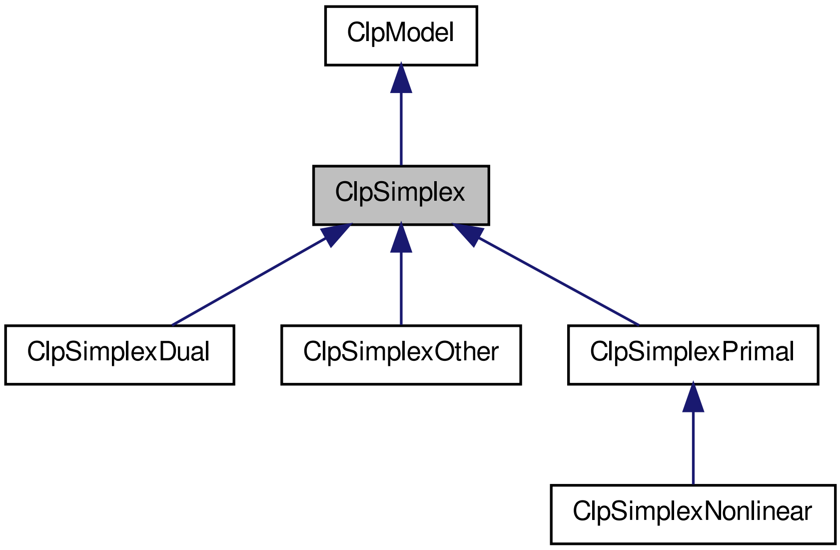
- ClpQuadraticObjective.hpp

3.53 ClpSimplex Class Reference

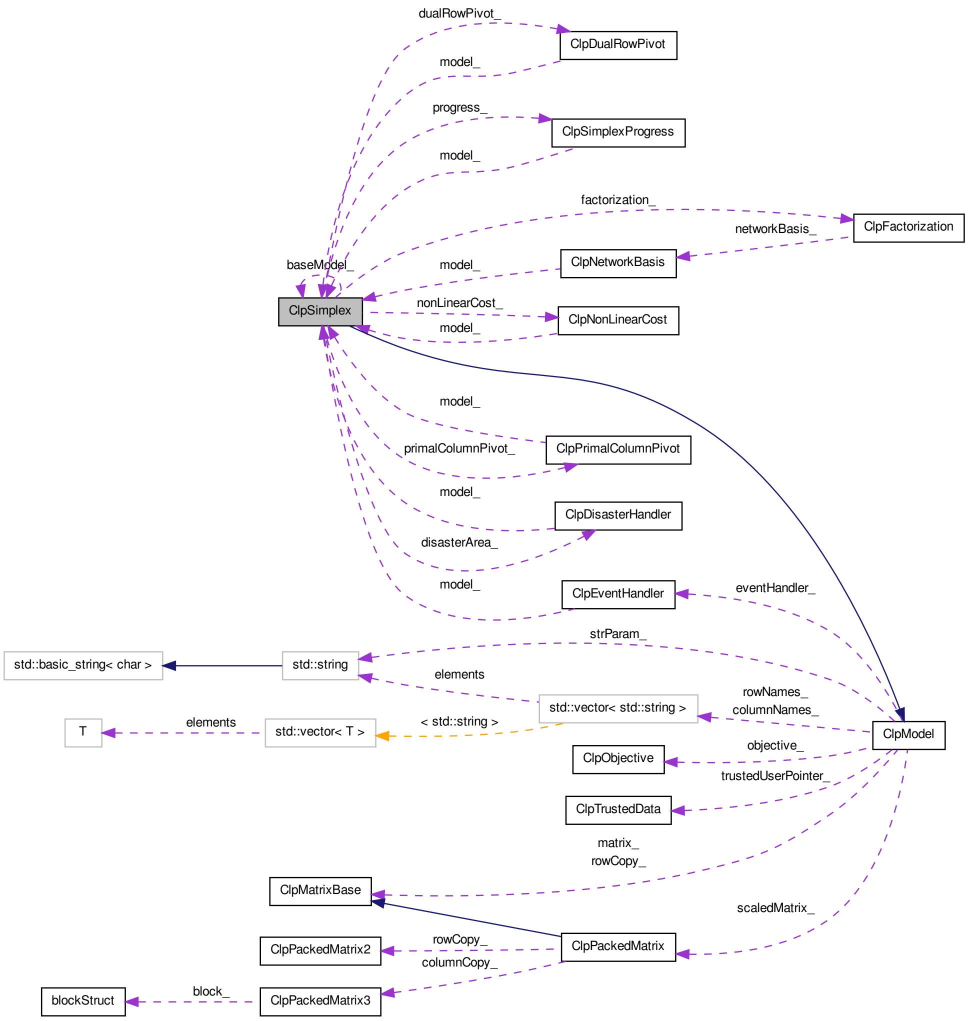
This solves LPs using the simplex method.

`#include <ClpSimplex.hpp>`

Inheritance diagram for ClpSimplex:



Collaboration diagram for ClpSimplex:



Public Types

- enum Status

  enums for status of various sorts.

Public Member Functions

Constructors and destructor and copy

- ClpSimplex (bool emptyMessages=false)

Default constructor.
- ClpSimplex (const ClpSimplex &rhs, int scalingMode=-1)
  Copy constructor.
- ClpSimplex (const ClpModel &rhs, int scalingMode=-1)
  Copy constructor from model.
- ClpSimplex (const ClpModel ∗wholeModel, int numberRows, const int ∗whichRows, int numberColumns, const int ∗whichColumns, bool dropNames=true, bool dropIntegers=true, bool fixOthers=false)
  Subproblem constructor.
- ClpSimplex (const ClpSimplex ∗wholeModel, int numberRows, const int ∗whichRows, int numberColumns, const int ∗whichColumns, bool dropNames=true, bool dropIntegers=true, bool fixOthers=false)
  Subproblem constructor.
- ClpSimplex (ClpSimplex ∗wholeModel, int numberColumns, const int ∗whichColumns)
  This constructor modifies original ClpSimplex and stores original stuff in created ClpSimplex.
- void originalModel (ClpSimplex ∗miniModel)
  This copies back stuff from miniModel and then deletes miniModel.
- void setPersistenceFlag (int value)
  Array persistence flag If 0 then as now (delete/new) 1 then only do arrays if bigger needed 2 as 1 but give a bit extra if bigger needed.
- void makeBaseModel ()
  Save a copy of model with certain state - normally without cuts.
- void deleteBaseModel ()
  Switch off base model.
- ClpSimplex ∗ baseModel () const
  See if we have base model.
- void setToBaseModel (ClpSimplex ∗model=NULL)
  Reset to base model (just size and arrays needed) If model NULL use internal copy.
- ClpSimplex & operator= (const ClpSimplex &rhs)
  Assignment operator. This copies the data.
- ∼ClpSimplex ()
  Destructor.
- void loadProblem (const ClpMatrixBase &matrix, const double ∗collb, const double ∗colub, const double ∗obj, const double ∗rowlb, const double ∗rowub, const double ∗rowObjective=NULL)
  Loads a problem (the constraints on the rows are given by lower and upper bounds).
- void **loadProblem** (const CoinPackedMatrix &matrix, const double ∗collb, const double ∗colub, const double ∗obj, const double ∗rowlb, const double ∗rowub, const double ∗rowObjective=NULL)
- void loadProblem (const int numcols, const int numrows, const CoinBigIndex ∗start, const int ∗index, const double ∗value, const double ∗collb, const double ∗colub, const double ∗obj, const double ∗rowlb, const double ∗rowub, const double ∗rowObjective=NULL)
  Just like the other loadProblem() method except that the matrix is given in a standard column major ordered format (without gaps).
- void loadProblem (const int numcols, const int numrows, const CoinBigIndex ∗start, const int ∗index, const double ∗value, const int ∗length, const double ∗collb, const double ∗colub, const double ∗obj, const double ∗rowlb, const double ∗rowub, const double ∗rowObjective=NULL)

This one is for after presolve to save memory.
- int loadProblem (CoinModel &modelObject, bool keepSolution=false)
  This loads a model from a coinModel object - returns number of errors.
- int readMps (const char *filename, bool keepNames=false, bool ignoreErrors=false)
  Read an mps file from the given filename.
- int readGMPL (const char *filename, const char *dataName, bool keepNames=false)
  Read GMPL files from the given filenames.
- int readLp (const char *filename, const double epsilon=1e-5)
  Read file in LP format from file with name filename.
- void borrowModel (ClpModel &otherModel)
  Borrow model.
- void **borrowModel** (ClpSimplex &otherModel)
- void passInEventHandler (const ClpEventHandler *eventHandler)
  Pass in Event handler (cloned and deleted at end)
- void getbackSolution (const ClpSimplex &smallModel, const int *whichRow, const int *whichColumn)
  Puts solution back into small model.
- int loadNonLinear (void *info, int &numberConstraints, ClpConstraint **&constraints)
  Load nonlinear part of problem from AMPL info Returns 0 if linear 1 if quadratic objective 2 if quadratic constraints 3 if nonlinear objective 4 if nonlinear constraints.

Functions most useful to user

- int initialSolve (ClpSolve &options)
  General solve algorithm which can do presolve.
- int initialSolve ()
  Default initial solve.
- int initialDualSolve ()
  Dual initial solve.
- int initialPrimalSolve ()
  Primal initial solve.
- int initialBarrierSolve ()
  Barrier initial solve.
- int initialBarrierNoCrossSolve ()
  Barrier initial solve, not to be followed by crossover.
- int dual (int ifValuesPass=0, int startFinishOptions=0)
  Dual algorithm - see ClpSimplexDual.hpp for method.
- int **dualDebug** (int ifValuesPass=0, int startFinishOptions=0)
- int primal (int ifValuesPass=0, int startFinishOptions=0)
  Primal algorithm - see ClpSimplexPrimal.hpp for method.
- int nonlinearSLP (int numberPasses, double deltaTolerance)
  Solves nonlinear problem using SLP - may be used as crash for other algorithms when number of iterations small.
- int nonlinearSLP (int numberConstraints, ClpConstraint **constraints, int numberPasses, double deltaTolerance)
  Solves problem with nonlinear constraints using SLP - may be used as crash for other algorithms when number of iterations small.

- int barrier (bool crossover=true)

  Solves using barrier (assumes you have good cholesky factor code).
- int reducedGradient (int phase=0)

  Solves non-linear using reduced gradient.
- int solve (CoinStructuredModel ∗model)

  Solve using structure of model and maybe in parallel.
- int loadProblem (CoinStructuredModel &modelObject, bool originalOrder=true, bool keepSolution=false)

  This loads a model from a CoinStructuredModel object - returns number of errors.
- int cleanup (int cleanupScaling)

  When scaling is on it is possible that the scaled problem is feasible but the unscaled is not.
- int dualRanging (int numberCheck, const int ∗which, double ∗costIncrease, int ∗sequenceIncrease, double ∗costDecrease, int ∗sequenceDecrease, double ∗valueIncrease=NULL, double ∗valueDecrease=NULL)

  Dual ranging.
- int primalRanging (int numberCheck, const int ∗which, double ∗valueIncrease, int ∗sequenceIncrease, double ∗valueDecrease, int ∗sequenceDecrease)

  Primal ranging.
- int writeBasis (const char ∗filename, bool writeValues=false, int formatType=0) const

  Write the basis in MPS format to the specified file.
- int readBasis (const char ∗filename)

  Read a basis from the given filename, returns -1 on file error, 0 if no values, 1 if values.
- CoinWarmStartBasis ∗ getBasis () const

  Returns a basis (to be deleted by user)
- void setFactorization (ClpFactorization &factorization)

  Passes in factorization.
- ClpFactorization ∗ **swapFactorization** (ClpFactorization ∗factorization)
- void copyFactorization (ClpFactorization &factorization)

  Copies in factorization to existing one.
- int tightenPrimalBounds (double factor=0.0, int doTight=0, bool tightIntegers=false)

  Tightens primal bounds to make dual faster.
- int crash (double gap, int pivot)

  Crash - at present just aimed at dual, returns.
- void setDualRowPivotAlgorithm (ClpDualRowPivot &choice)

  Sets row pivot choice algorithm in dual.
- void setPrimalColumnPivotAlgorithm (ClpPrimalColumnPivot &choice)

  Sets column pivot choice algorithm in primal.
- int strongBranching (int numberVariables, const int ∗variables, double ∗newLower, double ∗newUpper, double ∗∗outputSolution, int ∗outputStatus, int ∗outputIterations, bool stopOnFirstInfeasible=true, bool alwaysFinish=false, int startFinishOptions=0)

  For strong branching.
- int fathom (void ∗stuff)

  Fathom - 1 if solution.
- int fathomMany (void ∗stuff)

Do up to N deep - returns.
- double doubleCheck ()

    Double checks OK.
- int startFastDual2 (ClpNodeStuff *stuff)

    Starts Fast dual2.
- int fastDual2 (ClpNodeStuff *stuff)

    Like Fast dual.
- void stopFastDual2 (ClpNodeStuff *stuff)

    Stops Fast dual2.
- ClpSimplex * fastCrunch (ClpNodeStuff *stuff, int mode)

    Deals with crunch aspects mode 0 - in 1 - out with solution 2 - out without solution returns small model or NULL.

Needed for functionality of OsiSimplexInterface

- int pivot ()

    Pivot in a variable and out a variable.
- int primalPivotResult ()

    Pivot in a variable and choose an outgoing one.
- int dualPivotResult ()

    Pivot out a variable and choose an incoing one.
- int startup (int ifValuesPass, int startFinishOptions=0)

    Common bits of coding for dual and primal.
- void **finish** (int startFinishOptions=0)
- bool statusOfProblem (bool initial=false)

    Factorizes and returns true if optimal.
- void defaultFactorizationFrequency ()

    If user left factorization frequency then compute.

most useful gets and sets

- bool primalFeasible () const

    If problem is primal feasible.
- bool dualFeasible () const

    If problem is dual feasible.
- ClpFactorization * factorization () const

    factorization
- bool sparseFactorization () const

    Sparsity on or off.
- void **setSparseFactorization** (bool value)
- int factorizationFrequency () const

    Factorization frequency.
- void **setFactorizationFrequency** (int value)
- double dualBound () const

    Dual bound.
- void **setDualBound** (double value)
- double infeasibilityCost () const

    Infeasibility cost.
- void **setInfeasibilityCost** (double value)

- int perturbation () const

  Amount of print out: 0 - none 1 - just final 2 - just factorizations 3 - as 2 plus a bit more 4 - verbose above that 8,16,32 etc just for selective debug.
- void **setPerturbation** (int value)
- int algorithm () const

  Current (or last) algorithm.
- void setAlgorithm (int value)

  Set algorithm.
- bool isObjectiveLimitTestValid () const

  Return true if the objective limit test can be relied upon.
- double sumDualInfeasibilities () const

  Sum of dual infeasibilities.
- void **setSumDualInfeasibilities** (double value)
- double sumOfRelaxedDualInfeasibilities () const

  Sum of relaxed dual infeasibilities.
- void **setSumOfRelaxedDualInfeasibilities** (double value)
- int numberDualInfeasibilities () const

  Number of dual infeasibilities.
- void **setNumberDualInfeasibilities** (int value)
- int numberDualInfeasibilitiesWithoutFree () const

  Number of dual infeasibilities (without free)
- double sumPrimalInfeasibilities () const

  Sum of primal infeasibilities.
- void **setSumPrimalInfeasibilities** (double value)
- double sumOfRelaxedPrimalInfeasibilities () const

  Sum of relaxed primal infeasibilities.
- void **setSumOfRelaxedPrimalInfeasibilities** (double value)
- int numberPrimalInfeasibilities () const

  Number of primal infeasibilities.
- void **setNumberPrimalInfeasibilities** (int value)
- int saveModel (const char ∗fileName)

  Save model to file, returns 0 if success.
- int restoreModel (const char ∗fileName)

  Restore model from file, returns 0 if success, deletes current model.
- void checkSolution (int setToBounds=0)

  Just check solution (for external use) - sets sum of infeasibilities etc.
- void checkSolutionInternal ()

  Just check solution (for internal use) - sets sum of infeasibilities etc.
- void checkUnscaledSolution ()

  Check unscaled primal solution but allow for rounding error.
- CoinIndexedVector ∗ rowArray (int index) const

  Useful row length arrays (0,1,2,3,4,5)
- CoinIndexedVector ∗ columnArray (int index) const

  Useful column length arrays (0,1,2,3,4,5)
- double alphaAccuracy () const

  Initial value for alpha accuracy calculation (-1.0 off)
- void **setAlphaAccuracy** (double value)
- void setDisasterHandler (ClpDisasterHandler ∗handler)

  Objective value.

- ClpDisasterHandler ∗ disasterHandler () const
  Get disaster handler.
- double largeValue () const
  Large bound value (for complementarity etc)
- void **setLargeValue** (double value)
- double largestPrimalError () const
  Largest error on Ax-b.
- double largestDualError () const
  Largest error on basic duals.
- void setLargestPrimalError (double value)
  Largest error on Ax-b.
- void setLargestDualError (double value)
  Largest error on basic duals.
- double zeroTolerance () const
  Get zero tolerance.
- void setZeroTolerance (double value)
  Set zero tolerance.
- int ∗ pivotVariable () const
  Basic variables pivoting on which rows.
- bool automaticScaling () const
  If automatic scaling on.
- void **setAutomaticScaling** (bool onOff)
- double currentDualTolerance () const
  Current dual tolerance.
- void **setCurrentDualTolerance** (double value)
- double currentPrimalTolerance () const
  Current primal tolerance.
- void **setCurrentPrimalTolerance** (double value)
- int numberRefinements () const
  How many iterative refinements to do.
- void **setNumberRefinements** (int value)
- double alpha () const
  Alpha (pivot element) for use by classes e.g. steepestedge.
- void **setAlpha** (double value)
- double dualIn () const
  Reduced cost of last incoming for use by classes e.g. steepestedge.
- int pivotRow () const
  Pivot Row for use by classes e.g. steepestedge.
- void **setPivotRow** (int value)
- double valueIncomingDual () const
  value of incoming variable (in Dual)

public methods

- double ∗ solutionRegion (int section) const
  Return row or column sections - not as much needed as it once was.
- double ∗ **djRegion** (int section) const
- double ∗ **lowerRegion** (int section) const
- double ∗ **upperRegion** (int section) const

- double ∗ **costRegion** (int section) const
- double ∗ solutionRegion () const

  Return region as single array.
- double ∗ **djRegion** () const
- double ∗ **lowerRegion** () const
- double ∗ **upperRegion** () const
- double ∗ **costRegion** () const
- Status **getStatus** (int sequence) const
- void **setStatus** (int sequence, Status newstatus)
- bool startPermanentArrays ()

  Start or reset using maximumRows_ and Columns_ - true if change.
- void setInitialDenseFactorization (bool onOff)

  Normally the first factorization does sparse coding because the factorization could be singular.
- bool **initialDenseFactorization** () const
- int sequenceIn () const

  Return sequence In or Out.
- int **sequenceOut** () const
- void setSequenceIn (int sequence)

  Set sequenceIn or Out.
- void **setSequenceOut** (int sequence)
- int directionIn () const

  Return direction In or Out.
- int **directionOut** () const
- void setDirectionIn (int direction)

  Set directionIn or Out.
- void **setDirectionOut** (int direction)
- double valueOut () const

  Value of Out variable.
- void setValueOut (double value)

  Set value of out variable.
- void setLowerOut (double value)

  Set lower of out variable.
- void setUpperOut (double value)

  Set upper of out variable.
- void setTheta (double value)

  Set theta of out variable.
- int isColumn (int sequence) const

  Returns 1 if sequence indicates column.
- int sequenceWithin (int sequence) const

  Returns sequence number within section.
- double solution (int sequence)

  Return row or column values.
- double & solutionAddress (int sequence)

  Return address of row or column values.
- double **reducedCost** (int sequence)
- double & **reducedCostAddress** (int sequence)
- double **lower** (int sequence)
- double & lowerAddress (int sequence)

Return address of row or column lower bound.

- double **upper** (int sequence)
- double & upperAddress (int sequence)

  Return address of row or column upper bound.
- double **cost** (int sequence)
- double & costAddress (int sequence)

  Return address of row or column cost.
- double originalLower (int iSequence) const

  Return original lower bound.
- double originalUpper (int iSequence) const

  Return original lower bound.
- double theta () const

  Theta (pivot change)
- double bestPossibleImprovement () const

  Best possible improvement using djs (primal) or obj change by flipping bounds to make dual feasible (dual)
- ClpNonLinearCost ∗ nonLinearCost () const

  Return pointer to details of costs.
- int moreSpecialOptions () const

  Return more special options 1 bit - if presolve says infeasible in ClpSolve return 2 bit - if presolved problem infeasible return 4 bit - keep arrays like upper_ around 8 bit - if factorization kept can still declare optimal at once 16 bit - if checking replaceColumn accuracy before updating 32 bit - say optimal if primal feasible! 64 bit - give up easily in dual (and say infeasible) 128 bit - no objective, 0-1 and in B&B 256 bit - in primal from dual or vice versa 512 bit - alternative use of solveType_ 1024 bit - don't do row copy of factorization 2048 bit - perturb in complete fathoming 4096 bit - try more for complete fathoming.
- void setMoreSpecialOptions (int value)

  Set more special options 1 bit - if presolve says infeasible in ClpSolve return 2 bit - if presolved problem infeasible return 4 bit - keep arrays like upper_ around 8 bit - no free or superBasic variables 16 bit - if checking replaceColumn accuracy before updating 32 bit - say optimal if primal feasible! 64 bit - give up easily in dual (and say infeasible) 128 bit - no objective, 0-1 and in B&B 256 bit - in primal from dual or vice versa 512 bit - alternative use of solveType_ 1024 bit - don't do row copy of factorization 2048 bit - perturb in complete fathoming 4096 bit - try more for complete fathoming.

status methods

- void **setFakeBound** (int sequence, FakeBound fakeBound)
- FakeBound **getFakeBound** (int sequence) const
- void **setRowStatus** (int sequence, Status newstatus)
- Status **getRowStatus** (int sequence) const
- void **setColumnStatus** (int sequence, Status newstatus)
- Status **getColumnStatus** (int sequence) const
- void **setPivoted** (int sequence)
- void **clearPivoted** (int sequence)
- bool **pivoted** (int sequence) const
- void setFlagged (int sequence)

  To flag a variable (not inline to allow for column generation)
- void **clearFlagged** (int sequence)

- bool **flagged** (int sequence) const
- void setActive (int iRow)

  To say row active in primal pivot row choice.
- void **clearActive** (int iRow)
- bool **active** (int iRow) const
- void createStatus ()

  Set up status array (can be used by OsiClp).
- void allSlackBasis (bool resetSolution=false)

  Sets up all slack basis and resets solution to as it was after initial load or readMps.
- int lastBadIteration () const

  So we know when to be cautious.
- int progressFlag () const

  Progress flag - at present 0 bit says artificials out.
- void forceFactorization (int value)

  Force re-factorization early.
- double rawObjectiveValue () const

  Raw objective value (so always minimize in primal)
- void computeObjectiveValue (bool useWorkingSolution=false)

  Compute objective value from solution and put in objectiveValue_.
- double computeInternalObjectiveValue ()

  Compute minimization objective value from internal solution without perturbation.
- int numberExtraRows () const

  Number of extra rows.
- int maximumBasic () const

  Maximum number of basic variables - can be more than number of rows if GUB.
- int baseIteration () const

  Iteration when we entered dual or primal.
- void generateCpp (FILE ∗fp, bool defaultFactor=false)

  Create C++ lines to get to current state.
- ClpFactorization ∗ getEmptyFactorization ()

  Gets clean and emptyish factorization.
- void setEmptyFactorization ()

  May delete or may make clean and emptyish factorization.
- void moveInfo (const ClpSimplex &rhs, bool justStatus=false)

  Move status and solution across.

Basis handling

- void getBInvARow (int row, double ∗z, double ∗slack=NULL)

  Get a row of the tableau (slack part in slack if not NULL)
- void getBInvRow (int row, double ∗z)

  Get a row of the basis inverse.
- void getBInvACol (int col, double ∗vec)

  Get a column of the tableau.
- void getBInvCol (int col, double ∗vec)

  Get a column of the basis inverse.
- void getBasics (int ∗index)

  Get basic indices (order of indices corresponds to the order of elements in a vector retured by getBInvACol() and getBInvCol()).

Changing bounds on variables and constraints

- void setObjectiveCoefficient (int elementIndex, double elementValue)
  Set an objective function coefficient.
- void setObjCoeff (int elementIndex, double elementValue)
  Set an objective function coefficient.
- void setColumnLower (int elementIndex, double elementValue)
  Set a single column lower bound
  Use -DBL_MAX for -infinity.
- void setColumnUpper (int elementIndex, double elementValue)
  Set a single column upper bound
  Use DBL_MAX for infinity.
- void setColumnBounds (int elementIndex, double lower, double upper)
  Set a single column lower and upper bound.
- void setColumnSetBounds (const int ∗indexFirst, const int ∗indexLast, const double ∗boundList)
  Set the bounds on a number of columns simultaneously
  The default implementation just invokes setColLower() and setColUpper() over and over again.
- void setColLower (int elementIndex, double elementValue)
  Set a single column lower bound
  Use -DBL_MAX for -infinity.
- void setColUpper (int elementIndex, double elementValue)
  Set a single column upper bound
  Use DBL_MAX for infinity.
- void setColBounds (int elementIndex, double newlower, double newupper)
  Set a single column lower and upper bound.
- void setColSetBounds (const int ∗indexFirst, const int ∗indexLast, const double ∗boundList)
  Set the bounds on a number of columns simultaneously
- void setRowLower (int elementIndex, double elementValue)
  Set a single row lower bound
  Use -DBL_MAX for -infinity.
- void setRowUpper (int elementIndex, double elementValue)
  Set a single row upper bound
  Use DBL_MAX for infinity.
- void setRowBounds (int elementIndex, double lower, double upper)
  Set a single row lower and upper bound.
- void setRowSetBounds (const int ∗indexFirst, const int ∗indexLast, const double ∗boundList)
  Set the bounds on a number of rows simultaneously
- void resize (int newNumberRows, int newNumberColumns)
  Resizes rim part of model.

Protected Member Functions

protected methods

- int gutsOfSolution (double ∗givenDuals, const double ∗givenPrimals, bool valuesPass=false)

May change basis and then returns number changed.

- void gutsOfDelete (int type)

  Does most of deletion (0 = all, 1 = most, 2 most + factorization)

- void gutsOfCopy (const ClpSimplex &rhs)

  Does most of copying.

- bool createRim (int what, bool makeRowCopy=false, int startFinishOptions=0)

  puts in format I like (rowLower,rowUpper) also see StandardMatrix 1 bit does rows (now and columns), (2 bit does column bounds), 4 bit does objective(s).

- void createRim1 (bool initial)

  Does rows and columns.

- void createRim4 (bool initial)

  Does objective.

- void createRim5 (bool initial)

  Does rows and columns and objective.

- void deleteRim (int getRidOfFactorizationData=2)

  releases above arrays and does solution scaling out.

- bool sanityCheck ()

  Sanity check on input rim data (after scaling) - returns true if okay.

Friends

- void ClpSimplexUnitTest (const std::string &mpsDir)

  A function that tests the methods in the ClpSimplex class.

Functions less likely to be useful to casual user

- int getSolution (const double ∗rowActivities, const double ∗columnActivities)

  Given an existing factorization computes and checks primal and dual solutions.

- int getSolution ()

  Given an existing factorization computes and checks primal and dual solutions.

- int createPiecewiseLinearCosts (const int ∗starts, const double ∗lower, const double ∗gradient)

  Constructs a non linear cost from list of non-linearities (columns only) First lower of each column is taken as real lower Last lower is taken as real upper and cost ignored.

- ClpDualRowPivot ∗ dualRowPivot () const

  dual row pivot choice

- ClpPrimalColumnPivot ∗ primalColumnPivot () const

  primal column pivot choice

- bool goodAccuracy () const

  Returns true if model looks OK.

- void returnModel (ClpSimplex &otherModel)

  Return model - updates any scalars.

- int internalFactorize (int solveType)

  Factorizes using current basis.

- ClpDataSave saveData ()

    Save data.
- void restoreData (ClpDataSave saved)

    Restore data.
- void cleanStatus ()

    Clean up status.
- int factorize ()

    Factorizes using current basis. For external use.
- void computeDuals (double ∗givenDjs)

    Computes duals from scratch.
- void computePrimals (const double ∗rowActivities, const double ∗columnActivities)

    Computes primals from scratch.
- void add (double ∗array, int column, double multiplier) const

    Adds multiple of a column into an array.
- void unpack (CoinIndexedVector ∗rowArray) const

    Unpacks one column of the matrix into indexed array Uses sequenceIn_ Also applies scaling if needed.
- void unpack (CoinIndexedVector ∗rowArray, int sequence) const

    Unpacks one column of the matrix into indexed array Slack if sequence>= numberColumns Also applies scaling if needed.
- void unpackPacked (CoinIndexedVector ∗rowArray)

    Unpacks one column of the matrix into indexed array as packed vector Uses sequenceIn_-Also applies scaling if needed.
- void unpackPacked (CoinIndexedVector ∗rowArray, int sequence)

    Unpacks one column of the matrix into indexed array as packed vector Slack if sequence>= numberColumns Also applies scaling if needed.
- void setValuesPassAction (double incomingInfeasibility, double allowedInfeasibility)

    For advanced use.
- int housekeeping (double objectiveChange)

    This does basis housekeeping and does values for in/out variables.
- void checkPrimalSolution (const double ∗rowActivities=NULL, const double ∗columnActivies=NULL)

    This sets largest infeasibility and most infeasible and sum and number of infeasibilities (Primal)
- void checkDualSolution ()

    This sets largest infeasibility and most infeasible and sum and number of infeasibilities (Dual)
- void checkBothSolutions ()

    This sets sum and number of infeasibilities (Dual and Primal)
- double scaleObjective (double value)

    If input negative scales objective so maximum <= -value and returns scale factor used.
- int solveDW (CoinStructuredModel ∗model)

    Solve using Dantzig-Wolfe decomposition and maybe in parallel.
- int solveBenders (CoinStructuredModel ∗model)

    Solve using Benders decomposition and maybe in parallel.

data. Many arrays have a row part and a column part.

There is a single array with both - columns then rows and then normally two arrays pointing to rows and columns.

The single array is the owner of memory

- double bestPossibleImprovement_

  Best possible improvement using djs (primal) or obj change by flipping bounds to make dual feasible (dual)
- double zeroTolerance_

  Zero tolerance.
- int columnPrimalSequence_

  Sequence of worst (-1 if feasible)
- int rowPrimalSequence_

  Sequence of worst (-1 if feasible)
- double bestObjectiveValue_

  "Best" objective value
- int moreSpecialOptions_

  More special options - see set for details.
- int baseIteration_

  Iteration when we entered dual or primal.
- double primalToleranceToGetOptimal_

  Primal tolerance needed to make dual feasible (<largeTolerance)
- double largeValue_

  Large bound value (for complementarity etc)
- double largestPrimalError_

  Largest error on Ax-b.
- double largestDualError_

  Largest error on basic duals.
- double alphaAccuracy_

  For computing whether to re-factorize.
- double dualBound_

  Dual bound.
- double alpha_

  Alpha (pivot element)
- double theta_

  Theta (pivot change)
- double lowerIn_

  Lower Bound on In variable.
- double valueIn_

  Value of In variable.
- double upperIn_

  Upper Bound on In variable.

- double dualIn_

  Reduced cost of In variable.
- double lowerOut_

  Lower Bound on Out variable.
- double valueOut_

  Value of Out variable.
- double upperOut_

  Upper Bound on Out variable.
- double dualOut_

  Infeasibility (dual) or ? (primal) of Out variable.
- double dualTolerance_

  Current dual tolerance for algorithm.
- double primalTolerance_

  Current primal tolerance for algorithm.
- double sumDualInfeasibilities_

  Sum of dual infeasibilities.
- double sumPrimalInfeasibilities_

  Sum of primal infeasibilities.
- double infeasibilityCost_

  Weight assigned to being infeasible in primal.
- double sumOfRelaxedDualInfeasibilities_

  Sum of Dual infeasibilities using tolerance based on error in duals.
- double sumOfRelaxedPrimalInfeasibilities_

  Sum of Primal infeasibilities using tolerance based on error in primals.
- double acceptablePivot_

  Acceptable pivot value just after factorization.
- double ∗ lower_

  Working copy of lower bounds (Owner of arrays below)
- double ∗ rowLowerWork_

  Row lower bounds - working copy.
- double ∗ columnLowerWork_

  Column lower bounds - working copy.
- double ∗ upper_

  Working copy of upper bounds (Owner of arrays below)
- double ∗ rowUpperWork_

  Row upper bounds - working copy.
- double ∗ columnUpperWork_

  Column upper bounds - working copy.
- double ∗ cost_

  Working copy of objective (Owner of arrays below)
- double ∗ rowObjectiveWork_

  Row objective - working copy.
- double ∗ objectiveWork_

Column objective - working copy.

- CoinIndexedVector ∗ rowArray_ [6]

  Useful row length arrays.

- CoinIndexedVector ∗ columnArray_ [6]

  Useful column length arrays.

- int sequenceIn_

  Sequence of In variable.

- int directionIn_

  Direction of In, 1 going up, -1 going down, 0 not a clude.

- int sequenceOut_

  Sequence of Out variable.

- int directionOut_

  Direction of Out, 1 to upper bound, -1 to lower bound, 0 - superbasic.

- int pivotRow_

  Pivot Row.

- int lastGoodIteration_

  Last good iteration (immediately after a re-factorization)

- double ∗ dj_

  Working copy of reduced costs (Owner of arrays below)

- double ∗ rowReducedCost_

  Reduced costs of slacks not same as duals (or - duals)

- double ∗ reducedCostWork_

  Possible scaled reduced costs.

- double ∗ solution_

  Working copy of primal solution (Owner of arrays below)

- double ∗ rowActivityWork_

  Row activities - working copy.

- double ∗ columnActivityWork_

  Column activities - working copy.

- int numberDualInfeasibilities_

  Number of dual infeasibilities.

- int numberDualInfeasibilitiesWithoutFree_

  Number of dual infeasibilities (without free)

- int numberPrimalInfeasibilities_

  Number of primal infeasibilities.

- int numberRefinements_

  How many iterative refinements to do.

- ClpDualRowPivot ∗ dualRowPivot_

  dual row pivot choice

- ClpPrimalColumnPivot ∗ primalColumnPivot_

  primal column pivot choice

- int ∗ pivotVariable_

  Basic variables pivoting on which rows.

- ClpFactorization ∗ factorization_

  factorization
- double ∗ savedSolution_

  Saved version of solution.
- int numberTimesOptimal_

  Number of times code has tentatively thought optimal.
- ClpDisasterHandler ∗ disasterArea_

  Disaster handler.
- int changeMade_

  If change has been made (first attempt at stopping looping)
- int algorithm_

  Algorithm >0 == Primal, <0 == Dual.
- int forceFactorization_

  Now for some reliability aids This forces re-factorization early.
- int perturbation_

  Perturbation:
- unsigned char ∗ saveStatus_

  Saved status regions.
- ClpNonLinearCost ∗ nonLinearCost_

  Very wasteful way of dealing with infeasibilities in primal.
- int lastBadIteration_

  So we know when to be cautious.
- int lastFlaggedIteration_

  So we know when to open up again.
- int numberFake_

  Can be used for count of fake bounds (dual) or fake costs (primal)
- int numberChanged_

  Can be used for count of changed costs (dual) or changed bounds (primal)
- int progressFlag_

  Progress flag - at present 0 bit says artificials out, 1 free in.
- int firstFree_

  First free/super-basic variable (-1 if none)
- int numberExtraRows_

  Number of extra rows.
- int maximumBasic_

  Maximum number of basic variables - can be more than number of rows if GUB.
- int dontFactorizePivots_

  If may skip final factorize then allow up to this pivots (default 20)
- double incomingInfeasibility_

  For advanced use.
- double **allowedInfeasibility_**
- int automaticScale_

  Automatic scaling of objective and rhs and bounds.

- int maximumPerturbationSize_

  Maximum perturbation array size (take out when code rewritten)
- double * perturbationArray_

  Perturbation array (maximumPerturbationSize_)
- ClpSimplex * baseModel_

  A copy of model with certain state - normally without cuts.
- ClpSimplexProgress progress_

  For dealing with all issues of cycling etc.
- int spareIntArray_ [4]

  Spare int array for passing information [0]!=0 switches on.
- double spareDoubleArray_ [4]

  Spare double array for passing information [0]!=0 switches on.
- class OsiClpSolverInterface

  Allow OsiClp certain perks.

3.53.1 Detailed Description

This solves LPs using the simplex method.

It inherits from ClpModel and all its arrays are created at algorithm time. Originally I tried to work with model arrays but for simplicity of coding I changed to single arrays with structural variables then row variables. Some coding is still based on old style and needs cleaning up.

For a description of algorithms:

for dual see ClpSimplexDual.hpp and at top of ClpSimplexDual.cpp for primal see ClpSimplexPrimal.hpp and at top of ClpSimplexPrimal.cpp

There is an algorithm data member. + for primal variations and - for dual variations

Definition at line 49 of file ClpSimplex.hpp.

3.53.2 Member Enumeration Documentation

3.53.2.1 enum **ClpSimplex::Status**

enums for status of various sorts.

First 4 match CoinWarmStartBasis, isFixed means fixed at lower bound and out of basis

Definition at line 57 of file ClpSimplex.hpp.

3.53.3 Constructor & Destructor Documentation

3.53.3.1 ClpSimplex::ClpSimplex (const **ClpSimplex** & *rhs*, int *scalingMode* = `-1`)

Copy constructor.

May scale depending on mode -1 leave mode as is 0 -off, 1 equilibrium, 2 geometric, 3, auto, 4 dynamic(later)

3.53.3.2 ClpSimplex::ClpSimplex (const ClpModel & *rhs*, int *scalingMode* = `-1`)

Copy constructor from model.

May scale depending on mode -1 leave mode as is 0 -off, 1 equilibrium, 2 geometric, 3, auto, 4 dynamic(later)

3.53.3.3 ClpSimplex::ClpSimplex (const ClpModel * *wholeModel*, int *numberRows*, const int * *whichRows*, int *numberColumns*, const int * *whichColumns*, bool *dropNames* = `true`, bool *dropIntegers* = `true`, bool *fixOthers* = `false`)

Subproblem constructor.

A subset of whole model is created from the row and column lists given. The new order is given by list order and duplicates are allowed. Name and integer information can be dropped Can optionally modify rhs to take into account variables NOT in list in this case duplicates are not allowed (also see getbackSolution)

3.53.3.4 ClpSimplex::ClpSimplex (const ClpSimplex * *wholeModel*, int *numberRows*, const int * *whichRows*, int *numberColumns*, const int * *whichColumns*, bool *dropNames* = `true`, bool *dropIntegers* = `true`, bool *fixOthers* = `false`)

Subproblem constructor.

A subset of whole model is created from the row and column lists given. The new order is given by list order and duplicates are allowed. Name and integer information can be dropped Can optionally modify rhs to take into account variables NOT in list in this case duplicates are not allowed (also see getbackSolution)

3.53.3.5 ClpSimplex::ClpSimplex (ClpSimplex * *wholeModel*, int *numberColumns*, const int * *whichColumns*)

This constructor modifies original ClpSimplex and stores original stuff in created ClpSimplex.

It is only to be used in conjunction with originalModel

3.53.4 Member Function Documentation

3.53.4.1 void ClpSimplex::originalModel (ClpSimplex * *miniModel*)

This copies back stuff from miniModel and then deletes miniModel.

Only to be used with mini constructor

3.53.4.2 void ClpSimplex::loadProblem (const ClpMatrixBase & *matrix*, const double * *collb*, const double * *colub*, const double * *obj*, const double * *rowlb*, const double * *rowub*, const double * *rowObjective* = `NULL`)

Loads a problem (the constraints on the rows are given by lower and upper bounds).

If a pointer is 0 then the following values are the default:

- `colub`: all columns have upper bound infinity
- `collb`: all columns have lower bound 0
- `rowub`: all rows have upper bound infinity
- `rowlb`: all rows have lower bound -infinity
- `obj`: all variables have 0 objective coefficient

Reimplemented from ClpModel.

3.53.4.3 void ClpSimplex::loadProblem (const int *numcols*, const int *numrows*, const CoinBigIndex ∗ *start*, const int ∗ *index*, const double ∗ *value*, const double ∗ *collb*, const double ∗ *colub*, const double ∗ *obj*, const double ∗ *rowlb*, const double ∗ *rowub*, const double ∗ *rowObjective* = `NULL`)

Just like the other loadProblem() method except that the matrix is given in a standard column major ordered format (without gaps).

Reimplemented from ClpModel.

3.53.4.4 int ClpSimplex::loadProblem (CoinModel & *modelObject*, bool *keepSolution* = `false`)

This loads a model from a coinModel object - returns number of errors.

If keepSolution true and size is same as current then keeps current status and solution

Reimplemented from ClpModel.

3.53.4.5 int ClpSimplex::readLp (const char ∗ *filename*, const double *epsilon* = `1e-5`)

Read file in LP format from file with name filename.

See class CoinLpIO for description of this format.

3.53.4.6 void ClpSimplex::borrowModel (ClpModel & *otherModel*)

Borrow model.

This is so we dont have to copy large amounts of data around. It assumes a derived class wants to overwrite an empty model with a real one - while it does an algorithm. This is same as ClpModel one, but sets scaling on etc.

Reimplemented from ClpModel.

3.53.4.7 int ClpSimplex::loadNonLinear (void ∗ *info*, int & *numberConstraints*, ClpConstraint ∗∗& *constraints*)

Load nonlinear part of problem from AMPL info Returns 0 if linear 1 if quadratic objective 2 if quadratic constraints 3 if nonlinear objective 4 if nonlinear constraints.

-1 on failure

3.53.4.8 int ClpSimplex::initialSolve (ClpSolve & *options*)

General solve algorithm which can do presolve.

See ClpSolve.hpp for options

3.53.4.9 int ClpSimplex::dual (int *ifValuesPass* = 0, int *startFinishOptions* = 0)

Dual algorithm - see ClpSimplexDual.hpp for method.

ifValuesPass==2 just does values pass and then stops.

startFinishOptions - bits 1 - do not delete work areas and factorization at end 2 - use old factorization if same number of rows 4 - skip as much initialization of work areas as possible (based on whatsChanged in clpmodel.hpp) ** work in progress maybe other bits later

Reimplemented in ClpSimplexDual.

3.53.4.10 int ClpSimplex::primal (int *ifValuesPass* = 0, int *startFinishOptions* = 0)

Primal algorithm - see ClpSimplexPrimal.hpp for method.

ifValuesPass==2 just does values pass and then stops.

startFinishOptions - bits 1 - do not delete work areas and factorization at end 2 - use old factorization if same number of rows 4 - skip as much initialization of work areas as possible (based on whatsChanged in clpmodel.hpp) ** work in progress maybe other bits later

Reimplemented in ClpSimplexPrimal.

3.53.4.11 int ClpSimplex::nonlinearSLP (int *numberPasses*, double *deltaTolerance*)

Solves nonlinear problem using SLP - may be used as crash for other algorithms when number of iterations small.

Also exits if all problematical variables are changing less than deltaTolerance

3.53.4.12 int ClpSimplex::nonlinearSLP (int *numberConstraints*, ClpConstraint ** *constraints*, int *numberPasses*, double *deltaTolerance*)

Solves problem with nonlinear constraints using SLP - may be used as crash for other algorithms when number of iterations small.

Also exits if all problematical variables are changing less than deltaTolerance

3.53.4.13 int ClpSimplex::barrier (bool *crossover* = true)

Solves using barrier (assumes you have good cholesky factor code).

Does crossover to simplex if asked

3.53.4.14 int ClpSimplex::reducedGradient (int *phase* = 0)

Solves non-linear using reduced gradient.

Phase = 0 get feasible, =1 use solution

3.53.4.15 int ClpSimplex::loadProblem (CoinStructuredModel & *modelObject*, bool *originalOrder* = `true`, bool *keepSolution* = `false`)

This loads a model from a CoinStructuredModel object - returns number of errors.

If originalOrder then keep to order stored in blocks, otherwise first column/rows correspond to first block - etc. If keepSolution true and size is same as current then keeps current status and solution

3.53.4.16 int ClpSimplex::cleanup (int *cleanupScaling*)

When scaling is on it is possible that the scaled problem is feasible but the unscaled is not.

Clp returns a secondary status code to that effect. This option allows for a cleanup. If you use it I would suggest 1. This only affects actions when scaled optimal 0 - no action 1 - clean up using dual if primal infeasibility 2 - clean up using dual if dual infeasibility 3 - clean up using dual if primal or dual infeasibility 11,12,13 - as 1,2,3 but use primal

return code as dual/primal

3.53.4.17 int ClpSimplex::dualRanging (int *numberCheck*, const int ∗ *which*, double ∗ *costIncrease*, int ∗ *sequenceIncrease*, double ∗ *costDecrease*, int ∗ *sequenceDecrease*, double ∗ *valueIncrease* = `NULL`, double ∗ *valueDecrease* = `NULL`)

Dual ranging.

This computes increase/decrease in cost for each given variable and corresponding sequence numbers which would change basis. Sequence numbers are 0..numberColumns and numberColumns.. for artificials/slacks. For non-basic variables the information is trivial to compute and the change in cost is just minus the reduced cost and the sequence number will be that of the non-basic variables. For basic variables a ratio test is between the reduced costs for non-basic variables and the row of the tableau corresponding to the basic variable. The increase/decrease value is always >= 0.0

Up to user to provide correct length arrays where each array is of length numberCheck. which contains list of variables for which information is desired. All other arrays will be filled in by function. If fifth entry in which is variable 7 then fifth entry in output arrays will be information for variable 7.

If valueIncrease/Decrease not NULL (both must be NULL or both non NULL) then these are filled with the value of variable if such a change in cost were made (the existing bounds are ignored)

Returns non-zero if infeasible unbounded etc

Reimplemented in ClpSimplexOther.

3.53.4.18 int ClpSimplex::primalRanging (int *numberCheck*, const int ∗ *which*, double ∗ *valueIncrease*, int ∗ *sequenceIncrease*, double ∗ *valueDecrease*, int ∗ *sequenceDecrease*)

Primal ranging.

This computes increase/decrease in value for each given variable and corresponding sequence numbers which would change basis. Sequence numbers are 0..numberColumns and numberColumns.. for artificials/slacks. This should only be used for non-basic variabls as otherwise information is pretty useless For basic variables the sequence number will be that of the basic variables.

Up to user to provide correct length arrays where each array is of length numberCheck. which contains list of variables for which information is desired. All other arrays will be filled in by function. If fifth entry in which is variable 7 then fifth entry in output arrays will be information for variable 7.

Returns non-zero if infeasible unbounded etc

Reimplemented in ClpSimplexOther.

3.53.4.19 int ClpSimplex::writeBasis (const char ∗ *filename*, bool *writeValues* = `false`, int *formatType* = `0`) const

Write the basis in MPS format to the specified file.

If writeValues true writes values of structurals (and adds VALUES to end of NAME card)

Row and column names may be null. formatType is

- 0 - normal
- 1 - extra accuracy
- 2 - IEEE hex (later)

Returns non-zero on I/O error

Reimplemented in ClpSimplexOther.

3.53.4.20 int ClpSimplex::tightenPrimalBounds (double *factor* = `0.0`, int *doTight* = `0`, bool *tightIntegers* = `false`)

Tightens primal bounds to make dual faster.

Unless fixed or doTight>10, bounds are slightly looser than they could be. This is to make dual go faster and is probably not needed with a presolve. Returns non-zero if problem infeasible.

Fudge for branch and bound - put bounds on columns of factor ∗ largest value (at continuous) - should improve stability in branch and bound on infeasible branches (0.0 is off)

3.53.4.21 int ClpSimplex::crash (double *gap*, int *pivot*)

Crash - at present just aimed at dual, returns.

-2 if dual preferred and crash basis created -1 if dual preferred and all slack basis preferred 0 if basis going in was not all slack 1 if primal preferred and all slack basis preferred 2 if primal preferred and crash basis created.

if gap between bounds <="gap" variables can be flipped (If pivot -1 then can be made super basic!)

If "pivot" is -1 No pivoting - always primal 0 No pivoting (so will just be choice of algorithm) 1 Simple pivoting e.g. gub 2 Mini iterations

3.53.4.22 int ClpSimplex::strongBranching (int *numberVariables,* const int ∗ *variables,* double ∗ *newLower,* double ∗ *newUpper,* double ∗∗ *outputSolution,* int ∗ *outputStatus,* int ∗ *outputIterations,* bool *stopOnFirstInfeasible =* `true`*,* bool *alwaysFinish =* `false`*,* int *startFinishOptions =* `0`)

For strong branching.

On input lower and upper are new bounds while on output they are change in objective function values (>1.0e50 infeasible). Return code is 0 if nothing interesting, -1 if infeasible both ways and +1 if infeasible one way (check values to see which one(s)) Solutions are filled in as well - even down, odd up - also status and number of iterations

Reimplemented in ClpSimplexDual.

3.53.4.23 int ClpSimplex::fathomMany (void ∗ *stuff*)

Do up to N deep - returns.

-1 - no solution nNodes_ valid nodes >= if solution and that node gives solution ClpNode array is 2∗∗N long. Values for N and array are in stuff (nNodes_ also in stuff)

3.53.4.24 int ClpSimplex::pivot ( )

Pivot in a variable and out a variable.

Returns 0 if okay, 1 if inaccuracy forced re-factorization, -1 if would be singular. Also updates primal/dual infeasibilities. Assumes sequenceIn_ and pivotRow_ set and also directionIn and Out.

3.53.4.25 int ClpSimplex::primalPivotResult ( )

Pivot in a variable and choose an outgoing one.

Assumes primal feasible - will not go through a bound. Returns step length in theta Returns ray in ray_ (or NULL if no pivot) Return codes as before but -1 means no acceptable pivot

3.53.4.26 int ClpSimplex::dualPivotResult ( )

Pivot out a variable and choose an incoing one.

Assumes dual feasible - will not go through a reduced cost. Returns step length in theta Returns ray in ray_ (or NULL if no pivot) Return codes as before but -1 means no acceptable pivot

3.53.4.27 int ClpSimplex::startup (int *ifValuesPass*, int *startFinishOptions* = 0)

Common bits of coding for dual and primal.

Return 0 if okay, 1 if bad matrix, 2 if very bad factorization

startFinishOptions - bits 1 - do not delete work areas and factorization at end 2 - use old factorization if same number of rows 4 - skip as much initialization of work areas as possible (based on whatsChanged in clpmodel.hpp) ∗∗ work in progress maybe other bits later

3.53.4.28 bool ClpSimplex::statusOfProblem (bool *initial* = false)

Factorizes and returns true if optimal.

Used by user

3.53.4.29 int ClpSimplex::perturbation ( ) const [inline]

Amount of print out: 0 - none 1 - just final 2 - just factorizations 3 - as 2 plus a bit more 4 - verbose above that 8,16,32 etc just for selective debug.

Perturbation: 50 - switch on perturbation 100 - auto perturb if takes too long (1.0e-6 largest nonzero) 101 - we are perturbed 102 - don't try perturbing again default is 100 others are for playing

Definition at line 531 of file ClpSimplex.hpp.

3.53.4.30 int ClpSimplex::saveModel (const char ∗ *fileName*)

Save model to file, returns 0 if success.

This is designed for use outside algorithms so does not save iterating arrays etc. It does not save any messaging information. Does not save scaling values. It does not know about all types of virtual functions.

3.53.4.31 void ClpSimplex::checkSolution (int *setToBounds* = 0)

Just check solution (for external use) - sets sum of infeasibilities etc.

If setToBounds 0 then primal column values not changed and used to compute primal row activity values. If 1 or 2 then status used - so all nonbasic variables set to indicated bound and if any values changed (or ==2) basic values re-computed.

3.53.4.32 void ClpSimplex::checkSolutionInternal ( )

Just check solution (for internal use) - sets sum of infeasibilities etc.

3.53.4.33 int ClpSimplex::getSolution (const double ∗ *rowActivities*, const double ∗ *columnActivities*)

Given an existing factorization computes and checks primal and dual solutions.

Uses input arrays for variables at bounds. Returns feasibility states

3.53.4.34 int ClpSimplex::getSolution ( )

Given an existing factorization computes and checks primal and dual solutions.

Uses current problem arrays for bounds. Returns feasibility states

3.53.4.35 int ClpSimplex::createPiecewiseLinearCosts (const int ∗ *starts*, const double ∗ *lower*, const double ∗ *gradient*)

Constructs a non linear cost from list of non-linearities (columns only) First lower of each column is taken as real lower Last lower is taken as real upper and cost ignored.

Returns nonzero if bad data e.g. lowers not monotonic

3.53.4.36 int ClpSimplex::internalFactorize (int *solveType*)

Factorizes using current basis.

solveType - 1 iterating, 0 initial, -1 external If 10 added then in primal values pass Return codes are as from ClpFactorization unless initial factorization when total number of singularities is returned. Special case is numberRows_+1 -> all slack basis.

3.53.4.37 void ClpSimplex::computeDuals (double ∗ *givenDjs*)

Computes duals from scratch.

If givenDjs then allows for nonzero basic djs

3.53.4.38 int ClpSimplex::housekeeping (double *objectiveChange*) [protected]

This does basis housekeeping and does values for in/out variables.

Can also decide to re-factorize

3.53.4.39 double ClpSimplex::scaleObjective (double *value*) [protected]

If input negative scales objective so maximum <= -value and returns scale factor used.

If positive unscales and also redoes dual stuff

3.53.4.40 void ClpSimplex::setValuesPassAction (double *incomingInfeasibility*, double *allowedInfeasibility*)

For advanced use.

When doing iterative solves things can get nasty so on values pass if incoming solution has largest infeasibility < incomingInfeasibility throw out variables from basis until largest infeasibility < allowedInfeasibility or incoming largest infeasibility. If allowedInfeasibility>= incomingInfeasibility this is always possible altough you may end up with an all slack basis.

Defaults are 1.0,10.0

3.53.4.41 void ClpSimplex::setDisasterHandler (ClpDisasterHandler * *handler*) [inline]

Objective value.

Set disaster handler

Definition at line 764 of file ClpSimplex.hpp.

3.53.4.42 int ClpSimplex::gutsOfSolution (double * *givenDuals*, const double * *givenPrimals*, bool *valuesPass* = false) [protected]

May change basis and then returns number changed.

Computation of solutions may be overriden by given pi and solution

3.53.4.43 bool ClpSimplex::createRim (int *what*, bool *makeRowCopy* = false, int *startFinishOptions* = 0) [protected]

puts in format I like (rowLower,rowUpper) also see StandardMatrix 1 bit does rows (now and columns), (2 bit does column bounds), 4 bit does objective(s).

8 bit does solution scaling in 16 bit does rowArray and columnArray indexed vectors and makes row copy if wanted, also sets columnStart_ etc Also creates scaling arrays if needed. It does scaling if needed. 16 also moves solutions etc in to work arrays On 16 returns false if problem "bad" i.e. matrix or bounds bad If startFinishOptions is -1 then called by user in getSolution so do arrays but keep pivotVariable_

3.53.4.44 void ClpSimplex::deleteRim (int *getRidOfFactorizationData* = 2) [protected]

releases above arrays and does solution scaling out.

May also get rid of factorization data - 0 get rid of nothing, 1 get rid of arrays, 2 also factorization

3.53.4.45 double* ClpSimplex::solutionRegion (int *section*) const [inline]

Return row or column sections - not as much needed as it once was.

These just map into single arrays

Definition at line 896 of file ClpSimplex.hpp.

3.53.4.46 void ClpSimplex::setInitialDenseFactorization (bool *onOff*)

Normally the first factorization does sparse coding because the factorization could be singular.

This allows initial dense factorization when it is known to be safe

3.53.4.47 void ClpSimplex::createStatus ( )

Set up status array (can be used by OsiClp).

Also can be used to set up all slack basis

3.53.4.48 int ClpSimplex::numberExtraRows ( ) const [inline]

Number of extra rows.

These are ones which will be dynamically created each iteration. This is for GUB but may have other uses.

Definition at line 1184 of file ClpSimplex.hpp.

3.53.4.49 void ClpSimplex::setColumnLower (int *elementIndex*, double *elementValue*)

Set a single column lower bound

Use -DBL_MAX for -infinity.

Reimplemented from ClpModel.

3.53.4.50 void ClpSimplex::setColumnUpper (int *elementIndex*, double *elementValue*)

Set a single column upper bound

Use DBL_MAX for infinity.

Reimplemented from ClpModel.

3.53.4.51 void ClpSimplex::setColumnSetBounds (const int ∗ *indexFirst*, const int ∗ *indexLast*, const double ∗ *boundList*)

Set the bounds on a number of columns simultaneously

The default implementation just invokes setColLower() and setColUpper() over and over again.

Parameters

index-First,indexLas	pointers to the beginning and after the end of the array of the indices of the variables whose *either* bound changes
boundList	the new lower/upper bound pairs for the variables

Reimplemented from ClpModel.

3.53.4.52 void ClpSimplex::setColLower (int *elementIndex*, double *elementValue*) [inline]

Set a single column lower bound

Use -DBL_MAX for -infinity.

Reimplemented from ClpModel.

Definition at line 1265 of file ClpSimplex.hpp.

3.53.4.53 void ClpSimplex::setColUpper (int *elementIndex*, double *elementValue*) [inline]

Set a single column upper bound

Use DBL_MAX for infinity.

Reimplemented from ClpModel.

Definition at line 1270 of file ClpSimplex.hpp.

3.53.4.54 void ClpSimplex::setColSetBounds (const int ∗ *indexFirst*, const int ∗ *indexLast*, const double ∗ *boundList*) [inline]

Set the bounds on a number of columns simultaneously

Parameters

indexFirst,indexLast	pointers to the beginning and after the end of the array of the indices of the variables whose *either* bound changes
boundList	the new lower/upper bound pairs for the variables

Reimplemented from ClpModel.

Definition at line 1286 of file ClpSimplex.hpp.

3.53.4.55 void ClpSimplex::setRowLower (int *elementIndex*, double *elementValue*)

Set a single row lower bound

Use -DBL_MAX for -infinity.

Reimplemented from ClpModel.

3.53.4.56 void ClpSimplex::setRowUpper (int *elementIndex*, double *elementValue*)

Set a single row upper bound

Use DBL_MAX for infinity.

Reimplemented from ClpModel.

3.53.4.57 void ClpSimplex::setRowSetBounds (const int ∗ *indexFirst*, const int ∗ *indexLast*, const double ∗ *boundList*)

Set the bounds on a number of rows simultaneously

Parameters

indexFirst,indexLast	pointers to the beginning and after the end of the array of the indices of the constraints whose *either* bound changes
boundList	the new lower/upper bound pairs for the constraints

Reimplemented from ClpModel.

3.53.5 Friends And Related Function Documentation

3.53.5.1 void ClpSimplexUnitTest (const std::string & *mpsDir*) [friend]

A function that tests the methods in the ClpSimplex class.

The only reason for it not to be a member method is that this way it doesn't have to be compiled into the library. And that's a gain, because the library should be compiled with optimization on, but this method should be compiled with debugging.

It also does some testing of ClpFactorization class

3.53.6 Member Data Documentation

3.53.6.1 int ClpSimplex::perturbation_ [protected]

Perturbation:

-50 to +50 - perturb by this power of ten (-6 sounds good) 100 - auto perturb if takes too long (1.0e-6 largest nonzero) 101 - we are perturbed 102 - don't try perturbing again default is 100

Definition at line 1472 of file ClpSimplex.hpp.

3.53.6.2 ClpNonLinearCost* ClpSimplex::nonLinearCost_ [protected]

Very wasteful way of dealing with infeasibilities in primal.

However it will allow non-linearities and use of dual analysis. If it doesn't work it can easily be replaced.

Definition at line 1479 of file ClpSimplex.hpp.

3.53.6.3 int ClpSimplex::numberExtraRows_ [protected]

Number of extra rows.

These are ones which will be dynamically created each iteration. This is for GUB but may have other uses.

Definition at line 1495 of file ClpSimplex.hpp.

3.53.6.4 double ClpSimplex::incomingInfeasibility_ [protected]

For advanced use.

When doing iterative solves things can get nasty so on values pass if incoming solution has largest infeasibility $<$ incomingInfeasibility throw out variables from basis until largest infeasibility $<$ allowedInfeasibility. if allowedInfeasibility$>=$ incomingInfeasibility this is always possible altough you may end up with an all slack basis.

Defaults are 1.0,10.0

Definition at line 1510 of file ClpSimplex.hpp.

The documentation for this class was generated from the following file:

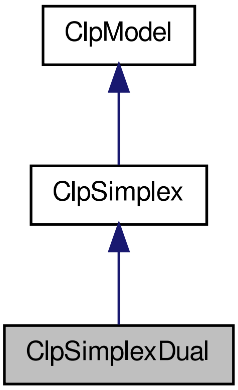
- ClpSimplex.hpp

3.54 ClpSimplexDual Class Reference

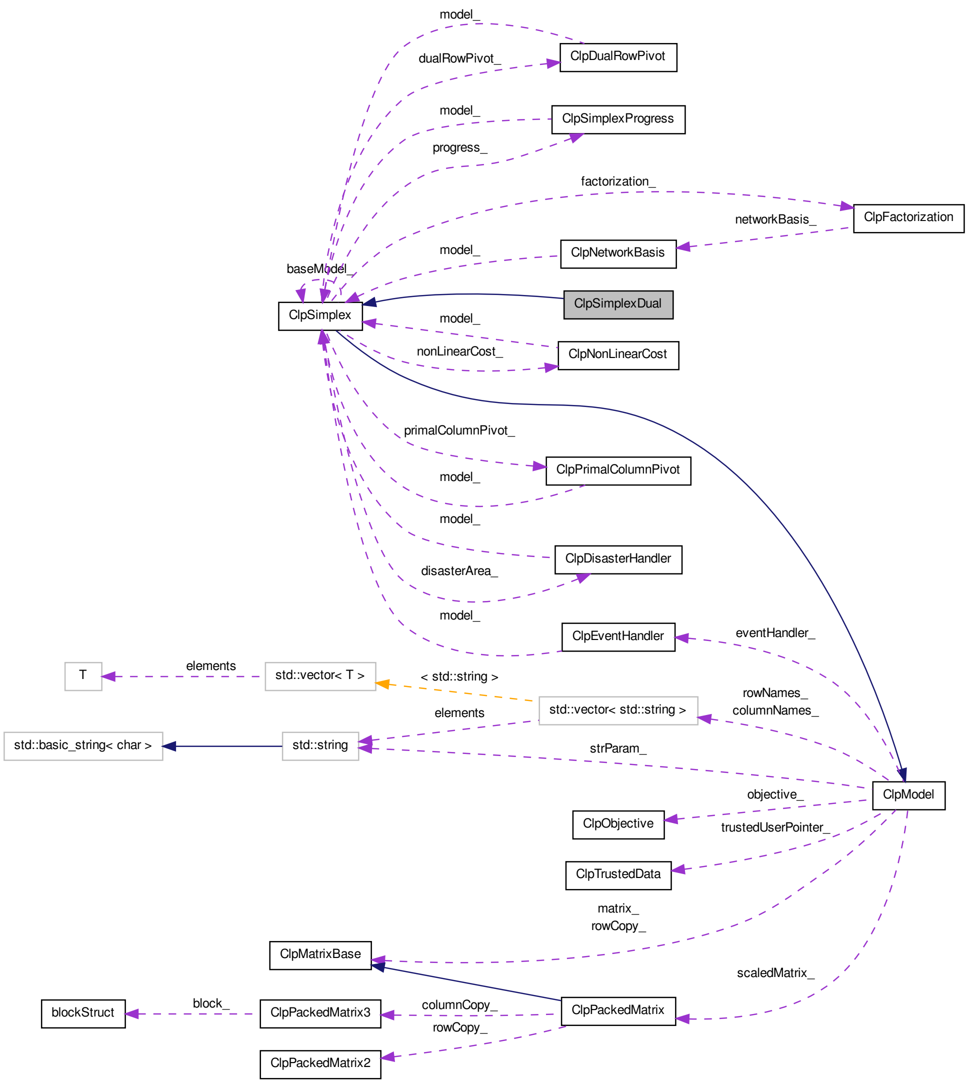
This solves LPs using the dual simplex method.

`#include <ClpSimplexDual.hpp>`

Inheritance diagram for ClpSimplexDual:



Collaboration diagram for ClpSimplexDual:



Public Member Functions

Description of algorithm

- int dual (int ifValuesPass, int startFinishOptions=0)
  Dual algorithm.
- int strongBranching (int numberVariables, const int ∗variables, double ∗newLower, double ∗newUpper, double ∗∗outputSolution, int ∗outputStatus, int ∗outputIterations,

bool stopOnFirstInfeasible=true, bool alwaysFinish=false, int startFinishOptions=0)

For strong branching.

- ClpFactorization ∗ setupForStrongBranching (char ∗arrays, int numberRows, int numberColumns, bool solveLp=false)

  This does first part of StrongBranching.
- void cleanupAfterStrongBranching (ClpFactorization ∗factorization)

  This cleans up after strong branching.

Functions used in dual

- int whileIterating (double ∗&givenPi, int ifValuesPass)

  This has the flow between re-factorizations Broken out for clarity and will be used by strong branching.
- int updateDualsInDual (CoinIndexedVector ∗rowArray, CoinIndexedVector ∗columnArray, CoinIndexedVector ∗outputArray, double theta, double &objectiveChange, bool fullRecompute)

  The duals are updated by the given arrays.
- void updateDualsInValuesPass (CoinIndexedVector ∗rowArray, CoinIndexedVector ∗columnArray, double theta)

  The duals are updated by the given arrays.
- void flipBounds (CoinIndexedVector ∗rowArray, CoinIndexedVector ∗columnArray)

  While updateDualsInDual sees what effect is of flip this does actual flipping.
- double dualColumn (CoinIndexedVector ∗rowArray, CoinIndexedVector ∗columnArray, CoinIndexedVector ∗spareArray, CoinIndexedVector ∗spareArray2, double accpetablePivot, CoinBigIndex ∗dubiousWeights)

  Row array has row part of pivot row Column array has column part.
- int dualColumn0 (const CoinIndexedVector ∗rowArray, const CoinIndexedVector ∗columnArray, CoinIndexedVector ∗spareArray, double acceptablePivot, double &upperReturn, double &bestReturn, double &badFree)

  Does first bit of dualColumn.
- void checkPossibleValuesMove (CoinIndexedVector ∗rowArray, CoinIndexedVector ∗columnArray, double acceptablePivot)

  Row array has row part of pivot row Column array has column part.
- void checkPossibleCleanup (CoinIndexedVector ∗rowArray, CoinIndexedVector ∗columnArray, double acceptablePivot)

  Row array has row part of pivot row Column array has column part.
- void doEasyOnesInValuesPass (double ∗givenReducedCosts)

  This sees if we can move duals in dual values pass.
- void dualRow (int alreadyChosen)

  Chooses dual pivot row Would be faster with separate region to scan and will have this (with square of infeasibility) when steepest For easy problems we can just choose one of the first rows we look at.
- int changeBounds (int initialize, CoinIndexedVector ∗outputArray, double &changeCost)

  Checks if any fake bounds active - if so returns number and modifies updatedDualBound_- and everything.
- bool changeBound (int iSequence)

  As changeBounds but just changes new bounds for a single variable.

- void originalBound (int iSequence)

  Restores bound to original bound.
- int checkUnbounded (CoinIndexedVector ∗ray, CoinIndexedVector ∗spare, double changeCost)

  Checks if tentative optimal actually means unbounded in dual Returns -3 if not, 2 if is unbounded.
- void statusOfProblemInDual (int &lastCleaned, int type, double ∗givenDjs, ClpDataSave &saveData, int ifValuesPass)

  Refactorizes if necessary Checks if finished.
- int perturb ()

  Perturbs problem (method depends on perturbation()) returns nonzero if should go to dual.
- int fastDual (bool alwaysFinish=false)

  Fast iterations.
- int numberAtFakeBound ()

  Checks number of variables at fake bounds.
- int pivotResult ()

  Pivot in a variable and choose an outgoing one.
- int nextSuperBasic ()

  Get next free , -1 if none.
- int startupSolve (int ifValuesPass, double ∗saveDuals, int startFinishOptions)

  Startup part of dual (may be extended to other algorithms) returns 0 if good, 1 if bad.
- void **finishSolve** (int startFinishOptions)
- void **gutsOfDual** (int ifValuesPass, double ∗&saveDuals, int initialStatus, ClpDataSave &saveData)
- void **resetFakeBounds** (int type)

3.54.1 Detailed Description

This solves LPs using the dual simplex method.

It inherits from ClpSimplex. It has no data of its own and is never created - only cast from a ClpSimplex object at algorithm time.

Definition at line 23 of file ClpSimplexDual.hpp.

3.54.2 Member Function Documentation

3.54.2.1 int ClpSimplexDual::dual (int *ifValuesPass*, int *startFinishOptions* = 0)

Dual algorithm.

Method

It tries to be a single phase approach with a weight of 1.0 being given to getting optimal and a weight of updatedDualBound_ being given to getting dual feasible. In this version I have used the idea that this weight can be thought of as a fake bound. If the distance between the lower and upper bounds on a variable is less than the feasibility weight then we are always better off flipping to other bound to make dual feasible. If the distance is greater then we make up a fake bound updatedDualBound_ away from one bound. If we end up optimal or primal infeasible, we check to see if bounds okay. If so we have finished, if not we increase updatedDualBound_ and continue (after checking if unbounded). I am undecided about free variables - there is coding but I am not sure about it. At present I put them in basis anyway.

The code is designed to take advantage of sparsity so arrays are seldom zeroed out from scratch or gone over in their entirety. The only exception is a full scan to find outgoing variable for Dantzig row choice. For steepest edge we keep an updated list of infeasibilities (actually squares). On easy problems we don't need full scan - just pick first reasonable.

One problem is how to tackle degeneracy and accuracy. At present I am using the modification of costs which I put in OSL and some of what I think is the dual analog of Gill et al. I am still not sure of the exact details.

The flow of dual is three while loops as follows:

while (not finished) {

while (not clean solution) {

Factorize and/or clean up solution by flipping variables so dual feasible. If looks finished check fake dual bounds. Repeat until status is iterating (-1) or finished (0,1,2)

}

while (status==-1) {

Iterate until no pivot in or out or time to re-factorize.

Flow is:

choose pivot row (outgoing variable). if none then we are primal feasible so looks as if done but we need to break and check bounds etc.

Get pivot row in tableau

Choose incoming column. If we don't find one then we look primal infeasible so break and check bounds etc. (Also the pivot tolerance is larger after any iterations so that may be reason)

If we do find incoming column, we may have to adjust costs to keep going forwards (anti-degeneracy). Check pivot will be stable and if unstable throw away iteration and break to re-factorize. If minor error re-factorize after iteration.

Update everything (this may involve flipping variables to stay dual feasible.

}

}

TODO's (or maybe not)

At present we never check we are going forwards. I overdid that in OSL so will try and make a last resort.

Needs partial scan pivot out option.

May need other anti-degeneracy measures, especially if we try and use loose tolerances as a way to solve in fewer iterations.

I like idea of dynamic scaling. This gives opportunity to decouple different implications of scaling for accuracy, iteration count and feasibility tolerance.

for use of exotic parameter startFinishoptions see Clpsimplex.hpp

Reimplemented from ClpSimplex.

3.54.2.2 int ClpSimplexDual::strongBranching (int *numberVariables*, const int ∗ *variables*, double ∗ *newLower*, double ∗ *newUpper*, double ∗∗ *outputSolution*, int ∗ *outputStatus*, int ∗ *outputIterations*, bool *stopOnFirstInfeasible* = true, bool *alwaysFinish* = false, int *startFinishOptions* = 0)

For strong branching.

On input lower and upper are new bounds while on output they are change in objective function values (>1.0e50 infeasible). Return code is 0 if nothing interesting, -1 if infeasible both ways and +1 if infeasible one way (check values to see which one(s)) Solutions are filled in as well - even down, odd up - also status and number of iterations

Reimplemented from ClpSimplex.

3.54.2.3 int ClpSimplexDual::whileIterating (double ∗& *givenPi*, int *ifValuesPass*)

This has the flow between re-factorizations Broken out for clarity and will be used by strong branching.

Reasons to come out: -1 iterations etc -2 inaccuracy -3 slight inaccuracy (and done iterations) +0 looks optimal (might be unbounded - but we will investigate) +1 looks infeasible +3 max iterations

If givenPi not NULL then in values pass

3.54.2.4 int ClpSimplexDual::updateDualsInDual (CoinIndexedVector ∗ *rowArray*, CoinIndexedVector ∗ *columnArray*, CoinIndexedVector ∗ *outputArray*, double *theta*, double & *objectiveChange*, bool *fullRecompute*)

The duals are updated by the given arrays.

Returns number of infeasibilities. After rowArray and columnArray will just have those which have been flipped. Variables may be flipped between bounds to stay dual feasible. The output vector has movement of primal solution (row length array)

3.54.2.5 void ClpSimplexDual::updateDualsInValuesPass (CoinIndexedVector ∗ *rowArray*, CoinIndexedVector ∗ *columnArray*, double *theta*)

The duals are updated by the given arrays.

This is in values pass - so no changes to primal is made

3.54.2.6 double ClpSimplexDual::dualColumn (CoinIndexedVector ∗ *rowArray*, CoinIndexedVector ∗ *columnArray*, CoinIndexedVector ∗ *spareArray*, CoinIndexedVector ∗ *spareArray2*, double *accpetablePivot*, CoinBigIndex ∗ *dubiousWeights*)

Row array has row part of pivot row Column array has column part.

This chooses pivot column. Spare arrays are used to save pivots which will go infeasible We will check for basic so spare array will never overflow. If necessary will modify costs For speed, we may need to go to a bucket approach when many variables are being flipped. Returns best possible pivot value

3.54.2.7 void ClpSimplexDual::checkPossibleValuesMove (CoinIndexedVector $*$ *rowArray*, CoinIndexedVector $*$ *columnArray*, double *acceptablePivot*)

Row array has row part of pivot row Column array has column part.

This sees what is best thing to do in dual values pass if sequenceIn==sequenceOut can change dual on chosen row and leave variable in basis

3.54.2.8 void ClpSimplexDual::checkPossibleCleanup (CoinIndexedVector $*$ *rowArray*, CoinIndexedVector $*$ *columnArray*, double *acceptablePivot*)

Row array has row part of pivot row Column array has column part.

This sees what is best thing to do in branch and bound cleanup If sequenceIn_ $<$ 0 then can't do anything

3.54.2.9 void ClpSimplexDual::doEasyOnesInValuesPass (double $*$ *givenReducedCosts*)

This sees if we can move duals in dual values pass.

This is done before any pivoting

3.54.2.10 void ClpSimplexDual::dualRow (int *alreadyChosen*)

Chooses dual pivot row Would be faster with separate region to scan and will have this (with square of infeasibility) when steepest For easy problems we can just choose one of the first rows we look at.

If alreadyChosen $>$=0 then in values pass and that row has been selected

3.54.2.11 int ClpSimplexDual::changeBounds (int *initialize*, CoinIndexedVector $*$ *outputArray*, double & *changeCost*)

Checks if any fake bounds active - if so returns number and modifies updatedDualBound_- and everything.

Free variables will be left as free Returns number of bounds changed if $>$=0 Returns -1 if not initialize and no effect Fills in changeVector which can be used to see if unbounded and cost of change vector If 2 sets to original (just changed)

3.54.2.12 bool ClpSimplexDual::changeBound (int *iSequence*)

As changeBounds but just changes new bounds for a single variable.

Returns true if change

3.54.2.13 void ClpSimplexDual::statusOfProblemInDual (int & *lastCleaned*, int *type*, double $*$ *givenDjs*, ClpDataSave & *saveData*, int *ifValuesPass*)

Refactorizes if necessary Checks if finished.

Updates status. lastCleaned refers to iteration at which some objective/feasibility cleaning too place.

type - 0 initial so set up save arrays etc

- 1 normal -if good update save

2 restoring from saved

3.54.2.14 int ClpSimplexDual::fastDual (bool *alwaysFinish* = `false`)

Fast iterations.

Misses out a lot of initialization. Normally stops on maximum iterations, first re-factorization or tentative optimum. If looks interesting then continues as normal. Returns 0 if finished properly, 1 otherwise.

3.54.2.15 int ClpSimplexDual::numberAtFakeBound ( )

Checks number of variables at fake bounds.

This is used by fastDual so can exit gracefully before end

3.54.2.16 int ClpSimplexDual::pivotResult ( )

Pivot in a variable and choose an outgoing one.

Assumes dual feasible - will not go through a reduced cost. Returns step length in theta Returns ray in ray_ (or NULL if no pivot) Return codes as before but -1 means no acceptable pivot

The documentation for this class was generated from the following file:

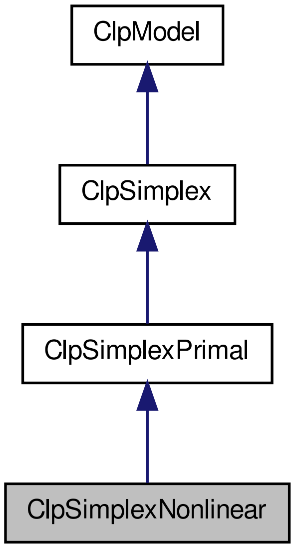
- ClpSimplexDual.hpp

3.55 ClpSimplexNonlinear Class Reference

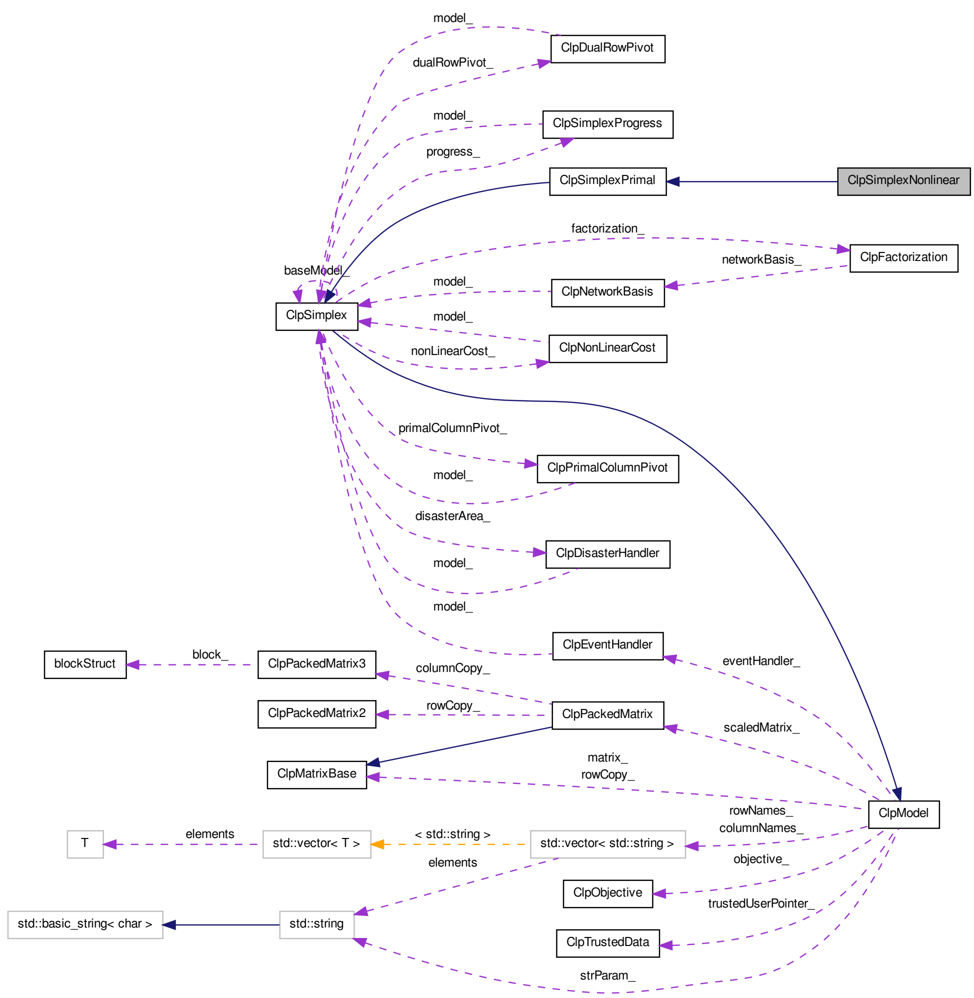
This solves non-linear LPs using the primal simplex method.

`#include <ClpSimplexNonlinear.hpp>`

Inheritance diagram for ClpSimplexNonlinear:



Collaboration diagram for ClpSimplexNonlinear:



Public Member Functions

Description of algorithm

- int primal ()

  Primal algorithms for reduced gradient At present we have two algorithms:
- int primalSLP (int numberPasses, double deltaTolerance)

  Primal algorithm for quadratic Using a semi-trust region approach as for pooling problem This is in because I have it lying around.
- int primalSLP (int numberConstraints, ClpConstraint $**$constraints, int numberPasses, double deltaTolerance)

Primal algorithm for nonlinear constraints Using a semi-trust region approach as for pooling problem This is in because I have it lying around.

- void directionVector (CoinIndexedVector ∗longArray, CoinIndexedVector ∗spare1, CoinIndexedVector ∗spare2, int mode, double &normFlagged, double &normUnflagged, int &numberNonBasic)

  Creates direction vector.
- int whileIterating (int &pivotMode)

  Main part.
- int pivotColumn (CoinIndexedVector ∗longArray, CoinIndexedVector ∗rowArray, CoinIndexedVector ∗columnArray, CoinIndexedVector ∗spare, int &pivotMode, double &solutionError, double ∗array1)

  longArray has direction pivotMode - 0 - use all dual infeasible variables 1 - largest dj while >= 10 trying startup phase Returns 0 - can do normal iteration (basis change) 1 - no basis change 2 - if wants singleton 3 - if time to re-factorize If sequenceIn_ >=0 then that will be incoming variable
- void statusOfProblemInPrimal (int &lastCleaned, int type, ClpSimplexProgress ∗progress, bool doFactorization, double &bestObjectiveWhenFlagged)

  Refactorizes if necessary Checks if finished.
- int pivotNonlinearResult ()

  Do last half of an iteration.

3.55.1 Detailed Description

This solves non-linear LPs using the primal simplex method.

It inherits from ClpSimplexPrimal. It has no data of its own and is never created - only cast from a ClpSimplexPrimal object at algorithm time. If needed create new class and pass around

Definition at line 28 of file ClpSimplexNonlinear.hpp.

3.55.2 Member Function Documentation

3.55.2.1 int ClpSimplexNonlinear::primal ( )

Primal algorithms for reduced gradient At present we have two algorithms:

A reduced gradient method.

3.55.2.2 int ClpSimplexNonlinear::primalSLP (int *numberPasses,* double *deltaTolerance*)

Primal algorithm for quadratic Using a semi-trust region approach as for pooling problem This is in because I have it lying around.

3.55.2.3 int ClpSimplexNonlinear::primalSLP (int *numberConstraints,* ClpConstraint ∗∗ *constraints,* int *numberPasses,* double *deltaTolerance*)

Primal algorithm for nonlinear constraints Using a semi-trust region approach as for pooling problem This is in because I have it lying around.

3.55.2.4 void ClpSimplexNonlinear::directionVector (CoinIndexedVector * *longArray*, CoinIndexedVector * *spare1*, CoinIndexedVector * *spare2*, int *mode*, double & *normFlagged*, double & *normUnflagged*, int & *numberNonBasic*)

Creates direction vector.

note longArray is long enough for rows and columns. If numberNonBasic 0 then is updated otherwise mode is ignored and those are used. Norms are only for those > 1.0e3*dualTolerance If mode is nonzero then just largest dj

3.55.2.5 void ClpSimplexNonlinear::statusOfProblemInPrimal (int & *lastCleaned*, int *type*, ClpSimplexProgress * *progress*, bool *doFactorization*, double & *bestObjectiveWhenFlagged*)

Refactorizes if necessary Checks if finished.

Updates status. lastCleaned refers to iteration at which some objective/feasibility cleaning too place.

type - 0 initial so set up save arrays etc

- 1 normal -if good update save

2 restoring from saved

3.55.2.6 int ClpSimplexNonlinear::pivotNonlinearResult ( )

Do last half of an iteration.

Return codes Reasons to come out normal mode -1 normal -2 factorize now - good iteration -3 slight inaccuracy - refactorize - iteration done -4 inaccuracy - refactorize - no iteration -5 something flagged - go round again +2 looks unbounded +3 max iterations (iteration done)

The documentation for this class was generated from the following file:

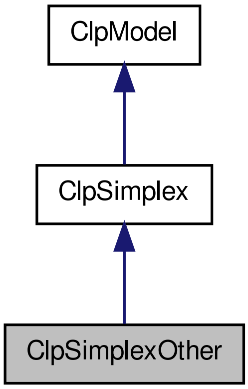
- ClpSimplexNonlinear.hpp

3.56 ClpSimplexOther Class Reference

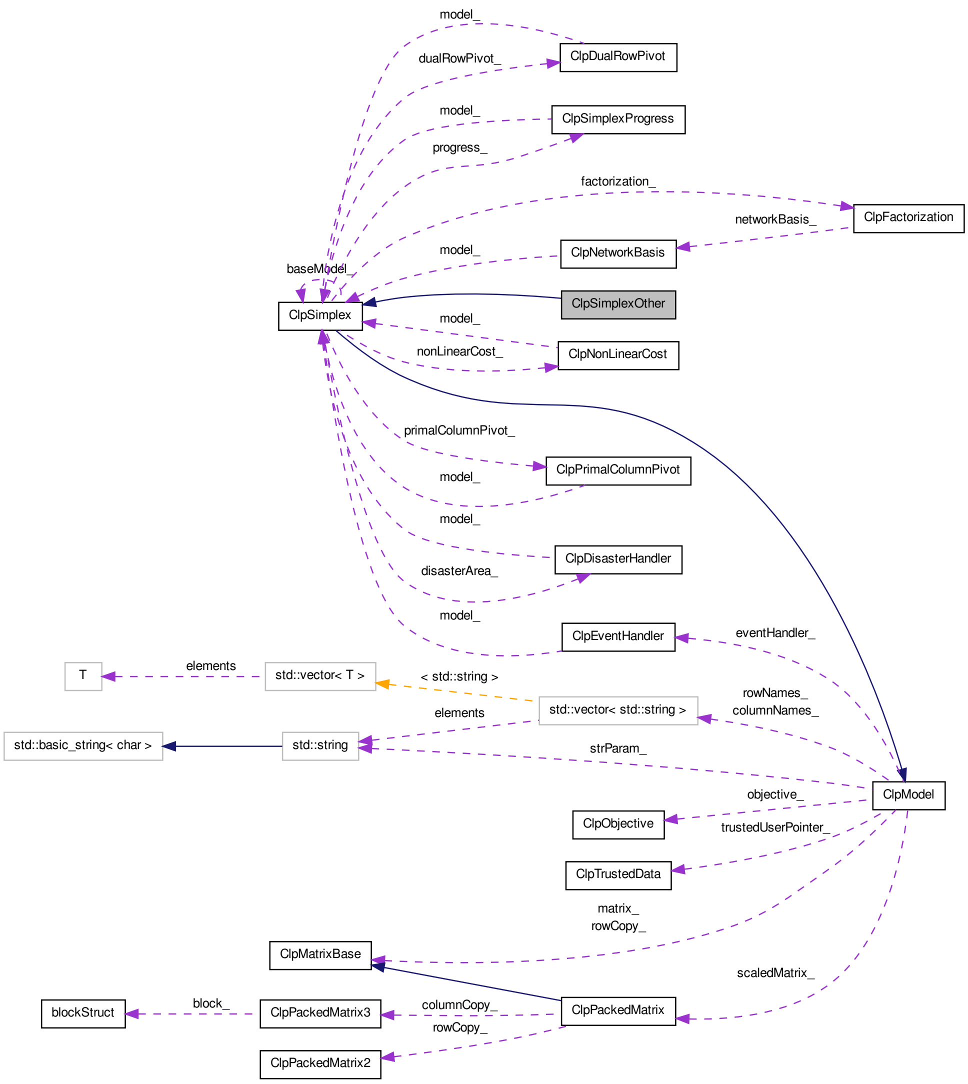
This is for Simplex stuff which is neither dual nor primal.

`#include <ClpSimplexOther.hpp>`

Inheritance diagram for ClpSimplexOther:



Collaboration diagram for ClpSimplexOther:



Methods

- void dualRanging (int numberCheck, const int ∗which, double ∗costIncrease, int ∗sequenceIncrease, double ∗costDecrease, int ∗sequenceDecrease, double ∗valueIncrease=NULL, double ∗valueDecrease=NULL)

    Dual ranging.
- void primalRanging (int numberCheck, const int ∗which, double ∗valueIncrease, int ∗sequenceIncrease, double ∗valueDecrease, int ∗sequenceDecrease)

Primal ranging.

- int parametrics (double startingTheta, double &endingTheta, double reportIncrement, const double *changeLowerBound, const double *changeUpperBound, const double *changeLowerRhs, const double *changeUpperRhs, const double *changeObjective)

  Parametrics This is an initial slow version.
- int parametrics (const char *dataFile)

  Version of parametrics which reads from file See CbcClpParam.cpp for details of format Returns -2 if unable to open file.
- int writeBasis (const char *filename, bool writeValues=false, int formatType=0) const

  Write the basis in MPS format to the specified file.
- int readBasis (const char *filename)

  Read a basis from the given filename.
- ClpSimplex * dualOfModel (double fractionRowRanges=1.0, double fractionColumnRanges=1.0) const

  Creates dual of a problem if looks plausible (defaults will always create model) fractionRowRanges is fraction of rows allowed to have ranges fractionColumnRanges is fraction of columns allowed to have ranges.
- int restoreFromDual (const ClpSimplex *dualProblem)

  Restores solution from dualized problem non-zero return code indicates minor problems.
- ClpSimplex * crunch (double *rhs, int *whichRows, int *whichColumns, int &nBound, bool moreBounds=false, bool tightenBounds=false)

  Does very cursory presolve.
- void afterCrunch (const ClpSimplex &small, const int *whichRows, const int *whichColumns, int nBound)

  After very cursory presolve.
- ClpSimplex * gubVersion (int *whichRows, int *whichColumns, int neededGub, int factorizationFrequency=50)

  Returns gub version of model or NULL whichRows has to be numberRows whichColumns has to be numberRows+numberColumns.
- void setGubBasis (ClpSimplex &original, const int *whichRows, const int *whichColumns)

  Sets basis from original.
- void getGubBasis (ClpSimplex &original, const int *whichRows, const int *whichColumns) const

  Restores basis to original.
- void cleanupAfterPostsolve ()

  Quick try at cleaning up duals if postsolve gets wrong.
- int tightenIntegerBounds (double *rhsSpace)

  Tightens integer bounds - returns number tightened or -1 if infeasible.
- int expandKnapsack (int knapsackRow, int &numberOutput, double *buildObj, CoinBigIndex *buildStart, int *buildRow, double *buildElement, int reConstruct=-1) const

  Expands out all possible combinations for a knapsack If buildObj NULL then just computes space needed - returns number elements On entry numberOutput is maximum allowed, on exit it is number needed or.

3.56.1 Detailed Description

This is for Simplex stuff which is neither dual nor primal.

It inherits from ClpSimplex. It has no data of its own and is never created - only cast from a ClpSimplex object at algorithm time.

Definition at line 23 of file ClpSimplexOther.hpp.

3.56.2 Member Function Documentation

3.56.2.1 void ClpSimplexOther::dualRanging (int *numberCheck*, const int ∗ *which*, double ∗ *costIncrease*, int ∗ *sequenceIncrease*, double ∗ *costDecrease*, int ∗ *sequenceDecrease*, double ∗ *valueIncrease* = NULL, double ∗ *valueDecrease* = NULL)

Dual ranging.

This computes increase/decrease in cost for each given variable and corresponding sequence numbers which would change basis. Sequence numbers are 0..numberColumns and numberColumns.. for artificials/slacks. For non-basic variables the information is trivial to compute and the change in cost is just minus the reduced cost and the sequence number will be that of the non-basic variables. For basic variables a ratio test is between the reduced costs for non-basic variables and the row of the tableau corresponding to the basic variable. The increase/decrease value is always $>=$ 0.0

Up to user to provide correct length arrays where each array is of length numberCheck. which contains list of variables for which information is desired. All other arrays will be filled in by function. If fifth entry in which is variable 7 then fifth entry in output arrays will be information for variable 7.

If valueIncrease/Decrease not NULL (both must be NULL or both non NULL) then these are filled with the value of variable if such a change in cost were made (the existing bounds are ignored)

When here - guaranteed optimal

Reimplemented from ClpSimplex.

3.56.2.2 void ClpSimplexOther::primalRanging (int *numberCheck*, const int ∗ *which*, double ∗ *valueIncrease*, int ∗ *sequenceIncrease*, double ∗ *valueDecrease*, int ∗ *sequenceDecrease*)

Primal ranging.

This computes increase/decrease in value for each given variable and corresponding sequence numbers which would change basis. Sequence numbers are 0..numberColumns and numberColumns.. for artificials/slacks. This should only be used for non-basic variabls as otherwise information is pretty useless For basic variables the sequence number will be that of the basic variables.

Up to user to provide correct length arrays where each array is of length numberCheck. which contains list of variables for which information is desired. All other arrays will be filled in by function. If fifth entry in which is variable 7 then fifth entry in output arrays will be information for variable 7.

When here - guaranteed optimal

Reimplemented from ClpSimplex.

3.56.2.3 int ClpSimplexOther::parametrics (double *startingTheta,* double & *endingTheta,* double *reportIncrement,* const double ∗ *changeLowerBound,* const double ∗ *changeUpperBound,* const double ∗ *changeLowerRhs,* const double ∗ *changeUpperRhs,* const double ∗ *changeObjective*)

Parametrics This is an initial slow version.

The code uses current bounds + theta ∗ change (if change array not NULL) and similarly for objective. It starts at startingTheta and returns ending theta in endingTheta. If reportIncrement 0.0 it will report on any movement If reportIncrement >0.0 it will report at startingTheta+k∗reportIncrement. If it can not reach input endingTheta return code will be 1 for infeasible, 2 for unbounded, if error on ranges -1, otherwise 0. Normal report is just theta and objective but if event handler exists it may do more On exit endingTheta is maximum reached (can be used for next startingTheta)

3.56.2.4 int ClpSimplexOther::writeBasis (const char ∗ *filename,* bool *writeValues* = `false`, int *formatType* = `0`) const

Write the basis in MPS format to the specified file.

If writeValues true writes values of structurals (and adds VALUES to end of NAME card)

Row and column names may be null. formatType is

- 0 - normal
- 1 - extra accuracy
- 2 - IEEE hex (later)

Returns non-zero on I/O error

Reimplemented from ClpSimplex.

3.56.2.5 ClpSimplex∗ ClpSimplexOther::crunch (double ∗ *rhs,* int ∗ *whichRows,* int ∗ *whichColumns,* int & *nBound,* bool *moreBounds* = `false`, bool *tightenBounds* = `false`)

Does very cursory presolve.

rhs is numberRows, whichRows is 3∗numberRows and whichColumns is 2∗numberColumns.

3.56.2.6 void ClpSimplexOther::afterCrunch (const ClpSimplex & *small,* const int ∗ *whichRows,* const int ∗ *whichColumns,* int *nBound*)

After very cursory presolve.

rhs is numberRows, whichRows is 3∗numberRows and whichColumns is 2∗numberColumns.

3.56.2.7 int ClpSimplexOther::expandKnapsack (int *knapsackRow,* int & *numberOutput,* double * *buildObj,* CoinBigIndex * *buildStart,* int * *buildRow,* double * *buildElement,* int *reConstruct* = `-1`) const

Expands out all possible combinations for a knapsack If buildObj NULL then just computes space needed - returns number elements On entry numberOutput is maximum allowed, on exit it is number needed or.

-1 (as will be number elements) if maximum exceeded. numberOutput will have at least space to return values which reconstruct input. Rows returned will be original rows but no entries will be returned for any rows all of whose entries are in knapsack. So up to user to allow for this. If reConstruct >=0 then returns number of entrie which make up item "reConstruct" in expanded knapsack. Values in buildRow and buildElement;

The documentation for this class was generated from the following file:

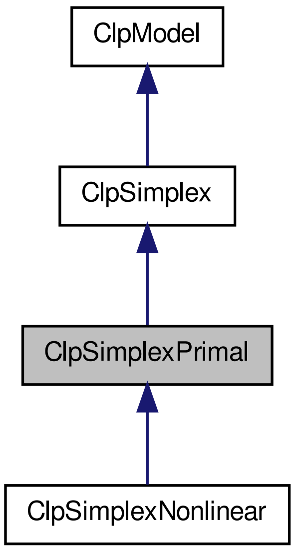
- ClpSimplexOther.hpp

3.57 ClpSimplexPrimal Class Reference

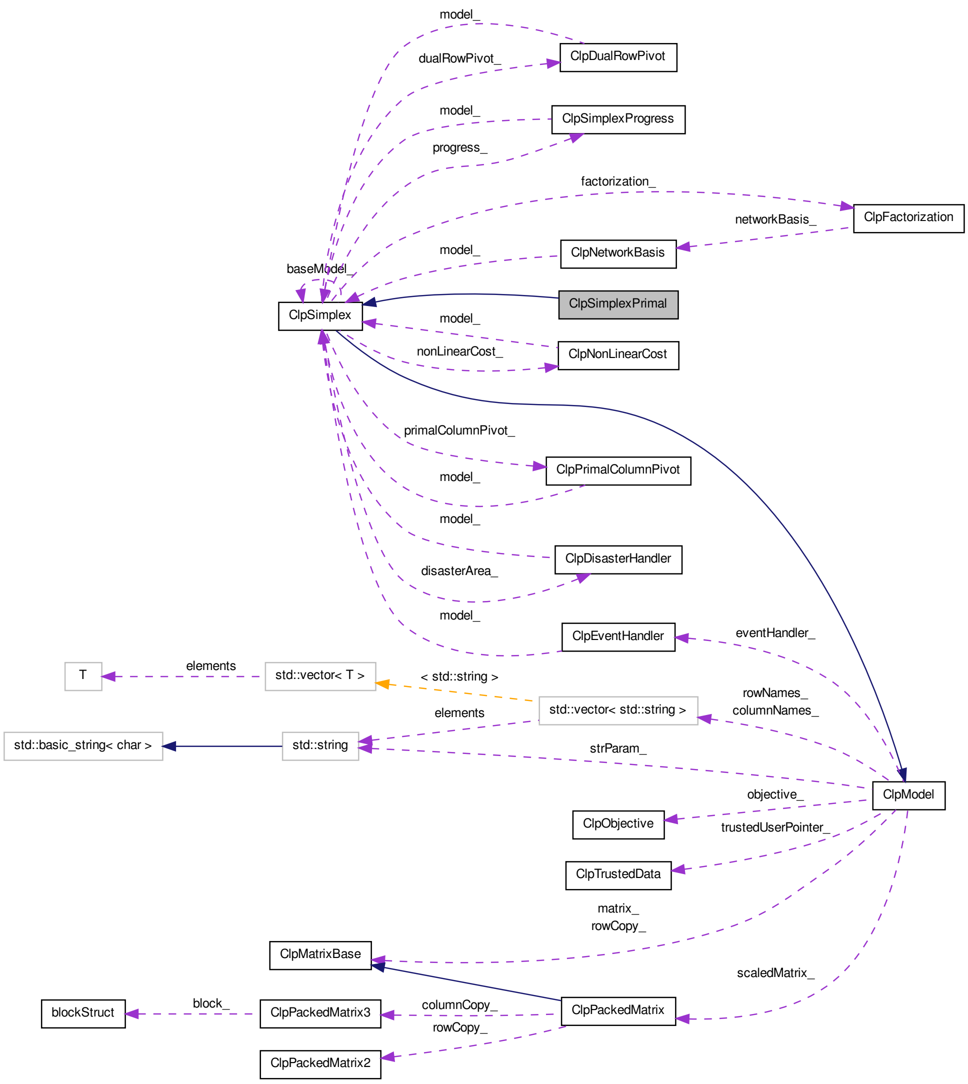
This solves LPs using the primal simplex method.

`#include <ClpSimplexPrimal.hpp>`

Inheritance diagram for ClpSimplexPrimal:



Collaboration diagram for ClpSimplexPrimal:



Public Member Functions

Description of algorithm

- int primal (int ifValuesPass=0, int startFinishOptions=0)
  Primal algorithm.

For advanced users

- void alwaysOptimal (bool onOff)
  Do not change infeasibility cost and always say optimal.
- bool **alwaysOptimal** () const
- void exactOutgoing (bool onOff)
  Normally outgoing variables can go out to slightly negative values (but within tolerance) - this is to help stability and and degeneracy.
- bool **exactOutgoing** () const

Functions used in primal

- int whileIterating (int valuesOption)
  This has the flow between re-factorizations.
- int pivotResult (int ifValuesPass=0)
  Do last half of an iteration.
- int updatePrimalsInPrimal (CoinIndexedVector ∗rowArray, double theta, double &objectiveChange, int valuesPass)
  The primals are updated by the given array.
- void primalRow (CoinIndexedVector ∗rowArray, CoinIndexedVector ∗rhsArray, CoinIndexedVector ∗spareArray, int valuesPass)
  Row array has pivot column This chooses pivot row.
- void primalColumn (CoinIndexedVector ∗updateArray, CoinIndexedVector ∗spareRow1, CoinIndexedVector ∗spareRow2, CoinIndexedVector ∗spareColumn1, CoinIndexedVector ∗spareColumn2)
  Chooses primal pivot column updateArray has cost updates (also use pivotRow_ from last iteration) Would be faster with separate region to scan and will have this (with square of infeasibility) when steepest For easy problems we can just choose one of the first columns we look at.
- int checkUnbounded (CoinIndexedVector ∗ray, CoinIndexedVector ∗spare, double changeCost)
  Checks if tentative optimal actually means unbounded in primal Returns -3 if not, 2 if is unbounded.
- void statusOfProblemInPrimal (int &lastCleaned, int type, ClpSimplexProgress ∗progress, bool doFactorization, int ifValuesPass, ClpSimplex ∗saveModel=NULL)
  Refactorizes if necessary Checks if finished.
- void perturb (int type)
  Perturbs problem (method depends on perturbation())
- bool unPerturb ()
  Take off effect of perturbation and say whether to try dual.
- int unflag ()
  Unflag all variables and return number unflagged.
- int nextSuperBasic (int superBasicType, CoinIndexedVector ∗columnArray)
  Get next superbasic -1 if none, Normal type is 1 If type is 3 then initializes sorted list if 2 uses list.
- void primalRay (CoinIndexedVector ∗rowArray)
  Create primal ray.
- void clearAll ()
  Clears all bits and clears rowArray[1] etc.
- int lexSolve ()
  Sort of lexicographic resolve.

3.57.1 Detailed Description

This solves LPs using the primal simplex method.

It inherits from ClpSimplex. It has no data of its own and is never created - only cast from a ClpSimplex object at algorithm time.

Definition at line 23 of file ClpSimplexPrimal.hpp.

3.57.2 Member Function Documentation

3.57.2.1 int ClpSimplexPrimal::primal (int *ifValuesPass* = 0, int *startFinishOptions* = 0)

Primal algorithm.

Method

It tries to be a single phase approach with a weight of 1.0 being given to getting optimal and a weight of infeasibilityCost_ being given to getting primal feasible. In this version I have tried to be clever in a stupid way. The idea of fake bounds in dual seems to work so the primal analogue would be that of getting bounds on reduced costs (by a presolve approach) and using these for being above or below feasible region. I decided to waste memory and keep these explicitly. This allows for non-linear costs! I have not tested non-linear costs but will be glad to do something if a reasonable example is provided.

The code is designed to take advantage of sparsity so arrays are seldom zeroed out from scratch or gone over in their entirety. The only exception is a full scan to find incoming variable for Dantzig row choice. For steepest edge we keep an updated list of dual infeasibilities (actually squares). On easy problems we don't need full scan - just pick first reasonable. This method has not been coded.

One problem is how to tackle degeneracy and accuracy. At present I am using the modification of costs which I put in OSL and which was extended by Gill et al. I am still not sure whether we will also need explicit perturbation.

The flow of primal is three while loops as follows:

while (not finished) {

while (not clean solution) {

Factorize and/or clean up solution by changing bounds so primal feasible. If looks finished check fake primal bounds. Repeat until status is iterating (-1) or finished (0,1,2)

}

while (status==-1) {

Iterate until no pivot in or out or time to re-factorize.

Flow is:

choose pivot column (incoming variable). if none then we are primal feasible so looks as if done but we need to break and check bounds etc.

Get pivot column in tableau

Choose outgoing row. If we don't find one then we look primal unbounded so break and check bounds etc. (Also the pivot tolerance is larger after any iterations so that may be reason)

If we do find outgoing row, we may have to adjust costs to keep going forwards (anti-degeneracy). Check pivot will be stable and if unstable throw away iteration and break to re-factorize. If minor error re-factorize after iteration.

Update everything (this may involve changing bounds on variables to stay primal feasible.

}

}

TODO's (or maybe not)

At present we never check we are going forwards. I overdid that in OSL so will try and make a last resort.

Needs partial scan pivot in option.

May need other anti-degeneracy measures, especially if we try and use loose tolerances as a way to solve in fewer iterations.

I like idea of dynamic scaling. This gives opportunity to decouple different implications of scaling for accuracy, iteration count and feasibility tolerance.

for use of exotic parameter startFinishoptions see Clpsimplex.hpp

Reimplemented from ClpSimplex.

3.57.2.2 void ClpSimplexPrimal::exactOutgoing (bool *onOff*)

Normally outgoing variables can go out to slightly negative values (but within tolerance) - this is to help stability and and degeneracy.

This can be switched off

3.57.2.3 int ClpSimplexPrimal::whileIterating (int *valuesOption*)

This has the flow between re-factorizations.

Returns a code to say where decision to exit was made Problem status set to:

-2 re-factorize -4 Looks optimal/infeasible -5 Looks unbounded +3 max iterations

valuesOption has original value of valuesPass

3.57.2.4 int ClpSimplexPrimal::pivotResult (int *ifValuesPass* = 0)

Do last half of an iteration.

This is split out so people can force incoming variable. If solveType_ is 2 then this may re-factorize while normally it would exit to re-factorize. Return codes Reasons to come out (normal mode/user mode): -1 normal -2 factorize now - good iteration/ NA -3 slight inaccuracy - refactorize - iteration done/ same but factor done -4 inaccuracy - refactorize - no iteration/ NA -5 something flagged - go round again/ pivot not possible +2 looks unbounded +3 max iterations (iteration done)

With solveType_ ==2 this should Pivot in a variable and choose an outgoing one. Assumes primal feasible - will not go through a bound. Returns step length in theta Returns ray in ray_

3.57.2.5 int ClpSimplexPrimal::updatePrimalsInPrimal (CoinIndexedVector ∗ *rowArray,* double *theta,* double & *objectiveChange,* int *valuesPass*)

The primals are updated by the given array.

Returns number of infeasibilities. After rowArray will have cost changes for use next iteration

3.57.2.6 void ClpSimplexPrimal::primalRow (CoinIndexedVector ∗ *rowArray,* CoinIndexedVector ∗ *rhsArray,* CoinIndexedVector ∗ *spareArray,* int *valuesPass*)

Row array has pivot column This chooses pivot row.

Rhs array is used for distance to next bound (for speed) For speed, we may need to go to a bucket approach when many variables go through bounds If valuesPass non-zero then compute dj for direction

3.57.2.7 void ClpSimplexPrimal::statusOfProblemInPrimal (int & *lastCleaned,* int *type,* ClpSimplexProgress ∗ *progress,* bool *doFactorization,* int *ifValuesPass,* ClpSimplex ∗ *saveModel =* `NULL`)

Refactorizes if necessary Checks if finished.

Updates status. lastCleaned refers to iteration at which some objective/feasibility cleaning too place.

type - 0 initial so set up save arrays etc

- 1 normal -if good update save

2 restoring from saved saveModel is normally NULL but may not be if doing Sprint

The documentation for this class was generated from the following file:

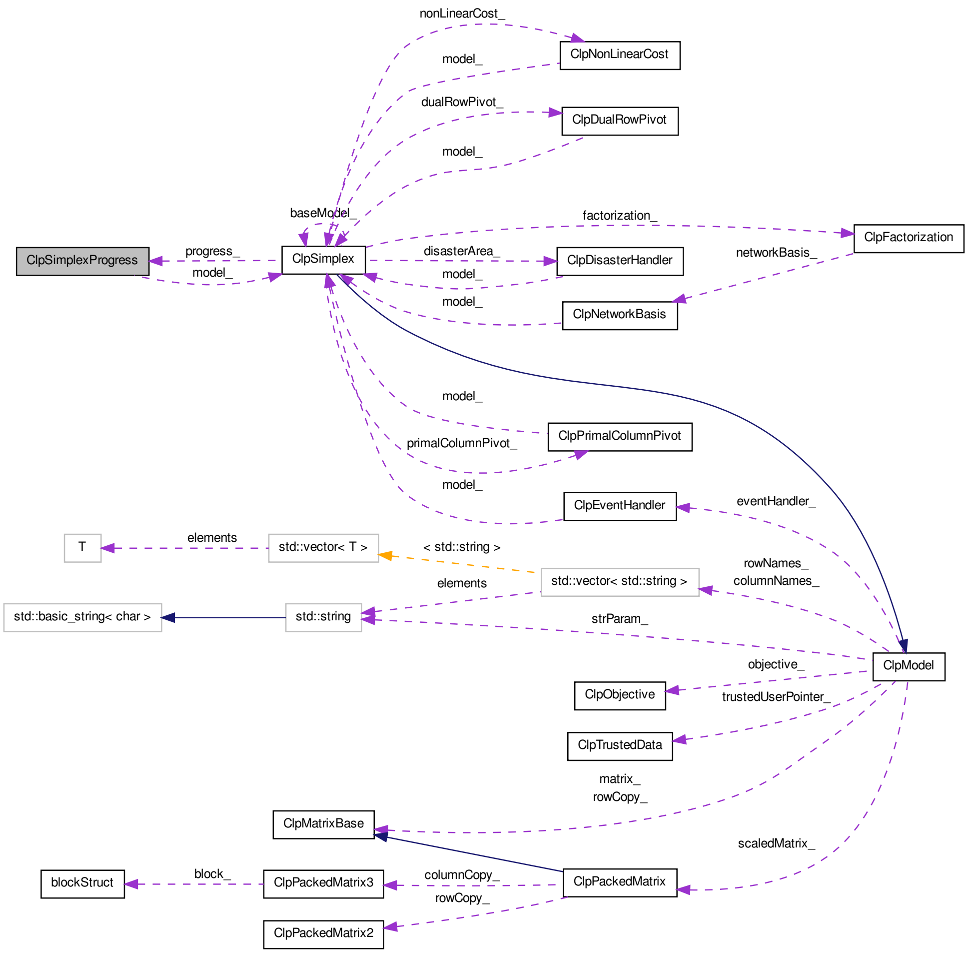
- ClpSimplexPrimal.hpp

3.58 ClpSimplexProgress Class Reference

For saving extra information to see if looping.

`#include <ClpSolve.hpp>`

Collaboration diagram for ClpSimplexProgress:



Public Member Functions

Constructors and destructor and copy

- ClpSimplexProgress ()

  Default constructor.
- ClpSimplexProgress (ClpSimplex ∗model)

  Constructor from model.
- ClpSimplexProgress (const ClpSimplexProgress &)

  Copy constructor.
- ClpSimplexProgress & operator= (const ClpSimplexProgress &rhs)

  Assignment operator. This copies the data.

- ∼ClpSimplexProgress ()

  Destructor.
- void reset ()

  Resets as much as possible.
- void fillFromModel (ClpSimplex ∗model)

  Fill from model.

Check progress

- int looping ()

  Returns -1 if okay, -n+1 (n number of times bad) if bad but action taken, >=0 if give up and use as problem status.
- void startCheck ()

  Start check at beginning of whileIterating.
- int cycle (int in, int out, int wayIn, int wayOut)

  Returns cycle length in whileIterating.
- double lastObjective (int back=1) const

  Returns previous objective (if -1) - current if (0)
- void setInfeasibility (double value)

  Set real primal infeasibility and move back.
- double lastInfeasibility (int back=1) const

  Returns real primal infeasibility (if -1) - current if (0)
- void modifyObjective (double value)

  Modify objective e.g. if dual infeasible in dual.
- int lastIterationNumber (int back=1) const

  Returns previous iteration number (if -1) - current if (0)
- void clearIterationNumbers ()

  clears all iteration numbers (to switch off panic)
- void newOddState ()

  Odd state.
- void **endOddState** ()
- void **clearOddState** ()
- int **oddState** () const
- int badTimes () const

  number of bad times
- void **clearBadTimes** ()
- int reallyBadTimes () const

  number of really bad times
- void **incrementReallyBadTimes** ()
- int timesFlagged () const

  number of times flagged
- void **clearTimesFlagged** ()
- void **incrementTimesFlagged** ()

Public Attributes

Data

- double objective_ [CLP_PROGRESS]

Objective values.
- double infeasibility_ [CLP_PROGRESS]
  Sum of infeasibilities for algorithm.
- double realInfeasibility_ [CLP_PROGRESS]
  Sum of real primal infeasibilities for primal.
- double initialWeight_
  Initial weight for weights.
- int in_ [CLP_CYCLE]
  For cycle checking.
- int **out_** [CLP_CYCLE]
- char **way_** [CLP_CYCLE]
- ClpSimplex ∗ model_
  Pointer back to model so we can get information.
- int numberInfeasibilities_ [CLP_PROGRESS]
  Number of infeasibilities.
- int iterationNumber_ [CLP_PROGRESS]
  Iteration number at which occurred.
- int numberTimes_
  Number of times checked (so won't stop too early)
- int numberBadTimes_
  Number of times it looked like loop.
- int numberReallyBadTimes_
  Number really bad times.
- int numberTimesFlagged_
  Number of times no iterations as flagged.
- int oddState_
  If things are in an odd state.

3.58.1 Detailed Description

For saving extra information to see if looping.

Definition at line 244 of file ClpSolve.hpp.

The documentation for this class was generated from the following file:

- ClpSolve.hpp

3.59 ClpSolve Class Reference

This is a very simple class to guide algorithms.

`#include <ClpSolve.hpp>`

Public Types

- enum SolveType
  enums for solve function

Public Member Functions

Constructors and destructor and copy

- ClpSolve ()

  Default constructor.
- ClpSolve (SolveType method, PresolveType presolveType, int numberPasses, int options[6], int extraInfo[6], int independentOptions[3])

  Constructor when you really know what you are doing.
- void generateCpp (FILE ∗fp)

  Generates code for above constructor.
- ClpSolve (const ClpSolve &)

  Copy constructor.
- ClpSolve & operator= (const ClpSolve &rhs)

  Assignment operator. This copies the data.
- ∼ClpSolve ()

  Destructor.

Functions most useful to user

- void setSpecialOption (int which, int value, int extraInfo=-1)

  Special options - bits 0 4 - use crash (default allslack in dual, idiot in primal) 8 - all slack basis in primal 2 16 - switch off interrupt handling 3 32 - do not try and make plus minus one matrix 64 - do not use sprint even if problem looks good.
- int **getSpecialOption** (int which) const
- void setSolveType (SolveType method, int extraInfo=-1)

  Solve types.
- SolveType **getSolveType** ()
- void **setPresolveType** (PresolveType amount, int extraInfo=-1)
- PresolveType **getPresolveType** ()
- int **getPresolvePasses** () const
- int getExtraInfo (int which) const

  Extra info for idiot (or sprint)
- void setInfeasibleReturn (bool trueFalse)

  Say to return at once if infeasible, default is to solve.
- bool **infeasibleReturn** () const
- bool doDual () const

  Whether we want to do dual part of presolve.
- void **setDoDual** (bool doDual_)
- bool doSingleton () const

  Whether we want to do singleton part of presolve.
- void **setDoSingleton** (bool doSingleton_)
- bool doDoubleton () const

  Whether we want to do doubleton part of presolve.
- void **setDoDoubleton** (bool doDoubleton_)
- bool doTripleton () const

  Whether we want to do tripleton part of presolve.
- void **setDoTripleton** (bool doTripleton_)
- bool doTighten () const

  Whether we want to do tighten part of presolve.

- void **setDoTighten** (bool doTighten_)
- bool doForcing () const

    Whether we want to do forcing part of presolve.
- void **setDoForcing** (bool doForcing_)
- bool doImpliedFree () const

    Whether we want to do impliedfree part of presolve.
- void **setDoImpliedFree** (bool doImpliedfree)
- bool doDupcol () const

    Whether we want to do dupcol part of presolve.
- void **setDoDupcol** (bool doDupcol_)
- bool doDuprow () const

    Whether we want to do duprow part of presolve.
- void **setDoDuprow** (bool doDuprow_)
- bool doSingletonColumn () const

    Whether we want to do singleton column part of presolve.
- void **setDoSingletonColumn** (bool doSingleton_)
- int presolveActions () const

    Set whole group.
- void **setPresolveActions** (int action)
- int substitution () const

    Largest column for substitution (normally 3)
- void **setSubstitution** (int value)

3.59.1 Detailed Description

This is a very simple class to guide algorithms.

It is used to tidy up passing parameters to initialSolve and maybe for output from that

Definition at line 20 of file ClpSolve.hpp.

3.59.2 Member Function Documentation

3.59.2.1 void ClpSolve::setSpecialOption (int *which*, int *value*, int *extraInfo* = -1)

Special options - bits 0 4 - use crash (default allslack in dual, idiot in primal) 8 - all slack basis in primal 2 16 - switch off interrupt handling 3 32 - do not try and make plus minus one matrix 64 - do not use sprint even if problem looks good.

which translation is: which: 0 - startup in Dual (nothing if basis exists).: 0 - no basis 1 - crash 2 - use initiative about idiot! but no crash 1 - startup in Primal (nothing if basis exists): 0 - use initiative 1 - use crash 2 - use idiot and look at further info 3 - use sprint and look at further info 4 - use all slack 5 - use initiative but no idiot 6 - use initiative but no sprint 7 - use initiative but no crash 8 - do allslack or idiot 9 - do allslack or sprint 10 - slp before 11 - no nothing and primal(0) 2 - interrupt handling - 0 yes, 1 no (for threadsafe) 3 - whether to make +- 1matrix - 0 yes, 1 no 4 - for barrier 0 - dense cholesky 1 - Wssmp allowing some long columns 2 - Wssmp not allowing long columns 3 - Wssmp using KKT 4 - Using Florida ordering 8 - bit set to do scaling 16 - set to be aggressive with gamma/delta? 32 - Use KKT 5 - for presolve 1 - switch off dual stuff 6 - for detailed printout (initially just presolve) 1 - presolve statistics

The documentation for this class was generated from the following file:

- ClpSolve.hpp

3.60 ClpTrustedData Struct Reference

For a structure to be used by trusted code.

`#include <ClpParameters.hpp>`

3.60.1 Detailed Description

For a structure to be used by trusted code.

Definition at line 119 of file ClpParameters.hpp.

The documentation for this struct was generated from the following file:

- ClpParameters.hpp

3.61 ClpHashValue::CoinHashLink Struct Reference

Data.

`#include <ClpNode.hpp>`

3.61.1 Detailed Description

Data.

Definition at line 335 of file ClpNode.hpp.

The documentation for this struct was generated from the following file:

- ClpNode.hpp

3.62 Idiot Class Reference

This class implements a very silly algorithm.

`#include <Idiot.hpp>`

Public Member Functions

- void solve2 (CoinMessageHandler ∗handler, const CoinMessages ∗messages)
  Stuff for internal use.

Constructors and destructor

Just a pointer to model is kept

- Idiot ()
  Default constructor.
- Idiot (OsiSolverInterface &model)
  Constructor with model.
- Idiot (const Idiot &)
  Copy constructor.
- Idiot & operator= (const Idiot &rhs)
  Assignment operator. This copies the data.
- ∼Idiot ()
  Destructor.

Algorithmic calls

- void solve ()
  Get an approximate solution with the idiot code.
- void crash (int numberPass, CoinMessageHandler ∗handler, const CoinMessages ∗messages, bool doCrossover=true)
  Lightweight "crash".
- void crossOver (int mode)
  Use simplex to get an optimal solution mode is how many steps the simplex crossover should take to arrive to an extreme point: 0 - chosen,all ever used, all 1 - chosen, all 2 - all 3 - do not do anything - maybe basis + 16 do presolves.

Gets and sets of most useful data

- double getStartingWeight () const
  Starting weight - small emphasizes feasibility, default 1.0e-4.
- void **setStartingWeight** (double value)
- double getWeightFactor () const
  Weight factor - weight multiplied by this when changes, default 0.333.
- void **setWeightFactor** (double value)
- double getFeasibilityTolerance () const
  Feasibility tolerance - problem essentially feasible if individual infeasibilities less than this.
- void **setFeasibilityTolerance** (double value)
- double getReasonablyFeasible () const
  Reasonably feasible.
- void **setReasonablyFeasible** (double value)
- double getExitInfeasibility () const
  Exit infeasibility - exit if sum of infeasibilities less than this.
- void **setExitInfeasibility** (double value)
- int getMajorIterations () const
  Major iterations.
- void **setMajorIterations** (int value)
- int getMinorIterations () const
  Minor iterations.
- void **setMinorIterations** (int value)

- int **getMinorIterations0** () const
- void **setMinorIterations0** (int value)
- int getReduceIterations () const

  Reduce weight after this many major iterations.
- void **setReduceIterations** (int value)
- int getLogLevel () const

  Amount of information - default of 1 should be okay.
- void **setLogLevel** (int value)
- int getLightweight () const

  How lightweight - 0 not, 1 yes, 2 very lightweight.
- void **setLightweight** (int value)
- int getStrategy () const

  strategy
- void **setStrategy** (int value)
- double getDropEnoughFeasibility () const

  Fine tuning - okay if feasibility drop this factor.
- void **setDropEnoughFeasibility** (double value)
- double getDropEnoughWeighted () const

  Fine tuning - okay if weighted obj drop this factor.
- void **setDropEnoughWeighted** (double value)

3.62.1 Detailed Description

This class implements a very silly algorithm.

It has no merit apart from the fact that it gets an approximate solution to some classes of problems. Better if vaguely homogeneous. It works on problems where volume algorithm works and often gets a better primal solution but it has no dual solution.

It can also be used as a "crash" to get a problem started. This is probably its most useful function.

It is based on the idea that algorithms with terrible convergence properties may be okay at first. Throw in some random dubious tricks and the resulting code may be worth keeping as long as you don't look at it.

Definition at line 48 of file Idiot.hpp.

3.62.2 Member Function Documentation

3.62.2.1 double Idiot::getFeasibilityTolerance ( ) const [inline]

Feasibility tolerance - problem essentially feasible if individual infeasibilities less than this.

default 0.1

Definition at line 113 of file Idiot.hpp.

3.62.2.2 double Idiot::getReasonablyFeasible ( ) const [inline]

Reasonably feasible.

Dubious method concentrates more on objective when sum of infeasibilities less than this. Very dubious default value of (Number of rows)/20

Definition at line 122 of file Idiot.hpp.

3.62.2.3 double Idiot::getExitInfeasibility ( ) const [inline]

Exit infeasibility - exit if sum of infeasibilities less than this.

Default -1.0 (i.e. switched off)

Definition at line 130 of file Idiot.hpp.

3.62.2.4 int Idiot::getMajorIterations ( ) const [inline]

Major iterations.

stop after this number. Default 30. Use 2-5 for "crash" 50-100 for serious crunching

Definition at line 138 of file Idiot.hpp.

3.62.2.5 int Idiot::getMinorIterations ( ) const [inline]

Minor iterations.

Do this number of tiny steps before deciding whether to change weights etc. Default - dubious sqrt(Number of Rows). Good numbers 105 to 405 say (5 is dubious method of making sure idiot is not trying to be clever which it may do every 10 minor iterations)

Definition at line 150 of file Idiot.hpp.

3.62.2.6 int Idiot::getReduceIterations ( ) const [inline]

Reduce weight after this many major iterations.

It may get reduced before this but this is a maximum. Default 3. 3-10 plausible.

Definition at line 166 of file Idiot.hpp.

3.62.2.7 void Idiot::solve2 (CoinMessageHandler * *handler*, const CoinMessages * *messages*)

Stuff for internal use.

Does actual work

The documentation for this class was generated from the following file:

- Idiot.hpp

3.63 IdiotResult Struct Reference

for use internally

```
#include <Idiot.hpp>
```

3.63.1 Detailed Description

for use internally

Definition at line 22 of file Idiot.hpp.

The documentation for this struct was generated from the following file:

- Idiot.hpp

3.64 Info Struct Reference

******** DATA to be moved into protected section of ClpInterior

```
#include <ClpInterior.hpp>
```

3.64.1 Detailed Description

******** DATA to be moved into protected section of ClpInterior

Definition at line 27 of file ClpInterior.hpp.

The documentation for this struct was generated from the following file:

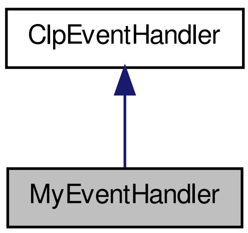
- ClpInterior.hpp

3.65 MyEventHandler Class Reference

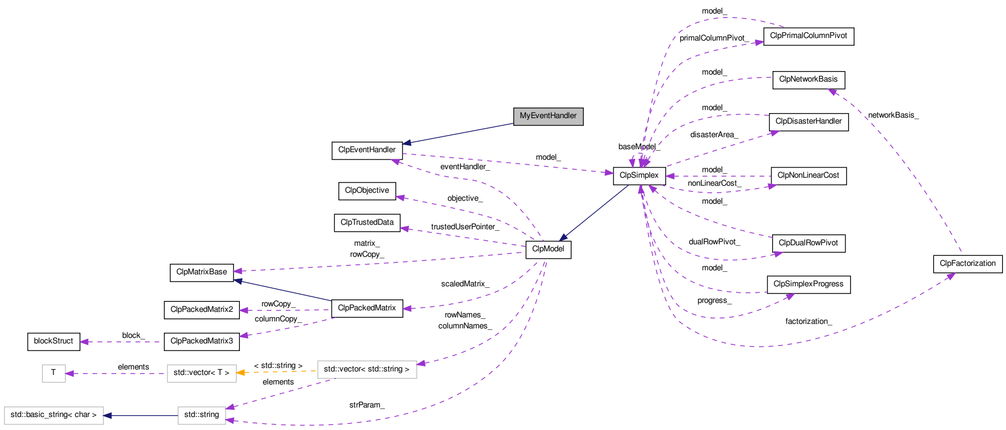
This is so user can trap events and do useful stuff.

```
#include <MyEventHandler.hpp>
```

Inheritance diagram for MyEventHandler:



Collaboration diagram for MyEventHandler:



Public Member Functions

Overrides

- virtual int event (Event whichEvent)

  This can do whatever it likes.

Constructors, destructor etc

- MyEventHandler ()

  Default constructor.
- MyEventHandler (ClpSimplex ∗model)

  Constructor with pointer to model (redundant as setEventHandler does)
- virtual ∼MyEventHandler ()

  Destructor.
- MyEventHandler (const MyEventHandler &rhs)

  The copy constructor.
- MyEventHandler & operator= (const MyEventHandler &rhs)

  Assignment.
- virtual ClpEventHandler ∗ clone () const

  Clone.

3.65.1 Detailed Description

This is so user can trap events and do useful stuff.

This is used in Clp/Test/unitTest.cpp

ClpSimplex model_ is available as well as anything else you care to pass in

Definition at line 18 of file MyEventHandler.hpp.

3.65.2 Constructor & Destructor Documentation

3.65.2.1 MyEventHandler::MyEventHandler ( )

Default constructor.

3.65.2.2 MyEventHandler::MyEventHandler (const **MyEventHandler** & *rhs*)

The copy constructor.

3.65.3 Member Function Documentation

3.65.3.1 virtual int MyEventHandler::event (**Event** *whichEvent*) `[virtual]`

This can do whatever it likes.

If return code -1 then carries on if 0 sets ClpModel::status() to 5 (stopped by event) and will return to user. At present if <-1 carries on and if >0 acts as if 0 - this may change. For ClpSolve 2 -> too big return status of -2 and -> too small 3

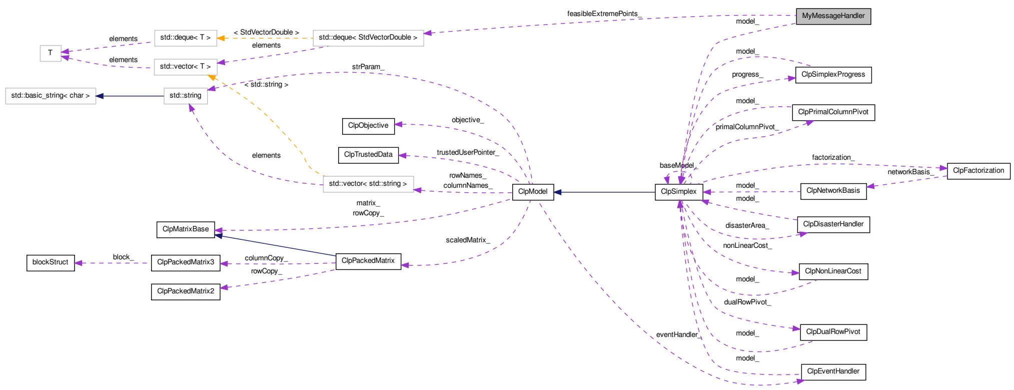
Reimplemented from ClpEventHandler.

The documentation for this class was generated from the following file:

- MyEventHandler.hpp

3.66 MyMessageHandler Class Reference

Collaboration diagram for MyMessageHandler:



Public Member Functions

Overrides

- virtual int **print** ()

set and get

- const ClpSimplex ∗ model () const

  Model.
- void **setModel** (ClpSimplex ∗model)
- const std::deque< StdVectorDouble > & getFeasibleExtremePoints () const

  Get queue of feasible extreme points.
- void clearFeasibleExtremePoints ()

  Empty queue of feasible extreme points.

Constructors, destructor

- MyMessageHandler ()

  Default constructor.
- MyMessageHandler (ClpSimplex ∗model, FILE ∗userPointer=NULL)

  Constructor with pointer to model.
- virtual ∼MyMessageHandler ()

  Destructor.

Copy method

- MyMessageHandler (const MyMessageHandler &)

  The copy constructor.
- MyMessageHandler (const CoinMessageHandler &)

  The copy constructor from an CoinSimplexMessageHandler.
- MyMessageHandler & **operator=** (const MyMessageHandler &)
- virtual CoinMessageHandler ∗ clone () const

  Clone.

Protected Attributes

Data members

The data members are protected to allow access for derived classes.

- ClpSimplex ∗ model_

  Pointer back to model.
- std::deque< StdVectorDouble > feasibleExtremePoints_

  Saved extreme points.
- int iterationNumber_

  Iteration number so won't do same one twice.

3.66.1 Detailed Description

Definition at line 28 of file MyMessageHandler.hpp.

3.66.2 Constructor & Destructor Documentation

3.66.2.1 MyMessageHandler::MyMessageHandler ( )

Default constructor.

3.66.2.2 MyMessageHandler::MyMessageHandler (const MyMessageHandler &)

The copy constructor.

3.66.2.3 MyMessageHandler::MyMessageHandler (const CoinMessageHandler &)

The copy constructor from an CoinSimplexMessageHandler.

The documentation for this class was generated from the following file:

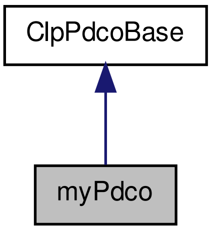
- MyMessageHandler.hpp

3.67 myPdco Class Reference

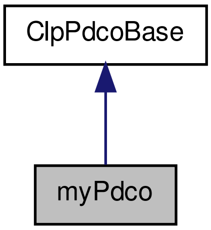
This implements a simple network matrix as derived from ClpMatrixBase.

`#include <myPdco.hpp>`

Inheritance diagram for myPdco:



Collaboration diagram for myPdco:



Public Member Functions

Useful methods

- virtual void **matVecMult** (ClpInterior ∗model, int mode, double ∗x, double ∗y) const
- virtual void **getGrad** (ClpInterior ∗model, CoinDenseVector< double > &x, CoinDenseVector< double > &grad) const
- virtual void **getHessian** (ClpInterior ∗model, CoinDenseVector< double > &x, CoinDenseVector< double > &H) const
- virtual double **getObj** (ClpInterior ∗model, CoinDenseVector< double > &x) const
- virtual void **matPrecon** (ClpInterior ∗model, double delta, double ∗x, double ∗y) const

Constructors, destructor

- myPdco ()
  Default constructor.
- myPdco (double d1, double d2, int numnodes, int numlinks)
  Constructor from Stuff.
- myPdco (ClpInterior &model, FILE ∗fpData, FILE ∗fpParam)
  Also reads a model.
- virtual ∼myPdco ()
  Destructor.

Copy method

- myPdco (const myPdco &)
  The copy constructor.
- myPdco & **operator=** (const myPdco &)
- virtual ClpPdcoBase ∗ clone () const
  Clone.

Protected Attributes

Data members

The data members are protected to allow access for derived classes.

- int ∗ **rowIndex_**
- int **numlinks_**
- int **numnodes_**

3.67.1 Detailed Description

This implements a simple network matrix as derived from ClpMatrixBase.

If you want more sophisticated version then you could inherit from this. Also you might want to allow networks with gain

Definition at line 19 of file myPdco.hpp.

3.67.2 Constructor & Destructor Documentation

3.67.2.1 myPdco::myPdco ( )

Default constructor.

3.67.2.2 myPdco::myPdco (const myPdco &)

The copy constructor.

The documentation for this class was generated from the following file:

- myPdco.hpp

3.68 Options Struct Reference

∗∗∗∗∗∗∗∗ DATA to be moved into protected section of ClpInterior

```
#include <ClpInterior.hpp>
```

3.68.1 Detailed Description

∗∗∗∗∗∗∗∗ DATA to be moved into protected section of ClpInterior

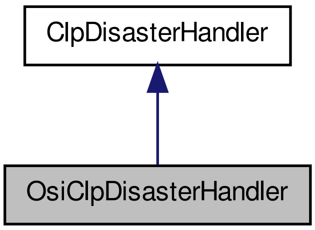
Definition at line 44 of file ClpInterior.hpp.

The documentation for this struct was generated from the following file:

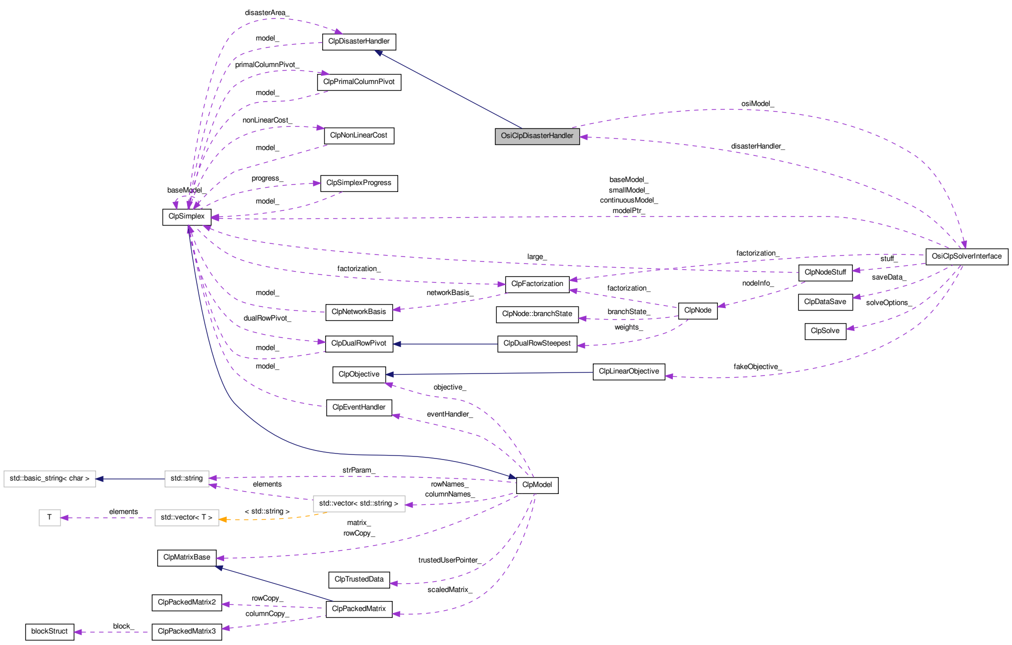
- ClpInterior.hpp

3.69 OsiClpDisasterHandler Class Reference

Inheritance diagram for OsiClpDisasterHandler:



Collaboration diagram for OsiClpDisasterHandler:



Public Member Functions

Virtual methods that the derived classe should provide.

- virtual void intoSimplex ()
  Into simplex.
- virtual bool check () const
  Checks if disaster.
- virtual void saveInfo ()
  saves information for next attempt
- virtual int typeOfDisaster ()
  Type of disaster 0 can fix, 1 abort.

Constructors, destructor

- OsiClpDisasterHandler (OsiClpSolverInterface *model=NULL)
  Default constructor.
- virtual ~OsiClpDisasterHandler ()
  Destructor.
- **OsiClpDisasterHandler** (const OsiClpDisasterHandler &)
- OsiClpDisasterHandler & **operator=** (const OsiClpDisasterHandler &)
- virtual ClpDisasterHandler * clone () const
  Clone.

Sets/gets

- void setOsiModel (OsiClpSolverInterface *model)
  set model.
- OsiClpSolverInterface * osiModel () const
  Get model.
- void setWhereFrom (int value)
  Set where from.
- int whereFrom () const
  Get where from.
- void setPhase (int value)
  Set phase.
- int phase () const
  Get phase.
- bool inTrouble () const
  are we in trouble

Protected Attributes

Data members

The data members are protected to allow access for derived classes.

- OsiClpSolverInterface * osiModel_
  Pointer to model.
- int whereFrom_

Where from 0 dual (resolve) 1 crunch 2 primal (resolve) 4 dual (initialSolve) 6 primal (initialSolve)

- int phase_

  phase 0 initial 1 trying continuing with back in and maybe different perturb 2 trying continuing with back in and different scaling 3 trying dual from all slack 4 trying primal from previous stored basis

- bool inTrouble_

  Are we in trouble.

3.69.1 Detailed Description

Definition at line 1394 of file OsiClpSolverInterface.hpp.

3.69.2 Constructor & Destructor Documentation

3.69.2.1 OsiClpDisasterHandler::OsiClpDisasterHandler (OsiClpSolverInterface * *model* = NULL)

Default constructor.

3.69.3 Member Function Documentation

3.69.3.1 void OsiClpDisasterHandler::setOsiModel (OsiClpSolverInterface * *model*)

set model.

The documentation for this class was generated from the following file:

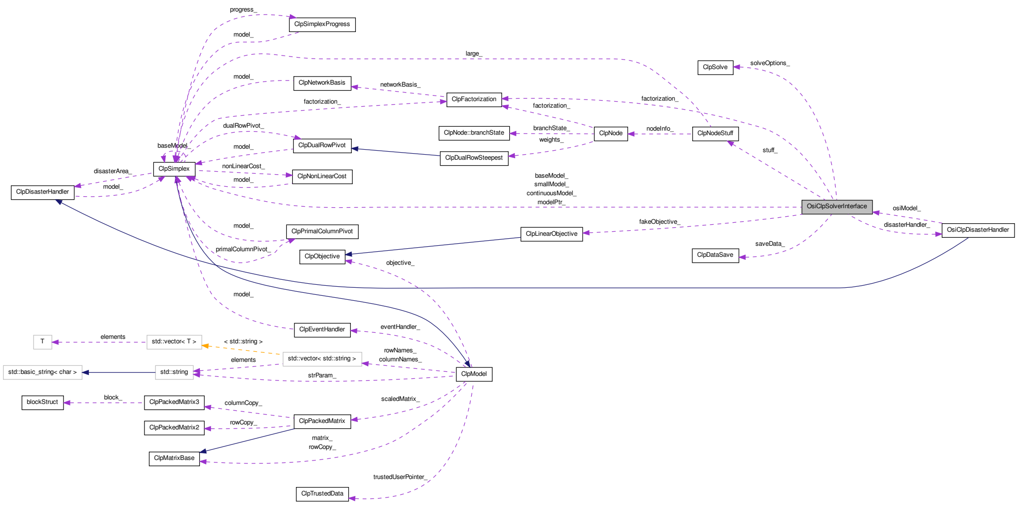
- OsiClpSolverInterface.hpp

3.70 OsiClpSolverInterface Class Reference

Clp Solver Interface.

```
#include <OsiClpSolverInterface.hpp>
```

Collaboration diagram for OsiClpSolverInterface:



Public Member Functions

- virtual void setObjSense (double s)

  Set objective function sense (1 for min (default), -1 for max,)
- virtual void setColSolution (const double ∗colsol)

  Set the primal solution column values.
- virtual void setRowPrice (const double ∗rowprice)

  Set dual solution vector.

Solve methods

- virtual void initialSolve ()

  Solve initial LP relaxation.
- virtual void resolve ()

  Resolve an LP relaxation after problem modification.
- virtual void resolveGub (int needed)

  Resolve an LP relaxation after problem modification (try GUB)
- virtual void branchAndBound ()

  Invoke solver's built-in enumeration algorithm.
- void crossover (int options, int basis)

  Solve when primal column and dual row solutions are near-optimal options - 0 no presolve (use primal and dual) 1 presolve (just use primal) 2 no presolve (just use primal) basis - 0 use all slack basis 1 try and put some in basis.

OsiSimplexInterface methods

Methods for the Osi Simplex API.

The current implementation should work for both minimisation and maximisation in mode 1 (tableau access). In mode 2 (single pivot), only minimisation is supported as of 100907.

- virtual int canDoSimplexInterface () const
  Simplex API capability.
- virtual void enableFactorization () const
  Enables simplex mode 1 (tableau access)
- virtual void disableFactorization () const
  Undo any setting changes made by enableFactorization.
- virtual bool basisIsAvailable () const
  Returns true if a basis is available AND problem is optimal.
- virtual void getBasisStatus (int ∗cstat, int ∗rstat) const
  The following two methods may be replaced by the methods of OsiSolverInterface using OsiWarmStartBasis if: 1.
- virtual int setBasisStatus (const int ∗cstat, const int ∗rstat)
  Set the status of structural/artificial variables and factorize, update solution etc.
- virtual void getReducedGradient (double ∗columnReducedCosts, double ∗duals, const double ∗c) const
  Get the reduced gradient for the cost vector c.
- virtual void getBInvARow (int row, double ∗z, double ∗slack=NULL) const
  Get a row of the tableau (slack part in slack if not NULL)
- virtual void getBInvARow (int row, CoinIndexedVector ∗z, CoinIndexedVector ∗slack=NULL, bool keepScaled=false) const
  Get a row of the tableau (slack part in slack if not NULL) If keepScaled is true then scale factors not applied after so user has to use coding similar to what is in this method.
- virtual void getBInvRow (int row, double ∗z) const
  Get a row of the basis inverse.
- virtual void getBInvACol (int col, double ∗vec) const
  Get a column of the tableau.
- virtual void getBInvACol (int col, CoinIndexedVector ∗vec) const
  Get a column of the tableau.
- virtual void getBInvACol (CoinIndexedVector ∗vec) const
  Update (i.e.
- virtual void getBInvCol (int col, double ∗vec) const
  Get a column of the basis inverse.
- virtual void getBasics (int ∗index) const
  Get basic indices (order of indices corresponds to the order of elements in a vector retured by getBInvACol() and getBInvCol()).
- virtual void enableSimplexInterface (bool doingPrimal)
  Enables simplex mode 2 (individual pivot control)
- virtual void disableSimplexInterface ()
  Undo setting changes made by enableSimplexInterface.
- virtual int pivot (int colIn, int colOut, int outStatus)
  Perform a pivot by substituting a colIn for colOut in the basis.

- virtual int primalPivotResult (int colIn, int sign, int &colOut, int &outStatus, double &t, CoinPackedVector ∗dx)

    Obtain a result of the primal pivot Outputs: colOut -- leaving column, outStatus -- its status, t -- step size, and, if dx!=NULL, ∗dx -- primal ray direction.
- virtual int dualPivotResult (int &colIn, int &sign, int colOut, int outStatus, double &t, CoinPackedVector ∗dx)

    Obtain a result of the dual pivot (similar to the previous method) Differences: entering variable and a sign of its change are now the outputs, the leaving variable and its statuts -- the inputs If dx!=NULL, then ∗dx contains dual ray Return code: same.

Parameter set/get methods

The set methods return true if the parameter was set to the given value, false otherwise.

There can be various reasons for failure: the given parameter is not applicable for the solver (e.g., refactorization frequency for the clp algorithm), the parameter is not yet implemented for the solver or simply the value of the parameter is out of the range the solver accepts. If a parameter setting call returns false check the details of your solver.

The get methods return true if the given parameter is applicable for the solver and is implemented. In this case the value of the parameter is returned in the second argument. Otherwise they return false.

- bool **setIntParam** (OsiIntParam key, int value)
- bool **setDblParam** (OsiDblParam key, double value)
- bool **setStrParam** (OsiStrParam key, const std::string &value)
- bool **getIntParam** (OsiIntParam key, int &value) const
- bool **getDblParam** (OsiDblParam key, double &value) const
- bool **getStrParam** (OsiStrParam key, std::string &value) const
- virtual bool **setHintParam** (OsiHintParam key, bool yesNo=true, OsiHintStrength strength=OsiHintTry, void ∗otherInformation=NULL)

Methods returning info on how the solution process terminated

- virtual bool isAbandoned () const

    Are there a numerical difficulties?
- virtual bool isProvenOptimal () const

    Is optimality proven?
- virtual bool isProvenPrimalInfeasible () const

    Is primal infeasiblity proven?
- virtual bool isProvenDualInfeasible () const

    Is dual infeasiblity proven?
- virtual bool isPrimalObjectiveLimitReached () const

    Is the given primal objective limit reached?
- virtual bool isDualObjectiveLimitReached () const

    Is the given dual objective limit reached?
- virtual bool isIterationLimitReached () const

    Iteration limit reached?

WarmStart related methods

- virtual CoinWarmStart * getEmptyWarmStart () const
  Get an empty warm start object.
- virtual CoinWarmStart * getWarmStart () const
  Get warmstarting information.
- CoinWarmStartBasis * getPointerToWarmStart ()
  Get warmstarting information.
- const CoinWarmStartBasis * getConstPointerToWarmStart () const
  Get warmstarting information.
- virtual bool setWarmStart (const CoinWarmStart *warmstart)
  Set warmstarting information.
- virtual CoinWarmStart * getPointerToWarmStart (bool &mustDelete)
  Get warm start information.

Hotstart related methods (primarily used in strong branching).

The user can create a hotstart (a snapshot) of the optimization process then reoptimize over and over again always starting from there.

***NOTE**: between hotstarted optimizations only bound changes are allowed.*

- virtual void markHotStart ()
  Create a hotstart point of the optimization process.
- virtual void solveFromHotStart ()
  Optimize starting from the hotstart.
- virtual void unmarkHotStart ()
  Delete the snapshot.
- int startFastDual (int options)
  Start faster dual - returns negative if problems 1 if infeasible, Options to pass to solver 1 - create external reduced costs for columns 2 - create external reduced costs for rows 4 - create external row activity (columns always done) Above only done if feasible When set resolve does less work.
- void stopFastDual ()
  Stop fast dual.
- void setStuff (double tolerance, double increment)
  Sets integer tolerance and increment.

Methods related to querying the input data

- virtual int getNumCols () const
  Get number of columns.
- virtual int getNumRows () const
  Get number of rows.
- virtual int getNumElements () const
  Get number of nonzero elements.
- virtual std::string getRowName (int rowIndex, unsigned maxLen=static_cast< unsigned >(std::string::npos)) const
  Return name of row if one exists or Rnnnnnnn maxLen is currently ignored and only there to match the signature from the base class!

- virtual std::string getColName (int colIndex, unsigned maxLen=static_cast< unsigned >(std::string::npos)) const

  Return name of column if one exists or Cnnnnnnn maxLen is currently ignored and only there to match the signature from the base class!
- virtual const double ∗ getColLower () const

  Get pointer to array[getNumCols()] of column lower bounds.
- virtual const double ∗ getColUpper () const

  Get pointer to array[getNumCols()] of column upper bounds.
- virtual const char ∗ getRowSense () const

  Get pointer to array[getNumRows()] of row constraint senses.
- virtual const double ∗ getRightHandSide () const

  Get pointer to array[getNumRows()] of rows right-hand sides.
- virtual const double ∗ getRowRange () const

  Get pointer to array[getNumRows()] of row ranges.
- virtual const double ∗ getRowLower () const

  Get pointer to array[getNumRows()] of row lower bounds.
- virtual const double ∗ getRowUpper () const

  Get pointer to array[getNumRows()] of row upper bounds.
- virtual const double ∗ getObjCoefficients () const

  Get pointer to array[getNumCols()] of objective function coefficients.
- virtual double getObjSense () const

  Get objective function sense (1 for min (default), -1 for max)
- virtual bool isContinuous (int colNumber) const

  Return true if column is continuous.
- virtual bool isBinary (int colIndex) const

  Return true if variable is binary.
- virtual bool isInteger (int colIndex) const

  Return true if column is integer.
- virtual bool isIntegerNonBinary (int colIndex) const

  Return true if variable is general integer.
- virtual bool isFreeBinary (int colIndex) const

  Return true if variable is binary and not fixed at either bound.
- virtual const char ∗ getColType (bool refresh=false) const

  Return array of column length 0 - continuous 1 - binary (may get fixed later) 2 - general integer (may get fixed later)
- bool isOptionalInteger (int colIndex) const

  Return true if column is integer but does not have to be declared as such.
- void setOptionalInteger (int index)

  Set the index-th variable to be an optional integer variable.
- virtual const CoinPackedMatrix ∗ getMatrixByRow () const

  Get pointer to row-wise copy of matrix.
- virtual const CoinPackedMatrix ∗ getMatrixByCol () const

  Get pointer to column-wise copy of matrix.
- virtual CoinPackedMatrix ∗ getMutableMatrixByCol () const

  Get pointer to mutable column-wise copy of matrix.
- virtual double getInfinity () const

  Get solver's value for infinity.

Methods related to querying the solution

- virtual const double ∗ getColSolution () const
  Get pointer to array[getNumCols()] of primal solution vector.
- virtual const double ∗ getRowPrice () const
  Get pointer to array[getNumRows()] of dual prices.
- virtual const double ∗ getReducedCost () const
  Get a pointer to array[getNumCols()] of reduced costs.
- virtual const double ∗ getRowActivity () const
  Get pointer to array[getNumRows()] of row activity levels (constraint matrix times the solution vector.
- virtual double getObjValue () const
  Get objective function value.
- virtual int getIterationCount () const
  Get how many iterations it took to solve the problem (whatever "iteration" mean to the solver.
- virtual std::vector< double ∗ > getDualRays (int maxNumRays, bool fullRay=false) const
  Get as many dual rays as the solver can provide.
- virtual std::vector< double ∗ > getPrimalRays (int maxNumRays) const
  Get as many primal rays as the solver can provide.

Changing bounds on variables and constraints

- virtual void setObjCoeff (int elementIndex, double elementValue)
  Set an objective function coefficient.
- virtual void setColLower (int elementIndex, double elementValue)
  Set a single column lower bound
  Use -DBL_MAX for -infinity.
- virtual void setColUpper (int elementIndex, double elementValue)
  Set a single column upper bound
  Use DBL_MAX for infinity.
- virtual void setColBounds (int elementIndex, double lower, double upper)
  Set a single column lower and upper bound.
- virtual void setColSetBounds (const int ∗indexFirst, const int ∗indexLast, const double ∗boundList)
  Set the bounds on a number of columns simultaneously
  The default implementation just invokes setColLower() and setColUpper() over and over again.
- virtual void setRowLower (int elementIndex, double elementValue)
  Set a single row lower bound
  Use -DBL_MAX for -infinity.
- virtual void setRowUpper (int elementIndex, double elementValue)
  Set a single row upper bound
  Use DBL_MAX for infinity.
- virtual void setRowBounds (int elementIndex, double lower, double upper)
  Set a single row lower and upper bound.
- virtual void setRowType (int index, char sense, double rightHandSide, double range)
  Set the type of a single row

- virtual void setRowSetBounds (const int ∗indexFirst, const int ∗indexLast, const double ∗boundList)

  Set the bounds on a number of rows simultaneously
  The default implementation just invokes setRowLower() and setRowUpper() over and over again.
- virtual void setRowSetTypes (const int ∗indexFirst, const int ∗indexLast, const char ∗senseList, const double ∗rhsList, const double ∗rangeList)

  Set the type of a number of rows simultaneously
  The default implementation just invokes setRowType() over and over again.
- virtual void setObjective (const double ∗array)

  Set the objective coefficients for all columns array [getNumCols()] is an array of values for the objective.
- virtual void setColLower (const double ∗array)

  Set the lower bounds for all columns array [getNumCols()] is an array of values for the objective.
- virtual void setColUpper (const double ∗array)

  Set the upper bounds for all columns array [getNumCols()] is an array of values for the objective.
- virtual void setRowName (int rowIndex, std::string name)

  Set name of row.
- virtual void setColName (int colIndex, std::string name)

  Set name of column.

Integrality related changing methods

- virtual void setContinuous (int index)

  Set the index-th variable to be a continuous variable.
- virtual void setInteger (int index)

  Set the index-th variable to be an integer variable.
- virtual void setContinuous (const int ∗indices, int len)

  Set the variables listed in indices (which is of length len) to be continuous variables.
- virtual void setInteger (const int ∗indices, int len)

  Set the variables listed in indices (which is of length len) to be integer variables.
- int numberSOS () const

  Number of SOS sets.
- const CoinSet ∗ setInfo () const

  SOS set info.
- virtual int findIntegersAndSOS (bool justCount)

  Identify integer variables and SOS and create corresponding objects.

Methods to expand a problem.

Note that if a column is added then by default it will correspond to a continuous variable.

- virtual void **addCol** (const CoinPackedVectorBase &vec, const double collb, const double colub, const double obj)
- virtual void addCol (const CoinPackedVectorBase &vec, const double collb, const double colub, const double obj, std::string name)

  Add a named column (primal variable) to the problem.

- virtual void addCol (int numberElements, const int ∗rows, const double ∗elements, const double collb, const double colub, const double obj)

    Add a column (primal variable) to the problem.
- virtual void addCol (int numberElements, const int ∗rows, const double ∗elements, const double collb, const double colub, const double obj, std::string name)

    Add a named column (primal variable) to the problem.
- virtual void **addCols** (const int numcols, const CoinPackedVectorBase ∗const ∗cols, const double ∗collb, const double ∗colub, const double ∗obj)
- virtual void **addCols** (const int numcols, const int ∗columnStarts, const int ∗rows, const double ∗elements, const double ∗collb, const double ∗colub, const double ∗obj)
- virtual void **deleteCols** (const int num, const int ∗colIndices)
- virtual void **addRow** (const CoinPackedVectorBase &vec, const double rowlb, const double rowub)
- virtual void addRow (const CoinPackedVectorBase &vec, const double rowlb, const double rowub, std::string name)

    Add a named row (constraint) to the problem.
- virtual void **addRow** (const CoinPackedVectorBase &vec, const char rowsen, const double rowrhs, const double rowrng)
- virtual void addRow (int numberElements, const int ∗columns, const double ∗element, const double rowlb, const double rowub)

    Add a row (constraint) to the problem.
- virtual void addRow (const CoinPackedVectorBase &vec, const char rowsen, const double rowrhs, const double rowrng, std::string name)

    Add a named row (constraint) to the problem.
- virtual void **addRows** (const int numrows, const CoinPackedVectorBase ∗const ∗rows, const double ∗rowlb, const double ∗rowub)
- virtual void **addRows** (const int numrows, const CoinPackedVectorBase ∗const ∗rows, const char ∗rowsen, const double ∗rowrhs, const double ∗rowrng)
- virtual void **addRows** (const int numrows, const int ∗rowStarts, const int ∗columns, const double ∗element, const double ∗rowlb, const double ∗rowub)
- void **modifyCoefficient** (int row, int column, double newElement, bool keepZero=false)
- virtual void **deleteRows** (const int num, const int ∗rowIndices)
- virtual void saveBaseModel ()

    If solver wants it can save a copy of "base" (continuous) model here.
- virtual void restoreBaseModel (int numberRows)

    Strip off rows to get to this number of rows.
- virtual void applyRowCuts (int numberCuts, const OsiRowCut ∗cuts)

    Apply a collection of row cuts which are all effective.
- virtual void applyRowCuts (int numberCuts, const OsiRowCut ∗∗cuts)

    Apply a collection of row cuts which are all effective.
- virtual ApplyCutsReturnCode applyCuts (const OsiCuts &cs, double effectivenessLb=0.0)

    Apply a collection of cuts.

Methods to input a problem

- virtual void loadProblem (const CoinPackedMatrix &matrix, const double ∗collb, const double ∗colub, const double ∗obj, const double ∗rowlb, const double ∗rowub)

Load in an problem by copying the arguments (the constraints on the rows are given by lower and upper bounds).

- virtual void assignProblem (CoinPackedMatrix ∗&matrix, double ∗&collb, double ∗&colub, double ∗&obj, double ∗&rowlb, double ∗&rowub)

  Load in an problem by assuming ownership of the arguments (the constraints on the rows are given by lower and upper bounds).
- virtual void loadProblem (const CoinPackedMatrix &matrix, const double ∗collb, const double ∗colub, const double ∗obj, const char ∗rowsen, const double ∗rowrhs, const double ∗rowrng)

  Load in an problem by copying the arguments (the constraints on the rows are given by sense/rhs/range triplets).
- virtual void assignProblem (CoinPackedMatrix ∗&matrix, double ∗&collb, double ∗&colub, double ∗&obj, char ∗&rowsen, double ∗&rowrhs, double ∗&rowrng)

  Load in an problem by assuming ownership of the arguments (the constraints on the rows are given by sense/rhs/range triplets).
- virtual void loadProblem (const int numcols, const int numrows, const CoinBigIndex ∗start, const int ∗index, const double ∗value, const double ∗collb, const double ∗colub, const double ∗obj, const double ∗rowlb, const double ∗rowub)

  Just like the other loadProblem() methods except that the matrix is given in a standard column major ordered format (without gaps).
- virtual void loadProblem (const int numcols, const int numrows, const CoinBigIndex ∗start, const int ∗index, const double ∗value, const double ∗collb, const double ∗colub, const double ∗obj, const char ∗rowsen, const double ∗rowrhs, const double ∗rowrng)

  Just like the other loadProblem() methods except that the matrix is given in a standard column major ordered format (without gaps).
- virtual int loadFromCoinModel (CoinModel &modelObject, bool keepSolution=false)

  This loads a model from a coinModel object - returns number of errors.
- virtual int readMps (const char ∗filename, const char ∗extension="mps")

  Read an mps file from the given filename (defaults to Osi reader) - returns number of errors (see OsiMpsReader class)
- int readMps (const char ∗filename, bool keepNames, bool allowErrors)

  Read an mps file from the given filename returns number of errors (see OsiMpsReader class)
- virtual int readMps (const char ∗filename, const char ∗extension, int &numberSets, CoinSet ∗∗&sets)

  Read an mps file.
- virtual void writeMps (const char ∗filename, const char ∗extension="mps", double objSense=0.0) const

  Write the problem into an mps file of the given filename.
- virtual int writeMpsNative (const char ∗filename, const char ∗∗rowNames, const char ∗∗columnNames, int formatType=0, int numberAcross=2, double objSense=0.0) const

  Write the problem into an mps file of the given filename, names may be null.
- virtual int readLp (const char ∗filename, const double epsilon=1e-5)

  Read file in LP format (with names)

- virtual void writeLp (const char ∗filename, const char ∗extension="lp", double epsilon=1e-5, int numberAcross=10, int decimals=5, double objSense=0.0, bool useRowNames=true) const

  Write the problem into an Lp file of the given filename.
- virtual void writeLp (FILE ∗fp, double epsilon=1e-5, int numberAcross=10, int decimals=5, double objSense=0.0, bool useRowNames=true) const

  Write the problem into the file pointed to by the parameter fp.
- virtual void replaceMatrixOptional (const CoinPackedMatrix &matrix)

  I (JJF) am getting annoyed because I can't just replace a matrix.
- virtual void replaceMatrix (const CoinPackedMatrix &matrix)

  And if it does matter (not used at present)

Message handling (extra for Clp messages).

Normally I presume you would want the same language.

If not then you could use underlying model pointer

- virtual void passInMessageHandler (CoinMessageHandler ∗handler)

  Pass in a message handler.
- void newLanguage (CoinMessages::Language language)

  Set language.
- void **setLanguage** (CoinMessages::Language language)
- void setLogLevel (int value)

  Set log level (will also set underlying solver's log level)
- void generateCpp (FILE ∗fp)

  Create C++ lines to get to current state.

Clp specific public interfaces

- ClpSimplex ∗ getModelPtr () const

  Get pointer to Clp model.
- ClpSimplex ∗ swapModelPtr (ClpSimplex ∗newModel)

  Set pointer to Clp model and return old.
- unsigned int specialOptions () const

  Get special options.
- void **setSpecialOptions** (unsigned int value)
- int lastAlgorithm () const

  Last algorithm used , 1 = primal, 2 = dual other unknown.
- void setLastAlgorithm (int value)

  Set last algorithm used , 1 = primal, 2 = dual other unknown.
- int cleanupScaling () const

  Get scaling action option.
- void setCleanupScaling (int value)

  Set Scaling option When scaling is on it is possible that the scaled problem is feasible but the unscaled is not.
- double smallestElementInCut () const

  Get smallest allowed element in cut.
- void setSmallestElementInCut (double value)

  Set smallest allowed element in cut.

- double smallestChangeInCut () const

  Get smallest change in cut.
- void setSmallestChangeInCut (double value)

  Set smallest change in cut.
- void setSolveOptions (const ClpSolve &options)

  Pass in initial solve options.
- virtual int tightenBounds (int lightweight=0)

  Tighten bounds - lightweight or very lightweight 0 - normal, 1 lightweight but just integers, 2 lightweight and all.
- virtual CoinBigIndex getSizeL () const

  Return number of entries in L part of current factorization.
- virtual CoinBigIndex getSizeU () const

  Return number of entries in U part of current factorization.
- const OsiClpDisasterHandler ∗ disasterHandler () const

  Get disaster handler.
- void passInDisasterHandler (OsiClpDisasterHandler ∗handler)

  Pass in disaster handler.
- ClpLinearObjective ∗ fakeObjective () const

  Get fake objective.
- void setFakeObjective (ClpLinearObjective ∗fakeObjective)

  Set fake objective (and take ownership)
- void setFakeObjective (double ∗fakeObjective)

  Set fake objective.
- void setupForRepeatedUse (int senseOfAdventure=0, int printOut=0)

  Set up solver for repeated use by Osi interface.
- virtual void synchronizeModel ()

  Synchronize model (really if no cuts in tree)
- void setSpecialOptionsMutable (unsigned int value) const

  Set special options in underlying clp solver.

Constructors and destructors

- OsiClpSolverInterface ()

  Default Constructor.
- virtual OsiSolverInterface ∗ clone (bool copyData=true) const

  Clone.
- OsiClpSolverInterface (const OsiClpSolverInterface &)

  Copy constructor.
- OsiClpSolverInterface (ClpSimplex ∗rhs, bool reallyOwn=false)

  Borrow constructor - only delete one copy.
- void releaseClp ()

  Releases so won't error.
- OsiClpSolverInterface & operator= (const OsiClpSolverInterface &rhs)

  Assignment operator.
- virtual ∼OsiClpSolverInterface ()

  Destructor.
- virtual void reset ()

  Resets as if default constructor.

Protected Attributes

Protected member data

- ClpSimplex * modelPtr_

  Clp model represented by this class instance.

Cached information derived from the OSL model

- char * rowsense_

  Pointer to dense vector of row sense indicators.
- double * rhs_

  Pointer to dense vector of row right-hand side values.
- double * rowrange_

  Pointer to dense vector of slack upper bounds for range constraints (undefined for non-range rows)
- CoinWarmStartBasis * ws_

  A pointer to the warmstart information to be used in the hotstarts.
- double * rowActivity_

  also save row and column information for hot starts only used in hotstarts so can be casual
- double * **columnActivity_**
- ClpNodeStuff stuff_

  Stuff for fast dual.
- int numberSOS_

  Number of SOS sets.
- CoinSet * setInfo_

  SOS set info.
- ClpSimplex * smallModel_

  Alternate model (hot starts) - but also could be permanent and used for crunch.
- ClpFactorization * factorization_

  factorization for hot starts
- double smallestElementInCut_

  Smallest allowed element in cut.
- double smallestChangeInCut_

  Smallest change in cut.
- double largestAway_

  Largest amount continuous away from bound.
- char * spareArrays_

  Arrays for hot starts.
- CoinWarmStartBasis basis_

  Warmstart information to be used in resolves.
- int itlimOrig_

  The original iteration limit before hotstarts started.
- int lastAlgorithm_

  Last algorithm used.
- bool notOwned_

  To say if destructor should delete underlying model.
- CoinPackedMatrix * matrixByRow_

Pointer to row-wise copy of problem matrix coefficients.

- CoinPackedMatrix ∗ matrixByRowAtContinuous_

  Pointer to row-wise copy of continuous problem matrix coefficients.
- char ∗ integerInformation_

  Pointer to integer information.
- int ∗ whichRange_

  Pointer to variables for which we want range information The number is in [0] memory is not owned by OsiClp.
- bool fakeMinInSimplex_

  Faking min to get proper dual solution signs in simplex API.
- double ∗ linearObjective_

  Linear objective.
- ClpDataSave saveData_

  To save data in OsiSimplex stuff.
- ClpSolve solveOptions_

  Options for initialSolve.
- int cleanupScaling_

  Scaling option When scaling is on it is possible that the scaled problem is feasible but the unscaled is not.
- unsigned int specialOptions_

  Special options 0x80000000 off 0 simple stuff for branch and bound 1 try and keep work regions as much as possible 2 do not use any perturbation 4 allow exit before re-factorization 8 try and re-use factorization if no cuts 16 use standard strong branching rather than clp's 32 Just go to first factorization in fast dual 64 try and tighten bounds in crunch 128 Model will only change in column bounds 256 Clean up model before hot start 512 Give user direct access to Clp regions in getBInvARow etc (i.e., do not unscale, and do not return result in getBInv parameters; you have to know where to look for the answer) 1024 Don't "borrow" model in initialSolve 2048 Don't crunch 4096 quick check for optimality Bits above 8192 give where called from in Cbc At present 0 is normal, 1 doing fast hotstarts, 2 is can do quick check 65536 Keep simple i.e.
- ClpSimplex ∗ baseModel_

  Copy of model when option 131072 set.
- int lastNumberRows_

  Number of rows when last "scaled".
- ClpSimplex ∗ continuousModel_

  Continuous model.
- OsiClpDisasterHandler ∗ disasterHandler_

  Possible disaster handler.
- ClpLinearObjective ∗ fakeObjective_

  Fake objective.
- CoinDoubleArrayWithLength rowScale_

  Row scale factors (has inverse at end)
- CoinDoubleArrayWithLength columnScale_

  Column scale factors (has inverse at end)

Friends

- void OsiClpSolverInterfaceUnitTest (const std::string &mpsDir, const std::string &netlibDir)

  A function that tests the methods in the OsiClpSolverInterface class.

Protected methods

- void setBasis (const CoinWarmStartBasis &basis)

  Sets up working basis as a copy of input and puts in as basis.
- void setBasis ()

  Just puts current basis_ into ClpSimplex model.
- CoinWarmStartDiff ∗ getBasisDiff (const unsigned char ∗statusArray) const

  Warm start difference from basis_ to statusArray.
- CoinWarmStartBasis ∗ getBasis (const unsigned char ∗statusArray) const

  Warm start from statusArray.
- void deleteScaleFactors ()

  Delete all scale factor stuff and reset option.
- const double ∗ upRange () const

  If doing fast hot start then ranges are computed.
- const double ∗ **downRange** () const
- void passInRanges (int ∗array)

  Pass in range array.
- void setSOSData (int numberSOS, const char ∗type, const int ∗start, const int ∗indices, const double ∗weights=NULL)

  Pass in sos stuff from AMPl.
- void computeLargestAway ()

  Compute largest amount any at continuous away from bound.
- double largestAway () const

  Get largest amount continuous away from bound.
- void setLargestAway (double value)

  Set largest amount continuous away from bound.
- void lexSolve ()

  Sort of lexicographic resolve.
- virtual void applyRowCut (const OsiRowCut &rc)

  Apply a row cut (append to constraint matrix).
- virtual void applyColCut (const OsiColCut &cc)

  Apply a column cut (adjust one or more bounds).
- void gutsOfDestructor ()

  The real work of a copy constructor (used by copy and assignment)
- void freeCachedResults () const

  Deletes all mutable stuff.
- void freeCachedResults0 () const

  Deletes all mutable stuff for row ranges etc.
- void freeCachedResults1 () const

  Deletes all mutable stuff for matrix etc.
- void extractSenseRhsRange () const

  A method that fills up the rowsense_, rhs_ and rowrange_ arrays.
- void **fillParamMaps** ()
- CoinWarmStartBasis getBasis (ClpSimplex ∗model) const

Warm start.
- void setBasis (const CoinWarmStartBasis &basis, ClpSimplex *model)

  Sets up working basis as a copy of input.
- void crunch ()

  Crunch down problem a bit.
- void redoScaleFactors (int numberRows, const CoinBigIndex *starts, const int *indices, const double *elements)

  Extend scale factors.

3.70.1 Detailed Description

Clp Solver Interface.

Instantiation of OsiClpSolverInterface for the Model Algorithm.

Definition at line 38 of file OsiClpSolverInterface.hpp.

3.70.2 Member Function Documentation

3.70.2.1 virtual int OsiClpSolverInterface::canDoSimplexInterface ( ) const [virtual]

Simplex API capability.

Returns

- 0 if no simplex API
- 1 if can just do getBInv etc
- 2 if has all OsiSimplex methods

3.70.2.2 virtual void OsiClpSolverInterface::enableFactorization ( ) const [virtual]

Enables simplex mode 1 (tableau access)

Tells solver that calls to getBInv etc are about to take place. Underlying code may need mutable as this may be called from CglCut::generateCuts which is const. If that is too horrific then each solver e.g. BCP or CBC will have to do something outside main loop.

3.70.2.3 virtual bool OsiClpSolverInterface::basisIsAvailable ( ) const [virtual]

Returns true if a basis is available AND problem is optimal.

This should be used to see if the BInvARow type operations are possible and meaningful.

3.70.2.4 virtual void OsiClpSolverInterface::getBasisStatus (int * *cstat*, int * *rstat*) const [virtual]

The following two methods may be replaced by the methods of OsiSolverInterface using OsiWarmStartBasis if: 1.

OsiWarmStartBasis resize operation is implemented more efficiently and 2. It is ensured that effects on the solver are the same

Returns a basis status of the structural/artificial variables At present as warm start i.e 0 free, 1 basic, 2 upper, 3 lower

NOTE artificials are treated as +1 elements so for <= rhs artificial will be at lower bound if constraint is tight

This means that Clpsimplex flips artificials as it works in terms of row activities

3.70.2.5 virtual int OsiClpSolverInterface::setBasisStatus (const int * *cstat*, const int * *rstat*) [virtual]

Set the status of structural/artificial variables and factorize, update solution etc.

NOTE artificials are treated as +1 elements so for <= rhs artificial will be at lower bound if constraint is tight

This means that Clpsimplex flips artificials as it works in terms of row activities Returns 0 if OK, 1 if problem is bad e.g. duplicate elements, too large ...

3.70.2.6 virtual void OsiClpSolverInterface::getBInvACol (CoinIndexedVector * *vec*) const [virtual]

Update (i.e.

ftran) the vector passed in. Unscaling is applied after - can't be applied before

3.70.2.7 virtual void OsiClpSolverInterface::enableSimplexInterface (bool *doingPrimal*) [virtual]

Enables simplex mode 2 (individual pivot control)

This method is supposed to ensure that all typical things (like reduced costs, etc.) are updated when individual pivots are executed and can be queried by other methods.

3.70.2.8 virtual int OsiClpSolverInterface::pivot (int *colIn*, int *colOut*, int *outStatus*) [virtual]

Perform a pivot by substituting a colIn for colOut in the basis.

The status of the leaving variable is given in statOut. Where 1 is to upper bound, -1 to lower bound Return code is 0 for okay, 1 if inaccuracy forced re-factorization (should be okay) and -1 for singular factorization

3.70.2.9 virtual int OsiClpSolverInterface::primalPivotResult (int *colIn*, int *sign*, int & *colOut*, int & *outStatus*, double & *t*, CoinPackedVector * *dx*) [virtual]

Obtain a result of the primal pivot Outputs: colOut -- leaving column, outStatus -- its status, t -- step size, and, if dx!=NULL, *dx -- primal ray direction.

Inputs: colIn -- entering column, sign -- direction of its change (+/-1). Both for colIn and colOut, artificial variables are index by the negative of the row index minus 1. Return code (for now): 0 -- leaving variable found, -1 -- everything else? Clearly, more informative set of return values is required Primal and dual solutions are updated

3.70.2.10 virtual CoinWarmStart* OsiClpSolverInterface::getEmptyWarmStart ( ) const [virtual]

Get an empty warm start object.

This routine returns an empty CoinWarmStartBasis object. Its purpose is to provide a way to give a client a warm start basis object of the appropriate type, which can resized and modified as desired.

3.70.2.11 virtual bool OsiClpSolverInterface::setWarmStart (const CoinWarmStart * *warmstart*) [virtual]

Set warmstarting information.

Return true/false depending on whether the warmstart information was accepted or not.

3.70.2.12 virtual CoinWarmStart* OsiClpSolverInterface::getPointerToWarmStart (bool & *mustDelete*) [virtual]

Get warm start information.

Return warm start information for the current state of the solver interface. If there is no valid warm start information, an empty warm start object wil be returned. This does not necessarily create an object - may just point to one. must Delete set true if user should delete returned object. OsiClp version always returns pointer and false.

3.70.2.13 virtual const char* OsiClpSolverInterface::getRowSense ( ) const [virtual]

Get pointer to array[getNumRows()] of row constraint senses.

- 'L' <= constraint
- 'E' = constraint
- 'G' >= constraint
- 'R' ranged constraint
- 'N' free constraint

3.70.2.14 virtual const double* OsiClpSolverInterface::getRightHandSide ( ) const [virtual]

Get pointer to array[getNumRows()] of rows right-hand sides.

- if rowsense()[i] == 'L' then rhs()[i] == rowupper()[i]
- if rowsense()[i] == 'G' then rhs()[i] == rowlower()[i]
- if rowsense()[i] == 'R' then rhs()[i] == rowupper()[i]
- if rowsense()[i] == 'N' then rhs()[i] == 0.0

3.70.2.15 virtual const double∗ OsiClpSolverInterface::getRowRange ( ) const [virtual]

Get pointer to array[getNumRows()] of row ranges.

- if rowsense()[i] == 'R' then rowrange()[i] == rowupper()[i] - rowlower()[i]
- if rowsense()[i] != 'R' then rowrange()[i] is undefined

3.70.2.16 virtual bool OsiClpSolverInterface::isInteger (int *colIndex*) const [virtual]

Return true if column is integer.

Note: This function returns true if the the column is binary or a general integer.

3.70.2.17 bool OsiClpSolverInterface::isOptionalInteger (int *colIndex*) const

Return true if column is integer but does not have to be declared as such.

Note: This function returns true if the the column is binary or a general integer.

3.70.2.18 virtual int OsiClpSolverInterface::getIterationCount ( ) const [inline, virtual]

Get how many iterations it took to solve the problem (whatever "iteration" mean to the solver.

Definition at line 498 of file OsiClpSolverInterface.hpp.

3.70.2.19 virtual std::vector<double∗> OsiClpSolverInterface::getDualRays (int *maxNumRays*, bool *fullRay* = false) const [virtual]

Get as many dual rays as the solver can provide.

(In case of proven primal infeasibility there should be at least one.)

The first getNumRows() ray components will always be associated with the row duals (as returned by getRowPrice()). If `fullRay` is true, the final getNumCols() entries will correspond to the ray components associated with the nonbasic variables. If the full ray is requested and the method cannot provide it, it will throw an exception.

NOTE for implementers of solver interfaces:

The double pointers in the vector should point to arrays of length getNumRows() and they should be allocated via new[].

NOTE for users of solver interfaces:

It is the user's responsibility to free the double pointers in the vector using delete[].

3.70.2.20 virtual std::vector<double∗> OsiClpSolverInterface::getPrimalRays (int *maxNumRays*) const [virtual]

Get as many primal rays as the solver can provide.

(In case of proven dual infeasibility there should be at least one.)

NOTE for implementers of solver interfaces:

The double pointers in the vector should point to arrays of length getNumCols() and they should be allocated via new[].

NOTE for users of solver interfaces:

It is the user's responsibility to free the double pointers in the vector using delete[].

3.70.2.21 virtual void OsiClpSolverInterface::setColLower (int *elementIndex*, double *elementValue*) [virtual]

Set a single column lower bound

Use -DBL_MAX for -infinity.

3.70.2.22 virtual void OsiClpSolverInterface::setColUpper (int *elementIndex*, double *elementValue*) [virtual]

Set a single column upper bound

Use DBL_MAX for infinity.

3.70.2.23 virtual void OsiClpSolverInterface::setColSetBounds (const int * *indexFirst*, const int * *indexLast*, const double * *boundList*) [virtual]

Set the bounds on a number of columns simultaneously

The default implementation just invokes setColLower() and setColUpper() over and over again.

Parameters

index-First,indexLas	pointers to the beginning and after the end of the array of the indices of the variables whose *either* bound changes
boundList	the new lower/upper bound pairs for the variables

3.70.2.24 virtual void OsiClpSolverInterface::setRowLower (int *elementIndex*, double *elementValue*) [virtual]

Set a single row lower bound

Use -DBL_MAX for -infinity.

3.70.2.25 virtual void OsiClpSolverInterface::setRowUpper (int *elementIndex*, double *elementValue*) [virtual]

Set a single row upper bound

Use DBL_MAX for infinity.

3.70.2.26 virtual void OsiClpSolverInterface::setRowSetBounds (const int * *indexFirst*, const int * *indexLast*, const double * *boundList*) [virtual]

Set the bounds on a number of rows simultaneously

The default implementation just invokes setRowLower() and setRowUpper() over and over again.

Parameters

indexFirst,indexLast	pointers to the beginning and after the end of the array of the indices of the constraints whose *either* bound changes
boundList	the new lower/upper bound pairs for the constraints

3.70.2.27 virtual void OsiClpSolverInterface::setRowSetTypes (const int ∗ *indexFirst*, const int ∗ *indexLast*, const char ∗ *senseList*, const double ∗ *rhsList*, const double ∗ *rangeList*) [virtual]

Set the type of a number of rows simultaneously

The default implementation just invokes setRowType() over and over again.

Parameters

indexFirst,indexLast	pointers to the beginning and after the end of the array of the indices of the constraints whose *any* characteristics changes
senseList	the new senses
rhsList	the new right hand sides
rangeList	the new ranges

3.70.2.28 virtual void OsiClpSolverInterface::setObjective (const double ∗ *array*) [virtual]

Set the objective coefficients for all columns array [getNumCols()] is an array of values for the objective.

This defaults to a series of set operations and is here for speed.

3.70.2.29 virtual void OsiClpSolverInterface::setColLower (const double ∗ *array*) [virtual]

Set the lower bounds for all columns array [getNumCols()] is an array of values for the objective.

This defaults to a series of set operations and is here for speed.

3.70.2.30 virtual void OsiClpSolverInterface::setColUpper (const double ∗ *array*) [virtual]

Set the upper bounds for all columns array [getNumCols()] is an array of values for the objective.

This defaults to a series of set operations and is here for speed.

3.70.2.31 virtual int OsiClpSolverInterface::findIntegersAndSOS (bool *justCount*) [virtual]

Identify integer variables and SOS and create corresponding objects.

Record integer variables and create an OsiSimpleInteger object for each one. All existing OsiSimpleInteger objects will be destroyed. If the solver supports SOS then do the same for SOS. If justCount then no objects created and we just store numberIntegers_ Returns number of SOS

3.70.2.32 virtual void OsiClpSolverInterface::setColSolution (const double ∗ *colsol*) [virtual]

Set the primal solution column values.

colsol[numcols()] is an array of values of the problem column variables. These values are copied to memory owned by the solver object or the solver. They will be returned as the result of colsol() until changed by another call to setColsol() or by a call to any solver routine. Whether the solver makes use of the solution in any way is solver-dependent.

3.70.2.33 virtual void OsiClpSolverInterface::setRowPrice (const double ∗ *rowprice*) [virtual]

Set dual solution vector.

rowprice[numrows()] is an array of values of the problem row dual variables. These values are copied to memory owned by the solver object or the solver. They will be returned as the result of rowprice() until changed by another call to setRowprice() or by a call to any solver routine. Whether the solver makes use of the solution in any way is solver-dependent.

3.70.2.34 virtual void OsiClpSolverInterface::addCol (int *numberElements,* const int ∗ *rows,* const double ∗ *elements,* const double *collb,* const double *colub,* const double *obj*) [virtual]

Add a column (primal variable) to the problem.

3.70.2.35 virtual void OsiClpSolverInterface::addRow (const CoinPackedVectorBase & *vec,* const double *rowlb,* const double *rowub,* std::string *name*) [virtual]

Add a named row (constraint) to the problem.

The default implementation adds the row, then changes the name. This can surely be made more efficient within an OsiXXX class.

3.70.2.36 virtual void OsiClpSolverInterface::addRow (int *numberElements,* const int ∗ *columns,* const double ∗ *element,* const double *rowlb,* const double *rowub*) [virtual]

Add a row (constraint) to the problem.

3.70.2.37 virtual void OsiClpSolverInterface::restoreBaseModel (int *numberRows*) [virtual]

Strip off rows to get to this number of rows.

If solver wants it can restore a copy of "base" (continuous) model here

3.70.2.38 virtual void OsiClpSolverInterface::applyRowCuts (int *numberCuts,* const OsiRowCut * *cuts*) [virtual]

Apply a collection of row cuts which are all effective.

applyCuts seems to do one at a time which seems inefficient.

3.70.2.39 virtual void OsiClpSolverInterface::applyRowCuts (int *numberCuts,* const OsiRowCut ** *cuts*) [virtual]

Apply a collection of row cuts which are all effective.

applyCuts seems to do one at a time which seems inefficient. This uses array of pointers

3.70.2.40 virtual ApplyCutsReturnCode OsiClpSolverInterface::applyCuts (const OsiCuts & *cs,* double *effectivenessLb* = 0.0) [virtual]

Apply a collection of cuts.

Only cuts which have an `effectiveness >= effectivenessLb` are applied.

- ReturnCode.getNumineffective() -- number of cuts which were not applied because they had an `effectiveness < effectivenessLb`
- ReturnCode.getNuminconsistent() -- number of invalid cuts
- ReturnCode.getNuminconsistentWrtIntegerModel() -- number of cuts that are invalid with respect to this integer model
- ReturnCode.getNuminfeasible() -- number of cuts that would make this integer model infeasible
- ReturnCode.getNumApplied() -- number of integer cuts which were applied to the integer model
- cs.size() == getNumineffective() + getNuminconsistent() + getNuminconsistentWrtIntegerModel() + getNuminfeasible() + getNumApplied()

3.70.2.41 virtual void OsiClpSolverInterface::loadProblem (const CoinPackedMatrix & *matrix,* const double * *collb,* const double * *colub,* const double * *obj,* const double * *rowlb,* const double * *rowub*) [virtual]

Load in an problem by copying the arguments (the constraints on the rows are given by lower and upper bounds).

If a pointer is NULL then the following values are the default:

- `colub`: all columns have upper bound infinity
- `collb`: all columns have lower bound 0
- `rowub`: all rows have upper bound infinity
- `rowlb`: all rows have lower bound -infinity
- `obj`: all variables have 0 objective coefficient

3.70.2.42 virtual void OsiClpSolverInterface::assignProblem (CoinPackedMatrix ∗& *matrix*, double ∗& *collb*, double ∗& *colub*, double ∗& *obj*, double ∗& *rowlb*, double ∗& *rowub*) [virtual]

Load in an problem by assuming ownership of the arguments (the constraints on the rows are given by lower and upper bounds).

For default values see the previous method.

WARNING: The arguments passed to this method will be freed using the C++ `delete` and `delete[]` functions.

3.70.2.43 virtual void OsiClpSolverInterface::loadProblem (const CoinPackedMatrix & *matrix*, const double ∗ *collb*, const double ∗ *colub*, const double ∗ *obj*, const char ∗ *rowsen*, const double ∗ *rowrhs*, const double ∗ *rowrng*) [virtual]

Load in an problem by copying the arguments (the constraints on the rows are given by sense/rhs/range triplets).

If a pointer is NULL then the following values are the default:

- `colub`: all columns have upper bound infinity
- `collb`: all columns have lower bound 0
- `obj`: all variables have 0 objective coefficient
- `rowsen`: all rows are >=
- `rowrhs`: all right hand sides are 0
- `rowrng`: 0 for the ranged rows

3.70.2.44 virtual void OsiClpSolverInterface::assignProblem (CoinPackedMatrix ∗& *matrix*, double ∗& *collb*, double ∗& *colub*, double ∗& *obj*, char ∗& *rowsen*, double ∗& *rowrhs*, double ∗& *rowrng*) [virtual]

Load in an problem by assuming ownership of the arguments (the constraints on the rows are given by sense/rhs/range triplets).

For default values see the previous method.

WARNING: The arguments passed to this method will be freed using the C++ `delete` and `delete[]` functions.

3.70.2.45 virtual void OsiClpSolverInterface::loadProblem (const int *numcols*, const int *numrows*, const CoinBigIndex * *start*, const int * *index*, const double * *value*, const double * *collb*, const double * *colub*, const double * *obj*, const double * *rowlb*, const double * *rowub*) [virtual]

Just like the other loadProblem() methods except that the matrix is given in a standard column major ordered format (without gaps).

3.70.2.46 virtual void OsiClpSolverInterface::loadProblem (const int *numcols*, const int *numrows*, const CoinBigIndex * *start*, const int * *index*, const double * *value*, const double * *collb*, const double * *colub*, const double * *obj*, const char * *rowsen*, const double * *rowrhs*, const double * *rowrng*) [virtual]

Just like the other loadProblem() methods except that the matrix is given in a standard column major ordered format (without gaps).

3.70.2.47 virtual void OsiClpSolverInterface::writeMps (const char * *filename*, const char * *extension* = "mps", double *objSense* = 0.0) const [virtual]

Write the problem into an mps file of the given filename.

If objSense is non zero then -1.0 forces the code to write a maximization objective and +1.0 to write a minimization one. If 0.0 then solver can do what it wants

3.70.2.48 virtual int OsiClpSolverInterface::writeMpsNative (const char * *filename*, const char ** *rowNames*, const char ** *columnNames*, int *formatType* = 0, int *numberAcross* = 2, double *objSense* = 0.0) const [virtual]

Write the problem into an mps file of the given filename, names may be null.

formatType is 0 - normal 1 - extra accuracy 2 - IEEE hex (later)

Returns non-zero on I/O error

3.70.2.49 virtual void OsiClpSolverInterface::writeLp (const char * *filename*, const char * *extension* = "lp", double *epsilon* = 1e-5, int *numberAcross* = 10, int *decimals* = 5, double *objSense* = 0.0, bool *useRowNames* = true) const [virtual]

Write the problem into an Lp file of the given filename.

If objSense is non zero then -1.0 forces the code to write a maximization objective and +1.0 to write a minimization one. If 0.0 then solver can do what it wants. This version calls writeLpNative with names

3.70.2.50 virtual void OsiClpSolverInterface::writeLp (FILE * *fp*, double *epsilon* = 1e-5, int *numberAcross* = 10, int *decimals* = 5, double *objSense* = 0.0, bool *useRowNames* = true) const [virtual]

Write the problem into the file pointed to by the parameter fp.

Other parameters are similar to those of writeLp() with first parameter filename.

3.70.2.51 virtual void OsiClpSolverInterface::replaceMatrixOptional (const CoinPackedMatrix & *matrix*) [virtual]

I (JJF) am getting annoyed because I can't just replace a matrix.

The default behavior of this is do nothing so only use where that would not matter e.g. strengthening a matrix for MIP

3.70.2.52 virtual void OsiClpSolverInterface::passInMessageHandler (CoinMessageHandler * *handler*) [virtual]

Pass in a message handler.

It is the client's responsibility to destroy a message handler installed by this routine; it will not be destroyed when the solver interface is destroyed.

3.70.2.53 void OsiClpSolverInterface::setCleanupScaling (int *value*) [inline]

Set Scaling option When scaling is on it is possible that the scaled problem is feasible but the unscaled is not.

Clp returns a secondary status code to that effect. This option allows for a cleanup. If you use it I would suggest 1. This only affects actions when scaled optimal 0 - no action 1 - clean up using dual if primal infeasibility 2 - clean up using dual if dual infeasibility 3 - clean up using dual if primal or dual infeasibility 11,12,13 - as 1,2,3 but use primal

Definition at line 1035 of file OsiClpSolverInterface.hpp.

3.70.2.54 double OsiClpSolverInterface::smallestElementInCut ( ) const [inline]

Get smallest allowed element in cut.

If smaller than this then ignored

Definition at line 1039 of file OsiClpSolverInterface.hpp.

3.70.2.55 void OsiClpSolverInterface::setSmallestElementInCut (double *value*) [inline]

Set smallest allowed element in cut.

If smaller than this then ignored

Definition at line 1043 of file OsiClpSolverInterface.hpp.

3.70.2.56 double OsiClpSolverInterface::smallestChangeInCut ( ) const [inline]

Get smallest change in cut.

If (upper-lower)*element < this then element is taken out and cut relaxed. (upper-lower) is taken to be at least 1.0 and this is assumed >= smallestElementInCut_

Definition at line 1051 of file OsiClpSolverInterface.hpp.

3.70.2.57 void OsiClpSolverInterface::setSmallestChangeInCut (double *value*) [inline]

Set smallest change in cut.

If (upper-lower)$*$element $<$ this then element is taken out and cut relaxed. (upper-lower) is taken to be at least 1.0 and this is assumed $>=$ smallestElementInCut_

Definition at line 1059 of file OsiClpSolverInterface.hpp.

3.70.2.58 void OsiClpSolverInterface::setupForRepeatedUse (int *senseOfAdventure* = `0`, int *printOut* = `0`)

Set up solver for repeated use by Osi interface.

The normal usage does things like keeping factorization around so can be used. Will also do things like keep scaling and row copy of matrix if matrix does not change.

`senseOfAdventure:`

- 0 - safe stuff as above
- 1 - will take more risks - if it does not work then bug which will be fixed
- 2 - don't bother doing most extreme termination checks e.g. don't bother re-factorizing if less than 20 iterations.
- 3 - Actually safer than 1 (mainly just keeps factorization)

`printOut`

- -1 always skip round common messages instead of doing some work
- 0 skip if normal defaults
- 1 leaves

3.70.2.59 void OsiClpSolverInterface::setSpecialOptionsMutable (unsigned int *value*) const

Set special options in underlying clp solver.

Safe as const because modelPtr_ is mutable.

3.70.2.60 virtual void OsiClpSolverInterface::applyRowCut (const OsiRowCut & *rc*) `[protected, virtual]`

Apply a row cut (append to constraint matrix).

3.70.2.61 virtual void OsiClpSolverInterface::applyColCut (const OsiColCut & *cc*) `[protected, virtual]`

Apply a column cut (adjust one or more bounds).

3.70.2.62 CoinWarmStartBasis OsiClpSolverInterface::getBasis (ClpSimplex $*$ *model*) const `[protected]`

Warm start.

NOTE artificials are treated as +1 elements so for $<=$ rhs artificial will be at lower bound if constraint is tight

This means that Clpsimplex flips artificials as it works in terms of row activities

3.70.2.63 void OsiClpSolverInterface::setBasis (const CoinWarmStartBasis & *basis*, ClpSimplex ∗ *model*) [protected]

Sets up working basis as a copy of input.

NOTE artificials are treated as +1 elements so for <= rhs artificial will be at lower bound if constraint is tight

This means that Clpsimplex flips artificials as it works in terms of row activities

3.70.3 Friends And Related Function Documentation

3.70.3.1 void OsiClpSolverInterfaceUnitTest (const std::string & *mpsDir*, const std::string & *netlibDir*) [friend]

A function that tests the methods in the OsiClpSolverInterface class.

3.70.4 Member Data Documentation

3.70.4.1 CoinWarmStartBasis∗ OsiClpSolverInterface::ws_ [mutable, protected]

A pointer to the warmstart information to be used in the hotstarts.

This is NOT efficient and more thought should be given to it...

Definition at line 1257 of file OsiClpSolverInterface.hpp.

3.70.4.2 double OsiClpSolverInterface::smallestElementInCut_ [protected]

Smallest allowed element in cut.

If smaller than this then ignored

Definition at line 1274 of file OsiClpSolverInterface.hpp.

3.70.4.3 double OsiClpSolverInterface::smallestChangeInCut_ [protected]

Smallest change in cut.

If (upper-lower)∗element < this then element is taken out and cut relaxed.

Definition at line 1278 of file OsiClpSolverInterface.hpp.

3.70.4.4 CoinWarmStartBasis OsiClpSolverInterface::basis_ [protected]

Warmstart information to be used in resolves.

Definition at line 1284 of file OsiClpSolverInterface.hpp.

3.70.4.5 int OsiClpSolverInterface::itlimOrig_ [protected]

The original iteration limit before hotstarts started.

Definition at line 1286 of file OsiClpSolverInterface.hpp.

3.70.4.6 int OsiClpSolverInterface::lastAlgorithm_ [mutable, protected]

Last algorithm used.

Coded as

- 0 invalid
- 1 primal
- 2 dual
- -911 disaster in the algorithm that was attempted
- 999 current solution no longer optimal due to change in problem or basis

Definition at line 1298 of file OsiClpSolverInterface.hpp.

3.70.4.7 double* OsiClpSolverInterface::linearObjective_ [mutable, protected]

Linear objective.

Normally a pointer to the linear coefficient array in the clp objective. An independent copy when fakeMinInSimplex_ is true, because we need something permanent to point to when getObjCoefficients is called.

Definition at line 1330 of file OsiClpSolverInterface.hpp.

3.70.4.8 int OsiClpSolverInterface::cleanupScaling_ [protected]

Scaling option When scaling is on it is possible that the scaled problem is feasible but the unscaled is not.

Clp returns a secondary status code to that effect. This option allows for a cleanup. If you use it I would suggest 1. This only affects actions when scaled optimal 0 - no action 1 - clean up using dual if primal infeasibility 2 - clean up using dual if dual infeasibility 3 - clean up using dual if primal or dual infeasibility 11,12,13 - as 1,2,3 but use primal

Definition at line 1348 of file OsiClpSolverInterface.hpp.

3.70.4.9 unsigned int OsiClpSolverInterface::specialOptions_ [mutable, protected]

Special options 0x80000000 off 0 simple stuff for branch and bound 1 try and keep work regions as much as possible 2 do not use any perturbation 4 allow exit before re-factorization 8 try and re-use factorization if no cuts 16 use standard strong branching rather than clp's 32 Just go to first factorization in fast dual 64 try and tighten bounds in crunch 128 Model will only change in column bounds 256 Clean up model before hot start 512 Give user direct access to Clp regions in getBInvARow etc (i.e., do not unscale, and do not return result in getBInv parameters; you have to know where to look for the answer) 1024 Don't "borrow" model in initialSolve 2048 Don't crunch 4096 quick check for optimality Bits above 8192 give where called from in Cbc At present 0 is normal, 1 doing fast hotstarts, 2 is can do quick check 65536 Keep simple i.e.

no crunch etc 131072 Try and keep scaling factors around 262144 Don't try and tighten bounds (funny global cuts) 524288 Fake objective and 0-1 1048576 Don't recompute ray after crunch 2097152

Definition at line 1376 of file OsiClpSolverInterface.hpp.

The documentation for this class was generated from the following file:

- OsiClpSolverInterface.hpp

3.71 Outfo Struct Reference

******** DATA to be moved into protected section of ClpInterior

`#include <ClpInterior.hpp>`

3.71.1 Detailed Description

******** DATA to be moved into protected section of ClpInterior

Definition at line 35 of file ClpInterior.hpp.

The documentation for this struct was generated from the following file:

- ClpInterior.hpp