COIN-OR Annual Report 2007

2007 November 1

1 Introduction

The COmputational INfrastructure for Operations Research (COIN-OR) is the premier web site devoted to open-source software for the operations research community. Hosted by INFORMS, the COIN-OR web site is home to twenty-five application projects and a burgeoning community comprised of 2,003 subscriptions from 1,027 unique e-mail addresses. COIN-OR encourages new project contributions by providing an extensive set of tools and infrastructure support for collaborative project development. Since 2004, COIN-OR has been managed by the non-profit educational COIN-OR Foundation.

2 Elected Leadership

The Strategic Leadership Board (SLB) conducts the business affairs of the Foundation, sets the overall strategic direction of the Foundation, and functions as the legal Board of Directors. Members of the Strategic Leadership Board are elected to three-year terms. The following are the current members as well as the year their current term ends:

- Bob Fourer (2008)

- Kevin Furman (2009)

- Lou Hafer (2009)

- Brady Hunsaker (2007), Secretary

- Randy Kiefer (2007)

- Robin Lougee-Heimer (2008)

- Ted Ralphs, as representative of the TLC

- Matthew Saltzman (2007), President

The Technical Leadership Council (TLC) provides the technical direction required to achieve the strategic goals of the Foundation as set by the SLB and sets the technical standards applicable to all Foundation projects. Members of the Technical Leadership Council are elected to three-year terms. The following are the current members:

- JP Fasano (2009)

- Laszlo Ladanyi (2008)

- Leo Lopes (2009)

- Francois Margot (2008)

- Kipp Martin (2008)

- Ted Ralphs (2008)

- Andreas Wächter (2007)

3 Reports from the TLC and SLB

3.1 TLC Accomplishments

- Completely overhauled and updated the project management guidelines.

- Completely overhauled and updated the project submission process.

- Reviewed and accepted 5 new projects.

- Created a mechanism which allows project managers to create static HTML pages for their project separate from the Trac-based project management system. All projects now have two Web addresses, one for the project management page (projects.coin-or.org/ProjName) and one for the static pages (www.coin-or.org/ProjName).

- Created a new XML-based project information system that generates a standardized project information page for each project in real-time from an XML file maintained by each PM. The address of a project's auto-generated information page is www.coin-or.org/projects/ProjName.xml

- Implemented short "installation verification tests" to allow users to quickly test whether the software was installed correctly without having to download a large data set.

- Overhauled and standardized the project mailing list structure.

- Implemented a wide range of improvements to the configuration and build system (BuildTools).

  - System for automatically keeping project configuration scripts synchronized to allow multi-project builds.
  - Support for a wider range of platforms.
  - Tools for automatically creating project releases.

- Creation of and improvements to the CoinHelp wiki.

- Hosted the first ever "COIN-OR bug squashing party." About half a dozen of us met on-line for two solid days of squashing bugs, eliminating compiler warnings and getting the trunks of projects in the repository to build together on a wide range of platforms. We are currently in the process of creating releases from the code generated during the bug squashing party. These will eventually result in the creation of a suite of completely interoperable COIN-OR binaries that will include most projects. An RPM for Linux is also in the works.

3.2 SLB

The SLB coordinates its work through the following standing committees:

- Corporate Relations

- Finance

- Legal Affairs

- Membership

- Outreach

- Web (subcommittee of Outreach)

3.2.1 Corporate Relations

Members: Robin Lougee-Heimer (chair), Bjarni Kristjansson, Randy Kiefer

The Corporate Relations Committee oversees the corporate sponsorship and membership of the COIN-OR Foundation. As shown on http://www.coin-or.org/corporate.html, the 2007 corporate members are IBM, Schneider, and Maximal Software, and the corporate sponsors are GAMS, IBM, ILOG, INFORMS, Maximal Software, and Schneider. We thank these companies for their vital support and leadership in promoting open-source for OR. We continue to learn of corporations using COIN-OR in their research, operations, and products. The Corporate Relations Committee seeks volunteers to develop closer ties with our corporate community members. To volunteer, send a note to the current Chair at robinlh@us.ibm.com. Corporate Sponsorship is needed to sustain the growth of COIN-OR, as we look to expand the capacity of our server to provide greater and more reliable service.

3.2.2 Finance

Members: Ted Ralphs (Treasurer and chair), Brady Hunsaker

The Foundation's account balance as of 10/31/06 was $10,138.51. Over the past year, we have received $1258.70 in contributions, including a $1000 sponsorship from GAMS for which we are extremely grateful! Our estimated outlays for the year are approximately $1200. This is only an estimate based on last year's expenditures because bills related to INFORMS are not all in yet. Major expenditures for the year included legal fees (filing taxes) and INFORMS expenses. This should leave us with approximately the same balance this year as last year.

3.2.3 Legal Affairs

Members: Ted Ralphs (chair), Bob Fourer, Lou Hafer, Robin Lougee-Heimer, Matt Saltzman

Legal Affairs, and the SLB as a whole, have spent considerable time and effort over the past year exploring the intricacies of open-source ownership and licensing, with the goal of developing a policy for documenting the provenance of the software hosted by COIN-OR. The problem is difficult, with conflicting demands from stakeholders, and progress has been slow. The Foundation has had informal discussions with intellectual property lawyers. Most recently, it has entered into a representation agreement with the Software Freedom Law Center.

3.2.4 Membership

Members: Lou Hafer (chair), Robin Lougee-Heimer, Brady Hunsaker

In its annual burst of Fall activity, the Membership Committee has welcomed six new full members in recognition of their substantial contributions of individual time and effort to the activities of COIN-OR projects. There are now a total of 54 full members of COIN-OR. In spite of a complete absence of reminders, 11 associate members have renewed over the past year, and we hope to improve on this with a timely reminder for the INFORMS 2007 meeting in November in Seattle.

3.2.5 Outreach

Members: Robin Lougee-Heimer (chair), Bob Fourer, Bjarni Kristjansson, Brady Hunsaker, Matt Saltzman

The Outreach Committee is responsible for coordinated evangelism at COIN-OR. In 2007, we continued past traditions (e.g., the COIN-OR Cup) and experimented with new ideas (e.g., an Annual Report). Participating in Outreach is an easy way to support COIN-OR, and can be as simple as sitting at the COIN-OR

booth at a conference for a few minutes to share your personal experience, ordering the chocolate coins we give away, or presenting the "intro to COIN-OR" materials at a meeting you're already attending. The Outreach Committee seeks new members to help us expand our reach and better reflect our diverse community. We welcome you to join us by sending a note to the current Chair at robinlh@us.ibm.com. The Outreach Committee Accomplishments in 2007 include the following.

- Conferences - see below.

- COIN-OR Cup - see below.

- Strategic Partnership with ICS - see below

- Member and Users Meetings

- ORMS Today articles

- Annual Report

- info@coin-or.org

4   Project List

Bonmin Basic Open-source Nonlinear Mixed INteger programming, an experimental C++ code for solving general mixed-integer nonlinear programming problems,

Branch-Cut-Price Framework a parallel branch-cut-price framework,

BuildTools Unix developer tools and documentation

CoinMP a Windows DLL solver with a C-API interface to COIN-OR LP, COIN-OR Branch and Cut, and the Cut Generation Library,

COIN-OR Binary Distributions pre-compiled binary distributions of COIN-OR projects

COIN-OR Branch and Cut a library for creating branch and cut algorithms, which together with COIN-OR LP and the Cut Generation Library forms a stand-alone mixed-integer linear solver.

COIN-OR Graph Classes a collection of network representations and algorithms

COIN-OR LP a linear program solver,

CoinUtils COIN-OR utilities library,

CoinWeb Web services for COIN-OR projects

COPS COIN-OR Open Parallel Search Framework

CppAD a tool for differentiation of C++ functions

CSDP library for semidefinite programming

Cut Generation Library a collection of algorithms to generate cutting planes,

Derivative-Free Optimization a package for solving general nonlinear optimization problems when derivatives are unavailable,

DyLP an implementation of the dynamic simplex algorithm

FLOPC++ an algebraic modeling language embedded in C++

GAMSlinks links between GAMS and open source solvers

IPOPT an interior point algorithm for general large-scale nonlinear optimization,

Lagrangian Global Optimizer global optimization of nonconvex mixed-integer programs

MSVisualStudio tools for building various COIN-OR projects using Microsoft Visual Studio compilers

Non-Linear Program Application Programming Interface subroutine interface for defining and solving non-linear programming problems,

Open Solver Interface a uniform subroutine interface for callable solver libraries,

Open Tabu Search a framework for creating tabu search algorithms,

Stochastic Modeling Interface an interface for optimization under uncertainty,

SVM-QP Support Vector Machine Quadratic Programming,

SYMPHONY a callable library for solving mixed-integer linear programs, and

Volume Algorithm a generalization of the subgradient method which produces approximate primal solutions as well as dual solutions.

The projects above reflect the interests of the individuals who have participated to date. The volunteers running COIN-OR and its projects continually strive to improve overall quality, documentation, ease of use, and robustness. The level of success in achieving these goals varies by project and depends on the support received from the community. New projects that reflect the broad interests and needs of the OR community, such as resources for visualization, data mining, simulation, constraint programming, statistics, forecasting, spreadsheets, and more, are welcome.

4.1   New Projects

Five new projects were added in 2007.

- COIN-OR Graph Classes by Philip Walton (Junction Solutions, Inc). COIN-OR Graph Classes (CGC) is a collection of network representations and algorithms to facilitate the development and implementation of network algorithms. Representations of graphs and the algorithms which act on the graphs are not tied together. The template based design allows some mix and match of graph representation to graph algorithm. It uses common STL-like iteration patterns for navigating through the graph for ease of development for those familiar with C++ concepts. The graph representations are as compact as possible without sacrificing time complexity or flexibility. A few graph representations (array based and set based) are supplied and many algorithms (shortest paths up to min cost flow algorithms) are supplied as part of the library.

- GAMSlinks: by Stefan Vigerske (Humboldt-University Berlin), Michael Bussieck (GAMS Software GmbH), and Steven Dirkse (GAMS Development Corporation). The GAMSlinks project is devoted to the development of links between the proprietary GAMS package (http://www.gams.com) and the open-source solvers and interfaces. The links are made public under the Common Public License (CPL). Currently, links to the following open-source solvers are supported, with more to come: Based on the COIN-OR Open Solver Interface (OSI), we have developed links to the COIN-OR Branch and Cut Solver (CBC) which includes the COIN-OR Linear Programming Solver (CLP), both from John Forrest, and to the GNU Linear Programming Kit (GLPK), from Andrew Makhorin. Further, links to the nonlinear programming solver Interior Point Optimizer (Ipopt) from Andreas Waechter and the mixed-integer nonlinear programming solver Bonmin from Pierre Bonami et.al. are available. With the latest GAMS release, all these solvers are also distributed free of charge in binary form for Linux

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and Windows. Next to the developing of interface, the GAMSlinks project also helps developers to link their solvers to GAMS by themselves, and hence enables access to performance tools and large libraries of GAMS models (http://www.gamsworld.org) useful for development, testing, quality assurance, and benchmarking. The GamsModel class provides all necessary methods to read a mixed-integer linear model from GAMS, to process an option file, and to return the solution to GAMS.

- LaGO by Stefan Vigerske (Humboldt-University Berlin) and Ivo Nowak (formerly at Humboldt-University Berlin). The Lagrangian Global Optimizer (LaGO) is a software package for the global optimization of nonconvex mixed-integer nonlinear programs (MINLP) written by Ivo Nowak and Stefan Vigerske (Humboldt-University Berlin). LaGO comes with a GAMS and an AMPL interface and is capable of working with black-box formulations of the functions defining the MINLP. Only methods for the evaluation of function values, gradients, and Hessian-vector-multiplications, and information about sparsity of the functions must be provided. LaGO implements an extended Branch and Cut algorithm. In the preprocessing, every function is reformulated into a block-separable form and convex envelopes are computed for each term separately. For that purpose, nonquadratic functions are first replaced by quadratic underestimators using a powerful heuristic. Quadratic functions are then replaced by convex alpha-underestimators as introduced by Adjiman and Floudas (1997). Finally, a linear outer approximation is constructed by linearization of the convex relaxation and generation of mixed-integer rounding cuts (using one of the COIN-OR Cut Generators). The efficiency is further improved by the application of two box reduction techniques. A reimplementation of LaGO's core techniques has been started, aiming at making the solver more flexible and easier to integrate with other COIN-OR projects (esp. Bonmin).

- OBOE by Jean-Philippe Vial, Alain Haurie, Nidhi Sawhney (University of Geneva). The Oracle Based Optimization Engine (OBOE) is an implementation of the Analytic Center Cutting Plane Algorithm whose goal is to solve convex (non-differentiable) problems using only subgradient information. OBOE is written in C++ and can be considered as a production project for use by third parties. It has been developed over the last fifteen years at the University of Geneva and is available under the Common Public License.

- OS by Robert Fourer, Jun Ma (Northwestern University), and Kipp Martin (University of Chicago). Optimization Services (OS) is a new COIN-OR project designed to provide a set of standards for representing optimization instances, results, solver options, and communication between clients and solvers in a distributed environment using Web Services. Initial components of the project include the following:

  - XML-based standards for representing optimization instances (OSiL) and optimization results (OSrL).
  - Open-source C++ libraries for reading and writing OSiL and OSrL, with matching C++ libraries to provide a robust solver and modeling-language interface for linear and nonlinear optimization problems.
  - A command-line executable `OSSolverService` for reading problem instances (in OSiL and other formats) and calling a solver either locally or on a remote server.
  - Utilities that convert AMPL `nl` files and standard MPS files into the OSiL XML format.
  - An executable program `amplClient` that facilitates using OS in conjunction with the AMPL modeling language.
  - Server software for setting up a remote optimization solver service that works with Apache Tomcat and Apache Axis.

4.2 Established Projects Evolve

Established projects continued to evolve thanks to many people in the user and developer communities.

Bonmin

The main news for Bonmin this year is its inclusion in GAMS release 22.5 through Stefan Vigerske (GAM-Slinks project). Pierre Bonami has been working on new html documentation. It is not fully complete yet but he hopes it will be fully ready by the INFORMS Meeting.

BuildTools

- Support for Glpk (Gnu Linear Programming Kit) as a third-party package.

- Full support for both Studio and GCC compilers in the Sun Solaris / SPARC environment, and improved support for the Solaris / x86 environment. The Sun Studio IDE and compilers are available as a free download from Sun Microsystems.

- Improved support for the Microsoft cl C/C++ compiler in the Msys, MinGW, and Cygwin environments. The cl compiler is included in Microsoft Visual Studio Express, a stripped-down version of Microsoft Visual Studio available as a free download from MicroSoft?.

- Easy-to-use support for Netlib's Fortan-to-C (f2c) translator, allowing Windows users to compile Fortran 77 code with the Microsoft cl compiler.

COIN-OR Binary Distributions

A new binary for the CBC project was created and posted thanks to Bob Entriken (Electric Power Research Institue). A DLL file and extra library and include files to create your own light-weight CBC application are included. Entry into CBC is available from standard C and C++ interfaces.

There are plans to create a yum-based binary distribution of many COIN-OR projects by Seattle. Yum is a package management system for rpm-based distributions (e.g., Red Hat, Fedora)

COIN-OR Branch and Cut (CBC)

- Lots of general improvements have been made, the outstanding one being shared memory parallel—ideal for your dual CPU laptop.

- An up-to-date CBC is included as a free mixed-integer programming solver in the GAMS distribution, thanks to the COIN-OR GAMSlinks project.

- Mathematica can now use CBC. Contact Yifan Hu.

COIN-OR Linear Programming Solver (CLP)

- An up-to-date CLP is included as a free linear programming solver in the GAMS distribution, thanks to the COIN-OR GAMSlinks project.

- Mathematica can now use CLP.

- CLP is available through freebsd.org thanks to Robin Schilham (affiliation?)

COIN-OR Open Parallel Search Framework (COPS)

The parallel performance of the ALPS component of COPS has been improved significantly due to dynamic parameter adjustment and a new static load balancing scheme for problems with long node processing time. Stable version 1.0 of ALPS, 0.9 of BiCePS, and 0.9 or BLIS have been been released.

A parallel Vehicle Routing Problem solver has been added to the COPS project. The VRP solver is built on top of the BLIS component of COPS and can be used to solve the classic capacitated VRP, as well as the TSP. The TSP solver, comprised entirely of COIN software, recently won the first Open Contest of

Parallel Programming at the 19th International Symposium on Computer Architecture and High Performance Computing.

Cut Generation Library (CGL)

A new residual capacity cut generator, CglResidual, was contributed by Francisco Barahona. There are now 17 different cut generators available for use in teaching, research, and business.

CppAD

The CppAD tool for automatic differentiation of functions now can be used with OpenMP. OpenMP (Open Multi-Processing) is an application programming interface that supports multi-platform shared memory multiprocessing programming in C/C++ and Fortran on many architectures, including Unix and Microsoft Windows platforms. The portable, scalable OpenMP model gives programmers a simple and flexible interface for developing parallel applications for platforms ranging from the desktop to the supercomputer.

CSDP

In 2007, two new papers appeared that used CSDP to solve SDP problems in their research projects. The complete list of publications in which CSDP has been used can be found on the project's wiki.

Several speakers at the 2007 International Conference on Continuous Optimization (ICCOPT) used CSDP to obtain computational results presented at the conference.

FLOPC++

It is planned to enhance FLOPC++ with modeling support for Multi-Stage Stochastic Linear Programs with Recourse. With the planned new features, a SLP can be modeled in the same way as a non-stochastic LP, except that one or more of the data items are specified to be stochastic and that one of the index sets is designated (by using MP_stage instead of MP_set) to define the stages of the model. As a first step in the development, FLOPC++ should be able to generate the deterministic equivalent problem, later it should be able to populate an SMI object instead. It is not likely that the new enhancements will be fully mature by November, but some basic functionality is expected to be ready for users to try out.

IPOPT

- A MATLAB interface to IPOPT was added thanks to a contribution by Peter Carbonetto (University of British Columbia).

- Visual Studio support was incorporated into IPOPT for the free MSVS Express C++ compiler (cl), also allowing compilation for Fortran 77 code (e.g., Blas, MA27) with Netlib's Fortran-to-C compiler (f2c).

- IPOPT is now included as a free NLP solver in the GAMS distribution, thanks to the COIN-OR GAMSlinks project.

Open Solver Interface

- OsiGlpk has been updated to take advantage of new capabilities in glpk releases up to glpk v4.22.

- The OSI base class now provides long-overdue support for a problem's original row and column names.

- More bug fixes than any of the developers would like to admit. Lots of new capabilities in the OSI base class.

SYMPHONY

SYMPHONY has had two point releases over the past year. Most recently, version 5.1.5 has been released. Details of what's new in each release are on the SYMPHONY wiki. We are currently preparing for a release 5.2, which will include new primal heuristics, improved warm starting procedures, hooks to a new visualization engine, and more.

5 User Reports

One of COIN-OR's lofty goals is to accelerate the adoption of state-of-the-art models, algorithms, and computational research. The following new-user reports, listed in alphabetical order of the contributor, indicate continuing progress.

- My name is Mustafa Baz. I am a PhD student in the Department of Industrial Engineering at the University of Pittsburgh. I study automated tuning of optimization parameters and use CBC in this research.

- Robert Harder teaches Operations Research in the Computer Science department at the Air Force Academy where the OR undergraduate degree is split among four departments: computer science, math, economics, and management. Each year the students take on several OR-related projects in the community, provide insightful analysis, and often provide a custom tool to provide repeatable analysis after they've graduated.

- Larry Biegler is in the Chemical Engineering Department at Carnegie Mellon University and researches optimization applications for chemical process design, control, and operations. His group is very interested in further development of COIN-OR tools, in particular IPOPT, bonmin and CBC for these problem classes.

- I am Lijian Chen. I was working with Dr. Tito Homem-de-Mello to develop algorithms to solve the large scale stochastic programming models. Right now, I am working as an assistant professor in the University of Louisville. I get to know COIN-OR program since late 2004 and I love it almost instantly. I and my student are currently using COIN-OR libraries on the research of financial planning, risk management and logistics. All my research papers' numerical results are based on this wonderful open source code.

- SmartFolio (www.smartfolio.com) is an Excel-based asset allocation, portfolio optimization and risk management software sold by Modern Investment Technologies Ltd. SmartFolio contains a wide range of advanced optimization criteria, most of which result in general nonlinear programing problems, as well as more traditional quadratic programming portfolio optimization problems. To successfully address these problems, SmartFolio uses Ipopt 3.0.1. Boris Gnedenko, Managing Director of Modern Investment Technologies Ltd., said Ipopt was selected for being far more stable and several orders faster than standard Excel solvers.

- Hello to all free and open source people out there, I am a PhD student in Management Science, working towards a dissertation in supply chain optimization. I am a fan of Free/Libre/Open-Source Software(FLOSS). I use FLOSS on my personal computers, and doing my best to spread the word of mouth and to have them installed on public computers at school. I would be so happy to see our school using FLOSS alternatives to the software it is currently using. It is my belief that such a movement would benefit the community in many ways. Currently, I have to use MPL and Cplex combination but looking forward to switch to FLOSS alternatives such as GNU Math Prog language, GLPK and relevant COIN-OR projects. I am pretty busy currently with my dissertation work, however it is among my wish list to create Debian and/or Ubuntu packages for the COIN-OR projects and to maintain these projects for Debian and Ubuntu GNU distributions. I believe that COIN-OR is filling an enormous gap

in Operations Research. Thank you for your great work! Baris Hasdemir, Department of Operations Management, Isenberg School of Management, University of Massachusetts, Amherst.

- My name is Heesu Hwang working for TransSolutions,LLC as an associate. I have been using COIN-OR resources since 2004 starting with my Ph.D., and I think COIN-OR is an invaluable and unique community contributing a lot to those who want to learn and do research.

- Mahmuda Naznin writes, "Hi, I just finished my Ph.D. in Computer Science from Department of Computer Science and Operations Research, North Dakota State University (NDSU), USA, Fall 2007. I will continue my work as Assistant Professor in Department of Computer Science and Engineering (CSE), Bangladesh Engineering and Technology (BUET), Dhaka, Bangladesh from October, 2007. I am working on network management and optimization model, specially for sensor network. COIN-OR is a very useful site for my research. Specially open source codes are helpful."

- The Systems Biology Markup Language Ordinary Differential Equations Solver Library (SOSlib, www.tbi.univie.ac.a is a programming library and a command-line application for symbolic and numerical analysis of a system of ordinary differential equations derived from a chemical reaction network encoded in the Systems Biology Markup Language. As part of their parameter estimation, SOSlib uses IPOPT.

- Rolf Steenge (Royal Dutch Airlines/Air France) is using CBC for solving all kinds of airline timetable problems, i.e. mostly network problems with side constraints. CBC is embedded in a graphical user interface with the flights displayed as a Gantt chart. The applications are standalone Windows/XP and all the data is available on the PC (no servers, internet, etc.) Everybody is very enthusiastic about the progress Coin has made in the last year. Also, the level of support is excellent. Maybe we will need a network solver and then apply Lagrangian relaxation for problems which are too large for CBC to solve. The network solver should be such that it operates with floating point objective function coefficients and should be able to start from a previous solution with minor modifications in the objective function (as modified by the lagrangian multipliers).

- Cindy Phillips at Sandia National Labs has been using COIN-OR for a long time. They've been doing some cool things with the Vol code this year.

- Yahoo! Inc. (www.yahoo.com) is one of the world's largest global online networks of integrated services and advertising on the Web is big business. Ralphe Wiggins and John Tomlin (Yahoo Research) formulated an optimization model for setting bid levels in auctions for placement of certain types of graphical advertisements on web pages. Their model is non-convex, but they were able to obtain optimal or near-optimal solutions rapidly using the COIN-Or Cut and Branch Solver. Zoe Abrams, Ofer Mendelevitch, and John Tomlin (Yahoo Research) used the COIN-OR Linear Program Solver in the column-generation scheme described in "Optimal delivery of sponsored search advertisements subject to budget constraints" which appeared in the Proceedings of the ACM Conference on Electronic Commerce (EC'07).

- Stefan Vigerske is a research associate at the Department of Mathematics at the Humboldt University Berlin. He is using COIN-OR projects for research in global optimization (MINLP) and in stochastic programming (Benders decomposition). What he would like to see next from COIN-OR is a new release of Bonmin (which prerequires a new release of CBC).

- Stefan Wild is a PhD student at the School of Operations Research and Information Engineering at Cornell University. Within COIN-OR he predominantly uses DFO for his research on optimization of computationally expensive functions.

- Wei Yang is a graduate student at department of industrial engineering of Dalhousie University. She uses COIN-LP as a main tool to implement my algorithm based on primal and dual simplex method for my research.

- My name is Alex Weissensteiner. I'm working on "Life-Cycle Asset Allocation" and "Cash Management" using SLP (CLP is my solver) at the University of Innsbruck. I use the CLP solver for research and teaching!

6   COIN-OR Conference Activities

A variety of activities involving COIN-OR occurred at following conferences during 2007.

- OR2007
- 11th Stochastic Programming Conference
- ICCOPT II & MOPTA-07
- INFORMS International Puerto Rico 2007
- EURO XXII
- 10th INFORMS Computing Society Conference
- INFORMS Annual Meeting

INFORMS Annual Meeting

The technical program included an invited cluster on COIN-OR, co-sponsored by the INFORMS Computing Society. More talks on COIN-OR related projects were held in other tracks. COIN-OR had a presence in the exhibit area, thanks to the generosity of INFORMS. The six-session cluster organized by Brian Borchers (New Mexico Tech)highlighted an array of open-source efforts that are underway in research, business, and government. The sessions were as follows.

- Free Open-source Software for Operations: An Introduction to COIN-OR
- Interfacing to COIN-OR
- New COIN-OR Projects
- Optimization Services and Third Party Software
- Open Source MIP Solvers
- Comparisons of State-of-the-art Linear Math Programming

7   2007 COIN-OR INFORMS Cup Competition

The third annual COIN-OR INFORMS Cup Competition—the "most coveted prize in computational OR"—was held in conjunction with INFORMS Annual Meeting in Seattle. The Cup Chair, Brad Bell (University of Washington), will award the cup in a ceremony Monday, November 5th.

8   Strategic INFORMS Computing Society Partnership

The COIN-OR Foundation and the INFORMS Computing Society (ICS) formed a strategic partnership in 2006 to further their mutual goals. ICS has been a strong supporter of COIN-OR since its beginning in 2000, co-sponsoring conference tracks and sessions. As a strategic partner, COIN-OR news contributed by Robin Lougee-Heimer (IBM) appeared in the semi-annual ICS newsletters and the monthly e-news mailings. Lou Hafer (Simon Fraser University) presented an update on COIN-OR at the ICS Business Meeting in November.