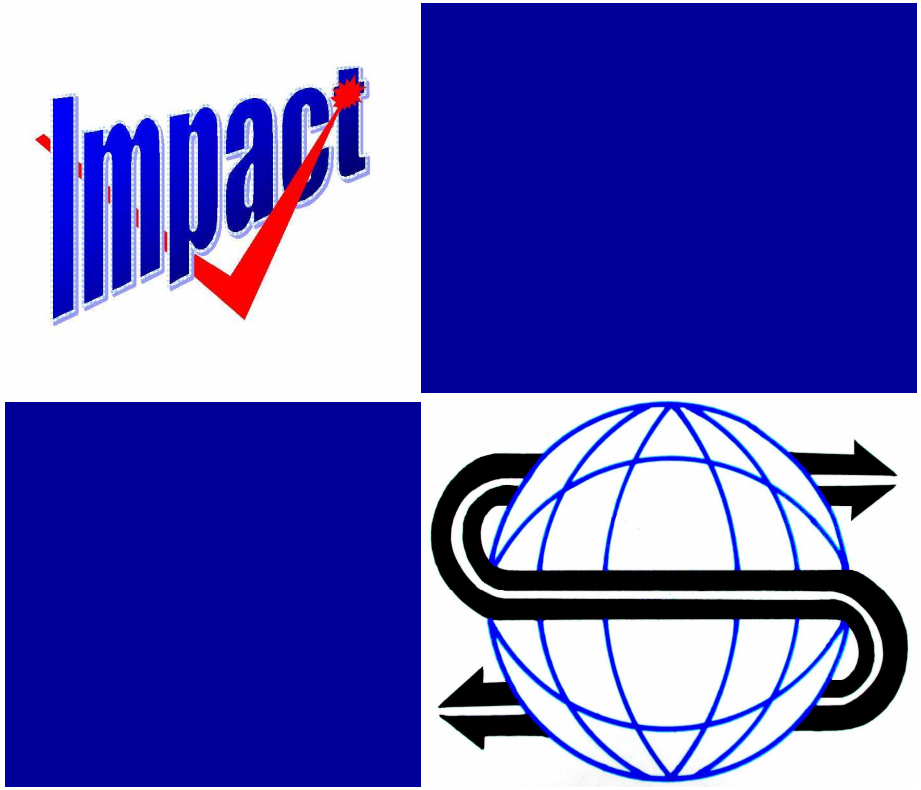


IMPACT Solver for Optimization Services

Huanyuan(Wayne) Sheng

Joint work with Professor Sanjay Mehrotra and Jun Ma

Outline

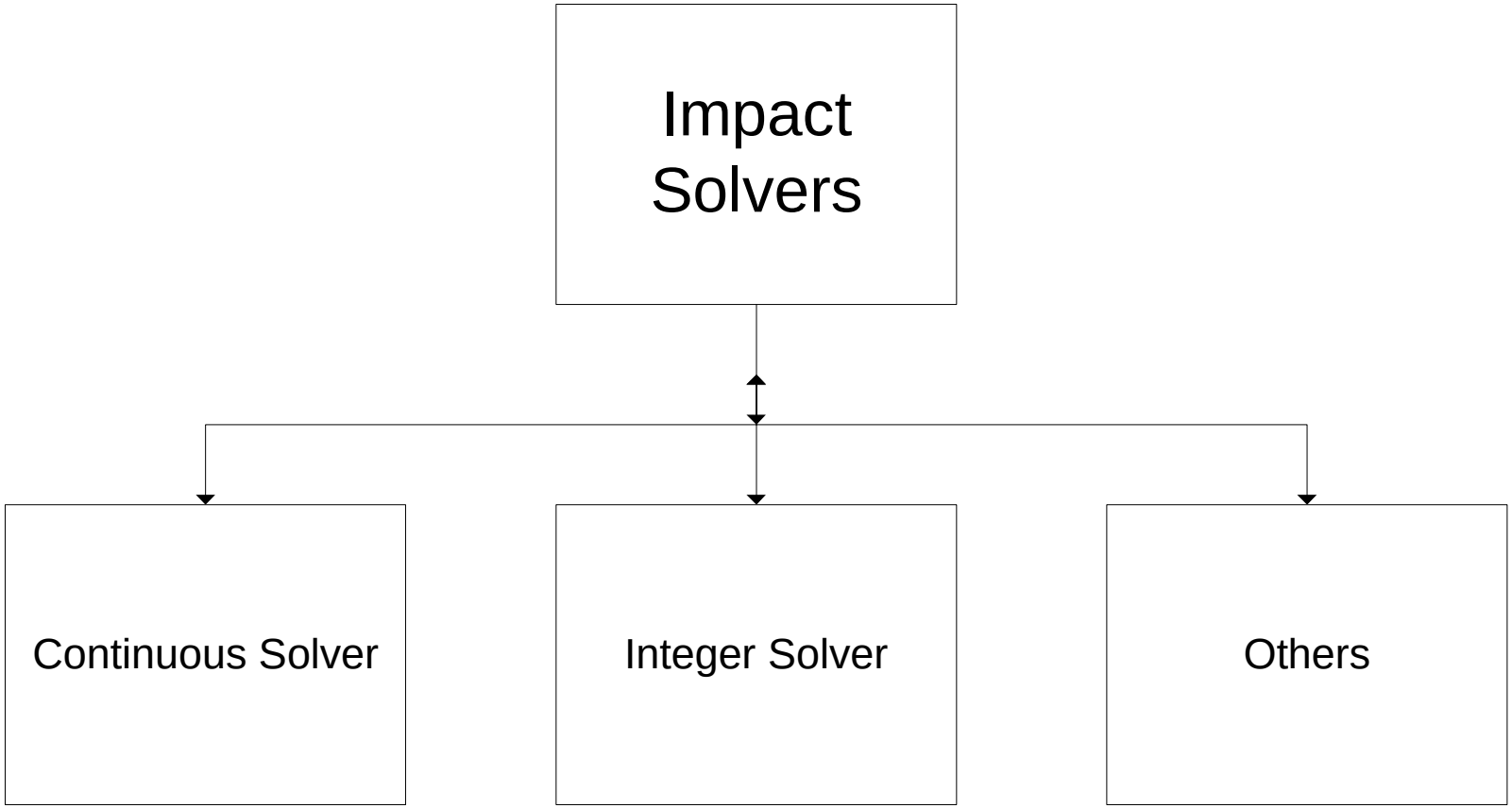
- Brief Introduction
- Impact Solver Design
- Impact Solver Features
- Conclusion

IMPACT -- **I**ntegrated **M**athematical **P**rogramming **A**dvanced **C**omputational **T**ools

- Comprehensive computational packages.
- Mathematical programming algorithms testing code.
- Web services based solver tool.

Impact Solver

General Design

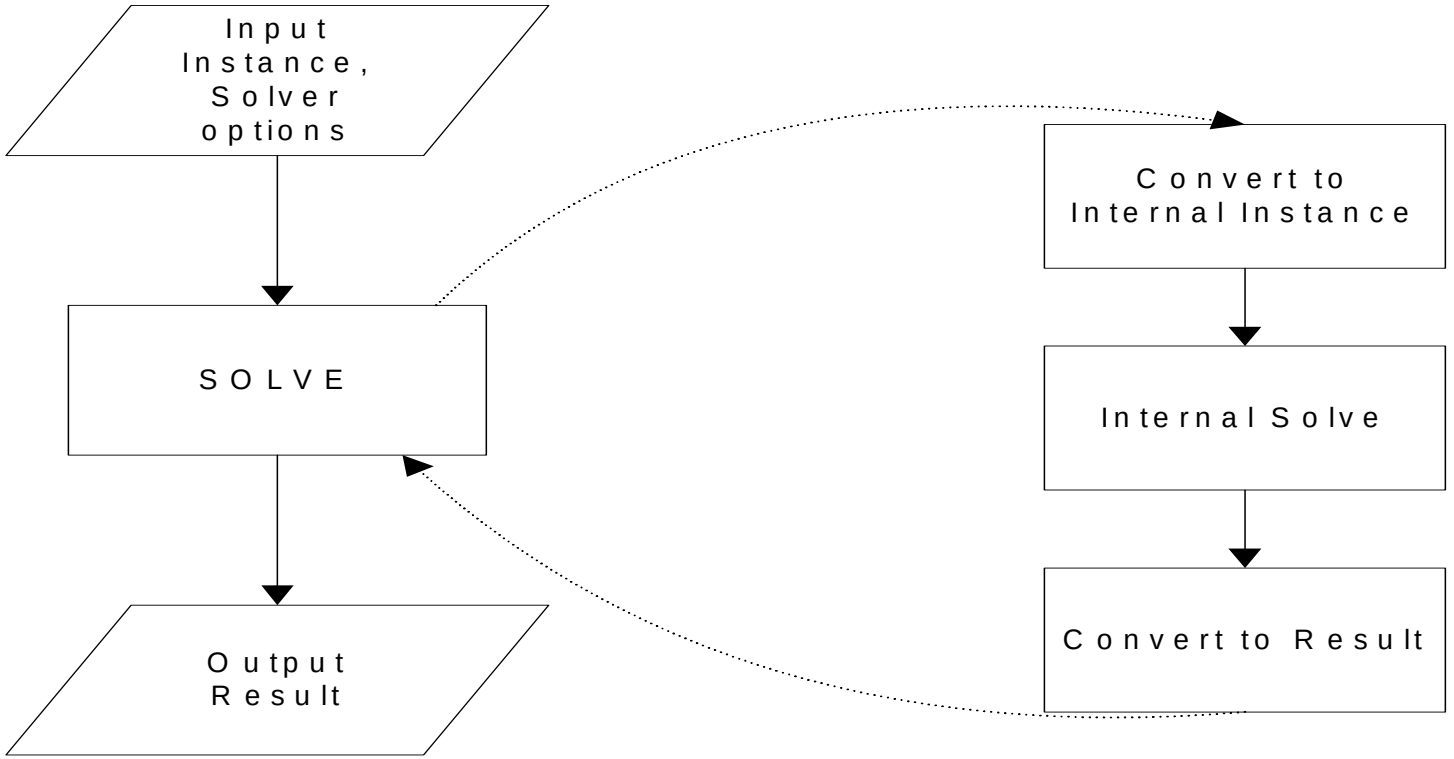


Impact Solver
General Design

- Extension of OSSolver
- Unified input and output interface
- Self contained and highly customized internal routines.

Impact Solver

General Design



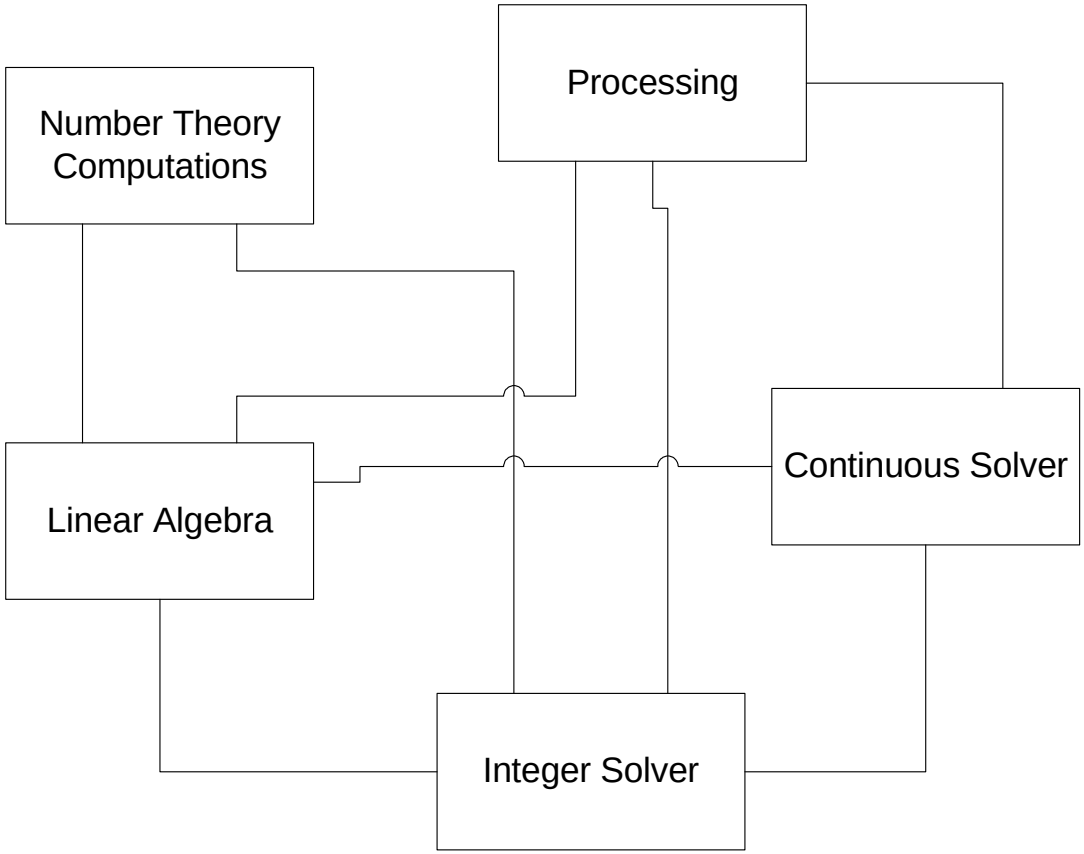
Impact Solver Features

- Impact Solver Service
  - solve, getJobID, send, retrieve, kill, knock functions
  - Callable from client agent implemented in any language on any platform, e.g. C/C++, Java, .net
- Impact Standalone Modules
- Impact Algorithms

Impact Solver Features

Standalone Functions

- Modules



Impact Solver Features

Algorithms

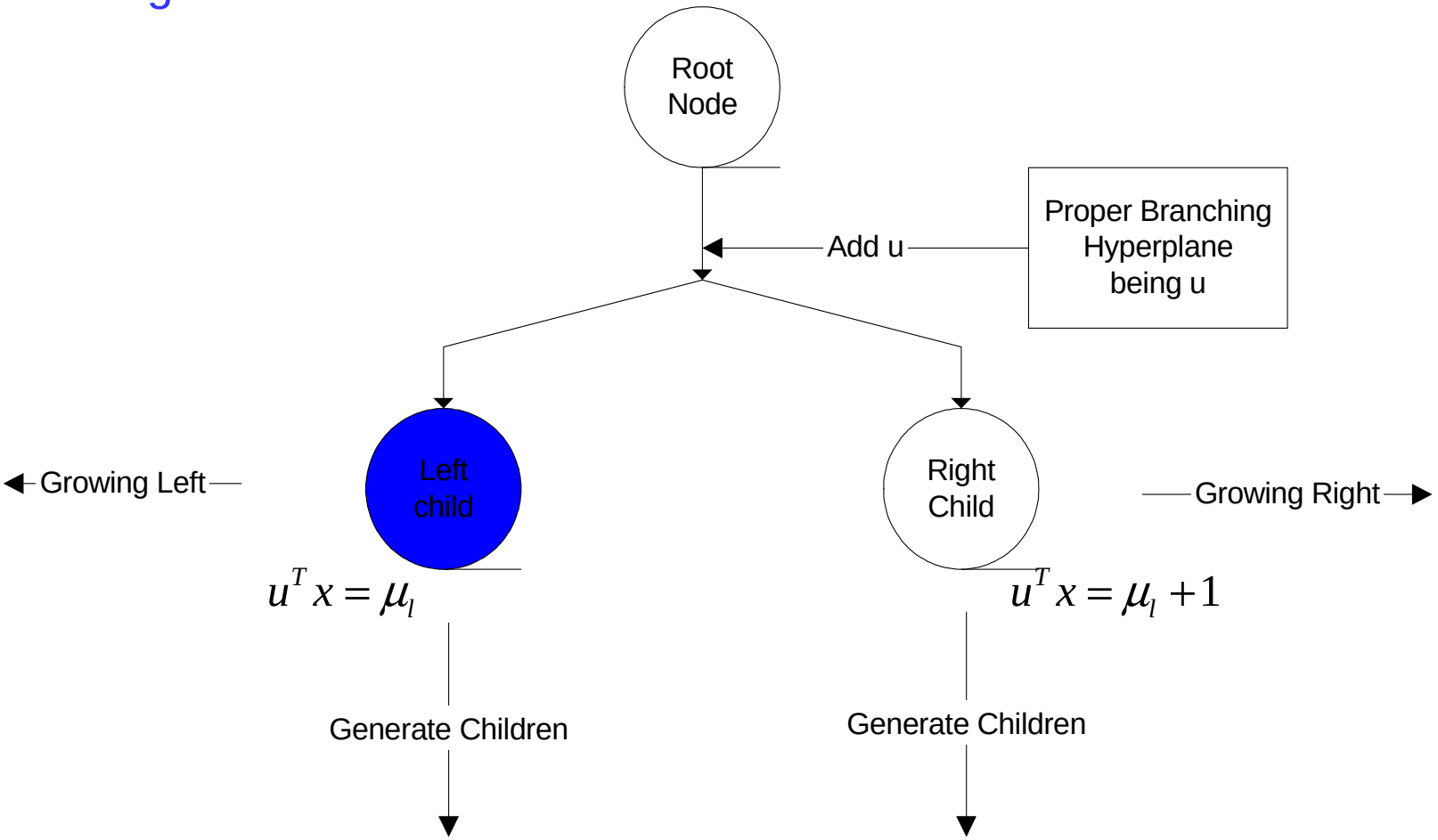
- Research Focus
  - Mixed Integer Nonlinear Programming
  - Parallel computing for MINLP
- Algorithm Studies
  - Heuristics for generalized branch and bound methods
  - Web service based distributed parallel, e.g. communications, load balance handling.

    (See talk On Implementing a Parallel Integer Solver Using Optimization Services)

Impact Solver Features

Algorithms

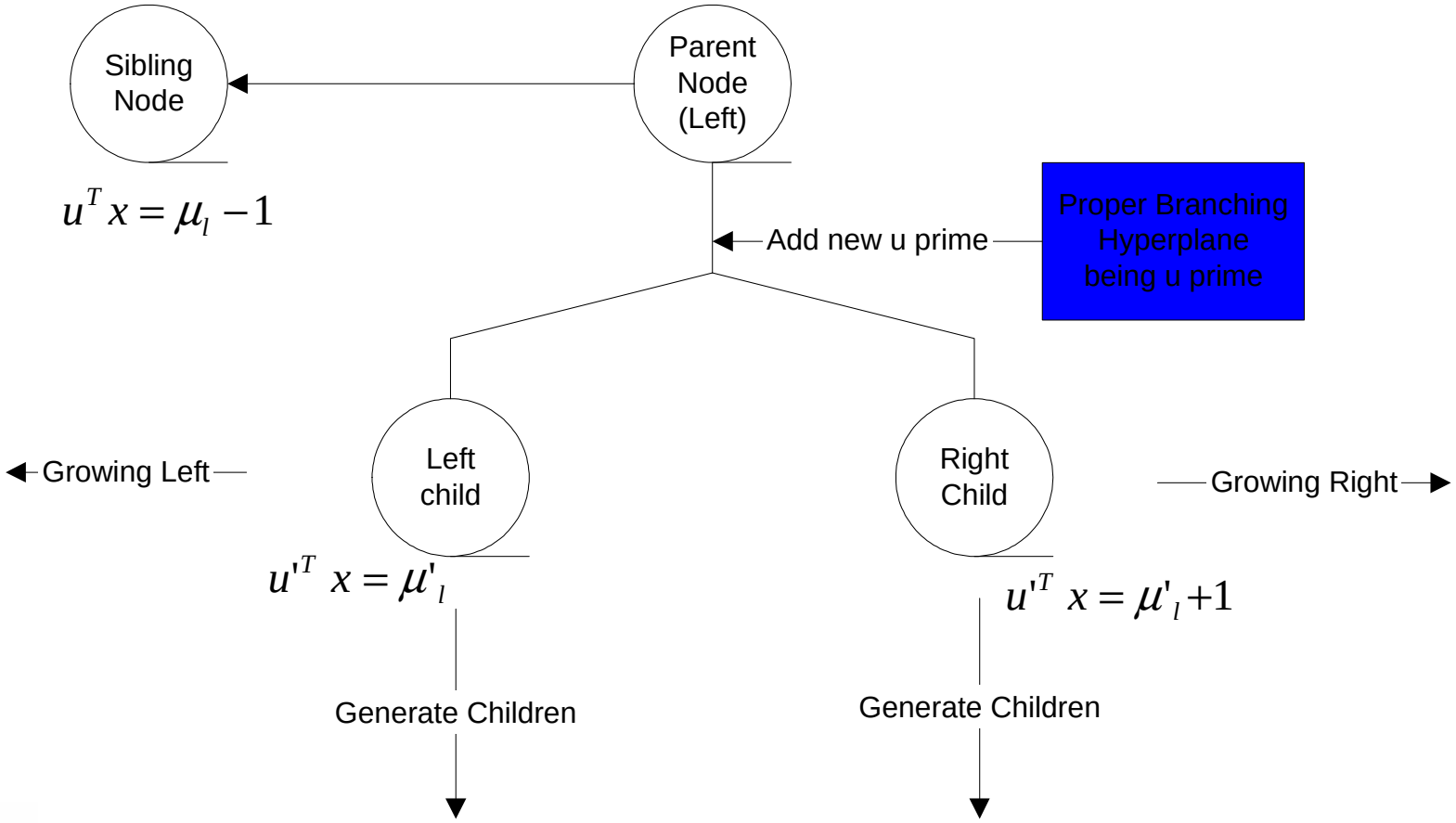
- Starting Node



Impact Solver Features

Algorithms

- Subsequent Node



Impact Solver Features

Algorithms

- Generate Proper Branching Hyperplanes
  - Basis Reduction Based (Mehrotra and Li)
    - LLL
    - GBR
  - Heuristics (ongoing)

Conclusion

- Impact Solver Service is natively OS-Compatible.
  - Impact solver is a scalable platform for testing research algorithms.
  - Impact Solver is a web service based solver tool.
- Novel branch and bound approaches for MINLP are studied by using Impact solver service framework.
- Parallel computing for integer programming is being developed under Impact and OS framework.

Huanyuan Sheng, Sanjay Mehrotra and Jun Ma
Impact Solver for Optimization Services, November 8, 2006