COIN OR Project
(Computational Infrastructure for Operations Research)

Dimitris Dimou
Alexandros Zigouris

University of Patras

mijuomij@gmail.com

April 9, 2016

Overview

Installation

1. svn co https://projects.coin-or.org/svn/Clp/stable/1.16 coin-Clp
2. cd coin-Clp
3. ./configure -C
4. make
5. make test
6. make install
7. make doxydoc

Background

Clp is written in C++ and is released as open source code under
the Eclipse Public License (EPL). It is available from the COIN-OR
initiative. The code is written primarily by John J. Forrest, now
retired from IBM Research. The project is currently managed by
John Forrest, Julian Hall, and the rest of the Clp team.
The latest stable version is 1.16.

Basic model classes

The top three levels of the hierarchy are depicted in the figure below. The first two levels (i.e. ClpModel, ClpSimplex, ClpInterior) contain all the problem data which define a model (that is, a problem instance). The third level contains most of the algorithmic aspects of CLP.
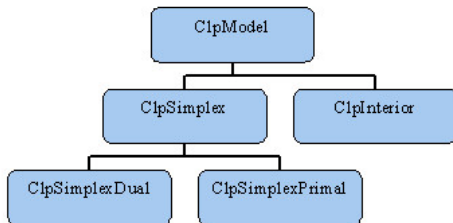
Load model

- ▶ Load from matrix

```
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)
```

- ▶ Load from MPS file

```
int ClpModel::readMps (const char *filename,
                       bool keepNames = false,
                       bool ignoreErrors = false)
```

- ▶ Load from GMPL file

```
int ClpModel::readGMPL (const char *filename,
                        const char *dataName,
                        bool keepNames = false)
```

MPS format

```
   NAME              DOVETAIL
ROWS
 N    obj
 L    c1
 L    c2
 L    c3
 L    c4
COLUMNS
    MARK0000    'MARKER'                'INTORG'
    x1          obj              3      c1              1
    x1          c2               3      c3              1
    x2          obj              2      c1              1
    x2          c2               1      c4              1
    MARK0001    'MARKER'                'INTEND'
RHS
    RHS         c1               9      c2             18
    RHS         c3               7      c4              6
BOUNDS
 LO BND         x1               0
 LO BND         x2               0
ENDATA
```

```cpp
#include "ClpSimplex.hpp"

int main (int argc, const char *argv[])
{
  ClpSimplex  model;
  int status;
  if (argc < 2)
    status=model.readMps("dovetail.mps");
  else
    status=model.readMps(argv[1]);
  if (!status) {
    model.primal();
  }
  return 0;
}
```

Solution inspection

- ▶ double *   model.primalColumnSolution();
- ▶ double *   model.primalRowSolution();
- ▶ bool   model.isProvenOptimal();
- ▶ bool   model.isProvenPrimalInfeasible();
- ▶ bool   model.isProvenDualInfeasible();
- ▶ bool   model.isIterationLimitReached();

Other useful methods

Set methods

- ▶ model.setMaximumIterations(int value);

- ▶ model.setMaximumSeconds(double value);

- ▶ model.setDualBound(double value);

- ▶ model.setOptimizationDirection(double value);

Get methods

- ▶ model.numberRows();

- ▶ model.numberColumns();

- ▶ model.objectiveValue();

- ▶ model.objective();

Pivot choices

- ClpPrimalColumnPivot
  - ClpPrimalColumnSteepest
  - ClpPrimalColumnDantzig
- ClpDualRowSteepest
  - ClpDualRowDantzig
  - ClpDualRowPivot

Bullet Points