COIN OR Project
(Computational Infrastructure for Operations Research)

Dimitris Dimou
Alexandros Zigouris

University of Patras

mijuomij@gmail.com

April 14, 2016

Overview

COIN OR

Dimitris
Dimou
Alexandros
Zigouris

CLP for Linear
Programming
Installation
Overeview
Usage
Executable

Installation

COIN OR

Dimitris
Dimou
Alexandros
Zigouris

CLP for Linear
Programming
Installation
Overeview
Usage
Executable

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 (documentation)

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

COIN OR

Dimitris
Dimou
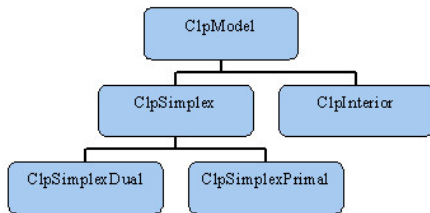Alexandros
Zigouris

CLP for Linear
Programming
Installation
Overeview
Usage
Executable

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
```

COIN OR

Dimitris
Dimou
Alexandros
Zigouris

CLP for Linear
Programming
Installation
Overeview
Usage
Executable

```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

COIN OR

Dimitris
Dimou
Alexandros
Zigouris

CLP for Linear
Programming
Installation
Overeview
Usage
Executable

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

COIN OR

Dimitris
Dimou
Alexandros
Zigouris

CLP for Linear
Programming
Installation
Overeview
Usage
Executable

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

COIN OR

Dimitris
Dimou
Alexandros
Zigouris

CLP for Linear
Programming
Installation
Overeview
Usage
Executable

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

Quick start

COIN OR

Dimitris
Dimou
Alexandros
Zigouris

CLP for Linear
Programming
Installation
Overeview
Usage
Executable

- Commands
    - import (filename)
    - primals
    - duals
    - max
    - min
    - maxIt (num)
    - presolve (on/off)
    - allslack
    - solution (filename)
    - quit

- Example :

clp filename -maximize -dualsimplex -solution solfile