CLP for Linear Programming
Installation
Overview
Usage
Executable

COIN OR Project (Computational Infrastructure for Operations Research)

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Overview

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Installation

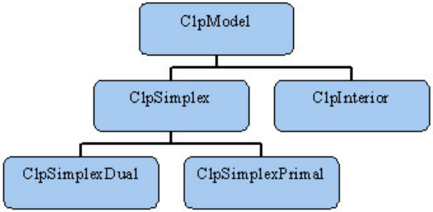
1. svn co https://projects.coin-or.org/svn/Clp/stable/1.16 coin-Clp
2. cd coin-Clp
3. ./configure -C
4. make
5. make test
6. make install
7. make doxydoc (documentation)

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
```

```
#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();

Model modification

- void setRowSetBounds(indexFirst, indexLast, boundList);
- void setColumnSetBounds(indexFirst, indexLast, boundList);
- void setObjectiveCoefficient(elementIndex, elementValue);
- void resize(newNumberRows, newNumberColumns);
- void addRows(number, rowLower, rowUpper, rowStarts, columns, elements);
- void addColumns(number, columnLower, columnUpper, objective, columnStarts, rows, elements);

Pivot choices

- ClpPrimalColumnPivot
  - ClpPrimalColumnSteepest
  - ClpPrimalColumnDantzig
- ClpDualRowSteepest
  - ClpDualRowStee pest
  - ClpDualRowDantzig

Quick start

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

```
clp filename -maximize -dualsimplex -solution solfile
```