HPCC - Hrothgar
Getting Started User Guide – Cplex
Table of Contents

1. Introduction ........................................................................................................................................... 3
2. Setting up the environment ....................................................................................................................... 3
3. Job Submission ......................................................................................................................................... 5
   3.1. Script for Batchjob submission ........................................................................................................... 5
   3.2. Job submission ................................................................................................................................... 6
   3.3 Interactive Job submission .................................................................................................................... 6
4. Using CPLEX libraries to compile and link C code: ............................................................................... 7
1. Introduction

ILOG CPLEX's mathematical optimization technology enables better decision-making for efficient resource utilization. With ILOG CPLEX, complex business problems can be represented as mathematical programming models. Advanced optimization algorithms allow you to rapidly find solutions to these models.

2. Setting up the environment

Hrothgar is equipped with SoftEnv to set up the environment with minimum work by users. The use of SoftEnv is not required but highly recommended by HPCC staff.

Step 1: setting up user environment

If the user environment is already set up, please skip this step.

At the first use, the user should copy two sample dot-files: dot-bashrc is the start up script which evokes SoftEnv; dot-soft contains a list of software whose specific environment variables will be set up for the user.

```bash
$ cp /lustre/work/apps/examples/dot-bashrc .bashrc
$ cp /lustre/work/apps/examples/dot-soft .soft
$ ln -s .bashrc .bash_profile
```

Log out and log in again.
Step 2: setting up CPLEX environment

To run CPLEX on Hrothgar,

1. Add cplex to user environment by typing the command:
   ```
   $ soft add +cplex
   ```
2. To check the environment setting: which cplex
   ```
   $ which cplex
   ```
3. Job Submission

3.1. Script for Batchjob submission

The following is a script file (Cplex.sh) to submit a CPLEX job on Hrothgar. It assumes that input files are in the same directory with the script.

```bash
hrothgar$ soft add cplex
hrothgar$ which cplex
/lustre/work/apps/ilog/Cplex_Studio_AcademicResearch12/ibplex
/bin/x86-64 ales10_4.1/cplex
hrothgar$ 
```
3.2. Job submission

qsub cplex.sh - To submit your Cplexjob to Hrothgar

qstat - To check the status of the job

3.3 Interactive Job submission

Interactive jobs are currently only allowed in . Command To submit a job interactively on Hrothgar

$ qlogin -q serial -P hrothgar -pe fill

A node will be assigned for your job and user will be logged in to the node. Users need to add cplex to SoftEnv to set up the environment on the compute node.
4. Using CPLEX libraries to compile and link C code:

Example in /lustre/work/apps/examples/cplex directory

```
$ soft add +cplex

$ cp -r /lustre/work/apps/examples/cplex cplex
```

http://www.hpcc.ttu.edu
Step 1: Generate Object file

\[ $ \text{gcc} -c -m64 -fpic -I/\$\text{CPLLEXINC} \text{lplex1.c} -o \text{lplex1.o} \]

Step 2: Link object file with cplex libs.

\[ $ \text{gcc} -m64 -fpic -I/\$\text{CPLLEXINC} \text{lplex1.o} -o \text{lplex1.exe} -L/\$\text{CPLLEXLIB} -lcplex -lm -pthread \]

The script to submit this program is available in the same directory, called cplex.sh. It submit the job to run lplex1.exe, and write the output to the file “Outputfile”.

```
#!/bin/bash
#$ -cwd
#$ -S /bin/bash
#$ -V
#$ -N Cplex
#$ -j y
#$ -o $JOB_NAME.o$JOB_ID
#$ -e $JOB_NAME.e$JOB_ID
#$ -q serial
#$ -P hrothgar

./lplex1.exe -r > Outputfile
```

Submit Test Job

\[ $ qsub cplex.sh \]
Use command “cat Outputfile” to check the results when the job finishes.

```bash
$ cat OutputFile
```
grendel:/cplex$ ls
Cplex.o65448 lpexl.c lpexl.lp machinefile.66448
cplex.sh lpexl.exe lpexl.o Outputfile

grendel:/cplex$ cat Outputfile
Tried aggregator 1 time.
No LP presolve or aggregator reductions.
Presolve time = 0.06 sec.
Iteration log . . .
Iteration:  1  Dual infeasibility =  0.000000
Iteration:  2  Dual objective =  202.500000

Solution status = 1
Solution value =  202.500000

Row 0:  Slack =  0.000000  Pi =  2.750000
Row 1:  Slack =  0.000000  Pi =  0.250000
Column 0:  Value =  40.000000  Reduced cost =  3.500000
Column 1:  Value =  17.500000  Reduced cost =  -0.000000
Column 2:  Value =  42.500000  Reduced cost =  -0.000000

grendel:/cplex$ gstat

grendel:/cplex$