HTCondor Tutorial

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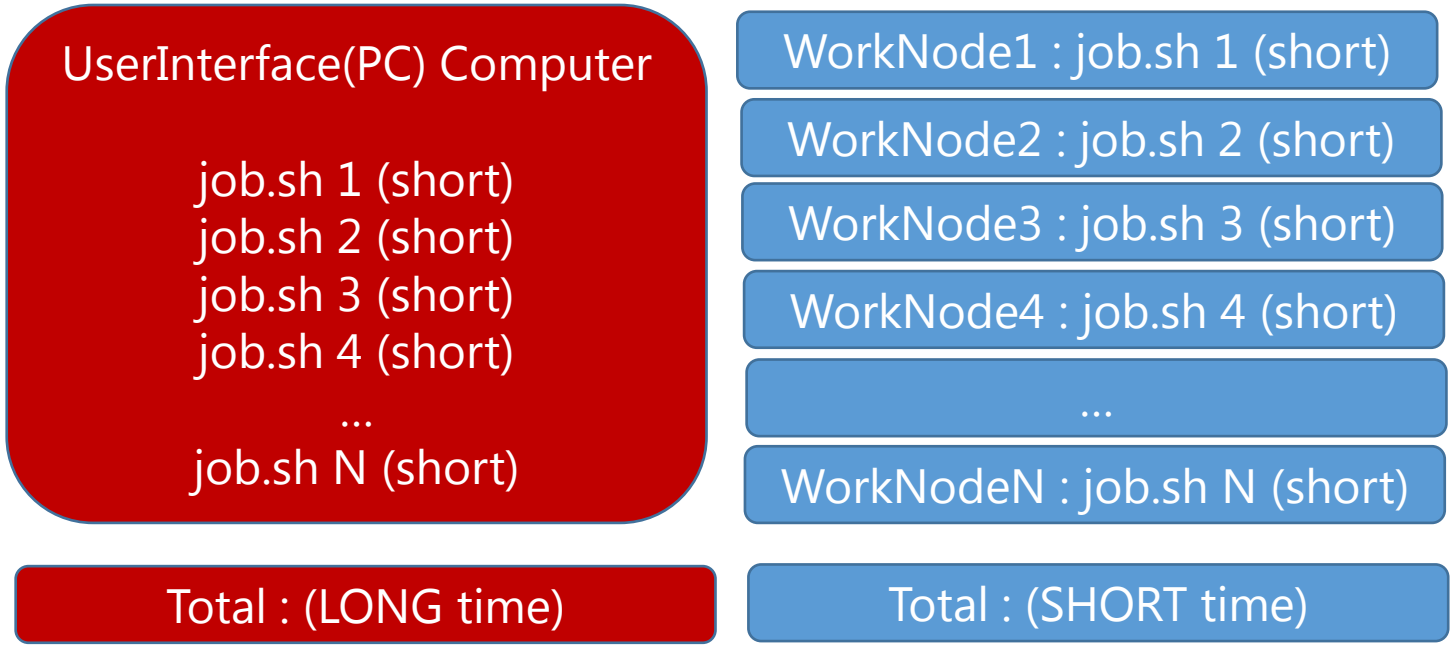
2. Basic Condor (Hands-On)
3. cmsRun(CMSSW) using Condor (Hands-On)

Introduction to the tutorial

- Introduction to the HT Condor : http://research.wisc.edu/htcondor
- Introduction to the tutorial
  - Batch system
    - ✓ PBS(OpenPBS,Torque,…)
    - ✓ LSF
    - ✓HTCondor
- How to Submit Condor Jobs
- Condor for CMSSW(cmsRun)



PART1 : Basic Condor

Requirements : account on ui02.sdfarm.kr

Basic Condor Command

Command	Basic Usage	Description
condor_submit	$> condor_submit [JobDescFile]	submit a job
condor_q	$> condoq_q [clusterID]	show status a jobs
condor_rm	$> condor_rm [clusterID]	remove jobs from the queue
condor_hold	$> condor_hold [clusterID]	hold jobs in the queue
condor_release	$> condor_release [clusterID]	release jobs in the queue
condor_tail	$> condor_tail [clusterID].[processID]	display the standard output
condor_status	$> condor_status	list summary of pool resources

```
[ycyang@ui10 ex3]$ condor_submit job3.jdl
Submitting job(s).....
5 job(s) submitted to cluster 22399.
```

```
[ycyang@ui10 ex3]$ condor_q


-- Submitter: ui10.sdfarm.kr : <134.75.124.121:10474> : ui10.sdfarm.kr
 ID      OWNER            SUBMITTED     RUN_TIME ST PRI SIZE CMD
22347.0   chanwook        1/14 00:29   0+00:00:00 H  0   0.0  run_combine
22348.0   chanwook        1/14 00:35   0+00:00:00 H  0   0.0  run_combine
22399.0   ycyang          1/27 22:23   0+00:00:02 R  0   0.0  run3.sh 1000 0
22399.1   ycyang          1/27 22:23   0+00:00:02 R  0   0.0  run3.sh 1000 1
22399.2   ycyang          1/27 22:23   0+00:00:02 R  0   0.0  run3.sh 1000 2
22399.3   ycyang          1/27 22:23   0+00:00:02 R  0   0.0  run3.sh 1000 3
22399.4   ycyang          1/27 22:23   0+00:00:02 R  0   0.0  run3.sh 1000 4

7 jobs; 0 completed, 0 removed, 0 idle, 5 running, 2 held, 0 suspended
```

Exercise 0 : condor_submit

Hands-on : condor_submit [JobDescriptionFile]

$>mkdir ex0; cd ex0
$>cp ~ycyang/tut/condor/ex0/job0.jdl
$>condor_submit job0.jdl

```
[ycyang@ui10 ex0]$ cat job0.jdl
executable = /bin/hostname
universe = vanilla
output   = condor_$(Cluster)_$(Process).out
error    = condor_$(Cluster)_$(Process).err
log      = condor_$(Cluster)_$(Process).log
should_transfer_files = YES
when_to_transfer_output = ON_EXIT
queue 2
```

Result

$>ls -al
.....
$>cat condor*.out
wn????sdfarm.kr

Exercise 1 : condor_(q/hold/release/tail/rm)

Hands-on : condor_command [CluserID].[ProcessID]

```
$> mkdir ex1; cd ex1
$> cp ~ycyang/tut/condor/ex1/run1.sh
$> cp ~ycyang/tut/condor/ex1/job1.jdl
$> cat run1.sh
$> cat job1.jdl
$> condor_submit job1.jdl
2 job(s) submitted to cluster 22404.

$> condor_q $USER
$> condor_hold [ClusterID]
$> condor_release [ClusterID]
$> condor_tail [ClusterID].0
$> condor_rm [ClusterID].0
```

Result

```
$>cat condor_[ClusterID]_1.log
```

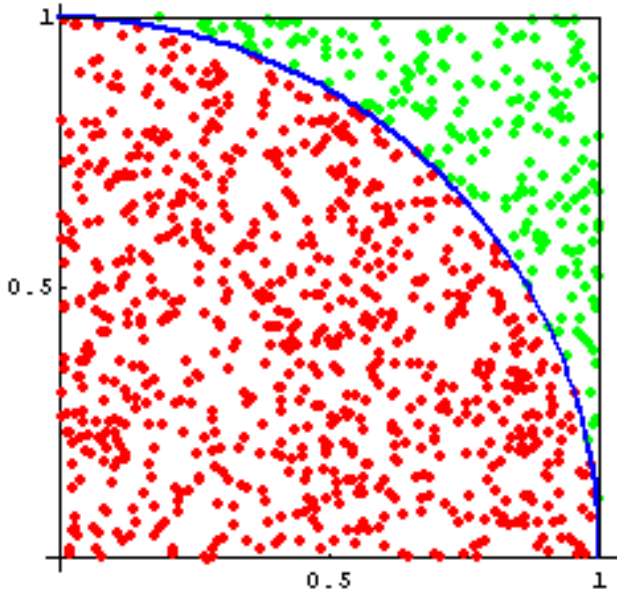
Exercise 2 : what is the value of pi(π)

Hands-on : user code running

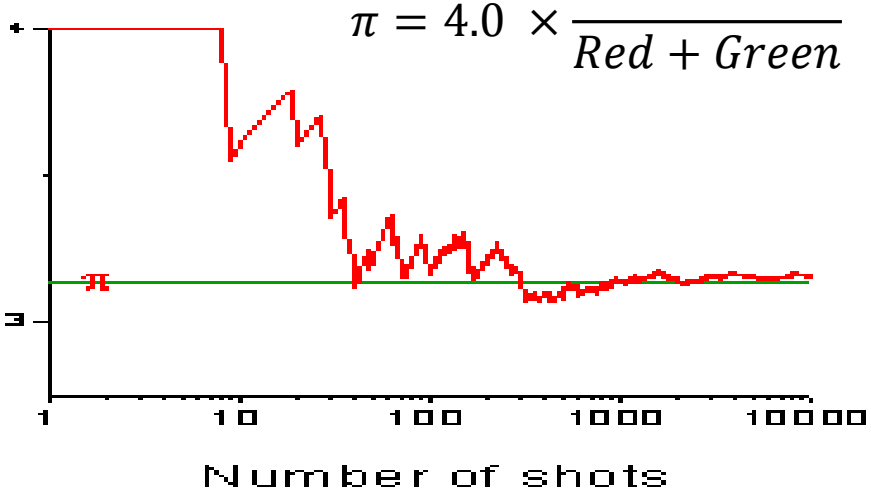
```
$> mkdir ex2; cd ex2
$> cp ~ycyang/tut/condor/ex2/piCalc.exe
$> ./piCalc.exe 10000 1
pi = 3.1376  Count: [ 784 / 10000 ]
$> ./piCalc.exe 10000 2
$> …

$> cp ~ycyang/tut/condor/ex2/job2.jdl
$> condor_submit job2.jdl
```

Result

```
$>~ycyang/tut/condor/ex2/merge.sh
pi = 3.14159265359 in google.com
your value = ???
```



$$\pi = 4.0 \times \frac{Red}{Red + Green}$$



PART2 : Condor for cmsRun

Requirements : 1. Experience with CMSSW,
2. CMS VOMS Account

Exercise 0 : CMSSW on UI(ui10.sdfarm.kr)

Hands-on : CMSSW setup

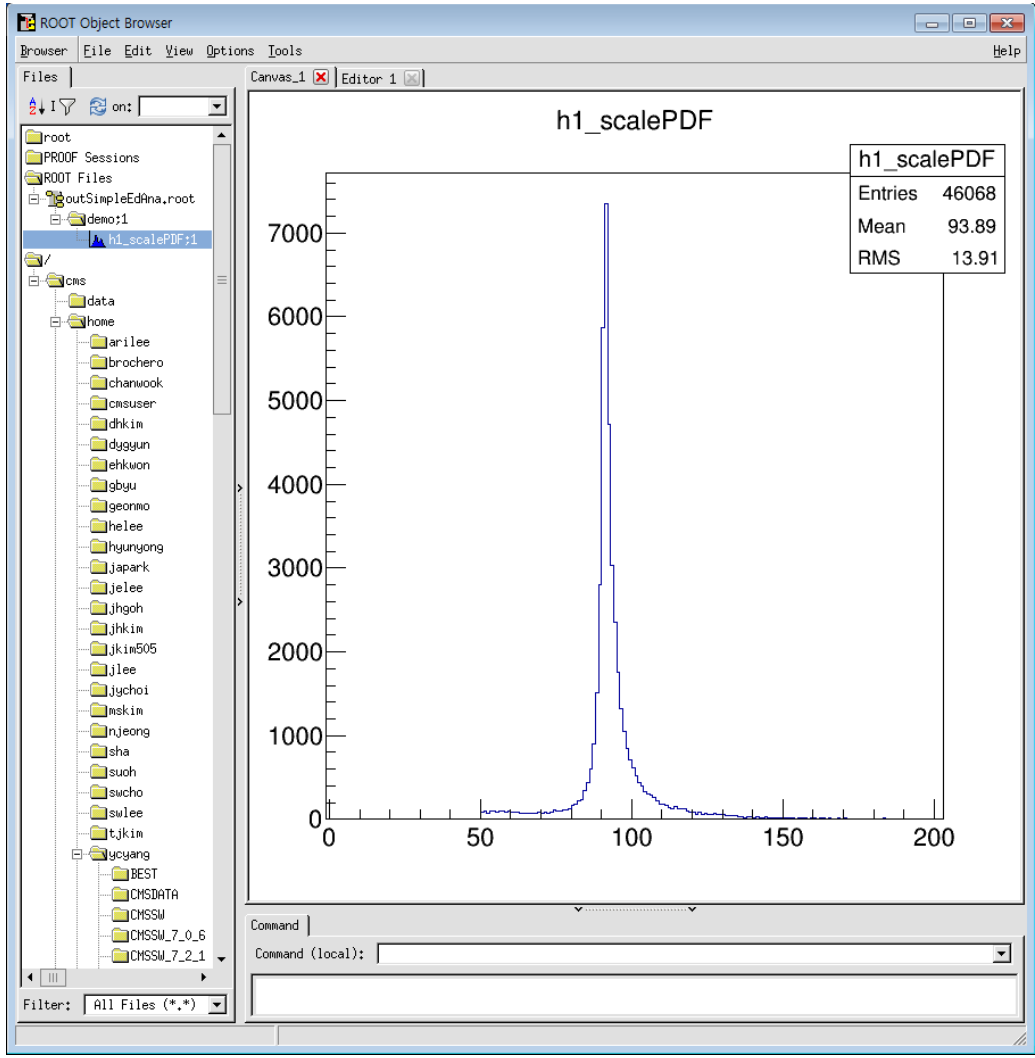
```
$> export SCRAM_ARCH=slc6_amd64_gcc481
$> export VO_CMS_SW_DIR=/cvmfs/cms.cern.ch
$> source $VO_CMSSW_DIR/cmsset_default.sh
$> cmsrel CMSSW_7_2_2 #(= $CMSSW_BASE )
$> cd CMSSW_7_2_2/src
$> cmsenv
```

Hands-on : Build User Code

```
$> cp –r ~ycyang/tut/cmssw/CMSSW_7_2_2/src/SimpleEdAna .
$> scram b –j4
$> ls ../lib/slc6_amd64_gcc481/
```

Hands-on : cmsRun

```
$> cp ~ycyang/tut/cmssw/CMSSW_7_2_2/src/SimpleEdAna_cfg.py
$> cmsRun SimpleEdAna_cfg.py
$> root outSimpleEdAna.root
```



Not simple to do cmsRun on CondorWN

- $CMSSW_BASE directory to WorkNode → Not Working

```
[ycyang@ui10 src]$ echo $CMSSW_BASE
/cms/home/ycyang/tut/cmssw/CMSSW_7_2_2
[ycyang@ui10 src]$ ls $CMSSW_BASE
biglib  bin  cfipython  config  doc  external  include  lib  logs  objs  python  src  test  tmp
[ycyang@ui10 src]$
```

- cmsRun using condor
  - ??? $CMSSW_BASE path mismatch
  - ??? user_module(lib), imported python configuration files
  - ??? InputFiles for dataset
  - ??? etc …

How to create the condor job

- $CMSSW_BASE path → new release CMSSW_7_2_2 on worknode
- user libraries → tar/copy $CMSSW_BASE/lib directory to worknode
- python configuration files → pickle.dump(process, 'file') like edmConfigDump
- input files in dataset → das_client.py (file_list and site)
- JSON(select good lumi.) for collision data → process.source.lumisToProcess
- voms-proxy; access inputfile in global CMS sites

Exercise 1 : CMSSW.py or CMSSW.pkl

Hands-on : edm configuration files dump

$> edmConfigTree SimpleEdAna_cfg.py
$> edmConfigDump SimpleEdAna_cfg.py > CMSSW.py
$> edmConfigTree CMSSW.py

```
[ycyang@ui10 src]$ edmConfigTree SimpleEdAna_cfg.py
 SimpleEdAna_cfg.py
    FWCore.MessageService.MessageLogger_cfi
    SimpleEdAna.SimpleEdAna.CfiFile_cfi
[ycyang@ui10 src]$
[ycyang@ui10 src]$
[ycyang@ui10 src]$ edmConfigDump SimpleEdAna_cfg.py > CMSSW.py
[ycyang@ui10 src]$
[ycyang@ui10 src]$
[ycyang@ui10 src]$ edmConfigTree CMSSW.py
 CMSSW.py
```

Hands-on : pickle.dump()

$> ~ycyang/tut/cmssw/CMSSW_7_2_2/src/makePSet SimpleEdAna_cfg.py
$> ls CMSSW.pkl
$> cp ~ycyang/tut/cmssw/CMSSW_7_2_2/src/RunPKL.py .
$> cmsRun RunPKL.py

Exercise 2 : file list in CMS DATASET

Hands-on : das_client.py

$> export DATASET=/DYJetsToLL_M-50_13TeV-madgraph-pythia8-tauola_v2/Spring14miniaod-PU20bx25_POSTLS170_V5-v1/MINIAODSIM
$> das_client.py --query="file dataset=$DATASET | grep file.name, file.nevents" --limit=0
$> das_client.py --query="site dataset=$DATASET" --limit=0

```
[ycyang@ui10 src]$  das_client.py --query="file \
> dataset=/DYJetsToLL_M-50_13TeV-madgraph-pythia8-tauola_v2/Spring14miniaod-PU20bx25_POSTLS170_V5-v1/MINIAODSIM \
> | grep file.name, file.nevents" --limit=0 | grep ".root" | tail
/store/mc/Spring14miniaod/DYJetsToLL_M-50_13TeV-madgraph-pythia8-tauola_v2/MINIAODSIM/PU20bx25_POSTLS170_V5-v1/30000/F8D5740A-FE23-E411-86AC-02163E007A37.root 45794
/store/mc/Spring14miniaod/DYJetsToLL_M-50_13TeV-madgraph-pythia8-tauola_v2/MINIAODSIM/PU20bx25_POSTLS170_V5-v1/30000/FA2520DE-0424-E411-B6F4-02163E00A091.root 46063
/store/mc/Spring14miniaod/DYJetsToLL_M-50_13TeV-madgraph-pythia8-tauola_v2/MINIAODSIM/PU20bx25_POSTLS170_V5-v1/30000/FA8EC1DF-E923-E411-BD7B-02163E0104F3.root 49878
/store/mc/Spring14miniaod/DYJetsToLL_M-50_13TeV-madgraph-pythia8-tauola_v2/MINIAODSIM/PU20bx25_POSTLS170_V5-v1/30000/FC72E520-DB23-E411-AC86-02163E006C73.root 49915
/store/mc/Spring14miniaod/DYJetsToLL_M-50_13TeV-madgraph-pythia8-tauola_v2/MINIAODSIM/PU20bx25_POSTLS170_V5-v1/30000/FC763BCB-0324-E411-81E1-02163E00FED0.root 46046
/store/mc/Spring14miniaod/DYJetsToLL_M-50_13TeV-madgraph-pythia8-tauola_v2/MINIAODSIM/PU20bx25_POSTLS170_V5-v1/30000/FC7A2E17-EE23-E411-A26B-02163E008ECF.root 45871
/store/mc/Spring14miniaod/DYJetsToLL_M-50_13TeV-madgraph-pythia8-tauola_v2/MINIAODSIM/PU20bx25_POSTLS170_V5-v1/30000/FC864C9E-E723-E411-A07C-02163E00F116.root 45969
/store/mc/Spring14miniaod/DYJetsToLL_M-50_13TeV-madgraph-pythia8-tauola_v2/MINIAODSIM/PU20bx25_POSTLS170_V5-v1/30000/FC884039-F723-E411-8DD8-02163E00EF9D.root 46048
/store/mc/Spring14miniaod/DYJetsToLL_M-50_13TeV-madgraph-pythia8-tauola_v2/MINIAODSIM/PU20bx25_POSTLS170_V5-v1/30000/FE181786-D823-E411-A7F5-02163E00FEB9.root 31675
/store/mc/Spring14miniaod/DYJetsToLL_M-50_13TeV-madgraph-pythia8-tauola_v2/MINIAODSIM/PU20bx25_POSTLS170_V5-v1/30000/FE89A2A0-E923-E411-BDAC-02163E00A0AF.root 49921
[ycyang@ui10 src]$
[ycyang@ui10 src]$
[ycyang@ui10 src]$ das_client.py --query="site \
> dataset=/DYJetsToLL_M-50_13TeV-madgraph-pythia8-tauola_v2/Spring14miniaod-PU20bx25_POSTLS170_V5-v1/MINIAODSIM" --limit=0
T3_KR_UOS
T2_CH_CERN
T2_FR_GRIF_IRFU
T2_KR_KNU
T3_KR_KISTI
```

Exercise 3 : Create Condor Jobs for cmsRun

Hands-on : full example condor job for cmsRun

```
$> voms-proxy-init –voms cms
$> ~ycyang/local/cmsUtil/cmsCondor.sh –cfg=SimpleEdAna_cfg.py –dataset=/DYJetsToLL_M-50_13TeV-madgraph-pythia8-tauola_v2/Spring14minaod-PU20bx25_POSTLS170-v1/MINIAODSIM –nfiles=10
$> ls Condor_*/
$> cd Condor_*/
$> vi job.jdl (queue 2)
$> condor_submit job.jdl
```

```
[ycyang@ui10 src]$ ls -1 Condor_*
cmsRunLog
condorLog
condorOut
input.tgz
inputfiles.das
job.jdl
run.sh
```

```
[ycyang@ui10 src]$ cat Condor_*/job.jdl
executable = $ENV(PWD)/run.sh
universe = vanilla
output   = condorLog/condorLog_$(Cluster)_$(Process).log
error    = condorLog/condorLog_$(Cluster)_$(Process).log
log      = /dev/null
use_x509userproxy = True
should_transfer_files = yes
initialdir = $ENV(PWD)
transfer_input_files = input.tgz, inputfiles.das
when_to_transfer_output = ON_EXIT
transfer_output_files = condorOut, cmsRunLog
environment = CONDOR_ID=$(Cluster)_$(Process); ThisInputURL=root://cms-xrdr.sdfarm.kr:1094//cms/data/xrd/
arguments = 10 NULL True
queue 93
```

Summary

- Do by your hands
- Question / Discussion
- Ref> http://research.cs.wisc.edu/htcondor/manual/v7.6/2_5Submitting_Job.html