Condor-G:
HTCondor for grid submission
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Acknowledgement

• These slides are heavily based on the presentation Jaime Frey gave at UCSD in Feb 2011
  http://www.t2.ucsd.edu/twiki2/bin/view/Main/GlideinFactory1111
A Condor pool is composed of 3 pieces:

- Central manager
  - Collector
  - Negotiator
- Submit nodes
  - Schedd
- Execution nodes
  - Startd
  - Job
Condor-G

• Condor-G refactors a submit host as a grid client
Grid sites

• Recall what a grid site looks like:

   - Different CE types: HTCondor CE, CREAM, Nordugrid
   - Different Schedulers: HTCondor, PBS, LSF, SGE
Condor-G Daemons

- Condor-G is a normal schedd, but spawns different child processes to manage the grid job
  - recall the vanilla equiv was the shadow process
Gridmanager Daemon

- Runs under the schedd
- Similar to the shadow
- Handles all management of grid jobs
- Single instance manages all grid jobs for a particular user for a given schedd
GAHP (Grid ASCII Helper Protocol)

• Runs under gridmanager
• Encapsulates grid client libraries in separate process
• Simple ASCII protocol
• Easy to use client libraries when they can’t be linked directly with the gridmanager
• Each CE type (HTCondor, CREAM) has a different gahp that understands the CE protocol
• Gridmanagers only understand how to communicate with the GAHP
  • think of GAHP as a CE protocol translator for the grid manager
How it works

Condor-G

Schedd

Grid Resource

CREAM

LSF
How it works

600 Grid jobs

Condor-G

Grid Resource

CREAM

LSF

Schedd
How it works

Condor-G

Schedd

Gridmanager

Grid Resource

CREAM

LSF

600 Grid jobs
How it works

Condor-G

- Schedd
- Gridmanager
- GAHP

(Grid Resource)

- CREAM
- LSF

600 Grid jobs
How it works

Condor-G

- Schedd
- Gridmanager
- GAHP

Grid Resource

- CREAM
- LSF

600 Grid jobs

(CREAM)
How it works

Condor-G

1. Schedd
2. Gridmanager
3. GAHP

(CREAM)

Grid Resource

1. CREAM
2. LSF
3. User Job

600 Grid jobs
Submit file fields
• Format:

Universe = grid
Grid_Resource = condor <hostname> <hostname>:<port>
+<submit_attr> = <submit_attr_val>

• submit attributes target specific resources, can be added directly to submit file as custom classad attrs

• Example:

Universe = grid
Grid_Resource = condor osg-gw-2.t2.ucsd.edu osg-gw-2.t2.ucsd.edu:9619
+maxMemory = 16384
+xcount = 8
• Format:

```
Universe = grid
Grid_Resource = cream <hostname>:<port>/cream-<batch>-<queue>
cream_attributes = <submit_attr> = <submit_attr_val>; ...
```

• submit attributes must be set in cream_attributes

• Example:

```
Universe = grid
Grid_Resource = cream ce07.pic.es:8443/cream-pbs-mcore_sl6
cream_attributes = WholeNodes = False; HostNumber = 1; CPUNumber = 8
```
NorduGrid

• Format:

```
Universe = grid
Grid_Resource = nordugrid <hostname>
nordugrid_rsl = (<submit_attr>=<submit_attr_val>)...
```

• submit attributes must be set in nordugrid_rsl in globes rsl format

• Example:

```
Universe = grid
Grid_Resource = nordugrid arc-ce01.gridpp.rl.ac.uk
nordugrid_rsl = (count=8)(memory=3072)(runtimeenvironment=ENV/GLITE)
```
Credential Management

• Condor-G requires X509 grid cert proxies for authentication
• X509 proxy path may be explicitly specified in submit file:
  
  ```
  X509UserProxy = /home/einstein/other/proxy
  ```

• Proxy may expire before jobs finish executing
  
  • When a new proxy is available, Condor will forward the renewed proxy to the job
HELD Status

• Jobs will be held when Condor-G needs help with an error
  • On release, Condor-G will retry
• The reason for the hold will be saved in the job ad and user log
condor_q -held
161.0 jfrey 2/13 13:58 CREAM_Delegate
    Error: Received NULL fault;

cat job.log
012 (161.000.000) 02/13 13:58:38 Job was held.
    CREAM_Delegate Error: Received NULL fault; the error is due to another cause...

condor_q -af HoldReason
CREAM_Delegate Error: Received NULL fault; the error is due to another cause...
Common Errors

• Authentication
  • Hold reason may be misleading
  • User may not be authorized by CE
  • Condor-G may not have access to all Certificate Authority files
  • User’s proxy may have expired

• CE no longer knows about job
  • CE admin may forcibly remove job files
  • Condor-G is obsessive about not leaving orphaned jobs
  • May need to take extra steps to convince Condor-G that remote job is gone
The End
The HTCondor Project (Established ‘85)

• Research and Development in the Distributed High Throughput Computing field
• Team of ~35 faculty, full time staff and students
  • Face software engineering challenges in a distributed UNIX/Linux/NT environment
  • Are involved in national and international grid collaborations
  • Actively interact with academic and commercial entities and users
  • Maintain and support large distributed production environments
  • Educate and train students
Pointers

• HTCondor Home Page
  http://research.cs.wisc.edu/htcondor/

• HTCondor Manual
  http://research.cs.wisc.edu/htcondor/manual/current/

• Support
  htcondor-users@cs.wisc.edu
  htcondor-admin@cs.wisc.edu