
CERN

CERN Grid: HTCondor-CE and HTCondor

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Outline

Introduction

Our journey from CREAM and LSF to HTCondor-CE and HTCondor as our Grid offering at CERN.

Glimpse of the Past

As most of you will know, CERN has based its Grid Compute around the CREAM CE and LSF as the Batch System.

Several years ago, when the decision was taken to move to a HTCondor batch system, several CEs were evaluated.

The ARC Compute Element

In our initial Grid Pilot of HTCondor we offered the ARC-CE as the entry point.

However, we ran into a few issues and felt like something was missing.

There was a disconnect between how we had to manage ARC, and how we wanted to manage the farm in general.

Enter HTCondor-CE

We'd heard of HTCondor-CE, however, we were under the impression it was tied to the OSG environment.

This didn't turn out to be the case. A couple of days with Brian Bockelman and we had a test CE in the pool.

Migrating VOs

CMS and ATLAS already base their submission infrastructure on condor schedds.

However, the none-OSG VOs had never worked with them in this manner before.

We embarked upon a campaign to offer our help and get the other VOs submitting via schedds.

Review

Over the next couple of months we evaluated where we stood and the pros/cons.

After familiarizing ourselves with configuring/managing the CE, we decided that the HTCondor-CE is where we wanted to take the future of the pool.

CE Configuration

HTCondor-CE is just a special configuration of HTCondor.
A couple of configuration options need to be provided:

- UID_DOMAIN.
- Site-specific security overrides.
- Your job route definitions.

See my next talk after coffee for the details.

Job Routes

Job Routes are a declarative approach to defining what a job looks like on your local batch system.

You take an incoming resource request from a VO and turn it into what you want a job to look like.

Job Routes ctd.

You'll want a base catch-all route and then maybe some VO/project specific routes.

The routes can be as simple or as complex as you like.

Route Example

Here's an example of our main route, although we have others.

```
JOB_ROUTER_ENTRIES = \
   [ \
    MaxIdleJobs = 4000; \
    TargetUniverse = 5; \
    name = "Local_Condor"; \
    set_AcctSubGroup = ifThenElse(regexp("production",x509userproxyfqan),strc
    set_CERNAcctGroup = toUpper(x509UserProxyVOName)); \
    eval_set_AccountingGroup = strcat("group_u_", CERNAcctGroup, ".", AcctSub
    eval_set_AcctGroup = strcat("group_u_", CERNAcctGroup, ".", AcctSubGroup)
    delete_SUBMIT_Iwd = true; \
    set_WantIOProxy = true; \
    set_default\_maxMemory = 2000; \
    set_DataCentre = "$$(DataCentre:meyrin)"; \
    set_HEPSPEC = "$$(HEPSPEC:80)"; \
  ]
```

CE Management

Simple to manage and easy to see what's going on.
CE versions of all the condor CLIs, e.g. condor_ce_q

```
274495.0   lhbplt01        2/26 10:32   0+02:10:36 R  0   976.6 DIRAC_PCL24F_pilot
274496.0   lhbplt01        2/26 10:52   0+01:22:52 C  0   48.8 DIRAC_S2cRdm_pilot
274507.0   lhbplt01        2/26 11:32   0+01:14:49 R  0   976.6 DIRAC_Fc7VyE_pilot
274509.0   lhbplt01        2/26 11:52   0+00:57:24 R  0   1464.8 DIRAC_DfE3iu_pilot
274517.0   ilc030          2/26 11:59   0+00:18:13 R  0   0.2  DIRAC_cjEAIt_pilot
274523.0   lhbplt01        2/26 12:12   0+00:38:50 R  0   976.6 DIRAC_geUrJz_pilot
274526.0   lhbplt01        2/26 12:32   0+00:18:45 R  0   732.4 DIRAC_T5oA1k_pilot
274527.0   alisgm76        2/26 12:49   0+00:00:00 I  0   0.0  agent.startup.3660
274528.0   lhbplt01        2/26 12:52   0+00:00:00 I  0   0.0  DIRAC_C_Mh2N_pilot

4852 jobs; 1517 completed, 0 removed, 781 idle, 2554 running, 0 held, 0 suspended
[root@ce504 ~]#
```

Logging

All logs files go to **/var/log/condor-ce**.

Important log files: *JobRouterLog*, *SchedLog*, *AuditLog*

AuditLog: Anything that happened on the queue, proxies, authentication etc. Automatically configured to be kept for 90 days.

JobRouter Log

Excerpt from the Job Router Log:

```
03/02/16 09:43:24 JobRouter: Checking for candidate jobs. routing table is:
Route Name              Submitted/Max        Idle/Max     Throttle Recent: S
Local_Condor                6313/  10000      40/   4000     none
03/02/16 09:43:24 JobRouter (src=3043640.0,dest=3951953.0,route=Local_Condo
03/02/16 09:43:25 JobRouter (src=3043641.0,dest=3951954.0,route=Local_Condo
03/02/16 09:43:25 JobRouter (src=3043614.0,dest=3951929.0,route=Local_Condo
03/02/16 09:43:25 JobRouter (src=3043634.0,dest=3951957.0,route=Local_Condo
03/02/16 09:43:25 JobRouter (src=3043636.0,dest=3951959.0,route=Local_Condo
03/02/16 09:43:25 JobRouter (src=3043591.0,dest=3951897.0,route=Local_Condo
03/02/16 09:43:25 JobRouter (src=3043638.0,dest=3951961.0,route=Local_Condo
03/02/16 09:43:25 JobRouter (src=3043639.0,dest=3951962.0,route=Local_Condo
03/02/16 09:43:26 JobRouter (src=3043558.0,dest=3951880.0,route=Local_Condo
03/02/16 09:43:26 JobRouter (src=3027782.0,dest=3940672.0,route=Local_Condo
03/02/16 09:43:26 JobRouter (src=3043569.0,dest=3951891.0,route=Local_Condo
03/02/16 09:43:26 JobRouter (src=3043599.0,dest=3951921.0,route=Local_Condo
```

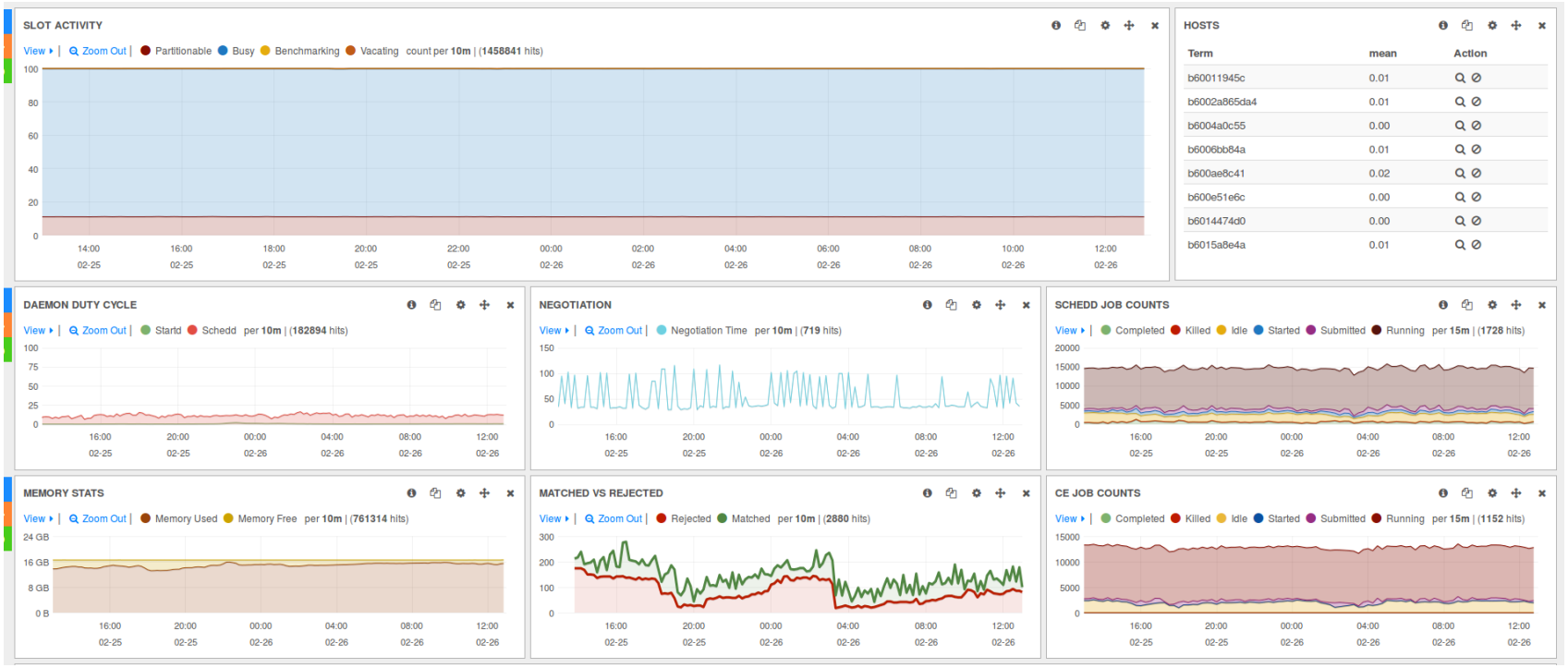
Monitoring

We monitor primarily with the python-bindings.

Make sure the CE Schedd and Batch Schedd aren't out-of-sync with job numbers.

Monitor and alarm on the Job Router run-time.

Monitoring Example



How the VOs Interact

There are two submission methods.

- Submit via a condor_schedd running on a vobox.
- Direct submission to the CE with condor_submit.

The Schedd set-up has some great advantages and power.

More involvement from the VO framework is required for direct submission.

VO Management

VO	Job Manager	Info Source
CMS	Schedd	Factory Frontend
ATLAS	Schedd	PaNDA
ALICE	Schedd (JobRouter)	ALiEN (BDII)
LHCb	Schedd	DIRAC (BDII)
ILC	Schedd	DIRAC (BDII)

Conclusion

In conclusion, we've been incredibly happy with HTCondor-CE.

It scales nicely, is a pleasure to manage and fits perfectly with our wider needs/plans for managing the Tier-0 batch farm.

Any questions?

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