



Open Science Grid

Condor-G

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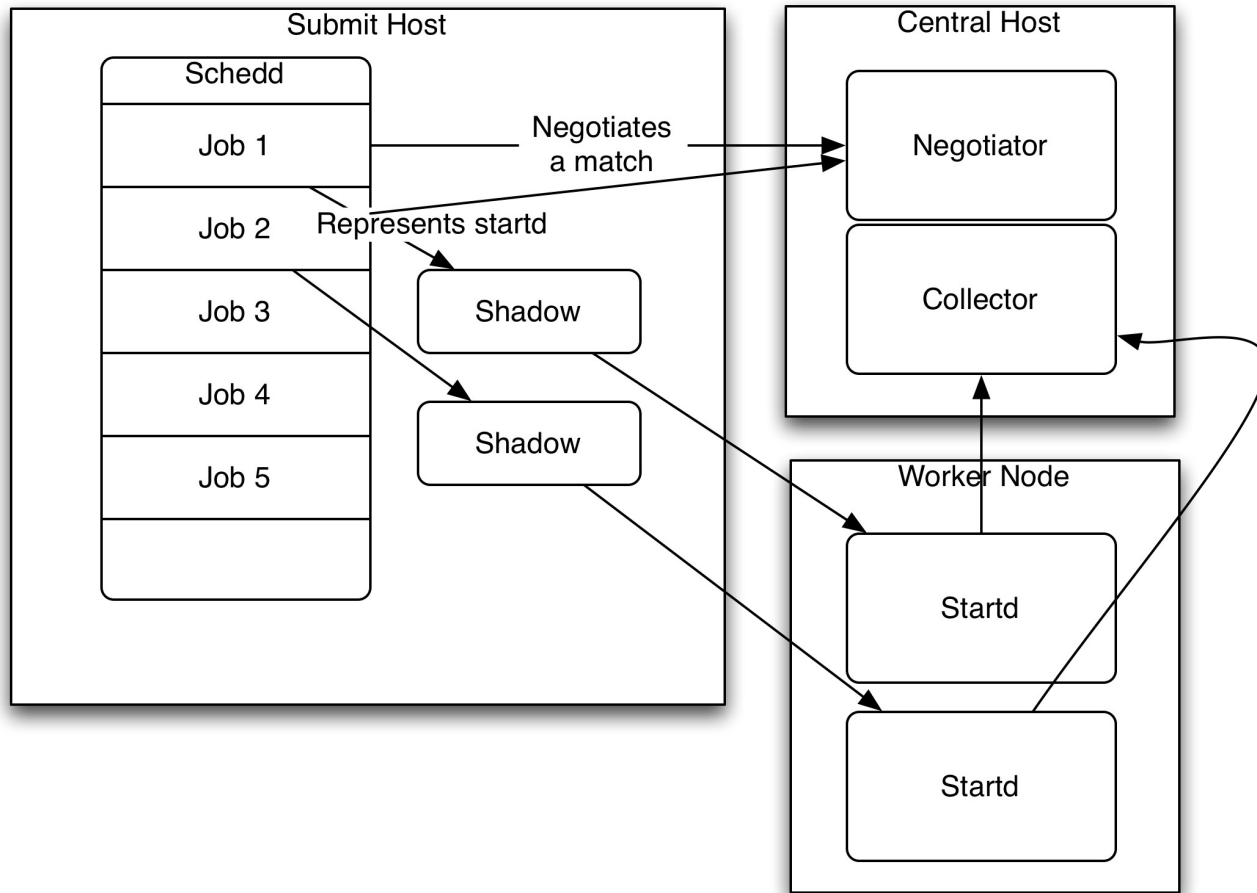
Condor-G

- Condor Grid Universe
- There is an added complexity in using multiple sites, but many things remain the same:
 - Job submission
 - Checking job status
 - Cancelling jobs
 - Managing input/output
 - Managing job dependencies

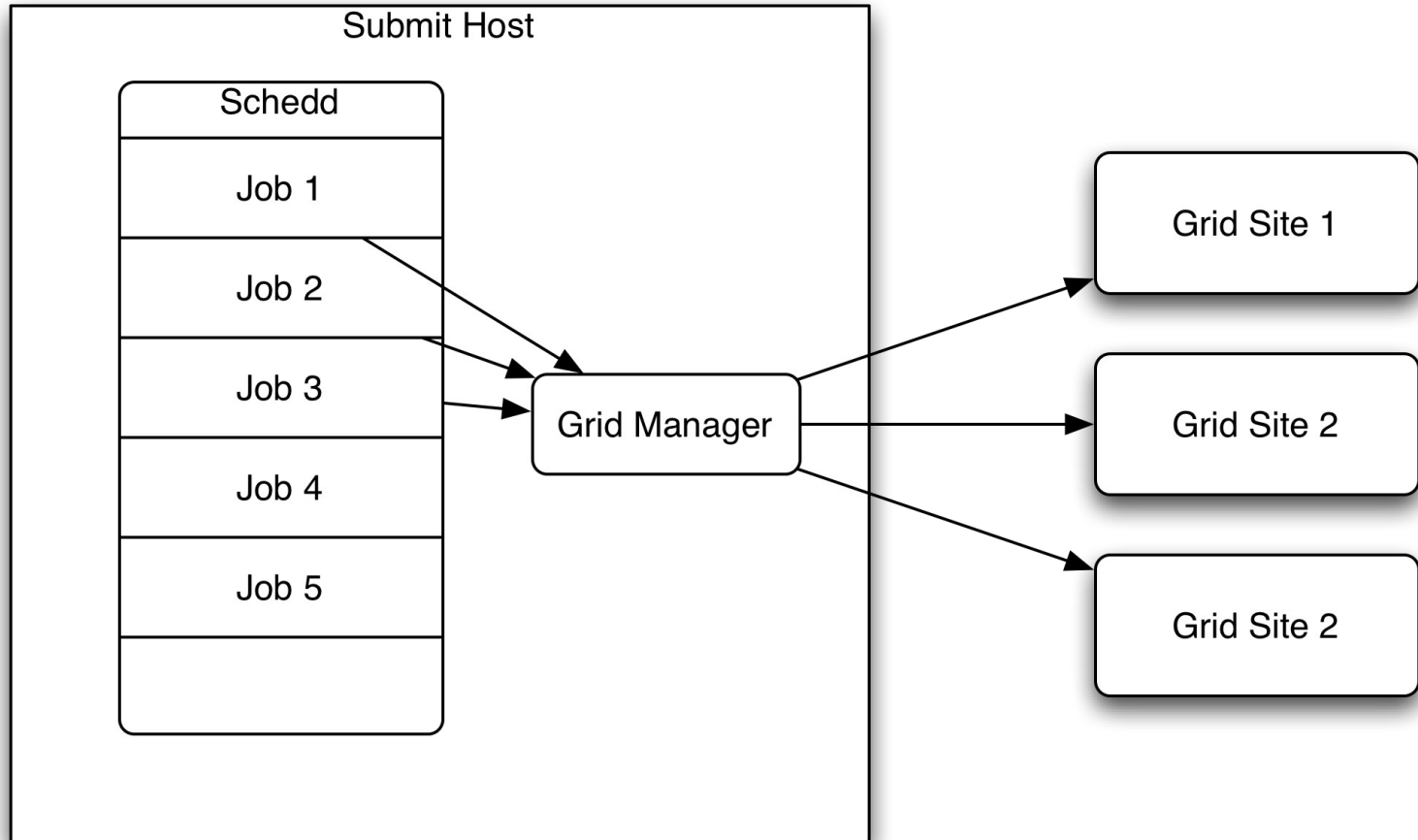
Observation

- The requirements for the *grid* and for the *batch system* look about the same!
- ***Key insight:*** We can reuse a large portion of our batch system to command and control grid jobs.
 - In fact, this means we can present familiar interfaces to the user!
- Hence, Condor-G was born.

Normal Condor



Condor-G



Condor vanilla vs Condor-G

- In Condor, the current state of the batch slot is represented by the shadow.
 - Negotiation provides matchmaking down to the best slot.
 - Schedd provides queue management and presents a “batch system” interface to the user. Works with shadow and negotiator.
- In the grid universe, a “gridmanager” process is spawned which performs the different queue actions.

Gridmanagers

- There is one gridmanager type per grid flavor:
 - Globus
 - CREAM
 - Nordugrid
 - EC2 (Clouds)
 - PBS
 - ...
- PBS isn't normally thought of as a grid, but Condor-G / the "grid universe" is just a way to interface the Condor with external batch-like systems.

Gridmanagers

- For example, the GT2 grid manager will take a job from the schedd and use the job's ClassAd to submit the job via a Globus C library.
 - If the job is successfully submitted, the gridmanager process will update the Schedd accordingly.
- Periodically, the gridmanager will poll all the jobs at a site, get their latest status, and update the schedd queue.

Condor vs Condor-G vs Globus

Action	Condor	Condor-G	Globus
Submit job	condor_submit	condor_submit	globus-job-submit
Query Status	condor_status	condor_status	globus-job-status
Cancel job	condor_rm	condor_rm	globus-job-cancel
Job Description	ClassAd	ClassAd	RSL

- All your queue and job management can be done by condor.
 - Familiar interface and description language.
- Tools which know how to interact with Condor can interact cleanly with grid jobs.
 - There may be no “standard grid protocol”, but Condor-G is almost the defacto standard grid client.
 - Allows effective use even while the server technology is evolving (Keep up with the hype cycle: Utility computing -> grid computing -> cloud computing; all can use Condor)

Workflow on the Grid

- See: Workflows on Condor, i.e. DAGMan.
 - Because DAGMan layers on top of the Condor schedd...
 - And we put our grid jobs into Condor-G...
 - All of our workflow methodology converts to the grid *with no changes*.

Condor-G Details

- *Always* use Condor-G on the OSG; Globus tools are extremely unscalable and will crash the remote site at about 100 jobs
- Condor-G is activated when you set the Condor job's universe to "grid"
- You also need to specify what endpoint and grid flavor using "grid_resource" in your submit file.

Condor-G Details

- To use Condor-G to submit to a Globus resource, add the following 2 lines to your submit file:
 - `universe=grid`
 - `grid_resource = gt2 ce.sp.grid.unesp.br/jobmanager-condor`
- This submits to the OSG-EDU resource. A few other sample endpoints:
 - `ff-grid.unl.edu/jobmanager-pbs` (Firefly)
 - `red.unl.edu/jobmanager-condor` (Nebraska)



Jobmanagers

ce.sp.grid.unesp.br/jobmanager-condor

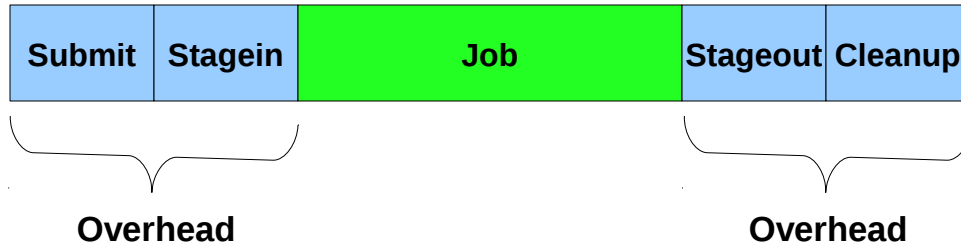
ce.grid.unesp.br/jobmanager-pbs

ce.grid.unesp.br/jobmanager-fork

Condor-G “Gotchas”

- Assume no shared file system.
 - Know your input and output files and let Condor handle the file movement.
- Never run compute jobs on “jobmanager” or “jobmanager-fork” (why?)
- Grid is NOT uniform.
 - Different architectures, OS, execution environment.
 - Different policies, restrictions, site preferences.
 - Condor-G does not make any of these magically heterogeneous.
 - On the OSG, for Condor-G, you are expected to provide a **wrapper** to make the execution environment what you need.

Job Overhead



- Short jobs?
- Cluster them together!



Review

- You should have learned:
 - Grids have needs similar to batch systems.
 - Condor schedd provides all the job/queue management that one needs for the grid.
 - Condor-G is activated when you use the grid universe in Condor.
 - The normal Condor components are replaced by the “gridmanager” process, which translates the Condor commands to grid commands.
 - By using Condor-G, you can reuse the (large) Condor infrastructure on many grids, including the OSG.

Questions? Exercises

- Let us know if you are having problems with setting up your certificate, as you will not be able to do any exercises without it!
- <http://tinyurl.com/2fxxwpy>
 - Wednesday