Challenges in Dynamic Deployment of Condor Across Distributed Environments

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Problem Statement

 Difficult to allocate reliable resources across multi-sites:

 - Batch Systems (Scheduling)
 - Network (Public vs Private, Firewalls)
 - Availability
 - Capabilities
 - Etiquette
Overlay Grid Network

› Create custom global Condor pool using Glidein technologies.
› Global fair share at user and group level.
› Uniformity across all Grids (OSG, EGEE)
› “Reduces grid-related errors by 50%”
CRONUS

- ATLAS Virtual Computing Cluster
- Condor-G Glideins
- Condor-C Job Submissions
- GCB Network Nodes
- Goal: +10,000 jobs

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Deployment Challenges

- Unknown Network Capabilities
- Cleaning Up on Execution Node
- Retrieving Job Attributes
- Scalability Issues
Unknown Network Capabilities

- **Problem**: How can we determine the network environment of execute nodes?
- Firewalls, Public vs. Private IPs
- GCB mitigates problem, but is error prone.
Solution: Network Probe

- Contact Condor servers @ Wisconsin to determine network information.

- Only enable GCB if needed.

- Source code is available!

![Diagram showing network traffic between Glidein Node and Probe Server, with options to enable GCB and firewall rules.](www.cs.wisc.edu/condor)
Cleaning Up on Execution Node

- **Problem:** How do we make sure that our Glideins are actually doing work and not wasting cycles?
- **Must handle severed network connections.**
Solution: Shutdown Exprs.

New expressions allow Condor daemons to shutdown individually and not be restarted by the Master.

```
STARTD_DAEMON_SHUTDOWN = \ 
    State == "Claimed" && \ 
    Activity == "Idle" && \ 
    (CurrentTime - EnteredCurrentActivity) > 600

MASTER_DAEMON_SHUTDOWN = \ 
    STARTD_StartTime == 0
```

Glidein Condor Configuration File
Retrieving Job Attributes

Problem: How can we get additional information about Condor-C jobs when they are executing on Glideins?

Use only existing, reliable Condor mechanisms.
Solution: Copy Attributes List

› Provide a list of attributes to copy back to Condor-C job's ClassAd on submit node.

› Resolves $\$(<Parameter>)$ at runtime.

```
CONDORC_ATTRS_TO_COPY = \ 
MATCH_FileSystemDomain, \ 
MATCH_UidDomain, ....
```

Submit Side Condor Configuration File

```
+Remote_Env = \ 
"FileSystemDomain=$\$(FileSystemDomain)"
```

Condor-C Submission File
Scalability Issues

Problem: How can we increase the number of jobs per central manager and GCB node?

Preliminary tests showed only 1,000 jobs could reliably be submitted for each Tier-1 central manager.
Solution: Internal Improvements

- Improved core ClassAd library: faster attribute look-ups and parsing.
- Re-factored scheduling algorithms.
- Increased scalability of GCB libraries.
- Localhost communication optimizations.
- Effort is still ongoing...
Summary

› Network Probe
› Daemon Shutdown Expressions
› Condor-C Copy Attributes List
› Scalability Improvements
› Questions?