Federating pools – from Clusters to Grids
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Agenda

Overview of the Condor-CE basis for GlideinWMS and OSG

• What’s a CE
• Why we need one
• Past history

• Possible future work
First, some terminology

- CE “Compute Element”
- SE “Storage Element”
- WN “Worker Node:”
The Problem

› You have many pools, all different
  • Different batch systems
  • Different policy
› Want to use all of them
› Job sender shouldn’t need to know about site differences
Solution: A common “Door”

Door translates common requests into site-specific requests

Door applies site-specific policy to common job

Door added to sites
Solution: A common “Door”
Door Principles

- Need powerful transformations
- Need to hide site dependencies
- Want language to be declarative
  - Terse, Analyzable, Usable
- Need all work to be Manageable
Focus on non-functional requirements

Doors must be

- Scalable
- Manageable
- Accountable
- Secureable
- Extensible
Fundamental Principle

“Submit locally, Run Globally”

• Same job description, local or grid
• Global grid is not a separate system, it extends the existing system
In 2017, Globus announced dropping support for GRAM
Required new implementation
Allow us to learn from lessons of GRAM
GRAM lessons learned

➢ GRAM imperative, not declarative
  • Adaptation provided by perl scripts
    • Modified by every local site
    • Upgrade nightmares

➢ Scalability problems

➢ Accounting and manageability problems
HTCondor to the rescue

- With HTCondor tools described yesterday…
  - Condor-C
  - Job Router
- We built Condor-CE with existing parts
One Logical job, in many places

Job1

Reflected here

Changes here

Job1

GRID ENGINE
Condor power on both sides

Full condor pool here

Schedd here
All is not well: source routing

Which route?
Wait while idle...

Local Pool

Remote Pool

Remote Pool

GRID ENGINE

slurm workload manager
Solution: Late binding

Local Pool

Remote Pool

Remote Pool

Pilots, not jobs
Factory submission

Pilots, not jobs
Kubernetes

- Could be just another grid type
- Allows interesting possibilities
- Runs containers
- Runs as root
- Provisions its own network
Conclusion

- Condor-CE allows us to build grids
- Built on years of experience in months