Using Condor Glide-Ins and GCB to run on the Grid

The CDF experience

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Traditional use of Condor in CDF

CDF Analysis Farm (CAF)

Single Point of Submission system
- CAF Daemons accept and authenticate user jobs, handle output.
- Condor Schedd does the real job
Had to move to the Grid

- HEP moving to the Grid
- Nobody wants to finance dedicated nodes, anymore

- Need to move
- Want to preserve user interface

“The Grid”
Why not plain Condor-G?

Works, but...
- No central matchmaking
- No control over priorities
- Site selection problem
- Black holes can eat most of the user jobs
CDF decided to go with Condor glide-ins

Glide-ins solve all the problems
What is the Glidekeeper

- Just a simple script
  - Checks number jobs and number glide-ins
  - Makes sure there is always at least a glide-in per CE, when idle jobs in the queue

- Does not need to be complex
  - Just blindly submit to all the CEs
  - But could be made as complex as needed
What is a glide-in

- Glide-ins are properly configured **startds**
  - Same old binaries used
- CDF uses a startup script to validate the node before starting startd
  - Prevent job failure

```
### condor_config

```
DAEMON_LIST = MASTER,STARTD
NEGOTIATOR_HOST = $(HEAD_NODE)
COLLECTOR_HOST = $(HEAD_NODE)

TMOUT=288000
MaxJobRetirementTime=$(TMOUT)
SHUTDOWN_GRACEFUL_TIMEOUT=$(TMOUT)

# How long will it wait in an unclaimed state
STARTD_NOCLAIM_SHUTDOWN = 1200

HEAD_NODE = cdfhead.fnal.gov
```

```
### glidein_startup.sh

```
validate_node()
local_config()
./condor_master -r $mins -dyn -f

```

Glide-ins are properly configured **startds**
- Same old binaries used
- CDF uses a startup script to validate the node before starting startd
  - Prevent job failure
CDF using glide-ins for a year, now

CNAF (Bologna, Italy), the first GlideCAF

SDSC (San Diego, CA, USA)

CNAF one year history plot: Note over a thousand running jobs for long period of time.

SDSC six months history plot

Fermilab (Batavia, IL, USA)     IN2P3 (Lyon, France)     MIT (Boston, MA, USA)
Problems found along the road

- File delivery
- Firewalls
- Security concerns
Problems found along the road

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- Security concerns
**glidein.submit**

Universe = Globus  
GlobusScheduler = mysite/jobmanager-mybatch

Executable = glidein_startup.sh  
transfer_Input_files = condor.tgz

Queue

---

**Open Science Grid**  
Works fine on OSG

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Only the executable guaranteed to be transferred on EGEE.  
Other files need gLite tools.

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Cannot use Condor-G transfer mechanism!
HTTPd for file transfer

GlideCAF (Portal)

Glidekeeper

Glide-in Schedd

HTTPd

Main Schedd

Collector/Neg

Submitter Daemons

glidein_startup.sh

validate_node()

wget http://cdfhead.fnal.gov/condor.tgz

sha1sum knownSHA1 condor.tgz

if [ $? -eq 0 ]; then

tar -xzvf condor.tgz

local_config()

./condor_master -r $retmins -dyn -f

fi
Add HTTP Proxy to reduce load

```bash
validate_node()
env http_proxy=proxy1.fnal.gov
  `wget http://cdfhead.fnal.gov/condor.tgz`
  sha1sum knownSHA1 condor.tgz
if [ $? -eq 0 ]; then
  tar -xzf condor.tgz
  `local_config()
  ./condor_master -r $retmins -dyn -f`
fi
```
Problems found along the road

- File delivery
- Firewalls
- Security concerns
UDP packets often lost over WAN

Firewalls and NATs make it impossible

Firewall/NAT
Working with remote Grid sites - Smart

TCP traffic is reliable

UDP is fast

Use GCB to bridge firewalls

Glide-in Schedd

Collector

Main Schedd

Globus

Startd

User Job

Available Batch Slot

Globus

Startd

User Job

Available Batch Slot

UDP

TCP

TCP

TCP

UDP

Outgoing

TCP

Firewall/NAT

GCB
Generic Connection Brokering (GCB)

- Condor proxy service
  - Fully integrated in Condor
  - Just a configuration parameter
- For scalability, use multiple instances
  - Point different glide-ins to different GCBs

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HEAD_NODE = cdfhead.fnal.gov

# GCB configuration
NET_REMAP_INAGENT = cdfgcb1.fnal.gov
NET_REMAP_ENABLE = true
NET_REMAP_SERVICE = GCB
```
How GCB works

1) Establish a persistent TCP connection to a GCB

2) Advertise itself and the GCB connection

3) Send own address

4) Schedd address forwarded

5) Establish a TCP connection to the schedd

6) A job can be sent to the startd

GCB must be on a public network

Just a proxy

Collector

Schedd

GCB Broker

Startd

User Job

TCP

Grid Pool

Firewall/NAT

TCP

Globus

European Condor Week 2006 - CDF experience with Condor glide-ins and GCB - Igor Sfiligoi
The use of GCB at CDF

- Using a pre-production version of GCB
  - Waiting for Condor v6.7.20
- N.American CAF just opened to users
  - Condor collector and schedds at Fermilab
  - Using 2 GCBs, both at Fermilab
  - Gliding into Fermilab, MIT and San Diego
  - Rest of US and Canada Grid sites to follow
Problems found along the road

- File delivery
- Firewalls
- Security concerns
Security in the pull model

- Real user known only after glide-in starts
  - Cannot use user proxy when submitting to CE
  - Real user proxy delivered by Condor
    - User job can use it for further authentication

- All glide-ins use a single service proxy
  - Site admin does not know about the real user
  - All jobs potentially run under the same UID
    - No system protection between users

- Glide-in and job run under the same UID
  - User can steal service proxy
Security problem at a glance

CAF (Portal)

Submitter Daemons

Glidekeeper

User jobs

Schedd

Collector/Neg

Schedd

Node

Batch Slot

Glidein

User Job

Batch Slot

Glidein

User Job

Batch queue

Globus

ProxyX
Use gLExec to authenticate on the WN

- Authenticate on WN before starting the user job
  - Can change UID on the fly
- Grid admin knows who is running
Status of gLExec

• Current gLExec works only on CE
  – Cannot use it as-is

• Work in progress to make it usable for the glideins
  – See later talk

• Condor team promised to make use of gLExec once available
Summary

- Glide-ins and GCB took CDF to the Grid
  - Without leaving the Condor environment
- Using the pull model made our life easy
  - No need to select a site in advance
  - Matchmaking done at a global level
  - Policies kept in CDF hands
- No need for any add-on at Grid sites
  - Will use what is found
    - gLEexec and a local Squid desirable