Minerva Infrastructure Meeting – October 04, 2011

END TO END SOLUTION USING GLIDEINWMS & GLOBUS ONLINE

Overview

- Problem Statement
- Requirements
- Proto-type
  - Running jobs on FermiGrid
  - Running jobs outside Fermilab

Problem Statement

- Current Model
  - Community uses glideinWMS to run workflows
  - Transfer output files -
    - to Bluearc experiment mount points
    - using custom scripts (CPN)
- Problem
  - Ownership of the output files after transfer is not preserved correctly
- Proposed Solution
  - Provide an end-to-end solution that would integrate well with glideinWMS and the custom data transfer solutions
  - Two sub-projects
    - Setup gridftp server to facilitate data transfer
      - Required component to preserve the file ownership
    - Integrate with the Globus Online Service
      - Optional component that leverages on the modern techniques and solutions like Globus Online as provided by the Grid community
      - Futuristic – CPN script can not work outside Fermigrid setup
  - Work was done as part of CEDPS activity in the Fermilab (Ended Sep 2011)
  - Project Home: https://cdcvs.fnal.gov/redmine/projects/cedps-glideinwms
  - Project Document: http://cd-docdb.fnal.gov/cgi-bin/ShowDocument?docid=4406

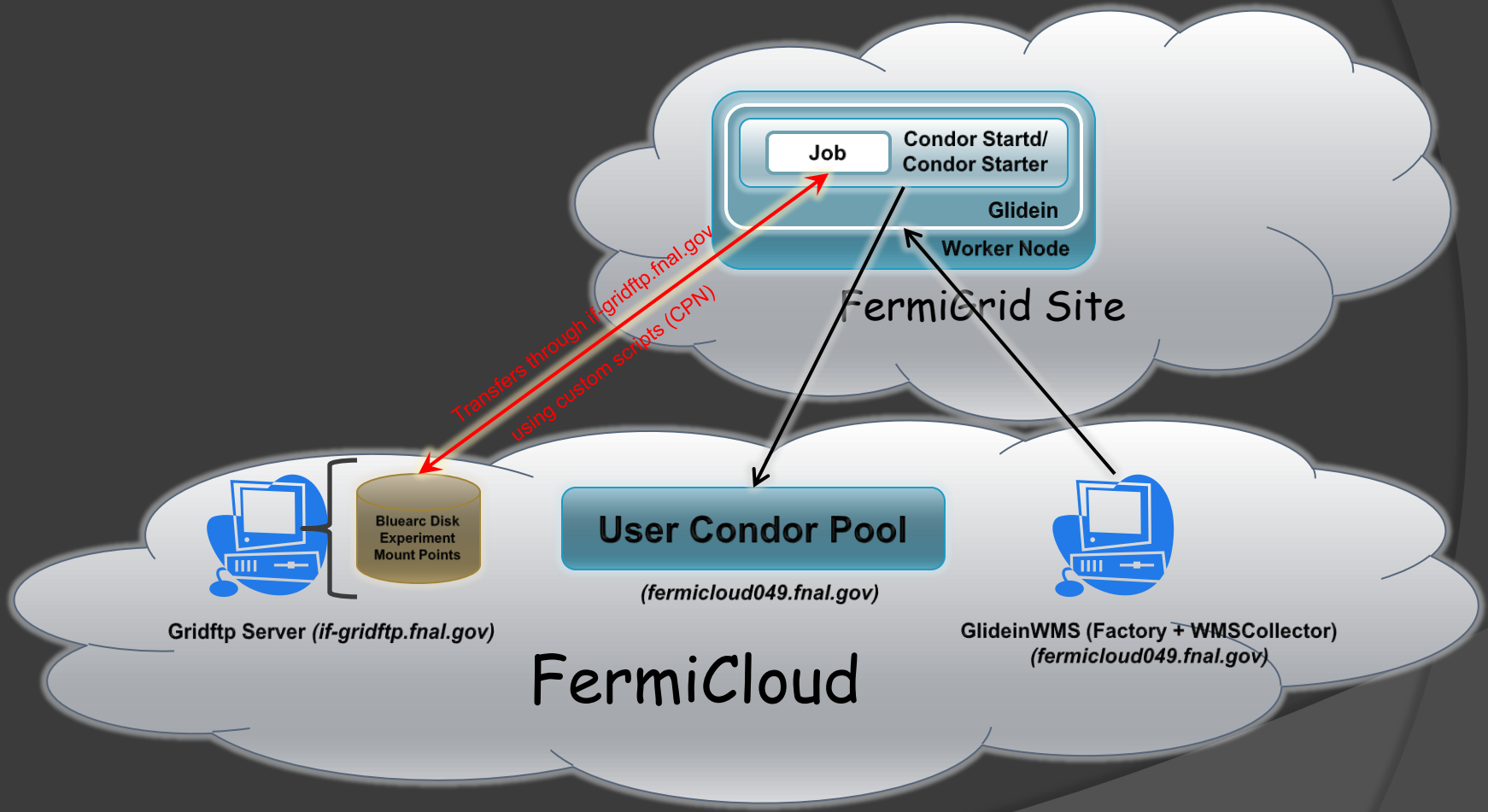
Requirements

- Key Requirements: Solution must –
  - Use user membership & account information from VOMS & NIS servers
  - Preserve the file ownership properties of a transferred file. i.e. uid.gid
  - Be compatible with existing grid processing infrastructure
  - Must support existing strong authentications i.e. Kerberos & X509
  - Must not adversely affect the performance of the central disk services. i.e. support for appropriate access locks and bandwidth throttling to the central disk
  - Support a minimum transfer bandwidth of 50Mb/s per client, and an aggregated bandwidth sufficient to saturate the network connection to the storage destination
  - Be able to scale to support a minimum of 500 simultaneous client jobs slots per experiment
- Other Requirements: Solution should –
  - Be convenient enough to replicate for different IF experiments
  - Not impact other experiments that are using the provided grid infrastructure
  - Fermigrid members must have administrative rights on the machine
  - Include diagnostic tools and support for system monitoring

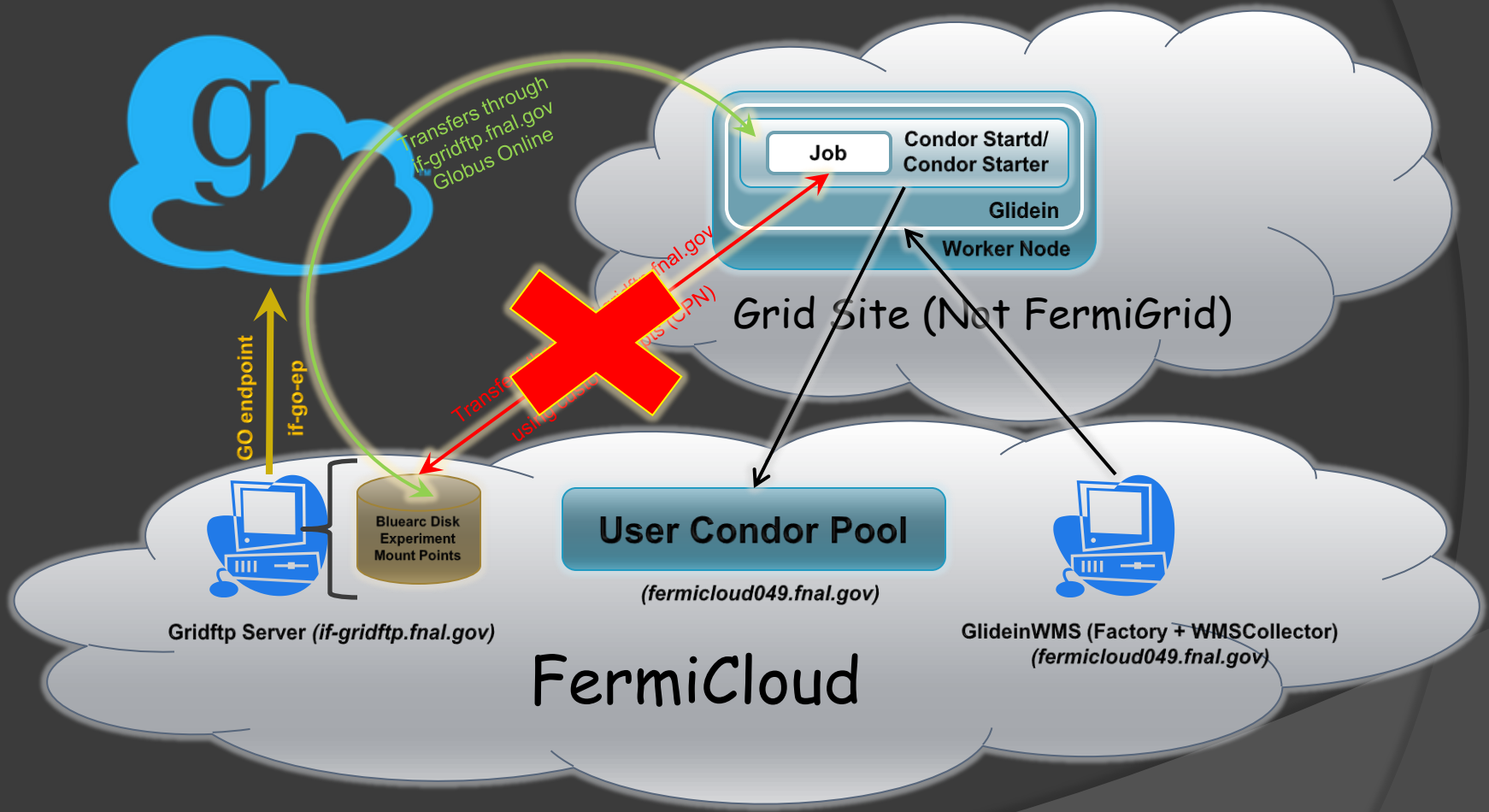
Proto-type

- Services hosted on FermiCloud VMs
- Core setup
  - Setup Gridftp service on FermiCloud VM (if-gridftp.fnal.gov)
    - Each experiment has their own VM (minerva-gridftp.fnal.gov, minos-gridftp.fnal.gov, nova-gridftp.fnal.gov …)
    - VMs are identical
      - Easy to clone for different experiments
      - Base image to clone from available
      - Differ in options used to invoke the tools
    - Setup multiple VMs behind LVS to increase scalability
  - Tools to generate -
    - Gridftp access list (gridmap file) populated from experiment subgroup in Fermilab VOMS server
    - Local user accounts from experiment NIS servers
  - Scale testing by Dennis Box
    - Ran ~500 jobs & ~600 files transferred using globus-url-copy with locking mechanism
    - More scale testing in progress
  - Enhance CPN to use globus-url-copy
    - Work in progress by Dennis Box

Proto-type Scenario: Computing on FermiGrid resources



End-To-End Solution using GlideinWMS & Globus Online



Proto-type [...contd.]

- Setup using third-party file transfer services
  - Running workflows on non Fermilab sites
    - Experiment disks not mounted on worker nodes
    - CPN script cannot be used for locking without major changes – is it even possible to use CPN?
  - Other solutions
    - Let infrastructure transfer the files rather than application
    - Use condor file transfer plugin
      - Globus Online plugin through glideinWMS
      - Reuse the infrastructure from core setup
      - Register if-gridftp.fnal.gov as a Globus Online end point
    - Scheme can be extended to other file transfer protocols

Deployment: Steps taken

- Setup if-gridftp.fnal.gov
  - Core setup -
    - Create a FermiCloud VM
    - Install VDT & configure gridftp service
    - Tool to create gridmap file from experiment specific VOMS group
    - Tool to create local user accounts from experiment specific NIS server
  - Setup related to Globus Online
    - Create a Globus Online account (few simple steps)
    - Register the gridftp service with Globus Online service
- glideinWMS deployment (fermicloud049.fnal.gov)
  - Configure Frontend to use globusonline_plugin.py
  - Run test jobs

Sample Condor JDF

```
# CONDOR JDF for test job
universe = vanilla
executable = /local/home/testuser/testjobs/info-from-go.sh
initialdir = /local/home/testuser/testjobs/joboutput
output = out.$(cluster).$(process)
error = err.$(cluster).$(process)
log = log.$(cluster).$(process)

should_transfer_files = YES
when_to_transfer_output = ON_EXIT_OR_EVICT

# Input files
transfer_input_files = globusonline://parag:paragtest:/grid/data/parag/data

# Output sandbox transfer
output_destination = globusonline://parag:if-go-ep:/tmp/uploaded_data-fnalgrid
transfer_output_files = data_to_upload

x509userproxy=/local/home/testuser/testjobs/x509up_u11017.fermilab
+DESIRED_Sites = "GR7x1“
Requirements = (stringListMember(GLIDEIN_Site,DESIRED_Sites)) && (Disk > 0 && (Arch == "INTEL" || Arch ==
"X86_64"))

Queue
```