An OSG-based distributed Campus Computing Infrastructure

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Introduction Campus Computing

Description of generic campus situation (ex. MIT)

- Large variety of research areas: engineering, maths, sciences, social sciences ....
- Most need large computing at times and have some computing resources
  - some resources shared but not widely, usage not 100% for all of them
  - no accurate inventory of all existing resources
- Most resources use some linux variant of similar versions

Some Issues

- Researches have peak demands that exceed their resources
- Often though the resources are not fully used
- Account management is work intensive
Introduction Campus Computing

Big computing centers do not work

Requirements for a new model

- Minimally expensive: money and human resources
- Technically feasible and attractive for most research efforts
- Use existing resources, but leave owners maximal control
- Reach beyond campus as needed/wanted

Virtual Computing Center: Pretend to be big

- Create a common login pool, big enough for tests
- Connect this pool to each campus computing resource
- Also connect to external resources: ex. OSG
Pilot factories – HTCondor based

- frontend submits pilots to resources
- workers pull in matching work

Open Science Grid – OSG
- plenty of resources across US

CMS Computing
- CMS resources across world

Virtual Center 'subMIT'

Campus

HPRCF – Bates
includes CMS Tier-2

CMS Tier-3

EAPS cluster
Earth and Planetary Sciences

Limited to CMS
Implementation Details – MIT

How are jobs running?

- FrontEnd submits glideIn pilots through BOSCO to the various resources submit nodes (local flavor)
- On subMIT user jobs get submitted to a HTCondor collector
- Physical workers are matched at subMIT and pull down their work
- subMIT becomes a huge virtual resource, real work is done at the physical worker
- At completion output is shipped as specified
Conclusions

The Virtual Computing Center

- Viable, pragmatic solution for generic campus computing
- Covers most use cases, but not all
- Allows maximal flexibility: all resources can be separately registered and used, but also controlled by owners
- Specific fully functional prototype implemented at MIT using OSG based tools: HTCondor, bosco, glideInWMS pilots
- Prototype provided over 30M CPU hours to MIT based researchers

What next?

- Some investment needed to establish infrastructure and support
- Users need to re-learn some, but win big
- Resource owners need to be convinced and have to adjust
- Need to find all other resources on campus and connect them