What's Different About Overlay Systems?

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Open Science Grid

Overlay Systems are Awesome!

Photo by Zachary Nelson on Unsplash

What's the Catch?

Requires more infrastructure, software, set-up, management, troubleshooting...

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*"You know you have a **distributed system** when the crash of a computer you've never heard of stops you from getting any work done."*

- Leslie Lamport

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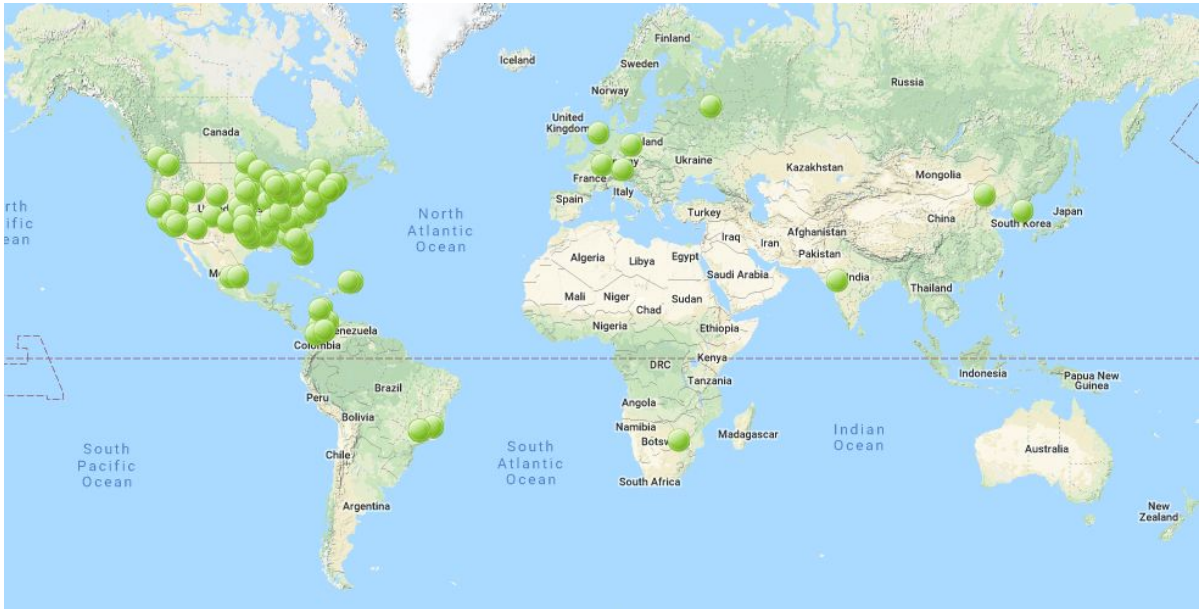
#1: Heterogenous Resources

Accounting for differences between the
OSG and your local cluster

Sites of the OSG



Source: http://display.opensciencegrid.org/

Heterogeneous Resources - Software

- Different operating systems (Red Hat, CentOS, Scientific Linux; versions 6 and 7)
- Varying software versions (e.g., at least Python 2.6)
- Varying software availability (e.g., no BLAST*)

Solution: Make your jobs more portable: OASIS, containers, etc (more in Wednesday's talks)

Hetero. Resources - Hardware

- CPU: Mostly single core
- RAM: Mostly < 8GB
- GPU: Limited #s but more being added
- Disk: No shared file system (more in Thursday's talks)

Solution: Split up your workflow to make your jobs more high throughput

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#2: With Great Power Comes Great Responsibility

How to be a good netizen

Resources You Don’t Own

- Primary resource owners can kick you off for any reason
- No local system administrator relationships
- No sensitive data (again)!

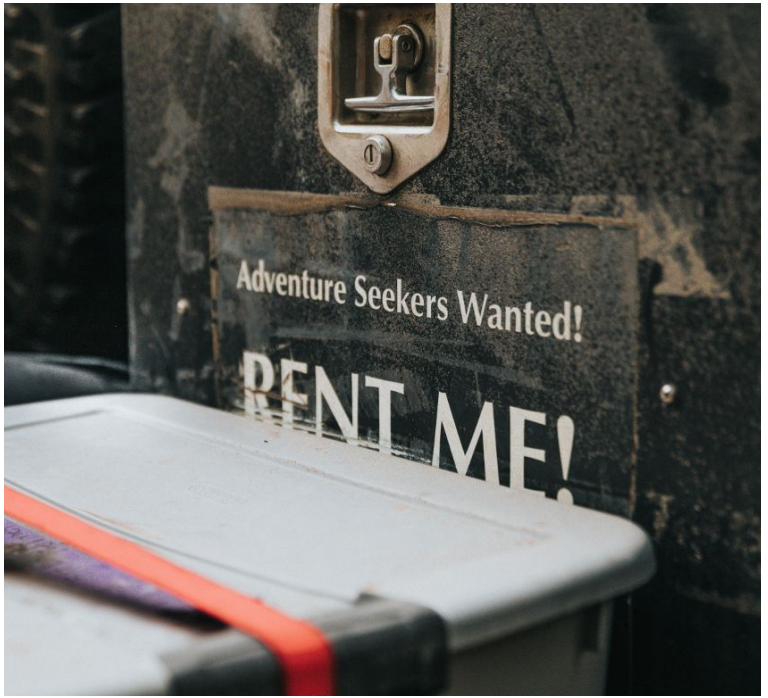

Photo by Nathan Dumlao on Unsplash

Be a Good Netizen!

- Use of shared resources is a privilege
- Only use the resources that you request
- Be nice to your submit nodes

Solution: Test jobs on local resources with

```
condor_submit -i
```

#3: Slower Ramp Up

Leasing resources takes time!

Slower Ramp Up

- Adding slots: pilot process in the OSG
  vs slots already in your local pool
- Not a lot of time (~minutes) compared to most job runtimes (~hours)
  - Small trade-off for increased availability
  - Tip: If your jobs only run for < 10min each, consider combining them so each job runs for at least 30min

Robustify Your Jobs

Succeeding in the face of failure

Job Robustification

- Test small, test often
- Specify `output`, `error`, and `log` files at least while you develop your workflow
- Use `on_exit_hold` to catch different failure modes
  - `on_exit_hold = (ExitCode =?= 3)`
  - `on_exit_hold = (time() - JobCurrentStartDate < 1 * $(HOUR))`
- For jobs that run too long:

```
periodic_hold      = (time() - JobCurrentStartDate > 4 * $(HOUR))
periodic_release       = (HoldReasonCode == 3) && (NumJobStarts < 3)
```

`HoldReasonCode` is 3 for any jobs where `on_exit_hold` or `periodic_hold` evaluate to True

Job Robustification

- In your own code:
  - Self checkpointing
  - Different exit codes for use with `on_exit_hold`
  - Defensive troubleshooting (`hostname`, `ls -l`, `pwd`, `condor_version` in your wrapper script)
  - Add simple logging (e.g. print, echo, etc)

Questions?