Condor at Purdue: Vegetating, Virtualization, and Videos

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That's no moon - that's a space station.

Yeah, the fact that it's entirely metal, perfectly spherical, covered in lights, and has a laser dish sort of clued me in, Captain Obvious...
We've got a lot of cores

Over 37 kilocores across campus

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We've got a lot of cores

- Three community clusters (Steele, Coates, Rossmann)
- Two “ownerless” clusters (Radon, Miner)
- CMS Tier-2 cluster
- Other small clusters
- Instructional labs and academic departments
Might as well share
“Since he retired all he does is watch TV and vegetate.”
Vegetating = hibernation

Financial concerns
- CIO must find $15 million in *recurring* cost savings

Environmental concerns
- Labs get really toasty!
- Burning coal is not the most environmentally-friendly thing to do

Let’s try hibernation
The path to hibernation

- Condor support
  - Requires version 7.4.3/7.5.3 or greater for waking to work properly

- Network ACLs
  - Allow WoL traffic across subnets
  - Alternative: run a rooster inside each subnet

- Is condor_kbdd.exe running as the logged in user?
  - It had better be!

- Finding willing test subjects
  - This is actually the hard part

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To be determined...
- Working with lab admins to test in several labs
- Reaching out to departments to find more testers

...but CIO report estimates ~ $300,000/year in savings
- Based on hibernating 26k machines 8 hours a day
- Assumes 100% compliance
- Ignores increased hardware failure rate
- Saves less than 1% of budget
But when we have results…

There’s a dashboard for that

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Virtualization

- We have a lot of unused Windows cores...
  - Approximately 6 kilocores
- ...and not many Windows jobs
  - 0.5% of submitted jobs in the past year
The solution?

"XZIBIT" Explains Virtualization

Yo, Dawg!
I heard you like computers,
so we put a computer in your computer
so you can compute while you compute!

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Bare-bones Linux VMs launched as Condor VM Universe jobs
- Require jobs to be self-contained
- A great way to do a Denial of Service attack
Making life better

- Pre-staging vmdk files conserves bandwidth
  - Job starts require KB of network bandwidth instead of GB
- Replace IPOP with CCB
  - VM-based jobs start faster
  - No extra service required
What’s next?

- Wider deployment of VMs
  - Consistent pool of running VMs
  - Standalone (non-Condor) VM management tool
  - Bolt-on application disks
  - Running VMs at partner institutions

- Dynamic VM pool size
  - If a VM is running, the host can’t hibernate

- Finding a user to run lots of code over a weekend
  - Management loves sending out press releases
Doubletake – YouTube at Purdue

- Student-submitted video assignments
  - Great for ASL assignments
- Jobs grabbed from web submission and rendered with Condor and ffmpeg
  - Preempts jobs on the two dedicated nodes
  - Can flock to the rest of the Condor pools
- Jobs shoved to website when rendering is complete
  - 10 MB/minute encoding times
DoubleTake

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The Future

Huh... that's weird. This doesn't LOOK like the future...

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The Future

- More cores!
  - Another cluster coming in the fall
- More DiaGrid participants
  - Ball State University, University of Delaware
- More VMs
  - Application/domain specific virtual machines?
- Need more users
  - What are we going to do with all of these spare cycles?
We’re hiring!

DiaGrid job opportunities coming

- Condor expert/enthusiast
- Experience working with researchers
- Strong problem solving
- Parallel programming skills preferred

www.purdue.edu/jobs

(positions are not yet posted)