

HP Labs – openlab wrap up

CERN openlab III major review
29 January 2009

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- Tycoon (J.M. Dana)
- Resource allocation (X. Grehant)

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- Collaborations
- Tycoon-gLite integration
- Scalability tests
- Conferences & reports
- The cloud computing initiative

- Several collaborations were initiated regarding Tycoon:
 - HP Labs (Palo Alto)
 - EGEE
 - BalticGrid
 - Constellation Technologies

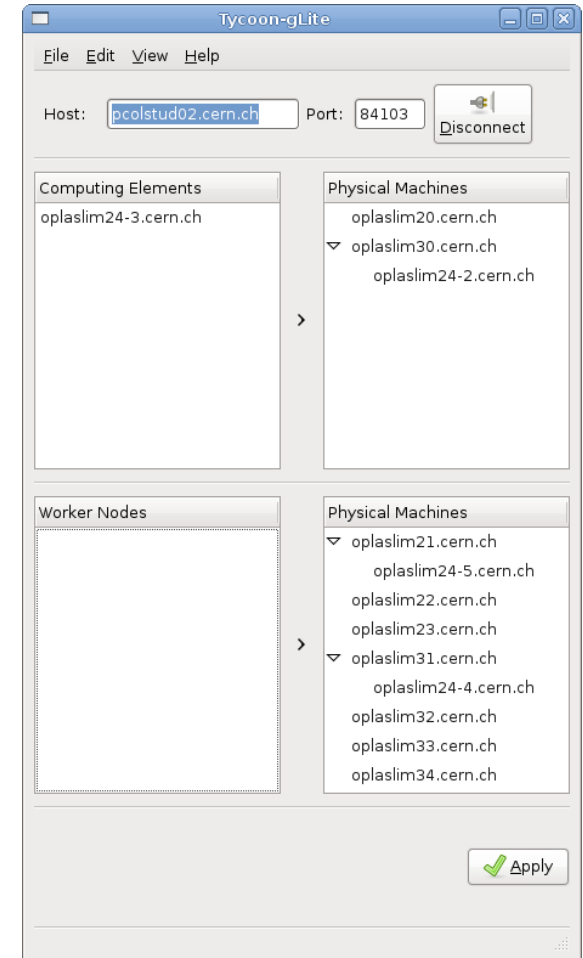
- This implementation was our solution for the integration Tycoon/EGEE

```

output
Modify the output only if you're sure about what you're doing...
and always at your own risk!

tycoon host create_account oplaslim30.cern.ch 1 "0 disk:1.2GB,2GB" file_system=file:///var/lib/tycoon/audc/Xen303/lib/default.ext3
tycoon_scp /tmp/tycoon-gLite_CIBHjC/site-info.def root@oplaslim30.cern.ch:/root/
tycoon host create_account oplaslim21.cern.ch 1 "0 disk:1.2GB,2GB" file_system=file:///var/lib/tycoon/audc/Xen303/lib/default.ext3
tycoon_scp /tmp/tycoon-gLite_CIBHjC/site-info.def root@oplaslim21.cern.ch:/root/
tycoon host create_account oplaslim31.cern.ch 1 "0 disk:1.2GB,2GB" file_system=file:///var/lib/tycoon/audc/Xen303/lib/default.ext3
tycoon_scp /tmp/tycoon-gLite_CIBHjC/site-info.def root@oplaslim31.cern.ch:/root/
tycoon host create_account oplaslim24.cern.ch 1 "0 disk:1.2GB,2GB" file_system=file:///var/lib/tycoon/audc/Xen303/lib/default.ext3
tycoon_scp /tmp/tycoon-gLite_CIBHjC/site-info.def root@oplaslim24.cern.ch:/root/

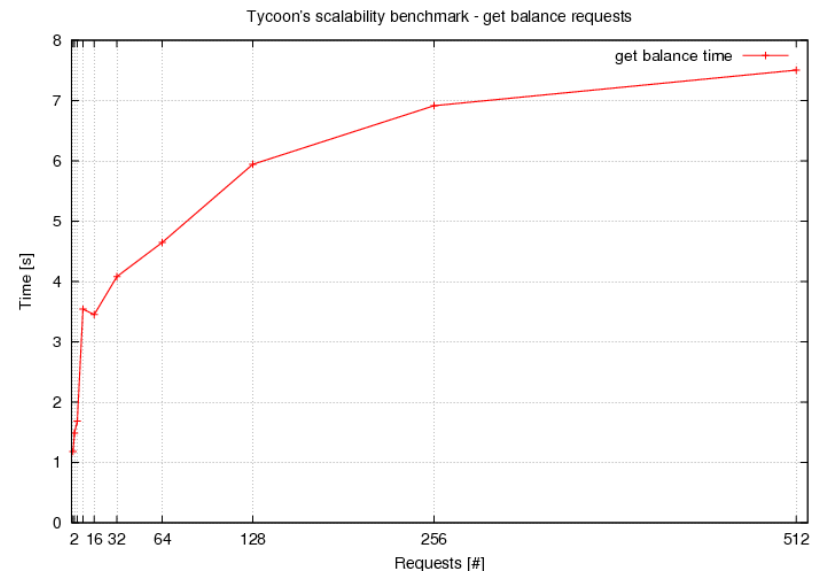
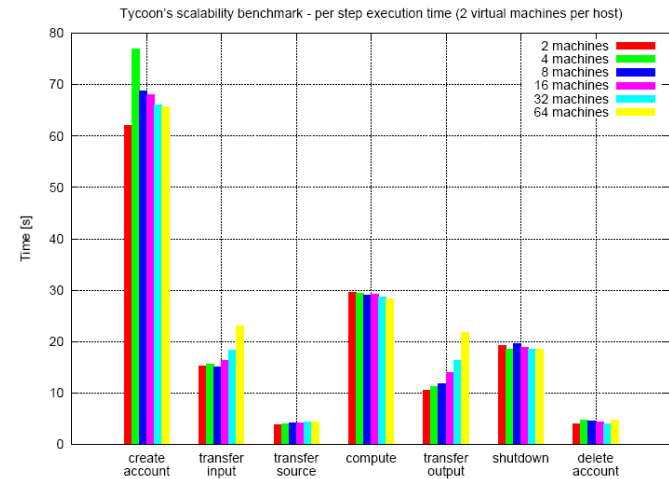
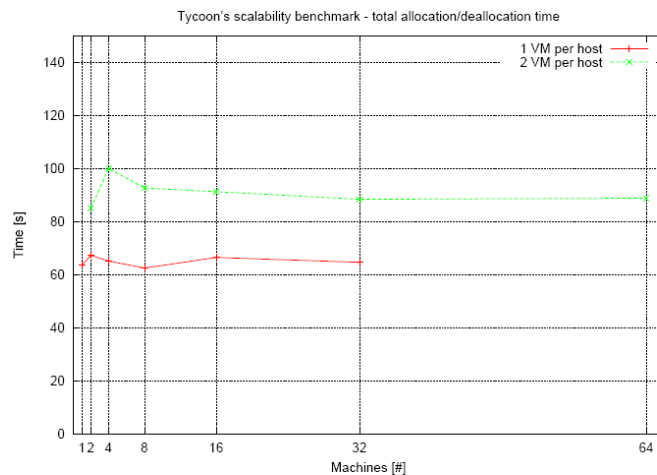
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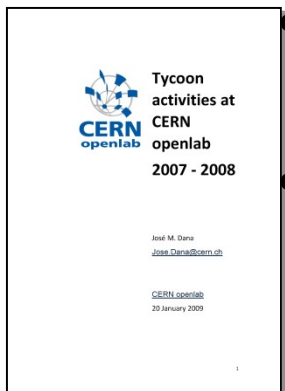
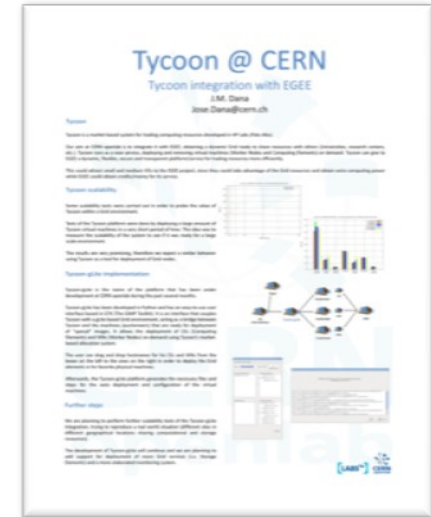
The screenshot shows the Tycoon-gLite application window. At the top, there is a menu bar with 'File', 'Edit', 'View', and 'Help'. Below the menu bar, there are fields for 'Host' (set to 'pcolstud02.cern.ch') and 'Port' (set to '84103'), along with a 'Disconnect' button. The main area is divided into four panels: 'Computing Elements' (containing 'oplaslim24-3.cern.ch'), 'Physical Machines' (containing a list of machines including 'oplaslim20.cern.ch', 'oplaslim30.cern.ch', and 'oplaslim24-2.cern.ch'), 'Worker Nodes' (empty), and another 'Physical Machines' panel (containing a list of machines including 'oplaslim21.cern.ch', 'oplaslim24-5.cern.ch', 'oplaslim22.cern.ch', 'oplaslim23.cern.ch', 'oplaslim31.cern.ch', 'oplaslim24-4.cern.ch', 'oplaslim32.cern.ch', 'oplaslim33.cern.ch', and 'oplaslim34.cern.ch'). At the bottom right, there is an 'Apply' button with a green checkmark icon.



- Several tests were carried out in order to measure Tycoon's scalability



- Tycoon was presented in:
 - EGEE Conference '06
 - EGEE Conference '07
 - EGEE User Forum '07
 - Distributed Computing Workshop 08
- Two reports have been written:
 - Technical report written and sent to HP Labs (Palo Alto) in January 2008
 - Final report with all the technical information regarding Tycoon finished in January 2009



The Open Cloud Computing initiative: Tycoon and the Cloud Computing

- **“Cloud Computing”** is a style of computing where IT-related capabilities are provided **“as a service”**, allowing users to access technology-enabled services **“in the cloud”** **without knowledge of, expertise with, or control over the technology infrastructure that supports them**
- Tycoon is being used as a resource allocation system in “the cloud”
- We believe that our collaboration with HP Labs has helped Tycoon to be part of this new research initiative

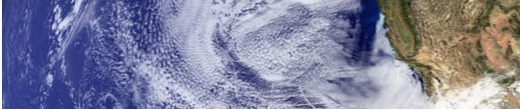
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HP Labs cloud-computing test bed: VideoToon demo



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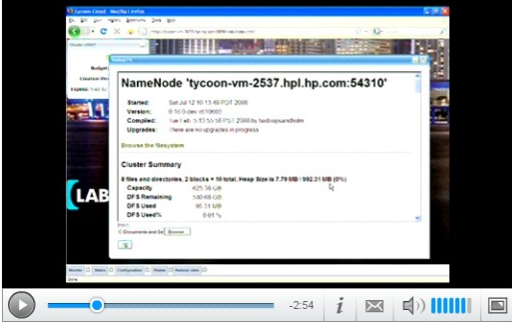
The HP, Intel and Yahoo! Cloud Computing Research Test Bed will provide efficient and powerful hardware platforms managed by flexible and scalable system services that support a variety of application domains. Its main objective is to support researchers who are developing new ways of managing data centers and experimenting with new cloud services.

To make this concrete, we showcase on this page an example of one such experiment: testing out a new combination of some unique HP, Yahoo!, and Intel@ technologies working together to build a cloud-computing service.

In this example, Thomas Sandholm wants to make the HPL VideoToon processing technology available as a service to cartoon-ize videos. To do so he combined VideoToon with Intel@ VT Virtualization Technology to provide efficient performance isolation, HP Labs Tycoon to do agile market-based allocation, and Yahoo! Apache Hadoop to simplify parallelization. The entire test was pulled together in less than 2 weeks. It's now ready for trying out at scale, to explore the effects of multiple users competing for resources.

The goal of the testbed is to make this kind of experimentation equally easy for many other users.

Demo Video

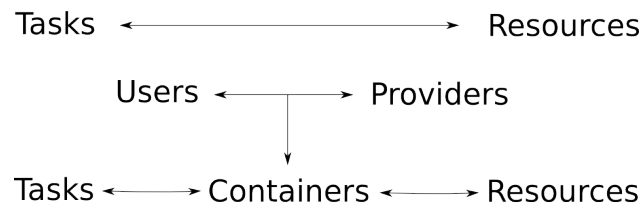


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Towards Efficient Resource Allocation in Scientific Grids, ENST Research Report 2008

- Identify the efficiency problem when multiple organizations share resources
- Are we doing it the right way at CERN?
 - Condor tools with Globus paradigms
 - Users converge towards more control with *Late Binding*
 - New ideas clash with *de facto* architecture
- Influence of HP Labs research
 - Tycoon, the auction-based alternative
 - Full flexibility of utility computing, e.g. SoftUDC

- *Symmetric Mapping: an architectural pattern for resource supply in Grids and Clouds, SMTPS'09*
- Cost-effectiveness of the allocation
 - With several independent participants
 - Based on separation of supply and usage



- Containers are contract descriptions
- Implementation with Condor and some elements we developed

Xen Management with SmartFrog, VHPC'06

- Allocation of resources to containers
 - Under the responsibility of each provider
 - Consists in the deployment of environments from descriptions
- Implementation: SmartDomains
 - Initially used for distributed tests at CERN
 - Xen virtual machines
 - SmartFrog by HP Labs
 - Description language
 - Configuration, deployment, lifecycle mngt
 - Distribution, synchronization

- Allocation of tasks to containers
 - Under the responsibility of each user (Virtual Organization or application scheduler)
 - Requires sustained services on transient containers
- Container election and service deployment
 - Container termination triggers re-election
 - Service re-deployed on newly elected container
- Proof of concept: SmartCitizens
 - Leader election algorithms (mobile networks)
 - Deployment by SmartFrog (HP Labs)

- *Lightweight task analysis for cache-aware scheduling on heterogeneous clusters, PDPTA'08*
- *+ work in progress*
- Performance of task - container allocation
 - Resource stalls, parallelism
 - Fast and precise prediction model in validation
- To evaluate and drive allocation by users
- Influence from openlab PCC, Intel, and mathematicians from CERN and ENST

- Bad luck: financing discontinued
 - Labs restructuration changed initial plans
 - Financial crisis killed second option
- Work continued to finish what we started
 - With ENST, CERN openlab and HP Labs
- HP Labs: thank you for financing 3 years
- Thank you for your trust, and the opportunity to learn and do good research