OrgGrid: A Centralized BOINC Resource Manager for Institutional Networks

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Institutions like Universities have a large number of desktop PCs.

These PCs are usually underemployed.

However, the computing power is really good (multi-cores, 1GB of RAM, etc.).
Computing Resources in Institutions

- These resources can be harnessed by means of BOINC.
- BOINC is a middleware widely used by researchers:
  - 1,154,833 users
  - 2,364,170 PCs
  - 703.040 TeraFLOPS
- Nevertheless, BOINC is thought and focused around users.
BOINC relies on users:

- The users decide with which project they collaborate.
- The users decide how much of their resources are donated.

On the other hand, institutional PCs do not belong to users.
Standard BOINC Model
Our proposal is a new model where the institution has the power of choice.

In this model, the user is removed from the decision process and the institution decides.
Resource Based BOINC Model
A institution, which employs this model, has to be able to do remotely the following tasks:

- Creation of PC pools.
- Allocation of BOINC projects to PC pools.
- BOINC Clients Upgrade.
- Statistics Retrieval.

With this goal, a software tool has been created to support the new model.
BOINC Resource Managing Committee

Diagram showing the interaction between BOINC Resources, Managing Committee, and Research Groups.
Remote PC attaching to BOINC projects.
- Master-Slave.
- NAT, Firewalls or Proxy problems.
- **SOLUTION:** To employ HTTP exclusively for all communications.

BOINC PCs Management.
- 2 Management Policies:
  - *Dedicated Time*
  - *Student/Worker* WakeOnLAN
Client

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Server

![Diagram of Server Interface and Decision Core]

- Interface:
  - Admin.
  - Hosts
  - BOINC Prj
  - Groups
  - Info
  - Active Hosts
  - Stats
  - Failures

- Decision Core:
  - Store
  - BOINC
  - System
  - Groups
  - Decisions
  - BOINC ver.
  - Group
  - Project

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Experiments & Results

Goal: To prove the validity of the model.

Client Side:
- The Clients contact the Server.
- The Clients upgrade the BOINC core client.
- The Clients are attached to BOINC projects to produce results.

Server Side:
- Creation of PC pools.
- Allocation of clients to PC pools.
- Allocation of BOINC projects to PC pools.
Experiments & Results

- 3 Campuses from the University of Extremadura.
  - Cáceres, Faculty of Law.
  - Badajoz, Faculty of Engineering.
  - Mérida, Computer Science.

- 1 Laboratory per campus.
  - 20 GNU/Linux PCs per laboratory.

- 3 BOINC Projects:
  - SETI@HOME
  - Nnsimu
  - BoincStats
Project Evolution for One Month

Experiments & Results

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Active Hosts Evolution for One Month
Total Free Hard Disk Space Evolution for One Month
Experiments & Results

Total Free RAM Space Evolution for One Month

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Experiments & Results

Laboratory Evolution for Two Months

June

August

Dedicated Policy
Student Policy

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Future Work

A New Tool:
- Start from scratch a new tool: PHP5.
- Multiplatform: Ms. Windows & GNU/Linux.
- Multiuser.
- Multilanguage.
The New Version: OrgGrid

- Written from scratch.
- Coded in PHP5.
- Based on BOINC Account’s Manager Protocol.
- Multiuser (different roles):
  - Root.
  - Supplier.
  - Allocator.
- Multilanguage (by default English).
- Multiplatform: Ms. Windows, GNU/Linux and MacOSX.
Figure: Login Screen
Figure: Different Roles
Figure: Hosts

Wellcome root

Available Hosts

<table>
<thead>
<tr>
<th>Host</th>
<th>Pool</th>
<th>Supplier</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>default</td>
<td>berkeley</td>
</tr>
</tbody>
</table>
**Figure:** Host Features

```
<table>
<thead>
<tr>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supplier:</td>
</tr>
<tr>
<td>Venue</td>
</tr>
<tr>
<td>Number of CPUs:</td>
</tr>
<tr>
<td>Processor Vendor:</td>
</tr>
<tr>
<td>Processor Model:</td>
</tr>
<tr>
<td>FLOPS</td>
</tr>
<tr>
<td>IOFS</td>
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</tr>
<tr>
<td>Total Credit:</td>
</tr>
<tr>
<td>RAC</td>
</tr>
<tr>
<td>OS Version:</td>
</tr>
<tr>
<td>Delete</td>
</tr>
</tbody>
</table>
```

**OrgGrid, Pangalactic 2008**
Figure: Pools
**Figure: Pool Options**

### OrgGrid

#### Pools
- Start
- Projects
- Hosts
- Pools
- Users
- Statistics
- Log Out

#### Editing pool

<table>
<thead>
<tr>
<th>Pool Features</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pool Name</td>
<td>default</td>
</tr>
<tr>
<td>Supplier</td>
<td>badajoz</td>
</tr>
</tbody>
</table>

**Processor usage**
- Suspend work while computer is on battery power? (matters only for portable computers)
  - Yes ☑️ No ✗
- Suspend work while computer is in use?
  - Yes ☑️ No ✗
- 'In use' means mouse/keyboard activity in last 3 minutes
- Suspend work if no mouse/keyboard activity in last 3 minutes (Needed to enter low-power mode on some computers)
  - Enforced by version 5.10.14+
  - 0 minutes
- Do work only between the hours of 0:00 and 0:00 (no restriction if equal)
- Leave applications in memory while suspended? (suspended applications will consume swap space if yes)
  - Yes ☑️ No ✗
- Switch between applications every 60 minutes (recommended: 60 minutes)
- On multiprocessors, use at most 16 processors (Enforced by version 5.10 and earlier)
- On multiprocessors, use at most 100% of the processors
Figure: Projects
Figure: Projects Options
Figure: Users

<table>
<thead>
<tr>
<th>User ID</th>
<th>Role</th>
<th>Supplier</th>
</tr>
</thead>
<tbody>
<tr>
<td>root</td>
<td>root</td>
<td>root</td>
</tr>
<tr>
<td>david</td>
<td>root</td>
<td>berkeley</td>
</tr>
<tr>
<td>daniel</td>
<td>supplier</td>
<td>badajoz</td>
</tr>
<tr>
<td><a href="mailto:berkeley@unex.es">berkeley@unex.es</a></td>
<td>supplier</td>
<td>berkeley</td>
</tr>
<tr>
<td>allocator</td>
<td>allocator</td>
<td>merida</td>
</tr>
</tbody>
</table>
We have presented a new BOINC Resource based model.
The new model replaces the final user for an Institution.
We have shown a new tool which enables the model.
The new tool is an on-going work.
Conclusions

Questions

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