New Horizons on Campus ICT Infrastructure

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About me…

• Working in IT & Telecom industry for 12 years
• A PhD candidate working on his thesis
• A frequent university campus visitor
An Outlook

• Digital Campus installations started early 90’s
• Science and technology information systems installed first
• Student affairs/HR automation, student labs, Web portals and user applications
• Campus backbones and integration
• Mobility support
• e-Learning environments
• HPC clusters/Grid
University IT Infrastructure Grouping

• Server farm
• Office Automation and Desktop applications
• Campus network
• Web portal and User applications
• Main IT room / control centre
• Wireless communications
• Campus backbone & cabling
• IT security
• Telephony and Unified messaging system (UMS)
• Public facilities - Kiosks and Displays
• Digital Surveillance
Differences from Enterprise IT Systems

<table>
<thead>
<tr>
<th></th>
<th>Campus</th>
<th>Company</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ultimate goal</td>
<td>To create knowledge value</td>
<td>To create economical value (profits)</td>
</tr>
<tr>
<td>Focus of information</td>
<td>Knowledge</td>
<td>Capital, Material flow</td>
</tr>
<tr>
<td>Key resource bank</td>
<td>Educational resource bank</td>
<td>Client and product resource bank</td>
</tr>
<tr>
<td>Typical systems</td>
<td>E-learning, E-campus</td>
<td>ERP/MRP/CRM</td>
</tr>
<tr>
<td>Main source of alteration</td>
<td>Teaching patterns</td>
<td>Marketing/production patterns</td>
</tr>
<tr>
<td>Relevant IT theories</td>
<td>Few</td>
<td>ERP/BPM/ValueChain, etc.</td>
</tr>
<tr>
<td>Time relativity</td>
<td>Each semester as a cycle; system load varying periodically.</td>
<td>Relatively stable</td>
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Differences from Enterprise IT Systems

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<tbody>
<tr>
<td>Service recipients</td>
<td>Teachers and students.</td>
<td>Employees</td>
</tr>
<tr>
<td>Capital investment</td>
<td>More attention to network construction, less to the application system construction.</td>
<td>More attention to the application system construction</td>
</tr>
<tr>
<td>Time relativity</td>
<td>Each semester as a cycle, work pressure and personnel alteration varying periodically.</td>
<td>Relatively stable</td>
</tr>
<tr>
<td>Cultural atmosphere</td>
<td>Campus culture characterized by freedom and open-mindedness</td>
<td>Company culture characterized by discipline and efficiency</td>
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Differences from Enterprise IT Systems

Organizational Characteristics

<table>
<thead>
<tr>
<th></th>
<th>Campus</th>
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</thead>
<tbody>
<tr>
<td>Relation between</td>
<td>Relatively independent, loosely-connected</td>
<td>Closely connected</td>
</tr>
<tr>
<td>departments</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of personnel</td>
<td>Usually a lot, some with an enrollment of 60,000 students[7]</td>
<td>From very few to a great many</td>
</tr>
<tr>
<td>Knowledge structure</td>
<td>Many experts at computer in different departments</td>
<td>Few experts at computer in other departments</td>
</tr>
<tr>
<td>Personnel mobility</td>
<td>Noticeable periodical mobility (such as freshmen coming to and graduates leaving the school)</td>
<td>No noticeable periodical mobility</td>
</tr>
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University ICT Systems & Processes

Reality

- Incompatible systems with weak levels of integration
- Fragmented data
- Fragmented processes and ownership
- Lacking in functionality

- Weak customer service
- Slow new service introduction
- Poor economies of scale
- High man-power costs
What we need?

• A framework for delivering highly flexible, low cost operations for:
  – Processes
  – Data architecture and information models
  – Integration architecture
ITIL Framework

Organizational Model

Process Model

ITIL Framework
Technology Model - 1

Towards Tighter Integration
Campus Application Integration Framework based on SOA
Technology Model - 2

An Ideal Information Model & Data Architecture

Georgia State Univ. Info. Model
Additional Recommendations

• Use COTS
• Build server farms as internal clouds
• Manageable clients
• Support Mobility
  – Structured, manageable WiFi (802.16n) networks
  – Power plugs for mobile users
  – Seamless – secure “outside campus” services
• Social collaboration services
• Empower users to develop new content/services/applications (i.e. internal marketplaces)
e-Science

- Data sharing and integration
  - Life sciences, sharing standard data-sets, combining collaborative data-sets
  - Medical informatics, integrating hospital information systems for better care and better science
  - Sciences, high-energy physics

- Simulation-based science and engineering
  - Earthquake simulation

- Capability computing
  - Life sciences, molecular modeling, tomography
  - Engineering, materials science
  - Sciences, astronomy, physics

- High-throughput, capacity computing for
  - Life sciences: BLAST, CHARMM, drug screening
  - Engineering: aircraft design, materials, biomedical
  - Sciences: high-energy physics, economic modeling

Source: Hiro Kishimoto GGF17 Keynote May 2006
e-Science Recommendations

• University Cluster

• Deskside Clusters for research groups

• Grid Infrastructure collaborating with other universities
  – Internet-2 like network
Towards “Digital Campus” – A Dream University

A multipurpose Digital Campus facilitating for a better e-Learning environment by Kansai University

- Unified spaces of both virtual and real
  - Visualisation of resources via Web3D

- Metamodel to utilize resources over the Internet
  - Contents retrieval and integration from multiple resources, data storage according to location information, and its utilization

- Campus amenity and educational contents among individuals
  - Avatar appearance, objects and links allocation
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The Big Merge: A message from the MeeGo Technical Steering Group
An interview with Imad Sousou and Valtteri Halla

MeeGo blog
Latest news from the team

What's new
Interesting bits about MeeGo
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- Intel Software Tools
- Modular Course Content

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- C/C++/Fortran
- Want the most performance

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- C/C++
- Want simplest path to multicore

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- Developing for Intel Atom Processor


* Embedded Development is on the way
Thank You!