Case Study 4:
An overview of the University of Westminster SunRay Service

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increased access
reduced costs
The University of Westminster

- The University has had four different names during its long history:
  - The Royal Polytechnic Institution (1838-1881)
  - Regent Street Polytechnic (1881-1970)
  - The University of Westminster (1992 to present)

- 20000 students
- 4 Campuses (Regent, Cavendish, Harrow, Marylebone)
- 10 Schools
- 3 Schools at Cavendish of which the School of Informatics where we started a SunRay project in 1999.
7 years of SunRay experience at the School of Informatics

• Dean: Prof Stephen Winter
• 2 departments covering four main disciplines:
  – Software engineering
  – Information systems
  – Maths
  – Electronics
• 1200 students
• 60 academics
• 5 SunRay labs, 11 PC labs, 1 electronics HW lab
Our motivations

• To have a cost effective solution to replace old Sun/HP Workstations and PCs for students in Software engineering (SE), Information systems (IS) and electronics departments.
• To provide labs to large number of students, especially large groups of SE & IS students.
• To offer students technological pluralism
• Reduce support cost (time, staff)
• Environmental friendly (heat, power)
• Consistency of desktop settings
• And more recently: digital signage
The School SunRay Service

- It consists of a group of SunRay servers configured as a failover group for School students and staff to access a Solaris/JDS environment.
  - 145 SunRays deployed in labs (186 before summer 2006)
  - 3x 20 seaters and 2x 40 seaters
  - 20 SunRays deployed to staff, support areas, staff resources room
  - 1 SunRay deployed at home

- Staff use smartcards, students use NSCM or logout at the end of the tutorial
- Since 2005: Java Desktop System (JDS)
- Access to School specialist applications, School & corporate services, etc
- Access to a properly configured Web browser
- Users can print from SunRay to PALMS
- Staff can print to their SunRay printer
- Mounts user’s home directories from University NFS server
- Uses University LDAP Novell e-directory for authenticating users
- Users can use software clients to interoperates with Citrix, RDP, etc.
SunRays success in the School

• Good for delivering tutorials to large groups of students in software engineering and information systems. Up to 300 undergraduate students in first year who are all using SunRays.
• Over 40 School modules in 06/07 are delivered in SunRay labs in a Solaris / JDS environment.
• This represents over 130 hours of scheduled tutorials per week in Semester 1 and 80 hours in Semester 2.
• Modules: programming, internet applications, e-applications, web services, databases, concurrent programming, event-driven programming, computer graphics, secure languages, network application development, microelectronics design, VLSI, etc.
• Used for CPD
• Around 10 staff are using SunRays as their desktop
• Users are very satisfied with the SunRay solution. Labs are reliable, desktops have a uniform standard configuration and there are no viruses. SunRay lab support is minimal.
SunRay environment: packages

• Programming: Java, C++, Eiffel, Perl
• Graphics: ImageMagic, gimp, OpenGL, Java3D
• IDE: Netbeans, Eclipse, Sun workshop, Sun Java creator, etc
• StarOffice, Emacs, latex, sccs
• Web: mozilla, firefox, giftrans, javascript, tomcat, jboss, cgi
• IBM Rational Rose
• Databases: Oracle clients, mysql clients, etc
• Media: showmetv, vlc
SunRay benefits to the School (1/2)

- Lower TCO
- Cost effective: low cost appliance, reduced staff support costs and maintenance costs, low physical security deployment cost
- Reliable, less hardware maintenance: no moving parts
- Easy to replace, stateless desktop: no data at the desktop
- Reduced costs of administration: rapid deployment and updates
- Small footprint on the desk/labs, silent.
- Zero configuration and administration on the desktops
SunRay benefits to the School (2/2)

• Servers are centrally managed (1 server administrator, 2 lab managers)
• Zero annual desktop refresh costs
• Appliance get the performance of the servers
• High-availability with failover group
• Mobility with Hot-desking technology
• Improved security: centralise data and applications (mirror, backed up), theft of data from insecure desktop not an issue, no viruses
• Improved overall user session availability during unstable power conditions
• Software can be installed, tested and maintained remotely
SunRays: the exceptions

• SunRays may not be the best fit for:
  – 3D graphics intensive applications. We have two PC multimedia labs for such specialist software.

• Not suitable as device appliances eg specialised network equipment, embedded systems
  – We have dedicated network/systems labs and embedded systems labs
SunRay deployment in the School

<table>
<thead>
<tr>
<th>Year</th>
<th>System</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>SRS1.0</td>
<td>CDE</td>
</tr>
<tr>
<td>2001</td>
<td>1.1</td>
<td>NIS, failover group, static load balancing</td>
</tr>
<tr>
<td>2002</td>
<td>1.2</td>
<td>NSCM, dynamic LB</td>
</tr>
<tr>
<td>2003</td>
<td>1.3</td>
<td>replace HP WS with SunRays, phase out E450</td>
</tr>
<tr>
<td>2004</td>
<td>2.0</td>
<td>USB, LDAP, Redeploy E280R in CAM mode for WDS</td>
</tr>
<tr>
<td>2005</td>
<td>3.0b1</td>
<td>JDS, JDSR3</td>
</tr>
<tr>
<td>2006</td>
<td></td>
<td></td>
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<tr>
<td>2007</td>
<td></td>
<td></td>
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</tbody>
</table>
Interoperability today

- ssh, X11
- Rdp, citrix
- Corporate, school services, Grid services
- Corporate, school services, Local pc
- ssh, X11
- Corporate, school services, Grid services
- Local pc
- Solaris
Installation, Configuration

- Jumpstart (remote installation from home/testing from home using SunRay@Home)
- Class B (plenty of IP addresses)
- Failover
- NSCM + Smart Card
- Mount NFS home directories from ISLS server
- LDAP client to pool of ISLS Novell e-directory servers
- Optimise JDS for speed/performance
- OpenGL
- Customise JDS menu, limit number of processes per user, memory
- Mozilla autoconfig
- Software depot
Monitoring of the SunRay servers

• Functional monitoring:
  – Nagios
  – Administrator often logged in to the SunRay

• Performance monitoring
  – Useful to monitor server utilisation and identify possible problems
  – Orca (plot data)
  – XE/SE toolkit (performance toolkit)

• Things to watch for in a sunray server:
  – Run-away processes
  – Shared memory
  – Memory leaks
Experience

• In 2000/1, it was early stage for Sun to provide SunRay support to customer with large number of SunRays when we started. Documentation was still being developed and we created our own documentation as part of support calls.
• Until 2002, we were using workarounds to load-balance sessions
• IP addresses & failover. Network reconfigured to Class B
• There is now plenty of SunRay documentation, blueprints
• There is a now a large SunRay community
• There are forums, mailing lists, blogs with lots of expertise and solutions
• SunRay software is now very stable
• Very few support calls from users except the traditional support issues (over quota, account locked) which are not SunRay specific
• We have a few more JDS user support calls than for CDE
• Only experience with SunRay software on Solaris.
• Experience with a dedicated SunRay network
Westminster Digital Signage

- Objective is to provide signage using digital displays
- Content displayed include student information, research, seminars, events, timetables, lab information, etc
- Content is web-based and rotates according to a display list
- A failover group of two sunray servers are configured in Kiosk mode with firefox and full-screen plugin.
Conclusions and future work

• The School has experience with SunRays providing Solaris/JDS desktop
• The School is interested at remote desktop solutions with SunRays to widen the use of SunRays in the School
• The School is interested in a group of SunRay servers composed of a mix of Linux/Solaris
• The University as a whole is looking at Remote desktop solutions including SunRays and Sun Secure Global Desktop.