

RED HAT ENTERPRISE LINUX SERVES AS FOUNDATION FOR THE UNIVERSITY OF OKLAHOMA'S CAMPUS COMPUTING



SOFTWARE

Red Hat Enterprise Linux

HARDWARE

Dell PowerEdge Rack Servers
r910 and r810

Intel Pentium Xeon 4-based
commodity systems

MIGRATION

Solaris to Red Hat® Enterprise
Linux®

Fedora to Red Hat Enterprise
Linux

The University of Oklahoma (OU) was operating largely on a Solaris environment prior to 2007. When concerns about cost and vendor lock-in forced a move to commodity hardware, OU selected Red Hat® Enterprise Linux® for all campus computing needs, from the website to the Oracle PeopleSoft system. On another part of campus, at the Supercomputing Center, Red Hat Enterprise Linux had long been the foundation for high-performance computing clusters due to its stability and large ecosystem.



HIGHER EDUCATION

CUSTOMER SINCE
2002

“Everything is for the students. Red Hat Enterprise Linux allows us to sustain the performance and high level of service that we currently provide to our students.”

MARK WEIGEL
LEAD UNIX TEAM
IT DEPARTMENT AT THE UNIVERSITY OF OKLAHOMA



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NEEDED A SCALABLE, RELIABLE, AND HIGH-PERFORMING OPERATING SYSTEM ROBUST ENOUGH FOR A BROAD RANGE OF UNIVERSITY USE CASES

The University of Oklahoma (OU) is a major research and degree-granting academic institution with three campuses that are home to more than 30,000 students. Prior to 2007, OU was running everything from its main campus website to its PeopleSoft infrastructure on Solaris. The hardware consisted of more than a dozen SPARC-based Sun Enterprise V880 servers, as well as 34 smaller Sun Enterprise 420 and 440 servers.

But this IT infrastructure was unsustainable in the long term.

“We began searching for an alternative to Solaris, primarily to get away from being locked into the proprietary hardware, but also because of the Sun licensing and support costs, which were very high,” said Elliott Robertson, an IT analyst on the UNIX team within the OU IT department. “And we expected the biggest challenge of migrating away from Solaris to be the refresh of the Oracle PeopleSoft system onto commodity hardware with a new operating system. We needed a highly scalable and reliable operating system that could run on low-cost commodity hardware and was certified to run PeopleSoft. Red Hat Enterprise Linux fit all the requirements.”

At the same time, OU was about to implement a new student system: the SunGard Higher Education’s Banner system.

“We decided to merge the two projects when we determined that Red Hat was the best choice for both the PeopleSoft and the Banner deployments,” said Gayathri Swaminathan, an IT analyst with the OU IT UNIX team.

On another part of campus, a different scenario had been taking shape since 2002. The OU Supercomputing Center for Education & Research (OSCER) was founded in 2001 to help students and staff learn and use advanced computing in their science and engineering research and education.

OSCER deployed its first cluster in May 2002. “This was one of the first Pentium 4 Xeon supercomputing clusters out there, and the beginning of commodity hardware being used in rack form,” said Dr. Henry Neeman, OSCER’s founding director. The original cluster had 8 storage nodes connected to a shared network file system (NFS) space that supported all the client computing nodes. The operating system was the then-community version of Red Hat Enterprise Linux, comparable to today’s Fedora operating system.

But Fedora, the community version of Red Hat Enterprise Linux, wasn’t working as well for OSCER as was required. “We needed the advantages that came from commercial-class support, which translated into the all the patches that went into the Red Hat Enterprise Linux distributed kernel,” said Brandon George, OSCER’s manager of operations. “So we decided to upgrade to the commercial version of Red Hat Enterprise Linux.”

RED HAT ENTERPRISE LINUX: THE RIGHT SOLUTION

After the OU IT department decided that Red Hat Enterprise Linux would be the primary operating system at OU in 2007, the UNIX team chose Dell PowerEdge Rack Servers (mostly PowerEdge r910) for most of the applications and the Banner student system and Dell PowerEdge r810s for the Oracle PeopleSoft database servers. Currently, the UNIX team manages 60 machines for the Banner system alone and 200 Red Hat Enterprise Linux machines overall. "As an organization, we were looking to create an IT environment that could scale, was flexible, and was capable of provisioning and implementing large-scale infrastructure and projects," said Weigel, OU UNIX team lead. "Red Hat Enterprise Linux enabled all of that for us."

At OSCER, the team migrated from Fedora, the community version, to Red Hat Enterprise Linux, the commercial version, before the first cluster went live. "We brought in Red Hat Enterprise Linux in fall 2003; and that was the end of the story," said George. "And we just recently upgraded to Red Hat Enterprise Linux 6.2."

Each of the OU UNIX team members is a Red Hat Certified Engineer, as are several of the OSCER operations team, and all are active in the open source and Red Hat communities. "We keep in touch with the community to stay informed on the latest Red Hat technologies," said Robertson.

SIGNIFICANT COST SAVINGS, STABILITY, EASE OF USE, AND A STRONG ECOSYSTEM

"The ease of use is a major benefit," said Weigel. "Updating our Red Hat Enterprise Linux systems is much easier than trying to patch Solaris files; and the proof is in the size of our team. We are a small group, and have been able to keep more than 200 Red Hat Enterprise Linux machines up and running without extra help. That's a big check mark for operational efficiency."

This ease of use was especially appreciated when the Banner student system was being deployed. No real standardized configuration and provisioning methodology exists for Oracle Real Application Clusters (RAC) nodes. "As a team, we had to come up with a design that we could repeat for all RAC clusters within the infrastructure," said Swaminathan. "We have multiple environments—development, quality assurance (QA), and production—for both the student and PeopleSoft systems. Being able to do one standard template, and repeat it, do a design change and repeat it, has been great."

"We've become very efficient in our operational 'to dos,'" said Austin Grice, another IT analyst on the UNIX team. "All this is possible because of the migration to Red Hat Enterprise Linux, and the standard set of tools available for it."

"University IT departments need to serve dozens of independent researchers, each of them basically needing their own IT departments when they get grants and embark on projects," said Swaminathan. "So we have an entire stack of workload deployments at any given time. Without an agile infrastructure made possible by Red Hat Enterprise Linux, we simply wouldn't be able to do it."

Also, individual academic departments have specific service level agreements (SLAs), and frequently, one will need an additional web server or additional node, or a LAMP (Linux, Apache, MySQL, and PHP) stack as a separate node. “It’s easy to take our baseline template and make some changes to help that department,” said Weigel.

This agility is also important when the OU UNIX team has to integrate with central resources. We have actually reduced a lot of the footprint in our database, the cooling and other costs, because of virtualizing under Red Hat Enterprise Linux. We’re also able to talk to Microsoft services for email and authentication,” said Swaminathan.

For the OU UNIX team, the proof that Red Hat Enterprise Linux is working for the university is the user satisfaction.

“Everything is for the students. Red Hat Enterprise Linux allows us to sustain the performance and high level of service that we currently provide to our students,” said Weigel.

“Our supercomputing capacity has grown by a factor of 100 and our supercomputing user population has grown by a factor of 20 since we opened our doors,” said Neeman. “And we double our user base every two and a half years. This is impressive when you consider that we’re an academic institution with very high turnover as students graduate and move on. Even taking that into account, we’ve seen exponential growth in the number of students, faculty, and staff taking advantage of the resources we provide.”

“We made our choice of Red Hat Enterprise Linux because of its proven security and stability, and its vast ecosystem,” said George. “That ecosystem is partly human, as other people at other institutions are doing similar things with this technology. But it’s also technical as a lot of technologies on the market today are validated or certified against a limited subset of products.”

When OSCER purchases a supercomputing cluster, the IT staff has to make choices both among vendors and also among several different categories of subsystems—not just the CPU, or the server the CPU sits in, but storage, software, and multiple types of networks, such as Ethernet and others. “Our confidence is higher, and our support contracts are more solid, if our technology choices correspond well to what the various subsystems have been certified against,” said Neeman.

“In principle, we could build everything from source, which would be quite labor intensive. Some institutions that do that are very successful. But what that would mean, in practice, is that we’d have no time to help our users be productive,” said Neeman. “We don’t have an unlimited budget. The technology choices we make represent balances and tradeoffs.” By doing things like tweaking the Linux kernel, Neeman’s team would have to focus its resources internally rather than outwardly toward the users. “We would be cheating our users out of the help they need to be productive, to produce publishable research,” said Neeman.

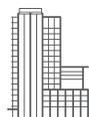
“Stability and the ecosystem, both at the technology and human level, are what matter to us,” said Neeman. “If we know an operating system has both those things, that makes it very attractive for us.”



CUSTOMER CASE STUDY Red Hat Enterprise Linux Serves as Foundation for the University of Oklahoma's Campus Computing

ABOUT THE UNIVERSITY OF OKLAHOMA

Created by the Oklahoma Territorial Legislature in 1890, the University of Oklahoma (OU) is a doctoral degree-granting research university serving the educational, cultural, economic, and healthcare needs of the state, region, and nation. By 1895, there were four faculty members, three men and one woman, and 100 students enrolled. Today there are more than 30,000 students at the university, which now has a campus in Tulsa as well as the original one in Norman, Oklahoma. In addition, the OU Health Sciences Center is composed of seven health-related colleges located near the state capitol in Oklahoma City.



ABOUT RED HAT

Red Hat is the world's leading provider of open source solutions, using a community-powered approach to provide reliable and high-performing cloud, virtualization, storage, Linux, and middleware technologies. Red Hat also offers award-winning support, training, and consulting services. Red Hat is an S&P company with more than 70 offices spanning the globe, empowering its customers' businesses.



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