

CASE STUDY

Lawrence Livermore National Laboratory (LLNL)

Government Research & Development Institution



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Client: Lawrence Livermore National Laboratory

Lawrence Livermore National Laboratory (LLNL) is an important government research and development institution with a yearly budget of \$1.5 billion. In the past, it developed nuclear warheads. Most of its work today involves researching how to safely and properly store the nation's stockpile of nuclear weapons. Because the research at LLNL is both highly complicated and highly classified, the institution requires powerful and secure computer systems. In fact, the LLNL's systems, such as the IBM Blue Gene/L, routinely rank among the world's fastest supercomputers.

Challenges & Requirements

Despite its considerable on-site computing power, for security reasons LLNL workers could not access the Internet or web-based applications from its internal network. The lack of access to work-related online resources hindered their productivity and ability to collaborate with researchers outside their network, and the lack of access to personal and social websites negatively impacted employee morale. LLNL tasked IronOrbit with building an external, high-performance virtual desktop platform that would preserve the security of the internal network while providing vital Internet access to on-site workers.

Finally, LLNL decided to outsource the execution of its original VDI plan to a hosting provider, one especially knowledgeable and experienced in designing, building, and managing affordable desktop virtualization platforms. A traditional VDI retains permanent virtualized desktops and their data. Malware can infect this kind of VDI and either steal data from the virtualized desktop or infiltrate the VD's user's internal network.

To avoid the problem of infected systems altogether, LLNL wanted a VDI with non-persistent virtualized desktops, in other words one that built a new VD for each session of each user and destroyed it afterwards. But no such VDI exists.

The non-persistent infrastructure would have to be built from scratch or from modified versions of existing solutions.

In addition, LLNL wanted the VDI users to enjoy some kind of consistency and personalization, to somehow be able to retain a small number of persistent settings, files, and bookmarks to access from their secure non-persistent desktops. And of course, even with all of its highly unique and complex requirements, LLNL also expected that the entire system be fast, secure, and cost-effective.

Robin Goldstone, LLNL Project Manager, explains:

“We needed an easy-to-use, cost-effective system that integrates with existing platforms, performs well, and meets employee needs as well as Laboratory security requirements.”

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Despite its plentiful budget and well-developed in-place IT infrastructure, LLNL failed when it had attempted to build the web access service itself. First it made plans to develop a virtual desktop infrastructure (VDI). After some testing and analysis, LLNL concluded that it did not have the IT resources to implement a functional and cost-effective VDI. Setting aside their initial scheme, LLNL next attempted a pilot implementation of a web-access solution built upon Windows Terminal Services technology.

This pilot failed because:

- 1 WTS could not assign unique profiles to its users.
- 2 WTS compromised LLNL security because it had to be installed inside the internal network.

LLNL's IT REQUIREMENTS

- Non-persistent virtual desktops running Windows XP Professional
- Web access service external to the main LLNL network
- Secure, high-performance, cost-effective, with rapid implementation
- Some level of user personalization

The Solution

IronOrbit provided LLNL with a fast, reliable, scalable, and secure web-access VDI. IronOrbit launched a pilot implementation in August 2010 of 250 desktops supporting 1,250 users. LLNL workers quickly registered for the limited number of slots and filled the pilot to capacity. Almost immediately the users began reporting benefits such as enhanced productivity and increased satisfaction with their job and workplace. In early 2011 IronOrbit completed the project when it scaled the Safeweb infrastructure to the full 1,000 desktops supporting 5,000 users.

Safeweb was designed and developed to meet the unique needs and requirements of LLNL:

Massive, state-of-the-art hardware infrastructure

The custom VDI, supporting a total capacity of 1,000 concurrent users, required 40 dual-processor servers capable of hosting 40 or more virtual desktops each. An additional \$30,000 in top-of-the-line hardware was procured for a separate security and record-keeping system.

Microsoft Windows 2008 Server back-end

infrastructure. Responsible for core connectivity and profile management

User-friendly Microsoft Windows XP Professional operating systems for the virtual desktops

IronOrbit customized and fine-tuned the virtual desktops to run non-standard Windows XP Professional operating systems. Normally virtual desktops run a version of the operating system of their back-end infrastructure, an edition with less features and less familiarity among users.

Custom-built, non-persistent, Citrix VDI-in-a-Box

virtualized desktops. IronOrbit worked closely with the VDI-in-a-Box senior technical team to design, build, and implement the one-of-a-kind non-persistent virtualized desktops. The resulting VDI supports 5,000 total and 1,000 concurrent users. As requested by LLNL, the VDI creates a unique virtual desktop for each session of each user and deletes the unique VDI once the user logs out. The VDI also incorporates the persistent user profiles securely preserved by the back-end infrastructure, letting users retain a small number of files, settings, and bookmarks when utilizing Safeweb over multiple session.

Optimized for speed and cost

IronOrbit calibrated the Safeweb infrastructure to deliver the best performance at the lowest cost. Minutely calculating its server-to-user ratio and intricately prioritizing computing resources, IronOrbit was able to maximize the efficiency of its IT infrastructure to the point where it could deliver the service for less than \$1 per user per day.

Comprehensive record-keeping and malware scanning security system

To satisfy LLNL's security requirements, IronOrbit developed an auxiliary system that inspected for threats and intrusions all the data exchanged between Safeweb and the internal LLNL network. The system also served as a record-keeping infrastructure for compliance purposes. Because of the massive amount of data being sifted, tracked, and logged, this system required an extensive \$30,000 hardware infrastructure. It was also carefully engineered not to interfere with the performance of Safeweb. The security system managed to scan the exchanged information (packets) without causing dropped packets or data bottlenecks.

Project Highlights

Company:

- Lawrence Livermore National Laboratory
- Nuclear and basic science
- Staff: 6,800

IT Needs

- Non persistent desktops
- Secure web access
- Quick deployment
- Highest performance at lowest cost

IronOrbit VDI powered by Citrix features:

- Low cost: Less than \$1 per user per day
- Disposable virtual desktops
- Superior WAN user experience
- Premier support 24/7/365

Solution

Secure, high-performance custom VDI with non-persistent desktops and a dedicated helpdesk portal

About Us

IronOrbit is part of the SACA Technologies group of companies, a family of IT businesses specializing in cloud computing, networking, virtualization and managed IT.

In 2003, SACA's leadership noticed an increase in demand for cloud-hosted desktops, servers and applications. Recognizing the importance that cloud computing would play in the future, our leadership founded a new enterprise dedicated exclusively to cloud services. That enterprise was IronOrbit, one of the world's premier suppliers of cloud-hosted IT infrastructure.

At IronOrbit, we're committed to delivering cloud services that go above and beyond. We aim to take your IT beyond the cloud and into orbit, with the most powerful, comprehensive and flexible services in the industry. This ethos is reflected in our business name, which was inspired by our commitment to truly "out of this world" service. From services to support, everything we do revolves around you, the client.

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