Canonical

Wyoming Department of Transportation keeps drivers safe and informed by pivoting from hypervisors to LXD

About Wyoming Department of Transportation

- Government agency responsible for transport infrastructure in Wyoming, USA
- Oversees planning, building, and maintenance of 6,800 miles of highway
- Supports the highest demand for travel weather information in the country

Highlights

- To optimise database cost and performance, WYDOT migrated from VMs on Hyper-V to LXD system containers
- LXD has doubled performance with half the resources compared to traditional hypervisors
- WYDOT can configure up to 8 new containers in under an hour for unprecedented scalability

WYOMING Department of Transportation

To safely travel Wyoming's highways in winter, drivers need fast and reliable access to weather information.

To meet the state's immense demand for road and traffic information, the Wyoming Department of Transportation (WYDOT) relied on a traditional, virtualisation-based IT strategy. But as demand continued to grow, enterprise hypervisor licensing was becoming prohibitively expensive. By switching to system containers with LXD and Ubuntu, WYDOT has been able to double performance with half the resources, unlocking the scalability and cost-effectiveness it needs to serve Wyoming's drivers now and in the future.

Challenge

Wyoming is the least populated US state, but at the same time, it sees some of the highest demands for road and travel updates in the country. Across Wyoming, there are huge spaces between populated areas, and drivers can easily go for hours without seeing another person. This makes reliable access to weather information critical for citizens to be able to travel safely – especially during Wyoming's harsh winters.

WYDOT is the government organisation responsible for delivering this information, and its Travel Information Service website receives over 1.6 billion hits per year. To support this service, the agency operates approximately 200 servers running virtual machines through Microsoft Hyper-V. However, with demand for the online service growing each year, WYDOT could no longer afford to keep scaling its existing environment.

Vince Garcia, GIS and ITS Program Manager at WYDOT, explains: "The real challenge was cost. We wanted to expand, but the price of enterprise hypervisor licensing was out of reach. We needed to consolidate our operations and reduce resource requirements."

WYDOT's workloads were spread across a variety of operating systems, so the agency set its sights on centralising onto a single platform. Additionally, to escape the steep license fees, WYDOT decided to switch from Hyper-V to Kernel-based Virtual Machine (KVM), an open source hypervisor alternative.

Solution

> "With LXD there's no loss of function like you get with a hypervisor. We benchmarked it against our existing environment and it delivered twice the performance on our database with half the resources."
>
> — Suzie Roseberry, Intelligent Transportation Systems Developer and Database Administrator at WYDOT

WYDOT began looking for an operating system that would be as performant and cost-effective as possible. What's more, after CentOS was unexpectedly discontinued, the agency wanted a well-established, industry-leading platform that it would be able to rely on long-term. Ubuntu was the ideal fit for these criteria, and the organisation reached out to Canonical to support the implementation. It was at this point that WYDOT learned about LXD.

"In our first meeting with Canonical we ended up completely pivoting our plan," says Vince Garcia. "They told us about LXD, and it was the perfect solution. We'd intended to build a full KVM environment on Ubuntu, but LXD was an even better option."

LXD is an image-based system container and virtual machine manager from Canonical that enables users to run a full Linux OS inside a container. Eliminating the need for a traditional hypervisor, LXD delivers the same performance as bare metal, and new containers can be spun up in a matter of seconds for seamless scalability.

"With LXD there's no loss of function like you get with a hypervisor," confirms Suzie Roseberry, ITS Developer and Database Administrator at WYDOT. "We benchmarked it against our existing environment and it delivered twice the performance on our database with half the resources."

WYDOT quickly got to work implementing LXD and migrating as many workloads as possible to Ubuntu. Canonical helped the agency define its new strategy through a series of predesign meetings, then provided hands-on support setting up the LXD environment across two datacentres. Throughout the process, Canonical delivered training and knowledge transfer so that WYDOT's internal team would be able to manage, maintain, and scale the system on their own moving forwards.

"Canonical's process is very well structured and fine-tuned," adds Vince Garcia. "They got us up and running in just a few days, and gave us the skillset and understanding to expand the environment on our own."

Results

> "Moving from hypervisors to the container technology that LXD offers on Ubuntu was like a quantum leap for us in terms of concept and performance."
>
> — Marcel Redöhl, Geographic Information Systems and Intelligent Transportation Systems Program Manager at WYDOT

With LXD and Ubuntu in place, WYDOT's Travel Information Service is performing better than ever while operating at a fraction of the cost of the old system.

Vince Garcia comments: "Moving from hypervisors to the container technology that LXD offers on Ubuntu was like a quantum leap for us in terms of concept and performance. Even our experienced Linux engineers were surprised and impressed by LXD's capabilities."

Now, the agency can not only meet existing demand, it also has the space and resources to effortlessly scale up as website traffic continues to grow.

"Setting up LXD containers is amazingly fast," says Suzie Roseberry. "We've been able to configure eight containers in under an hour. And with Canonical's help, we've ensured that the process is highly repeatable."

To maximise security and uptime for the new environment, WYDOT opted for 24/7 support from Canonical through the Ubuntu Advantage for Infrastructure package. Looking ahead, the organisation has plans to expand its use of Canonical tooling even further, starting with Landscape for streamlined management of Ubuntu machines.

"Seeing the performance of our database with LXD, we're smiling from ear to ear," concludes Vince Garcia. "It might be the best money we've spent in the last five years."

For more information about LXD and how it can enable your use cases, please visit: ubuntu.com/lxd

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