Server, storage and networking device simulation at scale with containers

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Agenda

- Why
- What is
- Value of
Imagine a world where you can...

- Cut through the massive costs/efforts
- Reduce hardware dependency
- Drastically simplify validation of complex sensor states/error conditions
- Seamlessly execute automation for every build without worrying about the infrastructure availability

Why Z10N
ZION creates real world lab environment with thousands of devices at the fraction of cost for physical devices.

Rapid recording of required devices over multiple protocols.

Easy deployment of recorded device simulation across thousands of nodes

Supports device communication over multiple interfaces like Redfish, WSMAN, WMI, SNMP, SSH, etc.

The best advice to those about to embark on a very large simulation is often the same as Punch’s famous advice to those about to marry: Don’t!

– Bratley, Fox and Schrage (1986)
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Architecture

Presentation Layer

Controller Layer

Service Layer

Business Layer

Persistence Layer

DB PostgreSQL
2014-2015
VM solution
- VMware based hypervisor solution with Windows VMs

2016
VM solution + OpenVZ Trial
- VMware based hypervisor solution with Windows & CentOS VMs
- Trials with OpenVZ containers with unique public IP Address per container and external storage.

2017
VM solution + OpenVZ drop + Docker Trial
- VMware based hypervisor solution with Windows & CentOS VMs
- Trials with OpenVZ containers halted after stability issues
- Trials with Docker swarm with macvlan with base OS as CentOS, Ubuntu & Fedora. Trial positive. Docker Swarm deployed

2018
VM solution + Docker solution
- VMware based hypervisor solution with Windows & CentOS VMs ramp down with eventual drop
- Docker Swarm fully operational

2019
Docker prevails
- Docker Swarm supporting 32K simulations across 11 servers
Docker hosts

Containers

External network

Infra orchestration

Docker Swarm Cluster
REST APIs

- Programmatic recording, provisioning & customization of nodes
- CI/CT, Customer demos, Automation & Orchestration leverage APIs for Zero touch experience

Leasing policy

- Dev-Test on static nodes
- Perf/Scale on leased nodes

Self-service

- Self-service portal for easy leasing, recording and deployment

Bespoke

- Customization is the key differentiator
Reduction in expenditure by more than 99% with total cost saving estimated above $1M

Early to Market with quick & reliable Dev-Test using simulation

5X reduction in hardware due to protocol consolidation

Zero touch automated execution/demos

Flexibility of running functional, non-functional tests at will

Test every hardware state with single click customization

Recurrence setup creation cost reduced to almost Zero

Reduction in expenditure by more than 99% with total cost saving estimated above $1M
Key tenets

- **Simple**: Turn-key recording & deployment along with Rest API support
- **Scalable**: Single click rapid deployment on thousands of nodes with Docker containers
- **Unified**: All-in-one protocol support with shareable device simulations at Z10N Marketplace
- **Future proof**: Auto-learn and adapt mode
- **Flexible**: Highly customizable with on-the-fly randomization

15K simulations running issueless non-stop for 9 months

Stable across scaled bring-up & tear-down and super responsive with each simulation queried for hundreds of SNMP, SOAP or REST calls at regular frequency

- **7X more device simulations per server**: 4000 (not the max count) It was just a conservative number considering decent load balancing
- **Time to create 1000 device simulations**: 30 hrs
- **Creation time of 1000 device simulations is 360X lesser with Docker**

No of device simulations per server with 512GB RAM:

- VM: 512
- Docker: 4000
Server, storage and networking device simulation at scale with containers

At any Enterprise hardware company, one of our topmost goal is to deliver products on time with highest quality. Our challenge is to develop and test as thoroughly and efficiently as we can, given our time and resource constraints. Hardware availability happens to be scarce which results in design, development and tests getting pushed right. Products are developed and tested under non-scaled environments for just a few finite states, again impacting quality. Reduced quality would inherently further increase the costs and efforts. Z10N would help create real world lab environment with thousands of server, storage, networking hardware devices at the fraction of cost for physical devices which would help the organization to:

- Cut through the massive costs/efforts
- Reduce vendor/hardware dependency
- Enable rapid prototyping
- Drastically simplify design & validation of complex sensor states/error conditions
- Seamlessly design & develop products, execute automation & non-functional tests at will without worrying about the hardware availability

Learn how you could simulate a hardware device and create thousands of clones for the same in just a few minutes with 99% reduction in expenditure.

This device simulation solution is already helping DellEMC make better, faster products and with its capabilities it’s surely getting DellEMC the "Power to do more".
Name: Hemant Gaikwad

Hemant is a Test Architect at Dell EMC Server & Infrastructure Systems Group & works on strategy & optimization for the Systems Management portfolio products. He has initiated and led Performance Engineering, Cloud migration, Automation, Process improvements & Simulation/Emulation related tech vitality activities in the recent past. Apart from this, Hemant likes to spend his free time on cycling, carpentry & photography.
Thank you

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