ubuntu

Machine Application Containers

Container World
17 February 2016

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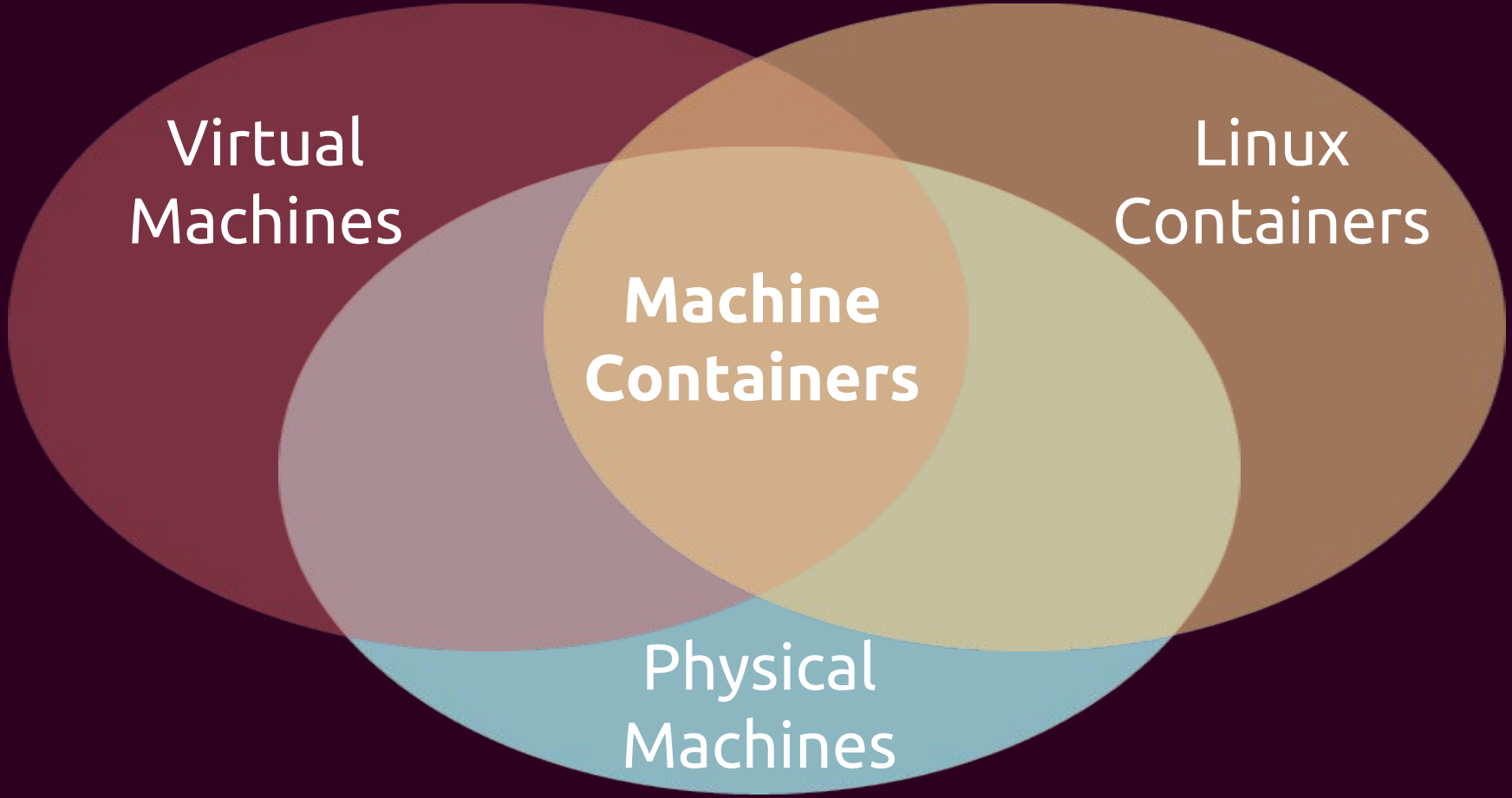
CANONICAL

Machine containers
boot an operating system

Application containers
execute a binary

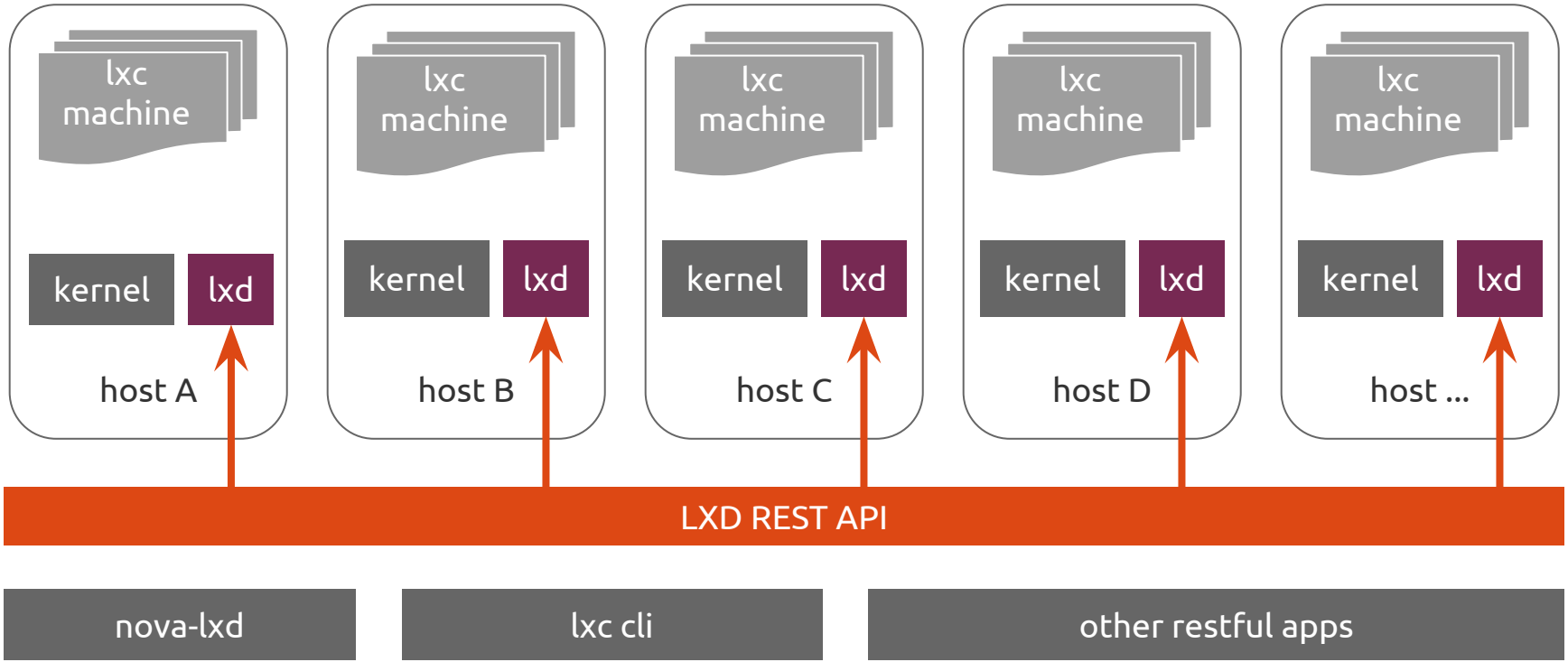
	Application Containers (e.g. Docker, Rocket)	**Machine Containers** (e.g. LXD, OpenVZ)
What does it contain?	A single running process, app, or service (e.g. /usr/sbin/apache2, /usr/sbin/mysqld)	A functional, running operating system (e.g. Ubuntu, CentOS)
What does it look like, inside of the container?	Complete filesystem with a single running process	Complete filesystem with all normal OS processes
What problem does it solve?	Basis for Micro Service Architecture solutions	Cheaper, faster, more efficient virtual machines
Density?	Hundreds of containers per core	Hundreds of containers per core
Performance?	Identical performance to bare metal	Identical performance to bare metal
Latency?	Negligible latency	Negligible latency
How is it used at scale?	PaaS -- hosted applications (e.g. Kubernetes, Mesos)	IaaS -- hosted machines (e.g. OpenStack, Joyent)
Size of code base?	Docker: 374K lines of source code Rocket: 216K lines of source code	LXD: 28K lines of source code
Security?	cgroups, (~namespaces, ~apparmor)	cgroups, user namespaces, apparmor, seccomp


Virtual
Machines
Linux
Containers
Machine
Containers
Physical
Machines

LXC 2.0 includes LXD

LXD provides machine containers

LXD is Ubuntu's container hypervisor

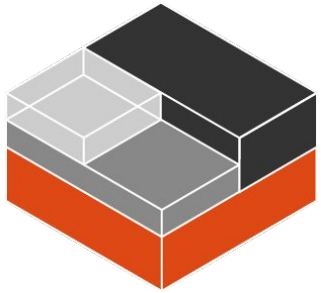


LXD operates much like other hypervisors

type 1 (paravirt)

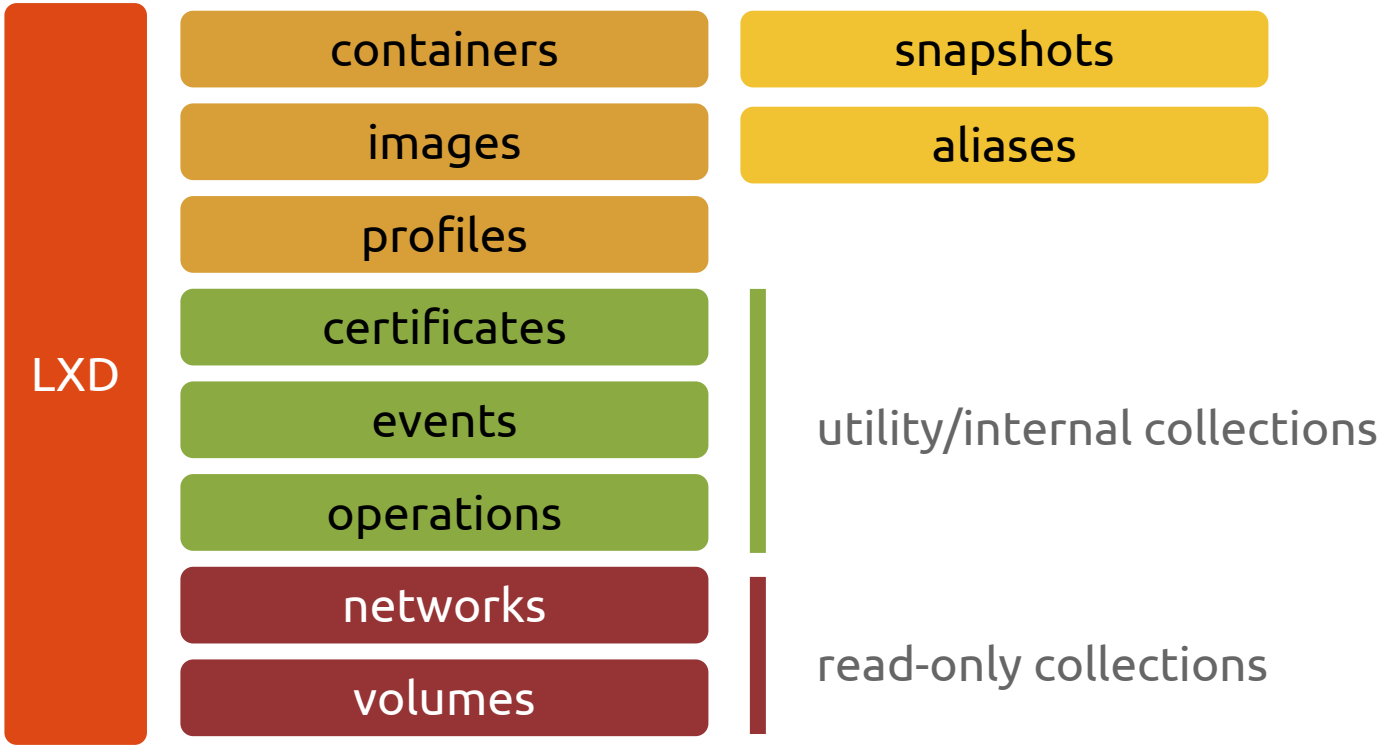
type 2 (hw-accel)

type 3 (container)



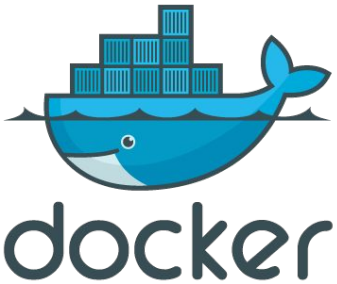
LXD

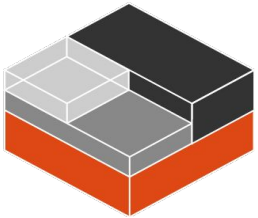
LXD exposes a REST API

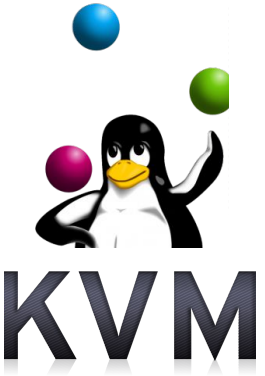


Ubuntu offers choice

of cloud, containers, and everything in between







Application Containers

Machine Containers

Virtual Machines

let’s try lxd

```
# Install lxd, and setup zfs
sudo apt install lxd
sudo lxd init

# Create a machine container
lxc image list
lxc launch ubuntu demo1
lxc list
lxc info demo1
lxc config show demo1
```

```
# Test the performance in the container
lxc exec demo1 -- apt update
lxc exec demo1 -- apt install -y sysbench
lxc exec demo1 -- sysbench --test=cpu run

# Compare the performance of the host system
sudo apt install -y sysbench
sysbench --test=cpu run
```

```
# Confirm the container behaves like a VM
lxc exec demo1 -- bash

  ps -ef
  ls -alF /
  cat /proc/cpuinfo
  df -h
  free
  ifconfig
  ping -c 3 8.8.8.8
  sudo apt install -y openssh-server
  ssh localhost
```

```
# Count the CPUs and Memory available
lxc exec demo1 -- grep processor /proc/cpuinfo
lxc exec demo1 -- free

# Limit the container to 1 CPU and 1GB of Memory
lxc config set demo1 limits.cpu 1
lxc config set demo1 limits.memory 128MB

# Recount the CPUs and Memory available
lxc exec demo1 -- grep processor /proc/cpuinfo
lxc exec demo1 -- free
```

```
# Update and snapshot a container
lxc exec demo1 -- apt update
lxc exec demo1 -- apt dist-upgrade -y
lxc snapshot demo1 upgraded

# Cause some trouble
lxc exec demo1 -- rm -rf /bin
lxc exec demo1 bash

# Repair the damage
lxc restore demo1 upgraded
lxc exec demo1 -- ls -alF /
```

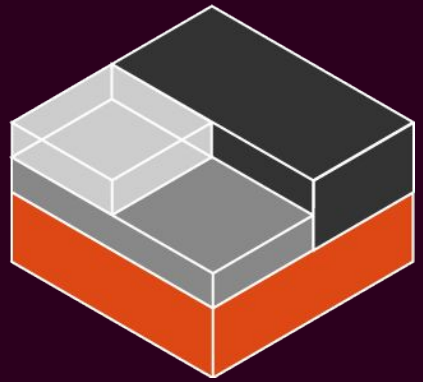
```
lxc --help
    config      - Manage configuration.
    copy        - Copy containers within or in between lxd instances.
    delete      - Delete containers or container snapshots.
    exec        - Execute the specified command in a container.
    file        - Manage files on a container.
    help        - Presents details on how to use LXD.
    image       - Manipulate container images
    info        - List information on containers.
    launch      - Launch a container from a particular image.
    list        - Lists the available resources.
    move        - Move containers within or in between lxd instances.
    profile     - Manage configuration profiles.
    publish     - Publish containers as images.
    remote      - Manage remote LXD servers.
    restart     - Changes one or more containers state to restart.
    restore     - Reset the state of a resource back to a snapshot.
    snapshot    - Create a read-only snapshot of a container.
    start       - Changes one or more containers state to start.
    stop        - Changes one or more containers state to stop.
    version     - Prints the version number of LXD.
```

Ubuntu Advantage

Commercial support for the host covers all of your LXD or Docker guests

	Unsupported Free	**UA Essential** $150/node	**UA Standard** $750/node	**UA Advanced** $1500/node
Download, Install, Run, with Bugfix & Security Updates, Docs, Manuals, AskUbuntu, Launchpad, NTP, Entropy	✓	✓	✓	✓
Landscape Management & Monitoring Compliance Auditing, Kernel Live patching	Free trial	✓	✓	✓
8x5 web support (base packages), IP Indemnification, 24x7 KnowledgeBase		✓	✓	✓
10x5 phone & web support (main packages), Hardening Guides			✓	✓
24x7 phone & web support (main packages + select backports)				✓

ubuntu



ubuntu.com/lxd

github.com/lxc/lxd

linuxcontainers.org/lxd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