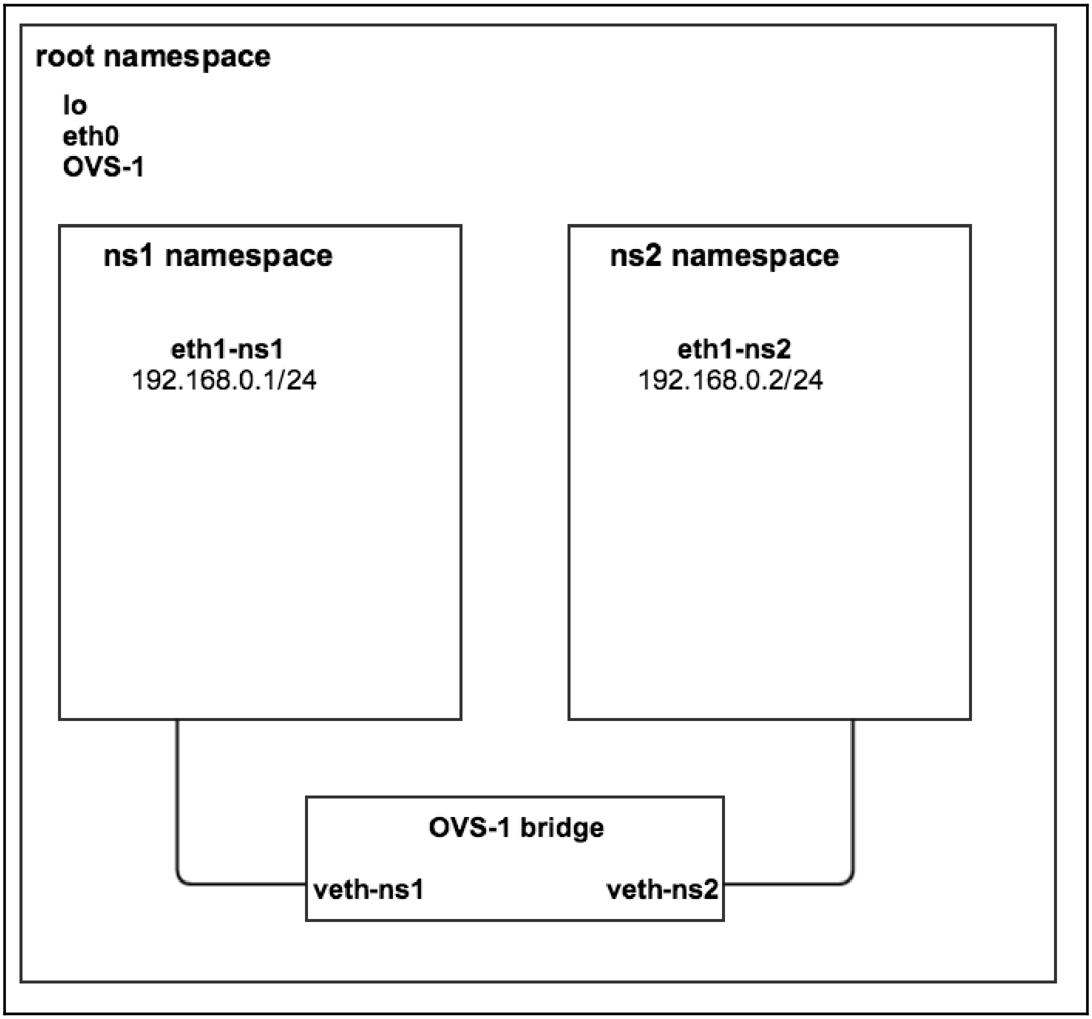
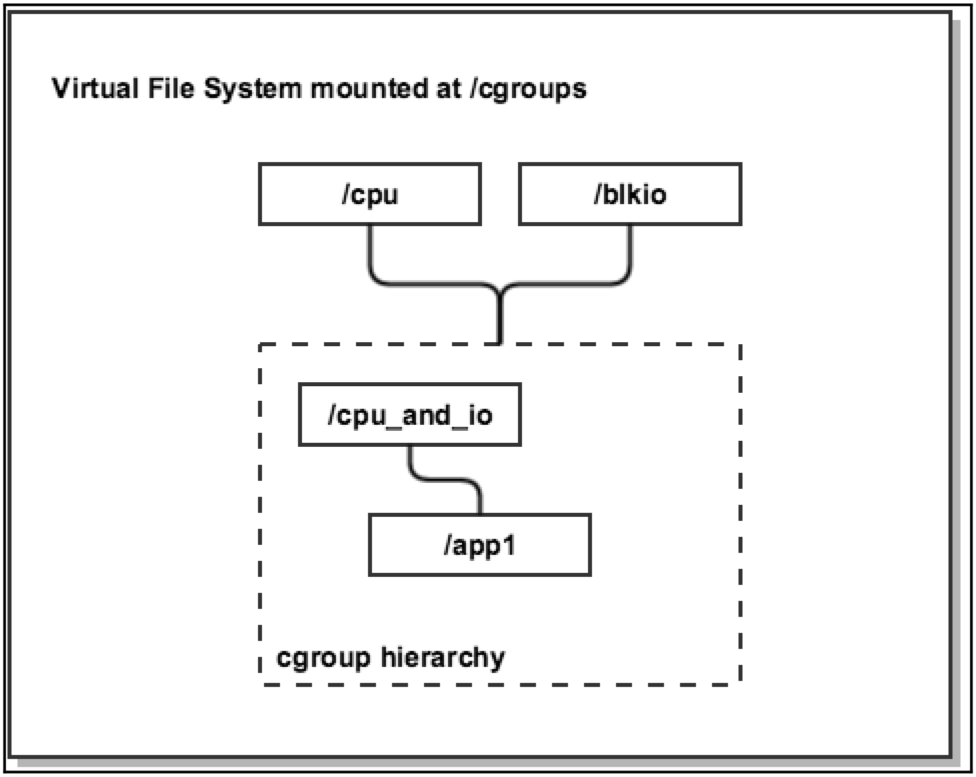
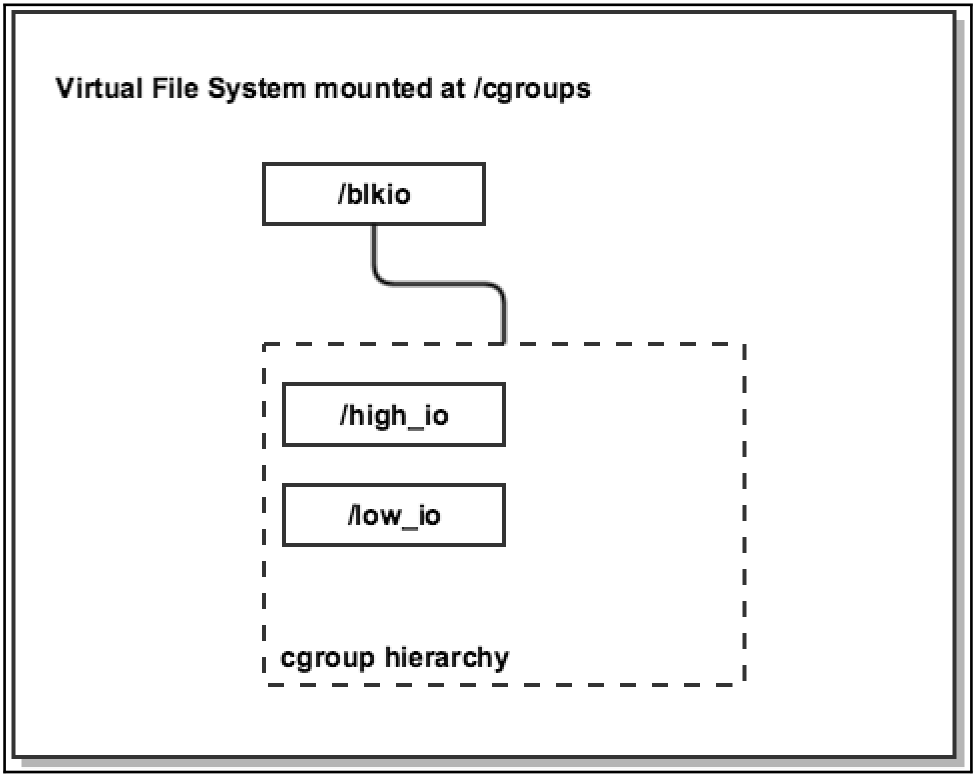
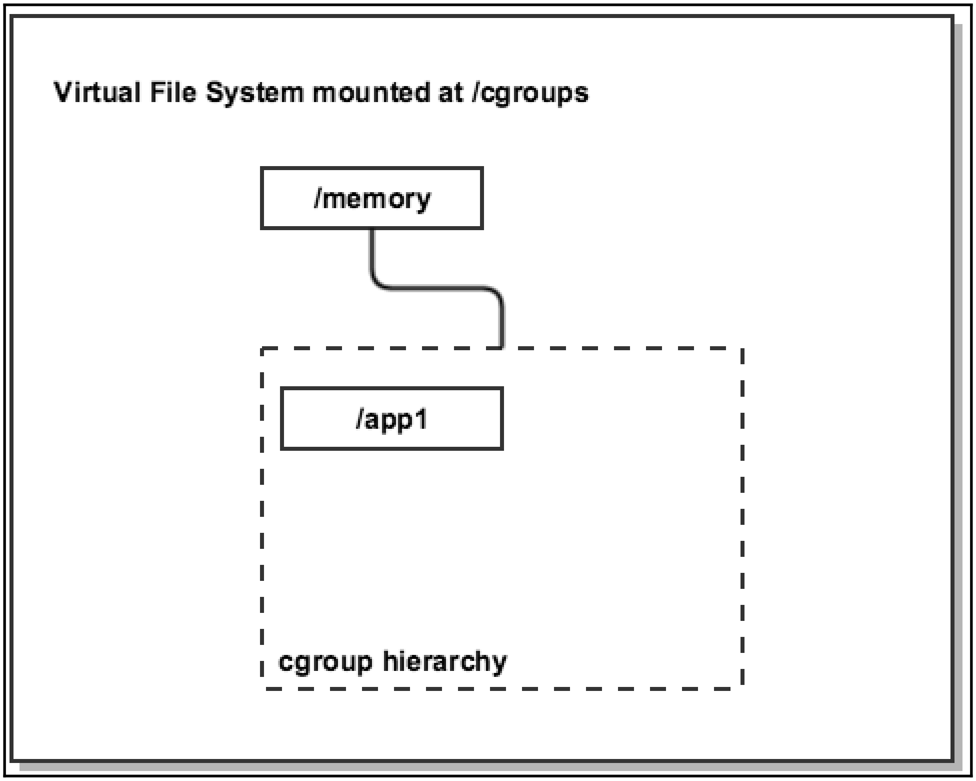
Chapter 1: Introduction to Linux Containers

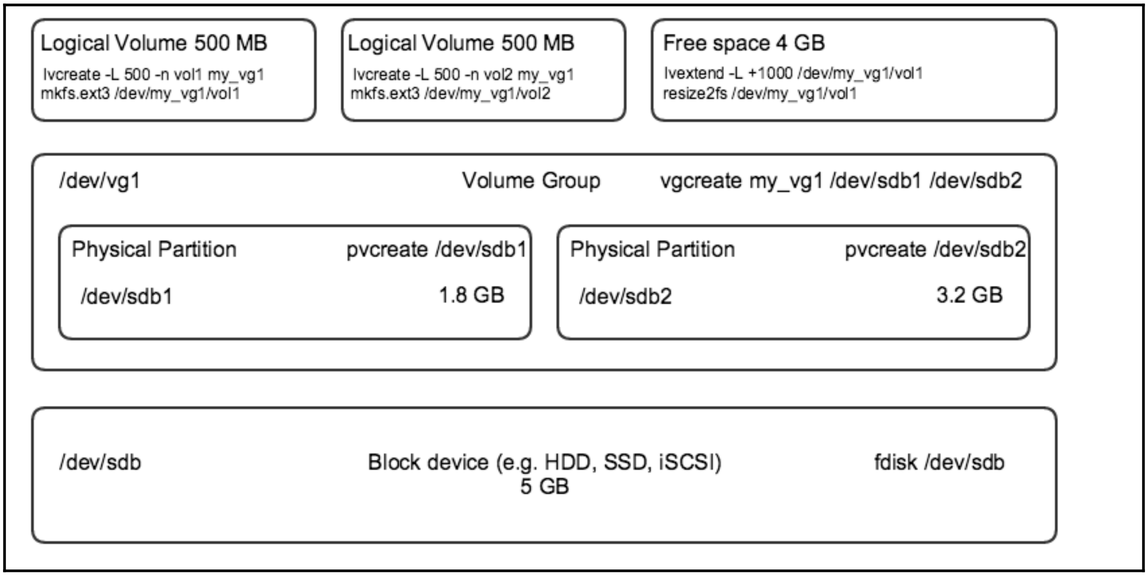



Virtual File System mounted at /cgroups
/cpu
/blkio
/cpu_and_io
/app1
cgroup hierarchy

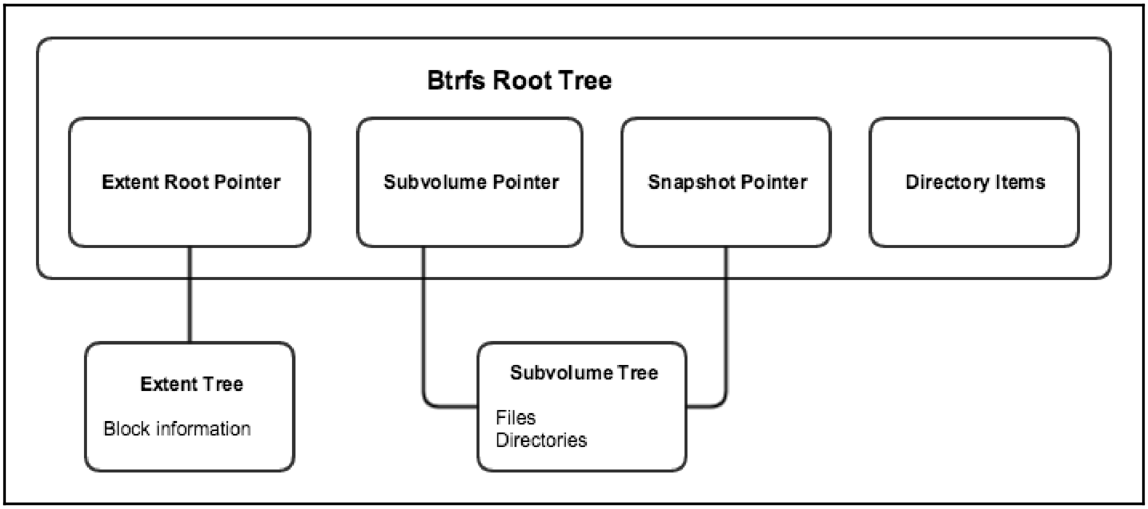

Virtual File System mounted at /cgroups
/blkio
/high_io
/low_io
cgroup hierarchy

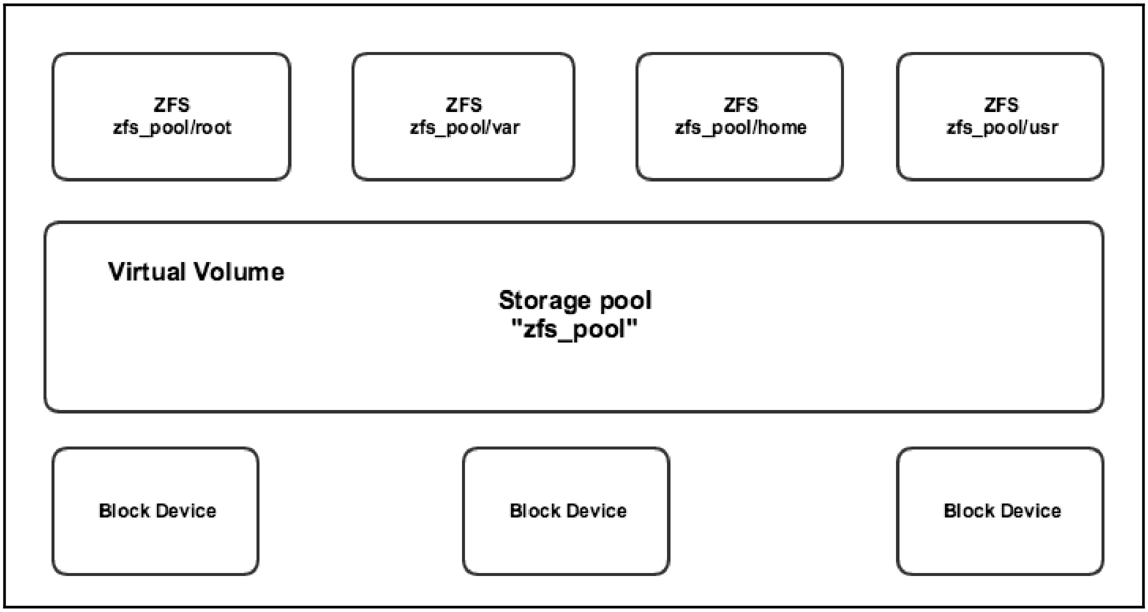

Virtual File System mounted at /cgroups
/memory
/app1
cgroup hierarchy

Chapter 3: Command-Line Operations Using Native and Libvirt Tools

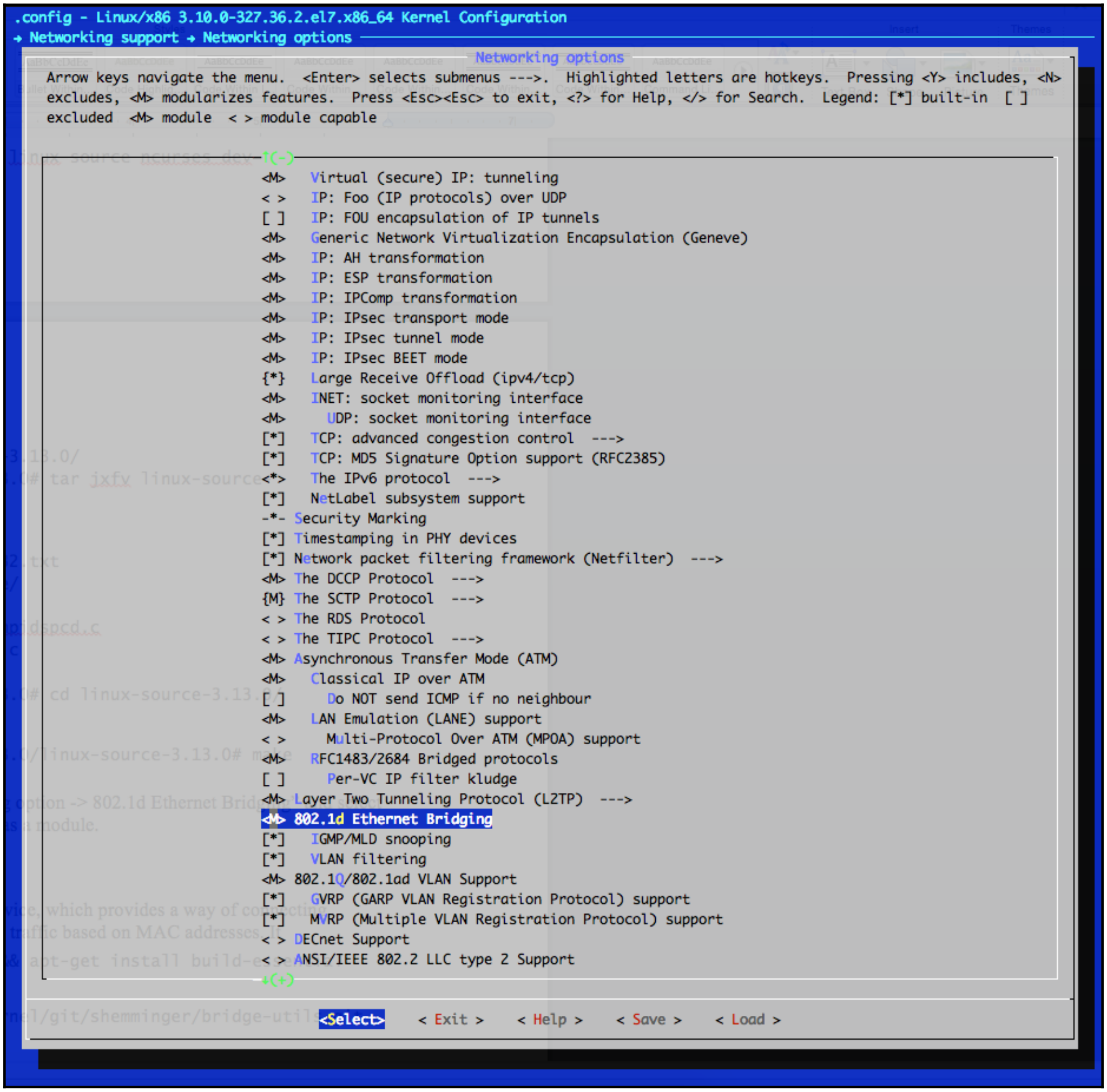


```
lvcreate -L 500 -n vol1 my_vg1
mkfs.ext3 /dev/my_vg1/vol1
lvcreate -L 500 -n vol2 my_vg1
mkfs.ext3 /dev/my_vg1/vol2
lvextend -L +1000 /dev/my_vg1/vol1
resize2fs /dev/my_vg1/vol1
vgcreate my_vg1 /dev/sdb1 /dev/sdb2
pvcreate /dev/sdb1
pvcreate /dev/sdb2
fdisk /dev/sdb
```

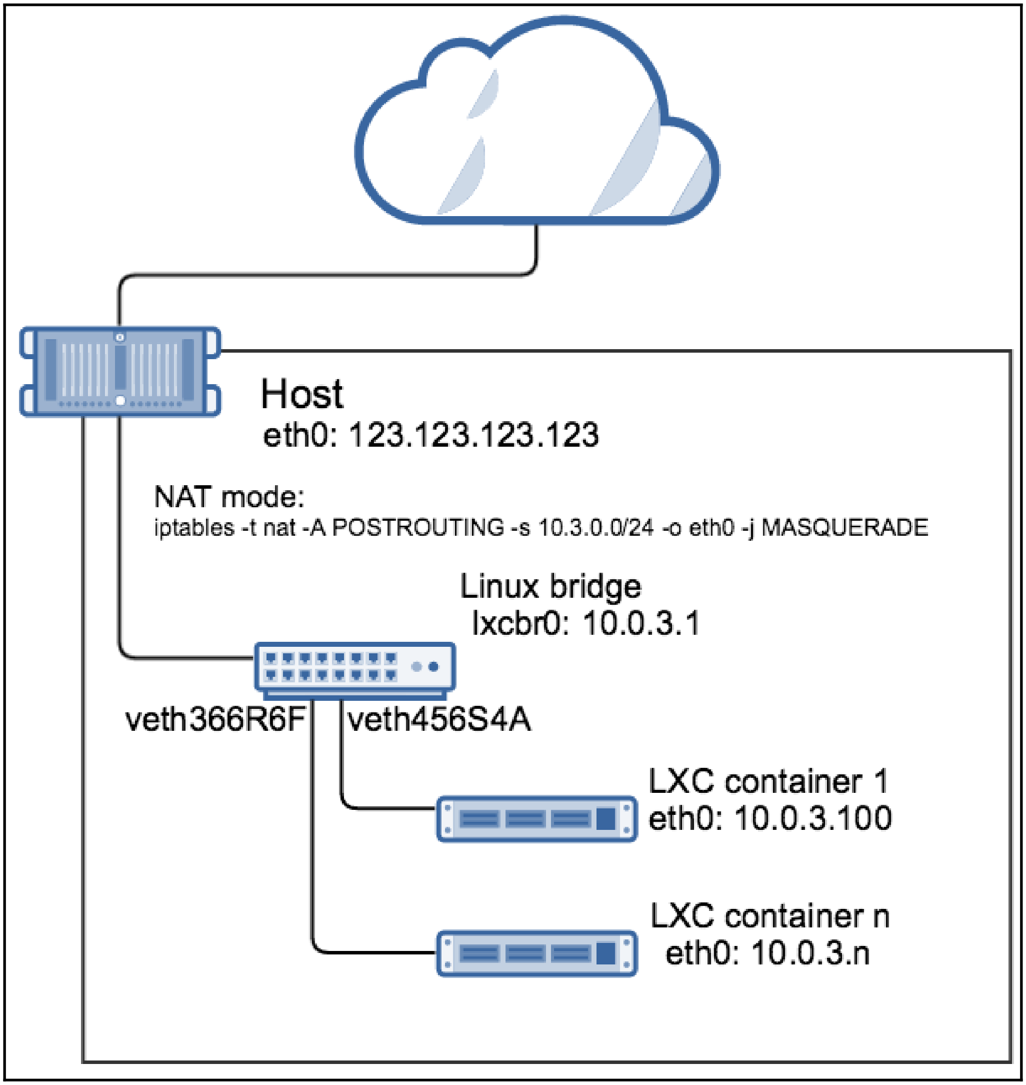


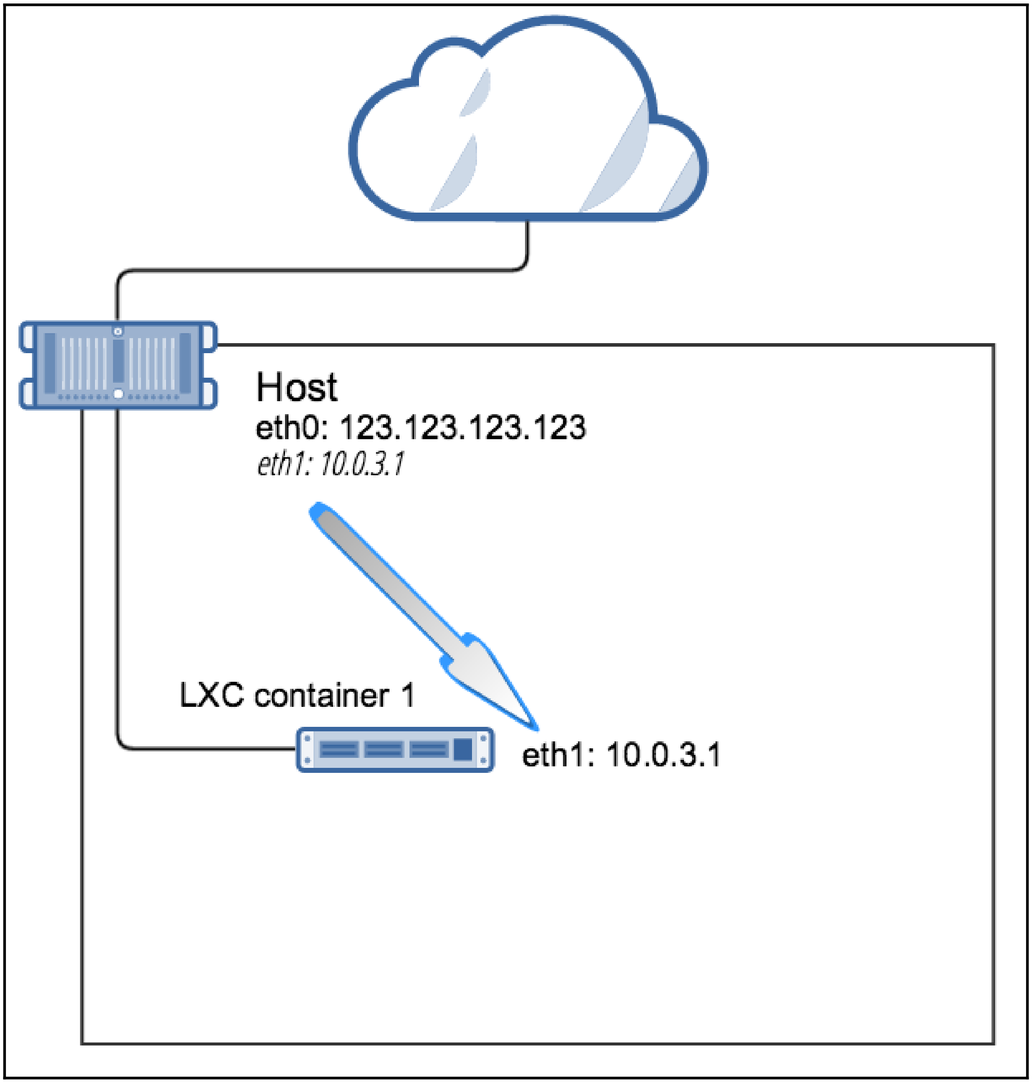

ZFS
zfs_pool/root
ZFS
zfs_pool/var
ZFS
zfs_pool/home
ZFS
zfs_pool/usr
Virtual Volume
Storage pool
"zfs_pool"
Block Device
Block Device
Block Device

Chapter 5: Networking in LXC with the Linux Bridge and Open vSwitch

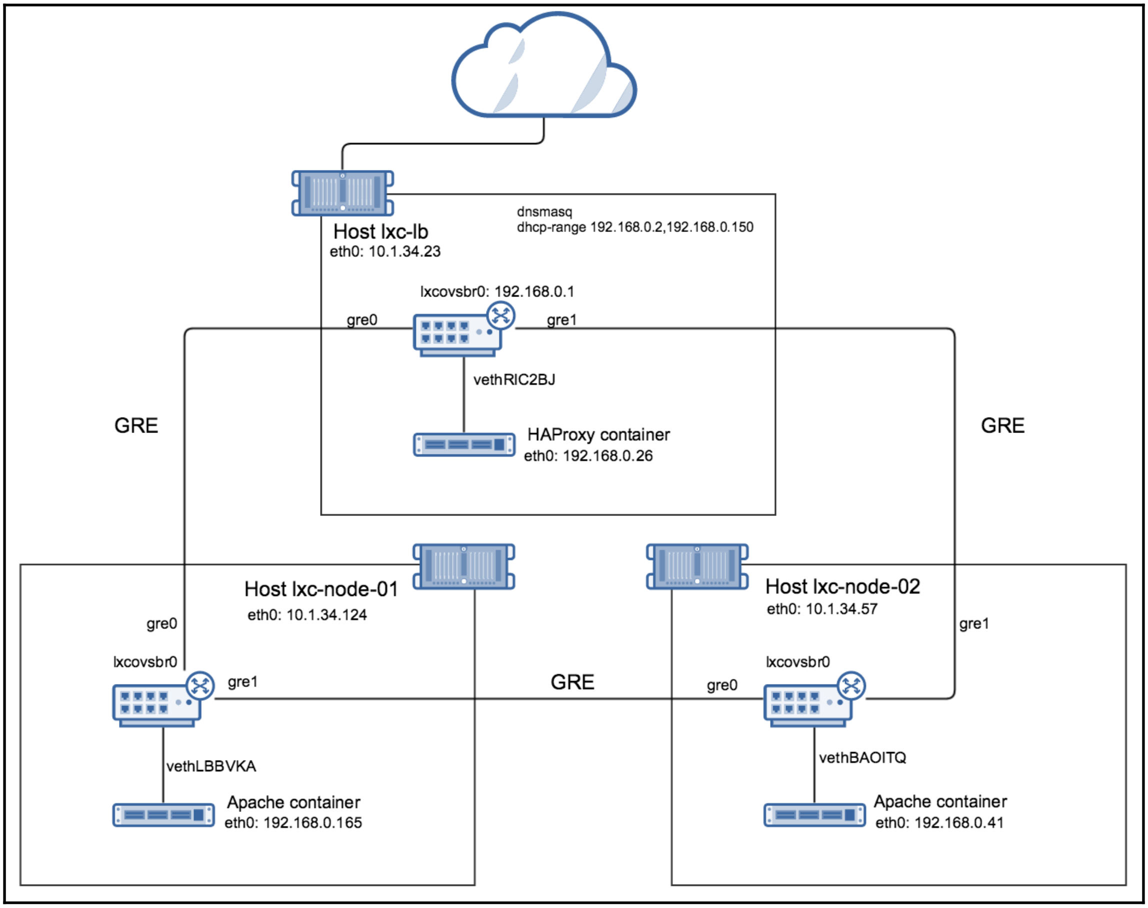


```
.config - Linux/x86 3.10.0-327.36.2.el7.x86_64 Kernel Configuration
→ Networking support → Networking options ─────────────────────────────────────
                                   Networking options
  Arrow keys navigate the menu.  <Enter> selects submenus --->.  Highlighted letters are hotkeys.  Pressing <Y> includes, <N>
  excludes, <M> modularizes features.  Press <Esc><Esc> to exit, <?> for Help, </> for Search.  Legend: [*] built-in  [ ]
  excluded  <M> module  < > module capable

                          ↑(-)
                          <M>   Virtual (secure) IP: tunneling
                          < >   IP: Foo (IP protocols) over UDP
                          [ ]   IP: FOU encapsulation of IP tunnels
                          <M>   Generic Network Virtualization Encapsulation (Geneve)
                          <M>   IP: AH transformation
                          <M>   IP: ESP transformation
                          <M>   IP: IPComp transformation
                          <M>   IP: IPsec transport mode
                          <M>   IP: IPsec tunnel mode
                          <M>   IP: IPsec BEET mode
                          {*}   Large Receive Offload (ipv4/tcp)
                          <M>   INET: socket monitoring interface
                          <M>     UDP: socket monitoring interface
                          [*]   TCP: advanced congestion control  --->
                          [*]   TCP: MD5 Signature Option support (RFC2385)
                          <*>   The IPv6 protocol  --->
                          [*]   NetLabel subsystem support
                          -*- Security Marking
                          [*] Timestamping in PHY devices
                          [*] Network packet filtering framework (Netfilter)  --->
                          <M> The DCCP Protocol  --->
                          {M} The SCTP Protocol  --->
                          < > The RDS Protocol
                          < > The TIPC Protocol  --->
                          <M> Asynchronous Transfer Mode (ATM)
                          <M>   Classical IP over ATM
                          [ ]     Do NOT send ICMP if no neighbour
                          <M>   LAN Emulation (LANE) support
                          < >     Multi-Protocol Over ATM (MPOA) support
                          <M>   RFC1483/2684 Bridged protocols
                          [ ]     Per-VC IP filter kludge
                          <M> Layer Two Tunneling Protocol (L2TP)  --->
                          <M> 802.1d Ethernet Bridging
                          [*]   IGMP/MLD snooping
                          [*]   VLAN filtering
                          <M> 802.1Q/802.1ad VLAN Support
                          [*]   GVRP (GARP VLAN Registration Protocol) support
                          [*]   MVRP (Multiple VLAN Registration Protocol) support
                          < > DECnet Support
                          < > ANSI/IEEE 802.2 LLC type 2 Support
                          ↓(+)

                       <Select>    < Exit >    < Help >    < Save >    < Load >
```

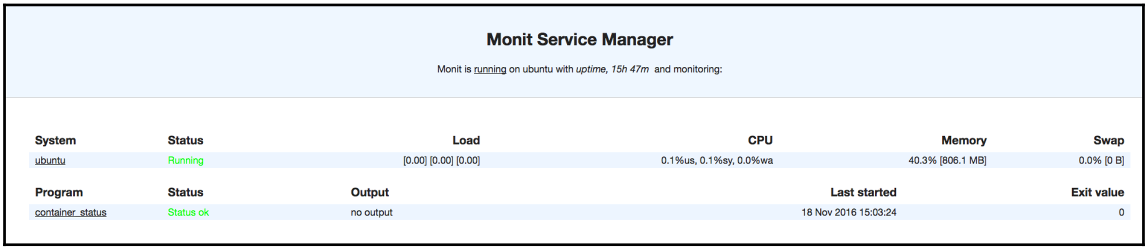

Host
eth0: 123.123.123.123
NAT mode:
iptables -t nat -A POSTROUTING -s 10.3.0.0/24 -o eth0 -j MASQUERADE
Linux bridge
lxcbr0: 10.0.3.1
veth366R6F
veth456S4A
LXC container 1
eth0: 10.0.3.100
LXC container n
eth0: 10.0.3.n


Host
eth0: 123.123.123.123
eth1: 10.0.3.1
LXC container 1
eth1: 10.0.3.1

Chapter 6: Clustering and Horizontal Scaling with LXC



Chapter 7: Monitoring and Backups in a Containerized World

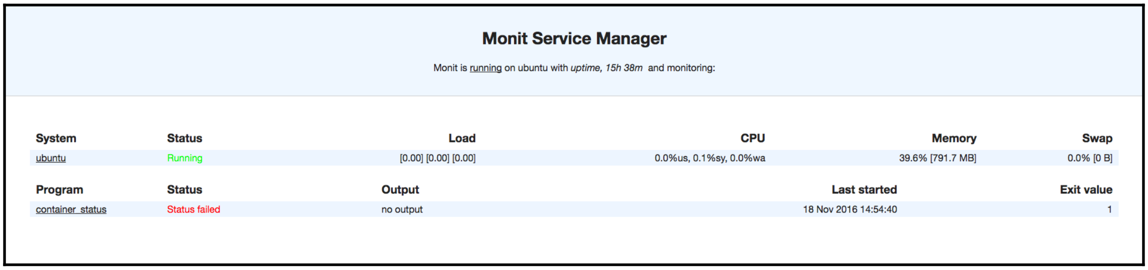


Monit Service Manager

Monit is running on ubuntu with *uptime, 15h 47m* and monitoring:

System	Status	Load	CPU	Memory	Swap
ubuntu	Running	[0.00] [0.00] [0.00]	0.1%us, 0.1%sy, 0.0%wa	40.3% [806.1 MB]	0.0% [0 B]

Program	Status	Output	Last started	Exit value
container_status	Status ok	no output	18 Nov 2016 15:03:24	0

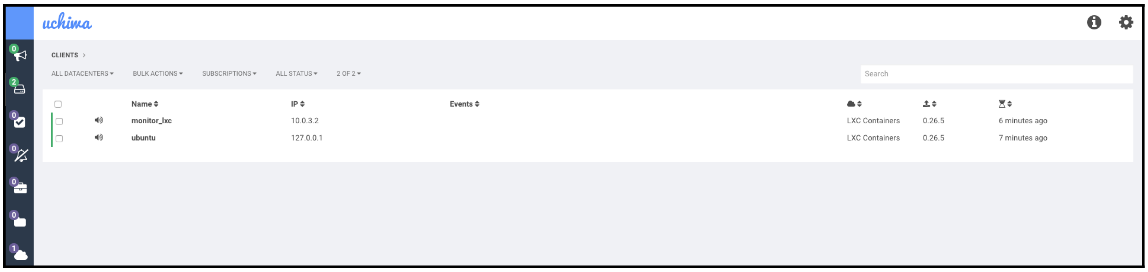


Monit Service Manager

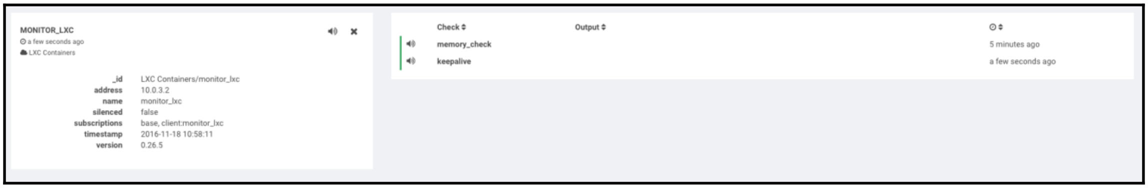
Monit is running on ubuntu with *uptime, 15h 38m* and monitoring:

System	Status	Load	CPU	Memory	Swap
ubuntu	Running	[0.00] [0.00] [0.00]	0.0%us, 0.1%sy, 0.0%wa	39.6% [791.7 MB]	0.0% [0 B]

Program	Status	Output	Last started	Exit value
container_status	Status failed	no output	18 Nov 2016 14:54:40	1



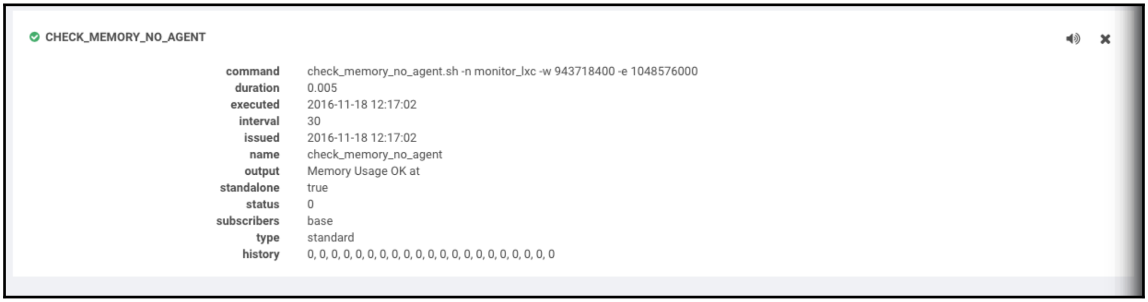
☐		Name	IP	Events	☁	⭱	⌛
☐	🔊	monitor_lxc	10.0.3.2		LXC Containers	0.26.5	6 minutes ago
☐	🔊	ubuntu	127.0.0.1		LXC Containers	0.26.5	7 minutes ago



MONITOR_LXC
a few seconds ago
LXC Containers

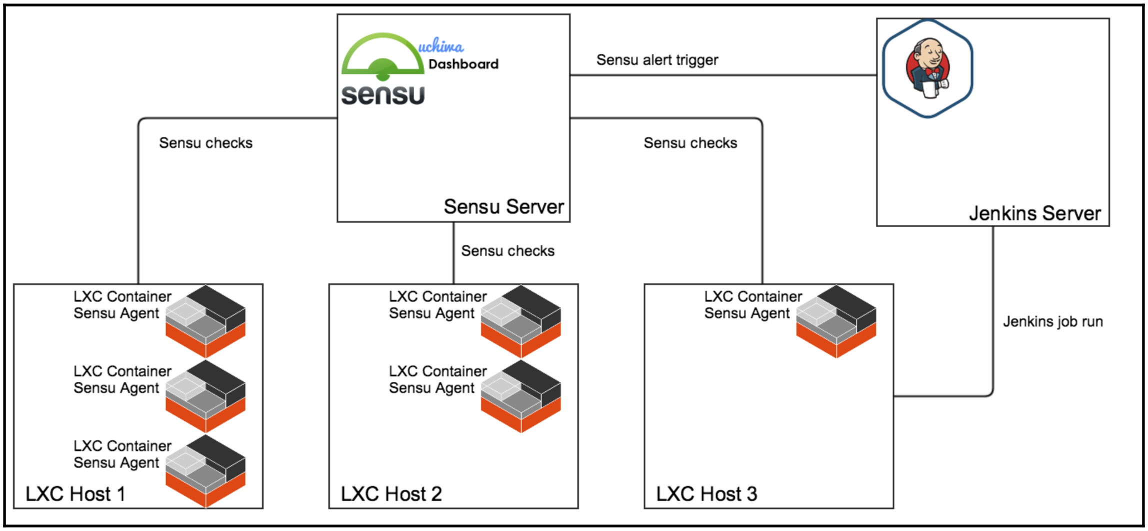
_id	LXC Containers/monitor_lxc
address	10.0.3.2
name	monitor_lxc
silenced	false
subscriptions	base, client:monitor_lxc
timestamp	2016-11-18 10:58:11
version	0.26.5

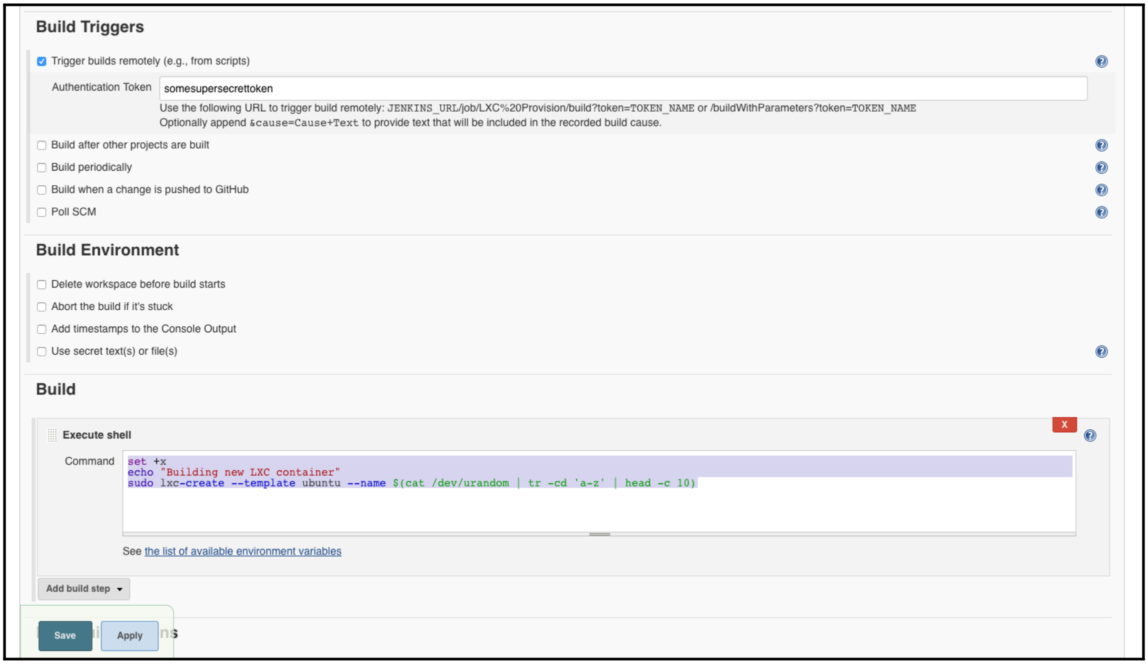
	Check	Output	⏲
🔊	memory_check		5 minutes ago
🔊	keepalive		a few seconds ago



✓ CHECK_MEMORY_NO_AGENT

command	check_memory_no_agent.sh -n monitor_lxc -w 943718400 -e 1048576000
duration	0.005
executed	2016-11-18 12:17:02
interval	30
issued	2016-11-18 12:17:02
name	check_memory_no_agent
output	Memory Usage OK at
standalone	true
status	0
subscribers	base
type	standard
history	0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0





Build Triggers

☑ Trigger builds remotely (e.g., from scripts)

Authentication Token: somesupersecrettoken

Use the following URL to trigger build remotely: `JENKINS_URL`/job/LXC%20Provision/build?token=`TOKEN_NAME` or /buildWithParameters?token=`TOKEN_NAME`
Optionally append `&cause=Cause+Text` to provide text that will be included in the recorded build cause.

□ Build after other projects are built

□ Build periodically

□ Build when a change is pushed to GitHub

□ Poll SCM

Build Environment

□ Delete workspace before build starts

□ Abort the build if it's stuck

□ Add timestamps to the Console Output

□ Use secret text(s) or file(s)

Build

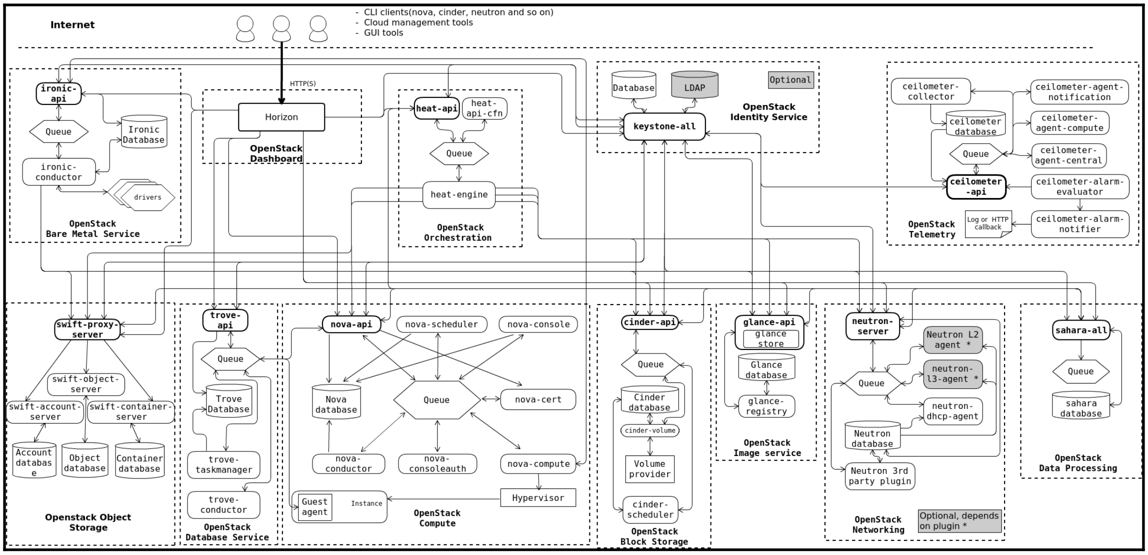
Execute shell

Command

```
set +x
echo "Building new LXC container"
sudo lxc-create --template ubuntu --name $(cat /dev/urandom | tr -cd 'a-z' | head -c 10)
```

See the list of available environment variables

Chapter 8: Using LXC with OpenStack


Internet
- CLI clients(nova, cinder, neutron and so on)
- Cloud management tools
- GUI tools
HTTP(S)
ironic-api
Queue
Ironic Database
ironic-conductor
drivers
OpenStack Bare Metal Service
Horizon
OpenStack Dashboard
heat-api
heat-api-cfn
Queue
heat-engine
OpenStack Orchestration
Database
LDAP
Optional
OpenStack Identity Service
keystone-all
ceilometer-collector
ceilometer-agent-notification
ceilometer database
ceilometer-agent-compute
Queue
ceilometer-agent-central
ceilometer-api
ceilometer-alarm-evaluator
Log or HTTP callback
ceilometer-alarm-notifier
OpenStack Telemetry
swift-proxy-server
swift-object-server
swift-account-server
swift-container-server
Account database
Object database
Container database
Openstack Object Storage
trove-api
Queue
Trove Database
trove-taskmanager
trove-conductor
OpenStack Database Service
nova-api
nova-scheduler
nova-console
Nova database
Queue
nova-cert
nova-conductor
nova-consoleauth
nova-compute
Hypervisor
Guest agent
Instance
OpenStack Compute
cinder-api
Queue
Cinder database
cinder-volume
Volume provider
cinder-scheduler
OpenStack Block Storage
glance-api
glance store
Glance database
glance-registry
OpenStack Image service
neutron-server
Neutron L2 agent *
neutron-l3-agent *
Queue
neutron-dhcp-agent
Neutron database
Neutron 3rd party plugin
OpenStack Networking
Optional, depends on plugin *
sahara-all
Queue
sahara database
OpenStack Data Processing