LXD Containers

What is LXD ?

LXD (pronounced lex-dee) is the lightervisor, or lightweight container hypervisor. LXC (lex-see) is a program which creates and administers “containers” on a local system. It also provides an API to allow higher level managers, such as LXD, to administer containers

Its a container “Manager”

- LXD is not container type its a manager
- It allows you to run Linux Containers(LXC)
- But it gives you additional features , such as clustering

What is Linux Containers ?

- LXC containers are more “VM like” than other containers
- Docker utilizes layers , every change you make on docker container is saved as new layer , when you stop docker container then it looses all its stateful information
- If you stop lxc containers it does loose any anything, its same as vms
- Linux Containers are called Linux Containers because they utilize features build right into the linux kernel
- Utilises cgroups and namespaces

Note :

LXD is the management layer , LXC is the type of container that it helps you to manage and lxc containers utilize features in the linux kernel itself inorder to function.

What is LXC?

LXC is a userspace interface for the Linux kernel containment features. Through a powerful API and simple tools, it lets Linux users easily create and manage system or application containers.

What is Snap?

Snap is a packaging and software distribution system developed by Canonical, the same company behind Ubuntu. Snaps are self-contained application packages that include all of the dependencies an application needs to run, regardless of the system libraries and packages installed on the host machine

Installation setup :

LXD is provided as a snap package any distro uses snap package will be able to utilize lxd.

Why snap if developer wants his application to accept for different destros the destros then he can setup that particular application in snap , the destros which support snap will also support that application.

Check snap is installed or not ?

lokesh@cybercub:~$ which snap
/usr/bin/snap

If not installed

lokesh@cybercub:~$ sudo apt install snapd

Install LXD using snap

lokesh@cybercub:~$ sudo snap install lxd
[sudo] password for lokesh:
lxd (5.21/stable) 5.21.2-2f4ba6b from Canonical** installed

How to initialize LXD ?

Before you can create a LXD instance, you must configure and initialize LXD.

lokesh@cybercub:~$ lxd init
Would you like to use LXD clustering? (yes/no) [default=no]:
Do you want to configure a new storage pool? (yes/no) [default=yes]:
Name of the new storage pool [default=default]:
Name of the storage backend to use (dir, lvm, powerflex, zfs, btrfs, ceph) [default=zfs]: dir
Would you like to connect to a MAAS server? (yes/no) [default=no]:
Would you like to create a new local network bridge? (yes/no) [default=yes]:
What should the new bridge be called? [default=lxdbr0]: lxdbr1
What IPv4 address should be used? (CIDR subnet notation, “auto” or “none”) [default=auto]:
What IPv6 address should be used? (CIDR subnet notation, “auto” or “none”) [default=auto]:
Would you like the LXD server to be available over the network? (yes/no) [default=no]:
Would you like stale cached images to be updated automatically? (yes/no) [default=yes]:
Would you like a YAML "lxd init" preseed to be printed? (yes/no) [default=no]:

```
lokesh@cybercub:~$ lxc storage list
+---------+--------+-----------------------------------------------+-------------+---------+---------+
|  NAME   | DRIVER |                    SOURCE                     | DESCRIPTION | USED BY |  STATE  |
+---------+--------+-----------------------------------------------+-------------+---------+---------+
| default | dir    | /var/snap/lxd/common/lxd/storage-pools/default |             | 1       | CREATED |
+---------+--------+-----------------------------------------------+-------------+---------+---------+
```

```
lokesh@cybercub:~$ lxc profile list
+---------+----------------------+---------+
|  NAME   |     DESCRIPTION      | USED BY |
+---------+----------------------+---------+
| default | Default LXD profile | 0       |
+---------+----------------------+---------+
```

Create a LXD container without name (LXD assigns itself)

lokesh@cybercub:~$ lxc launch ubuntu:22.04
Creating the instance
Instance name is: stunning-quail
Starting stunning-quail

Create a LXD container with name

lokesh@cybercub:~$ lxc launch ubuntu:22.04 uuf
Creating uuf
Starting uuf

```
lokesh@cybercub:~$ lxc list
+---------------+---------+----------------------+-----------------------------------------------+-----------+-----------+
|      NAME     |  STATE  |         IPV4         |                     IPV6                      |   TYPE    | SNAPSHOTS |
+---------------+---------+----------------------+-----------------------------------------------+-----------+-----------+
| stunning-quail | RUNNING | 10.189.151.162 (eth0) | fd42:71c6:d70c:1045:216:3eff:fe39:b560 (eth0) | CONTAINER | 0         |
+---------------+---------+----------------------+-----------------------------------------------+-----------+-----------+
| uuf           | RUNNING | 10.189.151.179 (eth0) | fd42:71c6:d70c:1045:216:3eff:fe56:6ada (eth0) | CONTAINER | 0         |
+---------------+---------+----------------------+-----------------------------------------------+-----------+-----------+
```

Enter through the bash of a lxd container

lokesh@cybercub:~$ lxc exec uuf /bin/bash

root@uuf:~#

Check for internet access

root@uuf:~# ping google.com
PING google.com (142.250.194.174) 56(84) bytes of data.
64 bytes from del12s06-in-f14.1e100.net (142.250.194.174): icmp_seq=1 ttl=111 time=55.4 ms
64 bytes from del12s06-in-f14.1e100.net (142.250.194.174): icmp_seq=2 ttl=111 time=61.3 ms

Stop / Shutdown the LXD Containers

lokesh@cybercub:~$ lxc stop uuf
lokesh@cybercub:~$ lxc stop stunning-quail

```
lokesh@cybercub:~$ lxc list
+-----------------+---------+------+------+-----------+-----------+
|      NAME       |  STATE  | IPV4 | IPV6 |   TYPE    | SNAPSHOTS |
+-----------------+---------+------+------+-----------+-----------+
| stunning-quail | STOPPED |      |      | CONTAINER | 0         |
+-----------------+---------+------+------+-----------+-----------+
| uuf             | STOPPED |      |      | CONTAINER | 0         |
+-----------------+---------+------+------+-----------+-----------+
```

To check Ip is static (to cross check)

lokesh@cybercub:~$ lxc start uuf
lokesh@cybercub:~$ lxc start stunning-quail

```
lokesh@cybercub:~$ lxc list
+---------------+---------+---------------------+----------------------------------------------+-----------+-----------+
|      NAME     |  STATE  |        IPV4         |                     IPV6                     |   TYPE    | SNAPSHOTS |
+---------------+---------+---------------------+----------------------------------------------+-----------+-----------+
| stunning-quail | RUNNING | 10.189.151.162 (eth0) | fd42:71c6:d70c:1045:216:3eff:fe39:b560 (eth0) | CONTAINER | 0         |
+---------------+---------+---------------------+----------------------------------------------+-----------+-----------+
| uuf           | RUNNING | 10.189.151.179 (eth0) | fd42:71c6:d70c:1045:216:3eff:fe56:6ada (eth0) | CONTAINER | 0         |
+---------------+---------+---------------------+----------------------------------------------+-----------+-----------+
```

To delete LXD container

lokesh@cybercub:~$ lxc delete uuf

List all the LXD containers

lokesh@cybercub:~$ lxc list

```
lokesh@cybercub:~$ lxc list
+-----------------+---------+------+------+-----------+-----------+
|      NAME       |  STATE  | IPV4 | IPV6 |   TYPE    | SNAPSHOTS |
+-----------------+---------+------+------+-----------+-----------+
| stunning-quail | STOPPED |      |      | CONTAINER | 0         |
+-----------------+---------+------+------+-----------+-----------+
```

Clone LXD containers

lokesh@cybercub:~$ lxc copy misp dfir-iris

```
lokesh@cybercub:~$ lxc list
+-----------+---------+----------------------+-----------------------------------------------+-----------+-----------+
|   NAME    |  STATE  |         IPV4         |                     IPV6                      |   TYPE    | SNAPSHOTS |
+-----------+---------+----------------------+-----------------------------------------------+-----------+-----------+
| dfir-iris | STOPPED |                      |                                               | CONTAINER | 0         |
+-----------+---------+----------------------+-----------------------------------------------+-----------+-----------+
| misp      | RUNNING | 172.17.0.1 (docker0) | fd42:71c6:d70c:1045:216:3eff:fe15:fd34 (eth0) | CONTAINER | 0         |
|           |         | 10.189.151.212 (eth0)|                                               |           |           |
+-----------+---------+----------------------+-----------------------------------------------+-----------+-----------+
```

lokesh@cybercub:~$ for i in {1..4}; do
  lxc launch ubuntu:20.04 sensor$i
done
Creating sensor1
Starting sensor1
Creating sensor2
Starting sensor2
Creating sensor3
Starting sensor3
Creating sensor4
Starting sensor4

```
lokesh@cybercub:~$ lxc list
+------------+---------+----------------------+-----------------------------------------------+-----------+-----------+
|    NAME    |  STATE  |         IPV4         |                     IPV6                      |   TYPE    | SNAPSHOTS |
+------------+---------+----------------------+-----------------------------------------------+-----------+-----------+
| agent      | RUNNING | 10.189.151.4 (eth0)  | fd42:71c6:d70c:1045:216:3eff:fe09:fcb3 (eth0) | CONTAINER | 0         |
+------------+---------+----------------------+-----------------------------------------------+-----------+-----------+
| agent1     | STOPPED |                      |                                               | CONTAINER | 0         |
+------------+---------+----------------------+-----------------------------------------------+-----------+-----------+
| dfir-iris  | STOPPED |                      |                                               | CONTAINER | 0         |
+------------+---------+----------------------+-----------------------------------------------+-----------+-----------+
| misp       | STOPPED |                      |                                               | CONTAINER | 0         |
+------------+---------+----------------------+-----------------------------------------------+-----------+-----------+
| sensor1    | RUNNING | 10.189.151.79 (eth0) | fd42:71c6:d70c:1045:216:3eff:fe41:a219 (eth0) | CONTAINER | 0         |
+------------+---------+----------------------+-----------------------------------------------+-----------+-----------+
| sensor2    | RUNNING | 10.189.151.57 (eth0) | fd42:71c6:d70c:1045:216:3eff:fe85:8723 (eth0) | CONTAINER | 0         |
+------------+---------+----------------------+-----------------------------------------------+-----------+-----------+
| sensor3    | RUNNING | 10.189.151.13 (eth0) | fd42:71c6:d70c:1045:216:3eff:fea9:9b2 (eth0)  | CONTAINER | 0         |
+------------+---------+----------------------+-----------------------------------------------+-----------+-----------+
| sensor4    | RUNNING | 10.189.151.97 (eth0) | fd42:71c6:d70c:1045:216:3eff:fee2:90eb (eth0) | CONTAINER | 0         |
+------------+---------+----------------------+-----------------------------------------------+-----------+-----------+
| tpot       | RUNNING | 172.17.0.1 (docker0) | fd42:71c6:d70c:1045:216:3eff:fe39:b560 (eth0) | CONTAINER | 0         |
|            |         | 10.189.151.162 (eth0)|                                               |           |           |
+------------+---------+----------------------+-----------------------------------------------+-----------+-----------+
| wazuh      | STOPPED |                      |                                               | CONTAINER | 0         |
+------------+---------+----------------------+-----------------------------------------------+-----------+-----------+
| wazuh-idps | STOPPED |                      |                                               | CONTAINER | 0         |
+------------+---------+----------------------+-----------------------------------------------+-----------+-----------+
```

lokesh@cybercub:~$ for i in {1..4}; do   lxc stop sensor$i; done
lokesh@cybercub:~$ lxc list

```
lokesh@cybercub: $ lxc list
+------------+---------+----------------------+-----------------------------------------------+-----------+-----------+
|    NAME    |  STATE  |         IPV4         |                     IPV6                      |   TYPE    | SNAPSHOTS |
+------------+---------+----------------------+-----------------------------------------------+-----------+-----------+
| agent      | RUNNING | 10.189.151.4 (eth0)  | fd42:71c6:d70c:1045:216:3eff:fe09:fcb3 (eth0) | CONTAINER | 0         |
+------------+---------+----------------------+-----------------------------------------------+-----------+-----------+
| agent1     | STOPPED |                      |                                               | CONTAINER | 0         |
+------------+---------+----------------------+-----------------------------------------------+-----------+-----------+
| dfir-iris  | STOPPED |                      |                                               | CONTAINER | 0         |
+------------+---------+----------------------+-----------------------------------------------+-----------+-----------+
| misp       | STOPPED |                      |                                               | CONTAINER | 0         |
+------------+---------+----------------------+-----------------------------------------------+-----------+-----------+
| sensor1    | STOPPED |                      |                                               | CONTAINER | 0         |
+------------+---------+----------------------+-----------------------------------------------+-----------+-----------+
| sensor2    | STOPPED |                      |                                               | CONTAINER | 0         |
+------------+---------+----------------------+-----------------------------------------------+-----------+-----------+
| sensor3    | STOPPED |                      |                                               | CONTAINER | 0         |
+------------+---------+----------------------+-----------------------------------------------+-----------+-----------+
| sensor4    | STOPPED |                      |                                               | CONTAINER | 0         |
+------------+---------+----------------------+-----------------------------------------------+-----------+-----------+
| tpot       | RUNNING | 172.17.0.1 (docker0) | fd42:71c6:d70c:1045:216:3eff:fe39:b560 (eth0) | CONTAINER | 0         |
|            |         | 10.189.151.162 (eth0)|                                               |           |           |
+------------+---------+----------------------+-----------------------------------------------+-----------+-----------+
| wazuh      | STOPPED |                      |                                               | CONTAINER | 0         |
+------------+---------+----------------------+-----------------------------------------------+-----------+-----------+
| wazuh-idps | STOPPED |                      |                                               | CONTAINER | 0         |
+------------+---------+----------------------+-----------------------------------------------+-----------+-----------+
```

//Igone from here

RND //Under Development

Create a storage list
lokesh@cybercub:~$ lxc storage create hpc-store dir
Storage pool hpc-store created

lokesh@cybercub:~$ lxc storage list

```
lokesh@cybercub: $ lxc storage list
+-----------+--------+-----------------------------------------------------+-------------+---------+---------+
|   NAME    | DRIVER |                       SOURCE                        | DESCRIPTION | USED BY |  STATE  |
+-----------+--------+-----------------------------------------------------+-------------+---------+---------+
| hpc-store | dir    | /var/snap/lxd/common/lxd/storage-pools/hpc-store    |             | 1       | CREATED |
+-----------+--------+-----------------------------------------------------+-------------+---------+---------+
```

Create custom profile in LXD containers
lokesh@cybercub:~$ lxc profile copy default hpc-profile
lokesh@cybercub:~$ lxc profile device add hpc-profile root disk path=/ pool=hpc-store
Device root added to hpc-profile

```
lokesh@cybercub:~$ lxc profile list
+-------------+----------------------+---------+
|    NAME     |     DESCRIPTION      | USED BY |
+-------------+----------------------+---------+
| default     | Default LXD profile | 0       |
+-------------+----------------------+---------+
| hpc-profile | Default LXD profile | 0       |
+-------------+----------------------+---------+
```

lokesh@cybercub:~$ lxc storage delete hpc-store
Storage pool hpc-store deleted

```
lokesh@cybercub:~$ lxc storage list
+------+--------+--------+-------------+---------+-------+
| NAME | DRIVER | SOURCE | DESCRIPTION | USED BY | STATE |
+------+--------+--------+-------------+---------+-------+
```

lokesh@cybercub:~$ lxc profile delete hpc-profile

```
lokesh@cybercub:~$ lxc profile list
+---------+----------------------+---------+
|  NAME   |     DESCRIPTION      | USED BY |
+---------+----------------------+---------+
| default | Default LXD profile | 1       |
+---------+----------------------+---------+
```

Path where LXD containers present :
root@cybercub:/var/snap/lxd/common/lxd/containers# ls
agent1 dfir-iris experiment misp tpot wazuh

Path for Storage Pools :
root@cybercub:/var/snap/lxd/common/lxd/storage-pools# ls
default wazuh-store