

Chameleon Tutorial

Tutorial on the Chameleon Testbed

Lan Nguyen

Data-Intensive Distributed Systems Laboratory



Chameleon

The screenshot shows the Chameleon Cloud user dashboard at `chameleoncloud.org/user/dashboard/`. The top navigation bar includes links for About, User, Learn, Experiment, Blog, and 2023 User Meeting. Below this, a secondary navigation bar contains Dashboard, Projects, Outages, Help Desk, and Profile. The main content area is titled "Dashboard" and features a section for "Active Projects". A red text overlay "Pick one of the site" points to a dropdown menu that is open, displaying a list of sites: CHI@TACC, CHI@UC, CHI@NU, CHI@NCAR, CHI@EVL, CHI@IIT, and KVM@TACC. The dropdown menu is highlighted with a red border. The "Active Projects" section shows a table with columns for Project and Usage/Info. The first row lists "CS553" with ID "CHI-210825" and a usage of "23%". Below this, there is a section for "Ongoing outages".

chameleoncloud.org/user/dashboard/

Chameleon About User Learn Experiment Blog 2023 User Meeting

Dashboard Projects Outages Help Desk Profile

Dashboard

Active Projects

Pick one of the site

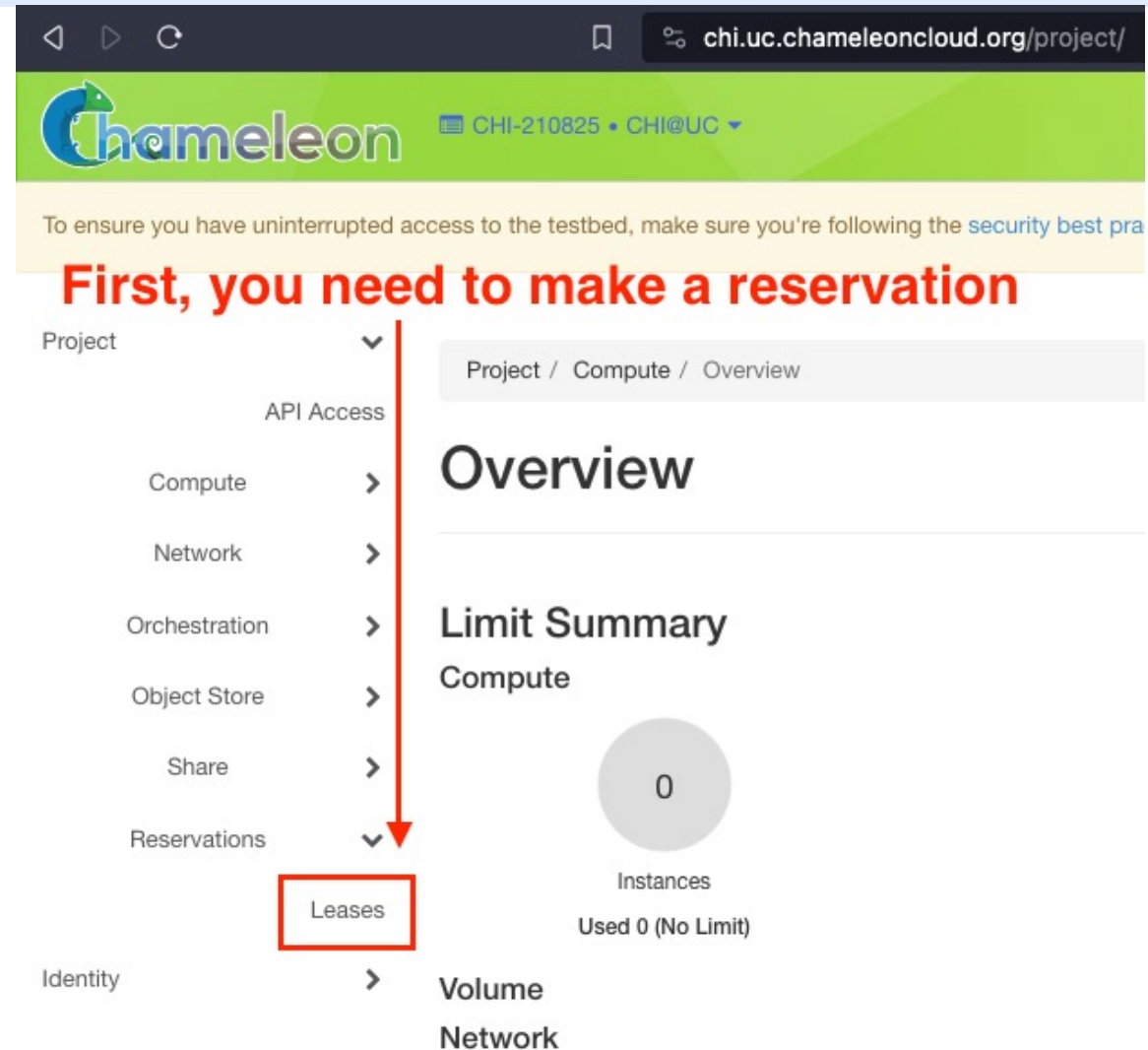
Project Usage/Info

CS553 CHI-210825 23%

Ongoing outages

Hardware Discovery
Appliances
Jupyter Interface
Trove New
CHI@Edge (preview)
Sites
CHI@TACC
CHI@UC
CHI@NU
CHI@NCAR
CHI@EVL
CHI@IIT
KVM@TACC

Chameleon (Cont.)



The screenshot shows the Chameleon web interface in a browser. The address bar displays `chi.uc.chameleoncloud.org/project/`. The header features the Chameleon logo and project details: `CHI-210825 • CHI@UC`. A yellow banner contains the text: "To ensure you have uninterrupted access to the testbed, make sure you're following the [security best pra](#)".

Below the banner, a red text overlay states: **First, you need to make a reservation**. A red arrow points from this text to the 'Leases' tab in the left sidebar.

The left sidebar contains the following navigation items:

- Project (dropdown arrow)
- API Access
- Compute (>)
- Network (>)
- Orchestration (>)
- Object Store (>)
- Share (>)
- Reservations (dropdown arrow)
 - Leases** (highlighted with a red box)
- Identity (>)

The main content area shows the breadcrumb "Project / Compute / Overview" and the title "Overview". Below this is the "Limit Summary" section for "Compute", which displays a large circle with the number "0" and the text "Instances Used 0 (No Limit)".

Chameleon (Cont.)

The screenshot shows the Chameleon web interface. At the top, there's a green header with the Chameleon logo, a user ID 'CH-210825 • CH@UC', and a user profile 'lyn2007'. Below the header is a yellow banner with a security notice: 'To ensure you have uninterrupted access to the testbed, make sure you're following the [security best practices!](#)'. The left sidebar contains a navigation menu with items like Project, API Access, Compute, Network, Orchestration, Object Store, Share, Reservations, and Identity. The 'Reservations' section is expanded, showing 'Leases' as the selected item. The main content area is titled 'Leases' and contains a table with columns: Lease name, Created by, Start date, End date, Status, Degraded, and Actions. The table is currently empty, displaying 'No items to display.' To the right of the table are two buttons: 'Host Calendar' and 'Network Calendar', followed by a blue button labeled '+ Create Lease' which is highlighted with a red box and a red arrow pointing to it from the text 'Create your lease'.

Chameleon CH-210825 • CH@UC lyn2007

To ensure you have uninterrupted access to the testbed, make sure you're following the [security best practices!](#)

Project / Reservations /

Leases

Create your lease

Host Calendar Network Calendar + Create Lease

Lease name	Created by	Start date	End date	Status	Degraded	Actions
No items to display.						

Chameleon (Cont.)

Create Lease

General *

Hosts

Networks

Lease Name *

DataSys

Start Date ?

Today

Start Time ?

Now

Lease Length (days) ?

7

Ends ?

2023-10-09

End Time ?

Same time as now

Your timezone is currently configured as **UTC**. If you need to update your timezone please go to your [User Settings](#).

Please be courteous to other users of the testbed and make sure your lease represents a responsible use of Chameleon resources and complies with our [best practices](#). Chameleon operators reserve the right to terminate leases judged to be abusive.

For leases shorter than 24 hours, use a lease length of zero days.

Cancel

« Back

Next »

Chameleon (Cont.)

Create Lease

General *

Hosts

Networks

☒ Reserve Hosts

Minimum Number of Hosts ?

4

Maximum Number of Hosts ?

4

Resource Properties ?

node_type

=

compute_skylake

X

Add Filter

Cancel

« Back

Next »

For specific node reservations, you can find the node UUID using [Resource Discovery](#) on the user portal.

↑
To request machine with specific hardware

Chameleon (Cont.)

Create Lease

General *HostsNetworks

☐ Reserve Network

Network name is required when reserving a network.

Network Name ?

Network Description ?

Resource Properties ?

physical_network = physnet1 X

Add Filter

☐ Reserve Floating IPs

Number of Floating IP Addresses Needed ?

0

Cancel

« Back

Create

ILLINOIS
TECH

DataSys
Data Science & Analytics
System Library

7

Chameleon (Cont.)

Chameleon

CHI-210825 • CHI@UC

lvm2007

To ensure you have uninterrupted access to the testbed, make sure you're following the [security best practices!](#)

Project

API Access

Compute

Network

Orchestration

Object Store

Share

Reservations

Leases

Identity

Project / Reservations /

Leases

Displaying 1 item

Host Calendar

Network Calendar

Create Lease

Delete Leases

Lease name	Created by	Start date	End date	Status	Degraded	Actions
DataSys	e714805866004fd735c63a0f443037615508c24eca9bf7c1cd5a7ab4f8b7b815	2023-10-02 20:39 UTC	2023-10-09 20:38 UTC	ACTIVE	No	Update Lease

Displaying 1 item

Your lease will appear here once create



Chameleon (Cont.)

Chameleon CHI-210825 CHI@UC

To ensure you have uninterrupted access to the testbed, make sure you're following the [security best practices](#)!

Project / Compute / Instances

Instances

Go back to "Instances" and click on "Launch Instance"

Instance ID = Filter

Instance Name	Image Name	IP Address	Flavor	Created By	Key Pair	Status	Task	Power State	Age	Actions
No items to display.										

Chameleon (Cont.)

Launch Instance

Details

Source

Networks

Network Ports

Key Pair

Please provide the initial hostname for the instance, the availability zone where it will be deployed, and the instance count. Increase the Count to create multiple instances with the same settings.

Project Name

CHI-210825

Instance Name *

DataSys

Description

Reservation *

DataSys (afd0e35c-2a39-4530-a7ce-0693ed36739a)

Count *

1

Total Instances
(No Limit)

0 Current Usage

1 Added

✕ Cancel

Show Advanced

< Back

Next >

Launch Instance

Chameleon (Cont.)

Launch Instance

Details

Source

Networks

Network Ports

Key Pair

Instance source is the template used to create an instance. You can use an image, a snapshot of an instance (image snapshot), a volume or a volume snapshot (if enabled). You can also choose to use persistent storage by creating a new volume.

Select Boot Source

Image

Allocated

Displaying 0 items

Name	Chameleon Supported	Updated	Size	Format
Select an item from Available items below				

Displaying 0 items




Available 30 Select one

Q

ubuntu22

X

Displaying 4 items

Name	Chameleon Supported	Updated	Size	Format
> CC-Ubuntu22.04	Yes 	3/1/23 6:36 AM	1.73 GB	QCOW2 <div>↑</div>
> CC-Ubuntu22.04-ARM64	Yes 	3/23/23 4:02 PM	1.69 GB	QCOW2 <div>↑</div>
> CC-Ubuntu22.04-CUDA	Yes 	8/31/23 7:25 PM	6.62 GB	QCOW2 <div>↑</div>
> CC-Ubuntu22.04-CUDA-20230301	No	8/31/23 7:21 PM	6.67 GB	QCOW2 <div>↑</div>

Displaying 4 items

Cancel

Show Advanced

< Back

Next >

Launch Instance

Chameleon (Cont.)

Launch Instance

Details

Source

Networks

Network Ports

Key Pair

A key pair allows you to SSH into your newly created instance. You may select an existing key pair, import a key pair, or generate a new key pair.

+ Create Key Pair

Import Key Pair

Allocated

Displaying 1 item

Name	Type	Fingerprint
> LN	ssh	64:5f:b3:3f:ce:5c:d3:51:55:db:25:22:81:1a:42:1f

Displaying 1 item

Available 0

Select one

Q

Click here for filters or full text search.

X

Displaying 0 items

Name	Type	Fingerprint
No items to display.		

Displaying 0 items

☐ Set admin password

Cancel

Show Advanced

< Back

Next >

Launch Instance

Make sure your key is allocated then "Launch Instance"

Chameleon (Cont.)

Launch Instance

Details

Source

Networks

Network Ports

Key Pair

A key pair allows you to SSH into your newly created instance. You may select an existing key pair, import a key pair, or generate a new key pair.

+ Create Key Pair

Import Key Pair

Allocated

Displaying 1 item

	Name	Type	Fingerprint	
>	LN	ssh	64:5f:b3:3f:ce:5c:d3:51:55:db:25:22:81:1a:42:1f	↓

Displaying 1 item

Available 0 Select one

Q

Click here for filters or full text search.

×

Displaying 0 items

Name	Type	Fingerprint
No items to display.		

Displaying 0 items

☐ Set admin password

✕ Cancel

Show Advanced

< Back

Next >

Launch Instance

If you don't have any key allocated, go to "Import Key Pair"

Chameleon (Cont.)

Launch Instance

Details

Source

Networks

Network Ports

Key Pair

Import Key Pair

Key Pairs are how you login to your instance after it is launched. Choose a key pair name you will recognize and paste your SSH public key into the space provided.

Key Pair Name *

Your key name goes here

Key Type *

SSH Key

Load Public Key from a file

Choose File No file chosen

Public Key * (Modified)

Content size: 566 bytes of 16.00 KB

ssh-rsa
AAAAB3NzaC1vc2EAAAADAQABAAQgODFgZQonMKhx4qp01r1RQFkm5U1TiwS+UWMDWn4aTYkQT4FGDttmsar
ByYNcG3uTx8o4z8dm1sxSQ5cYCad+uotP3w0w81RwxEBjzh+pBBXm6d/GpRztuD2abfjH/LcBAoMvVGuSCww6uB
u9XltDuVC+vuChXpdyw25ynDQw/zm7QznyRpDRSpkLhLLANiybXm/3l2hs2rkP.1Y04M1VFb7YzOSda7Qz5YT70qx
mcWseMzeDoTEdY8fp79D.JlsL+Uz.J7BuLBQVPg0EYbQ4.Jn4su77kGX8WCKka3hctFzEFtpnq1EXU6LXOuYHtAxu
+TFRUEswLzjmJ7yUR2BXYs3BEi47tM0IKrHdAq9Sf378EE3go0CWrbwC9HTu8njYpgjew59PGVn3N+buMP95X3u+2
G3981QTiVwBxoZDXxF7hdDliolqv5TNL4/00DW/9C2Mf3qlah0OvGbEa5GMHGCoSd6ggRbeFIUqTfo+x1KHwhYq6fl
rj1vln3J3gbbL0s158= gbn@Lans-MBP

Cancel

Import Key Pair

Set admin password

Cancel

Show Advanced

< Back

Next >

Launch Instance

Chameleon (Cont.)

Launch Instance

Details

Source

Networks

Network Ports

Key Pair

A key pair allows you to SSH into your newly created instance. You may select an existing key pair, import a key pair, or generate a new key pair.

+ Create Key Pair

Import Key Pair

Allocated

Displaying 1 item

Name	Type	Fingerprint
> LN	ssh	64:5f:b3:3f:ce:5c:d3:51:55:db:25:22:81:1a:42:1f

Displaying 1 item

▼ Available 0

Select one

Q

Click here for filters or full text search.

x

Displaying 0 items

Name	Type	Fingerprint
No items to display.		

Displaying 0 items

☐ Set admin password

Cancel

Show Advanced


< Back

Next >

Launch Instance

Finally, launch instance

Chameleon (Cont.)

 CHI-210825 • CHI@UC ▼

To ensure you have uninterrupted access to the testbed, make sure you're following the [security best practices](#)!

Project ▼
API Access
Compute >
Network ▼
Network Topology
Networks
Routers
Floating IPs
Orchestration >
Object Store >
Share >
Reservations >
Identity >

Project / Compute / Instances

Instances

Displaying 1 item

<input type="checkbox"/>	Instance Name	Image Name	IP Address	Flavor	Created By
<input type="checkbox"/>	DataSys	CC-Ubuntu22.04	10.140.81.229	baremetal	e7f48058660

Displaying 1 item

**You need an external IP to access your instance.
Go to "Floating IPs"**

Chameleon (Cont.)

The screenshot shows the Chameleon web interface. At the top, there's a green header with the Chameleon logo and user information. Below it, a yellow banner contains a security notice. The left sidebar has a menu with categories like Project, API Access, Compute, Network, and Identity. The main content area is titled 'Floating IPs' and includes a breadcrumb trail 'Project / Network / Floating IPs'. A table with columns 'IP Address', 'Description', 'Mapped Fixed IP Address', 'Pool', 'Status', and 'Actions' is present, but it's empty with the message 'No items to display.' In the top right of the table area, there are filters and a button labeled 'Allocate IP To Project', which is highlighted by a red box and a red arrow pointing to it from the text 'To allocate IP to your instance'.

Chameleon CHI-210825 • CHI@UC

To ensure you have uninterrupted access to the testbed, make sure you're following the [security best practices!](#)

Project / Network / Floating IPs

Floating IPs

To allocate IP to your instance

Floating IP Address = Filter **Allocate IP To Project**

IP Address	Description	Mapped Fixed IP Address	Pool	Status	Actions
No items to display.					

Project

- API Access
- Compute
- Network
- Network Topology
- Networks
- Routers
- Floating IPs**
- Orchestration
- Object Store
- Share
- Reservations
- Identity

Chameleon (Cont.)

Allocate Floating IP

Pool *

public

Description

Description:

Allocate a floating IP from a given floating IP pool.

Project Quotas

Floating IP 0 of 50 Used

Cancel

Allocate IP

Chameleon (Cont.)

Chameleon

CHI-210825 • CHI@UC

lyn2007

To ensure you have uninterrupted access to the testbed, make sure you're following the [security best practices!](#)

Project

API Access

Compute

Network

Network Topology

Networks

Routers

Floating IPs

Orchestration

Object Store

Share

Reservations

Identity

Project / Network / Floating IPs

Floating IPs

Displaying 1 item

Floating IP Address

Filter

Allocate IP To Project

Release Floating IPs

To associate this IP address with your instance

IP Address	Description	Mapped Fixed IP Address	Pool	Status	Actions
192.5.87.58		-	public	Down	Associate

Displaying 1 item

Chameleon (Cont.)

Manage Floating IP Associations

IP Address *

192.5.87.58

▼

+

Select the IP address you wish to associate with the selected instance or port.

Port to be associated *

Select a port

Select a port


DataSys: 10.140.81.229

Make sure to select the correct instance

Cancel

Associate

Chameleon (Cont.)

 CHI-210825 • CHI@UC ▼

To ensure you have uninterrupted access to the testbed, make sure you're following the [security best practices](#)!

Project ▼
API Access
Compute ▼
Overview
Instances
Images
Key Pairs
Network >
Orchestration >
Object Store >
Share >
Reservations >
Identity >

Project / Compute / Instances

Instances

Displaying 1 item

<input type="checkbox"/>	Instance Name	Image Name	IP Address	Flavor
<input type="checkbox"/>	DataSys	CC-Ubuntu22.04	10.140.81.229 192.5.87.58	baremetal

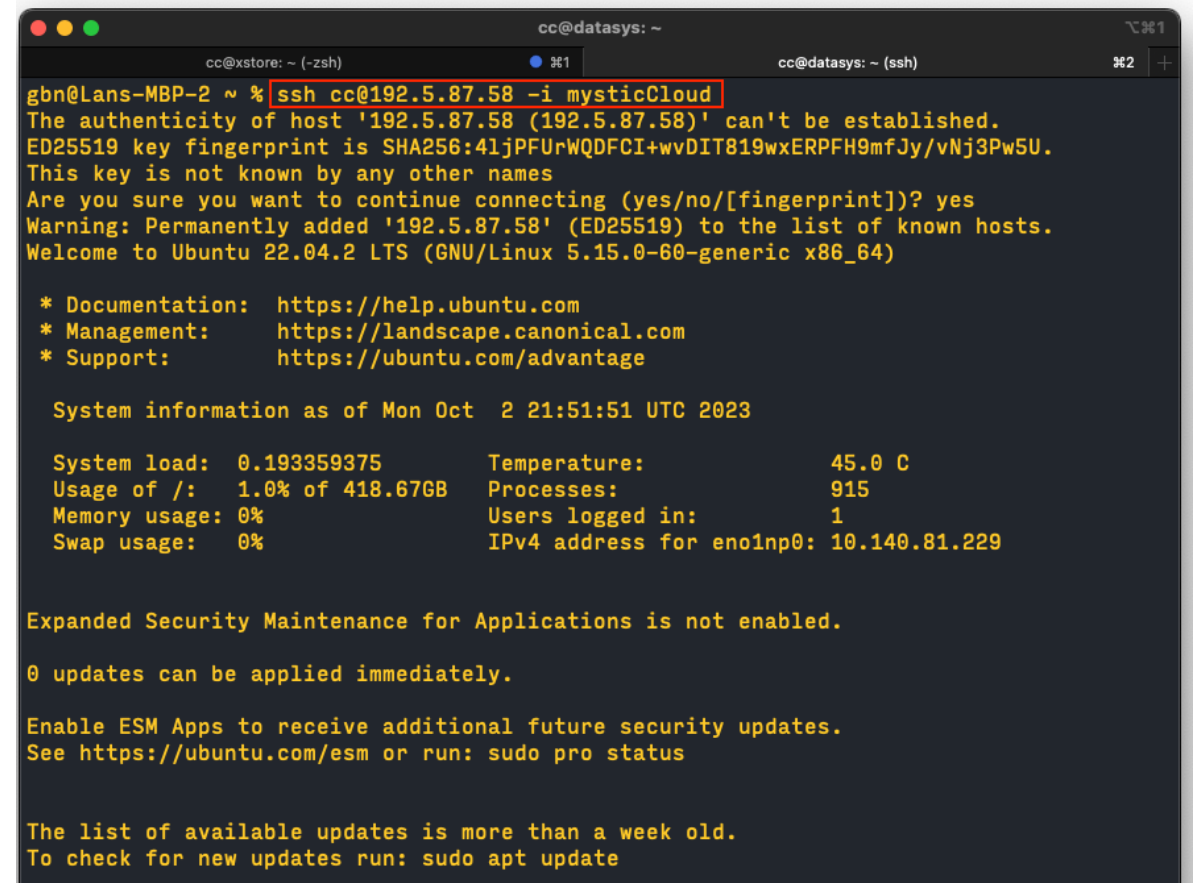
Displaying 1 item

Your instance can now be accessed via ssh

Chameleon (Cont.)

To access your Chameleon instance:

\$ ssh cc@<instance ext. IP addr> -i <your private key>



The screenshot shows a terminal window with a dark background. At the top, there are window control buttons and a title bar that reads 'cc@datasys: ~'. Below the title bar, there are tabs for 'cc@xstore: ~ (-zsh)' and 'cc@datasys: ~ (ssh)'. The main terminal area shows a command prompt 'gbn@Lans-MBP-2 ~ %' followed by the command 'ssh cc@192.5.87.58 -i mysticCloud'. The output of the command shows a warning about the host's authenticity, a confirmation to add the host to the known hosts list, and a welcome message to Ubuntu 22.04.2 LTS. Below this, there is a list of links for documentation, management, and support. Then, system information is displayed, including system load, usage of /, memory usage, swap usage, temperature, processes, users logged in, and IPv4 address for eno1np0. Finally, there is a message about expanded security maintenance for applications and a list of available updates.

```
cc@datasys: ~
cc@xstore: ~ (-zsh)
cc@datasys: ~ (ssh)
gbn@Lans-MBP-2 ~ % ssh cc@192.5.87.58 -i mysticCloud
The authenticity of host '192.5.87.58 (192.5.87.58)' can't be established.
ED25519 key fingerprint is SHA256:4ljPFUrWQDFCI+wwDIT819wxERPFH9mfJy/vNj3Pw5U.
This key is not known by any other names
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '192.5.87.58' (ED25519) to the list of known hosts.
Welcome to Ubuntu 22.04.2 LTS (GNU/Linux 5.15.0-60-generic x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:    https://landscape.canonical.com
 * Support:       https://ubuntu.com/advantage

System information as of Mon Oct  2 21:51:51 UTC 2023

System load:  0.193359375      Temperature:   45.0 C
Usage of /:   1.0% of 418.67GB  Processes:    915
Memory usage: 0%              Users logged in: 1
Swap usage:   0%              IPv4 address for eno1np0: 10.140.81.229

Expanded Security Maintenance for Applications is not enabled.

0 updates can be applied immediately.

Enable ESM Apps to receive additional future security updates.
See https://ubuntu.com/esm or run: sudo pro status

The list of available updates is more than a week old.
To check for new updates run: sudo apt update
```

Linux VM

First-time setup:

```
$ sudo lxd init
```

Modify firewall rules (First-time only):

```
$ sudo ufw allow in on lxdbr0
```

```
$ sudo ufw route allow in on lxdbr0
```

```
$ sudo ufw route allow out on lxdbr0
```

Launching a VM:

```
$ sudo lxc launch ubuntu:22.04 <VM Name> --vm -c limits.cpu=4 -c limits.memory=4GiB
```

Shell Access: (To ssh, requires installing openssh-server on target VM)

```
$ sudo lxc shell <VM Name>
```

Source:

<https://ubuntu.com/tutorials/how-to-launch-an-instantly-functional-linux-desktop-vm-with-lxd#2-initiate-an-ubuntu-desktop-vm>
<https://www.cyberciti.biz/faq/install-lxd-on-ubuntu-22-04-lts-using-apt-snap/>

**ILLINOIS
TECH**