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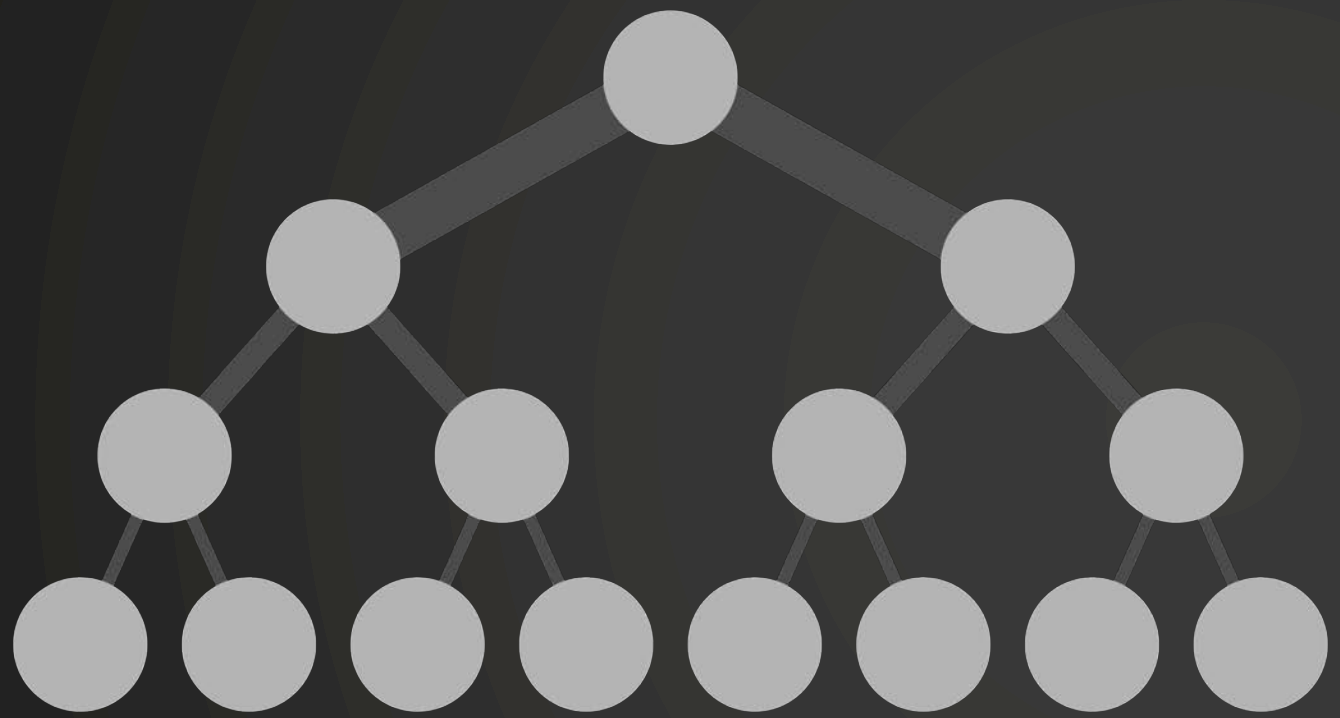

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Delivering science and technology
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Network and Services Practicum

Hands-on with networks and services

Presented by CSCNSI

Starting Assumptions

This guide assumes the following steps have been completed

- Your cluster’s master node is built and has external network connectivity on interface `em2`.
- - One compute node is built with the address `172.16.0.1` on interface `em1`.
- - The compute node has its default route going through the master's cluster address: `172.16.0.254`.

The Steps

1. Examine your network configuration
2. Configure the cluster network on your master node
3. Configure NAT on your master node
4. Set up an SSH key for root
5. Configure NTP
6. Install a web server on your master
7. Systemd, under the hood

Step 1: Examine your network configuration

Start out by familiarizing yourself with the existing network configuration on your master node and ensuring it has external connectivity

- Take a look at your master node's network config:
  - `ip addr show`
- Find the two ethernet interfaces you will be using: `em1` and `em2`
- Test your master node's external network connectivity
  - `ping 8.8.8.8`, `traceroute 8.8.8.8`

Step 2: Configure the cluster network on your master node

Your cluster's internal network will be used to manage its compute nodes. The master doesn't start out with a node on it, so you need to add it.

- Assign the address `172.16.0.254` to interface `em1`
- Bring the interface down, and then bring it back up again so it gets its new configuration
- Use `ethtool` to ensure `em1` is configured correctly
- Ping your compute node to ensure connectivity is working correctly

Step 3: Configure NAT on your master node

Your compute nodes live on a private network. Enabling Network Address Translation on your master lets them talk to the rest of the world

- Enable IPv4 packet filtering on your master
- Install the iptables packages on your master node
- Add the NAT configuration to your iptables configuration
- Enable and start the iptables service
- Test that your compute node has external network connectivity

Step 4: Set up an SSH key for root

SSH keys are not necessary, but make it easier to perform automation. In this step, you will interact with the configuration of the SSH service.

- On your compute node, enable public key authentication
- On your master node, generate a public/private key pair
- Add the public key from your master to your `.ssh/authorized_keys` file on your compute node
- SSH to your compute node to ensure it is working

Step 5: Configure NTP

NTP is a convenient service that keeps a system's clock synchronized with another time server. We will set it up to keep all of the cluster's clocks in sync.

- If needed, install the NTP package on your master node and ensure it can synchronize its clock with an outside source
- If needed, enable the NTP service on your master node
- Install the NTP package on your compute node
- Enable the NTP service on your compute node
- Configure your compute node to use your NTP node as its time source
- Restart NTP on your compute node and ensure it is able to synchronize its clock with the master node

Step 6: Install a web server on your master

Web servers are convenient services to have running on master nodes: they can hand out node images, configurations, and a variety of other things. You will install `nginx` on your master node.

- On your master node, install the `nginx` package
- On your master node, check the status of and enable the `nginx` service
- On your compute node, use `curl` to confirm you can access the web server
- Add a “hello world” file to the web server’s root directory
- On your compute node, use `curl` to confirm you can access the new file
- On your compute node, use `telnet` to talk directly to the web server and send it raw HTTP commands

Step 7: Systemd, under the hood

Systemd is complex, but it helps to know a little about how it works under the hood. We will take a look at:

- Where system unit files live
- What happens when you “enable” one
- What they look like
- The right ways to modify one for your system configuration

Done

When you are done with these steps, you should have:

- A working cluster network between your master node and compute node
- Your master node synchronizing its time with an outside source and your compute node synchronizing its time with your master node
- Your compute node's SSH server configured to accept public key authentication from your master node, and your master node's public key in place on our compute node
- A working webserver on your master node that can be accessed by your compute node

Questions?