OpenSUSE Kubic: Installation

-Workbook-

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Documentation Conventions:

The following typographical conventions are used in this manual:

Bold	Represents things you should pay attention to or buttons you click, text or options that you should click/select/type in a GUI.
Bold Gray	Represents the name of a Task or in the context of what is seen on the screen, the screen name, a tab name, column name, field name, etc.
Bold Red	Represents warnings or very important information.
Option > Option > Option	Represents a chain of items selected from a menu.
BOLD_UPPERCASE_ITALIC	Represents an “exercise variable” that you replace with another value.
`bold monospace`	Represents text displayed in a terminal or entered in a file.
`bold monospace blue`	Represents commands entered at the command line.
`bold monospace green`	Represents a file name.

1 Kubic Setup

Description:

This section will take you step by step through the installation of openSUSE Kubic through to bootstrapping the cluster using Virtualbox 6. The steps here should work on any OS that Virtualbox supports.

1- 1 Setup Clone Master

Description:

In this section you will set up a Kubic Clone Master which will make it easier to create new nodes.

Note: This tutorial was written using Virtualbox 6.0. It contains step by step instructions for the installation process. However it is assumed that the user knows how to install and use Virtualbox on the operating system of their choice.

Task 1: Download the installation media

1. Go to the following url and download the current version of the Kubic url:

   `http://download.opensuse.org/tumbleweed/iso/openSUSE-Tumbleweed-Kubic-DVD-x86_64-Current.iso.mirrorlist`

Task 2: Set up NAT Network

1. Open VirtualBox and Click on **File** and then **Preferences**:
2. Click on the **Network** Icon
3. Click on the first icon on the right that **Adds new NAT network**
4. Click on the third icon on the right that **Edits selected NAT network**
5. The **Network CIDR** should be:

   `10.0.2.0/24`

   Leave the rest of the settings as their default values
   Click **OK** to close this screen
6. Click **OK** to close the preferences screen

Task 3: Set up a new VM

1. Open VirtualBox and Click on the **New** icon:
2. In the **Name** field, enter a name:

   Kubic-CloneMaster

3. In the **Version** field, choose OpenSUSE 64-bit
   Click **Next**
4. Allow for **2048MB** RAM
   Click **Next**
5. Choose Create a virtual hard disk now
   Click **Next**

6. Choose **VDI (Virtual Disk Image)**
   Click **Next**
7. Choose **Dynamically allocated**
   Click **Next**
8. Allow for **30GB**
   Click **Create**
9. Click on the **Settings** icon on the right
10. Go to the **Network** icon
11. Change **Attached to**
    NAT Network
    Name: **NatNetwork**
12. Go to the **System** icon and click on the **Processor** tab
13. Change the number of processors to **2**
14. Click **OK**

Task 4: Start Installation

1. On the main Virtualbox screen, choose **Kubic-CloneMaster** and click on the Start icon

   You will be prompted to **Select a start-up disk**
2. Click on the folder icon:

   Choose the current iso file that you downloaded in Task 1
3. Click **start**
4. When the virtual machine boots, choose the installation option.
5. On the license screen, click **next** if you agree
6. Choose **kubeadm Node**
   Click **Next**
7. Enter an NTP server local to you or use the default one that is provided

   Go to **`http://ntp.org`** for more information.

   Click **Next**
8. Enter a root password and then confirm it
   Click **Next**
9. Click **Install**

Task 5: Post-Installation setup

1. After the installation has finished, the VM will reboot. Choose **Boot from Hard Disk**
2. Choose the first option: **openSUSE Tumbleweed Kubic**
3. Log into the command line:
   Userid: **root**

Password: **[your root password]**

4. Eject the installation media:

   ```
   eject /dev/sr0
   ```

5. Install Yast for easier network configuration:

   ```
   transactional-update pkg install yast2-network
   ```

6. Reboot your vm:

   ```
   reboot
   ```

7. Repeat steps 1-3 in this task:
8. Start the curses version of yast to configure networking

   ```
   yast2 lan
   ```

9. Use the **F4** key on your keyboard to edit:
   You can use the **tab** key to navigate the screen
10. Click **alt t** on your keyboard to change to Statically Assigned IP Address
11. In the IP Address field, enter:

    10.0.2.10

    Use the **tab** key to go to the next field

12. In the Subnet Mask field, enter:
    /24
13. Use the **F10** key to go to the next screen
14. Click **alt s** on your keyboard to change the **Hostname/DNS**
15. In the **hostname** field, enter: **clone-master**

    Use the **tab** key to go to the Name Server 1 field

16. Enter the generic Google DNS or substitute another if you prefer:

    8.8.8.8

17. Click **alt u** on your keyboard to change the **Routing**
18. In the **Default IPv4 Gateway** field, enter:

    10.0.2.2

19. Select click **alt i** on your keyboard to select **Enable IPv4 Forwarding**
20. Use the **F10** key to finish.
21. Ping the gateway. If you get a positive response, then you have set up the network correctly:

    ```
    ping 10.0.2.2
    ```

22. Ping an internet website. If you get a positive response, then you have set up the DNS correctly:

```
ping opensuse.org
```

23. If either step 19 or 20 gives an error, review the steps in this task.
24. Shut down the VM:

```
halt -p
```

Summary:

In this section you set up a new Kubic VM which will be used as a template for creating further VMs.

(End of Exercise)

1- 2 Clone VMs

Description:

In this section you will create VMs for your Kubic cluster.

Task 1: Create the Kubic Master Node

1. Right-click on the **Kubic-CloneMaster** VM and choose **Clone**
2. In the **Name** field, enter:
   Kubic-Master
3. In the **Mac Address Policy** field, choose:
   Generate new MAC addresses for all network adapters
4. On the Clone type screen, choose **Linked Clone**
   Click **Clone**

Task 2: Create a Kubic Worker Node

1. Right-click on the **Kubic-CloneMaster** VM and choose **Clone**
2. In the **Name** field, enter:
   Kubic-Worker1
3. In the **Mac Address Policy** field, choose:
   Generate new MAC addresses for all network adapters
4. On the Clone type screen, choose **Linked Clone**
   Click **Clone**
5. Repeat this task once more and create **Kubic_Worker2**. You may repeat as many times as you like as long as you have memory and disk space for each node.

The Kubic-CloneMaster VM can be deleted at this point if you don't think you will need more nodes or it can be left as a template. If it is deleted, it can always be recreated using the steps in the previous section.

Summary:

In this section you created additional VMs that will be used as Master and Worker nodes in an openUSE Kubic Kubernetes cluster.

(End of Exercise)

1- 3 Configure Master and Worker VMs

Description:

In this section, you will change the IP addresses on the Master and Worker VMs to be unique.

Task 1: Configure the Kubic-Master VM

1. From the main Virtualbox screen, choose the **Kubic-Master** VM and click on the down arrow next to the start icon. Click on **Detachable Start**
2. Log into the command line:
   Userid: **root**
   Password: **[your root password]**
3. Start the curses version of yast to configure networking

   ```
   yast2 lan
   ```

4. Use the **F4** key on your keyboard to edit
5. Use the **tab** key to navigate around the screen
6. Change the IP address to **10.0.2.11**
7. Change the **Hostname** to **kubic-master**
8. Use the **F10** key to go the next screen
9. User the **alt s** keys to go to the **Hostname/DNS** screen
10. Change the **Hostname** to **kubic-master**
11. Use the **F10** key to finish:

Task 2: Configure the Kubic-Worker1 VM

1. From the main Virtualbox screen, choose the **Kubic-Worker1** VM and click on the down arrow next to the start icon. Click on **Detachable Start**
2. Log into the command line:
   Userid: **root**
   Password: **[your root password]**
3. Start the curses version of yast to configure networking

   ```
   yast2 lan
   ```

4. Use the **F4** key on your keyboard to edit
5. Use the **tab** key to navigate around the screen
6. Change the IP address to **10.0.2.12**

7. Change the **Hostname** to **kubic-worker1**
8. Use the **F10** key to go the next screen
9. User the **alt s** keys to go to the **Hostname/DNS** screen
10. Change the **Hostname** to **kubic-worker1**
11. Use the **F10** key to finish

Repeat Task 2 for each worker node. Add 1 to the IP address and hostname for each node that you configure using the pattern in this section.

All nodes should be able to ping `10.0.2.2`, each other, and an internet website.

Summary:

In this section you changed the IP addresses on each node to be unique so they are ready to create a Kubernetes cluster

(End of Exercise)

1- 4 Bootstrap the Cluster

Description:

In this section you will bootstrap your Kubic Kubernetes cluster

Task 1: Set up Kubic-Master

1. Login into the **Kubic-Master** VM if you have not already done so:
   Userid: **root**
   Password: **[your root password]**
2. Run the following command to configure this as a Kubernetes master node:

   ```
   kubeadm init --cri-socket=/var/run/crio/crio.sock \
   --pod-network-cidr=10.244.0.0/16
   ```

   You should see some output and at the end, you will see this:
   You can now join any number of machines by running the following on each node as root:
   `kubeadm join 10.0.2.11:6443 --token` …
   Save this command. You will need it later!

Task 2: (optional) Add a second network interface to Kubic-Master VM

1. Power off the Kubic-Master VM

   ```
   halt -p
   ```

2. From the main Virtualbox screen, choose the **Kubic-Master VM** and click on Settings
3. Click on the Network icon
4. Click on the Adaptor 2 tab
   Change Attached to to Bridged Adaptor
   Name should automatically change to whatever physical network adaptor you are using.
5. From the main Virtualbox screen, choose the **Kubic-Master** VM and click on the down arrow next to the start icon. Click on Detachable Start
6. Log into the command line:
   Userid: **root**
   Password: **[your root password]**
7. Start the curses version of yast to configure networking on the new nic

   ```
   yast2 lan
   ```

8. Use the **F4** key on your keyboard to edit the new nic

9. Click on **alt y** on your keyboard to change this nic to DHCP. If your network does not have DHCP, set a static IP instead.
10. Click on **F10** on your keyboard to exit this screen
11. Click on **F10** on your keyboard to exit yast
12. Find your new IP addresses

    ```
    ip a
    ```

    You should now be able to log into the Kubic-Master using the terminal or application of your choice. You can also now copy and paste from this book.

Task 3: Set up the Kubic-Workers

1. Login to the Kubic-Worker1 VM if you have not already done so:

   Userid: **root**

   Password: **[your root password]**
2. Run the output command from Task 1 and add

   ```
   --cri-socket=/var/run/crio/crio.sock
   ```

   to the end of the command
3. Repeat this task for every worker VM

Task 4: Set up the kubectl

1. On the **Kubic-Master** VM, copy and set up the `config` file so that kubectl can interact with the cluster:

   ```
   mkdir -p $HOME/.kube
   sudo cp -i /etc/kubernetes/admin.conf $HOME/.kube/config
   sudo chown $(id -u):$(id -g) $HOME/.kube/config
   ```
2. Check on your nodes

   ```
   kubectl get nodes
   ```

   You should have 3 nodes. All of them should be in a NotReady status

Task 5: Set up Flannel

1. Run the following command to install flannel on your cluster:

   ```
   kubectl apply -f https://0y.at/kubicflannel
   ```
2. Check on your nodes

   ```
   watch kubectl get nodes
   ```

   In 1-2 minutes all of them should be in a Ready status. Click on **Ctrl c** on your keyboard to exit this screen.

You now have a fully functional Kubernetes cluster! You can add more worker nodes at any

time and then bootstrap them in like you did above.

Summary:

In this section you completed your Kubic Kubernetes cluster. It is now fully functional and ready to be used.

(End of Exercise)