TIE-23546 Cloud Platforms
Exercise 7: Triton Cloud Platform - Episode 1
v1.3

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Triton is an open source cloud platform and based on SmartOS. Joyent is responsible for developing Triton and SmartOS. Beside of that, Joyent provides cloud services and applications. You can rent cloud resources from Joyent or buy a private cloud application from Joyent. In this exercise, we build Triton private cloud platform.

The bedrock of Triton cloud platform is SmartOS. SmartOS is a bare-metal solution and works as a Tier-1 level hypervisor. A customer can allocate hardware virtual machines (HVM), operating system containers and Docker containers on Triton cloud platform (Source). Triton command line tool (Triton CLI) is used to create and manage virtual instances. It uses CloudAPI interface to control instances on a Triton cluster.

At this point, it is a good idea to check the user's permissions and hardware resources. You will need an administrator account to change network configurations of VMware Workstation. Triton cloud platform is a heavy application, so you need at least 16 GB memory. Beside of that, you need at least Intel Core i5 or i7 processor.

If you are using Oracle VM Virtual box, download and install the evaluation version of VMware Workstation Pro (Link). We need a network connection between Ubuntu and Triton. Therefore, you cannot run Ubuntu on Oracle and Triton on VMware. They use different network interfaces. You need to reinstall Ubuntu Server on VMware (see Exercise 1). Also, be sure to install Docker and Docker compose.

In this exercise, we build a private cloud platform with Triton. First, we install Triton cloud platform on VMware Workstation. Second, we are adding a new account to Triton cloud platform. Then we install Triton CLI tool on Ubuntu Server 01 and launch the virtual instances on Triton cloud.

Preliminary task – Generation of SSH keys

1. Select Ubuntu Ubuntu Server 01.
2. Take a snapshot [VMware Workstation\ Ubuntu Server 01 -> Snapshot\ Take Snapshot\ Snapshot 6].
3. Select NAT adapter [VMware Workstation\ Ubuntu Server 01 -> Settings\ Network adapter\ NAT].
4. Turn on the Ubuntu Server 01 and open the SSH connection.
5. Generate a new SSH key pair. Do not enter passphrase. Read instructions from the link.
6. Copy id_rsa.pub file to directory C:\Temp.
7. Shutdown Ubuntu Server 01 (sudo poweroff).

Installation of Triton cloud platform

Triton Cloud on a Laptop (CoaL) is designed for development and testing. Usually Triton cluster consist of one head node and multiple compute nodes. The head node is a management server and controls compute nodes. The compute nodes perform user's instances, such as hardware virtual machines, operating system containers and Docker containers. In the CoaL, the head node also acts as a compute node for instances.

Pre-installation procedures

1. Download Triton cloud platform (Link). Save the file to C:\Temp\Triton. Extract tgz and tar files.

2. Configure the network settings of VMware Workstation. Read installation instructions from the link (Downloading CoaL). Configure external and admin networks.

   Windows
   Download https://raw.githubusercontent.com/joyent/triton/master/tools/coal-windows-vmware-setup.bat. Select coal-windows-vmware-setup.bat and run it as Administrator.

   MacOS
   ```
   # curl -s https://raw.githubusercontent.com/joyent/triton/master/tools/coal-mac-vmware-setup
   # sudo sh coal-mac-vmware-setup
   ```

3. Start VMware Workstation and open the file USB-headnode from directory C:\Temp\Triton\coal-release-XX\. Remove Serial Ports 1 and 2 from the virtual machine.

Installation

4. Boot and configure Head Node. Read installation instructions from the link (Booting the head node). Follow instructions but make the following changes in configuration phase.

   - Company Name: Tampere University
   - Data center region: tuni-cloud
   - Data center name: coal-01
   - City and state: Tampere, Pirkanmaa
   - NTP Server: time.mikes.fi

5. Take a screenshot from "Triton Setup - Verify Configuration" menu. Add the image to appendix 1.

6. Finally, verify settings and confirm configuration.

7. The installation process takes 20-40 minutes. Installation is not complete until the Setup complete message displays (Source).

Post-installation procedures

8. Open a SSH connection to Head Node.

9. Perform the post-installation procedures. Read installation instructions from the link (Testing and Developing). Skip instructions on chapter "Maintaining CoaL".

10. Install Docker Engine for Triton. Use following commands (Source).

```
headnode# sdcadm post-setup dev-sample-data
headnode# sdcadm post-setup docker
```

11. Check the IP address of AdminUI and CloudAPI. AdminUI offers operator's management interface. Respectively, CloudAPI offers API interface for managing customer instances.

```
headnode# sdc-vmapi /vms?state=running | json -H -ga alias nics.0.ip nics.1.ip
```

12. Write down the addresses. You will need them later.

    AdminUI: 10.88.88.??
    CloudAPI: 10.88.88.??

13. Start a web browser and open AdminUI address https://10.88.88.XX.

14. You can manage Triton cloud platform with AdminUI interface. Create a new user. Use your real e-mail address and name. Activate “Approve For Provisioning” option. Finally, save the setting.

15. Select the user and add SSH key. Open id_rsa.pub file from directory C:\Temp and copy key to “SSH Public Key” field. Name the key file to id_rsa.pub. Finally, save the key.

16. You have added the account for Triton cloud platform.

Installation of Triton CLI tool

The Triton CLI is used to create and manage virtual instances. It uses CloudAPI interface to control instances on a Triton cluster. You can run Triton CLI on Linux or MacOS.

1. Open VMware Workstation and select Ubuntu Server 01.

2. Select NAT adapter [VMware Workstation\ Ubuntu Server 01 -> Settings\ Network adapter\ NAT].

3. Turn on the Ubuntu Server 01 and open the SSH connection.

4. Install Triton CLI tool. Do not defined environment variables. Read installation instructions from the link.

   Configure Triton profile

5. Create Triton profile. Read installation instructions from the link (Configuring Triton profiles).

   - We do not have valid CloudAPI SSL certificate. Use flag "-i" to accept insecure connections.
     ```
     Ubuntu# triton -i profile create
     ```
   - Profile name is fi-tuni-01.
   - The address of CloudAPI is https://10.88.88.XX.
   - Do not setup Docker. We configure that later.

6. Test the installation and configuration of Triton CLI tool. Type following commands. Take a screenshot and paste the image to appendix 2.

   ```
   Ubuntu# clear
   Ubuntu# triton -i info
   ```

7. If you see the right credentials, you have reached a milestone.

Triton CLI tool – Running instances on Triton cloud platform

Triton CLI tool uses CloudAPI interface to control instances on a Triton cluster. Proving a new instance is a straightforward process. User selects an appropriate layout and operating system. In the Triton terminology, layouts are called packages and operating systems to images. In the former case, a package defines the resources of instance. A package defines memory, swap, storage and computation capacity. Correspondingly, in the latter case an image stands for name and version of an operating system.

1. Triton cloud platform support multiple operating systems. You can list currently installed images by command `triton -i images`. As we can see, there are only Ubuntu and SmartOS based images.

2. Open AdminUI and install Debian-9 based container.

3. If the installation process is successfully, you will see detailed information of Debian-9 image. The image type is LX container and it is available to everyone.

4. AdminUI interface is only available to administrators. The web interface for basic users requires a service-level agreement (Source). For that reason, we use Triton CLI tool to create and run instances.

5. Create a Debian instance that based on LX container. Allocate 128 MB of memory and 3 GB of disk space to the server. Read installation instructions from the link. TIP. Try following commands.

```
Ubuntu# triton -i images
Ubuntu# triton -i packages
```

6. Open a SSH connection to the Debian instance. Type following commands. Take a screenshot and paste the image to appendix 3.

```
Ubuntu# triton -i ssh name_of_instance
Debian-LX# clear
Debian-LX# uname -a
Debian-LX# hostnamectl
```

7. You do not have to type password information. Triton CLI tool uses SSH keys in authentication process.

8. If you open AdminUI, you will see your Debian LX container running with other virtual machines. Stop you LX container and log out of AdminUI. If the stopping process is stuck, just press Close.

9. As we can see, running LX containers on a Triton cloud platform is as easy as running containers on a local computer. The only difference is that commands are slightly different.

10. At this point, it is good to take a break. We will continue on the Episode 2.

Finally

1. First, shutdown Ubuntu Server 01 (`sudo poweroff`). Then, shutdown Triton head node (`poweroff`). Finally, first close WMware software.

2. Do not destroy the virtual machines. We will use those in future exercise.

3. Save the final report to your home directory in Word Doc and Adobe PDF format (Word / File / Save as / PDF).

4. Return the final report in PDF format.

5. Good work! It is time to go for lunch or coffee.

Appendix 1. Triton Setup - Verify Configuration

Appendix 2. Triton CLI – Information.

Appendix 3. An image inside from Ubuntu LX container.