Packet Tracer - Data Center Exploration - Physical Mode

Objectives

Part 1: Explore the Characteristics of a Small Data Center

Part 2: Create a Plan for Expanding the Current Data Center

Part 3: Configure the Data Center Devices to Expand the Capacity

Background / Scenario

Data centers are often referred to as the brain of an organization storing and analyzing data, providing communication both internally and to clients, and providing the tools necessary for research and development activities. The data center must be constructed in such a manner that it can securely and efficiently provide its full range of products and services regardless of what catastrophe occurs. There are many different systems that go into the construction of a data center but for this activity we shall concern ourselves only with the networking components.

Data centers can range in size from only a few servers to housing hundreds or even thousands of servers. Whatever the size, the data center must be constructed in an extremely organized manner to simplify management and troubleshooting of a complex environment. Another design characteristic is to make the data center more robust by using redundancy to eliminate any single point of failure. This could involve adding extra devices to provide physical redundancy and/or using technologies such as First Hop Redundancy Protocols (FHRPs) and link aggregation to provide logical redundancy.

In this Packet Tracer Physical Mode (PTPM) activity, most of the devices in the Toronto and Seattle data centers are already deployed and configured. You have just been hired to review the current deployment and to expand the capacity of the Data Center 1 in Toronto.

Instructions

Part 1: Explore the Characteristics of a Small Data Center

In Part 1, you will explore the characteristics of the existing data centers (DC).

Step 1: Explore the physical layout of the data centers.

a. How is the **Branch Office** physically connected to the data centers?

b. What logical configuration in the **Branch Office** provides redundancy?

c. How is **Data Center 1** connected to **Data Center 2**?

d. How are the devices in **Data Center 1** physically organized?

e. Does the **Data Center 2** equipment layout differ from **Data Center 1**?

f. Why is the physical organization of the data center devices important?

Step 2: Explore the naming and addressing conventions in both Data Center 1 and Data Center 2.

a. How are the devices named in the data centers?

Hint: Rack is abbreviated as **R** and Server is abbreviated as **S**.

b. How are the devices addressed in the data centers?

c. Why is the naming and addressing of the data center devices important?

Step 3: Explore data center redundant layer 2 technology.

Examine **DC1 R0 Switch A** and **DC1 R0 Switch B**.

a. Navigate to the **Data Center 1 Server Room** in **Toronto**. From **Rack_0**, click **DC1 R0 Switch A** > **CLI** tab and **DC1 R0 Switch B** > **CLI** tab. Arrange the windows side by side.

b. What technology is used to provide redundancy and stability in their configuration?

c. What is the purpose of this technology?

d. What is the total bandwidth over **Port-channel1**?

e. What will happen if the **FastEthernet 0/1** port on **DC1 R0 Switch A** fails and why?

Step 4: Explore data center redundant Layer 3 technology.

Examine the **DC1A_Router** and **DC1B_Router**.

a. From **Rack_0**, click **DC1A_Router** > **CLI** tab and **DC1B_Router** > **CLI** tab. Arrange the windows side by side.

b. What technology is used to provide redundancy and stability in their configuration?

c. What is the purpose of this technology?

d. Which router and interface will be used as the default gateway for the 172.16.0.0/16 network and why?

e. Which router and interface will be used as the default gateway for the 10.16.0.0/16 network and why?

Part 2: Create a Plan for Expanding the Current Data Center

In Part 2, you will create a plan for adding a new rack of equipment to the current data centers.

Step 1: Determine what equipment is required to add one new rack of equipment to both Data Center 1 and Data Center 2.

From your review of the two current data centers in Part 1, determine the equipment required to add a new rack of equipment to Data Center 1. When scaling the infrastructure of a data center construction, it is important to standardize construction and configuration whenever possible.

a. What new switches are required? How should they be connected? What should their names be?

b. How are the R5 switches connected to the R0 switches?

c. How many servers should be added to Rack_5? How should they be configured and with what addresses?

d. How should the servers be connected to the network?

e. How would the above information change for adding a new rack to DC2?

Part 3: Configure the Data Center Devices to Expand the Data Center Capacity

In Part 3, you will install and configure the equipment for the new rack in DC1. Use the information from Part 2 for specifics.

Step 1: Install the required equipment in Rack_5

a. Drag two 2960 switches to the top of **Rack_5**.

b. Drag six servers to **Rack_5**.

c. Click the first server in **Rack_5** and, under **MODULES**, click and drag a second **PT-HOST-NM-1CFE** interface to the open slot. Click the Power button below the second interface.

d. Click the **Config** tab and set the display name **DC1-R5S1**. Close the server window.

e. Repeat Step1c and 1d for the other five servers, incrementing the server number as necessary (**DC1-R5S2**, **DC1-R5S3**, and so on).

Step 2: Configure IP addressing for the servers in Rack_5.

a. What is the **FastEthernet0** default gateway and DNS address for all servers in **Data Center 1**?

b. What is the **FastEthernet1** default gateway and DNS address for all servers in **Data Center 1**?

c. In conformance with the addressing scheme of servers in **Rack_0** through **Rack_4**, complete the following Addressing Table for the servers in **Rack_5**.

Server	Interface	IP address	Subnet Mask	Default Gateway	DNS Address
DC1-R5S1	FastEthernet 0				
	FastEthernet1				

DC1-R5S2	FastEthernet 0				
	FastEthernet1				
DC1-R5S3	FastEthernet 0				
	FastEthernet1				
DC1-R5S4	FastEthernet 0				
	FastEthernet1				
DC1-R5S5	FastEthernet 0				
	FastEthernet1				
DC1-R5S6	FastEthernet 0				
	FastEthernet1				

d. Using your documentation, configure IP addressing for the servers in **Rack_5**. Be sure to configure both interfaces. Click the server, and then the **Config** tab. Configure the default gateway and DNS server in **Global Settings**. Use the dropdown menu next to **Interfaces** to switch interfaces. Then click **FastEthernet0** under **INTERFACES** to configure the IP address and subnet mask. Repeat for **FastEthernet1**.

Note: Due to the limitation of Packet Tracer server simulation, you will be warned about the default gateway addresses and the 2nd DNS address. Click **OK** to these messages and continue. In addition, only the **FastEthernet0** DNS address is graded and only the **FastEthernet1** default gateway address is graded.

Step 3: Configure the display name and hostname for the switches in Rack_5.

Note: Make sure your display and host names conform to the standard. Packet Tracer will grade your connections and configuration as incorrect if your display names are incorrect.

a. Click the first switch in **Rack_5**, and then the **Config** tab.

b. Set the **Display Name** to **DC1 Rack 5 Switch A** and **Hostname** to **DC1R5_SwitchA**.

c. Click the second switch in **Rack_5**, and then the **Config** tab.

d. Set the **Display Name** to **DC1 Rack 5 Switch B** and **Hostname** to **DC1R5_SwitchB**.

Step 4: Connect cables for the Rack 5 equipment.

Note: Make sure your connections conform to the pattern established in the other racks. Packet Tracer will grade your connection as incorrect if you connect to the wrong switch port.

a. For each server, connect a copper straight-through cable from the **FastEthernet0** port to the correct port on **DC1R5_SwitchA** and a copper straight-through cable from the **FastEthernet1** port to the correct port on **DC1R5_SwitchB**.

Hint: Complete both connections for **DC1-R5S1** before proceeding down the rack.

b. Connect a copper straight-through cable from the **FastEthernet0/1** port of **DC1 Rack 5 Switch A** to the **FastEthernet0/23** port of **DC1 Master Switch A** and from the **FastEthernet0/2** port of **DC1 Rack 5 Switch A** to the **FastEthernet0/24** port of **DC1 Master Switch A**.

Note: After connecting to the **Rack_5** switch, use the bottom scroll bar to scroll to the left to connect to the appropriate **Rack_0** master switch.

c. Connect a copper straight-through cable from the **FastEthernet0/1** port of **DC1 Rack 5 Switch B** to the **FastEthernet0/23** port of **DC1 Master Switch B** and from the **FastEthernet0/2** port of **DC1 Rack 5 Switch B** to the **FastEthernet0/24** port of **DC1 Master Switch B**.

Step 5: Configure LACP between DC1 Master Switch A and DC1 Rack 5 Switch A.

```
DC1_MasterSwitchA(config)# interface range f0/23-24
DC1_MasterSwitchA(config-if-range)# switchport mode trunk
DC1_MasterSwitchA(config-if-range)# switchport trunk native vlan 99
DC1_MasterSwitchA(config-if-range)# channel-group 6 mode active
Creating a port-channel interface Port-channel 6

DC1_MasterSwitchA(config-if-range)# no shutdown
!------------------------------------------------------
DC1R5_SwitchA(config)# interface range f0/1-2
DC1R5_SwitchA(config-if-range)# switchport mode trunk
DC1R5_SwitchA(config-if-range)# switchport trunk native vlan 99
DC1R5_SwitchA(config-if-range)# channel-group 1 mode passive
Creating a port-channel interface Port-channel 1

DC1R5_SwitchA(config-if-range)# no shutdown
```

Step 6: Repeat the above to aggregate the appropriate ports between DC1R5_SwitchB and DC1_MasterSwitchB.

Step 7: Verify that the ports have been aggregated.

What protocol is Po1 using for link aggregation? Which ports are aggregated to form Po1 on DC1R5_SwitchB? Record the command used to verify.

Reflection Questions

1. What is a data center?

2. What benefits does a data center provide for an organization?

3. Why is redundancy important in a data center?

4. What elements of a data center should incorporate redundancy?

5. What is the importance of EtherChannel in a data center environment?