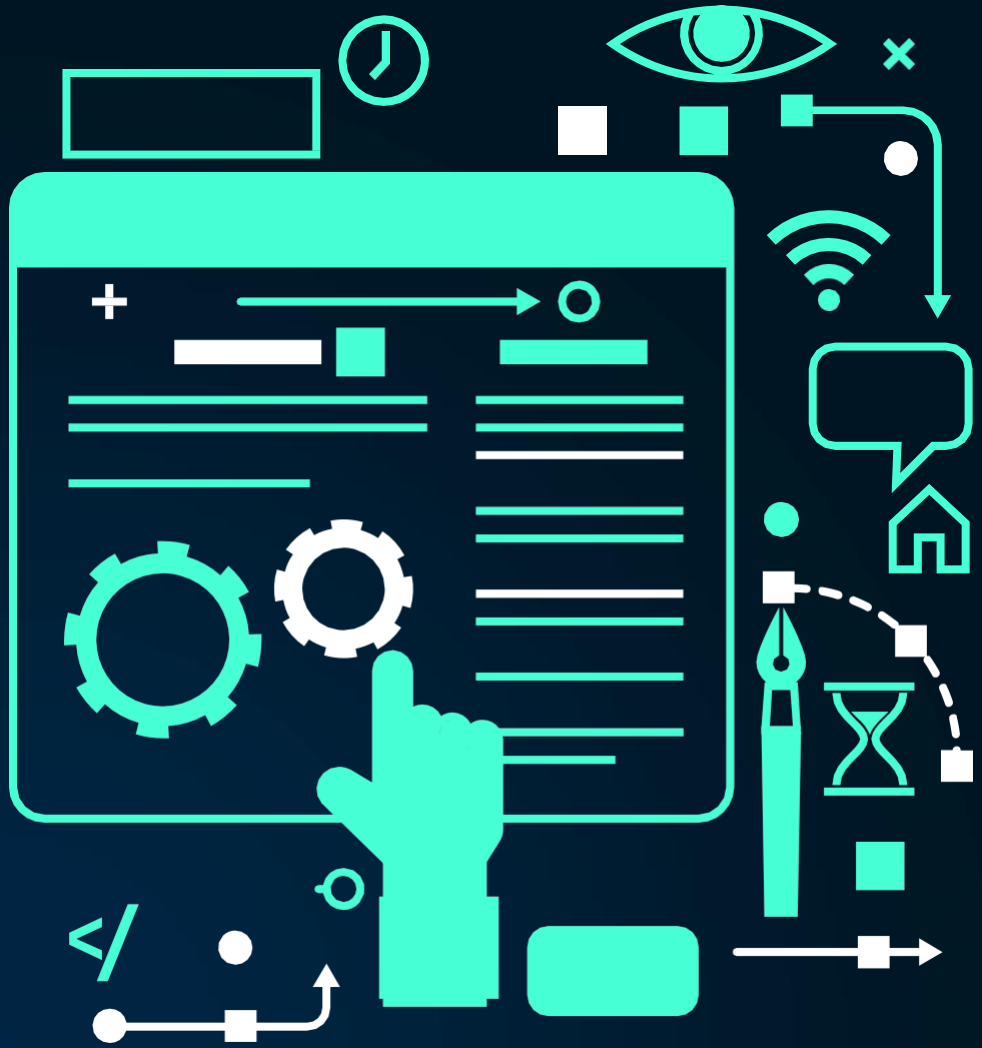
CIS 326: IT Infrastructure Management

Group 7



Group Members

Group 7

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1.1 Introduction

Background
A fundamental computer network denotes the successful interconnection of two or more devices, facilitated through either wired or wireless mediums. Networks play a pivotal role in facilitating various forms of communication among members and between different entities. Envision a world devoid of communicative networks, life would seem incomplete. Computer networking is enhancing efficiency and enabling seamless file-sharing. Networks typically comprise essential devices like routers, responsible for managing data packets by receiving, analyzing, and forwarding them. Another crucial component is the switch, which consolidates incoming packets and directs them through specified ports to their intended destinations. Additionally, there are end devices such as servers, PCs, laptops, printers, and IP phone devices, all collectively classified as peripherals.

1.2 Introduction

Objective

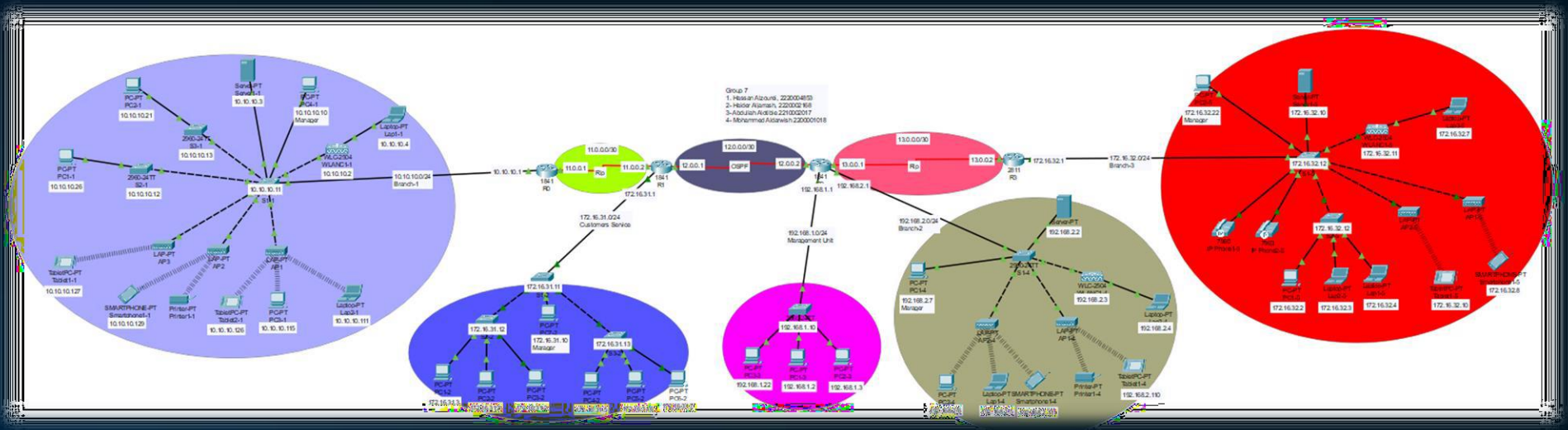
The network topology within the context of the "Packet Tracer" simulates a communicative network designed for the Coffee Shop Network. Through this network infrastructure, managers and employees can seamlessly access and share data without constraints. Furthermore, the network facilitates effective interactions between employees and customers. This report seeks to establish World Area Networks (WANs) while connecting branches with each other. The scope of data exchange within five categories: management unit, customer service, and three branches.

2.1 Topology Requirements

Our topology includes the following tools:

Assist	Quantity
Laptop	**7**
printer	**2**
Access point	**7**
PC	**18**
Switches	**10**
Routers	**4**
Serial cables	**3**
Straight-through cables	**30**
Cross-over cables	**15**
Telephone	**2**
Server	**3**
Wireless LAN Controller	**3**
Wireless	**13**

2.2 Set up the Topology



BRANCH-1 CUSTOMER SERVICE MANAGEMENT UNIT BRANCH-2 BRANCH-3

3.1 The Addressing Table

Device	Interface	IP Address	Subnet Mask	Default Gateway
R0	Fa0/0	10.10.10.1	255.255.255.0	-
R0	Se0/0/0	11.0.0.1	255.255.255.252	-
R1	Se0/0/0	11.0.0.2	255.255.255.252	-
R1	Se0/0/1	12.0.0.1	255.255.255.252	-
R2	Se0/0/1	12.0.0.2	255.255.255.252	-
R2	Se0/0/0	13.0.0.1	255.255.255.252	-
R3	Se0/0/0	13.0.0.2	255.255.255.252	-
R3	Fa0/0	172.16.32.1	255.255.255.0	-
PC1-1	Fa0	10.10.10.26	255.255.255.0	**10.10.10.1**
PC2-1	Fa0	10.10.10.21	255.255.255.0	**10.10.10.1**
PC3-1	Wireless	10.10.10.115	255.255.255.0	**10.10.10.1**
PC4-1	Fa0	10.10.10.10	255.255.255.0	**10.10.10.1**
PC1-2	Fa0	172.16.31.3	255.255.255.0	**172.16.31.1**
PC2-2	Fa0	172.16.31.4	255.255.255.0	**172.16.31.1**
PC3-2	Fa0	172.16.31.2	255.255.255.0	**172.16.31.1**
PC4-2	Fa0	172.16.31.5	255.255.255.0	**172.16.31.1**
PC5-2	Fa0	172.16.31.6	255.255.255.0	**172.16.31.1**
PC6-2	Fa0	172.16.31.7	255.255.255.0	**172.16.31.1**
PC7-2	Fa0	172.16.31.10	255.255.255.0	**172.16.31.1**
PC1-3	Fa0	192.168.1.2	255.255.255.0	**192.168.1.1**
PC2-3	Fa0	192.168.1.3	255.255.255.0	**192.168.1.1**
PC3-3	Fa0	192.168.1.22	255.255.255.0	**192.168.1.1**
PC1-4	Fa0	192.168.2.7	255.255.255.0	**192.168.2.1**
PC2-4	Wireless	192.168.2.6	255.255.255.0	**192.168.2.1**
PC1-5	Fa0	172.16.32.2	255.255.255.0	**172.16.32.1**
PC2-5	Fa0	172.16.32.22	255.255.255.0	**172.16.32.1**

3.2 The Addressing Table

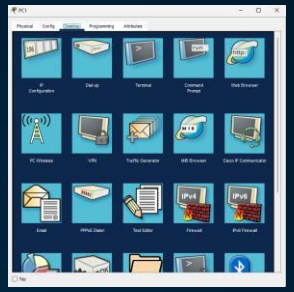
Device	Interface	IP Address	Subnet Mask	Default Gateway
Laptop1-1	Fa0	10.10.10.4	255.255.255.0	**10.10.10.1**
Laptop2-1	Wireless	10.10.10.111	255.255.255.0	**10.10.10.1**
Laptop1-4	Wireless	192.16.2.5	255.255.255.0	**192.16.2.1**
Laptop2-4	Fa0	192.16.2.4	255.255.255.0	**192.16.2.1**
Laptop1-5	Fa0	172.16.32.4	255.255.255.0	**172.16.32.1**
Laptop2-5	Fa0	172.16.32.3	255.255.255.0	**172.16.32.1**
Laptop3-5	Fa0	172.16.32.7	255.255.255.0	**172.16.32.1**
R2	Fa0/0	192.16.1.1	255.255.255.0	-
R2	Fa0/1	172.16.31.1	255.255.255.0	-
R1	Fa0/0	10.10.10.21	255.255.255.0	-
Printer1-1	Wireless	DHCP	255.255.255.0	**10.10.10.1**
Printer1-4	Wireless	DHCP	255.255.255.0	**192.16.2.1**
Tablet1-1	Wireless	10.10.10.127	255.255.255.0	**10.10.10.1**
Tablet2-1	Wireless	10.10.10.126	255.255.255.0	**10.10.10.1**
Tablet1-4	Wireless	192.168.2.110	255.255.255.0	**192.168.2.1**
Tablet1-5	Wireless	172.16.32.10	255.255.255.0	**172.16.32.1**
SmartPhone1-1	Wireless	10.10.10.129	255.255.255.0	**10.10.10.1**
SmartPhone1-4	Wireless	192.168.2.111	255.255.255.0	**192.168.2.1**
SmartPhone1-5	Wireless	172.16.32.8	255.255.255.0	**172.16.32.1**
R0	Fa0/0.100	10.10.10.1	255.255.255.0	-
R1	Fa0/0.100	172.16.31.1	255.255.255.0	-
R2	Fa0/0.100	192.168.1.1	255.255.255.0	-
R2	Fa0/1.100	192.168.2.1	255.255.255.0	-
R3	Fa0/0.100	172.16.32.1	255.255.255.0	-
WLANC1-1	G0/1	10.10.10.2	255.255.255.0	**10.10.10.1**
WLANC1-4	G0/1	192.168.2.3	255.255.255.0	**192.168.2.1**

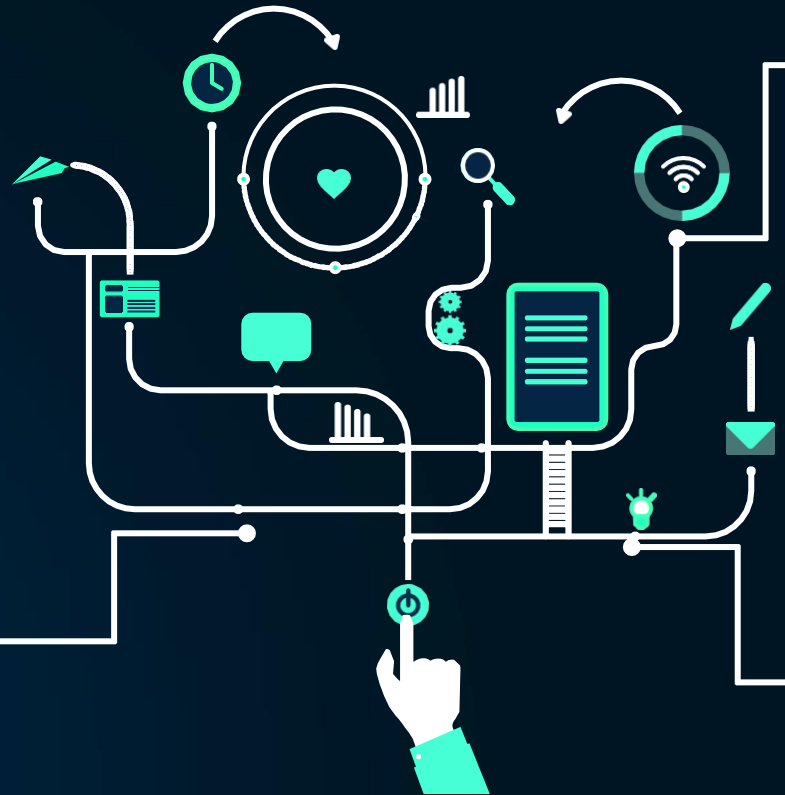
3.3 The Addressing Table

Device	Interface	IP Address	Subnet Mask	Default Gateway
WLANC1-5	G0/1	172.16.32.11	255.255.255.0	**172.16.32.1**
Server1-1	Fa0	10.10.10.3	255.255.255.0	**10.10.10.1**
Server1-1	Fa0	192.168.2.2	255.255.255.0	**192.168.2.1**
Server1-1	Fa0	172.16.32.10	255.255.255.0	**172.16.32.1**
AP1-1	G0	DHCP	255.255.255.0	**10.10.10.1**
AP2-1	G0	DHCP	255.255.255.0	**10.10.10.1**
AP3-1	G0	DHCP	255.255.255.0	**10.10.10.1**
AP1-4	G0	DHCP	255.255.255.0	**192.16.2.1**
AP2-4	G0	DHCP	255.255.255.0	**192.16.2.1**
AP1-5	G0	DHCP	255.255.255.0	**172.16.32.1**
AP2-5	G0	DHCP	255.255.255.0	**172.16.32.1**
S1-1	VLAN99	10.10.10.11	255.255.255.0	-
S2-1	VLAN99	10.10.10.12	255.255.255.0	-
S3-1	VLAN99	10.10.10.13	255.255.255.0	-
S1-2	VLAN99	172.16.31.11	255.255.255.0	-
S2-2	VLAN99	172.16.31.12	255.255.255.0	-
S3-2	VLAN99	172.16.31.13	255.255.255.0	-
S1-3	VLAN99	192.168.1.10	255.255.255.0	-
S1-4	VLAN99	192.16.2.10	255.255.255.0	-
S1-5	VLAN99	172.16.32.12	255.255.255.0	-
S2-5	VLAN99	172.16.32.12	255.255.255.0	-

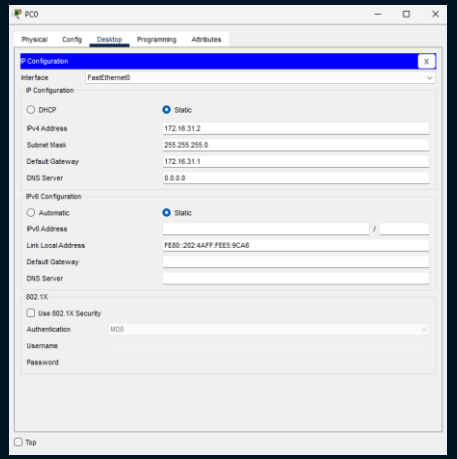
4.1 Hosts Configuration

Click on desktop on PC's, Laptops, SmartPhones, and Tabletes





Assign static IP address + default gateway



5.1 The Routers Configuration

R0:

```
R0(config)#int s0/0/0
R0(config-if)#ip add 11.0.0.1 255.255.255.252
R0(config-if)#no shutdown
R0(config-if)#clock rate 128000
R0(config-if)#int fa0/0
R0(config-if)#ip add 10.10.10.1 255.255.255.0
R0(config-if)#no shutdown
R0(config-if)#
```

```
R0(config)#ip route 172.16.31.0 255.255.255.0 s0/0/0
R0(config)#ip route 192.168.1.0 255.255.255.0 s0/0/0
R0(config)#ip route 192.168.2.0 255.255.255.0 s0/0/0
R0(config)#ip route 172.16.32.0 255.255.255.0 s0/0/0
R0(config)#ip route 12.0.0.0 255.255.255.252 s0/0/0
R0(config)#ip route 13.0.0.0 255.255.255.252 s0/0/0
R0(config)#
```

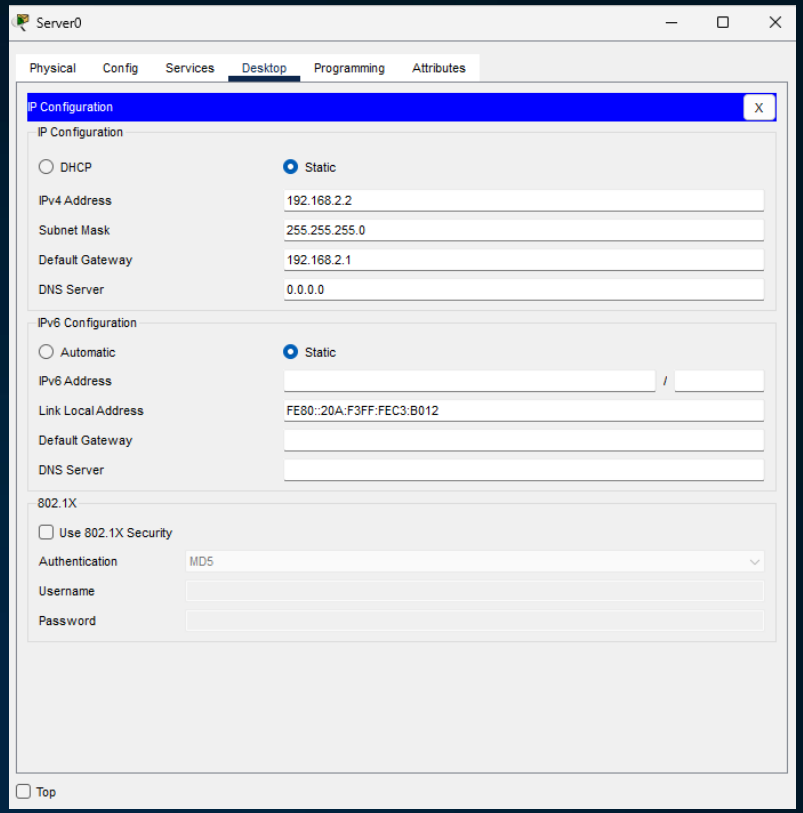
5.2 The Routers Configuration

R1:

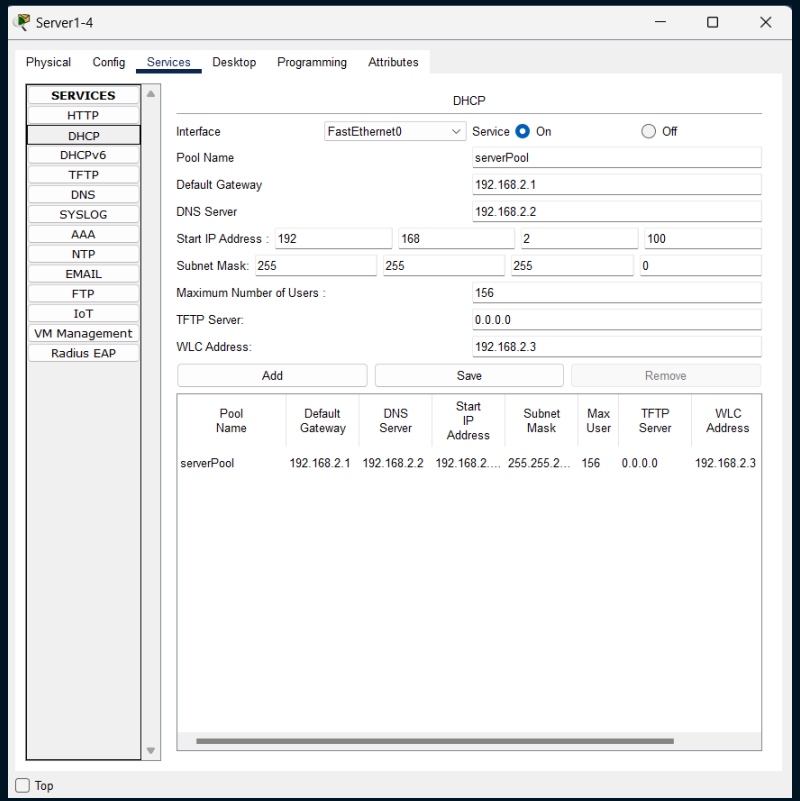
```
R1(config-if)#int s0/0/0
R1(config-if)#ip add 11.0.0.2 255.255.255.252
R1(config-if)#no shutdown
R1(config-if)#int fa0/0
R1(config-if)#ip add 172.16.31.1 255.255.255.0
R1(config-if)#no shutdown
R1(config-if)#int s0/0/1
R1(config-if)#ip add 12.0.0.1 255.255.255.252
R1(config-if)#no shutdown
R1(config-if)#clock rate 128000
```

```
R1(config)#ip route 10.10.10.0 255.255.255.0 s0/0/0
R1(config)#ip route 192.168.1.0 255.255.255.0 s0/0/1
R1(config)#ip route 192.168.2.0 255.255.255.0 s0/0/1
R1(config)#ip route 172.16.32.0 255.255.255.0 s0/0/1
R1(config)#ip route 13.0.0.0 255.255.255.252 s0/0/1
R1(config)#
```

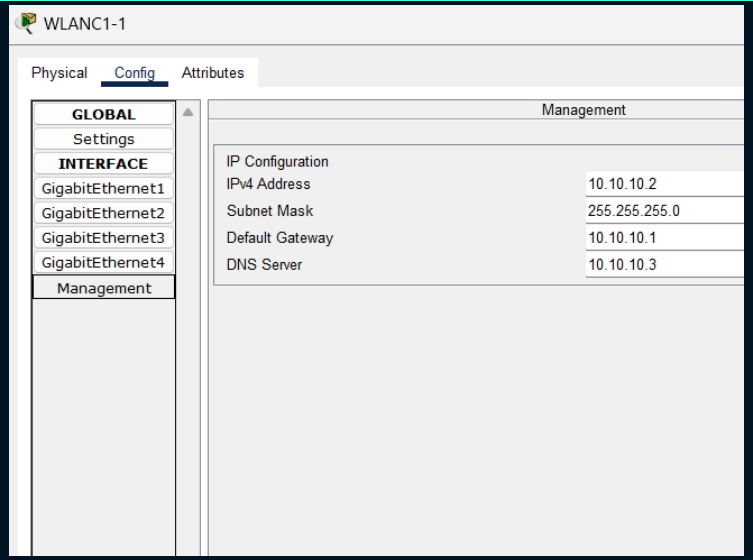
6.1 Server Configuration



Make DHCP Server:

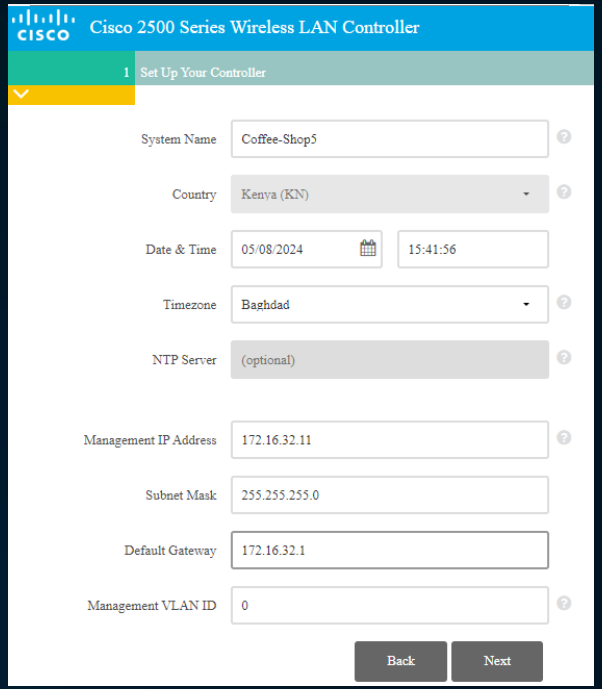


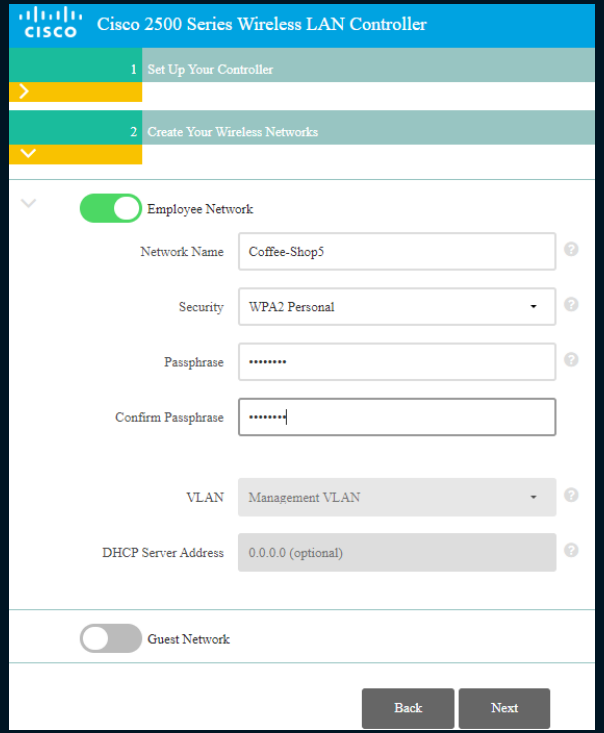
7.1 WLANC Configuration



7.2 WLANC Configuration

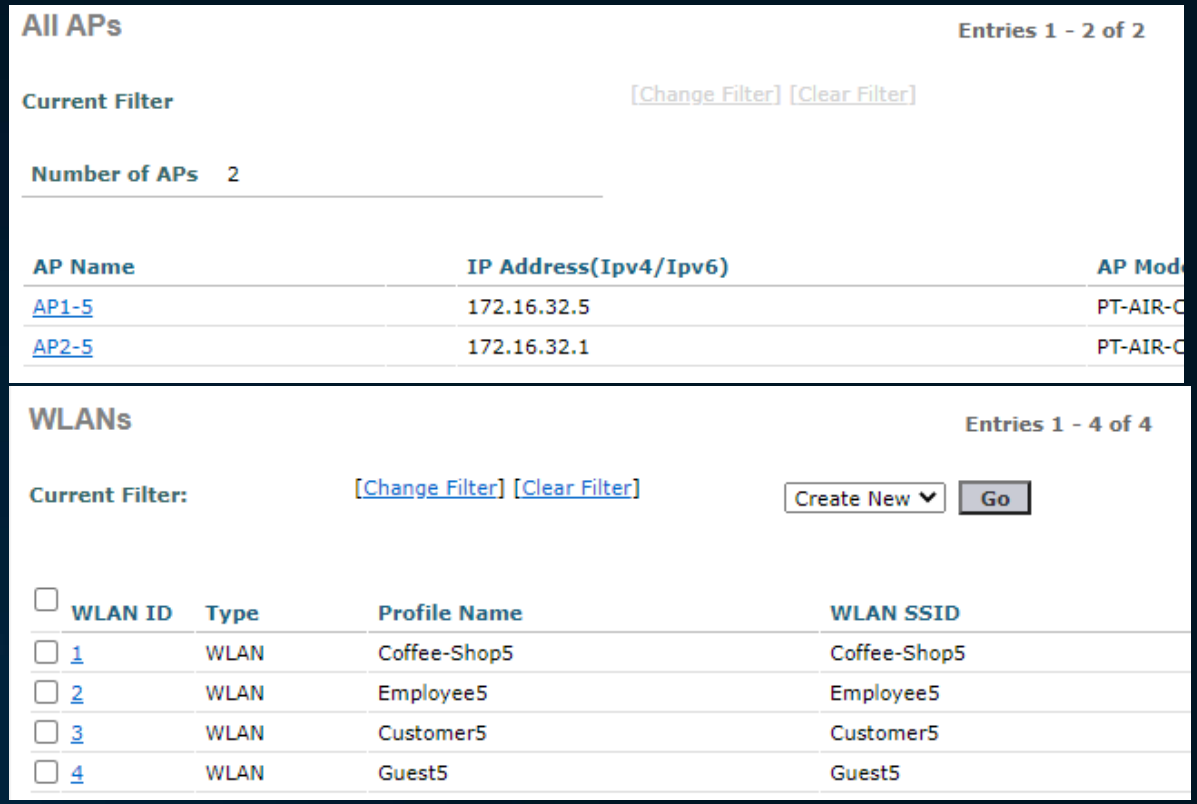
Access to WLANC:





7.3 WLANC Configuration

Check the Configuration of WLAN and AP:



All APs

Entries 1 - 2 of 2

Current Filter

[Change Filter] [Clear Filter]

Number of APs 2

AP Name	IP Address(Ipv4/Ipv6)	AP Mod
AP1-5	172.16.32.5	PT-AIR-C
AP2-5	172.16.32.1	PT-AIR-C

WLANs

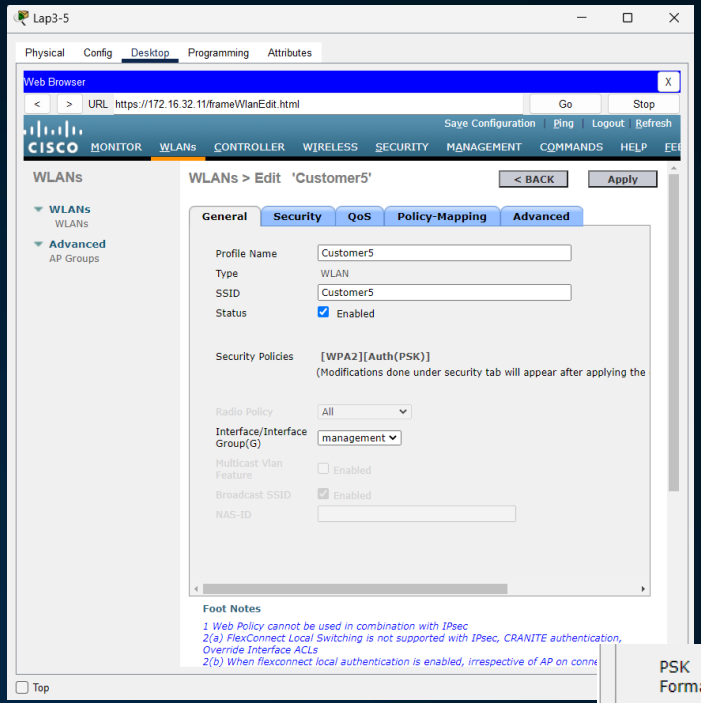
Entries 1 - 4 of 4

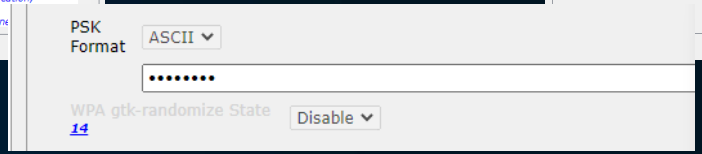
Current Filter: [Change Filter] [Clear Filter] Create New Go

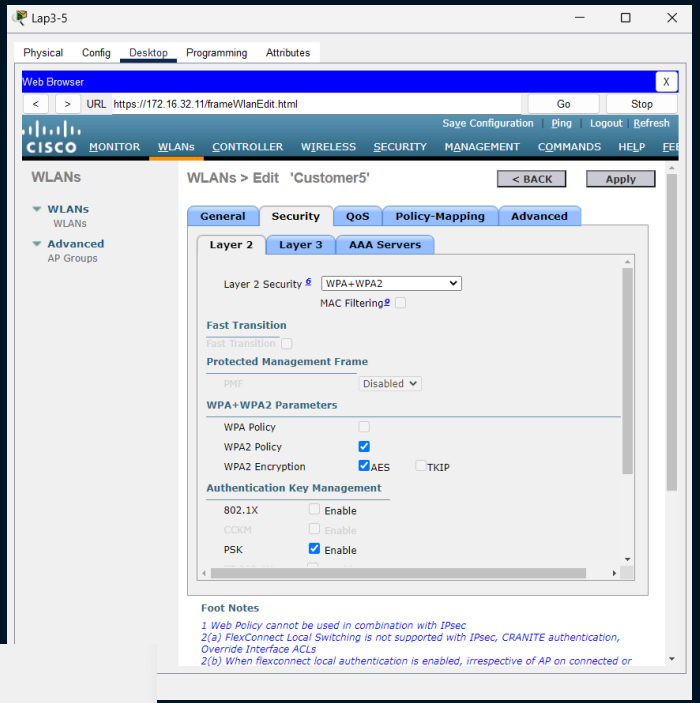
WLAN ID	Type	Profile Name	WLAN SSID
1	WLAN	Coffee-Shop5	Coffee-Shop5
2	WLAN	Employee5	Employee5
3	WLAN	Customer5	Customer5
4	WLAN	Guest5	Guest5

7.4 WLANC Configuration

Add new WLAN:

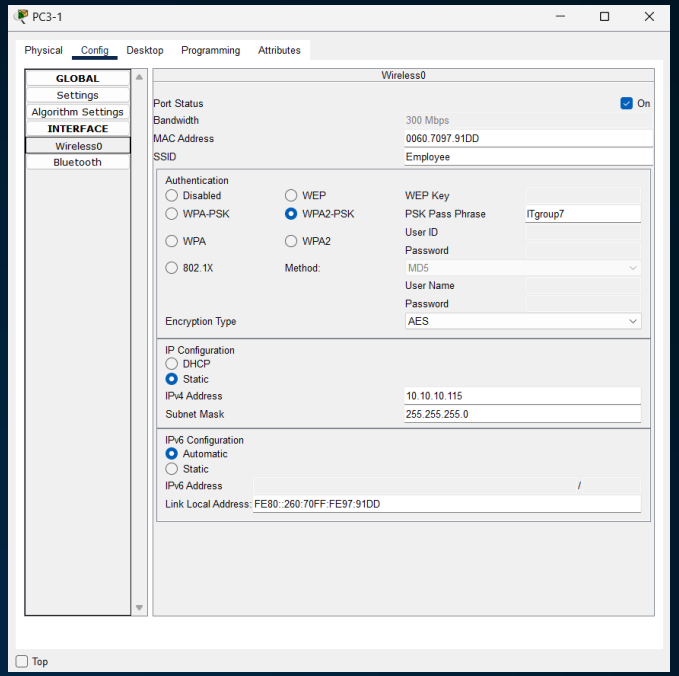




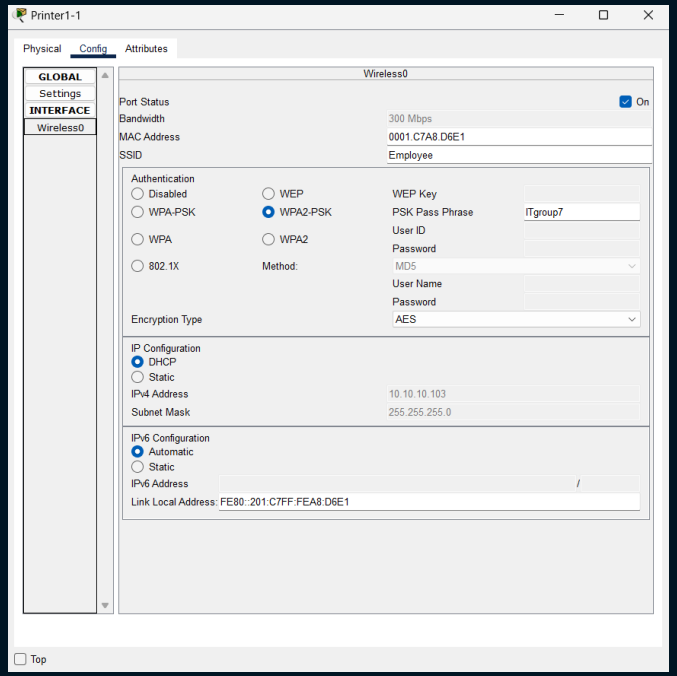


8.1 Configuration Wireless

Connecting PC's to the access point:



Connecting printers to the access point:



9.1 VLAN Configuration

Configuration Vlan between Switches:

```
S3(config)#vlan 99
S3(config-vlan)#name Coffee-Shop2
S3(config-vlan)#vlan 10
S3(config-vlan)#name Section1
S3(config-vlan)#vlan 20
S3(config-vlan)#name Section2
S3(config-vlan)#vlan 30
S3(config-vlan)#name Section3
S3(config-vlan)#vlan 100
S3(config-vlan)#name B2
```

```
S3(config-if)#int fa0/1
S3(config-if)#sw m t
S3(config-if)#sw t n vlan 99
S3(config-if)#int fa0/2
S3(config-if)#sw m t
S3(config-if)#sw t n vlan 99
S3(config-if)#int fa0/3
S3(config-if)#sw m t
S3(config-if)#sw t n vlan 99
S3(config-if)#
```

```
S3(config-if)#int vlan 99
S3(config-if)#ip add 172.16.31.11 255.255.255.0
S3(config-if)#no sh
S3(config-if)#
```

9.2 VLAN Configuration

Configuration Vlan between Switch and PC's:

```
S4(config)#int fa0/6
S4(config-if)#sw m acc
S4(config-if)#sw acc vlan 30
S4(config-if)#int fa0/11
S4(config-if)#sw acc vlan 10
S4(config-if)#int fa0/18
S4(config-if)#sw acc vlan 20
S4(config-if)#
```

```
S4(config-if)#
S4(config-if)#int vlan 99
S4(config-if)#ip add 172.16.31.12 255.255.255.0
S4(config-if)#no sh
S4(config-if)#
```

10.1 OSPF and Rip Configuration

Configuration Routers using Rip:

```
R0(config-router)#router rip
R0(config-router)#v 2
R0(config-router)#pass f0/0
R0(config-router)#net 11.0.0.0
R0(config-router)#net 10.10.10.0
R0(config-router)#
```

```
R0(config-subif)#int fa0/0.100
R0(config-subif)#encapsulation dot1Q 100
R0(config-subif)#ip add 10.10.10.1 255.255.255.0
R0(config-subif)#no sh
```

10.2 OSPF and Rip Configuration

Configuration Routers using OSPF:

```
R1(config)#router ospf 1
R1(config-router)#net 12.0.0.0 0.0.0.3 area 0
R1(config-router)#net 172.16.31.0 0.0.0.255 area 0
```

```
R1(config-subif)#int fa0/0.100
R1(config-subif)#encapsulation dot1Q 100
R1(config-subif)#ip add 172.16.31.1 255.255.255.0
R1(config-subif)#no sh
```

10.3 OSPF and Rip Configuration

Configuration Routers using both OSPF and Rip:

```
R1(config-router)#router rip
R1(config-router)#redistribute ospf 1 metric 1
R1(config-router)#router ospf 1
R1(config-router)#redistribute rip subnets
```

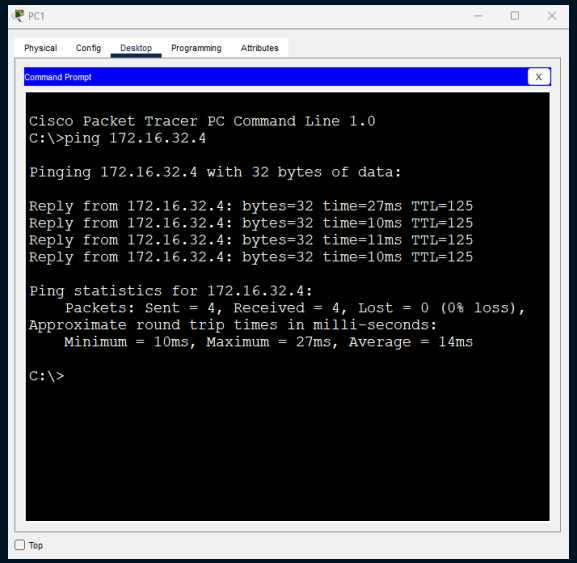
11.1 Verification

Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit
	Successful	PC1-5	Smartphone1-5	ICMP		0.000	N	0	(edit)
	Successful	PC1-4	PC1-3	ICMP		0.000	N	1	(edit)
	Successful	PC4-2	PC1-2	ICMP		0.000	N	2	(edit)
	Successful	Tablet1-1	PC3-1	ICMP		0.000	N	3	(edit)
	Successful	PC4-1	PC7-2	ICMP		0.000	N	4	(edit)
	Successful	PC2-4	Printer1-4	ICMP		0.000	N	5	(edit)
	Successful	PC2-5	PC7-2	ICMP		0.000	N	6	(edit)

Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit
	Successful	R0	R3	ICMP		0.000	N	0	(edit)
	Successful	PC3-2	PC6-2	ICMP		0.000	N	1	(edit)
	Successful	Lap1-1	Printer1-1	ICMP		0.000	N	2	(edit)
	Successful	PC2-3	PC3-3	ICMP		0.000	N	3	(edit)
	Successful	AP1-4	AP2-4	ICMP		0.000	N	4	(edit)
	Successful	PC7-2	PC1-4	ICMP		0.000	N	5	(edit)
	Successful	R1	R2	ICMP		0.000	N	6	(edit)

11.2 Verification

e.g.
Ping from PC1-5 to Laptop1-5



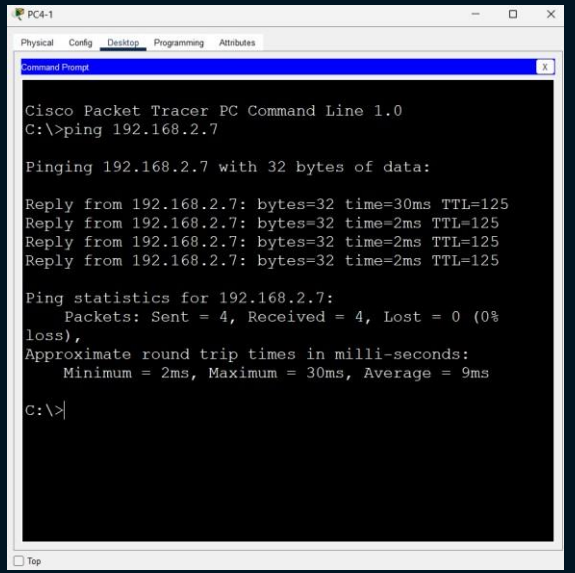
Branch-3 ➔

11.3 Verification

Branch-1 ➔
Branch-2 ➔

e.g.
Ping from PC4-1 to Laptop1-4

Ping from Manager in Branch1 to Manager in Branch2



12.0 CONCLUSION

The Coffee Shop Network project has successfully achieved its objectives, utilizing the Cisco Packet Tracer as the primary tool. The project aimed to establish an interconnected network among multiple coffee shop branches, enhancing communication, facilitating transactions, and optimizing overall operations. The project's outcomes align with its objectives, showcasing the effectiveness of the implemented network infrastructure. The network deployment has enabled the coffee shop to quickly handle many customers. the seamless connection between branches has fostered improved communication channels, allowing for the swift sharing of information and resources.

Case study: Amazon AWS

Concept of cloud computing:

Cloud computing provides several diverse online services that meet the client's needs without the need to purchase devices, cyber security staff, and pay high amounts. They provide services such as: databases, servers, software, and networking. Amazon provides various services in the field of cloud computing, as it is considered the most comprehensive, as it has very high security, a strong infrastructure, 17 years of experience, and serves millions of customers. It is used by many customers, which reduces its cost and increases flexibility, and it varies with more than 200 services. It is considered the most secure because its basic structure was initially designed to meet the security needs of government institutions and international banks. They also have an amazing technical support team to solve problems. Choosing cloud computing for Amazon helps large and small companies because it provides you with your service needs and ensures their safety at a reasonable price. It helps avoid contracting with multiple employees because it provides you with services without needing your own staff and saves space and purchasing devices because everything is virtual on the Internet.

Cloud computing models and usage areas:

Amazon offers many models and areas of use. We will mention three examples of what Amazon can offer.

Infrastructure as a Service (IaaS) Model:

Provides a virtual computing service over the Internet. A business model that provides infrastructure for information technology in exchange for payment that allows you to use the services you need via the Internet. The reason for its importance is that it helps in expansion and reducing costs and helps in eliminating the need to buy local devices and maintain them. One example is Amazon. They said that during the holiday season, application users increase three-fold, and this requires the purchase of additional server devices to overcome this problem. Amazon provides many secure centers with several devices and many devices. In exchange for payment, the customer can receive services via the Internet. Amazon offers several features, including speed, performance, reliability, backup and recovery, and a competitive price. They help you improve operational efficiency. They work on the principle of virtualization, allowing you to determine the type of infrastructure you need. This service can be used via Amazon Simple Storage Service.

Platform as a Service (PaaS) Model:

A platform targeting developers to create and develop websites and to create, publish and manage applications without the complexities of infrastructure management. It includes solutions and tools that help programmers. Amazon provides this service using Elastic Beanstalk. You can publish and manage applications via AWS Cloud without the need to look at the infrastructure. You only must download your applications. Elastic Beanstalk supports applications developed in Go, Java, .NET, Node.js, PHP, Python, and Ruby.

Software as a Service (SaaS) Model:

It provides software applications fully managed by Amazon through the Internet. Customers can use the applications without the need for installation or maintenance. They only must subscribe. Amazon provides this service through Amazon WorkMail, an email service that provides security and support for customers on desktop and mobile devices. To access email and contacts, you need several applications, but Amazon WorkMail provides them without the need for several applications.

How Does Cloud Computing Work?

Cloud computing operates by utilizing a network of remote servers hosted on the internet to store, handle, and process data, rather than relying on a local server or personal computer. This enables users to access resources and services whenever needed, as long as they have an internet connection. The pay-as-you-go model of cloud computing ensures that users only pay for the resources they utilize, making it a cost-effective solution for businesses of all sizes. AWS provides a comprehensive range of cloud computing services, such as computing power, storage, databases, machine learning, and more. These services can be easily accessed through a user-friendly web interface or API.

What cloud-computing services providers are available?

Cloud computing services come in various forms, catering to different needs and preferences. Some of the prominent cloud computing service providers include:

1. Amazon Web Services (AWS):

Amazon Web Services (AWS) stands as a frontrunner in the cloud services, offering an extensive suite of services spanning computing power, storage, databases, machine learning, analytics, and more. With a global presence and a robust infrastructure, AWS caters to businesses of all sizes, from startups to enterprises, enabling them to innovate and scale efficiently.

2. Microsoft Azure:

Microsoft Azure is a comprehensive cloud platform that provides a wide array of services, including computing, analytics, storage, networking, and artificial intelligence. Leveraging Microsoft's expertise and global reach, Azure empowers organizations to build, deploy, and manage applications with flexibility and scalability, while also integrating seamlessly with other Microsoft products and services.

3. Google Cloud Platform (GCP):

Google Cloud Platform (GCP) offers a suite of cloud computing services focused on computing, storage, machine learning, data analytics, and application development. With Google's expertise in data management and machine learning, GCP provides innovative solutions to help businesses drive insights, optimize operations, and accelerate digital transformation initiatives.

4. IBM Cloud:

IBM Cloud provides a comprehensive range of cloud services, including infrastructure as a service (IaaS), platform as a service (PaaS), software as a service (SaaS), and hybrid cloud solutions. With a focus on enterprise-grade security, AI-driven capabilities, and industry-specific solutions, IBM Cloud caters to the unique needs of businesses across various sectors, from healthcare to finance to manufacturing.

5. Oracle Cloud:

Oracle Cloud offers a robust suite of cloud services, encompassing computing, storage, databases, applications, and industry-specific solutions. With a focus on performance, reliability, and security, Oracle Cloud enables organizations to modernize their IT infrastructure, innovate with emerging technologies, and drive business agility in a highly competitive market landscape.

These are just a few examples of leading cloud computing service providers, each offering unique capabilities and solutions to address the evolving needs of businesses in today's digital age. By partnering with the right cloud provider, organizations can leverage the power of cloud computing to drive innovation, accelerate growth, and stay ahead of the competition.

How chosen cloud is different from other cloud service providers?

AWS stands out from other cloud service providers due to its extensive global infrastructure. With data centers located in various regions worldwide, AWS offers unparalleled reliability and minimal latency, ensuring that users can swiftly and securely access their applications and data from anywhere. Moreover, AWS boasts a vast ecosystem of services and tools, empowering users to develop, deploy, and manage virtually any kind of application or workload. The commitment of AWS to innovation and customer satisfaction further distinguishes it from its competitors, as it consistently introduces new features and services to cater to the ever-changing needs of its customers.

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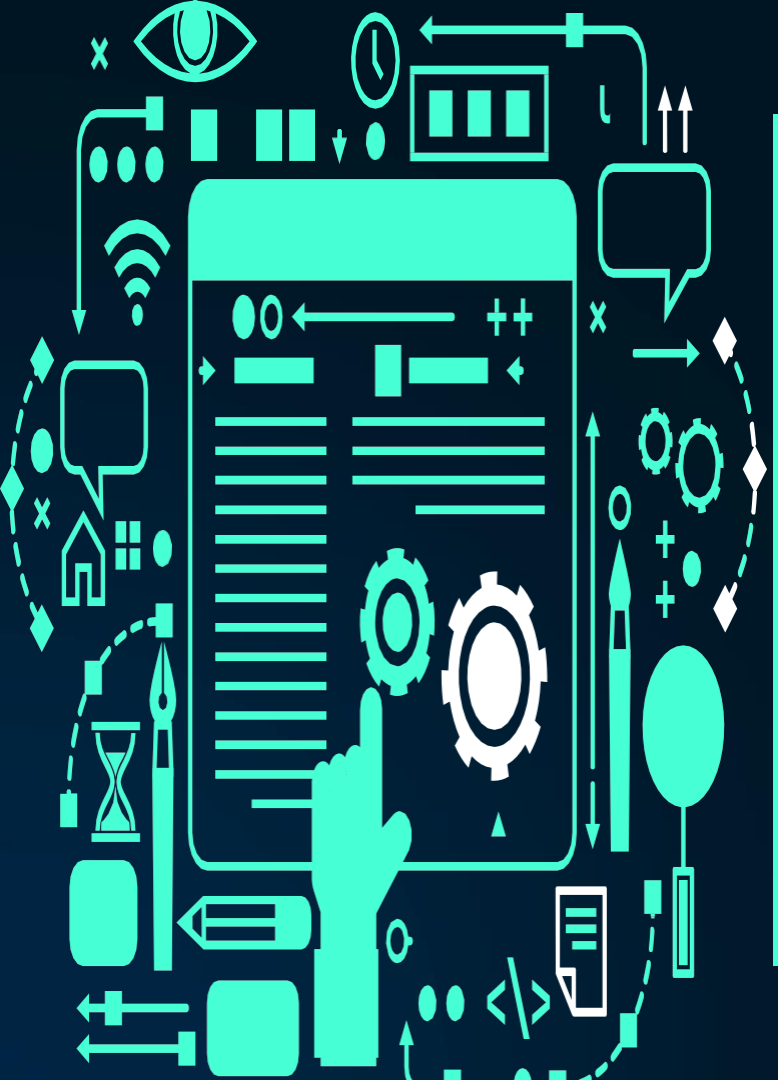

THANKS!

Does anyone have any question?