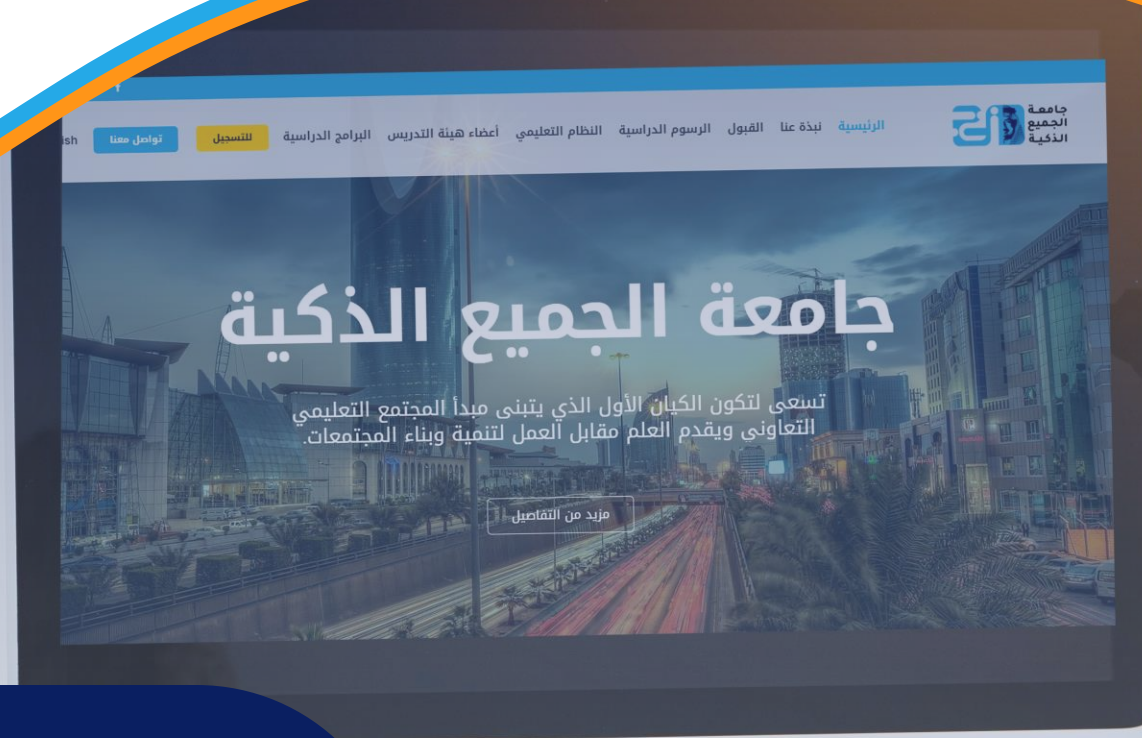




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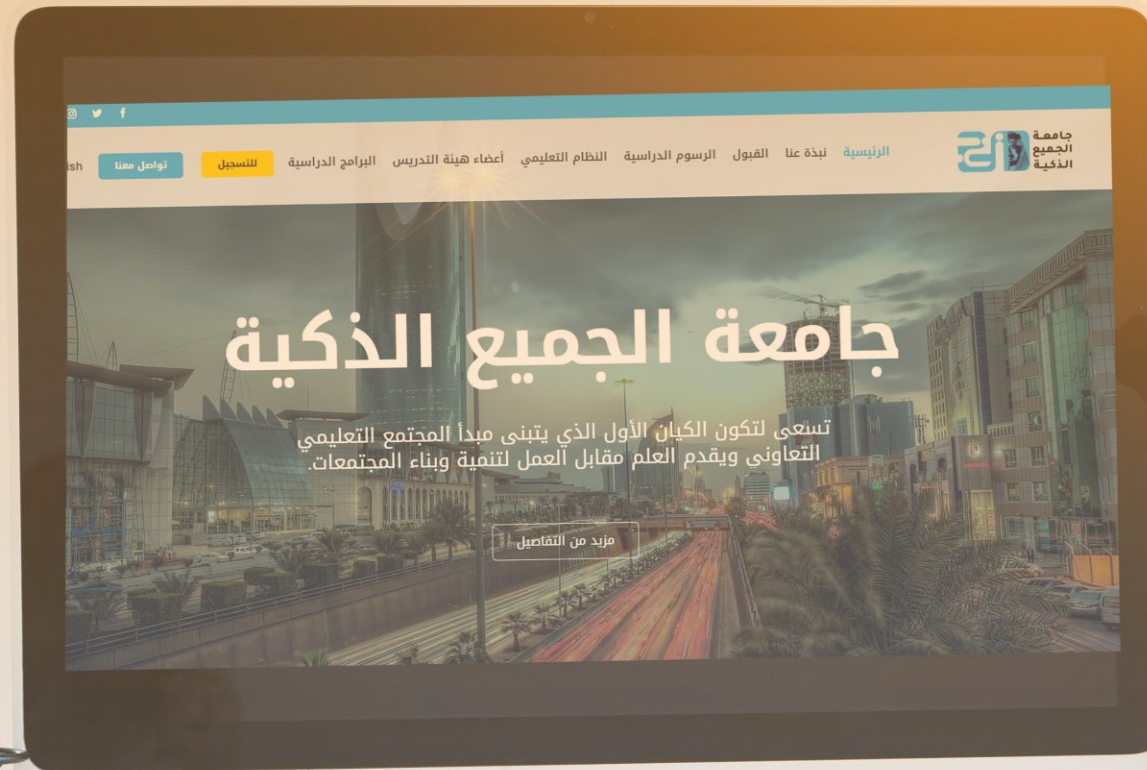


Prepared by
Dr. Hamada I. AbdulWakel
Lecture 1

CYB615
Network Programming



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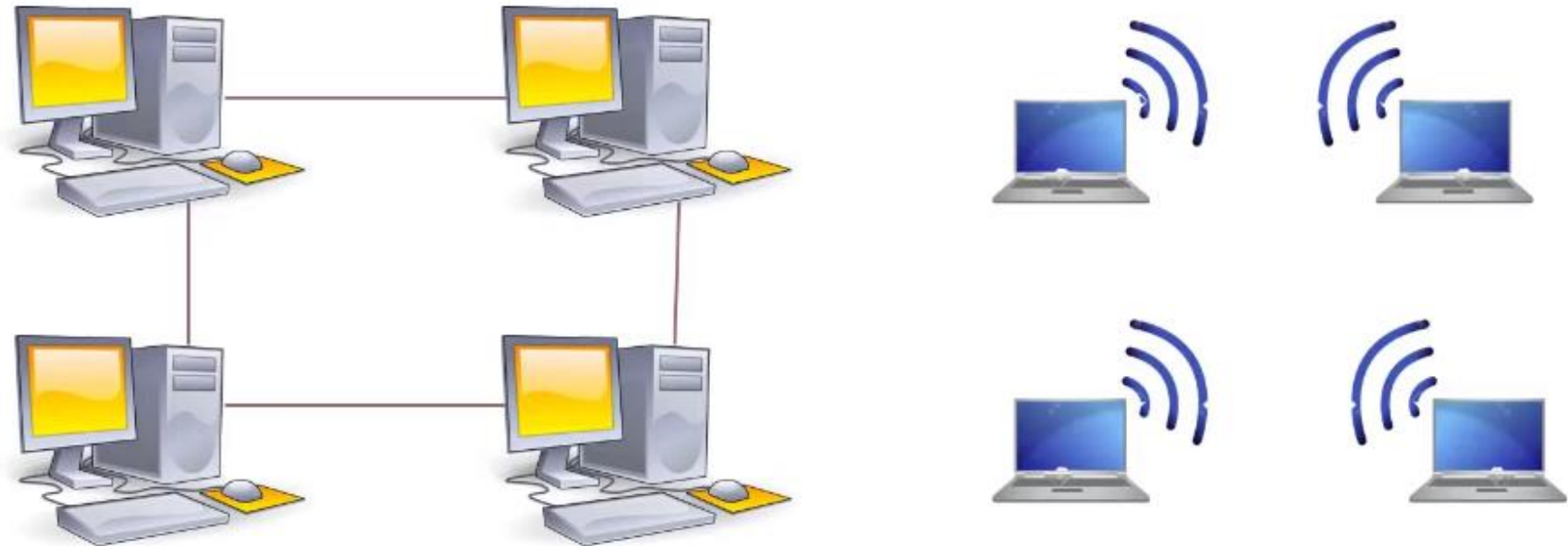


Module1: Computer Networking Basics

- Network Definition.
- Without & With Network Scenarios.
- Networking components.
- Network Types.
- Network Programming.
- Network Programming Levels.



- A collection of devices connected to one another allowing for data to be shared and used.



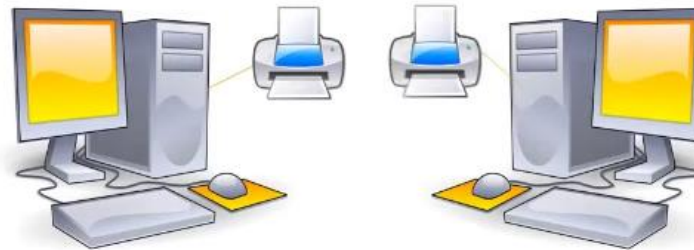
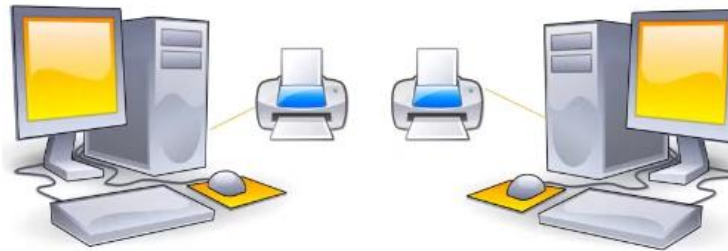
- Benefits:
 - Share resources:
 - Data.
 - Hardware.
 - Save a lot of money.
 - Increase workgroups collaborations.
 - Increase productivity.
 - Protect company data.



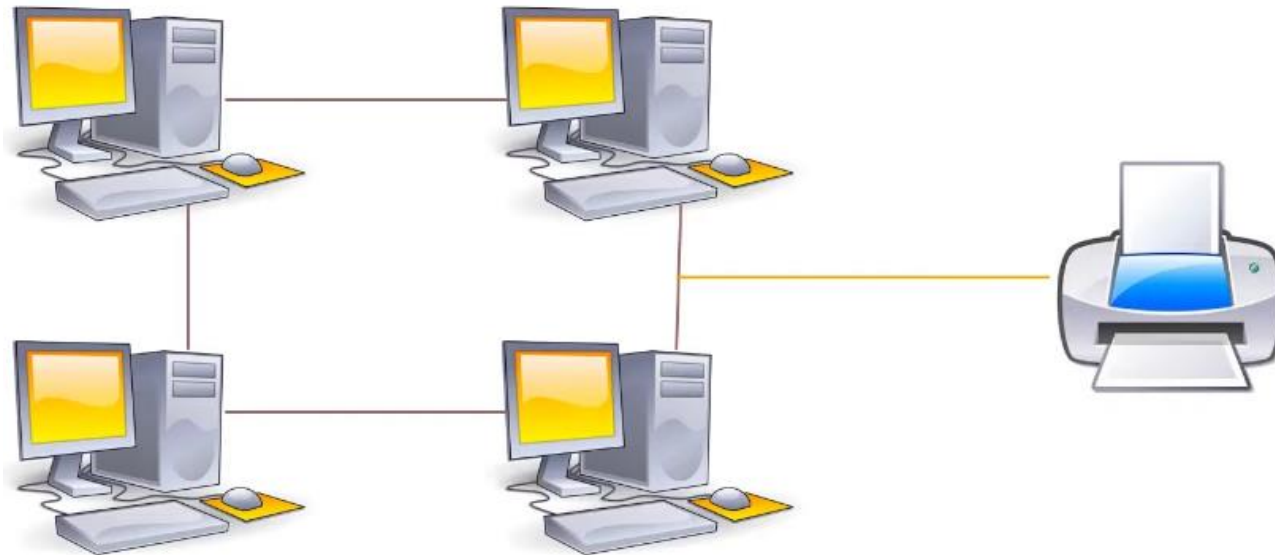
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Without & With Network Scenarios

- Scenario 1: Violating efficient use of resources.



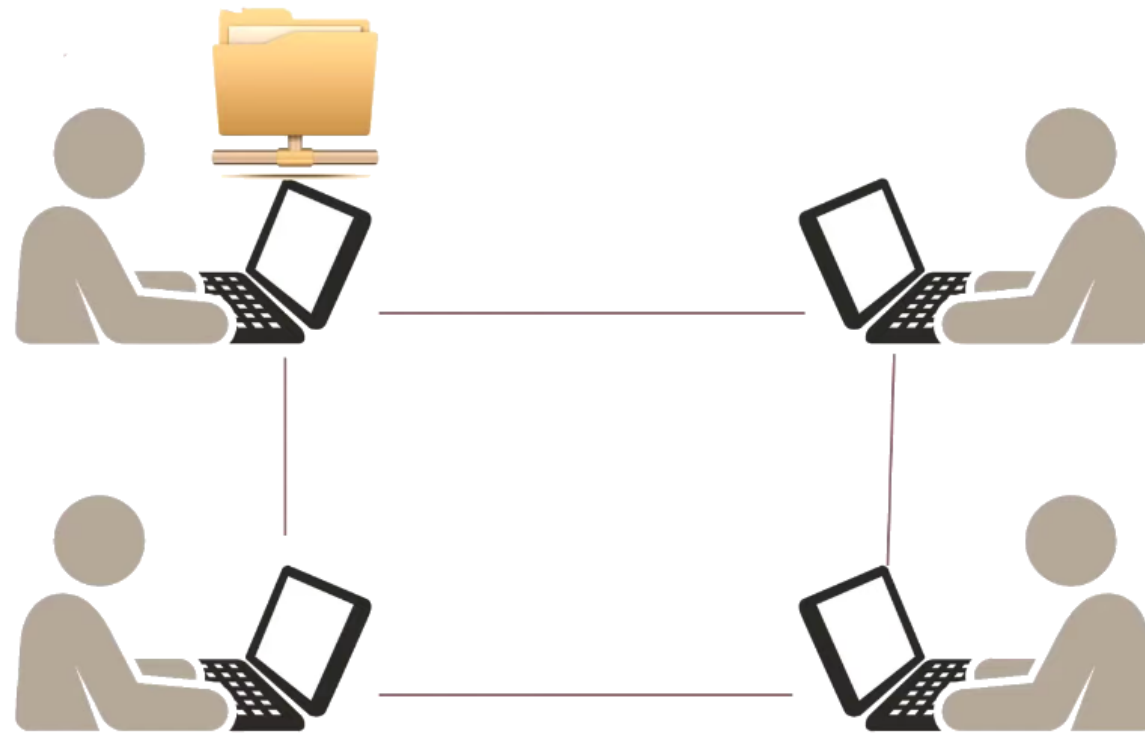
- Scenario 1:



- Scenario 2: Reducing teamwork collaboration and data synchronization.



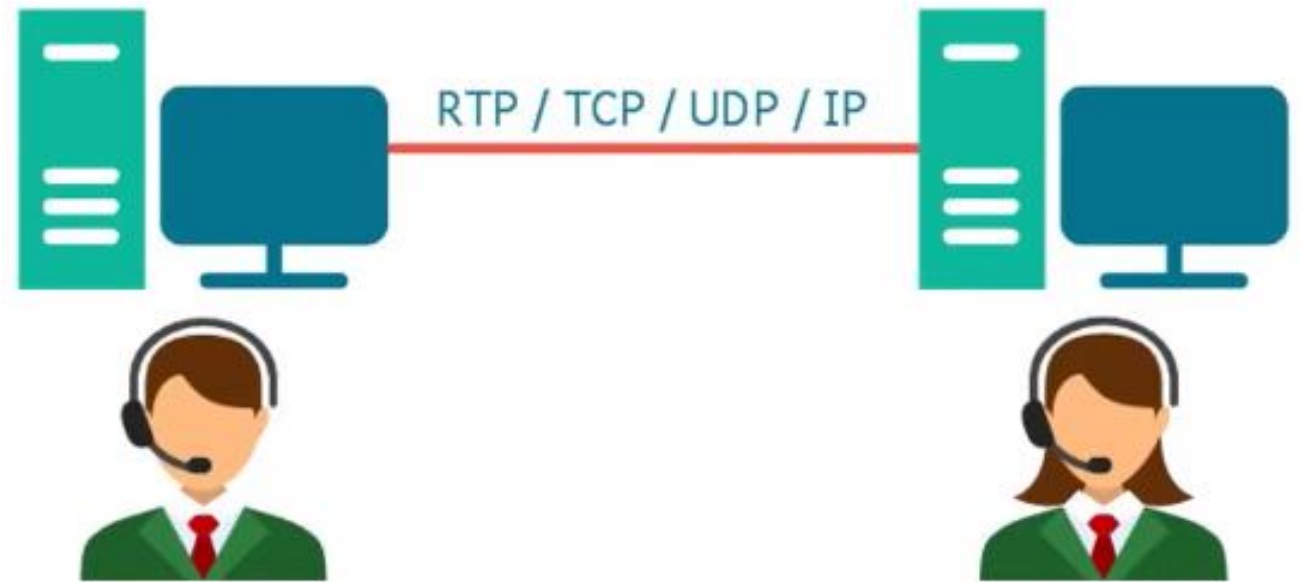
- Scenario 2:



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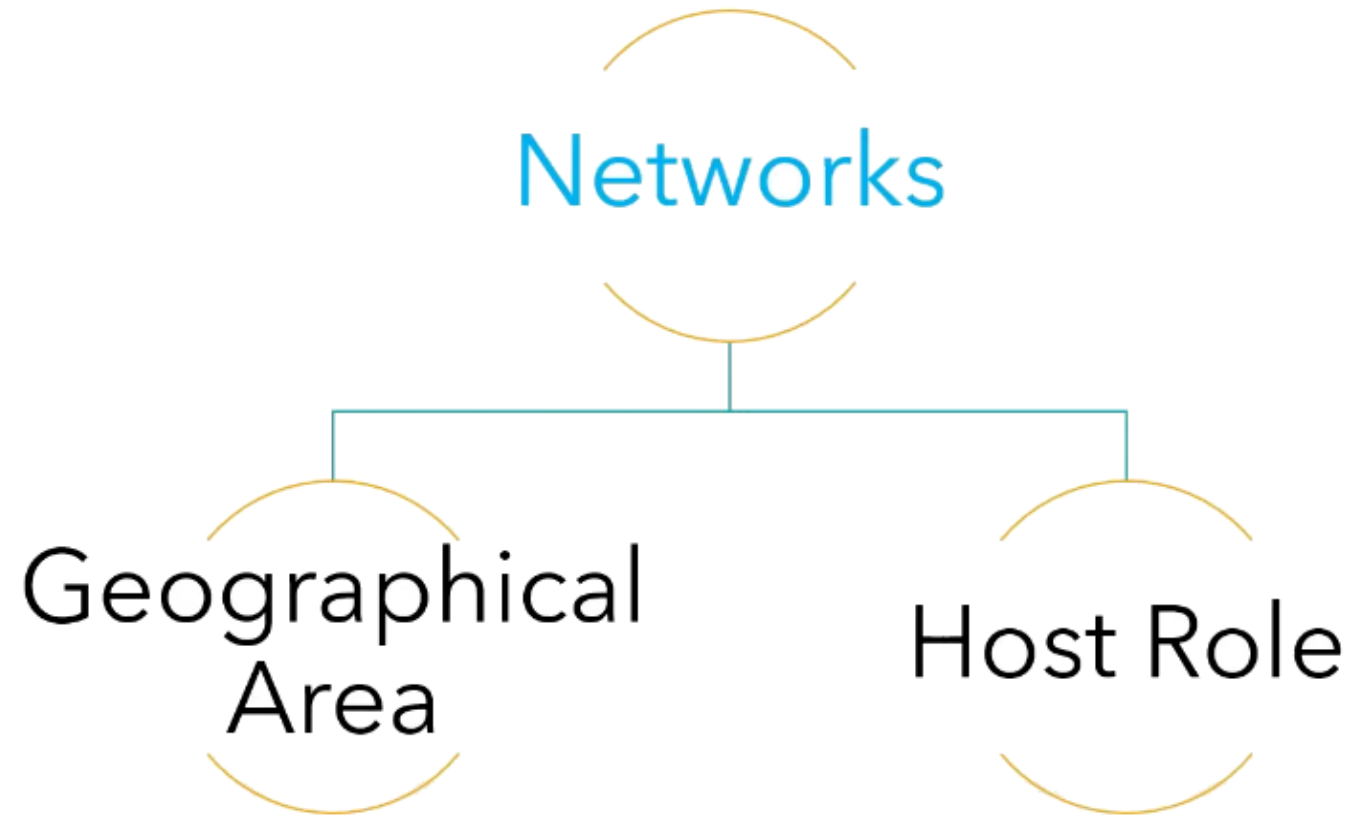
The Network Components

- Any network must have:
 - Computer systems.
 - Network media.
 - Cables:
 - Electrical signals.
 - Pulses of light.
 - Wireless:
 - Radio frequencies.



- Any network must have:
 - Network interface.
 - Convert data to suitable formats for media used.
 - Network protocol.
 - A Protocol is a standard pattern of exchanging information.
 - IP.





Geographical Area

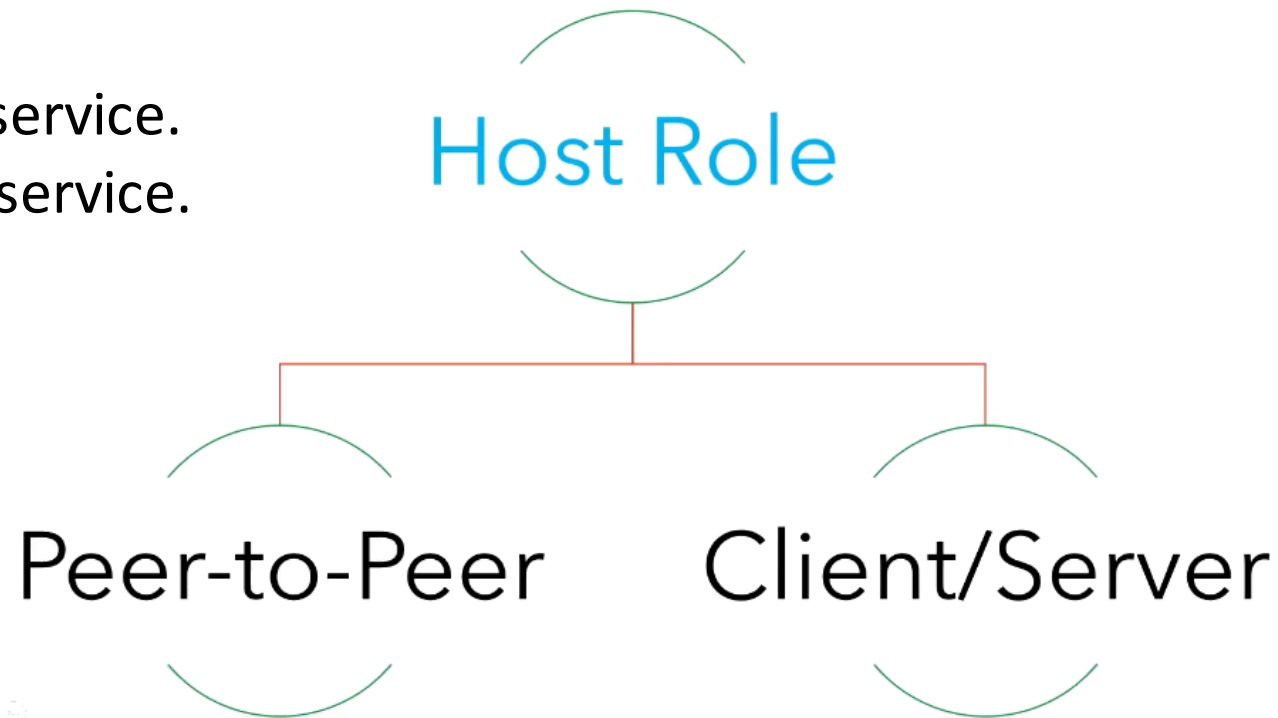
Local Area
Network(LAN)

Wide Area
Network(WAN)



Host Roles:

- 1- Client, request service.
- 2- Server, provide service.

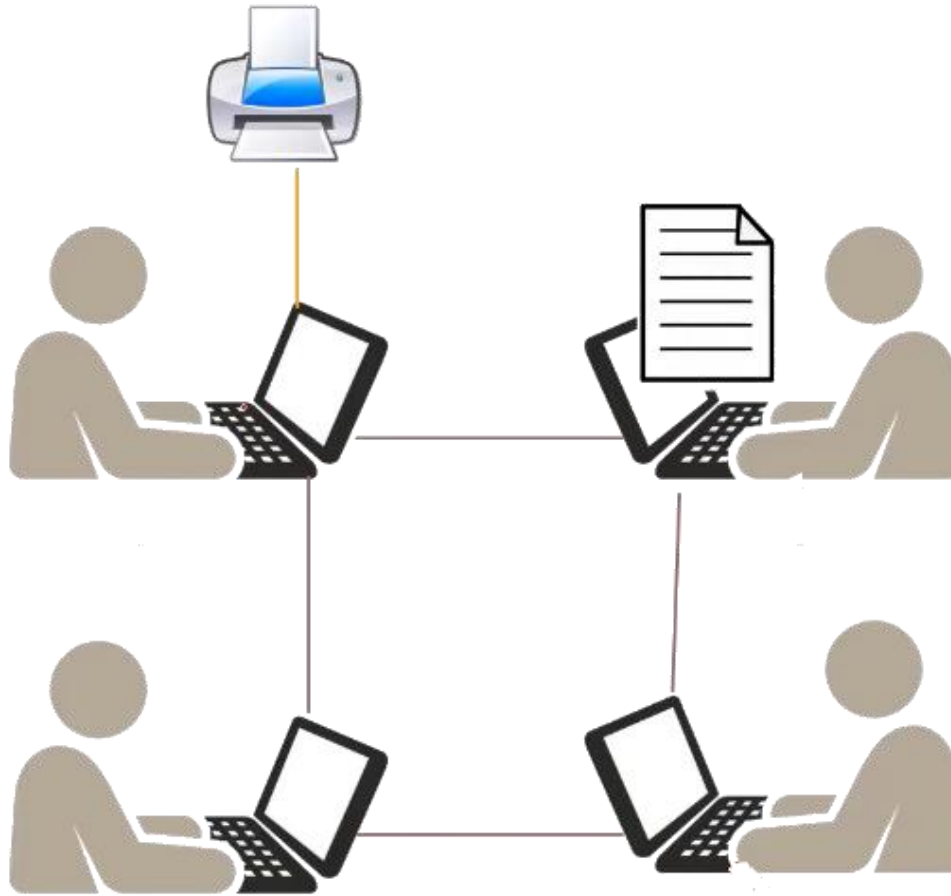


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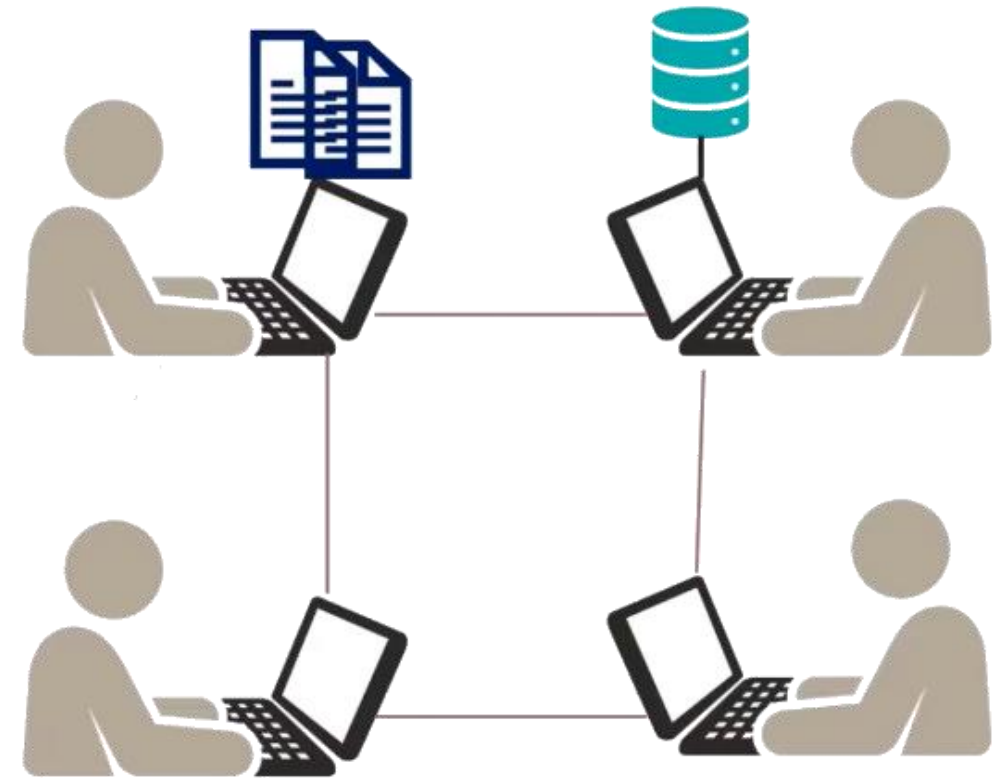
Network Types

Cont'd

Scenario 1



Scenario 2





- A network allows arbitrary applications to communicate.
- Network programming is the act of using **computer code** to write programs or processes that can communicate with other programs or processes across a network.
- A "programmable" network has **APIs** in its infrastructure that developers can use to program applications and other components to interact directly with the network.



Lecture 1

Why Python for Network Programming?

- The simplicity and high readability.
- The most powerful language.
- Helpful libraries for network engineers.
- Python increases network reliability.



- Python provides two levels of access to network programming:
 - Low-Level Access:
 - Access the basic socket support for the operating system using Python's libraries.
 - Implement client and server for both connection-oriented and connectionless protocols.
 - High-Level Access:
 - Implement protocols like HTTP, FTP, etc. using Python's libraries.



Lecture 1

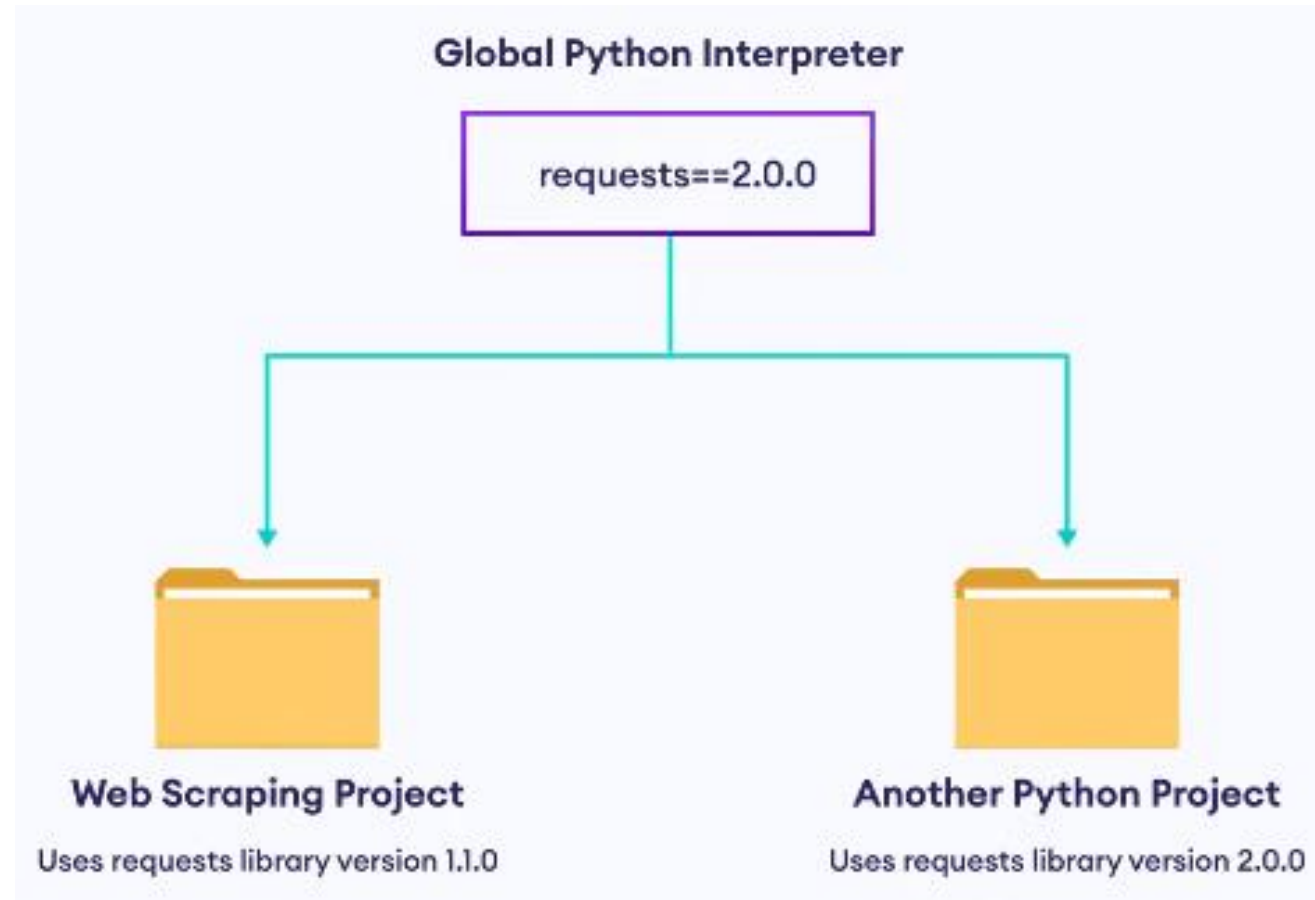
Requirements for Python Network Programming

- Python3 basics.
- OOP.
- [PyPi](#).
- Python package installer (pip).
 - Linux OS: `sudo apt install python3-pip`
 - Windows OS: [here](#).
- IDE (VScode - Pycharm).



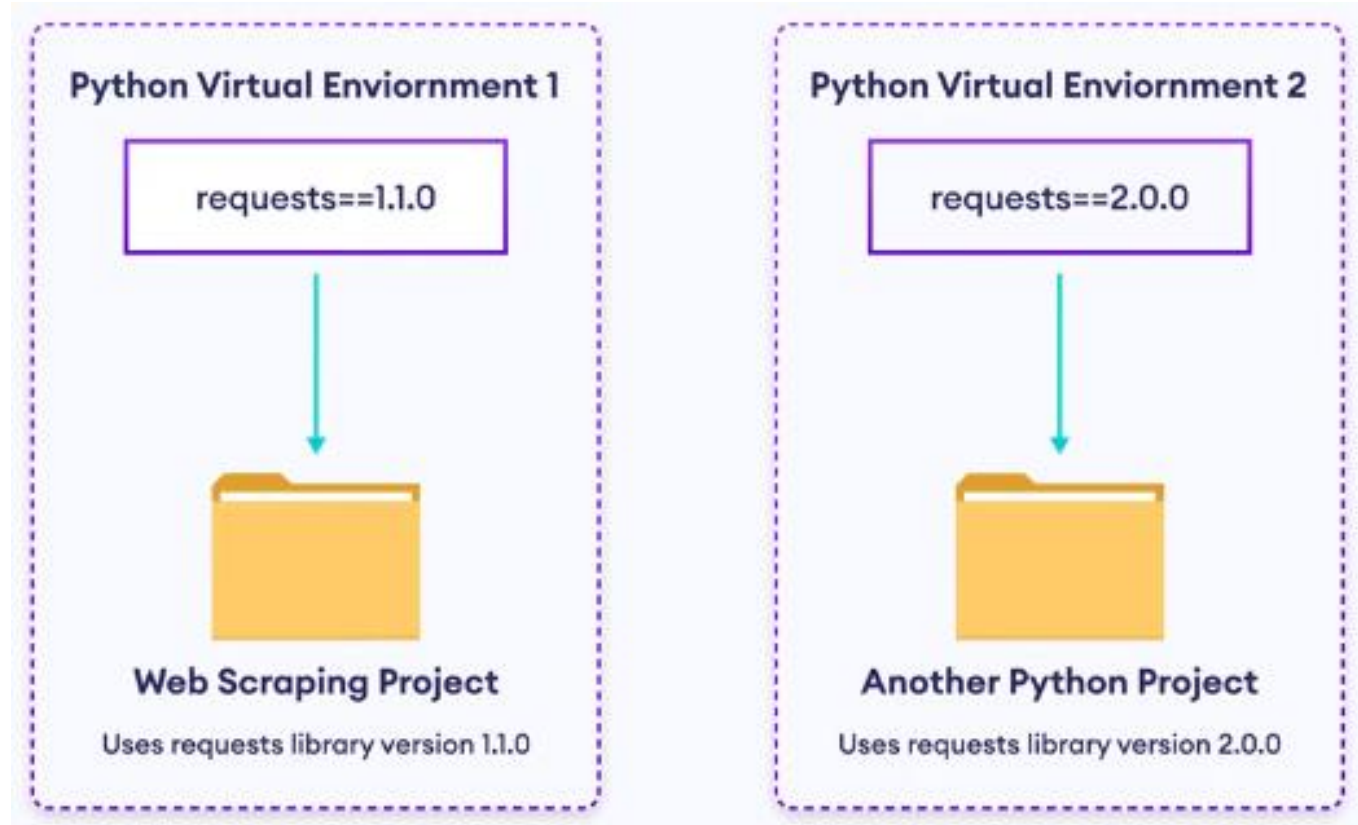
Lecture 1

Working with Multiple Projects



Lecture 1

Virtual Environment



- Virtual environment is a **tool** that helps to keep **dependencies** required by different projects separate by creating isolated python virtual environments for them.
- Venv does not related to your created codes, it just for handling packages needed to run/use in your codes.
- Your code **must not be inside** the Venv folder.



- Using a module named **virtualenv** which is a tool to create isolated python environments.
- Install Virtualenv:

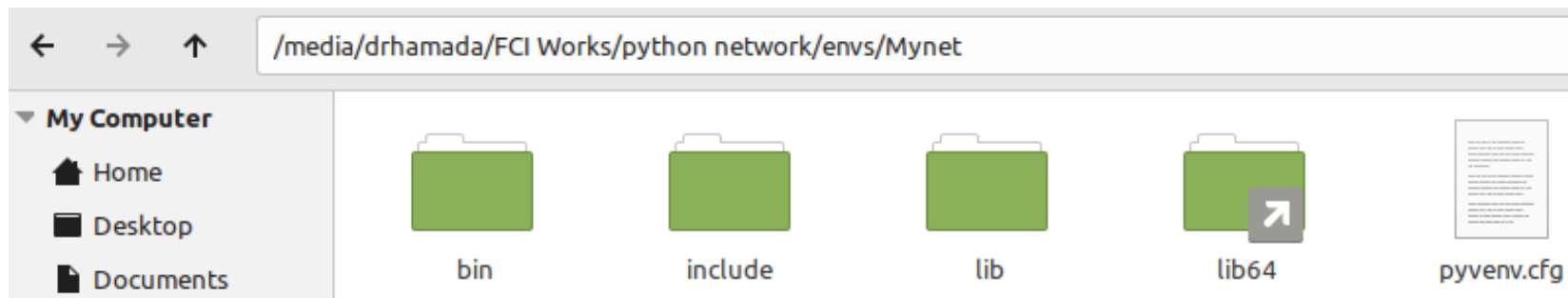
```
pip install virtualenv  
sudo apt install python3-virtualenv    (3.10)  
virtualenv --version
```



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Creating Virtual Environment

- Create the location for venvs on your machine.
`mkdir Myenvs && cd Myenvs`
- Create your venvs as your projects required.
`python3 -m venv Your_venv_Name` (3.10)



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Activating/Deactivating Virtual Environment

- To activate the required venv.
On Windows: `source Your_venv_Name/Scripts/activate`
On Linux: `source Your_venv_Name/bin/activate`
- To deactivate your venv.
`deactivate`

```
drhamada@drhamada-Latitude-E6520:/media/drhamada/FCI Works/python network/envs$ source Mynet/bin/activate
(Mynet) drhamada@drhamada-Latitude-E6520:/media/drhamada/FCI Works/python network/envs$
```



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Testing Package Isolation in Virtual Environment

- Run, to see the list of installed packages.

`pip list`

Without env valid path: `which python3` (3.10)

```
• drhamada@drhamada-Latitude-E6520:/media/drhamada/FCI Works/python network/envs$ python3 -m venv newEnv1
• drhamada@drhamada-Latitude-E6520:/media/drhamada/FCI Works/python network/envs$ source newEnv1/bin/activate
• (newEnv1) drhamada@drhamada-Latitude-E6520:/media/drhamada/FCI Works/python network/envs$ pip list
```

Package	Version
-----	-----
pip	22.0.2
setuptools	59.6.0



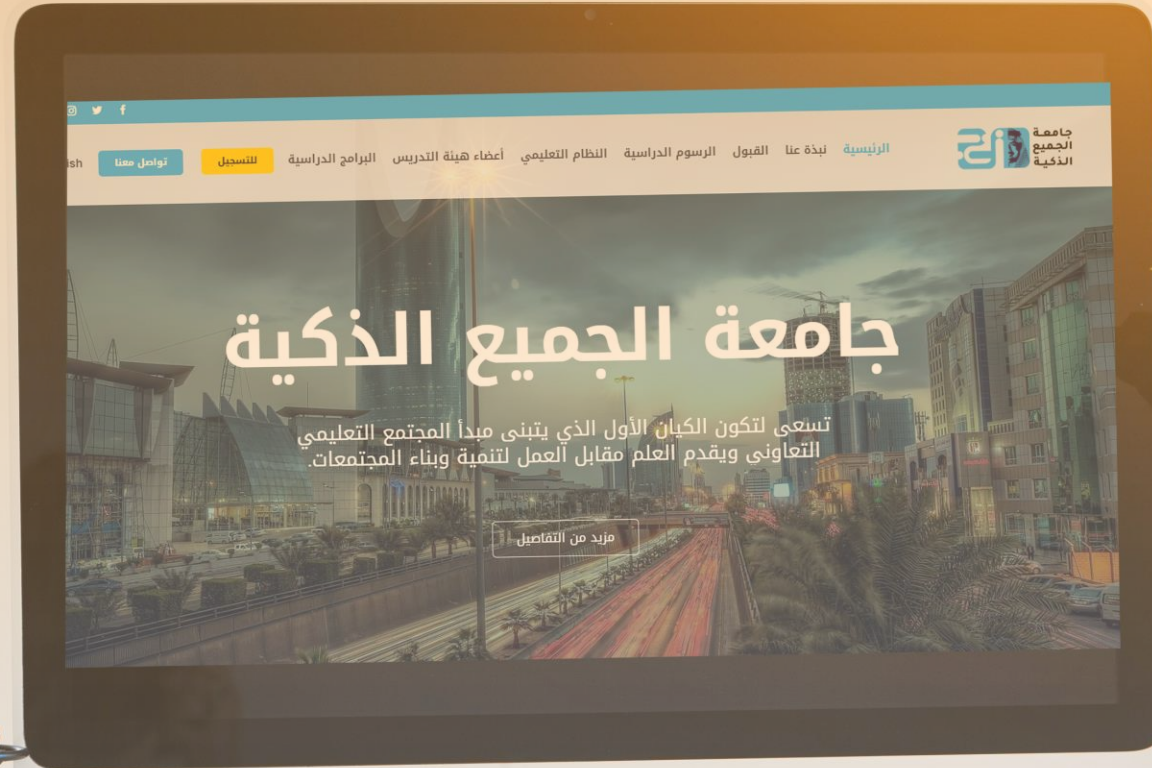
- Install a package in your venv.
`pip install ascii-train`
- Make a py file with the following code.
`import ascii_train
print(ascii_train.train("hamada"))`



- Run your py code.
if you got an error

`Your_venv_Name/bin/python3 "/path/to/code file/test.py"`





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THANK YOU