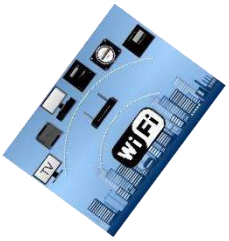
University of Mosul
College of Computer Sciences and Mathematics
Department of Statistics and Informatics

Computer 2
Second Stage



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Computer curriculum (second Stage)

Objective of the Curriculum:

This curriculum aims to provide students with both computer knowledge and practical skills in advanced areas of computing, with a particular focus on **network security, e-commerce, troubleshooting, and an introduction to artificial intelligence and its applications**.

Curriculum Contents :

The curriculum consists of **nine chapters**, covering a wide range of diverse topics.

Chapters :

1. Security and Networks
2. E-Commerce
3. Troubleshooting
4. Introduction to Artificial Intelligence
5. The Role of Artificial Intelligence in Modern Smartphones
6. Applications and Tools of Artificial Intelligence
7. Artificial Intelligence and Society
8. Ethical Challenges in Artificial Intelligence
9. The Future of Artificial Intelligence

We hope that this curriculum will serve as a **valuable reference for students** in their educational journey in the field of computer science.

Chapter One

Network Security

Computer Networks

• The Importance of Computers in Our Lives

It is undeniable that computers play a pivotal role in enhancing all aspects of our lives, whether practical, academic, or personal. Having a computer at home or in the workplace has become essential to save time and effort while performing various tasks with high efficiency.

• Challenges of Resource Sharing in the Workplace

Imagine working with three colleagues, and all of you need to use the same printer regularly. In this situation, you might face some challenges, such as:

- **First Solution: Using a Single Printer in Turns**
  This option may be impractical and time-consuming, especially if the workload is heavy.
- **Second Solution: Purchasing a Printer for Each User**
  This option can be very costly, particularly when the number of users is large.

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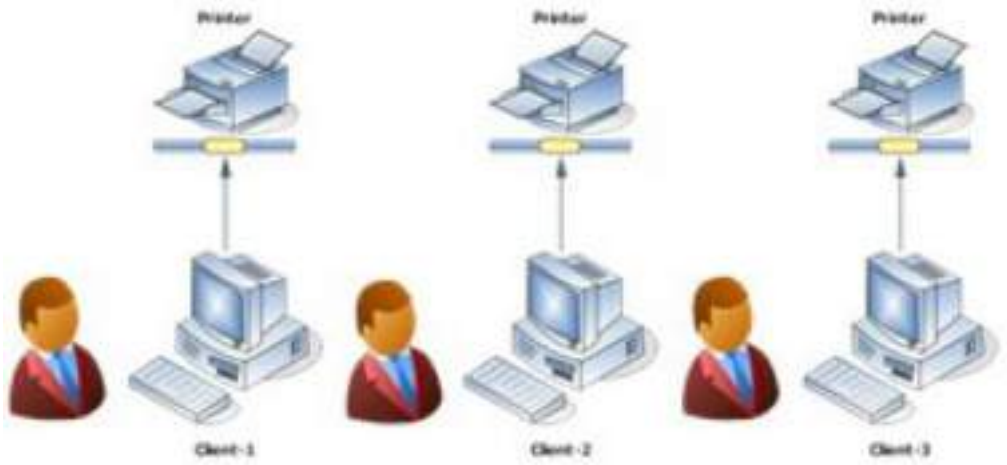

The Need for Computer Networks

The necessity of computer networks arises when there is a demand to share resources among multiple devices. These resources may include **hardware components** such as printers and scanners, or **software resources** such as applications and databases. Without a network, exchanging such resources between different devices becomes difficult or even impossible.

The Concept of Computer Networks

A computer network can simply be defined as a group of two or more devices connected together in any form. The primary goal of establishing a computer network is to enable users to **share resources** and **exchange information** among themselves, in addition to allowing centralized control of devices and providing technical support.

Benefits of Computer Networks

1. **Resource sharing** (such as printers and files).
2. **Facilitating communication** between people (emails, chats).
3. **Saving time and effort** in completing tasks.
4. **Centralized data storage and management**.
5. **Enhanced security and file backup**.
6. **Easier teamwork and collaboration**.
7. **Access to the Internet and global services**.

Computer Network Objectives

Objectives
1. Resource Integration: enabling efficient utilization of shared hardware and software resources.
2. Enhanced Communication: providing an effective environment for data and information exchange.
3. Institutional Collaboration: facilitating teamwork and joint projects within integrated network environments.
4. Security and Control: implementing centralized policies to ensure data protection and user access management.
5. Economic Efficiency: reducing operational costs through effective resource sharing.
6. Information Accessibility: ensuring instant access to data to support faster decision-making.

The Main Components of Computer Networks

Computer networks primarily consist of computing devices that are intended to be interconnected. These devices represent the core foundation and essential element for establishing any network. Thus, it can be stated that the creation and development of a computer network requires the availability of several components.

The components of computer networks can generally be classified into two main categories:

1. **Hardware Components**: the tangible devices that form the physical infrastructure of the network.
2. **Software Components**: the programs and systems that control the operation of the network and regulate the flow of data.

Computer Networks Components

First: Hardware Components of Computer Networks

The hardware components include the following elements:

1. **Computers**: devices connected to the network, such as desktop computers, laptops, tablets, and smartphones.
2. **Servers**: powerful machines that provide centralized services to other devices on the network, such as file storage, database management, and application hosting.
3. **Network Media**: the channels through which data is transmitted between devices, and they are classified into two types:
    - **Wired Media**: uses cables to transmit data, such as twisted-pair cables, coaxial cables, and fiber-optic cables.
    - **Wireless Media**: uses radio waves or infrared signals to transmit data, such as Wi-Fi and Bluetooth technologies.
4. **Network Interface Card (NIC)**: a hardware component installed in a computer to enable its connection to the network.
5. **Internetworking Devices**: devices used to interconnect different networks, such as:
    - **Hubs**: distribute data among all devices connected to them.
    - **Switches**: direct data to the specific destination device, thereby increasing the efficiency of the network.
    - **Routers**: forward data between different networks and determine the optimal paths for transmission.

Second: Software Components of Computer Networks

1. Network Operating Systems (NOS): specialized operating systems designed to manage networks and provide communication services, such as Windows Server and Linux Server.

2. Protocols: a set of rules that define how data is exchanged between devices, such as TCP/IP.

3. Network Management Software: applications used to monitor and manage network performance, identify issues, and apply corrective measures.

4. Application Software: programs that allow users to interact with the network, such as web browsers and email clients.