Distributed and Parallel Computer Systems

CSC 423

Lecture 1&2

Introduction

INSTRUCTOR

DR / AYMAN SOLIMAN

➢ Contents

1) Course Contents.

2) Grading System & distribution.

3) Course Information.

4) Course Policy.

5) Objectives.

6) Introduction.

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1) Course Contents.

➢ This course explores the ways in which greater computing power can be achieved through parallel computer architectures.

➢ Parallel architectures that have been proposed in the literature or implemented are discussed considering relevant design, implementation, and application issues.

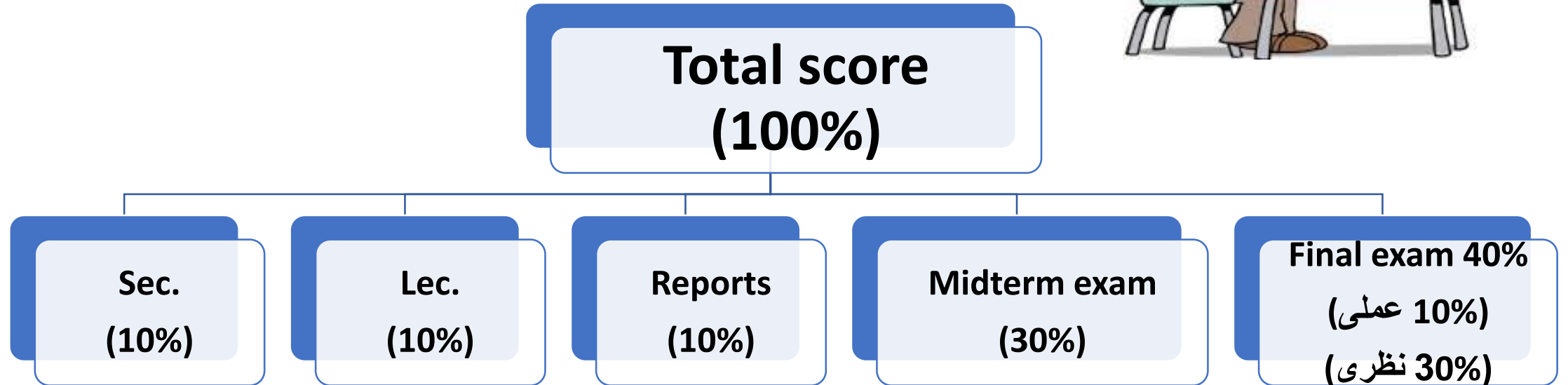➢ Multistage interconnection networks (MINs) are analyzed.

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1) Course Contents (cont.)

➤ Formal specifications of the MINs are used to derive other properties such as the ability of partitioning of each type of network.

➤ Throughout the course, the impact of VLSI technology and the parallel computing software environment on the design of these parallel-processing systems is discussed.

2) Grading System & distribution.

Total score (100%)

- Sec. (10%)
- Lec. (10%)
- Reports (10%)
- Midterm exam (30%)
- Final exam 40% (عملى 10%) (نظرى 30%)

3) Course Information.

Lecture: Wednesday (09:00 - 10:30 AM), (11:25 - 13:05 PM), (02:00 - 30:30 PM).

References:
➢Lecture Notes.
➢Distributed Systems Concepts and Design.
➢Distributed Systems Principles and Paradigms
➢Distributed Database System Principles
➢Fault Tolerance in Cloud Computing
➢Operating Systems Internals and Design Principles

Instructor:

Dr. Ayman Soliman
ayman.mohamed01@bhit.bu.edu.eg

TAs:

Eng. Nabil   Eng. Karim   Eng. Eman

4) Course Policy.

➢ Be **on time** and cell phones should be silent or off during the lecture.

➢ Any forms of **cheating or plagiarism** will result in a **Zero grade** for the required task, report or exam (No discussion nor excuses).

➢ Students are expected to **respect** Instructors, TAs, and their colleagues.

➢ Your grades is based on **merit only** nothing else.

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❑Distributed Systems

➤ Main features
- o geographical distribution of computers
- o Communication through cable/ fiber /wireless /... connections

➤ Advantages:
- o Interaction, co-operation and sharing of resources

➤ Benefits
- o Reduced costs
- o Improved availability and Performance

❑Goals

➢ Introduce the principles and concepts involved in design of Distributed Systems (DS)

➢ Familiarize with mechanisms and protocols for inter-process communication

➢ Give overview of fundamental problems and techniques for DS

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❑**Chapter Outline**

➤ Definition of Distributed Systems

➤ Examples
- o Internet
- o intranets
- o mobile and ubiquitous computing
- o The World-Wide Web

➤ Characteristics

➤ Challenges

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❑Distributed System

➢ A distributed system is a collection of autonomous computers interconnected by a computer network and equipped with distributed system software to form an integrated computing facility.

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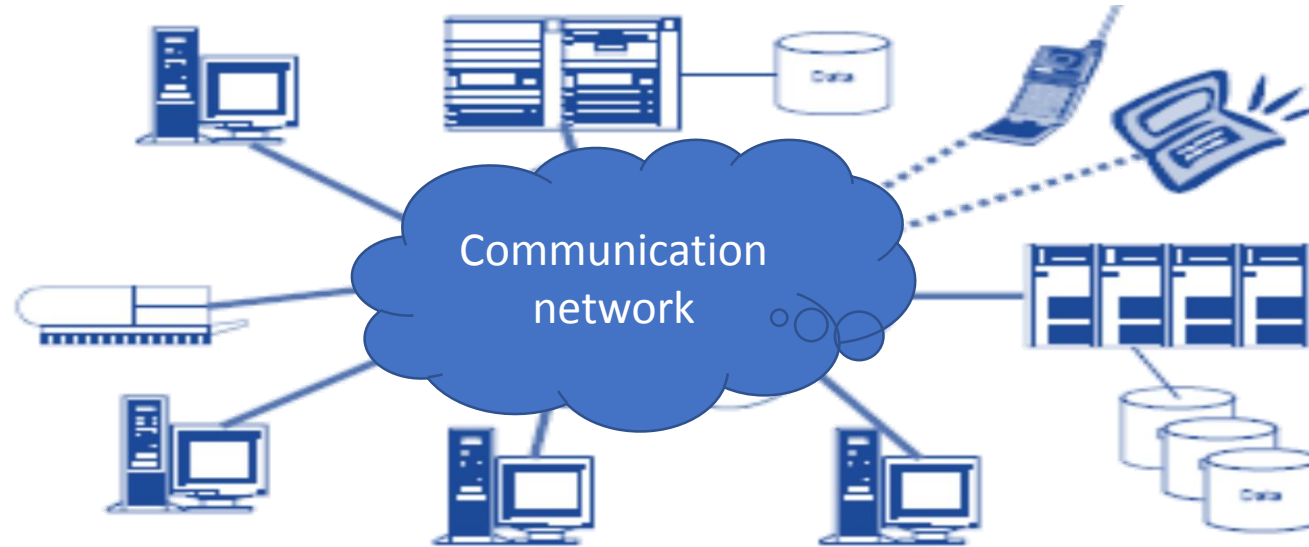
❑Distributed System

➢ Characteristics of distributed systems:
  o Concurrency of components,
  o Independent failures of components.

➢ Processes
  o Execute concurrently.
  o Interact in order to co-operate to achieve a common goal.
  o Co-ordinate their activities and exchange information by means of messages transferred over a communication network.
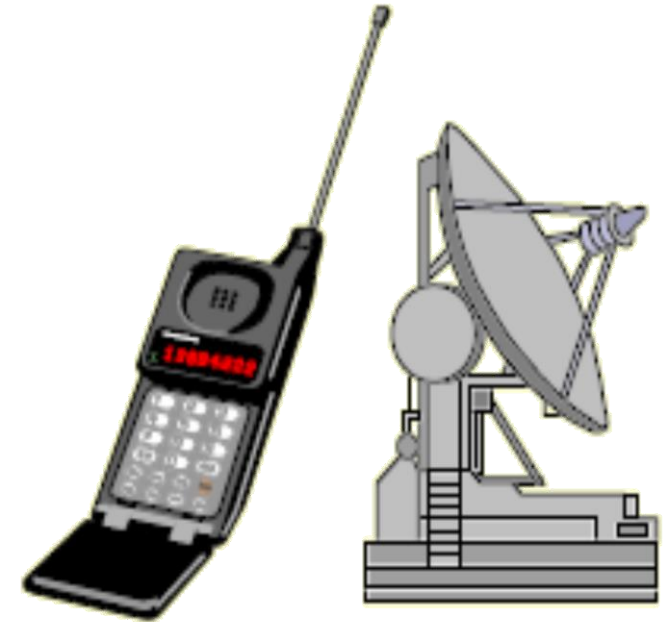
❑**Importance of Distributed Computing**

➢ Distributed computer systems are critical for functioning of many organizations
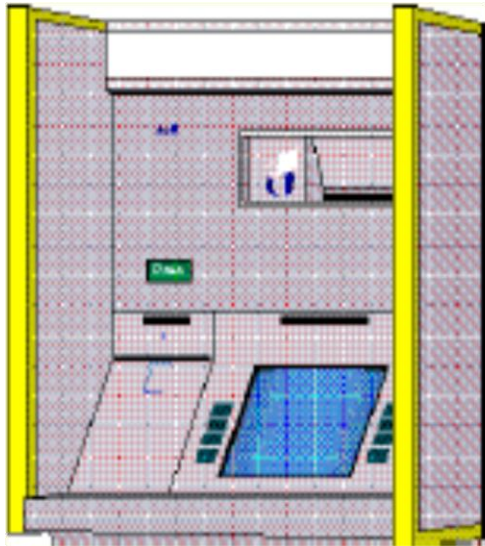
**Banks**   **Transport**   **Telecommunications**

❑Examples

➢ Internet
  o global network of interconnected computers which communicate through IP protocols

➢ Intranet
  o a separately administered network with a boundary that allows to enforce local security policies

➢ Mobile and ubiquitous (pervasive) computing
  o laptops, PDAs(Personal digital assistant), mobile phones, printers, home devices, ...

➢ The World-Wide Web
 o system for publishing and accessing resources and services across the Internet

❑A typical portion of the Internet

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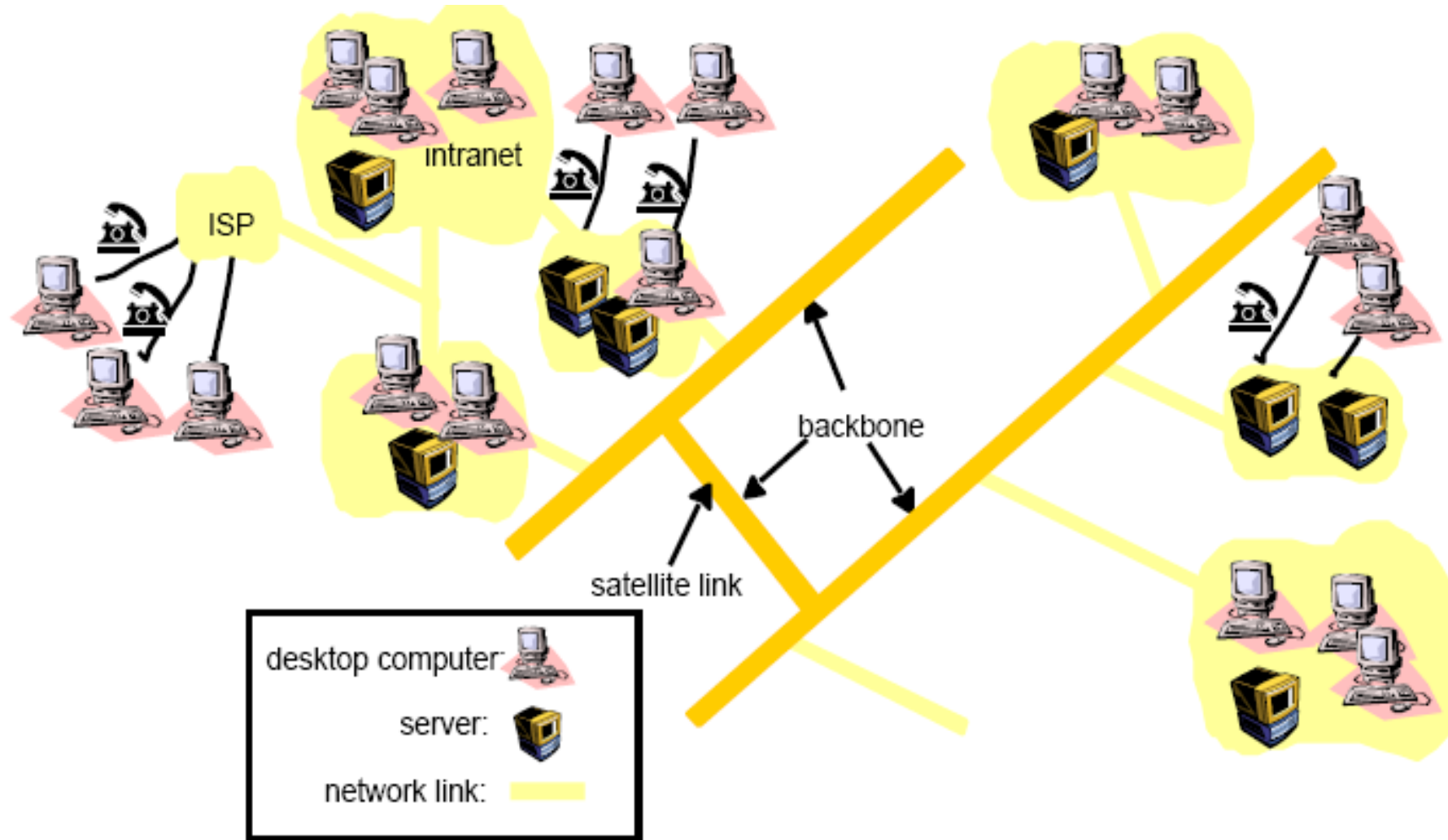
❑ Characteristics of Internet

➢ very large and heterogeneous

➢ enables email, file transfer, multimedia communications, WWW,...

➢ open-ended (An open-ended activity or situation does not have a planned ending, so it may develop in several ways)

➢ connects intranets (via backbones) with home users (via modems, ISPs)

❑A typical Intranet
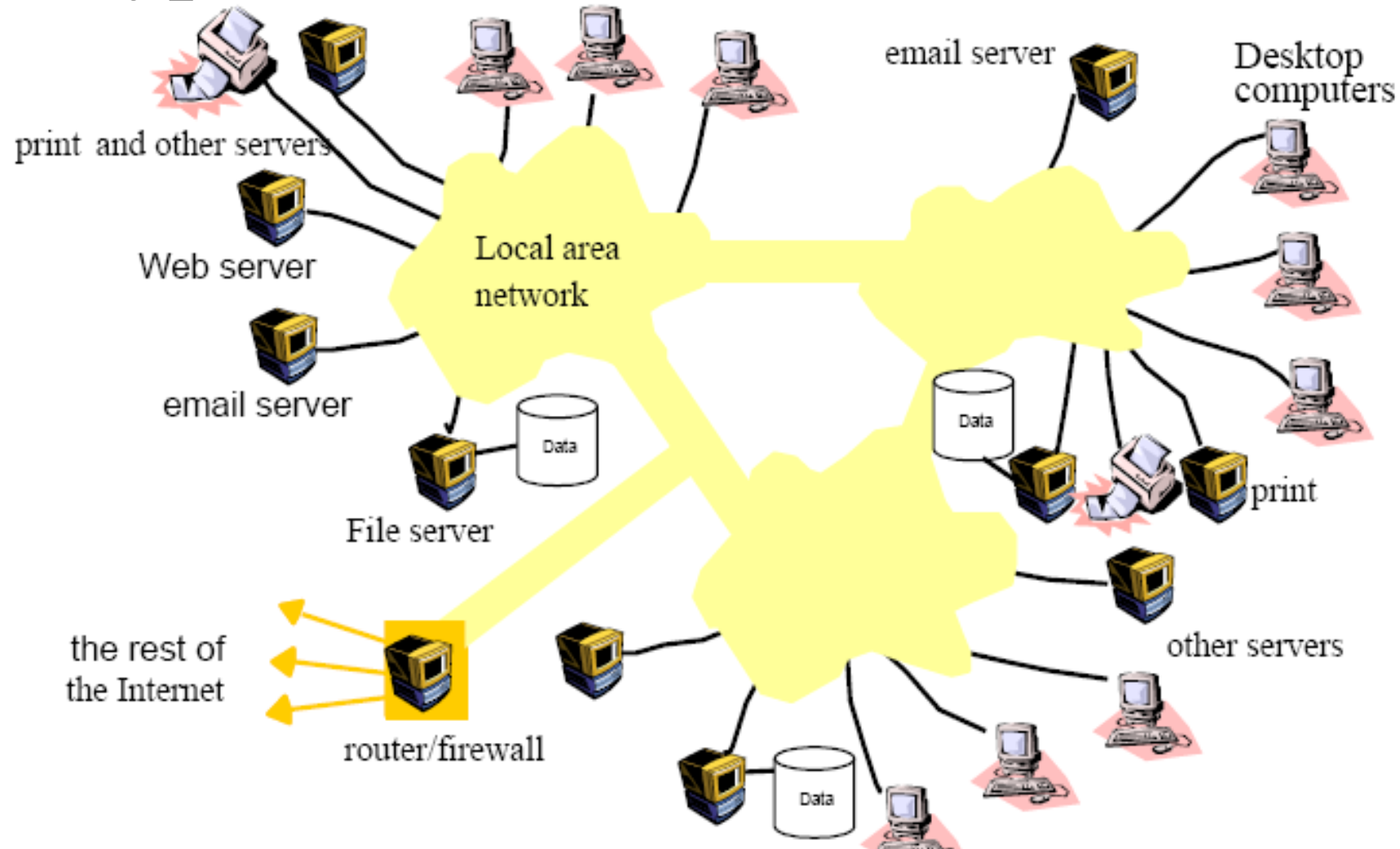
❑**Characteristics of intranets**

➢ Several LANs linked by backbones

➢ Enables information flow within organization
- o electronic data, documents, …

➢ Provides services
- o email, file, print servers,...

➢ Often connected to Internet via router

➢ In/Out communications protected by firewall

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❑Portable and handheld devices

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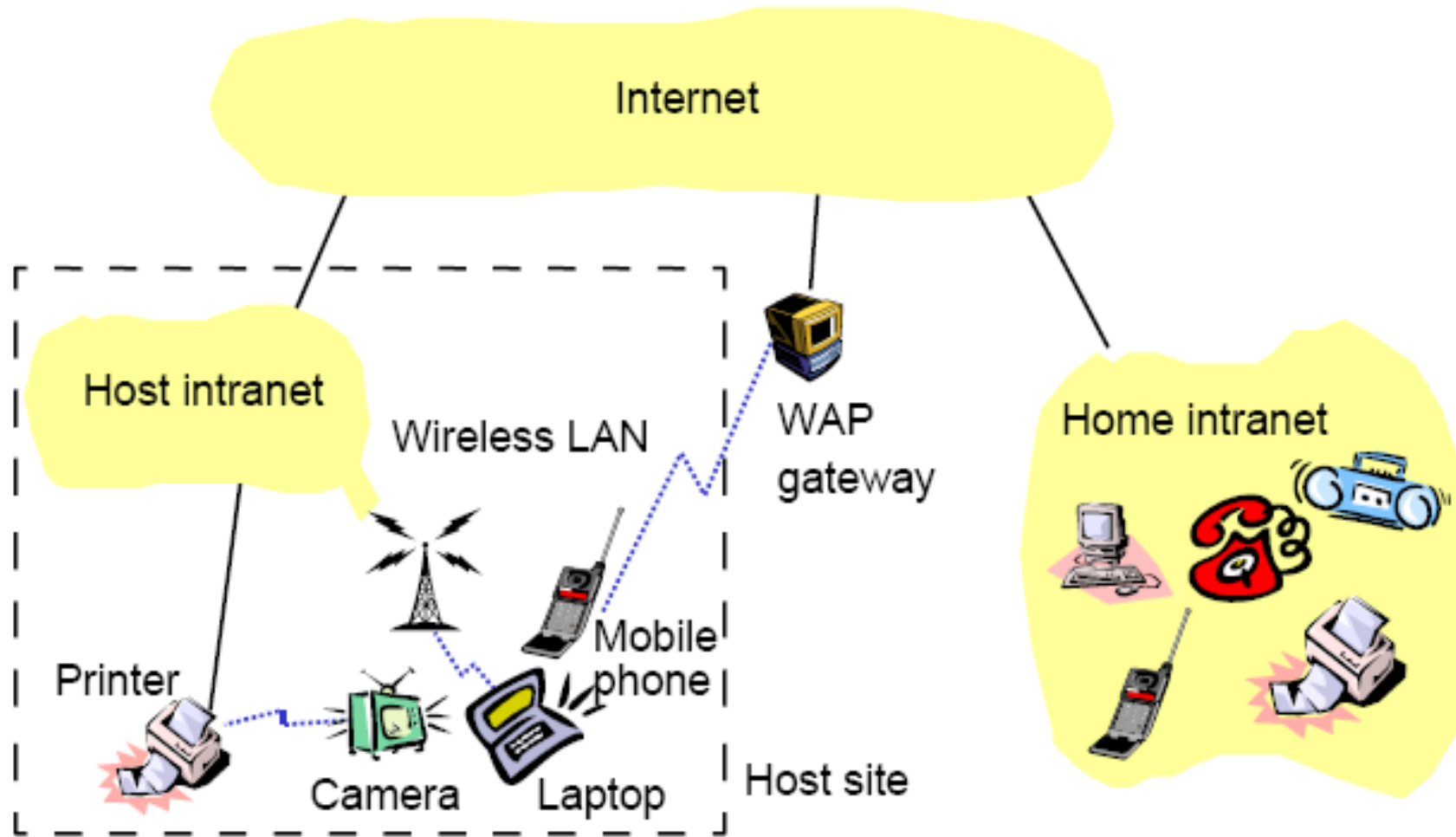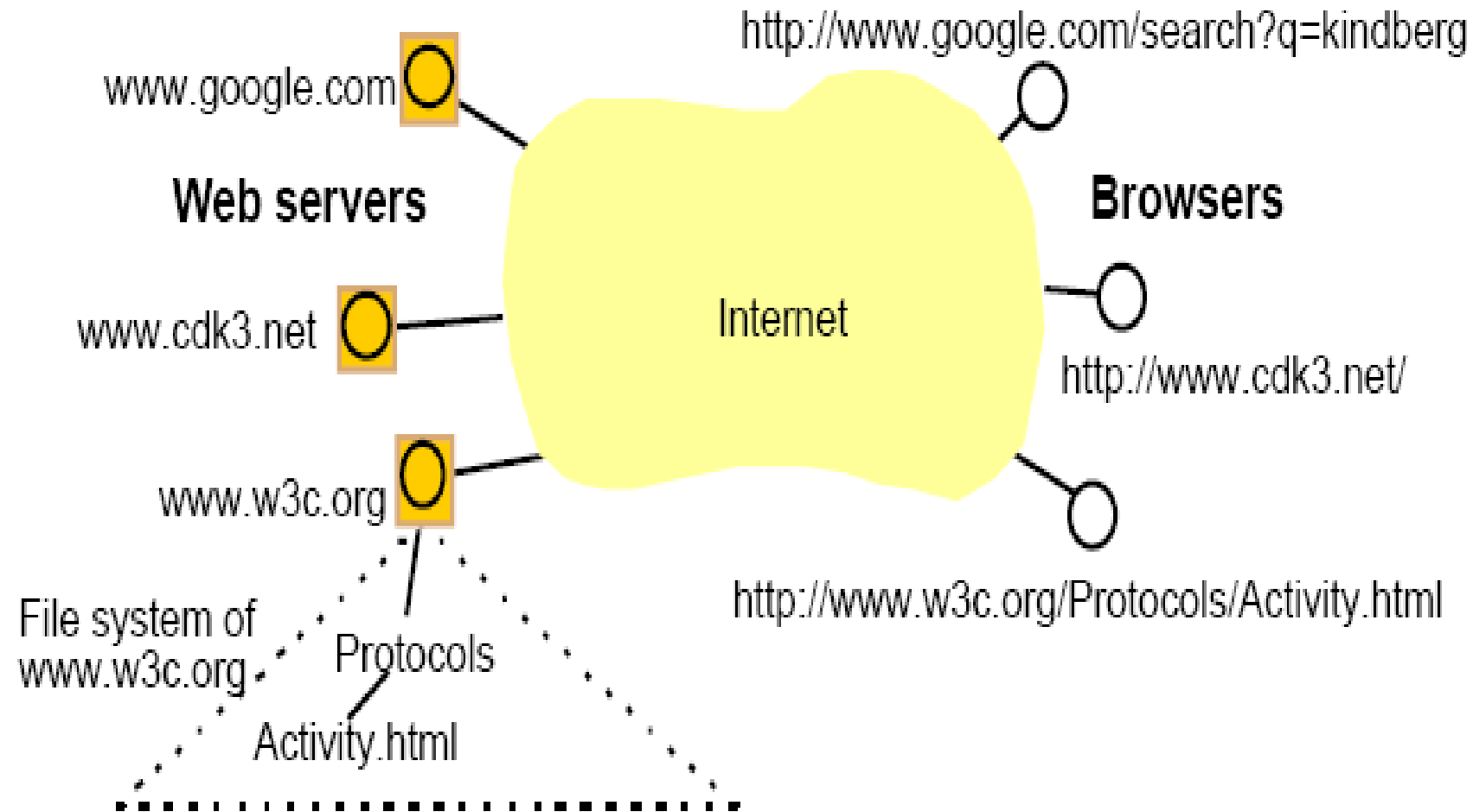
❑**Mobile & ubiquitous computing**

➢ Wireless LANs (WLANs)
- o connectivity for portable devices (laptops, PDAs, mobile phones, video/digital cameras, …)
- o WAP (Wireless Applications Protocol)

➢ Home intranet
- o devices embedded in home appliances (washing machines, …)
- o universal 'remote control' + communication

❑Web servers and web browsers

http://www.google.com/search?q=kindberg

www.google.com

Web servers

Browsers

www.cdk3.net

Internet

http://www.cdk3.net/

www.w3c.org

File system of www.w3c.org

Protocols

Activity.html

http://www.w3c.org/Protocols/Activity.html

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❑WWW

➢ world-wide resource sharing over Internet

➢ based on technologies:
  o HTML (Hyper Text Markup Language)
  o URL (Uniform Resource Locator)
  o client-server architecture

➢ open system

➢ can be extended, re-implemented, ...

❑**Challenges posed by DSs**

➢Due to:
- o size
- o changing technologies
- o complexity
- o society's dependence

❑Challenges

➢ The challenges arising from the construction of distributed systems are:

1) heterogeneity of its components.
2) openness, which allows components to be added or replaced.
3) Security.
4) scalability - the ability to work well when the number of users increases.
5) failure handling.
6) concurrency of components and
7) transparency.

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