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FACULTY OF EGINEERING AND TECHNOLOGY

Distributed Systems(BCS-701)
LECTURE-02

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OUTLINE

- CHARACTERIZATION OF DISTRIBUTED SYSTEMS
- Concurrency
- No global clock
- Independent failures
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CHARACTERIZATION OF DISTRIBUTED SYSTEMS

INTRODUCTION

Networks of computers are everywhere. The Internet is one, as are the many networks of which it is composed. Mobile phone networks, corporate networks, factory networks, campus networks, home networks, in-car networks – all of these, both separately and in combination, share the essential characteristics that make them relevant subjects for study under the heading distributed systems. Distributed system is the one in which hardware or software components located at networked computers communicate and coordinate their actions only by passing messages. This simple definition covers the entire range of systems in which networked computers can usefully be deployed. Characteristics of Distributed Systems are,

- Concurrency
- No global clock
- Independent failures

Concurrency

In a network of computers, concurrent program execution is the norm. I can do my work on my computer while you do your work on yours, sharing resources such as web pages or files when necessary. The capacity of the system to handle shared resources can be increased by adding more resources (for example. computers) to the network. The coordination of concurrently executing programs that share resources is also an important and recurring topic.

No global clock

When programs need to cooperate they coordinate their actions by exchanging messages. Close coordination often depends on a shared idea of the time at which the programs' actions occur. But it turns out that there are limits to the accuracy with which the computers in a network can synchronize their clocks – there is no single global notion of the correct time. This is a direct consequence of the fact that the only communication is by sending messages through a network.

Independent failures

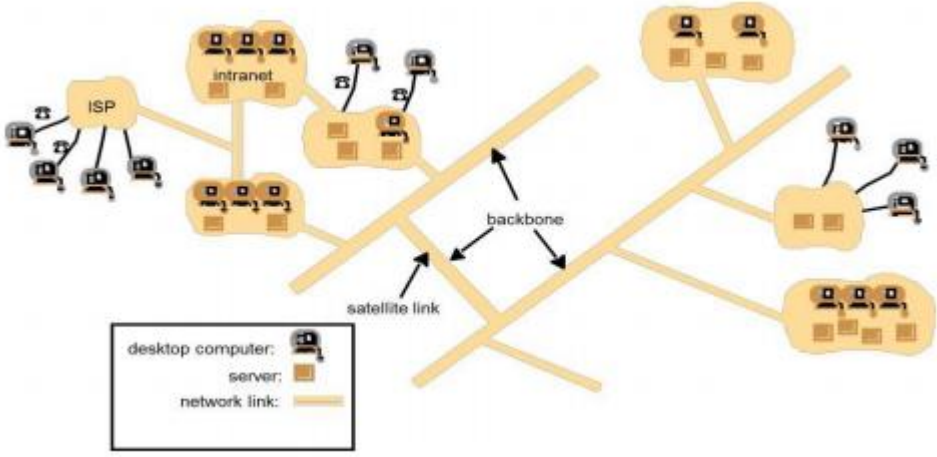
All computer systems can fail, and it is the responsibility of system Designers to plan for the consequences of possible failures. Distributed systems can fail in new ways. Faults in the network result in the isolation of the computers that are connected to it, but that doesn't mean that they stop running. In fact, the programs on them may not be able to detect whether the network has failed or has become unusually slow. Similarly, the failure of a Computer, or the unexpected termination of a program somewhere in the system (a crash), is not immediately made known to the other components with which it communicates. Each component of the system can fail independently, leaving the others still running.

EXAMPLES OF DISTRIBUTED SYSTEMS

- Internet
- Intranets Mobile
- Ubiquitous computing

Internet

Internet is a very large distributed system. It enables users, wherever they are, to make use of services like www, email, file transfer. The set of services is open-ended. Refer figure below which shows a typical portion of internet. Internet connects millions of LANs and MANs to each other.



Intranet

❑An intranet is a portion of the internet that is separately administered and has a boundary that can be configured to enforce local security policies.

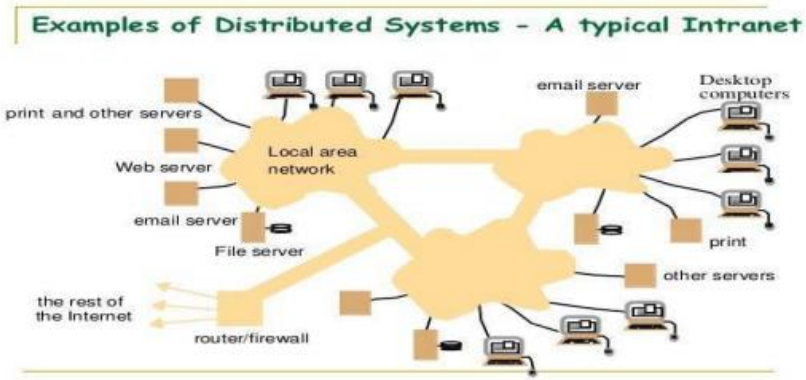
❑It may be composed of several LANs linked by backbone connections.

❑The n/w configuration of a particular intranet is the responsibility of the organization that administers it.

❑An intranet is connected to the Internet via router, which allows the users to use the services available in the Internet.

❑Firewall is used to protect intranet by preventing unauthorized messages leaving or entering.

❑Some organizations do not wish to connect their internal networks to the Internet at all. E.g. police and other security and law enforcement agencies are likely to have at least some internal networks that are isolated from outside world.

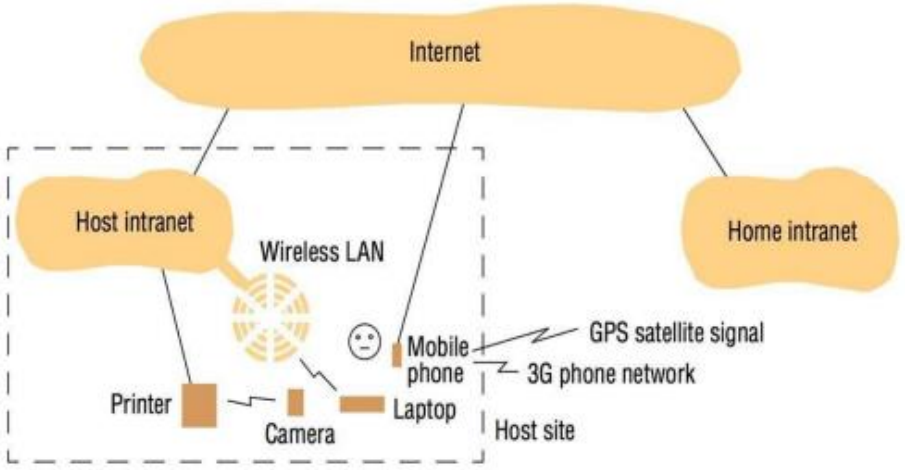


Mobile and Ubiquitous computing:

❑Integration of portable computing devices like Laptops, smartphones, handheld devices, pagers, digital cameras, smart watches, devices embedded in appliances like refrigerators, washing machines, cars etc. with the distributed systems became possible because of the technological advances in device miniaturization and wireless networking.

❑These devices can be connected to each other conveniently in different places, makes mobile computing possible.

❑Figure below shows how a user from home intranet can access the resources at Host intranet using mobile devices.



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