UNIT - 5

→ <u>Distributed Operating System</u> -

A distributed system is a collection of loosely coupled processors interconnected by a communication network.

Four major reasons for building distributed systems: resource sharing, computation speedup, reliability and communication

① <u>Types of distributed operating system</u> -

↳ <u>Data Migration</u> → transfer entire file or transfer portions of the file

↳ <u>Computation Migration</u> → by initiating RRC or by sending a message.

↳ <u>Process Migration</u> → by the client or by the user.

② <u>Design Issues</u> -

→ making the multiplicity of processors and storage devices transparent to the user

→ User mobility

→ fault tolerance

→ Scalability

③ <u>File System</u> -

A DFS (distributed file system) is a file system whose clients, servers and storage devices are dispersed among the machines of a distributed system.

A <u>service</u> is a software entity running one or more machines and providing a particular type of function to clients

A <u>server</u> is a service software running on a single machine

A <u>client</u> is a process that can invoke a service using a set of operations that form its client interface.

④ <u>Remote file access</u> -

Accessing file remotely by the user, and the user store that particular file. It can be implemented by RPC (Remote procedure call). For reasonable performance, we use a form of caching -

⑤ **RPC** (Remote Procedure Calls) —

It is a client-server mechanism that enables an applica on one machine to make a procedure call to code on another machine.

⑥ **RMI** (Remote Method Invocation) — distributed object technologies developed by SUN, available as part of the core Java API, java centric, object interfaces defined as Java interfaces, uses object serialization.

⑦ **DSM** (Distributed Shared memory) —

provides a virtual address space that is shared among all nodes in a distributed system.

⑧ **Basic concept of parallel processing & concurrent programming** —

parallel processing provide simultaneous data processing tasks for the purpose of increasing the computational speed of a computer system.

Concurrent programming allows multiple computations to occur simultaneously in cooperation with each other.

→ **Security & threats protection** —

① **Security violation through parameter** —

- → Denial of service → prevent legitimate use of the system
- → Theft of service → unauthorized used of service
- → Breach of confidentiality → unauthorized reading of data
- → Breach of integrity → unauthorized modification of data
- → Breach of availability → unauthorized destruction of data

② **Computer Worms** — It is a full program itself. It spreads to other computers over the network. It potentially bring the either network to grinding halt. Does not harm other program or data.

Safeguards against worms -
→ Prevent its creation
→ Prevent its spreading

(3) **Computer virus** - It is written with a clear intention of infecting other programs. It is a part of a program. Computer virus does not operate independently. It corcould harm to the system.

Types of viruses - Boot sector infectors, Memory Resident infectors, file specific infectors, command processor infectors, general purpose infectors

Infection methods - Append, Replace, insert, delete, redirect

Virus detection - Checks for the integrity of the binary files.

Virus Removal - Bit pattern of some virus can be "predicted".

Virus Prevention - Bang official, legal copies of software

(4) **Security design principle** -
→ Public design
→ least Privilege
→ explicit demand
→ continuous verification
→ simple design
→ user acceptance
→ multiple conditions

(5) **Authentication** - It is a process of verifying whether a person is a legitimate user or not.
In centralized environment, three ways -
→ (password) A secret, known only to that user.
→ (magnetic badge) something possessed only by that user
→ some human characteristics of the user (fingerprints).
In distributed environment,

⑥ Protection Mechanisms –

> Protection Framework – Access Rights, Access Hierarchies, Domains and Domain Switching, Block structured languages.

> Access Control List (ACL) – stores the data by column.

> Capability list – stores the data by rows.

> Combined schemes – Combine all above schemes.