SNS COLLEGE OF ENGINEERING

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AN AUTONOMOUS INSTITUTION

Approved by AICTE, New Delhi and Affiliated to
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V SEMESTER

DEPARTMENT OF COMPUTER SCIENCE AND DESIGN

19TS501 - Cloud Computing

(Regulation – 2019)

UNIT – 1

Topic: 1.4 Underlying Principles of Parallel and Distributed Computing

Academic Year 2024 – 2025 (Odd Semester)

1.4.Underlying Principles of Parallel and Distributed Computing Parallel computing

Parallel computing is the process of performing computational tasks across multiple processors at once to improve computing speed and efficiency. It divides tasks into sub-tasks and executes them simultaneously through different processors.

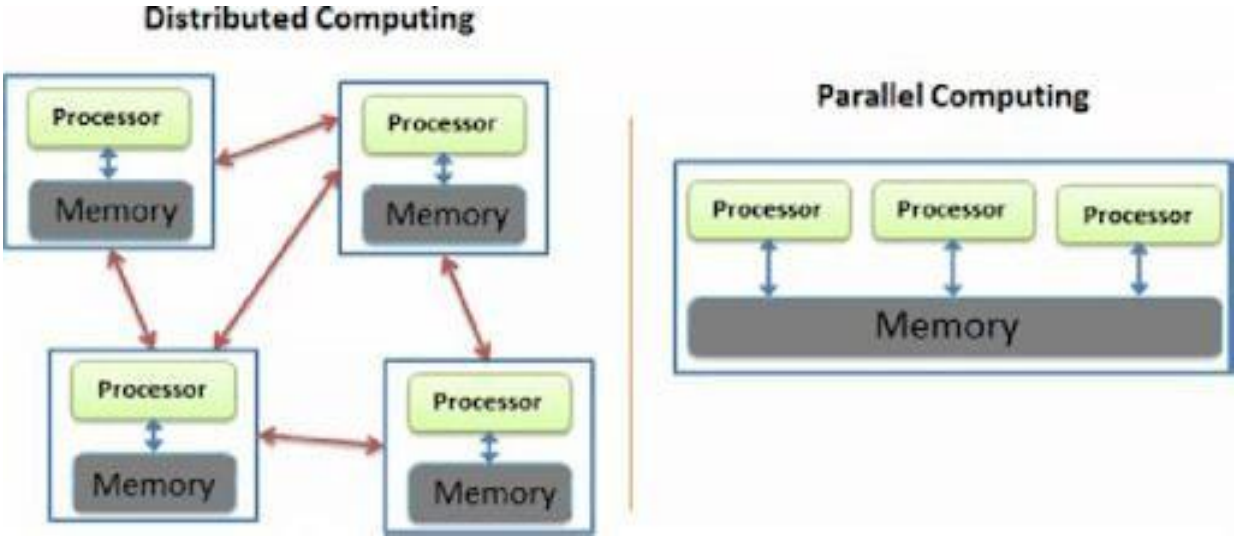
There are three main types, or "levels," of parallel computing: bit, instruction, and task.

Bit-level parallelism: Uses larger "words," which is a fixed-sized piece of data handled as a unit by the instruction set or the hardware of the processor, to reduce the number of instructions the processor needs to perform an operation.
Instruction-level parallelism: Employs a stream of instructions to allow processors to execute more than one instruction per clock cycle (the oscillation between high and low states within a digital circuit).

Runs computer code across multiple processors to run multiple tasks at the same time on the same data

Distributed computing
Distributed computing is the process of connecting multiple computers via a local network or wide area network so that they can act together as a single ultra-powerful computer capable of performing computations that no single computer within the network would be able to perform on its own.

Distributed computers offer two key advantages:
Easy scalability: Just add more computers to expand the system.
Redundancy: Since many different machines are providing the same service, that service can keep running even if one (or more) of the computers goes down.



S.NO	Parallel Computing	Distributed Computing
1.	Many operations are performed simultaneously	System components are located at different locations
2.	Single computer is required	Uses multiple computers
3.	Multiple processors perform multiple operations	Multiple computers perform multiple operations
4.	It may have shared or distributed memory	It have only distributed memory
5.	Processors communicate with each other through bus	Computers communicate with each other through message passing.
6.	Improves the system performance	Improves system scalability, fault tolerance and resource sharing capabilities

Advantages and Disadvantages of Parallel Computing

There are various advantages and disadvantages of parallel computing. Some of the advantages and disadvantages are as follows:

Advantages

- It saves time and money because many resources working together cut down on time and costs.
- It may be difficult to resolve larger problems on Serial Computing.
- You can do many things at once using many computing resources.
- Parallel computing is much better than serial computing for modeling, simulating, and comprehending complicated real-world events.

Disadvantages

- The multi-core architectures consume a lot of power.
- Parallel solutions are more difficult to implement, debug, and prove right due to the complexity of communication and coordination, and they frequently perform worse than their serial equivalents.
- Advantages and Disadvantages of Distributed Computing

Advantages

- It is flexible, making it simple to install, use, and debug new services.
- In distributed computing, you may add multiple machines as required.
- If the system crashes on one server, that doesn't affect other servers.
- A distributed computer system may combine the computational capacity of several computers, making it faster than traditional systems.

Disadvantages

- Data security and sharing are the main issues in distributed systems due to the features of open systems
- Because of the distribution across multiple servers, troubleshooting and diagnostics are more challenging.
- The main disadvantage of distributed computer systems is the lack of software support.