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FACULTY OF EGINEERING AND TECHNOLOGY

Distributed Systems(BCS-701)
LECTURE-05

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OUTLINE

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Limitation of Distributed System

Distributed System is a collection of self-governing computer systems efficient of transmission and cooperation among each other by the means of interconnections between their hardware and software. It is a collection of loosely coupled processor that appears to its users a single systematic system. Distributed systems has various limitations such as in distributed system there is not any presence of a global state. This differentiates distributed system computing from databases in which a steady global state is maintained.

Distributed system limitations has the impact on both design and implementation of distributed systems. There are mainly two limitations of the distributed system which are as following:

1. Absence of a Global Clock
2. 2. Absence of Shared Memory

Limitation of Distributed System

Absence of a Global Clock:

In a distributed system there are a lot of systems and each system has its own clock. Each clock on each system is running at a different rate or granularity leading to them asynchronous. In starting the clocks are regulated to keep them consistent, but only after one local clock cycle they are out of the synchronization and no clock has the exact time.

Time is known for a certain precision because it is used for the following in distributed system:

- Temporal ordering of events
- Collecting up-to-date information on the state of the integrated system
- Scheduling of processes

There are restrictions on the precision of time by which processes in a distributed system can synchronize their clocks due to asynchronous message passing. Every clock in distributed system is synchronize with a more reliable clock, but due to transmission and execution time lapses the clocks becomes different. Absence of global clock make more difficult the algorithm for designing and debugging of distributed system.

Limitation of Distributed System

Absence of Shared Memory:

Distributed systems have not any physically shared memory, all computers in the distributed system have their own specific physical memory. As computer in the distributed system do not share the common memory, it is impossible for any one system to know the global state of the full distributed system. Process in the distributed system obtains coherent view of the system but in actual that view is partial view of the system.

As in distributed system there is an absence of a global state, it is challenging to recognize any global property of the system. The global state in distributed system is divided by many number of computers into smaller entities.

FUNDAMENTAL MODELS

Computation occurs within processes; the processes interact by passing messages, resulting in communication (information flow) and coordination (synchronization and ordering of activities) between processes. In the analysis and design of distributed systems we are concerned especially with these interactions. The interaction model must reflect the facts that communication takes place with delays that are often of considerable duration, and that the accuracy with which independent processes can be coordinated is limited by these delays and by the difficulty of maintaining the same notion of time across all the computers in a distributed system.

Failure: The correct operation of a distributed system is threatened whenever a fault occurs in any of the computers on which it runs (including software faults) or in the network that connects them. Our model defines and classifies the faults. This provides a basis for the analysis of their potential effects and for the design of systems that are able to tolerate faults of each type while continuing to run correctly.

Security: The modular nature of distributed systems and their openness exposes them to attack by both external and internal agents. Our security model defines and classifies the forms that such attacks may take, providing a basis for the analysis of threats to a system and for the design of systems that are able to resist them.

INTERACTION MODEL

The discussion of system architectures in indicates that fundamentally distributed systems are composed of many processes, interacting in complex ways. For example:

• Multiple server processes may cooperate with one another to provide a service; the examples mentioned above were the Domain Name System, which partitions and replicates its data at servers throughout the Internet, and Sun's Network Information Service, which keeps replicated copies of password files at several servers in a local area network.

Two significant factors affecting interacting processes in a distributed system:

• Communication performance is often a limiting characteristic.

• It is impossible to maintain a single global notion of time.

Performance of communication channel

❑The communication channels in our model are realized in a variety of ways in distributed systems, for example

- ➢By an implementation of streams
- ➢By simple message passing over a computer network

❑Communication over a computer network has the performance characteristics such as:

- ▪**Latency** The delay between the start of a message's transmission from one process to the beginning of its receipt by another.
- ▪**Bandwidth** The total amount of information that can be transmitted over a computer network in a given time. Communication channels using the same network, have to share the available bandwidth.
- ▪**Jitter** The variation in the time taken to deliver a series of messages. It is relevant to multimedia data. For example, if consecutive samples of audio data are played with differing time intervals then the sound will be badly distorted.

References

- https://www.javatpoint.com/digital-image-processing-tutorial
- https://www.tutorialpoint.com/
- https://www.geeksforgeeks.org/limitation-of-distributed-system/
- Distributed Systems, Concepts and Design, George Coulouris, J Dollimore and Tim Kindberg, Pearson Education, 4th Edition,2009.
- Distributed Systems, Principles and paradigms, Andrew S.Tanenbaum, Maarten Van Steen, Second Edition, PHI.
- Distributed Systems, An Algorithm Approach, Sikumar Ghosh, Chapman & Hall/CRC, Taylor & Fransis Group, 2007.