CMP 421 Dr Gaga

Assignment: what are the gaps out there and how can industrial training bridge those gaps.

18/ November 2024\* Discuss the types of parallel computing and the future of parallel computing

18th November 18, 2024 discuss distributed computing applications and use cases

Assignment: Discuss the Disadvantages of RPC

Discuss the disadvantage of distributed computing

2. Distributed vs parallel

# Net-centric Computing

Every computing is centered in net centric and all computers are stand-alone computers. Stand-alone network is when an organization is able to connect all the systems in that organization and they are not connected to beyond that network. Even if 2 buildings in 2 different locations are connected to one network as long as it is the same network, it is still a stand-alone network.

* LAN:
* WAN:
* Connected networks (internet): the network of networks or

To connect networks with other networks via banking, it has to be connected through MIPS which is connected to CBN and too ensure security, it is connected to EFCC

Figure 1 Distributed Network

Smart networks: these are networks that have been integrated with AI

The use of processor: it performs arithmetic, logical and I/O operations of a computer system

Internet vs network: network is the connection of computer devices while internet is the connection of networks

Computing is the process of using computer technology to complete a given oriented task.

Single vs multi-processor: it’s in the name

Multi boosts performance and makes provision for fault tolerance

Tightly coupled systems: parallel computing systems and loosely coupled systems: distributed

The degree of coupling is low in loosely coupled and high in tightly coupled

Advantages:

Loosely (Distributed memory system): its communication is via message passing. Each cpu has its ow memory

Tightly (parallel processing system): it has a single system wide memory with a shared memory multiprocessor system and communicates via interconnected hardware

Types of computing:

* Centralized computing: is computing where most of the processing is performed on a central server. It uses client server architecture.
* Decentralized computing: is computing which distributes workloads among several machines instead of relying on a single central server.

Parallel computing: is a technique of computing where multiple tasks are processed simultaneously on multiple processors.

Difference between distributed vs parallel is that

* distributed is multiple computers while parallel is a single computer with multiple processors
* message passing vs multiple processors perform processing
* synchronization algorithm vs master cock for synching

Distributed computing: every node working with every node within a network to solve a single problem. A set of node is called a cluster.

# Distributed computing

This is a network of independent computers working together to achieve common computational goals

Advantages

* Scalability: new systems can be added to the network
* Availability: due to the numerous amount of systems, in the occasion of a breakdown, the system can pick up from where the last one stopped
* Transparency: the process between the machine and the gateway is unknown. The system operates as a single entity and so any one of the computers can receive the message and can deliver it back to the sending machine

Types of architecture

Client- server: the clients make request to the server then the servers process the request and the feedback is delivered back to the client.

3-tier : application layer, service layer, access layer. Using this type, it increases flexibility in the sense that when there is a problem in one of the sectors, you will be able to diagnose and resolve it easily.

N-tier: more than 3 sectors. Each sector has its own layer independent of the other.

P2p: each machine is directly linked to the other and can communicate only with each other.

Distributed computing model

* Mini computer model: there is a network communicating with the computers which each computer has nodes which can communicate with other nodes in the system.
* Workstation model:
* Workstation server networking
* Communication network
* Hybrid model: combination of 2 or more of the models

Operating system: a software that bridges the users, the application and the hardware.

Distributed operating system: is an OS that runs on several machines which work as a single entity. It supports communication and integration and is transparent.

Challenges of building a distributed OS

* Separated physical resources = loss of resources such as time and messaging signals for communication

Types of transparency

* Access transparency: we do not know how we are getting the information or signal.
* Location transparency: we do not know from where we are getting the information
* Concurrency
* Scalability
* Performance: unaware of updates and improvements
* Migration: unaware of change of location for the server location

Remote Procedure Call (RPC)

This is a protocol that allows the computer program to request something from another computer without the programmer needing to explicitly code communication details.

Importance:

* Different OS communication.:

Sequence of events

* Call -> pack -> send -> wait -> unpack -> return
* Client -> stub -> RPC runtime -> stub -> client

Advantages

Distributed shared memory (DSM)

Between the systems in a distributed system, there is a virtual address space which maps out the individual memory address of each of the computers in the system