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SE COMPS A-3

OPERATING SYSTEMS
EXPERIMENT - 5
THEORY

AIM: Implementation of process and thread synchronization using Client Server architecture

THEORY:

Synchronized Keyword

Java provides a keyword “Synchronized” that can be used in a program to mark a Critical section. The critical section can be a block of code or a complete method. Thus, only one thread can access the critical section marked by the Synchronized keyword.

We can write the concurrent parts (parts that execute concurrently) for an application using the Synchronized keyword. We also get rid of the race conditions by making a block of code or a method Synchronized.

When we mark a block or method synchronized, we protect the shared resources inside these entities from simultaneous access and thereby corruption.

Types of Synchronization

There are 2 types of synchronization as explained below:

1) Process Synchronization

Process Synchronization involves multiple processes or threads executing simultaneously. They ultimately reach a state where these processes or threads commit to a specific sequence of actions.

2) Thread Synchronization

In Thread Synchronization, more than one thread is trying to access a shared space. The threads are synchronized in such a manner that the shared space is accessed only by one thread at a time.

In Java, we can use the synchronized keyword with:

- A block of code
- A method

The above types are the mutually exclusive types of thread synchronization. Mutual exclusion keeps the threads accessing shared data from interfering with each other.

The other type of thread synchronization is “InterThread communication” that is based on cooperation between threads.

Client-Server Model:

The Client-server model is a distributed application structure that partitions task or workload between the providers of a resource or service, called servers, and service requesters called clients. In the client-server architecture, when the client computer sends a request for data to the server through the internet, the server accepts the requested process and deliver the data packets requested back to the client. Clients do not share any of their resources. Examples of Client-Server Model are Email, World Wide Web, etc.

Working of Client-Server Model:

In this article we are going to take a dive into the **Client-Server** model and have a look at how the **Internet** works via, web browsers. This article will help us in having a solid foundation of the WEB and help in working with WEB technologies with ease.

- **Client:** When we talk the word **Client**, it mean to talk of a person or an organization using a particular service. Similarly in the digital world a **Client** is a computer (**Host**) i.e. capable of receiving information or using a particular service from the service providers (**Servers**).
- **Servers:** Similarly, when we talk the word **Servers**, It mean a person or medium that serves something. Similarly in this digital world a **Server** is a remote computer which provides information (data) or access to particular services.

So, its basically the **Client** requesting something and the **Server** serving it as long as its present in the database.

Advantages of Client-Server model:

- Centralized system with all data in a single place.
- Cost efficient requires less maintenance cost and Data recovery is possible.
- The capacity of the Client and Servers can be changed separately.

Disadvantages of Client-Server model:

- Clients are prone to viruses, Trojans and worms if present in the Server or uploaded into the Server.
- Server are prone to Denial of Service (DOS) attacks.
- Data packets may be spoofed or modified during transmission.
- Phishing or capturing login credentials or other useful information of the user are common and MITM(Man in the Middle) attacks are common.

Server-side Programming :

It is the program that runs on server dealing with the generation of content of web page.

1) Querying the database

2) Operations over databases

3) Access/Write a file on server.

4) Interact with other servers.

5) Structure web applications.

6) Process user input. For example if user input is a text in search box, run a search algorithm on data stored on server and send the results.

Client-side Programming :

It is the program that runs on the client machine (browser) and deals with the user interface/display and any other processing that can happen on client machine like reading/writing cookies.

1) Interact with temporary storage

2) Make interactive web pages

3) Interact with local storage

4) Sending request for data to server

5) Send request to server

6) work as an interface between server and user

CONCLUSION:

We learnt the use of the synchronization keyword in java.The different types of synchronization.We also learnt about the Client-Server model in Java and its implementation with the use of Sockets from java.net package.