Distributed Computing-Future and Applications

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Abstract - *The use of a distributed system to solve a single large problem by breaking it down into several tasks where each task is computed in the individual computers of the distributed system. A distributed system consists of more than one self directed computer that communicates through a network. All the computers connected in a network communicate with each other to achieve a common goal by making use of their own local memory.*

***Key Words*: distributed, computed, network, task, memory**

1. INTRODUCTION

Distributed computing just means that something is shared among multiple systems which may also be in different locations. In terms of enterprise, distributed computing has often meant putting various steps in business processes at the most efficient places in a network of computers. In distributed computing, a single problem is divided into many parts, and each part is solved by different computers.

1.1 Architecture of Distributed Computing

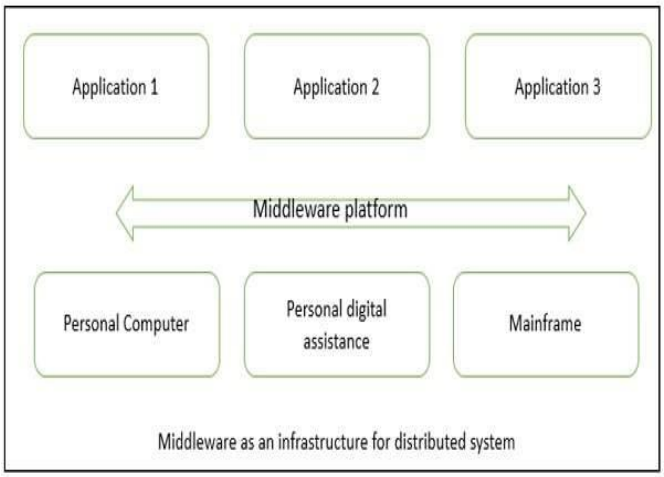

Fig-1 Distributed Architecture

In this architecture, information processing is not confined to a single machine rather it is distributed over several independent computers.

1.2 Architecture Types

1.2.1 Client Server Architecture

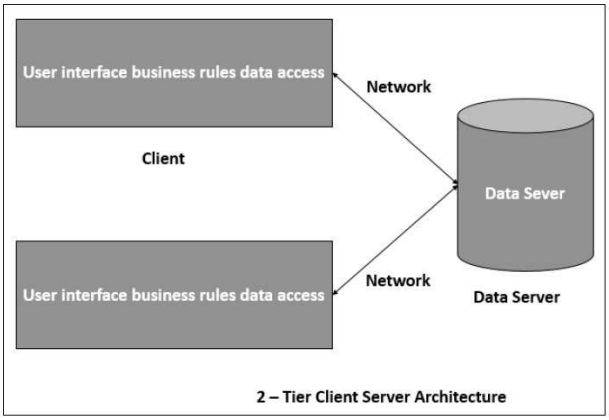

Fig-2 Client Server Architecture

The client-server architecture is the most common distributed system architecture which decomposes the system into two major subsystems or logical processes –

- **Client** – this is the first process that issues a request to the second process i.e. the server.
- **Server** – this is the second process that receives the request, carries it out, and sends a reply to the client.

In this architecture, the application is modeled as a set of services those are provided by servers and a set of clients that use these services. The servers need not to know about clients, but the clients must know the identity of servers.

1.2.2 Thin-client model

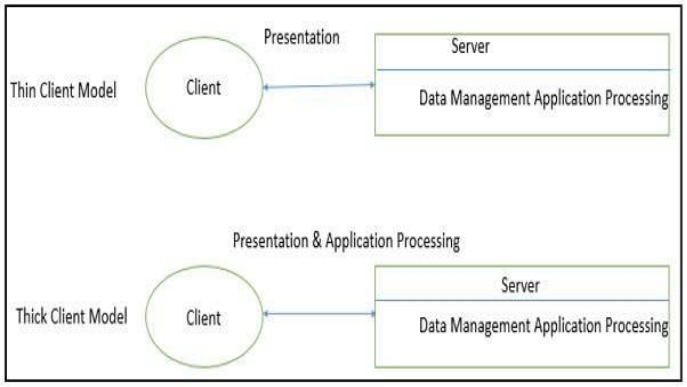

Fig-3 Thin Client Architecture

In this model, all the application processing and data management is carried by the server. The client is responsible for running the GUI software. It is used when legacy systems are migrated to client server architectures in which legacy system acts as a server in its own right with a graphical interface implemented on a client.

But, a major disadvantage is that it places a heavy processing load on both the server and the network.

1.2.3 Multi-Tier Architecture

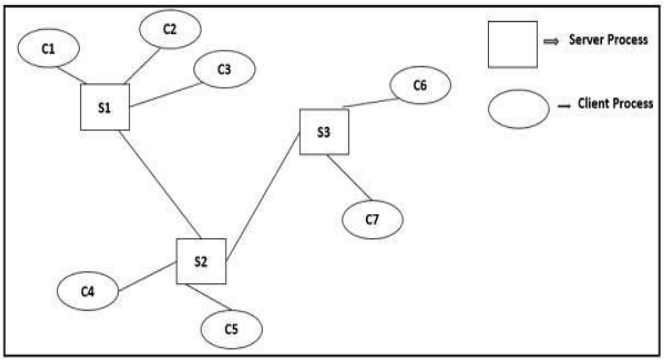

Fig-4 Multi-Tier Architecture

Multi-tier architecture is a client–server architecture in which the functions such as presentation, application processing, and data management are physically separated. By separating an application into number of tiers, developers obtain the option of changing or adding a specific layer, instead of reworking the entire application. It provides a model by which developers can create flexible and reusable applications.

The mostly used general multi tier architecture is three tier architecture which consist of a Presentation Tier, an application tier and a Data tier.

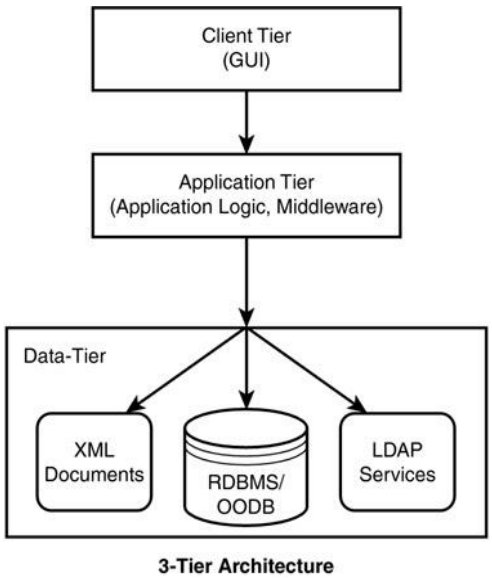

Fig-5 Three-Tier Architecture

Presentation Tier: In this tier, user can directly access webpage and operating system GUI's. The main function of this tier is to translate the given task in to user understandable language.

Application Tier: It moves the data between two corresponding layers. This tier coordinates the application, processes the commands, makes logical decisions, evaluation, and performs calculations.

Data Tier: In this layer, information is stored and retrieved from the database or file system. The information is then passed back for processing and then back to the user. It includes the data persistence mechanisms (database servers, file shares, etc.) and provides API (Application Programming Interface) to the application tier which provides methods of managing the stored data.

2. Types of Distributed Computing

1. **Grid Computing:** Multiple independent computing clusters which acts like a "grid" because they are composed of resource nodes not located within a single domain.

2. **Cloud Computing:** Cloud computing is a computing paradigm where computing is moved away from personal computers or an individual application server to a "cloud" of computers. This method of distributed computing is done through pooling all computer resources together and being managed by software rather than human.

3. Advantages of Distributed Computing

1. **Sharing Data:** User at one site may be able to access the data from another site. Each site is able to retain a degree of control over data that are stored locally which leads to autonomy.

2. **Availability:** If one site fails in a distributed system, the remaining sites may be able to continue operating. Thus failure of one site does not affect the entire network.

3. In distributed system there is a global database administrator responsible for the entire system. A part of global data base administrator responsibilities is delegated to local data base administrator for each site.

4. Disadvantages of Distributed Computing

1. **Complexity:** It requires proper coordination among all sites. If not so, it leads to complexity.

2. **Software Development Cost:** It is more difficult to implement a distributed database system; thus it is more costly.

3. **Increased Processing Overhead:** The exchange of information and additional computation required to achieve co-ordination are a form of overhead that does not arise in centralized system.

5. Applications of Distributed System

1. Telecommunication Networks.
2. Distributed Rendering in Computer Graphics
3. Peer to Peer networks
4. Multiplayer online gaming
5. Airplane control towers
6. Scientific computing and data rendering

6. Future of Distributed System

Some mobile devices also used the distributed technology resources to make such applications for mobile devices. An open source software platform for supporting Grid systems and applications Amoeba: A distributed operating system that is designed for distributed computing tasks. Green Tea Software: A java based P2P generic distributed network computing platform that transmits code and data on-demand to run on heterogeneous OS. There are some future prospects of Distributed computing in technological World.

3. CONCLUSIONS

With the rapid development of various emerging distributed computing technologies such as Web services, Grid computing, and Cloud computing, computer networks become the integrant of the next generation distributed computing systems. Therefore, integration of networking and distributed computing systems becomes an important research problem for building the next-generation high-performance distributed information infrastructure.

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REFERENCES

[1] www.tutorialspoint.com

[2] www.slideshare.net

[3] "Distributed computing principles and algorithms and systems " by Ajay D. Kshemkalyani

[4] www.en.wikipedia.org

[5] www.techtarget.com