

Experiment 01: Study of Distributed Computing system architecture and Applications of Disputed Computing.

Learning Objective: Student should be able to understand concepts of distributed computing and apply them to explain various applications

Tools: MS Word

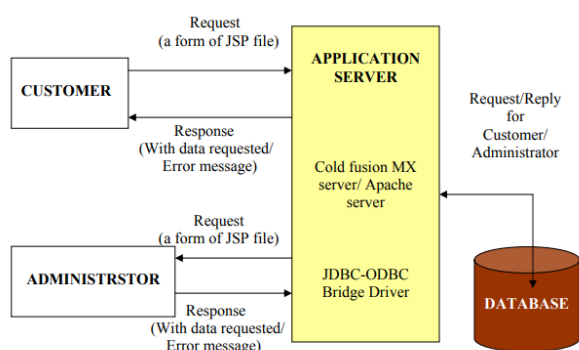
Theory:

Introduction to Distributed Computing: Distributed computing is a model in which components of a software system are shared among multiple computers or nodes. Even though the software components may be spread out across multiple computers in multiple locations, they're run as one system. This is done to improve efficiency and performance. The systems on different networked computers communicate and coordinate by sending messages back and forth to achieve a defined task. Distributed computing can increase performance, resilience and scalability, making it a common computing model in database and application design.

Goals of Distributed Computing: Performance. Distributed computing can help improve performance by having each computer in a cluster handle different parts of a task simultaneously. Scalability. Distributed computing clusters are scalable by adding new hardware when needed. Resilience and redundancy. Multiple computers can provide the same services. This way, if one machine isn't available, others can fill in for the service. Likewise, if two machines that perform the same service are in different data centers and one data center goes down, an organization can still operate. Cost-effectiveness. Distributed computing can use low-cost, off-the-shelf hardware. Efficiency. Complex requests can be broken down into smaller pieces and distributed among different systems. This way, the request is simplified and worked on as a form of parallel computing, reducing the time needed to compute requests. Distributed applications. Unlike traditional applications that run on a single system, distributed applications run on multiple systems simultaneously.

Case study: Distributed Computing Application for Online Banking: In today's world of emerging technologies, enterprises are moving towards the Internet for businesses. People are rushing towards the e-commerce applications for their day-to-day needs, which in turn are making the Internet very popular. Online Banking has given both an opportunity and a challenge to traditional banking. In the fast growing world, banking is a necessity, which in turn takes a lot of time from our busy schedule. Going to a branch or ATM or paying bills by paper check and mailing them out, and balancing checkbooks are all time-consuming tasks. Banking online automates many of these processes, saving time and money. For all banks, online banking is a powerful tool to gain new customers while it helps to eliminates costly paper handling and manual teller interactions in an increasingly competitive banking environment. Banks have spent generations gaining trust of their customers, and the goal for this project is to develop a user friendly, secure Online Banking Application. The application will be built using Java Server Pages (JSP), tomcat as the application server, and Microsoft Access / SQL Server as a database.

Architecture: The Online Banking Application is based on 3-tiered model. The Enterprise architecture for Online Banking Application is shown below.



The 3-tiered architecture shown above has the following major components:

- **Client:** There will be two clients for the application. One will be a web-based user-friendly client called bank customers. The other will be for administration purposes.
- **Application Server:** It takes care of the server script, takes care of JDBC-ODBC driver, and checks for the ODBC connectivity for mapping to the database in order to fulfill client and administrator's request.
- **Database:** Database Servers will store customer's and bank data.

Simply stated, the application works based on a request/response protocol. A client initiates a request to the server. The server responds by executing the business logic hosted inside the JSP program and if required, communicates with the Database Server to fulfill a client's request.

The Online Banking Application project will be divided into 4 modules namely:

- Bank Account
- Bank Account Administrator
- Credit Card Customer
- Credit Card Account Administrator

Similar banking applications available in the market A considerable amount of research has been done in the past few months on this project. Many banks had migrated from paper based banking system to electronic / online banking. Each bank had its own, user friendly interface, which helps its customers to interact with their account at their ease. A wide variety of online banking applications are available in the market, which in turn help the bank to function smoothly without reducing the quality of service. All banks which are using online banking application use the same basic principle. National City Bank has excellent features, which allows customers to check their accounts and view their statements. The best thing about this bank's system allows us to schedule payments and do online transactions. The security feature is the best; it gains the trust of the customer and allows them to do their transitions in an efficient and secure manner. However, the interface is very complicated for novice users. The interface for credit card customer is confusing. Bank One is the fastest growing bank in United States with millions of customers, who perform their transactions online. The security issues are wonderful, and it allows the customer to view their transactions, pay bills online, ATM/branch locator and provide 4 calculators and educators that will help customers to determine savings, mortgages and loan amounts. Educators are learning materials covering several financial topics which help the customer to learn more about the facilities that the bank has for them. The user interface is not as useful for the novice customers. TCF bank Online banking is a safe, fast and convenient way to access the accounts. It has all functionality but was lacking in user interface.

Advantages of Distributed Computing: Distributed computing includes the following benefits:

- Performance. Distributed computing can help improve performance by having each computer in a cluster handle different parts of a task simultaneously.
- Scalability. Distributed computing clusters are scalable by adding new hardware when needed.
- Resilience and redundancy. Multiple computers can provide the same services. This way, if one machine isn't available, others can fill in for the service. Likewise, if two machines that perform the same service are in different data centers and one data center goes down, an organization can still operate.
- Cost-effectiveness. Distributed computing can use low-cost, off-the-shelf hardware.
- Efficiency. Complex requests can be broken down into smaller pieces and distributed among different systems. This way, the request is simplified and worked on as a form of parallel computing, reducing the time needed to compute requests.
- Distributed applications. Unlike traditional applications that run on a single system, distributed applications run on multiple systems simultaneously.

Learning Outcomes: Students should have the ability to

LO1: Understand the basics of Architecture of Distributed Computing.

LO2: Studied Architecture of an application used in Distributed Computing.

Course Outcomes: Course Outcomes: Upon completion of the course students will be able to create architecture of Distributed Computing.

Conclusion: We were able to Understand the basics of Architecture of Distributed Computing, its goals, and advantages and also Studied Architecture of an application used in Distributed Computing.

Viva Questions:

1. List and explain Distributed Computing Architecture
2. Explain the steps used to develop architecture of university or banking, etc.

For Faculty Use:

Correction Parameters	Formative Assessment [40%]	Timely completion of Practical [40%]	Attendance/ Learning Attitude [20%]	
Marks Obtained				