Ira A. Fulton Schools of Engineering
Arizona State University

Term: Fall 2023 **Subject:** Computer Science & Engineering (CSE) **Number:** 512

Course Title: Distributed **D**atabase **S**ystems (CSE 512)

GROUP PROJECT TOPIC PROPOSAL

Team Name	Cluster Crafters: Mobile Phone Supply Chain Management	
Team Members	Balaji Rajaguru Rajakumar	1225704623
	Prajwal Mahaveera	1225421041
	Suryanarayan Nagendra	1225467633
	Abhishek Hondad	1225701750
Project Topic	We've picked **Mobile Phone Supply Chain Management** for our project. This area lets us keep track of mobile phones from the time they are made, to when they are sent out, and finally delivered to customers. This topic offers great learning as it has multiple components and interactions to explore. It's perfect for learning about database systems, like how data is spread out and stored in different places (distributed databases), broken down into smaller parts (fragmentation), copied for backup (replication), and how we manage and speed up the data searches (query processing and optimization). We also get to explore how to handle transactions and use databases that don't need a fixed structure (NoSQL databases).	
Plan of Action	Part 1: Design and Implementation of a Distributed Database System	1. Design the architecture, layout, and entity-relationship diagrams of the distributed database. 2. Selection of appropriate nodes and their locations. 3. Implementation of the Database Schema provided across multiple nodes. Tools: PostgreSQL
	Part 2: Fragmentation and Replication Techniques	1. Decide how to break information into pieces and define the pieces.

		(Fragmentation - Eg. Horizontal, Vertical) 2. Make copies of the pieces to make sure info is always available. (data replication) 3. Put breaking and copying info into action on the spread-out database. Tools: PostgreSQL or Apache ZooKeeper
	Part 3: Query Processing and Optimization Techniques	1. Build smart ways to find data quickly. (Utilize PostgreSQL's build-in query optimization) 2. Make data searches quicker and use fewer resources. 3. Evaluate our smart and quick data searches. Tools: PostgreSQL or Apache Calcite
	Part 4: Distributed Transaction Management	1. Develop and implement mechanisms for handling transactions in a distributed environment. 2. Make sure deals are secure and correct in different places. 3. Check how well our deal-handling works in different situations, including at the same time and when things go wrong. Tools: Apache Ignite
	Part 5: Distributed NoSQL Database Systems Implementation	1. Implementation of the given schema in a NoSQL distributed database system. 2. Ensure high availability, scalability, and fault tolerance of the NoSQL system. 3. Test the implemented NoSQL system for data consistency, availability, and partition tolerance. Tools: MongoDB and Docker

	Part 6: 3-Minute Video Demo	1. Make a clear video that shows and explains how the project's shared database works. 2.Explain how it helps us achieve our goals and resolve the problems.
Team Member Contribution/ Responsibility	Abhishek	**To lead the tasks:** ● Design and Implementation of a Distributed Database System ● 3-minute video recording **To lead the review of tasks:** ● Distributed NoSQL Database Systems Implementation ● Be part of completing rest of the tasks with the team members
	Balaji Rajaguru Rajakumar	**To lead the tasks:** ● Fragmentation and Replication Techniques ● Distributed Transaction Management **To lead the review of tasks:** ● Query Processing and Optimization Techniques ● Be part of completing rest of the tasks with the team members
	Prajwal Mahaveera	**To lead the task:** ● Distributed NoSQL Database Systems Implementation ● Keep track of overall progress of the project. **To lead the review of task:** ● Design and Implementation of a Distributed Database System. ● Distributed Transaction Management ● Be part of completing rest of the tasks with the team members

	Suryanarayan Nagendra	**To lead the task:** ● Query Processing and Optimization Techniques ● Keep track of overall progress of the project. **To lead the review of task:** ● Fragmentation and Replication Techniques ● 3-minute video recording ● Be part of completing rest of the tasks with the team members

Signature:

BRR PM SN AH