

# PA3.2: USING CONSENSUS TO BUILD DISTRIBUTED SYSTEMS

Vaishnavi Shah (33984452)

Ashlin Rodrigues (34054291)

## Gigapaxos:

In this design, Gigapaxos is used to build a fault tolerant system across multiple instances. Gigapaxos handles the replication of the application instances and manages the distribution of requests to these replicas. Even if a replica fails temporarily, Gigapaxos can redirect requests to available replicas. This enables the system to gracefully handle failures without compromising the overall functionality.

In the constructor, the class initializes the MyDBReplicableAppGP instance and sets the identifier that is used to identify the different replicas, myID. It establishes a connection to Cassandra, specifying the contact IP address as "127.0.0.1".

Using Cassandra, each piece of data is replicated to multiple nodes, ensuring that if one node fails, the data can be retrieved from a replica on another node.

The execute method takes a Request object, converts it to a string, and extracts the query from a JSON object. The query is then executed using the Cassandra session. This method allows the application to process incoming requests, ensuring that the database is updated accordingly. It enables the system to handle a continuous stream of requests, even in the presence of failures.

The checkpoint method performs a checkpoint operation by executing a SELECT query on the grade table in Cassandra. It retrieves the results, converts them to a string, and returns the string. This method is essential for capturing the current state of the database for recovery purposes. It captures a consistent snapshot of its state for potential recovery.

The restore method is responsible for restoring the database from a given string representation. It parses the input string, extracting rows and values. The parsed data is then inserted into the grade table in Cassandra, reconstructing the database state. It involves creating a map (resultMap) to store the key-value pairs. For each key-value pair in resultMap, the method executes a query on the Cassandra database. This process updates the database with the values from the checkpoint. This method is crucial for recovering the system to a consistent, known good state after a failure.

This design successfully passes all the test cases.

Vaishnavi Shah dunno what else to add