Two-Phase Commit Mechanism

Unlike a transaction on a local database, a distributed transaction involves altering data on multiple databases. Consequently, distributed transaction processing is more complicated, because the database must coordinate the committing or rolling back of the changes in a transaction as a self-contained unit. In other words, the entire transaction commits, or the entire transaction rolls back.

The database ensures the integrity of data in a distributed transaction using the **two-phase commit mechanism**. In the **prepare phase**, the initiating node in the transaction asks the other participating nodes to promise to commit or roll back the transaction. During the **commit phase**, the initiating node asks all participating nodes to commit the transaction. If this outcome is not possible, then all nodes are asked to roll back.

All participating nodes in a distributed transaction should perform the same action: they should either all commit or all perform a rollback of the transaction. The database automatically controls and monitors the commit or rollback of a distributed transaction and maintains the integrity of the **global database** (the collection of databases participating in the transaction) using the two-phase commit mechanism. This mechanism is completely transparent, requiring no programming on the part of the user or application developer.

The commit mechanism has the following distinct phases, which the database performs automatically whenever a user commits a distributed transaction:

| **Phase** | **Description** |
| --- | --- |
| Prepare phase | The initiating node, called the **global coordinator**, asks participating nodes other than the commit point site to promise to commit or roll back the transaction, even if there is a failure. If any node cannot prepare, the transaction is rolled back. |
| Commit phase | If all participants respond to the coordinator that they are prepared, then the coordinator asks the commit point site to commit. After it commits, the coordinator asks all other nodes to commit the transaction. |
| Forget phase | The global coordinator forgets about the transaction. |