



Distributed Systems project:

Study and Implementation of the Sieve Protocol in BFT

Samuele De Tuglie
Emanuele Artegiani
Pablo Sebastian Vargas Grateron



Objectives and Features

- **Main Goal:** Sieve protocol practical implementation.
- **Objective:** establish resilient Replicated State Machine (RSM) that can tolerate Byzantine faults in a distributed network.
- **Emphasis:** guarantee scalability and consistency.
- **Additional Feature:** basic client provided for communication with the RSM, performing a small set of actions.



Sieve protocol simulation

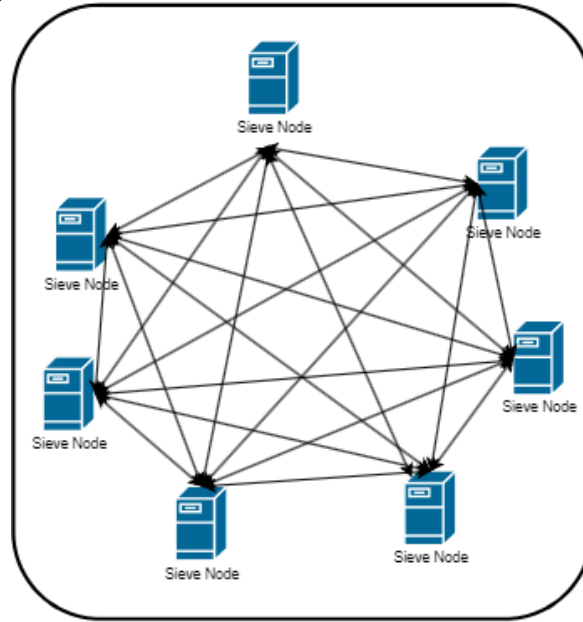
- **Requirement:** Sieve protocol needs a minimum of $3f + 1$ nodes to resist Byzantine failures.
- **Evaluation:** Simulation includes Byzantine actors to assess protocol resilience.
- **Outcome:** Demonstrates efficacy of Sieve process in achieving Byzantine Fault Tolerance (BFT).
- **Asynchronous Message Passing model:** Sieve nodes communicate exchanging encrypted messages to each others.



Design goals

- **Consistency & Consensus:** the shared db is always in a consistent state because every decision is made with consensus.
- **Scalability & Openness:** the network is based on nodes. Every interaction is made using messages with a standard json format.
- **Availability:** due to Sieve protocol intrinsic functionalities.
- **Transparency:** the network of nodes is perceived like a single server.

Network Architecture



The server is composed by the sieve nodes



Server



Client 1

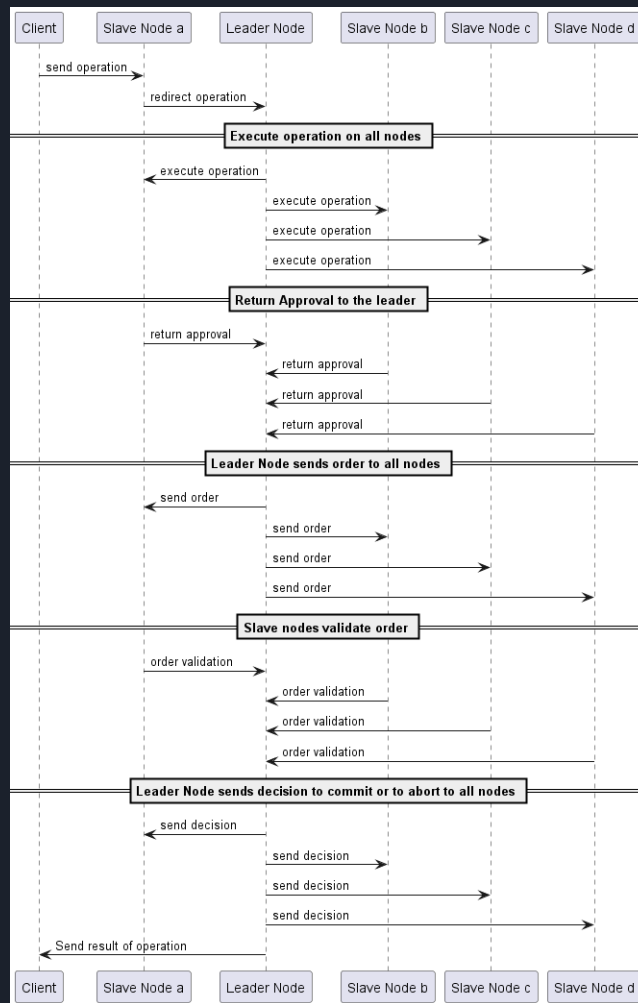
...



Client N



Simplified Event Diagram



Demo

The interface is divided into two main sections: Admin and Client.

Admin Section:

- Server status:** A red box displays the message "Server is not running". Below this are two buttons: "Start server" and "Stop server".
- Log:** A section with a "Clear" button and a large, empty text area for logging.

Client Section:

- Operation:** A section with two input fields labeled "Key:" and "Value:". Below these fields are two buttons: "Request" and "Send".
- Response history:** A section with a "Clear" button and a large, empty text area for displaying response history.