

transmitted to the client through the socket. • Scalability and Performance Benefits By limiting the number of active threads, the server prevents resource exhaustion and maintains stability even with a large number of concurrent client requests. The thread pool model allows the server to scale efficiently by balancing concurrency and resource usage.

4. System Architecture

The system consists of three main components:

- Clients
- Main Server Thread
- Thread Pool with Job Queue

The Job Queue is a shared First-In-First-Out (FIFO) buffer that stores socket file descriptors corresponding to pending client requests. Since this queue is accessed by multiple threads, it is protected using a mutex lock to ensure mutual exclusion and prevent race conditions.

Key characteristics: