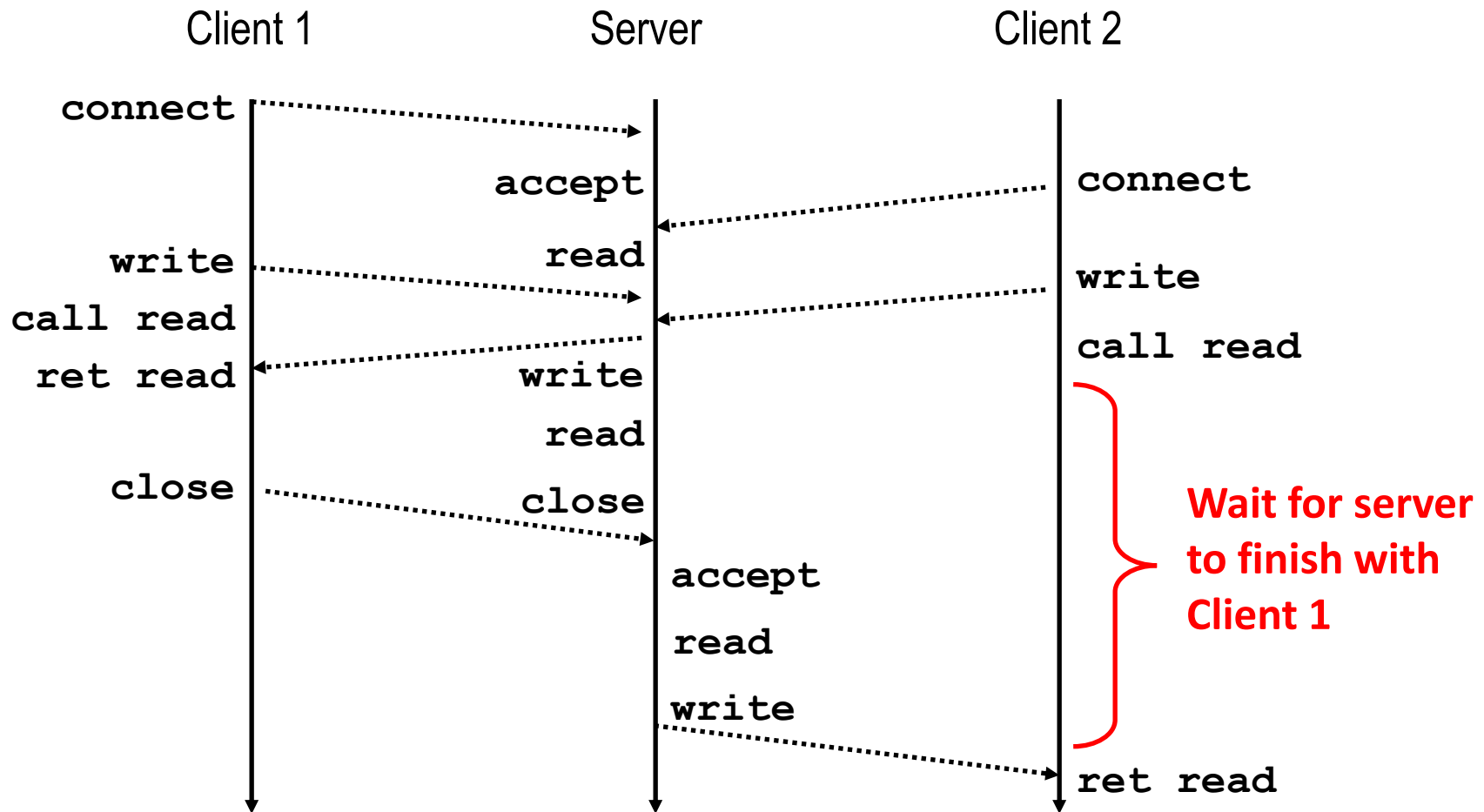


Concurrent Programming:

The need for concurrent servers

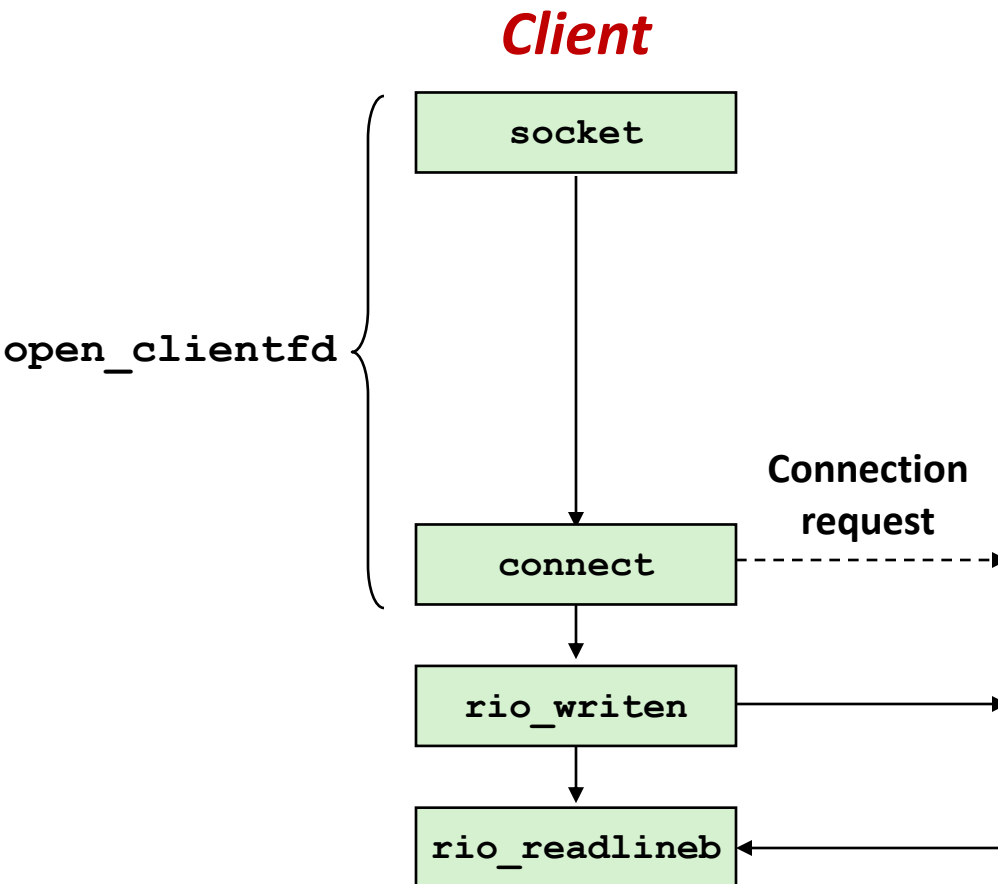
Iterative Servers

- Iterative servers process one request at a time



Where Does Second Client Block?

- Second client attempts to connect to iterative server



- Call to connect returns

- Even though connection not yet accepted
- Server side TCP manager queues request
- Feature known as “TCP listen backlog”

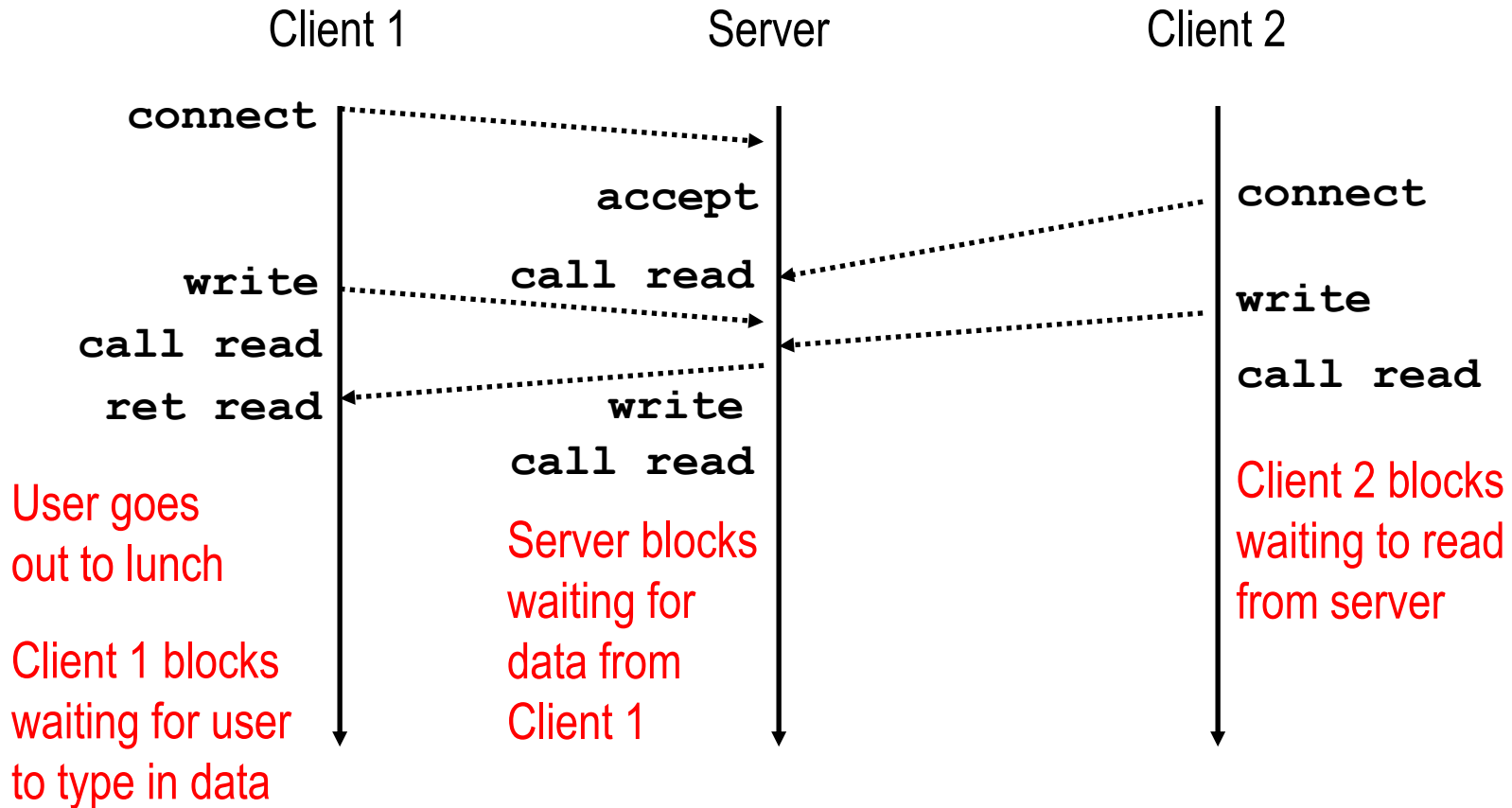
- Call to rio_writen returns

- Server side TCP manager buffers input data (subject to buffer size)

- Call to rio_readlineb blocks

- Server hasn't written anything for it to read yet.

Fundamental Flaw of Iterative Servers





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Approaches for Writing Concurrent Servers

Allow server to handle multiple clients concurrently

1. Process-based

- Kernel automatically interleaves multiple logical flows
- Each flow has its own private address space

2. Event-based

- Programmer manually interleaves multiple logical flows
- All flows share the same address space
- Uses technique called *I/O multiplexing*.

3. Thread-based

- Kernel automatically interleaves multiple logical flows
- Each flow shares the same address space
- Hybrid of of process-based and event-based.