CS420: Operating Systems

Client/Server Communication

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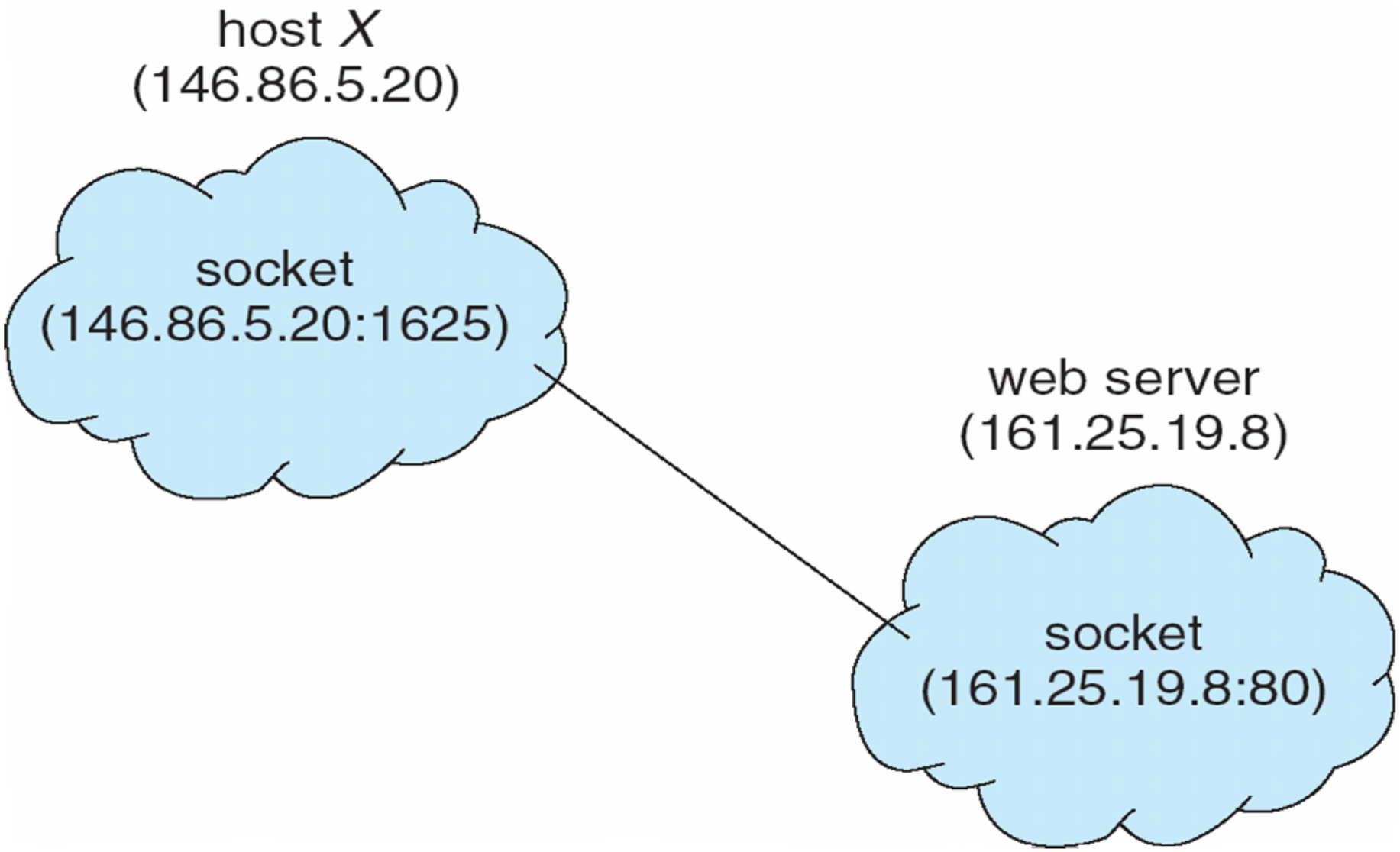
Communications in Client-Server Systems

- **Three additional strategies for communicating between processes (local and/or remote processes)**
  - Sockets
  - Remote Procedure Calls
  - Pipes

Sockets

- **A socket is defined as an endpoint for communication**
- **A socket is a concatenation of IP address and a port**
- **The socket 161.25.19.8:1625 refers to port 1625 on host 161.25.19.8**
- **Communication links exist between a pair of sockets**
  - All connections must be unique

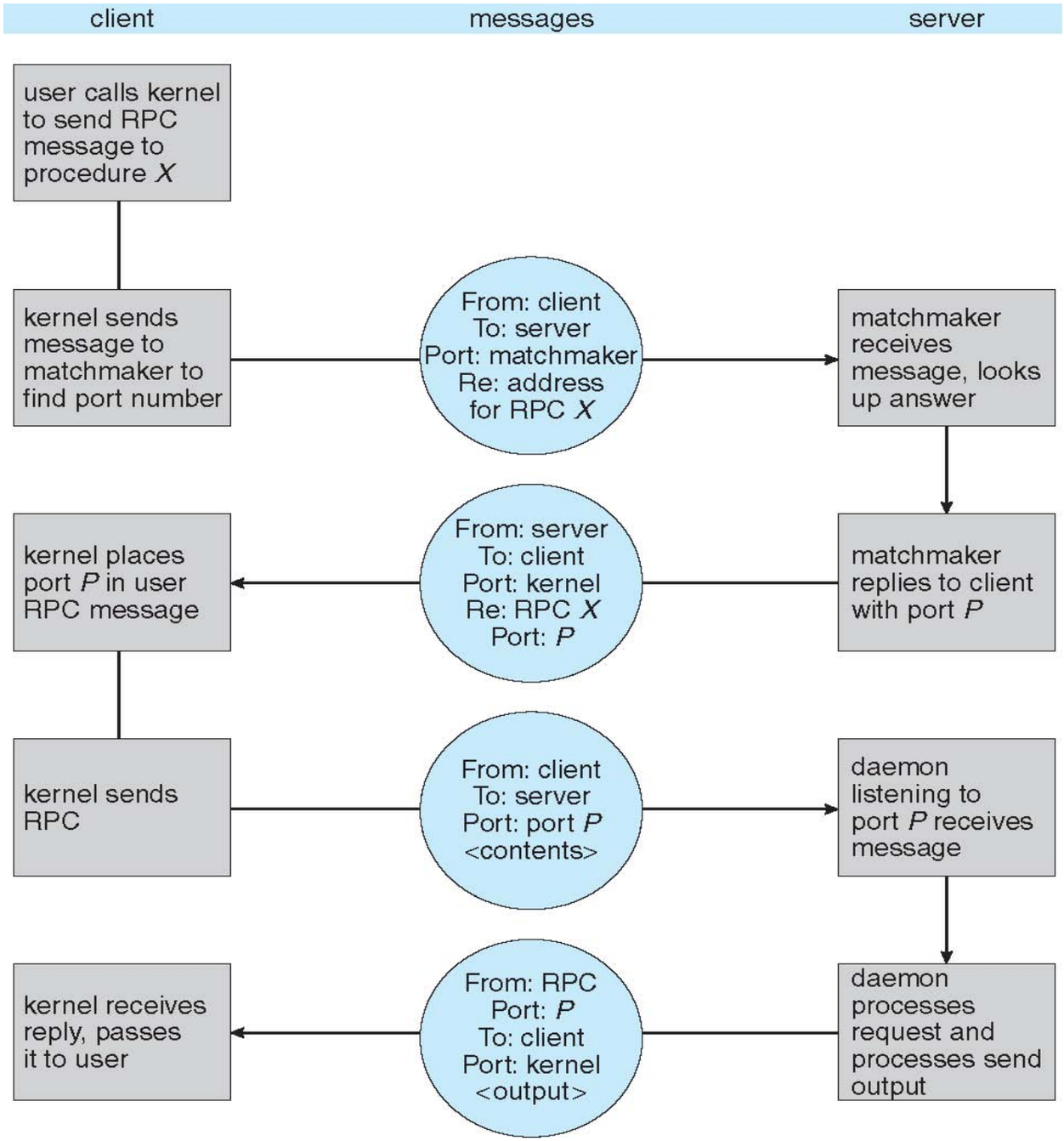
Socket Communication



Remote Procedure Calls

- **Remote procedure call (RPC) abstracts procedure calls between processes on networked systems**
  - Allows a client to invoke a procedure on a remote host the same as it would locally
- **Stubs – client-side proxy for the actual procedure on the server**
  - Typically, a separate stub exists for each unique remote procedure
- **The client-side stub locates the server and marshalls the parameters**
- **The server-side stub receives this message, unpacks the marshalled parameters, and performs the procedure on the server**

Execution of RPC



Pipes

- **Pipes serve as a conduit allowing two processes to communicate**

- **Implementation Issues**
  - Is communication unidirectional or bidirectional?
  - In the case of two-way communication, is it half or full-duplex?
  - Must there exist a relationship (i.e. parent-child) between the communicating processes?
  - Can the pipes be used over a network?

- **Two common types of pipes, ordinary pipes and named pipes**

Ordinary Pipes

- **Ordinary pipes allow communication in standard producer-consumer style**
  - Opened and treated similarly to a file

- **Producer writes to one end (the write-end of the pipe)**

- **Consumer reads from the other end (the read-end of the pipe)**

- **Ordinary pipes are unidirectional**

- **Ordinary pipe cannot be accessed from outside the process that creates it**
  - Requires parent-child relationship between communicating processes

Named Pipes

- **Named pipes are more powerful than ordinary pipes**
- **Communication is bidirectional**
- **No parent-child relationship is necessary between the communicating processes**
- **Several processes can use the named pipe for communication**
- **Provided on both UNIX and Windows systems**