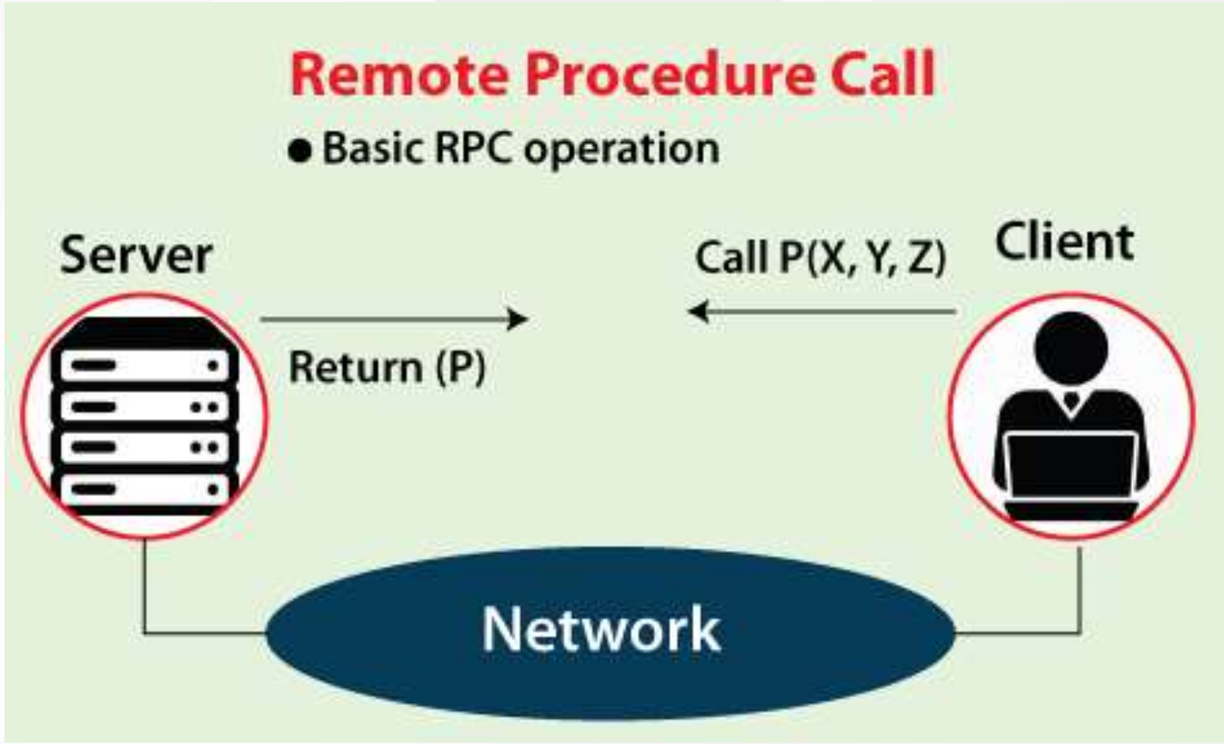
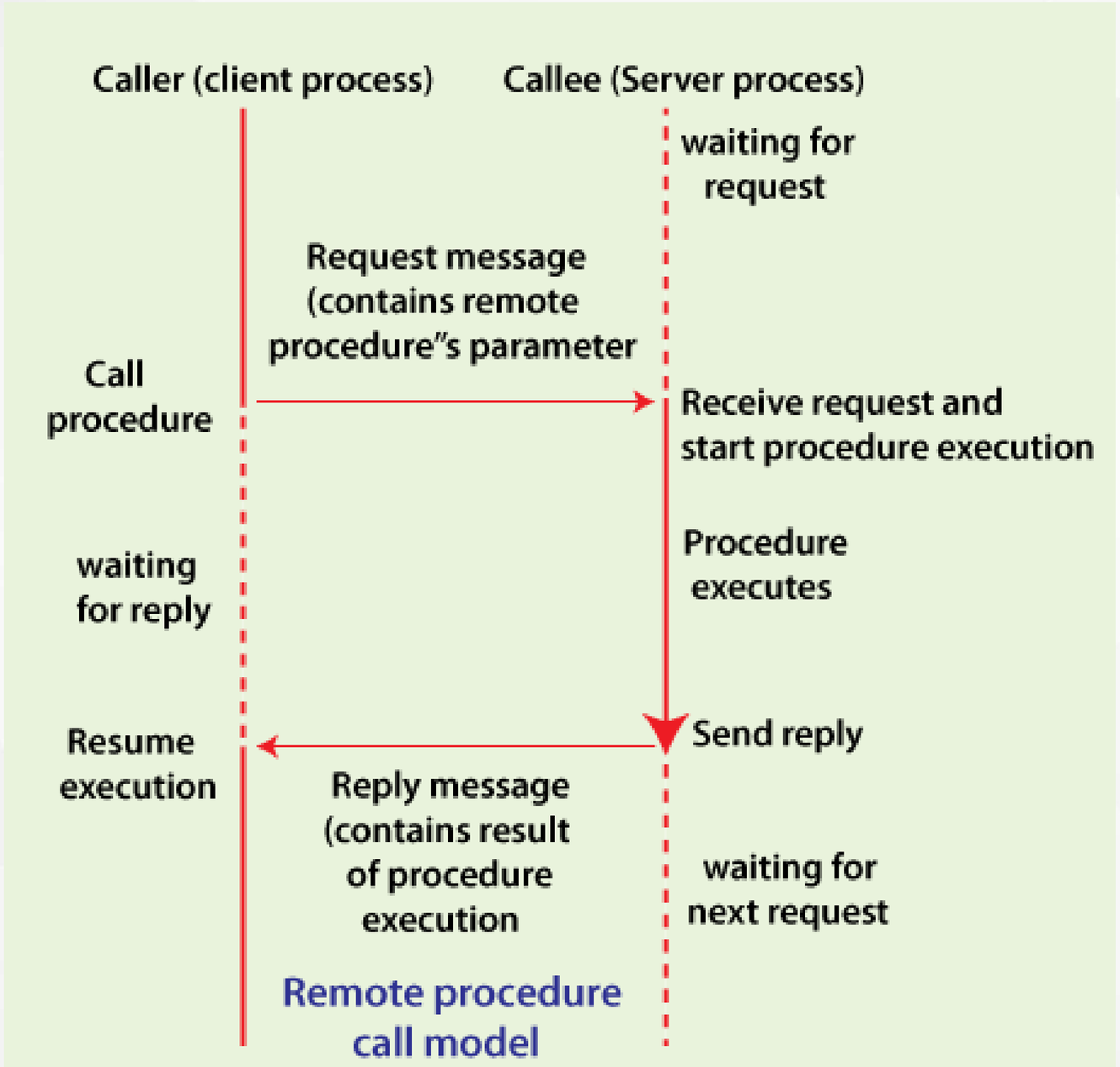
Remote Procedure Call

Remote Procedure Call

- Used for constructing distributed, client-server-based applications
- A function call or a subroutine call
- A request-response message-passing system.



How to Make a Remote Procedure Call



- Location transparency
- A form of inter-process communication (IPC)

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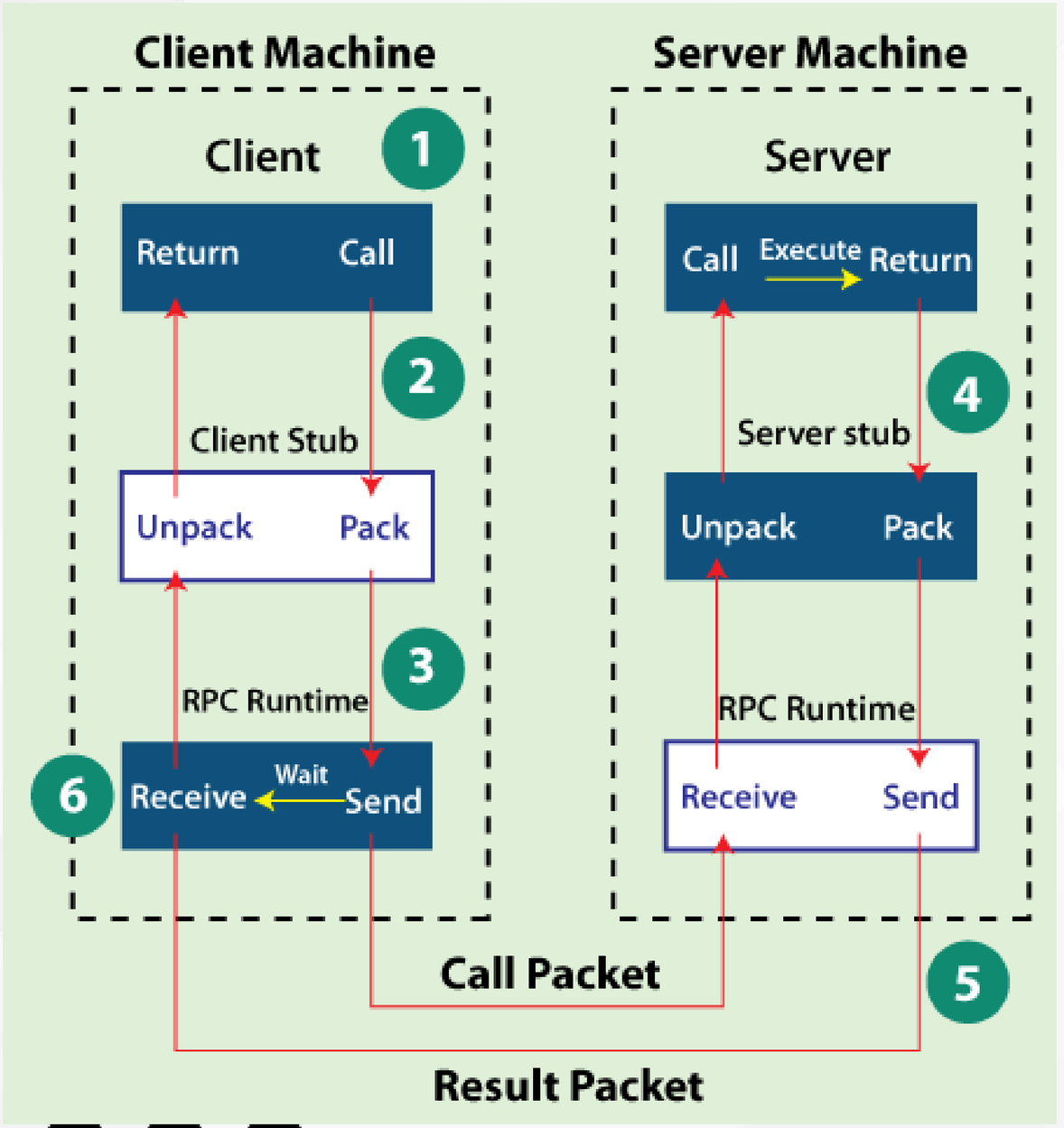

Step 1: The client, client stub, and RPC run time execute on the client machine.

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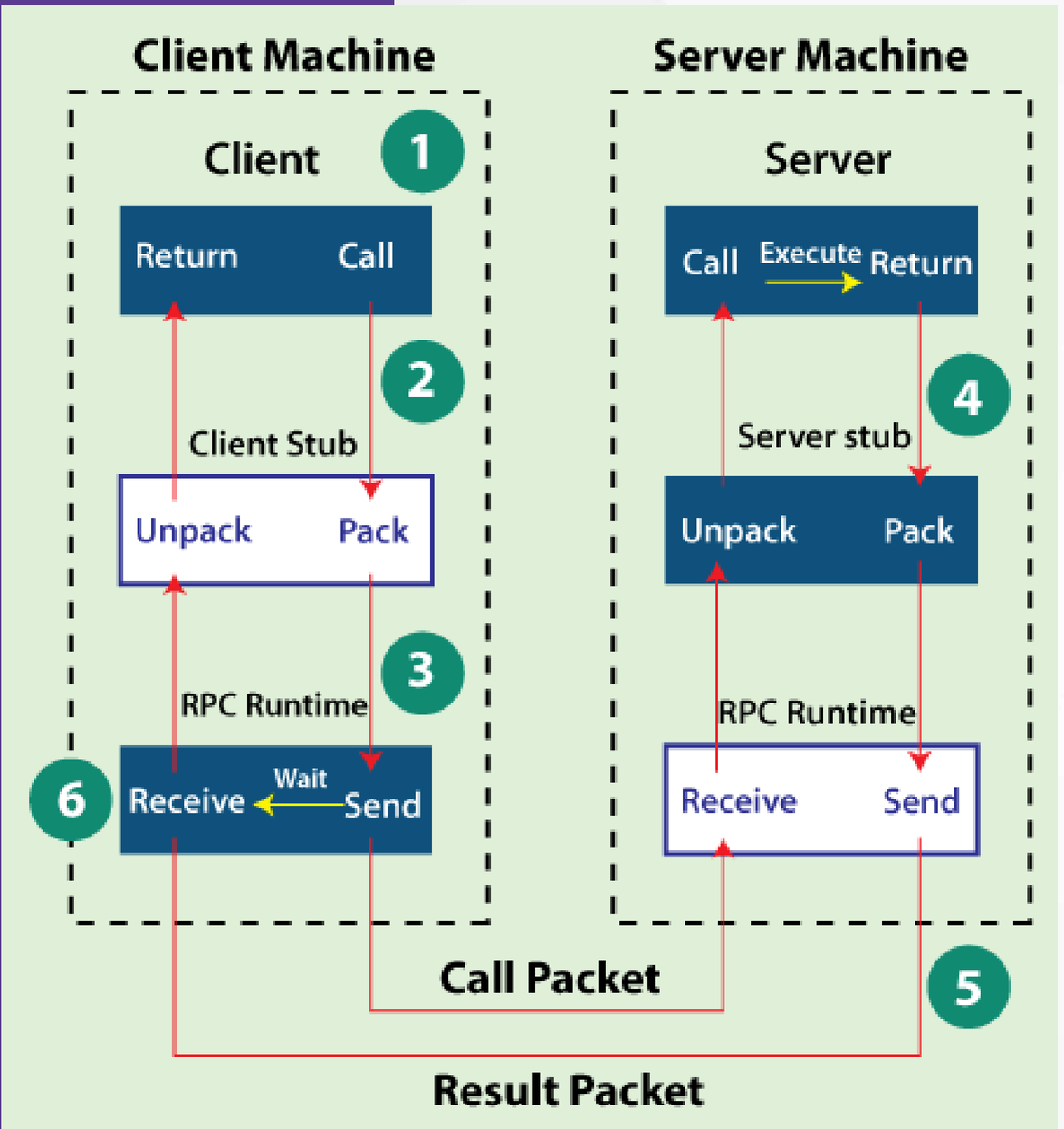

Step 2: A client starts a client stub process by passing parameters in the usual way.

The packing of the procedure parameters is called ***marshalling***.

The client stub stores within the client's own address space, and it also asks the local RPC Runtime to send back to the server stub.

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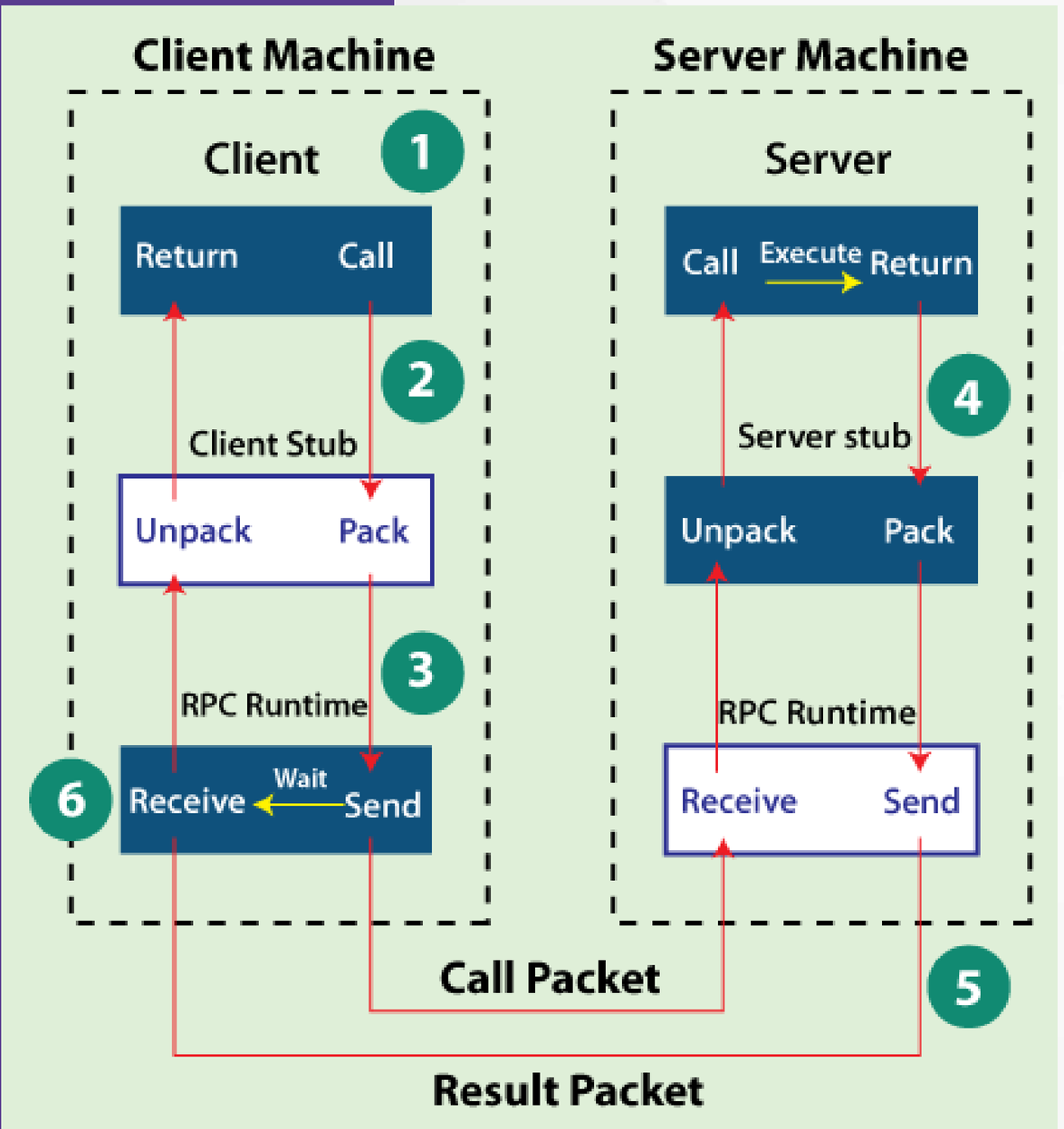

Step 3: In this stage, the user can access RPC by making regular Local Procedural Call.

RPC Runtime manages the transmission of messages between the network across client and server, and it also performs the job of retransmission, acknowledgment, routing, and encryption.

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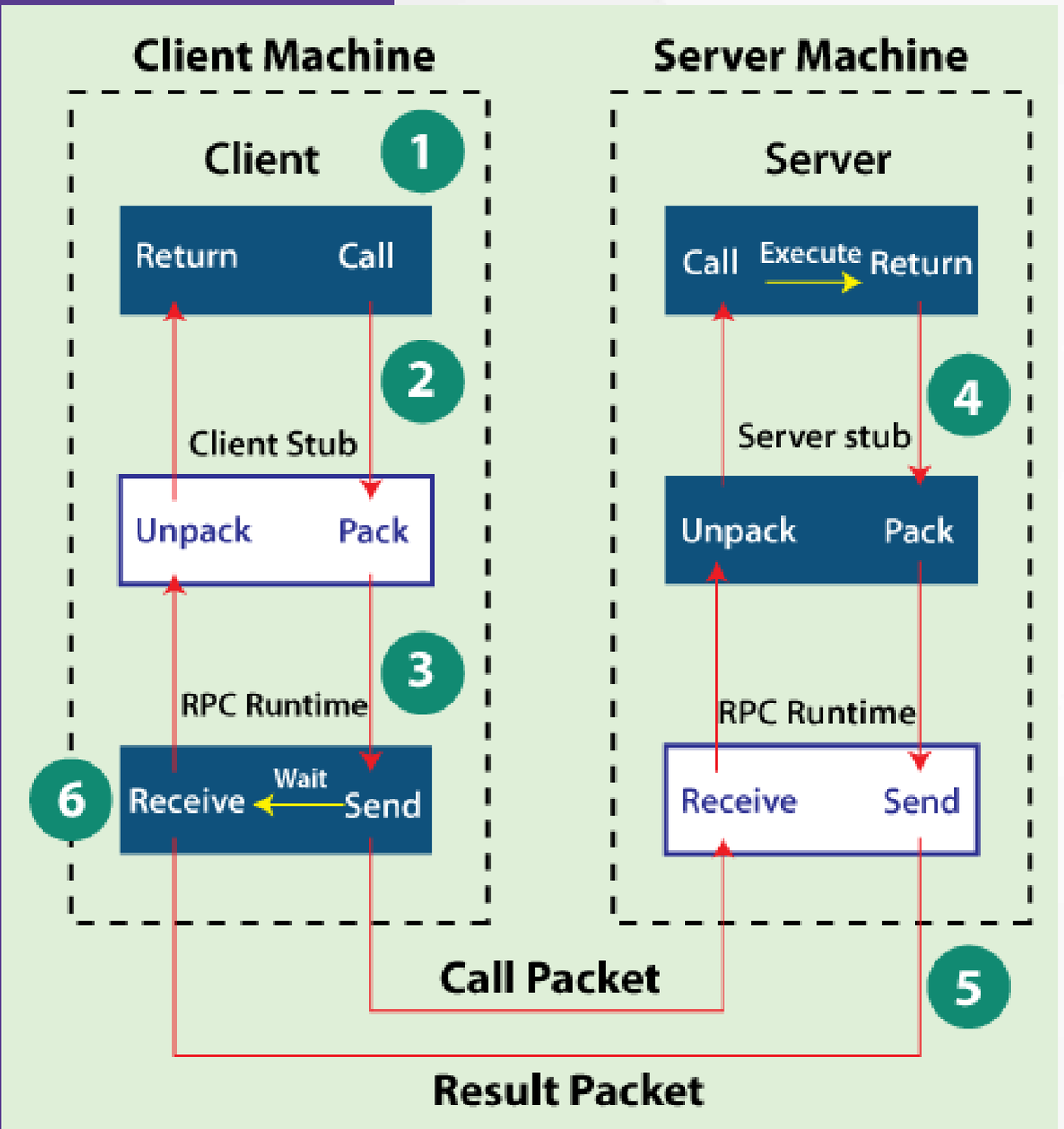

Step 4: After completing the server procedure, it returns to the server stub, which packs (marshalls) the return values into a message. The server stub then sends a message back to the transport layer.

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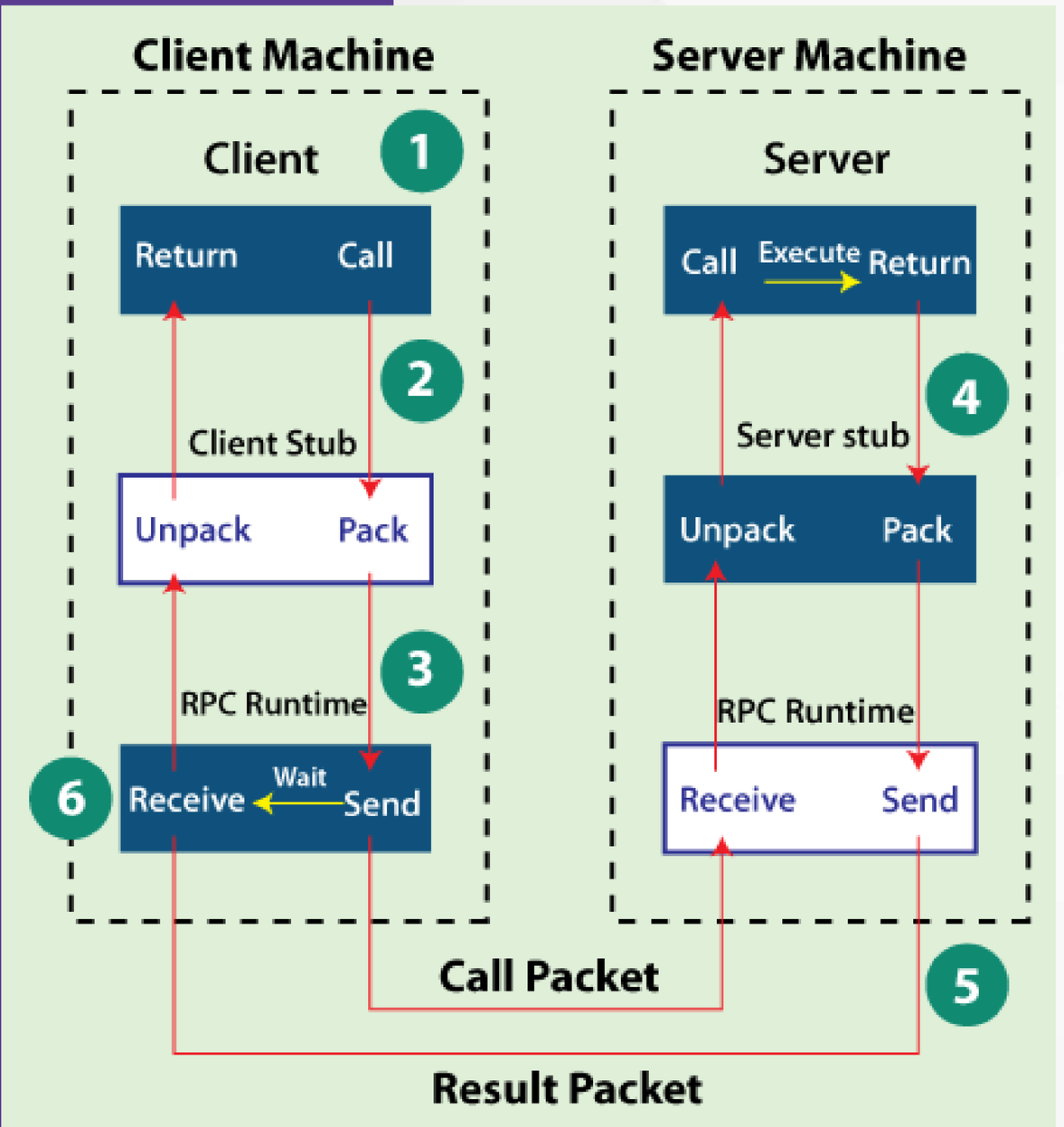


Step 5: In this step, the transport layer sends back the result message to the client transport layer, which returns back a message to the client stub.

Step 6: In this stage, the client stub de-marshalls (unpack) the return parameters in the resulting packet, and the execution process returns to the caller.

How to Make a Remote Procedure Call

Binding

How does the client know who to call and where the service resides?

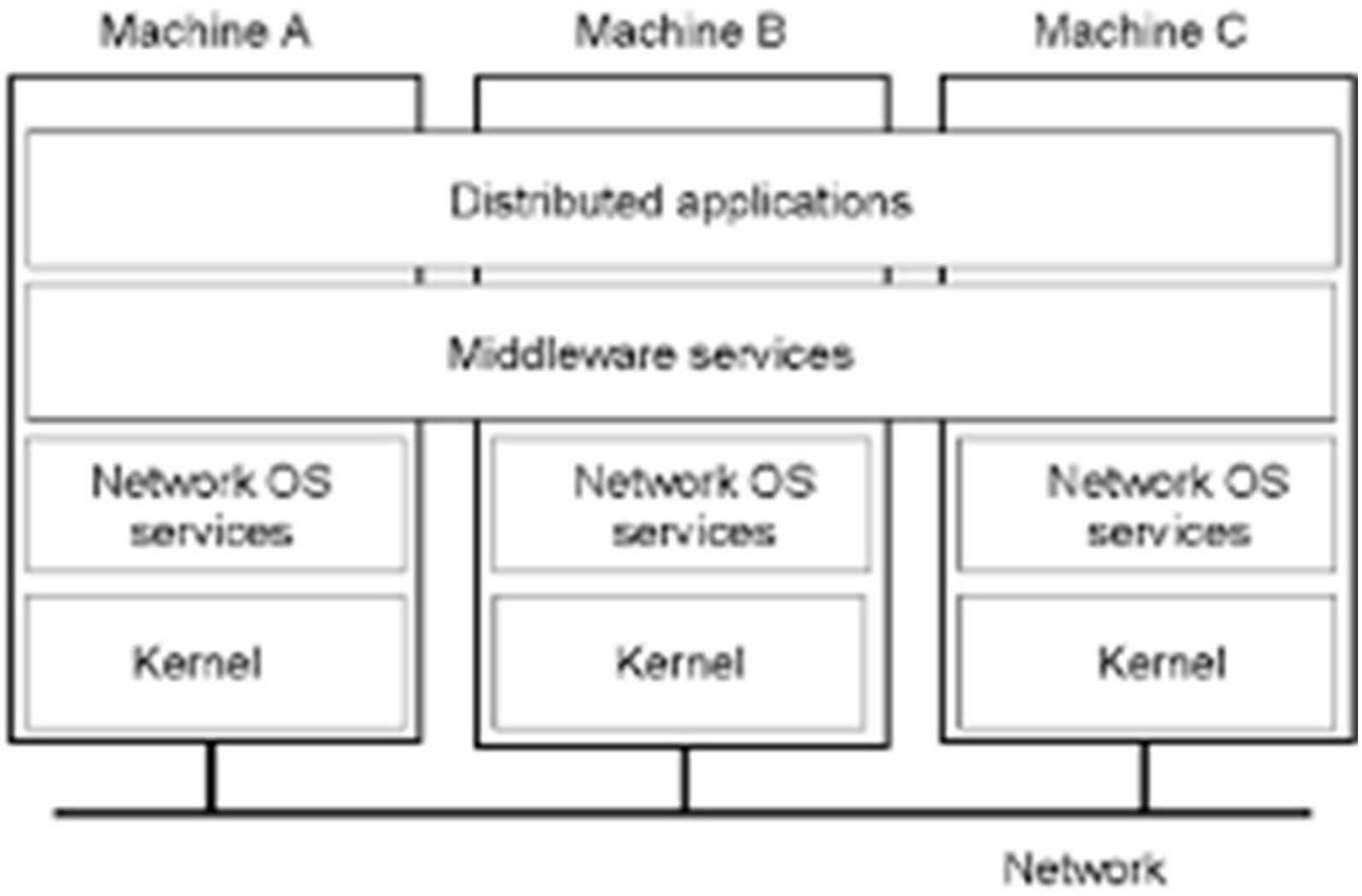
The most flexible solution is to use dynamic binding and find the server at run time when the RPC is first made. The first time the client stub is invoked, it contacts a name server to determine the transport address at which the server resides. The binding consists of two parts:

- **Naming:** A Server having a service to offer exports an interface for it. Exporting an interface registers it with the system so that clients can use it.
- **Locating:** A Client must import an (exported) interface before communication can begin.

RPC Characteristics

Characteristics of RPC

- The called procedure is in another process, which is likely to reside in another machine.
- The processes do not share address space.
- Parameters are passed only by values.
- RPC executes within the environment of the server process.
- It doesn't offer access to the calling procedure's environment.


Machine A
Machine B
Machine C
Distributed applications
Middleware services
Network OS services
Network OS services
Network OS services
Kernel
Kernel
Kernel
Network