Understanding TCP and UDP



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Network Engineer

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Transport Layer Protocols

- Transmission Control Protocol (TCP)
- User Datagram Protocol (UDP)

Protocol Hierarchy

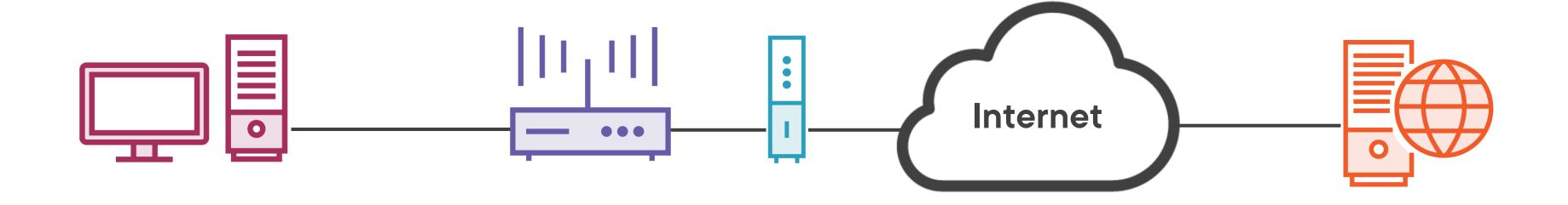


OSI Model

7	Application Layer
6	Presentation Layer
5	Session Layer
4	Transport Layer
3	Network Layer
2	Data Link Layer
1	Physical Layer

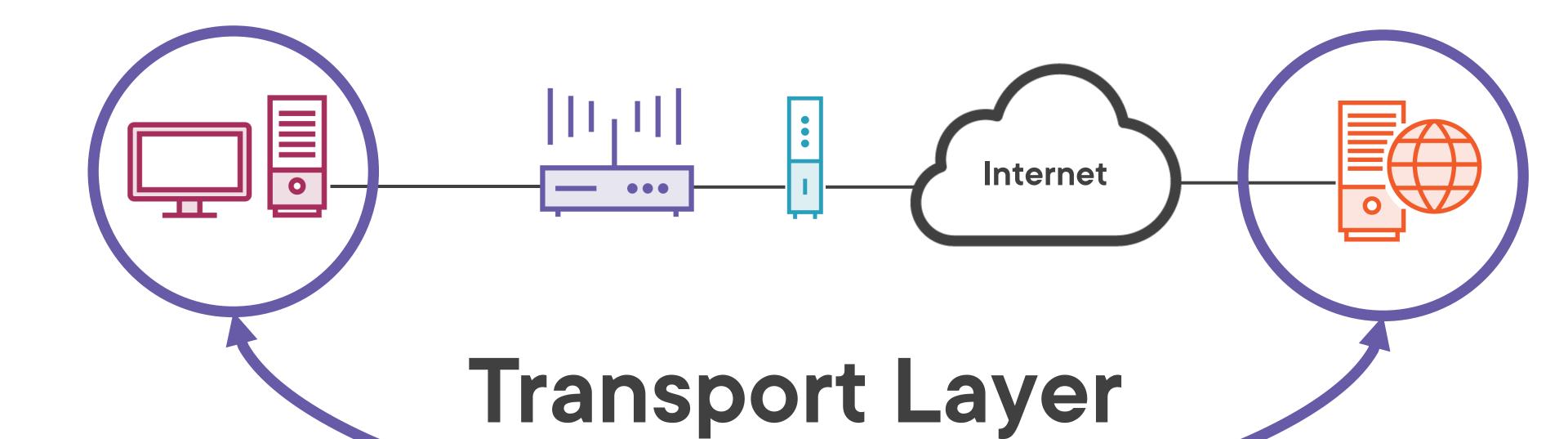
Transport Layer Protocols



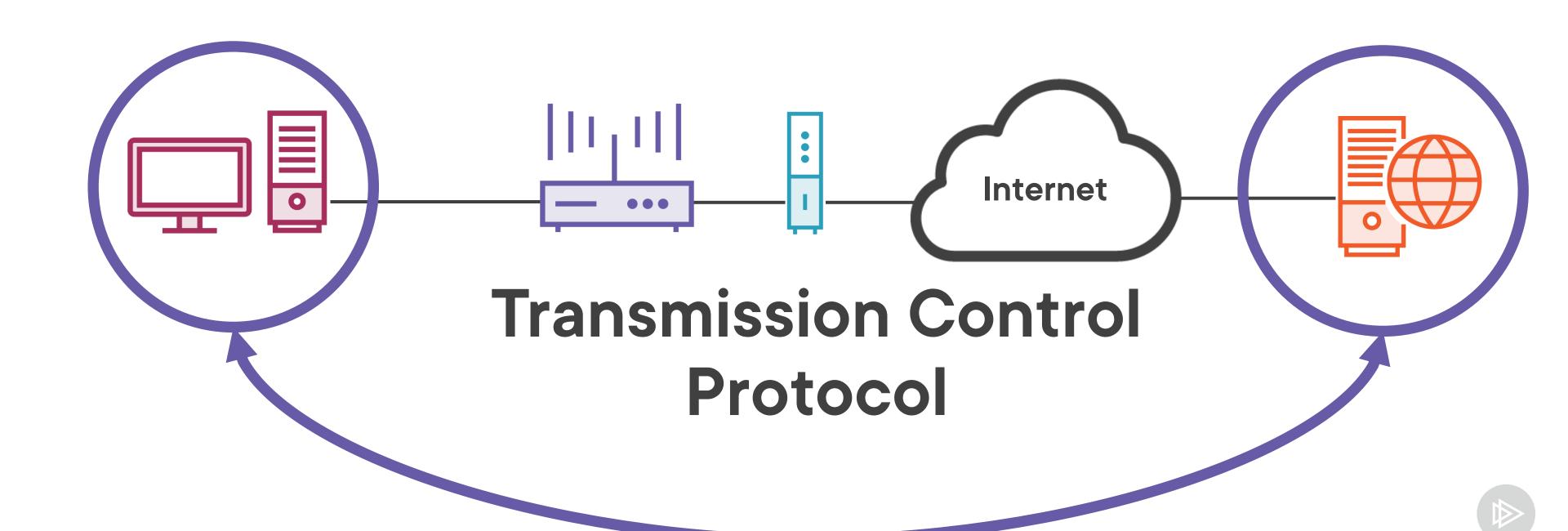


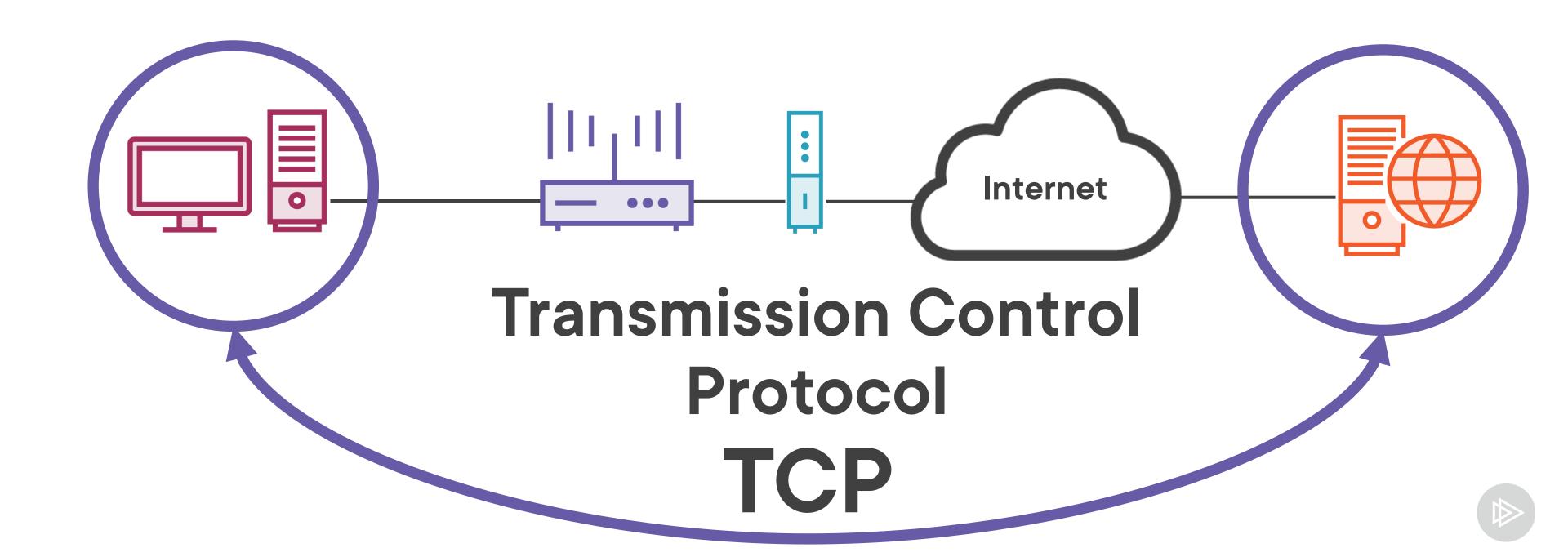
Transport Layer

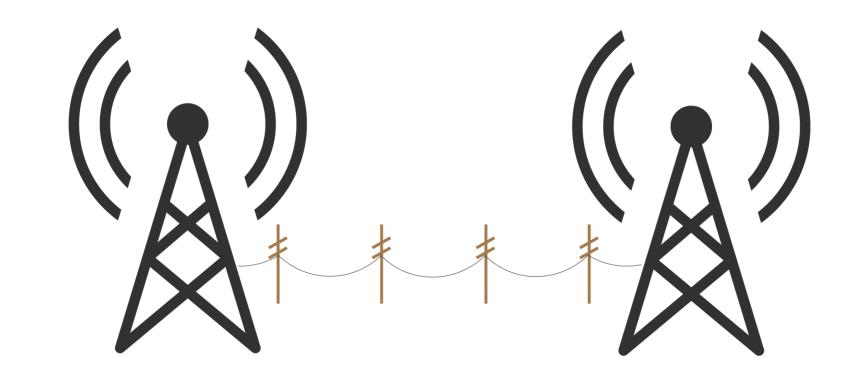










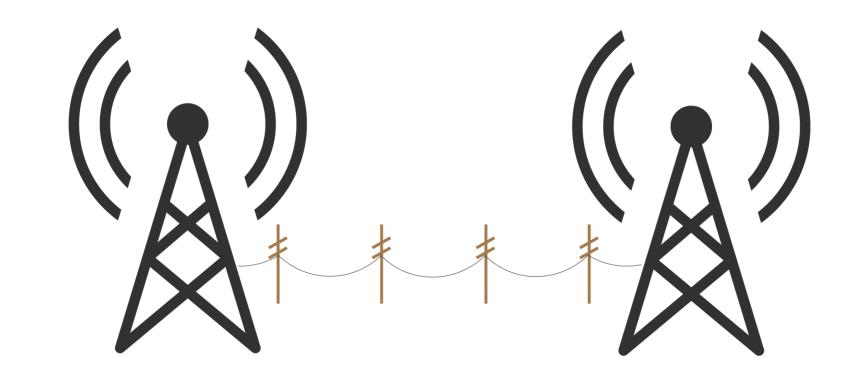








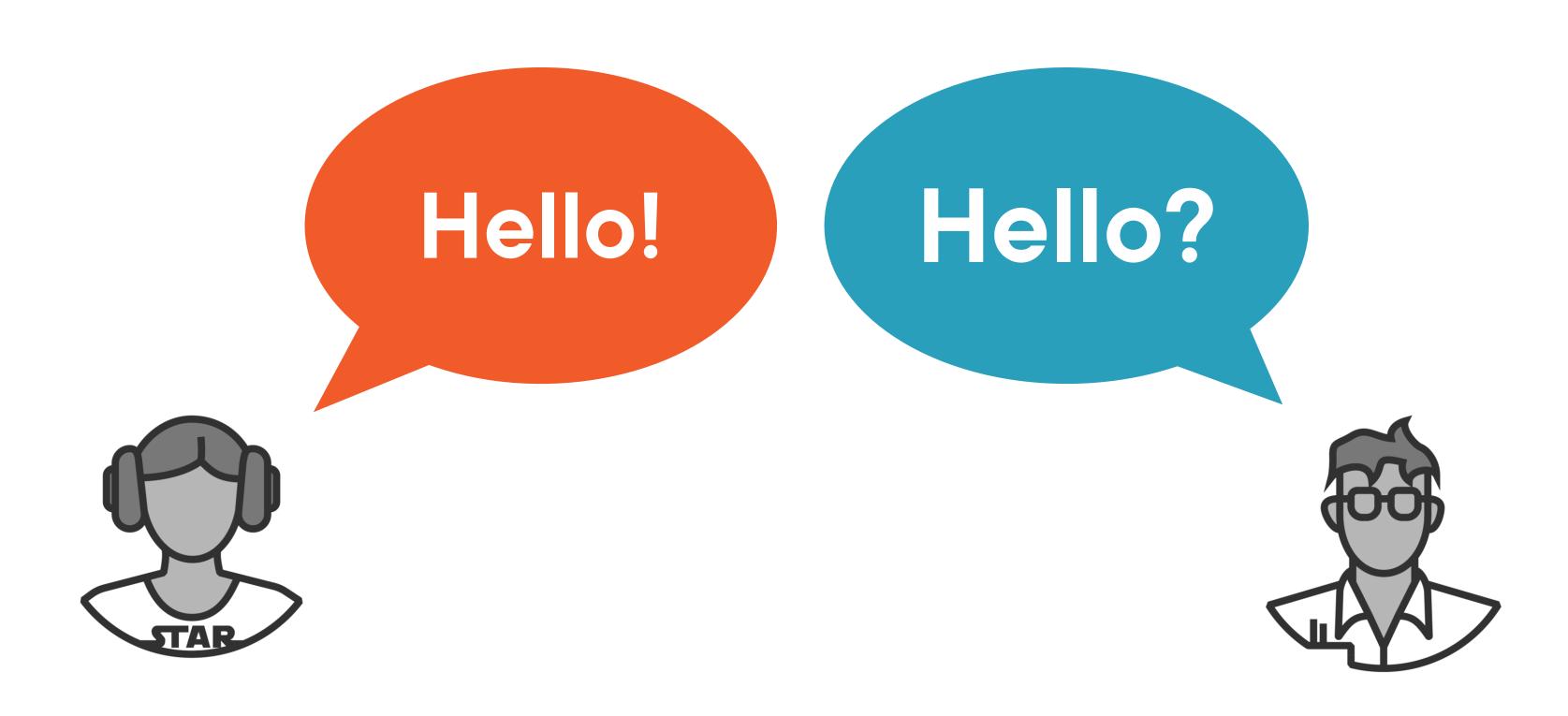
4 | 5 | 6 7 | 8 | 9













l don't understand

You're breaking up

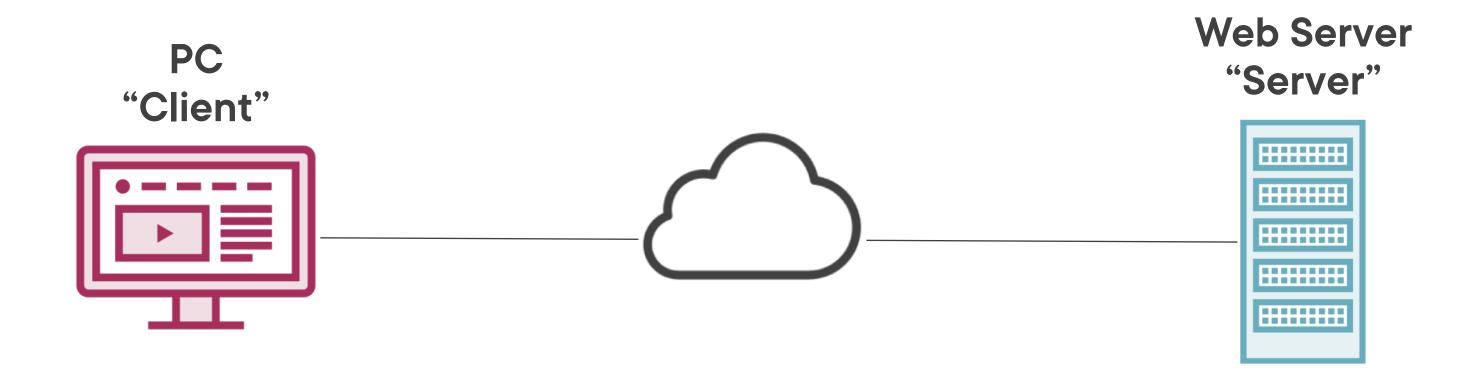


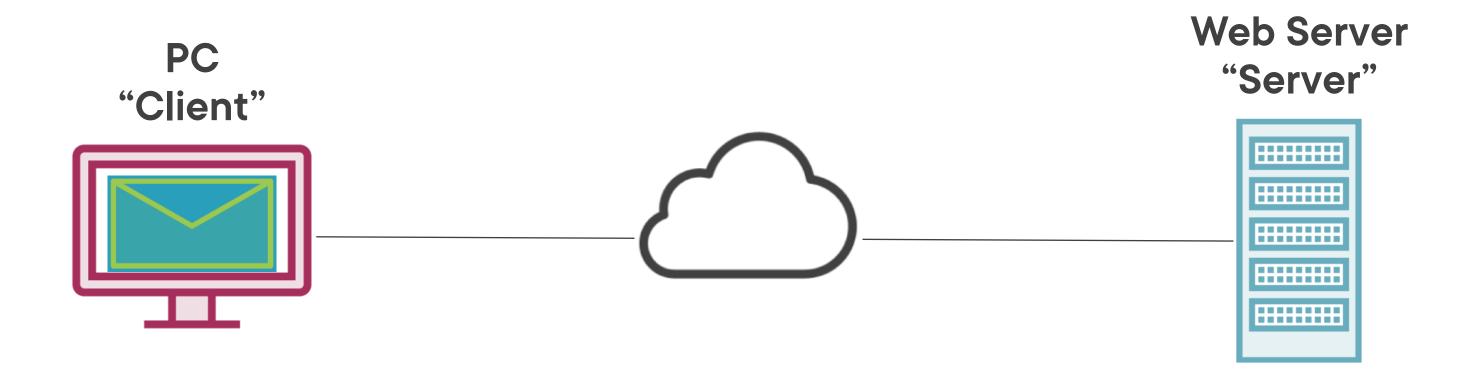


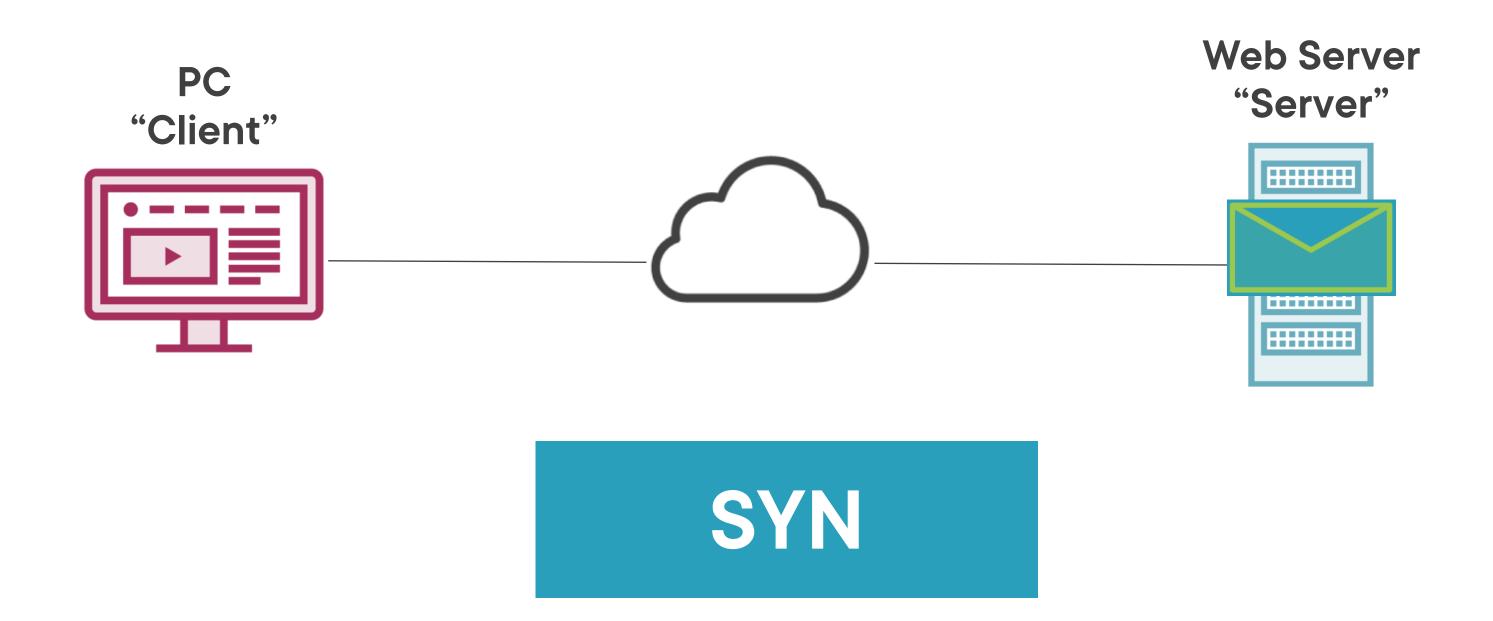




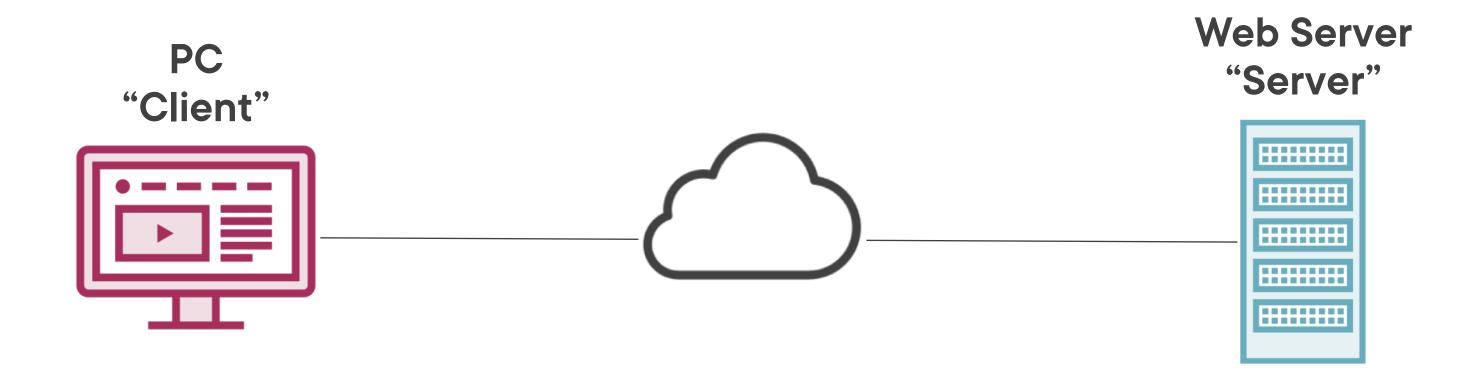


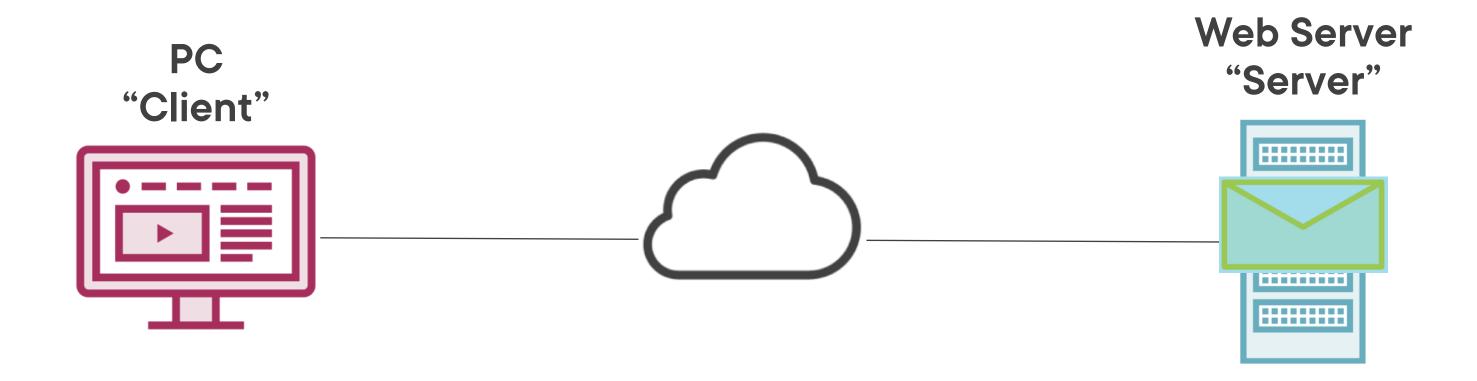




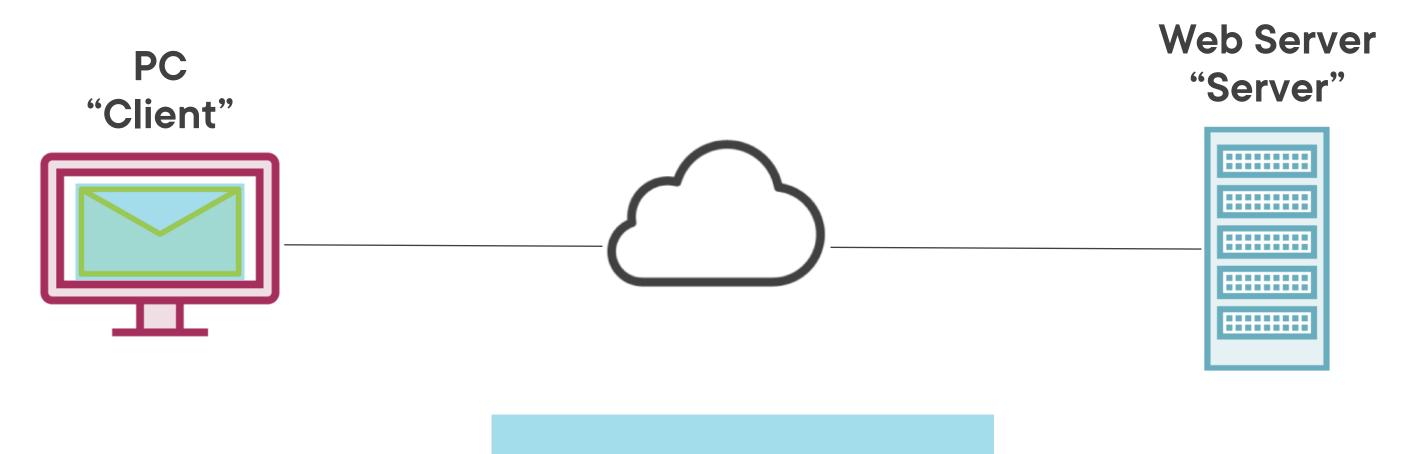






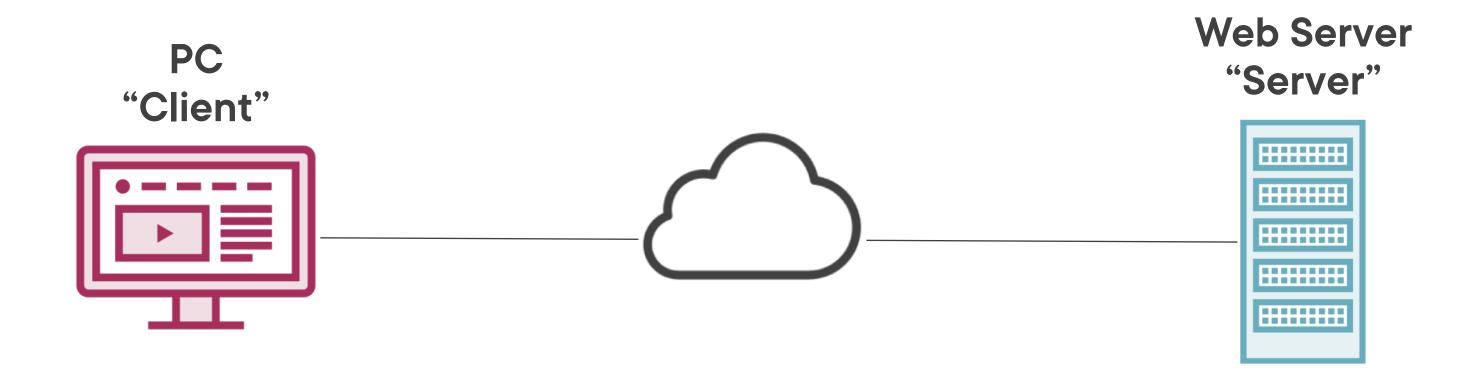


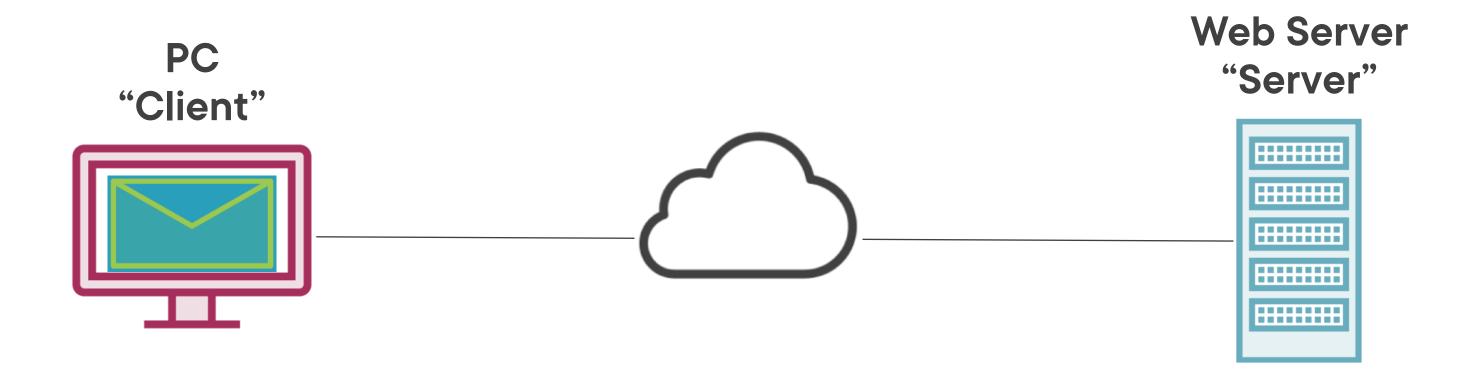
The 3-way Handshake



SYN-ACK

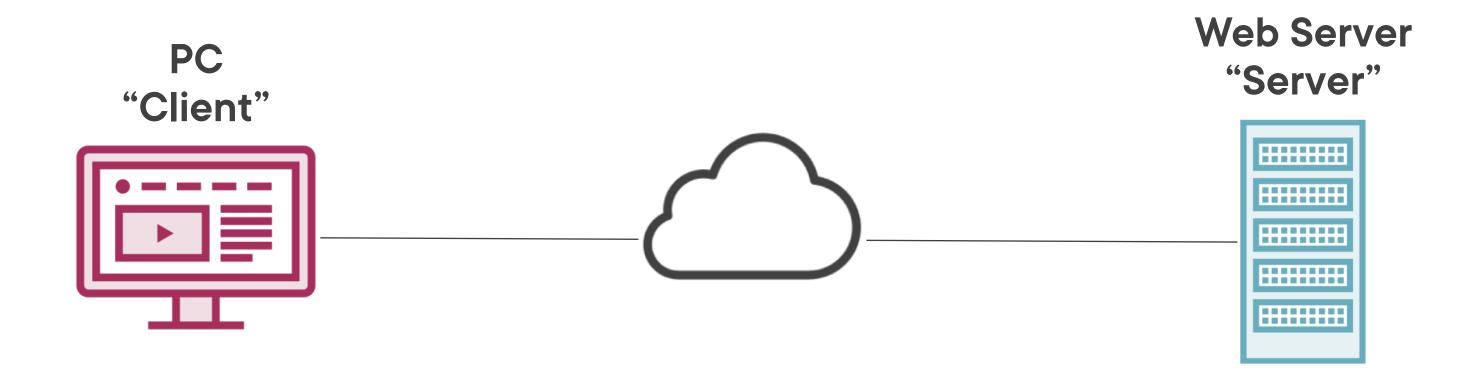




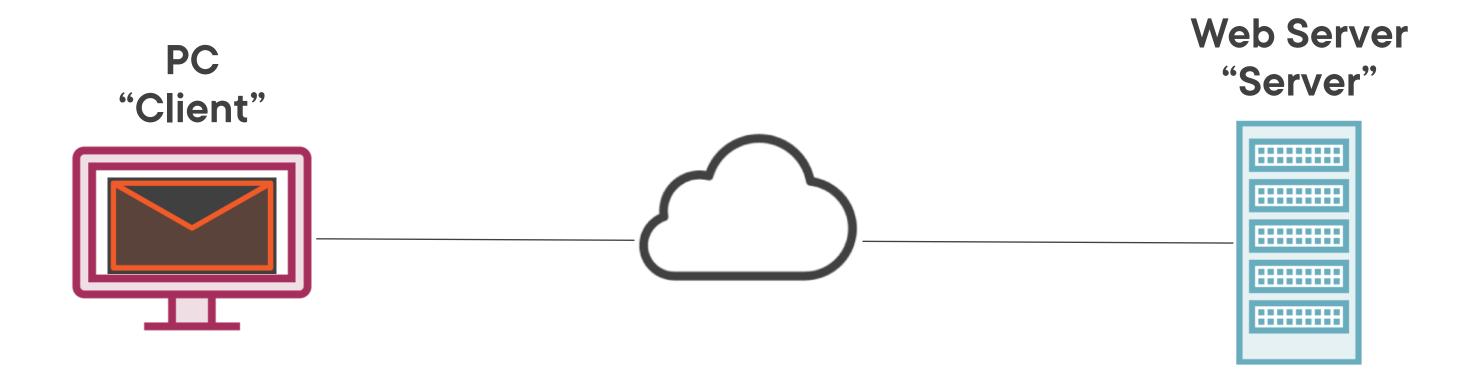








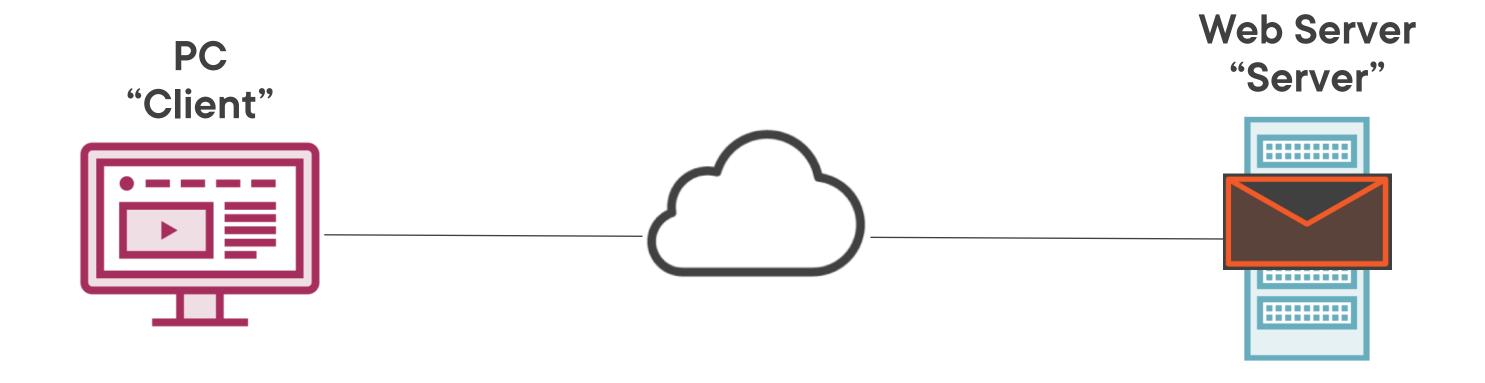
The 3-way Handshake



Send me the website

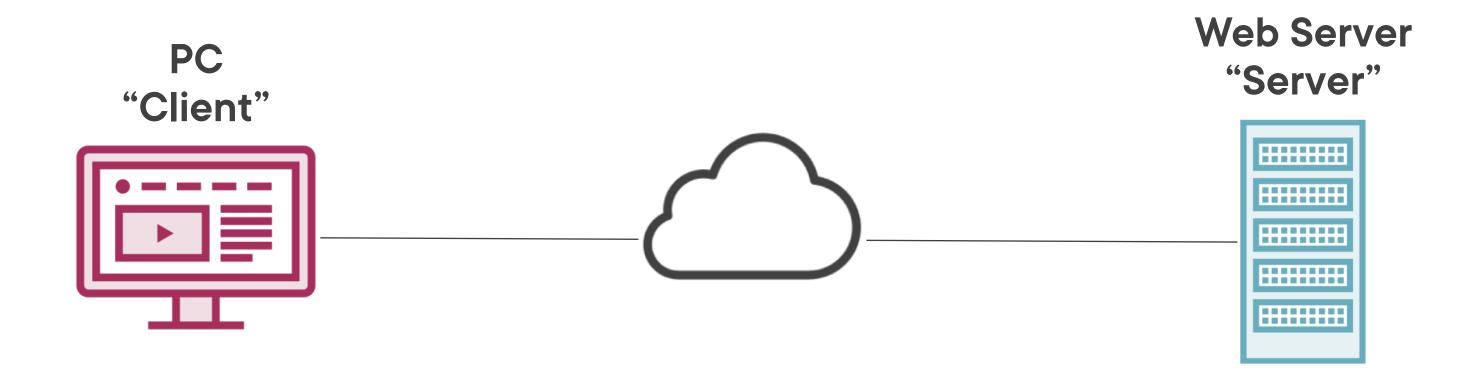


The 3-way Handshake

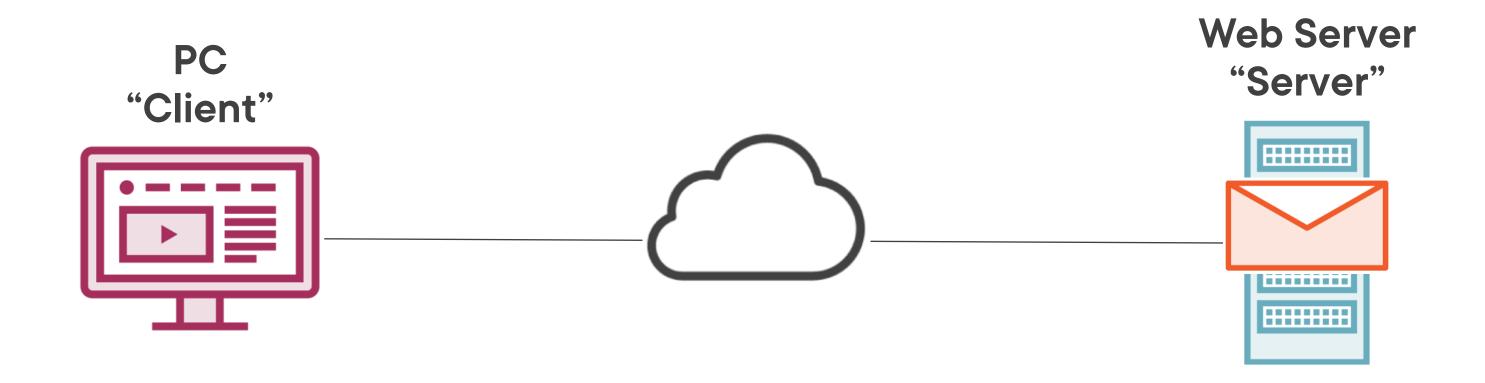


Send me the website





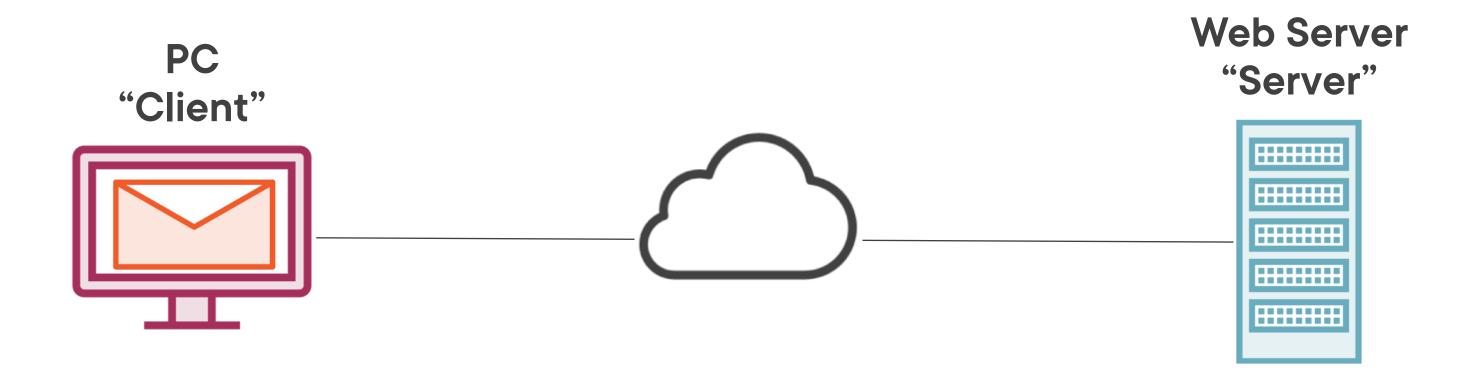
The 3-way Handshake



Here's the website

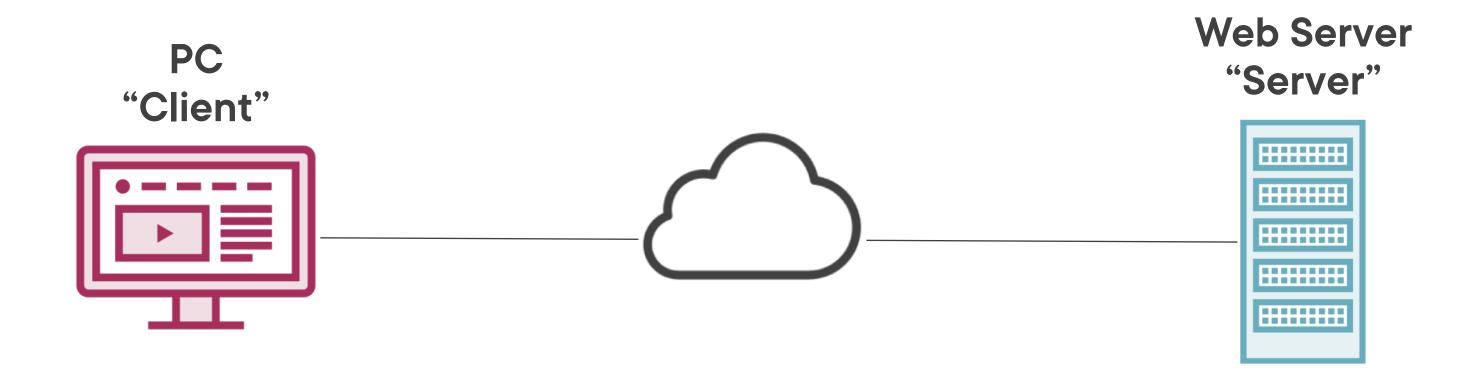


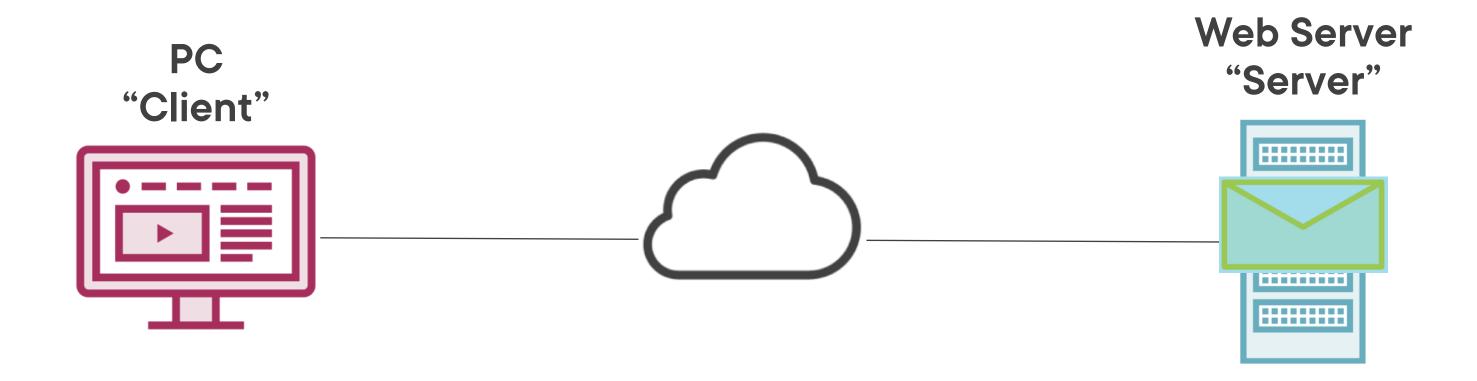
The 3-way Handshake



Here's the website

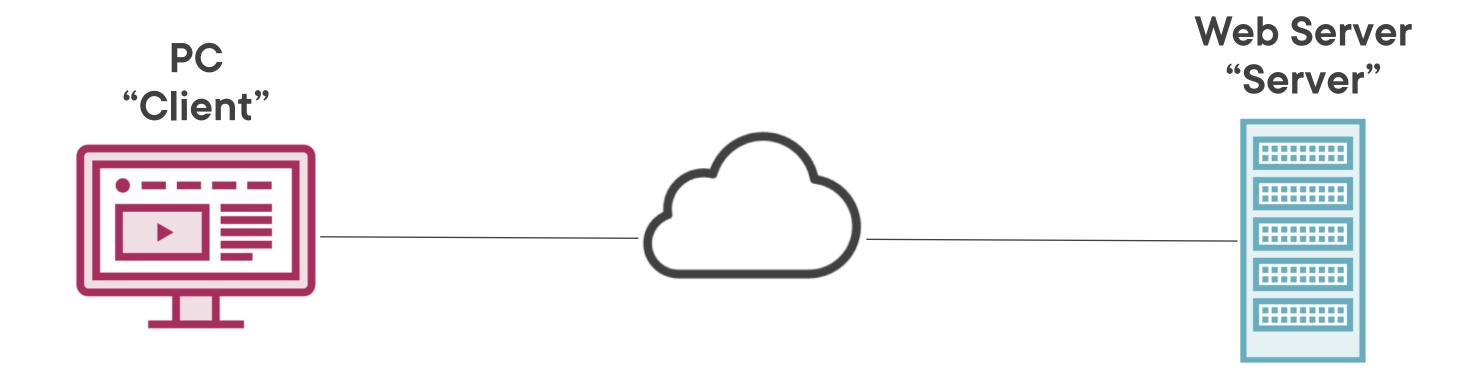


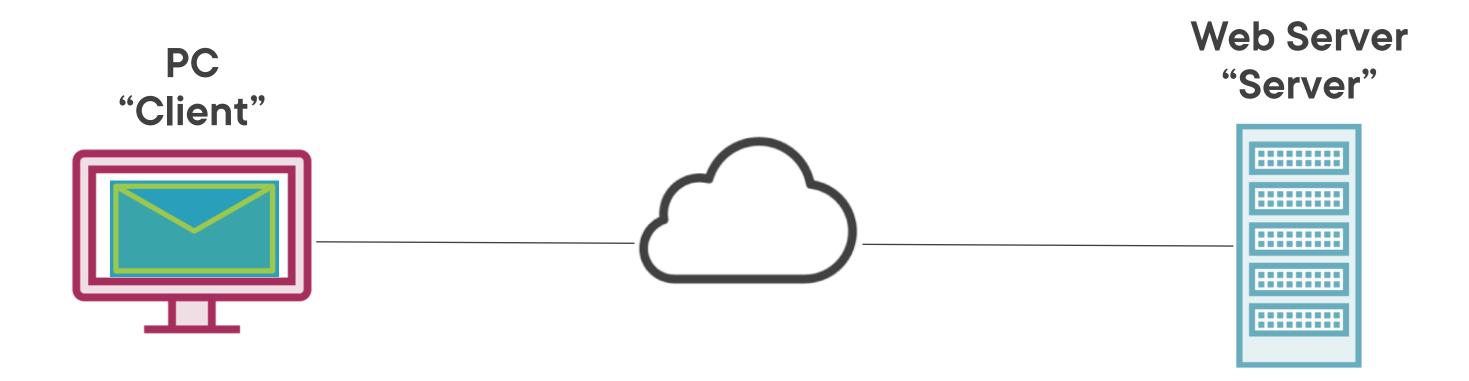




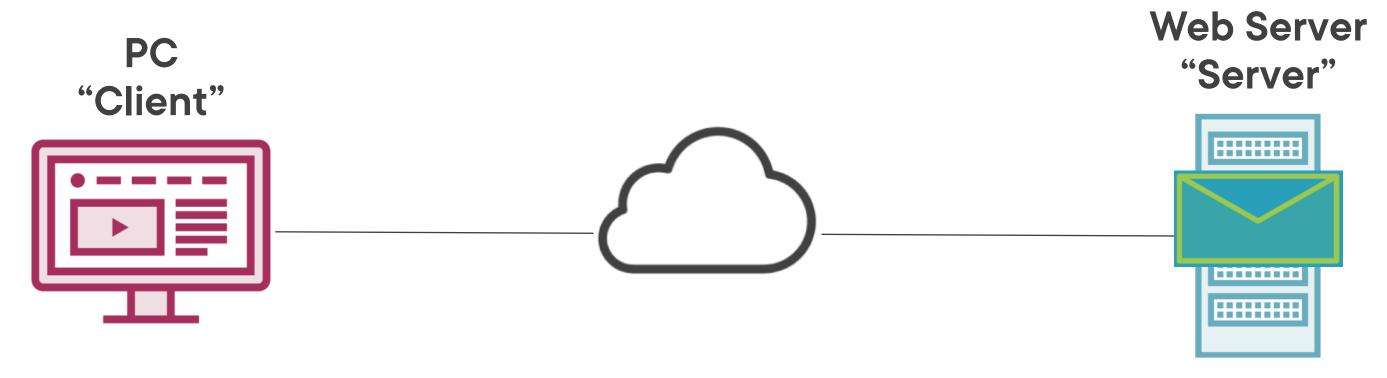






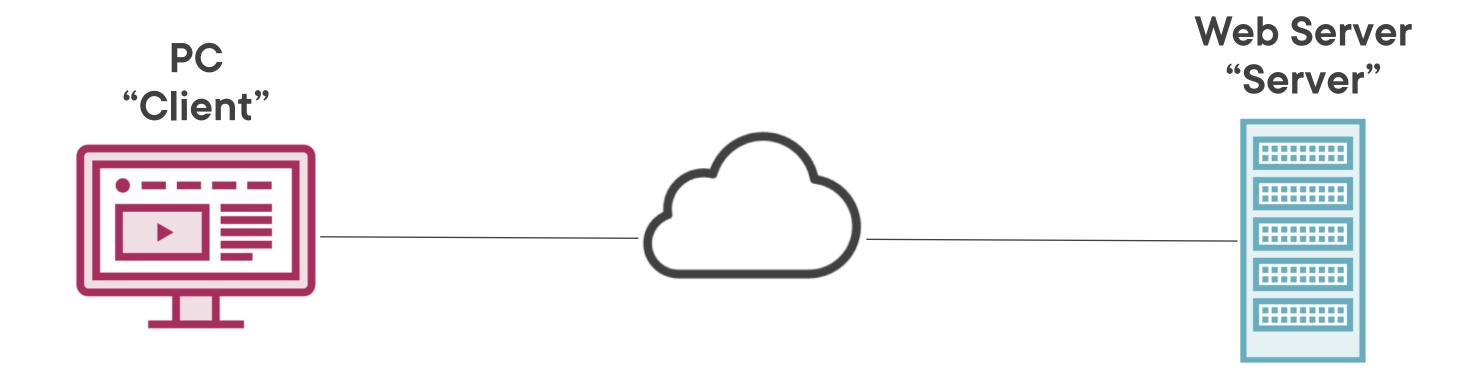


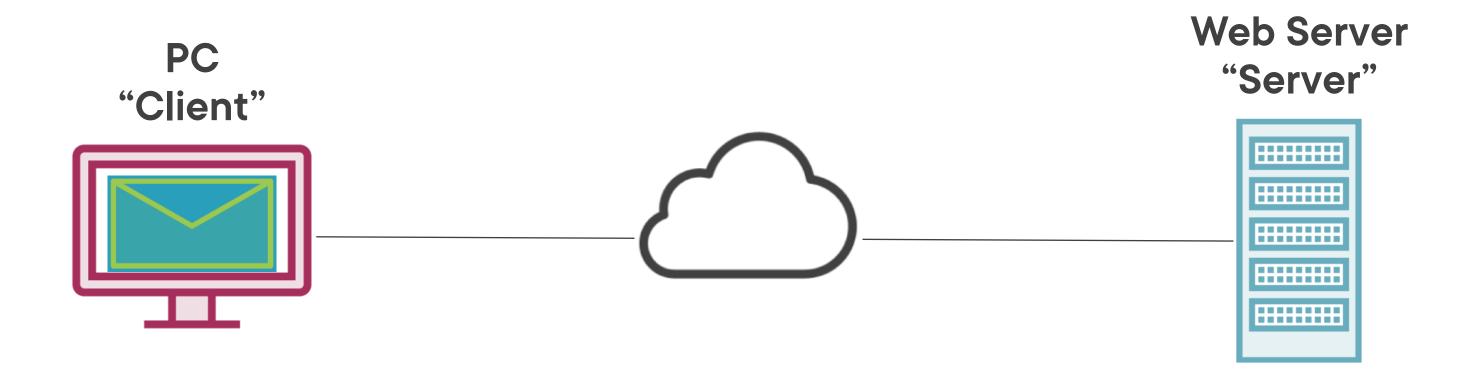
The 4-way Disconnect FIN-WAIT



FIN-ACK

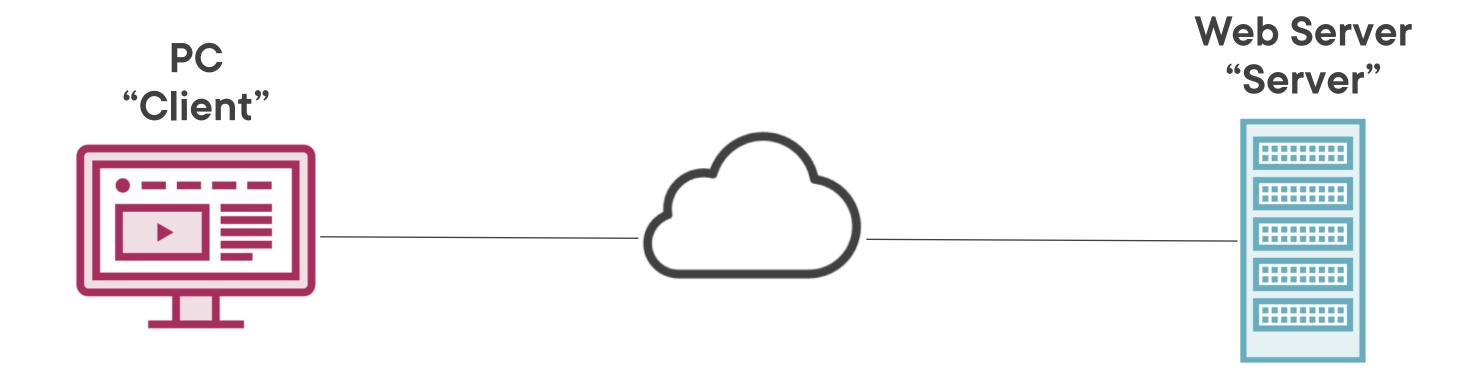


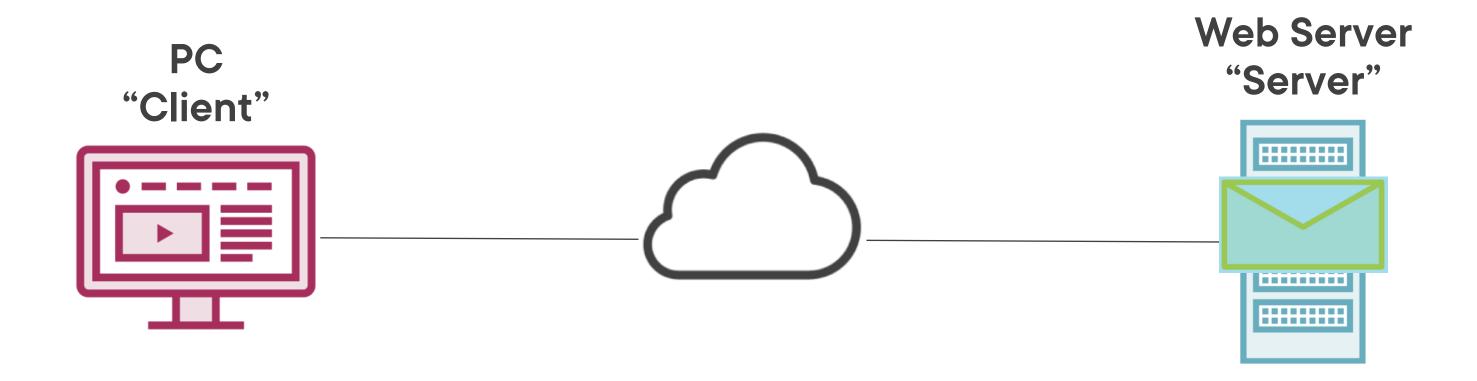






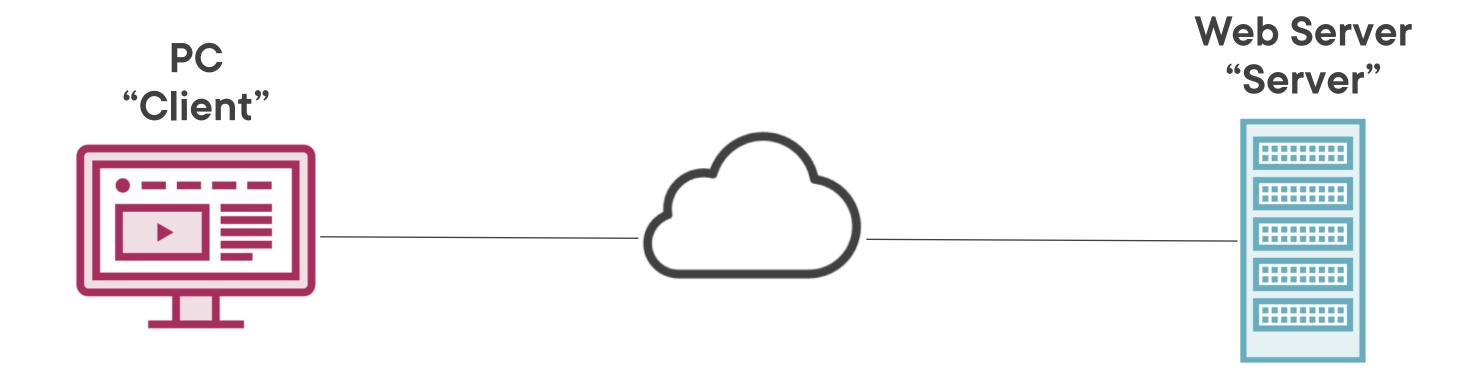


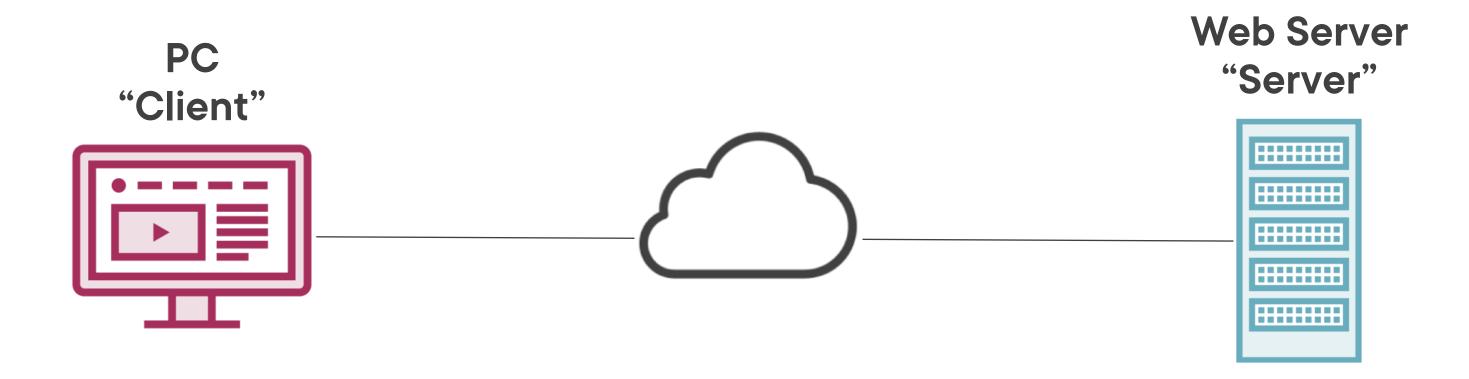


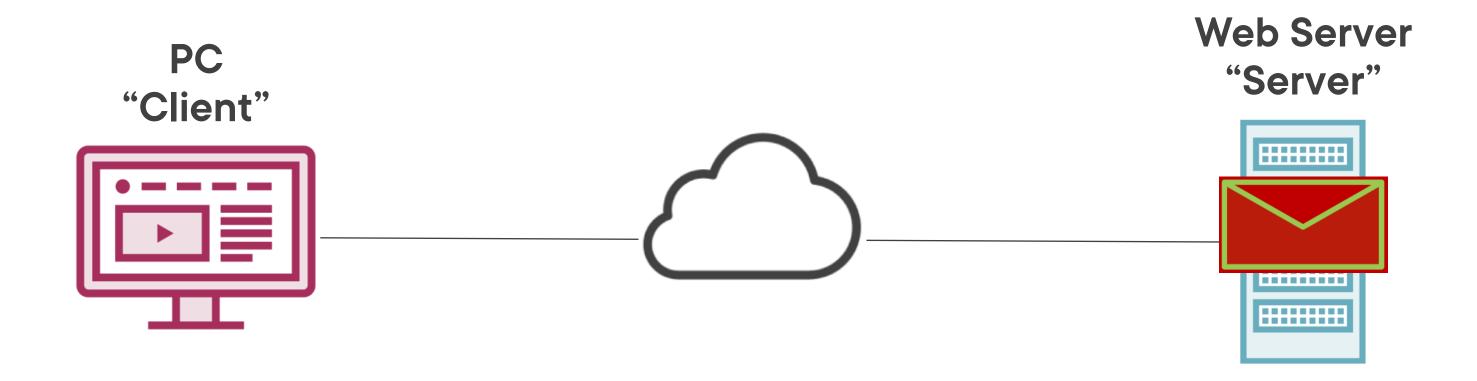


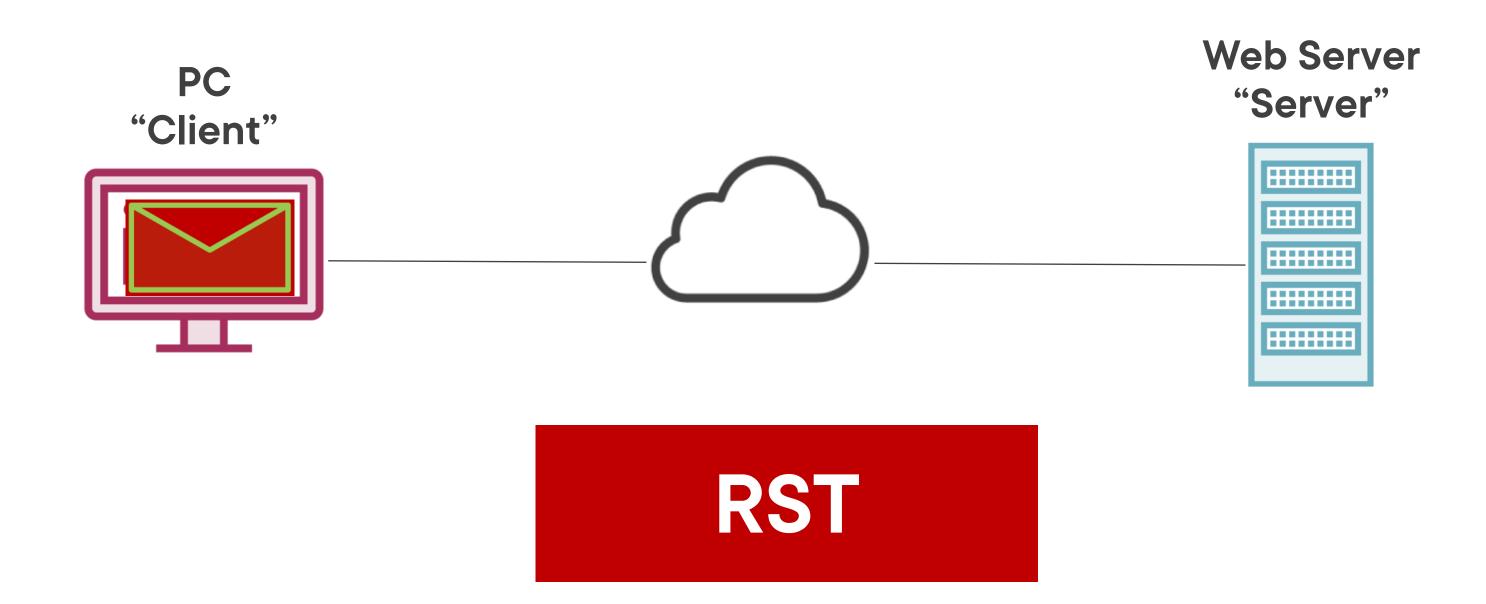


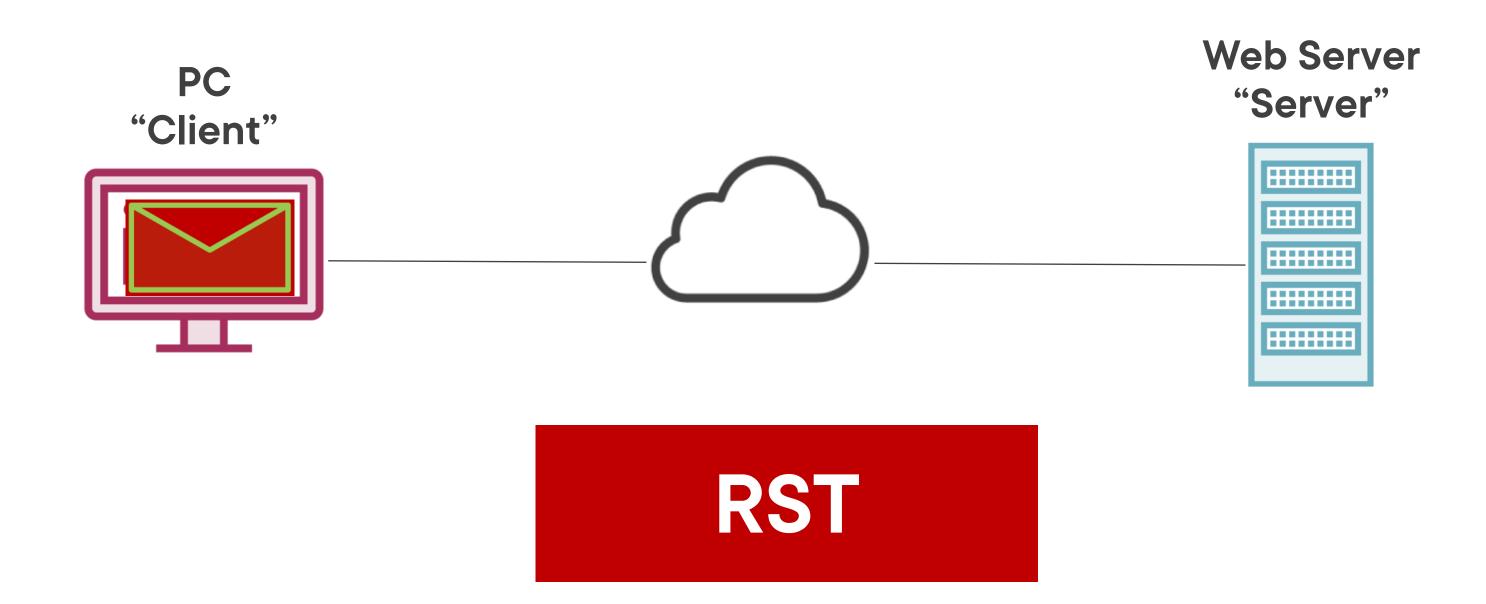


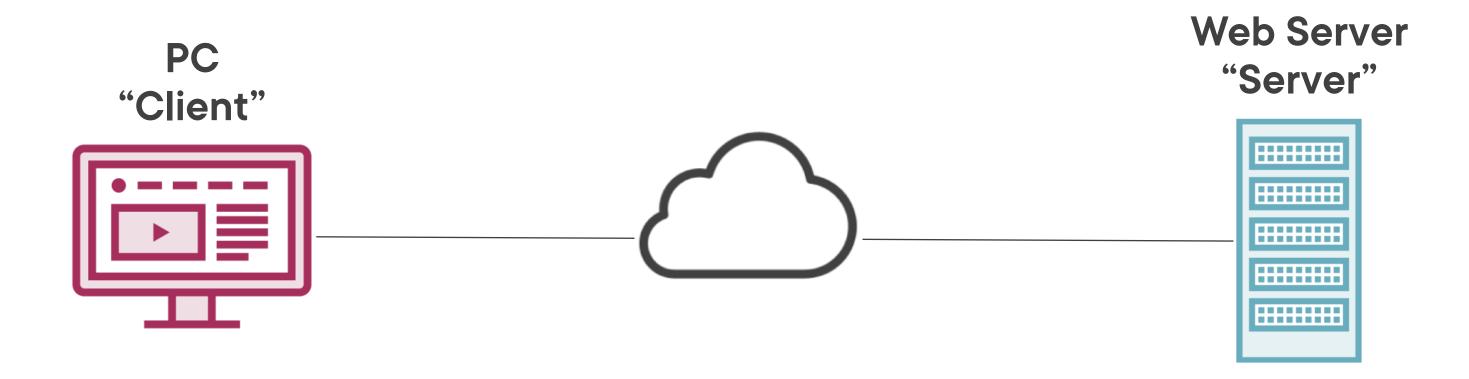


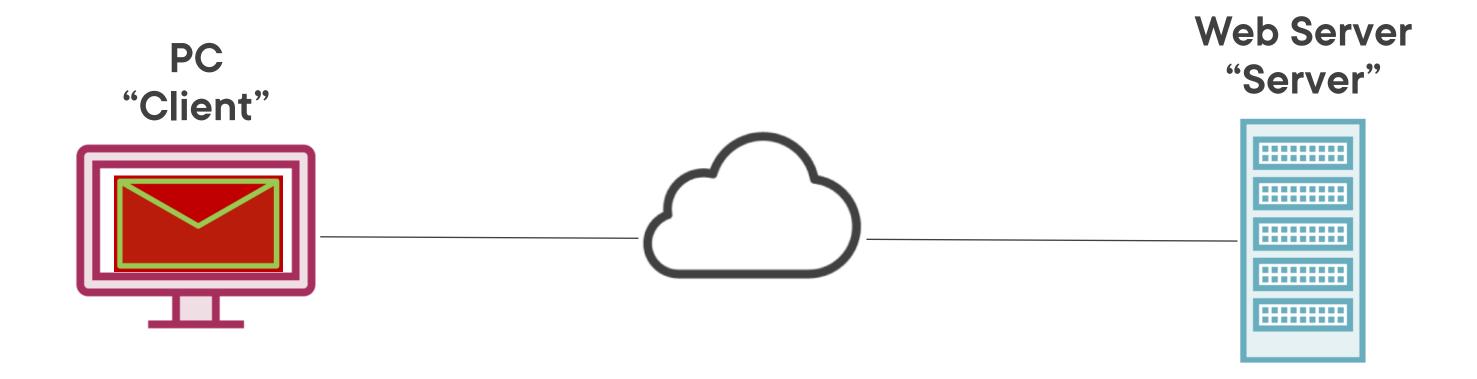


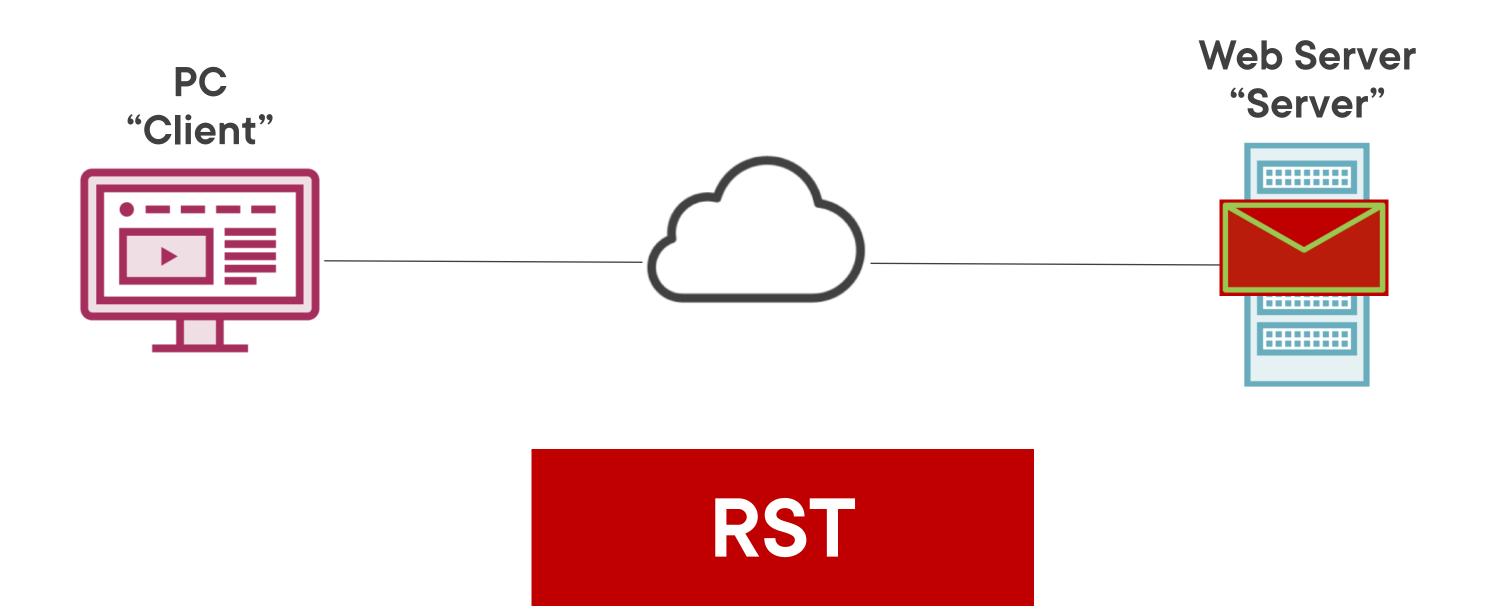








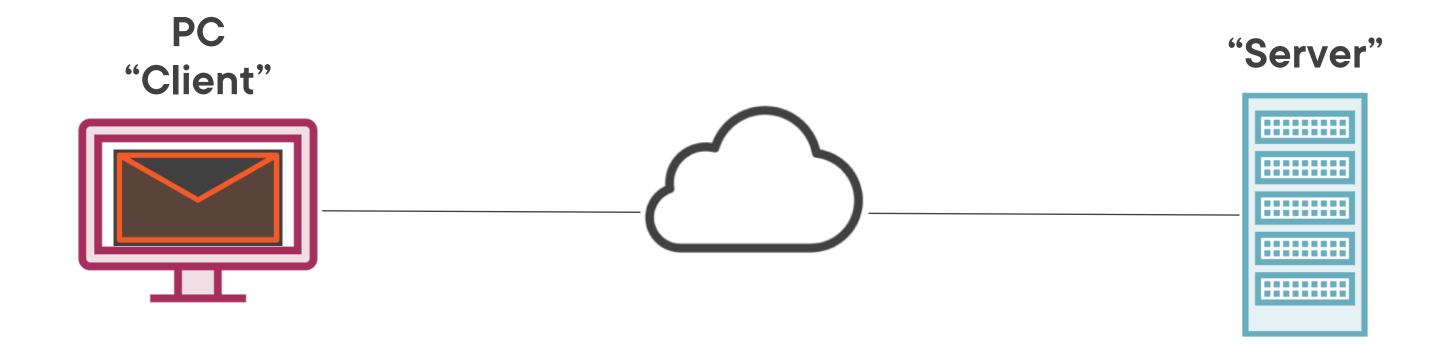




Introducing User Datagram Protocol (UDP)







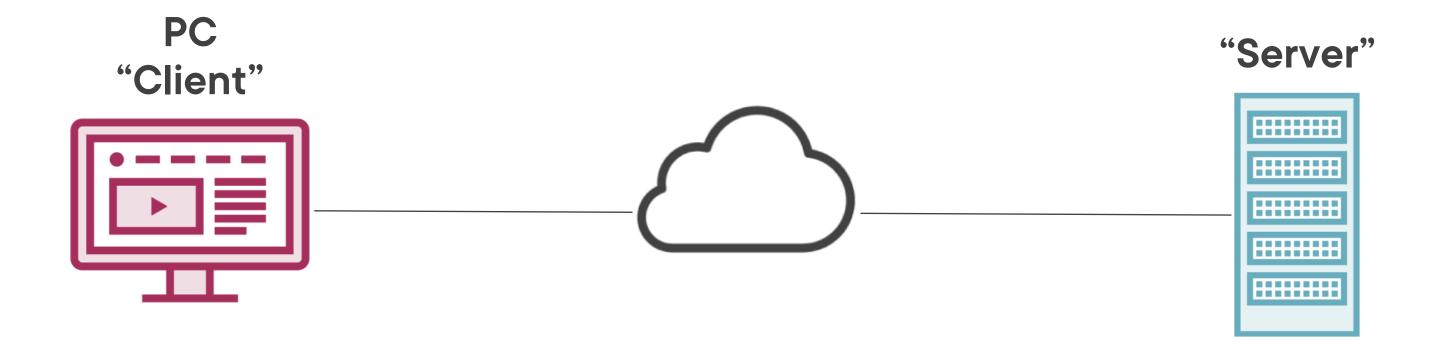
Send me the data

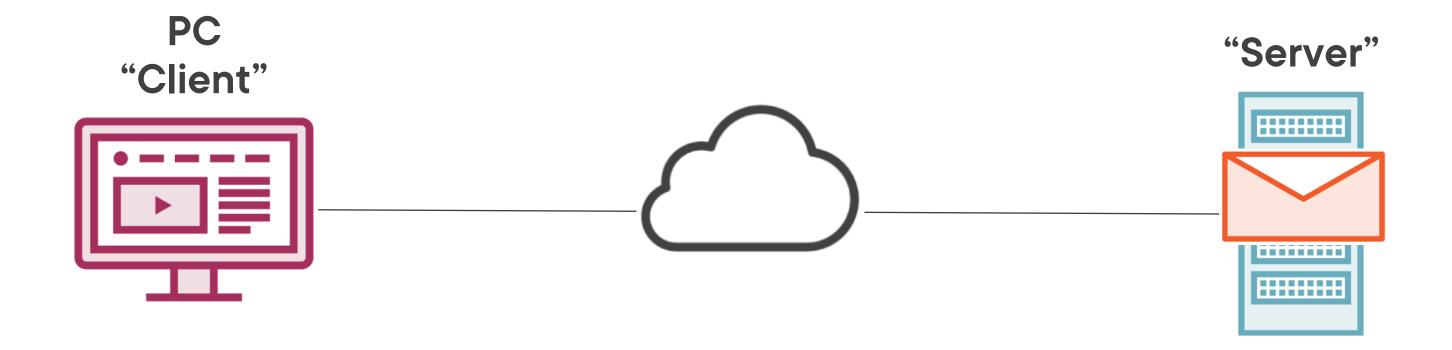


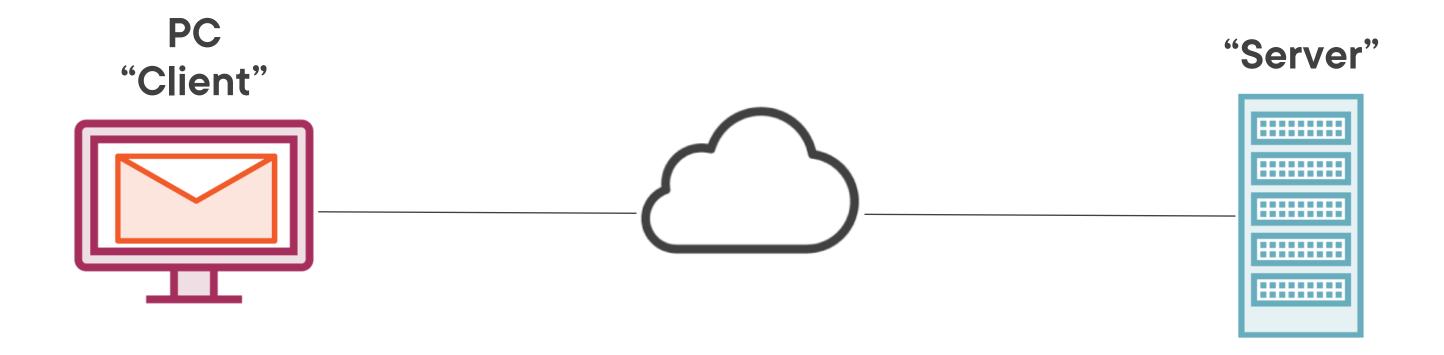


Send me the data









Here's the data





No 3-way handshake

No reliable communication

No sequence numbers, no acknowledge numbers

Used for efficient data transfer



Transport Layer Addressing:

Port Numbers



0 - 65,535

Server Port Numbers
Well Known / Registered
Port Numbers

Client Port Numbers

Ephemeral Port

Numbers

0 - 65,535

Server Port Numbers
Well Known / Registered
Port Numbers

Client Port Numbers

Ephemeral Port

Numbers

0 - 65,535

Server Port Numbers
Well Known / Registered
Port Numbers

Client Port Numbers

Ephemeral Port

Numbers

Well Known
O - 1023
Registered
1,024 - 49,151

Ephemeral 49,152 - 65,535



Well Known

0 - 1023

Registered

1,024 - 49,151

Application Protocol	Port Number
HTTP	80
HTTPs	443
FTP	20,21
SSH	22
Telnet	23



Well Known

0 - 1023

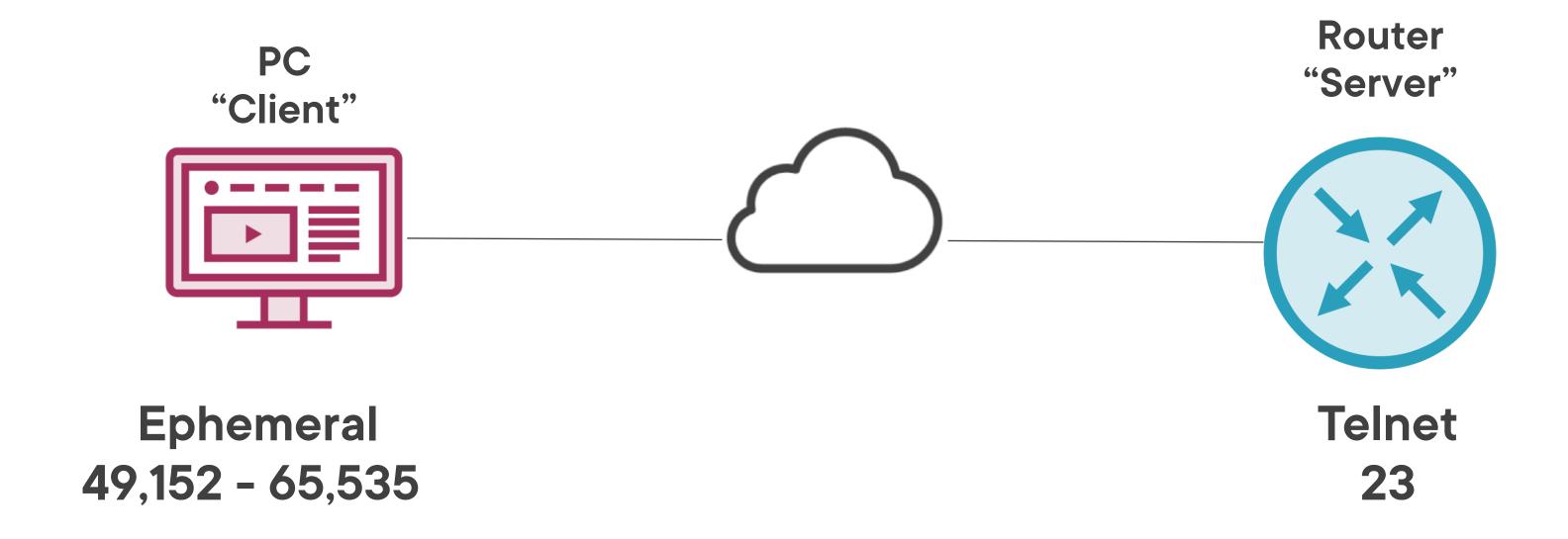
Registered

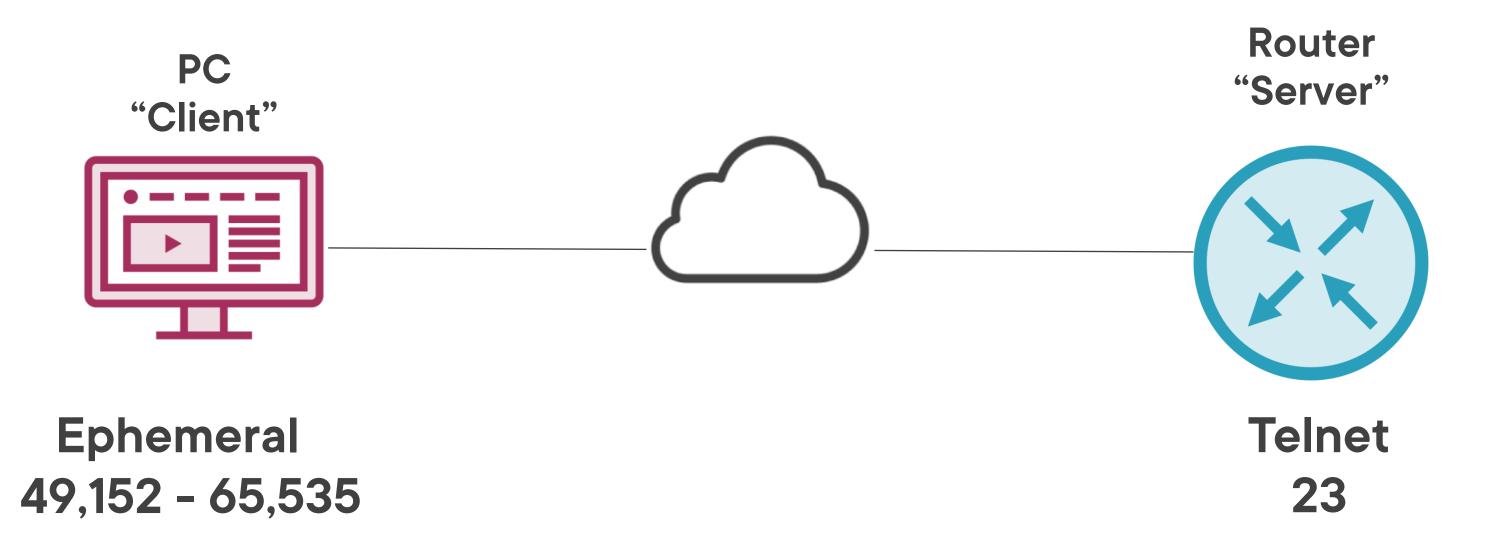
1,024 - 49,151

Application Protocol	Port Number
HTTP	80
HTTPs	443
FTP	20,21
SSH	22
Telnet	23

Custom Applications "Official and Unofficial"







Source Port 49,152
Destination Port 23



Application Layer Protocol Dependency



HTTP	HTTPs	FTP	SFTP	SMB	POP3	IMAP	SMTP	LDAPs	LDAP	TFTP
80	443	20,21	22	445	110/ 995	143/ 993	25/ 587	636	389	69

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80	443	20,21	22	445	110/ 995	143/ 993	25/ 587	636	389	69
	TCP								TCP/ UDP	UDP

HTTP	HTTPs	FTP	SFTP	SMB	POP3	IMAP	SMTP	LDAPs	LDAP	TFTP
80	443	20,21	22	445	110/ 995	143/ 993	25/ 587	636	389	69
TCP								TCP/ UDP	UDP	

IP

Telnet	SSH	RDP	DNS	SIP	H.323	SNMP	DHCP	NTP
23	22	3389	53	5060	1719	161	68, 69	123
TCP				TCP/	U)P		
IP								

Summary



Transport Layer Protocols

- Transmission Control Protocol (TCP)
- User Datagram Protocol (UDP)

Protocol Hierarchy

