

Transport Layer, TCP and Floods

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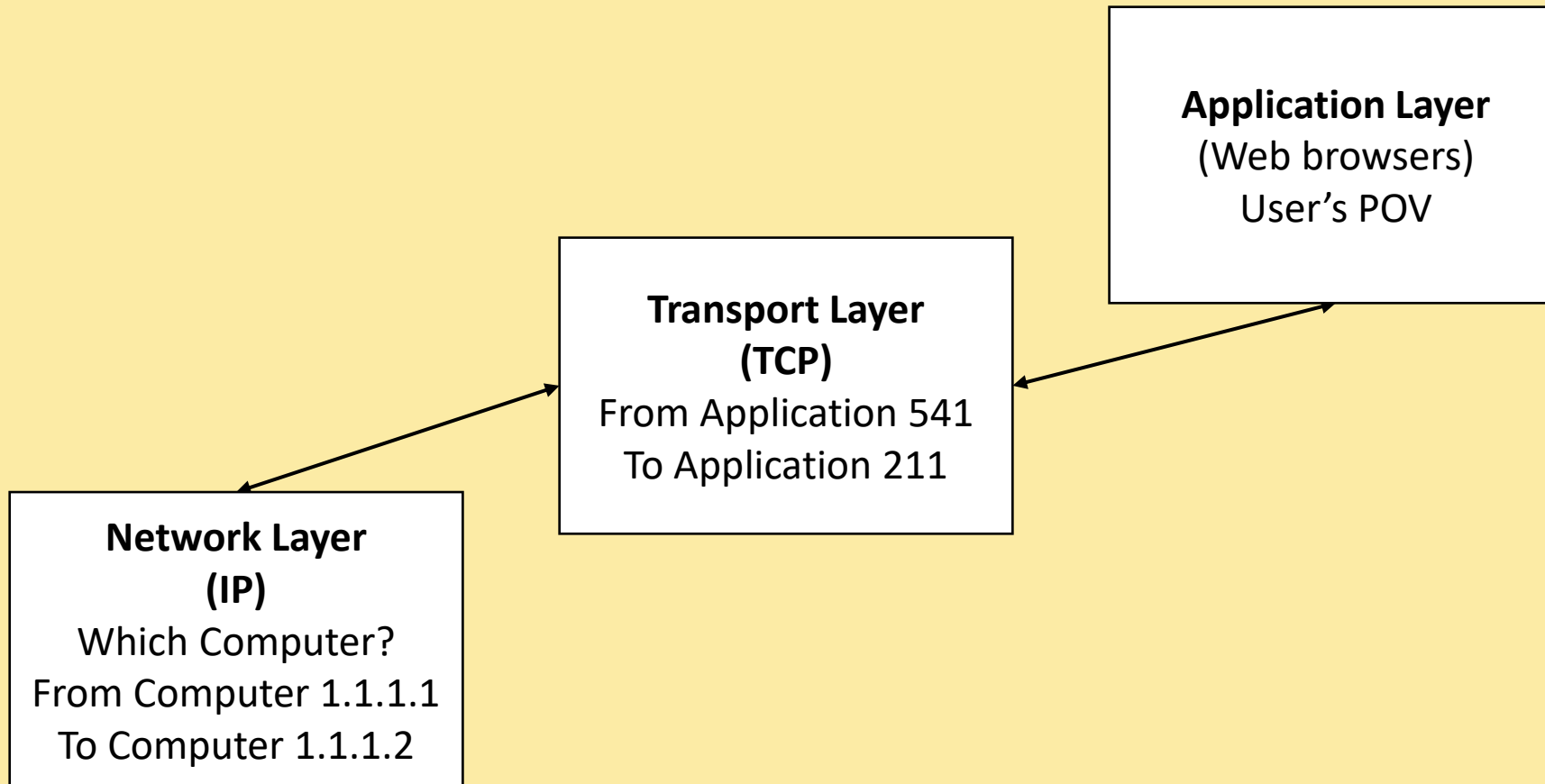
About Me

- Linux and Network Deep Diver
- Github: github.com/AliGhaffarian

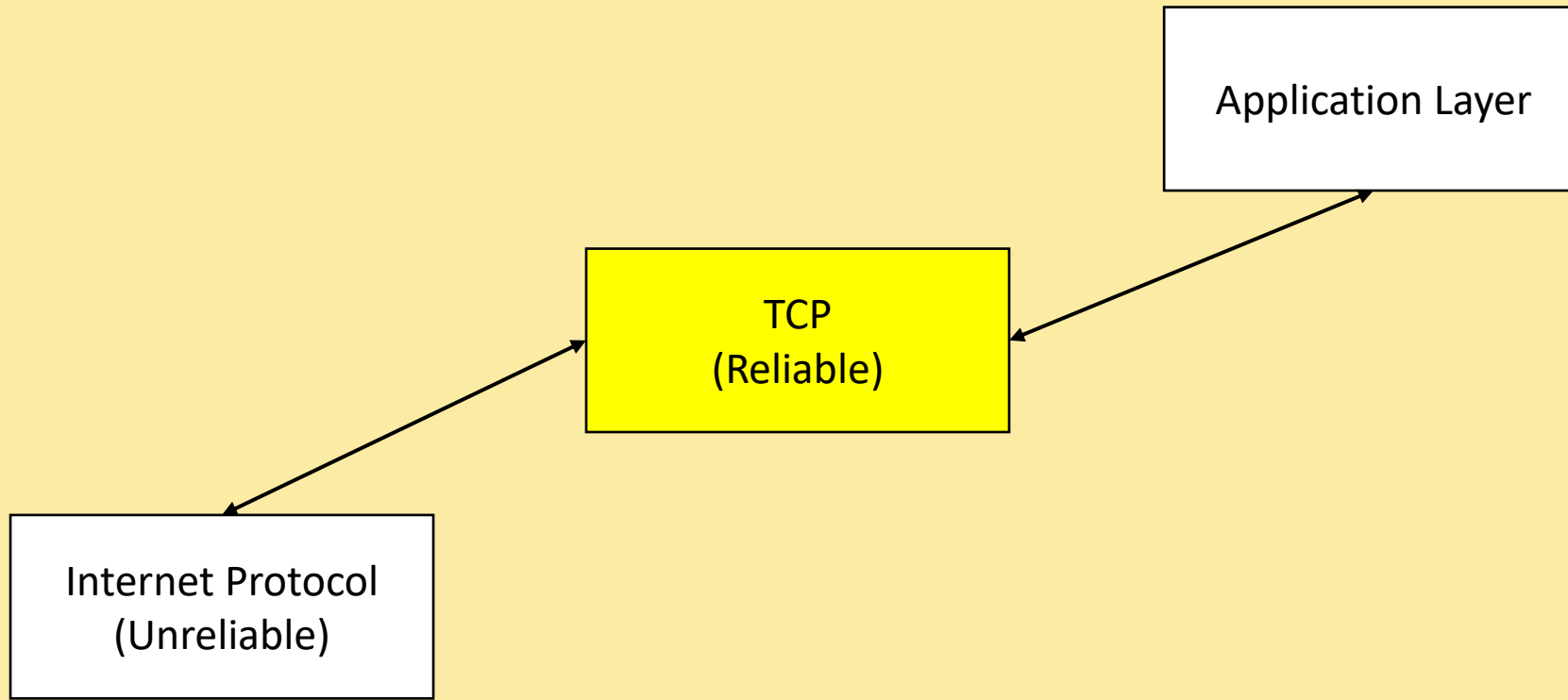
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Transport Layer in TCP/IP Stack



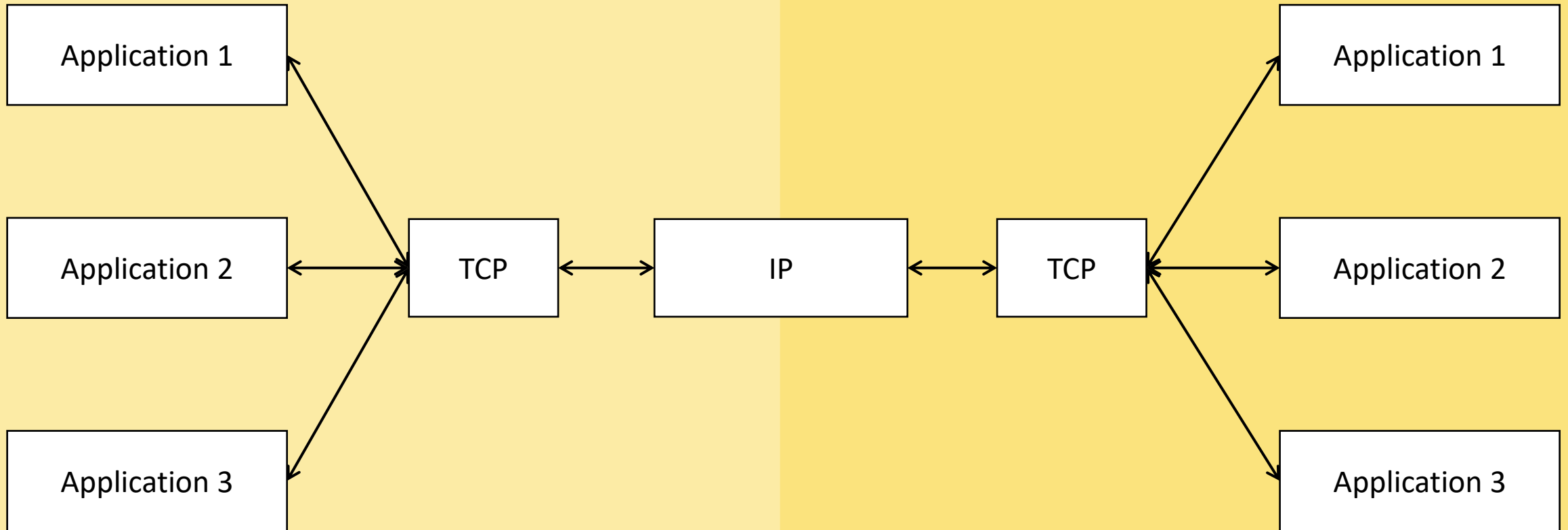
TCP



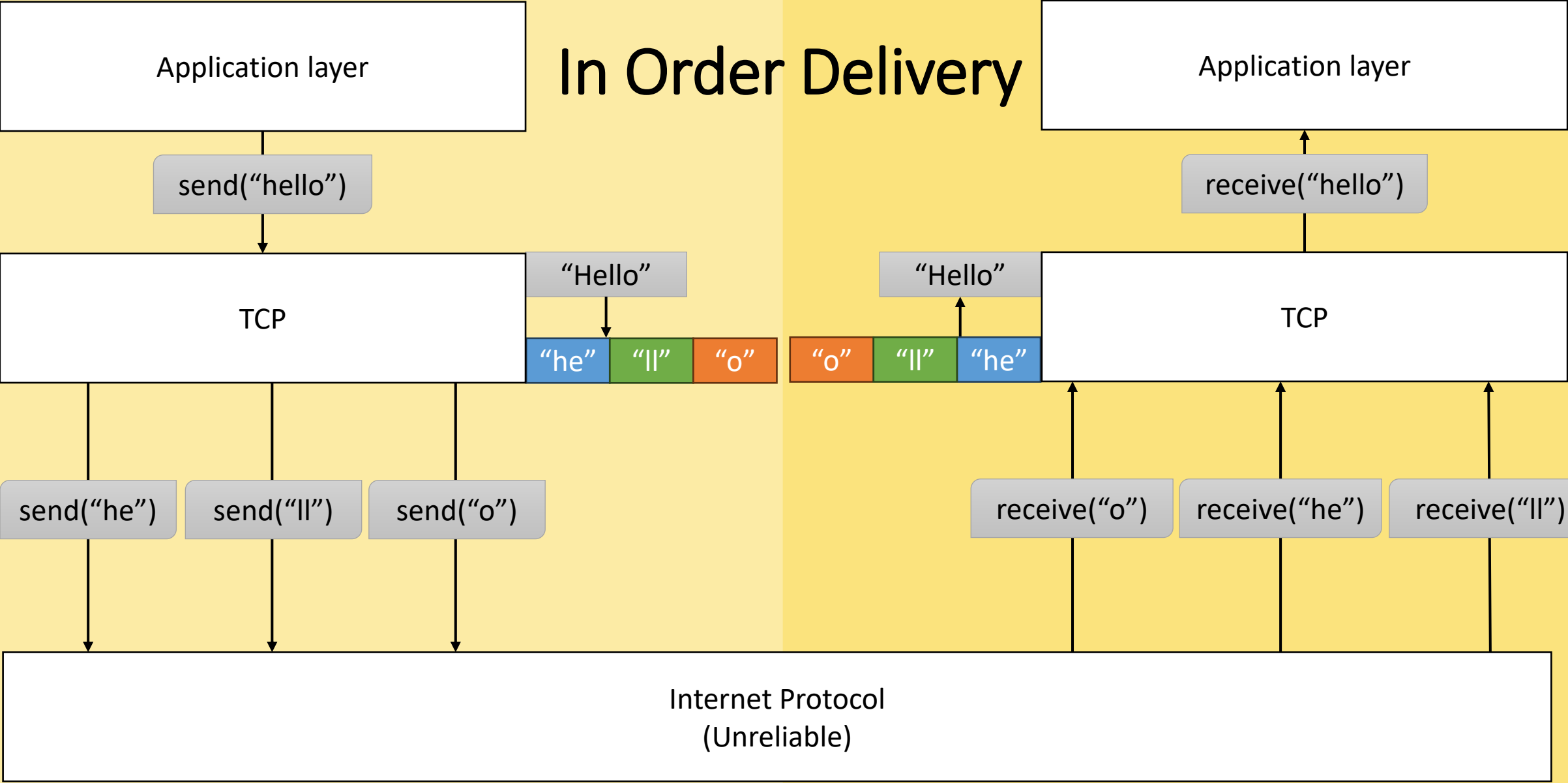
TCP's Fields

- Source Port (From Which Application)
- Destination Port (To Which Application)
- Sequence Number
- Acknowledgement Number
- Flags
- ...

Multiplexing / Demultiplexing



In Order Delivery



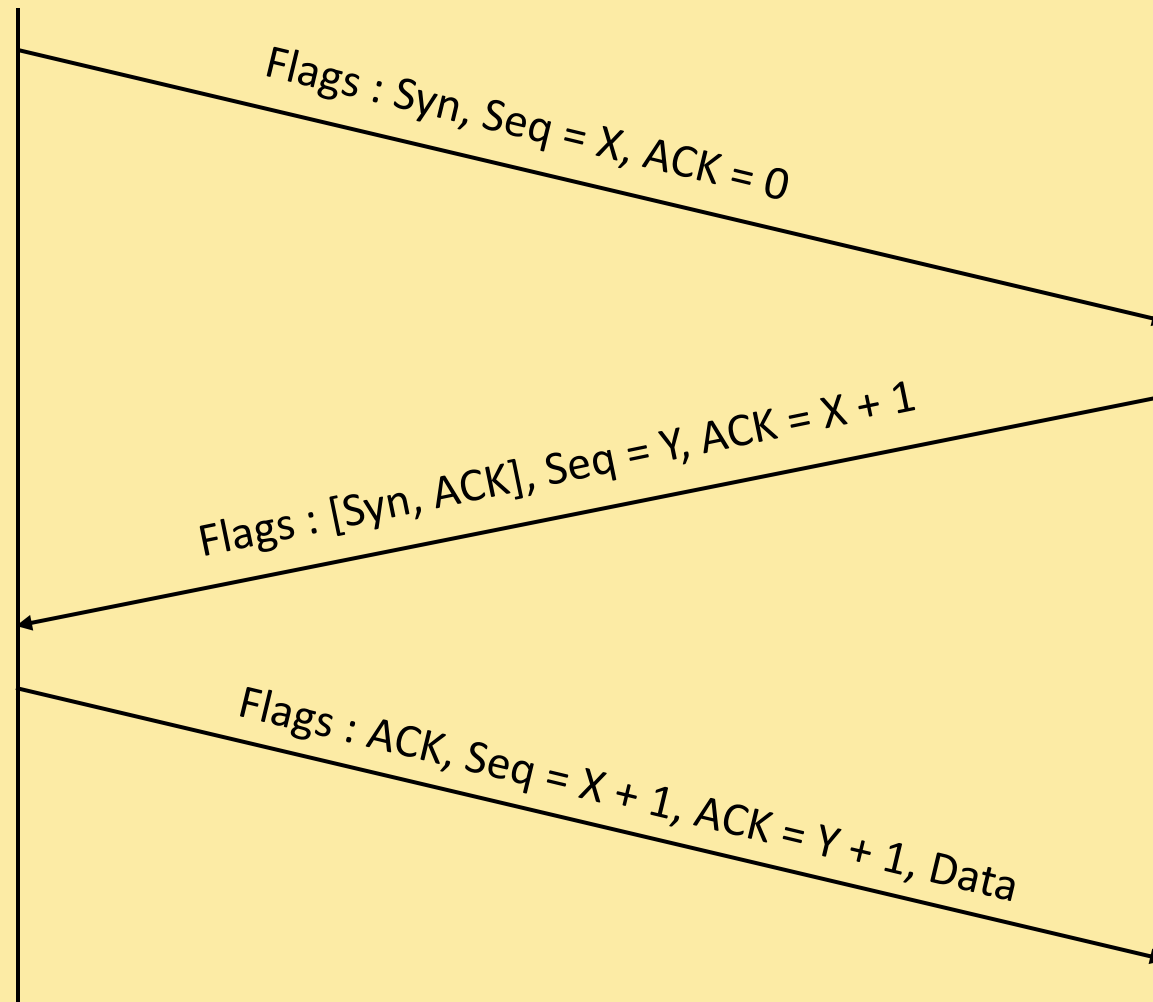
TCP Flags

000.	....	....	= Reserved
...0	....	....	= Accurate ECN
....	0...	....	= Congestion Window Reduced
....	.0..	....	= ECN-Echo
....	..0.	....	= Urgent
....	...0	....	= Ack
....	....	0...	= Push
....	....	.0..	= Reset
....	....	..0.	= Syn
....	....	...0	= Fin

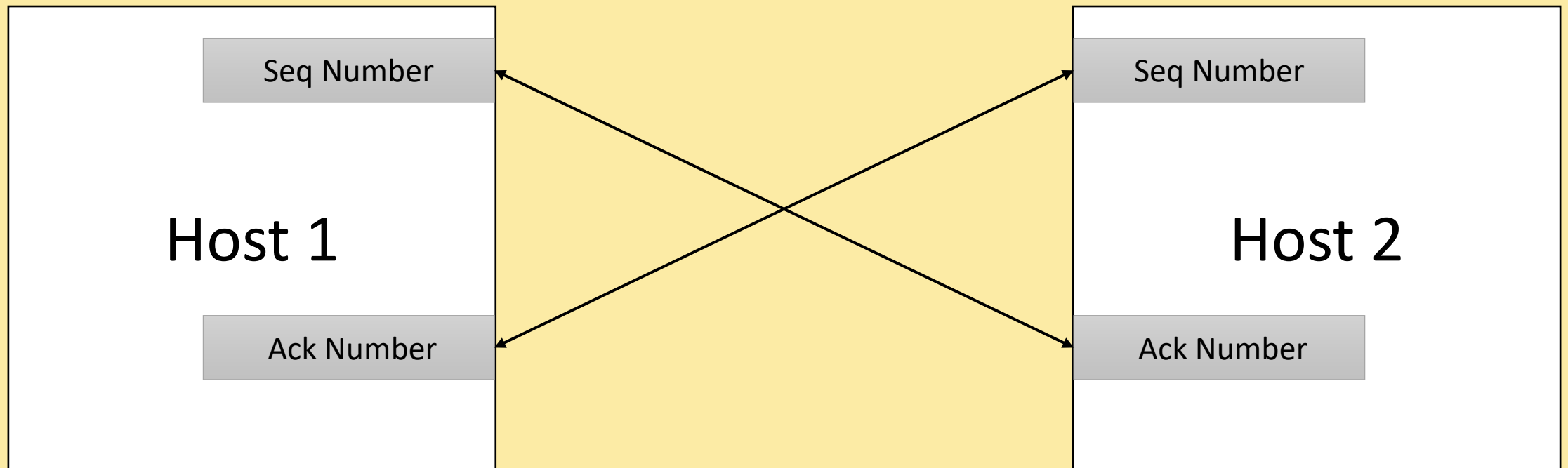
The Tree Way Handshake

Host 1

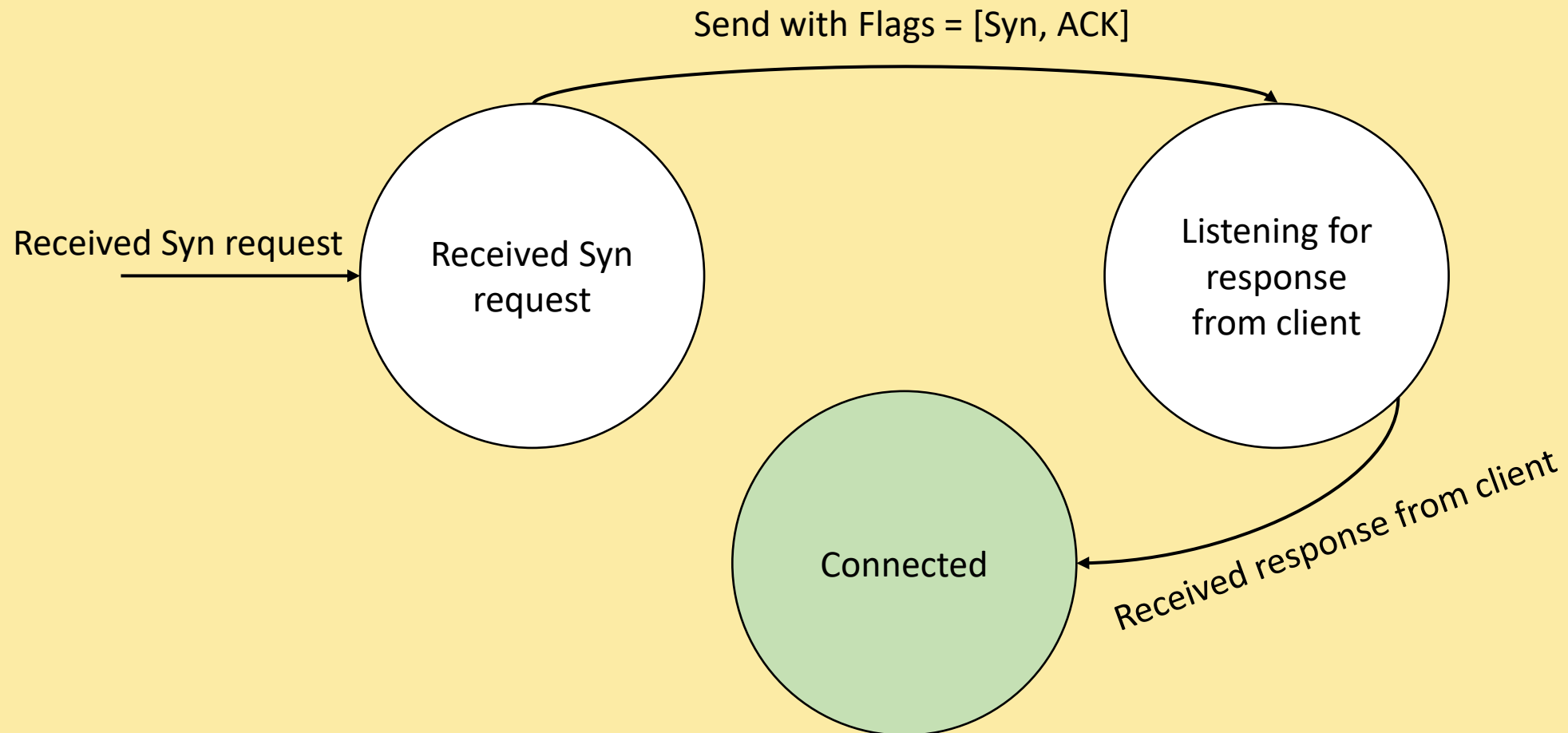
Host 2



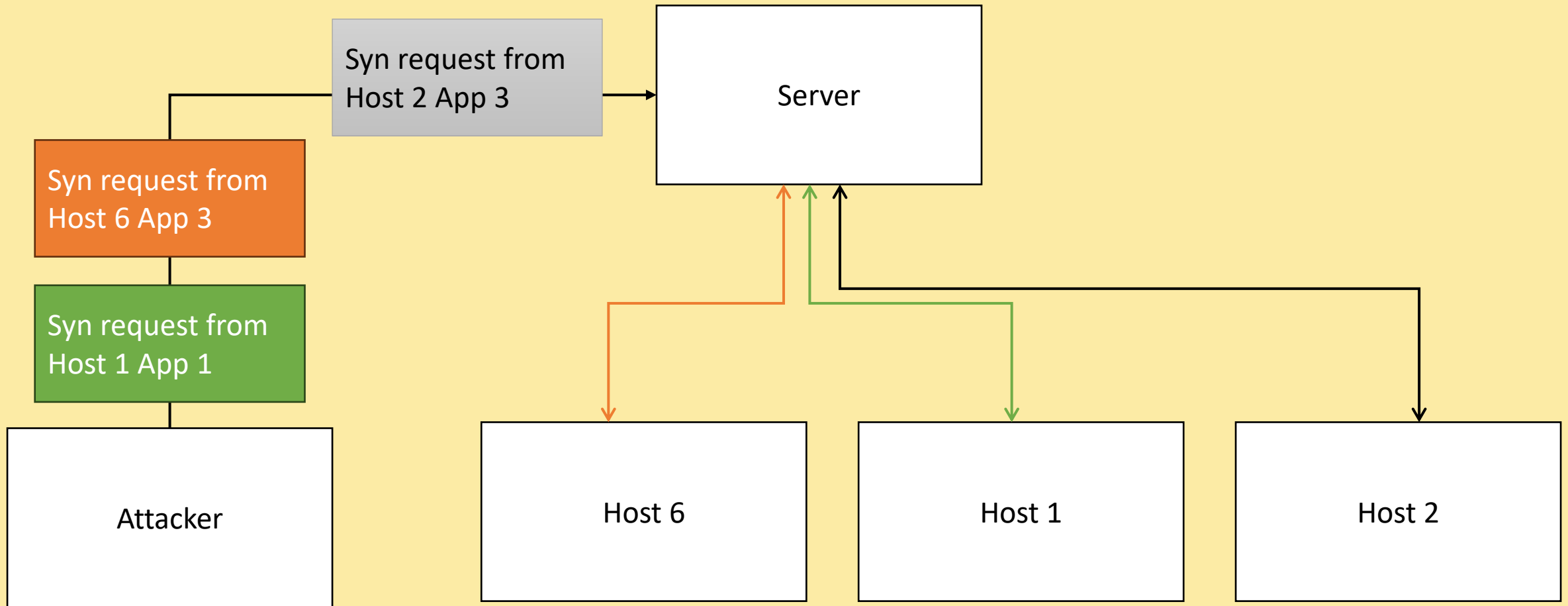
Sequence And Acknowledgement Number



State Machine of a TCP Server

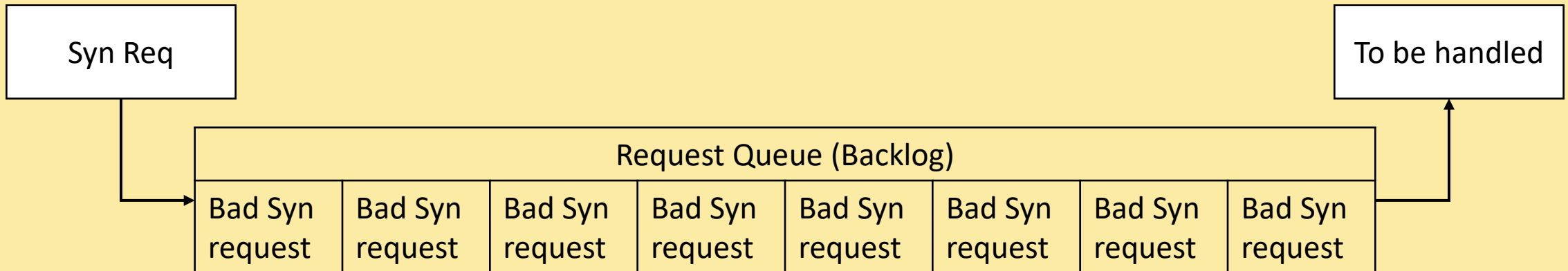


SYN Floods



SYN Flooding is Cheap

Always Waiting on Non-Existing Clients



Solution

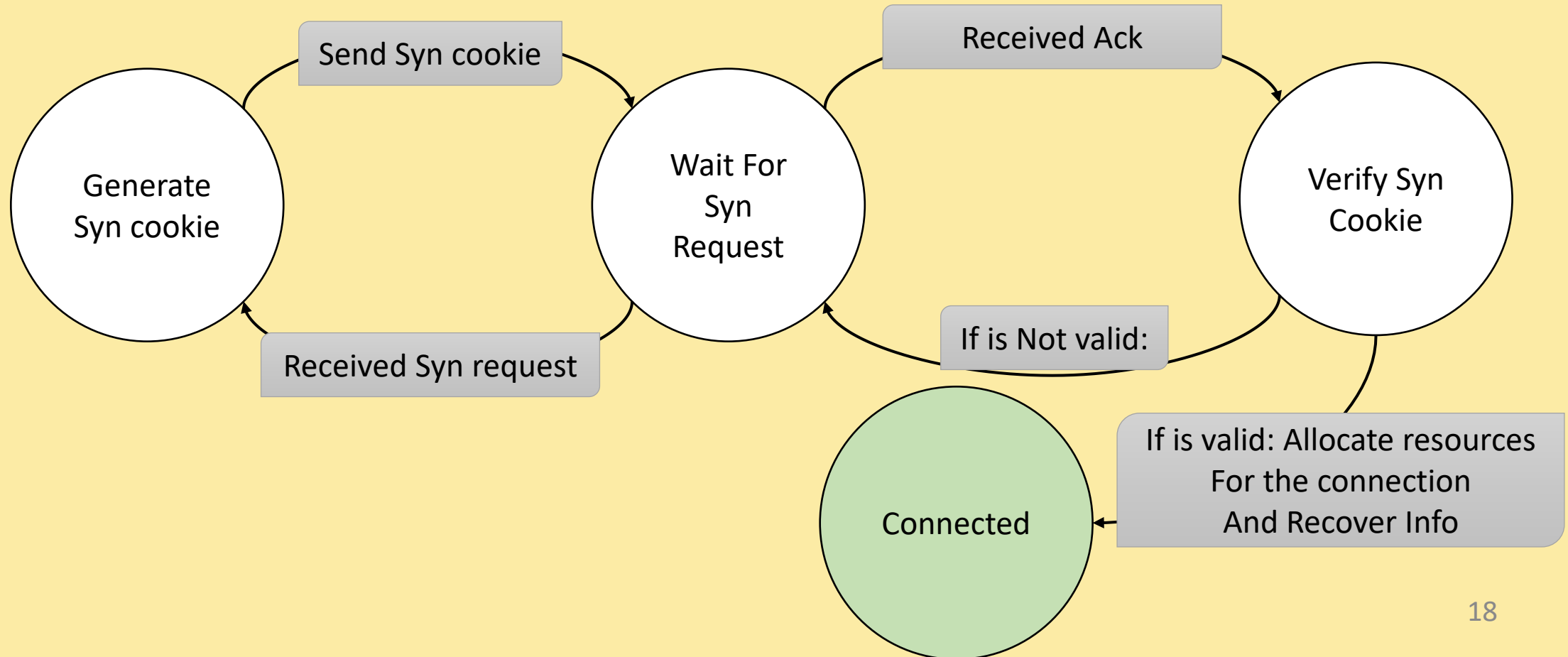
Break the Protocol?

Syn Cookies

- Handle the Handshake Statelessly
- No More Request Queue (Backlog)
- Reconstructing the Connection

How is it Done?

Forget the Connection But Not Really



Information to Recover

- Server's IP Address
- Client's IP Address
- Server's Sequence Number
- Client's Sequence Number
- Server's Port
- Client's Port
- TCP Options (Optional but Important)

Why Encoding Stuff?

- Preventing Against Connection Spoofing
- Being Flooded with Acks

Benefits and Drawbacks of Syn Cookies

- Higher Cost of Syn floods
- Lower Memory Usage
- No Direct Support For TCP Options
- Higher CPU Usage
- Complexity

Learn More

- `linux/net/ipv4/syncookies.c`
- `lwn.net/Articles/277146`

Questions

Presentation Files:

github.com/AliGhaffarian/university_thingies