What’s wrong with HTTP?

- TCP connection “warmup”
  - ... persistent connections
- Slow down due to TCP error control actions
  - ... parallel connections
- Head-of-line blocking (big requests ahead of small ones)
  - ... SPDY and HTTP/2
- Cost of initiating (secure) transport
  - ... QUIC
SPDY

- An open protocol developed by Google
  - precursor to HTTP/2, deprecated as HTTP/2 was ratified

- Goal: reduce latency and improve security
  - through multiplexing, prioritization, and compression
  - server push

- Does not replace HTTP/1.1
  - implemented using TLS’s Next Protocol Negotiations (NPN)
HTTP/2

- Based on SPDY
- Key features (mostly the same as for SPDY)
  - multiplexing
  - compression
  - server push
- Almost an RFC…
  - approved by the IETF httpbis WG in February
  - fast-tracked standardization with heavy Google involvement
TCP is bad and there isn’t much we can do about it…

- so, let’s throw it away and build a new transport/application layer protocol (in the application layer) on top of UDP
- and, improve on TCP / TLS / HTTP/2 combination

Goals:

- reduce connection establishment time (esp. of repeated ones)
- multiplexing
- improve congestion control
- FEC
- connection migration
Router Architecture (review)
Switching Fabric

- N inputs and M outputs (often M = N)

**Solutions**
- bus
- crossbar
- multistage interconnection network (MIN)

**Cost / benefit analysis**
- number of crosspoints (switches)
- latency
- permissible requests / cross-section bandwidth