

Lecture 4: September 19, 2018

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4.1 TCP v.s. UDP

- UDP involves simply sending packets with no handshaking. This requires that the socket be provided with server information each time.
- TCP involves handshaking and confirms the client has received packets
- TCP requires 2 sockets, one to enable handshaking and another to send data.
- When using TCP, the secondary socket does not require any additional server information to send data, as its a dedicated connection upon which the application can push data
- TCP port for handshaking is typically standardized
- Once a connection has been negotiated, a new port is opened for each connection. As a result, TCP requires a lot of overhead.

4.2 Application architecture

There are typically two different types of architectures

- Client-Sever
 - Requires a dedicated server which handles all requests and is solely responsible for directing data to the client
 - This raises issues when attempting to scale up, as more data centers with more servers will be required to support more users. This is very cost prohibitive
- Peer-to-Peer (P2P)
 - Peer-to-Peer attempts to eliminate the central server by linking different clients who have files stored locally
 - Unfortunately, as we scale P2P across large number of users and files, a smaller server may be required to keep track of users and ip addresses
 - P2P raises security issues because you must have an open port on your system to send and receive data.
 - Some smaller P2P systems use **Service Discovery**, which involves users broadcasting their presence. Once service is discovered, a client-server relationship is established between the different users.

4.2.1 Needs of the Transport layer

A network application requires the transport layer to provide :

- **Data Integrity** : Applications require 100% reliable data transfer
- **Timing** : Some apps require low delay
- **Throughput** : Some applications require a minimum amount of throughput
- **Security** : Applications may require the data to secure (i.e encryption, etc)