



Modeling And Performance Analysis Of BitTorrent-like Peer-to-Peer Networks

An Introduction

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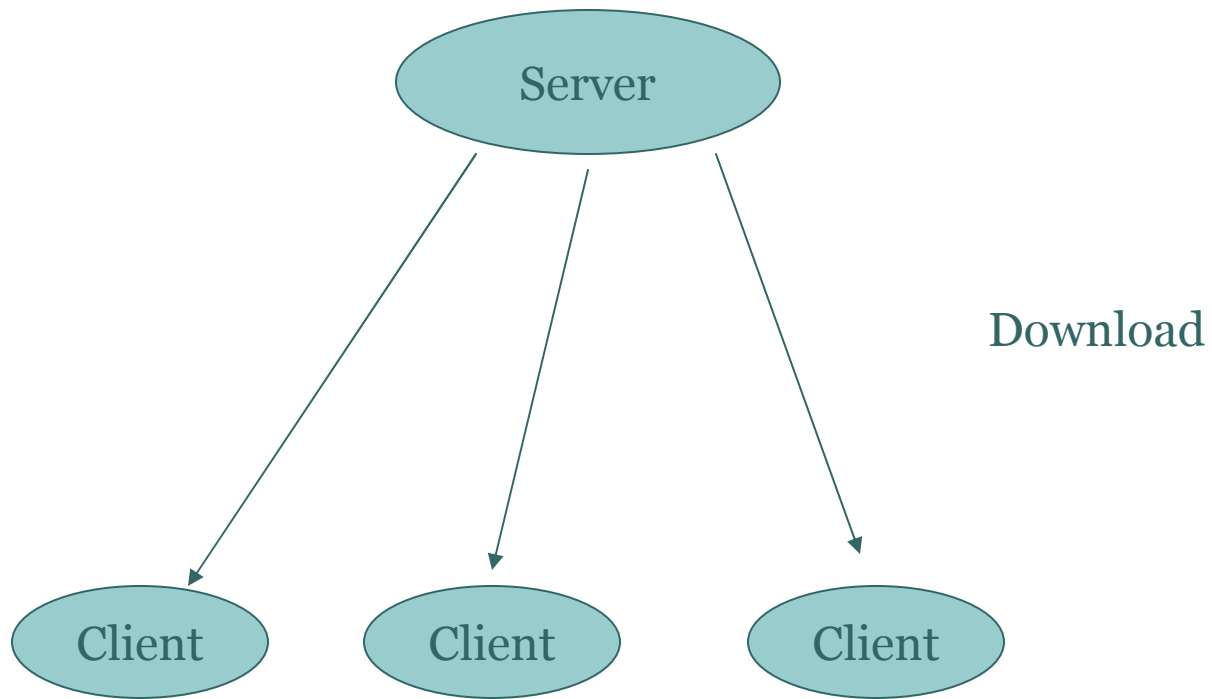
BitTorrent

- Most popular P2P protocol.
- Created by Bram Cohen.
- Application level overlay network.





Traditional File Transfer



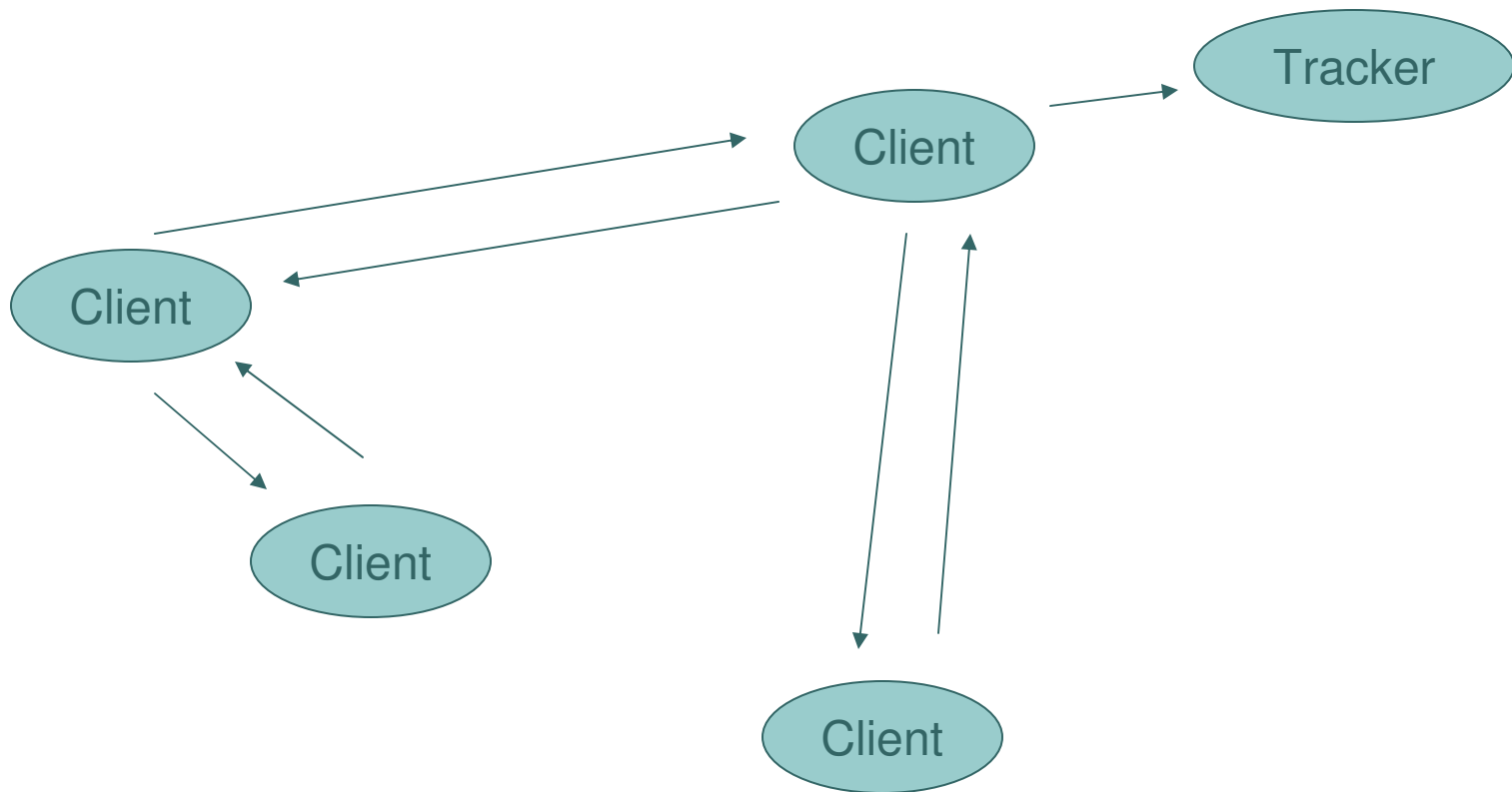


Traditional File Transfer

- Server: Serves files.
- Clients: Download from server.
- Server bandwidth severely stretched.
- Can't scale to huge number of clients.
- Can't scale to large file sizes.
- Wastes the upload capacity of clients.



BitTorrent In Contrast ...





BitTorrent In Contrast ...

- Has no “servers”.
- Clients “share” the file between themselves.
- Upload capacity of clients put to use.
- “Speed” of download depends on number of peers who possess the required file.



Details

- 2 kinds of BitTorrent peers:
- Downloaders: Downloading file pieces they don't have. Uploading file pieces they have to other peers.
- Seeds: Good “Samaritans” uploading their full file to other peers.



Trackers

- Special “servers” which maintain:
 - List of files they track
 - List of peers who have those files
- Downloaders talk to trackers
 - Get the list of peers for the required file.
- Very light communication.



Typical Session

- A person wants a file.
- He finds a tracker which has this file.
- Opens the tracker information (file:peers) in a BitTorrent client.
- Client is “downloader”.
- Downloader talks to tracker and gets list of peers who have the file.



Typical Session ...

- Files are broken into pieces of 256KB.
- Each peer may have “some” pieces of a given file.
- Downloader contacts peers and finds the ones which have pieces it needs.
- Initiates download from these peers.



Typical Session ...

- Meanwhile, other downloaders talk to our downloader seeking pieces it has.
- This results in uploads from our downloader.
- A peer “prefers” to upload to a peer which in turn gives it the best download speed.
- This helps in “starving” free-loaders.



Model We'll Study ...

- Performance at steady state
 - No change in number of downloaders and seeds.
 - Average downloading time?
- How “effective” is BitTorrent?
- Is it stable with varying number of downloaders and seeds?



Thank You