

# Swarm Based P2P Network

## BitTorrent

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# Outline

## 1 Overview

# Protocol

- Made to distribute large files.
- First create a *Torrent descriptor file*
  - Details of the file.
  - A cryptographic hash of the file's contents
  - Stored and distributed to search engines.
- The user joins a **swarm** of hosts.
- Each host is a simultaneous downloader and uploader.
- **IDEA** : Break a large file into multiple segments (256 KB)
  - Distribute the **pieces** to peers.
  - The peers can subsequently re-distribute the **pieces** .
- A BitTorrent client (tracker) can simultaneously download the different **pieces** from different hosts.

# BitTorrent Client

- Each file has a dedicated
  - Torrent file → metadata, hash
  - A tracker → a server, which co-ordinates the process of downloading the file
- Approach: Connect to the tracker, which has a list of peers that contain the different pieces. Connect to the peers to get the different pieces.

## Alternative Approach

Do not use a tracker. Use a DHT instead. This will help you locate all the peers that contain a given piece. Refer to the Mainline DHT (uses Kademlia).

# Downloading and Sharing Files

- Users need to use regular search mechanisms to find Torrents of interest.
- Similarly, if a server has a new file it hosts it, and distributes the Torrent file. It is known as the **seeder** .
- Once a client gets the Torrent file, it connects to the tracker, and gets the list of peers.
- Downloads the **pieces** in a random order.
- Different strategies:
  - Prioritise traffic for those nodes that have sent a lot of data on the network.
  - A sender will preferentially send data to the nodes that have sent it data in the past ( **tit for tat** ).
  - Keep some bandwidth for yourself, and some for **others** .

# Security and Privacy

## Security and Privacy

- No anonymity or security.
- The legal onus is more on the site that indexes the Torrents.
- Nevertheless, everybody involved in the hosting and propagating of copyrighted or illegal material is culpable.
  - Depends on the specific country.

# Searching for Torrents

- Mainline DHT is the largest DHT in the world with somewhere between 10 million to 25 million computers.
- All the current versions of the BitTorrent clients are compatible with Mainline DHT.
- Alternative approach:
  - Use a gossip based protocol to have BitTorrent directories among the peer nodes (Tribler).
  - Use anti-entropy to regularly exchange list of Torrents.
  - Since there are too many Torrents, the software gradually learns the user's interest and filters the Torrents.

-  BitTorrent Wikipedia Article <https://en.wikipedia.org/wiki/BitTorrent>
-  Izal, Mikel, et al. “Dissecting bittorrent: Five months in a torrent’s lifetime.” International Workshop on Passive and Active Network Measurement. Springer Berlin Heidelberg, 2004.