Peer to Peer Applications: BitTorrent

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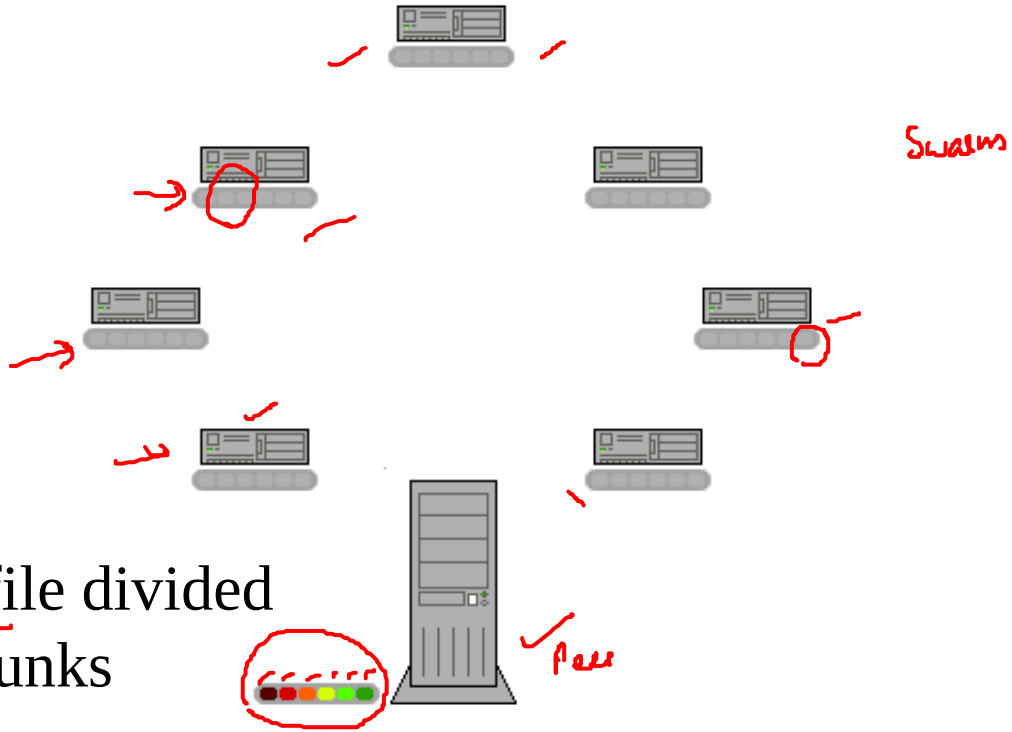
BitTorrent

- Basic Idea: Ignore search; focus on efficient fetch
- Why like this?

  - To handle flash crowds (e.g. new game release)
  - Past: single source, multiple mirror sources
    - Source servers can become bottlenecks; high cost
- BitTorrent: Users form a swarm of peers (all interested in the same file)
  - Each upload to/ download from each other simultaneously



Challenges:

- Churn: Peers come and go
- Freeloaders: Download but not upload

Publish

- Create a torrent file (.torrent). Includes meta data about the file you wish to share and url of a tracker
- Meta Data:
  - Name of the file
  - SHA-1 hash of each piece (a file is divided into pieces)
  - Piece size (usually 256KB)
  - Length of the file

Publish

- Tracker: A server that coordinates file transfer; keeps track of peers in the swarm
  - Both public (any one can use) and private trackers available (only by invitation)
- Publish the torrent file on a web server
- Ensure a machine that has the entire file joins the swarm (initial seed)
  - Seed: A node with a complete file

Search/Join

- Search: Out of band (use google or on popular websites that host torrents) to find the torrent file
- Join: Contact “tracker” listed in the torrent file
  - Provide your IP-addr, Port info, amount uploaded/downloaded etc (do this periodically)
  - Tracker provides a list of peers who are downloading same file

Terminology

- Seed: A node with the complete file
- Leech: A node that is still downloading the file
- Peer: Runs BitTorrent client. Can be a seed or a leech
- Sub-piece: File is divided into pieces (typically 256KB). Each piece further sub-divided into sub-pieces (typically 16 no.).
  - Unit of request is a subpiece; 5 requests pipelined at once
  - A peer can upload only after receiving a complete piece

Fetch

- As part of Join, a leecher gets a list of peers who are downloading same file
- Which piece (sub-piece) to request?
  - Piece Selection Algorithm
- From whom to request? And whose request to accept or deny
  - Choking Algorithm

Break