ĐẠI HỌC QUỐC GIA THÀNH PHỐ HỒ CHÍ MINH

TRƯỜNG ĐẠI HỌC BÁCH KHOA

KHOA KHOA HỌC - KỸ THUẬT MÁY TÍNH

HỌC KỲ

Bài tập lớn

Cơ Sở Dữ Liệu

GVHD:

SV:

Huỳnh Minh Khoa	- 2252346
Thân Nguyễ Minh Khoa	- 2252361
Trần Lương Yến Nhi	- 2252586
Nguyễn Lê Vân Tú	- 2252881

TP. HỒ CHÍ MINH, THÁNG 10/2024

Mục lục

I BitTorrent File-Sharing Application Functions and Communication Protocols

1. **File Discovery and Metadata Sharing** *Description:* Allows users to locate and retrieve metadata about files to be shared or downloaded, typically through .torrent files or magnet links. *Communication Protocols:*

   - **HTTP:** For downloading .torrent files or accessing magnet links.

2. **Peer Discovery** *Description:* Enables the identification and connection to other peers sharing the same file, ensuring distributed sharing. *Communication Protocols:*

   - **BitTorrent Tracker Protocol (HTTP):** Centralized approach to finding peers.

3. **File Piece Distribution** *Description:* Divides files into smaller pieces for efficient sharing. Each piece is individually shared and verified to ensure data integrity. *Communication Protocols:*

   - **BitTorrent Protocol over TCP/UDP:** Manages the exchange of file pieces.

4. **Upload** *Description:* Handles the sending of file pieces from a user's device to multiple peers in the network. Ensures balanced contribution and resource sharing. *Communication Protocols:*

   - **BitTorrent Protocol over TCP/UDP:** Governs the sending of data pieces to peers.

5. **Download** *Description:* Manages receiving file pieces from other peers. Ensures optimal use of network resources by downloading from multiple peers concurrently. *Communication Protocols:*

   - **BitTorrent Protocol over TCP/UDP:** Controls receiving data pieces from multiple peers simultaneously.

6. **Piece Verification** *Description:* Verifies the integrity of each downloaded piece by comparing its hash to the expected value, ensuring the reliability of the download. *Communication Protocols:*

- **Internal Hash Verification (SHA-1):** Conducted within the application to confirm the accuracy of received data.

7. **Tit-for-Tat Function** *Description:* Implements a strategy to ensure fair sharing by prioritizing peers that contribute more data. Encourages reciprocation among peers to balance the network load. *Communication Protocols:*

   - **BitTorrent Protocol:** Uses a built-in mechanism to manage upload/download ratios and prioritize reciprocating peers.

8. **Encryption Function** *Description:* Ensures secure data transfer by encrypting communications between peers. Uses key exchange mechanisms to establish a secure connection. *Communication Protocols:*

   - **Diffie-Hellman Key Exchange:** Establishes a shared secret between peers to encrypt communication.
   - **AES (Advanced Encryption Standard):** Encrypts the actual data transfer for security.

9. **Error Handling and Recovery** *Description:* Detects and recovers from issues like incomplete or corrupted downloads. Retries failed downloads and re-requests missing pieces from other peers. *Communication Protocols:*

   - **BitTorrent Protocol:** Contains mechanisms for retrying failed piece downloads and error detection.

II Tracker-Specific Functions

10. **Tracker Registration** *Description:* Registers new peers with the tracker to enable them to participate in the file-sharing network. *Communication Protocols:*

    - **BitTorrent Tracker Protocol (HTTP):** Used to register peers with a centralized tracker.

11. **Tracker Announce** *Description:* Updates the tracker with a peer's status, such as upload/download progress, which files the client is seeding and connection status. *Communication Protocols:*

    - **BitTorrent Tracker Protocol (HTTP):** Communicates the peer's status to the tracker.

12. **Tracker Peer List Retrieval** *Description:* Allows peers to retrieve a list of other peers sharing the same file from the tracker. *Communication Protocols:*

    - **BitTorrent Tracker Protocol (HTTP):** Provides a list of active peers from the tracker.

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