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Project 2 Architecture Description

- Client/server architecture uses a multithreaded server to handle multiple clients on the same incoming socket.
- Besides the files themselves, the primary structure being passed from server to client is the list_item, which represents a hash-filename pair. These are used to determine which files are present on the server (LIST) and compare them to what is present on the client (DIFF). The list_item struct, the "array" that encapsulates it, and related operations are defined in utils.c.
- Server and client communicate with each other using a well-defined protocol. One host sends a specifically-formatted message to the other and expects a specifically-formatted response. Details of this protocol are as follows:
  - For the LIST command, the client sends the server the string "LIST." In response, the client expects the sequence of bytes <count><item1><item2>...<item n>
    - count is a 4-byte integer representing the number of items to follow
    - items 1-n are list_item structs, each representing an individual mp3 filename-hash pair from the server's current directory
  - The DIFF command is handled client-side, so no communication is required. The client makes use of one of the list_item_array utility functions defined in utils.c to compare an authoritative set (the server's) to another set (the client's).
  - For the PULL command, the client sends the server the string "PULL " appended with the 16-byte MD5 hash of the file being requested. The client expects the sequence of bytes <filesize><file>
    - filesize is an 8-byte integer representing the file's size in bytes
    - file is the file itself
  - The LEAVE command is handled client-side, so no communication is required. The client frees its resources and closes its connection to the server (which in turn ends the server thread that was handling that particular client).