

FTP

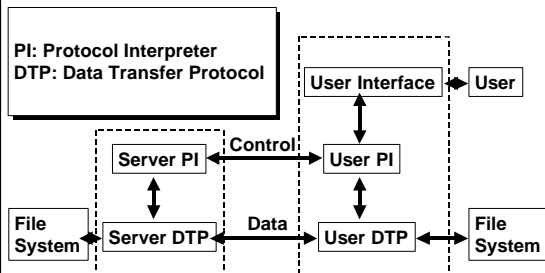
File Transfer Protocol

Reference:
RFC 959

FTP Objectives (from RFC 959)

- promote sharing of files
- encourage indirect use of remote computers
- shield user from variations in file storage
- transfer data reliably and efficiently
- "FTP, although usable directly by a user at a terminal, is designed mainly for use by programs"

The FTP Model



Control and Data Connections

- Control functions (commands) and reply codes are transferred over the control connection.
- All data transfer takes place over the data connection.
- The control connection must be “up” while data transfer takes place.

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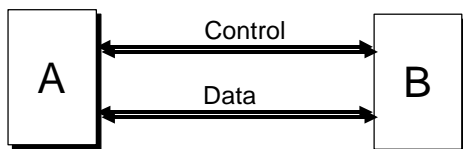
Control Connection

- The control connection is the “well known” service.
- The control connection uses the TELNET protocol.
- Commands and replies are all line oriented text (default is ASCII).

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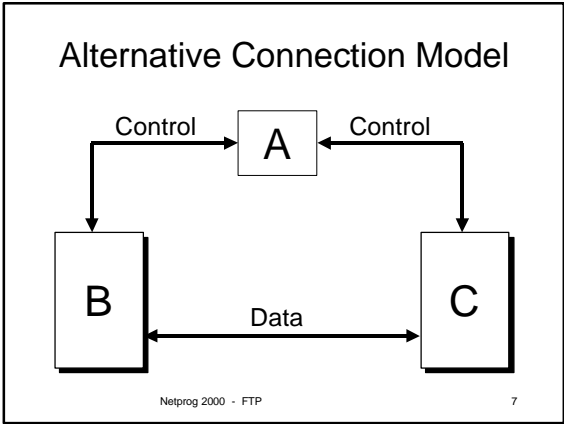
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Standard Connection Model



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Access Control Commands

USER *specify user*
 PASS *specify password*
 CWD *change directory*
 CDUP *change directory to parent*
 QUIT *logout*

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Transfer Parameter Commands

PORT *publish local data port*
 PASV *server should listen*
 TYPE *establish data representation*
 MODE *establish transfer mode*
 STRU *establish file structure*

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Service Commands

RETR *retrieve file*
STOR *send file*
STOU *send file and save as unique*
APPE *send file and append*
ABOR *abort prev. service command*
PWD *print working directory*
LIST *transfer list of files over data link*

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FTP Replies

- All replies are sent over control connection.
- Replies are a single line containing
 - 3 digit status code (sent as 3 numeric chars).
 - text message.
- The FTP spec. includes support for multiline text replies.

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FTP Reply Status Code

First digit of status code indicates type of reply:

- '1': Positive Preliminary Reply (got it, but wait).
- '2': Positive Completion Reply (success).
- '3': Positive Intermediate Reply (waiting for more information).
- '4': Transient Negative Completion (error - try again).
- '5': Permanent Negative Reply (error - can't do).

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FTP Reply Status Code

- 2nd digit indicates function groupings.
 - '0': Syntax (problem with command syntax).
 - '1': Information (reply to help or status cmds).
 - '2': Connections (problem with a connection).
 - '3': Authentication (problem with login).
 - '4': Unspecified.
 - '5': File system (related to file system).
- 3rd digit indicates specific problem within function group.

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Data Transfer Modes

- STREAM: file is transmitted as a stream of bytes.
- BLOCK: file is transmitted as a series of blocks preceded by headers containing count and descriptor code (EOF, EOR, restart marker).
- COMPRESSED: uses a simple compression scheme - compressed blocks are transmitted.

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RFC 959

- The RFC includes lots more information and many details including:
 - parameters for commands
 - lists of reply status codes
 - protocol state diagrams
 - support for a variety of file structures
 - sample sessions

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