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Functionality Needed**  
1. Upload file on local host to remote host

#1 ULOAD message format  
2. Download file on remote host to local host

#2 ULOADREQ message format

3. Request List of files from remote host’s share directory

#3 LISTREQ message format

4. Response List of files in local host’s share directory

#4 LISTRES message format

**User interaction outline**

*\*\*assumptions: both the local host and remote host have their programs running successfully\*\**

1. message prompts user for a remote host IP address
2. User enters remote host IP address into application
3. application makes connection to remote host and a message confirms the successful connection
4. The Both the local host and remote host listen for responses on port 4000 and they will send messages to each other on port 4000.
5. If the local user would like a list of all files within the remote host’s share director, the local user can send a LISTREQ message to the remote host on port 4000.
6. If the local host received a LISTREQ message from the remote host on port 4000, it will create a LISTRES message and send it to the remote host on port 4000.
7. If the local user would like to send a file to a remote host, the local host will create an UPLOAD message containing the control and payload information \*plus\* the payload data to the remote host on port 4000.
8. If a local host receives an UPLOAD message, the local host will parse the control and payload information within the UPLOAD message and create a file in the share directory with the given information.
9. If the local user would like to receive a file from a remote host, the local host will create a ULOADREQ message containing control and the file name for the desired file in the share directory on remote host send it to the remote host on port 4000.
10. If the local host receives a ULOADREQ from a remote host on port 4000, the local host will create an UPLOAD message for the file specified in the ULOADREQ message. The local host will then send the UPLOAD message to the remote host port 4000.

**File transfer application header field values:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Flag | Payload Name Length | Payload Name | Payload Extension Length | Payload Extension | Option | Payload |
| ULOAD [INT] = 1 | [INT] =  payload.name.size() | [BYTES] =  payload.name() | [INT] = payload.extension.size() | [BYTES] =  payload.extension() | [INT] = 0 | [BYTES] = byteStream(payload) |
| ULOADREQ [INT] = 2 | [INT] =  payload.name.size() | [BYTES] =  payload.name() | [INT] = payload.extension.size() | [BYTES] =  payload.extension() | [INT] = 0 | [BYTES] = byteStream(payload) |
| LISTREQ  [INT] = 3 | [INT] = 0 | [BYTES] = 0 | [INT] = 0 | [BYTES] = 0 | [INT] = 0 | [BYTES] = 0 |
| LISTRES  [INT] = 4 | [INT] = 0 | [BYTES] = 0 | [INT] = 0 | [BYTES] = 0 | [INT] = 0 | [BYTES] = byteStream(ListString) |

* UPLOAD:
  + this message is used when one host wants to send a file to a remote host.
    - Flag field: [INT] = 1
    - Payload Name Length Field: [INT] = payload.name.length
    - Payload Name: [BYTES] = payload.name
    - Payload Extension Length: [INT] = payload.extension.length
    - Payload Extension: [BYTES] = payload.extension
    - Option: [INT] = 0 (“0” means no options)
    - Payload: [BYTES] = byteStream(payload)
* ULOADREQ:
  + this message is used when one host wants a file sent to it from a remote host.
    - Flag field: [INT] = 2
    - Payload Name Length Field: [INT] = payload.name.length
    - Payload Name: [BYTES] = payload.name
    - Payload Extension Length: [INT] = payload.extension.length
    - Payload Extension: [BYTES] = payload.extension
    - Option: [INT] = 0 (“0” means ignore field)
    - Payload: [BYTES] = 0 (“0” means ignore field)
* LISTREQ:
  + this message is sent to a remote host when the user of the local host is requesting a list of the contents in the share directory of a remote host.
    - Flag field: [INT] = 3
    - Payload Name Length Field: [INT] = 0 (“0” means ignore field)
    - Payload Name: [BYTES] = 0 (“0” means ignore field)
    - Payload Extension Length: [INT] = 0 (“0” means ignore field)
    - Payload Extension: [BYTES] = 0 (“0” means ignore field)
    - Option: [INT] = 0 (“0” means ignore field)
    - Payload: [BYTES] = 0 (“0” means ignore field)
* LISTRES:
  + this message is used when a LISTREQ is received from a remote host.
  + The host which receives this should create and send a string of comma-delimited list (List String) of the length of each file name including its extension as an INT followed by a comma and the file name plus its extension for each file in the share directory.
  + The List String will be the payload of the LISTRES
  + After the last file name has been added to the string, the end-of-list indicator will be a file-name-length of “-1”
    - For Example
      * if the share directory contains:
        + image.jpg
        + document.doc
        + text.txt
      * the List String should contain:
        + 9,image.jpg,13,document.docx,8,text.txt,-1
    - Flag field: [INT] = 4
    - Payload Name Length Field: [INT] = 0 (“0” means ignore field)
    - Payload Name: [BYTES] = 0 (“0” means ignore field)
    - Payload Extension Length: [INT] = 0 (“0” means ignore field)
    - Payload Extension: [BYTES] = 0 (“0” means ignore field)
    - Option: [INT] = 0 (“0” means ignore field)
    - Payload: [BYTES] = bytestream(ListString)

***RESOURCE LINKS***  
  
<https://www.geeksforgeeks.org/file-transfer-protocol-ftp-in-application-layer/>