

EZA Programming 201  
Writing an FTP Client in COBOL

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# RFCs

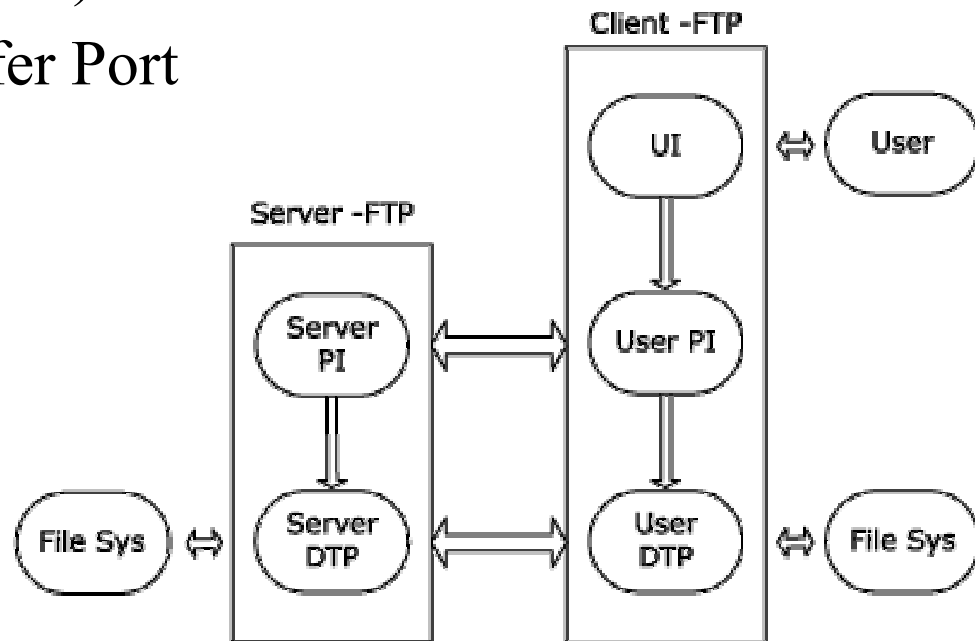
- RFC 765 – June 1980
- RFC 951 – October 1985
  - Obsoletes RFC 765
  - We will use this standard for our programming
- RFC 2228 – October 1997
  - Updates RFC 951
  - “(new commands) provide strong authentication, integrity, and confidentiality...”

# RFCs

- RFC 1579 – February 1994
  - FTP clients should default to PASV
- RFC 2257 – May 1999
  - FTP security exposures (how to hack an FTP server)
- RFC 4217 – October 2005
  - How to use RFC 2228 with TLS (RFC 2246)

# Paths

- UI = User Interface
- PI = Protocol (control) Interface
- DTP = Data Transfer Port



# Paths

- Control path
  - Connect to port 21
  - Responses received on this path/socket
- Data path
  - Request port number using PASV command
  - Only data transfer happens on this path/socket
  - Closed at end of file transfer
  - Must be recreated for each transfer in a session

# Responses

- Responses may be multi-line
  - First line has response number plus a dash
    - “100-”
  - Last/only line has response number plus a space
    - “100 ”
  - Intermediate lines may have either:
    - “100-”
    - Non-numeric character in position 1

# Responses

- EOL
  - <CRLF> (preferred)
  - <CR>
- Partial Responses
  - TCP does not guarantee that all parts of the response will arrive together
  - Code must do another EZA-RECV if last line in buffer not a ‘last line’ that ends with EOL

# Responses

123-First line

Second line

234 A line beginning with numbers

123 The last line

```
3231332D 53746174 7573206F 66205445 *....ëÈ/ÈÍË.?Ã.èá* *213-Status of TE*
53543A0D 0A647277 78727778 722D7820 *èè...ÀÊÏìÊÏìÊ.Ì.* *ST:..drwxrwxr-x *
20203220 74746869 6770656E 20657665 *....ÈÈÇÑÅøÁ>.ÁÎÁ* * 2 tthigpen eve*
72796F6E 65202020 20202020 20302041 *Ê`?>Á..... * *ryone 0 A*
70722020 37203130 3A323220 54455354 *øÊ.....èáèè* *pr 7 10:22 TEST*
0D0A3231 3320456E 64206F66 20537461 *.....á>À.?Ã.ëÈ/* *..213 End of Sta*
7475732E 0D0A4040 40404040 40404040 *ÈÍË... * *tus...@@@@@@@@@*
```



# Responses

- A response may appear before expected
  - Multiple responses with data transfers
    - “Data ready to send”
    - “Data sent”
- Early response must be kept and must override the next EZA-RECV
- Response to “LIST”:

```
31353020 44617461 20636F6E 6E656374 *....Ã Ã.Ã?>>ÃÃÃ* *150 Data connect*
696F6E20 65737461 626C6973 6865642E *Ã?>.ÃÃÃÃ%ÃÃÃÃÃ.* *ion established.*
0D0A3232 36204469 72656374 6F727920 *.....ÃÃÃÃÃÃ?Ã`. *..226 Directory *
6C697374 20686173 20626565 6E207375 *%ÃÃÃ.ÃÃ.ÃÃÃ>.ÃÃ* *list has been su*
626D6974 7465642E 0D0A4040 40404040 *Ã_ÃÃÃÃÃ... * *bmitted...@@@@@*
```

# GETHOSTBYNAME

- Returns an array that is usable by Cobol
- Must use EZACIC08 to “deblock”
  - See coding example
    - ML-GETHOSTBYNAME (page 8)
    - EZA-HOSTENT-EXTRACT (page 23)

# PASV

- Response to a PASV
  - Address (4 parts)
  - Port (2 parts)
  - 227 <some variable text> (nnn,nnn,nnn,nnn,ppp,ppp)
    - nnn,nnn,nnn,nnn = ip address
    - ppp,ppp = port
      - Must be converted to hex and combined
      - 5,61 = x'05' & x'61' = x'0561' = port 1377

```
32323720 456E7465 72696E67 20506173 *....Ã; >ÃÃÃÃ>Ã.&Ã* *227 Entering Pas*  
73697665 204D6F64 65202831 39322C31 *ÃÃÃÃ.(?ÃÃ.....* *sive Mode (192,1*  
36382C31 2C37372C 352C3631 290D0A40 *.....* *68,1,77,5,61)..@*
```

# Using BSTTEZ20

- Build request area (will be COMMAREA)
- Delete or Load any TSQs
- EXEC CICS LINK
  - EXEC CICS LINK
  - PROGRAM(BSTTEZ20)
  - COMMAREA(REQUEST-INFO)
  - LENGTH(REQUEST-INFO-LENGTH)
  - END-EXEC.
- Examine 'counts'
- Examine command table entries

# Using BSTTEZ20

- Request area
  - Header area
    - Connection information
      - Host, userid, password
      - Initial directory (optional)
      - Counts
      - Error message (connection errors only)
  - Commands table
    - Command
    - TSQ information
    - Flags
    - Results

# Using BSTTEZ20

```
01 DFHCOMMAREA.  
   05 RI-HEADER.  
      10 RI-SYSID          PIC X(02).  
      10 RI-DEBUG-FLAG    PIC X(01).  
          88 RI-DEBUG-CONSOLE VALUE 'C'.  
      10 RI-HOST          PIC X(128).  
      10 RI-PORT          PIC 9(04)    COMP.  
      10 RI-USERID        PIC X(32).  
      10 RI-PASSWORD      PIC X(32).  
      10 RI-DIRECTORY     PIC X(32).  
      10 RI-COMMAND-COUNT PIC S9(04)   COMP.  
      10 RI-COMMAND-COUNT-DONE PIC S9(04) COMP.  
      10 RI-COMMAND-COUNT-ERRORS PIC S9(04) COMP.  
      10 RI-ERROR-MSG     PIC X(30).
```

# Using BSTTEZ20

```
05  RI-COMMANDS                                OCCURS 0060
    10  RI-COMMAND                             PIC X(256) .
    10  RI-TSQ                                 PIC X(08) .
    10  RI-TSQ-RECSIZE                         PIC 9(09) .
    10  RI-TSQ-COUNT                           PIC 9(09) .
    10  RI-TSQ-ENCODING                        PIC X(01) .
        88  RI-TSQ-ASCII                       VALUE 'A' .
        88  RI-TSQ-BINARY                      VALUE 'B' .
        88  RI-TSQ-EBCDIC                      VALUE 'E' .
    10  RI-OPTIONAL                            PIC X(01) .
        88  RI-IS-OPTIONAL                     VALUE 'Y' .
    10  RI-STATUS                             PIC X(01) .
        88  RI-NOT-PROCESSED                   VALUE 'N' .
        88  RI-GOOD                           VALUE 'G' .
        88  RI-BAD-RESPONSE                    VALUE 'B' .
        88  RI-INCOMPLETE-TRANSFER            VALUE 'I' .
        88  RI-INVALID-QUEUE                  VALUE 'Q' .
        88  RI-RESPONSE-TRUNCATED             VALUE 'T' .
        88  RI-ERRORS                         VALUE 'B' 'I' 'Q' 'T' .
    10  RI-RC                                 PIC X(03) .
    10  RI-MESSAGE                            PIC X(256) .
```

# Using BSTTEZ20

- BSTTEZ21
  - Sends many non-data transfer command
- BSTTEZ22
  - Sends commands that create data
- BSTTEZ23
  - Sends data transfer commands



# BSTTEZ20

- Code Review

# Downloads

- Downloads can be found at:
  - <http://www.vse2pdf.com/coolstuff>
- You can also find the examples from the previous “Using EZA” WAVV sessions