the warranty group®

Invasion of APIs and the BLOB,

or how I learned to stop worrying and love the acronym.

By Eamonn Foley – Senior Programmer Analyst

Who I Am

- 15+ Years in Synon/2e
- DBA, Architect, Developer, Instructor, Consultant, Cantankerous old coot.
- Currently Sr. Programmer Analyst/General Know It All at the warranty group®

Target Audience

- 2e developers with the following skills
  - Basic 2e skills (you can create a function)
  - Very basic RPG skills (You can spell RPG if spotted 2 letters and given 26 guesses)
  - Basic SQL skills (Create Table, Select, Insert and Update)

Agenda

- Using APIs in a 2e Model
- Using the SQL BLOB data type.
- Q & A

So why are we here

- Issues arose with traditional method for listing spool files
  - Concerns over system upgrades
  - Speed
  - Left over spool filess

- Solution was to use API
  - Faster
  - Upgrade resistant
  - Sounds good, but what is it, and how do we use it

API Overview

- What is an API
  - An Application Programming Interface (API) is an interface between different software programs.
  - An API can be generic (like a JAVA API) or specific to an application (like Google Maps API).
  - OS/400 provides APIs that replicate commands (but with greater control/results.

API Overview cont.

- So, what can it do.
  - Information found on IBM Infocenter
  - “List” programs
    - Spool Files (hey that could work), Jobs, Objects, Object locks.
  - “Detail” programs
    - Object information, Job Information
  - Cool Other Stuff
    - User Spaces (sort of like large flat files) Used to store the “list” results
    - Validate User Password
    - Encryption

API How to Use It

- Multiple methods to access APIs
  - Traditional RPG Programs (OPM and ILE)
    - Requires source code skills, limits enhancement/maintenance
  - CL Programs
    - Greater access to skills required, but still not a home run
  - 2e Functions
    - Pretty sure all 2e developers have the skills to enhance/maintain

API and how to use it

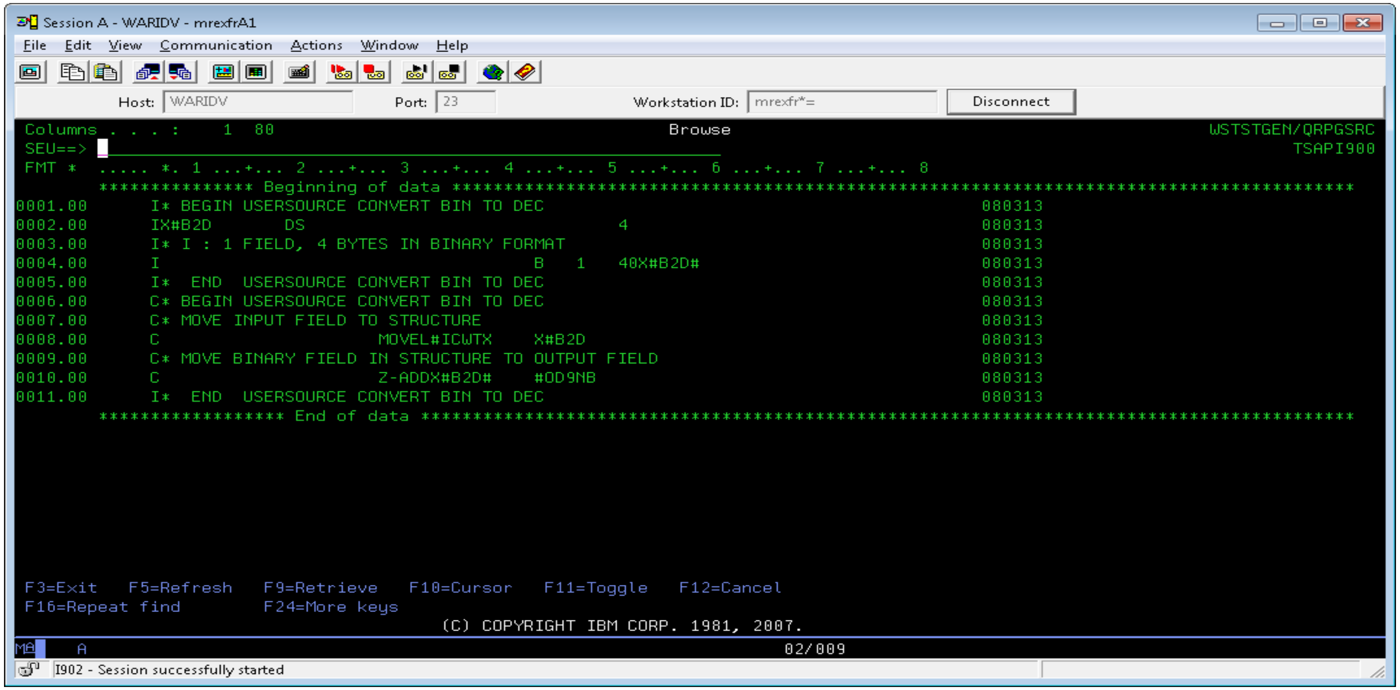
- So how do we get started
  - What API do I need?
    - List Spool Files
    - Create/Delete User Space
    - Retrieve User Space
  - Um, these don’t look like 2e functions.
    - How do I deal with Binary fields?
    - Have no fear, lets break it down.

API How to Use It cont.

- 2e function required
  - Execute User Source
    - Used to convert decimal to binary back
  - Execute User Program
    - Used to define the API call
  - Execute Internal Functions
    - Wrapper
  - 2e Arrays
    - Used as parameter lists
    - Extensive use element feature

API Getting Started

- User Source
  - Not as scary as it seems
  - 2e stores binary values as 4 character text



Host: WARIDV Port: 23 Workstation ID: mrexfr*=

```
 Columns . . . :    1  80                                       Browse                                                  WSTSTGEN/QRPGSRC
 SEU==>                                                                                                                         TSAPI900
 FMT *  ..... *. 1 ...+... 2 ...+... 3 ...+... 4 ...+... 5 ...+... 6 ...+... 7 ...+... 8
        *************** Beginning of data *************************************************************************
0001.00      I* BEGIN USERSOURCE CONVERT BIN TO DEC                                              080313
0002.00      IX#B2D       DS                                4                                    080313
0003.00      I* I : 1 FIELD, 4 BYTES IN BINARY FORMAT                                            080313
0004.00      I                                    B   1    40X#B2D#                              080313
0005.00      I*  END  USERSOURCE CONVERT BIN TO DEC                                              080313
0006.00      C* BEGIN USERSOURCE CONVERT BIN TO DEC                                              080313
0007.00      C* MOVE INPUT FIELD TO STRUCTURE                                                    080313
0008.00      C                      MOVEL#ICWTX    X#B2D                                         080313
0009.00      C* MOVE BINARY FIELD IN STRUCTURE TO OUTPUT FIELD                                   080313
0010.00      C                      Z-ADDX#B2D#    #OD9NB                                        080313
0011.00      I*  END  USERSOURCE CONVERT BIN TO DEC                                              080313
        ****************** End of data ****************************************************************************






 F3=Exit   F5=Refresh   F9=Retrieve   F10=Cursor   F11=Toggle   F12=Cancel
 F16=Repeat find        F24=More keys
                                        (C) COPYRIGHT IBM CORP. 1981, 2007.
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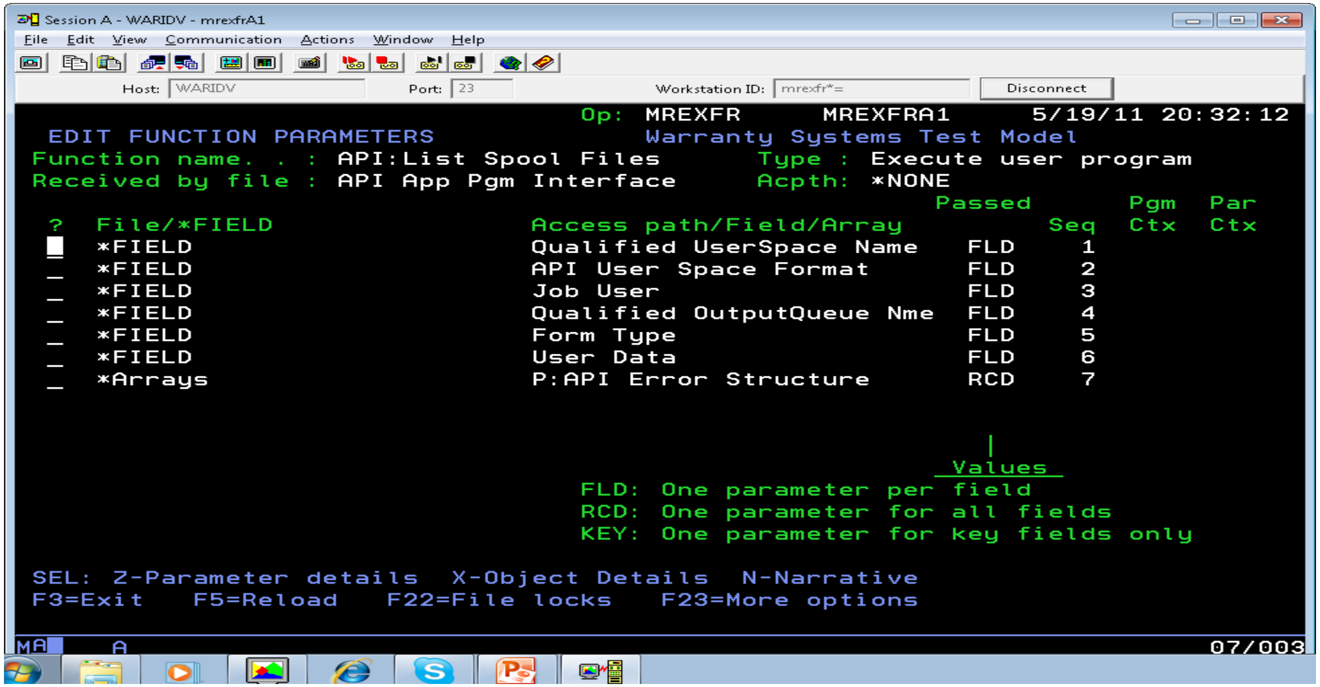
API Getting Start Cont.

- Execute User Program
  - Placeholder for calls
  - Use arrays to handle parameter lists
  - Nearly all API calls return error messages


Session A - WARIDV - mrexfrA1
File Edit View Communication Actions Window Help
Disconnect

Host: WARIDV Port: 23 Workstation ID: mrexfr*=

```
                                   Op: MREXFR     MREXFRA1     5/19/11 20:32:12
  EDIT FUNCTION PARAMETERS                     Warranty Systems Test Model
 Function name. . : API:List Spool Files      Type : Execute user program
 Received by file : API App Pgm Interface     Acpth: *NONE
                                                         Passed      Pgm  Par
  ?  File/*FIELD                Access path/Field/Array         Seq  Ctx  Ctx
  █  *FIELD                     Qualified UserSpace Name   FLD    1
  _  *FIELD                     API User Space Format      FLD    2
  _  *FIELD                     Job User                   FLD    3
  _  *FIELD                     Qualified OutputQueue Nme  FLD    4
  _  *FIELD                     Form Type                  FLD    5
  _  *FIELD                     User Data                  FLD    6
  _  *Arrays                    P:API Error Structure      RCD    7


                                                            |
                                                          Values
                                   FLD: One parameter per field
                                   RCD: One parameter for all fields
                                   KEY: One parameter for key fields only

 SEL: Z-Parameter details  X-Object Details  N-Narrative
 F3=Exit   F5=Reload   F22=File locks   F23=More options

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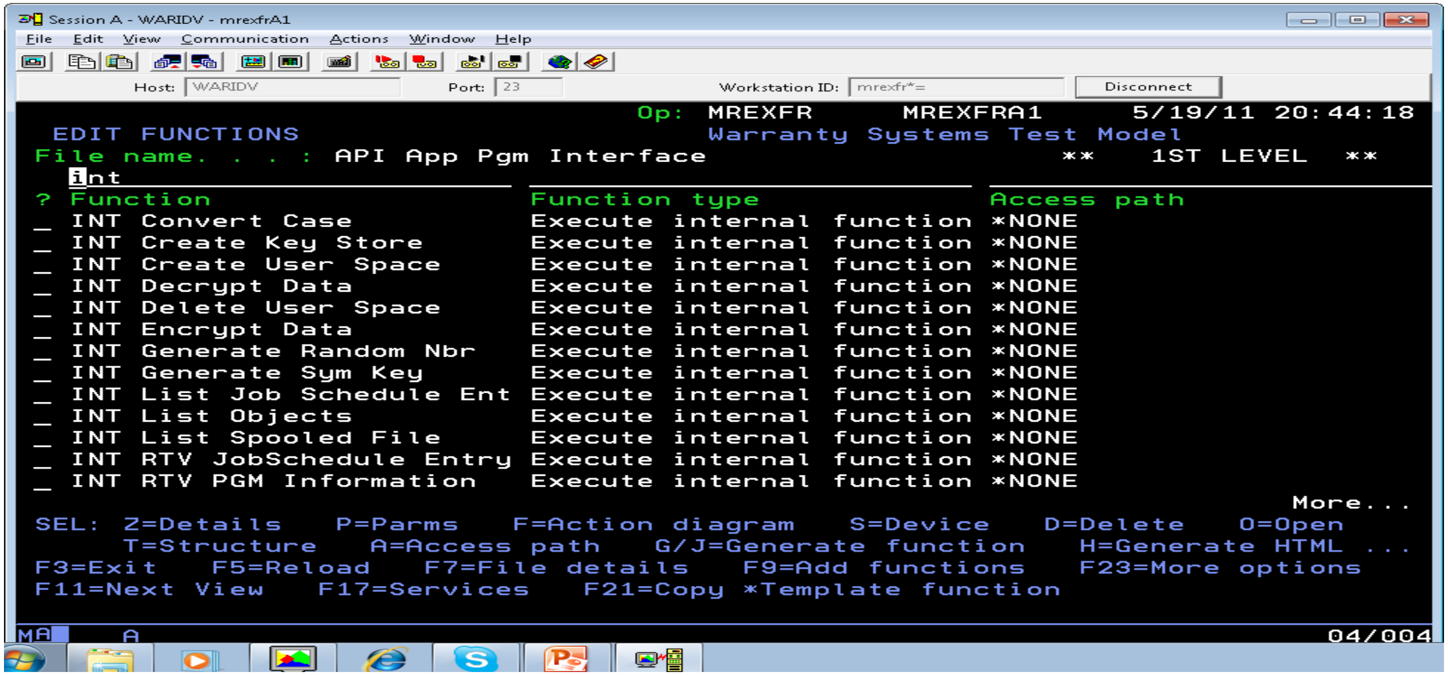
API How to Use It cont.

- Execute Internal Function
  - Basis for Modular Design
  - Functions limited to a single purpose
  - Build once use many times.



Host: WARIDV Port: 23 Workstation ID: mrexfr*=

```
                                   Op:  MREXFR      MREXFRA1     5/19/11  20:44:18
 EDIT FUNCTIONS                        Warranty Systems Test Model
File name. . . . :  API App Pgm Interface                         **   1ST LEVEL   **
   int
? Function                          Function type                 Access path
_  INT Convert Case                 Execute internal function     *NONE
_  INT Create Key Store             Execute internal function     *NONE
_  INT Create User Space            Execute internal function     *NONE
_  INT Decrypt Data                 Execute internal function     *NONE
_  INT Delete User Space            Execute internal function     *NONE
_  INT Encrypt Data                 Execute internal function     *NONE
_  INT Generate Random Nbr          Execute internal function     *NONE
_  INT Generate Sym Key             Execute internal function     *NONE
_  INT List Job Schedule Ent        Execute internal function     *NONE
_  INT List Objects                 Execute internal function     *NONE
_  INT List Spooled File            Execute internal function     *NONE
_  INT RTV JobSchedule Entry        Execute internal function     *NONE
_  INT RTV PGM Information          Execute internal function     *NONE
                                                                              More...
SEL: Z=Details   P=Parms   F=Action diagram   S=Device   D=Delete   O=Open
     T=Structure   A=Access path   G/J=Generate function   H=Generate HTML ...
F3=Exit   F5=Reload   F7=File details   F9=Add functions   F23=More options
F11=Next View   F17=Services   F21=Copy *Template function

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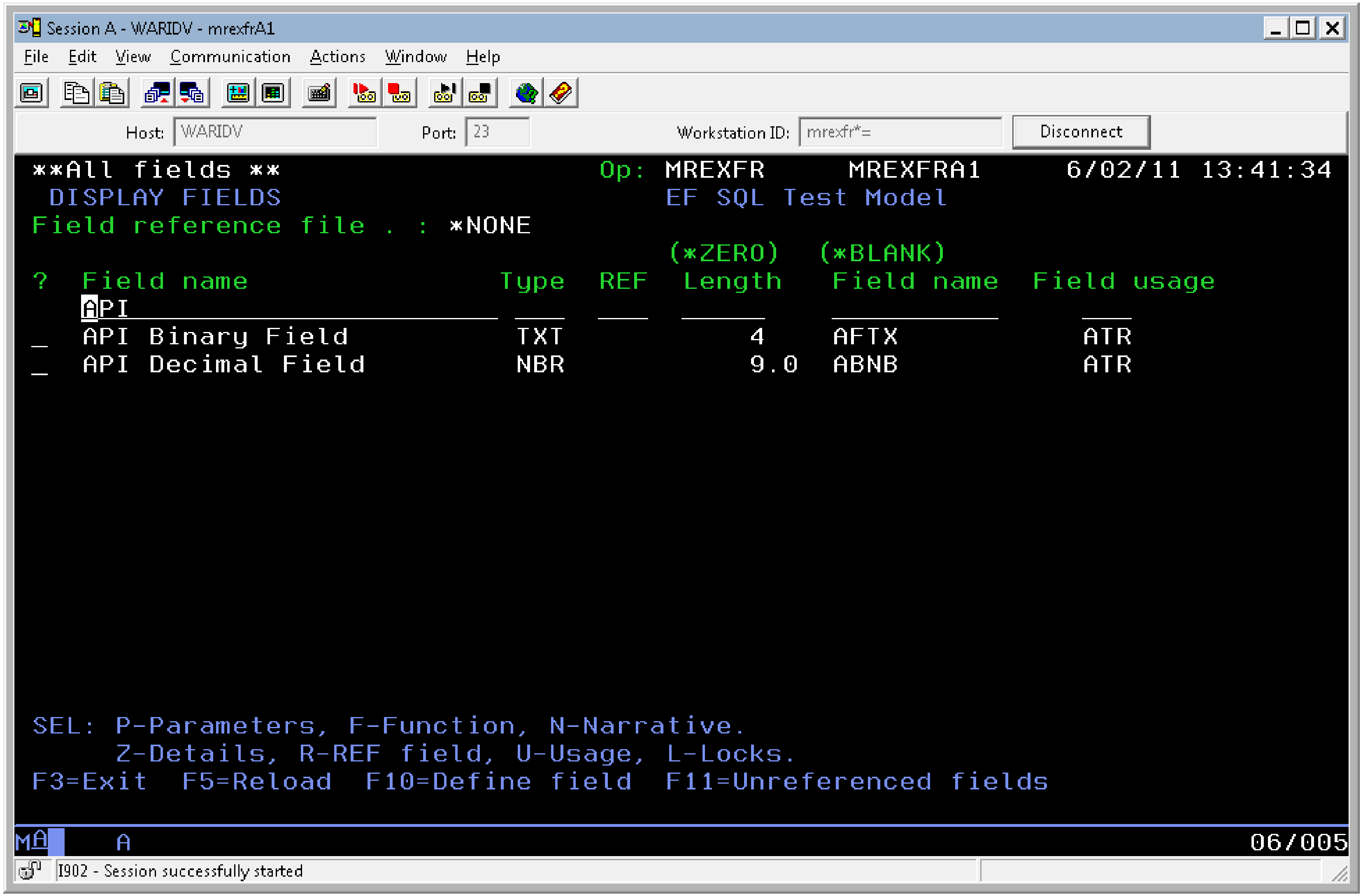
API Sample

- Defining the functions
  - Fields required, Binary data is defined as 4 character text field in the model.
  - One time setup – Binary to Decimal, Decimal to Binary User Source
  - Define API as an Execute User Programs.
  - All API functions define an Error Structure as part of each call. This returns blank or the message ID if there is a problem.

API Sample – Defining Fields



Host: WARIDV Port: 23 Workstation ID: mrexfr*=

```
 **All fields **                  Op: MREXFR     MREXFRA1     6/02/11 13:41:34
  DISPLAY FIELDS                      EF SQL Test Model
 Field reference file . : *NONE
                                       (*ZERO)  (*BLANK)
 ?  Field name               Type  REF  Length   Field name  Field usage
    API_______________________  ___   ___  _____    __________     ___
 _  API Binary Field          TXT            4    AFTX           ATR
 _  API Decimal Field         NBR          9.0    ABNB           ATR









 SEL: P-Parameters, F-Function, N-Narrative.
      Z-Details, R-REF field, U-Usage, L-Locks.
 F3=Exit  F5=Reload  F10=Define field  F11=Unreferenced fields
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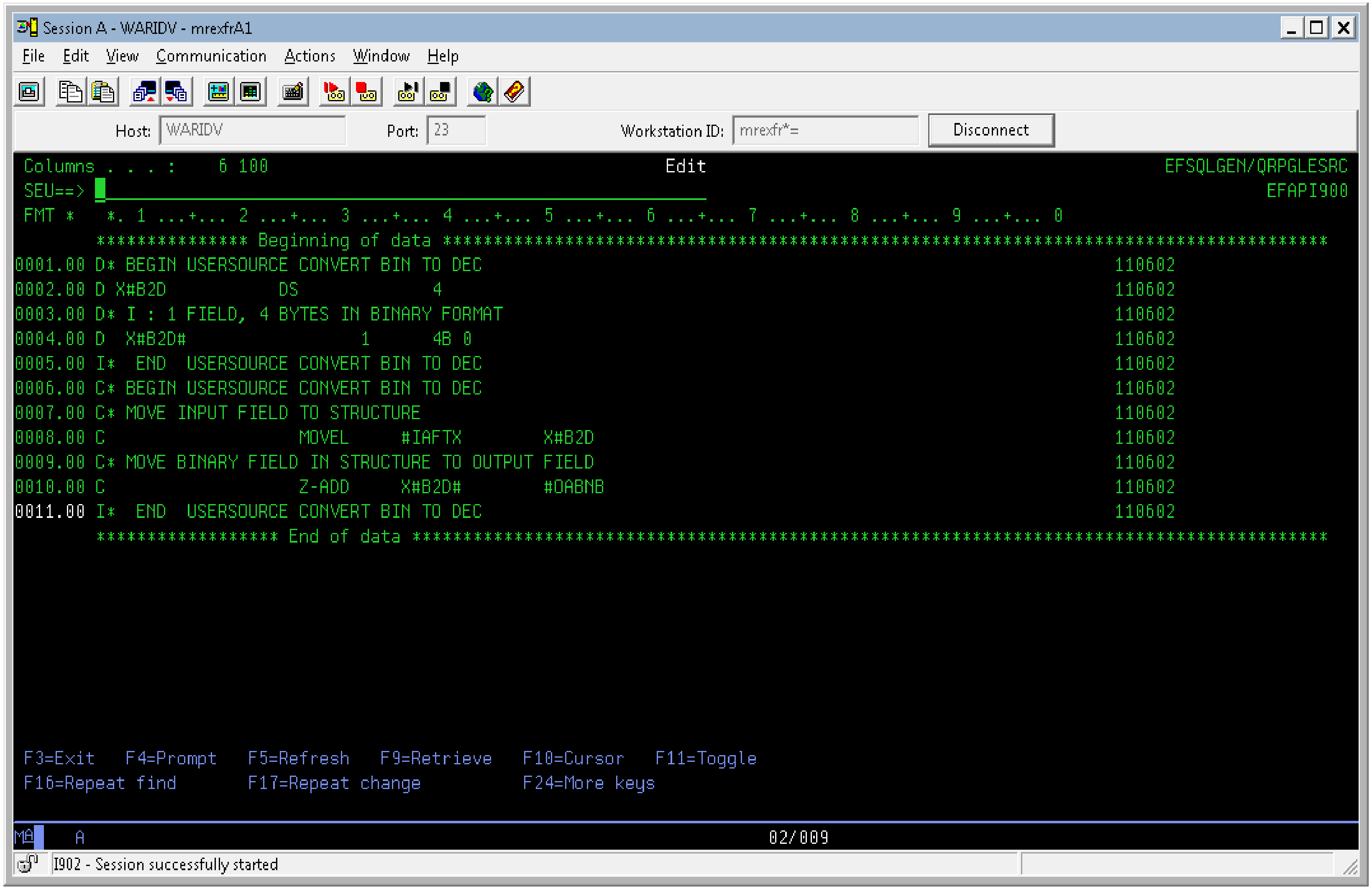
API Sample – Create Conversion Source


Session A - WARIDV - mrexfrA1
File Edit View Communication Actions Window Help
Disconnect

Host: WARIDV Port: 23 Workstation ID: mrexfr*=

```
 Columns . . . :     6 100                                Edit                                 EFSQLGEN/QRPGLESRC
 SEU==> _____________________________________________________                                          EFAPI900
 FMT *   *. 1 ...+... 2 ...+... 3 ...+... 4 ...+... 5 ...+... 6 ...+... 7 ...+... 8 ...+... 9 ...+... 0
        *************** Beginning of data ****************************************************************
0001.00 D* BEGIN USERSOURCE CONVERT BIN TO DEC                                                               110602
0002.00 D X#B2D           DS             4                                                                  110602
0003.00 D* I : 1 FIELD, 4 BYTES IN BINARY FORMAT                                                             110602
0004.00 D  X#B2D#                  1     4B 0                                                                110602
0005.00 I*  END  USERSOURCE CONVERT BIN TO DEC                                                               110602
0006.00 C* BEGIN USERSOURCE CONVERT BIN TO DEC                                                               110602
0007.00 C* MOVE INPUT FIELD TO STRUCTURE                                                                     110602
0008.00 C                   MOVEL     #IAFTX        X#B2D                                                    110602
0009.00 C* MOVE BINARY FIELD IN STRUCTURE TO OUTPUT FIELD                                                    110602
0010.00 C                   Z-ADD     X#B2D#        #OABNB                                                   110602
0011.00 I*  END  USERSOURCE CONVERT BIN TO DEC                                                               110602
        ****************** End of data ***************************************************************



 F3=Exit   F4=Prompt   F5=Refresh   F9=Retrieve   F10=Cursor   F11=Toggle
 F16=Repeat find       F17=Repeat change          F24=More keys

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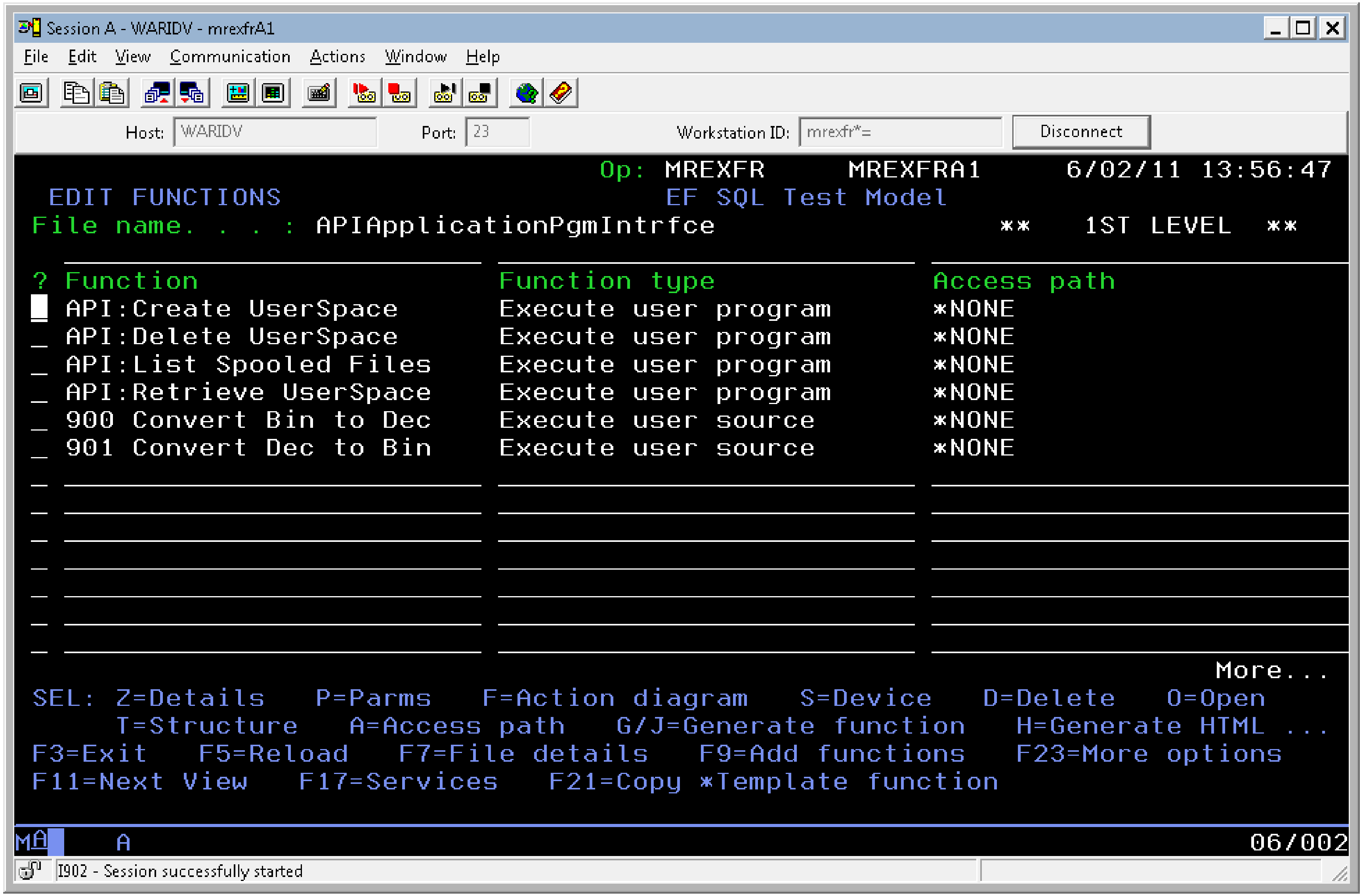
API Sample – User Program Stubs



Session A - WARIDV - mrexfrA1
File Edit View Communication Actions Window Help
Disconnect

Host: WARIDV Port: 23 Workstation ID: mrexfr*=

```
                                        Op: MREXFR     MREXFRA1     6/02/11 13:56:47
  EDIT FUNCTIONS                            EF SQL Test Model
 File name. . . : APIApplicationPgmIntrfce                **   1ST LEVEL   **

 ? Function                  Function type             Access path
 _ API:Create UserSpace      Execute user program      *NONE
 _ API:Delete UserSpace      Execute user program      *NONE
 _ API:List Spooled Files    Execute user program      *NONE
 _ API:Retrieve UserSpace    Execute user program      *NONE
 _ 900 Convert Bin to Dec    Execute user source       *NONE
 _ 901 Convert Dec to Bin    Execute user source       *NONE
 _ _________________________ _________________________ _________________________
 _ _________________________ _________________________ _________________________
 _ _________________________ _________________________ _________________________
 _ _________________________ _________________________ _________________________
 _ _________________________ _________________________ _________________________
 _ _________________________ _________________________ _________________________
 _ _________________________ _________________________ _________________________
                                                                          More...
 SEL: Z=Details   P=Parms   F=Action diagram   S=Device   D=Delete   O=Open
      T=Structure   A=Access path   G/J=Generate function   H=Generate HTML ...
 F3=Exit   F5=Reload   F7=File details   F9=Add functions   F23=More options
 F11=Next View   F17=Services   F21=Copy *Template function

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API Sample cont.

- Define Execute Internal Function to wrap around the call to the API (Create User Space).
  - Users provide the name/library for object and get the return code to test for success/fail.
  - This creates a “black box” approach.
  - Hides the formatting and other logic from the developer.
  - Rinse and repeat for the Delete User Space API

API Sample cont.

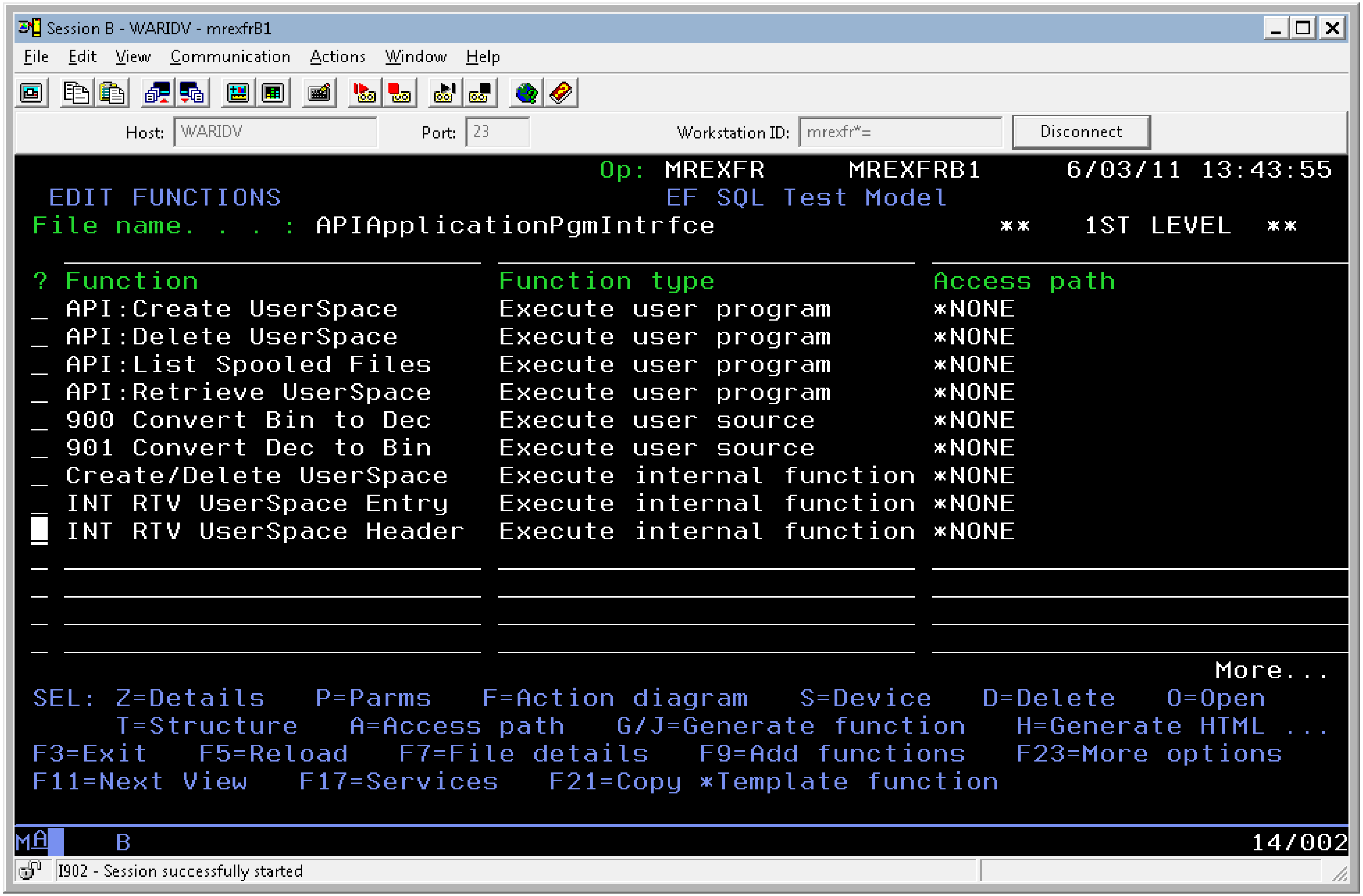
- Define a EXCINTFUN around the call to the list spool files API.
  - API Format (common to lists and some other types) is used to define the information returned.

- Reading from the User Space
  - A user space is nothing more then a flat file.
  - When you read, you define the starting point and how far to read

API Sample cont.

- Reading from the User Space cont.
  - List functions all define their information in a header the same way
  - Information header tells you how many records, where to start and how big a record is
  - Break down the process into 2 functions
    - Get User Space Record and Get Header Information
  - First create a EXCINTFUN that passes in user space name, starting point and length to read and returns what was read and a return code
  - Get Header Information calls the prior function.

API Sample cont



Host: WARIDV   Port: 23   Workstation ID: mrexfr*=

```
                                   Op: MREXFR     MREXFRB1     6/03/11 13:43:55
  EDIT FUNCTIONS                       EF SQL Test Model
 File name. . . : APIApplicationPgmIntrfce              **    1ST LEVEL    **

 ? Function                  Function type            Access path
 _ API:Create UserSpace      Execute user program     *NONE
 _ API:Delete UserSpace      Execute user program     *NONE
 _ API:List Spooled Files    Execute user program     *NONE
 _ API:Retrieve UserSpace    Execute user program     *NONE
 _ 900 Convert Bin to Dec    Execute user source      *NONE
 _ 901 Convert Dec to Bin    Execute user source      *NONE
 _ Create/Delete UserSpace   Execute internal function *NONE
 _ INT RTV UserSpace Entry   Execute internal function *NONE
 _ INT RTV UserSpace Header  Execute internal function *NONE
 _ _________________________ _________________________ _________________________
 _ _________________________ _________________________ _________________________
 _ _________________________ _________________________ _________________________
 _ _________________________ _________________________ _________________________
                                                                        More...
 SEL: Z=Details   P=Parms   F=Action diagram   S=Device   D=Delete   O=Open
      T=Structure   A=Access path   G/J=Generate function   H=Generate HTML ...
 F3=Exit   F5=Reload   F7=File details   F9=Add functions   F23=More options
 F11=Next View   F17=Services   F21=Copy *Template function

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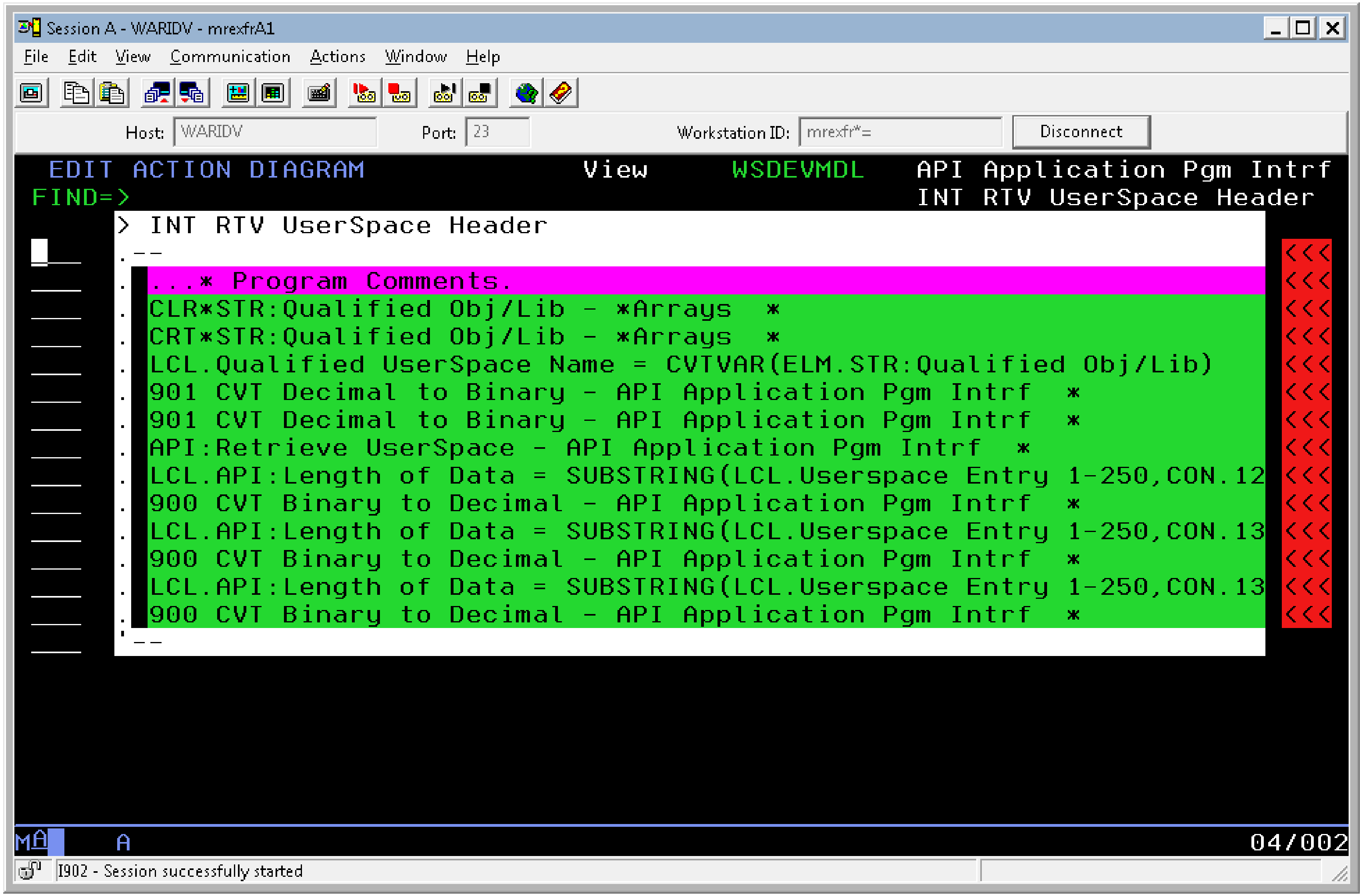
API Sample cont



Session A - WARIDV - mrexfrA1
File Edit View Communication Actions Window Help
Host: WARIDV
Port: 23
Workstation ID: mrexfr*=
Disconnect

```
 EDIT ACTION DIAGRAM                View      WSDEVMDL    API Application Pgm Intrf
FIND=>                                                    INT RTV UserSpace Header
      > INT RTV UserSpace Header
      .--
      . ...* Program Comments.                                                      <<<
      . CLR*STR:Qualified Obj/Lib - *Arrays  *                                      <<<
      . CRT*STR:Qualified Obj/Lib - *Arrays  *                                      <<<
      . LCL.Qualified UserSpace Name = CVTVAR(ELM.STR:Qualified Obj/Lib)            <<<
      . 901 CVT Decimal to Binary - API Application Pgm Intrf  *                    <<<
      . 901 CVT Decimal to Binary - API Application Pgm Intrf  *                    <<<
      . API:Retrieve UserSpace - API Application Pgm Intrf  *                       <<<
      . LCL.API:Length of Data = SUBSTRING(LCL.Userspace Entry 1-250,CON.12         <<<
      . 900 CVT Binary to Decimal - API Application Pgm Intrf  *                    <<<
      . LCL.API:Length of Data = SUBSTRING(LCL.Userspace Entry 1-250,CON.13         <<<
      . 900 CVT Binary to Decimal - API Application Pgm Intrf  *                    <<<
      . LCL.API:Length of Data = SUBSTRING(LCL.Userspace Entry 1-250,CON.13         <<<
      . 900 CVT Binary to Decimal - API Application Pgm Intrf  *                    <<<
      '--

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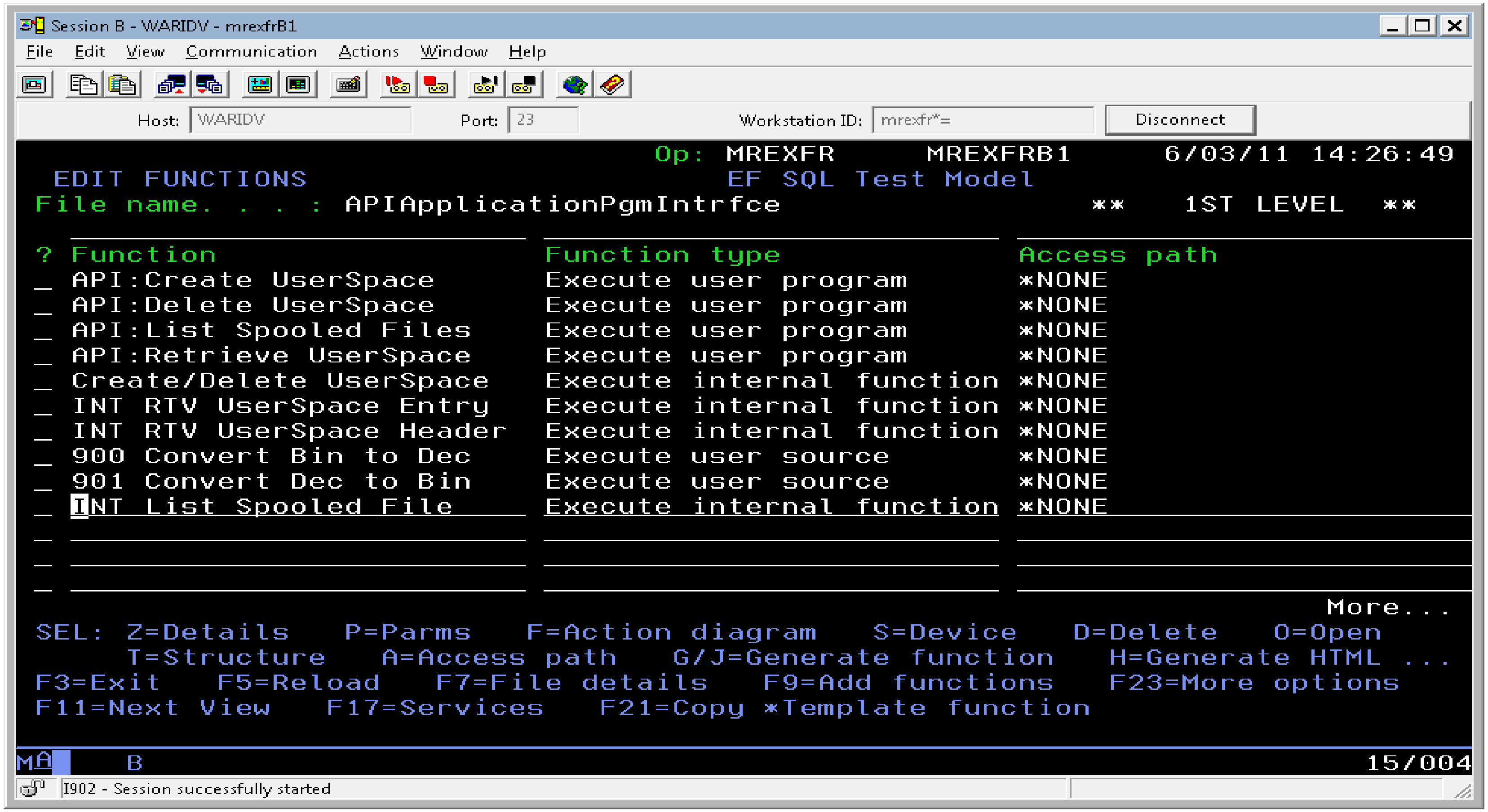
API Sample cont.

- Now we need to setup our call to list the spool files.



Host: WARIDV Port: 23 Workstation ID: mrexfr*=

```
                                        Op:  MREXFR     MREXFRB1     6/03/11 14:26:49
  EDIT FUNCTIONS                            EF SQL Test Model
 File name. . . :  APIApplicationPgmIntrfce                    **   1ST LEVEL   **

 ? Function                  Function type             Access path
 _ API:Create UserSpace      Execute user program      *NONE
 _ API:Delete UserSpace      Execute user program      *NONE
 _ API:List Spooled Files    Execute user program      *NONE
 _ API:Retrieve UserSpace    Execute user program      *NONE
 _ Create/Delete UserSpace   Execute internal function *NONE
 _ INT RTV UserSpace Entry   Execute internal function *NONE
 _ INT RTV UserSpace Header  Execute internal function *NONE
 _ 900 Convert Bin to Dec    Execute user source       *NONE
 _ 901 Convert Dec to Bin    Execute user source       *NONE
 _ INT List Spooled File     Execute internal function *NONE
 _
 _
 _
                                                                          More...
 SEL: Z=Details   P=Parms   F=Action diagram   S=Device   D=Delete   O=Open
      T=Structure   A=Access path   G/J=Generate function   H=Generate HTML ...
 F3=Exit   F5=Reload   F7=File details   F9=Add functions   F23=More options
 F11=Next View   F17=Services   F21=Copy *Template function
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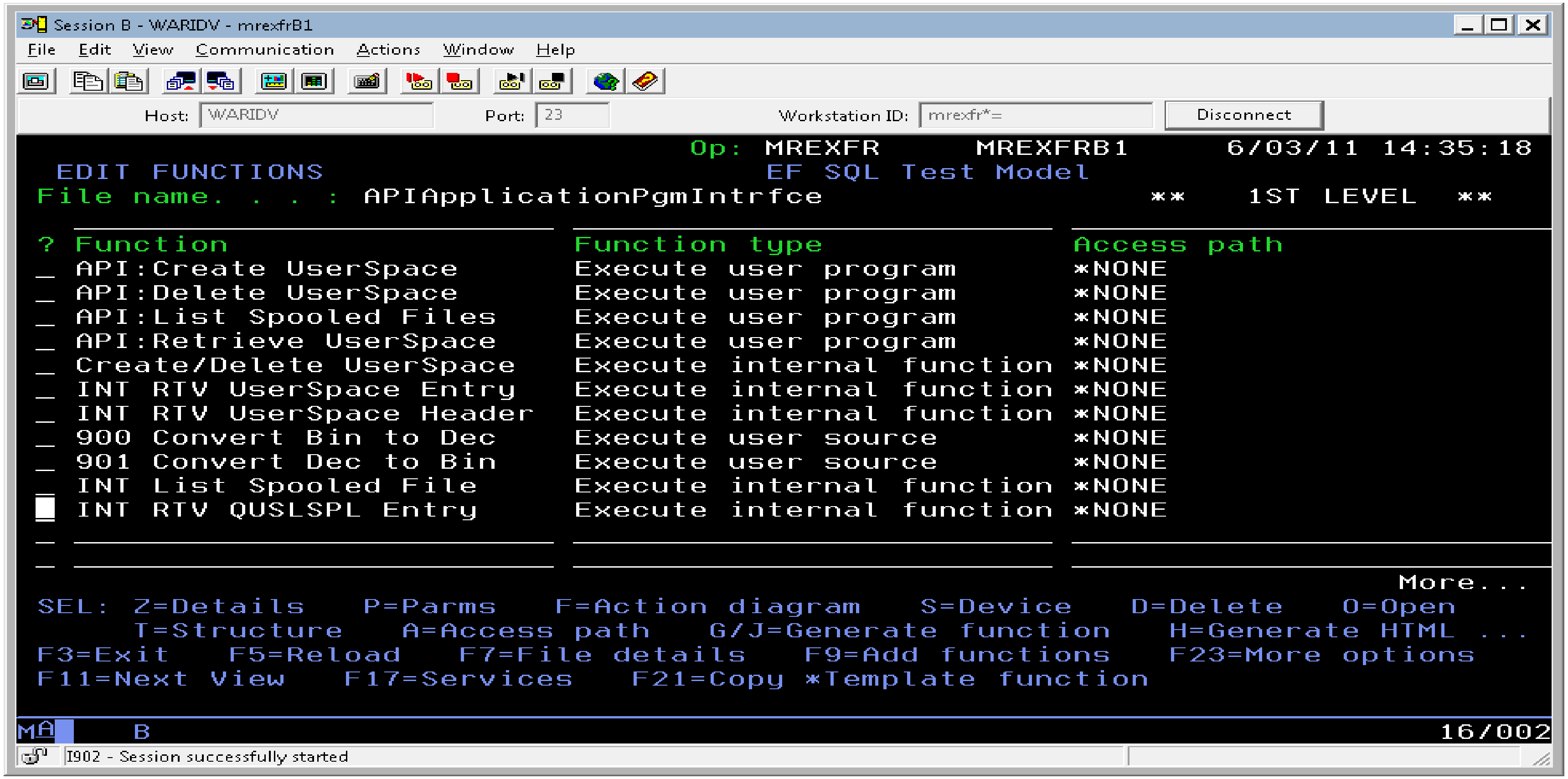
API Sample cont.

- Lastly we setup our retrieve of the spool file list entry.



Host: WARIDV Port: 23 Workstation ID: mrexfr*=

```
                                   Op:  MREXFR      MREXFRB1      6/03/11  14:35:18
  EDIT FUNCTIONS                            EF SQL Test Model
 File name. . . :  APIApplicationPgmIntrfce                    **    1ST LEVEL   **

 ? Function                  Function type            Access path
 _ API:Create UserSpace      Execute user program     *NONE
 _ API:Delete UserSpace      Execute user program     *NONE
 _ API:List Spooled Files    Execute user program     *NONE
 _ API:Retrieve UserSpace    Execute user program     *NONE
 _ Create/Delete UserSpace   Execute internal function *NONE
 _ INT RTV UserSpace Entry   Execute internal function *NONE
 _ INT RTV UserSpace Header  Execute internal function *NONE
 _ 900 Convert Bin to Dec    Execute user source      *NONE
 _ 901 Convert Dec to Bin    Execute user source      *NONE
 _ INT List Spooled File     Execute internal function *NONE
 █ INT RTV QUSLSPL Entry     Execute internal function *NONE
 _ _________________________ _________________________ _________________________
 _ _________________________ _________________________ _________________________
                                                                          More...
 SEL: Z=Details   P=Parms   F=Action diagram   S=Device   D=Delete   O=Open
      T=Structure   A=Access path   G/J=Generate function   H=Generate HTML ...
 F3=Exit   F5=Reload   F7=File details   F9=Add functions   F23=More options
 F11=Next View   F17=Services   F21=Copy *Template function

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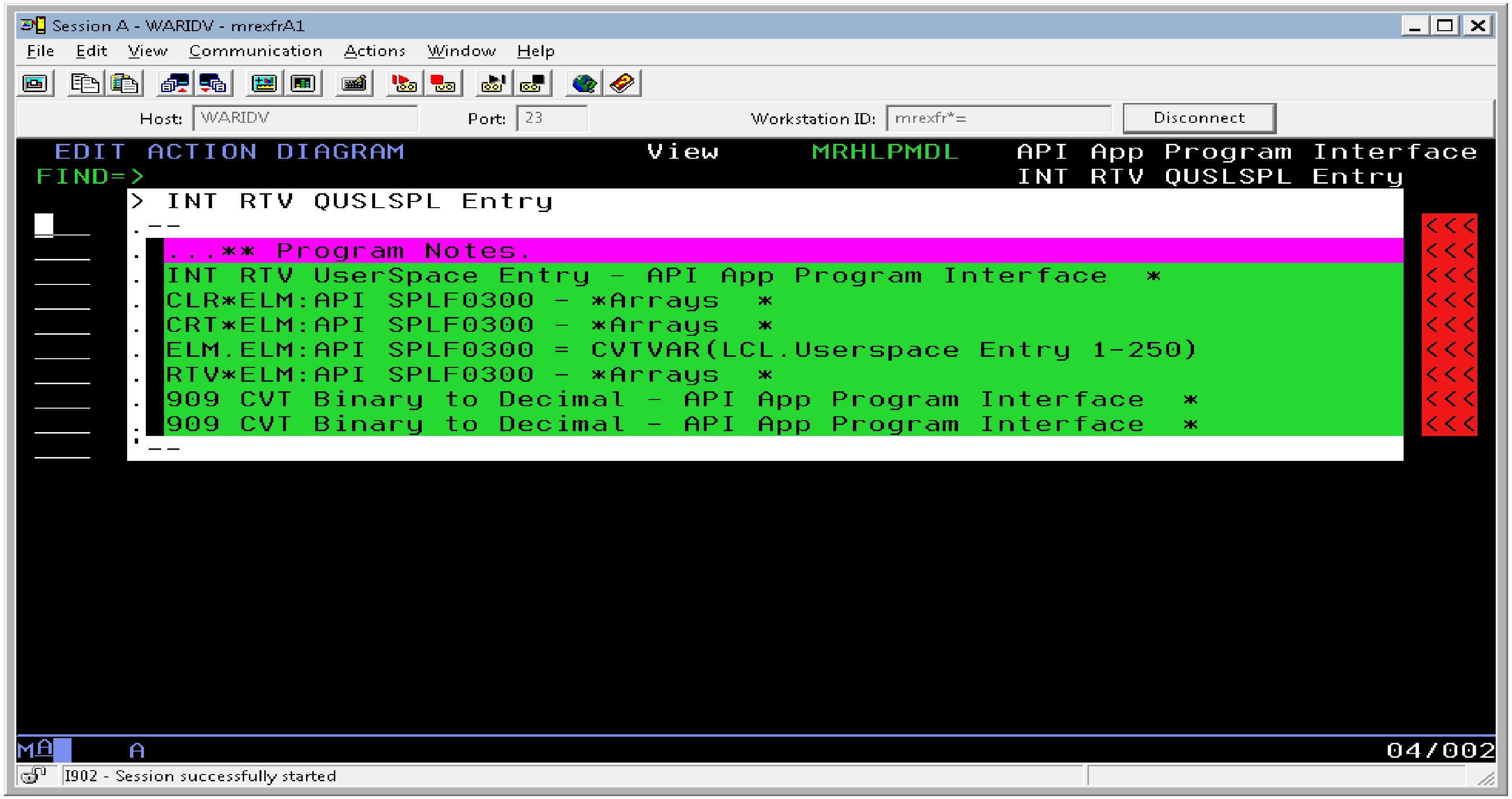
API Sample cont.

- Now take the returned data and parse it out. (An array element is nice here).


Session A - WARIDV - mrexfrA1
File Edit View Communication Actions Window Help
Disconnect

Host: WARIDV Port: 23 Workstation ID: mrexfr*=

```
   EDIT ACTION DIAGRAM                      View      MRHLPMDL    API App Program Interface
  FIND=>                                                          INT RTV QUSLSPL Entry
              > INT RTV QUSLSPL Entry
              . --
              . ...** Program Notes.                                                       <<<
              . INT RTV UserSpace Entry - API App Program Interface  *                     <<<
              . CLR*ELM:API SPLF0300 - *Arrays  *                                          <<<
              . CRT*ELM:API SPLF0300 - *Arrays  *                                          <<<
              . ELM.ELM:API SPLF0300 = CVTVAR(LCL.Userspace Entry 1-250)                   <<<
              . RTV*ELM:API SPLF0300 - *Arrays  *                                          <<<
              . 909 CVT Binary to Decimal - API App Program Interface  *                    <<<
              . 909 CVT Binary to Decimal - API App Program Interface  *                    <<<
              : --

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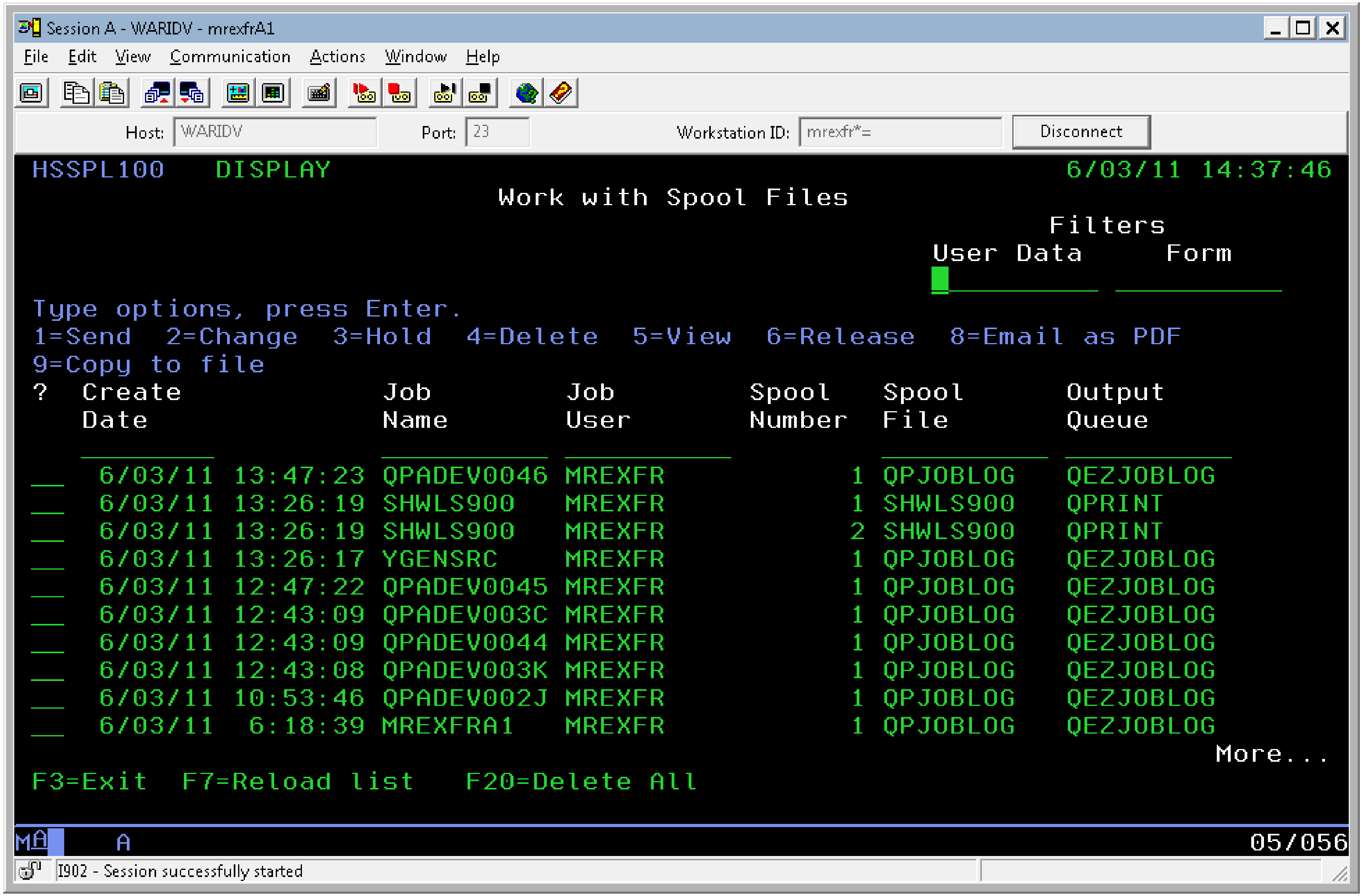
API Sample cont.

- Seems like a lot of work.
  - Nearly all of the functions are built to be resuable.
  - Modular, Modular, Modular.

Sample in the wild



Session A - WARIDV - mrexfrA1
File Edit View Communication Actions Window Help
Disconnect

Host: WARIDV Port: 23 Workstation ID: mrexfr*=

```
HSSPL100    DISPLAY                                         6/03/11 14:37:46
                             Work with Spool Files
                                                          Filters
                                                    User Data      Form
                                                    _________   __________
Type options, press Enter.
1=Send  2=Change  3=Hold  4=Delete  5=View  6=Release  8=Email as PDF
9=Copy to file
?  Create                Job        Job        Spool   Spool      Output
   Date                  Name       User       Number  File       Queue
   ________              _________  _________          _________  _________
__  6/03/11 13:47:23 QPADEV0046 MREXFR            1 QPJOBLOG   QEZJOBLOG
__  6/03/11 13:26:19 SHWLS900   MREXFR            1 SHWLS900   QPRINT
__  6/03/11 13:26:19 SHWLS900   MREXFR            2 SHWLS900   QPRINT
__  6/03/11 13:26:17 YGENSRC    MREXFR            1 QPJOBLOG   QEZJOBLOG
__  6/03/11 12:47:22 QPADEV0045 MREXFR            1 QPJOBLOG   QEZJOBLOG
__  6/03/11 12:43:09 QPADEV003C MREXFR            1 QPJOBLOG   QEZJOBLOG
__  6/03/11 12:43:09 QPADEV0044 MREXFR            1 QPJOBLOG   QEZJOBLOG
__  6/03/11 12:43:08 QPADEV003K MREXFR            1 QPJOBLOG   QEZJOBLOG
__  6/03/11 10:53:46 QPADEV002J MREXFR            1 QPJOBLOG   QEZJOBLOG
__  6/03/11  6:18:39 MREXFRA1   MREXFR            1 QPJOBLOG   QEZJOBLOG
                                                                      More...
F3=Exit  F7=Reload list   F20=Delete All

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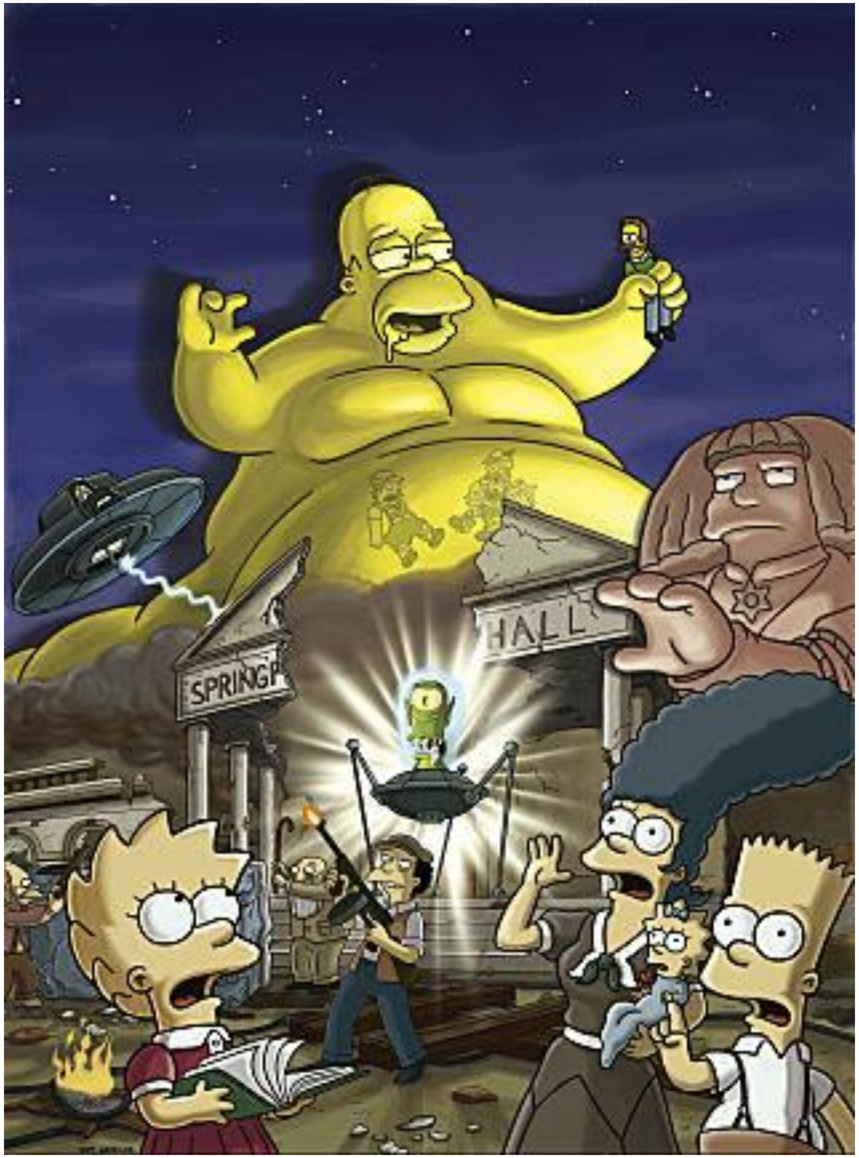


SQL And the Blob

- What is a BLOB
    - Not the latest blockbuster summer movie monster
    - Binary Large Object
        - Useful for storing items such as PDF / images / documents / Jimmy Hoffa
        - Not native to the 2e world (yet?)

- Getting Started
  - All code on an article from Scott Klement
  - http://systeminetwork.com/article/rpg-vs-blob
  - Will require User Source
    - Not beyond the skill of a bad RPG developer (like me)
    - .

SQL & the BLOB

- 3 Main Items of source code
  - SQL Source for your table
  - EXCUSRSRC – Define BLOB data type
  - EXCUSRSRC – The Read and Write of object

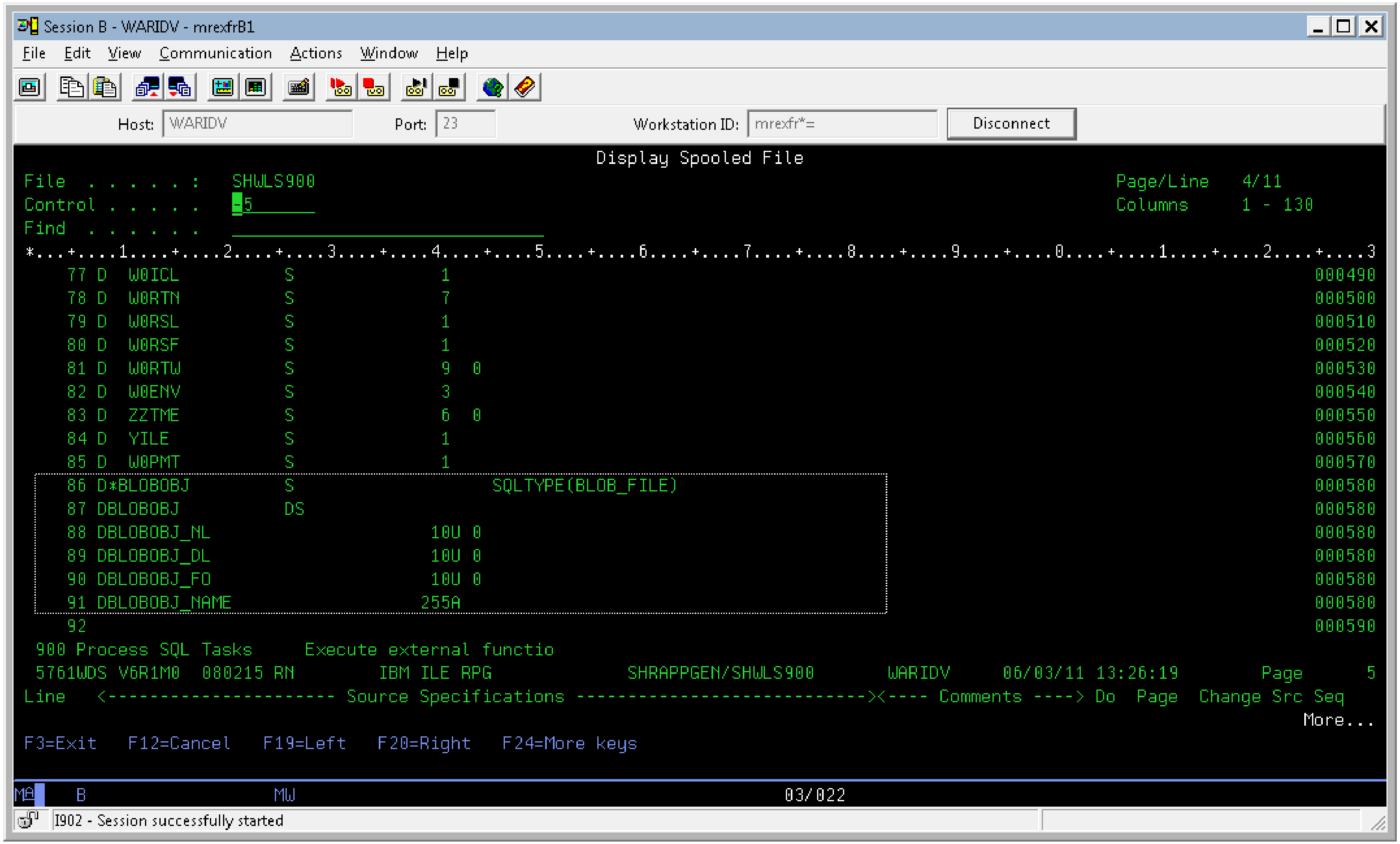
SQL & the BLOB cont.

- SQL Source for your table
  - Plenty of ways to define this
    - STRSQL
    - SQL editor in Ops Navigator
    - <Insert name of favorite SQL editor here>
  - Just so long as you have defined the BLOB SQL data type for one of your fields.

SQL & the BLOB cont.

- EXCUSRSRC – Define BLOB data type
  - Only lines needed are to define the data type for RPG
    - D BlobObj S SQLTYPE(BLOB_FILE)
  - Compiler will convert this to a data structure that consists of the IFS path (BlobObj_NAME), length of the IFS path(BlobObj_NL) , and the file operation(BlobObj_FO).

SQL & the BLOB cont.



Host: WARIDV   Port: 23   Workstation ID: mrexfr*=

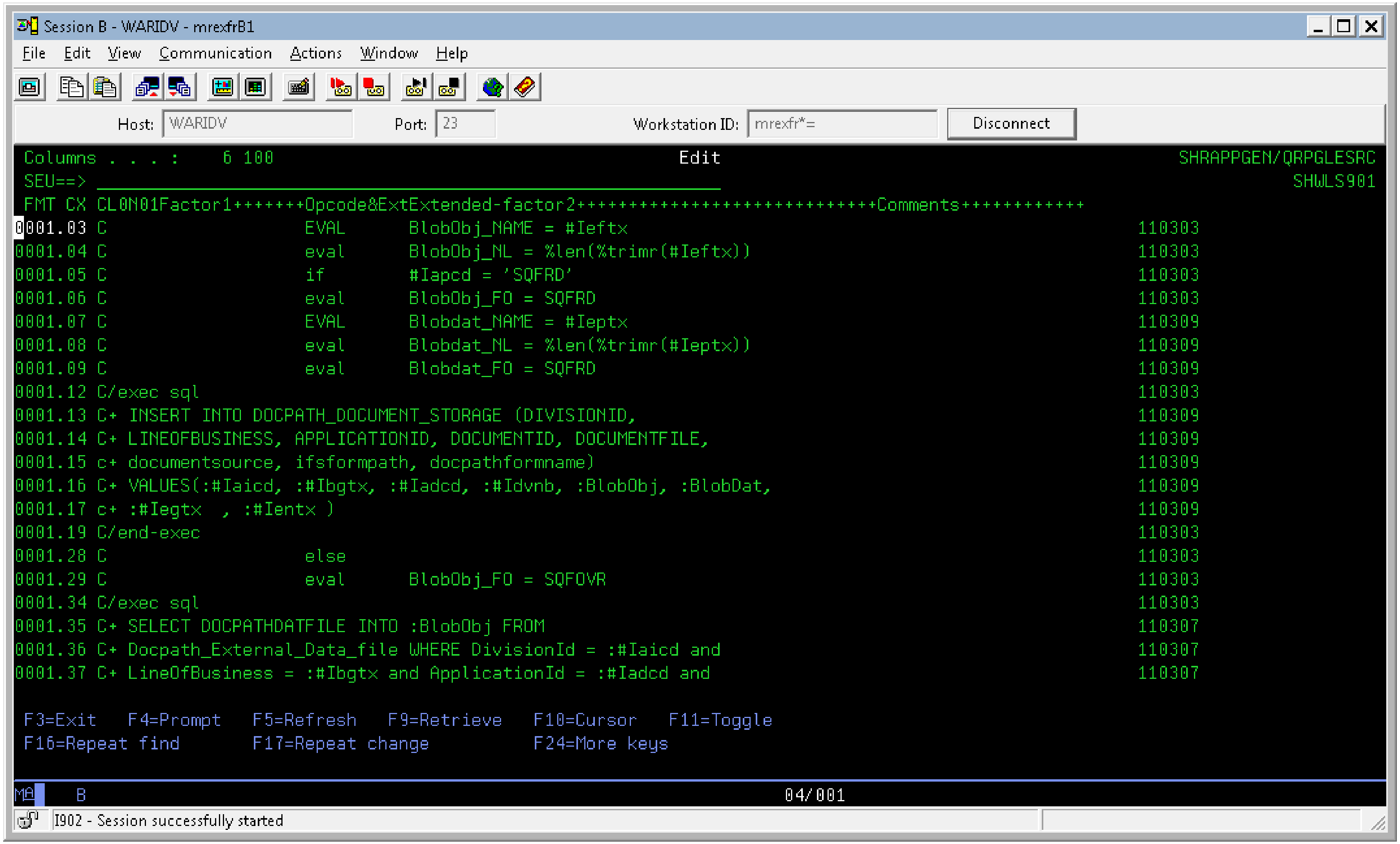
```
                                                       Display Spooled File
File  . . . . . :   SHWLS900                                                                             Page/Line    4/11
Control . . . . .   5                                                                                    Columns      1 - 130
Find  . . . . . .
*...+....1....+....2....+....3....+....4....+....5....+....6....+....7....+....8....+....9....+....0....+....1....+....2....+....3
    77 D  W0ICL          S              1                                                                                   000490
    78 D  W0RTN          S              7                                                                                   000500
    79 D  W0RSL          S              1                                                                                   000510
    80 D  W0RSF          S              1                                                                                   000520
    81 D  W0RTW          S              9  0                                                                                000530
    82 D  W0ENV          S              3                                                                                   000540
    83 D  ZZTME          S              6  0                                                                                000550
    84 D  YILE           S              1                                                                                   000560
    85 D  W0PMT          S              1                                                                                   000570
    86 D*BLOBOBJ         S                    SQLTYPE(BLOB_FILE)                                                            000580
    87 DBLOBOBJ          DS                                                                                                 000580
    88 DBLOBOBJ_NL                     10U 0                                                                                000580
    89 DBLOBOBJ_DL                     10U 0                                                                                000580
    90 DBLOBOBJ_FO                     10U 0                                                                                000580
    91 DBLOBOBJ_NAME                  255A                                                                                  000580
    92                                                                                                                      000590
 900 Process SQL Tasks     Execute external functio
 5761WDS V6R1M0  080215 RN        IBM ILE RPG            SHRAPPGEN/SHWLS900        WARIDV      06/03/11 13:26:19        Page     5
Line   <---------------------- Source Specifications ---------------------------><---- Comments ----> Do  Page  Change Src Seq
                                                                                                                          More...
F3=Exit   F12=Cancel   F19=Left   F20=Right   F24=More keys

MA     B                  MW                                       03/022
```

I902 - Session successfully started

SQL & the BLOB cont.

- EXCUSRSRC – The Read and Write of object
  - First we setup the file operation
    - Defined constants by compiler SQFRD for reading in and SQFOVR to write out, overwrite if it exists
  - Select or Insert depending on which way you are going with the object.
  - Lastly we test if the SQL operation was successful
    - Test SQLCOD

SQL and the BLOB cont.



Session B - WARIDV - mrexfrB1

Host: WARIDV   Port: 23   Workstation ID: mrexfr*=

```
 Columns . . . :    6 100                                 Edit                               SHRAPPGEN/QRPGLESRC
 SEU==> ____________________________________________________________                                    SHWLS901
 FMT CX CL0N01Factor1+++++++Opcode&ExtExtended-factor2+++++++++++++++++++++++++++++Comments++++++++++++
0001.03 C                   EVAL      BlobObj_NAME = #Ieftx                                                110303
0001.04 C                   eval      BlobObj_NL = %len(%trimr(#Ieftx))                                    110303
0001.05 C                   if        #Iapcd = 'SQFRD'                                                     110303
0001.06 C                   eval      BlobObj_FO = SQFRD                                                   110303
0001.07 C                   EVAL      Blobdat_NAME = #Ieptx                                                110309
0001.08 C                   eval      Blobdat_NL = %len(%trimr(#Ieptx))                                    110309
0001.09 C                   eval      Blobdat_FO = SQFRD                                                   110309
0001.12 C/exec sql                                                                                         110303
0001.13 C+ INSERT INTO DOCPATH_DOCUMENT_STORAGE (DIVISIONID,                                               110309
0001.14 C+ LINEOFBUSINESS, APPLICATIONID, DOCUMENTID, DOCUMENTFILE,                                        110309
0001.15 c+ documentsource, ifsformpath, docpathformname)                                                   110309
0001.16 C+ VALUES(:#Iaicd, :#Ibgtx, :#Iadcd, :#Idvnb, :BlobObj, :BlobDat,                                  110309
0001.17 c+ :#Iegtx  , :#Ientx )                                                                            110309
0001.19 C/end-exec                                                                                         110303
0001.28 C                   else                                                                           110303
0001.29 C                   eval      BlobObj_FO = SQFOVR                                                  110303
0001.34 C/exec sql                                                                                         110303
0001.35 C+ SELECT DOCPATHDATFILE INTO :BlobObj FROM                                                        110307
0001.36 C+ Docpath_External_Data_file WHERE DivisionId = :#Iaicd and                                       110307
0001.37 C+ LineOfBusiness = :#Ibgtx and ApplicationId = :#Iadcd and                                        110307

 F3=Exit   F4=Prompt   F5=Refresh   F9=Retrieve   F10=Cursor   F11=Toggle
 F16=Repeat find       F17=Repeat change          F24=More keys

MA    B                                                  04/001
```

I902 - Session successfully started

Questions?