Uni Hamburg – Mainframe Summit
z/OS – The Mainframe Operating

Part 2 – TSO, ISPF und Unix Shell

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Introduction to the new mainframe

Chapter 4: Interactive facilities of z/OS: TSO/E, ISPF, and UNIX

Chapter 4 objectives

Be able to:

- Log on to z/OS
- Run programs from the TSO READY prompt
- Navigate through the menu options of ISPF
- Use the ISPF editor to make changes to a file
- Use the UNIX interfaces on z/OS, including the z/OS UNIX command shell.

Key terms in this chapter

- 3270 and 3270 emulator
- CLIST
- ISHELL
- ISPF
- logon
- native mode
- OMVS command
- path
- READY prompt
- Restructured Extended Executor (REXX)
- shell
- Time Sharing Option / Extensions (TSO/E)

How do we interact with z/OS?

TSO/E

- Allows users to logon to z/OS and use a limited set of basic commands. This is sometimes called using TSO in its native mode.

ISPF

- Provides a menu system for accessing many of the most commonly used z/OS functions.

z/OS UNIX shell and utilities

- Allows users to write and invoke shell scripts and utilities, and use the shell programming language.

TSO overview

TSO/E

- Acronym for Time Sharing Option/Extensions (TSO/E)
- Allows users to create an interactive session with z/OS
- Provides a single-user logon capability and a basic command prompt interface to z/OS
- Most users work with TSO through its menu-driven interface, Interactive System Productivity Facility (ISPF)

TSO overview (continued)

- In a z/OS system, each user gets a user ID and a password authorized for TSO logon.
- During TSO logon, the system displays the TSO logon screen on the user's 3270 display device or TN3270 emulator.
- z/OS system programmers modify the layout and text of the TSO logon panel to better suit the needs of the system's users.

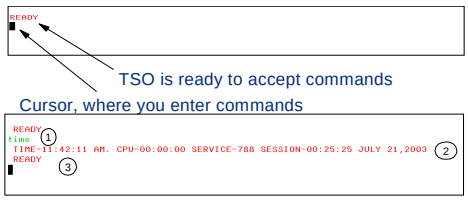
TSO/E logon screen

```
------------------------------ TSO/E LOGON ------------------------------

   Enter LOGON parameters below:                RACF LOGON parameters:

   Userid    ===> ZPROF

   Password  ===>                               New Password ===>

   Procedure ===> IKJACCNT                      Group Ident  ===>

   Acct Nmbr ===> ACCNT#

   Size      ===> 860000

   Perform   ===>

   Command   ===>

   Enter an 'S' before each option desired below:
          -Nomail         -Nonotice        -Reconnect        -OIDcard

PF1/PF13 ==> Help    PF3/PF15 ==> Logoff    PA1 ==> Attention    PA2 ==> Reshow
You may request specific help information by entering a '?' in any entry field
```


Using TSO commands in native mode

- Usually, ISPF provides the interface for TSO.
- However, TSO includes a limited set of basic commands independent of ISPF and other programs.
- Using TSO in this way is called using TSO in its native mode.
- When you logon to TSO, the z/OS system responds by displaying the READY prompt, and waits for input (similar to a DOS prompt).

TSO Ready Prompt



1 - You enter a command (like a DOS prompt)
2 - TSO displays the command output and
3 - TSO is ready to accept new commands

Using CLISTs under native TSO

- Place a command list or CLIST ("see list") in a file and execute the list as if it were a single command.
- A CLIST issues the commands in sequence.
- CLISTs are used for performing routine tasks and working more efficiently with TSO.
- TSO users create CLISTs with the CLIST command language.

CLISTs versus REXX

- REXX is Restructured Extended Executor language, a command language used with TSO
- Both CLISTs and REXX offer shell script-type processing.
- Both are interpretive languages, not compiled languages (although REXX can be compiled as well).
- Some z/OS users write functions directly as CLISTs or REXX programs
- CLIST programming is unique to z/OS, while the REXX language is used on many platforms.

ISPF overview

- Acronym for Interactive System Productivity Facility
- ISPF is a menu-driven interface for user interaction with z/OS system. The ISPF environment is executed from native TSO.
- ISPF provides utilities, an editor and ISPF applications to the user. To the extent permitted by various security controls an ISPF user has full access to most z/OS system functions.

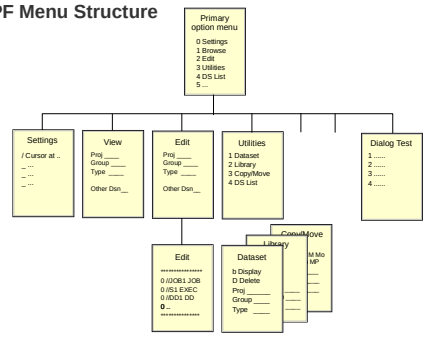
Using ISPF allocate screen

```
 Menu  RefList  Utilities  Help
                      Allocate New Data Set
Command ===>

Data Set Name  . . . : ZSCHOL.TEST.CNTL

Management class . . .              (Blank for default management class)
Storage class  . . . .              (Blank for default storage class)
 Volume serial . . . . EBBER1       (Blank for system default volume) **
 Device type . . . . .              (Generic unit or device address) **
Data class . . . . . .              (Blank for default data class)
• Space units . . . . . TRACK       (BLKS, TRKS, CYLS, KB, MB, BYTES
                                     or RECORDS)
 Average record unit                (M, K, or U)
 Primary quantity  . . 2            (In above units)
 Secondary quantity  . 1            (In above units)
 Directory blocks  . . 0            (Zero for sequential data set) *
 Record format . . . . FB
 Record length . . . . 80
 Block size  . . . . . 27920
 Data set name type  :              (LIBRARY, HFS, PDS, or blank)  *
                                    (YY/MM/DD, YYYY/MM/DD

   F1=Help      F2=Split     F3=Exit      F7=Backward  F8=Forward   F9=Swap
F10=Actions  F12=Cancel
```


Navigating through ISPF menus

- To access ISPF under TSO, the user enters a command from the READY prompt to display the *ISPF Primary Option Menu.*
- You can access online help from any of the ISPF panels (press the PF1 key)
- ISPF includes a text editor and browser, and functions for locating files and performing other utility functions.

ISPF Menu Structure



General structure of ISPF panels

Common functions provided in ISPF menus…

Action Bar

```
Menu  Utilities  Compilers  Options  Status  Help
```

Point-and-Shoot

```
0  Settings     Terminal and user parameters
1  View         Display source data or listings
2  Edit         Create or change source data
3  Utilities    Perform utility functions
```

Option Number

```
0  Settings     Terminal and user parameters
1  View         Display source data or listings
2  Edit         Create or change source data
3  Utilities    Perform utility functions
Options ===> 3
```

Function Keys

```
F1=Help      F3=Exit      F7=Bkwd          F8=Fwd
F10=Actions  F11=Retrieve F12=Cancel
```

Keyboard mapping:

Function	*Key*
Enter	Ctrl (right side)
Exit, end, or return	PF3
Help	PF1
PA1 or Attention	Alt-Ins or Esc
PA2	Alt-Home
Cursor movement	Tab or Enter
Clear	Pause
Page up	PF7
Page down	PF8
Scroll left	PF10
Scroll right	PF11
Reset locked keyboard	Ctrl (left side)

ISPF Edit Panel - some line commands

Command	Description
I	Insert lines
D	Delete lines
R	Repeat lines
C	Copy lines
M	Move lines
A	After line
B	Before line
(	Shift right columns
<	Shift right data
)	Shift left columns
>	Shift left data
X	Exclude lines

ISPF Edit Panel - Inserting lines

Screen 1

```
 File  Edit  Edit_Settings  Menu  Utilities  Compilers  Test  Help
ISREDDE2   MIRIAM.PRIVATE.JCLLIB(ABC1) - 01.03              Columns 00001 00072
Command ===> ____________________________________________ Scroll ===> PAGE
****** ***************************** Top of Data ******************************
000100 PROC 0 DB
000200 IF &DB = .DB THEN +
****** **************************** Bottom of Data ****************************
```

Screen 2

```
 File  Edit  Edit_Settings  Menu  Utilities  Compilers  Test  Help
ISREDDE2   MIRIAM.PRIVATE.JCLLIB(ABC1) - 01.03              Columns 00001 00072
Command ===> ____________________________________________ Scroll ===> PAGE
****** ***************************** Top of Data ******************************
000100 PROC 0 DB
'''''' _
''''''
''''''
''''''
''''''
000200 IF &DB = .DB THEN +
****** **************************** Bottom of Data ****************************
```


z/OS UNIX interactive interfaces

Like TSO and ISPF, the z/OS UNIX shell and utilities provide an interactive interface to z/OS.

Use the UNIX shell to:

- **Invoke shell scripts and utilities**
- **Write shell scripts (a list of shell commands created with the shell programming language)**
- **Run shell scripts and C language programs interactively.**

Invoking the UNIX shell

You can invoke the UNIX shell in any of these ways:

- **From a 3270 display or a workstation running a 3270 emulator**
- **From a TCP/IP-attached terminal, using the rlogin and telnet commands**
- **From TSO by entering the OMVS command or the ISHELL command.**

TSO commands used with z/OS UNIX

ISHELL → This command invokes the *ISPF shell*.

- **Intended for users more familiar with TSO/ISPF than UNIX**
- **Provides panels for working with UNIX files, mounting and unmounting file systems, and z/OS UNIX administration.**
- **z/OS programmers can do much of their work under ISHELL.**

OMVS → This command invokes the *z/OS UNIX shell.*

- **Intended for users more familiar with UNIX than TSO/ISPF**
- **Allows the user to alternate between the shell and TSO**
- **UNIX programmers should find the z/OS UNIX shell programming environment familiar.**

ISHELL command (ish)

A good starting point for TSO/ISPF users who want to use z/OS UNIX.

Under ISHELL, you can use action codes to:

- **b** Browse a file or directory
- **e** Edit a file or directory
- **d** Delete a file or directory
- **r** Rename a file or directory
- **a** Show the attributes of a file or directory
- **c** Copy a file or directory

OMVS command shell session

You use the OMVS command to invoke the z/OS UNIX shell.

Under the UNIX shell, users can:

- **Invoke shell commands or utilities that request services from the system.**
- **Write shell scripts using the shell programming language.**
- **Run shell scripts and C-language programs interactively (in the foreground), in the background, or in batch.**

Direct login to the shell

rlogin

- **When the inetd daemon is active, you can rlogin to the shell from a workstation. To log in, use the rlogin (remote log in) command syntax supported at your site.**

telnet

- **Also uses the inetd daemon**
- **inetd must be active and set up to recognize and receive the incoming telnet requests.**

Summary

- **TSO allows users to logon to z/OS and use a limited set of basic commands in native mode.**
- **ISPF is a menu-driven interface for user interaction with z/OS.**
- **ISPF provides utilities, an editor and ISPF applications to the user. To the extent permitted by various security controls an ISPF user has full access to most z/OS system functions.**
- **TSO ISPF should be viewed as a system management interface and a development interface for traditional z/OS programming.**
- **The z/OS UNIX shell and utilities provide a command interface to the z/OS UNIX environment. You can access the shell either by logging on to TSO/E or by using the remote login facilities of TCP/IP (rlogin).**
- **If you use TSO/E, a command called OMVS creates a shell for you. You can work in the shell environment until exiting or temporarily switching back to the TSO/E environment.**