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z/OS – The Mainframe Operating System

Part 2 – TSO, ISPF and Unix Shell

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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

<table>
<thead>
<tr>
<th>Enter LOGON parameters below:</th>
<th>RACF LOGON parameters:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Userid ====&gt; ZPROF</td>
<td>New Password ====&gt;</td>
</tr>
<tr>
<td>Password ====&gt;</td>
<td>Group Ident ====&gt;</td>
</tr>
<tr>
<td>Procedure ====&gt; IKJACCNT</td>
<td></td>
</tr>
<tr>
<td>Acct Nmbr ====&gt; ACCNT#</td>
<td></td>
</tr>
<tr>
<td>Size ====&gt; 860000</td>
<td></td>
</tr>
<tr>
<td>Perform ====&gt;</td>
<td></td>
</tr>
<tr>
<td>Command ====&gt;</td>
<td></td>
</tr>
</tbody>
</table>

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

PF1/PA13 ==> Help   PF3/PA15 ==> 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

## Menu Bar

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
<th>Parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Settings</td>
<td>User ID : AUES100</td>
</tr>
<tr>
<td>1</td>
<td>View</td>
<td>Time. : 16:14</td>
</tr>
<tr>
<td>2</td>
<td>Edit</td>
<td>Terminal. : 3278</td>
</tr>
<tr>
<td>3</td>
<td>Utilities</td>
<td>Screen. : 1</td>
</tr>
<tr>
<td>4</td>
<td>Foreground</td>
<td>Language. : ENGLISH</td>
</tr>
<tr>
<td>5</td>
<td>Batch</td>
<td>Appl ID. : ISR</td>
</tr>
<tr>
<td>6</td>
<td>Command</td>
<td>TSO logon : LOGON</td>
</tr>
<tr>
<td>7</td>
<td>Dialog Test</td>
<td>TSO prefix: AUES100</td>
</tr>
<tr>
<td>8</td>
<td>LM Facility</td>
<td>System ID : SYS1</td>
</tr>
<tr>
<td>9</td>
<td>IBM Products</td>
<td>MVS acct. : ACCNT#</td>
</tr>
<tr>
<td>10</td>
<td>SCLM</td>
<td>Release : ISPF 5.2</td>
</tr>
<tr>
<td>11</td>
<td>Workplace</td>
<td></td>
</tr>
</tbody>
</table>

## Panel Options

- **Menu**: Utilities, Compilers, Options, Status, Help
- **Utilities**: Perform utility functions
- **Compilers**: Interactive language processing
- **Options**: System Display and Search Facility
- **Status**: ISPF Object/Action Workplace

## Dynamic Status Area

- **Terminal**: 3278
- **Screen**: 1
- **Language**: ENGLISH
- **Appl ID**: ISR
- **MVS acct.**: ACCNT#
- **Release**: ISPF 5.2

Enter X to Terminate using log/list defaults

## Command Line Function Keys

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

<table>
<thead>
<tr>
<th>Function</th>
<th>Key</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enter</td>
<td>Ctrl (right side)</td>
</tr>
<tr>
<td>Exit, end, or return</td>
<td>PF3</td>
</tr>
<tr>
<td>Help</td>
<td>PF1</td>
</tr>
<tr>
<td>PA1 or Attention</td>
<td>Alt-Ins or Esc</td>
</tr>
<tr>
<td>PA2</td>
<td>Alt-Home</td>
</tr>
<tr>
<td>Cursor movement</td>
<td>Tab or Enter</td>
</tr>
<tr>
<td>Clear</td>
<td>Pause</td>
</tr>
<tr>
<td>Page up</td>
<td>PF7</td>
</tr>
<tr>
<td>Page down</td>
<td>PF8</td>
</tr>
<tr>
<td>Scroll left</td>
<td>PF10</td>
</tr>
<tr>
<td>Scroll right</td>
<td>PF11</td>
</tr>
<tr>
<td>Reset locked keyboard</td>
<td>Ctrl (left side)</td>
</tr>
</tbody>
</table>
### ISPF Edit Panel - some line commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Insert lines</td>
</tr>
<tr>
<td>D</td>
<td>Delete lines</td>
</tr>
<tr>
<td>R</td>
<td>Repeat lines</td>
</tr>
<tr>
<td>C</td>
<td>Copy lines</td>
</tr>
<tr>
<td>M</td>
<td>Move lines</td>
</tr>
<tr>
<td>A</td>
<td>After line</td>
</tr>
<tr>
<td>B</td>
<td>Before line</td>
</tr>
<tr>
<td>(</td>
<td>Shift right columns</td>
</tr>
<tr>
<td>&lt;</td>
<td>Shift right data</td>
</tr>
<tr>
<td>)</td>
<td>Shift left columns</td>
</tr>
<tr>
<td>&gt;</td>
<td>Shift left data</td>
</tr>
<tr>
<td>X</td>
<td>Exclude lines</td>
</tr>
</tbody>
</table>
Introduction to the new mainframe

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 ************************
150100 PROC O DB
000200 IF 8DB = .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 O DB
........ --
........
........
........
000200 IF 8DB = .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.