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)
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.
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TSO/E logon screen

Enter LOGON parameters below:

UserId  ==>  LUTZ
Password  ==>  _
Procedure  ==>  IKJACCNT
Acct Nmbr  ==>  ACCNT#
Size  ==>  2096128
Perform  ==> 
Command  ==>  isppdf

Enter an 'S' before each option desired below:

-Nomail    -Nonotic    -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).
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**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

 Allocate New Data Set

Command ==> 

Data Set Name ....: LUTZ.TEST.FILE

Management class ..: (Blank for default management class)
Storage class ....: (Blank for default storage class)
Volume serial ....: (Blank for system default volume) **
Device type ......: (Generic unit or device address) **
Data class ......: (Blank for default data class)
Space units ......: CYLINDER (BLKS, TRKS, CYLS, KB, MB, BYTES or RECORDS)
Average record unit_: (M, K, or U)
Primary quantity ..: 5 (In above units)
Secondary quantity: 5 (In above units)
Directory blocks ..: 30 (Zero for sequential data set) *
Record format .....: U
Record length .....: 0
Block size ......: 27998
Data set name type: LIBRARY (LIBRARY, HFS, PDS, LARGE, BASIC, *
F1=Help F2=Split F3=Exit F7=Backward F8=Forward F9=Swap
F10=Actions F12=Cancel

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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

Primary option menu
0 Settings
1 Browse
2 Edit
3 Utilities
4 DS List
5 ...

Settings
/C Cursor at ..
... ...
... ...
... ...

View
Proj ____
Group ____
Type ____
Other Dsn__

Edit
Proj ____
Group ____
Type ____
Other Dsn__

Utilities
1 Dataset
2 Library
3 Copy/Move
4 DS List

Dialog Test
1 ..... 
2 ..... 
3 ..... 
4 ..... 

Conv/Mo
Library

Dataset
b Display
D Delete
Proj _____
Group _____
Type _____
General structure of ISPF panels

Menu Utilities Compilers Options Status Help
-----------------------------------------------
\* ISPF Primary Option Menu

0 Settings    Terminal and user parameters     User ID . : AUES100
1 View        Display source data or listings  Time . . : 16:14
2 Edit        Create or change source data    Terminal. : 3278
3 Utilities   Perform utility functions       Screen . : 1
4 Foreground  Interactive language processing Language . : ENGLISH
5 Batch       Submit job for language processing Appl ID . : ISR
6 Command     Enter TSO or Workstation commands TSO logon : LOGON
7 Dialog Test Perform dialog testing          TSO prefix: AUES100
8 LM Facility Library administrator functions  System ID : SYS1
9 IBM Products IBM program development products MVS acct. : ACCNT#
10 SCLM        SW Configuration Library Manager Release . : ISPF 5.2
11 Workplace   ISPF Object/Action Workplace
5 SDSF        System Display and Search Facility

Enter X to Terminate using log/list defaults

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

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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

### Function Keys

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

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## 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>

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ISPF Edit Panel - Inserting lines

Screen 1

```
150100 PROC 0 DB
000200 IF 8DB = .DB THEN +
```

Screen 2

```
000100 PROC 0 DB
.......
.......
.......
000200 IF 8DB = .DB THEN +
```
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.
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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.
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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.