



Uni Hamburg – Mainframe Summit 2010 z/OS – The Mainframe Operating System

Part 2 – TSO, ISPF and Unix Shell

Redelf Janßen
IBM Technical Sales Mainframe Systems
Redelf.Janssen@de.ibm.com





Introduction to the new mainframe

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

```
di, 3444  
mov ax, Score  
call PrintNumber  
  
p, 219  
DrawShape  
  
ah, 1  
16h  
GetKey
```



```
xor di, di  
mov cx, 2000  
mov ax, 700h  
rep stosw  
  
call DrawBorders  
  
mov di, 184  
mov si, offset sNext  
call PrintText  
mov di, 272  
mov si, offset sHiScore  
call PrintText
```

```
mov al, 0- mov ah, 7  
Clear screen and set color 7  
  
mov di, 3430  
mov si, offset sScore  
call PrintText  
mov di, 450  
mov si, offset sSpeed  
call PrintText
```

```
mov di, 292  
mov bx, HiScore  
call PrintNumber  
  
mov Score, 0  
  
call ChooseGame  
  
call Rand  
mov NextShape, ax  
call NewShape  
call DrawNextShape
```



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.

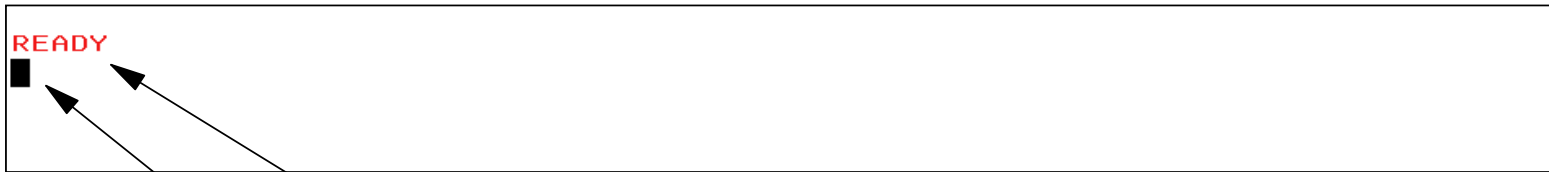
TSO/E logon screen

```
----- TSO/E LOGON -----  
  
Enter LOGON parameters below:                                RACF LOGON parameters:  
  
Userid    ===> ZPROF  
  
Password  ===>  
  
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



TSO is ready to accept commands

Cursor, where you enter commands



- 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)

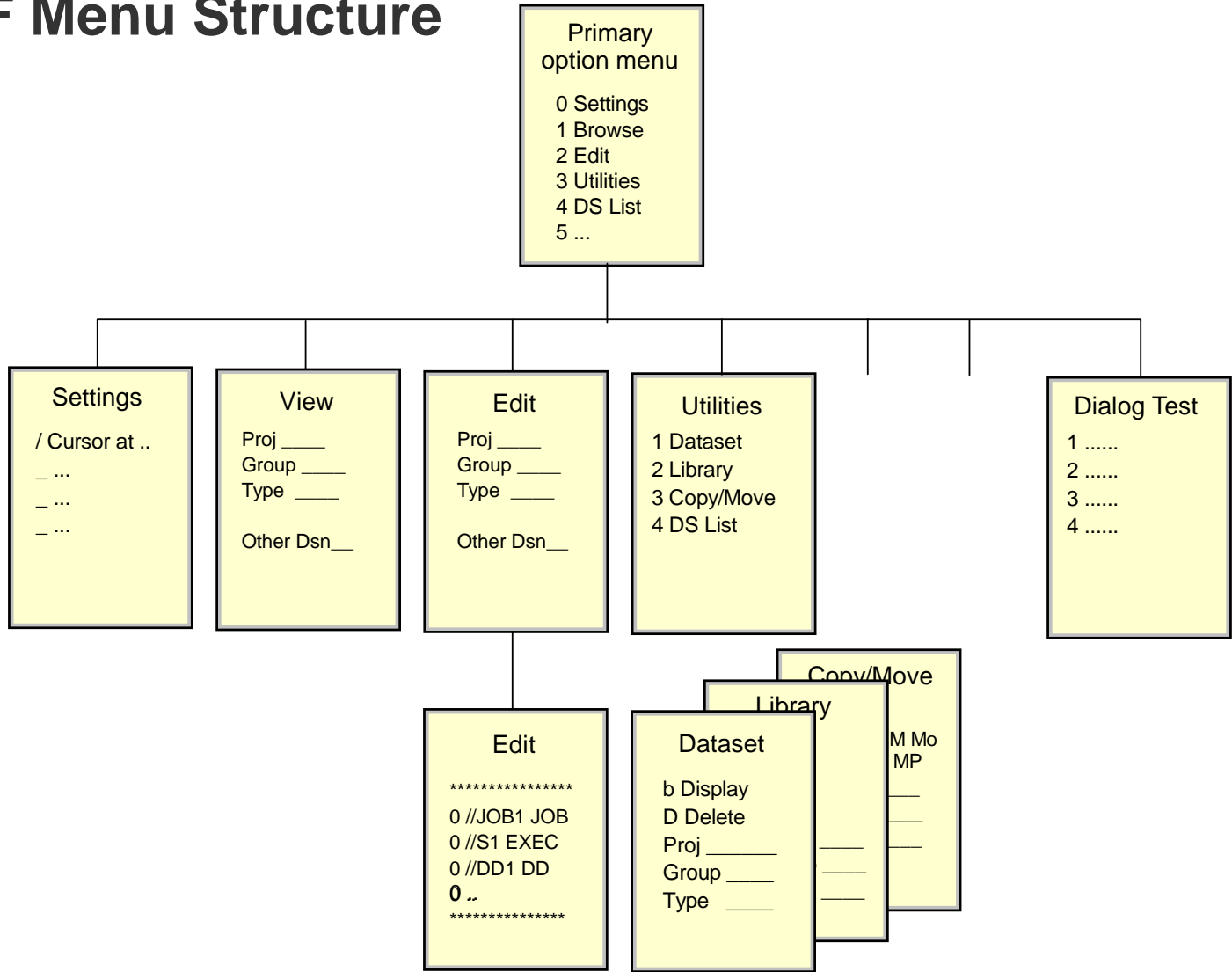
      F1=Help      F2=Split      F3=Exit      F7=Backward  F8=Forward  F9=Swap
F10=Actions  F12=Cancel

```

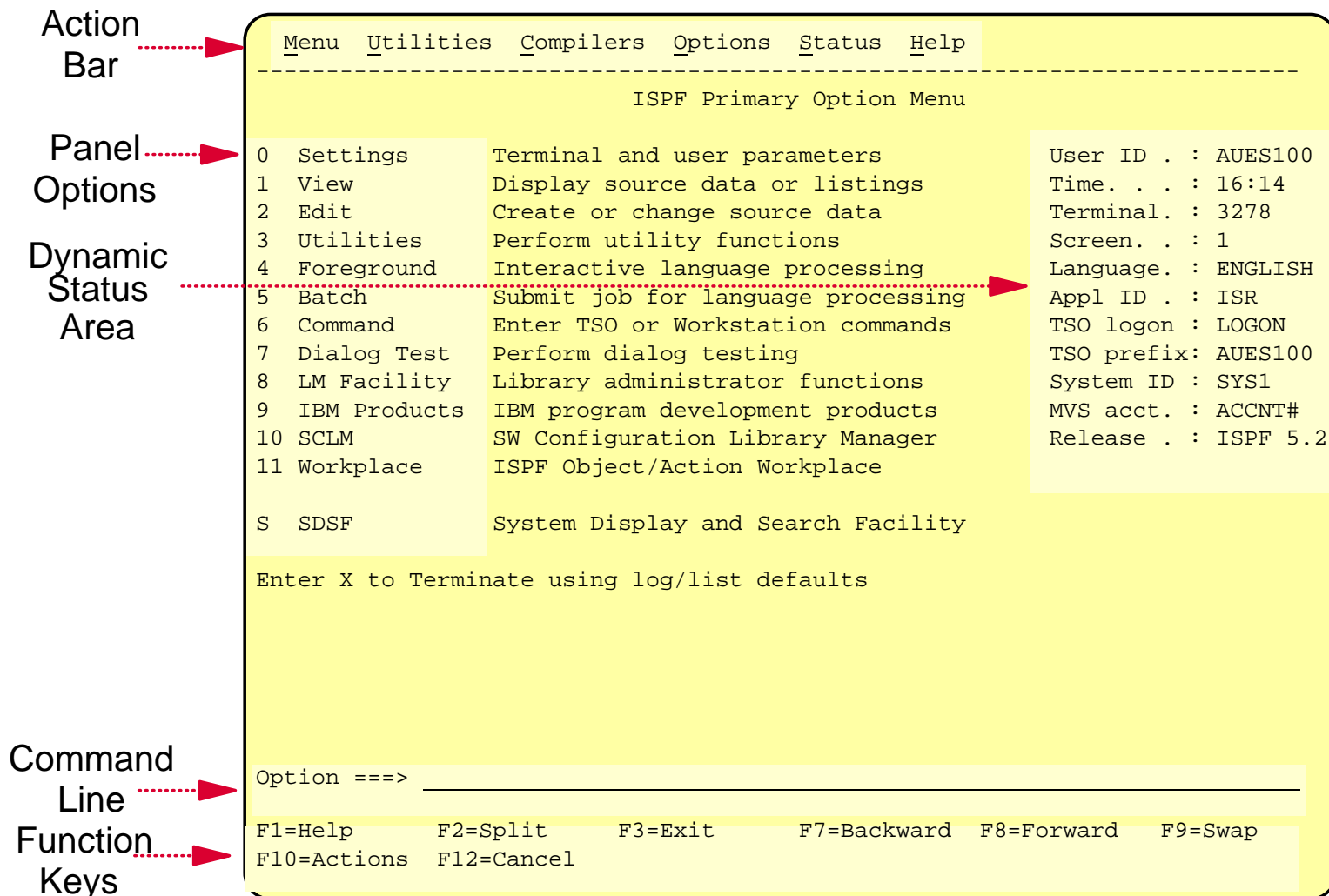
Navigating through ISPF menus

- 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

Enter

Exit, end, or return

Help

PA1 or Attention

PA2

Cursor movement

Clear

Page up

Page down

Scroll left

Scroll right

Reset locked keyboard

Key

Ctrl (right side)

PF3

PF1

Alt-Ins or Esc

Alt-Home

Tab or Enter

Pause

PF7

PF8

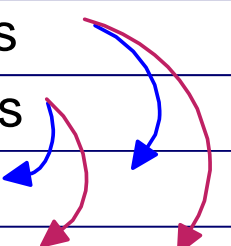
PF10

PF11

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 *****
i50100 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.**