Exercise Guide
with hints

Introducing z/OS UNIX System Services

Course code EZP05G ERC 1.0

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Exercises description

These practical exercises on z/OS UNIX are designed to be used with the *Introducing z/OS UNIX System Services* course (EZP05).

In the exercise instructions, each step is prefixed by a line. You can check off each step as you complete it to keep track of your progress.

Most exercises include required sections that should always be completed. These might be required before performing later exercises. Some exercises might also include optional sections that you can perform if you have sufficient time and want an extra challenge.

This course includes “hints” in pink ”.

The standard “Exercise instructions” section provides high-level instructions for the tasks you should perform. You need to apply the knowledge you gained in the unit presentation to perform the exercise.

The “Exercise instructions with hints” provide more detailed instructions and hints to help you perform the exercise steps.

Read the *What this exercise is about* and *What you should be able to do* sections in each exercise.

Replace *###* with your TSO user ID tsa0*###* (*###* is your assigned id).

IBM PCOMM emulator uses the right Ctrl key or the numeric keypad Enter key as the 3270 Enter key.

Some exercise instructions are explicit, while others encourage you to explore the shells for a solution.

Information

You might find some help in a lab solution dataset: D80WW.EZP05V1.OMVS.LABS.SOLUTION.

-
  -

Exercise 1. System Familiarization

Estimated time

00:15

Overview

The steps in this exercise are to guide you through accessing the Skytap environment to gain entry into the IBM mainframe system and exit ISPF and logoff TSO. These action items are to be performed on the actual live system.

Objectives

- Access the Skytap environment
- Access the system image
- Log on to TSO
- Logoff TSO

References

SC34-4823	Interactive System Productivity Facility (ISPF) User's Guide

Exercise instructions

Preface

Note

The Enter key on your keyboard may/may not be the Enter key.

On some keyboards, the Enter key for VM is the right CTRL key. Take care when entering your password. If you enter the password incorrectly four times, your user ID will be revoked. Contact the Help Desk for support.

Section 1: Gathering information and accessing the lab image

Access your lab environment

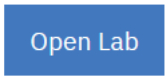
You will use the IBM Remote Lab Platform (IRLP) to complete your lab session

Instructions:

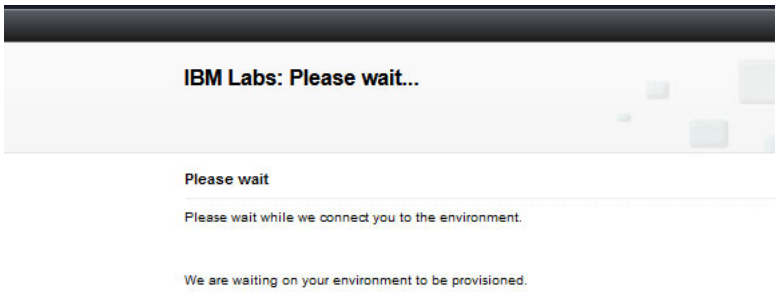
a. Ensure that you have downloaded the relevant exercise guide.

b. Access the lab using the 'Open Lab' button shown here.

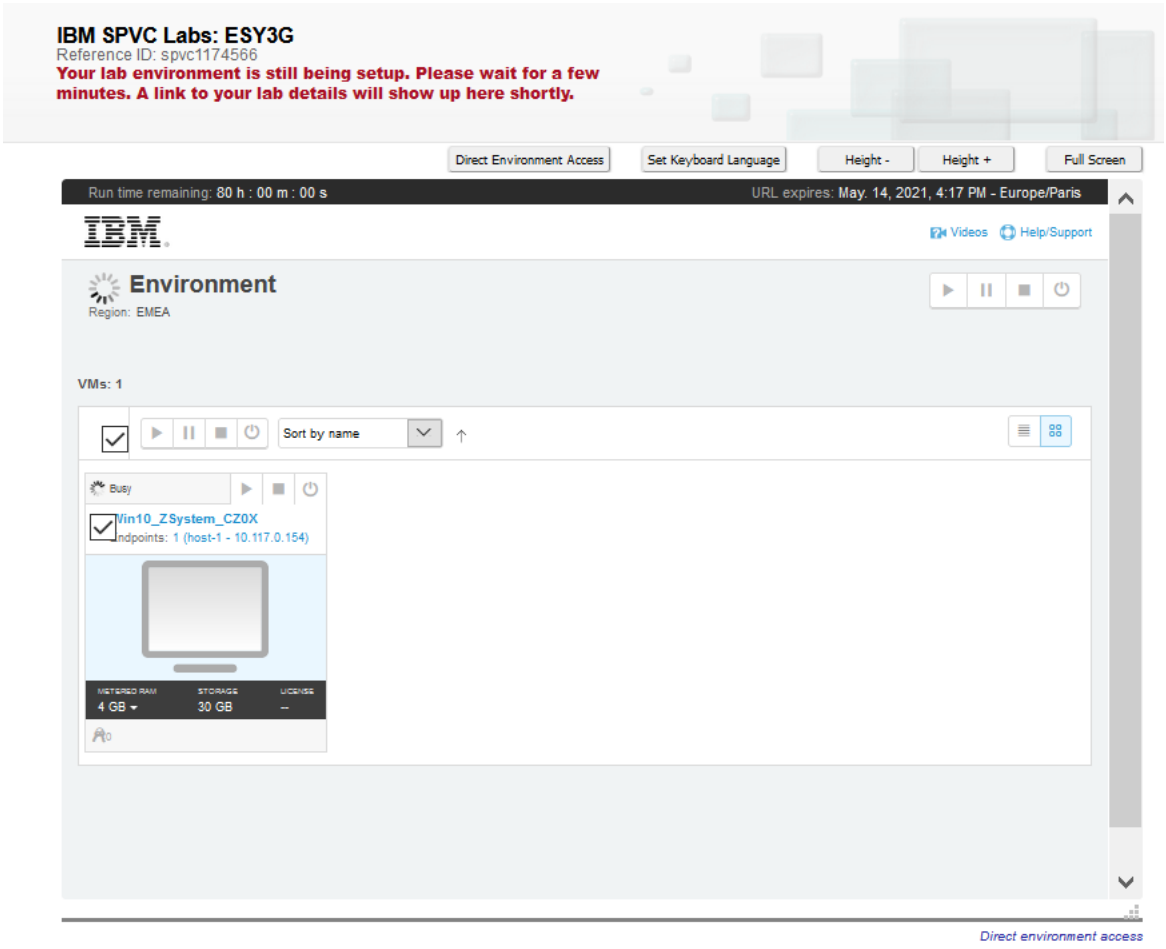
c. Log in with your IBM ID (Sign up here if you don't already have one), complete the labs by following the exercise guide and return to this course.



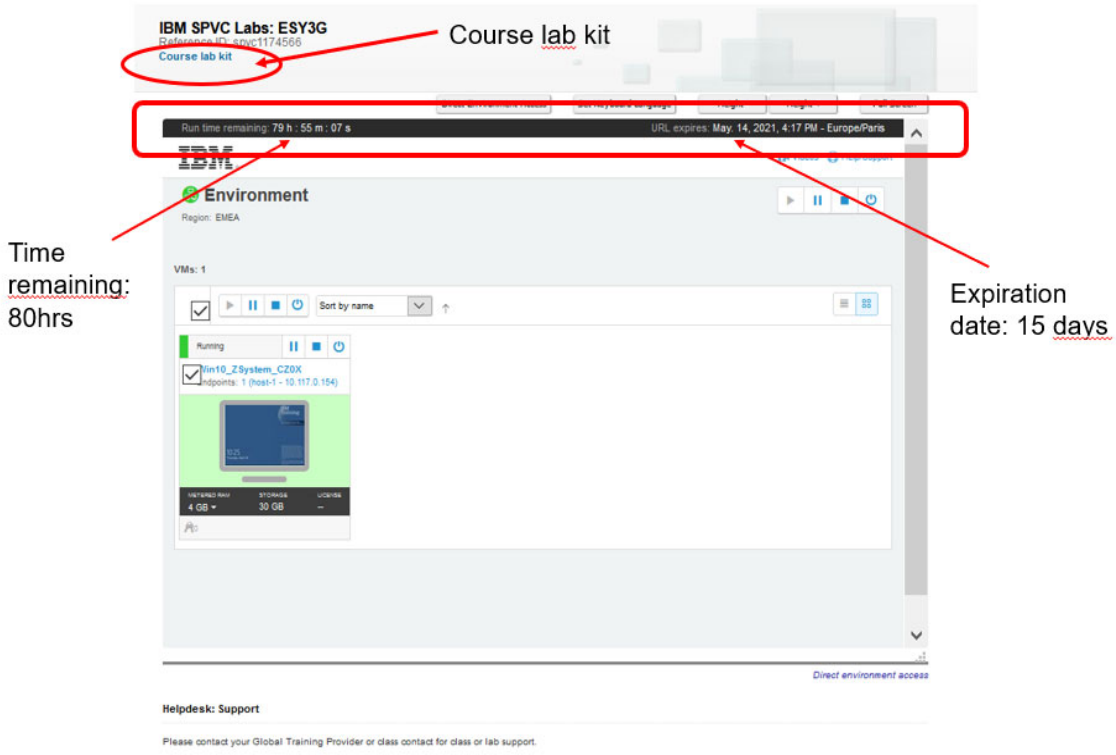
__ 1. Wait until your environment gets initialized. It can take a few minutes...



__ 2. This screen below shows that the provisioning of your environment is still in progress.



__ 3. Don’t try to activate your vmware or click anywhere until you get the ‘green light’, as shown below.



This will provide you with all of the information you will need to progress through this course.

The above is just an example. **Do not** use the information above to record your information. Ensure that you use the information in your **Course Lab Kit**. (click the link as shown above)

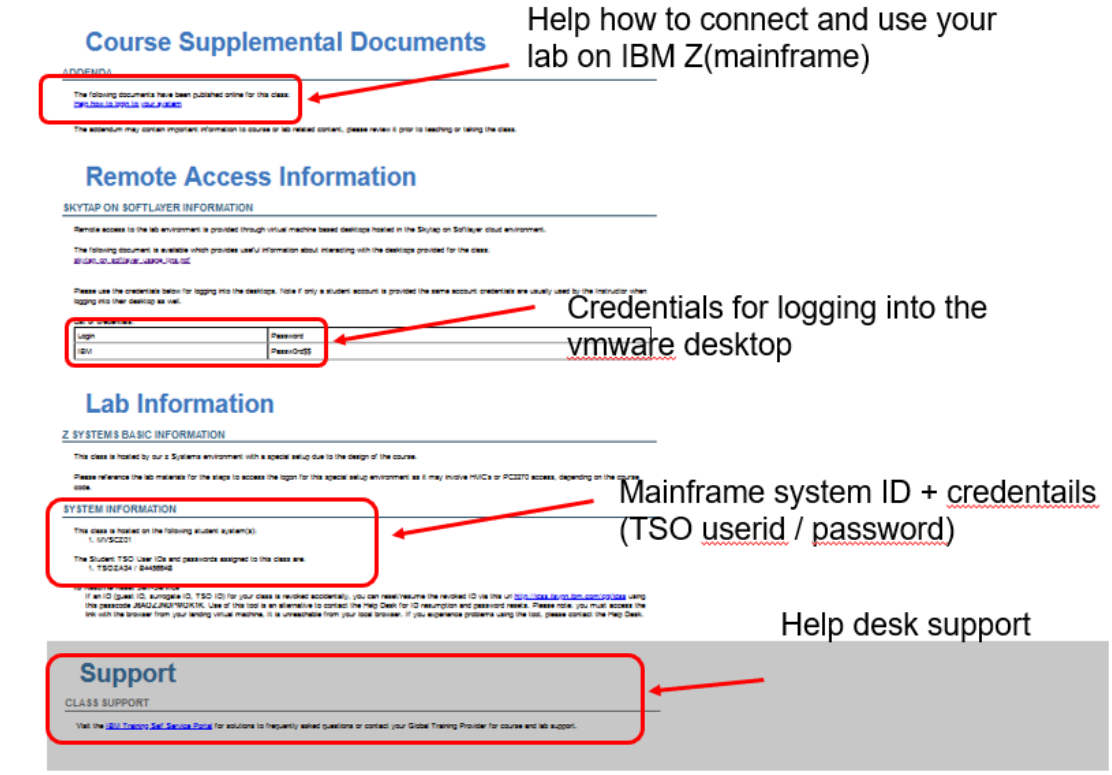
The Course Lab Kit built will have the VMware windows ID / password noted along with your mainframe (TSO) credentials in 'Lab Information' section at the bottom (see on next page).

By default, your access to these labs will be available for **15 days or a total of 80 hours** (whichever comes first). We limit it to that timeline to control our server resources.

Attention

If your lab access expires you will be provided with a new lab environment the next time you go into the labs. The Course Kit for this new environment will include new TSO credentials. Your work in the expired lab will be lost.

To avoid loosing your work and resetting your lab environment, you can request an extension: just email irlphelp@us.ibm.com asking for an extension when you get close to the limit. Please provide the Skytap Session ID.



This Course Lab Kit will have the VMware windows ID / password noted along with your mainframe (TSO) credentials in 'Lab Information' section at the bottom .

__ 4. Record your information here for reference:

a. PC Image Login: _____

b. PC Image Password: _____

c. System name: _____

d. TSO user ID: _____

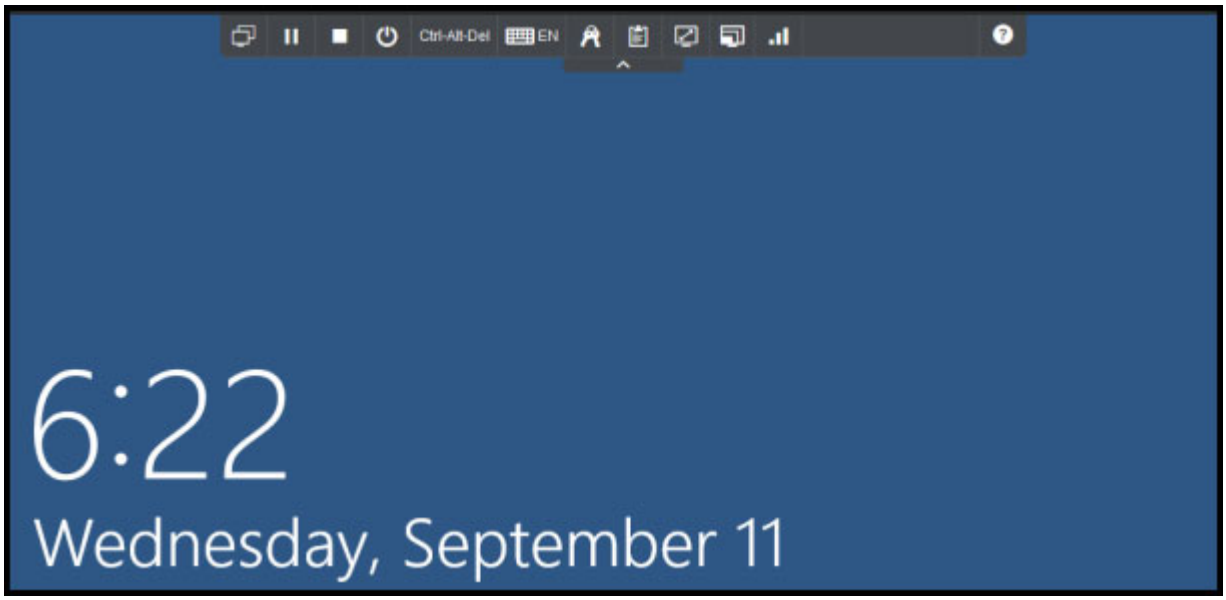
e. TSO password: _____

__ 5. If the lab image is "suspended" or "powered off", then Click the session image to activate it. (Click the Play button).

__ 6. Click the **play button**.

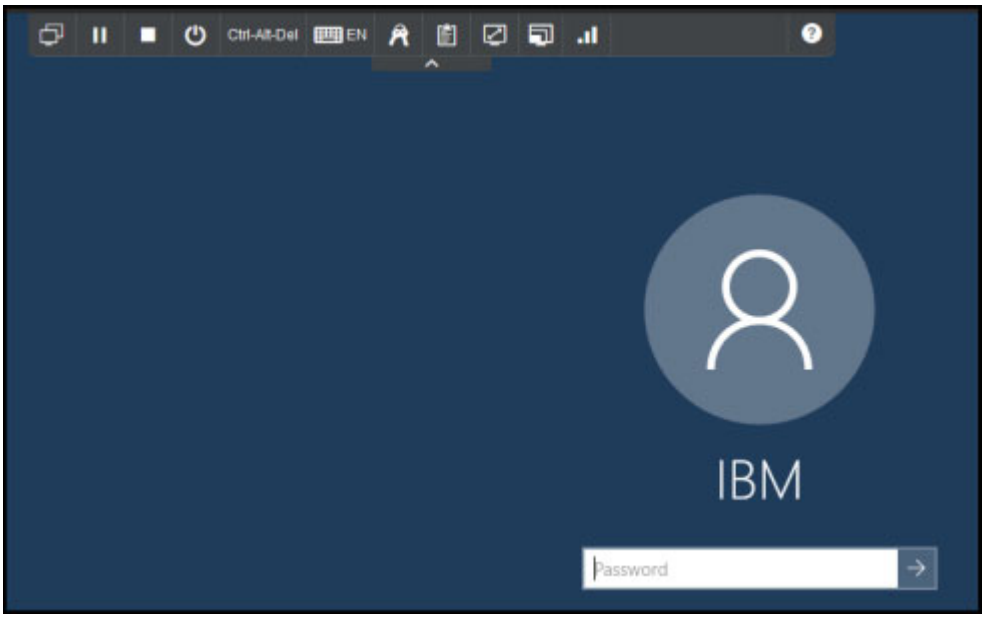
Wait patiently while your image is being created. This may take a while.

__ 7. **Left click** in the middle of the next screen:



The request for the password will now appear.

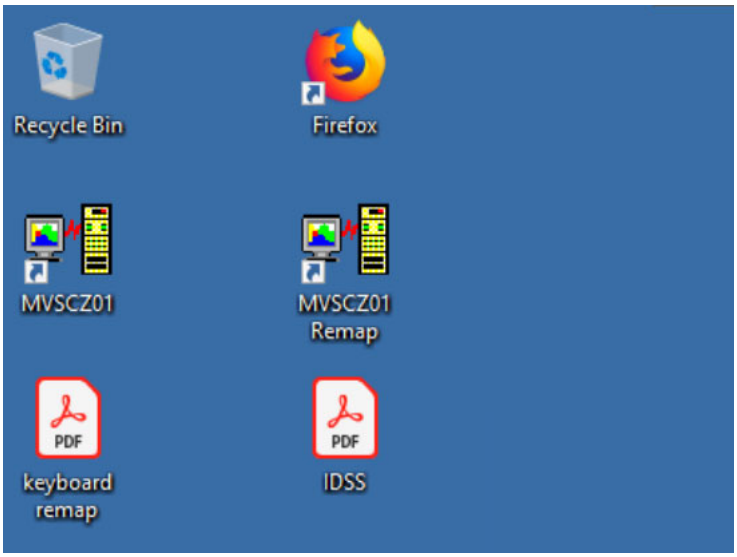
__ 8. Using the information you recorded in step 3, enter the assigned **password** on the following screen and **press the arrow** to the right of the entry to continue.



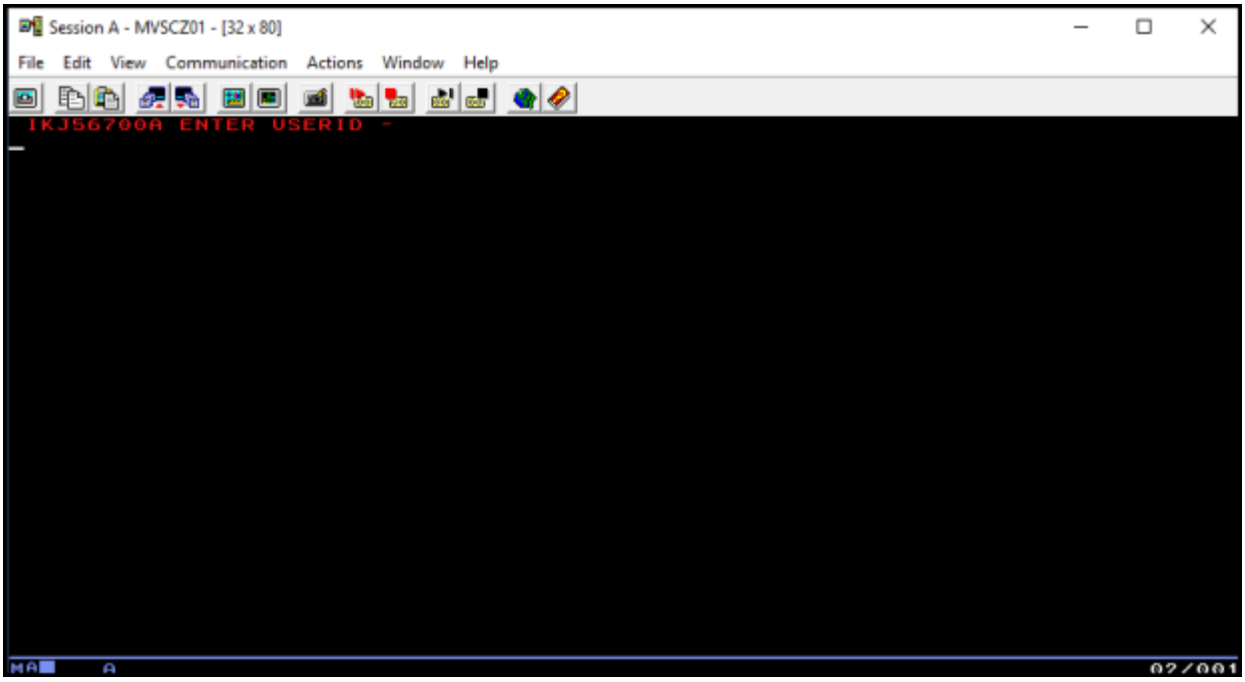
__ 9. Once the icons appear on the desktop, using the information you recorded in step 3, **double click the system name**.

Note

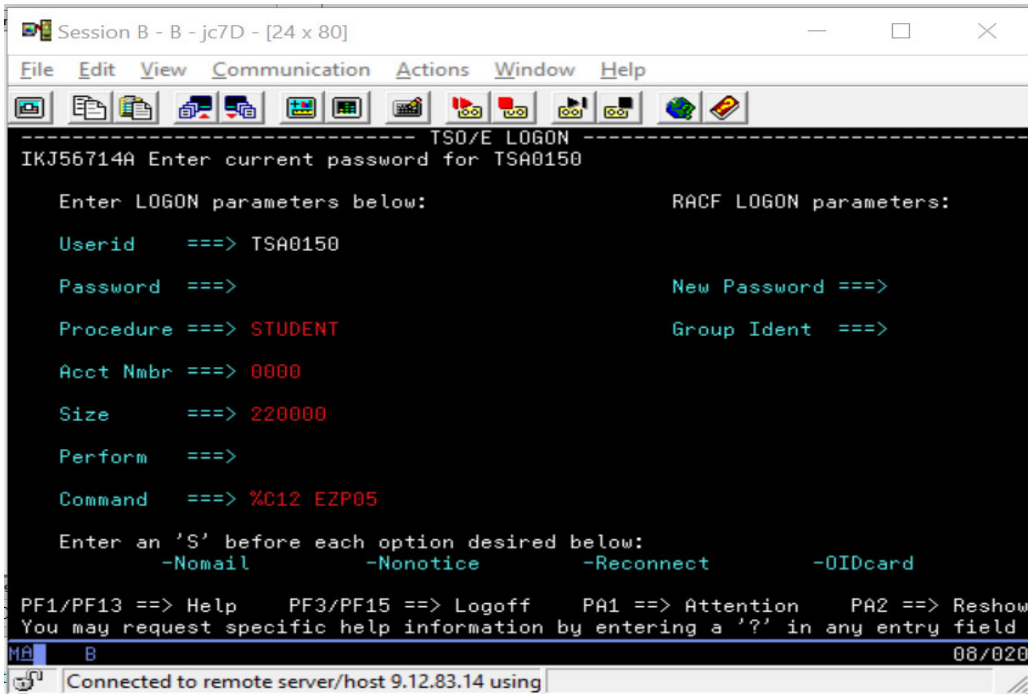
On the desktop, you have a PCOM icon that has "enter" at the "right ctrl" and a "remap" icon that has "enter" at the "enter" key. You also have a "keyboard remap" guide and a "IDSS" guide on the desktop, with instructions in case you need to reset/reinitialize your TSO password.



__ 10. Using the information you recorded in step 3, enter the assigned **TSO user ID** and press the **Enter Key.**



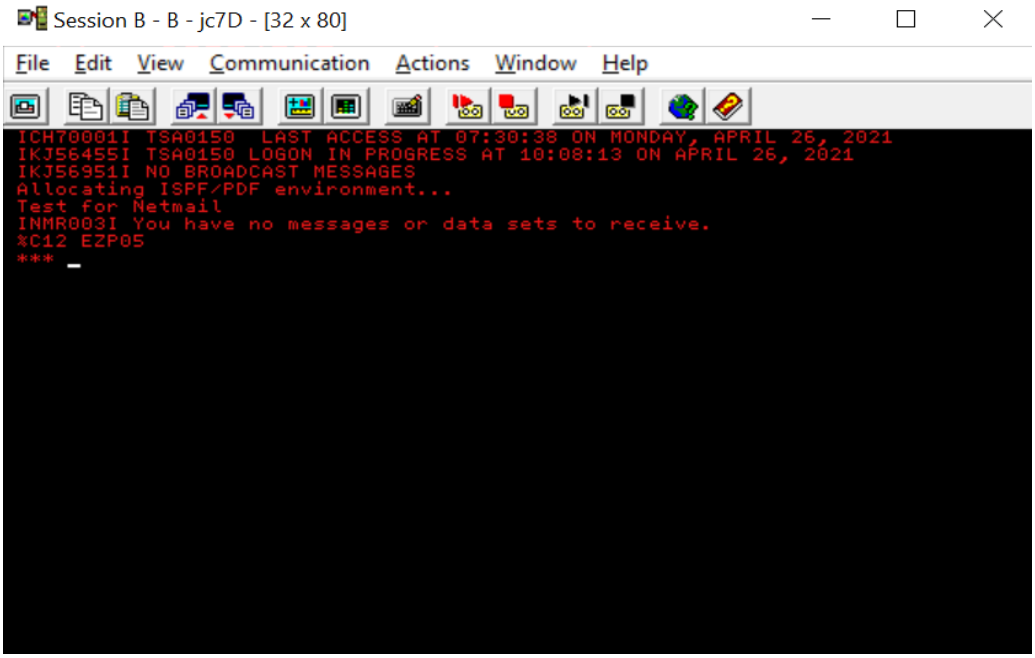
__ 11. Using the information you recorded in step 3, enter the assigned **TSO password** and press the **Enter Key.**



Information

When you enter your full password of 8 characters, it will automatically tab over to "new password" field. There is no need to change your original password. If you accidentally start to enter a new password, you can just hit "enter" and it will prompt for a confirmation of the new password. Do NOT enter the confirmation and hit "enter" again and it will then indicate that your new passwords don't match. Just hit "enter" one more time and the logon will proceed WITHOUT changing the password.

__ 12. Once you have successfully logged on, the following screen will appear:



__ 13. When three asterisks (***) appear, press the **Enter Key** to continue.

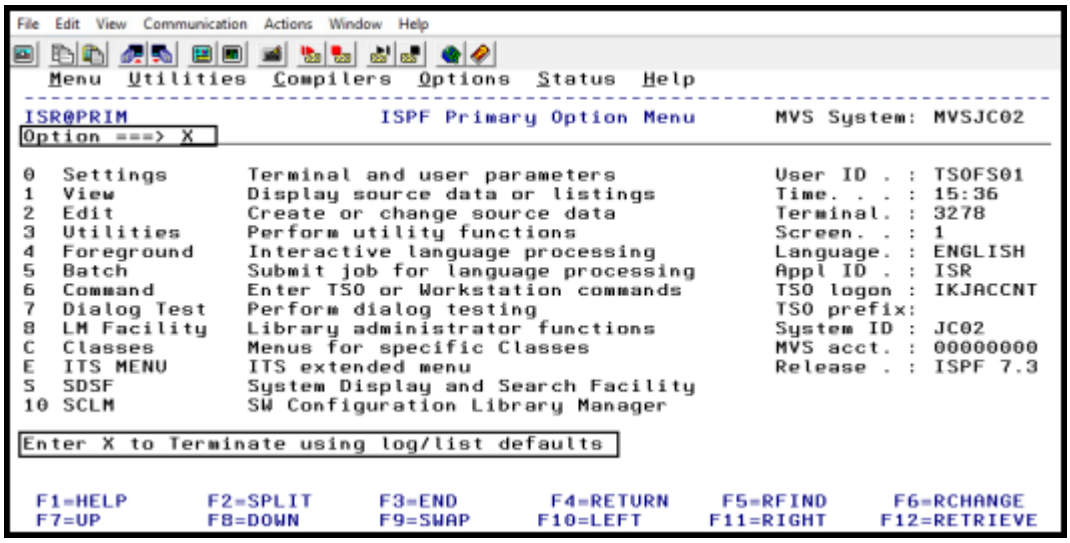
You are now logged on to TSO.

When *** (three asterisks) appear on the screen, press the **Enter Key** to continue.

Section 2: Exit ISPF

__ 14. To leave ISPF's Program Development Facility:

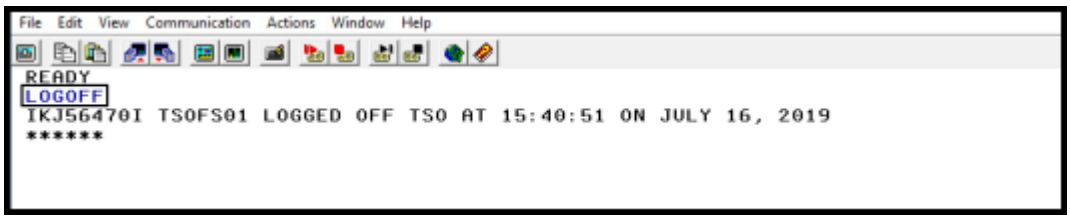
__ a. You can enter an **X** on the command line or press the **F3 Key**.



You now have ended the ISPF session and returned to the TSO command line mode. Your TSO session is still running.

Section 3: Logoff

__ 15. To terminate your TSO session, enter the TSO command **logoff** on your terminal.



TSO then replies with a message like **IKJ56470I *userid* LOGGED OFF TSO AT 14:40:51 on July 16, 2019** to indicate that your TSO session has been terminated.

End of exercise

Exercise 2. Using the ISHELL

(*with hints*)

Overview

This exercise provides an opportunity to get familiar with the ISHELL and ISPF UDLIST interface (OPT3.17) and the hierarchical file system characteristics.

Objectives

At the end of this exercise, you should be able to:

- Invoke the ISHELL
- Use the UNIX directory list interface (UDLIST 3.17)
- Define functions that can be performed using the ISHELL and UDLIST
- Describe how to use help information
- Show how to use ISHELL and UDLIST to list the contents of a directory
- Use the ISHELL and UDLIST to create a new file and work with UNIX files

Introduction

The course Lab Kit has the required information about the password and the user ID that has been assigned to your course session. This user ID is used for all of the following exercises.

The logon procedure has been described in the Exercise 1, "System Familiarization," on page 1-1.

Exercise instructions with hints

Preface

- All exercises in this chapter depend on the availability of your booked class environment.
- A » sign indicates a hint.

Part 1: ISHELL introduction

__ 1. Log on to TSO as described in Exercise 1, "System Familiarization," on page 1-1.

__ 2. From the **ISPF** menu, choose the option to invoke the ISHELL or use the `ISHELL` command.

__ 3. If there is no option for the ISHELL on the **ISPF** menu, use the `ISHELL TSO` command to invoke the ISHELL or goto option 6 TSO and enter 'ish' (or ishell).

Questions

How can you enter the ISHELL from TSO/ISPF on your system?

_____

» Possible answers:

- In ISPF Primary Option Menu, select **E** for ITS menu, and then in the next menu, select **7** for ISH.
- In ISPF Primary Option Menu, select **6** for Command, and then in ISPF Command shell, select **ISHELL** or **ISH**. (ISH is an alias for ISHELL.)

Can you specify parameters or options when you enter ISHELL from TSO/ISPF?

_____

» Possible answer:

- No. The `ISHELL` command has no parameters or options.

__ 4. From the ISHELL (the UNIX System Services ISPF Shell), exit to TSO/ISPF.

__ 5. Enter ISHELL again from TSO/ISPF.

Questions

How can you exit the ISHELL to TSO/ISPF on your system?

_____

» Possible answers:

- PF3 twice
- PF3 + Enter
- PF12 + PF3
- PF12 + Enter
- In command line, type **`exit`** and press PF3.
- In command line, type **`exit`** and press Enter.
- In command line, type **`cancel`** and press PF3.
- In command line, type **`cancel`** and press Enter.
- Related: Use of PF2 / PF9 - see next question.

__ 6. From the ISHELL (the UNIX System Services ISPF Shell), use PF2 to enter TSO/ISPF in split screen mode.

Questions

Can this be done? _____

» Possible answer:

- Yes

__ 7. From the ISPF Primary Option Menu on the secondary screen, enter ISHELL.

Questions

Can this be done? Can you flip-flop with PF9? _____

» Possible answers:

- Yes, and yes.

Note

Enter ‘swapbar’ to ensure that all screens titles are displayed, and that you can easily swap from one display screen to another by positioning your cursor on any screen title at the bottom and pressing enter.

Use the pull-down menus from the action bar to see what actions can be performed.

- The ISHELL screen is CUA (Common User Interface) based. It has an action bar at the top of the screen. Note the use of PF10 and Tab. (Make sure you have enabled PF keys display with the command `PFSHOW ON`.)
- Placing the cursor under any of the actions listed on the action bar and pressing the Enter key results in a pop-up window (also called a pop-up menu or pull-down menu) for the action being displayed. The window shows a list of actions that can be chosen.
  - Use the help key (PF1) on any field if you do not know what to do.

Questions

Which actions can be done for File?

_____

» Possible answers:

- New (N)
- Attributes (A)
- Delete (D)
- Rename (R)
- Edit (E)
- Browse text (B)
- Browse records (V)
- Copy to (C)
- Replace from (I)
- Print (P)
- Compare (M)
- Find strings (F)
- Run (X)
- Link
- File system(U)
- Edit records(G)

How can you display the attributes for a file or directory?

_____

» Possible answers:

- Select the file by entering / in front of it to select it, then in menu File, select **2** to display the attributes of the current file or directory. Note the use of PF8 and PF7 to scroll the display.

```
File  Directory  Special_file  Commands  Help
Directory List

Select one or more files with / or action codes.
action from the action bar otherwise your default
with S to use your default action.  Cursor select
navigation.  See help for details.
EUID=100050165   /u/ezp05/tsa0165/
  Type  Filename
_ Dir   .
_ Dir   ..
/ File  .profile
```

- In command line, use command **a** to display the attributes of the current file or directory. Note the use of PF11 to go to command line.

What does the asterisk (*) on actions in the File_System and Setup mean?

_____

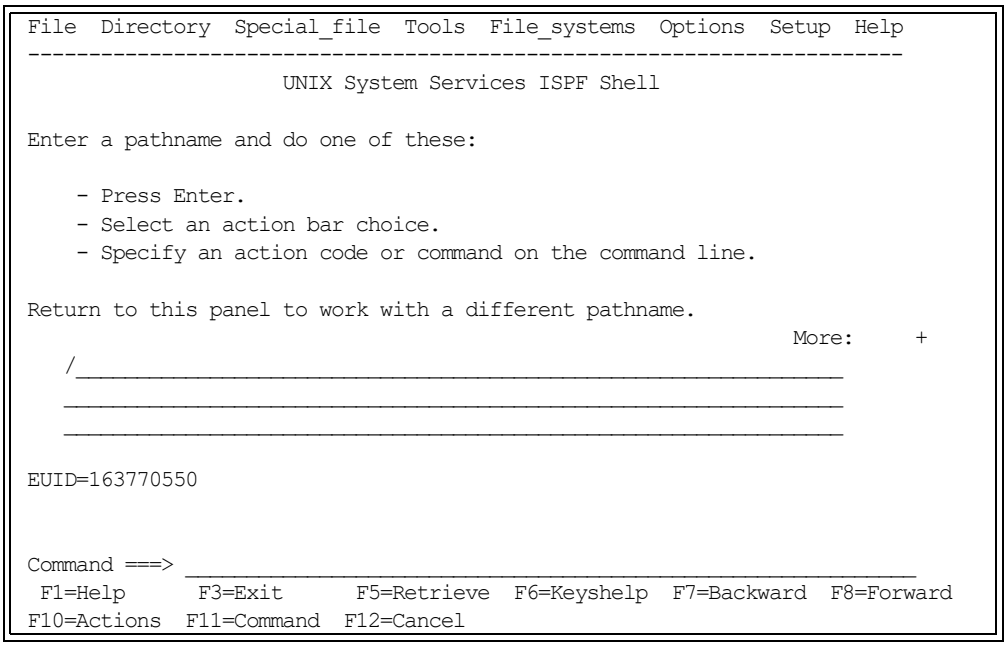
» Possible answer:

- Some choices (*) require a superuser or the “special” attribute for full function (or both).

Part 2: Introduction to the file system

__ 8. List the contents of the root file system.

- The name of the root file system is **/** (forward slash).
- If **/** (forward slash) is not already specified on the ISH main panel, enter it as shown on the following panel.



__ 9. There are different methods for displaying the contents of a directory. See whether you can find one way of doing it.

Questions

How did you do it? _____

» Possible answers:

- Press Enter. Listing the directory is the default action if a directory is displayed.
- Use PF10, press Tab twice to Directory, and then enter 1. List directory(L)...
- Use PF11 and l (for list).

__ 10. Press PF12 to return to the initial panel

```
File  Directory  Special_file  Tools  File_systems  Options  Setup

                    UNIX System Services ISPF Shell

Enter a pathname and do one of these:

    - Press Enter.
    - Select an action bar choice.
    - Specify an action code or command on the command line.

Return to this panel to work with a different pathname.
                                                                More:
   /
   ___________________________________________________________________
   ___________________________________________________________________
   ___________________________________________________________________

EUID=100050165
```

__ 11. Tab to Options > directory list and select the following Directory List options:

```
Directory List Options

 Select options and fields to be displayed with /

 /  File type    ( 4 columns)
 /  Permissions: octal  ( 4 columns)
 _  Permissions: rwx  (10 columns)
 /  Change time  (16 columns)
 /  Owner        ( 9 columns)
 /  File size    (10 columns)

 _  View/change sort options...
 _  View/change file name highlighting...
 /  Verbose directory list panel
```

__ 12. Display (list) the contents of the directory **bin** in the root file system.

- Find the directory **bin** on the root directory list and choose the option to list its contents.

Questions

Did you do it the same way as for the root (above)?

_____

» Possible answers:

- No, probably, if you have `/bin` displayed as the current path name in main panel. Because bin is a symlink, so if you just press enter it will display the attribute of the symlink, not the content of the bin directory.

```
_ Syml   777  2011-09-08 11:08  BPXROOT           12  bin
```

- To avoid this problem you should specify **/bin/** (and not /bin) then press Enter to display the bin directory contents.

```
Enter a pathname and do one of these:

     - Press Enter.
     - Select an action bar choice.
     - Specify an action code or command on the command line.

 Return to this panel to work with a different pathname.

    /bin/
```

- yes, possibly, if you have the root (/) displayed as the current path name in main panel. If so, then list root directory first, then select `bin` with a slash to the left. When selecting with slash, the default action is taken, which is list for a directory.

__ 13. Sort the directory list you just displayed. Sort items by size, and then sort by Change time. (For better viewing, make sure you enabled the fields display in the directory list by going back to primary menu, then options, then dir list, and enable the fields to display permission bits (octal display only), change time, owner, and size).

__ 14. Return to the /bin/ directory. Enter the command **`sort`** in the command line and select **Sort by size** (or tab to Commands, then 2. Sort).

Questions

Can you sort by criteria other than size?

_____

» Possible answers:

- Yes

- Sort can be done in two levels, on the following:
  - Default
  - File name mixed case
  - File name
  - File type
  - Permissions
  - Size
  - Owner
  - Change time

__ 15. You can also put the cursor on any of the column titles to sort on the desired criteria and press Enter. Try it for the **Changed-XXX**, **Size**, and **Filename** columns.

```
EUID=100050150   /V2R3/bin/
  Type  Perm  Changed-GMT-1     Owner      ------Size  Filename  Row 1 of 298
_ File   755  2017-09-07 13:58  BPXROOT       7995392  ssh
_ File   755  2017-09-07 13:58  BPXROOT       6602752  sftp
_ File   755  2017-09-07 13:58  BPXROOT       6504448  ssh-keyscan
_ File   755  2017-09-07 13:58  BPXROOT       6463488  scp
_ File   755  2017-09-07 13:58  BPXROOT       6324224  ssh-keygen
_ File   755  2017-09-07 13:58  BPXROOT       6094848  ssh-add
_ File   755  2017-09-07 13:58  BPXROOT       5910528  ssh-agent
_ File   755  2017-04-27 13:39  BPXROOT       2363392  pedb
_ File   755  2017-04-27 13:28  BPXROOT       2174976  as
_ File   755  2017-04-27 13:39  BPXROOT       1904640  tcsh
_ File   755  2017-04-27 13:28  BPXROOT       1769472  dbgld
_ File   755  2017-09-07 14:01  BPXROOT       1724416  sh
_ File   755  2017-09-07 14:01  BPXROOT       1097728  ex
_ File   755  2017-09-07 14:01  BPXROOT       1097728  vi
_ File   755  2017-04-27 13:39  BPXROOT        753664  dbe
_ File   755  2017-04-27 13:39  BPXROOT        729088  pax
_ File   755  2017-04-27 13:39  BPXROOT        716800  pdbx
```

Questions

The default sort sequence is file name mixed case. How can this default be changed?

_____

» Possible answer:

- PF10, then select options, then select **1** for directory list, then select **view/change sort** options.

__ 16. Sort back to the default of filename, by putting the cursor on the Filename column, and press Enter

```
Primary sort:
3   1.  Default
    2.  File name mixed case
    3.  File name
```

__ 17. Choose a file in `/bin/` directory to browse. (select a 'File', not a Syml, more on symbolic links later)

- Take note that the short form of Browse is B or b. If you remember this, you can use B directly when you want to browse a file instead of prompting the pop-up menu to choose actions from.

__ 18. Look at **`dev`** in the root file system. Press PF12 (cancel) to return to the previous directory (root /).

- Look at `/dev`.

Questions

Is it a file or a directory? Is it something else? _____

» Possible answers:

- No, it is something else.
- It is a symbolic link.

__ 19. Again, If you want to display the content of `/dev` as a directory and not the content of the symlink (it points to `$SYSNAME/dev`), you must append **/** (forward slash) after `/dev` and specify `/dev/`. Try it now. It should display some special files like `null`, `random` `zero`, `operlog`, and `console` and charater files (fd_, ttyp_, ptyp_).

__ 20. Now display the contents of your HOME directory /u/ezp05/tsa0###, where `tsa0###` is your TSO user ID

Troubleshooting

file names are case sensitive in any UNIX environment, including in z/OS USS.

__ 21. Create some new files called **`newfile`**, **`newfile2`**, and so forth, in the `/u/ezp05/tsa0###` directory.

- To create a new file, you will have to go back to the main ISHELL panel, input the file name on the path name (for example, `/u/ezp05/tsaxxxx/`**`newfile2`**) then press Enter (or select option File and 1 (New)).
- Use file type regular file and set the permission bits to 755.
- Select file source for regular file as `edit`.

Questions

Can you create an empty file this way? _____

» Possible answer:

- Yes, if you do not enter anything in the editor.

__ 22. There is an easier way to create a new file or directory using the ISHELL, by entering **`n`** in front of the `.special` directory (see example below).

```
EUID=1    /u/ezp05/tsa0001/
  Type   Filename
n Dir    .
_ Dir    ..
_ File   .profile
```

You are then prompted to create either a file (2) or directory (1).

__ 23. Display the contents of your `/u/ezp05/tsa0###` directory to see the new files there.

Do this the same way you listed the root directory.

»hint

```
EUID=100050150   /u/ezp05/tsa0150/
  Type  Filename                                              Row 1 of 6
_ Dir   .
_ Dir   ..
_ File  .profile
_ File  .sh_history
_ File  newfile
_ File  newfile2
```

Questions

Can you browse an empty file this way? _____

» Possible answer:

- No

__ 24. Edit one of the new files, and add a few lines of text.

- select line command ‘e’
- The editor is the ISPF editor.
- PF3 saves the file and returns from editing the file.

```
_ Dir    755  2021-04-30 11:47  TSA0165        8192  .
_ Dir    755  2021-04-28 11:46  BPXROOT        8192  ..
_ File   755  2021-04-20 10:31  TSA0165       10914  .profile
e File   755  2021-04-30 11:46  TSA0165           0  newfile
_ File   755  2021-04-30 11:47  TSA0165           0  newfile2
```

Questions

Can you use another editor in this ISHELL environment? _____

» Possible answer:

- No

Note

The following items create three new files. Each create uses a different set of panels. This demonstrates that there are frequently several ways to accomplish a task in the ISHELL.

__ 25. Create a new file called **/u/ezp05/tsa0###/test1** using any method you want. For example:

- __ a. Enter the absolute path name on the pathname line, **/u/ezp05/tsa0###/test1**.
- __ b. On the action bar select **File**.
- __ c. On the pull-down menu select **New**.
- __ d. Set permission bits to **755**.

__ 26. Create a new file called **/u/ezp05/tsa0###/test2**.

- __ a. Enter the absolute path name on the pathname line, **/u/ezp05/tsa0###/test2**.
- __ b. Press the Enter key.
- __ c. Set permission bits to **755** and select option to create a regular file.

__ 27. Create a new file called **/u/ezp05/tsa0###/test3**.

- __ a. Enter the absolute path name on the pathname line, **/u/ezp05/tsa0###/test3**.
- __ b. On the command line enter **n** (the action code for creating a new file).
- __ c. Set permission bits to **755** and select option to create a regular file.

__ 28. Try to find which file system all your UNIX files have been created.

- __ a. In your `/u/ezp05/tsa0###` directory, select any file and enter **U** (for Filesystem) or from your `/u/ezp05/tsa0###` directory path, tab to **File** and select opt15 (**U**).

Questions

What is the file system name? _____

Under which mount point was it mounted?_____

» Possible answers:

```
EUID=100050165   /u/ezp05/tsa0165/
  Type  Perm  Changed-EST5EDT   Owner      ------Size  Filename
_ Dir    755  2021-04-30 11:49  TSA0165         8192  .
_ Dir    755  2021-04-28 11:46  BPXROOT         8192  ..
_ File   755  2021-04-20 10:31  TSA0165        10914  .profile
_ File   755  2021-04-30 11:46  TSA0165            0  newfile
u File   755  2021-04-30 11:47  TSA0165            0  newfile2
_ File   755  2021-04-30 11:49  TSA0165            0  test1
_ File   755  2021-04-30 11:49  TSA0165            0  test2
```

- File system name is `D80WW.EZP05V1.ZFS .`
- Mount point is `/u/ezp05`

  »hint

```
File system name:
D80WW.EZP05V1.ZFS
Mount point:
/u/ezp05
                                                    More:     +

Status . . . . . . . . : Available
File system type . . . : ZFS
Mount mode . . . . . . : R/W
Device number  . . . . : 31
Type number  . . . . . : 1
DD name  . . . . . . . :
Block size . . . . . . : 1024
Total blocks . . . . . : 108000
Available blocks . . . : 101927
Blocks in use  . . . . : 6073
```

__ 29. Enable directory list reference.

__ a. Go back to Options on primary menu, select option 5 **Advanced**, and then select **/Enable** directory reference list.

__ b. Now go to **Tools** and select option 4. **Reference list(REF)**.

__ c. Display the contents of / (root dir) , then /bin/, then /u/ezp05/tsa01###

__ d. You can now use the **ref** command on any panel to display the reference list.

__ e. You have a direct shortcut to any of the previously used directories which you can select using **s** or **/** (forward slash).

```
Directory Reference List

     Directory
_    /V2R3/bin/
_    /u/ezp05/
_    /u/ezp05/tsa0165/
```

UDLIST

ISPF provides a direct interface to edit, view, and browse UNIX files and directories. This interface is called UDLIST. In the View (opt1) and Edit (opt2) panels of ISPF, you can now enter UNIX files and directory paths directly in the Other Partitioned, Sequential or VSAM Data Set, or z/OS UNIX file instead of specifying an MVS classical non-UNIX data set.

__ 30. On the command line enter 'start' to start a new ISPF panel, Go to ISPF primary option 2 (EDIT), and enter **/u/ezp05** as the path name.

```
dit Entry Panel
 Command ===>

 ISPF Library:
    Project . . . TSA0001
    Group . . . . OMVS     . . .          . . .          . . .
    Type  . . . . LABS
    Member  . . .                 (Blank or pattern for member selection list)

 Other Partitioned, Sequential or VSAM Data Set, or z/OS UNIX file:
    Name . . . . . /u/ezp05 +
    Volume Serial            (If not cataloged)

 Workstation File:
    File Name  . .
```

__ 31. Press PF8 to scroll down until you find your own directory **tsa0###**, then select your own directory by entering **L** in front of **tsa00*nn*** as the path name.

```
 Menu  Utilities  View  Options  Help
ssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssss
                          z/OS UNIX Directory List          Row 1 to 31 of 32
Command ===>                                                 Scroll ===> PAGE

Pathname . : /u/ezp05

Command  Filename        Message          Type Permission Audit  Ext  Fmat
--------------------------------------------------------------------------------
         .                                 Dir  rwxr-xr-x  fff---
         ..                                Dir  rwxr-xr-x  fff---
         billv                             Dir  rwxr-xr-x  fff---
         etc2                              Dir  rwxr-xr-x  fff---
         inga000                           Dir  rwxr-xr-x  fff---
         myscr1                            File rwxr-xr-x  fff--- --s- nl
         op051                             Dir  rwxrwxrwx  fff---
l        tsa0001          Listed           Dir  rwxr-xr-x  fff---
         tsa0002                           Dir  rwxr-xr-x  fff---
         tsa0003                           Dir  rwxr-xr-x  fff---
         tsa0004                           Dir  rwxr-xr-x  fff---
```

__ 32. Enter **n** in front of special directory .(dot) to create a new UNIX file and directory.

```
 Menu  Utilities  View  Options  Help
ssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssss
                          z/OS UNIX Directory List            Row 1 to 8 of 8
Command ===>                                                 Scroll ===> PAGE

Pathname . :
/u/ezp05/tsa0001

Command  Filename        Message          Type Permission Audit  Ext  Fmat
-------------------------------------------------------------------------------
n        .                                Dir  rwxr-xr-x  fff---
         ..                               Dir  rwxr-xr-x  fff---
```

__ 33. The new UNIX object will be a file, named **security.xml**, with permission bits 755 (rwx,rx,rx). (make sure you have overriden the end of the pathname '.' with security.xml, see below in bold)

```
Create New z/OS UNIX File
Command ===>

Pathname . . . . /u/ezp05/tsa0001/security.xml                              +

Permissions  . . 755  (Octal)

Link . . . . . .                                                          +

                                          Options
File Type  . . . 2  1. Directory             Set sticky bit
                    2. Regular file          Copy...
                    3. FIFO                  Edit...
                    4. Symbolic Link
```

__ 34. Once the file has been created, enter **CI** (copy in) in front of the file in order to copy the content of another file or data set into it.

```
ssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssss
                          z/OS UNIX Directory List            Row 1 to 5 of 5
Command ===>                                                 Scroll ===> PAGE

Pathname . : /u/ezp05/tsa0001


Command  Filename        Message          Type Permission Audit  Ext  Fmat
-------------------------------------------------------------------------------
         .                                Dir  rwxr-xr-x  fff---
         ..                               Dir  rwxr-xr-x  fff---
         .ishell-reflist                  File r--------  fff--- --s- nl
         .sh_history                      File rw-------  fff--- --s- ----
CI       security.xml                     File rwxr-xr-x  fff--- --s- ----
```

__ 35. Copy the content of data set **'D80WW.EZP05V1.SECURITY.XML'** (between quotes). Do not specify Binary copy.

```
Replace z/OS UNIX File
Command ===>

Into z/OS UNIX file:
  Name . . . : /u/ezp05/tsa0001/security.xml

From z/OS UNIX file, data set, or member:
  Name . . . . 'd80ww.ezp05v1.security.xml'                                 +
```

```
Options
     Binary copy
     Convert
```

__ 36. Try to read the content of the file using any variation of V(iew), B(rowse), or E(dit).

Questions

Can you read the content of the file? _____

» Possible answer:

- No, because it is an ASCII file the content is not readable.

```
BROWSE    /u/ezp05/tsa0150/security.xml          Line 0000000000 Col 001 080
 Command ===>                                                Scroll ===> PAGE
******************************** Top of Data ********************************
..Ì_%.ÎÁÊËÑ?>.......Á>Ä?ÀÑ>Å..íèã.......ËÁÄÍÊÑÈ`.ëÁÄÍÊÑÈ`.Ì_Ñ.ÎÁÊËÑ?>.......Ì_%>
ÏÁÂËøÇÁÊÁ./øøËÁÊÎÁÊ.ËÄÇÁ_/Ë.....ËÁÄÍÊÑÈ`.Ì_Ñ..Ì_Ñ.ÑÀ..ëÁÄÍÊÑÈ`¬...ÍËÁ<?Ä/%ëÁÄÍÊÑ
?ÊÄÁãÑ>ÁåÊ/Ñ>ÁÀ¢ä ëÁÄÍÊÑÈ`..Ã/%ËÁ../øøá>/Â%ÁÀ..ÈÊÍÁ..À`>/_ÑÄ/%%`íøÀ/ÈÁëë<ä?>ÃÑÅ.
ÈÑ?>..Ì_Ñ.ÑÀ..ëï ( ÍÈÇÁ>ÈÑÄ/ÈÑ?>¬...|ñà..+?.|ñà.Ã?Ê.ÈÇÑË._ÁÄÇ/>ÑË_../ÍÈÇä?>ÈÁÌÈñ
/>ÑË_Ë.Ì_Ñ.È`øÁ..ËÁÄÍÊÑÈ`.<è& ..Ì_Ñ.ÑÀ..<è& ¬...|ñà..?ÑÀ...................../ÍÈÇä?
è& ..ÈÑ_Á?ÍÈ........,Á`ëÁÈåÊ?Íø...Á`ëÁÈåÊ?Íø¬+?ÀÁ.¬Ì.¬.........ÈÊÍËÈ ËË?ÄÑ/ÈÑ?>.Ì
.........Ñ>ÈÁÊÄÁøÈ?ÊË.Ì_Ñ.ÑÀ..è ñ>ÈÁÊÄÁøÈ?Ê¬...Ñ>ÈÁÊÄÁøÈ?Êä%/ËË+/_Á..Ä?_.ÑÂ_.ÏË.
```

__ 37. Now try to edit the file with the **`E(dit)`** command. It should display garbage (ASCII data); in z/OS an enhancement has been introduced to help you edit native ASCII Files (used by components like Java, XML, WebSphere, CIM...); Under the ISPF edit (option 2 ISPF) you have to enter the SOURCE ASCII primary command for legacy datasets. Under the UDLIST (or option 3.17 ISPF), you have the equivalent function for UNIX files, provided by line command `EA` Edit an ASCII file, or `VA` View an ASCII file.

__ 38. Exit from edit mode of `security.xml`; try to enter **EA** in front of file `security.xml`.

»hint

```
Pathname . : /u/ezp05/tsa0165
EUID . . . : 100050165
Command  Filename        Message
--------------------------------
         .
         ..
         .profile
         newfile
         newfile2
ea       security.xml
         test1
         test2
```

Questions

Can you read the content of the file? _____

» Possible answer:

- Yes, EA stands for Edit ASCII.

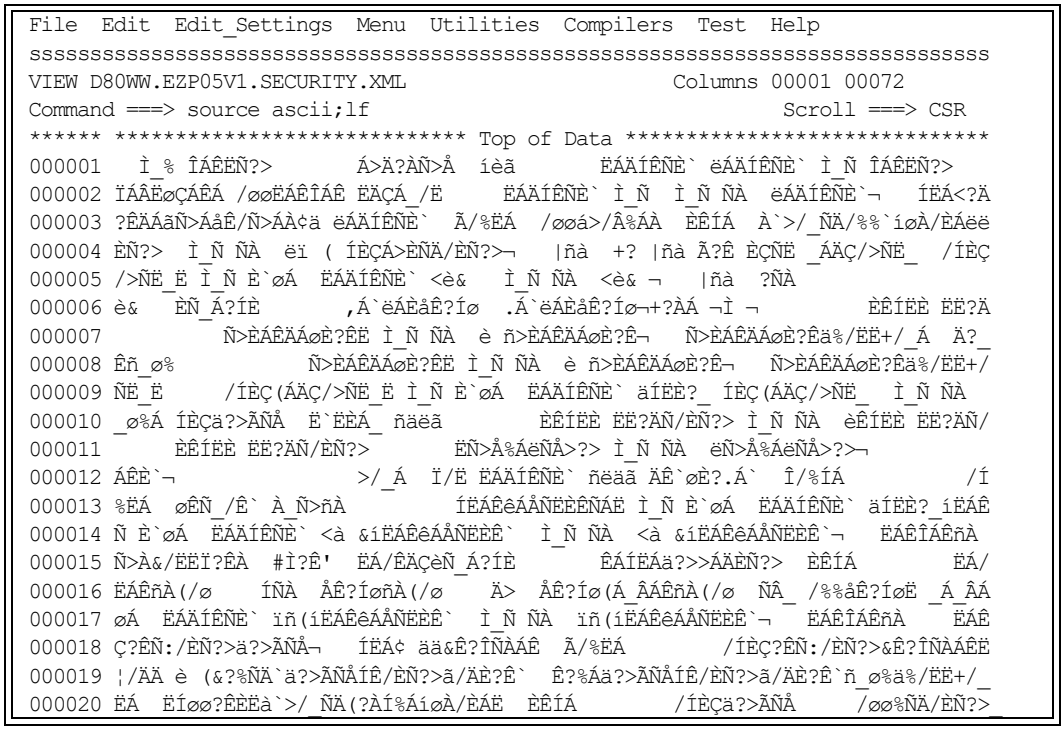
»hint

```
EDIT       /u/ezp05/tsa0150/security.xml                 Columns 00001 00072
Command ===>                                               Scroll ===> CSR
****** ***************************** Top of Data ******************************
000001 <?xml version="1.0" encoding="UTF-8"?>
000002 <security:Security xmi:version="2.0" xmlns:xmi="http://www.omg.org/XMI"
000003   <authMechanisms xmi:type="security:SWAMAuthentica tion" xmi:id="SWAMAu
000004   <authMech anisms xmi:type="security:LTPA" xmi:id="LTPA_1" OID="oid:1.3
000005     <trustAssociation xmi:id="TrustAssociation_1" enabled="false">
000006       <interceptors xmi:id="TAInterceptor_1" interceptorClassName="com.i
000007       <interceptors xmi:id="TAInterceptor_2" interceptorClassName="com.i
000008       <interceptors xmi:id="TAInterceptor_3" interceptorClassName="com.i
000009       <interceptors xmi:id="TAInterceptor_4" interceptorClassName="com.i
000010     </trustAssociation>
000011     <singleSignon xmi:id="SingleSignon_1" requiresSSL="false" domainName
000012   </authMechan isms>
000013   <authMechanisms xmi:type="security:CustomAuthMechanism" xmi:id="Custom
000014     <trustAssociation xmi:id="TrustAssociation_1196326524421" enabled="f
000015       <interceptors xmi:id="TAInterceptor_1196326524440" interceptorClas
000016      </trustAssociation>
...
```

__ 39. Switch to another ISPF panel (enter ‘start’), and try to view (ISPF option 1) dataset **‘D80WW.EZP05V1.SECURITY.XML’(between quotes)**;

```
Menu  RefList  RefMode  Utilities  Workstation  Help
View Entry Panel
Command ===>

ISPF Library:
   Project . . . TSA0150
   Group . . . . OMVS     . . .          . . .          . . .
   Type  . . . . LABS
   Member  . . .                 (Blank or pattern for member selection list)

Other Partitioned, Sequential or VSAM Data Set, or z/OS UNIX file:
   Name . . . . . 'D80WW.EZP05V1.SECURITY.XML'                                +
   Volume Serial . .           (If not cataloged)
```

in View mode, enter **RESET**, then **SOURCE ASCII** again, and then **LF**; LF stands for line feed; it will look for any end of line character in the ASCII File and substitute a linefeed for easier editing.



»hint

```
File  Edit  Edit_Settings  Menu  Utilities  Compilers  Test  Help
 VIEW D80WW.EZP05V1.SECURITY.XML                          Columns 00001 00072
 Command ===>                                               Scroll ===> CSR
 ****** ***************************** Top of Data ******************************
 000001 <?xml version="1.0" encoding="UTF-8"?>
 000002 <security:Security xmi:version="2.0" xmlns:xmi="http://www.omg.org/XMI"
 000003 y.xmi" xmi:id="Security_1" useLocalSecurityServer="true" useDomainQualif
 000004 nabled="true" dynamicallyUpdateSSLConfig="true" activeAuthMechanism="LTP
 000005   <authMechanisms xmi:type="security:SWAMAuthentication" xmi:id="SWAMAut
 000006 M" authValidationConfig="system.SWAM"/>
 000007   <authMechanisms xmi:type="security:LTPA" xmi:id="LTPA_1" OID="oid:1.3.
 000008 g="system.LTPA" timeout="120" keySetGroup="KeySetGroup_Node1_x9_1">
 000009     <trustAssociation xmi:id="TrustAssociation_1" enabled="false">
 000010       <interceptors xmi:id="TAInterceptor_1" interceptorClassName="com.i
 000011       <interceptors xmi:id="TAInterceptor_2" interceptorClassName="com.i
 000012       <interceptors xmi:id="TAInterceptor_3" interceptorClassName="com.i
 000013       <interceptors xmi:id="TAInterceptor_4" interceptorClassName="com.i
 000014     </trustAssociation>
 000015     <singleSignon xmi:id="SingleSignon_1" requiresSSL="false" domainName
 000016   </authMechanisms>
 000017   <authMechanisms xmi:type="security:CustomAuthMechanism" xmi:id="Custom
 000018 thConfig="system.ICSF">
 000019     <trustAssociation xmi:id="TrustAssociation_1196326524421" enabled="f
 000020       <interceptors xmi:id="TAInterceptor_1196326524440" interceptorClas
 000021     </trustAssociation>
 000022     <singleSignon xmi:id="SingleSignon_1196326524459" requiresSSL="false
 000023     <properties xmi:id="Property_1196326524476" name="was.security.ISCF.
```

__ 40. Enter **CAN**, to cancel the View session.

__ 41. The swapbar at the bottom will show a list of ISPF active panels (sessions)

```
F1=Help      F2=Split     F3=Exit      F4=Expand    F7=Backward  F8=Forward
F9=Swap      F10=Actions  F12=Cancel
 -DSLIST  BPXWP77  *ISRUUDL ISRBRO01
```

__ 42. Go back to your UDLIST session (not ISHELL !), using 3.17 or the same as Procedure , "UDLIST," on page 2-15, or put your cursor on *ISRUUDL in the swapbar and press Enter

__ 43. Then enter **n** in front of special directory . (dot) to create a new UNIX file or directory. The name of the new file will be **myscr1** with permission bits 755.

```
Create New z/OS U
Command ===>

Pathname . . . . /u/ezp05/tsa0165/myscr1

Permissions  . . 755  (Octal)

Link . . . . . .


File Type  . . . 2  1. Directory
                    2. Regular file
```

__ 44. Press Enter

__ 45. Use **CI** to copy in the content of file **/u/ezp05/source/myscr1**.

»hint

```
          ..
          .profile
ci        myscr1          Created
          newfile
          newfile2
------------------------------------------------------------------
Replace z/OS UNIX File
Command ===>

Into z/OS UNIX file:
  Name . . . : /u/ezp05/tsa0150/myscr1

From z/OS UNIX file, data set, or member:
  Name . . . . /u/ezp05/source/myscr1                              +

Options
     Binary copy
     Convert

Conversion Table
--------------------------------------------------------------------------------
```

It will show:

```
myscr1          Replaced
```

__ 46. Once the file is created, you can display its content with the `B(rowse)` or `V(iew)` line commands. Then press PF3 to return to the directory list.

```
VIEW       /u/ezp05/tsa0165/myscr1
Command ===>
****** ****************************
if test ! "$1"
  then
      echo "no positional parameters"
  elif test -d $1
then
echo "$1 is a directory"
ls $1
elif test -f $1 # else if file
  then
      echo "$1 is a file"
      cat $1
  else
      echo "$1 is just a string"
fi    #endif
```

__ 47. Now enter line command **x** to execute this shell script.

```
Pathname . : /u/ezp05/tsa0165
EUID . . . : 100050165
Command  Filename        Message
------------------------------
         .
         ..
         .profile
x        myscr1          Viewed
```

Important

Remember that "Case" sensitivity is very important in z/OS UNIX for commands and file names, like it is in any NIX system.

__ 48. Once prompted, specify **! /samples/** in the **Command for Files** field and **2** for the run method (login shell).

»hint

If you use /samples as the directory for "Command For File", it will only show the directory name...you will need /samples/ with a trailing '/' to show the contents of the directory.

/samples is a symbolic link, so in this case you have to use /samples/ to indicate the directory and not the symlink entry.

```
Execute Command for z/OS UNIX File
 Command ===>

 Pathname . . . . /u/ezp05/tsa0150/myscr1

 Enter the command below. Use the pathname substitution character !
 to indicate where to have the pathname substituted. If not specified, the
 pathname will be appended to the end of the command.

 Command for file: ! /samples/




 Run method . . . 2  1. Direct
                     2. Login shell
                     3. TSO

 z/OS UNIX command time limit . . .
```

__ 49. The shell script will execute the UNIX **ls** command against directory **/samples/**.

»hint

```
BROWSE    /tmp/TSA0165.18:18:02.27.stdout.ispfudl  Line
 Command ===>
****************************** Top of Data **********
Sysname :
CZ01

/samples/ is a directory
Devices
Dialcodes
Dialers
IBM
Makefile
Permissions
Ported_Tools_License.readme
Systems
ansi.ti
comics.lst
compile.c
complete.tcsh
copytree
csh.cshrc
csh.login
dc1.l
dc1.y
...
...
```

__ 50. Repeat the same, but this time specify **! /samples/inittab** in the **Command for file** field.

»hint

```
BROWSE    /tmp/TSA0150.12:16:38.84.stdout.ispfudl  Line 0000000000
 Command ===>                                                 Scrol
******************************** Top of Data **********************
Sysname :
CZ01

/samples/inittab is a file
# Initialization table, pathname = /etc/inittab
#
#    LICENSED MATERIALS - PROPERTY OF IBM
#    5694-A01 (C) COPYRIGHT IBM CORP. 2006
#
#    STATUS=HBB7730
#
# Initial setup for z/OS UNIX
#
# sample inittab file
etcrc::wait:/etc/rc
inetd::respfrk:/usr/sbin/inetd /etc/inetd.conf
msgend::once:/bin/echo Done processing /etc/inittab > /dev/console
:end of file
```

__ 51. Go back to your own directory display, and enter the **x** line command against special directory **.** (dot) to execute a UNIX command or script.

__ 52. Once prompted, enter the following: **cp /u/ezp05/source/myrexx** to copy rexx script file **myrexx** into your own directory.

»hint

```
Execute Command for z/OS UNIX File
Command ===>

Pathname . . . . /u/ezp05/tsa0150/.

Enter the command below. Use the pathname substitution character !
to indicate where to have the pathname substituted. If not specified, the
pathname will be appended to the end of the command.

Command for file: cp /u/ezp05/source/myrexx




Run method . . . 2  1. Direct
                    2. Login shell
                    3. TSO

z/OS UNIX command time limit . . .
```

__ 53. Enter **ref** on the UDLIST command line to ***refresh*** your directory list.

__ 54. Create a new file (**n**), and name it **rexxuss** with perm bits 755. Now edit it with **e**. Once in edit mode, enter **copy +/myrexx** to copy in the content of file **myrexx** from your current directory. Save and exit edit mode (PF3).

```
EDIT       /u/ezp05/tsa0165/rexxuss
Command ===> copy +/myrexx
****** ***************************** Top o
==MSG> -Warning- The UNDO command is not a
==MSG>           your edit profile using t
''''''
''''''
''''''
''''''
```

__ 55. Execute the shell script file **rexxuss** with line command **>** or **<**. The line command prefix characters **>** and **<** are used to identify a command to be run in z/OS UNIX. The **>** prefix character requests the command be run using the login shell. The < prefix character requests the command be run directly.

The same UDLIST interface is also available in ISPF option 3.17.

»hint

```
          ps                                File rw-r--r--  fff--- --s- ----
 <        rexxuss          Ended 0          File rwxr-xr-x  fff--- --s- ----
          security.xml                      File rwxr-xr-x  fff--- --s- ----

BROWSE    /tmp/INSTPHR.08:15:55.87.stdout.ispfudl  Line 0000000000 Col 001 080
 Command ===>                                              Scroll ===> PAGE
******************************** Top of Data ********************************
hello world
using address TSO under shell...
sysname :  CZ01
using address syscall...
gid: 0
using address sh...
id:
uid=0(BPXROOT) gid=12000000(INSTR012) groups=0(OMVSGRP),120050000(S12EZP05)
currently mounted filesystems..
Mounted on     Filesystem               Avail/Total    Files      Status
/u/ezp05       (D80WW.EZP05V1.ZFS)      199534/216000  4294966666 Available
/CZ01/var/wbem (OMVS2.SCFZHFS2)         212366/357120  4294963090 Available
/V2R3/usr/lpp/liberty_zos (OMVS.V2R3.SBBLZFS)       49838/2598080  4294954688 Av
/CZ01/var/zosmf (OMVS2.SIZUUSRD)         233062/375840  4294963442 Available
/u/es10/students (D80WW.ES10V15.ZFS)      38734/43200    4294966953 Available
```

__ 56. Start a new ISPF panel (‘start’), then go to ISPF 3.17. You can use the REFLIST panel option to retrieve and work with one of the last used UNIX directories or specify a starting directory name in the Pathname. Try it with your home directory **/u/ezp05/tsa0###**.

»hint

```
REFLIST is a "pull down" option at the top of the 3.17 screen and then you need
to select “1. Current Personal Data Set List (REFLIST)”
File  View  Options  Help
sssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssss
                            Personal Data Set List
Command ===>

Enter a list action to perform or select a data set entry to retrieve.
Action: S=Save A=Save As D=Delete this list E=Extended Edit L=DSLIST U=UDLIST

Action  Name      Description                    Created      Referenced
        REFLIST   Last 30 referenced data sets               21/04/26 13:48
                                                                 More:   -
.  /tmp/TSA0150.13:42:10.20.stdout.ispfudl
.  /tmp/TSA0150.13:41:33.45.stdout.ispfudl
.  /tmp/TSA0150.13:41:15.82.stdout.ispfudl
.  /tmp/TSA0150.13:41:15.82.stderr.ispfudl
.  /tmp/TSA0150.12:21:15.97.stdout.ispfudl
.  /u/ezp05/tsa0150/myscr1
.  /tmp/TSA0150.12:20:57.94.stdout.ispfudl
.  /u/ezp05/myscr1
.  /tmp/TSA0150.12:18:53.26.stdout.ispfudl
.  /tmp/TSA0150.12:18:20.71.stdout.ispfudl
.  /tmp/TSA0150.12:16:38.84.stdout.ispfudl
.  /tmp/TSA0150.12:15:57.29.stdout.ispfudl
.  'D80WW.EZP05V1.OMVS.LABS.SOLUTION'
s  /u/ezp05/tsa0150
.  'D80WW.EZP05V1.SECURITY.XML'
.  /u/ezp05/tsa0150/security.xml
.  /u/ezp05/tsa0150/test
.  /u/ezp05
```

»hint

```
Menu  RefList  RefMode  Utilities  Options  File_Systems  Help
 sssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssss
                       z/OS UNIX Directory List Utili     List entry retrieved
 Option ===>

    blank Display directory list             P Print directory list

    Pathname . . . /u/ezp05/tsa0150


 Enter "/" to select option
```

```
/  Confirm File Delete
/  Confirm Non-empty Directory Delete

When the directory list is displayed, enter either:
  "/" on the directory list line command field for the command prompt pop-up,
  an ISPF line command, the name of a TSO command, CLIST, or REXX exec, or
```

»hint

```
Menu  Utilities  View  Options  Help
sssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssss
                          z/OS UNIX Directory List          Row 1 to 13 of 13
Command ===>                                                 Scroll ===> PAGE

Pathname . : /u/ezp05/tsa0150
EUID . . . : 100050150
Command  Filename        Message          Type Permission Audit  Ext  Fmat
--------------------------------------------------------------------------------
         .                                Dir  rwxr-xr-x  fff---      ----
         ..                               Dir  rwxr-xr-x  fff---      ----
         .profile                         File rwxr-xr-x  fff--- --s- ----
         .sh_history                      File rw-------  fff--- --s- ----
         myrexx                           File rwxr-xr-x  fff--- --s- ----
         myscr1                           File rwxr-xr-x  fff--- --s- ----
         newfile                          File rwxr-xr-x  fff--- --s- ----
         newfile2                         File rwxr-xr-x  fff--- --s- ----
         rexxuss                          File rwxr-xr-x  fff--- --s- ----
         security.xml                     File rwxr-xr-x  fff--- --s- ----
         test                             File rwxr-xr-x  fff--- --s- ----
         test1                            File rwxr-xr-x  fff--- --s- ----
```

Note that in Options you can change the column arrangement as well as the width of columns.

»hint

```
z/OS UNIX Directory List Column Arrangemen Row 1 to 13 of 13
 Command ===>                                        Scroll ===> PAGE

 Enter "/" to select option
    Restore default column arrangements

 Order  Column          Width  Maximum
  01    Type             04        4
  02    Permission       10       10
  03    Audit            06        6
  04    Ext              04        4
  05    Fmat             04        4
  06    Owner            08        8
  07    Group            08        8
  08    Links            06       14
  09    Size             10       20
  10    Modified         19       19
  11    Changed          19       19
  12    Accessed         19       19
  13    Created          19       19
```

End of exercise

Exercise 3. Working with files in the ISHELL

(*with hints*)

Overview

This exercise provides an opportunity to practice working with the hierarchical file system using the ISHELL.

Objectives

At the end of this exercise, you should be able to:

- Copy members in a PDS to the file system
- Create a symbolic link and a hard link and explain the difference between them
- Change file permission bits
- Create a FIFO (a named pipe)
- Rename and delete a file

Introduction

The setup for this exercise is the same as for the previous. Use the same teams and user IDs.

Exercise instructions with hints

Preface

- All exercises in this chapter depend on the availability of your booked class environment.
- In the exercises, make sure you always change the directory / HLQ to your own ID, otherwise you will receive security (RACF) violation messages that indicate you do not have authority.
- A » sign indicates a hint.

Part 1: Managing files

__ 1. From the ISHELL or UDLIST environment, create two new files named `data1` and `data2` in your directory *(`/u/ezp05/tsa0###`)*.

__ a. Let the file `data1` contain a few lines. One line should include the word **test**, and another line should include the word **TEST**.

» hint

```
EDIT       /u/ezp05/tsa0150/data1
Command ===>
****** **************************** Top
000001 test
000002 TEST
```

__ b. Let the file data2 contain a few lines of any text you want.

__ c. hint: You can use line option ‘c’ to copy file data1 to fle data2

```
         .sh_history
c        data1           Edited
------------------------------------------------------------------------
Copy From z/OS UNIX File
Command ===>

From z/OS UNIX file:
  Name . . . : /u/ezp05/tsa0165/data1

To z/OS UNIX file, data set, or member:
  Name . . . . /u/ezp05/tsa0165/data2
  Permissions  755  (Octal)

Options
  /  Confirm copy to existing target
```

__ 2. Copy file **`u/tsa0###/data1`** to a new MVS data set named **`tsa0###.MYDATA1`**. You must enclose an MVS data set name in apostrophes (single quotes). For example: `'TSA0###.MYDATA1'`; Remember to replace the *###* with your id.

» If in ISHELL Look under **File** on the action bar, or use line command **'c'** (also with UDLIST)

```
Pathname . : /u/ezp05/tsa0150
EUID . . . : 100050150
Command  Filename        Message          Type Permission Audit
-------------------------------------------------------------
         .                                 Dir  rwxr-xr-x  fff---
         ..                                Dir  rwxr-xr-x  fff---
         .profile                          File rwxr-xr-x  fff---
         .sh_history                       File rw-------  fff---
c        data1                             File rwxr-xr-x  fff---
         data2                             File rwxr-xr-x  fff---
         myrexx                            File rwxr-xr-x  fff---
-------------------------------------------------------------------------------
-----------------------------From z/OS UNIX file:
  Name . . . : /u/ezp05/tsa0150/data1

To z/OS UNIX file, data set, or member:
  Name . . . . 'TSA0150.MYDATA1'                                    +
  Permissions  755  (Octal)

Options
  /  Confirm copy to existing target
     Update permissions for existing target file
     Binary copy
     Convert

Conversion Table
-------------------------------------------------------------------------------
IGD101I SMS ALLOCATED TO DDNAME (SYS00205)
        DSN (TSA0150.MYDATA1                              )
        STORCLAS (BASE) MGMTCLAS (STANDARD) DATACLAS (        )
        VOL SER NOS= SMS001
-------------------------------------------------------------------------------
data1           Copied           File rwxr-xr-x  fff--- --s- ----
```

Questions

Was the new MVS data set created at once without any prompt, or did you need to specify allocation parameters?

_____

» Possible answer:

- It was created directly without any prompts.

__ 3. Use PF9 or the swapbar to select an ISPF session named *DSLIST if there is one active, or enter ‘start’ to create a new ISPF PANEL (you can have up to 8 ISPF active session panels).

__ 4. Use option 3.4 to list your **tsa0###.*** data sets. Find your **MYDATA1** data set.

» hint

```
DSLIST - Data Sets Matching TSA0150
Command ===>

Command - Enter "/" to select action
------------------------------------------------
         TSA0150
         TSA0150.ISPF.PROFILE
         TSA0150.ISP02707.SPFLOG1.LIST
         TSA0150.ISP02707.SPFTEMP0.CNTL
         TSA0150.ISP02707.SPFTEMP1.CNTL
         TSA0150.ISP03011.SPFLOG1.LIST
         TSA0150.ISP03210.SPFLOG1.LIST
i        TSA0150.MYDATA1
         TSA0150.OMVS.LABS
         TSA0150.TSOLOG.DATA
         TSA0150.ZFS.TEST
         TSA0150.ZFS.TEST.DATA
```

__ a. By using the **I** command, you can see the following:

- Organization . . . : PS, Record format . . . : VB.

```
Data Set Name . . . . : TSA0150.MYDATA1

General Data                            Current Allocation
 Management class . . : STANDARD         Allocated cylinders : 1
 Storage class  . . . : BASE             Allocated extents . : 1
  Volume serial . . . : SMS001
  Device type . . . . : 3390
 Data class . . . . . : **None**
  Organization  . . . : PS              Current Utilization
  Record format . . . : VB               Used cylinders  . . : 1
  Record length . . . : 255              Used extents  . . . : 1
  Block size  . . . . : 32760
  1st extent cylinders: 1
  Secondary cylinders : 1               Dates
  Data set name type  :                  Creation date . . . : 2021/04/26
                                         Referenced date . . : 2021/04/26
                                         Expiration date . . : ***None***
  SMS Compressible  . : NO
```

Questions

Was the new MVS data set created with the name you expected?

_____

» Possible answers:

- Yes
- No, it was created with the name `tsa0###.tsa0###.MYDATA1`, so I should add quotes. Note: The format of a data set name follows TSO/E rules. Place single quotes (') around fully qualified data set names. Names without quotes are prefixed with your current TSO prefix, which is usually your user ID.

__ 5. Try to browse the content of this z/OS dataset by entering b in front of it.

```
DSLIST - Data Sets Matching TSA0165
Command ===>

Command - Enter "/" to select action
-----------------------------------------
         TSA0165
         TSA0165.ISPF.PROFILE
         TSA0165.ISP04034.SPFLOG1.LIST
b        TSA0165.MYDATA1
         TSA0165.OMVS.LABS
         TSA0165.TSOLOG.DATA

BROWSE    TSA0165.MYDATA1
 Command ===>
********************************
test
TEST
```

__ 6. Then exit by pressing PF3.

__ 7. From the TSO command prompt in TSO/ISPF (ISPF option 6), use **OGET** to copy file **/u/ezp05/tsa0###/data1** to a new MVS data set named **tsa0###.ODATA1**.

__ 8. you can request syntax help with command: TSO HELP OGET

```
Enter TSO or Workstation commands below:

 ===> oget '/u/ezp05/tsa0150/data1' 'TSA0150.ODATA1'
IGD101I SMS ALLOCATED TO DDNAME (SYS00208)
        DSN (TSA0150.ODATA1                              )
        STORCLAS (BASE) MGMTCLAS (STANDARD) DATACLAS (        )
        VOL SER NOS= SMS001
***
```

- Conversion can be specified. In this case, do not specify conversion.

Questions

Was the new MVS data set automatically created?

_____

» Possible answers:

- Yes, and the command was `OGET '/u/ezp05/tsa0###/data1' ODATA1`
- Yes. If a data set with this name already exists, it is replaced. If the sequential data set does not exist, it is automatically allocated.

__ 9. From the TSO command prompt in TSO/ISPF (ISPF option 6), use **OGET** to copy file **/u/tsa0###/data1** to a new member named **data1** in a new partitioned data set named **tsa0###.PDATA**.

- Conversion can be specified. In this case, do not specify conversion.

Questions

Was the new data set automatically created? Was the new member automatically created?

```
oget '/u/ezp05/tsa0150/data1' 'TSA0150.pdata(data1)'
IKJ56228I DATA SET TSA0150.PDATA NOT IN CATALOG OR CATALOG CAN NOT BE ACCESSED
 BPXF130E A PARTITIONED DATA SET MUST EXIST PRIOR TO COPYING. A NEW PARTITIONED
DATA SET IS NOT DYNAMICALLY ALLOCATED.
 ***
```

_____

» Possible answers:

- Data set: No. Member: Yes.
- If a member by this name already exists in the data set, it is replaced, and if the member does not exist, a new member is created; however, if a partitioned data set or PDSE does not exist, it is not allocated. You will get some error messages like:

```
IKJ56228I DATA SET TSA0001.PDATA NOT IN CATALOG OR CATALOG CAN NOT BE ACCESSED
 BPXF130E A PARTITIONED DATA SET MUST EXIST PRIOR TO COPYING. A NEW PARTITIONED
DATA SET IS NOT DYNAMICALLY ALLOCATED.
 ***
```

- In this case, you need to allocate the new PDS data set in TSO/ISPF 3.2 named ***xxxxxx*.PDATA** or use existing **PDS *xxxxx*.OMVS.LABS** in the **OGET** command.

```
sssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssss
                                Data Set Utility
Option ===> a

    A Allocate new data set                 C Catalog data set
    R Rename entire data set                U Uncatalog data set
    D Delete entire data set                S Short data set information
blank Data set information                  V VSAM Utilities

ISPF Library:
   Project  . . TSA0150          Enter "/" to select option
   Group  . . . OMVS             /  Confirm Data Set Delete
   Type . . . . LABS

Other Partitioned, Sequential or VSAM Data Set:
   Name  . . . . . . . 'tsa0150.pdata'
   Volume Serial . . .           (If not cataloged, required for option "C")

Data Set Password  . .           (If password protected)
--------------------------------------------------------------------------------
Allocate New Data Set
Command ===>
                                                                        More:
Data Set Name  . . . : TSA0150.PDATA

Management class . . . STANDARD       (Blank for default management class)
Storage class  . . . . BASE           (Blank for default storage class)
 Volume serial . . . . SMS001         (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  . . 1              (In above units)
 Secondary quantity    1              (In above units)
 Directory blocks  . . 5              (Zero for sequential data set) *
 Record format . . . . fb
 Record length . . . . 80
 Block size  . . . . . 3120
 Data set name type                   (LIBRARY, HFS, PDS, LARGE, BASIC, *
 Data set version  . :                 EXTREQ, EXTPREF or blank)
 Num of generations  :
 Extended Attributes                  (NO, OPT or blank)
 Expiration date . . .                (YY/MM/DD, YYYY/MM/DD
```

- The command was **OGET '/u/ezp05/tsa0###/data1' PDATA(DATA1)**

```
IGD103I SMS ALLOCATED TO DDNAME SYS00210
***
```

__ 10. From the TSO command prompt in TSO/ISPF, use **OGET** to copy file **u/tsa0###/data2** to a new member named **data2** to your now existing MVS partitioned data set named **tsa0###.PDATA**.

Questions

How was the OGET command used?

_____

» Possible answer:

- The command was OGET '/u/ezp05/tsa0###/data2' PDATA(DATA2)

```
IGD103I SMS ALLOCATED TO DDNAME SYS00211
***
```

__ 11. Enter **ISHELL**. In the swapbar it is identified by a session starting with letters BPX

```
*ISRTSO  -BPXWP32 ISRUUDL0 ISRBRO01 UDLIST
```

__ 12. From there, copy all members (in this case, two members) of the MVS PDS named **tsa0###.PDATA** into a new directory named ***u/tsa0###/mydir***.

- Possible options include binary copy, conversion of data set names to lowercase, code page conversion, and adding a suffix to the file names.
- Use the Directory pull-down choice Copy from PDS(I). Use defaults when copying.

__ 13. Was the new directory *mydir* automatically created? Were the new files automatically created?

_____

» Possible answers:

- Directory: No. Files: Yes.

Create the new directory **mydir**, then select it by putting a **/** in front of it, and use the Directory pull-down choice 7 Copy from PDS(I).

```
Copy a PDS into a Directory

Copying into directory:
/u/ezp05/tsa0150/mydir

Enter PDS name:
'tsa0150.pdata'_____________________________


Select additional options:
_  Binary copy
/  Member list...
/  Make names lowercase
_  Conversion...
_  Do not reset permissions for replaced files

Permissions  . . . . . 755  (3 digits, each 0-7)
Append suffix to names . . . . _____________________

------------------------------------------------------------------------------
Member List

 Select members to copy
    Member     Filename         Row 1 of 2
 /  DATA1      data1
 /  DATA2      data2

------------------------------------------------------------------------------
File  Directory  Special_file  Commands  Help

                                Directory List

Select one or more files with / or action codes.  If / i
action from the action bar otherwise your default action
with S to use your default action.  Cursor select can al
navigation.  See help for details.
EUID=100050150   /u/ezp05/tsa0150/mydir/
  Type  Filename
_ Dir   .
_ Dir   ..
_ File  data1
_ File  data2
```

Questions

Were the new files created with lowercase names? _____

» Possible answer:

- Yes

__ 14. Delete the newly created file **u/tsa0###/mydir/data2**.

__ a. When the panel to confirm the deletion is displayed, press the Enter key to confirm that you want to delete the file, and the file will be deleted.

Questions

Is this confirmation always needed in such situations?

_____

» Possible answer:

- No, you can select the additional option, Bypass delete confirmations.

__ 15. On the path name, write file **u/tsa0###/mydir/data1** then select **File** > **opt 12. Find strings(F)...** to find the string test in the file and call the output file **/u/ezp05/tsa0###/findstr1**.

- A panel is displayed where you can specify a path name for the output file.

```
Enter the Pathname

Enter the pathname for the search output:

/u/ezp05/tsa0150/findstr1_________________________
```

- Another panel is displayed where you can enter the text strings to be searched for.

```
Enter Search Strings

Search string 1  . . . test_____________________
Search string 2  . . . _________________________
Search string 3  . . . _________________________
Search string 4  . . . _________________________
```

Questions

Did **find** detect both the text **test** and the text **TEST**? _____

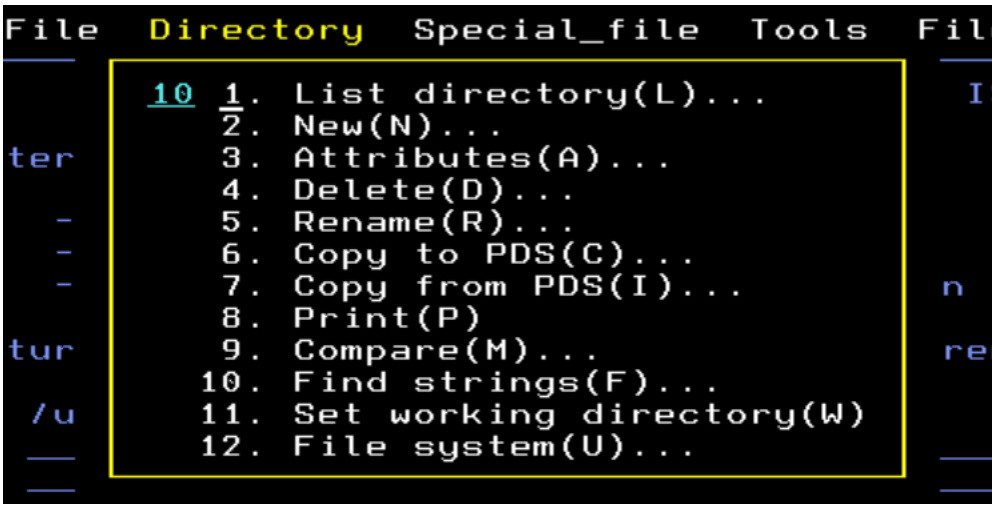
» Possible answer:

- Yes

```
BROWSE    /u/ezp05/tsa0150/findstr1
 Command ===>
******************************** Top of Data ***
Searching /u/ezp05/tsa0150/mydir/data1 for:
test

1:test
2:TEST
```

__ 16. Find the string **test** in the directory **/u/ezp05/tsa0###** and call the output file **findstr2** in the same directory.

- The action for this is similar to the previous task, except that this is for a directory.




```
Enter the Pathname

Enter the pathname for the search output:

/u/ezp05/tsa0150/findstr2_________________
```

Questions

What is the difference between the output from searching for a string in a file and searching in a directory?

_____

» Possible answer:

- The files in the directory containing the string are shown by name.

```
BROWSE    /u/ezp05/tsa0165/findstr2
 Command ===>
****************************** Top of Da
/u/ezp05/tsa0165/
/u/ezp05/tsa0165/newfile
/u/ezp05/tsa0165/.profile
/u/ezp05/tsa0165/newfile2
/u/ezp05/tsa0165/test1
/u/ezp05/tsa0165/test2
/u/ezp05/tsa0165/security.xml
/u/ezp05/tsa0165/myscr1
1:if test ! "$1"
4:  elif test -d $1
8:elif test -f $1 # else if file
/u/ezp05/tsa0165/.sh_history
/u/ezp05/tsa0165/myscr4
1:# test if directory
2:if test -d $1
/u/ezp05/tsa0165/myrexx
/u/ezp05/tsa0165/rexxuss
/u/ezp05/tsa0165/data1
1:test
2:TEST
/u/ezp05/tsa0165/data2
1:test
2:TEST
...
...
```

__ 17. Set your working directory to **/u/ezp05/tsa0###**.

- Look under the action **Directory** on the action bar.

Questions

Which function did you use from the pull-down choice?

_____

» Possible answer:

- Set working directory (W).

__ 18. Browse the contents of **/u/ezp05/tsa0###/data1** using a relative path name on the ISHELL main panel.

- The working directory can be referred to by a dot (.).

Questions

How is the relative path name specified?

_____

» Possible answer:

- By a dot (.). For example, **./data1** (entered on the path name).

```
------------------------------------------------------------------------
UNIX System Services ISPF Shell

Enter a pathname and do one of these:

    - Press Enter.
    - Select an action bar choice.
    - Specify an action code or command on the command line.

Return to this panel to work with a different pathname.
                                                                   More:
   ./
   ___________________________________________________________________
   ___________________________________________________________________
   ___________________________________________________________________
```

__ 19. List the content of your working directory by using shell command **ls -l** on the command line.

__ a. Type: **sh ls -l .** (with the trailing dot (.)) on the command line ====>


```
BROWSE    /tmp/TSA0150.14:50:25.724716.ishell      Line 0000000000
 Command ===>                                                Scrol
******************************** Top of Data **********************
Sysname :
CZ01

total 184
-rwxr-xr-x   1 TSA0150  S12EZP05      10 Apr 26 10:08 data1
-rwxr-xr-x   1 TSA0150  S12EZP05      20 Apr 26 10:08 data2
-rw-------   1 TSA0150  S12EZP05     218 Apr 26 10:37 findstr1
-rw-------   1 TSA0150  S12EZP05    1531 Apr 26 10:45 findstr2
-rw-------   1 TSA0150  S12EZP05    4165 Apr 26 10:46 findstr3
drwxr-xr-x   2 TSA0150  S12EZP05    8192 Apr 26 10:35 mydir
-rwxr-xr-x   1 TSA0150  S12EZP05     490 Apr 26 09:41 myrexx
-rwxr-xr-x   1 TSA0150  S12EZP05     271 Apr 26 08:21 myscr1
-rwxr-xr-x   1 TSA0150  S12EZP05       6 Apr 26 07:46 newfile
-rwxr-xr-x   1 TSA0150  S12EZP05       5 Apr 26 07:46 newfile2
-rwxr-xr-x   1 TSA0150  S12EZP05     490 Apr 26 09:46 rexxuss
-rwxr-xr-x   1 TSA0150  S12EZP05   26914 Apr 26 07:59 security.xml
-rwxr-xr-x   1 TSA0150  S12EZP05       0 Apr 26 07:47 test
-rwxr-xr-x   1 TSA0150  S12EZP05       0 Apr 26 07:47 test1
-rwxr-xr-x   1 TSA0150  S12EZP05       0 Apr 26 07:47 test2
```

__ 20. Display attributes for the directory **/u/ezp05/tsa0###/mydir** by using shell command **ls -al** on the command line.

Questions

What are the permissions?

_____

» Possible answers:

- 755
- rwx r-x r-x

- Owner: Read and write and search. Group: read and search. Other: read and search.

```
Command ===> sh ls -al ./mydir
BROWSE    /tmp/TSA0150.14:53:11.224633.ishell      Line 0000
 Command ===>
******************************** Top of Data ***************
Sysname :
CZ01

total 48
drwxr-xr-x   2 TSA0150  S12EZP05    8192 Apr 26 10:35 .
drwxr-xr-x   3 TSA0150  S12EZP05    8192 Apr 26 10:52 ..
-rwxr-xr-x   1 TSA0150  S12EZP05     162 Apr 26 10:32 data1
```

__ 21. Change attributes for the directory `/u/ezp05/tsa0###/mydir` using the `ishell panel options`. Use the following permissions:

Owner: Read and write

Group: Read and search

Other: Read

__ a. Check the permission bits and set them to new values. Use the Help key.

Questions

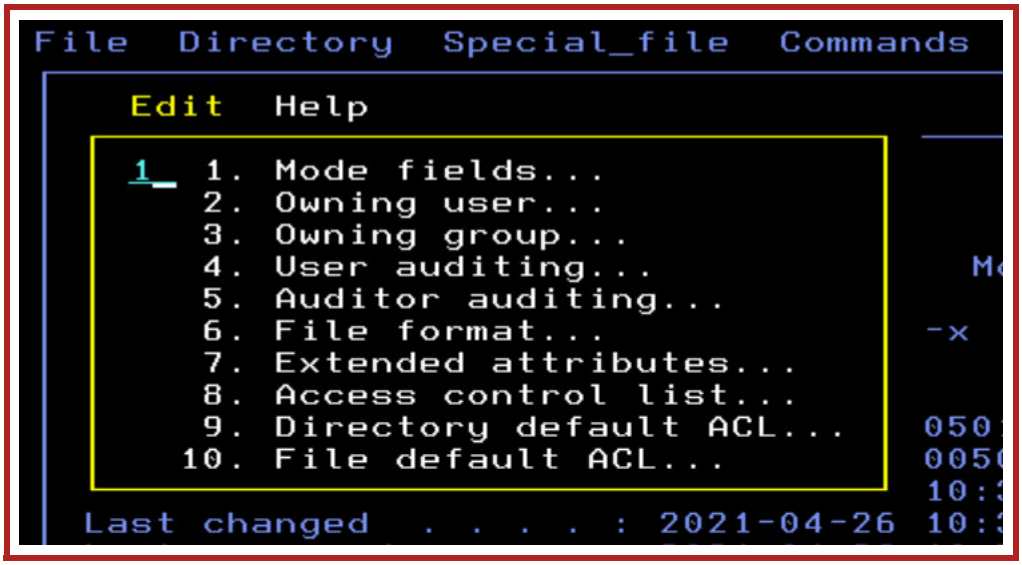
What are the permissions now (in octal)?

_____

» Possible answer:

- 654

```
EUID=100050150   /u/ezp05/tsa0150/
  Type  Filename
_ Dir   .
_ Dir   ..
_ File  .ishell-reflist-TSA0150
_ File  .profile
_ File  .sh_history
_ File  data1
_ File  data2
_ File  findstr1
_ File  findstr2
_ File  findstr3
a Dir   mydir
_ File  myrexx
```



Change the Mode

```
 Change any values and press
 Enter.

 Permissions  . . . . 654
 Set UID bit  . . . . 0
 Set GID bit  . . . . 0
 Sticky bit . . . . . 0
```

__ 22. Go back to **Options > directory list**. Disable octal permissions, enable rwx permissions, and redisplay directory **/u/ezp05/tsa***0xxx*.

```
Options  Setup  Help
sssssssssssssssssssssss
 1  1. Directory list...
    2. Default actions...
    3. Edit or browse...
    4. Mount table...
    5. Advanced...


Directory List Options

Select options and fields to be displayed with /

/  File type    ( 4 columns)
   Permissions: octal  ( 4 columns)
/  Permissions: rwx (10 columns)
/  Change time (16 columns)
/  Owner        ( 9 columns)
/  File size    (10 columns)

_  View/change sort options...
_  View/change file name highlighting...
/  Verbose directory list panel

EUID=100050150   /u/ezp05/tsa0150/
  Type  Permission  Filename
_ Dir    rwxr-xr-x  .
_ Dir    rwxr-xr-x  ..
_ File   r--------  .ishell-reflist-TSA0150
_ File   rwxr-xr-x  .profile
_ File   rw-------  .sh_history
_ File   rwxr-xr-x  data1
_ File   rwxr-xr-x  data2
_ File   rw-------  findstr1
_ File   rw-------  findstr2
_ File   rw-------  findstr3
_ Dir    rw-r-xr--  mydir
_ File   rwxr-xr-x  myrexx
_ File   rwxr-xr-x  myscr1
```

__ 23. Try to create a new file called **labfile** in the **/u/ezp05/tsa0###/mydir** directory.

- Creating a new file is a process that was done in a previous step.

Questions

Explain what happens and why.

_____

» Possible answers:

- Permission is denied. Permission to directory was 654, so you only have rw- access.
- If you want to put a new file in a directory you need both search and write access to the directory. The system needs to search the directory to determine whether the entry is already there.

```
Errno=6Fx Permission is denied; Reason=EF076015.  Press Enter to
continue.
```

__ 24. Tou may have received a Permission denied failure, with reason code EF076015. Any Unix System Services error code can be queried using bpxmtext (as a TSO command or shell command).

__ 25. Switch to another ISPF session, goto TSO op6, and enter:

```
BPXMTEXT EF076015
zFS Thu Nov 30 13:49:56 EST 2017
Description: SAF CKACC returned error.

Action: The user did not have the correct permission on the object for the
operation requested. Change the permissions on the object or have a user that
is authorized execute the operation.
***
```

__ 26. Switch back to ISHELL, and change attributes for the directory `/u/ezp05/tsa0###`**`/mydir`**. Set the permission bits to 300.

CAUTION

Be careful to only set "300" on the /mydir/ and NOT the entire user directory (/u/ezp05/tsa0###)

Questions

What does it mean?

_____

» Possible answers:

- Owner: Write and search. Group: None. Other: None.

__ 27. On the main panel, enter in the pathname **/u/ezp05/tsa0###/mydir/labfile** to create a new file called **labfile** in the **/u/ezp05/tsa0###/mydir** directory.

__ a. Use file type regular file, and accept the default permission bits of 755.

__ b. Select file source for regular file as edit (option 1) , and input some text (anything).

Questions

Can you create the file successfully this way?

_____

» Possible answer:

- Yes. You have write and search access to the directory.

```
Create a New File

 Pathname:
                                                          More:     +
   /u/ezp05/tsa0150/mydir/labfile
   ____________________________________________________________________
   ____________________________________________________________________
   ____________________________________________________________________

 Permissions  . . 755  (3 digits, each 0-7)

 File type                          File source for regular file
 2_  1.  Directory                  _1_  1.  Edit...
     2.  Regular file                    2.  Copy file...
     3.  FIFO                            3.  Copy data set...
     4.  Symbolic link...
     5.  Hard link...               View and set attributes  . . . N


EDIT       /u/ezp05/tsa0150/mydir/labfile
Command ===>
****** **************************** Top of Da
000001 test lab
```

__ 28. Display (browse) the contents of **/u/ezp05/tsa0###/mydir/labfile**.

Questions

Can you browse the file successfully?

_____

» Possible answer:

- Yes, if you refer directly to the file in the directory. Permission to the directory is 300 (-wx --- ---), and read access to directory is not needed for accessing files in the directory.

__ 29. Display (list) the contents of **/u/ezp05/tsa0###/mydir**.

Questions

Can you do a list of the directory successfully?

_____

» Possible answer:

- No, because the permission to the directory is 300 (-wx --- ---), and read access to directory is needed for listing the contents in the directory.

```
Errno=6Fx Permission is denied; Reason=EF076015.  Press Enter to
continue.
```

__ 30. Change attributes for the directory **/u/ezp05/tsa0###/mydir**. Set the permission bits to **100**.

Questions

What does it mean?

_____

» Possible answers:

- Owner: Search. Group: None. Other: None.

```
Change the Mode

 Change any values and press
 Enter.

 Permissions  . . . . 100
 Set UID bit  . . . . 0
 Set GID bit  . . . . 0
 Sticky bit . . . . . 0
```

__ 31. Display (browse) the contents of **/u/ezp05/tsa0###/mydir/labfile**.

Questions

Can you browse the file successfully?

_____

» Possible answers:

- Yes, if you refer to the file directly. No otherwise.

```
Enter a pathname and do one of these:

    - Press Enter.
    - Select an action bar choice.
    - Specify an action code or command on th

Return to this panel to work with a different

   /u/ezp05/tsa0150/mydir/labfile
   ____________________________________________

BROWSE    /u/ezp05/tsa0150/mydir/labfile
 Command ===>
******************************** Top of Dat
test lab
```

- The permission to the directory is 100 (--x --- ---) which means you have permission to access the files in the directory. (x= traverse the directory)

__ 32. Change the contents of **/u/ezp05/tsa0###/mydir/labfile** with **edit**. Add some text, and save the file.

Questions

Can you change the contents of the file successfully?

_____

» Possible answers:

- Yes, if you refer to the file directly.

- The permission to the directory is 100 (--x --- ---) which means you have permission to get access to files in the directory, according to the permission bits of the files.

```
5  1. New(N)...
   2. Attributes(A)...
   3. Delete(D)...
   4. Rename(R)...
   5. Edit(E)...
   6. Browse text(B)...
```

```
EDIT       /u/ezp05/tsa0150/mydir/labfile
Command ===>
****** ***************************** Top of Da
000001 test lab
000002 test lab
```

__ 33. Delete the file **/u/ezp05/tsa0###/mydir/labfile**.

Questions

Can you delete the file successfully?

_____

» Possible answer:

- No. You do not have write access to the directory.

```
Errno=6Fx Permission is denied; Reason=EF086015.  Press Enter to
continue.
```

__ 34. in ISPF opt 6 TSO, enter BPXMTEXT EF086015 to understand the permission falure

```
zFS Thu Nov 30 13:49:56 EST 2017
Description: SAF CKACC returned error.

Action: The user did not have the correct permission on the object for the
operation requested. Change the permissions on the object or have a user that
is authorized execute the operation.
```

__ 35. Change attributes for the directory **/u/ezp05/tsa0###/mydir**. Set the permission bits to **500**.

```
sh chmod 500 /u/ezp05/tsa0150/mydir/

or
Directory  Special_file  Too
sssssssssssssssssssssssssss
 3  1. List directory(L)...
    2. New(N)...
    3. Attributes(A)...
    4. Delete(D)...
    5. Rename(R)...
    6. Copy to PDS(C)...
Edit  Help
ssssssssssssssssssssssssssssssssssssssssssss
            Display File Attributes

Pathname : /u/ezp05/tsa0150/mydir/
                                      More:
File type . . . . . : Directory
Permissions . . . . . : 400 r--------
Access control list . : 0
File size . . . . . : 8192
File owner  . . . . . : TSA0150(100050150)
Group owner . . . . . : S12EZP05(120050000)


Edit  Help
sssssssssssssssssssssss
 1  1. Mode fields...
    2. Owning user...
    3. Owning group...
Change the Mode

Change any values and press
Enter.

Permissions  . . . . 500
Set UID bit  . . . . 0
Set GID bit  . . . . 0
Sticky bit . . . . . 0
```

Questions

What does it mean?

_____

» Possible answers:

- Owner: Read Execute. Group: None. Other: None.

__ 36. Display (list) the contents of **/u/ezp05/tsa0###/mydir** .

Questions

Can you list the directory successfully?

_____

» Possible answer:

- Yes, when permission to the directory is 500 (r-x --- ---), with ls

```
Command ===> sh ls /u/ezp05/tsa0150/mydir/

BROWSE    /tmp/TSA0150.16:02:21.022538.ishell
 Command ===>
******************************** Top of Data ******
Sysname :
CZ01

data1
labfile
```

- note: ishell or udlist requires ‘X’ search capability. ‘ls’ just requires read access to the directory

__ 37. Display (browse) the contents of **/u/ezp05/tsa0###/mydir/labfile**.

Questions

Can you browse the file successfully?

_____

» Possible answer:
- yes, when permission to the directory is 500 (r-x --- ---), you can. Search permission to directory is required to do so.

__ 38. Delete the directory **/u/ezp05/tsa0###/mydir**.

__ a. Two files in the directory exist. Confirm deletion of these two files (if prompted).

Questions

Can you delete the directory successfully?

_____

» Possible answer:
- No. You do not have write access to the directory, so you cannot delete the files in the directory. When you do not have write access to the directory, a directory must be empty for deletion of the directory to be successful.

```
Errno=88x The directory is not empty; Reason=EF086033.  Press
Enter to continue.
```

__ 39. Create a new directory called `/u/ezp05/tsa0###/mydir2`. Set permissions to 400. Then delete the directory it.

- With 400, you have read only access to the directory. No files in the directory exist.

Questions

Can you delete the directory successfully?

_____

» Possible answer:
- Yes, you can.

```
sh rmdir /u/ezp05/tsa0150/mydir2
```

__ 40. Create a new directory **/u/ezp05/tsa0###/mydir3**. Set permissions to 000. Then delete the directory.

- With 000, you have no access to the directory. No files in the directory exist.

Questions

Can you delete the directory successfully?

_____

» Possible answer:

- Yes, you can. Your authorization to do so is related to the permissions you have in the **/u/ezp05/tsa0###** directory, which is 755.

```
sh rmdir /u/ezp05/tsa0150/mydir3
```

Part 2: Create special files

__ 41. Set permissions for directory **/u/ezp05/tsa0###/mydir** back to the default value, 755 (via sh command or panels).

```
sh chmod 755 /u/ezp05/tsa0150/mydir
```

- /u/ezp05/tsa0###/mydir contains two files, data1 and labfile.

Questions

What is the link count of the file data1? (Hint: Display attributes)

_____

» Possible answers:

```
sh ls -al /u/ezp05/tsa0150/mydir/data1
BROWSE    /tmp/TSA0150.06:54:45.244960.ishell      Line 0000000000 Col 001 080
 Command ===>                                                  Scroll ===> PAGE
******************************** Top of Data ********************************
Sysname :
CZ01

-rwxr-xr-x   1 TSA0150  S12EZP05     162 Apr 26 10:32 /u/ezp05/tsa0150/mydir/da
```

- Link count for /u/ezp05/tsa0###/mydir/data1 is 1.
- The link count of an object is the number of directory entries within the file system that point to the object.

__ 42. Create a symbolic link for /u/ezp05/tsa0###/mydir/data1 in your home directory (in /u/ezp05/tsa0###), and name this symbolic link sldata1.

- A symbolic link is a special file. A symbolic link is a file that contains the path name for another file (in essence, a reference to the original file). Only the original path name is the real name of the original file. You can create a symbolic link to a file or a directory.

  __ a. Enter `/u/ezp05/tsaxxxx/sldata1` on the path name, then press Enter. When prompted, select opt4 symbolic link, then 1 for the type of symbolic link. For pathname, specify the path name for the reference of the symbolic link, `/u/ezp05/tsa0###/mydir/data1`.

```
or with a shell command:
> tools> 2. Run shell command(SH)...
ln -sf /u/ezp05/tsa0###/mydir/data1 /u/ezp05/tsaxxxx/sldata1
------------------------------------------------------------------
> use Tools > 2 Run shell command
Tools  File_systems  Options  Set
Esssssssssssssssssssssssssssssss
e 2  1. Work with processes(PS)...
e    2. Run shell command(SH)...
e    3. Run program(EX)...
e    4. Reference list(REF)...

Enter a Shell Command
 ------------------------------------------------------------------
 Enter a shell command and press Enter.

 Standard output and standard error are redirected to a temporary
 file.  If there is any data in the file when the shell command
 completes, the file is displayed.
    ln -sf /u/ezp05/tsa0150/mydir/data1 /u/ezp05/tsa0150/sldata1
------------------------------------------------------------------------------
Directory List

Select one or more files with / or action codes.  If / is used also select an
action from the action bar otherwise your default action will be used.  Select
with S to use your default action.  Cursor select can also be used for quick
navigation.  See help for details.
EUID=100050150   /u/ezp05/tsa0150/
  Type  Filename                                          Row 1 of 21
_ Dir   .
_ Dir   ..
_ File  .ishell-reflist-TSA0150
_ File  .profile
_ File  .sh_history
_ File  data1
_ File  data2
_ File  findstr1
_ File  findstr2
_ File  findstr3
_ Dir   mydir
```

```
_ File  myrexx
_ File  myscr1
_ File  newfile
_ File  newfile2
_ File  rexxuss
_ File  security.xml
_ Syml  sldata1


------------------------------------------------------------------------
_ File   rwxr-xr-x  2021-04-30 11:58  TSA0165         26914  security.xml
 a Syml   rwxrwxrwx  2021-05-03 09:58  TSA0165            29  sldata
 _ File   rwxr-xr-x  2021-04-30 11:49  TSA0165             0  test1
------------------------------------------------------------------------
Symbolic Link Attributes

Pathname : /u/ezp05/tsa0165/sldata
External link  . . : 0
File size  . . . . : 29
File owner . . . . : TSA0165(100050165)
Group owner  . . . : S12EZP05(120050000)
Last modified  . . : 2021-05-03 09:58:28
Last changed . . . : 2021-05-03 09:58:28
Last accessed  . . : 2021-05-03 09:58:28
Created  . . . . . : 2021-05-03 09:58:28
Link count . . . . : 1
Device number  . . : 1F
Inode number . . . : 29C
Seclabel . . . . . :
Symbolic link contents:

   /u/ezp05/tsa0165/mydir/data1
```

Questions

What is now the link count of the file `/u/ezp05/tsa0###/mydir/data1`?

» Possible answer:

- Link count for `/u/ezp05/tsa0###/mydir/data1` is still 1.

__ 43. Browse **/u/ezp05/tsa0###/sldata1**.

- Browse the contents of the link as you would browse a regular file.

Questions

What is seen when you browse the symbolic link?

_____

» Possible answer:

- The contents of /u/ezp05/tsa0###/mydir/data1

```
BROWSE     /u/ezp05/tsa0150/sldata1
 Command ===>
******************************** Top o
test
TEST
------------------------------------------------------------------------
sh ls -al /u/ezp05/tsa0150/sldata1
BROWSE    /tmp/TSA0150.07:43:07.853212.ishell      Line 0000000000 Col 001 080
 Command ===>                                          Scroll ===> PAGE
******************************** Top of Data ********************************
Sysname :
CZ01

lrwxrwxrwx   1 TSA0150  S12EZP05      28 Apr 27 03:19 /u/ezp05/tsa0165/sldata1 ->
/u/ezp05/tsa0165/mydir/data1
```

__ 44. Create a hard link for **/u/ezp05/tsa0###/mydir/data1** in your home directory (/u/ezp05/tsa0###), and name this hard link hldata1.

- A hard link is also a type of a special file.
- Sometimes, a hard link is referred to as just a link. It is similar to an alias.

  ex: ln /tmp/linktest.file /tmp/hardlink

- You might want to create a link if a file is moved, and you want users to be able to access the file under the old name or as an alias. You can create a link with a short path name for a file that has a long path name.

- Enter **/u/ezp05/tsaxxxx/hldata1** on the path name, then press Enter. When prompted, select **opt5** hard link. For path name, specify the path name for the reference of the hard link, /u/ezp05/tsa0###/mydir/data1.

```
or use
sh ln /u/ezp05/tsa0150/mydir/data1 /u/ezp05/tsa0150/hldata1
sh ls -al /u/ezp05/tsa0###/mydir/data1
sh ls -al /u/ezp05/tsa0###/hldata1
------------------------------------------------------------------------------
Select one or more files with / or action codes.  If / is used also select an
action from the action bar otherwise your default action will be used.  Select
with S to use your default action.  Cursor select can also be used for quick
navigation.  See help for details.
EUID=100050150   /u/ezp05/tsa0150/
  Type  Filename                                              Row 6 of 22
_ File  data1
_ File  data2
_ File  findstr1
_ File  findstr2
_ File  findstr3
_ File  hldata1
_ Dir   mydir
_ File  myrexx
_ File  myscr1
_ File  newfile
_ File  newfile2
_ File  rexxuss
_ File  security.xml
_ Syml  sldata1
_ File  test
_ File  test1
_ File  test2
```

Questions

What is the link count of the file /u/ezp05/tsa0###/mydir/data1? What is the link count for /u/ezp05/tsa0###/hldata1?

_____

» Possible answers:

- Link count for /u/ezp05/tsa0###/mydir/data1 is now 2.

- Link count for /u/ezp05/tsa0###/hldata1 is also 2 (of course, it is the same information).

```
sh ls -al /u/ezp05/tsa0150/hldata1
BROWSE    /tmp/TSA0150.07:51:15.843210.ishell      Line 0000000000 Col 001 08
 Command ===>                                                Scroll ===> PAG
******************************** Top of Data ********************************
Sysname :
CZ01

-rwxr-xr-x   2 TSA0150  S12EZP05     162 Apr 26 10:32 /u/ezp05/tsa0150/hldata1
------------------------------------------------------------------------------
sh ls -al /u/ezp05/tsa0150/mydir/data1

BROWSE    /tmp/TSA0150.07:52:20.294430.ishell      Line 0000000000 Col 001 080
 Command ===>                                                Scroll ===> PAGE
******************************** Top of Data *********************************
Sysname :
CZ01

-rwxr-xr-x   2 TSA0150  S12EZP05     162 Apr 26 10:32 /u/ezp05/tsa0150/mydir/dat
```

__ 45. Browse **/u/ezp05/tsa0###/hldata1**.

- Browse the contents of the link as you would browse a regular file.

Questions

What is seen when you browse the hard link?

_____

» Possible answer:

- The contents of /u/ezp05/tsa0###/mydir/data1.

```
BROWSE    /u/ezp05/tsa0150/hldata1
 Command ===>
******************************** Top of
test
TEST
```

__ 46. Delete the file **/u/ezp05/tsa0###/mydir/data1**.

Questions

What happens to the symbolic link? What happens to the hard link?

_____

» Possible answers:

- The symbolic link is unchanged. It now points to a non-existent file.

- The hard link is still there, but now it has a link count of 1.

```
b File  hldata1
BROWSE    /u/ezp05/tsa0150/hldata1
 Command ===>
******************************** Top of Da
test
TEST
------------------------------------------------------------------------
b Syml  sldata1
Errno=81x No such file or directory exists; Reason=053B006C The
 requested file does not exist.  Press Enter to continue.
```

__ 47. Change the main line to display **/u/ezp05/tsa0###/mydir/hldata1**, and press Enter.

Questions

What happened? Explain what you see. Can you describe the difference between a symbolic link and a hard link?

_____

_____

» Possible answers:

- The hard link is still there; it is /u/ezp05/tsa0###/mydir/hldata1.
- When pressing Enter, the default action for a file is done, which is browse, so the file is browsed. This was the file which was deleted before or, more correctly, had its original name deleted.
- A symbolic link is a new physical file which points to another file. When the other file is deleted, the symbolic link points to a file which is not there.
- A hard link is just another name for the same physical file. When the original file is deleted, the hard link still shows the contents of the file because the physical file was not deleted; just one of the names was deleted. The hard link looks like a regular file. When the last name of the file is deleted, the link count goes to zero, and the physical file itself is deleted.

__ 48. Create a FIFO called **myfifo** in the **/u/ezp05/tsa0###** directory.

- FIFO is also a type of a special file.

```
In this example, the named pipe, /u/ezp05/tsa0150/myfifo, is created by
specifying an absolute path name:
Create a New File

 Pathname:
                                                                More:
   /u/ezp05/tsa0165/myfifo
   ____________________________________________________________________
   ____________________________________________________________________
   ____________________________________________________________________

 Permissions  . . 644  (3 digits, each 0-7)

 File type                          File source for regular file
 3_  1.  Directory                  __  1.  Edit...
     2.  Regular file                   2.  Copy file...
     3.  FIFO                           3.  Copy data set...
     4.  Symbolic link...
     5.  Hard link...               View and set attributes  . .
or:
sh mkfifo /u/ezp05/tsa0150/myfifo
sh ls -al /u/ezp05/tsa0150/myfifo
BROWSE    /tmp/TSA0150.08:02:11.203868.ishell      Line 0000000000 Col 001 080
 Command ===>                                              Scroll ===> PAGE
******************************** Top of Data ********************************
Sysname :
CZ01

prw-r--r--   1 TSA0150  S12EZP05       0 Apr 27 04:02 /u/ezp05/tsa0150/myfifo


or with ISHEL panels:
--------------------------------------------------------------------------------
Edit  Help
ssssssssssssssssssssssssssssssssssssssssssssssss
           Display File Attributes

Pathname : /u/ezp05/tsa0165/myfifo
                                    More:     +
File type . . . . . : FIFO
Permissions . . . . . : 644 rw-r--r--
Access control list . : 0
File size . . . . . : 0
File owner  . . . . . : TSA0165(100050165)
Group owner . . . . . : S12EZP05(120050000)
Last modified . . . . : 2021-05-03 10:17:00
Last changed  . . . . : 2021-05-03 10:17:00
Last accessed . . . . : 2021-05-03 10:17:00
```

```
Created . . . . . : 2021-05-03 10:17:00
Link count  . . . . . : 1
```

Note

For a FIFO, you must specify permission bits. You can choose which permissions you want.

Questions

Can you use the ISHELL to add some text in the FIFO? _____

» Possible answer: No.

What types of actions can you do with a FIFO in the ISHELL?

_____

» Possible answers:

- Not many. You can do the following:
  - Create a new FIFO, display and change attributes, delete, rename, and create a link, but you cannot manipulate its contents.

End of exercise

Exercise 4. Using the z/OS UNIX shell (OMVS): Part one

(*with hints*)

Overview

This exercise provides an opportunity to become familiar with the z/OS UNIX shell (OMVS) and some of the shell commands. You will also get an impression of how the shell can be used.

Objectives

At the end of this exercise, you should be able to:

- Invoke and exit the OMVS shell
- Be familiar with the shell screen and function keys
- Switch back and forth between the OMVS shell and TSO
- Run a TSO command in the OMVS shell
- Use a few of the most common OMVS shell commands

Introduction

The setup for this lab is the same as for the previous exercises.

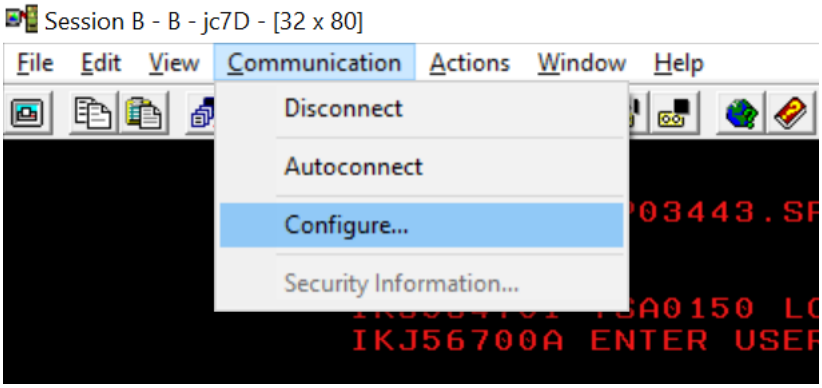
Exercise instructions with hints

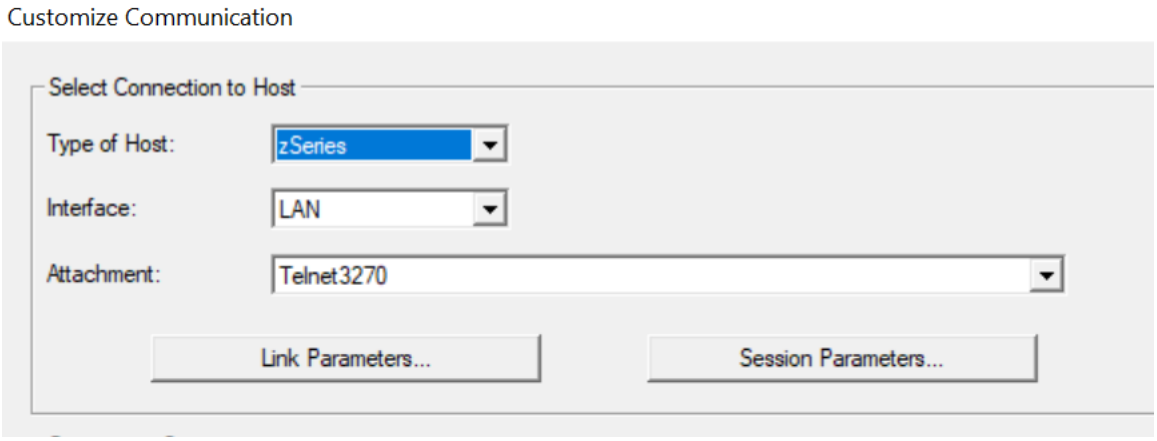
Preface

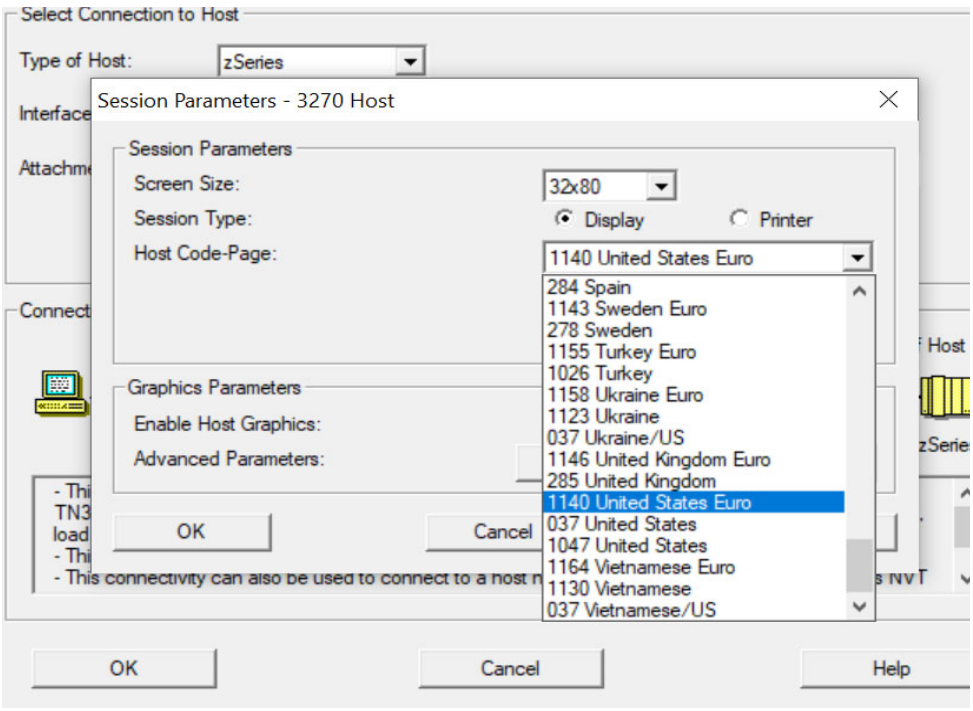
- All exercises in this chapter depend on the availability of your booked class environment.
- A » sign indicates a hint.

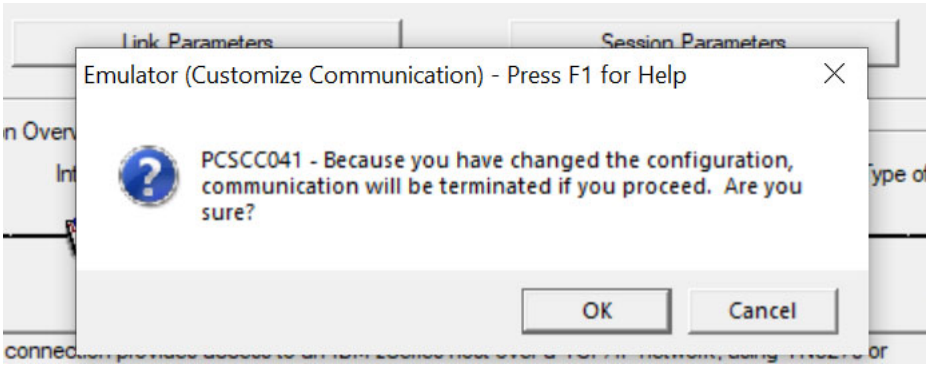
Part 1: Introduction to z/OS UNIX shell environment

__ 1. Your PCOMM session will likely already have Host Code Page already set to 037. Follow the instructions to verify that this is so. Before you log on, set your 3270 emulator program to use USA codepage **1140** for this connection, to minimize problems with code pages. If you are using the IBM Personal Communications Workstation program, select **Communication** > **Configure** > **Session Parameters** > Host Code-Page **1140 United States with Euro**. If you have a richer alphabet than A-Z, this prevents you from using your normal environment with your own language.









__ 2. Log on to TSO with your user ID.

- Follow instructions from Exercise 1, "System Familiarization," on page 1-1to log on.

__ 3. Invoke the shell by using the TSO **OMVS** command.

- You can invoke OMVS from TSO/ISPF option 6 (TSO prompt), using the ISPF menus, or directly form the TSO READY prompt.
- To further minimize problems with code pages, it might be desirable to invoke OMVS with parameter in the following way: `OMVS CONVERT((BPXFX111))`. This assumes you use Host Code Page 0037 Unites States for your 3270 emulator program.
- Since the cent sign is the default escape character, which you probably do not have on your keyboard (unless you are in USA), it might be desirable to invoke OMVS with some specific escape character other than cent sign. Shift+6 on your PC keyboard, is the ^ symbol, and it is

the equivalent of the cent- sign; If you do not have the cent sign on your keyboard, invoke OMVS from TSO with some escape character that you have on your keyboard, but do not otherwise use, for example with parameter as shown here: `OMVS ESC('^')`.

__ 4. From TSO/ISPF option 6, TSO prompt, it might look like:

```
=> OMVS CONVERT((BPXFX111)) ESC('^')

ESC('^') = left-parenthesis apostrophe ^ apostrophe right-parenthesis.
Note: When you type the above command, the ^ character will type as a cent-sign.
```

__ 5. Exit the OMVS shell, and go back to TSO.

- Several ways are possible.

Questions

How did you do it?

_____

» Possible answers:

- Exit and Enter.
- <Esc>D, ENTER. <Esc>D is the escape character followed by 'D'. Like §d if § was set as the escape character, as shown above. The keyboard entries are with no space between the escape character and the D:

```
Where <esc> is the ^ key (Shift+6 in some PC keyboards)
Where ENTER is the 3270 Enter key (right Ctrl key or numeric keypad
Enter key), Thus, the keyboard sequence you will type is:
^D ENTER
```

- PF2 to subcommand mode, then cancel and Enter. If you have a shell background job running, you cannot exit from the shell until it completes. However, you can switch to subcommand mode and exit.
- PF2 to subcommand mode, then close and Enter.
- PF2 to subcommand mode, then quit and Enter.

__ 6. Invoke the shell again with OMVS (like above), but now creating two shell sessions.

```
=> OMVS CONVERT((BPXFX111)) ESC('^') sessions(2)
```

__ a. Familiarize yourself with the interface. Try the PF keys, including NextSess key.

__ b. Try to PF6 to go to TSO, and enter some TSO command (for example: `TIME then LISTC then LU`). Return to your shell session from TSO with PA1.

__ c. You might need to use the pop-up keyboard function of the 3270 emulator program, for PA1, or use some special keys or key combinations for PA1, depending on your 3270 emulator setup. (<Alt+Insert> is often set up as PA1). The PopUp keyboard function of the PCOMM 3270 emulator PA1 (program attention key 1) can be selected as follows:

- Right-click in the 3270 screen. The HotKey (PopUp) appears. Click **PA1**.

__ 7. Note at the lower left of the OMVS shell session, which escape key is used. Might be shown as ESC=^

Questions

Can you work with the TSO/ISPF menus in TSO after using PF6 from shell?

_____

» Possible answers:

- No.
- Yes, if you typed `OEDIT` and then PF6. Then, under EDIT - ENTRY PANEL, you can go into split screen mode (start, PF2, PF9,..) and have access to any ISPF menu.

How can you go into subcommand mode in the shell?

_____

» Possible answers:

- PF2
- PA1

__ 8. Go to subcommand mode (PF2 or PA1), and issue subcommand **`OPEN`**.

__ a. Several subcommands can be done. Try PF1 for HELP and see the help text.

Questions

What is the result of the `OPEN`?

_____

» Possible answer:

- A new session was created and entered.

__ 9. How many sessions are active ? _____

» Possible answer:

- look at 'running' on the lower right corner of the screen.

```
===>
                                                                RUNNING <4>
ESC=^    1=Help      2=SubCmd    3=HlpRetrn  4=Top       5=Bottom    6=TSO
         7=BackScr   8=Scroll    9=NextSess 10=Refresh  11=FwdRetr  12=Retrieve
```

__ 10. Go to subcommand mode and issue the subcommand **`CLOSE`**.

- This ends the displayed session and switches to another one or returns to TSO/E if the only session was closed.

Questions

Can you exit all sessions and return to TSO with a single command or subcommand?

_____

» Possible answers:

- Yes, with subcommand `QUITALL`.

__ 11. Invoke the shell again with OMVS (as above) if you went back to TSO in the step before. Try to execute the **`TIME`** command from the shell.

Note: A `time` shell command exists, but you should try here to execute the TSO `TIME` command.

Questions

How can it be done?

_____

» Possible answers:

- Enter **`time`** and PF6.
- Enter **`tso time`**. To run a TSO/E command from the shell or in a shell script, simply preface the TSO/E command with the TSO shell command.
- A teaser: `time tso time` uses the shell `time` command to display the time of execution of the TSO `time` command**. ;-)**
- Another possible answer is PF6 and then `time`, but that is not really a correct answer if the TSO command should be executed from the shell.

```
===> tso time
IKJ56650I TIME-02:02:18 PM. CPU-00:00:00 SERVICE-23776 SESSION-00:26:13 APRIL 2
7,2021
```

Shell commands are case sensitive. For example, the shell command `time` cannot be entered as `TIME`. Are TSO commands also case sensitive in this environment?

_____

» Possible answers:

- No, you can, for example, use `time` and PF6**,** or you can use `TIME` and PF6. In the same way, you can use `tso TIME` or you can use `tso time`.
- However, note that you cannot use `TSO time` or `TSO TIME`. `(TSO in uppercase is not a shell command)`

__ 12. Familiarize yourself with the subcommand environment and case sensitivity of commands in subcommand mode and in shell command mode. Note that the subcommand `tso` cannot be used with parameters, while the `tso` shell command cannot be used without parameters.

__ a. Go to subcommand mode with PF2 and issue the subcommand **`TSO`** (uppercase or lowercase). If this brings you to TSO command mode, enter any TSO command, like 'SDSF' for instance to enter SDSF in TSO mode, navigate in SDSF to view your jobs (H),then press PF3 as many times as needed to return to the original subcommand mode then finally return the usual way with PA1.

» If you are using IBM Personal Communications Workstation program as your 3270 emulator, Alt-Insert is normally set up as PA1, and Alt-Home is normally PA2. You can also use the right mouse button and select **PA1**.

__ b. Go to subcommand mode with PF2 and issue the subcommand **tso** (lowercase). If this brings you to TSO command mode, return the usual way with PA1.

__ c. Go to subcommand mode with PF2 and issue the subcommand **TSO** (uppercase). If this brings you to TSO command mode, return the usual way with PA1.

__ d. Try to go to TSO command mode from the shell command line with **TSO + PF2**. If this brings you to TSO command mode, return the usual way with PA1.

__ e. Try to go to TSO command mode from the shell command line with **tso + PF2**. If this brings you to TSO command mode, return the usual way with PA1.

__ f. Try to execute a TSO command from the shell command line with **TSO time + Enter**.

__ g. Try to execute a TSO command from the shell command line with **tso time + Enter**.

__ h. Try to execute a TSO command from the shell command line with **time + PF6**.

__ i. Try to execute a TSO command from the shell command line with **TIME + PF6**.

Questions

Are subcommands case sensitive like the shell commands are?

_____

» Possible answers:

- No, they are not case sensitive. `TSO` works as well as `tso`. It is the same for all other subcommands.
- However, the shell command `tso` is case-sensitive, like other shell commands. `tso` is correct. `TSO` is incorrect.

Can you go to the TSO command environment directly with PF6 both from the subcommand mode and from the shell command mode?

_____

» Possible answer:

- Yes. PA1 brings you back to the same place you came from.

__ 13. Leave the OMVS shell, go back to ISPF edit mode, and edit JCL member **tsa0###.OMVS.LABS(TSOCMDS)**. The purpose of this job is to execute two different flavors of TSO shell commands under the shell in batch mode.

__ a. tso *xxxx*

__ b. tsocmd *xxxx* (*xxx* is the TSO command to execute, in our example it is `'lu'`)

```
//TSA0150T JOB 0000,'EZP05 TSOCMDS   ',MSGLEVEL=(1,1),
//    CLASS=A,MSGCLASS=Q,NOTIFY=&SYSUID,REGION=0M
//*************************************************************
//SCR1  EXEC PGM=BPXBATCH,REGION=4M,
//             PARM='SH  tso lu'
//* run tso shell command:tso lu
//*************************************************************
//STDOUT   DD  SYSOUT=*
//STDERR   DD  SYSOUT=*
//*************************************************************
//SCR1  EXEC PGM=BPXBATCH,REGION=4M,
//             PARM='SH  tsocmd lu'
//* run tsocmd  shell command: tsocmd lu
//*************************************************************
//STDOUT   DD  SYSOUT=*
//STDERR   DD  SYSOUT=*
```

__ 14. Do not submit the job, instead, leave edit mode and go back to OMVS shell, then use the shell **`'submit'`** command to submit this job. At the shell prompt, type **`'man submit'`** to learn about the submit syntax. Press [Enter] after each man page display (see (Page 1) at the lower left of the first page output...) until all man pages have been displayed.

__ 15. Now at the OMVS shell prompt, submit the JOB using the following submit syntax (for MVS datasets the syntax requires the use of double quotes “, double slashes //, and single quotes ‘):

```
submit "//'TSA0###.OMVS.LABS(TSOCMDS)'"
14.21.11 JOB03524 $HASP165 TSA0150T ENDED AT MVSCZ01  MAXCC=3840 CN(INTERNAL)
 ***
```

__ a. Go to SDSF (You can access SDSF with option S or option E.8), and look at your job output.

__ b. note: you can also invoke SDSF from the OMVS shell, with ‘SDSF+PF6’ (TSO)

```
TSA0150@CZ01:/u/ezp05/tsa0150-(TSA0150): $



 ===> sdsf
                                                                  RUNNING
ESC=^   1=Help      2=SubCmd    3=HlpRetrn  4=Top       5=Bottom    6=TSO
```

__ 16. Enter H to display your held outputs

```
SDSF MENU V2R3M0    PLEX1     CZ01
COMMAND INPUT ===> h
NP   NAME     Description              Group    Status
     DA       Active users             Jobs
     I        Input Queue              Jobs
     O        Output Queue             Output
     H        Held output Queue        Output
     ST       Status of jobs           Jobs
     JG       Job groups               JES
     SYM      System symbols           System
     SE       Scheduling environments  WLM
```

__ 17. select the last job

```
SDSF HELD OUTPUT DISPLAY ALL CLASSES LINES 1,859       LINE 1-23 (23)
COMMAND INPUT ===>                                      SCROLL ===> PAGE
NP   JOBNAME  JobID    Owner    Prty C ODisp Dest              REC-Cnt  PAGE
TSA0150T JOB02744 TSA0150   144 Q HOLD  LOCAL                  97
     TSA0150T JOB02747 TSA0150   144 Q HOLD  LOCAL                   97
     TSA0150T JOB02749 TSA0150   144 Q HOLD  LOCAL                   97
     TSA0150T JOB02772 TSA0150   144 Q HOLD  LOCAL                   97
     TSA0150T JOB02776 TSA0150   144 Q HOLD  LOCAL                   97
s    TSA0150T JOB03524 TSA0150   144 Q HOLD  LOCAL                   97

J E S 2  J O B  L O G  --  S Y S T E M  C Z 0 1  --  N O D E

14.21.11 JOB03524 ---- TUESDAY,   27 APR 2021 ----
14.21.11 JOB03524  IRR010I  USERID TSA0150  IS ASSIGNED TO THIS JOB.
14.21.11 JOB03524  ICH70001I TSA0150  LAST ACCESS AT 13:41:34 ON TUESDAY, APRIL
14.21.11 JOB03524  $HASP373 TSA0150T STARTED - INIT 1    - CLASS A       - SYS
14.21.11 JOB03524  -                                      -----TIMINGS (MINS.)--
14.21.11 JOB03524  -STEPNAME PROCSTEP    RC   EXCP   CONN       TCB       SRB  C
14.21.11 JOB03524  -SCR1               3840     82      1       .00       .00
14.21.11 JOB03524  -SCR1                 00     83      2       .00       .00
14.21.11 JOB03524  -TSA0150T ENDED.  NAME-EZP05 TSOCMDS        TOTAL TCB CPU TIM
14.21.11 JOB03524  $HASP395 TSA0150T ENDED - RC=3840
```

Questions

What is the difference between `tso` and `tsocmd`? Did both shell commands run successfully?

_____

» Possible answers:

- 'tsolu' has failed with:

```
IKJ56652I You attempted to run an authorized command or program.  This is
not supported under the Dynamic TSO Environment.
FOMF0139I Authorized commands are not supported
```

- 'tsocmd lu' was successful.
- The utility is very similar to the existing `tso` command and allows to run a TSO/E command from the shell, including authorized TSO/E commands. The `tsocmd` utility can be called from a shell script or shell prompt. It runs a TSO/E command from the shell using the TSO/E terminal monitor program (TMP), which is IKJEFT01.

__ 18. Go back to the OMVS shell (press PF3 as many times as necessary if you came from SDSF+PF6).

__ 19. Familiarize yourself with the subcommand environment and how to control it. Go to subcommand mode with PF2 and enter **`help`**.

- Note the use of PF4 and PF5 as well as PF7 and PF8.
- Return to subcommand mode from help with PF3.
- Return to shell from subcommand mode with PF3 (or with subcommand `close`). Note at the bottom of the screen how the PF key display changes.

Questions

Are the functions of PF4, PF5, PF7, and PF8 the same in shell as they are in subcommand mode?

_____

» Possible answer:

- Yes

__ 20. Familiarize yourself with the use of escape characters for controlling your environment. At the shell command line, enter **man man**, invoking the command `man` (for manual) to display information about the command `man` (to display documentation of the command itself). The output is presented one page at a time, with a new page each time you press Enter.

- Try the `man man` command to create a stream of output that you want to stop. Press the Enter key to display the next page;
- then try the escape sequence to stop the `man` command.
  - Generally speaking, if you want to interrupt a command and stop it from completing, type `<Ctrl+C>`. (Substitute for Ctrl+ the escape character you have selected when entering the OMVS shell. i.e '^C') The command stops executing and the system displays the shell prompt. You can now enter another shell command.
  - <Ctrl+C> depends on your environment. In the standard USA environment, it is `¢c` (cent sign +c in lowercase) or `¢C` (cent sign + C in uppercase); both upper and lowercase works. If you are outside the USA, you probably do not have a cent sign on your keyboard and should have set your escape character to something else, for example, **^.**

» If you are in trouble and cannot escape because you do not have the escape character on your keyboard, consider the following possibility: If your 3270 emulator program supports cut and paste, you can copy the displayed cent sign from the lower left corner of the screen to the clipboard buffer, and then paste it to the command line**.**

- The following are some of the standard shell escape characters:
  - <Ctrl+C> - Program interruption
  - <Ctrl+D> - End of file
  - <Ctrl+V> - Quit Program
  - <Ctrl+Z> - Suspend Program

» With most terminal emulators, you can use the keyboard remapping function to define one key to generate a multikey sequence. For example, you might define the D key so that it generates <EscChar+D+EscChar+Enter> when the <Ctrl> key is pressed in sequence with it. Thus, the sequence <Ctrl+D> acts like the ASCII sequence <Ctrl+D>.

Questions

You should still be under the man pages of 'man man' to test the different forms of <Ctrl+C> <Ctrl+V>

What happens when you enter your specific version of <Ctrl+C>? Would <Ctrl+V> also work here?

_____

» Possible answers:

- After entering <Ctrl+C>, you might see a message like `CEE5206S The signal SIGINT was received`. The command ends, and you can now enter a new command.
- Yes, <Ctrl+V> also works. After entering <Ctrl+V>, you might see a message like `CEE5220S The signal SIGQUIT was received`. The command ends, and you can now enter a new command.

__ 21. Familiarize yourself with the use of escape characters for controlling your environment. Some UNIX commands using stdin expect input from your terminal as default, for example, `cat`.

__ 22. At the shell command line, enter **`cat`** without any parameters.

__ a. Now, enter a line with any text + Enter. Do this a couple of times.

__ b. Assume that you want to stop (escape) this input. How?

__ c. <Ctrl+D> -- End of file -- is the escape sequence. Try to input `<Ctrl+D>`.

Questions

What happens after <Ctrl+D>?

_____

» Possible answers:

- The command (the program) `cat` gets an end of file. Then `cat` writes to stdout (to the terminal) the lines you wrote. Then `cat` ends, and you can now enter a new command.

```
TSA0150@CZ01:/u/ezp05/tsa0150-(TSA0150):
$TSA0150@CZ01:/u/ezp05/tsa0150-(TSA0150
): $cat

fff
ggg

<Ctrl+D>
fff
ggg
TSA0150@CZ01:/u/ezp05/tsa0150-(TSA0150):
$TSA0150@CZ01:/u/ezp05/tsa0150-(TSA0150
): $
```

__ 23. Get some information about your own environment. Find your home directory.

__ a. You can display the name of your home directory (and much more information about your user ID) with TSO command: '`LU TSA000# OMVS`' + PF6. (LU is the RACF `LISTUSER` TSO command, where # is your team number, and PF6 instructs the shell to run the command as a TSO command.) Try it! (without the quotes)

```
USER=TSA0165  NAME=EZP05G STUDENT        OWNER=TSOESCL   CREATED=21.110
  DEFAULT-GROUP=STUDENT  PASSDATE=21.110 PASS-INTERVAL=N/A PHRASEDATE=N/A
  ATTRIBUTES=NONE
  REVOKE DATE=NONE   RESUME DATE=NONE
...
...
OMVS INFORMATION
----------------
UID= 0100050165
HOME= /u/ezp05/tsa0165
PROGRAM= /bin/sh
CPUTIMEMAX= NONE
ASSIZEMAX= NONE
FILEPROCMAX= NONE
PROCUSERMAX= NONE
THREADSMAX= NONE
MMAPAREAMAX= NONE
***
```

__ b. You can display the name of your home directory (and much more information about your environment) using the `env` shell command (`env` for environment variables). Try it!

__ c. One of the many environment variables listed by the `env` command is `HOME = your_home_directory`. Instead of displaying all the many environment variables with `env`, you can display the contents of a single variable, for example, `echo $HOME` or `print $HOME`. Note the dollar sign before, and note the uppercase. Try it!

__ d. You can also use `env with` grep and pipe redirection, like: env | grep HOME

```
TSA0165@CZ01:/u/ezp05/tsa0165-(TSA0165): $env | grep HOME
PEGASUS_HOME=/usr/lpp/wbem
HOME=/u/ezp05/tsa0165
JAVA_HOME=/usr/lpp/java/J8.0_64
```

Questions

On a related note, try the (well known) command `id`. What kind of information about your environment is displayed? Can you see whether you are a superuser (with UID=0) from the output of `id`? You might also like to try the `who` and `whoami` commands.

_____

» Possible answers:

- `id` displays the user name and group affiliations of the user who issued the command.
- Yes, `id` tells you your UID. If UID=0, you are a superuser.
- Something like the following output:

```
TSA0150@CZ01:/u/ezp05/tsa0150-(TSA0150): $id
uid=100050150(TSA0150) gid=678(STUDENT) groups=120050000(S12EZP05)
TSA0150@CZ01:/u/ezp05/tsa0150-(TSA0150): $
```

Part 2: Using a few of the most common UNIX commands

__ 24. Using one of the most common UNIX commands in one of its most used forms, try out how to see documentation for the command. Try entering **`ls`**, **`ls -l`**, and **`ls -la`**.

» PF12 is useful for recalling the last commands entered.

__ a. The shell `history` and `r` (recall) commands can also be very useful (for example, enter **`r 10`** to retrieve and execute command number 10 in the history).

```
TSA0165@CZ01:/u/ezp05/tsa0165-(TSA0165): $history
2       oedit listf
3       chmod 755 listf
4       ls -al listf
5       exit
6       exit
7       TSO TIME
8       TSO time
9       submit "//'TSA0165.OMVS.LABS(TSOCMDS)'"
10      man man
11      man man
12      cat
13      env
14      env | grep HOME
15      LU TSA0165 OMVS
16      id
17      history
TSA0165@CZ01:/u/ezp05/tsa0165-(TSA0165): $r 16
id
```

__ b. To see the UNIX documentation for `ls`, enter **`man ls`**.

Questions

What is the result of the `ls` command?

_____

» Possible answers:

- A list of files in the current directory. Most often, people use `ls -l` or `ls -la`.
- `ls` is like `dir` in DOS. Note there is no `dir` command in UNIX, but some programmers like to define `dir` as an alias for `ls`.
- `ls -l` shows files with attributes.
- `ls -la` shows all files with attributes and also the pseudo hidden files starting with dot(s).

__ 25. Try a few common UNIX commands. Try `pwd` and `cd`

__ a. To see the documentation for `pwd` or for `cd`, use the same procedure as above for **`ls`**

__ b. Enter **pwd** and look at the output. You should be in your home directory, /u/ezp05/tsa0###.

```
TSA0150@CZ01:/u/ezp05/tsa0150-(TSA0150): $pwd
/u/ezp05/tsa0150
TSA0150@CZ01:/u/ezp05/tsa0150-(TSA0150): $
```

__ c. Enter **cd ..** and look at the output. Note the space required between cd and .. (unlike in DOS).

__ d. Enter **pwd** again and look at the output.

__ e. Enter **cd** to go back to the directory where you started.

```
TSA0150@CZ01:/u/ezp05/tsa0150-(TSA0150): $pwd
/u/ezp05/tsa0150
TSA0150@CZ01:/u/ezp05/tsa0150-(TSA0150): $cd ..
TSA0150@CZ01:/u/ezp05-(TSA0150): $pwd
/u/ezp05
TSA0150@CZ01:/u/ezp05-(TSA0150): $cd
TSA0150@CZ01:/u/ezp05/tsa0150-(TSA0150): $
```

» You might find the $HOME environment variable very useful.

Questions

What is the result of the pwd command? Of the first cd command? How did you enter the second cd command?

_____

» Possible answers:

- pwd is print working directory. It tells you where you are in the hierarchical file system.
- cd is change directory. It moves you around in the hierarchical file system. The second cd might be cd tsa0### (where tsa0### is your user ID), just cd, or even cd $HOME.

In general, what is the result of using a cd command without any arguments?

_____

» Possible answers:

- Calling cd without arguments sets the working directory to your home directory; in other words, to the value of the HOME environment variable if the variable exists. If there is no HOME variable, cd does not change the working directory.

__ 26. Use the TSO command **OEDIT** to create a new file named **myfile** in your home directory, /u/ezp05/tsa0###.

__ a. Enter **oedit myfile** + **PF6**, or enter **oedit myfile** + **Enter**.

__ b. Enter some lines of text in the OEDIT editor, and end with PF3.

__ c. Verify that the file is created. Enter **ls -l**.

__ d. Display the contents of the file you just made.

```
TSA0165@CZ01:/u/ezp05/tsa0165-(TSA0165): $ls -l
total 214
-rwxr-xr-x   1 TSA0165  S12EZP05      10 Apr 30 12:32 data1
-rwxr-xr-x   1 TSA0165  S12EZP05      10 Apr 30 12:34 data2
-rw-------   1 TSA0165  S12EZP05      60 May  3 03:27 findstr1
-rw-------   1 TSA0165  S12EZP05    1696 May  3 03:30 findstr2
-rwxr-xr-x   1 TSA0165  S12EZP05     162 May  3 03:25 hldata1
-rwxr-xr-x   1 TSA0165  S12EZP05      55 Apr 30 12:58 listf
drwxr-xr-x   2 TSA0165  S12EZP05    8192 May  3 10:13 mydir
prw-r--r--   1 TSA0165  S12EZP05       0 May  3 10:17 myfifo
-rwx------   1 TSA0165  S12EZP05      14 May  4 04:37 myfile
-rwxr-xr-x   1 TSA0165  S12EZP05     490 Apr 30 12:27 myrexx
-rwxr-xr-x   1 TSA0165  S12EZP05     244 Apr 30 12:20 myscr1
-rwxr-xr-x   1 TSA0165  S12EZP05      55 Apr 30 12:23 myscr4
-rwxr-xr-x   1 TSA0165  S12EZP05       0 Apr 30 11:46 newfile
-rwxr-xr-x   1 TSA0165  S12EZP05       0 Apr 30 11:47 newfile2
-rwxr-xr-x   1 TSA0165  S12EZP05     490 Apr 30 12:28 rexxuss
-rwxr-xr-x   1 TSA0165  S12EZP05   26914 Apr 30 11:58 security.xml
lrwxrwxrwx   1 TSA0165  S12EZP05      28 May  3 10:05 sldata1 -> /u/ezp05/tsa016
5/mydir/data1
-rwxr-xr-x   1 TSA0165  S12EZP05       0 Apr 30 11:49 test1
-rwxr-xr-x   1 TSA0165  S12EZP05       0 Apr 30 11:49 test2
TSA0150@CZ01:/u/ezp05/tsa0150-(TSA0150): $cat myfile
my file
```

Questions

Can you display the contents of the file with `echo myfile`, or `print myfile` ?

Can you do it with well known shell commands `cat` or more?

_____

» Possible answers:

- `echo`: no. `print`: no. `cat`: yes. `cat myfile` will do it. `more` will too.

__ 27. Use the TSO command **OBROWSE** to browse the file just created, `/u/ezp05/tsa0###/myfile`.

__ a. Try entering **OBROWSE myfile + Enter**.

__ b. Try entering **obrowse myfile + Enter**.

__ c. Try entering **OBROWSE myfile + PF6**.

__ d. Try entering **obrowse myfile + PF6**.

Questions

Were all of the four ways successful? Explain what happened.

_____

» Possible answers:

- `OBROWSE` + **Enter** does not work.
- `obrowse` is a TSO command as well as a shell command. The TSO command is not case sensitive. The shell command is case sensitive.

- Try entering **obrowse myfile + Enter**.
- Try entering **obrowse MYFILE + Enter**.

Were both ways successful? Explain what happened.

_____

» Possible answers:

- `obrowse MYFILE` does not work because file names are case sensitive.
- The file is named `myfile`, not `MYFILE`. `MYFILE` does not exist.

Information

z/OS UNIX System Services also supports OVIEW in TSO and the OMVS shell in z/OS 2.5.

__ 28. Use the (well known) shell command `cp` to copy file `/u/ezp05/tsa0###/myfile` to a new file named `/u/ezp05/tsa0###/myfile2`. Note that the command is named `cp`, not `copy` as it is in DOS/windows.

```
TSA0150@CZ01:/u/ezp05/tsa0150-(TSA0150): $cp ./myfile ./myfile2
TSA0150@CZ01:/u/ezp05/tsa0150-(TSA0150): $ls
data1          findstr3       myfile2        newfile2       test
data2          hldata1        myrexx         rexxuss        test1
findstr1       mydir          myscr1         security.xml   test2
findstr2       myfile         newfile        sldata1
```

__ a. Use **`pwd`** to see in which directory you currently are if you are in doubt.

__ b. Use **`ls -l`** to see which files exist in your current directory if you want to know.

__ c. Enter **`cat filename`** to see the contents of a file if you want to. If the file is large, it is useful to know the following two similar commands: `head filename` (to see just the first few lines) and `tail filename` (to see just the last few lines). Try it!

__ d. Display the contents of the file you just made (**`myfile2`**).

```
TSA0150@CZ01:/u/ezp05/tsa0150-(TSA0150): $tail myfile2
my file
```

Questions

How do you refer to the files?

Assuming you are in your `/u/ezp05/tsa0###` directory, are `/u/ezp05/tsa0###/filename`, `./filename`, and `filename` equivalent?

_____

» Possible answers:

- Yes, the three ways of referring to the files are equivalent here.

__ 29. Rename your file **`myfile2`** in your home directory (`/u/ezp05/tsa0###`) to **`myfile2n`**.

- This is a bit tricky if you are new to UNIX. No `ren` or `rename` command exists.
- The command to use is the well known UNIX command `mv`.
- You can enter `man mv` to see how `mv` works.
- Enter `ls -l` to verify your result.

Questions

How did you write the command to rename the file?

_____

» Possible answers:

- The command is `mv myfile2 myfile2n`

```
TSA0150@CZ01:/u/ezp05/tsa0150-(TSA0150): $mv ./myfile2 ./myfile2n
TSA0150@CZ01:/u/ezp05/tsa0150-(TSA0150): $ls
data1          findstr3      myfile2n      newfile2      test
data2          hldata1       myrexx        rexxuss       test1
findstr1       mydir         myscr1        security.xml  test2
findstr2       myfile        newfile       sldata1
```

__ 30. Delete the file **`myfile2n`** in your home directory, `/u/ezp05/tsa0###`.

- This is also a bit tricky if you are new to UNIX. No `del` or `erase` commands exist.
- The command to use is the well known UNIX command `rm`.
- You can enter `man rm` to see how `rm` works.
- Enter `ls -l` to verify your result.

Questions

How did you write the command to delete the file?

_____

» Possible answers:

- The command is `rm ./myfile2n`

End of exercise

Exercise 5. Using the z/OS UNIX shell (OMVS): Part two

(*with hints*)

Overview

This exercise provides an opportunity to become familiar with the z/OS UNIX shell and some of the shell commands and to get an impression of what the shell can be used for.

Objectives

At the end of this exercise, you should be able to:

- Use some common shell commands
- Combine commands using pipes

Introduction

The setup for this lab is the same as for the previous exercises.

Exercise instructions with hints

Preface

- All exercises in this chapter depend on the availability of your booked class environment.
- A » sign indicates a hint.

Part 1: Additional shell commands

__ 1. Log on to TSO and invoke the shell with the OMVS command as described in the previous exercise.

__ 2. Make a subdirectory named **myowndir** as a directory in your home directory, **/u/ezp05/tsa0###**.

- The command to use is the well known UNIX command `mkdir`.

  __ a. Enter **man mkdir** if you need to see the usage.

  __ b. Enter **ls -l** to verify the result.

Questions

How did you enter this command?

_____

» Possible answer:

- The command is `mkdir myowndir`.

```
TSA0150@CZ01:/u/ezp05/tsa0150-(TSA0150): $mkdir myowndir
TSA0150@CZ01:/u/ezp05/tsa0150-(TSA0150): $ls
data1          findstr3      myfile2n       newfile        sldata1
data2          hldata1       myowndir       newfile2       test
findstr1       mydir         myrexx         rexxuss        test1
findstr2       myfile        myscr1         security.xml   test2
TSA0150@CZ01:/u/ezp05/tsa0150-(TSA0150): $ls -al my*
-rwx------   1 TSA0150  S12EZP05       8 Apr 27 10:49 myfile
-rwx------   1 TSA0150  S12EZP05       8 Apr 27 10:57 myfile2n
-rwxr-xr-x   1 TSA0150  S12EZP05     490 Apr 26 09:41 myrexx
-rwxr-xr-x   1 TSA0150  S12EZP05     271 Apr 26 08:21 myscr1

mydir:
total 34
drwxr-xr-x   2 TSA0150  S12EZP05    8192 Apr 27 03:54 .
drwxr-xr-x   4 TSA0150  S12EZP05    8192 Apr 27 12:56 ..
-rwxr-xr-x   1 TSA0150  S12EZP05      18 Apr 26 11:57 labfile

myowndir:
total 16
drwxr-xr-x   2 TSA0150  S12EZP05       0 Apr 27 12:56 .
drwxr-xr-x   4 TSA0150  S12EZP05    8192 Apr 27 12:56 ..
TSA0150@CZ01:/u/ezp05/tsa0150-(TSA0150): $ls -al myow*
total 16
drwxr-xr-x   2 TSA0150  S12EZP05       0 Apr 27 12:56 .
drwxr-xr-x   4 TSA0150  S12EZP05    8192 Apr 27 12:56 ..
TSA0150@CZ01:/u/ezp05/tsa0150-(TSA0150): $
```

__ 3. Change your current directory to **myowndir**.

```
TSA0150@CZ01:/u/ezp05/tsa0150-(TSA0150): $cd myown*
TSA0150@CZ01:/u/ezp05/tsa0150/myowndir-(TSA0150): $
```

__ a. Now, in `myowndir`, enter **cd -** (means c d space minus-sign)

__ b. Again, enter **cd -**

__ c. Once again, enter **cd -**

Questions

What happens when you use `cd -` repeatedly?

_____

» Possible answers:

- Repeating this command toggles the current working directory between the current and the previous working directory.

- You switch between the two directories.

```
TSA0150@CZ01:/u/ezp05/tsa0150/myowndir-(TSA0150): $cd -
/u/ezp05/tsa0150
TSA0150@CZ01:/u/ezp05/tsa0150-(TSA0150): $cd -
/u/ezp05/tsa0150/myowndir
TSA0150@CZ01:/u/ezp05/tsa0150/myowndir-(TSA0150): $cd -
/u/ezp05/tsa0150
TSA0150@CZ01:/u/ezp05/tsa0150-(TSA0150): $
```

__ 4. Let's look at working with `cat` and redirecting output. Sometimes you might prefer to create a small file with `cat`**.** Try the following:

__ a. Switch back to your own home directory: **cd**

__ b. Enter **`cat > catfile`**

__ c. Enter a few input lines with any content. Press Enter after each line of input.

__ d. End this with **<Ctrl+D>** (which, in your case, might be `^d`).

__ e. Enter **`ls -l`** to verify you created a new file named **`catfile`**.

__ f. Enter **`cat catfile`** to see the contents of `catfile`.

Questions

What was the function of > `catfile`?

_____

» Possible answers:

- Output of `cat` went to `catfile` instead of going to the terminal screen.
- Most z/OS shell commands display information on your workstation screen (standard output). If you redirect the output, you can save the output from a command in a file instead. The output is sent to the file rather than to the screen. At the end of any command, enter `>filename`.

__ 5. Let's look at some details involved with redirecting output. Try the following (once again):

__ a. Enter **`cat > catfile`**.

__ b. Enter a few input lines with any content (make it different from the previous time).

__ c. End this with **<Ctrl+D>** (which, in your case, might be ^d).

__ d. Enter **`cat catfile`** to see the contents of `catfile`.

Questions

What was the function of `> catfile`? Specifically, was the previous file overwritten?

_____

» Possible answers:

- Yes, the previous file was overwritten. When you redirect output with `>filename` and it is an existing file, the output writes over any information that the file already contains.

```
TSA0150@CZ01:/u/ezp05/tsa0150-(TSA0150): $cat > catfile
this is line1
this is line2
this is line3

TSA0150@CZ01:/u/ezp05/tsa0150-(TSA0150):
$TSA0150@CZ01:/u/ezp05/tsa0150-(TSA0150
): $cat catfile
this is line1
this is line2
this is line3
TSA0150@CZ01:/u/ezp05/tsa0150-(TSA0150): $cat > catfile
this is line4
this is line5

TSA0150@CZ01:/u/ezp05/tsa0150-(TSA0150):
$TSA0150@CZ01:/u/ezp05/tsa0150-(TSA0150
): $cat catfile
this is line4
this is line5
```

- Information : The command `set -o noclobber` indicates that you do not want the `>` redirection operator to overwrite existing files. When this option is on and you specify the construct `>file`, the redirection only works if the file does not already exist. If you have this option on and you really *do* want to redirect output into an existing file, you must use `>|file` (with an "or" bar after the `>`) to indicate output redirection.

__ 6. Let's look at some more details involved with redirecting output. Try the following:

__ a. Enter **`cat >> catfile`**

__ b. Enter a few input lines with any content (make the content different from the previous time).

__ c. End this with **<Ctrl+D>** (which, in your case, might be `$d`).

__ d. Enter **`cat catfile`** to see the contents of `catfile`.

Questions

What was the function of `>> catfile`? Specifically, was the previous file overwritten?

_____

» Possible answers:

- No, the previous file was not overwritten, but it was appended. To append command output at the end of the file, use `>>filename` instead of `>filename`.

```
TSA0150@CZ01:/u/ezp05/tsa0150-(TSA0150): $cat >> catfile
this is line6
this is line7
this is line8

TSA0150@CZ01:/u/ezp05/tsa0150-(TSA0150):
$TSA0150@CZ01:/u/ezp05/tsa0150-(TSA0150
): $cat catfile
this is line4
this is line5
this is line6
this is line7
this is line8
```

__ 7. Let's look at working with the ; (semicolon). Try the following:

__ a. change to directory myowndir: **cd myowndir**

__ b. Enter **`date >> datefile`**

__ c. Then enter **date >>datefile;cat datefile**

» Remember the PF12 recall function.

Questions

What happened? What was the function of ; (semicolon)?

_____

» Possible answers:

- The shell lets you enter several commands on the same command line. To do this, use the semicolon character to separate the commands, for example, `cd mydir ; ls`.

```
TSA0150@CZ01:/u/ezp05/tsa0150/myowndir-(TSA0150): $date >> datefile
TSA0150@CZ01:/u/ezp05/tsa0150/myowndir-(TSA0150): $date >> datefile; cat
datefile
Tue Apr 27 13:21:53 EDT 2021
Tue Apr 27 13:22:22 EDT 2021
```

__ 8. Working with hard links.

__ a. Go back to your home directory, **/u/ezp05/tsa0###**: cd

__ b. You might need to take a look at **man ln**.

__ c. Now, create a hard link named **hl2datefile** to **/u/ezp05/tsa0###/myowndir/datefile** and verify that it works.

Questions

Can you write this in one line? How?

_____

» Possible answer:

- The command is :`ln myowndir/datefile hl2datefile; cat hl2datefile`

```
TSA0150@CZ01:/u/ezp05/tsa0150-(TSA0150): $ln myowndir/datefile hl2datefile
TSA0150@CZ01:/u/ezp05/tsa0150-(TSA0150): $cat hl2datefile
Tue May  4 04:50:13 EDT 2021
Tue May  4 04:50:34 EDT 2021
```

__ 9. Working with symbolic links.

__ a. In your home directory, `/u/ezp05/tsa0###`, create a symbolic link named **sl2datefile** to **/u/ezp05/tsa0###/myowndir/datefile** and verify that it works.

Questions

Can you write this in one line? How?

_____

» Possible answer:

- The command is `ln -s myowndir/datefile sl2datefile;cat sl2datefile`

```
TSA0150@CZ01:/u/ezp05/tsa0150-(TSA0150): $ln -s myowndir/datefile
sl2datefile;ca
t sl2datefile
Tue May  4 04:50:13 EDT 2021
Tue May  4 04:50:34 EDT 2021
```

__ 10. Let's look at comparing files. Sometimes, you might need to see whether two files are equal. Use **diff** to do so. `diff` is a complex command with some very nice features, but we will only look at the most simple usage here. Try the following:

__ a. Enter **date>df1** and wait a few seconds. Then enter **date>df2**.

__ b. Compare files **df1** and **df2**.

Questions

How did you enter this command?

_____

» Possible answer:

- The command is `diff df1 df2`

```
TSA0150@CZ01:/u/ezp05/tsa0150-(TSA0150): $date > df1
TSA0150@CZ01:/u/ezp05/tsa0150-(TSA0150): $date > df2
TSA0150@CZ01:/u/ezp05/tsa0150-(TSA0150): $diff df1 df2
1c1
< Wed Apr 28 05:21:46 EDT 2021
---
> Wed Apr 28 05:21:52 EDT 2021
```

__ 11. Let's look at finding files. Sometimes, you might want to find certain files in directories and subdirectories. Use **find** to do so. Let's try a few simple examples.

__ a. Enter **find .** (note the dot).

Questions

What happens?

_____

» Possible answers:

- The command `find .` finds (lists) all files and directories in this directory and all subdirectories.

__ 12. Enter **`find . -name 'my*'`**

Questions

What happens?

_____

» Possible answers:

- The command `find . -name 'my*'` finds (lists) all files and directories in this directory and all subdirectories named `my_anything`. The asterisk (*) is a wildcard character that stands for any sequence of zero or more characters.

```
TSA0150@CZ01:/u/ezp05/tsa0150-(TSA0150): $find . -name 'my*'
./myscr1
./myrexx
./mydir
./myfile
./myowndir
./myfile2n
```

__ 13. Try this one: `find . -name 'dat*' -exec ls -l {} ';'`

This command will find all the files where the name has "dat" included and then executes "ls -l" against the found items.

```
TSA0150@CZ01:/u/ezp05/tsa0150-(TSA0150): $find . -name 'dat*' -exec ls -l {} ';'
-rwxr-xr-x   1 TSA0150  S12EZP05      10 Apr 26 10:08 ./data1
-rwxr-xr-x   1 TSA0150  S12EZP05      20 Apr 26 10:08 ./data2
-rw-r--r--   2 TSA0150  S12EZP05      29 Apr 28 05:17 ./myowndir/datefile
-rw-r--r--   1 TSA0150  S12EZP05      58 Apr 27 13:22 ./datefile
```

__ 14. To find all files that have not been ave not been accessed in the last three days:

```
 find . -name "*" -atime +3          (accessed)
 find . -name "*" -ctime +1          (modified more that 1 day)
 find . -name "*" -ctime 1          (modified exectly yesterday)
TSA0165@CZ01:/u/ezp05/tsa0165-(TSA0165): $  find . -name "*" -ctime 1
.
./.sh_history
./.ishell-reflist-TSA0165
./mydir
./myfifo
./sldata1
./hldata1
./myfile
./myowndir
./myowndir/datefile
./catfile
./hl2datefile
./hl3datefile
./sl2datefile
./df1
./df2
```

__ 15. ***clear*** command: You can use the ***clear*** shell command in case you prefer to have a clear space before entering new commands

__ 16. Let's try the **touch** command. `touch` is a simple command which might be useful to know. You can look at a few examples.

__ a. Try entering **`touch fil1;touch fil2;touch fil3;ls -l fil*`**

Questions

What happens?

_____

» Possible answer:

- The `touch` command can be used to create a new empty file.

```
TSA0165@CZ01:/u/ezp05/tsa0165-(TSA0165): $touch fil1;touch fil2;touch fil3;ls
-l
 fil*
-rw-r--r--   1 TSA0165  S12EZP05       0 May  4 04:57 fil1
-rw-r--r--   1 TSA0165  S12EZP05       0 May  4 04:57 fil2
-rw-r--r--   1 TSA0165  S12EZP05       0 May  4 04:57 fil3
```

__ b. Take a look at the description of `touch`. Enter **`man touch`**.

__ c. Now try entering **`touch fil1;ls -l`**

Questions

What happens?

_____

» Possible answer:

- The `touch` command changes the time and date of the file(s) to the current time and date.

```
TSA0150@CZ01:/u/ezp05/tsa0150-(TSA0150): $touch fil1;ls -l fil*
-rw-r--r--   1 TSA0150  S12EZP05       0 Apr 28 05:54 fil1
-rw-r--r--   1 TSA0150  S12EZP05       0 Apr 28 05:52 fil2
-rw-r--r--   1 TSA0150  S12EZP05       0 Apr 28 05:52 fil3
```

__ d. Try to use **touch** to set the modification time of file **fil3** to 13:05 on July 3, 2020. View the result.

Questions

How do you enter the command?

_____

» Possible answers:

- Might be: `touch -m -t 202007031305 fil3;ls -l fil*`
- This last example is taken directly from the `man` text.

```
TSA0150@CZ01:/u/ezp05/tsa0150-(TSA0150): $touch -m -t 202007031305 fil3;ls -l
fil*
-rw-r--r--   1 TSA0150  S12EZP05       0 Apr 28 05:54 fil1
-rw-r--r--   1 TSA0150  S12EZP05       0 Apr 28 05:52 fil2
-rw-r--r--   1 TSA0150  S12EZP05       0 Jul  3  2020 fil3
```

__ e. Verify with find -atime

```
TSA0150@CZ01:/u/ezp05/tsa0150-(TSA0150): $ find . -name "*" -mtime +100
./fil3
```

__ 17. Let's look at handling permission bits. You might need to change the permission bits for a directory or a file. Try the following:

__ a. The command to use is **chmod**. Take a look in **man chmod** to learn about this command.

__ b. **chmod** can be used with many different options but only the simplest are used here. Change the permission bits of file **df1** to (octal) **400**.

Questions

What is the result of this command?

_____

» Possible answers:

- You might enter `chmod 400 df1;ls -l df*`

```
TSA0150@CZ01:/u/ezp05/tsa0150-(TSA0150): $chmod 400 df1;ls -l df*
-r--------   1 TSA0150  S12EZP05       29 Apr 28 05:21 df1
-rw-r--r--   1 TSA0150  S12EZP05       29 Apr 28 05:21 df2
```

- From output of `ls -l` you can see that permission bits for file `df1` was changed from `-rw-------` to `-r--------` so it is now read-only for the owner.

__ 18. Let's look at sorting. You might find it useful to know how to do this. Try the following:

__ a. Enter **`ls -l>mylist;cat mylist`**

__ b. Use **PF9** to jump to second session, and enter **`man sort`**. (If you only have one session, you can use F2 "SubCmd" and OPEN to get a second session). You can now flip-flop with PF9 between the two sessions, one with documentation, and one to try it out.

__ c. Enter a **`sort`** command to sort the contents of file **`mylist`** so that the list is sorted in file size order. Create or replace a file named **`mylist2`** with these contents and display it.

» Output of `ls -l` is, by line, permissions, links, owner, group, size, time, and name.

Questions

How did you enter the commands?

_____

» Possible answers:

- You might enter `sort -k 5 -o mylist2 mylist;cat mylist2`.
- or you might enter `sort -k 5 mylist >mylist2; cat mylist2`.

__ 19. Let's look at using pipes. Continuing the sort example above, trying to do the same function but using a pipe.

» Something with `cat mylist |` .....

Questions

How did you enter the commands?

_____

» Possible answers:

- You might enter `cat mylist | sort -k 5 -o mylist2;cat mylist2`.
- You might enter `cat mylist | sort -k 5 >mylist2; cat mylist2`.

__ 20. Try the following: (‘du’ display usage, you may use "man du" for help on the ‘du’ command output).

```
du -s . * | sort > bigfile1
(note: you may disregard message du: FSUM6180 file "sldata1": EDC5129I No such
file or directory. This is because you have deleted mydir/data1 previously)
```

__ 21. Enter:

```
cat bigfile1
TSA0165@CZ01:/u/ezp05/tsa0165-(TSA0165): $cat bigfile1
         0 fil1
...
...
         2 df1
         2 df2
         2 myfile
        16 findstr1
        16 findstr2
        16 hldata1
        16 listf
        16 mylist
        16 mylist2
        16 myowndir
        16 myrexx
        16 myscr1
        16 myscr4
        16 rexxuss
        64 security.xml
       210 mydir
```

__ 22. Let's look at using `wc`. This command is often used with pipes. `wc` stands for word count. `wc` is useful to count items. `wc` without arguments counts newlines, words, and bytes. `wc -l` counts newlines.

- Try entering this: **`ls | wc -l`**

```
TSA0150@CZ01:/u/ezp05/tsa0150-(TSA0150): $ls | wc -l
     33
```

Questions

How many files exist in your current directory?

_____

» Possible answer:

- As many as shown from the output of `wc -l`.

__ 23. How many words in file catfile ?

```
TSA0150@CZ01:/u/ezp05/tsa0150-(TSA0150): $cat catfile | wc -l
      5
```

__ 24. Let's look at the `grep` command. Sometimes, it can be useful to be able to select a specific subset of lines in a file or to select a specific subset of something which is sent to the terminal screen. `grep` can be used in many complex ways, but here we will just look at a few simple examples.

__ a. Try entering **`cat mylist | grep "my"`**

__ b. Try entering **`cat mylist | grep "my" | wc -l`**

__ c. Try entering **`cat mylist | grep "my"| sort -k 5 > mylist2;cat mylist2`**

Questions

What happens?

_____

» Possible answers:

- The `grep` command searches for a particular string (a specific pattern) in input from a file or standard input and extracts those lines. In this case, the string is `"my"`.

```
TSA0150@CZ01:/u/ezp05/tsa0150-(TSA0150): $cat mylist | grep "my"
drwxr-xr-x   2 TSA0150  S12EZP05    8192 Apr 27 03:54 mydir
-rwx------   1 TSA0150  S12EZP05       8 Apr 27 10:49 myfile
-rwx------   1 TSA0150  S12EZP05       8 Apr 27 10:57 myfile2n
-rw-r--r--   1 TSA0150  S12EZP05       0 Apr 28 07:41 mylist
drwxr-xr-x   2 TSA0150  S12EZP05    8192 Apr 28 05:17 myowndir
-rwxr-xr-x   1 TSA0150  S12EZP05     490 Apr 26 09:41 myrexx
-rwxr-xr-x   1 TSA0150  S12EZP05     271 Apr 26 08:21 myscr1
lrwxrwxrwx   1 TSA0150  S12EZP05      17 Apr 28 05:21 sl2datefile -> myowndir/da
tefile
lrwxrwxrwx   1 TSA0150  S12EZP05      28 Apr 27 03:19 sldata1 -> /u/ezp05/tsa015
0/mydir/data1

TSA0150@CZ01:/u/ezp05/tsa0150-(TSA0150): $cat mylist | grep "my" | wc -l
      9
> Sort by size (field nbr 5):
TSA0150@CZ01:/u/ezp05/tsa0150-(TSA0150): $cat mylist | grep "my"| sort -k 5 > my
list2;cat mylist2
-rw-r--r--   1 TSA0150  S12EZP05       0 Apr 28 07:41 mylist
-rwx------   1 TSA0150  S12EZP05       8 Apr 27 10:49 myfile
-rwx------   1 TSA0150  S12EZP05       8 Apr 27 10:57 myfile2n
lrwxrwxrwx   1 TSA0150  S12EZP05      17 Apr 28 05:21 sl2datefile -> myowndir/da
tefile
lrwxrwxrwx   1 TSA0150  S12EZP05      28 Apr 27 03:19 sldata1 -> /u/ezp05/tsa015
0/mydir/data1
-rwxr-xr-x   1 TSA0150  S12EZP05     271 Apr 26 08:21 myscr1
-rwxr-xr-x   1 TSA0150  S12EZP05     490 Apr 26 09:41 myrexx
drwxr-xr-x   2 TSA0150  S12EZP05    8192 Apr 27 03:54 mydir
drwxr-xr-x   2 TSA0150  S12EZP05    8192 Apr 28 05:17 myowndir
```

End of exercise

Exercise 6. Additional shell topics

(*with hints*)

Overview

This exercise provides an opportunity to use the shell to execute scripts and REXX execs and to tailor the user's environment. Also, the students will become familiar with the batch environment, BPXBATCH, oshell, and the new UDL ISPF option (3.17).

You will also learn how to logon using ssh (with openssh), execute remote shell commands, and use some of the standard unix applications like ftp.

Objectives

At the end of this exercise, you should be able to:

- Customize their shell environment
- Execute a shell script
- Execute a REXX exec
- Execute BPXBATCH
- Execute openssh shell
- Execute remote shell commands
- Execute ftp commands

Introduction

The setup for this lab is the same as for the previous exercises.

Exercise instructions with hints

Preface

- All exercises in this chapter depend on the availability of your booked class environment.
- A » sign indicates a hint.

Part 1: Customizing the shell

__ 1. If you are not already logged on to TSO, then log on using your user ID, and go into the OMVS shell as you have done in previous exercises (start an OMVS session:)

```
OMVS CONVERT((BPXFX111)) ESC('^') sessions(2)
```

__ 2. Let's look at working with aliases. Specifically, we will look at setting up an alias for a command and removing an alias.

__ a. Try the command `alias`. Enter **`alias`**

Questions

What do you see as a result of this command?

_____

» Possible answer:

- All currently defined aliases.

```
TSA0150@CZ01:/u/ezp05/tsa0150-(TSA0150): $alias
functions="typeset -f"
autoload="typeset -fu"
nohup="nohup "
stop="kill -STOP"
hash="alias -t"
r="fc -s"
integer="typeset -i"
suspend="stop \$\$"
history="fc -l"
```

You can read about the use of the `alias` command with `man alias`.

__ b. Some users of windows are used to the DOS command `dir` and might want to set it up as an alias for the similar function in this environment. Let's try it. Enter a command to make **`dir`** an alias for **`ls -l`**.

__ c. Then enter **`alias`** to verify that **`dir`** is in your alias list. Try to use **`dir`** to verify that it works as expected.

Questions

How do you make `dir` an alias for `ls -l`?

_____

» Possible answer:

- The command is `alias dir="ls -l"`

```
TSA0150@CZ01:/u/ezp05/tsa0150-(TSA0150): $alias dir="ls -l"
TSA0150@CZ01:/u/ezp05/tsa0150-(TSA0150): $alias
functions="typeset -f"
autoload="typeset -fu"
nohup="nohup "
stop="kill -STOP"
hash="alias -t"
dir="ls -l"
r="fc -s"
integer="typeset -i"
suspend="stop \$\$"
history="fc -l"
TSA0150@CZ01:/u/ezp05/tsa0150-(TSA0150): $dir
total 338
-rw-r--r--   1 TSA0150  S12EZP05     544 Apr 28 07:46 bigfile1
-rw-r--r--   1 TSA0150  S12EZP05     534 Apr 28 07:44 bigfiles
-rw-r--r--   1 TSA0150  S12EZP05      70 Apr 27 13:21 catfile
-rwxr-xr-x   1 TSA0150  S12EZP05      10 Apr 26 10:08 data1
-rwxr-xr-x   1 TSA0150  S12EZP05      20 Apr 26 10:08 data2
-rw-r--r--   1 TSA0150  S12EZP05      58 Apr 27 13:22 datefile
-r--------   1 TSA0150  S12EZP05      29 Apr 28 05:21 df1
-rw-r--r--   1 TSA0150  S12EZP05      29 Apr 28 05:21 df2
-rw-r--r--   1 TSA0150  S12EZP05       0 Apr 28 05:54 fil1
...
...
```

__ d. Take a look at **`man unalias`**.

Questions

How can you remove the `dir alias` you just defined? (Try it!)

_____

» Possible answer:

- The command to use is `unalias dir`.

Note: if you tested unalias and used (unalias -a) then all alias have been removed. You can close your OMVS sessions and open a clean session to get back the default alias setups.

__ 3. Let's introduce the `.profile`. Your alias settings are only temporary. They are lost as soon as you exit your shell session.

Questions

How can you make this alias a permanent alias for yourself?

_____

» Possible answer:

- Put the `alias` command in your `$HOME/.profile`
- use oedit `/u/ezp05/tsa0###/.profile to add it at the bottom`

```
EDIT       /u/ezp05/tsa0150/.profile
Command ===>
000266 #
000267 # ============================================
000268 # End of c89/cc/c++ customization section
000269 # ============================================
000270 alias dir="ls -l"
```

__ 4. Now let's look at working with shell variables and environment variables, specifically, setting the prompt. (The following assumes you are running in a plain standard environment without any `.profile` and with `$` as prompt.)

__ a. Enter **`env`** to see your environment variables.

Questions

Can you see `PS1` as an environment variable in the list?

_____

» Possible answer:

- No, PS1 is a shell variable but not an environment variable. It is not listed with `env`.

__ b. Enter **`echo $PS1`** to see your value of `PS1`.

Questions

What is displayed?

_____

» Possible answer:

- The $ or # is displayed, which is your prompt.

```
TSA0165@CZ01:/u/ezp05/tsa0165-(TSA0165): $echo $PS1
$LOGNAME@$HOST:$PWD-(${myid}): $
TSA0165@CZ01:/u/ezp05/tsa0165-(TSA0165):
```

__ c. Enter **PS1='$LOGNAME:$PWD: >'**

Questions

What happens?

_____

» Possible answer:

- Your prompt is now `tsa0###:/u/ezp05/tsa0###: >` where `tsa0###` is your user ID.

__ 5. Let's look at working with shell variables and environment variables and the use of `.profile`.

__ a. The previous step changed you prompt in this shell. Let's try to make your new prompt permanent. Enter **oedit .profile**.

__ a. In `oedit`, enter **PS1='$LOGNAME:$PWD: >'** and **PF3** to save your change.

__ b. Use **PF2 + quitall** to end all sessions and go back to TSO.

__ c. From TSO, go into the shell again (the usual way, with your `OMVS` command).

Questions

Does it work? Try PF9 to see if it also works in the second session. Was your changed prompt permanently set so that it works every time you go into the shell?

_____

» Possible answers:

- Yes

__ d. try the "dir" alias that you saved in your .profile

__ 6. Let's continue to look at working with shell variables and environment variables, focusing on the use of exported variables.

__ a. Let's try to make your changed prompt permanent. Enter **oedit .profile**.

__ b. In oedit, change the contents of this .profile file.
PS1='$LOGNAME:$PWD: >' to **export PS1='$LOGNAME:$PWD: >'** and save with **PF3**.

```
EDIT       /u/ezp05/tsa0150/.profile
Command ===>
000269 # ================================
000270 alias dir="ls -l"
000271 export PS1='$LOGNAME:$PWD: >'
```

__ c. Use **PF2 + quitall** to end all sessions and go back to TSO.

__ d. From TSO, go into the shell again (the usual way, with your OMVS command).

Questions

Does it work? Was your prompt changed as it should be?

_____

» Possible answers:

- Yes or no. See the next question and answer.

__ 7. If it did not work, and if you got an error message like EXPORT: /u/ezp05/tsa0###/.profile 1: FSUM7351 not found, try entering **cat .profile** and find out why it did not work.

Questions

What could be the reason?

_____

» Possible answer:

- `export` was not `export`, as it should be, but `EXPORT` because `oedit` had used CAPS ON.

__ a. If it did not work, correct it (`oedit .profile`, and so forth), and try again.

__ 8. Assume it now works when you enter the shell from TSO. Enter **`sh`** to enter a new shell, notice the prompt there, and enter **`exit`** to return.

Questions

Was your changed prompt inherited by (exported to) the new shell?

_____

» Possible answer:

- Yes

__ 9. Enter **`env`** to see your environment variables.

Questions

Can you now see PS1 as an environment variable in the list?

_____

» Possible answers:

- Yes, PS1 is now an environment variable. Only the shell variables that are exported are available to shell scripts and commands invoked from the shell. Environment variables are a subset of shell variables that have been exported.

__ 10. Enter shell command: date

```
TSA0150:/u/ezp05/tsa0150: >date
Tue May  4 05:24:14 EDT 2021
```

__ 11. Does it conform to your local time ? _____

__ 12. The date/time value is derived for an environment variable called TZ

__ 13. Enter command: echo $TZ

```
TSA0150:/u/ezp05/tsa0150: >echo $TZ
EST5EDT
```

Modify the TZ variable to reflect your time zone. See UNIX System Services Command Reference for a description of the TZ variable.

The TZ variable is set by default to EST5EDT (Eastern (est) 5 hours difference/daylight saving active (EDT).

__ 14. Update this TZ value to reflect the local time (GMT-x (summer time) or GMT-y (winter time):

x=?___ y=?_____ (Example: GMT-1 for Central European Time, winter time, for example, PARIS, ROME, ...)

__ 15. Enter command: export TZ=GMT-1 (if you are in France, or adapt it to your geo)

```
export TZ=GMT-1
TSA0150:/u/ezp05/tsa0150: >export TZ=GMT-1
TSA0150:/u/ezp05/tsa0150: >date
Tue May  4 10:24:53 GMT 2021
```

__ 16. Update your .profile file so that the change will be permanent for every shell you enter.

```
EDIT       /u/ezp05/tsa0150/.profile
Command ===>
000269 # ====================================
000270 alias dir="ls -l"
000271 export PS1='$LOGNAME:$PWD: >'
000272 export TZ=GMT-1
```

__ 17. enter: ‘date’, and verify the change

```
TSA0165:/u/ezp05/tsa0165: >date
Tue May  4 10:23:16 GMT 2021
```

Part 2: The very basics

In the next few steps, you will try to execute a script in your home directory, but your home directory is not in the search PATH. This is a common error; and is similar to the z/OS S806-04 program not found abend.

Let's try working with a simple script using if, test, then, endif, and comments.

__ 18. Enter **`oedit listf`** to edit a new file named **`listf`** with the following contents (you can cut&paste the 4 files below with care); take a few seconds to understand what it does.

```
# test if directory
if test -d $1
then ls $1
fi #endif
```

__ 19. Save the file (PF3), and make sure the file is executable: enter command

```
chmod 755 listf
```

__ 20. Verify with command:

```
ls -al listf
TSA0165@CZ01:/u/ezp05/tsa0165-(TSA0165): $ls -al listf
-rwxr-xr-x   1 TSA0165  S12EZP05      55 Apr 30 12:58 listf
```

You should have a directory from a previous exercise named `myowndir`.

__ 21. Enter command: '`listf` **`myowndir`**' to run the shell script.

Questions

Does it work as it should?

_____

» Possible answers:

- Probably not. It depends on the PATH environment variable. The current working directory is not included in the PATH.

Enter command **`echo $PATH`**. What is the content of this environment variable?

_____

» Possible answers:

- `/bin` only, so the current working directory is not part of the default path, and if you want to execute a file or script in your current working directory, you must prefix it with `./` to specify that the file to be executed is in the `cwd` or change the PATH to include the cwd (.).

```
TSA0150:/u/ezp05/tsa0150: >echo $PATH
/bin
```

__ 22. Enter **`./listf myowndir`** to run the shell script. Does it work as it should?

_____

» Possible answer:

- Yes

Can you do this in any code page? (Hint: Are # and $ the same in any code page?)

_____

» Possible answer:

- yes
- No. The different code pages are difficult to handle, especially with shell scripts.

__ 23. Making a simple script, continued. If, then, else.

__ a. Enter **oedit listf** to change the contents of the file named *listf* to the following contents by adding the lines in bold text:

```
# test if directory
   if test -d $1
   then ls $1
     else
          echo "$1 is a file"
          cat  $1
   fi     #endif
```

Attention

Be careful if you add the above lines with cut&paste from your PDF student guide, as it may generate incorrect characters that will render the script file non executable !

If so, verify that you don't have invalid characters in your edited file by using 'hex on'

Blanks should only be characters x'40', not x'41' or else. If you have such characters, do a global change; ex:

```
c x'41' x'40' all
hex off
```

__ b. Save the file from oedit with **PF3** and run the shell script with **./listf myowndir** and with ./**listf myscr1**

Questions

Does it work as it should?

_____

» Possible answers:

- The simple answer is yes.
- The better answer is no because the logic is not quite correct. What if the input (argument) is not a directory or a filename?

__ 24. Making a simple script, continued. Nested If, then, else.

__ a. Enter **oedit listf** to change the contents of the file named **listf** to the following by adding or modifying the lines in bold text:

```
# test if directory
   if test -d $1
then
echo "$1 is a directory"
ls $1
elif test -f $1 # else if file
  then
      echo "$1 is a file"
      cat $1
  else
      echo "$1 is just a string"
fi    #endif
```

Attention

Same warning here: add the above lines with care if you use cut&paste from your PDF student guide, as it may generate incorrect characters that will render the script file non executable !

__ 25. Save the file from oedit with **PF3** and run the shell script with

./listf myowndir, with **./listf myscr1**, and with **./listf mystr**.

Questions

Does it work as it should?

_____

» Possible answers:

- The simple answer is yes.

- The better answer is no because the logic is not quite correct. What if the input (argument) is empty?

__ 26. Making a simple script, continued. Test for empty argument.

__ a. Enter **oedit listf** to change the contents of the file named **listf** to the following by adding or modifying the lines in bold text:

```
if test ! "$1"
  then
      echo "no positional parameters"
  elif test -d $1
then
echo "$1 is a directory"
ls $1
elif test -f $1 # else if file
  then
      echo "$1 is a file"
      cat $1
  else
      echo "$1 is just a string"
fi    #endif
```

Attention

Same warning here: add the above lines with care if you use cut&paste from your PDF student guide, as it may generate incorrect characters that will render the script file non executable !

__ b. Save the file from oedit with **PF3** and test the shell script with different arguments and with no argument.

```
./listf
./listf myscr1
./listf mystr
./listf myowndir
```

» Good documentation about how to write shell scripts can be found in *Writing z/OS shell scripts* in the manual z/OS UNIX System Services, *User's Guide*, document number SA23-2279.

Questions

Does it work as it should?

_____

» Possible answer:

- Yes, if you categorize anything other than a file or directory as just a string.

Note

You can find a full solution copy of the listf script in member D80WW.EZP05V1.OMVS.LABS.SOLUTION(LISTF)

Part 3: BPXBATCH, OSHELL, OPUT, OGET

__ 27. Try to execute member BPXBAT1 from your lab data set (`tsa0###.OMVS.LABS`).

__ a. Go back to ISPF, and edit (opt2) member BPXBAT1 (or use 3.4 to list dataset TSA0###.OMVS.LABS then edit member BPXBAT1)

__ b. Look at the instructions in this member. The purpose of this exercise is to get a clean execution with RC=0. This JCL has many typos and errors. There are several errors (like wrong case for filepath) in the JCL.

__ c. The STDOUT and STDERR DD statements should look like this:

```
// PATHOPTS=(OWRONLY,OCREAT,OTRUNC),PATHMODE=SIRWXU,
```

__ d. Pay attention to the case. Remember that UNIX is case sensitive.

__ e. Submit the job; it is ok to keep submitting the job until all errors are corrected (like the missing quotes)

- You can access SDSF with option S or option E.8.

Questions

Did you correct all errors?

_____

» Possible answers: See the solution in D80WW.EZP05V1.OMVS.LABS.SOLUTION.

- `/BIN/DATE` has to be lowercase. STDOUT path name has to be lowercase. PATH in STDERR has to be between quotes. PATHOUT and PATHDISP must be

```
//STEP1 EXEC PGM=BPXBATCH,REGION=4M,
//           PARM='pgm /bin/date'
//STDOUT   DD  PATH='/u/ezp05/tsa0150/date_stdout',
//             PATHOPTS=(OWRONLY,OCREAT,OTRUNC),PATHMODE=SIRWXU,
//             PATHDISP=(KEEP,DELETE)
//STDERR   DD  PATH='/u/ezp05/tsa0150/date_stderr',
//             PATHOPTS=(OWRONLY,OCREAT,OTRUNC),PATHMODE=SIRWXU,
//             PATHDISP=(KEEP,DELETE)
```

__ 28. Go to ISPF option 3.17 (UDL). (remember that you can open new ISPF screens with ISPF command ‘start’, and use F9 to jump back and forth, or use the swapbar).

__ a. Specify your home directory as the path name.

```
Pathname . . . /u/ezp05/tsa0###
```

__ b. Press Enter, and browse the content of **‘date_stdout’** which has been created by the previous job (line command B).

__ c. You can use also line commands **E** (edit), **I** (attribute), and **R** (rename).

The following is a list of all line commands:

```
E  - Edit a file      EA - Edit an ASCII file
V  - View a file      VA - View an ASCII file
B  - Browse a file    CO - Copy data out
N  - Create new entry CI - Copy data in
L  - List a directory MM - Modify mode fields
D  - Delete an entry  MX - Modify extended attributes
R  - Rename an entry  X  - Execute a z/OS UNIX or TSO command
I  - Display attributes
```

```
BROWSE    /u/ezp05/tsa0150/date_stdout
 Command ===>
******************************** Top of
Wed Apr 28 13:53:20  2021
```

__ 29. Let’s work with `OPUT` command now; before you submit the OPUT sample JCL, browse `TSA00`*0#*.OMVS.LABS(**HELLO**). How many lines of data are in it? Now submit the OPUT job. Go to ISPF 3.17 (UDL) and enter **refresh**.

Questions

Can you browse the file `/u/ezp05/tsa0###/hello`? How many lines are in the source file? How can you fix that? (note: you are not asked to fix it right now, it will be done in the next step using a different technique).

_____

» Possible answers:

- You can browse it, but it now contains only one long line. When we ran the OPUT we specified the bin option. To fix that, we have to remove the bin option.

__ 30. Go to ISPF option 6 (TSO command) and enter the following command with spaces and quotes:

```
OPUTX 'tsa0###.OMVS.LABS' '/u/ezp05/tsa0###/' LC CONVERT(YES)
```

Questions

What was the result of the above `OPUTX` command?

_____

» Possible answers:

- `OPUTX` is a command to copy the content of PDS/PDSE into an FileSystem directory. Data exchange between traditional MVS data sets and the hierarchical file system can be accomplished through the TSO/E copy commands that are provided with OpenEdition, `OCOPY`, `OPUT`, `OGET`, `OPUTX`, and `OGETX`. `OGETX` and `OPUTX` support partitioned data sets,

allowing you to copy all members of a partitioned data set in one command invocation. In addition, you can apply a suffix to the new files.

```
oput 'tsa0150.OMVS.LABS($JC)' '/u/ezp05/tsa0150/$jc'  CONVERT(YES)
oput 'tsa0150.OMVS.LABS(BPXBATNW)' '/u/ezp05/tsa0150/bpxbatnw'  CONVERT(YES)
oput 'tsa0150.OMVS.LABS(BPXBAT1)' '/u/ezp05/tsa0150/bpxbat1'  CONVERT(YES)
oput 'tsa0150.OMVS.LABS(BPXBAT2)' '/u/ezp05/tsa0150/bpxbat2'  CONVERT(YES)
oput 'tsa0150.OMVS.LABS(BPXBPGM)' '/u/ezp05/tsa0150/bpxbpgm'  CONVERT(YES)
oput 'tsa0150.OMVS.LABS(BPXCALC)' '/u/ezp05/tsa0150/bpxcalc'  CONVERT(YES)
oput 'tsa0150.OMVS.LABS(CALC)' '/u/ezp05/tsa0150/calc'  CONVERT(YES)
oput 'tsa0150.OMVS.LABS(HELLO)' '/u/ezp05/tsa0150/hello'  CONVERT(YES)
oput 'tsa0150.OMVS.LABS(LABPRG1)' '/u/ezp05/tsa0150/labprg1'  CONVERT(YES)
oput 'tsa0150.OMVS.LABS(LABPRG2)' '/u/ezp05/tsa0150/labprg2'  CONVERT(YES)
...
...
```

Questions

Can you browse the file `/u/ezp05/tsa0###/hello`? How many lines are in the source file?

_____

» Possible answers:

- Yes, you can browse it, and it has several lines

```
#include <stdio.h>
int
main()
{
        /* A very simple program... */
        printf("Hello, world\n");
        return 0;
}
```

__ 31. Try to execute member **BPXBAT2** from your lab data set (`tsa0###.OMVS.LABS`).

__ a. Look at the instructions in this member. BPXBATCH is executed twice, once with STDOUT and STDERR going to zFS/HFS files (the old way) and then with STDOUT and STDERR going to SYSOUT (or MVS sequential files). Also, notice how we can ask BPXBATCH to execute a shell (parm=SH) or a UNIX program (parm=PGM).

__ b. Submit the job, and look at the job's output in SDSF

__ 32. Execute member BPXPGM in order to execute command `java -fullversion`, and get the version and service level of Java.

__ a. Look at the output in SDSF

__ b. What is the java build level ? _____

```
JRE 1.8.0 IBM ZOS build 8.0.5.16 (SR5 FP16)
```

__ 33. Execute member **LABZFS1** to allocate a zFS (aggregate) named `tsa0###.ZFS.TEST`.

__ a. The first step allocates the zFS linear dataset (cluster), and the second step formats it as a compatibility mode aggregate using utility IOEAGFMT.

```
//SYSIN     DD *
  DEFINE CLUSTER (NAME(TSA0150.ZFS.TEST) -
  VOLUME(SMS001)  -
  LINEAR CYL(1  1) SHAREOPTIONS(2))
//IFZFS     IF DEFZFS.RC=0 THEN
//*-------------------------------------------------
//* FORMAT THE ZFS
//*-------------------------------------------------
//FORMAT   EXEC   PGM=IOEAGFMT,REGION=0M,COND=(0,NE),
// PARM=('-aggregate TSA0150.ZFS.TEST    -compat')
```

__ 34. Execute member **LABZFS2** to create a new directory (‘**zfs**’) and mount the newly allocated ZFS to this new mountpoint.

```
//SYSTSIN  DD  *
  PROFILE MSGID WTPMSG
  MKDIR '/u/ezp05/tsa0150/zfs' MODE(7,5,5)
  MOUNT FILESYSTEM('TSA0150.ZFS.TEST') +
   MOUNTPOINT('/u/ezp05/tsa0150/zfs') +
  MODE(RDWR) TYPE(ZFS) NOSETUID
//*
//STEP011  EXEC PGM=IKJEFT1B
//SYSEXEC  DD DISP=SHR,DSN=SYS1.SBPXEXEC
//SYSTSPRT DD SYSOUT=*
//SYSTERM  DD DUMMY
//SYSPRINT DD SYSOUT=*
//SYSTSIN    DD *
 /*  invoke zfsadm for zfs   */
     oshell  +
     zfsadm lsfs -aggregate TSA0150.ZFS.TEST -long
   oshell  zfsadm  aggrinfo TSA0150.ZFS.TEST
READY
  PROFILE MSGID WTPMSG
READY
  MKDIR '/u/ezp05/tsa0150/zfs' MODE(7,5,5)
READY
  MOUNT FILESYSTEM('TSA0150.ZFS.TEST') MOUNTPOINT('/u/ezp05/tsa0150/zfs')
NOSETUID MODE(READ)

IOEZ00129I Total of 1 file systems found for aggregate TSA0150.ZFS.TEST
TSA0150.ZFS.TEST 27,,5 RW (Mounted R/W)      states 0x10001 On-line
   17179869120 K alloc limit;        161 K alloc usage
           720 K quota limit;        161 K quota usage
             8 K Filesystem Inode Table            2 file requests

    version 1.5

Total file systems on-line 1; total off-line 0; total busy 0; total mounted 1

TSA0150.ZFS.TEST (R/W COMP): 559 K free out of total 720
```

__ 35. Edit and submit job **DF**, which executes shell command ‘df’; Look at the job’s output under SDSF ‘H’

note: you can enter "=6" to go to ISPF opt 6, on any ISPF command line to make calls from the primary ISPF menu without having to go all the way back out to the primary menu.

```
EDIT       TSA0150.OMVS.LABS(DF) - 0
Command ===> =6
****** ****************************
000001 //TSA0150S JOB 0000,'EZP05 OS
000002 //    CLASS=A,MSGCLASS=Q,NOTI
------------------------------------------
Enter TSO or Workstation commands below:

 ===>
```

note: the SDSF job output could be in more than one output file and you have to select each part of the job number submitted.

```
SDSF HELD OUTPUT DISPLAY ALL CLASSES LINES 4,527
COMMAND INPUT ===>
PREFIX=*  DEST=(ALL)  OWNER=*  SYSNAME=
NP   JOBNAME  JobID    Owner    Prty C ODisp Dest
     TSA0150S JOB04010 TSA0150   144 Q HOLD  LOCAL
     TSA0150S JOB04725 TSA0150   144 Q HOLD  LOCAL
     TSA0150S JOB04725 TSA0150   144 Q HOLD  LOCAL
OSHELL df -P /u/ezp05/tsa0150/zfs
READY
END
Sysname :
CZ01

Filesystem        512-blocks      Used  Available  Capacity Mounted on
TSA0150.ZFS.TEST          1440         322       1118       23%
/u/ezp05/tsa0150
```

You can also run USS commands from TSO option 6 with the OSHELL command, and execute OSHELL commands in batch:

a. `OSHELL ps -ef`

b. `OSHELL ls -al`

c. `OSHELL id`

d. `OSHELL df -P /u/ezp05/tsa0150/zfs`

e. `OSHELL df`

and so forth.

__ 36. See member ‘OSHELL’ in your OMVS.LABS dataset to see how to run various shell commands in batch with the OSHELL command.

__ 37. Now submit member **PAXDUMP**. This job backs up your ***labp**** files into an external MVS data set in `pax` format. Step 1) uses `pax` to backup zFS/HFS files into a backup `pax` file and step 2) lists the content of the `pax` file if backup RC=0.

```
READY
  oshell pax -wvf "//'TSA0150.DUMP.PAX'" /u/ezp05/tsa0150/lab*
READY
END
Sysname :
CZ01

-rw-------   1 TSA0150  S12EZP05    1458 Apr 28 11:57 /u/ezp05/tsa0150/labprg1
-rw-------   1 TSA0150  S12EZP05    3078 Apr 28 11:57 /u/ezp05/tsa0150/labprg2
-rw-------   1 TSA0150  S12EZP05     567 Apr 28 11:57 /u/ezp05/tsa0150/labprg3
-rw-------   1 TSA0150  S12EZP05    8667 Apr 28 11:57 /u/ezp05/tsa0150/labprg4
-rw-------   1 TSA0150  S12EZP05    6156 Apr 28 11:57 /u/ezp05/tsa0150/labprg5
-rw-------   1 TSA0150  S12EZP05    3726 Apr 28 11:57 /u/ezp05/tsa0150/labprg6
-rw-------   1 TSA0150  S12EZP05    6723 Apr 28 11:57 /u/ezp05/tsa0150/labprg7
-rw-------   1 TSA0150  S12EZP05     162 Apr 28 11:57 /u/ezp05/tsa0150/labprg8
-rw-------   1 TSA0150  S12EZP05    7614 Apr 28 11:57 /u/ezp05/tsa0150/labprg9
```

__ 38. Go to ISPF 3.17 (UDL), and delete all the **`labprgx`** files in your directory, or issue command:

```
rm /u/ezp05/tsa0###/labp*
```

__ 39. Verify that there is no labp* files left in your directory, using ishell or command

```
ls -l /u/ezp05/tsa0###/labp*
ls: FSUM6785 File or directory "/u/ezp05/tsa0165/labp*" is not found
```

__ 40. Now execute member **PAXREST**. This job restores your files from the external `pax` MVS data set. Step 1 puts the `pax` file into the Hierarchical Filesystem. Step 2 `unpax` the file to restore all `labprgx` files. Step 3 deletes the `pax` file after the restore.

__ 41. Go to ISPF 3.17 (UDL), refresh, and verify that all `labprgx` files have been restored or use command:

```
ls -l lu/ezp05/tsa0###/labp*
-rw-------   1 TSA0165  S12EZP05    1458 May  4 11:07 /u/ezp05/tsa0165/labprg1
-rw-------   1 TSA0165  S12EZP05    3078 May  4 11:07 /u/ezp05/tsa0165/labprg2
-rw-------   1 TSA0165  S12EZP05     567 May  4 11:07 /u/ezp05/tsa0165/labprg3
-rw-------   1 TSA0165  S12EZP05    8667 May  4 11:07 /u/ezp05/tsa0165/labprg4
-rw-------   1 TSA0165  S12EZP05    6156 May  4 11:07 /u/ezp05/tsa0165/labprg5
-rw-------   1 TSA0165  S12EZP05    3726 May  4 11:07 /u/ezp05/tsa0165/labprg6
-rw-------   1 TSA0165  S12EZP05    6723 May  4 11:07 /u/ezp05/tsa0165/labprg7
-rw-------   1 TSA0165  S12EZP05     162 May  4 11:07 /u/ezp05/tsa0165/labprg8
-rw-------   1 TSA0165  S12EZP05    7614 May  4 11:07 /u/ezp05/tsa0165/labprg9
```

__ 42. In UDLIST 3.17, browse the content of rexx file **`myrex1`**, and execute it with line command **`X`**, and option 1 (direct), then again with line command <.

Questions

Did it work? What error do you get?

_____

» Possible answer:

- You might get insufficient access to execute. see yellow message in the upper right corner

```
Permission denied
```

- note: when you have a message in the ISPF screens, they you can use F1 to get a better explanation of the message. But F1 will not work if you have continued on and the message has cleared.

Questions

What are the permission bits of file `myrex1`?

_____

» Possible answer:

- 600, so the execute bits are not set for owner, group, and other.

```
myrex1          Browsed          File rw-------  fff--- --s- ----
```

__ 43. Type line command **I** in front of `myrex1`, and select modify to change the Mode Fields.

Questions

How should you set the permission bits of `myrex1` so that you can execute it?

_____

» Possible answers:

- 755, so other has execute permission; 111=7(RWX) for owner, 101 =5 for group (RX), and 101=5 (RX) for other.

```
Modify  Display
sssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssss
                          z/OS UNIX File Information
Command ===>

Pathname  . . : /u/ezp05/tsa0150/myrex1

General Data                                Mode Fields
 File Type . . : File                        Permissions . : 600
 File Size . . : 1701                        Set User ID . : NO
 Links . . . . : 1                           Set Group ID  : NO
 Inode . . . . : 24D                         Sticky Bit  . : NO
 File Format . : ----
 Last Modified : 2021/04/28 11:57:59        Extended Attributes

Modify  Display
sssssssssssssssssssssssssss
 1  1. Mode Fields...
    2. Extended Attributes...
    3. Owning User...
    4. Owning Group...
    5. File Format....
    6. User Auditing...
    7. Auditor Auditing...

Modify z/OS UNIX File Mode Fields
Command ===>

Pathname . : /u/ezp05/tsa0150/myrex1
Type . . . : File

Permissions  755  (Octal)

Enter "/" to select option
   Set UID bit
   Set GID bit
   Sticky bit
```

__ 44. Enter PF3 until you return to the directory list

__ 45. Try to execute **myrex1** again as stated in Q42 above. It should now work.

```
z/OS UNIX Directory List         Row 53 to 72 of 79
Command ===>                                          Scroll ===> CSR

Pathname . : /u/ezp05/tsa0150
EUID . . . : 100050150
Command  Filename        Message          Type Permission Audit  Ext  Fmat
-------------------------------------------------------------------------------
  <      myrex1          Ended 0          File rwxr-xr-x  fff--- --s- ----


BROWSE    /tmp/TSA0150.07:26:23.32.stdout.ispfudl  Line 0000000000 Col 001 080
 Command ===>                                          Scroll ===> PAGE
******************************** Top of Data ********************************
hello world
using address TSO under shell...
sysname :  CZ01
using address syscall...
gid: 0
using address sh...
id:
uid=100050150(TSA0150) gid=678(STUDENT) groups=120050000(S12EZP05)
currently mounted filesystems..
Mounted on     Filesystem               Avail/Total    Files      Status
/u/ezp05/tsa0150/zfs (TSA0150.ZFS.TEST)       1118/1440      4294967292 Availab
/u/ezp05       (D80WW.EZP05V1.ZFS)       200222/216000  4294966686 Available
/CZ01/var/wbem (OMVS2.SCFZHFS2)          212366/357120  4294963090 Available
/V2R3/usr/lpp/liberty_zos (OMVS.V2R3.SBBLZFS)       49838/2598080  4294954688 Av
/CZ01/var/zosmf (OMVS2.SIZUUSRD)          233094/375840  4294963445 Available
/u/es10/students (D80WW.ES10V15.ZFS)       38734/43200    4294966958 Available
...
...
```

__ 46. Go to the OMVS shell, and edit with oedit file calc.c

```
EDIT       /u/ezp05/tsa0150/calc.c                        Columns 00001 00072
Command ===>                                                Scroll ===> PAGE
****** ***************************** Top of Data ******************************
000001 /*
000002 // Display the list of arguments received by main by doing
000003 // precede each chain received by its offset in the list
000004 // argument and its length
000005 */
000006 #include <stdlib.h>
000007 #include <stdio.h>
000008
000009 int main(int argc,char *argvÝ¨)
000010 {
000011   int index=0,n1,n2,res;
000012   for(;index<argc;index++)
000013    printf("offset:%d length: %d %s\n",index,strlen(argvÝindex¨),argvÝind
000014
000015   n1=atoi(argvÝ1¨)  ;
000016   n2=atoi(argvÝ3¨)  ;
000017   switch(argvÝ2¨Ý0¨)
000018   {
```

Question: why do brackets ([ ]) show up as funny symbols?

- Answer: go to ISPF option 0 and ensure your terminal type is 3278A.

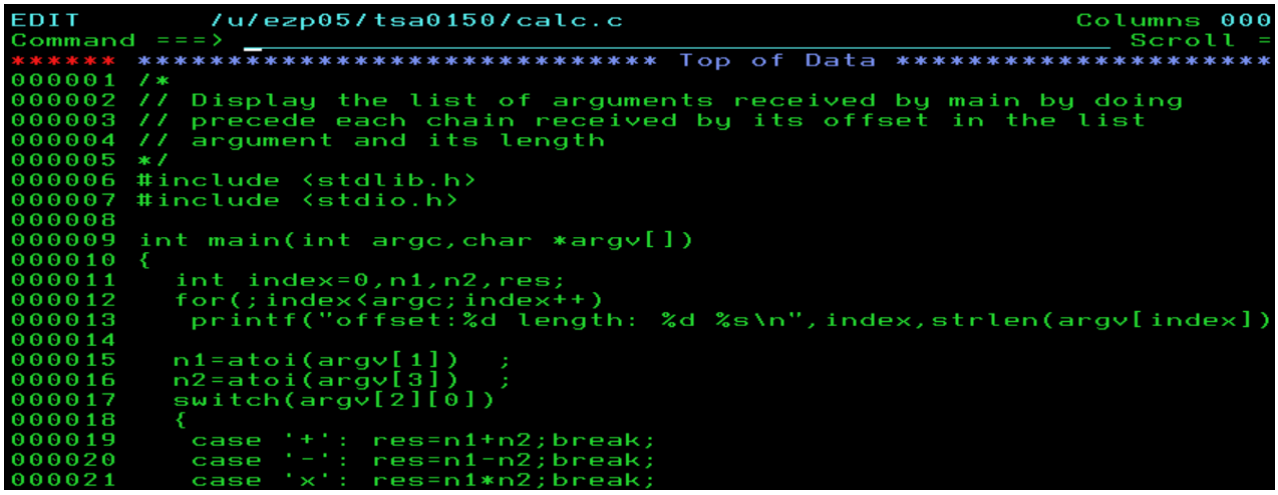
```
Menu  Utilities  Compilers  Options  Status  Help
 ------------------------------------------------
                            ISPF Primary Option Menu
 Option ===> 0

 0  Settings      Terminal and user parameters
--------------------------------------------------------------------------
```

- Scroll down (PF8), and select Terminal Type 4 . 3278A

```
Log/List  Function keys  Colors  Environ  Workstation  Identifier  Help
sssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssss
                              ISPF Settings
Command ===>
                                                                    More:
     Jump from leader dots
     Edit PRINTDS Command
     Always show split line
     Enable EURO sign

Member list options
  Enter "/" to select option
  /  Scroll member list
     Allow empty member list
     Allow empty member list (nomatch)
  /  Empty member list for edit only

Terminal Characteristics
  Screen format   2  1. Data    2. Std     3. Max     4. Part

  Terminal Type   4    1. 3277      2. 3277A     3. 3278      4. 3278A
                       5. 3290A     6. 3278T     7. 3278CF    8. 3277KN
```

__ 47. Press Enter , and PF3 to save

__ 48. Reopen oedit for file calc.c; you should now display the correct characters.



__ 49. Exit from edit with PF3, to return to the OMVS shell.

__ 50. enter the following command: **c89 -o calc calc.c**

Questions

What is the purpose of this command?

_____

» Possible answer:

- `c89` will perform the compilation of the `c` source file `calc.c` and produce a calc load module file in the same Filesystem directory.

```
TSA0150:/u/ezp05/tsa0150: >c89 -o calc calc.c
TSA0165:/u/ezp05/tsa0165: >ls -al calc*
-rw-------   1 TSA0165  S12EZP05   73728 May  4 14:45 calc
-rw-------   1 TSA0165  S12EZP05    2673 May  4 11:06 calc.c
-rw-r--r--   1 TSA0165  S12EZP05    5040 May  4 14:45 calc.o
```

__ 51. A new program file has been generated by the c compiler: ‘calc’

__ 52. Try to browse the content of this file with obrowse: obrowse calc

```
BROWSE    /u/ezp05/tsa0150/calc                  Line 0000000000 Col 001 080
 Command ===>                                                 Scroll ===> PAGE
******************************** Top of Data ********************************
IEWPLMH ...Ì...................Ì...........ð...........m...h...................
ç.....ø.....q.....{.....Y.................-. ...h.<.à.....ð.à..3{........211....
gxM.Å
«x©.À×"£Kxd.-j.Ø.xU.*j.Ø.xÈ.ìx4..ì0£ó.Õ.öxd..×"£-xd..ì0ø.ìÒ..q.}....öxd..ìøB½ì0'
....x4.....
..ì-..ìÃ..ìÃ..ìÃ.à×?-.ì0-...........µ............."...Ø...Ø........ó°....Ð......
.IBM...-...Ð...Ð...Ð...Ð...Ð...Ð...Ð...Ð...Ð...Ð...Ð...Ð...d...Ð...Ð...Ð...Ê
.----------------.........ó~....Y.........{......°.... ......&.....Ùì.... ..7...
{...Y.....................................-.......h.......^.......Q.......
D............C_@@PPA2        ..........Ø.....C_WSA           ...æ............B_I
{................ERWXM............Ø .....Ø...Ø..ÂØ.....................Y.......
Ø.....................................................ERWXM............. .....Ø.......
{................ED  .....................Ø..Ã....Ø.....................
```

It’s an executable program file.

__ 53. Press PF3 to exit browse mode

__ 54. Try to invoke this simple calculation program:

```
./calc 9 / 3
```

__ 55. Did it work ? _____

```
TSA0150:/u/ezp05/tsa0150: >./calc 9 / 3
./calc: FSUM9209 cannot execute: reason code = ef076015: EDC5111I Permission den
ied.
```

__ 56. Fix the problem with the chmod command

```
TSA0150:/u/ezp05/tsa0150: >ls -al calc
-rw-------   1 TSA0150  S12EZP05   73728 Apr 29 03:37 calc
TSA0150:/u/ezp05/tsa0150: >chmod 755 calc
```

__ 57. Try again:

```
./calc 9 x 3
./calc 12 - 7
./calc 15 / 5
./calc 23 + 34
```

Information

Be careful how you enter your command: it can produce unexpected results

calc 9 **/3** is not the same as calc 9 **/ 3**

the program expects 4 arguments:

arg 1 : calc
arg2: 9
arg3: /3 !!!

__ 58. edit file BPXCALC using OEDIT, update it to select whatever simple arithmetic operation you want, then exit with PF3 to save.

```
EDIT       /u/ezp05/tsa0150/bpxcalc                          Columns
Command ===>                                                   Scro
****** ***************************** Top of Data ****************
000001 //TSA01505 JOB 0000,'EZP05 BPXCALC   ',MSGLEVEL=(1,1),
000002 //    CLASS=A,MSGCLASS=Q,NOTIFY=&SYSUID,REGION=0M
000003 //*************************************************************
000004 //*************************************************************
000005 //*
000006 //*   BPXBATCH sample executes a program.
000007 //* Check the outputs in the  sysout .
000008 //*
000009 //*************************************************************
000010 //STEPNAME EXEC PGM=BPXBATCH,REGION=8M,
000011 //         PARM='PGM /u/ezp05/tsa0150/calc 4 x 9'
000012 //STDOUT   DD  SYSOUT=*
000013 //STDERR   DD  SYSOUT=*
```

__ 59. **submit** file member **BPXCALC** with the shell 'submit' command:

```
submit "//'TSA0###.OMVS.LABS(BPXCALC)'"
08.07.08 JOB03819 $HASP165 TSA01505 ENDED AT MVSCZ01  MAXCC=0000 CN(INTERNAL)
***
```

__ 60. to see your job output, from the OMVS shell, enter ‘SDSF’ and press PF6 (TSO)

```
TSA0150:/u/ezp05/tsa0150: >submit bpxcalc
JOB JOB03819 submitted from path 'bpxcalc'
TSA0150:/u/ezp05/tsa0150: >
 ===> SDSF
                                                                  INPUT <1>
ESC=^   1=Help      2=SubCmd    3=HlpRetrn  4=Top       5=Bottom    6=TSO
        7=BackScr   8=Scroll    9=NextSess 10=Refresh  11=FwdRetr  12=Retrieve
```

__ 61. Enter H for held outputs

```
SDSF MENU V2R3M0    PLEX1     CZ01                     L
COMMAND INPUT ===> h
NP   NAME     Description              Group    Status
     DA       Active users             Jobs
     I        Input Queue              Jobs
     O        Output Queue             Output
     H        Held output Queue        Output
     ST       Status of jobs           Jobs
     JG       Job groups               JES
     SYM      System symbols           System
     SE       Scheduling environments  WLM
```

__ 62. Go to the bottom to see the last job submitted, and select it to view the job results

```
SDSF OUTPUT DISPLAY TSA01505 JOB03819  DSID     3 LINE 12      COLS 02- 81
 COMMAND INPUT ===>                                            SCROLL ===> PAGE
          //        PARM='PGM /u/ezp05/tsa0150/calc 4 x 9'
        3 //STDOUT   DD  SYSOUT=*
        4 //STDERR   DD  SYSOUT=*
ICH70001I TSA0150  LAST ACCESS AT 08:05:26 ON THURSDAY, APRIL 29, 2021
IEFA111I TSA01505 IS USING THE FOLLOWING JOB RELATED SETTINGS:
         SWA=BELOW,TIOT SIZE=32K,DSENQSHR=DISALLOW,GDGBIAS=JOB
IEF236I ALLOC. FOR TSA01505 STEPNAME
IEF237I JES2 ALLOCATED TO STDOUT
IEF237I JES2 ALLOCATED TO STDERR
IEF142I TSA01505 STEPNAME - STEP WAS EXECUTED - COND CODE 0000
IEF285I   TSA0150.TSA01505.JOB03819.D0000101.?         SYSOUT
IEF285I   TSA0150.TSA01505.JOB03819.D0000102.?         SYSOUT
IEF373I STEP/STEPNAME/START 2021119.0807
IEF032I STEP/STEPNAME/STOP  2021119.0807
        CPU:     0 HR  00 MIN  00.00 SEC    SRB:     0 HR  00 MIN  00.00 SEC
        VIRT:   164K  SYS:   244K  EXT:       16K  SYS:    12040K
        ATB- REAL:                 1044K  SLOTS:                    0K
             VIRT- ALLOC:      11M SHRD:       0M
IEF375I  JOB/TSA01505/START 2021119.0807
IEF033I  JOB/TSA01505/STOP  2021119.0807
        CPU:     0 HR  00 MIN  00.00 SEC    SRB:     0 HR  00 MIN  00.00 SEC
offset:0 length: 21 /u/ezp05/tsa0150/calc
offset:1 length: 1 4
offset:2 length: 1 x
offset:3 length: 1 9
This result is:
36
----------------
```

__ 63. Press PF4 to return to the OMVS shell

__ 64. In the OMVS shell and enter the following command: **`ls -al hello*`**

__ 65. Rename file hello to hello.c:

```
mv hello hello.c
```

__ 66. Edit the **hello.c** file using the **oedit hello.c** command to display its content. Then **exit**.

```
EDIT       /u/ezp05/tsa0150/hello.c
Command ===>
****** **************************** Top of Data *
000001 #include <stdio.h>
000002 int
000003 main()
000004 {
000005         /* A very simple program... */
000006         printf("Hello, world\n");
000007         return 0;
000008 }
```

__ 67. Enter **c++ -o hello hello.c** (to compile c++ file hello.c and produce an executable file hello)

__ 68. Then enter **ls hello***.

Questions

How many files did you find?

_____

» Possible answer:

- Normally 3 (`hello.c` source file, `hello.o` object file, and `hello` executable file).

  (note: helloj is not related, it was copied before from OMVS.LABS)

```
TSA0150:/u/ezp05/tsa0150: >c++ -o hello hello.c
TSA0150:/u/ezp05/tsa0150: >ls hello*
hello    hello.c  hello.o
```

__ 69. Try to execute **hello** under the OMVS shell.

Questions

Was it successful? Any idea why?

_____

» Possible answer:

- You might get message `FSUM7351 not found because the current` directory is not in the PATH.

__ 70. Enter **echo $PATH**.

Is your current directory in the PATH?

__ 71. Enter **ls -al hello**

What are the permission bits of hello? (It should be 755.)

```
TSA0150:/u/ezp05/tsa0150: >ls -al hello
-rwxr-xr-x   1 TSA0150  S12EZP05   90112 Apr 29 04:51 hello
```

__ 72. If needed, change the permission bits so that everyone can execute it. Use **chmod 755 hello** (you can also use ISPF 3.17 UDL with line command **mm**).

__ 73. Now execute the **hello** program with **./hello** (notice how dot ./ has been specified to indicate that you want to execute **hello** in the current directory).

```
TSA0150:/u/ezp05/tsa0150: >hello
hello: FSUM7351 not found
TSA0150:/u/ezp05/tsa0150: >./hello
Hello, world
```

__ 74. Copy a sample source java program in your directory with command OPUT (from ISPF opt 6 or from OMVS and PF6):

```
Oput 'TSA0###.OMVS.LABS(HELLOJ)'    '/u/ezp05/tsa0###/HelloWorld.java'
TSA0150:/u/ezp05/tsa0150: >ls Hel*
HelloWorld.java
```

__ 75. Try to compile this java program with command javac

```
javac HelloWorld.java
```

__ 76. Did it work ? _____

```
TSA0150:/u/ezp05/tsa0150: >javac HelloWorld.java
javac: FSUM7351 not found
```

The JAVA HOME directory is not found in your PATH.

The JAVA code is in /usr/lpp/java/J8.0_64/

```
ls /usr/lpp/java/J8.0_64/
TSA0150:/u/ezp05/tsa0150: >ls /usr/lpp/java/J8.0_64/
HelloWorld.class  demo             mvstools          sample
IBM               docs             notices.txt       src.zip
JDK_INSTALL_OK    include          properties        standard
bin               lib              readme.txt
copyright         license_en.txt   release
```

__ 77. Enter the following export commands:

TSA0150:/u/ezp05/tsa0150: >export JAVA_HOME=/usr/lpp/java/J8.0_64/

TSA0150:/u/ezp05/tsa0150: >export PATH=$PATH:$JAVA_HOME/bin

TSA0150:/u/ezp05/tsa0150: >echo $PATH

```
TSA0150:/u/ezp05/tsa0150: >export JAVA_HOME=/usr/lpp/java/J8.0_64/
TSA0150:/u/ezp05/tsa0150: >export PATH=$PATH:$JAVA_HOME/bin
TSA0150:/u/ezp05/tsa0150: >echo $PATH
/bin:/usr/lpp/java/J8.0_64//bin
```

__ 78. Try again the java compile

TSA0150:/u/ezp05/tsa0150: >javac HelloWorld.java

```
TSA0150:/u/ezp05/tsa0150: >javac HelloWorld.java
TSA0150:/u/ezp05/tsa0150: >ls Hell*
HelloWorld.class  HelloWorld.java
```

__ 79. Execute the java program:

```
java HelloWorld
TSA0150:/u/ezp05/tsa0150: >java HelloWorld
Hello, World
```

__ 80. Add those 2 statements in your .profile so that the change will become permanent for every new shell you will start.

```
export JAVA_HOME=/usr/lpp/java/J8.0_64/
export PATH=$PATH:$JAVA_HOME/bin
EDIT       /u/ezp05/tsa0150/.profile
Command ===>
000270 alias dir="ls -l"
000271 export PS1='$LOGNAME:$PWD: >'
000272 export TZ=GMT-1
000273 export JAVA_HOME=/usr/lpp/java/J8.0_64/
000274 export PATH=$PATH:$JAVA_HOME/bin
```

__ 81. Enter **id**.

Questions

What is your UID?

_____

» Possible answer:

- It should be 100050**001** for tsa0001, 100050**002** for tsa0002, and so forth.

```
TSA0150:/u/ezp05/tsa0150: >id
uid=100050150(TSA0150) gid=678(STUDENT) groups=120050000(S12EZP05)
```

__ 82. You can also use the **su** command to switch to another user ID when you are 'superuser' or if you know the other user's password. Your current userid settings will not allow you to perform 'su'.

__ 83. If you want to try some other UNIX System Services shell commands, refer to UNIX System Services Command Reference, SA22-7802.

Examples:

df

echo: Use this command to send a message to the operator console (note: you don't have access to the console or SDSF log, but your message will still be sent...)

```
echo 'this is my message from' $(id) at $(date) > /dev/console
```

mount -q / to find out all the lower mount points down any directory; it is very useful to understand if a directory has lower file systems mounted down its hierarchy directory structure. (note: mount is in /usr/sbin/)

```
TSA0150:/u/ezp05/tsa0150: >TSA0150:/u/ezp05/tsa0150: >/usr/sbin/mount -q /
/u/ezp05/tsa0150/zfs
/CZ01/var/zosmf
/CZ01/var/wbem
/u/es10/students
/u/ezp05
/CZ01/etc
/CZ01/var
/CZ01/tmp
/CZ01/dev
/V2R3/usr/lpp/fonts
/V2R3/usr/lpp/netview/v6r2m1
/V2R3/usr/lpp/TWS
/V2R3/usr/lpp/IBM/pli/v5r1
/V2R3/usr/lpp/IBM/cobol/igyv6r1
/V2R3/usr/lpp/apa/v13r1
/V2R3/usr/lpp/encryptionfacility
/V2R3/usr/lpp/ing
/V2R3/usr/lpp/ixm
/V2R3/usr/lpp/kan
/V2R3/usr/lpp/mqm/V9R0MX
/V2R3/usr/lpp/mqmfte/V9R0Mx
/V2R3/usr/lpp/opmei
/V2R3/usr/lpp/IBM/azfv1r2
```

unmount :

__ a. In which filesystem is your own directory 'zfs' mounted ?: df zfs

_____

```
TSA0150:/u/ezp05/tsa0150: >df zfs
Mounted on     Filesystem               Avail/Total    Files      Status
/u/ezp05/tsa0150/zfs (TSA0150.ZFS.TEST)       1118/1440     4294967292 Availab
le
```

__ b. unmount **TSA0###.ZFS.TEST** (/usr/sbin/unmount)

```
TSA0150:/u/ezp05/tsa0150: >/usr/sbin/unmount -f TSA0###.ZFS.TEST
```

__ c. In which filesystem is your directory zfs now mounted ?: df zfs

```
TSA0150:/u/ezp05/tsa0150: >df zfs
Mounted on     Filesystem              Avail/Total    Files      Status
/u/ezp05       (D80WW.EZP05V1.ZFS)     199710/216000  4294966683 Available
```

__ d. Verify with mount -q

```
TSA0150:/u/ezp05/tsa0150: >/usr/sbin/mount -q zfs
/u/ezp05
```

bpxmtext: Useful to get online help for error messages help and return/reason codes (example: bpxmtext 005A).

tsocmd: To issue TSO commands under OMVS: tsocmd “lu”

history (or h): Retrieve all commands issued under the shell.

r: Retrieve and execute one of the listed commands from the history (example: r 10).

wall: To send broadcast messages to all UNIX logged inusers: wall test message to all

```
TSA0150:/u/ezp05/tsa0150: >wall test message to all

Broadcast message from TSA0150@CZ01 (ttyp0000) at 10:52:21 GMT-1 ...

test message to all
```

uname: To get the system environment and version/release: uname -a

fuser -u / (FUSER Utility lists the processes that are currently using a file or directory), -c option is useful when you want to unmount a file system.

Note

Note on special characters, oedit, EBCDIC and codepage conversion:

Why do brackets ([ ]) show up as funny symbols?

it could also be due to a mismatch between the z/OS system's default encoding and the actual encoding of the member edited by oedit.

Brackets are variant characters that have different hex values in different EBCDIC code pages. For example, in IBM-1047, their hex values are 0xAD and 0xBD, while in IBM-037, their hex values are 0xBA and 0xBB. If your default system encoding is set to IBM-1047, but the member being imported is really in IBM-037, you'll see exactly this behavior.

The code page for unix shell is already IBM 1047.

When you enter OMVS with CONVERT(BPXFX111) on your OMVS command, you can see normal square brackets instead of the odd characters.

If you don't, then go to ISPF option 0 and ensure your terminal type is 3278A

To determine the hex values of the characters in the member, you can open the member in the ISPF editor and use the hex on command to display the hex values (use hex off to turn them off again).

Square brackets are not standard characters in EBCDIC. The ones that work for Java are hex 'AD' and 'BD'.

C is another problem child. It uses funky characters like the square brackets '[]', curly brackets '{}' and broken vertical bar '¦'. These move around (or disappear) depending on your code page. But with C there is another catch: it's designed to use EBCDIC 1047, not EBCDIC 0037.

So if you're using arrays in C, the line:

```
char cvtstuff[140];
```

is fine if you're using IBM1047.

For IBM0037, it becomes:

```
char cvtstuffÝ140´
```

If you're using EBCDIC 0050, another common EBCDIC code page, it becomes:

```
char cvtstuffÝ140"
```

So why is C designed for EBCDIC 1047? Because z/OS Unix Systems Services (USS) is also designed for it.

When IBM created USS for z/OS, it had to work in EBCDIC. The POSIX standard for UNIX doesn't require the use of ASCII, and z/OS is an EBCDIC operating system. So it was designed to work for EBCDIC-1047.

The problem is that UNIX, and its core programming language C, rely on characters that don't exist in some EBCDIC codepages. EBCDIC 1047 is designed to include all the characters USS needs - effectively all the characters from Extended ASCII: ISO8859-1.

So EBCDIC 1047 is the default EBCDIC codepage used in USS. All parameter and help files are usually supplied in EBCDIC 1047, the C compiler expects code in EBCDIC 1047, and all UNIX file contents default to EBCDIC 1047. If you decide to use something else, they may look a little funny.

Part 4: SSH, remote shell, FTP

Information

The z/OS OpenSSH program product is a port of OpenSSH provided by IBM as part of z/OS.

For the open source documentation, see http://www.openssh.org.

OpenSSH provides secure encryption for both remote login and file transfer. Some of the utilities that it includes are:

- ssh, a z/OS client program for logging into a z/OS shell. It can also be used to log into other platform's UNIX shells. It is an alternative to rlogin.
- scp for copying files between networks. It is an alternative to rcp.

- sftp for file transfers over an encrypted ssh transport. It is an interactive file transfer program similar to ftp.
- sshd, a daemon program for ssh that listens for connections from clients.

Other basic utilities such as ssh-add, ssh-agent, ssh-keysign, ssh-keyscan,ssh-keygenand sftp-serverare also included.

How does z/OS OpenSSH differ from the open source version? What z/OS OpenSSH supports ?

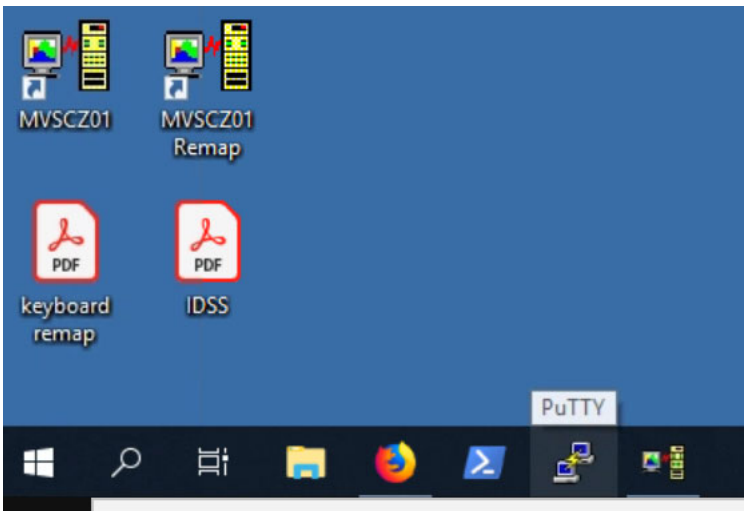
- sftp can treat files as binary or text.By default, sftp assumes that files are binary. Files transferred between EBCDIC and ASCII platforms are not converted. For file transfers between z/OS and ASCII UNIX platforms, you might need to convert your files (treat them as text).
- The sftpascii subcommand can be used to transfer files in ASCII between the local host and a remote UNIX host. This subcommand assumes that the file data on the network should be encoded in ISO/IEC 8859-1.
- The sftpbinary subcommand can be used to disable this conversion and return to performing binary file transfers.
- scp treats files as text. By default, scp performs ASCII/EBCDIC conversion on files. .ssh, sftp and scp are restricted from using passwords when running in a 3270 environment.The OpenSSH client (ssh) cannot use passwords when being run from OMVS (which is a 3270 session).
- sftp and scp invoke ssh as part of their processing, so they have the same restriction.

SSH has been implemented on your host, so you are going to login to your z/OS account using ssh.

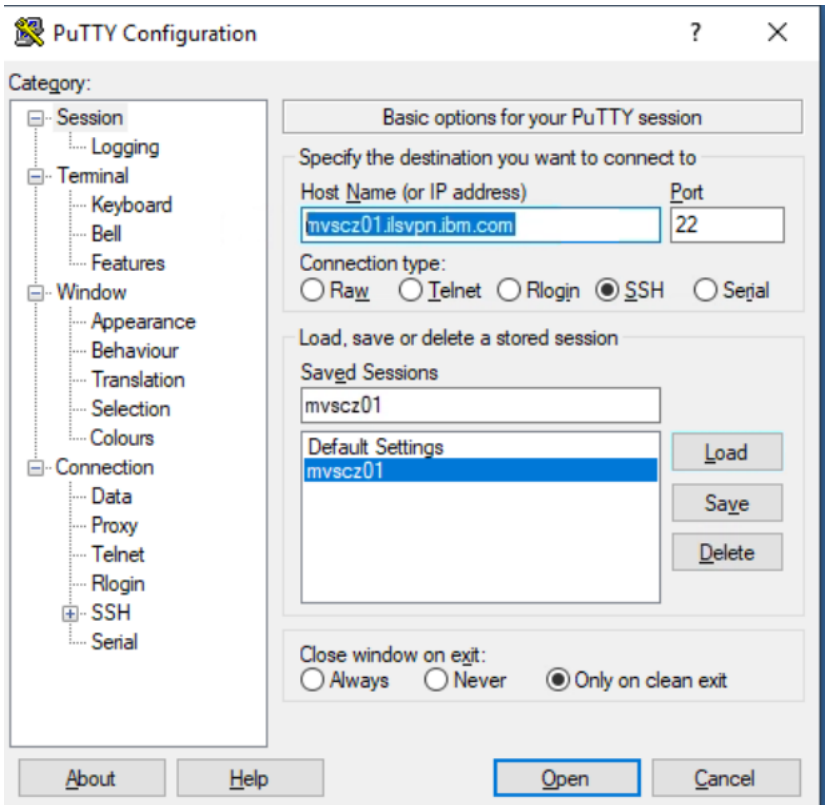
__ 1. Return to your vmware desktop.

__ 2. You should be able to find an icon for the ‘putty’ utility in the taskbar. Double click it to open it.

PuTTY is a free and open-source terminal emulator, serial console and network file transfer application. It supports several network protocols, including SCP, SSH, Telnet, rlogin

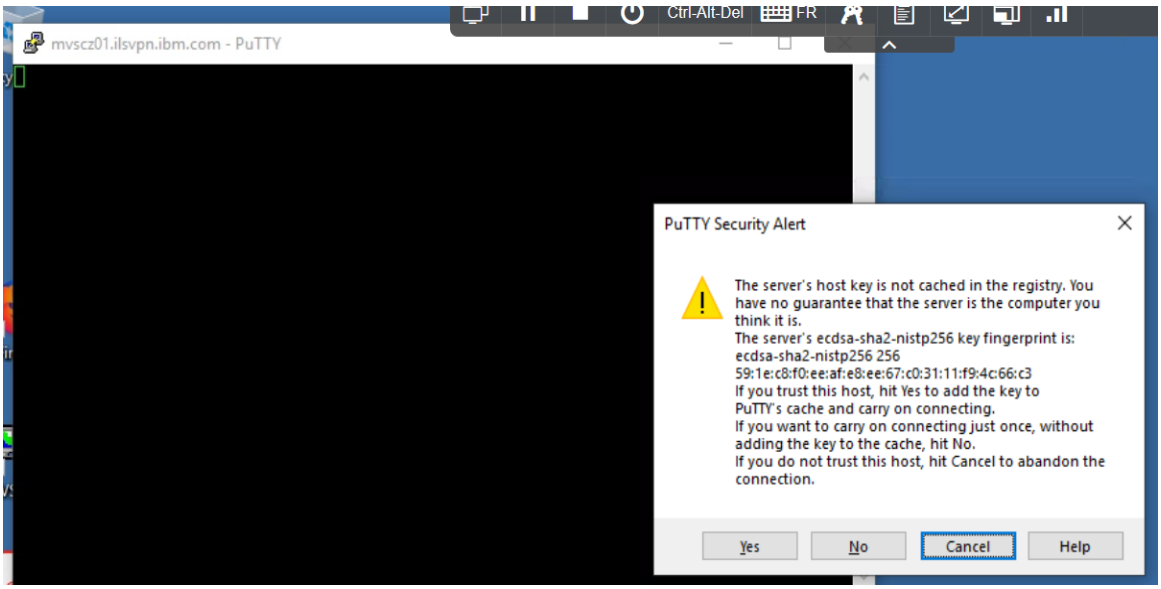


__ 3. Select and load session ‘mvscz01’ if you see it.



__ 4. If there is no saved session for mvscz01, create a new one with this hostname: mvscz01.ilsvpn.ibm.com, and port 22 (ssh)

__ 5. then click open to start it.



The first login attempt on your workstation to this host will detect that you have never cached the server's host key. You will get a warning message when you try to connect to a new server using SSH.

When connecting using SSH to connect to a server for the first time you will prompted to trust the host key of the server as below:

The server's host key is not cached in the registry. You have no guarantee that the server is the computer you think it is. The server's rsa2 key fingerprint is: ssh-rsa 2048 xx:xx:xx:xx:xx:xx:xx:xx:xx:xx:xx:xx:xx:xx:xx:xx

By default, SSH will ask for password authentication each time. This is enforced for security reasons. However, it is safer and recommended to use public-private key authentication mechanism. It can be configured by generate a public-private key pair.

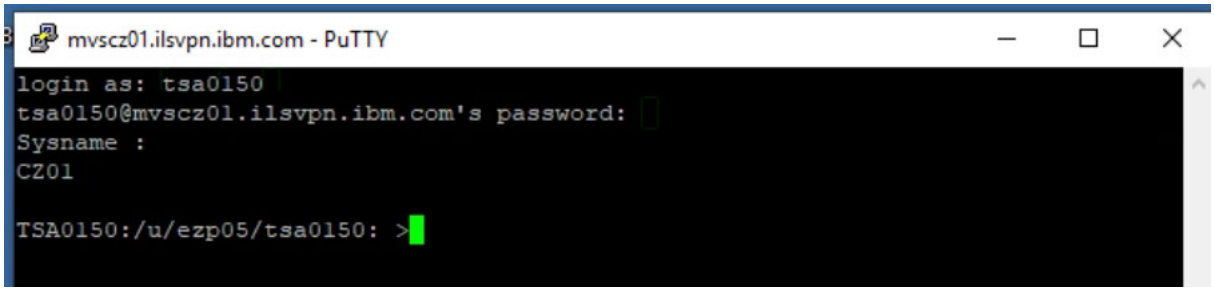
SSH provides the ssh-keygen utility which can be used to generate key pairs on local machine. The generated key pairs are stored under your local host ~/.ssh directory.

You then have to add public key to ~/.ssh/authorized_keys file on the remote host.

This is beyond the scope of this introductory course, so you will not do it, and just use the password authentication mechanism.

__ 6. You must accept to store the server's host key in cache, by clicking 'YES'.

The login shell should will proceed and show:



- Enter your host credentials (login: tsa0###, and password)

You are now logged to another type of shell interface: ASCII raw terminal.

__ 7. Enter some unix shell commands:

```
id
whoami
netstat
hostname
uname -a
./calc 9 x 7
submit bpxcalc
JOB JOB03927 submitted from path 'bpxcalc'
ps -ef (you should see a new process for your sshd login session)
TSA0150:/u/ezp05/tsa0150: >ps -ef
     UID        PID       PPID  C    STIME TTY       TIME CMD
 TSA0150   83952216   16843357  - 16:47:37 ttyp0000  0:00 ps -ef
 TSA0150   16843357   33620863  - 16:36:58 ttyp0000  0:00 -sh
 TSA0150   33620863   33620576  - 16:36:58 ?         0:00 /usr/sbin/sshd -f
/etc/ssh/sshd_config -R
```

__ 8. Can you invoke oedit or obrowse ? _____

```
TSA0150:/u/ezp05/tsa0150: >id
uid=100050150(TSA0150) gid=678(STUDENT) groups=120050000(S12EZP05)
TSA0150:/u/ezp05/tsa0150: >uname -a
OS/390 CZ01 26.00 04 2827
TSA0150:/u/ezp05/tsa0150: >oedit
FOMF0141I Unable to set 3270 passthrough mode
```

In this environment, the only way to edit files is via the unix (in)famous ‘vi’ editor. The 3270 ISPF environment is not available.

__ 9. Browse file ‘data1’ with utility cat: cat data1

__ 10. Try to edit file data1 with vi: vi data1

__ 11. Type ‘:q!’ (without the quotes) to leave vi

__ 12. If you’re familiar with vi, try to edit a file, add lines, delete lines, replace strings, save your changes and exit.

Information

If you’re interested in playing with vi, you can refer to the following web site, which gives you how-to instructions, and also contains a ‘cheat sheet’ to help you get started.

https://developer.ibm.com/technologies/linux/tutorials/l-vi/

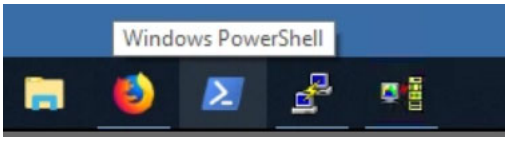
Command execution over SSH

Many times we need to work with remote Unix/Linux systems. We login to the remote host, perform work and exit that session.

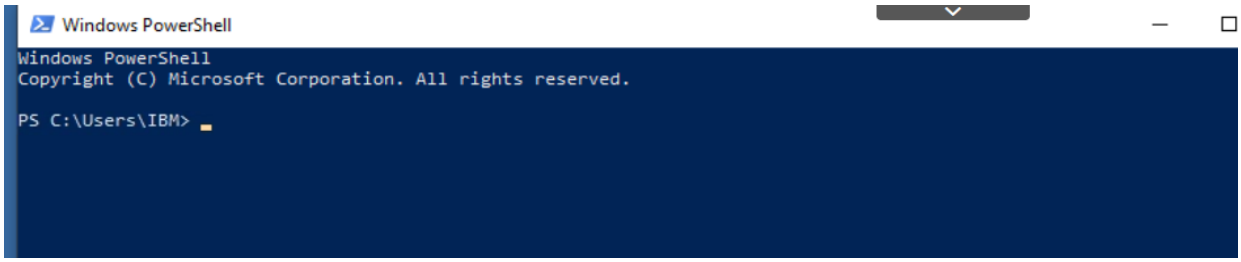
Can we perform all these actions from a local machine (linux, windows,..)? Yes, it’s possible .

SSH allows us to execute command on a remote host without logging into that host.

__ 13. Go back to your vmware desktop. You should see a blue icon for Windows PowerShell in the task bar:



__ 14. Click to open it



- Execute a single command:

__ 15. Let's execute 'uname' command over SSH. In the PowerShell session, enter the following command (replace ### with your actual id)

```
ssh tsa0###@mvscz01.ilsvpn.ibm.com uname -a
```

If you observe above command, it is similar to a regular SSH command with a minor difference. We have appended at the end the command to be executed (highlighted in bold).

You are prompted to enter your password.

The command is executed over a remote shell , and it will generate the below output:

```
PS C:\Users\IBM> ssh tsa0150@mvscz01.ilsvpn.ibm.com uname -a
tsa0150@mvscz01.ilsvpn.ibm.com's password:
OS/390 CZ01 26.00 04 2827
PS C:\Users\IBM>
```

After the remote command is executed you are returned automatically to your local Windows session.

Execute multiple commands

Using this technique, we can execute multiple commands using single SSH session. We just need to separate commands with semicolon (;).

__ 16. Enter the following command:

```
ssh tsa0###@mvscz01.ilsvpn.ibm.com "uname -a;hostname;date"
```

As expected, these commands will generate the output shown below:

```
PS C:\Users\IBM> ssh tsa0150@mvscz01.ilsvpn.ibm.com "uname;hostname;date"
tsa0150@mvscz01.ilsvpn.ibm.com's password:
OS/390
mvscz01.ilsvpn.ibm.com
Thu Apr 29 16:49:09  2021
```

Execute a remote script

Remote execution is not only limited to the commands; we can even execute scripts over SSH. We just have to provide absolute path of local script to the SSH command.

__ 17. Back in your TSO session, open OMVS or ishell, edit a file named info-system.sh and add the following 4 lines:

```
TSA0150:/u/ezp05/tsa0150: >oedit info-system.sh

#!/bin/sh
uname -a
hostname
netstat
```

__ 18. Save the file (PF3), and make script executable:

```
TSA0150:/u/ezp05/tsa0150: >chmod 755 info*
```

__ 19. Then run it on a remote server as follows: back in your vmware PowerShell session, enter the following command:

```
ssh tsa0###0@mvscz01.ilsvpn.ibm.com ./info-system.sh
tsa0150@mvscz01.ilsvpn.ibm.com's password:
OS/390 CZ01 26.00 04 2827
mvscz01.ilsvpn.ibm.com
MVS TCP/IP NETSTAT CS V2R3       TCPIP Name: TCPIP           17:05:23
User Id  Conn     Local Socket           Foreign Socket         State
-------  ----     ------------           --------------         -----
BPXOINIT 0000001E 0.0.0.0..10007         0.0.0.0..0             Listen
CFZCIM   00000034 0.0.0.0..5988          0.0.0.0..0             Listen
CFZCIM   000226A4 10.31.187.133..4621    10.31.187.133..8803    ClosWait
FTPSERVE 0000001A 0.0.0.0..21            0.0.0.0..0             Listen
GPMSERVE 00000030 0.0.0.0..8801          0.0.0.0..0             Listen
GPMSERVE 00000031 0.0.0.0..8803          0.0.0.0..0             Listen
IZUSVR1  0000002F 0.0.0.0..443           0.0.0.0..0             Listen
JES2S001 0001C0E8 10.31.187.133..175     10.31.188.179..15369   Establsh
JES2S001 0000000B 10.31.187.133..175     0.0.0.0..0             Listen
PAGENT   0000001D 0.0.0.0..16311         0.0.0.0..0             Listen
PORTMAP  00000019 0.0.0.0..111           0.0.0.0..0             Listen
SSHD3    00023CAF 10.31.187.133..22      10.117.0.26..57136     Establsh
SSHD3    00023D0F 10.31.187.133..22      10.117.0.26..61596     Establsh
SSHD3    000216A0 0.0.0.0..22            0.0.0.0..0             Listen
TELNET   0000001B 0.0.0.0..23            0.0.0.0..0             Listen
TELNET   00023CB6 10.31.187.133..23      10.119.2.74..52549     Establsh
TELNET   00023C5C 10.31.187.133..23      10.119.2.26..52815     Establsh
GPMSERVE 00000032 0.0.0.0..8802          *..*                   UDP
PORTMAP  00000018 0.0.0.0..111           *..*                   UDP
```

FTP:

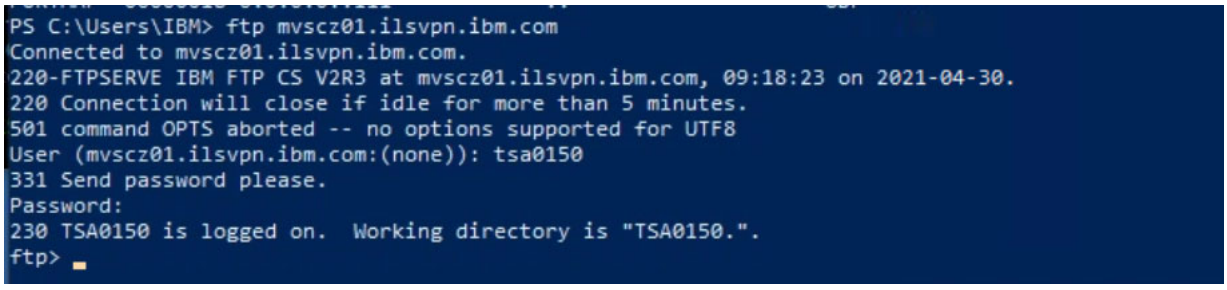
__ 1. Open a PowerShell session on your vmware workstation (use the blue icon in the task bar).

__ 2. In your PowerShell session, start an ftp connection to your z/OS hostname, where hostname is either your system hostname or IP address. Enter the following command:

```
ftp mvscz01.ilsvpn.ibm.com
```

__ 3. Enter your tsa0### ID and password at the prompt.

You should see the message userid logged on.



__ 4. Type ls (your are in your MVS “home directory” “TSA0###.”)

```
ftp> ls
200 Port request OK.
125 List started OK
DUMP.PAX
ISPF.PROFILE
ISP02707.SPFLOG1.LIST
ISP02707.SPFTEMP0.CNTL
ISP02707.SPFTEMP1.CNTL
ISP03011.SPFLOG1.LIST
ISP03889.SPFLOG1.LIST
MYDATA1
ODATA1
OMVS.LABS
PDATA
RMFZV2R3.ISPTABLE
TSOLOG.DATA
250 List completed successfully.
ftp: 303 bytes received in 0.01Seconds 30.30Kbytes/sec.
ftp>
```

__ 5. type cd ‘/u/ezp05/tsa0###’ to switch to your “Hierarchical Filesystem home directory”

type dir

```
ftp> cd /u/ezp05/tsa0150
250 HFS directory /u/ezp05/tsa0150 is the current working directory
ftp> dir
200 Port request OK.
125 List started OK
total 1462
-rw-------   1 TSA0150  S12EZP05     243 Apr 28 15:57 $jc
-rw-r--r--   1 TSA0150  S12EZP05     426 Apr 29 09:40 HelloWorld.class
-rwxr-xr-x   1 TSA0150  S12EZP05     119 Apr 28 17:46 HelloWorld.java
-rwxr-xr-x   1 TSA0150  S12EZP05   73728 Apr 29 07:29 a.out
-rw-r--r--   1 TSA0150  S12EZP05     544 Apr 28 11:46 bigfile1
-rw-r--r--   1 TSA0150  S12EZP05     534 Apr 28 11:44 bigfiles
-rw-------   1 TSA0150  S12EZP05    1458 Apr 28 15:57 bpxbat1
-rw-------   1 TSA0150  S12EZP05    2349 Apr 28 15:57 bpxbat2
-rw-------   1 TSA0150  S12EZP05    2997 Apr 28 15:57 bpxbatnw
-rw-------   1 TSA0150  S12EZP05     648 Apr 28 15:57 bpxbpgm
-rw-------   1 TSA0150  S12EZP05    1053 Apr 29 08:07 bpxcalc
-rwxr-xr-x   1 TSA0150  S12EZP05   73728 Apr 29 07:55 calc
-rw-------   1 TSA0150  S12EZP05     653 Apr 29 07:55 calc.c
-rw-r--r--   1 TSA0150  S12EZP05    5040 Apr 29 07:55 calc.o
-rw-r--r--   1 TSA0150  S12EZP05      70 Apr 27 17:21 catfile
```

__ 6. type lcd

__ 7. type pwd

```
ftp> lcd
Local directory now C:\Users\IBM.
ftp> pwd
257 "/u/ezp05/tsa0150" is the HFS working directory.
ftp>
```

__ 8. type !dir /p

```
ftp> !dir /p
 Volume in drive C has no label.
 Volume Serial Number is 24BB-C659

 Directory of C:\Users\IBM

04/29/2021  12:53 PM    <DIR>          .
04/29/2021  12:53 PM    <DIR>          ..
04/30/2021  05:20 AM               282 .bash_history
04/27/2021  04:20 AM    <DIR>          .ssh
03/01/2019  02:46 PM    <DIR>          3D Objects
03/01/2019  02:46 PM    <DIR>          Contacts
03/11/2021  12:00 PM    <DIR>          Desktop
03/01/2019  02:46 PM    <DIR>          Documents
04/27/2021  03:11 AM    <DIR>          Downloads
03/01/2019  02:46 PM    <DIR>          Favorites
03/01/2019  02:46 PM    <DIR>          Links
03/01/2019  02:46 PM    <DIR>          Music
04/29/2021  11:45 AM    <DIR>          OneDrive
03/01/2019  02:46 PM    <DIR>          Pictures
03/01/2019  02:46 PM    <DIR>          Saved Games
03/01/2019  02:46 PM    <DIR>          Searches
03/02/2019  06:30 PM    <DIR>          Videos
               2 File(s)            320 bytes
              16 Dir(s)  12,187,095,040 bytes free
```

__ 9. type :

```
get calc
get hello.c
ASCII
mget bpx* (reply y to all the file prompts)
bin
get hello
get HelloWorld.class
ftp> get hello.c
200 Port request OK.
125 Sending data set /u/ezp05/tsa0150/hello.c
250 Transfer completed successfully.
ftp: 656 bytes received in 0.00Seconds 656000.00Kbytes/sec.
ftp> ascii
200 Representation type is Ascii NonPrint
ftp> mget bpx*
200 Representation type is Ascii NonPrint
mget bpxbat1? y
200 Port request OK.
125 Sending data set /u/ezp05/tsa0150/bpxbat1
250 Transfer completed successfully.
ftp: 1476 bytes received in 0.00Seconds 1476000.00Kbytes/sec.
mget bpxbat2? y
200 Port request OK.
125 Sending data set /u/ezp05/tsa0150/bpxbat2
250 Transfer completed successfully.
ftp: 2378 bytes received in 0.00Seconds 2378000.00Kbytes/sec.
mget bpxbatnw? y
200 Port request OK.
125 Sending data set /u/ezp05/tsa0150/bpxbatnw
250 Transfer completed successfully.
ftp: 3034 bytes received in 0.00Seconds 3034000.00Kbytes/sec.
mget bpxbpgm? y
200 Port request OK.
125 Sending data set /u/ezp05/tsa0150/bpxbpgm
250 Transfer completed successfully.
ftp: 656 bytes received in 0.00Seconds 656000.00Kbytes/sec.
mget bpxcalc? y
200 Port request OK.
125 Sending data set /u/ezp05/tsa0150/bpxcalc
250 Transfer completed successfully.
ftp: 1066 bytes received in 0.00Seconds 1066000.00Kbytes/sec.
ftp> bin
200 Representation type is Image
ftp> get HelloWorld.class
200 Port request OK.
125 Sending data set /u/ezp05/tsa0150/HelloWorld.class
250 Transfer completed successfully.
```

```
ftp: 426 bytes received in 0.00Seconds 426000.00Kbytes/sec.
```

__ 10. Type !dir to check all the files you have transfered (get) on your local workstation

```
ftp> !dir
 Volume in drive C has no label.
 Volume Serial Number is 24BB-C659

 Directory of C:\Users\IBM

04/30/2021  05:33 AM    <DIR>          .
04/30/2021  05:33 AM    <DIR>          ..
04/30/2021  05:20 AM               282 .bash_history
04/27/2021  04:20 AM    <DIR>          .ssh
03/01/2019  02:46 PM    <DIR>          3D Objects
04/30/2021  05:33 AM             1,476 bpxbat1
04/30/2021  05:33 AM             2,378 bpxbat2
04/30/2021  05:33 AM             3,034 bpxbatnw
04/30/2021  05:33 AM               656 bpxbpgm
04/30/2021  05:33 AM             1,066 bpxcalc
04/30/2021  05:28 AM            73,760 calc
03/01/2019  02:46 PM    <DIR>          Contacts
03/11/2021  12:00 PM    <DIR>          Desktop
03/01/2019  02:46 PM    <DIR>          Documents
04/27/2021  03:11 AM    <DIR>          Downloads
03/01/2019  02:46 PM    <DIR>          Favorites
04/30/2021  05:29 AM               656 hello.c
04/30/2021  05:31 AM               426 HelloWorld.class
04/29/2021  12:56 PM                38 info-system.sh
03/01/2019  02:46 PM    <DIR>          Links
03/01/2019  02:46 PM    <DIR>          Music
04/29/2021  11:45 AM    <DIR>          OneDrive
03/01/2019  02:46 PM    <DIR>          Pictures
03/01/2019  02:46 PM    <DIR>          Saved Games
03/01/2019  02:46 PM    <DIR>          Searches
03/02/2019  06:30 PM    <DIR>          Videos
              10 File(s)         83,772 bytes
              16 Dir(s)  12,187,000,832 bytes free
```

__ 11. type cd 'TSA0###’

__ 12. type ls

__ 13. type cd 'tsa0###.omvs.labs’

__ 14. type ls

```
ftp> cd 'tsa0150.omvs.labs'
250 The working directory "TSA0150.OMVS.LABS" is a partitioned data set
ftp> ls
200 Port request OK.
125 List started OK
$JC
BPXBATNW
BPXBAT1
BPXBAT2
BPXBPGM
BPXCALC
CALC
...
...
```

__ 15. type dir * myjcl.lib

__ 16. type ls MYREX1

__ 17. type get MYREX1

```
ftp> ls MYREX1
200 Port request OK.
125 List started OK
MYREX1
250 List completed successfully.
ftp: 11 bytes received in 0.00Seconds 11000.00Kbytes/sec.
ftp> get MYREX1
200 Port request OK.
125 Sending data set TSA0150.OMVS.LABS(MYREX1) FIXrecfm 80
250 Transfer completed successfully.
ftp: 511 bytes received in 0.00Seconds 511000.00Kbytes/sec.
```

__ 18. type !dir myrex1

```
ftp> !dir myrex1
 Volume in drive C has no label.
 Volume Serial Number is 24BB-C659

 Directory of C:\Users\IBM

05/04/2021  12:51 PM             1,680 myrex1
               1 File(s)          1,680 bytes
               0 Dir(s)  12,210,823,168 bytes free
```

__ 19. type cd '/u/ezp05/tsa0###'

__ 20. type dir * myhfs.lib

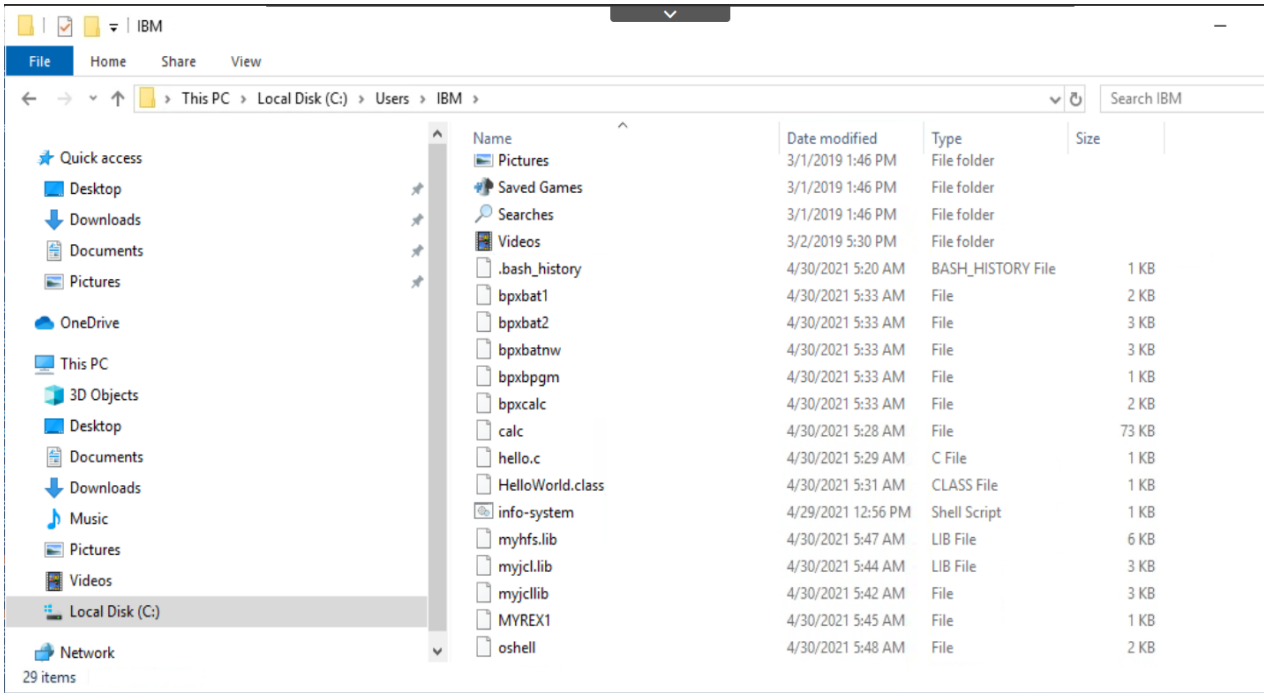
__ 21. type get oshell

```
ftp> cd '/u/ezp05/tsa0150'
250 HFS directory /u/ezp05/tsa0150 is the current working directory
ftp> dir * myhfs.lib
200 Port request OK.
125 List started OK
250 List completed successfully.
ftp: 5324 bytes received in 0.07Seconds 78.29Kbytes/sec.
ftp> ls
200 Port request OK.
125 List started OK
$jc
HelloWorld.class
HelloWorld.java
a.out
bigfile1
bigfiles
bpxbat1
bpxbat2
...
...
250 List completed successfully.
ftp: 737 bytes received in 0.07Seconds 10.84Kbytes/sec.
ftp> get oshell
200 Port request OK.
125 Sending data set /u/ezp05/tsa0150/oshell
250 Transfer completed successfully.
ftp: 1230 bytes received in 0.00Seconds 1230000.00Kbytes/sec.
ftp> pwd
257 "/u/ezp05/tsa0150" is the HFS working directory.
ftp> !dir
 Volume in drive C has no label.
 Volume Serial Number is 24BB-C659

 Directory of C:\Users\IBM

04/30/2021  05:48 AM    <DIR>          .
04/30/2021  05:48 AM    <DIR>          ..
04/30/2021  05:20 AM               282 .bash_history
04/27/2021  04:20 AM    <DIR>          .ssh
03/01/2019  02:46 PM    <DIR>          3D Objects
04/30/2021  05:33 AM             1,476 bpxbat1
04/30/2021  05:33 AM             2,378 bpxbat2
04/30/2021  05:33 AM             3,034 bpxbatnw
04/30/2021  05:33 AM               656 bpxbpgm
...
...
```

__ 22. type quit or bye to leave ftp

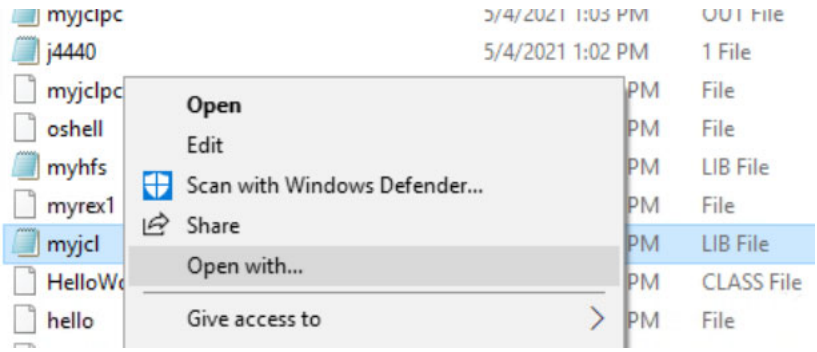
__ 23. Use the Windows explorer on your workstation to look at the contents of myjcl.lib and myhfs.lib (*note*: you may not see the file extension which are hidden by default in Windows)

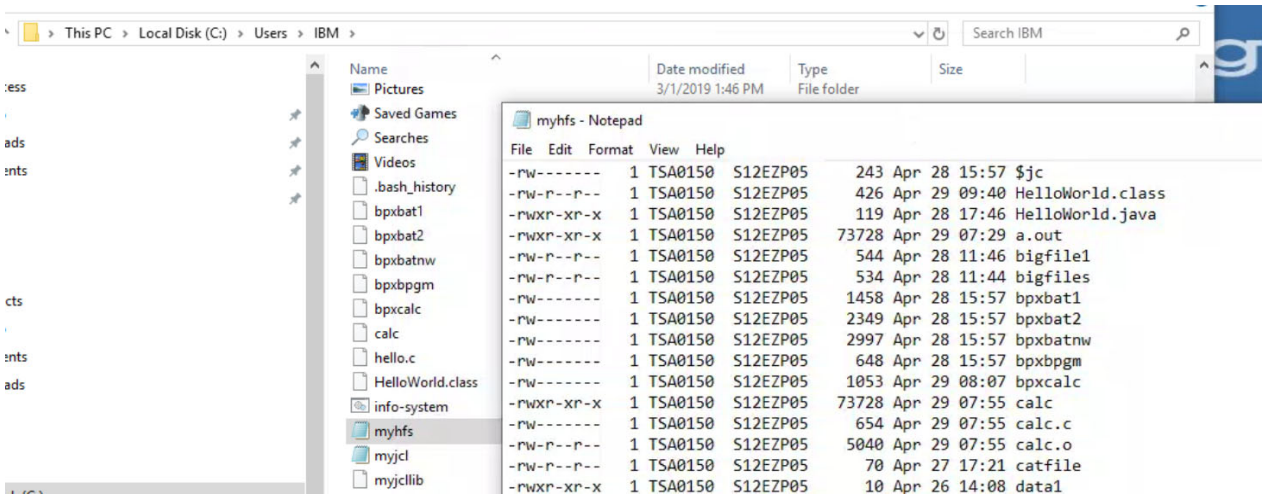
- all files were downloaded in C:\users\IBM



__ 24. Use notepad to edit those files .

- select file with your cursor, right click, and select “open with”, then select Notepad (or just use ‘edit’)





A job consists of job control language (JCL) and data. You can use FTP to submit a job. Let's test the interface between FTP and JES2 and see how you can submit jobs using FTP.

Procedure:

- You would start a session with the FTP server on the z/OS system to which you want to submit the job.
- After you have logged into the server, specify that you want to interface to JES with a site parameter by entering the following:

```
SITE FILEtype=JES
```

- To submit the JCL file you have created, enter the following:

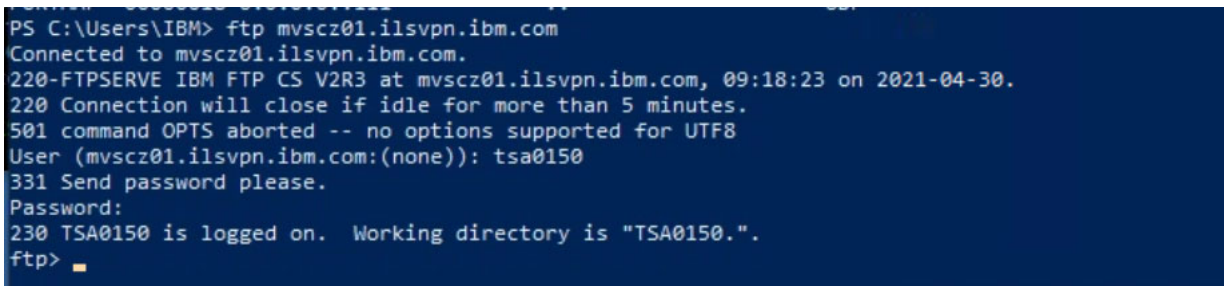
```
PUT filename.filetype
```

__ 25. In your PowerShell session, start an ftp connection to your z/OS hostname, where hostname is either your system hostname or IP address. Enter the following command:

```
ftp mvscz01.ilsvpn.ibm.com
```

__ 26. Enter your tsa0### ID and password at the prompt.

You should see the message userid logged on.



__ 27. type cd 'TSA0###.OMVS.LABS'

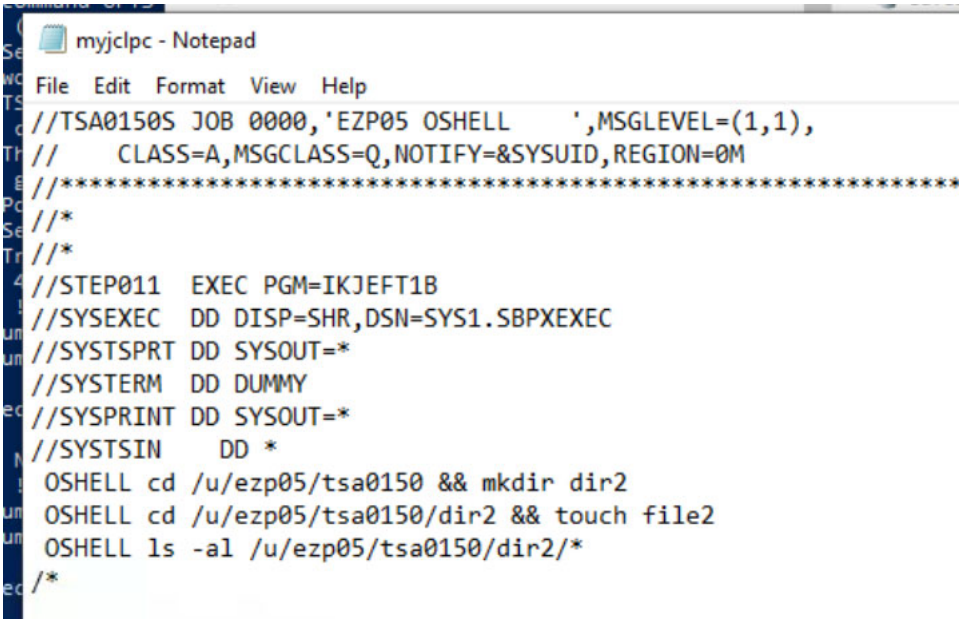
__ 28. type: get OSHELL myjclpc

__ 29. check that you have a file called ‘myjclpc’: type !dir /p ‘myjclpc’

```
ftp> cd 'tsa0150.omvs.labs'
250 The working directory "TSA0150.OMVS.LABS" is a partitioned data set
ftp> get OSHELL myjclpc
200 Port request OK.
125 Sending data set TSA0150.OMVS.LABS(OSHELL) FIXrecfm 80
250 Transfer completed successfully.
ftp: 449 bytes received in 0.00Seconds 449000.00Kbytes/sec.
ftp> !dir /p myjclpc
 Volume in drive C has no label.
 Volume Serial Number is 24BB-C659

 Directory of C:\Users\IBM

04/30/2021  06:04 AM               449 myjclpc
               1 File(s)            449 bytes
               0 Dir(s)  12,185,972,736 bytes free
```

__ 30. Using the Windows File explorer, edit myjclpc using Notepad, and change the //SYSTSIN input commands to the following oshell commands in bold.

```
//TSA0150S JOB 0000,'EZP05 OSHELL    ',MSGLEVEL=(1,1),
//    CLASS=A,MSGCLASS=Q,NOTIFY=&SYSUID,REGION=0M
//*************************************************************
//*
//*
//STEP011  EXEC PGM=IKJEFT1B
//SYSEXEC  DD DISP=SHR,DSN=SYS1.SBPXEXEC
//SYSTSPRT DD SYSOUT=*
//SYSTERM  DD DUMMY
//SYSPRINT DD SYSOUT=*
//SYSTSIN    DD *
  OSHELL cd /u/ezp05/tsa0150 && mkdir dir2
  OSHELL cd /u/ezp05/tsa0150/dir2 && touch file2
  OSHELL ls -al /u/ezp05/tsa0150/dir2/*
/*
```



__ 31. close Notepad and click save to save the file contents

__ 32. in your ftp session, type: *quote site filetype=jes*

```
ftp> open
To mvscz01.ilsvpn.ibm.com
Connected to mvscz01.ilsvpn.ibm.com.
220-FTPSERVE IBM FTP CS V2R3 at mvscz01.ilsvpn.ibm.com, 10:21:52 on 2021-04-30.
220 Connection will close if idle for more than 5 minutes.
501 command OPTS aborted -- no options supported for UTF8
User (mvscz01.ilsvpn.ibm.com:(none)): tsa0150
331 Send password please.
Password:
230 TSA0150 is logged on.  Working directory is "TSA0150.".
ftp> quote site filetype=jes
200 SITE command was accepted
ftp>
```

__ 33. type: put myjclpc jobhost

__ 34. go to your host SDSF session and check if a job has been submitted

__ 35. switch back to the workstation and enter ‘dir’ and look for the last held job output, in bold

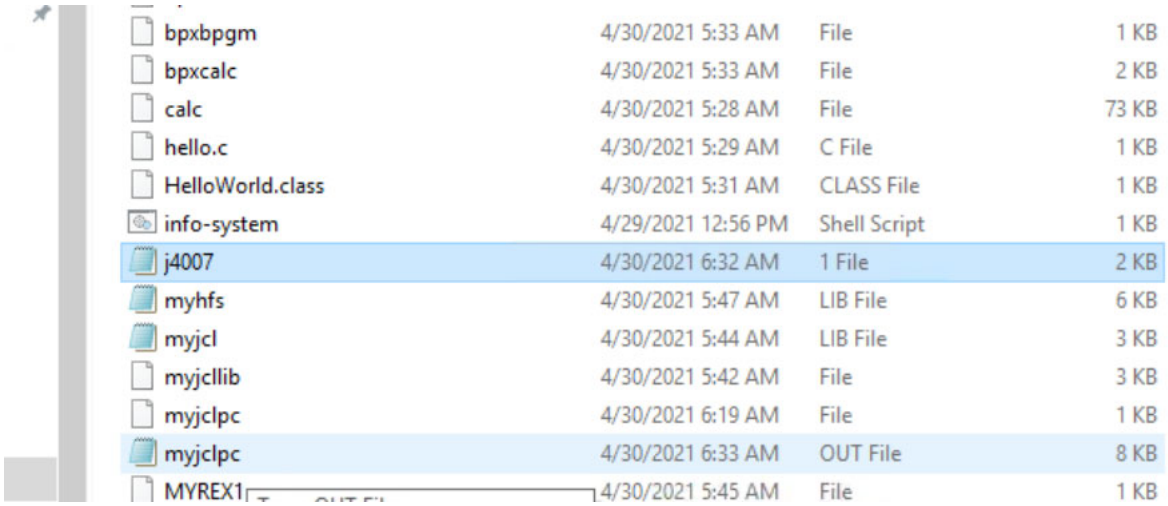
```
ftp> put myjclpc jobhost
200 Port request OK.
125 Sending Job to JES internal reader FIXrecfm 80
250-It is known to JES as JOB04007
250 Transfer completed successfully.
ftp: 491 bytes sent in 0.28Seconds 1.73Kbytes/sec.
ftp> dir
200 Port request OK.
125 List started OK
TSA0150C  JOB02708  OUTPUT    7 Spool Files
TSA0150X  JOB02709  OUTPUT    5 Spool Files
TSA0150X  JOB02710  OUTPUT    4 Spool Files
...
...
TSA0150S  JOB04004  OUTPUT    7 Spool Files
TSA0150S  JOB04005  OUTPUT    7 Spool Files
TSA0150S  JOB04006  OUTPUT    7 Spool Files
TSA0150S  JOB04007  OUTPUT    7 Spool Files
250 List completed successfully.
ftp: 3555 bytes received in 0.20Seconds 17.34Kbytes/sec.
```

__ 36. enter get jnnnn.1 (nnnn is the job number from above)

__ 37. enter get jnnnn myjclpc.out

```
ftp> get j4440.1
200 Port request OK.
125 Sending data set TSA0165.TSA0165S.JOB04440.D0000106.?
250 Transfer completed successfully.
ftp: 1028 bytes received in 0.00Seconds 1028000.00Kbytes/sec.
ftp> get j4440 myjclpc.out
200 Port request OK.
125 Sending all spool files for requested Jobid
250 Transfer completed successfully.
ftp: 8097 bytes received in 0.07Seconds 119.07Kbytes/sec.
```

__ 38. browse the content of files myjclpc.out and jnnnn.1 in your workstation



You can also submit a job and retrieve the output from the job in a single operation.

__ 39. type: close to end your ftp session

__ 40. type: **open** to start a new ftp session

```
ftp> open
To mvscz01.ilsvpn.ibm.com
Connected to mvscz01.ilsvpn.ibm.com.
220-FTPSERVE IBM FTP CS V2R3 at mvscz01.ilsvpn.ibm.com, 10:37:07 on 2021-04-30.
220 Connection will close if idle for more than 5 minutes.
501 command OPTS aborted -- no options supported for UTF8
User (mvscz01.ilsvpn.ibm.com:(none)): tsa0150
331 Send password please.
Password:
230 TSA0150 is logged on.  Working directory is "TSA0150.".
ftp> cd 'tsa0150.omvs.labs'
250 The working directory "TSA0150.OMVS.LABS" is a partitioned data set
```

__ 41. type: put myjclpc mvsjob

Note: the filetype is SEQ by default, so it is not sent to JES2, but it will ftp workstation file ***myjclpc*** and create a new member/ or dataset **mvsjob** in your host session.

__ 42. type: 'dir mvsjob' to check that a new member MVSJOB has been created in your JCL library.

```
ftp> dir mvsjob
ftp> dir mvsjob
200 Port request OK.
125 List started OK
 Name      VV.MM   Created       Changed      Size  Init   Mod   Id
MVSJOB
250 List completed successfully.
ftp: 143 bytes received in 0.01Seconds 14.30Kbytes/sec.
```

__ 43. Type: quote site filetype=JES

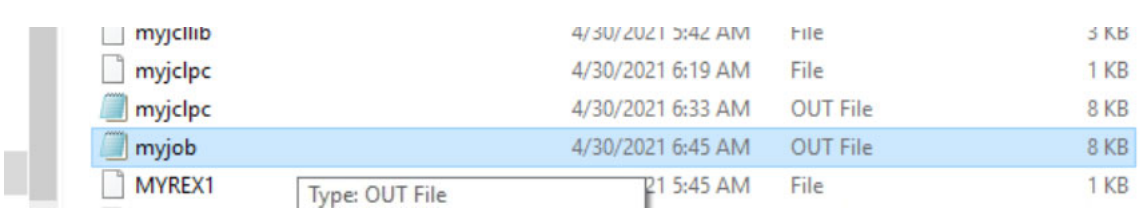
__ 44. type: get mvsjob myjob.out (now filetype is JES, so this get command will member or dataset ***mvsjob*** to the JES2 internal reader and will retrieve this output when the job is complete, as a PC/local file named ***myjob.out***)

```
ftp> get mvsjob myjob.out
200 Port request OK.
125-Submitting job mvsjob FIXrecfm 80
125 When JOB04010 is done, will retrieve its output
250 Transfer completed successfully.
ftp: 7787 bytes received in 3.07Seconds 2.54Kbytes/sec.
ftp>
```

__ 45. Type bye to end your ftp session

```
ftp> bye
221 Quit command received. Goodbye.
PS C:\Users\IBM>
```

__ 46. now browse the content of ***myjob.out*** on the workstation with Notepad. You should find the output of the job you have just submitted.



Note

The following restriction apply for the FTP/JES interface:

- the job you submit via ftp must be defined with an 'Held' output class,
- The maximum LRecl for the submitted job is 254 characters. JES scans only the first 72 characters of JCL.

If the FTP server is set up for JESINTERFACELEVEL 1, to be able to display the status, receive spool output for, and delete a job, the job name in the JCL must be the USERIDx, where x is a 1-character letter or number and USERID must be the user ID you use to log in to the FTP server to submit the job. Otherwise if the job name in the JCL is not USERIDx, the job can be submitted but the DIr subcommand does not display the job, and the GET and DELETE subcommands will not be supported for the job.

If the FTP server is set up for JESINTERFACELEVEL 2, the job name can be any name you are authorized to view using the Security Authorization Facility (SAF), such as RACF®.

You can determine how the FTP server is set up and whether you have authority to view jobs by entering the STAT client command and the SITE command. For JESINTERFACLEVEL 2, the 'quote STAT' command returns:

```
ftp> quote STAT
211-Server FTP talking to host 10.117.0.26, port 65493
211-User: TSA0150  Working directory: TSA0150.
...
211-Trailing blanks are removed from a fixed format data set when it is
211- retrieved.
211-Data set mode.  (Do not treat each qualifier as a directory.)
...
211-Primary allocation 5 tracks.  Secondary allocation 2 tracks.
211-Partitioned data sets will be created with 15 directory blocks.
211-FileType JES (MVS Job Spool). JES Name is JES2
...
211-JESLRECL is 80
211-JESRECFM is Fixed
211-JESINTERFACELEVEL is 1
....
211-SMS is active.
211-New data sets will be catalogued if a store operation ends abnormally
211-Single quotes will override the current working directory.
211-UMASK value is 027
...
211-Server site variable DSNTYPE is set to SYSTEM
211-Server site variable LISTSUBDIR is set to TRUE
211-Server site variable LISTLEVEL is set to 0
211 *** end of status ***
```

If the SITE JESOWNER= completes successfully, then the user has SAF authority to other users' jobs. If the SITE JESJOBNAME= completes successfully, then the user has SAF authority to other jobs.

```
ftp> quote site jesowner=TSA0151
200-JESINTERFACELEVEL=1. The value of JESOwner cannot be modified.
200 SITE command was accepted
```

When you are done, the JCL is then submitted to the JES internal reader and waits for an initiator to start the job. The job is submitted under the user ID that you used when you logged on to the system unless a different user ID is specified on the JOB card.

The default for filetype is SEQ, and when you want to go back to normal FTP file transfer mode, enter the following:

```
SITE FILEtype=SEQ
```

Information

Congratulations! You have completed all the exercises of this course. We hope you had fun with this.

Now is the time for you to return to the course web site and apply for the badge (if any) after passing successfully the final quizz ;-)

End of exercise