



IBM Z

MLH Localhost

Facilitator's Guide

This is the facilitator's guide for the IBM What the Hack is the Mainframe? Workshop. Participants will learn about IBM Z, the enterprise platform for high volume workloads and full-data encryption. They'll log into a live system, explore the environment, and process data.

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STEP 1: Software Setup

- You will need an emulator for this workshop. An **emulator** is hardware or software that lets a computer act like another computer.

Download the emulator that corresponds with your system:

www.mlhlocal.host/3720-Windows

www.mlhlocal.host/3270-Mac

For Mac:

On the website under Download the Latest Version select **HTTP download**.

Download the Latest Version of tn3270
Version 3.4.0 is an update to version 3.3 that adds support for OS X 10.12 Sierra. Besides supporting the latest versions of OS X

- OS X Version 3.4.0, November 9, 2013, 2.0 MB (for OS X 10.3.9 and later)
[HTTP download](#)
[Alternate site download](#)

Then in your **Downloads** double click the **tn3270** folder. You might get a screen that says the version needs to be optimized. Simply click **OK**. You should then get a screen that asks for your host name.

For the Host Name section they should input **192.86.32.91**. For the Window Title section put something descriptive like "My Mainframe Connection".

Host Name: 192.86.32.91

Window Title: My Mainframe Connection!

Initial Settings:

Extended Features

Screen Format

Special

Copy Settings:

Settings File

Session

Set Defaults

Cancel


Open Connection

For Windows:

Once at Tom Brennan's website, navigate to the [Downloads](#) Section on the Left Side panel.

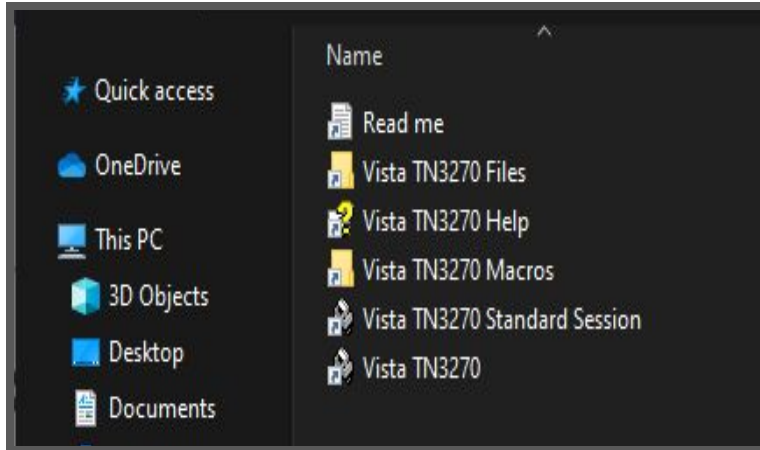
Scroll down to the [Vista V1.27](#) section and double click [Click for Vista V1.27](#).

Production Version

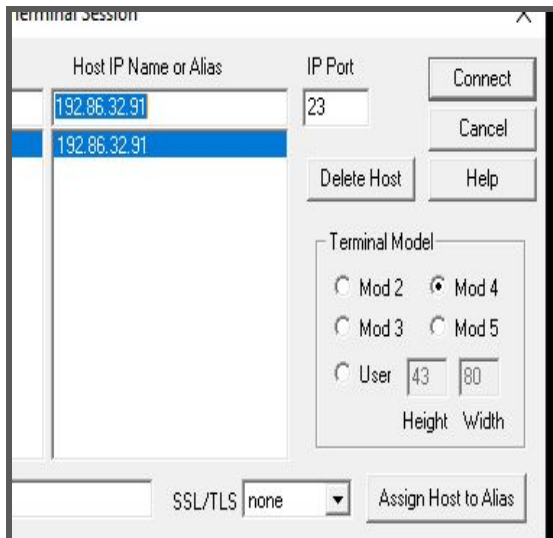
 [Click for Vista V1.27 - November 12, 2014](#)
 1.8 Meg self-installing exec - for **Windows XP, 2000, 2003,**
Note: Do not install V1.27 on top of V1.24 - instead, use the d
[What's new with V1.27?](#)

Previous Versions

Then scroll down to **Vista TN370**.

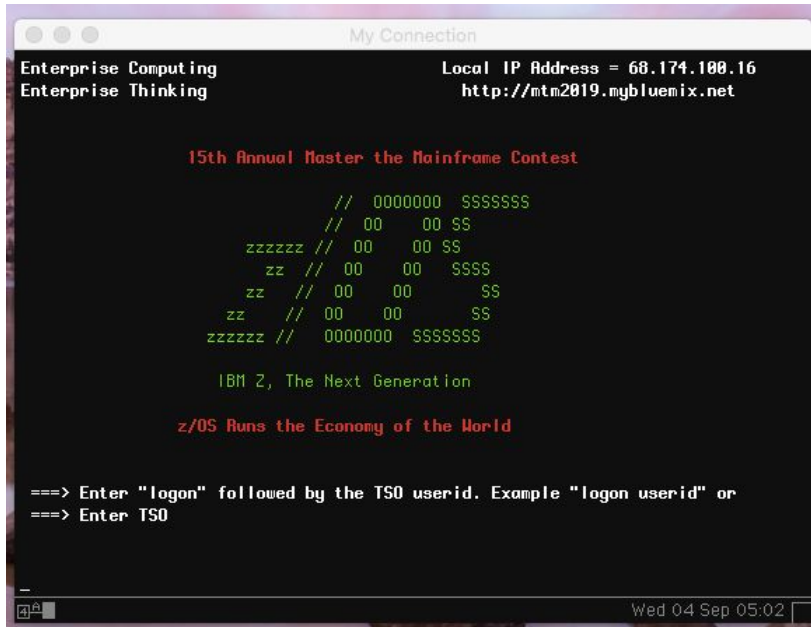


Enter the IP address: **192.86.32.91** in the Host IP address section and Port **23**. Then Click **Connect**.



STEP 2: z/OS Credentials

- For this next section you will need **z/OS credentials**. Your credentials tell a central computer that you are a known entity that they can share data with. You should be able to get these credentials from your email once you sign up for the Master the Mainframe contest at www.mlhlocal.host/master-the-mainframe. Don't see the email with your credentials? Check your spam folder.
- Once you have your credentials, navigate back to the OS window:



- Type **logon** and then your username and then press **Enter**. If you make a mistake, you can move your mouse over the letter. A flashing caret will appear under the letter. Press the **Space** bar to delete.



- If you need to reset your session, you can either Select the **Refresh** button, or close the emulator and connect to it again.



STEP 3: Change Your Password

- Before you change your password, you will need to think of a good new one! Your new password should:
 - Be equal to or less than 8 characters
 - Contain at least one letter
 - Contain at least one number
 - Not be the same as a previous password that you have used with the z/OS.
- To activate the Change Password function, Press **Enter**. You will then be prompted to enter a new Password twice. Whatever you enter in these fields will be considered your Password.
- Don't see your password? You are not supposed to. Characters are hidden for security purposes. So be careful about what you type!
- If you write an incorrect password or want to change your password again, there's no need for panic. Simply press **Enter** again and repeat the process.

```

----- TSO/E LOGON -----
IKJ56415I CURRENT PASSWORD HAS EXPIRED - PLEASE ENTER NEW PASSWORD
IKJ56429A REENTER -
Enter LOGON parameters below:                                RACF LOGON parameters:

Userid   ==> MLHACK1

                                           *New Password ==> _

Procedure ==> DBPROCCG                                Group Idnt ==>

Acct Nmbr ==> FB3

Size     ==> 32768

Perform  ==>

Command  ==> LOGOFF

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

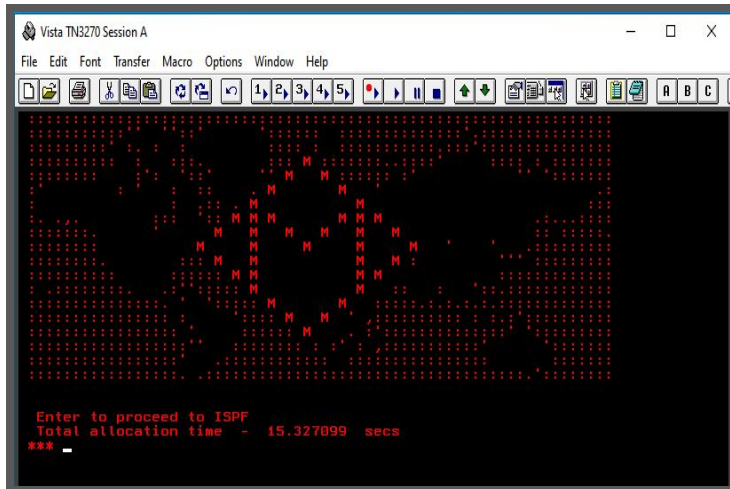
PF1/PF13 ==> Help   PF3/PF15 ==> Logoff   PA1 ==> Attention   PA2 ==> Reshow
You may request specific help information by entering a '?' in any entry field
M0 1.5 08/09/19.221 10:06PM 192.06.32.91 a 8,71

```

STEP 4: Exploring the Z/OS

- **Time-Sharing Option** is a dedicated space for you on the overall z/OS system. This means that you can interact with the system at the same time as others all around the world.

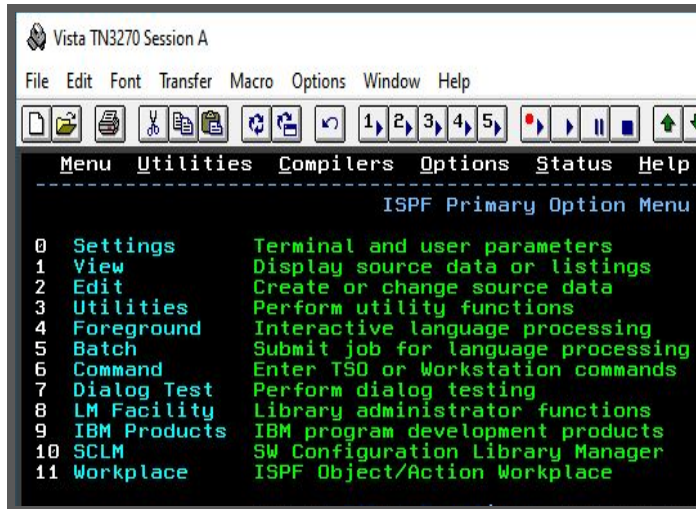
- Once you change your password you will automatically be logged into the TSO. This will take 10 seconds, so do not worry if your computer looks as if it is not doing anything. The screen you get should appear like the one below:



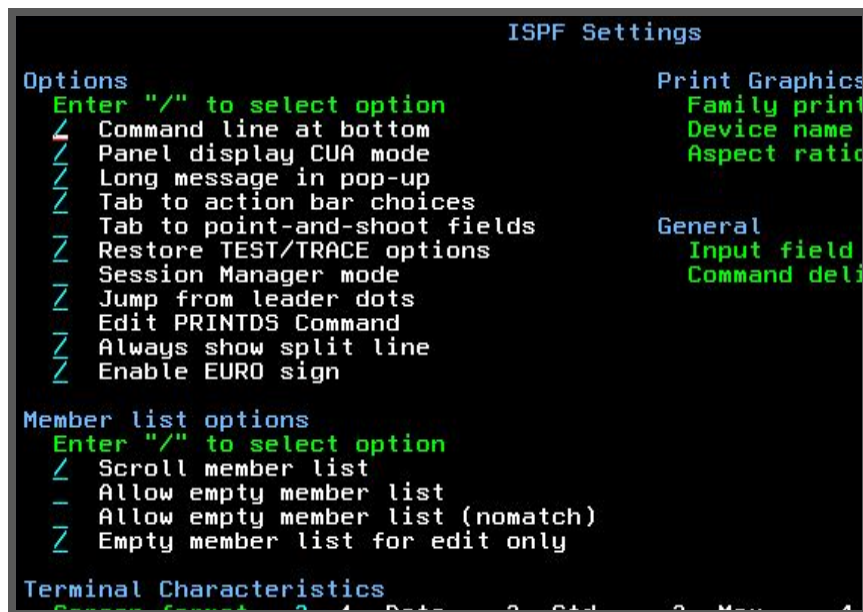
- Press **Enter** to access the menu screen. The Menu will show the **ISPF** options. ISPF stands for **Interactive System Productivity Facility**. This is a system that is composed of a text editor, browser, and database, and is all navigated through the keyboard.
- To see the capabilities of the system, type **SD** and then press **Enter**. The command **SD** opens the **System Display and Search Facility**. The SDSF lets you monitor, control, and view the output of the commands that you run within the z/OS system.
- The SDSF will present you with a screen with a lot of different options. The commands are in the *Menu* column and the descriptions of what these commands do is in the *Description* column.
- If you type a command and want to go back to the Menu, simply hit the **F3** button at the top of your keyboard.

STEP 5: Customize Your Settings

- Type **0** to Select the **Settings** command in the Menu, and then press **Enter** to enter the Settings dashboard.



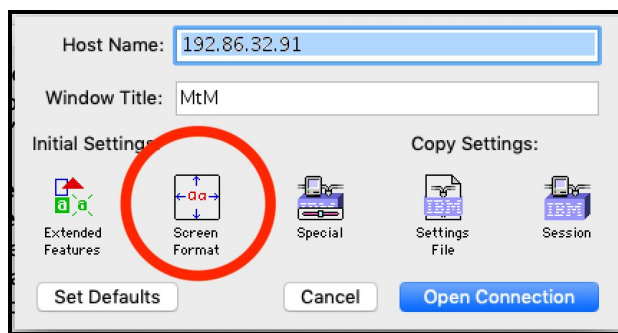
- Tab down to the option **Command line at the bottom**. When there, type the backslash \ symbol. The backslash acts like a True or False statement. When you use the backslash, you are turning the ISPF Settings on or off. A backslash turns a Setting On, whereas a Space " " turns the Setting off. Using spaces and backslashes, you can change the settings of your z/OS system.



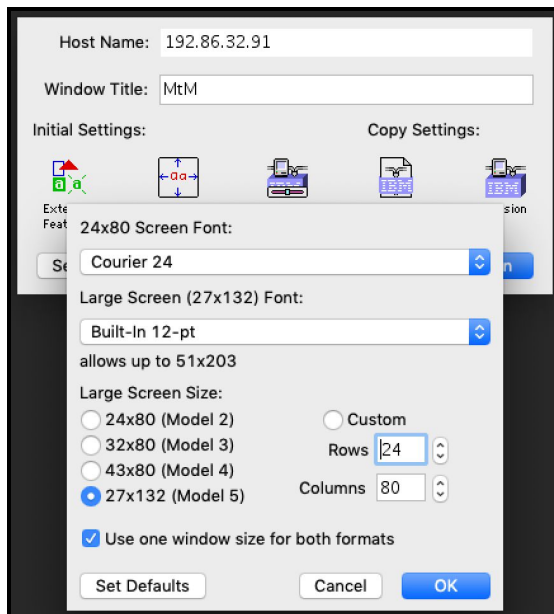
- Uncheck the option that says **Command line at bottom**. Then navigate back using the **F3** button.

STEP 6: Resize Your Screen

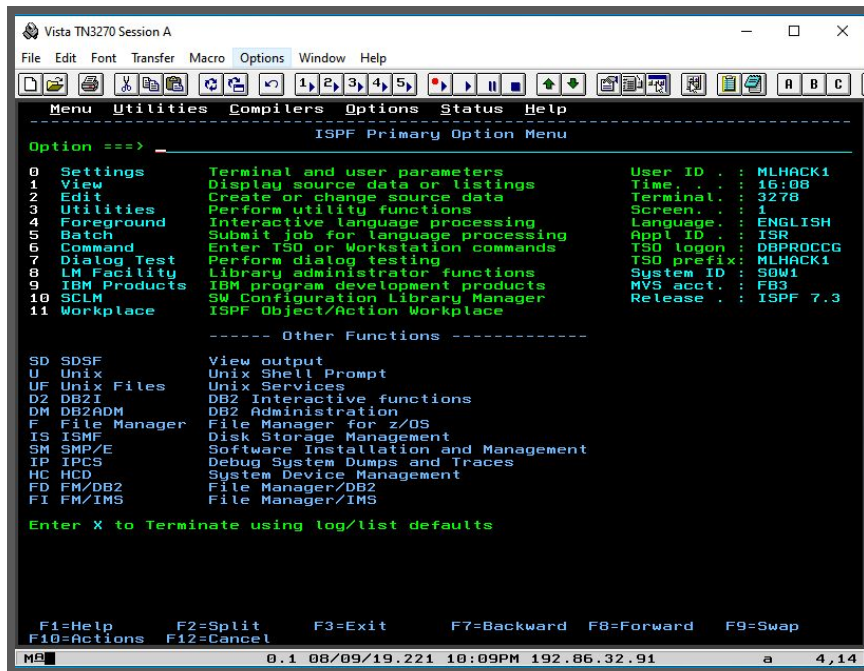
- Typically if you resize the windows on your computer, the elements in these windows will also resize. This will not happen with z/OS. Instead, you will need to manually resize the screen.
- To do so, exit the z/OS and Restart. In the Section where you put your Host Name, click on **Screen Format**.



- Within the Screen Format section, there are several different Models you can choose from, each with different sizes. Choose the Model that best fits your screen size.

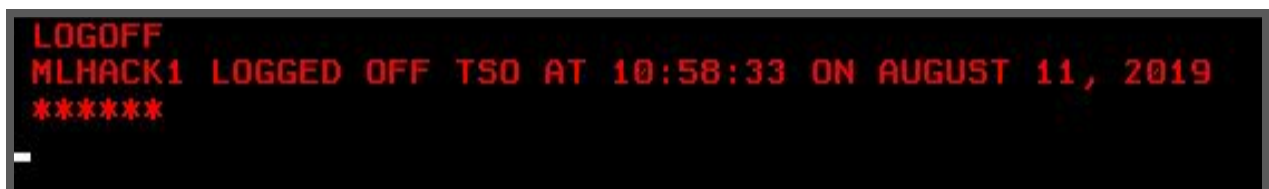


- Don't see the Screen Format option? For Vista the options will appear on the **Connection** Panel and in Linux it is under the **Option** menu.
- On this screen you can also change the font. Some good standard fonts are Courier, Lucidia Console, Menlo, and Monaco.
- When you navigate back into the z/OS system, your Command line should be at the Top, your screen is larger, and your font is different.



STEP 7: Disconnect and Reconnect

- You will be automatically be exited from the system after 3 minutes of inactivity.
- If you want to log out, navigate back to the ISPF. Then press **F3**.
- You will get a Logoff message:



- To Reconnect to the system, type **S**.
- Once reconnected, navigate to the ISPF and the command line. Enter the command:
tso submit 'zos.public.jcl(part1)'

- This command will prepare datasets that you will need for the next section.
- Then enter the jobname character **a**.

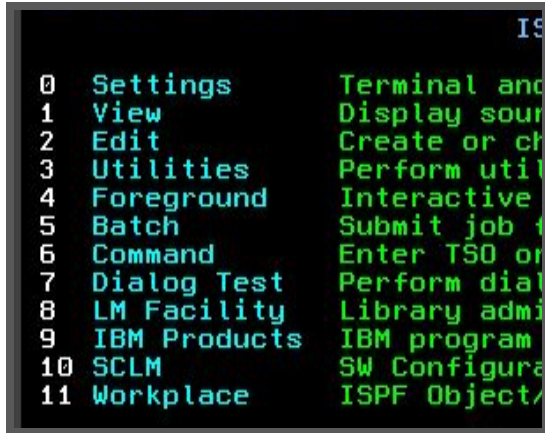
```
ISPF system data set allocation error - press Enter to continue.
Log file allocation error - ISPF will operate without a log data set.
Already cataloged, VSAM protected, or other - 'MLHACK1.S0W1.SPFLOG1.LIST'.
ENTER JOBNAME CHARACTER(S) -
a_
```

- Then there will be a notice that your dataset has been submitted.

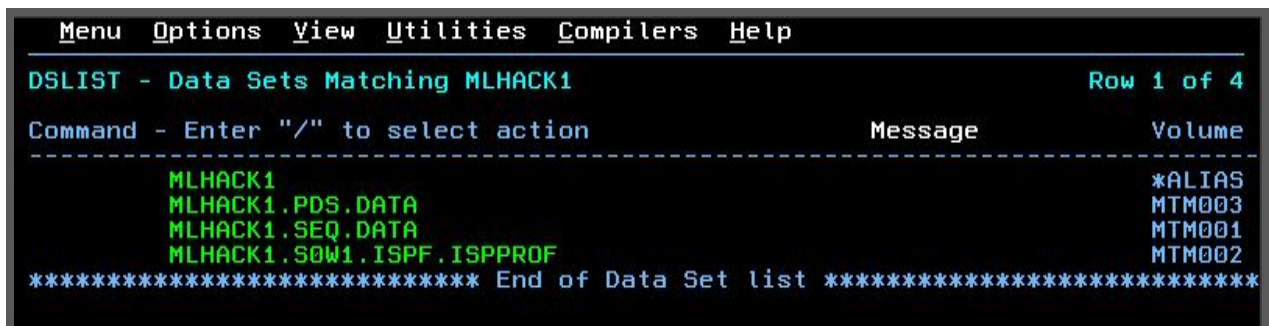
```
ISPF system data set allocation error - press Enter to continue.
Log file allocation error - ISPF will operate without a log data set.
Already cataloged, VSAM protected, or other - 'MLHACK1.S0W1.SPFLOG1.LIST'.
ENTER JOBNAME CHARACTER(S) -
a
JOB MLHACK1A(JOB07234) SUBMITTED
*** _
```

STEP 8: Storing and Browsing Through Data Sets

- Now that participants understand how to set up their system, we will begin to understand how to store and work with datasets.
- The Mainframe is composed of files, which have data on them (text or images), and folders, which are containers of multiple files.
- The z/OS system is composed of two different kinds of data sets: sequential and partitioned.
- **Sequential** data sets must be parsed (searched through) in order. This means that if you store an item as number 11 in an array, your computer will need to search through items 1 to 10 to get to item 11.
- **Partitioned** data sets are more like the standard design of files in folders. Partitioned datasets have records of all the files in them, and users can access them by referencing their name.
- For this next part you will need to be logged into the Mainframe and navigate to the ISPF.
- Navigate to Option 3, Utilities by typing **3** and then Enter.



- You will be brought to another Utilities screen. On this screen you want the **Dslist** option. This option is accessed by typing **4** and then pressing **Enter**.
- Tab down to the **Dsname Level** field. Enter your username in the field. Then press **Enter**.
- The next screen will show a **Data Set List Utility** which will ask you how you want to display your data. To then display the datasets, press **Enter** again.
- You will then see a list with your userID at the beginning. Your screen will look slightly different, with your userID displayed in the list.



- After your userID you will see two different endings that correspond with the different kinds of datasets that they are. PDS stands for Partitioned Data Set, whereas SEQ stands for Sequential Data Set.
- Navigate by tabbing down to the **USER.SEQ.DATA** dataset. Type **b** and press **Enter**. The command **b** lets you browse the SEQ folder.
- When you enter this folder you will see an approximation of a photo of the Simpsons created using code.



- While the photo we see is of two Simpsons characters, the data could be any kind of record, such as banking or medical data. The specific art style is called **ASCII-Art**.

STEP 9: Partitioned Data Sets

- Partitioned data sets** are capable of containing many members, which can be treated as sequential sub-data sets. However, they cannot have other partitioned data sets, whereas folders can contain numerous data sets and sub-data sets.
- Tab down to **USERID.PSD.DATA**. Type **b** in the field and then press **Enter**. Inside the Partitioned Data Set there is another list of sub-structures of other folders that you can explore.

Menu	Functions	Confirm	Utilities	Help
BROWSE	MLHACK1.PDS.DATA			
	Name	Prompt	Size	Created
	BINARY		28	2019/05/25
	COUNTRY			2019/05/25 17:24:52
	FUN		21	2019/05/24
	Z		23	2019/05/24
	End			

- To see what is in each folder, tab down to the folder that you want to explore, type **b**, and then press **Enter**. To get out of a folder, press the **F3** button.

STEP 10: Understanding the Unix File System

- In this next section we will run UNIX commands and work within a UNIX file system.
- We'll start by navigating back to the ISPF menu. Type **U** to activate the **Unix Shell Prompt**.
- The filesystem you will see looks different from the ISPF. The Unix Shell and the z/OS system are interoperable with each other, a concept that we will explore in more depth. The initial interface is the homepage of your Unix filesystem. You should see your user id displayed on the last line.

```
IBM
Licensed Material - Property of IBM
5650-Z0S Copyright IBM Corp. 1993, 2017
(C) Copyright Mortice Kern Systems, Inc., 1985, 1996.
(C) Copyright Software Development Group, University of Waterloo.

U.S. Government Users Restricted Rights -
Use, duplication or disclosure restricted by
GSA ADP Schedule Contract with IBM Corp.

IBM is a registered trademark of the IBM Corp.

/z/mlhack1 >
```

- After your username type **date** then press Enter.
- You should now see the date and time live in your terminal. Your time and date will be different. Understanding how to output the time and date is useful if you need to **timestamp** when a file or folder was created.

```
IBM
Licensed Material - Property of IBM
5650-Z0S Copyright IBM Corp. 1993, 2017
(C) Copyright Mortice Kern Systems, Inc., 1985, 1996.
(C) Copyright Software Development Group, University of Waterloo.

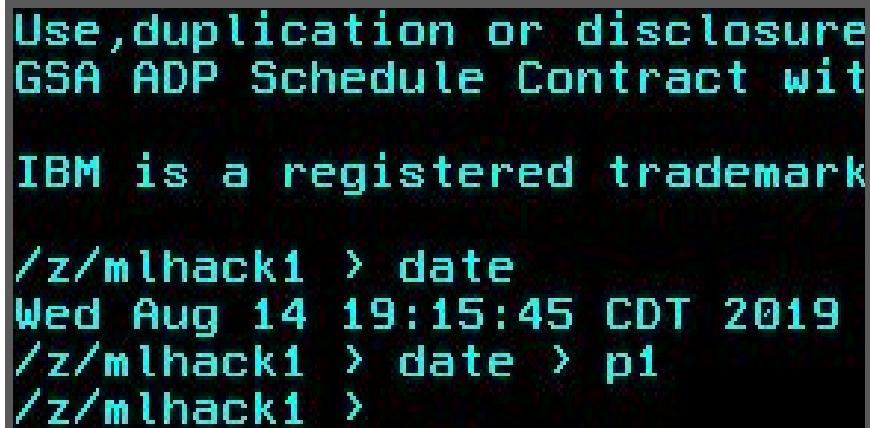
U.S. Government Users Restricted Rights -
Use, duplication or disclosure restricted by
GSA ADP Schedule Contract with IBM Corp.

IBM is a registered trademark of the IBM Corp.

/z/mlhack1 > date
Wed Aug 14 19:15:45 CDT 2019
/z/mlhack1 >
```

STEP 11: Saving a Timestamp

- We will need to create a file and fill it with date and time as the contents.
- Navigate to the input field. Type in `date > p1` and press Enter.

A terminal window with a black background and green text. The text shows a series of commands and their outputs. First, there are three lines of text: 'Use,duplication or disclosure', 'GSA ADP Schedule Contract wit', and 'IBM is a registered trademark'. Then, the prompt '/z/mlhack1 >' is followed by the command 'date', which outputs 'Wed Aug 14 19:15:45 CDT 2019'. Next, the prompt is followed by 'date > p1', and finally, the prompt is followed by '>'.

- This will print out a file named `p1`.
- To check whether the file was created, type `cat p1`. This command comes from **concatenate**, which means to join two strings together.
- Next, this folder will be transferred from Unix to z/OS to help participants understand how the two operating systems are interoperable.
- Type `cp p1 '//pds.data(p1)'` and then press **Enter**. This command copies the folder `p1` with your date and time into the z/OS operating system.
- We can now double check that the file has been passed to z/OS using the command: `cat '//pds.data(p1)'`.


```
/z/mlhack1 > date > p1
/z/mlhack1 > cat p1
Wed Aug 14 19:18:13 CDT 2019
/z/mlhack1 > cp p1 '//pds.data(p1)'
/z/mlhack1 > cat '//pds.data(p1)'
Wed Aug 14 19:18:13 CDT 2019
/z/mlhack1 >
```

- Now to check that the file has moved correctly, we will need to navigate back to z/OS. Type **exit** then press **Enter**. Then press **Enter** again.
- You should find yourself back at the ISPF. Look familiar?

```
IBM
Licensed Material - Property of IBM
5650-Z05 Copyright IBM Corp. 1993, 2017
(C) Copyright Mordice Kern Systems, Inc., 1985, 1996.
(C) Copyright Software Development Group, University of Waterloo, 1989.

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IBM is a registered trademark of the IBM Corp.

/z/mlhack1 > date
Wed Aug 14 19:15:45 CDT 2019
/z/mlhack1 > date > p1
/z/mlhack1 > cat p1
Wed Aug 14 19:18:13 CDT 2019
/z/mlhack1 > cp p1 '//pds.data(p1)'
/z/mlhack1 > cat '//pds.data(p1)'
Wed Aug 14 19:18:13 CDT 2019
/z/mlhack1 > exit

2>>> FSUM2331 The session has ended. Press <Enter> to end OMVS. RUNNING
```

STEP 12: Verify Your Dataset

- Type **3.4** into the **Utilities** menu. This is a shortcut to take you directly to the Utilities section.
- Enter your username into the **Level** section and press **Enter**.

```
RefList  RefMode  Utilities  Help
Data Set List Utility

Display data set list          P P
Display VTOC information      PV P

or both of the parameters below:
Level . . . MLHACK1
serial . . .

list options
l View          Enter "/" to select
Volume         / Confirm Data
Space          / Confirm Member
Attrib         / Include Additions
Total          / Display Catalog
               - Display Total
               - Prefix Dsname
```

- You should now see a list of folders that are accessible to you.
- Type **e** for Edit, then press **Enter**.

```
Menu  Options  View  Utilities  Con
DSLIST - Data Sets Matching MLHACK1
Command - Enter "/" to select action
-----
e_      MLHACK1
        MLHACK1.PDS.DATA
        MLHACK1.SEQ.DATA
        MLHACK1.SOW1.ISPF.ISPPROF
***** End of
```

- If your file transferred correctly, you should see Ps1 in the list of available folders.

<u>M</u> enu	<u>F</u> unctions	<u>C</u> onfirm	<u>U</u> tilities	<u>H</u> elp
EDIT				
MLHACK1.PDS.DATA				
	Name	Prompt	Size	Created
_____	BINARY		28	2019/05/25
_____	COUNTRY			
_____	FUN		21	2019/05/24
<u>s</u> _____	P1			
_____	Z		23	2019/05/24
End				

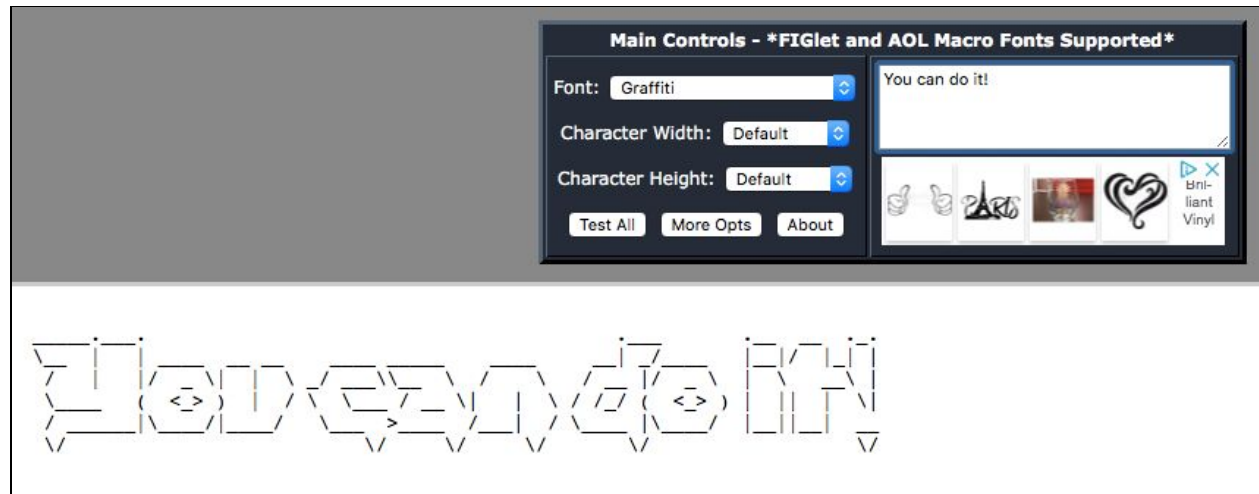
- To view the contents of P1, type **s** in front of the file and press **Enter**.
- The timestamp that you created in Unix is now visible in z/OS.
- To exit, press **Enter**. Then within the main ISPF, type **tsoquiz**. This will give you access to a quiz about the mainframe.

```
SD SDSF          View output
U  Unix          Unix Shell Pr
Option ==> tso p1quiz
F1=Help      F2=Split      F3=
```

- When you are done taking the quiz, the answers can be accessed at this address: mlhlocal.host/meet-the-mainframe

NEXT STEPS

- Challenge yourself to generate your own ASCII-Art and store it in the Mainframe from memory!
- You can generate your own art through a generator online: <http://patorjk.com/software/taag/#p=display&f=Graffiti&t=You%20can%20do%20it!>



- Check your email for more resources about mainframes!
- Take Part 2 and Part 3 of the Mainframe Challenge to earn an official MtM badge.
- Sign up to host a MtM workshop and get recognized as an official MtM Facilitator.