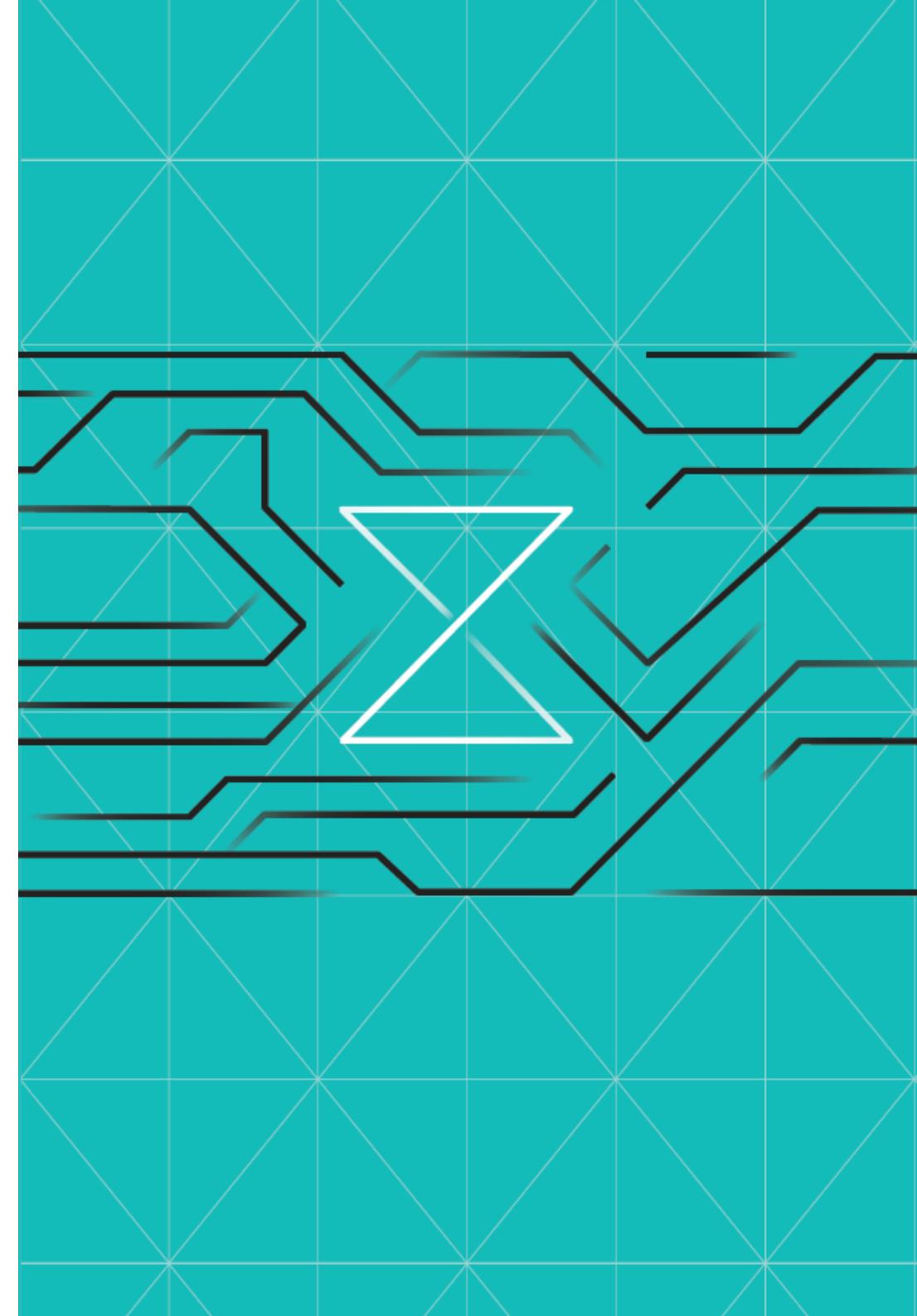


# Linux1

## LinuxONE - get access

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# GET CONNECTED ON THE LINUXONE COMMUNITY CLOUD

## The Challenge

Whether you're interested in Linux but don't know where to start, a skilled shell scripter looking for something different, or just looking for a home to expand your Advanced challenges, LinuxONE is here for you, all through the LinuxONE Community Cloud.

You'll take control of your own Linux system running on IBM Z hardware, giving you the ability to install packages, compile software, and even host a web page. Enjoy your stay!

## Before You Begin

You will benefit from completing the USS challenges before jumping into a Linux environment, though it is not required.

All you need is a laptop or workstation and an SSH client. You can use PuTTY, or the SSH client provided with your operating system.

## Investment

Steps	Duration
11	90 minutes

# 1 GET YOUR VIRTUAL MACHINE

Go to the LinuxONE developer page at

<https://developer.ibm.com/articles/get-started-with-ibm-linuxone/> and do a little reading about the IBM LinuxONE system and Community Cloud.

The screenshot shows the IBM Developer website with a dark header bar. The main navigation menu includes 'Topics', 'Products & Services', 'Community', and 'Open source at IBM'. Below the header, a sidebar on the left is titled 'IBM LinuxONE' and lists various resources: 'Get started with IBM LinuxONE', 'Try IBM LinuxONE', 'Articles', 'Code Patterns', 'Podcasts', 'Tutorials', 'Videos', 'Community' (with 'Blog Posts' and 'Events'), 'Related topics' (with 'Analytics', 'Blockchain', 'Containers', 'Hybrid Cloud', and 'IBM Z'), and a 'Log in' button. The main content area has a blue header with the text 'Get started with IBM LinuxONE' and a sub-header 'Unleash the power to innovate with IBM LinuxONE Community Cloud.' Below this, a section titled 'What is the IBM LinuxONE Community Cloud?' provides a brief description of the service. At the bottom of the main content area, there is a link 'Already signed up for a trial? Log into your account'. The footer of the page contains the text 'IBM | IBM Developer' and a copyright notice 'Copyright IBM 2021-2023'.

Then follow these instructions to request your own virtual system.

<https://github.com/linuxone-community-cloud/technical-resources/blob/master/faststart/deploy-virtual-server.md>

**NOTE: You will follow the instructions in this guide pretty closely, but please read ahead through steps 2-4 here, as they contain information specific to IBM Z Xplore.**

## 2 EVENT CODE

United States

Description of your project\*

Participating in the IBM Z Xplore program  
I'm gonna win!

EventCode

.....

IBM may use my contact data to keep me informed of products and services offered by IBM and its business partners.

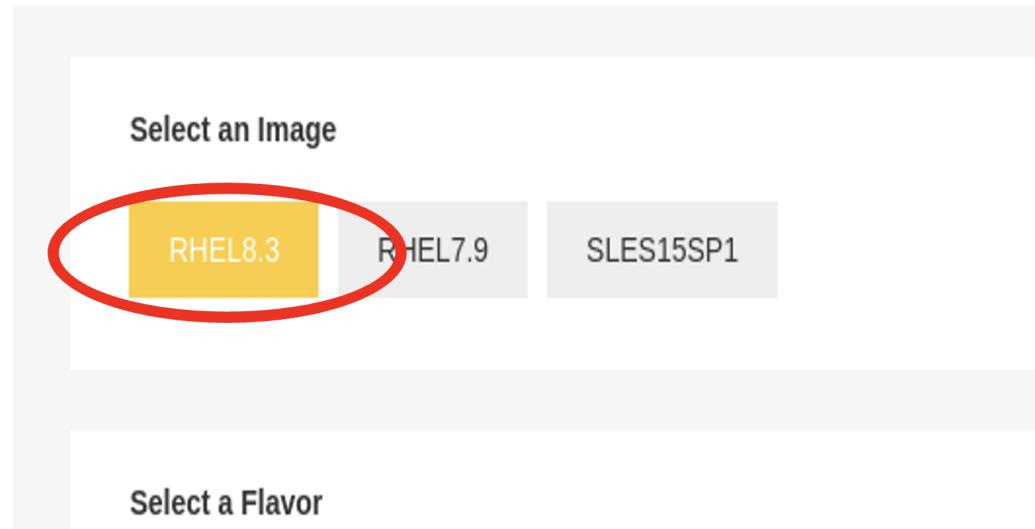
To speed up the registration process, and prioritise the creation of your Linux virtual machine, you should enter the event code **IBMZXPLORE** in the EventCode field.

**NOTE: if you do not provide the event code, your virtual machine may take longer to become available.**

### 3 SELECT THE LATEST RHEL VERSION

There are a number of Linux Distributions available for Z hardware, including SUSE Linux Enterprise Server (**SLES**) and Redhat Enterprise Linux (**RHEL**).

For these challenges, you will be using the latest RHEL version available, so make sure you select that here.



In the screenshot, it is RHEL8.3, but your view might show a more recent version - whatever it is, select the RHEL option.

Afterwards, if you want to try out another flavor, just go back and de-provision your RHEL server and request a SLES or ubuntu instance.

## 4 SECURE YOUR LOGIN



The screenshot shows a terminal window in VSCode. At the top, there are tabs for PROBLEMS, OUTPUT, TERMINAL, and DEBUG CONSOLE. Below the tabs, the terminal output is displayed:

```
elizabeth:~$ chmod 600 .ssh/linux-competition.pem
elizabeth:~$ ssh -i .ssh/linux-competition.pem linux1@148.100.76.111
[----] [----] [----] [----] [----]
=====
Welcome to the IBM LinuxONE Community Cloud!
This server is for authorized users only. All activity is logged and monitored.
Individuals using this server must abide to the Terms and Conditions listed here:
https://www.ibm.com/community/z/ibm-linuxone-community-cloud-terms-and-conditions/
Your access will be revoked for any non-compliance.
=====
Last login: Tue Aug  3 11:46:13 2021 from 107.215.218.33
[linux1@competition ~]$
```

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Good news! you may be able to use the terminal built right into VSCode to ssh into your LinuxONE instance. Once the virtual machine has started, download your **.pem** file (keep that in a safe place), and the permissions on the file so no one else can see it.

On MacOS, or linux:

```
chmod 600 your-key-file.pem
```

On Windows:

```
icacls.exe your-key-file.pem /reset
icacls.exe your-key-file.pem /grant:r "$(env:username):(r)"
icacls.exe your-key-file.pem /inheritance:r
```

If you can't, then please follow the instructions and use PuTTy

Then use an ssh command similar to the one above to log in.

You will use `-i` to point it to your pem file. It will ask you if you want to continue (replay "Yes"), and then you're in!

This step can be tricky, so take your time.

## 5 EXPLORE!

This is *your* system - take a look around.

```
<ZXP> cd ~  
<ZXP> mkdir my_directory  
<ZXP> cd my_directory/  
<ZXP> touch a_file  
<ZXP> touch another_file  
<ZXP> ls  
a_file  another_file  
<ZXP> rm a_file  
<ZXP> █
```

Most of the commands you learned in the USS challenges are here, too, so commands like `ls`, `cd`, `mv`, `mkdir` and `touch` should work just like they do in the USS shell environment, because Linux is a UNIX-like operating system.

## 6 SET DOWN YOUR ROOTS

```
<ZXP> cd /
<ZXP> ls -l
total 16
lrwxrwxrwx.  1 root root   7 Aug 12  2018 bin -> usr/bin
dr-xr-xr-x.  4 root root 4096 Jul 27 16:34 boot
drwxr-xr-x. 13 root root 2420 Aug  5 21:50 dev
drwxr-xr-x. 89 root root 8192 Jul 27 16:48 etc
drwxr-xr-x.  3 root root   20 Jul 27 16:33 home
lrwxrwxrwx.  1 root root   7 Aug 12  2018 lib -> usr/lib
lrwxrwxrwx.  1 root root   9 Aug 12  2018 lib64 -> usr/lib64
drwxr-xr-x.  2 root root   6 Aug 12  2018 media
drwxr-xr-x.  2 root root   6 Aug 12  2018 mnt
drwxr-xr-x.  2 root root   6 Aug 12  2018 opt
dr-xr-xr-x. 100 root root   0 Aug  5 21:50 proc
dr-xr-x---.  3 root root 149 Jul 27 16:33 root
drwxr-xr-x. 27 root root 800 Aug  5 21:50 run
lrwxrwxrwx.  1 root root   8 Aug 12  2018 sbin -> usr/sbin
drwxr-xr-x.  2 root root   6 Aug 12  2018 srv
dr-xr-xr-x. 13 root root   0 Aug  5 21:50 sys
drwxrwxrwt.  3 root root   85 Aug 14 09:30 tmp
drwxr-xr-x. 12 root root 144 Oct 29  2019 usr
drwxr-xr-x. 20 root root 278 Jul 27 16:32 var
```

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Since you have full access to this system, why not start by going into the top-level directory, also known as the **root** directory. Do that by entering `cd /`

Follow that up with `ls -l` to look around.

Are you curious to know what all those other directories mean?

bin

where programs (binaries) are kept

etc

System-wide configuration files

home

Where users keep their own files, including you!

lib

Short for "library". Shared code and kernel libraries

root

Where the system administrator (root) keeps their files

usr

Shared, read-only files, which includes some more binaries and documentation.

var

Short for “variable” files. Items in here change frequently, including logs, printer spools, and some caches.

## "WAIT, THIS IS MY OWN SYSTEM? HOW DOES THAT WORK?"

One of the many things IBM Z is good at is virtualization.

Basically, taking a whole lot of physical hardware and turning it into virtual resources. In this case, the system you're using is a virtual system running on top of what's called a Hypervisor. That's the thing that manages the translation between real, physical devices and logical or virtual resources.

Of course, unless you really go poking around, this appears just like a regular server, and that's the point. IBM Z hardware is able to make the most of resources.

In fact, there are probably hundreds, if not THOUSANDS, of other people just like you (well, not JUST like you) with their own very own system operating on the same hardware right now.

## 7 PERMISSION DENIED?

You are currently logged into the system as user "linux1".

This is a standard user that does not have the authority to do much damage. This is by design, to keep users from inadvertently messing up the system for everybody else.

Try to do a file listing of /root.

```
<ZXP> ls /root
ls: cannot open directory '/root': Permission denied
<ZXP>
```

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So even though this is your virtual machine, as a non-root user, you will get a "Permission denied" error because your current login (as the "linux1" user) are not allowed to look around in there.

## 8 ELEVATE YOUR AUTHORITY

Try the same command, but with **sudo** at the beginning. This is shorthand for “Switch User and DO”.

By default, you will become the **root** user which gives you full privileges.

Enter `sudo ls /root` and you should see something different this time.

```
<ZXP> ls /root
|ls: cannot open directory '/root': Permission denied
<ZXP> sudo ls /root
|anaconda-ks.cfg  original-ks.cfg
<ZXP> |||
```

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## 9 SOFTWARE INSTALLATION

One of the reasons you might want to use “root authority” briefly is to install software.

Type the command: `sudo yum install nano`

When you are asked if you want to Continue, enter “y”

**Yum** is a software package manager for Redhat Linux. You need to first say `sudo` to issue a “privileged” command, and then you are simply telling yum to install the editor called “nano”.

While you’re there, you can also issue `yum search nano` to find out about that package, or any other software you may be interested in.

Try `yum search text` to see a list of installable packages that mention “text” in their name or description.

For the curious, “yum” stands for “Yellowdog Updater, Modified”.

Yellowdog Linux was a Redhat-based Linux distribution for older PowerPC-equipped Macintoshes and IBM p-series servers, popular during the 1990s - the early days of Linux.



## "OH NO - I BROKE IT! CAN I GET ANOTHER?"

Of course! Go back to the the Linux Community Cloud page, delete the virtual machine that's currently running, and then make a new one. You can use the same keys, so no need to set that up again.

Some tips to keep your system from going "belly-up":

Stay in the linux1 user unless you absolutely need to perform an action as root. That's when the sudo command gets used, and ideally you should double, or even triple-check your commands before hitting Enter.

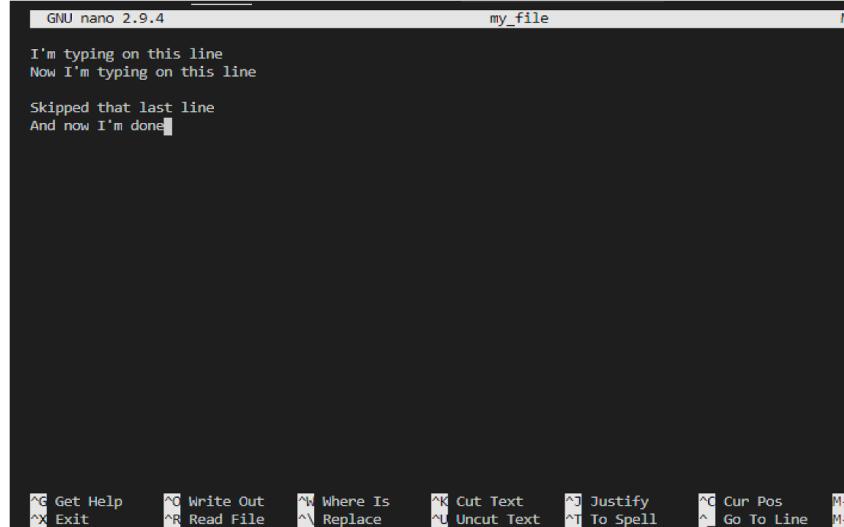
Don't be afraid of damaging the mainframe server by entering commands, everything is kept safely isolated through the hypervisor and virtualization.

You should always follow the usage guidelines and restrictions set forth by the Linux ONE Community Cloud agreement.

Nothing malicious or too network-intensive, please!

# 10 EDIT A FILE

Change directory to **/home/linux1** ( `cd /home/linux1` ) and enter the command `nano my-file`.



You are now using the software you just installed!

Enter some text (keep it clean, the admins are watching!) and then use the key combination *Control-O* to save the file (press enter to accept the name) and then *Control-X* to exit out.

Nano is one of the simpler text editors available on Linux.

# 11 WATCH A FILE AS IT CHANGES

Sometimes you want to see a file that is under construction.

Sound strange? What about keeping track of all of your system's messages in realtime, as they get added to the log file.

We can find that in the `/var` directory, since that's where variable files like logs and spools live.

Try out this command:

```
tail -f /var/log/messages
```

You should see output similar to :

```
systemd[1]: Starting dnf makecache...
dnf[7388]: Metadata cache refreshed recently.
systemd[1]: Started dnf makecache.
systemd[1]: Starting dnf makecache...
dnf[7417]: Metadata cache refreshed recently.
systemd[1]: Started dnf makecache.
systemd[1]: Starting dnf makecache...
dnf[7444]: rhel8 base
dnf[7444]: rhel8 supp
dnf[7444]: rhel8 appstream
dnf[7444]: rhel8 codeready
dnf[7444]: rhel8 ansible2.9
dnf[7444]: Metadata cache created.
systemd[1]: Started dnf makecache.
systemd[1]: Starting dnf makecache...
dnf[7475]: Metadata cache refreshed recently.
systemd[1]: Started dnf makecache.
systemd[1]: Starting dnf makecache...
dnf[7502]: Metadata cache refreshed recently.
systemd[1]: Started dnf makecache.
systemd[1]: Started /run/user/1000 mount wrapper.
systemd[1]: Created slice User Slice of UID 1000.
systemd[1]: Starting User Manager for UID 1000...
systemd-logind[6951]: New session 3 of user linux1.
systemd[1]: Started Session 3 of user linux1.
systemd[7513]: Reached target Timers.
systemd[7513]: Reached target Paths.
systemd[7513]: Starting D-Bus User Message Bus Socket.
systemd[7513]: Listening on D-Bus User Message Bus Socket.
```

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But perhaps not ... did you get a "Permission denied" message? You know how to fix that, right?

`tail` shows us the bottom part (get it?) of a file, and the `-f` flag says to "follow" it, showing any updates as they are added.

If anything happens on your system that the operating system thinks is important, it will show up here.  
Control-C cancels the command.

**No validation steps here**, just enjoy and keep on going!

## Nice job - let's recap

As you may know, an IBM Z mainframe is able to run many different operating systems at the same time. One of those operating systems is z/OS (which you've been using for most challenges) and it also happens to excel at running Linux.

In most big companies, you will find a mix of z/OS, Linux, and other operating systems being used. This is Linux on IBM Z hardware, and there's a lot more to explore.

## Next up ...

Keep it moving with the next Linux challenge, Go Worldwide. This will take the Linux things you've learned and elevate them to the next level.