



Use of the AWS Free Tier for Linux Foundation Training

Version 1.0

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Note: This is not a substitute for thoroughly reading the documentation at <https://www.aws.com/free>. It supplements that by giving an abbreviated set of instructions and elucidating information relevant to use with **Linux Foundation** courses.

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1 Why Use AWS for Linux Foundation Training

The **Linux Foundation** has a wide variety of courses in its catalog, both for Enterprise System Administration (**LFS***), and for Developer Training (**LFD***). Some of these courses have only relatively simple hardware and software requirements (including choice of **Linux** distribution) and others are quite demanding and have narrower distribution choices.

For the purpose of learning **Linux** administration or development, there is never a substitute for utilizing a native installation on bare metal hardware. However, this may be infeasible for a number of reasons, such as unavailability of suitable hardware.

Amazon Web Services (AWS) offers a wide range of virtual machine products (**instances**) which remote users can access in the cloud. In particular, one can use their **Free Tier** account level for up to a year and the simulated hardware and software choices available may be all one needs to perform the exercises for **Linux Foundation** training courses and gain experience with **Linux**. Or they may furnish a very educational supplement to working on local hardware, and offer opportunities to easily study more than one **Linux** distribution.

The AWS Free Tier account has the following main properties:

- No charge for 12 months
- Allows many simultaneous free **micro instances**
- Limit of 750 hours per month: enough to keep one virtual machine (**VM**), or instance, running continuously, or two half the time, three one third the time, etc.
- 1 GB of RAM per instance (This is not as limiting as it sounds since there will not be a graphical interface.)

- Up to 30 GB storage (**total**) for free; so you can have, for example, three instances with 10 GB each.
- Once additional resources are used, such as additional storage, or VMs more powerful than three instances, or the year passes, charges begin.
- Offers choice of major **Linux** distributions: **RHEL, SuSe/SLES, Ubuntu**
- Can connect to the instance either through command line **ssh** (or **PuTTY** on **Windows**) or through a browser window.

Note: you will be charged only if either you exceed free tier limits, or the year expires. We realize some people will be unwilling to supply credit card information to **AWS**, but there is no way around this.

There are limitations however:

- There is no graphical user interface (**GUI**); one can only work on a command line through an **ssh** client. Except for the lowest level **Linux Foundation** courses, such as **LFS101x** on **edX**, or **LFS300**, this is not at all a problem.
Our courses for the most part avoid **GUIs** because they vary so much from one distribution and version to another, and often have less power than lower level interfaces. Even the above mentioned introductory courses spend most of their time at the command line.
- One generally does not have access to the **boot screen** furnished by **grub**, and thus cannot pick kernels, modify boot parameters etc. And if one compiles a custom kernel and it fails to boot (or scrambles `/boot/grub/grub.cfg`) one may have no choice but to throw away the instance and create a new one.
- Some courses require access to the boot screen to play with emergency conditions, rescue and troubleshooting, booting into different run levels etc. This is impossible, but such exercises are only a few of many.

None of these issues should be very serious when doing **Linux Foundation** training courses.

2 Obtaining an AWS Free Tier Account

These instructions are skeletal and there is a lot more information on the **AWS** website, so please spend some time examining it. However, it is actually pretty easy to get set up and running in short order!

Note: While you can setup and control your account and your instances with any reasonable browser, please note you cannot use **Google Chrome** to use the **Java SSH** browser client; you will have to use **Firefox** or another browser. However, you can always use a different **ssh** client as we discuss later, so feel free to use **Chrome** for management, but not logging in.

1. Go to <https://aws.amazon.com/free> and click on I am a new user
2. Give name etc, and then click on **Sign in using our secure server**
3. Respond to all prompts (name, password etc.) and create the account
4. Click on **Personal Account** on next page (**Contact Information**) and fill out
5. Give Credit card information.

At this point **AWS** will take up to 24 hours to confirm the registration. In practice we have seen times more like 2 1/2 hours. Once this is done you can begin creating experimenting with instances.

3 Launching an instance

The instructions for creating (launching) your first instance (virtual machine) are essentially the same as creating new ones later, except you have to take the additional step of initialing your privacy key for **ssh** access.

Assuming your account exists and you have logged in:

1. Click on **Services->Compute->EC2**.
2. To create an instance, click on **Launch Instance**.
3. Check the one you want (anything that says **Free Tier Eligible**).
4. Once again pick the **Free Tier Eligible** entry, and click on **Next: Configure instance Details**. It is counter-intuitive from the layout, but do this **before Review and Launch**.
5. You probably will not need to change any details in the first setup screen.
Click on **Next: Add storage**. Pick up to 30 GB. We recommend the default 10 GB. of 8 GB by default.
6. Click on **Review and Launch**.

If this is your first instance, you will be given instructions for generating an **ssh key**; it will have a name like `mynameaws.pem`. On **Linux** (and other **UNIX**-like operating systems) it is usually best to store this in `$HOME/.ssh`; on **Windows** you will get appropriate instructions from web site.

It is rather important to keep and protect this file and remember where it is as you will have to supply it every time you want to connect to an instance.

Note: you should probably change the **Name** of the instance once it is created (by clicking in the name field and selecting the edit button), as otherwise you may wind up with multiple machines you cannot differentiate.

One can do much more complicated network and security setups that we will not discuss here; for simple courses the defaults are adequate. Some **Linux Foundation** courses that do more complicated things with networks and security may have further configuration suggestions.

4 Connecting to an instance and Starting/Stopping/Terminating

1. Click on **Actions->Instance State-> Start**
2. Click on **connect**. Follow instructions for either one of the following two methods:
 - An **ssh** client
 - A **Java SSH client** in a browser.

In either case, make sure to give correct path for the **ssh** key (e.g., `myname.pem`)

Note: You cannot use **Google Chrome**; it will tell you that if you try! **Firefox works just fine**.

3. Say OK to some warnings and agree to a license agreement if prompted to do so.
4. Make sure you click on **Actions->Instance State-> Stop** when you are done. Clicking on **Terminate** should kill the instance permanently.

Please note that when you connect through **ssh** you will be prompted to run something like:

```
ssh -i "/home/myaccount/.ssh/myaws.pem" ec2-user@ec2-35-161-xxx-xxx.us-west-2.compute.amazonaws.com
```

The proper user name will be mentioned and might be something like `ec2-user` or `ubuntu` depending on the instance. Make sure not to use `root` as the user, and make sure the correct location is given for your **ssh** key.

You can create new instances at any time and you can duplicate your current instances, take defaults, change the name, etc. at any time in the future.

5 What if you exceed the free limits?

If you want to gain access to more powerful machines you can simply request them when launching a new instance. They are not very expensive. If your year is up you would also have to pay for new micro instances

Prices will vary according to geographical region and some other variables, but for example for an instance of:

- **RHEL 7**, 1 CPU, 1 GB RAM \$0.073/hour (this is what you get for free for a year)
- **RHEL 7**, 2 CPU, 4 GB RAM \$0.112/hour
- **RHEL 7**, 4CPU, 16 GB RAM \$0.299/hour

For educational and recreational purposes this is not very expensive.

6 Preparing for Linux Foundation Courses

Once you have launched and connected to an instance, you will need to make sure you have the software needed to do the course. All instances are automatically set up to have **sudo** access for the user named **ec2-user** which is how you log into the system.

Exactly what packages are provided with the machine is not completely predictable, so you may want to bring it into line with **Linux Foundation** requirements by running our script, **ready-for.sh**.

Obtain this by doing:

```
wget https://training.linuxfoundation.org/cm/prep/ready-for.sh
chmod +x ready-for.sh
```

If this fails because the system does not have **wget** installed, then install it with one of the following commands depending on distribution:

```
sudo yum install wget
sudo zypper install wget
sudo apt-get install wget
```

for **Red Hat**, **SuSe** and **Ubuntu** distributions, respectively, and then run the **wget** command. Further preparation steps are explained at <https://training.linuxfoundation.org/cm/prep/>. Most of the time you can just do:

```
./ready-for.sh --install LFS301
```

where you substitute the proper course number, such as **LFS101x**, **LFD401**, etc.

It is also advisable to update your system before you go too far by doing one of

```
sudo yum update
sudo zypper update
sudo apt-get update ; sudo apt-get dist-upgrade
```

according to your distribution.

LFD Kernel Courses

For kernel level courses you can indeed use these instances but it requires some care. If you are content to use the distribution supplied kernel (say for **LFD430: Developing Linux Device Drivers**) you will still have to make sure the kernel development package is installed. For example, on **RHEL** you have to do

```
sudo yum update
sudo yum install kernel-devel
```

If you want to re-compile kernels and boot into them it is completely allowed (which you would have to do for **LFD420: Linux Kernel Internals and Development**). However, if you produce a non-bootable kernel through an error you may not be able to access your system again. So please make sure you keep copies of any thing you need, such as your work from preceding exercises, before rebooting if this is the case! You can always launch a new instance and terminate the now defective one.