Getting Started with FreeBSD

Welcome!

Today We Will:

- Learn about FreeBSD

- Setup a FreeBSD desktop

- Access the Internet

- Learn how to contribute to open source

Outline of Workshop

- Intro to FreeBSD

- Install FreeBSD on a VM (VirtualBox)

- Understand command line versus GUI

- Install a GUI (desktop) – We will install Lumina

- Install Firefox

- Install LibreOffice

The FreeBSD World

FreeBSD is an open source Unix-like **operating system** descended from the Unix developed at the University of California, Berkeley in the 1970s.

The FreeBSD Project is an active open source **community** since 1993 with hundreds of committers and thousands of contributors around the world.

The FreeBSD Foundation is a **non-profit organization** registered in Colorado, USA in 2000 dedicated to supporting the FreeBSD Project, its development and its community.

What is FreeBSD?

It's not a Linux Distribution!

One of the oldest (1993), largest, and most successful open source projects in the world

Complete operating system including kernel, userland, documentation, and tools

Over 30,000 3rd Party Open Source Packages

What is FreeBSD?

Created and distributed by a community of highly technical and committed contributors (Over 400 active developers and thousands of contributors)

Works on Intel / AMD x86 32 and 64bit, 32 and 64 bit ARM, RISC-V, PowerPC, Sparc64, MIPS, AWS, Azure, GCP, …
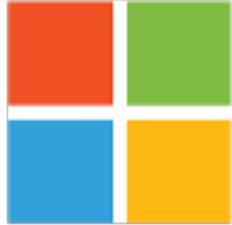
10s of millions of deployed systems

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Who Uses FreeBSD

Most Likely You Use FreeBSD!

iPhone or Apple computer

Streaming Netflix

NETFLIX

Messaging someone over Facebook's WhatsApp application

Sony PlayStation 4

FlightAware

FreeBSD

Why Use FreeBSD?

- Friendly and Approachable Community

- Excellent Documentation

- Good Tooling and Modern Compilers

- Consistent Development and Release Processes

- Wide Variety of Architectures Supported

- More control over your environment

- Secure

Why Companies Use FreeBSD?

History of innovation

Great tools

ABI stability within major releases

Mature release model

Excellent documentation in many languages
- https://www.freebsd.org/doc/zh_CN/books/handbook/

Business Friendly License

ZFS

Open Community

Why Get Involved in FreeBSD?

Gain marketable skills like:

Communication – How to ask questions – Distributed team

Collaboration

Tools – Respositories, bug reporting, IRC, …

Best Practices

Technologies – Operating Systems, File Systems, Networking, Storage

Why Get Involved in FreeBSD?

- Be part of an inclusive and welcoming community

- Learning opportunities from experts

- Opportunities to work in areas you're interested in

- Resume building - highlight skills in public forum

- Have fun working with like minded individuals

- Learn from reading real operating system code!
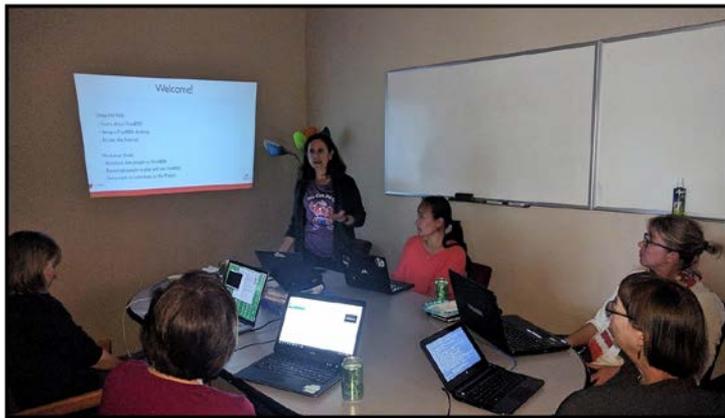
How You Can Contribute To FreeBSD

Report or fix a bug in the code

Documentation - improve, translate, fix documentation

Write about FreeBSD in a blog post, article, on social media

Educate people about FreeBSD – run a meetup!

Let's Get Started!

You should have downloaded VirtualBox on your computer– if you haven't go here:

- Download VirtualBox here https://www.virtualbox.org/wiki/Downloads

NOTE: For this workshop we will install from flash drive!

Next we need to download FreeBSD

- Visit the official FreeBSD releases page (https://www.freebsd.org/where.html). The disk images are listed *in order of release date*, so the most recent release can be found at the top of the page.

For **32-bit** machines, click on **i386 -** For **64-bit** machines, click on **amd64**

FreeBSD 11.1-RELEASE

Installer Images	Virtual Machine Images	SD Card Images	Documentation
amd64	README	BANANAPI	Released: July, 2017
i386	amd64	BEAGLEBONE	Release Notes
powerpc	i386	CUBIEBOARD	Readme
powerpc64	aarch64	CUBIEBOARD2	Hardware Compatibility List
sparc64		CUBOX-HUMMINGBOARD	Installation Instructions
aarch64		GUMSTIX	Errata
		RPI-B	Signed Checksums
		RPI2	
		PANDABOARD	
		WANDBOARD	

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Selecting Correct FreeBSD Image

After clicking the link, you will be redirected to a file directory containing multiple formats and versions of the FreeBSD installer.

File Name ↓	File Size ↓
Parent directory/	–
CHECKSUM.SHA256-FreeBSD-11.1-RELEASE-amd64	1171
CHECKSUM.SHA512-FreeBSD-11.1-RELEASE-amd64	1811
FreeBSD-11.1-RELEASE-amd64-bootonly.iso	313339904
FreeBSD-11.1-RELEASE-amd64-bootonly.iso.xz	71868412
FreeBSD-11.1-RELEASE-amd64-disc1.iso	723697664
FreeBSD-11.1-RELEASE-amd64-disc1.iso.xz	433368260

For Virtual Machines, the format you are looking for is the file ending in**disk.iso** as highlighted above. Click this file and it will start downloading the installer.

Configuring VirtualBox

Run VirtualBox to start the initialization process.

Select the "New" button on the top left of the window to open the configuration window.

Name your operating system as "FreeBSD", then select FreeBSD from the dropdown menu as well as the version (32 or 64 bit). Type = BSD

Choose the defaults options for disc setup until you reach the memory allocation section

Pick 2-4GB memory (as long as the slider does not move into the red)

Name and operating system

Please choose a descriptive name for the new virtual machine and select the type of operating system you intend to install on it. The name you choose will be used throughout VirtualBox to identify this machine.

Name: | FreeBSD|

Type: BSD

Version: FreeBSD (64-bit)

Expert Mode | Next | Cancel

Configuring VirtualBox Cont.

Hardware drive Option – Recommend 100GB at least 16GB

Hard disk file type = VDI

Hard disk file type

Please choose the type of file that you would like to use for the new virtual hard disk. If you do not need to use it with other virtualization software you can leave this setting unchanged.

- ⦿ VDI (VirtualBox Disk Image)
- ◯ VHD (Virtual Hard Disk)
- ◯ VMDK (Virtual Machine Disk)

Give the VM some extra processors if your machine can handle it
(stay in the green)

Choose Dynamically allocated physical storage
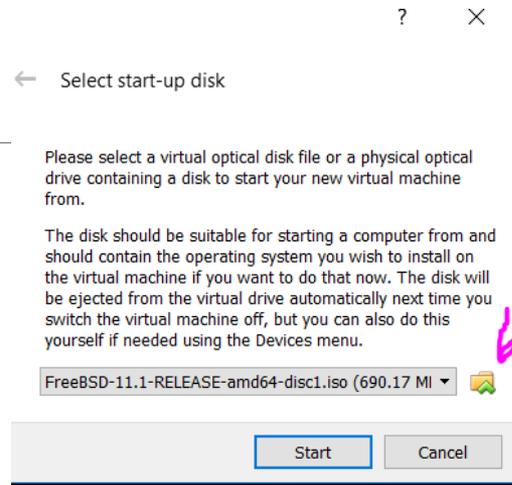
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Installing FreeBSD

After VirtualBox has been set up, boot FreeBSD by clicking the Start button

VirtualBox will start up a virtual machine and ask for a *virtual optical disk file*. This will be the **.iso** file that you downloaded through the FreeBSD website.

Navigate to this file by clicking the small file symbol next to the drop-down menu. Once selected, the booting process will continue and the FreeBSD installer will start.

The next steps will be to configure FreeBSD. When in doubt, use the default options provided. The next few slides will guide you through this process. You can also follow the FreeBSD handbook's installation guide https://www.freebsd.org/doc/handbook/using-bsdinstall.html to configure and set up your system.

? ✕

← Select start-up disk

Please select a virtual optical disk file or a physical optical drive containing a disk to start your new virtual machine from.

The disk should be suitable for starting a computer from and should contain the operating system you wish to install on the virtual machine if you want to do that now. The disk will be ejected from the virtual drive automatically next time you switch the virtual machine off, but you can also do this yourself if needed using the Devices menu.

FreeBSD-11.1-RELEASE-amd64-disc1.iso (690.17 MI ▼)

Start | Cancel

bsdinstall Setup

After the first boot, users will be directed to the welcome menu. **Arrow** keys can be used to navigate through the options while the **Enter** key will be used to save the selection and move onto the next menu. To begin installation, select the first [Install] option.

This will enter bdsinstall, a program that allows users to install FreeBSD while offering multiple options for customization. For now, default options will be all that's needed. The options are a great tool for more advanced users wanting a more personalized experience.

First, the installer will display a menu for keymap selection. Highlight the option to continue with the default keymap and press **Enter** to use the default keyboard layout.

The installer will then allow the user to set a hostname for the system. Type in a hostname that is unique for your network. Hit **Enter** again to save the new name.

After a hostname is selected and saved, the installer will prompt the user to select components to install. Stick with the default options and hit **Enter** to continue.

bsdinstall Setup Cont.

The installer will guide the user through the process of allocating disk space. This will allow FreeBSD to set up a partition scheme.

Choose the Auto (UFS) Guided Disk Setup

Confirm your selection

Use the Entire disk (ada0), this will make sure that all allocation disk space will be utilized.

Select GPT Partitions when prompted for a partition scheme. To navigate, use the **arrow keys** and **Space** to select the GPT option.

When prompted, complete the setup process and create the disk partition by selecting [Finish] and [Commit]. Once these changes have been saved and committed, bsdinstall will start the FreeBSD installation process. This may take a few minutes.

FreeBSD Post-Installation

While the FreeBSD installation process has been completed, there are a few more configuration options that need to be set before booting into the newly installed system.

First, the *root* password must be set. The *root* account is a superuser that has access to all files and commands. Characters that are typed during this section will not be displayed on the screen. Type the new root password and then a second time when prompted.

Next, FreeBSD will need to configure the network interfaces found on the computer. Select **Enter** to continue. The default options should be used.

Select [Yes] to configure IPv4

Select [Yes] to use DHCP to configure

Select [Yes] to configure IPv6

Select [Yes] to try SLAAC

At this point you will be directed to a menu with Resolver Configuration values, hit **Enter** to continue to the next step.

FreeBSD Post-Installation

The next menu is a large list of regions for time zone configuration. Use the arrow keys to navigate to the correct region and hit **Enter**. Next, navigate to the correct country or region. Finally, identify and choose the correct time zone. Select [Yes] to confirm.

A menu to set the correct date will be next, while you can navigate through the menu to set date, choose [Skip] if the displayed date is already correct. [Skip] the next menu as the time zone was set up in the previous configuration menu.

The next two menus will be to configure what system services will be started when the system boots. All services are optional and for now select [OK] in both menus to continue with the default configuration.

The next step will be to add a user besides *root*. Because *root* has no limits and protection, it is recommended to log in to the system using a user account to limit the damage if a mistake is made (even a typo could be catastrophic).

FreeBSD Post-Installation

When prompted to create a user account select [Yes].Bsdinstall will follow with a series of prompts to customize the account. Below is a quick summary of the information to input. For clarity, text in bold notates when the user should input text and not just use the default option:

- Username – username used to log in. **Username is case sensitive and should not contain spaces**

- Full name – **The user's full name**

- Uid – user ID (leave this blank)

- Login group – The user's group (leave blank)

- Invite user into other groups? – Additional groups for the user. **Type *wheel* here, which will give admin access.**

- Login Class – (leave blank)

- Shell – tcsh

- Home directory – The user's home directory (leave blank)

- Home directory permissions – Permissions on the user's home directory (leave blank)

FreeBSD Post-Installation

- Use password-based authentication? – Prompts user to input password at login (leave blank)

- Use an empty password? – Option to use a blank password, though this is insecure (leave blank)

- Use a random password? – Option for a randomized password (leave blank)

- Enter password – The password for this user. **Characters typed will not show on screen.**

- Enter password again – **The password must be typed again for verification.**

- Lock out the account after creation? – Option to lock out use (leave blank)

- User will be prompted to review the summary. If a mistake was made enter *no* and try again. If everything is correct, enter *yes* to finalize and create the new user. The menu will then ask if the user wants to create further user accounts, for now enter *no*.

Final configuration: Use the arrow keys to navigate to *Handbook* and press **Enter** to install the FreeBSD Handbook. Select [Ok] to begin installation.

Navigate to *Exit* and hit **Enter** to finalize changes. Select [No] when asked if further manual configuration is required and [Reboot] to complete the FreeBSD installation process.

Saving Your Configuration

- Once FreeBSD has been properly configured a window will appear asking if you would like to reboot to set the changes. Select "yes" and wait until the FreeBSD booting page appears again. Once this happens, close the virtual machine window and select "Power off the machine".

- On the main VirtualBox application, click the section (on the lower right side of the window) that says "Storage." A new window should appear showing the storage options.

- Under the main "Controller: IDE" there will be two options. One will be the hard disk that VirtualBox created for the system (it will have a square blue hard drive icon) and the other is the original FreeBSD download (with a light blue disk icon). Right click the *sub-storage* with the disk icon and select "Remove" from the drop-down menu.

- Select "OK" to save your changes and return to the main VirtualBox application. Click "Start" again and the FreeBSD virtual machine should now boot in its configured form. *You now have FreeBSD installed on your machine!*

Final Steps

In order to download packages you need to be logged into, or emulate the root user.

$ su

Install the VirtualBox guest addition packages:

$ pkg install emulators/virtualbox-ose-additions

Open the startup service configuration file located at /etc/rc.conf using the built in text editor ee:

$ ee /etc/rc.conf

To edit the file using ee, navigate using the arrow keys and type the text you need to enter. Once you are happy with your changes, press "<Esc> + <Enter>" and press "a" when given the option to *save changes*.)

Add these two lines to the bottom of the file and save your changes:

vboxguest_enable="YES"

vboxservice_enable-="YES"

Install Other Software

- Over 30,000 third-party software packages are available to install on FreeBSD!

- What applications do you typically use each day?
  ◦ Word
  ◦ Excel
  ◦ Internet Browser
  ◦ Mail app

Let's install an Internet Browser and an Open Source equivalent to Office!

How do we find out whether the software is available on FreeBSD?

$ pkg search firefox

$ pkg search libreoffice

GUI (Desktop) Prep

$ pkg install -y xorg (x windows server)

$ startx (this will test xorg by showing you a little x session with a few terminals and a clock, to exit use right ctrl + F1 then press ctrl + c)

$ ee /boot/loader.conf and add the following line to the end:

 kern.vty=vt

 $ ee /usr/local/etc/X11/xorg.conf.d/driver-vboxvideo.conf (and add the following content to the new file:

 Section "Device"
         Identifier "Card0"
         Driver   "vboxvideo"
EndSection

Just a Few More Steps

Enter the following commands:

$ sysrc dbus_enable=YES

$ dbus-uuidgen > /etc/machine-id

$ pkg install -y sudo

$ visudo (we will use the vi editor this time to edit sudo)

Within the sudo config type /wheel press Enter and uncomment the line below to allow all members of the wheel group to use sudo (in vi you can type the following to accomplish this task: j0xxZZ) (pressing j moves down, 0 moves to the beginning of a line, x deletes one character, ZZ is saves and quits)

$ reboot (you can also type init 6 to reboot)

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Set up Command History

As regular user run the following:

Enable command history in tcsh so you can have a record of the commands you've typed. This can be an extremely valuable tool that you'll find yourself using a lot. Type history to see the command history

$ ee .tcshrc (add the following contents)

set history = 99999999

set savehist = (99999999 merge)

set histfile = ~/.tcsh_history

Save file

Install a GUI

As regular user run the following:

$ sudo pkg install -y lumina

$ vi .xinitrc

Within the .xinitrc file type i to enter insert mode then add the following line:

exec start-lumina-desktop

To exit and save changes type ESC then type two capital Z's or you can also type :wq

$ startx

Open a terminal (alt-F1)

Changing Time Format in Lumina

Right click on desktop, Mouse over Preferences, Click on All Desktop Settings, click on General Options, in the Time Format field type the following

h:mm:ss A

This will change the clock to 12-hour format. If you don't want the seconds displayed remove the :ss

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Improving Lumina Controls

Add button to the bottom panel that allows one to change the volume, log out, change workspace, and set the screen brightness and locale settings.

1. Go back to the "All Desktop Settings" menu

2. Click on "Panels"

3. Click on the little "+" icon in Panel 1

4. Click on the drop down menu for "Select a Plugin"

5. Select "System Dashboard" from the menu

6. Click "Select"

7. Click on "Save"

Lumina Window Theme

Change the window theme and add some elements to the desktop window to simplify resizing.

1. Right click on the desktop

2. Mouse over "Preferences"

3. Click on "All Desktop Settings"

4. Click on "Window Manager"

5. Click on the drop down menu for "Window Theme"

6. Select one of the options

7. Click on "Save"

Set up Firefox

$ sudo pkg install -y firefox

Click on the Lumina icon in the bottom left either type firefox + Enter or mouse over applications > Internet > click on Firefox

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Install libreoffice and Add Media Libraries

$ pkg install -y libreoffice

Open libreoffice in Lumina

Open up a new document and start editing

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Useful Commands

Avoiding Issues
$ ^C (Ctrl-C)   Terminate command

$ ^U (Ctrl-U)   Clear to start of line

Rebooting / Shutting Down
$ sudo shutdown –p now   Power down
$ sudo shutdown –r now   Reboot
$ exit
$ logout   Log out

Display present work directory
$ pwd

Change to your home directory
$ cd
$ cd ~

Change to parent directory
$ cd ..

Finding Information
$ man cmd   Access the "cmd" command manual

                                      page, replace with any command.

Files
$ touch filename   Create file if it does not exist
$ rm filename   Delete file
$ mv oldname newname   Rename a file
$ locate filename   Find file (full filename not needed)

File Editing
$ vi filename   Opens the vi editor
$ ee filename   Opens the ee edito

Change to previous directory
$ cd -

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Website: www.freebsd.org

FreeBSD Foundation: www.freebsdfoundation.org

GitHub: github.com/freebsd

Mailing Lists: https://lists.freebsd.org/mailman/listinfo

Forums: https://forums.freebsd.org

FreeBSD Handbook: https://www.freebsd.org/doc/handbook/

IRC

Resources

https://www.freebsdfoundation.org/freebsd/how-to-guides/

https://linuxcbt.com/