SCaLE17x Intro to FreeBSD Workshop

Morning

To begin, we can simply visit FreeBSD.org on a working computer and look for the big “Download FreeBSD” button near the awesome beastie logo. Once on that page, you will need to select the proper image from the list of “Installer Images.” We'll choose “amd64.”

Next, we’ll pick the image called **FreeBSD-12.0-RELEASE-amd64-bootonly.iso** from the list because it’s the latest RELEASE version of FreeBSD and is quite small. I highly recommend you also take a look at the CHECKSUM.SHA512-FreeBSD-12.0-RELEASE-amd64 file and do your own SHA512 checksum verification after you have downloaded the file to see if they match. If so, you know that your download worked properly. Once the installer image has been downloaded, it is ready to be used to boot up the virtual machine.

In VirtualBox, click the “New” button to start the wizard that will walk you through creating a virtual machine. The important options to keep in mind are the type of OS we'll choose FreeBSD 64 bit, and the amount of RAM to dedicate to the virtual machine. Use some amount greater than 512MB and less than any number that puts your virtualbox wizard “slider” into the red. Keep your “slider” in the green, and you should be fine giving the machine a decent amount of memory to work with. Accept the defaults for the other settings. Once the wizard completes, you can start up the virtual machine.

Another wizard will appear asking you to point VirtualBox to the installer image for the new virtual machine. If you’d like to avoid this second wizard, simply edit the virtual machine settings before first boot, clicking on the “Storage” link, then the “Empty Disc” section, and then you can mount the virtual image on that screen. All of these steps in VirtualBox equate to assembling the hardware and inserting the installer CD. Pressing “Start” in VirtualBox is like pressing the “Power” button to boot up a real machine. On first boot of the install CD you are welcomed to FreeBSD and asked if you would like to begin an installation. Select “Install” by pressing “Enter/Return” on the keyboard. At this point, you will have noticed VirtualBox trying to explain it is capturing your mouse and keyboard to be used inside the virtual machine. Go ahead and dismiss these messages. To use the mouse and keyboard outside of the virtual machine again, you need to press the host key. VirtualBox displays the current host key in the bottom right of the window. This install says “Right Ctrl,” which means you need to press the right control button on the keyboard first to get back control over the mouse and keyboard from the virtual machine. Continue through the installer with the following in mind: for this install, we’ll continue with the default US keyboard layout, name the computer “getting-started-with-freebsd,” and select the default settings on the “Distribution Select” screen by just pressing “ok.” For the “Network Configuration” section, we went with the “em0” interface on the virtual machine and the “re0” interface on the real hardware. Yes, configure IPv4. Yes, use DHCP. Yes, use IPv6. Yes, try SLAAC. The resolver configuration should be populated with at least one DNS value. Use the “Tab” key on the keyboard to move to select “ok” to continue. For the “Mirror Configuration,” we used “Main Site.” Next, we need to decide how to partition the disc. On the “Partitioning” screen, there are options for Auto (ZFS) and Auto (UFS). Select Auto (ZFS), choose stripe as the ZFS pool type and select the disc to use for the pool with the space-bar, name the pool, and proceed with installation. Finally, agree to install FreeBSD by selecting "Yes."

- User Accounts

Set a password for the root account on the system. Don’t fret when there are no *** appearing while typing in your root password. Rest assured, the keystrokes are being recorded; they’re just not being shown on the Screen. For the “Time Zone” section we went with “America – North and South, United States of America,” “Mountain (most areas),” “Skip” on both “Time & Date” screens. For the “System Configuration” section, we unselected “sshd,” selected “powerd” and chose “ok.” On the next screen, we selected “9 secure_console” to put the root password prompt on any attempt to enter Single User Mode at the system console.

Say “yes” to the prompt about adding a new user. Use an all lowercase username. Enter the users “Full name.” Add the user account to the groups wheel, operator, video by responding to the question “Login group is .. Invite .. into other groups? []:” with **wheel operator video** then press “Enter.” Users in the wheel group can run “privileged” commands. The operator group allows users to do things like shutdown and restart the computer without needing to invoke the special privileges from the wheel group. It's a good idea to add users to the video group that is planning on using FreeBSD as a desktop. We chose “tcsh” for our shell and used defaults for the other fields while finally providing an account password. If all looks ok, proceed without creating any more user accounts.

For the “Final Configuration” section, select “Handbook.” We went with the default of “en” and chose “ok.” Once back on the configuration screen, select “Exit” to finish and “yes” to proceed with doing manual configuration. The only manual configuration we need to do is to shut down the machine so we can take out the CD. On the virtual machine, the power needs to be off to not get an error when removing the CD, so we’ll issue the shutdown command below to turn off the computer. Type either “init 0” or “shutdown -p now” to shut down.

To take a CD out of a virtual machine in VirtualBox, click on the name of the virtual machine, click on “Settings,” click on “Storage,” and click on the tiny CD icon. Notice another tiny CD icon with a tiny down arrow below it next to the “Optical Drive” section. Use this second CD icon to “Remove Disk from Virtual Drive.”

- **Cloning a VirtualBox VM**

Use the “Snapshots” menu in VirtualBox to “Clone” the VM. Check the box “Reinitialize the MAC address of all network cards”. We could choose either a “Full clone” or a “Linked clone”. We’ll use the “Full clone” option. Later on we’ll use this cloned VM.

After a break

Boot up the first VM, use the “Start” button to boot the machine and log in as the root user.

- ## Package Installation / Text Configuration

Type the following commands on the virtual machine:

```
pkg install -y xorg sudo lumina sakura virtualbox-ose-additions firefox

sysrc vboxguest_enable=YES

sysrc vboxservice_enable=YES

visudo (this command launches the vi text editor).
```

Type the following to edit the one line of text and get out of the editor:

```
/wheel
```

Type enter or hit return and then type

```
j0xxZZ (once you hit the first search term, j goes down, 0 goes to the
beginning of the line, xx deletes the comment, ZZ saves and quits vi)

sysrc dbus_enable=YES

dbus-uuidgen > /etc/machine-id

service dbus start
```

Change to regular user by holding down “control” and pressing “d” on the keyboard which will log out the current user. Log in again, this time as the regular user account that was created. Next type the following commands.

```
vi .xinitrc
```

Again the vi editor, and to begin typing you need to be in “insert mode” and must press “I” to enter insert mode and begin typing in text. Type in the following one-line configuration:

```
exec start-lumina-desktop
```

Exit vi by pressing “Esc” on the keyboard, then type **ZZ** or **:wq** followed by “Enter/Return.”At this point the virtual machine desktop can be started with the following command

```
startx
```

- Desktop Configuration

Right click on the desktop > Preferences > All Desktop Settings

Under Appearance click on “Theme,” then select “Icons” from the sidebar, then select “Material Design (light),” and click on “Apply.” Close the “Theme Settings” window.

Go back to the “Desktop Settings” window and select “Window Manager.” In the “Window Theme” drop-down menu, select “Twice.” Click on “Save.” Close the “Window Manager Settings” window.

Go back to the “Desktop Settings” window and select “Applications.” Set the “E-mail Client” to Firefox and “Virtual Terminal” to Sakura. Close all the settings windows.

Right click on the desktop and select “Preferences” then “Wallpaper,” click on the “+,” and choose “solid color.” We chose red for our color. Click “ok,” then “Save.”

- FreeBSD Handbook

Here is how to open a local copy of the handbook we installed in the Final Configuration:

Look for Firefox in the applications menu in Lumina.

Right click on: Desktop > Applications > Network > Firefox Web Browser

Open Firefox and navigate to the following URL:

```
file:///usr/local/share/doc/freebsd/handbook/index.html
```

This is a local copy of the FreeBSD Handbook, and it will always be available as it doesn't require an active internet connection.

That’s all it takes to install FreeBSD. The next recommended step is to choose a firewall and configure it. Also recommend you pick up a copy of the book *BSD*

Hacks to get more familiar with the “tcsh” shell as well as to acquire several new skills.

Back to the slides

FreeBSD Update and package updates

```
sudo -i
freebsd-update fetch install
```

Page Down & q should get you through the prompts. If the screen shows END press q, use Page Down for the other screens.

```
pkg update
pkg upgrade -y
```

Jails

IOCAGE

Set UTF-8 as the locale for this host

```
vi /etc/login.conf
```

Change the line with :umask=022: to look like the following

```
:umask=022:\
:charset=UTF-8:\
:lang=en_US.UTF-8:
```

save and quit the editor then run the following

```
cap_mkdb /etc/login.conf

logout
```

Login again as root and type the following to verify UTF-8 locale has been set

```
locale
```

Install iocage

```
pkg install -y git

mkdir -p /usr/local/src

cd /usr/local/src

git clone https://github.com/bsdci/ioc.git

cd ioc

make install
```

the following command assumes your zpool is named zroot adjust as necessary.

```
sysrc ioc_dataset_default=zroot/iocage

ioc list
```

We should now see an empty table as the output of ioc list, we'll do some additional housekeeping below

```
mount -t fdescfs null /dev/fd

vi /etc/fstab
```

Add the following line to the file and exit when finished. 'i' for insert mode, ESC then 'ZZ' to save and quit the file. Press TAB between each of the fields for the fstab file.

```
      fdescfs /dev/fd fdescfs rw    0 0
```

Download a Release branch of FreeBSD first

```
ioc fetch
```

We used [Enter] to fetch the default release iocage wants to provide. Verify the download with the following command

```
ioc list --release
```

View the help documentation

```
ioc --help
```

Any subcommands can also have the --help flag appended

```
ioc create --help
```

Create a base jail

```
ioc create jail-one
```

List current jails

```
ioc list
```

Do a filtered list of the jails based on what they are

```
ioc list release=11+
```

Setup networking on jail-one

```
ioc set vnet=off ip4_addr="em0|10.0.2.16/24” jail-one
```

List jails again to see the changes to the output

```
ioc list
```

Startup jail-one and jump into the console

```
ioc console -s jail-one
```

Verify networking is working

```
pkg
```

Say yes to the pkg bootstrap prompt

Exit the VM console with ctrl + d

Another feature to consider is “One-Shot Jails”

Turn off the jail

```
      ioc stop jail-one
```

try issuing the following command

```
      ioc exec -f jail-one ifconfig
```

The jail should start up, run the command, display the output and then stop the jail

To delete a jail

```
      ioc destroy jail-one
```

Poudriere

The following commands will work on the virtual machine we’ve been using sofar but it will take a long time to compile all the packages.

We’re going to use the cloned virtual machine we created earlier to explore Poudriere.

```
  pkg install -y poudriere
```

```
mkdir /usr/ports/distfiles
```

```
vi /usr/local/etc/poudriere.conf
    ZPOOL=zroot
    FREEBSD_HOST=https://download.freebsd.org
```

```
poudriere jail -c -j amd64-12-0 -v 12.0-RELEASE
```

```
poudriere jail -l
```

```
poudriere ports -cp head
```

```
poudriere ports -l
```

get together a list of packages to build. I ran pkg query -e '%a=0' %o on my laptop and a large list appeared. pkg query on my VM was much shorter. For this tutorial we will just build a shorter list of packages, but for reference here's the command to export the current packages installed on the system to a file called pkglist:

```
pkg query -e ‘%a=0’ %o > pkglist
cat pkglist
```

here's the output from a much shorter pkglist

```
ports-mgmt/pkg
ports-mgmt/poudriere
```

Two ways to configure custom options for packages, manually and with the normal make config screen.

FYI: Manually looks like this

```
  vi /usr/local/etc/poudriere.d/amd64-12-0-make.conf
      DEFAULT_VERSIONS += ssl=libressl
```

To customize a package one can use the normal package configuration screens, which will appear when issuing the following command

```
  poudriere options -j amd64-12-0 -p head -f pkglist
```

For this tutorial we’ll just actually build the packages with the default options by issuing the following command

```
  poudriere bulk -j amd64-12-0 -p head -f pkglist
```

```
  cd /usr/local/poudriere/data/logs/bulk/amd64-12-0-head/latest
```

this directory contains logs and even a website at /usr/local/poudriere/data

open the website to check status or press ctrl + t during the building to check status as well

the packages that were built are available at

```
      /usr/local/poudriere/data/packages/amd64-12-0-head
```

Create a pkg repository

```
  mkdir -p /usr/local/etc/pkg/repos
```

Disable the main FreeBSD repo

```
      vi /etc/pkg/FreeBSD.conf
```

Set enabled to no

```
            FreeBSD: {

                  enabled: no

            }
```

Create a FreeBSD.conf replacement file to hold the repository configuration

```
      vi /usr/local/etc/pkg/repos/amd64-12-0.conf
```

Add the following configuration

```
            amd64-12-0: {

                  url: “file:///usr/local/poudriere/data/packages/amd64-12-0-head”,

                  enabled: yes,

            }
```

To reinstall all packages using the new repo

```
      pkg upgrade -fy
```

Updating Poudriere

```
 vi /usr/local/etc/poudriere.conf

      CHECK_CHANGED_OPTIONS=verbose

      CHECK_CHANGED_DEPS=yes

poudriere jail -j amd64-12-0 -u
poudriere ports -p head -u

poudriere bulk -j amd64-12-0 -p head -f pkglist
```