Getting Started With FreeBSD

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Roller Angel - FreeBSD User
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Welcome

10-12 Learn about and install FreeBSD

12-1 Lunch

1-3 Set up desktop, learn to navigate shell, and more!

3-5 Set up a jail and learn about Poudriere

Let's Get Started!

First, we need to install VirtualBox

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

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 12.0-RELEASE

Installer Images	Virtual Machine Images	SD Card Images	Documentation
amd64 i386 powerpc powerpc64 sparc64 aarch64	README amd64 i386 aarch64	RPI-B BANANAPI BEAGLEBONE CUBIEBOARD CUBIEBOARD2 CUBOX-HUMMINGBOARD GENERICSD RPI2 PANDABOARD WANDBOARD PINE64 PINE64-LTS RPI3	Released: December, 2018 Release Notes Readme Hardware Compatibility List Installation Instructions Errata Signed Checksums

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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.
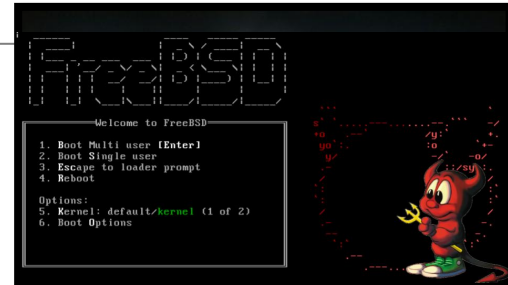
File Name ↓	File Size ↓
Parent directory/	-
CHECKSUM.SHA256-FreeBSD-12.0-RELEASE-amd64	1171
CHECKSUM.SHA512-FreeBSD-12.0-RELEASE-amd64	1811
FreeBSD-12.0-RELEASE-amd64-bootonly.iso ←	346167296
FreeBSD-12.0-RELEASE-amd64-bootonly.iso.xz	77782060
FreeBSD-12.0-RELEASE-amd64-disc1.iso	892467200
FreeBSD-12.0-RELEASE-amd64-disc1.iso.xz	623944576
FreeBSD-12.0-RELEASE-amd64-dvd1.iso	3884677120
FreeBSD-12.0-RELEASE-amd64-dvd1.iso.xz	2888051180
FreeBSD-12.0-RELEASE-amd64-memstick.img	975905280
FreeBSD-12.0-RELEASE-amd64-memstick.img.xz	627656096
FreeBSD-12.0-RELEASE-amd64-mini-memstick.img	385851904
FreeBSD-12.0-RELEASE-amd64-mini-memstick.img.xz	81653720

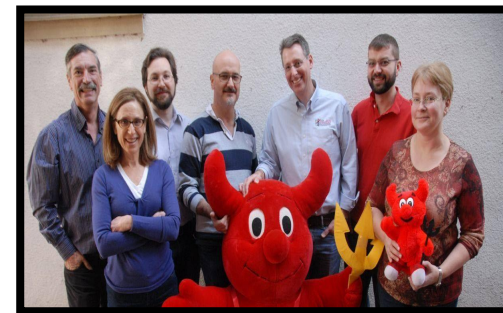T   l out by the
a

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
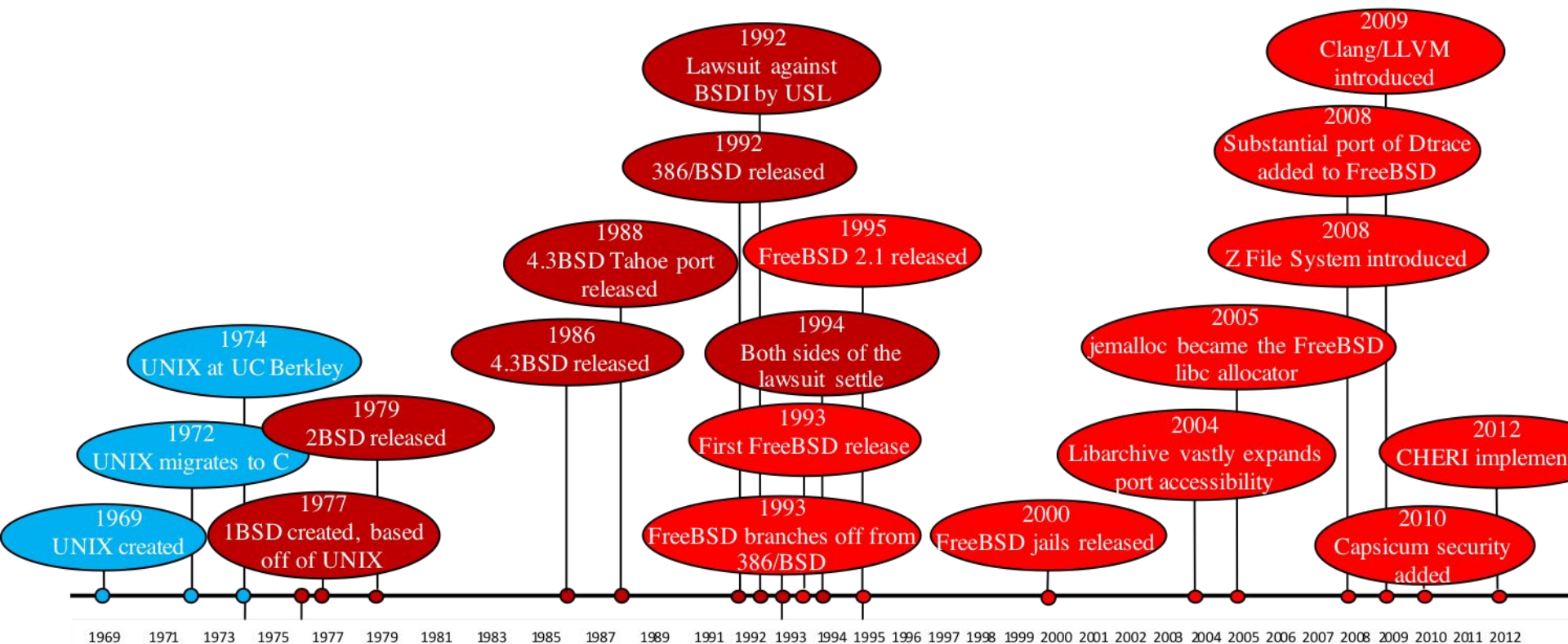
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What is FreeBSD?

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

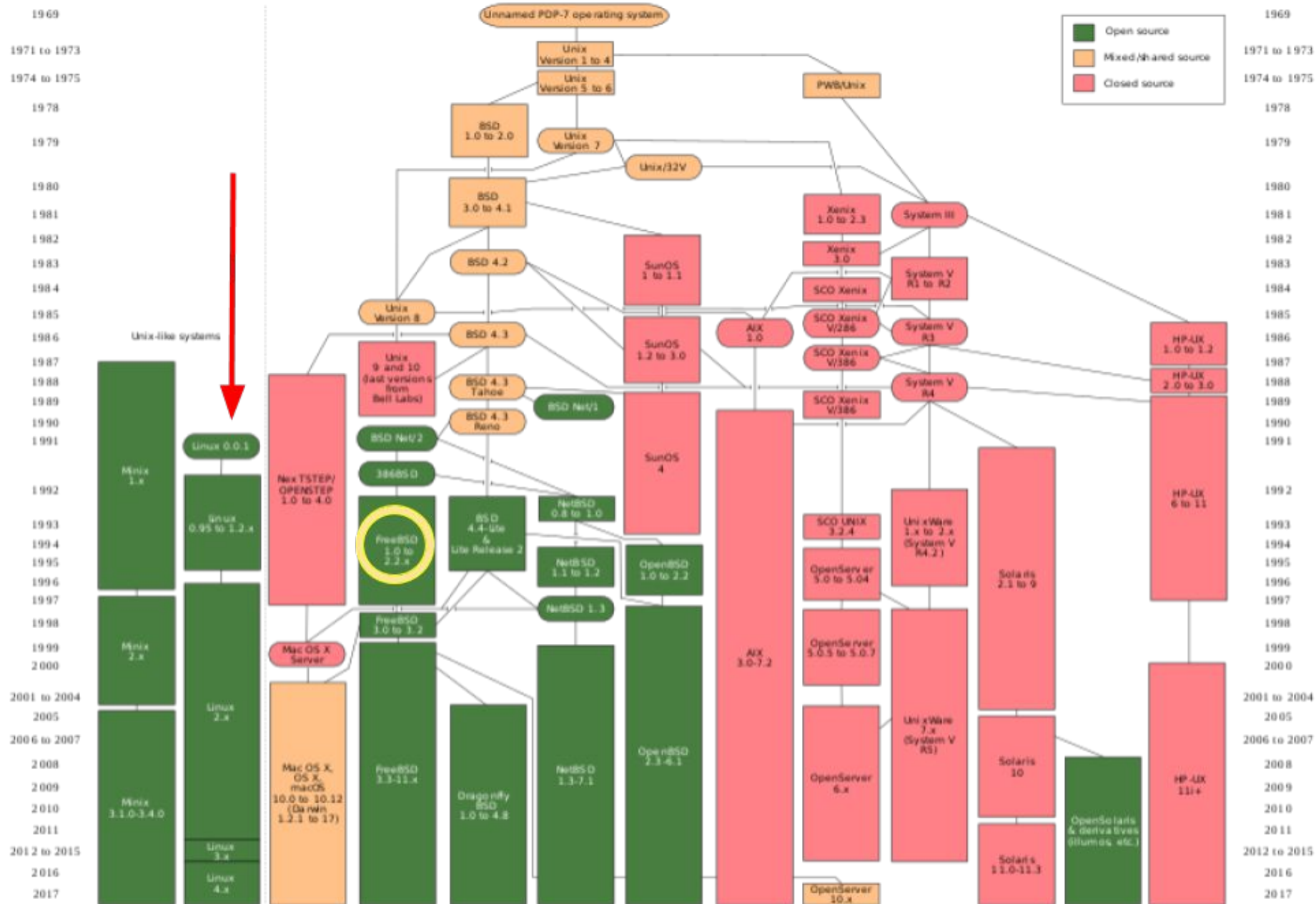Works on Intel / AMD x86 32 and 64-bit, 32 and 64 bit ARM, RISC-V, PowerPC, Sparc64, MIPS, AWS, Azure, GCP, …

10s of millions of deployed systems

Unix history timeline diagram. Years listed vertically on both left and right sides: 1969, 1971 to 1973, 1974 to 1975, 1978, 1979, 1980, 1981, 1982, 1983, 1984, 1985, 1986, 1987, 1988, 1989, 1990, 1991, 1992, 1993, 1994, 1995, 1996, 1997, 1998, 1999, 2000, 2001 to 2004, 2005, 2006 to 2007, 2008, 2009, 2010, 2011, 2012 to 2015, 2016, 2017.

Legend: Open source, Mixed/shared source, Closed source.

Ken Thompson (sitting) and Dennis Ritchie working together at a PDP-11
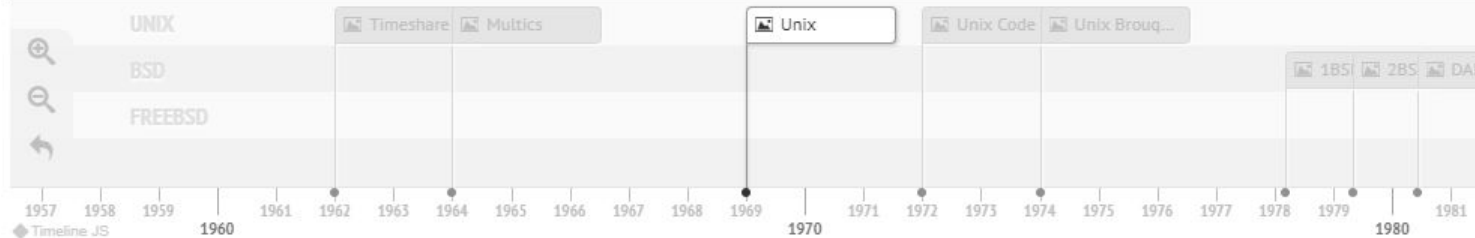
1969

UNIX

Before Bell Labs left the Multics project, Dennis Ritchie and Ken Thompson got a taste of what Multics could be capable of. They secured funding from the Bell Labs Legal department to purchase a more powerful PDP-11/20 machine. In 1969 Ken Thompson, Dennis Ritchie and others started working on a new program that utilized the full capabilities of the more powerful computer. This program was called Unics (Uniplexed Information and Computing Service).

MULTICS

UNIX CODE
MIGRATES TO C

UNIX

BSD

FREEBSD

Timeshare | Multics | Unix | Unix Code | Unix Brouq...

1BSI | 2BS | DAF

1957 1958 1959 1961 1962 1963 1964 1965 1966 1967 1968 1969 1971 1972 1973 1974 1975 1976 1977 1978 1979 1981

1960 1970 1980

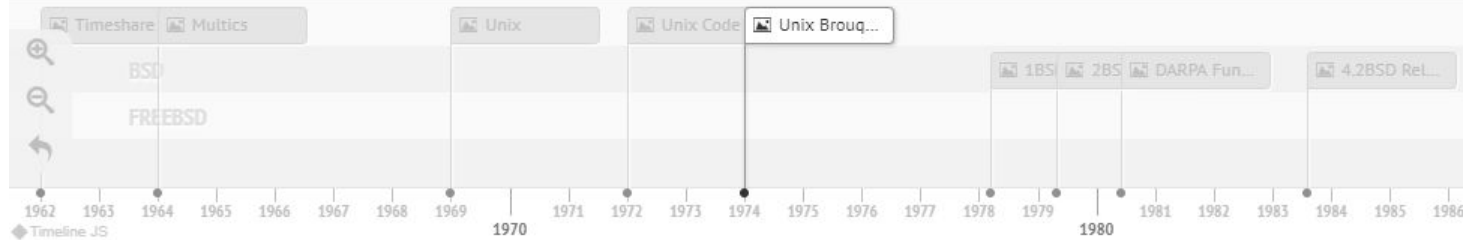Timeline JS

1974

UNIX BROUGHT TO UC BERKELEY

In 1974, Professor Bob Fabry of the University of California, Berkeley, acquired a UNIX source license from AT&T. Bob Fabry had previously seen UNIX 4 at the ACM Symposium (Association for Computing Machinery) on Operating System Principles in 1973 and was interested in bringing it to the University. The Computer Systems Research Group started to modify and improve AT&T Research Unix. They called this modified version "Berkeley Unix" or "BSD".

UC Berkeley

UNIX CODE MIGRATES TO C

1BSD RELEASE

Timeshare | Multics | Unix | Unix Code | Unix Brouq...

BSD | 1BSI | 2BS | DARPA Fun... | 4.2BSD Rel...

FREEBSD

1962 1963 1964 1965 1966 1967 1968 1969 1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986
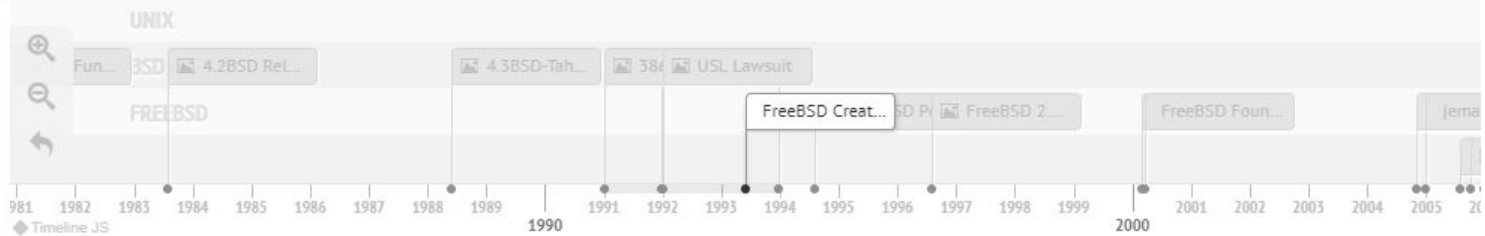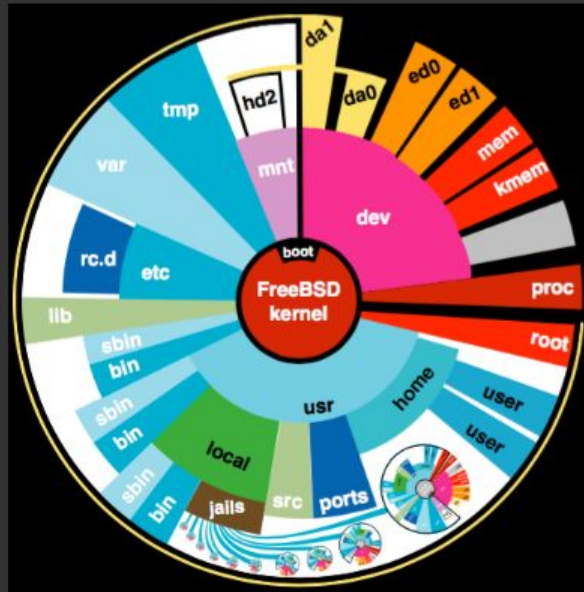
Timeline JS

Walnut Creek CD-ROM cover for FreeBSD 1.1

JUNE 1993

FREEBSD CREATED

The development flow of 386BSD was slow and after a period of neglect, a group of 386BSD users decided to branch out on their own and create FreeBSD so that they could keep the operating system up to date. On 19 June 1993, the name FreeBSD was chosen for the project. The first version of FreeBSD was released on November 1993.

USL LAWSUIT

FREEBSD PORTS

UNIX

FREEBSD

FreeBSD Creat...

1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005

Timeline JS

MARCH 2000

FREEBSD JAILS

FreeBSD Jails were released with FreeBSD 4.X in early 2000. The jail mechanism is an implimetation of operating system-level virtualizaton which allows system administrators to partition a FreeBSD system into several independent min-systems or "Jails". This gave sys admins much more power to secure and optimize their FreeBSD systems.

da1

hd2

da0

ed0

ed1

tmp

mem

kmem

var

mnt

dev

rc.d

etc

boot

proc

FreeBSD kernel

lib

root

sbin

bin

usr

home

user

sbin

bin

user

local

sbin

bin

jails

src

ports

FREEBSD 2.1.5

FREEBSD FOUNDATION FOUNDED

UNIX

4.5BSD-Tah...   386   USL Lawsuit

FREEBSD   FreeBS   FreeBSD P   FreeBSD 2...   FreeBSD Jails   jemalloc   ZFS   Clanq   Capsic

PF Ported

1988   1989   1991   1992   1993   1994   1995   1996   1997   1998   1999   2001   2002   2003   2004   2005   2006   2007   2008   2009   2011   2012

Timeline JS   1990   2000   2010

2012

CHERI

In 2012, the University of Cambridge started developing Capability Hardware Enhanced RISC Instructions (CHERI), an outgrowth based off of the earlier Capsicum project. CHERI transposes the Capsicum hybrid capability model into the CPU architecture space, allowing fine-grained compartmentalisation within process address spaces – while continuing to support current software designs.

CheriBSD running on a CHERI processor.

CAPSICUM

UNIX

BSD

FreeBSD Foun...   jemalloc   ZFS Clanq Capsic CHERI

PF Ported

2001 2002 2003 2004 2005 2006 2007 2008 2009 2011 2012 2013 2014 2015 2016 2017 2018 2019 2021 2022 2023 2024

2010   2020

Timeline JS

Who Uses FreeBSD

Most Likely You Use FreeBSD!

iPhone or Apple computer

Streaming Netflix

Messaging someone over Facebook's WhatsApp application

Sony PlayStation 4

FlightAware

Nintendo Switch

Why Use FreeBSD?

- Friendly and Approachable Community

- Excellent Documentation

- Good Tooling and Modern Compilers

- Consistent Development and Release Processes

- Wide Variety of Architectures Supported

- Secure

- It's the cool operating system to use! (Heard from many students)

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Why Companies Use FreeBSD?

- History of innovation
- Great tools
- ABI stability within major releases
- Mature release model
- Excellent documentation
- Business Friendly License
- ZFS
- Open Community

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How the Project Works

Independent of the FreeBSD Foundation

Developer Elected Core Team

Mentorship for Commit Bit

Functional Teams (core, release engineering, security, ports, documentation,…)

Collaborative Development Environment

FreeBSD core team

Historically "key" developers but now…

…9-member elected management body
- Votes and candidates from the full set of active committers
- Co-opted non-voting core team secretary

Responsibilities
- Administrative (commit bits, hats, team charters)
- Strategic (project direction, coordination, cajoling)
- Rules, conflict resolution, enforcement

We have no "benevolent" dictators for life!

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Who are the FreeBSD committers

Locations
- 34 countries
- 6 continents

Ages
- Oldest (documented) committer born in 1948
- Youngest (documented) committer born in 1997
- Average age 39.5
- Data from circa Nov 2017

Count vs. Age

Applications

Netflix – High performance content delivery

Sony Playstation 4 - Embedded

NetApp ONTAP – FreeBSD based enterprise storage

Groupon and WhatsApp - Datacenter applications

Apple - Uses large portions of FreeBSD in their Mac OS and iOS

Citrix Netscaler

Microsoft – Supports FreeBSD in the cloud environment

Why Get Involved in FreeBSD?

Gain marketable skills like:

Communication – How to ask questions – Distributed team

Collaboration

Tools – Repositories, 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!

Join the
FreeBSD
Project
Today!!

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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 - teach a workshop like this one!

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 init 0   **Power down**
$ sudo shutdown –r now   **Reboot**
$ sudo init 6   **Reboot**
$ exit
$ logout   **Log out**

$ drill
$ less
$ grep

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 most commands.

Files
$ touch filename   **Create file if it does not exist**
$ rm -rf directoryname   **Delete directory recursively**
$ rm filename   **Delete file**
$ mv olddirectoryname newdirectoryname **Rename a directory**
$ mv oldfilename newfilename   **Rename a file**
$ locate filename   **Find file (full filename not needed)**

File Editing
$ vi filename   **Opens the vi editor**
 (to exit vi type ESC :wq followed by Enter or ESC ZZ)
$ ee filename   **Opens the ee editor**

Change to previous directory
$ cd -

Download a file from the internet
$ fetch http://website.example.com/filename.txt

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Using the history command

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** at anytime to see the command history

To view the output one page at a time, pipe the command into a pager like less

history | less

Use **arrow keys** to navigate and **q** to exit

Setting up the tcsh shell (full .tcshrc config)

```
set black   = '%{\033[30m%}'
set red     = '%{\033[31m%}'
set green   = '%{\033[32m%}'
set yellow  = '%{\033[33m%}'
set blue    = '%{\033[34m%}'
set megenta = '%{\033[35m%}'
set cyan    = '%{\033[36m%}'
set white   = '%{\033[37m%}'
set nocolor = '%{\033[0m%}'

if ($?prompt) then
    set prompt = "[${red}%n@%m:%~${nocolor}][${yellow}%h${nocolor}]>%b: "
endif

set history = 99999999
set savehist = (99999999 merge lock)
set histfile = ~/.tcsh_history

# like Ctrl-d, just push TAB
set autolist

# one last chance to double-check I really am deleting the files I want to delete
set rmstar

# typo correction for commands
# set correct=all

# prevent shell from clobbering existing file if forget to use >> (append) and just use one >
set noclobber

# Fairly popular aliases to try out
alias la ls -laG
alias ll ls -G
```

Download this config rather than typing it all out by hand; simply use the following commands:
fetch http://bsd.pw/config/tcshrc
mv tcshrc ~/.tcshrc

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Introduction to FreeBSD Jails

FreeBSD Jails provide completely separated environments containing a FreeBSD instance.

FreeBSD Jails provide lightweight virtualization on the bare metal, sharing a space in the host operating systems kernel. With jails one can configure soft resource limits that can be updated live on the spot with one change in configuration on the host with no requirement to shut the system down first to make the changes.

Jails are an excellent solution for testing software while developing and installing many packages as well as for running software packages in production.

Think of a jail like one of those special mirrors that don't just reflect but allow others to peer in-

  the admin on the host machine can look inside and control the jail

  the admin on the jailed machine can't look outside the jail or change configuration on the host machine, they may not even realize they're in a jailed environment at all

Introduction to compiling FreeBSD ports with Poudriere

Poudriere combines the power and simplicity of packages with the customizability of ports.

The customized ports are built in an isolated environment, a FreeBSD Jail, so that the resulting packages are identical to those built on another system running Poudriere.

Once Poudriere has compiled a collection of packages, it is just a matter of setting up a repository to get those packages installed.

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Learn more about FreeBSD

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

Amount Raised: $1,332,398
Goal: $1,250,000
Donors: 979
DONATE

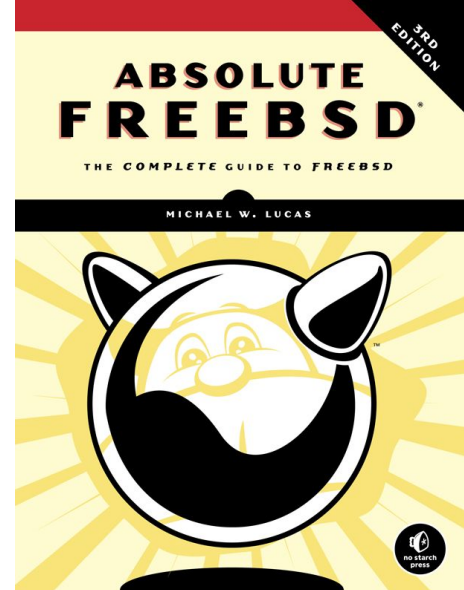ABOUT   WHAT WE DO   JOURNAL   GET INVOLVED   DONORS   NEWS & EVENTS   FREE

How-To Guides

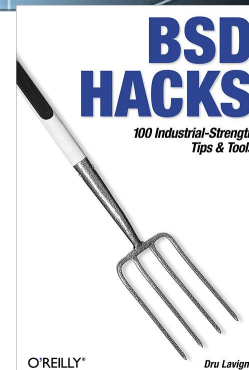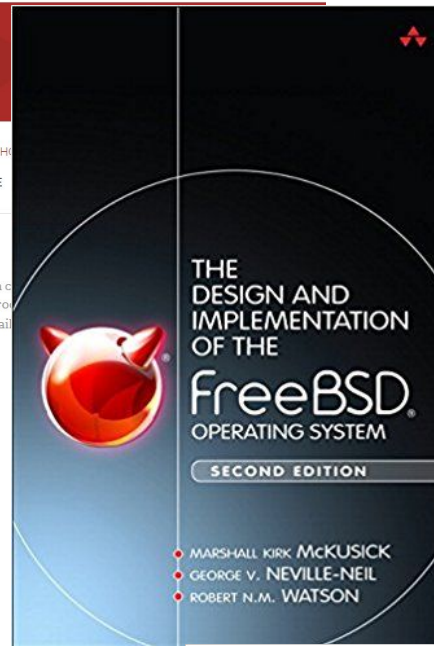FREEBSD.ORG   WHO USES FREEBSD   PRODUCTS FROM FREEBSD   HO
OCTOBER 2018 FREEBSD DEVELOPER SUMMIT   FREEBSD DAY   TIMELINE

Getting Started with FreeBSD

As part of the FreeBSD Foundation's education initiative, we've worked with
develop guides that make getting started with FreeBSD a straight forward pro
FreeBSD Quickstart Guide. Stay tuned for more how-tos as they become avail

FreeBSD Installation Guides:

- Installing FreeBSD with VirtualBox (Mac/Windows)
- Installing a Desktop Environment on FreeBSD
- Installing FreeBSD for Raspberry Pi
- Installing PC-BSD as a Primary Operating System

https://www.mckusick.com/history/
https://www.freebsd.org/doc/handbook/
deb@freebsdfoundation.org
Roller's Website http://BSD.pw
http://BSDNow.tv
http://mwl.io
https://www.linuxcbt.com/products_unixcbt_bsd11x_edition