MeetBSD.ir

همایش معرفی خانواده BSD در ایران
۹ اردیبهشت ۱۳۹۵
سالن همایش آفتاب

list of contents

- Introduction of speakers
- History of BSD
- Kernel models
- PKGNG
- Firewalls in FreeBSD and OpenBSD
- ZFS

Introduction of speakers

- Abdourahman Homaei
  - BSD Certified
  - NIX Samurai
- Mohammad Abedini
  - BSD Certified
  - OpenBSD Guy
- Mohammad Nikkhesal
  - Linux Instructor
  - OpenBSD Addicted

History of BSD

Berkeley Software Distribution

- UNIX developed in the 1970s at the Bell Labs research center by Ken Thompson, Dennis Ritchie, and others
- University of California, Berkeley acquired a UNIX source license from AT&T
- The BSD project was founded in 1976 by Bill Joy

History of BSD

Berkeley Software Distribution

- all recipients had to get a license from AT&T first in order to use BSD
- In June 1989 Work on replacing AT&T code began and，after 18 months，much of the AT&T code was replaced
- However，six files containing AT&T code remained in the kernel

History of BSD

Berkeley Software Distribution

- In 1992 William Jolitz and Lynne Jolitz wrote replacements for those six missing files
- They released 386BSD via an anonymous FTP server
- a group of 386BSD users decided to branch out on their own and create FreeBSD

History of BSD

Berkeley Software Distribution

- The first version of FreeBSD was released on November 1993
- NetBSD 0.8, was made in April, 1993
- OpenBSD released on 1 October 1996 from NetBSD
- DragonFly BSD released on 12 July 2004 from FreeBSD

BSD philosophy

- Complete OS NOT only KERNEL:Device Driver,Kernel-land,User-land
- Unified configuration
- Geek-friendly
- “If it ain't broke, don't fix it”

FreeBSD

- Latest release: 10.3
- Package manager: pkg
- Platforms: IA-32, x86-64, SPARC64, IA-64, PowerPC, ARM, MIPS
- Kernel type: Monolithic with dynamically loadable modules
- Who uses FreeBSD: Apple,Whatsapp,Netflix,NetApp,Sony(PS3,PS4),Panasonic, Yahoo,...
- Known for: performance,TCP/IP stack
- Home of: ZFS,ULE,Jail,BHyve
- License: Simplified BSD License

NetBSD

- Latest release: 7.0
- Package manager: pkgsrc
- Platforms: Alpha, ARM, PA-RISC, 68k, MIPS, PowerPC, SH3, SPARC, RISC-V,VAX and x86…
- Kernel type: Modular Monolithic, Anykernel
- Who uses NetBSD: NASA's SAMS-II Project,Apple's AirPort Extreme,Sony(PSP),Dell Force10
- Known for: Portability(57platform),code quality,Rump,Kernel scripting
- Home of: Rump
- License: 2-clause BSD license

OpenBSD

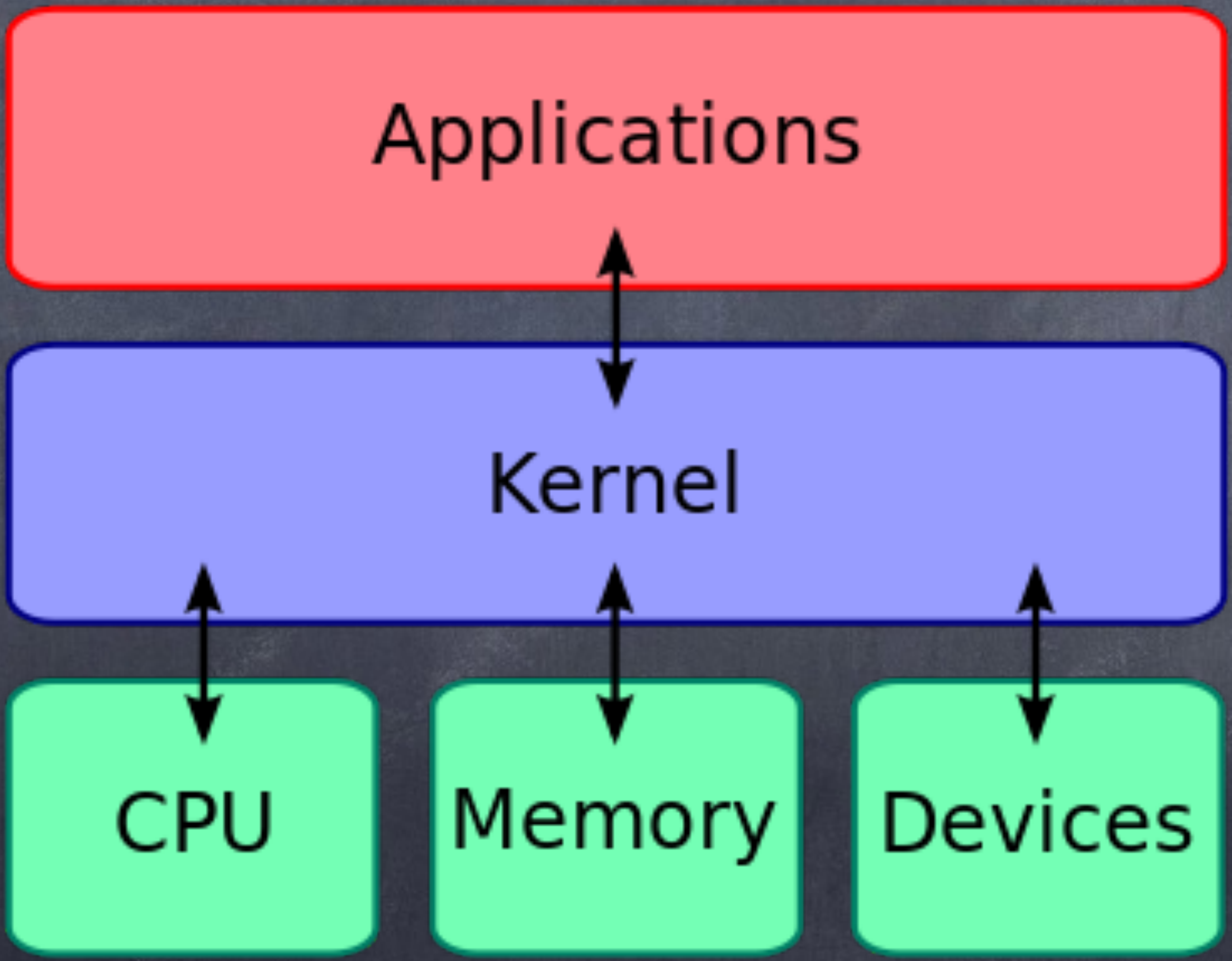
- Latest release: 5.9
- Package manager: pkg_×
- Platforms: Alpha, x86-64, i386, MIPS64, PowerPC, SPARC 32/64, Zaurus
- Kernel type: Monolithic
- Who uses OpenBSD: Banking in Switzerland,Adobe Systems,Italian Institute of Nuclear Physics
- Known for: Security
- Home of: OpenSSH,OpenSMTPD,PF
- License: BSD License

DragonflyBSD

- Latest release: 4.4.2
- Package manager: pkg
- Platforms: x86-64
- Kernel type: Hybrid
- Who uses DragonflyBSD: Tetrad Digital Integrity
- Known for: Scalability,high-availability
- Home of: HAMMER,VKERNEL
- License: Modified BSD License

15 minutes rest break

Kernel models



Applications

Kernel

CPU

Memory

Devices

Kernel models

- The kernel is a computer program
- central core of a computer's operating system
- first program loaded on startup
- then manages the remainder

Kernel models

- The critical code of the kernel is usually loaded into a protected area of memory
- When a process makes requests of the kernel, the request is called a system call
- Various kernel designs differ in how they manage system calls and resources

Kernel models

Monolithic kernels:

In a monolithic kernel, all OS services run along with the main kernel thread.

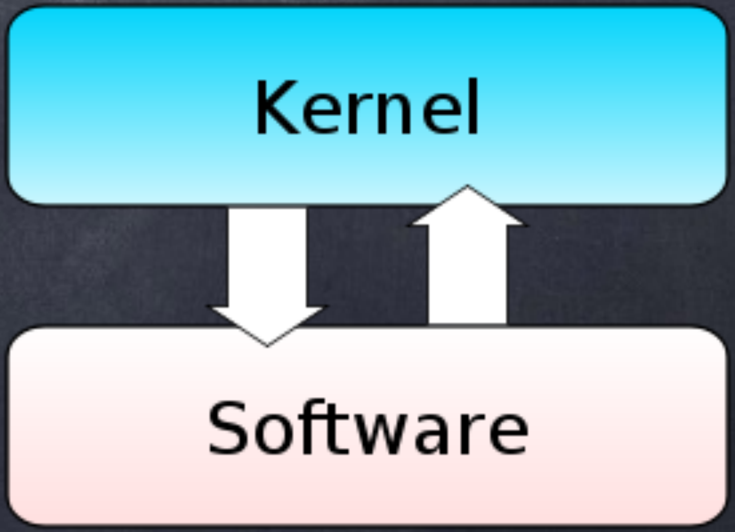
FreeBSD,OpenBSD,Linux,MS DOS,Win9x,OSx<8.6

Pros:

- Speed
- Simplicity of design

Cons:

- Potential stability issues
- Can become huge - Linux 2.6 has 7.0 million lines of code and Windows over 30million!
- Potentially difficult to maintain



Kernel models

Microkernels:

as little as possible in "system space" and as much as possible in "user space"

memory management, multitasking, and inter-process communication in system space

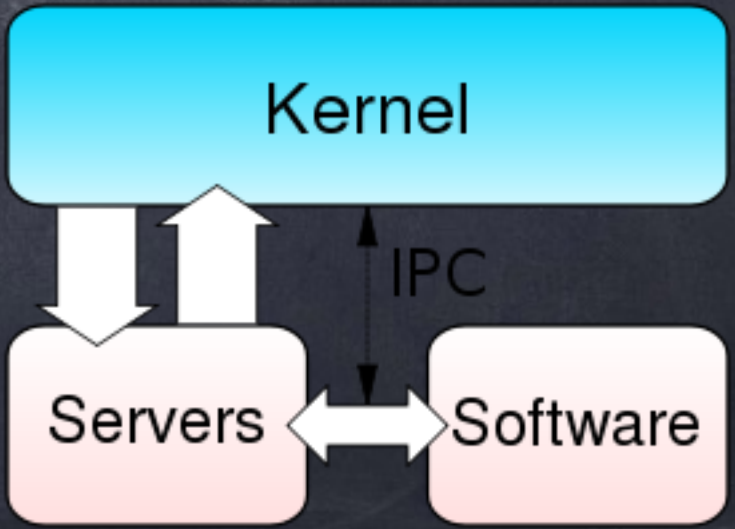
A Reimplementation of NetBSD by Andrew S. Tanenbaum,amigaOS,Mach,Minix

Pros:

- Stability
- Security
- Benefits for SMP machines

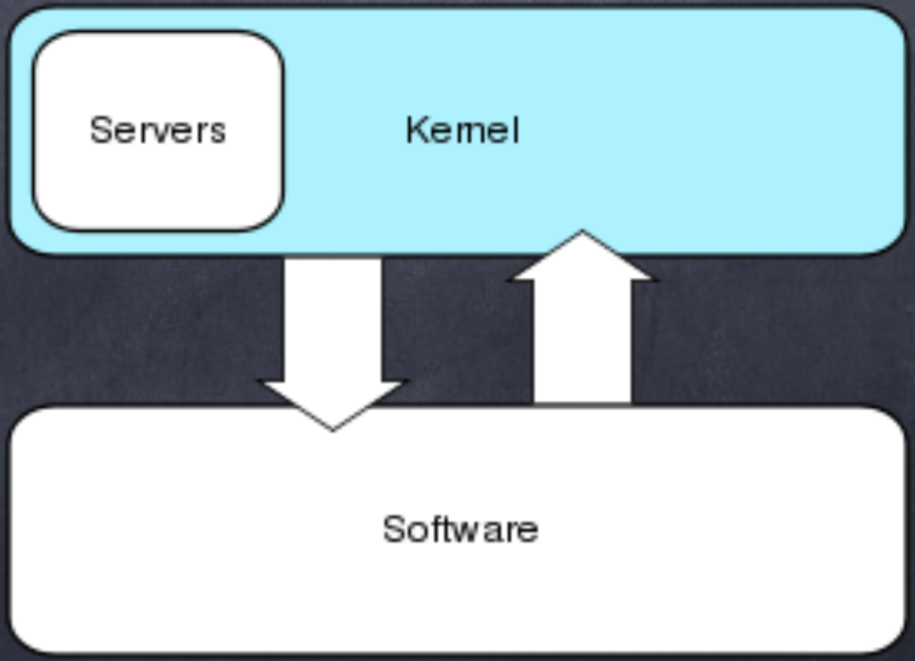
Cons:

- Additional context switches are usually required
- Slow Inter Process Communication can result in poor performance



Kernel models

- Hybrid (or Modular) kernels
  - except for device drivers
  - DragonflyBSD,NT Kernel,Darwin,BeOS,Plan9



Kernel models

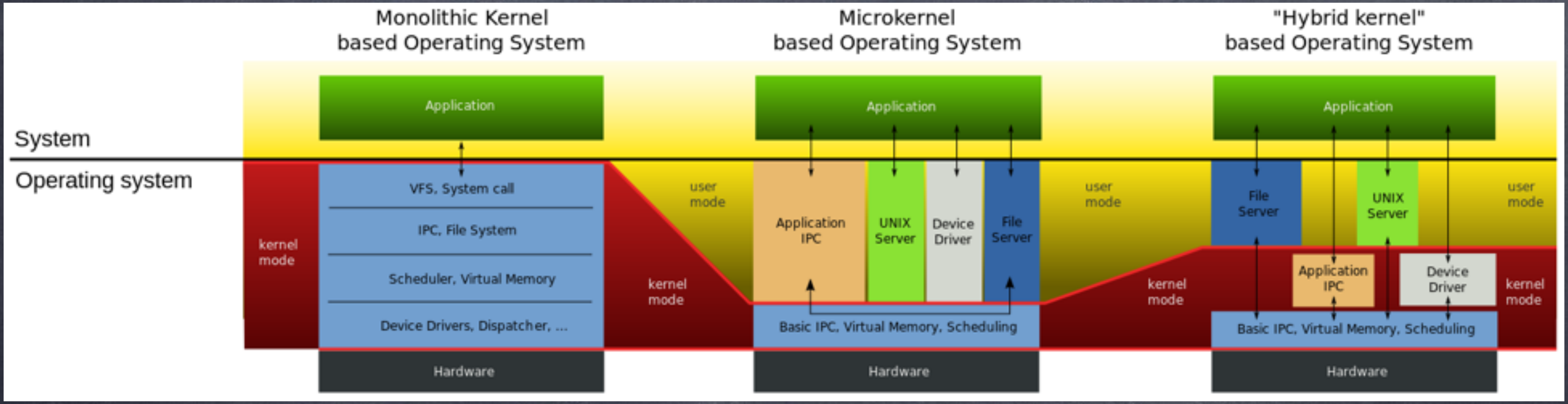
Anykernel:

- drivers either can be compiled into and/or run in the monolithic kernel or in user space on top of a light-weight rump kernel.
- "NetBSD"

Kernel models

Unikernel،Nanokernels،Exokernels،...

Kernel models



Kernel models

Work with kernel in FreeBSD as instans：

load kernel modules：kldload，kldunload，kldstat

change “mib” command：sysctl

15 minutes rest break

PKGNG

FreeBSD package manager

pkgng is:

- a replacement for pkg_× tools
- a tool to query/manage installed packages
- a tool to deal with binary packages
- a tool to upgrade/install packages from a remote repository

PKGNG

FreeBSD package manager

pkgng is:

- a library that provides all the package management in a safe way so one can write a new frontend
- Can be tar, tgz, tbz or txz
- Abi aware
- SQLite backend
- libpkg

PKGNG

FreeBSD package manager

Fast Track:

- Pkg install curl
- Global conf:/usr/local/etc/pkg.conf

PKGNG

FreeBSD package manager

pkg search

pkg install

pkg info

pkg version

pkg audit

pkg autoremove

Pkg backup

Pkg check

Pkg clean

Pkg stats

PKGNG

FreeBSD package manager

Audit installed packages for security advisories:

```
pkg audit
```

PKGNG

FreeBSD package manager

Resolve Conflicts:

Satisfiability Solvers or SAT Solver is logic of dependencies and conflicts resolution

Install/Upgrade package A → (a1)

Delete package B → (¬b1)

PKGNG

FreeBSD package manager

If package A depends on package B (versions B 1 and B 2),

then we can either have package A not installed or any of B

installed:(¬A || B1 || B2)

If we have a conflict between versions of B (B 1 , B 2 and B 3)

then we ensure that merely one version is installed:

(¬B 1 || ¬B 2)&(¬B 1 || ¬B 3)&(¬B 2 || ¬B 3)

5 minutes rest break