آریا تدبیر

طراحان شبکه

دپارتمان آموزش

معرفی سیستم عامل لینوکس

Introducing Linux

Mohammad Reza Gerami

mrgerami@aut.ac.ir

gerami@aryatadbir.com

What We Will Talk

- History of Linux
- Other Operating Systems before Linux
- Linux & GNU
  - Open Source & Free
- Advantages and Disadvantages of GNU/Linux
- Linux & You

Before Linux

آریا تدبیر
طراحان شبکه

- 1960, Early stage of computation
- Mainframes are the “computers”
- Innovating idea: Multi-programming & Multi-user
  - Create a multi-user & multi-program OS
- 1964, Multics
  - Multiplexed Information and Computing Service
  - GE, MIT and AT&T
  - Standard Operating System for USA government

Before Linux: UNIX

- Many difficulties in Multics development
- 1969
  - AT&T pulled out of Multics
  - Ken Thompson
    - A simplified version of Multics → UNIX
  - Dennis Ritchie
    - Rewrite the UNIX in C
- AT&T cannot sell the UNIX
  - UNIX is the first free Operating System

Before Linux: BSD

- 1974
  - Berkeley University buy a tape of UNIX
  - Student start code navigation
  - UNIX is customized and improved
  - They call the OS as BSD (Berkeley Software Distribution)
- Now
  - BSD does NOT contain any code of AT&T
  - BSD 4.4, FreeBDS, NetBSD and OpenBSD

Before Linux: Commercial UNIX

- 1983, AT&T is splitted → It can sell software
- There is a great market for Operating System
  - Major hardware vendors need OS
- AT&T is selling UNIX System v4 and licensing it
  - AIX for IBM, HP-UX for HP, …
- BSD is a real danger for AT&T's market
  - BSD is not supported
  - BSD should not be used in commercial

End of UNIX

- AT&T sold UNIX as much as possible
  - Novel bought UNIX code and License
- Novel sold the code and license after 2 years
  - Santa Cruz Operating System
- Microsoft developed Xenix
  - Based on UNIX VIII
  - It was NOT successful

Before Linux: Hurd

- 1983, GNU project was started by Stallman
- The goal is creating free UNIX-like
- GNU's kernel Hurd cannot attract attentions

Before Linux: Minix

- Tanenbaum developed free OS
- Its name is Minix
- Minix is based on UNIX
- Source code available, Modification is restricted
- It cannot run on 32bit processors

Staring Linux

- Develop a free OS for 32bit (Intel) processors
  - Title of a Finnish student's MS thesis
- The student is Linus Benedict Torvalds

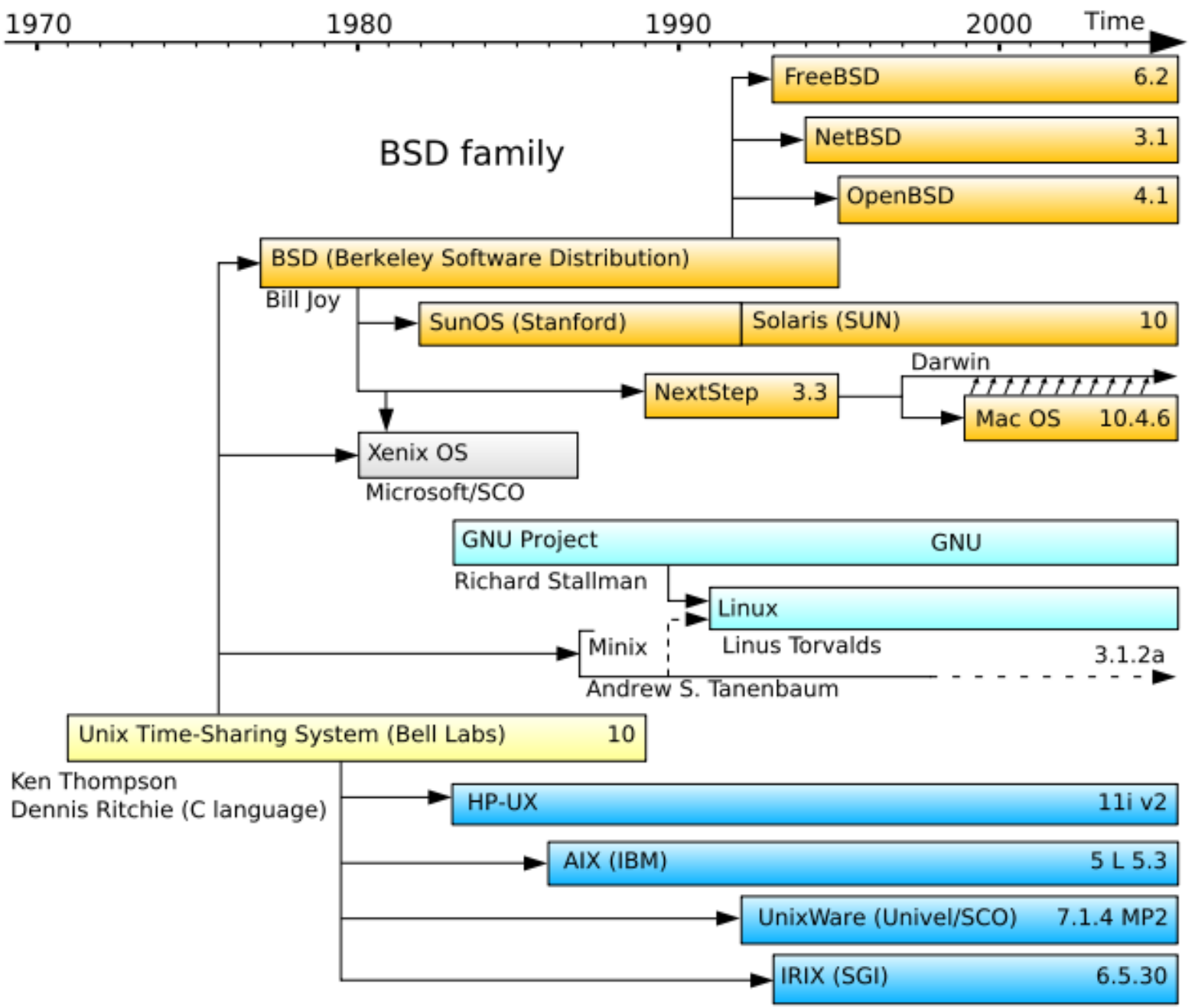
Linux was Born

آریا تدبیر
طراحان شبکه

- Birthday
  - 25 August 1991
  - Linux 0.02
  - It was developed in MINIX
  - It run on 80386 (32bit microprocessor)
  - It had a terminal emulator & C compiler
- Linus posted the code to Minix mailing list
  - He requested feedback

Now, Linux kernel

- More than 290 Mbytes source code
- More than 500 Maintainers
- More than 20 Supported Architectures
  - i386, ia64, Alpha, Arm, PowerPC, …
- More than 20 Network Protocols
  - IPv4, IPv6, ICMP, ICMPv6, TCP, UDP, 802, ..
- More than 50 Device Driver Categories
  - HDD, PCI, Network, SPI, I2C, USB, …


1970
1980
1990
2000
Time
BSD family
FreeBSD 6.2
NetBSD 3.1
OpenBSD 4.1
BSD (Berkeley Software Distribution)
Bill Joy
SunOS (Stanford)
Solaris (SUN) 10
Darwin
NextStep 3.3
Mac OS 10.4.6
Xenix OS
Microsoft/SCO
GNU Project
GNU
Richard Stallman
Linux
Linus Torvalds
Minix
3.1.2a
Andrew S. Tanenbaum
Unix Time-Sharing System (Bell Labs) 10
Ken Thompson
Dennis Ritchie (C language)
HP-UX 11i v2
AIX (IBM) 5 L 5.3
UnixWare (Univel/SCO) 7.1.4 MP2
IRIX (SGI) 6.5.30
System III & V family

Mr. TUX

آریا تدبیر
طراحان شبکه

- TUX is the official mascot of the Linux
- TUX: Torvalds UniX
- 1996
  - Alan Cox suggest
  - Larry Ewing create it
- He lost all Linux logo competitions

Linux is an OS Kernel

- What is OS Kernel?
  - Kernel is the government of computer
  - Kernel abstracts the hardware
  - Kernel controls the system resources
  - A kernel by itself gets you nowhere
- In addition to kernel, you need
  - Shell, User Interface, …
  - Library and programming tools
  - Applications

GNU/Linux

آریا تدبیر
طراحان شبکه

- GNU project is started before than Linux
- GNU: GNU is Not Unix
- GNU provides
  - Lot of tools, applications, libraries, …
  - Some License
- Most of GNU applications are ported in Linux
- Now you are using the GNU/Linux

Distribution

آریا تدبیر
طراحان شبکه

- Linux Distribution
  - Combination of Linux Kernel, GNU Tools, Other tools and management tools
- Now more than 250 distributions
  - Major distributions: Fedora, SuSe, Ubuntu, …
- What is the difference between distribution
  - Linux Kernel Version
  - Precompiled application
  - Management tools

GNU GPL

- GPL was written by Stallman in 1989
- GPL is the license of 60-70% free projects
- GPLs
  - GPLv1: 1989
    - Source code should be published with binary
    - Modified version of program is GPLv1 license
  - GPLv2: 1991
  - GPLv3: 2007

GNU GPL

آریا تدبیر
طراحان شبکه

- Free is freedom not cost
  - To run the program for any propose
  - To study and modify
  - To copy & redistribute the program
  - To improve and republic
- Copyleft: Any work derived from a copyleft piece of software must also be copyleft itself.
  - If you sell the software to someone, he can also sell it

GNU/Linux Licensing

- Linus published first Linux under shared source license
- Most of tools are under GNU Public License
- Linux 0.99 is published under GNU General Public License (GNU GPL)
- Linus: “making Linux GPL'd was definitely the best thing I ever did.”

Now, GNU/Linux

- More than 3 major desktops
  - GNOME, KDE, Xfce
- More than 5 major shells
  - Bash, csh, tsh, …
- Complete set of compilers
  - C, C++, java, Fortran, Python, Ada, …
- Many network services
  - Web, Email, File Sharing, DNS, FTP, SSH, …
- Many user applications
  - OpenOffice, Web browser, Latex, multimedia, …

GNU/Linux Usage

- Desktop computers
  - Windows 90%, Linux 2%
- Servers
  - Windows 36.3%, Linux 12.7%
- Supercomputers
  - Windows 1.4%, Linux 85%
- Mobile, PDA, Headsets
  - Linux 16.7%

GNU/Linux and Companies

- Linux as business
- Dell, IBM, HP, Sun, Novell, Red Hat, …
- How do the companies do?
  - Provide support for large business
  - Develop and sell high level management SW
- Embedded Linux Companies
  - Customize Linux for your hardware

GNU/Linux's Advantages

- Stability
  - It is very rarely to see the Kernel Panic
- Free Software
  - The is not any charge for software
- Support Wide Range of Hardware
  - Less memory
- Security
  - Open source → There is not any backdoor
  - Quick bug fixing

GNU/Linux's Disadvantages

- Leaning Curve
  - Linux is NOT for dummies
- Applications
  - Some applications have NOT equivalent in Linux
  - Some applications do NOT run in WINE
- Official Support
  - Companies need official support
  - No one is responsible for most Linux applications

GNU/Linux & You (Computer Engineer)

- Ok! ! !
  - Windows is more popular
  - 90% of Desktop computers run Windows
- But!
  - The 90% contains children, officers, …
  - How many CEs do use the Windows?
  - How many professional applications (supercomputing) do use the Linux?

GNU/Linux & CEs

آریا تدبیر
طراحان شبکه

- Linux is NOT for dummies
  - Linux is for CEs
- Linux does NOT hide anything
  - In details boot message
  - Kernel messages
  - No registry → All config files are text files
- Using Linux needs computer knowledge
  - You have the knowledge

GNU/Linux & You

آریا تدبیر
طراحان شبکه

- If you target PhD in Computer Science
  - You must learn Linux
  - Most tools, simulators, protocols, … are implemented & tested in Linux
- If you target Engineering in Iran
  - Linux Administrator
  - Linux Application developer
  - Embedded Linux Developer

Summary

آریا تدبیر
طراحان شبکه

Like mountain climbing

GNU/Linux is a great & hard fun

تماس با واحد آموزش

edu@aryatadbir.com