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Fundamentals of UNIX & Linux for System Administrators

FUL-02: History of Unix and Linux

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Module I : History of UNIX & Linux

Learning Outcomes

- Understand the history of UNIX & Linux
- Understand the history of the Linux Foundation
- Gain knowledge on the licensing of UNIX and Linux
- Familiarize with the use cases of UNIX and Linux in the real world
- Learn about the various distributions of UNIX and Linux
- Learn about the architecture of Linux operating system

Topics

- 1969:The Birth of UNIX
- History of UNIX
- Open-source programming
- History of Linux
- Why Linux
- Use cases
- Linux distributions
- Linux Architecture
- Summary UNIX and Linux comparison

1969:The Birth of UNIX

- *Solaris (Oracle Solaris) -1992/2010 – built for sun microsystems
- HP-UX – 1984, based on System V version 2 of UNIX
- IBM-AIX – 1986, based on System V version 3 and BSD 4.3. The idea was to make it run on IBM machines. Nowadays, it supports a wide spectrum of hardware platforms including Apple Network Server, PowerPC -based systems and PS/2 personal computers
- A/UX -1988, Apple's implementation of the UNIX system which was tailored for Macintosh computers. Ground to a halt in 1995

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History of UNIX

- UNIX is an Operating System (OS). developed 54 years ago i.e., 1969 at T& Bell Labs by Ken Thompson and Dennis Ritchie.
- It is a Command Line Interpreter based on the C and Assembly Language
- It was developed for the Mini-Computers as a time-sharing system (sharing of compute by single user or multi-user sessions)
- License is proprietary
- Historically closed source, now some Unix projects (BSD family and Illumos) are open sourced
- BSD open-source descendants include FreeBSD, OpenBSD
- UNIX was the predecessor of LINUX

Open-source Programming

- 1983: Richard Stallman started the GNU project to create a free UNIX-like operating system
- GNU was a software movement intended to provide free and quality software
- .1984: Stallman began writing the GNU C compiler (gcc), considered as one of the most efficient and robust compilers
- Open source programs are released under the GNU General Public License (GPL)

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History of Linux

- 1987: Andrew Tanenbaum wrote Minix, the first open-source OS in C language
- 1991: Linus Torvalds wrote the first Linux kernel in C; Linus was a Finnish computer scientist.
- Linux was developed with the contribution of many programmers globally
- Linux functionality is like UNIX

Why Linux ?

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- It is free! The source codes is available to users on the Internet and can be modified to any variant if they include the source code int their distribution
- Considered more stable and reliable than Windows
- Provides an alternative to the dominant Microsoft alternatives
- It is multi-tasking, mutli-user, thus provides good support of multiple CPUs.
- High portability –written in C
- MacOS now has an integrated shell and can run X11, Linux specific applications

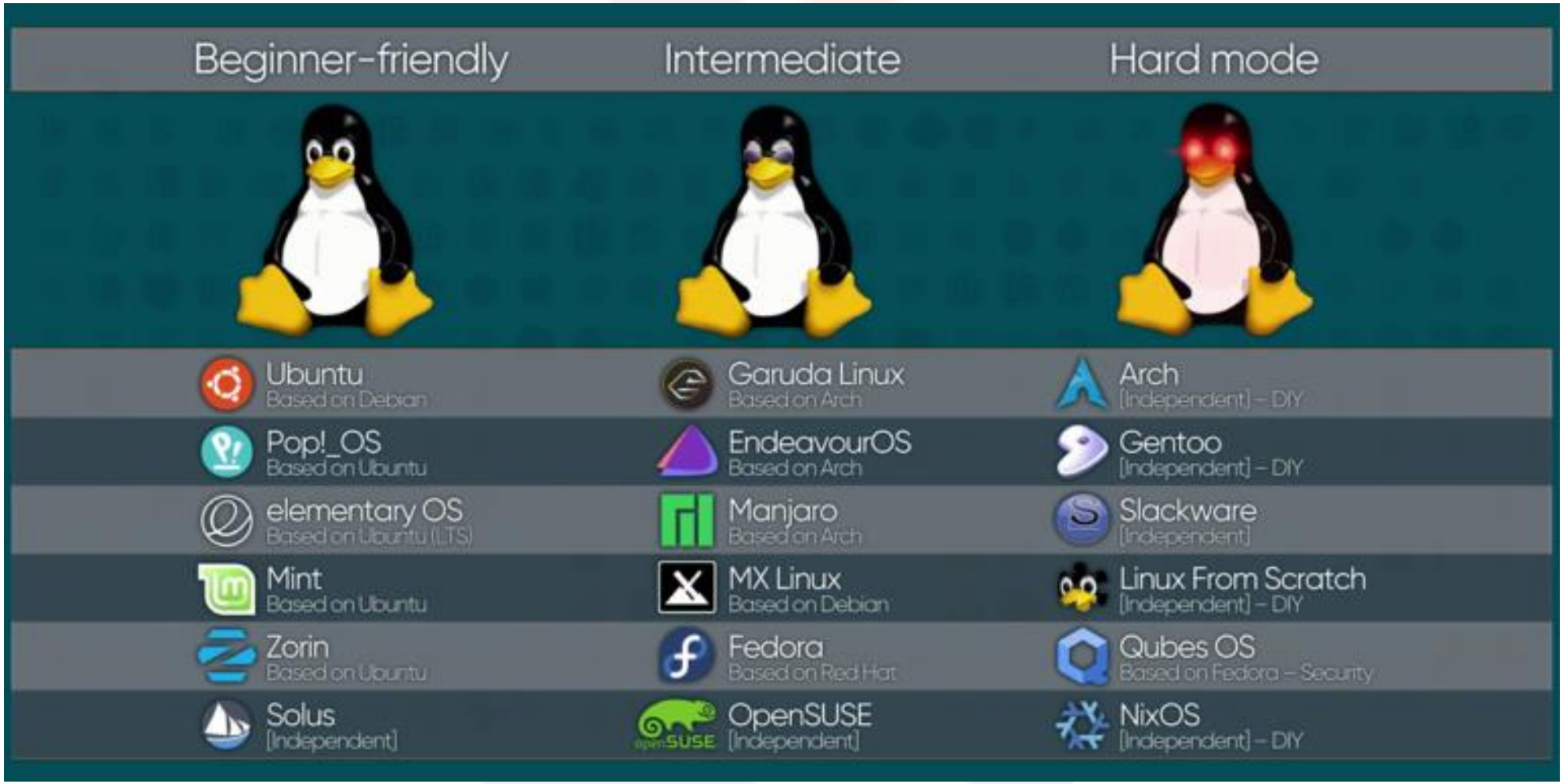
Practical Use Cases of Linux

- Webservers {37.6% of all websites; w3techs.com, October 2023 statistics
- Supercomputers
- Single-board computers e.g Raspberry-Pi
- Classic gaming
- Roku –rokutv, a media streaming box running on RokuOS

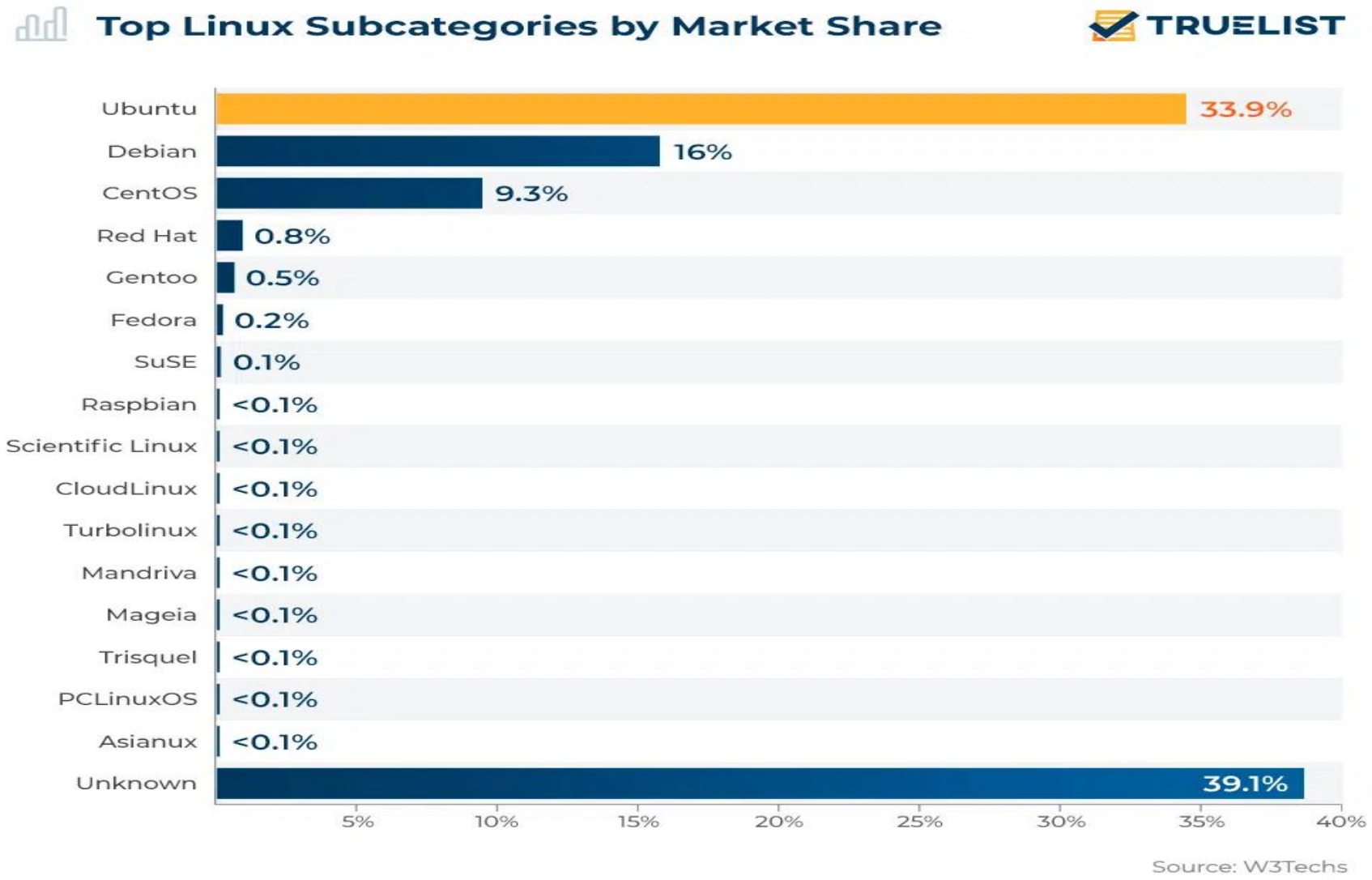
Practical Use Cases of Linux

- Smart TVs e.g LG uses WebOS, Samsung uses Tizen etc
- Smart watches e.g Samsung Tizen watches
- Amazon Kindle – digital e-reader
- Instagram
- Uber
- Air-bnb
- Backup and Recovery -SystemRescue

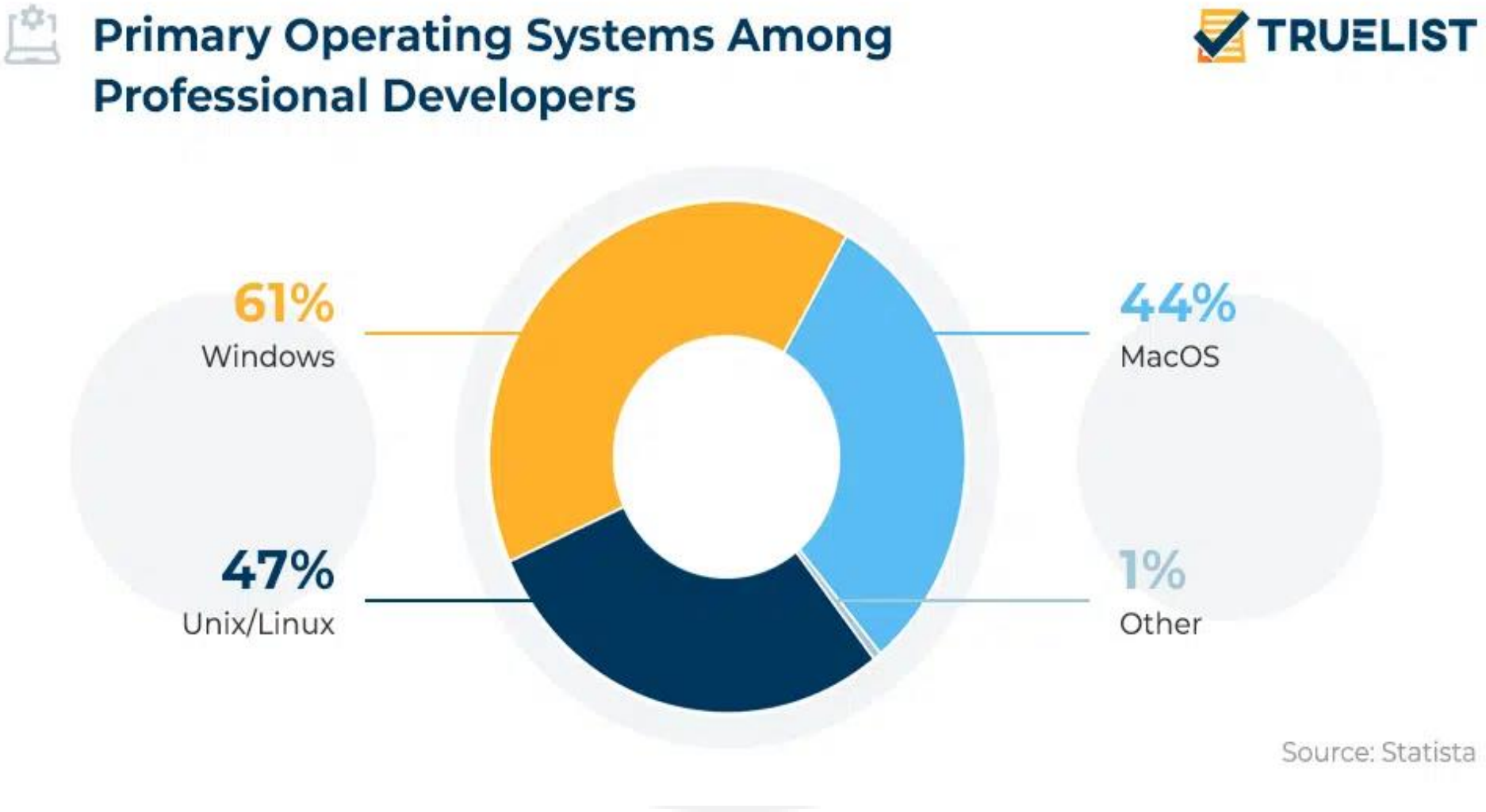
Linux Distributions



Linux Distributions -stats



Some useful statistics



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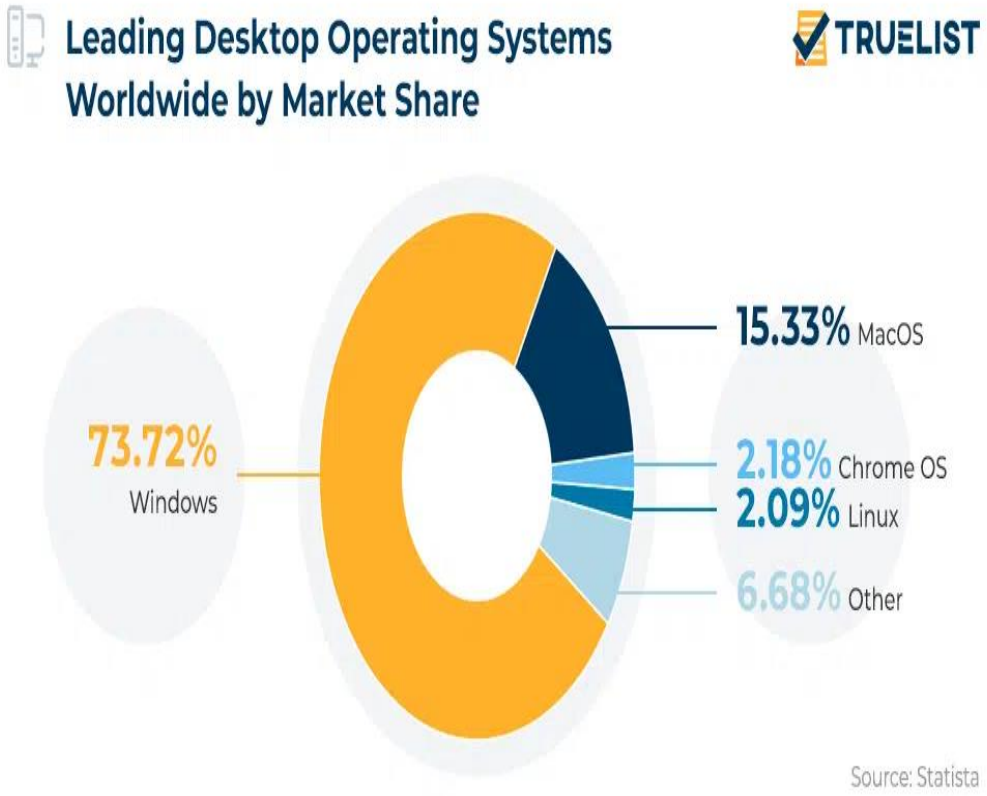
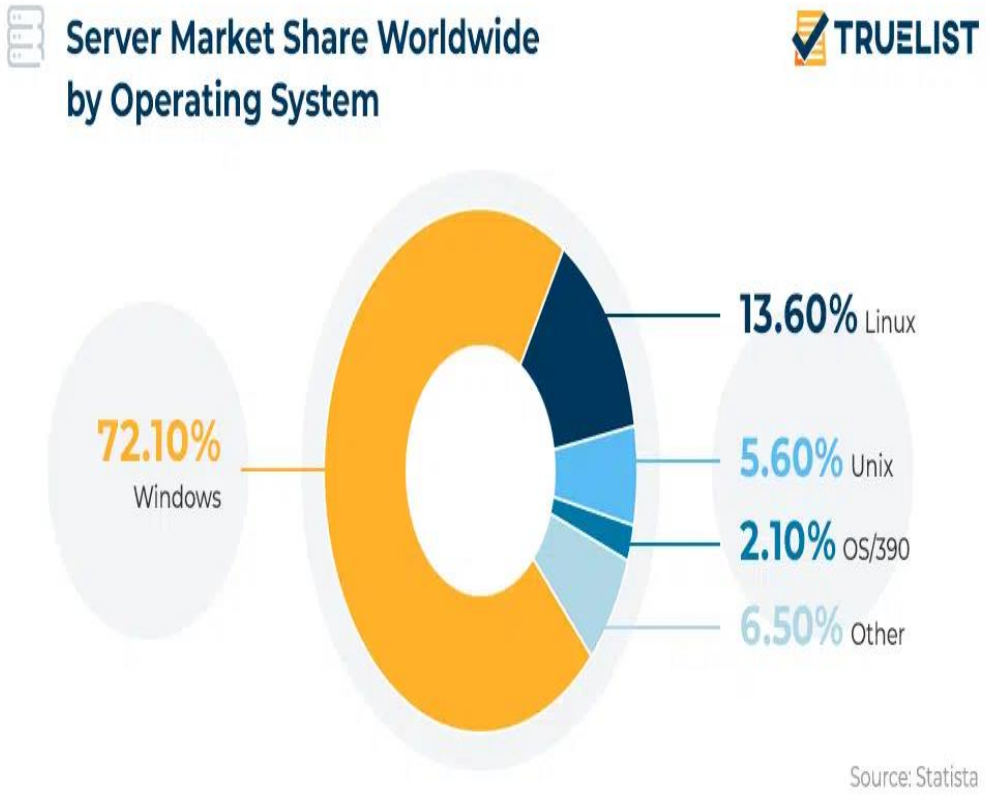
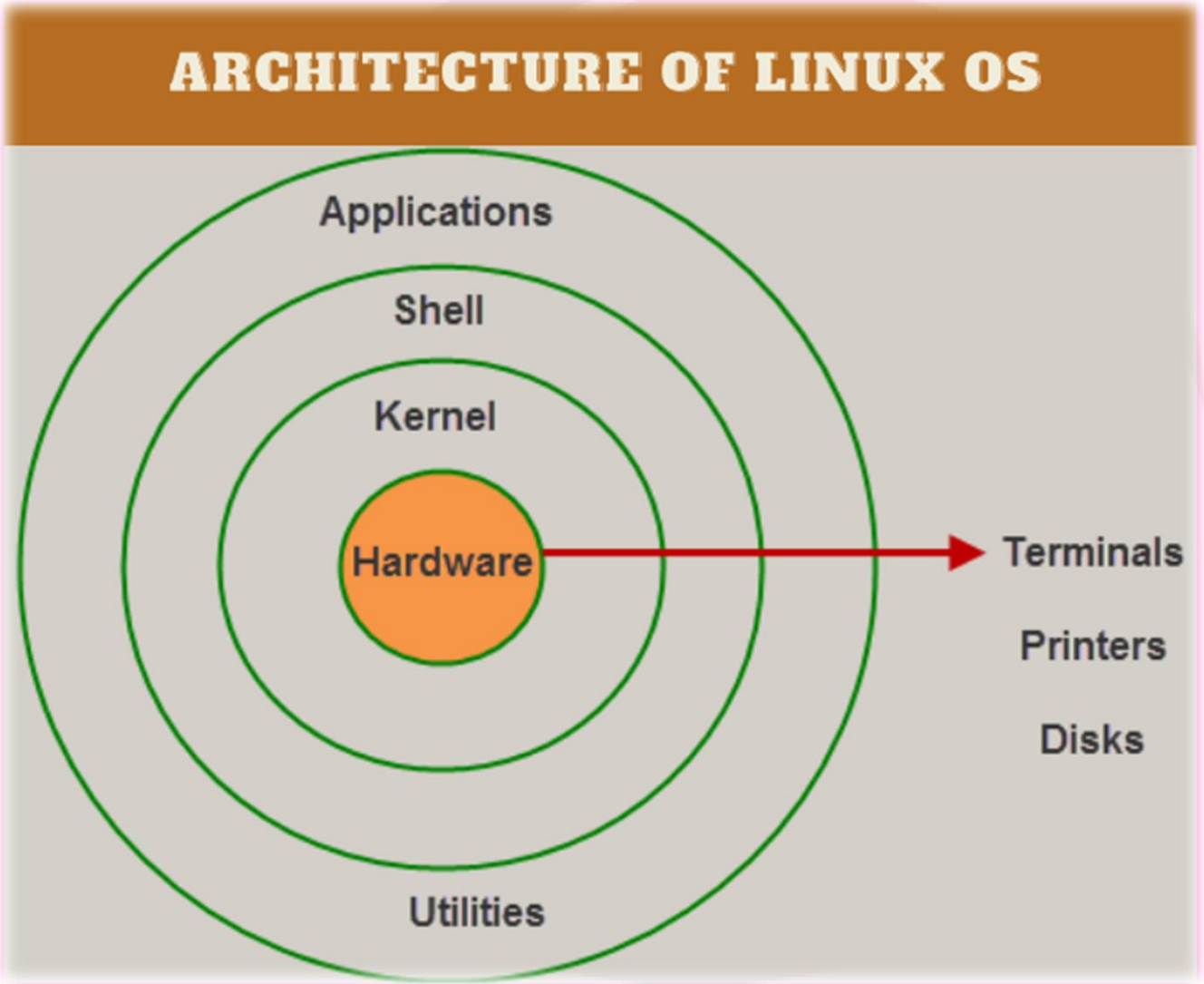




Linux Architecture



Linux Architecture

Kernel

- Core of the Linux based operating system.
- It virtualizes the common hardware resources of the computer to provide each process with its virtual resources.
- preventing and mitigating conflicts between different processes.
- Different types of the kernel are:
  - Monolithic Kernel
  - Hybrid kernels
  - Exo kernels
  - Micro kernels

System Library

- the special types of functions that are used to implement the functionality of the operating system.

Linux Architecture

Shell

- Applications that interpret the commands from the user
- active in the textual mode or terminal mode. Shells can also execute script files e.g bash, csh, tcsh, zh, sh etc.
- It is an interface to the kernel which hides the complexity of the kernel's functions from the users.
- It takes commands from the user and executes the kernel's functions.

Hardware Layer

- Consists of all peripheral devices like RAM/ HDD/ CPU etc.

System Utility

- Provides the functionalities of an operating system to the user

Summary Comparison

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PARAMETERS	LINUX	UNIX
Inception Year	1991	1969
Standard	Open source operating system which is freely available	Operating system can only be used by its copywriters
System type	Just the kernel	Complete Operating system
Target use	Can be used by anyone including home user and developer.	Developed mainly for servers, workstations and mainframes.
Cost	LINUX is freely available and distributed with no associated cost.	UNIX variants come as customized cost.
Security	60-100 viruses listed till date	85-120 viruses listed till date
Interface type	Primarily uses GUI with option of CLI	Primarily uses CLI
Portability	Portable	Not portable
Variants	Ubuntu, RedHat, Solaris, OpenSuse, etc.	AIS, HP-UX, BSD, etc
Source Code	The source code of Linux is available in general public.	The source code not available in general public.

https://ipwithease.com

Summary Comparison ..

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kEY	Linux	Unix
Development	Linux is open source and is developed by Linux community of developers.elopment	Unix was developed by AT&T Bell labs and is not open source.
Cost	Linux is free to use.	Unix is licensed OS.
Supportd File systems	Ext2, Ext3, Ext4, Jfs, ReiserFS, Xfs, Btrfs, FAT, FAT32, NTFS.o use.	fs, gpfs, hfs, hfs+, ufs, xfs, zfs.
Usage	Linux is used in wide varieties from desktop, servers, smartphones to mainframes.	Unix is mostly used on servers, workstations or PCs.
Default Shell	Bash (Bourne Again SHell) is default shell for Linux.	Bourne Shell is default shell for Unix.
GUI	Linux uses KDE and Gnome. Other GUI supported are LXDE, Xfce, Unity, Mate.	Unix was initially a command based OS. Most of the unix distributions now have Gnome.
Target processor	Linux was initially developed for Intel's x86 hardware processors. Now it supports 20+ processor families.	CUnix supports PA-RISC and Itanium family.
Example	Ubuntu, Debian GNU, Kalilinux ,Arch Linux, etc.	SunOS, Solaris, SCO UNIX, AIX, HP/UX, ULTRIX etc.

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Q&A

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