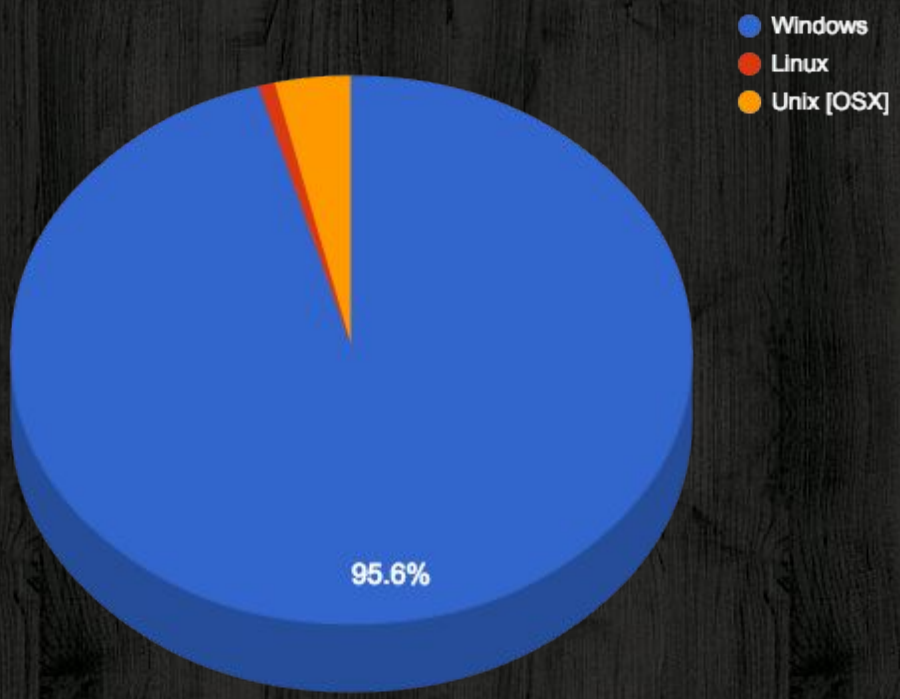
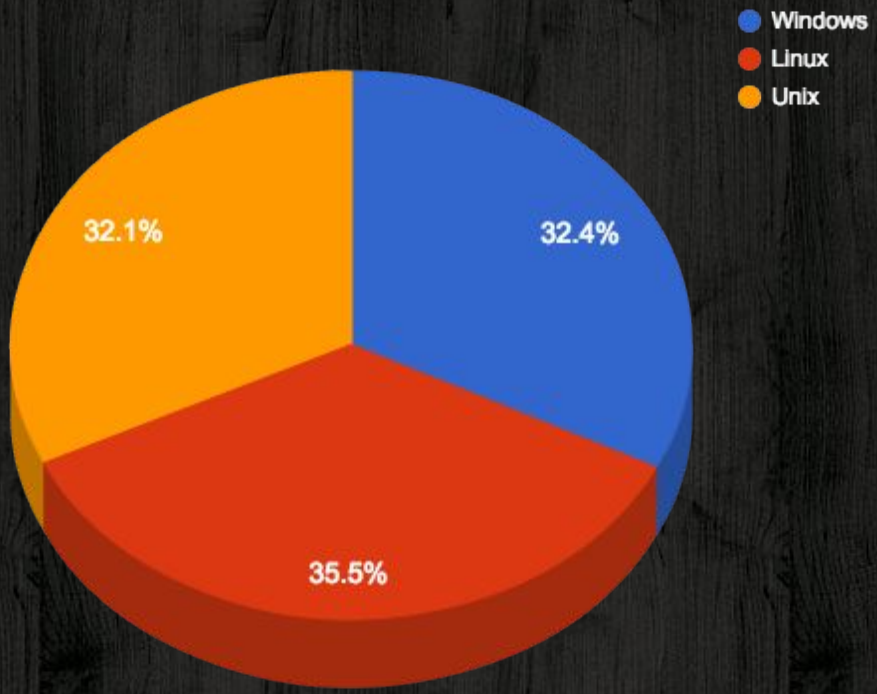
Linux in the Datacenter



Desktop OS Market Share (NetMarketshare.com, April 2015)

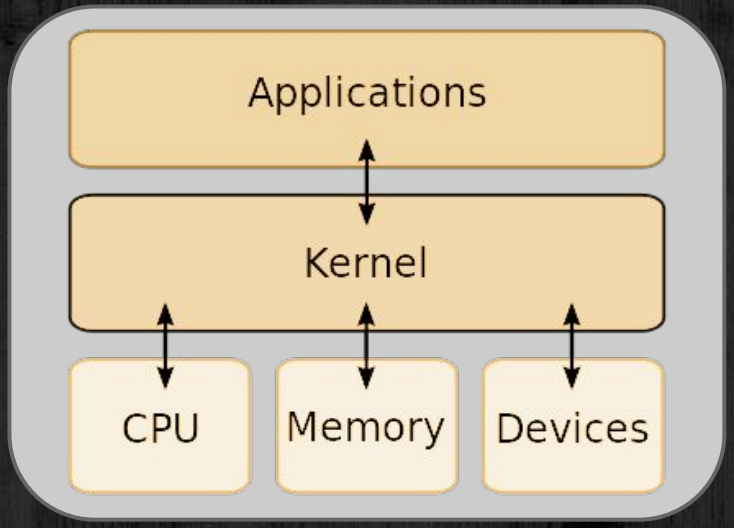


Server OS Market Share (W3Techs.com, September 2014)

Definitions

- POSIX
  - *“Portable Operating System Interface”*
  - *A standard API specification for OSs*
- UNIX
  - *A licensee of the Open Software Foundation*
  - *A POSIX-compliant OS*
- Linux
  - *A POSIX-compliant kernel*
  - *An OS built atop the Linux kernel*
- *nix
  - Generic term for POSIX-compliant OSs

“Kernel” vs. “OS”



Kernel

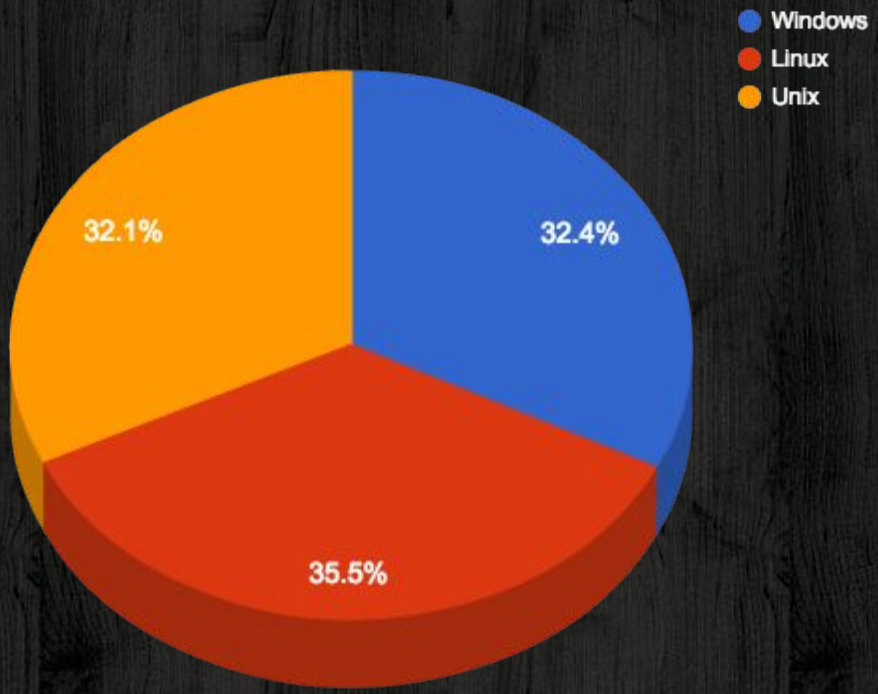
The software layer that lives between applications and system resources.

Operating System

A kernel bundled with system drivers and/or a suite of standard applications. For Linux, such a bundle is usually called a “distro” (for “distribution”)

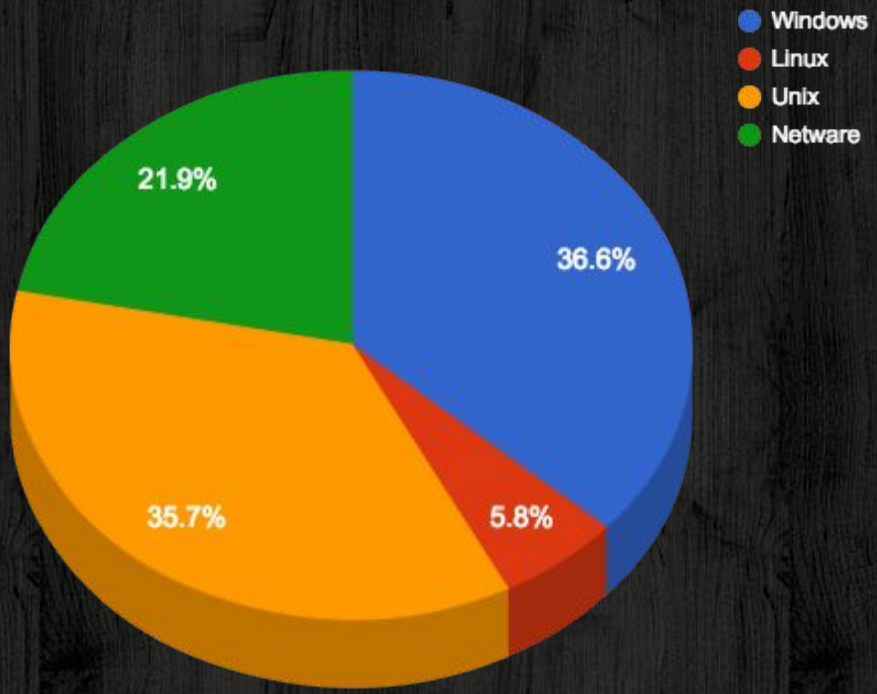
- **Command shell**
- **Compiler toolchain**
- **Text editor**
- **Web browser**
- **Package manager**
- **Desktop interface**

2014



Server OS Market Share (W3Techs.com, September 2014)

1997



Server OS Market Share in 1997 (the Microsoft "Halloween Memo", November 1998)

“

[T]he intrinsic parallelism and free idea exchange in OSS has benefits that are not replicable with our current licensing model and therefore present a long-term developer mindshare threat.

--Vinod Valloppillil, “The Halloween Memo”, 1998

OSS Benefits

- Customization
- License Management
- Interoperability
- “Many Eyes”
- Rapid Response

Customization

Open

Customizations can be created and released by any subset of the user base, down to an individual.

Closed

Customizations have to be created by the vendor and released as products, requiring marketing and testing expense.

License Management

Open

No license to keep track of, think about or buy.

Closed

DRM is a drag on installation and configuration time.
License types complicate deployment decisions.
$$$ x Internet scale = $$$$$$$$$

Interoperability

Open

The intersection of any two user bases usually contains enough development resources to ensure interoperability.

Closed

As with customization, new features require profitable markets. They also require coordination with a separate corporation with its own agenda.

“

“Given enough eyeballs, all bugs are shallow.”
I dub this “Linus [Torvald]’s Law.”

--Eric S. Raymond, “The Cathedral and the Bazaar”, 1997

“Many Eyes”

Open

Bug diagnosis is an easily-parallelized task.
Debugging features are a customization that can be deployed by users in the field.
Doesn’t guarantee *detecting* a bug.

Closed

“Black box” testers can only report symptoms; as a system becomes more complex, symptoms become more divorced from causes.

Rapid Response

Open

No barrier between the user and potential fixes. Development resources will by definition be available for as long as the product has users.

Closed

Every fix has to go through a release cycle. Eventually, the product will be abandoned.

*nix vs. Windows

- Customization
- License Management
- Interoperability
- “Many Eyes”
- Rapid Response

Customization

Security
Modular system allows disabling unneeded features to reduce attack surface.

Performance
Free to experiment with different techniques to improve performance. Free to discard legacy support.

Operations
Open package managers make setting up and configuring a system very easy. Command-shell focus is superior for data center operations.

License Management

Security
Free to use best-of-breed systems… no "pro versions".

Performance
No "pro versions".
Free to set up parallel virtual machines.
Can spend money on

Operations
No need to track keys.

Pricing and licensing overview

Edition	Ideal for…	Feature comparison	Licensing model	Pricing Open NL (US$)
Datacenter	Highly virtualized private and hybrid cloud environments	Full Windows Server functionality with unlimited virtual instances	Processor + CAL*	$6,155**
Standard	Low density or non-virtualized environments	Full Windows Server functionality with two virtual instances	Processor + CAL*	$882**
Essentials	Small business environments for servers with up to two processors	Simpler interface, pre-configured connectivity to cloud-based services; one virtual instance of Essentials	Server (25 User Limit)	$501**
Foundation	Economical general purpose server with a single processor	General purpose Server functionality with no virtualization rights	Server (15 User Limit)	OEM only

Interoperability

Security
Open-source third-party components mean security bugs get fixed faster.
Eliminates possibility of “back doors”.

Performance
Vendor credibility less of an issue, so wider array of options available--can experiment to find higher-performance alternatives.

Operations
Support not dependent on often-understaffed vendors.

“Many Eyes”

Security
Large community of security researchers with direct source code access.

Performance
Open projects can be “forked” to experiment with improvements.

Operations
Tutorials and reference materials often written by developers themselves, or by aspiring contributors reviewing the code to learn.

Rapid Response

Security
Security bugs generally fixed within hours of "zero day" announcement.

Performance
Crashes and performance bugs fixed with same speed as security bugs.

Operations
Individual components can be upgraded separately.
OSS release cycles generally twice as fast (or more!) than closed cycles.

Bottom Line

- For the same total budget, can buy more hardware to scale
- Software performs better and is more secure
- Software is easier to deploy and manage

Why Not

- Demands higher level of skill to manage
- Some important software is platform-specific
  - SQL Server
  - Exchange
  - Office
  - ASP.NET (except there's Mono…)
- Sometimes the publisher decides for you...