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# Web Servers

and servers of many different kinds…

# What is a server?

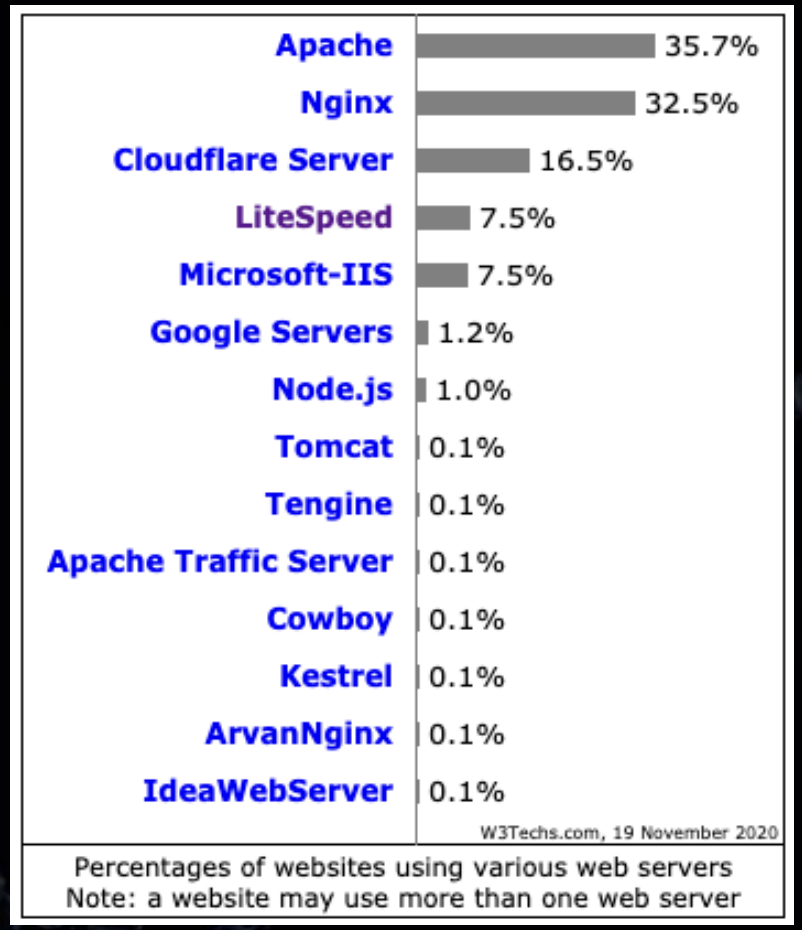
- A server is a computer program that provides services to other computer programs (and their users).
- A server is listening for connections on ports
  - Different services have different ports
- Running in development environment
  - Localhost (127.0.0.1) / Public IP through tunnel (Ngrok)
  - Virtual Machine, containers (Docker)
  - Development server machine
- Running in production environment
  - Own machine(s) - Virtual or physical

# What is a web server?

- ✓ Server software that handles and understands HTTP/HTTPS request/response
  - Listen default on port 80 (HTTP) or port 443 (HTTPS)
- ✓ Serve static web resources
  - Reading from file system
  - HTML pages, Documents, static files (CSS, JS, IMG), streaming media
- ✓ Serve dynamic web resources
  - Support server-script languages/platforms (like PHP, ASP.NET...)
  - Render web data on-the-fly (HTML, JSON...)
  - Communicate with databasesSend request to other servers

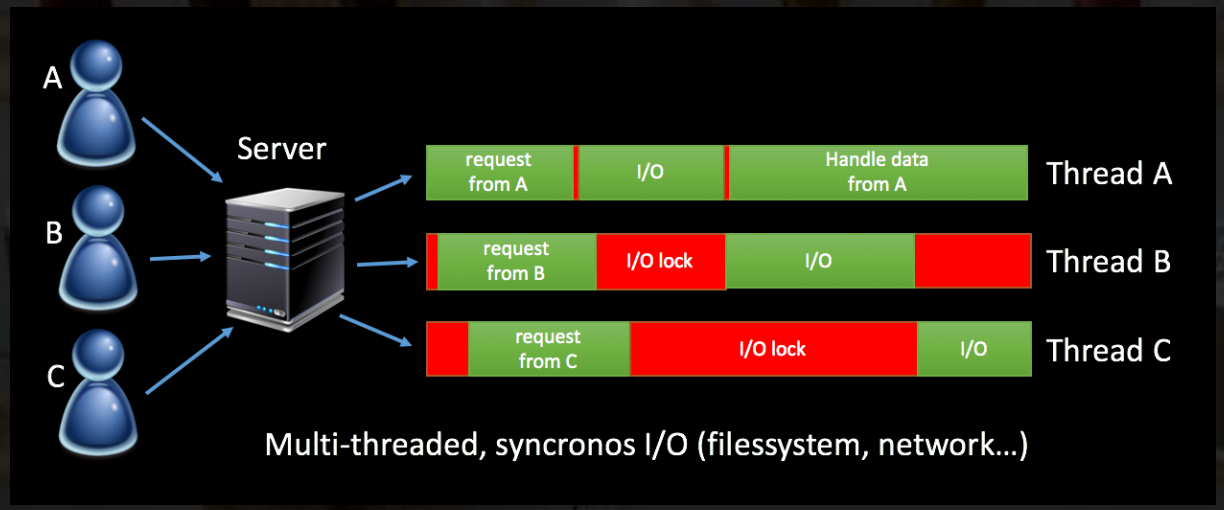
# Web Servers

- Apache
  - The A in LAMP-stack (Linux, Apache, MySQL, PHP)
- Nginx
  - Uses an asynchronous event-driven approach to handling requests
- IIS for Windows server (Internet Information Services)
  - .NET
- Apache Tomcat
  - A Java servlet, HTTP Connector, JSP engine
  - A Java servlet is a Java program that extends the capabilities of a server.
- Node.js
  - A platform! Create a web server through code (APIs)!

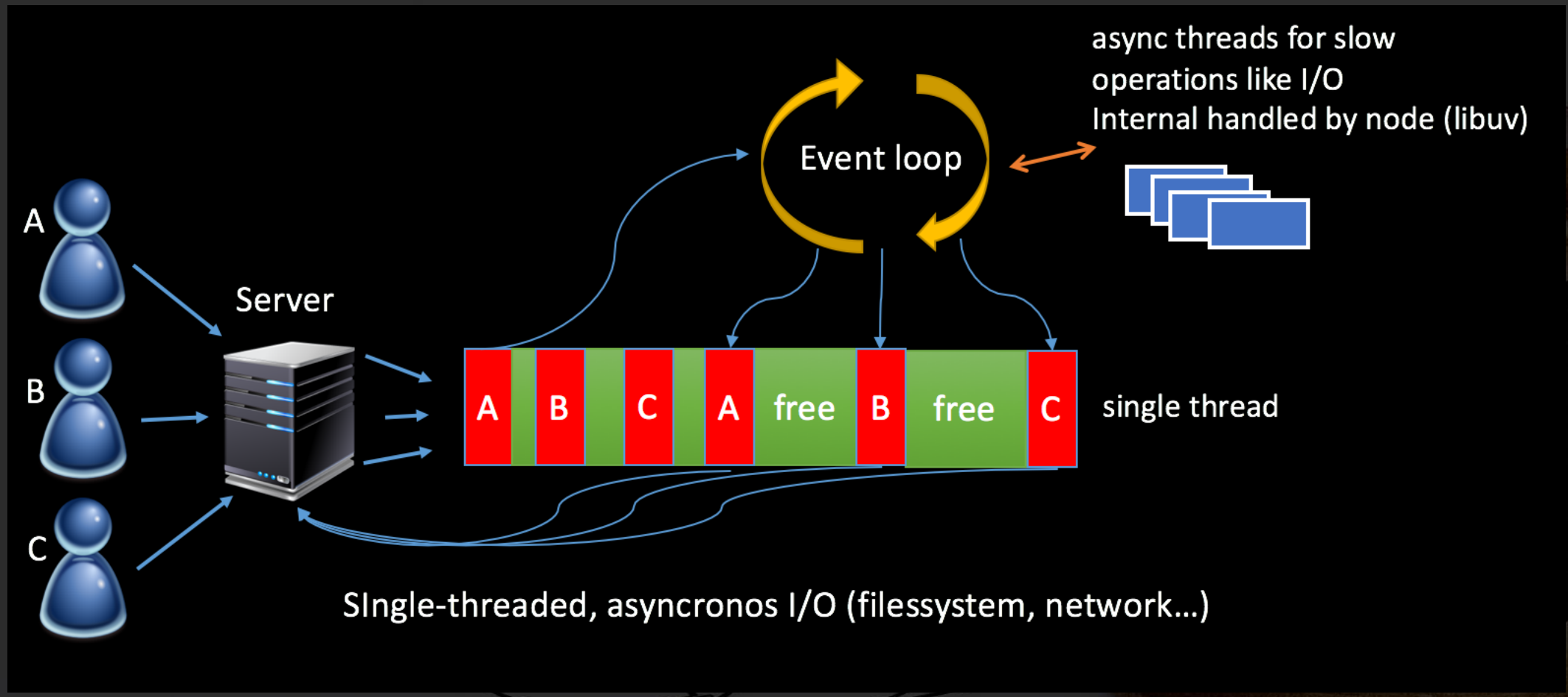


# Multi-Treaded Web Server Achitecture

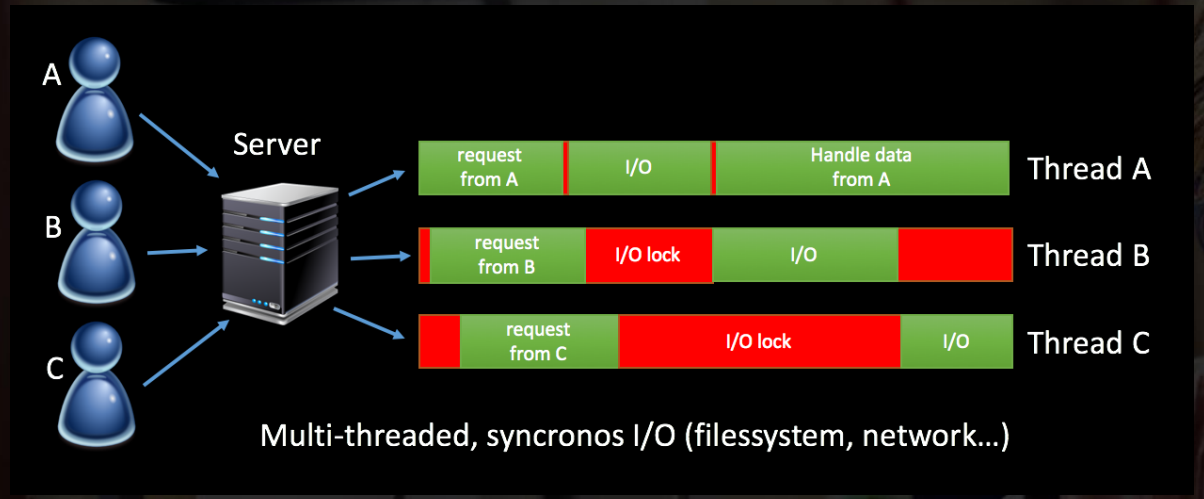
- ✓ Isolated "process" for each request
  - More traditional web servers like Apache (PHP), Tomcat (JAVA)
- ✓ Having a thread pool and use a thread for each request
  - Wait for available threads, taking system RAM
  - Lots of idle in each thread, waiting for I/O operations, context switching
  - Synchronous programming model
  - Problem handling many simultaneous requests

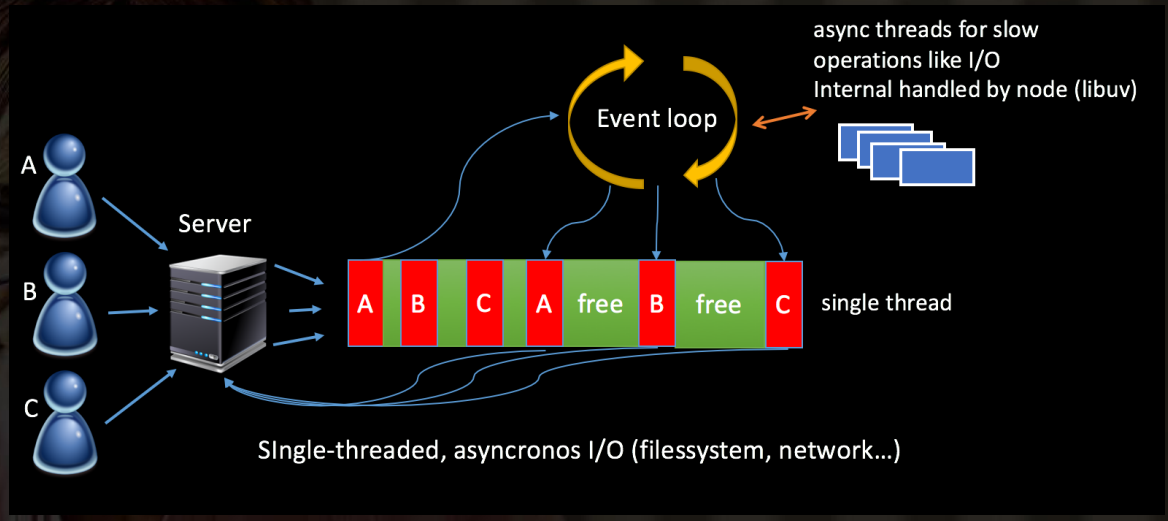


# Single-Treaded Web Server Achitecture



# What is the best?



# IIS



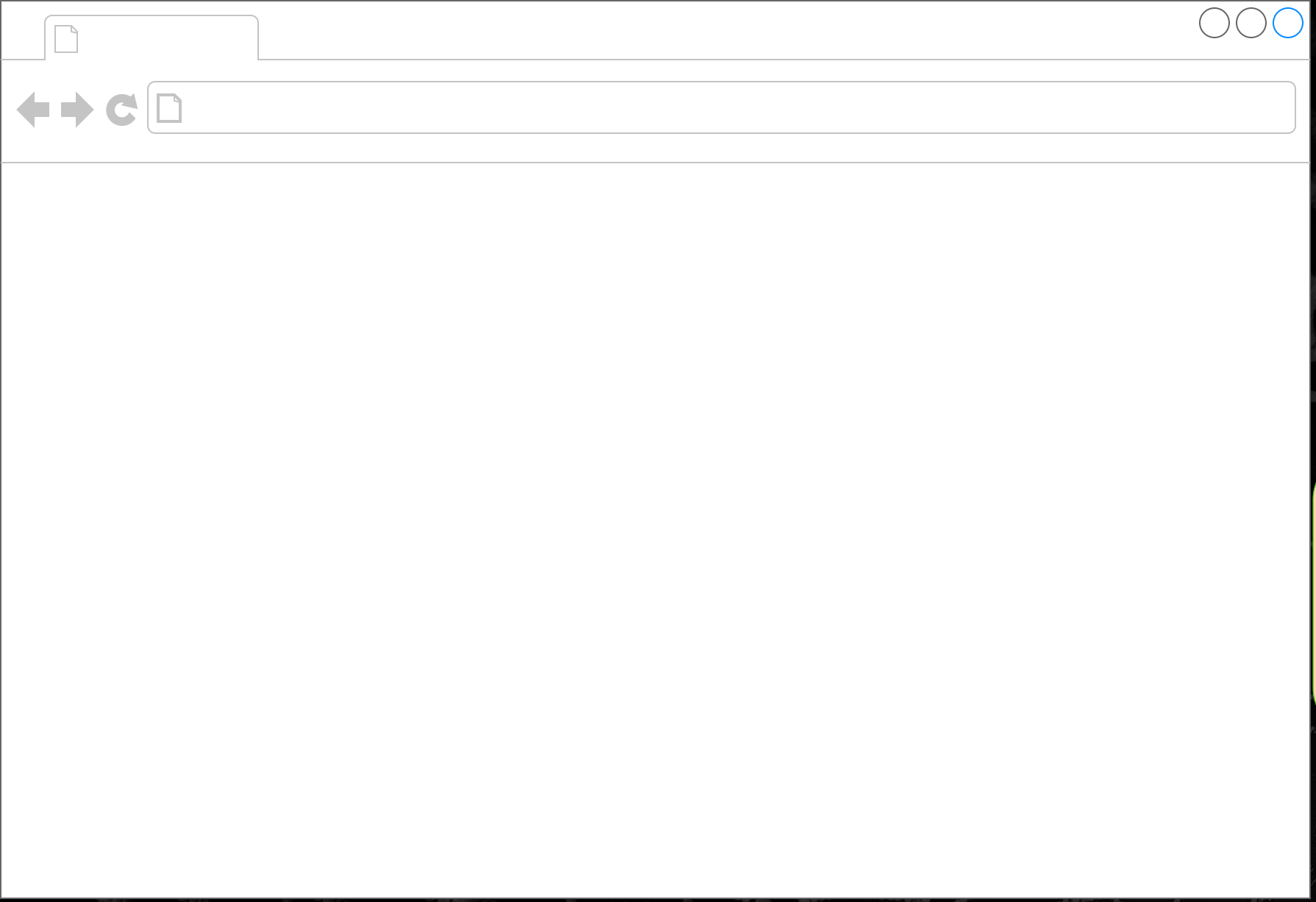
Microsoft IIS

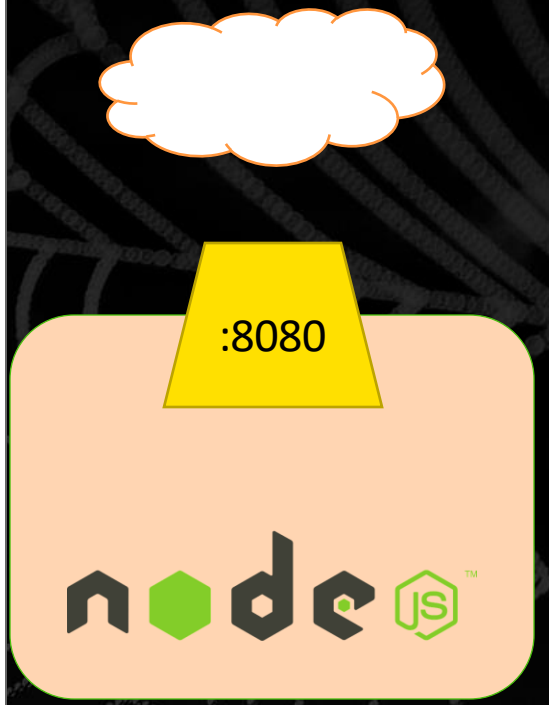
- ✓ Microsoft, tight coupled to Windows
- ✓ Using modules and extensions
- ✓ Graphic Administration (tight connection to the operating system)
  - or Powershell
- ✓ .NET applications

# Apache




- The most used web server on the Internet
  - http://w3techs.com/technologies/overview/web_server/all
- Open-source HTTP server for both UNIX and Windows
  - Apache Software Foundation
- The Apache HTTP Server was launched in 1995
  - Based on NCSA HTTPd server
  - Name: "Native American Indian tribe of Apache" / "A-patchy-server"
- Every request is spawn to a own thread (like a own process)
  - Thread pool
- Loadable Dynamic Modules which extend the core functionality.
  - mod_access, mod_auth, mod_rewrite
- .htaccess




:8080

# NGINX (“Engine X”)



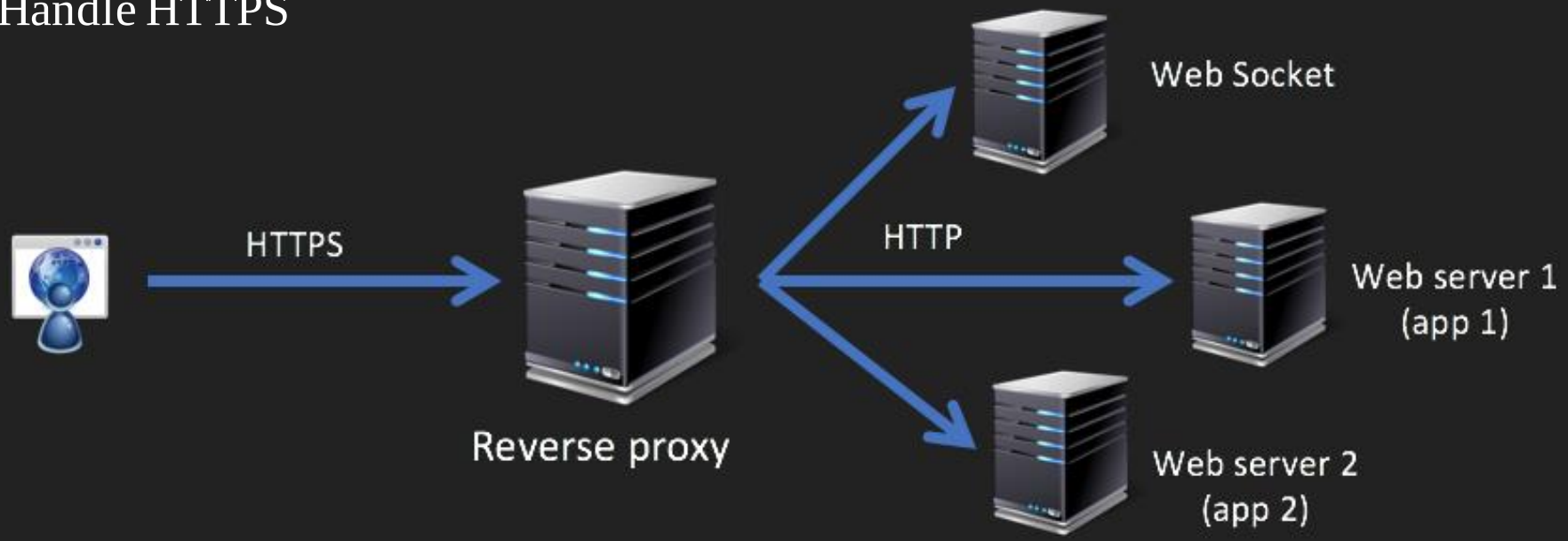
- ✓ Free web server, 2004, second most used (?)
  - http://w3techs.com/technologies/overview/web_server/all
  - Also used as other type of servers like (reversed) proxy, load balancer, cache server
- ✓ Nginx uses an asynchronous event-driven approach to handling requests
  - Non-blocking mode in a single main thread
  - Event-loop receiving event from a queue (like javascript event-loop)
- ✓ The company Nginx provide and support Nginx Plus as paid software
- ✓ nginx.conf

# Other Servers in a web environment

- Reverse proxy
- Load balancer
- Cache server
- Application server
- Virtual hosting

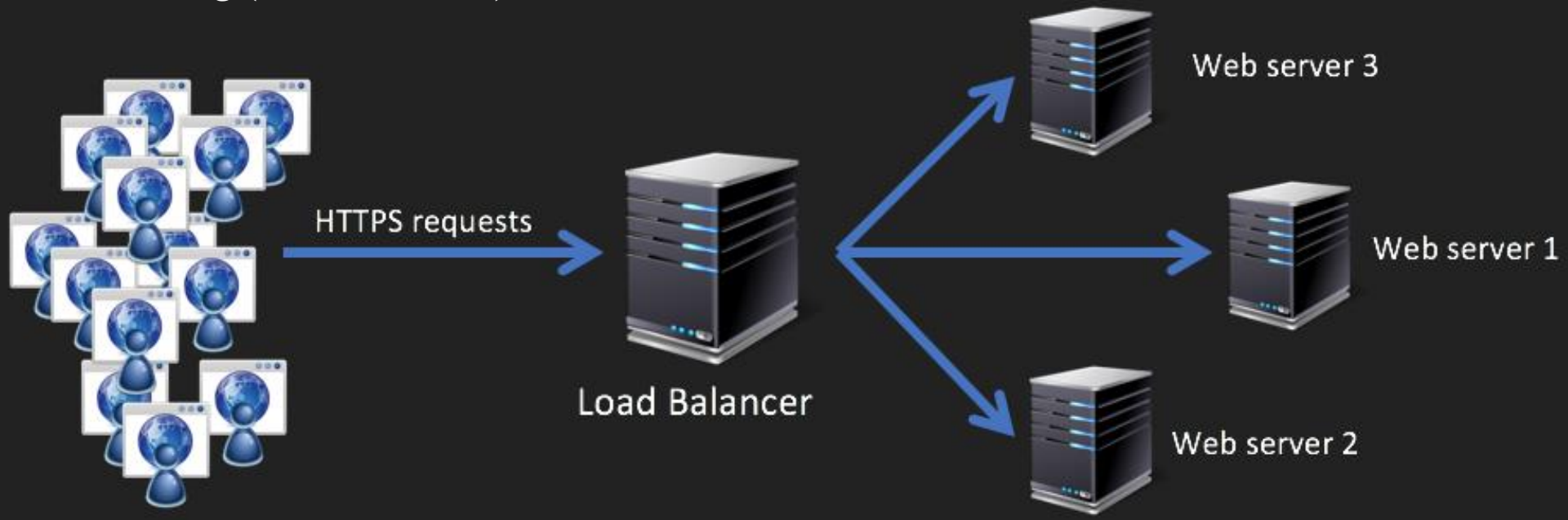
# Reverse Proxy

- ✓ Hide the origin server or servers
- ✓ act as firewall can protect against common web-based attacks, such as DOS or DDOS
- ✓ Distribute the load from incoming requests to several servers
- ✓ Handle HTTPS



# Load Balancer

- ✓ Scaling, handle more traffic
- ✓ Load balance traffic over more replicas
  - Horizontal scaling (more machines)
  - Vertical scaling (more hardware)



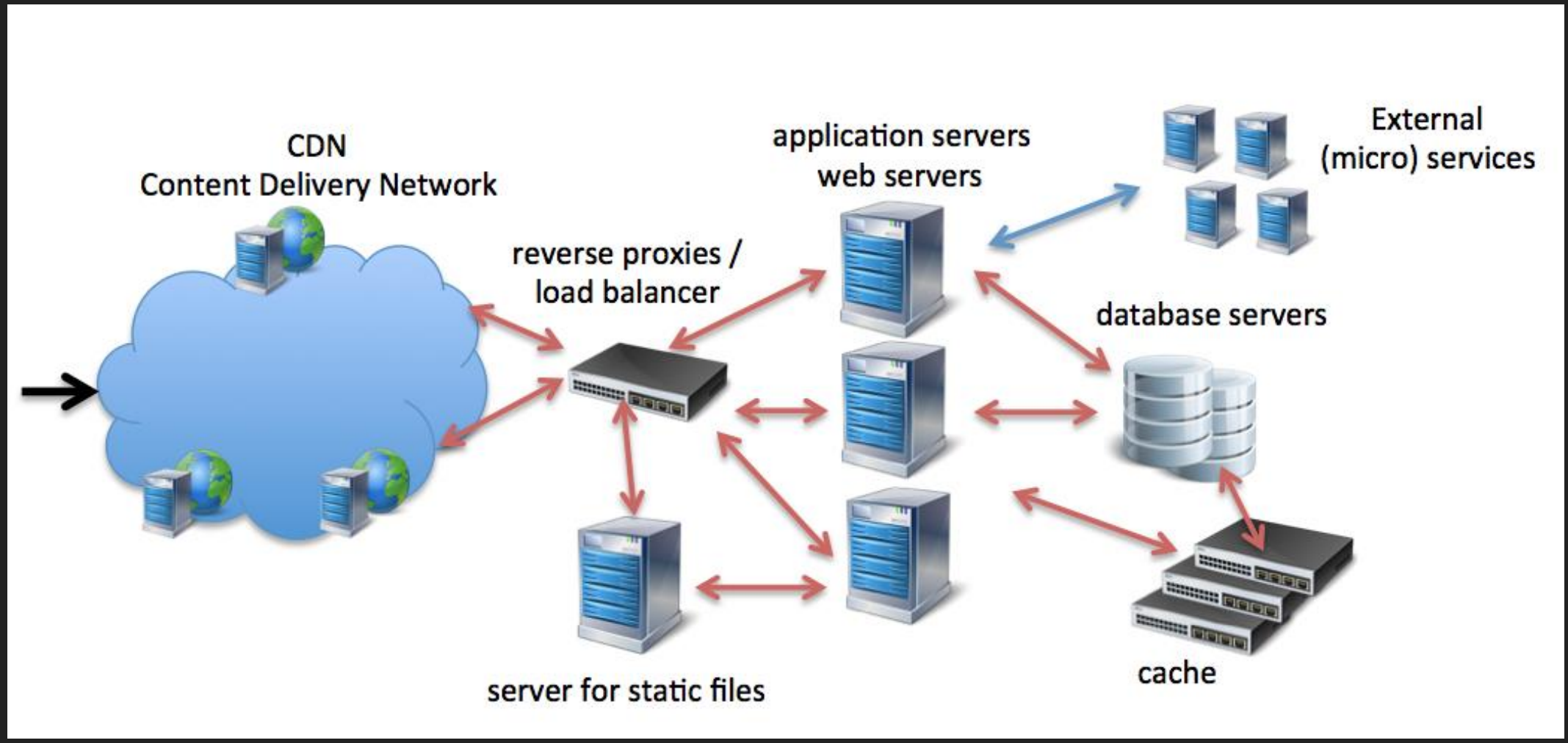
# Application Server

- ✓ Most of the times equals to web server
- ✓ A Web server always handle HTTP
- ✓ Application server could also handle other requests

# Virtual Hosting

- A web server is hosting one or more domain names on a single server
  - example.com could share resources with example.se
- Multiple web sites on one server

# Not just web servers….



https://mysite.com
https://gitlab.mysite.com
https://crud.mysite.com

https://194.47.176.244/
https://194.47.176.244/gitlab
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https

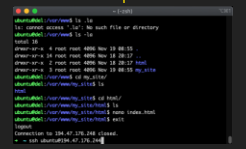
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http



var/www/my_main_app/

var/www/my_gitlab_app/

