UNIT-4

Web Server

- A web server is software and hardware that uses HTTP (Hypertext Transfer Protocol) and other protocols to respond to client requests made over the World Wide Web.
- The main job of a web server is to display website content through storing, processing and delivering webpages to users. Besides HTTP, web servers also support SMTP (Simple Mail Transfer Protocol) and FTP (File Transfer Protocol), used for email, file transfer and storage.
- Web server hardware is connected to the internet and allows data to be exchanged with other connected devices, while web server software controls how a user accesses hosted files.
- The web server process is an example of the client/server model. All computers that host websites must have web server software.
- Web servers are used in web hosting, or the hosting of data for websites and web-based applications -- or web applications.

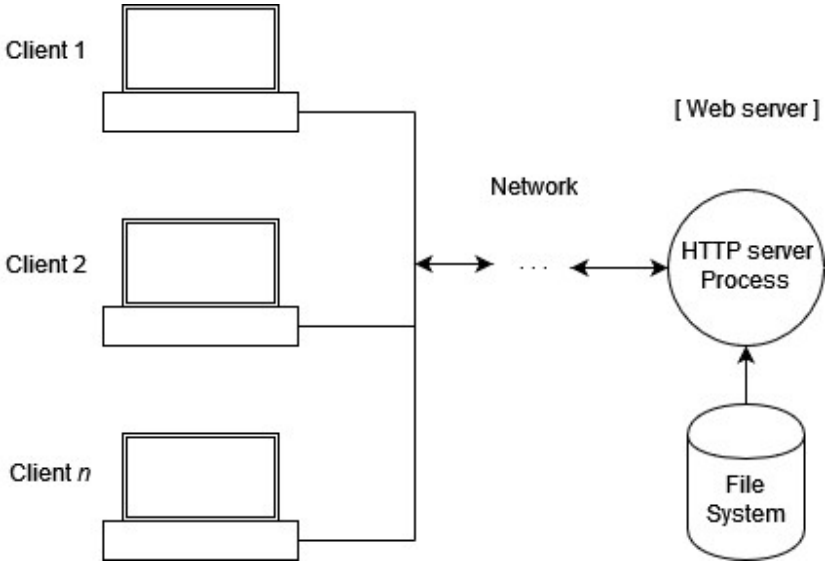
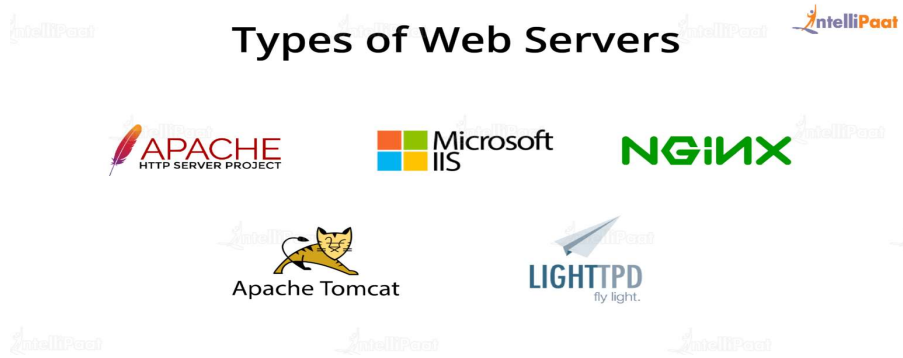


FIG:WEB SERVERS

- **Examples of web server uses:**
  - sending and receiving emails;
  - downloading requests for File Transfer Protocol (FTP) files; and
  - building and publishing webpages.
- **Common and top web server software on the market: There are a number of common web servers available, some including:**
  - **Apache HTTP Server.** Developed by Apache Software Foundation, it is a free and open source web server for Windows, Mac OS X, Unix, Linux, Solaris and other operating systems; it needs the Apache license.

- **Microsoft Internet Information Services (IIS).** Developed by Microsoft for Microsoft platforms; it is not open sourced, but widely used.
- **Nginx.** A popular open source web server for administrators because of its light resource utilization and scalability. It can handle many concurrent sessions due to its event-driven architecture. Nginx also can be used as a proxy server and load balancer.
- **Lighttpd.** A free web server that comes with the FreeBSD operating system. It is seen as fast and secure, while consuming less CPU power.
- **Sun Java System Web Server.** A free web server from Sun Microsystems that can run on Windows, Linux and Unix. It is well-equipped to handle medium to large websites.
- **Apache Tomcat.**Apache Tomcat is a free web server that specializes in Java Servlets. Apache Tomcat is popularly known as a Java container. It can work under Port 8080 and supports PHP, ASP.net, Perl, **Python**, and more.

❖ Multiple domains also can be hosted on one web server.



Web Server vs Application Server

S. No.	Web Server	Application Server
1.	Web servers are bound only to web containers	Application servers are bound to web containers as well as EJB containers
2.	Web servers are best-suited for static content	Application servers are best-suited for dynamic content
3.	Web servers do not use a lot of resources	Application servers use a lot of resources
4.	Web servers are responsible for arranging the run environment for web applications	Application servers are responsible for arranging the run environment for enterprise applications
5.	Multithreading is not supported in web servers	Multithreading is supported in application servers
6.	The capacity of a web server is lower than that of an application server	The capacity of an application server is more than that of a web server
7.	The protocols used in web servers are HTTP and HTML	The protocols used in application servers are GUI, HTTP, RPC, and RMI

Introduction to Nginx Server

- **NGINX** is pronounced as **"engine-ex".**
- It is an open-source, fast, lightweight and high-performance web server that can be used to serve static files.
- **NGINX** is open source software for web serving, reverse proxying, caching, load balancing, media streaming, and more. It started out as a web server designed for maximum performance and stability.
- In addition to its HTTP server capabilities, NGINX can also function as a proxy server for email **(IMAP, POP3, and SMTP)** and a reverse proxy and load balancer for **HTTP, TCP, and UDP servers**.
- Nginx was created by Igor Sysoev, with its 1st public release on October 2004 as an attempt to answer the **C10k problem**. Where C10k is the challenge of managing 10,000 connections at the same time.

Web server for reverse proxy, caching, and load balancing.

- The **reverse proxy** accepts a request from a client, forwards the request to a server that can fulfill it, and returns the response from the server to the client.
- **Caching** is a technique that stores a copy of a given resource and serves it back when requested. When a web cache has a requested resource in its store, it intercepts the request and returns its copy instead of re-downloading from the originating server.
- A **load balancer** distributes the incoming client requests to a group of servers, in which it can handle concurrent requests without experiencing load on a particular server.

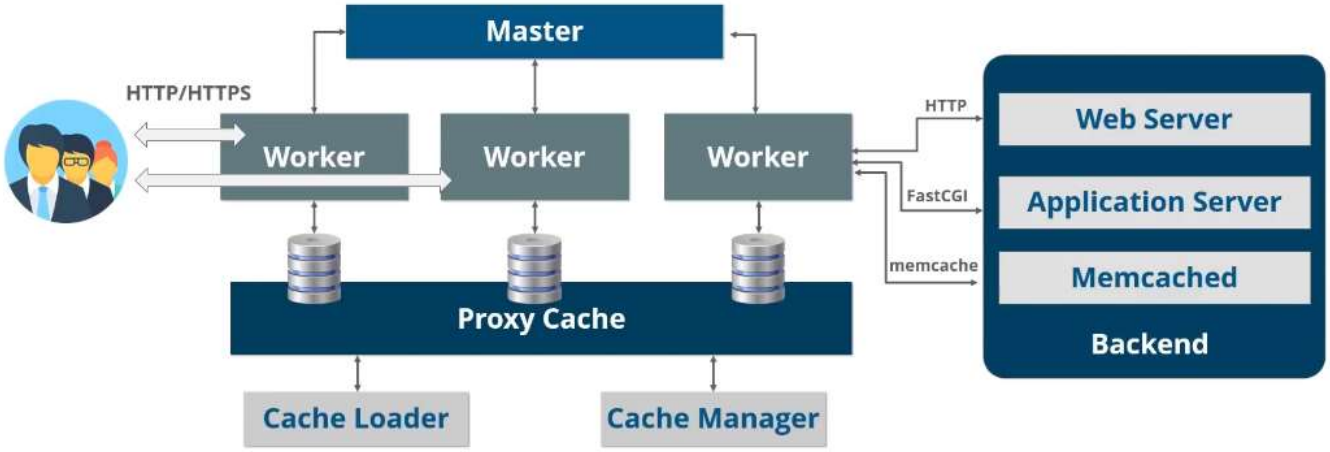


FIG:ARCHITECTURE OF NGINX

Features of NGINX

a. NGINX provides HTTP server abilities.
b. NGINX is developed to provide more stability than Apache and maximum performance.
c. NGINX behaves as a proxy server for email.
d. NGINX uses an event-driven approach and a single-threaded architecture to provide more performance even on a low-end computer.
e. NGINX provides more scalability.
f. NGINX dramatically reduces wait time for a client.

g. NGINX-based websites can be upgraded without any downtime.
h. NGINX supports reverse proxy with caching
i. NGINX supports IPV6 and Load Balancing

Nginx and Nginx Plus

- There are two versions of Nginx: Nginx Open Source and Nginx Plus.
- Nginx Open Source is **free and open-source software**.
- Nginx Plus is sold as a **subscription model**. It offers features in addition to Nginx Open Source, such as active health checks, session persistence based on cookies, DNS-service-discovery integration, Cache Purging API, AppDynamic, Datalog, Dynatrace New Relic plug-ins, Active-Active HA with config sync, Key-Value Store, on-the-fly with zero downtime updates upstream configurations, and key-value stores using Nginx Plus API and **web application firewall** (WAF) dynamic module.

Amazon Web Services (AWS)

- **AWS Meaning**: The **Amazon Web Services (AWS)** platform provides more than 200 fully featured services from data centers located all over the world, and is the world's most comprehensive cloud platform.
- Amazon web service is an online platform that **provides scalable and cost-effective cloud computing solutions**.
- AWS is a broadly adopted cloud platform that offers several on-demand operations like compute power, database storage, content delivery, etc., to help corporates scale and grow.

Introduction to AWS EC2

- **Amazon Elastic Compute Cloud EC2** is a **cloud computing** platform that provides a low-cost, scalable and durable way to run applications.
- An EC2 instance is a small-footprint virtual machine you can use to launch applications in the cloud.
- **Amazon Elastic Block Store Amazon EBS** is a storage system available in the **Amazon EC2 Elastic Cloud Service (ECS)**. EBS is **storage-class memory** that is used for block storage. With Amazon EBS, you can host one or many small disks up to 5TB. These volumes can be accessed and formatted using a simple API.
- EC2 functions are entirely managed by **AWS, with your EC2** instances performing all of the work. You can put up an EC2 instance in seconds and get it running within minutes.
- With Amazon EC2, you can perform all of the tasks associated with virtualization in a much easier and more robust manner. This way, you can get all of the benefits of virtualization for your applications, and it will also cost you much less compared to other virtualization solutions.

Implementing AWS EC2 Applications

- Data Warehousing
- Business Intelligence
- Enterprise Resource Planning (ERP)
- Time Series Analysis
- Mapping of Layer 7 Channels in a Layer 2 Network
- Distributed Logic

- Data Access Network
- Automation
- Automated Monitoring

Why is AWS EC2 important?

1. You don't require any hardware units
2. Easily scalable (up or down)
3. You only pay for what you use
4. You have complete control
5. Highly secure
6. You can access your assets from anywhere in the world

Features of Amazon EC2

a) Virtual computing environments, known as ***instances.***

b) Preconfigured templates for your instances, known as ***Amazon Machine Images (AMIs),*** that package the bits you need for your server (including the operating system and additional software).

c) Various configurations of CPU, memory, storage, and networking capacity for your instances, known as ***instance types.***

d) Secure login information for your instances using *key pairs* (AWS stores the public key, and you store the private key in a secure place).

e) Storage volumes for temporary data that's deleted when you stop, hibernate, or terminate your instance, known as ***instance store volumes.***

f) Persistent storage volumes for your data using **Amazon Elastic Block Store (Amazon EBS), known as *Amazon EBS volumes.***

g) Multiple physical locations for your resources, such as instances and Amazon EBS volumes, known as ***Regions*** and ***Availability Zones.***

h) A firewall that enables you to specify the protocols, ports, and source IP ranges that can reach your instances using ***security groups.***

i) Static IPv4 addresses for dynamic cloud computing, known as ***Elastic IP addresses.***

j) Metadata, known as ***tags***, that you can create and assign to your Amazon EC2 resources.

k) Virtual networks you can create that are logically isolated from the rest of the AWS Cloud, and that you can optionally connect to your own network, known as ***virtual private clouds*** **(VPCs).**

Application Hosting

Application providers who are building SaaS-based applications quickly learn that owning and operating the infrastructure on which these solutions are hosted can be expensive and complex, especially when customer demand is uncertain.

Application Hosting Using AWS

1. **Amazon Web Services (AWS)** delivers reliable, scalable, and cost-effective computing resources on which to host your applications. You can use the following AWS components alone or combined to host your application(s):
2. **Amazon Elastic Compute Cloud (Amazon EC2).** Amazon EC2 provides resizable compute capacity in the cloud. You define your virtual Amazon EC2 environment with the operating system, services, databases, and application platform stack required for your hosted application. Amazon EC2 provides a full management console and APIs to manage your compute resources.
3. **Amazon Simple Storage Service (Amazon S3).** Amazon S3 provides a simple web services interface to store and retrieve any amount of data, at any time, from anywhere on the web. It is durable, highly available, and secure. Amazon S3 also stores multiple redundant copies of your data.
4. **Amazon Relational Database Service (Amazon RDS).** Amazon RDS makes it easy to set up, operate, and scale a relational database in the cloud. It provides cost-efficient and resizable database capacity while managing time-consuming database administration tasks.
5. **Amazon CloudFront.** Amazon CloudFront provides a high performance, globally distributed content delivery system. Your application can use Amazon CloudFront to easily distribute or stream content to your users with low latency, high data transfer speeds, no commitments, and seamless integration with Amazon S3.
6. **Amazon Simple Queue Service (Amazon SQS).** Amazon SQS provides a high performance, secure queuing system for your application that enables you to reliably distribute work between your application's processes.
7. **Amazon DevPay.** Amazon DevPay is a simple-to-use online billing and account management service that makes it easy for you to sell applications that are built in, or run on top of, Amazon Web Services.

Why use AWS for web hosting?

Broad Platform Support

With AWS, you can use whatever CMS you like, including WordPress, Drupal, Joomla, and more. AWS also supports and provides SDKs for popular platforms like Java, Ruby, PHP, Node.js, and .Net.

Datacenters Worldwide

our customers can be anywhere in the world. With AWS you can have a datacenter or CDN hosting your website in any geography you choose with just a few mouse clicks.

Scalable from Day One

Website traffic can fluctuate a lot. From quiet times in the middle of the night, to campaign driven, social media sharing traffic spikes, AWS infrastructure that can grow and shrink to meet your needs.

Flexible Pricing Model

AWS only charges you for the resources you use, with no up-front costs or long-term contracts. AWS has web hosting options that offer pay-as-you-go pricing or fixed monthly pricing.

Single Page Web App Hosting

Static web apps that require only a single load in a web browser are referred to as **Single page web apps.** All subsequent actions by the user are made available through HTML, JavaScript, and CSS that are pre-loaded in the browser. Backend data is accessed via GraphQL or REST APIs that fetch content from a data store and update the UI without requiring a page reload.

Single page web apps offer native or desktop app-like performance. They offer all the static website benefits (low cost, high levels of reliability, no server adminstration, and scalability to handle enterprise-level traffic) with dynamic functionality and blazing fast performance.
Best for:

- Websites built with Single page app frameworks such as React JS, Vue JS, Angular JS, and Nuxt
- Websites built with static site generators such as Gatsby JS, React-static, Jekyll, and Hugo.
- Progressive web apps or PWAs
- Websites that do not contain server-side scripting, like PHP or ASP.NET
- Websites that have serverless backends