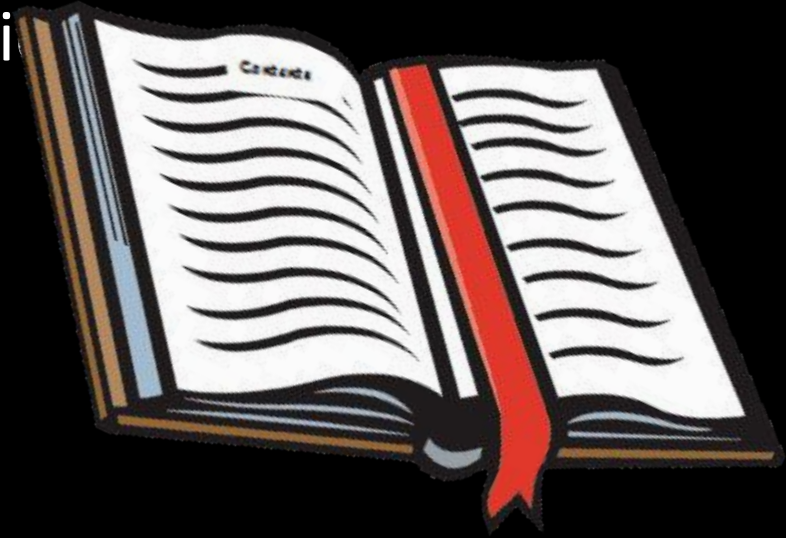# Web Technologies Basics

Concepts

Table of Contents

- Web Sites and Web Applications
- Web 1.0, 2.0, 3.0
- Web Browsers
- Hardware Servers
- Web Servers
- Client-Server Architecture
- 3-Tier / Multi-Tier Architectures
- Service-Oriented Architecture (SOA)

Web Page

- Document or information resource that is suitable for the World Wide Web

- Can be accessed through a web browser and displayed on a monitor or mobile device

- This information is usually in HTML or XHTML format, and may provide navigation to other web pages via hypertext links

- Web pages frequently refer to other resources such as style sheets (CSS), scripts (JavaScript) and images into their final presentation

Web Site

- Collection of related web pages containing web resources (web pages, images, videos, CSS files, JS files or other digital assets)

- Common navigation between web pages

- A website is hosted on at least one web server

- Accessible via a network (such as the Internet)

- All publicly accessible websites collectively constitute the World Wide Web

Web Application

- Next level web sites
- High interactivity
- High accessibility (Cloud)
- AJAX, Silverlight, Flash, Flex, etc.
- Applications are usually broken into logical chunks called "tiers", where every tier is assigned a role
- Desktop-like application in the web browser
- Web applications on desktop (Windows 8)
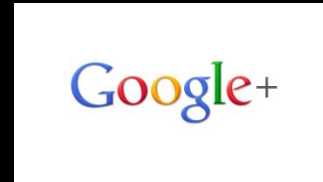
Web Browsers and Layout Engines
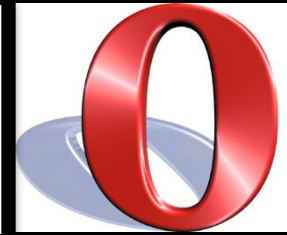
Web Browsers

- Program designed to enable users to access, retrieve and view documents and other resources from the Web

- Main responsibilities:
  - Bring information resources to the user (issuing requests to the web server and handling any results generated by the request)
  - Presenting web content (render HTML, CSS, JS)
  - Capable of executing applications within the same context as the document on view (Flash)

Layout Engines

- Software component that displays the formatted content on the screen combining:
  - Marked up content (such as HTML, XML, image files, etc.)
  - Formatting information (such as CSS, XSL, etc.)
- It "paints" on the content area of a window, which is displayed on a monitor or a printer
- Typically embedded in web browsers, e-mail clients, on-line help systems or other applications that require the displaying (and editing) of web content

Layout Engines and Web Browsers

- Trident-based
  - Internet Explorer, Netscape, Maxthon, etc.
- Gecko-based
  - Firefox, Netscape, SeaMonkey, etc.
- Blink-based
  - Chrome, Opera
- WebKit-based
  - Old Chrome, Safari, Maxthon, etc.
- Presto-based
  - Old Opera

User Agent Strings

◆ Identify web browsers and their version

◆ Can have some additional information like layout engine, user's operating system, etc.

◆ Example:

```
Mozilla/5.0 (Windows NT 6.1; WOW64; rv:7.0.1)
Gecko/20100101 Firefox/7.0.1
```

- Web browser: Firefox 7.0.1

- Rendering (layout) engine: Gecko/20100101

- Operating system: 64-bit Windows 7

  - WOW64 = Windows-On-Windows 64-bit

Hardware Servers

- Physical computer (a hardware system) dedicated to running one or more such services
- Servers are placed in collocation centers
- The server may be:
  - Database server
  - File server
  - Mail server
  - Print server
  - VPS servers

Web Servers

Apache, IIS, nginx, lighttpd, etc.

What Do the Web Servers Do?

- All physical servers have hardware
- The hardware is controlled by the operating system
- Web servers are software products that use the operating system to handle web requests
  - Web servers serve Web content
- These requests are redirected to other software products (ASP.NET, PHP, etc.), depending on the web server settings

Web Servers Market Share Feb 2014
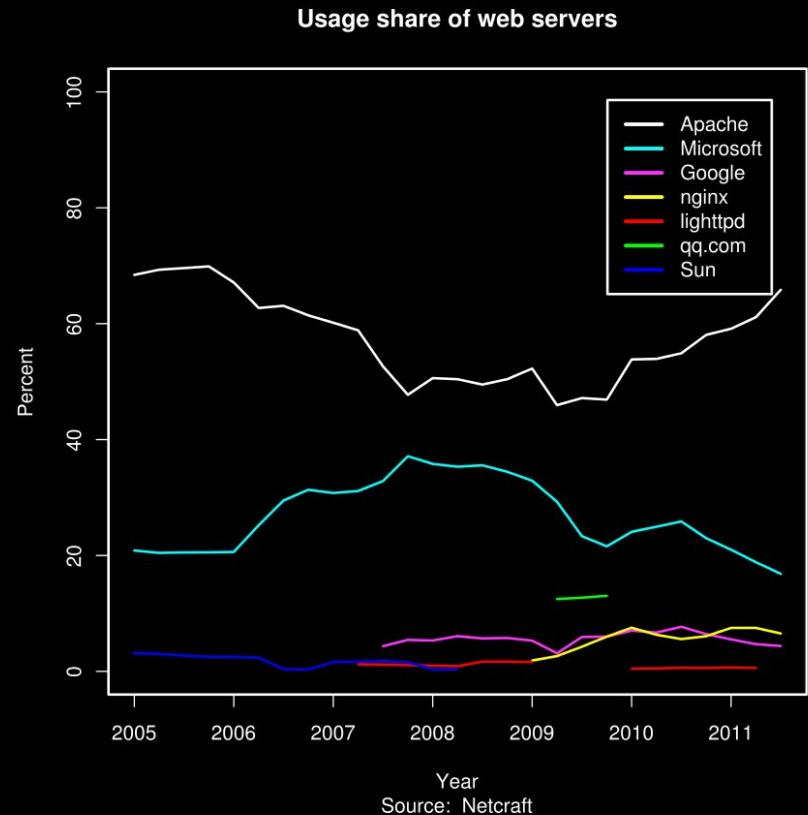
- Apache
  - 38.22 %

- IIS (by Microsoft)
  - 32.80%

- nginx (by Igor Sysoev)
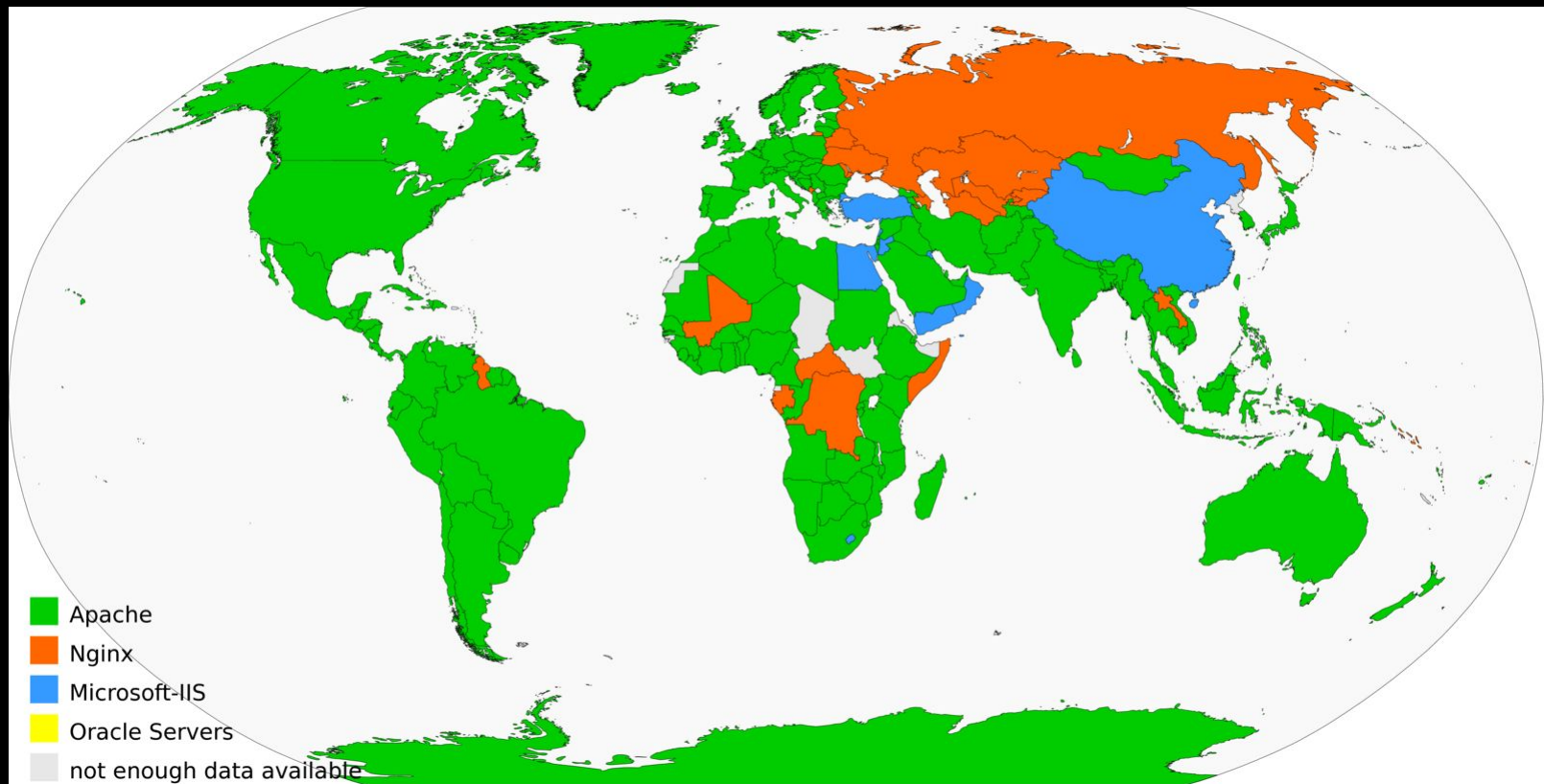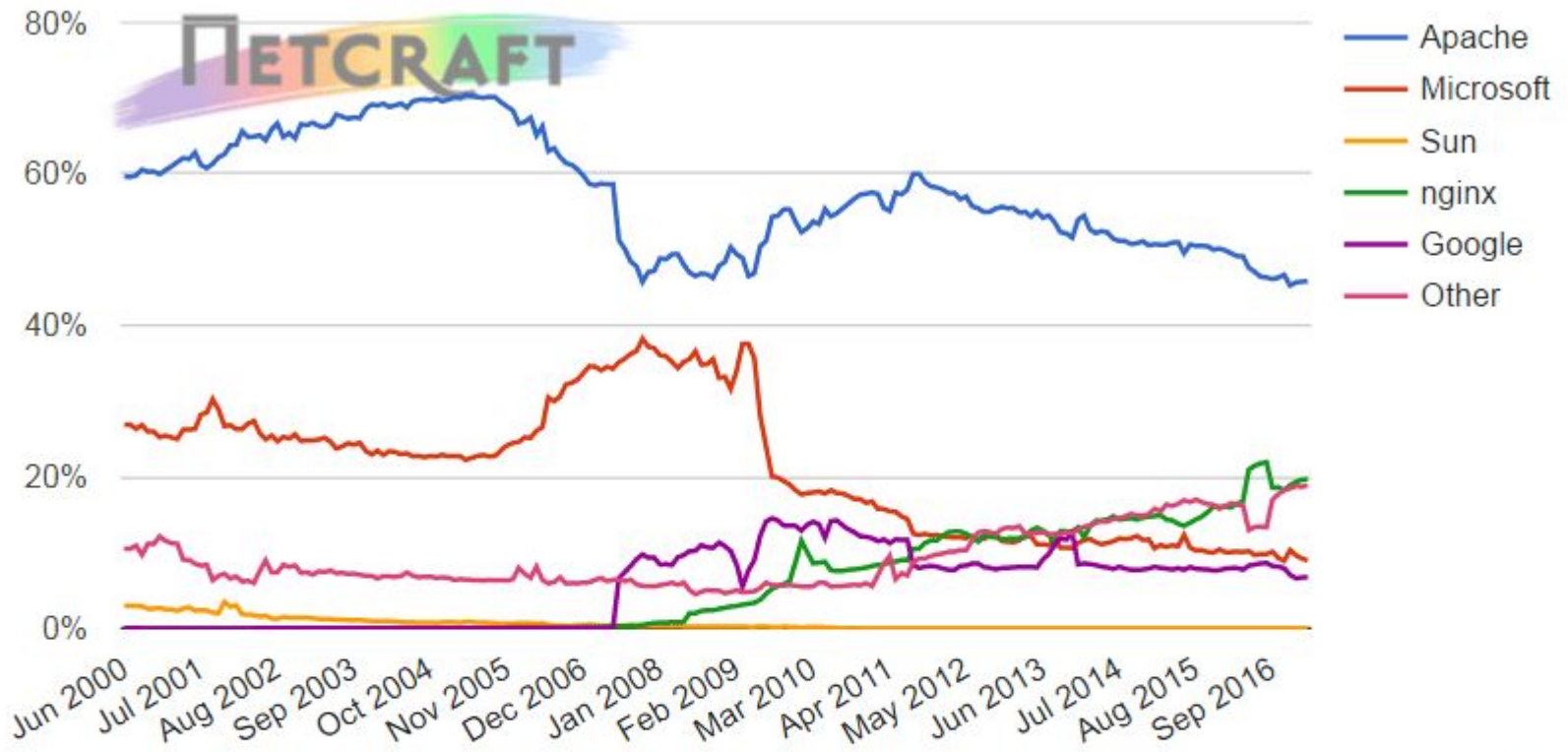 - 15.00%

- GWS (by Google)
  - 2.30%

Usage share of web servers

Legend:
- Apache
- Microsoft
- Google
- nginx
- lighttpd
- qq.com
- Sun

Year
Source: Netcraft

Most popular web servers in different countries

Источник: W3Tech.com

Web server developers: Market share of active sites

Developer	February 2017	Percent	March 2017	Percent	Change
Apache	79,593,938	45.78%	79,942,445	45.82%	0.05
nginx	34,088,228	19.60%	34,317,972	19.67%	0.07
Microsoft	16,031,854	9.22%	15,611,256	8.95%	-0.27
Google	11,656,739	6.70%	11,684,677	6.70%	-0.01

2019,2020 years

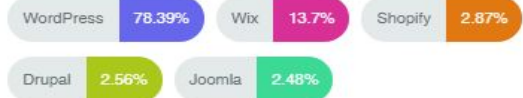Ниже представлены веб-серверы с наибольшим количеством пользователей по всему миру

Фильтр ▼

1. Apache — 41.68%
2. Nginx — 26.37%
3. IIS — 12.48%
4. LiteSpeed — 2.21%
5. Apache Traffic Server — 0.55%
6. OpenGSE — 0.44%
7. Phusion Passenger — 0.40%
8. Apache Tomcat — 0.18%
9. lighttpd — 0.14%
10. Tengine — 0.12%
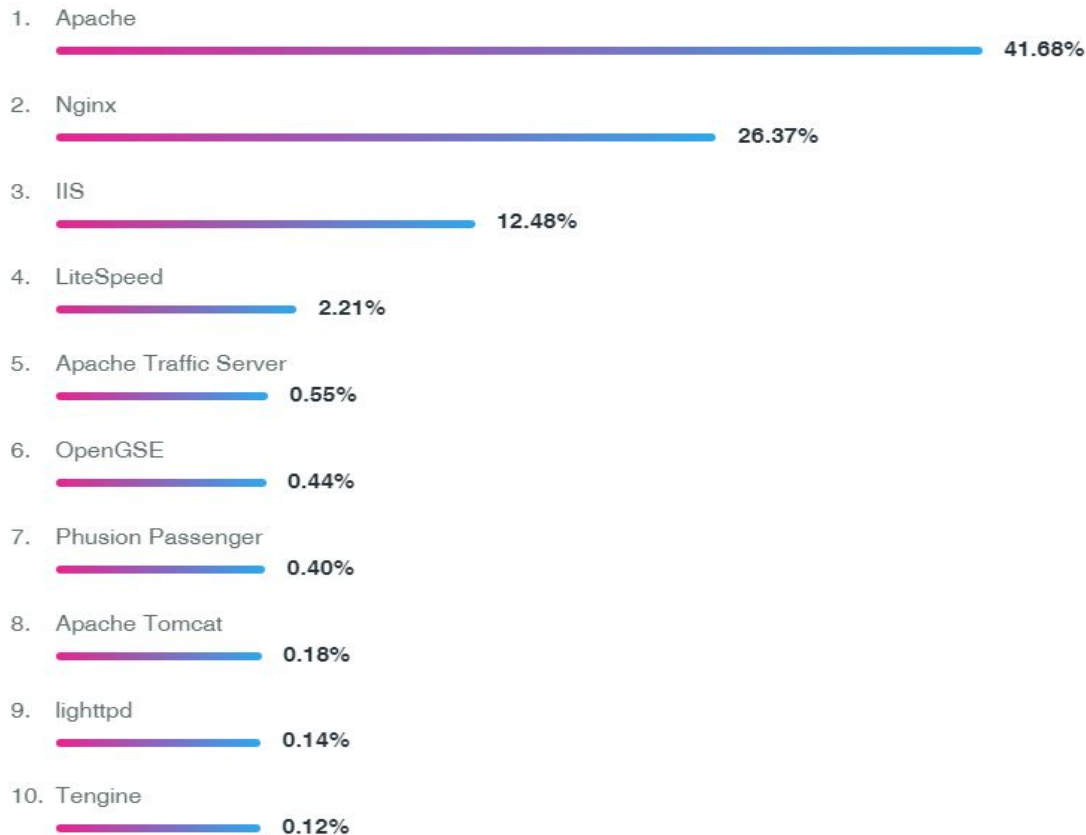
41.68%

Apache

Топ 5 CMS среди хостингов

2020

WordPress 78.39%   Wix 13.7%   Shopify 2.87%

Drupal 2.56%   Joomla 2.48%
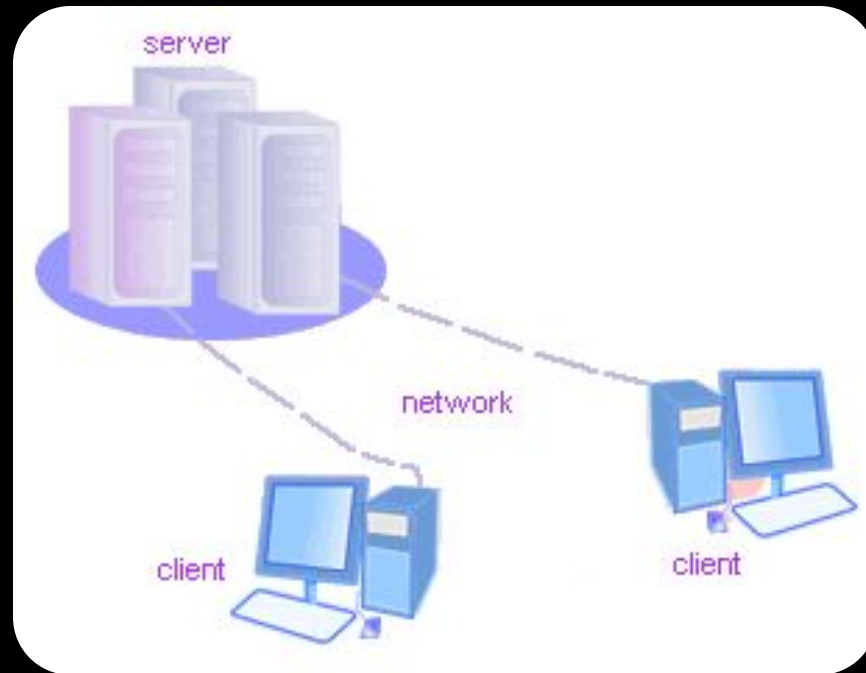
Client-Server Architecture

The Classical Client-Server Model

Client-Server Architecture

- The client-server model consists of:
  - Server – a single machine or cluster of machines that provides web applications (or services) to multiple clients
    - Examples:
      - Web server running PHP scripts or ASP.NET pages
      - IIS based Web server
      - WCF based service
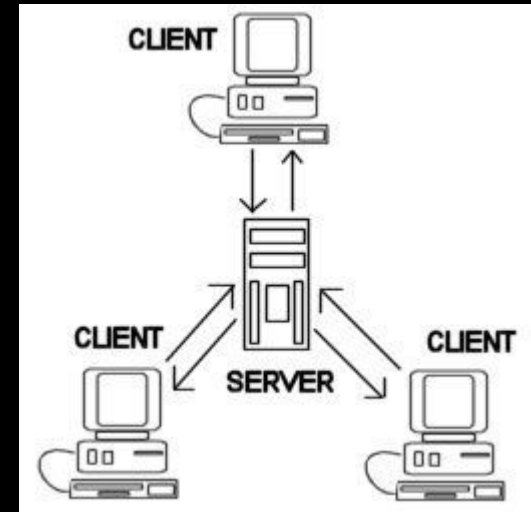   - Services in the cloud

      IIS (Internet Information Server), WCF (Windows Communication Foundation), .net
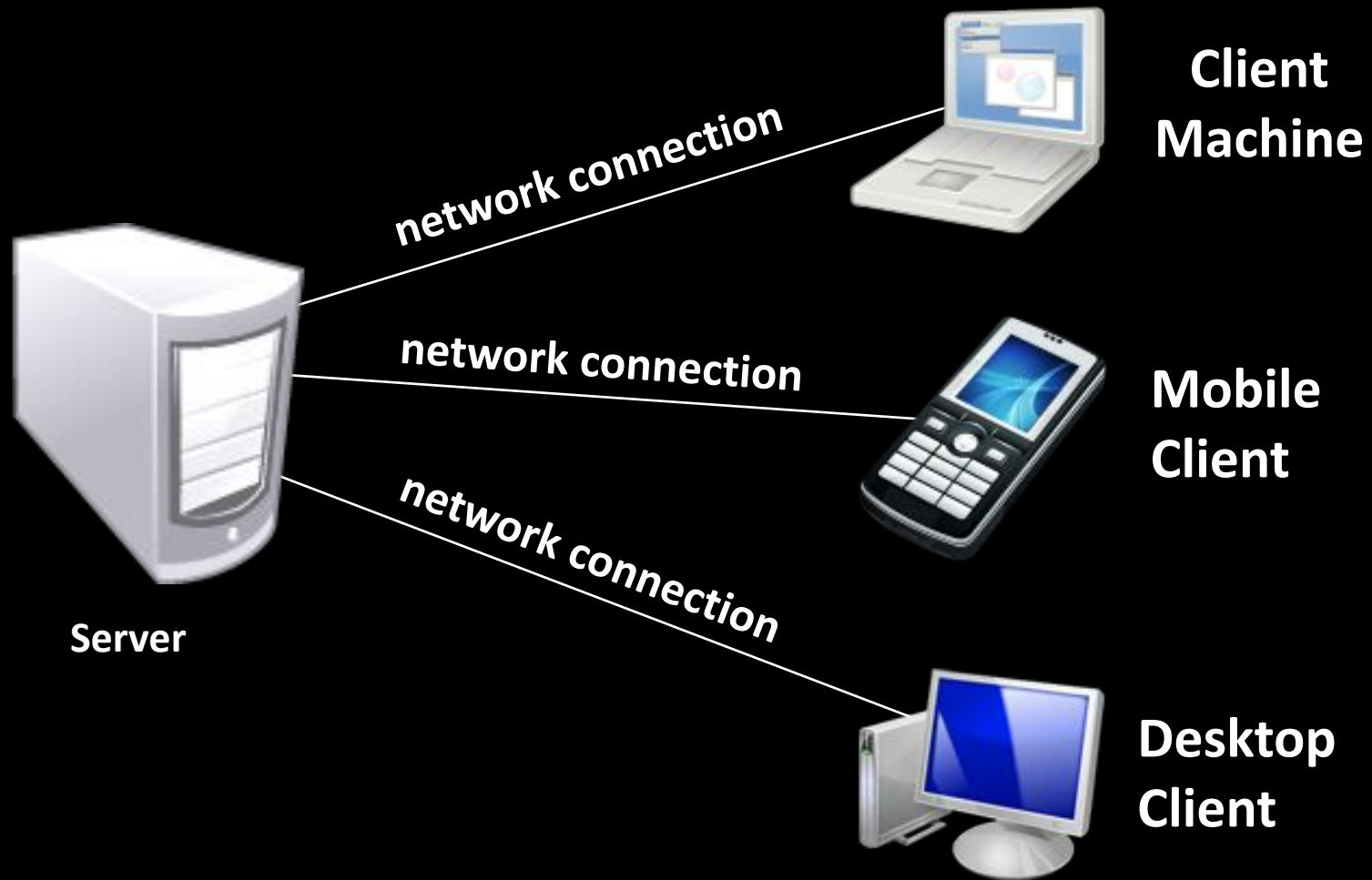
Client-Server Architecture

- The client-server model consists of:
  - Clients –software applications that provide UI (front-end) to access the services at the server
    - Examples:
      - Web browsers
      - WPF applications
      - HTML5 applications
      - Silverlight applications
      - ASP.NET consuming services

      WPF (Windows Presentation Foundation)
      XAML (e**X**tensible **A**pplication **M**arkup **L**anguage)

The Client-Server Model

network connection — Client Machine

network connection — Mobile Client

network connection — Desktop Client

Server

Client-Server Model – Examples

- Web server (Apache, IIS) – Web browser
- FTP server (ftpd) – FTP client (FileZilla)
- EMail server (qmail) – email client (Outlook)
- SQL Server – SQL Server Management Studio
- BitTorrent Tracker – Torrent client (µTorrent)
- DNS server (bind) – DNS client (resolver)
- DHCP server (wireless router firmware) – DHCP client (mobile phone /Android DHCP client/)
- SMB server (Windows) – SMB client (Windows)

- FTP (File Transfer Protocol)

- FileZilla

- DNS (Domain Name System)

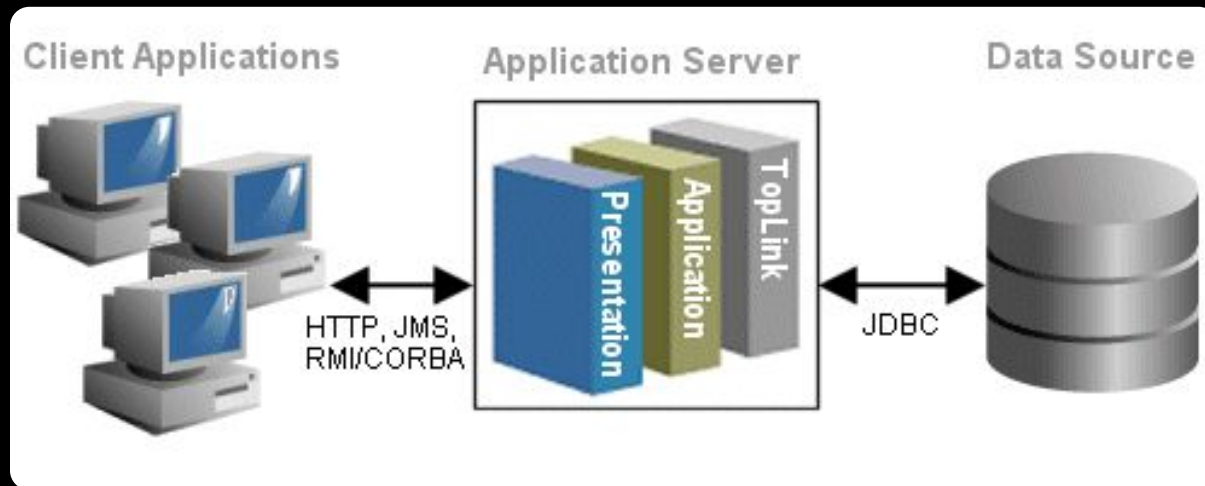- DHCP (Dynamic Host Configuration Protocol)

- SMB (Server Message Block)

\servername\sharename

Active Directory

ORM (Object Relational Mapping)
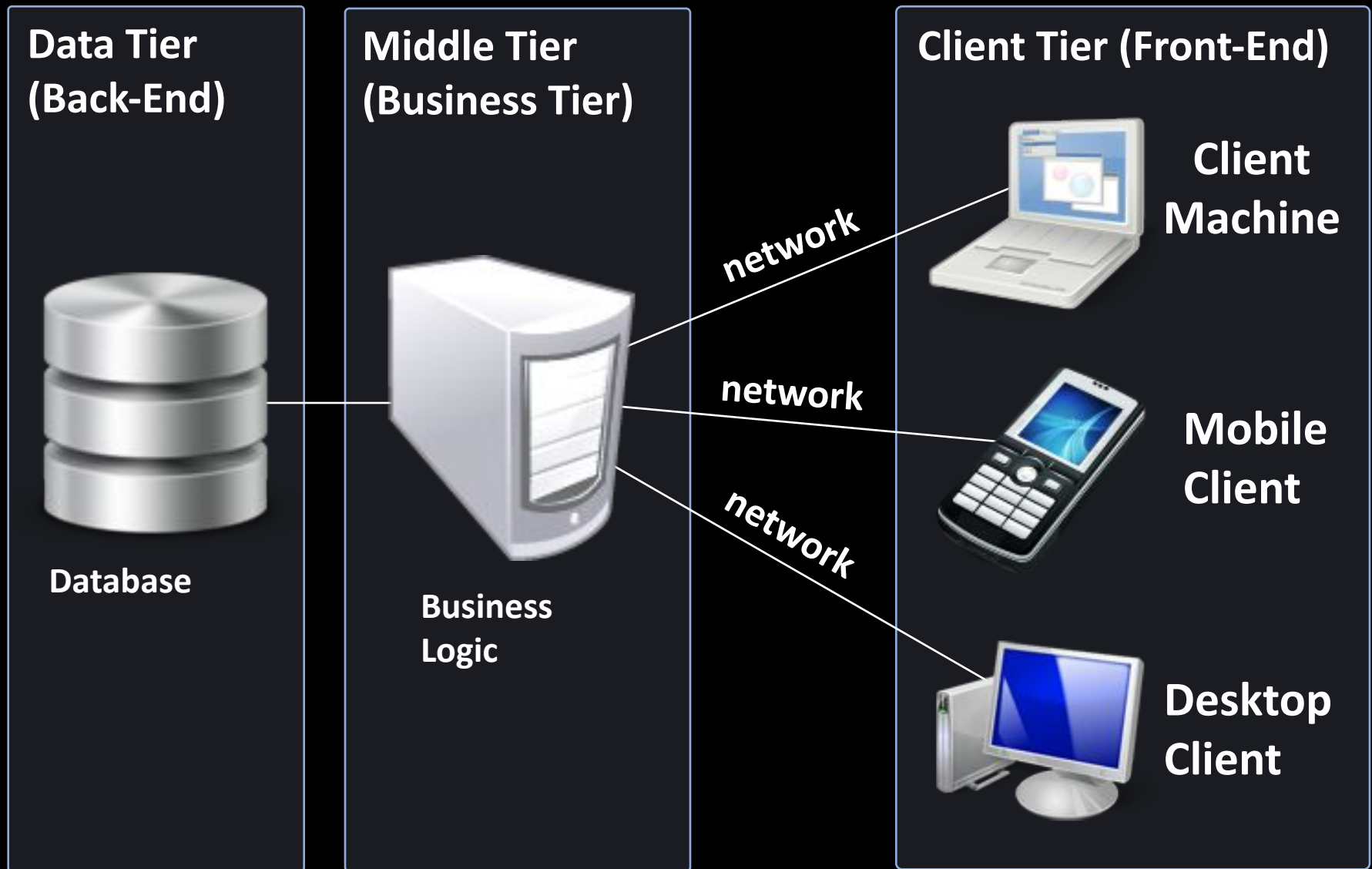
3-Tier / Multi-Tier Architectures

Classical Layered Structure of Software Systems

The 3-Tier Architecture

- The 3-tier architecture consists of the following tiers (layers):
  - Front-end (client layer)
    - Client software – provides the UI of the system
  - Middle tier (business layer)
    - Server software – provides the core system logic
    - Implements the business processes / services
  - Back-end (data layer)
    - Manages the data of the system (database / cloud)

The 3-Tier Architecture Model

Data Tier (Back-End)

Middle Tier (Business Tier)

Client Tier (Front-End)

Client Machine

network

Database

Business Logic

network

Mobile Client

network

Desktop Client

Typical Layers of the Middle Tier

- The middle tier usually has parts related to the front-end, business logic and back-end:

Presentation Logic

Implements the UI of the application (HTML5, Silverlight, WPF, …)
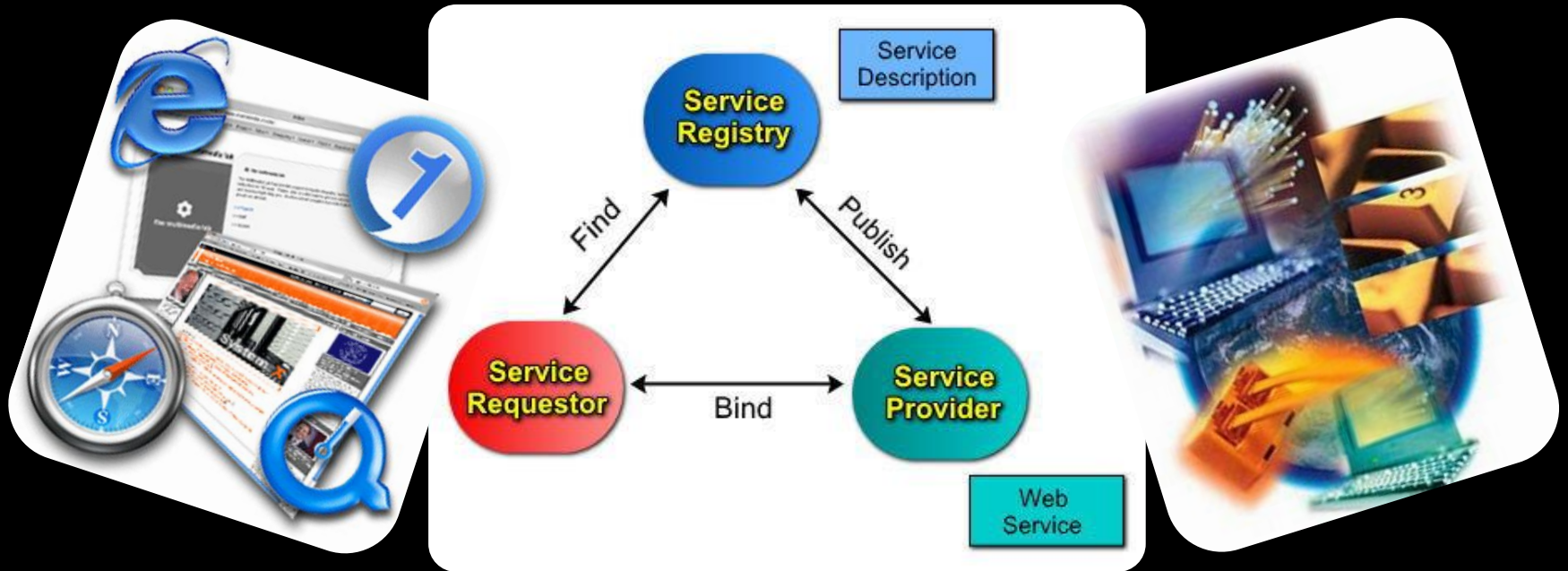
Business Logic

Implements the core processes / services of the application

Data Access Logic

Implements the data access functionality (usually ORM framework)

Service-Oriented Architecture (SOA)

What is a Service?

- In the real world a "service" is:
  - A piece of work performed by a service provider
  - Provides the client (consumer) some desired result by some input parameters
    - The requirements and the result are known
  - Easy to use
  - Always available
  - Has quality characteristics (price, execution time, constraints, etc.)

  SOAP (Simple Object Access Protocol)   RPC
  REST (Representational State Transfer)   Restful

What is "Cloud"?

What is Cloud?

- Cloud ≈ multiple hardware machines combine their computing power and resources
  - Share them between multiple applications
  - To save costs and use resources more efficiently
- Public clouds
  - Provide computing resources on demand
    - Publicly in Internet
    - Paid or free of charge (to some limit)
  - Amazon AWS, Google App Engine, Microsoft Azure, Rackspace, PHPFog, Heroku, AppHarbor

Cloud Computing Models

- Infrastructure as a Service (IaaS)
  - Virtual machines in the cloud on demand
  - Users install the OS and software they need

- Platform as a Service (PaaS)
  - Platform, services and APIs
    (application programming interface) for developers
  - E.g. Java + JBoss + JSF + JPA + MongoDB or JavaScript + Node.js + MongoDB + RabbitMQ

- Software as a Service (SaaS)
  - Hosted application on demand (e.g. WordPress)

- JBoss
- JSF (JavaServer Faces)
- JPA (Java Persistence API)
- MongoDB (от англ. humongous — огромный)
- JSON (JavaScript Object Notation)
- RabbitMQ   Message Oriented Middleware
- AMQP (Advanced Message Queuing Protocol)
- Node.js