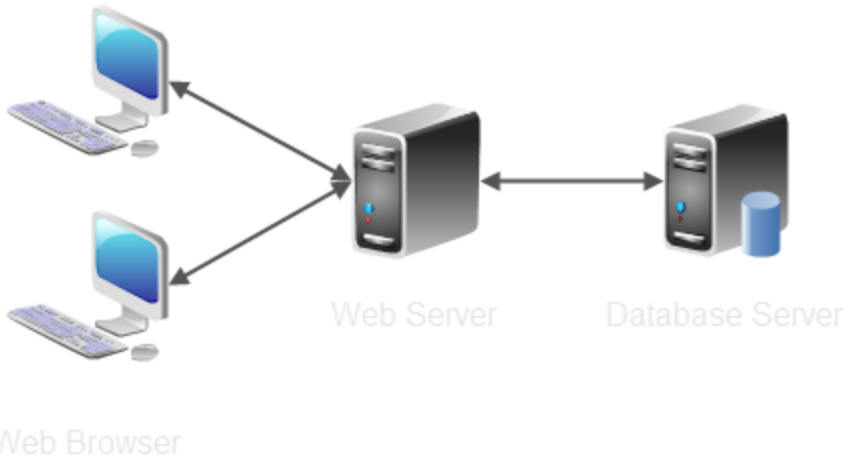
Advanced Web Technologies



Iosif Polenakis

PhD Candidate,
Department of Computer Science and Engineering,
University of Ioannina.

email: ipolenak@cs.uoi.gr, tel.: 2651008831

Advanced Web Technologies

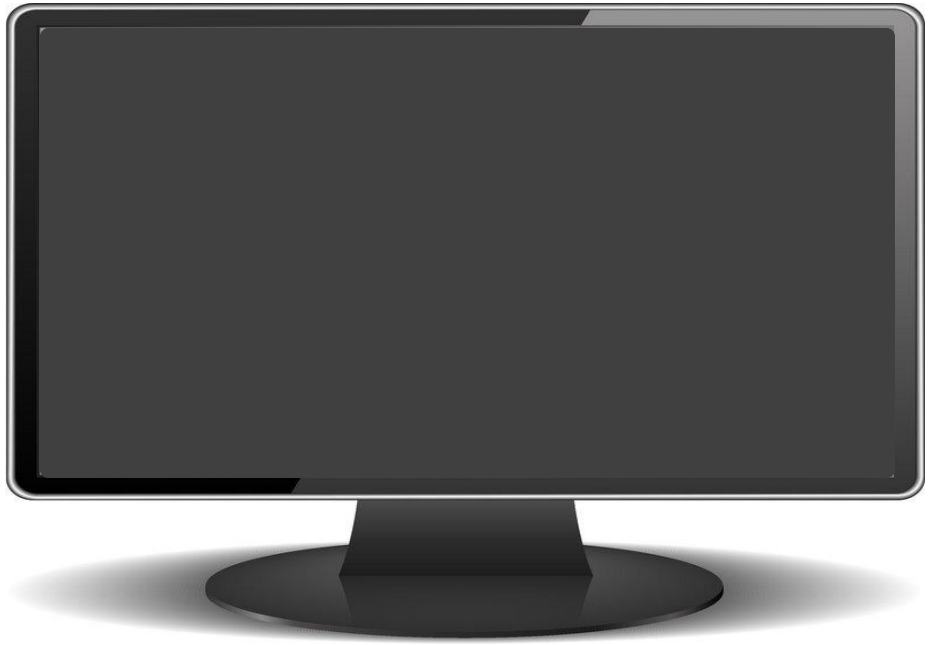
- Aims of Advanced Web Technologies:
  - ✓ Server platform independence
  - ✓ Client Technology Independence
  - ✓ Formalizing the communication between the different components:
    - Web Client → Web Server,
    - Application Server → DB Server
  - ✓ Deployment of a distributed model of implementing software and applications

Basis of Advanced Web Technologies

- All the Web Technologies are based on protocols and various Internet Services.

Prerequisite:

- *All the **components** should be inter-connected through IP technologies …*



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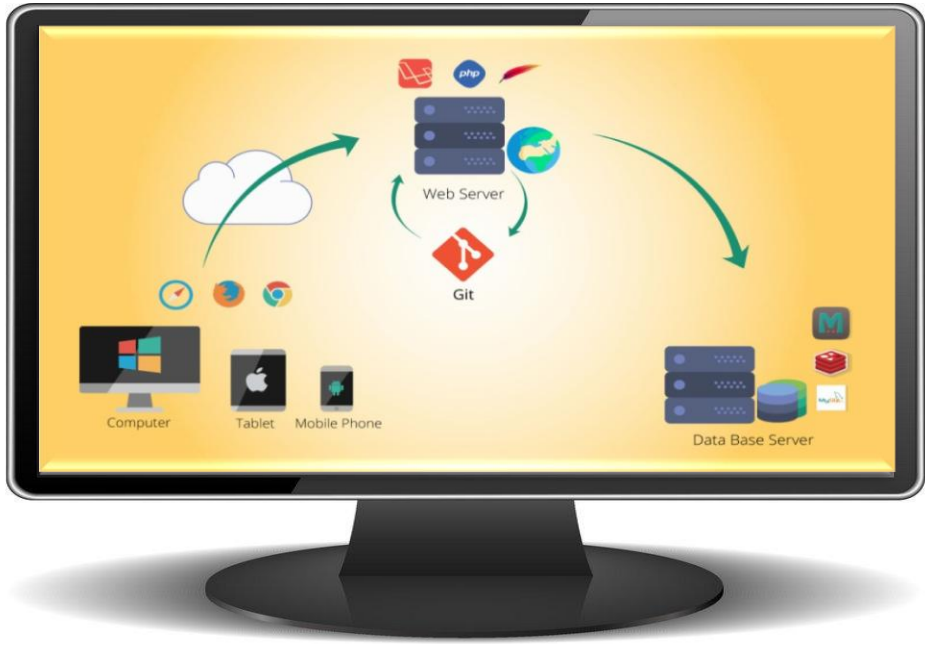

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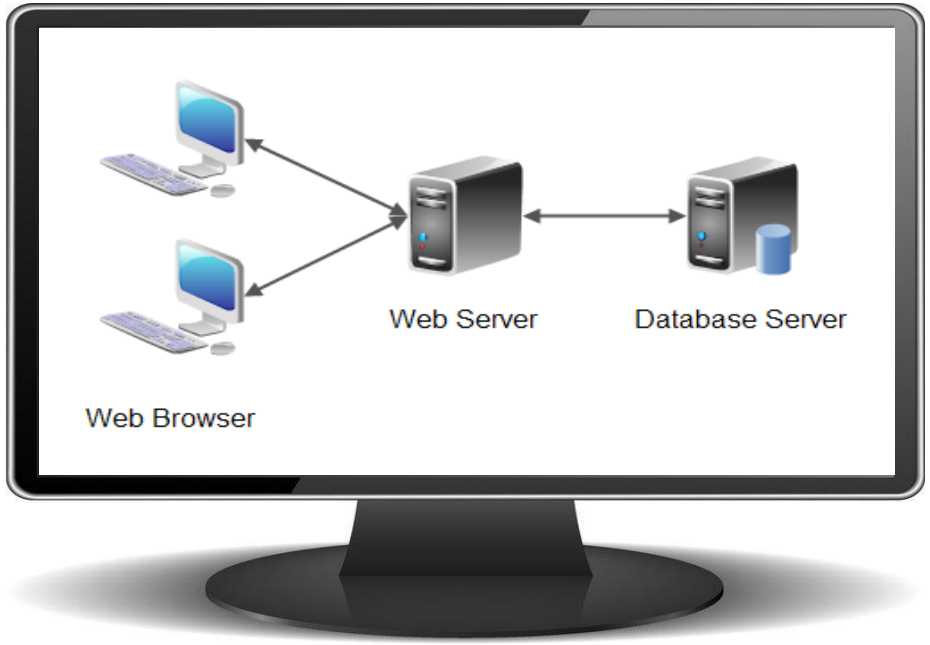

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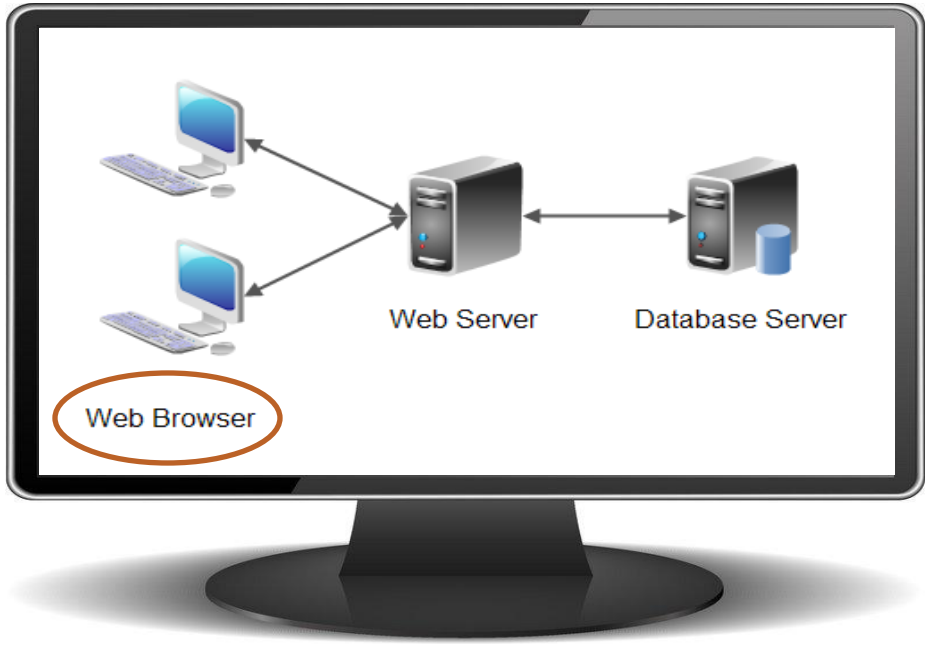

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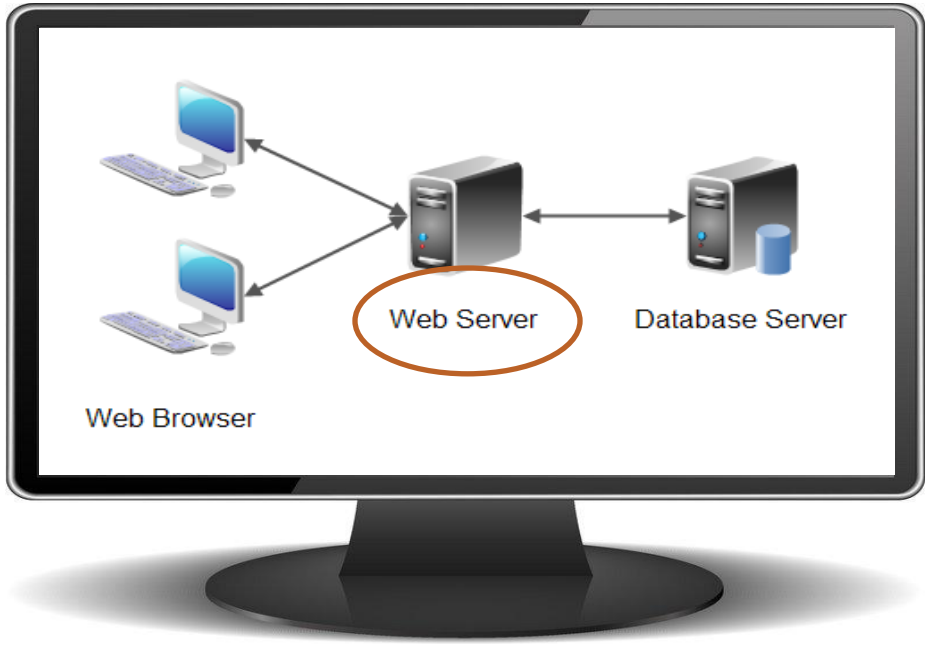

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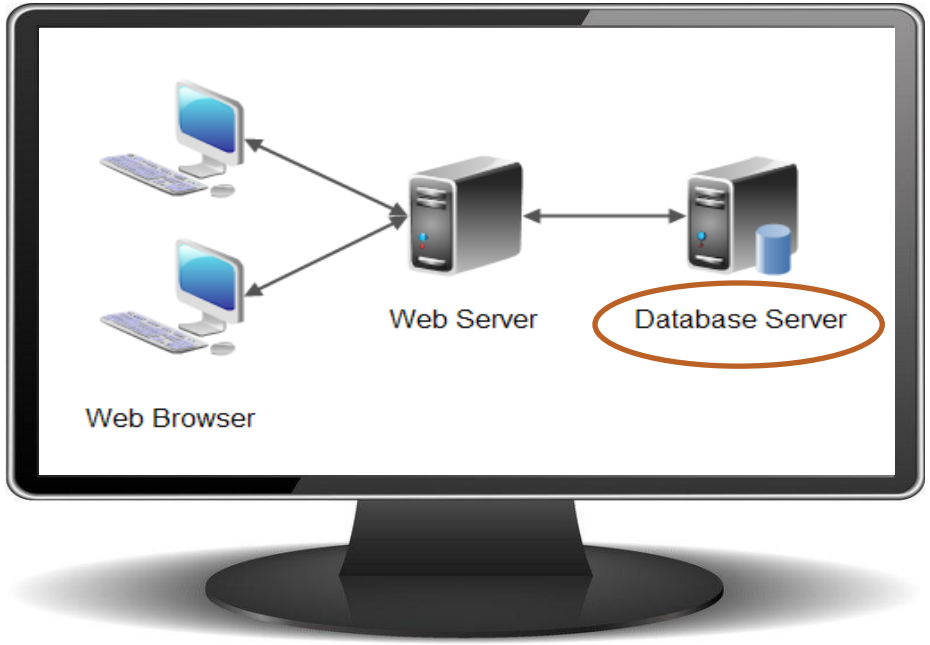

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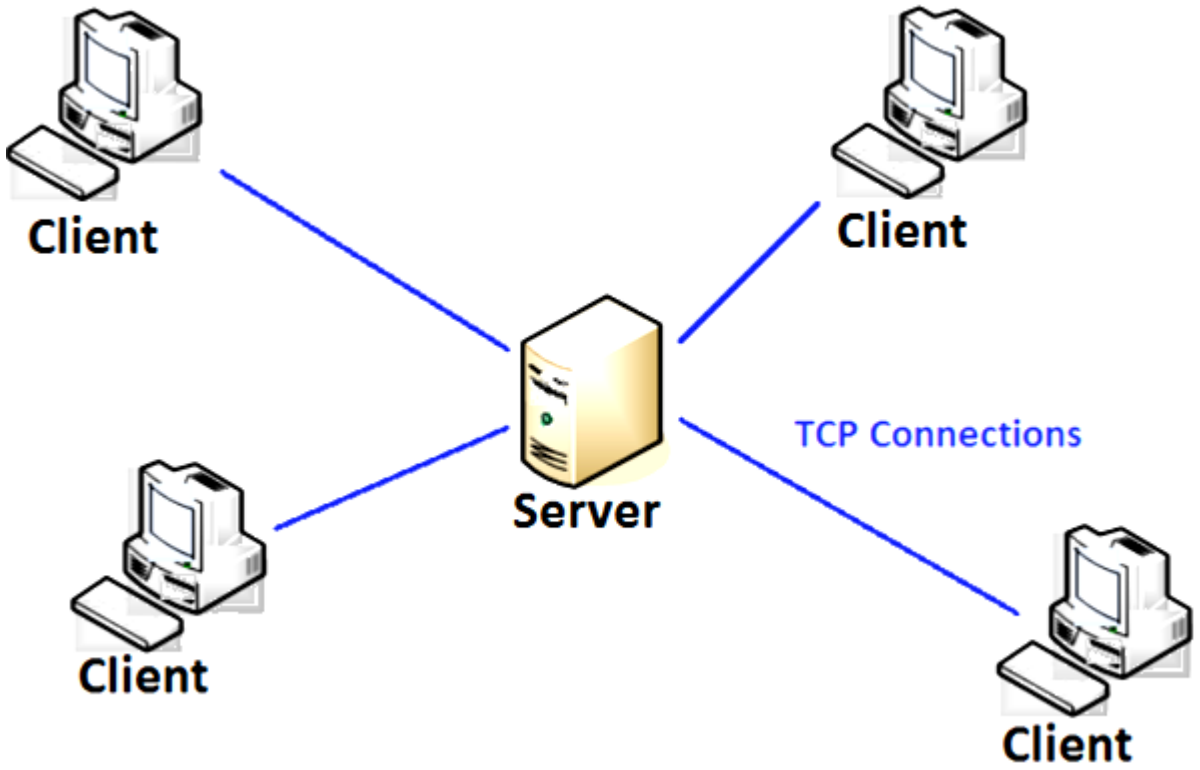

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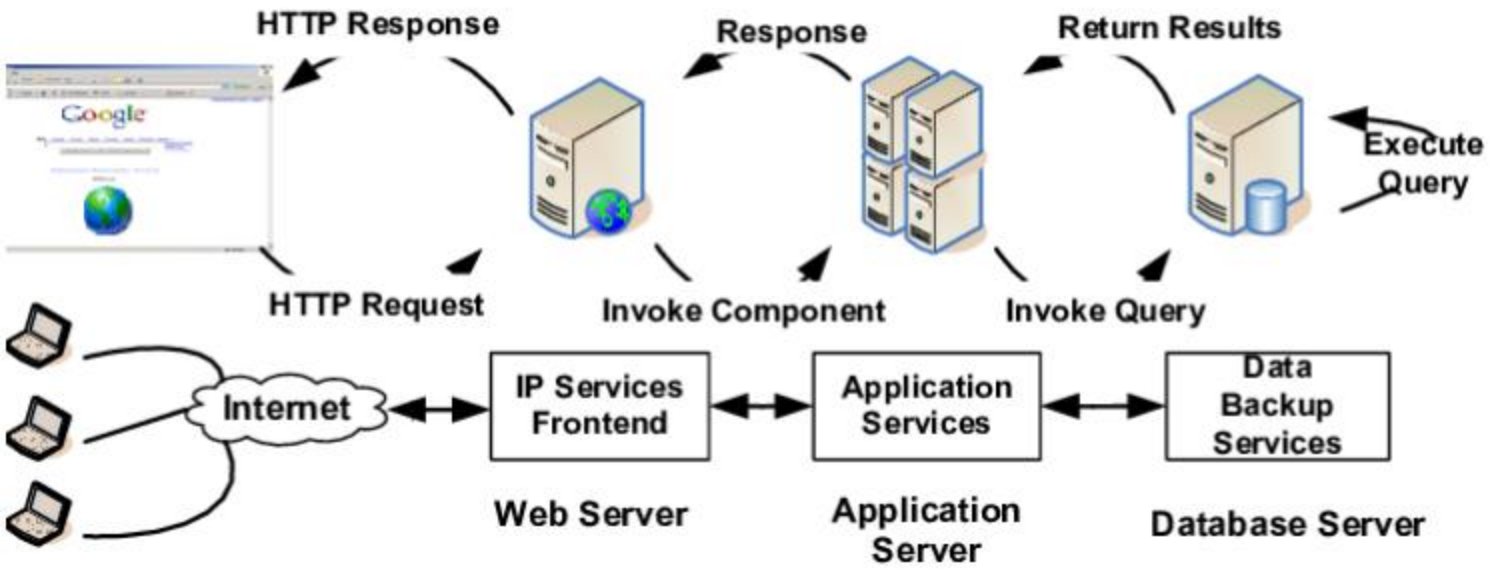

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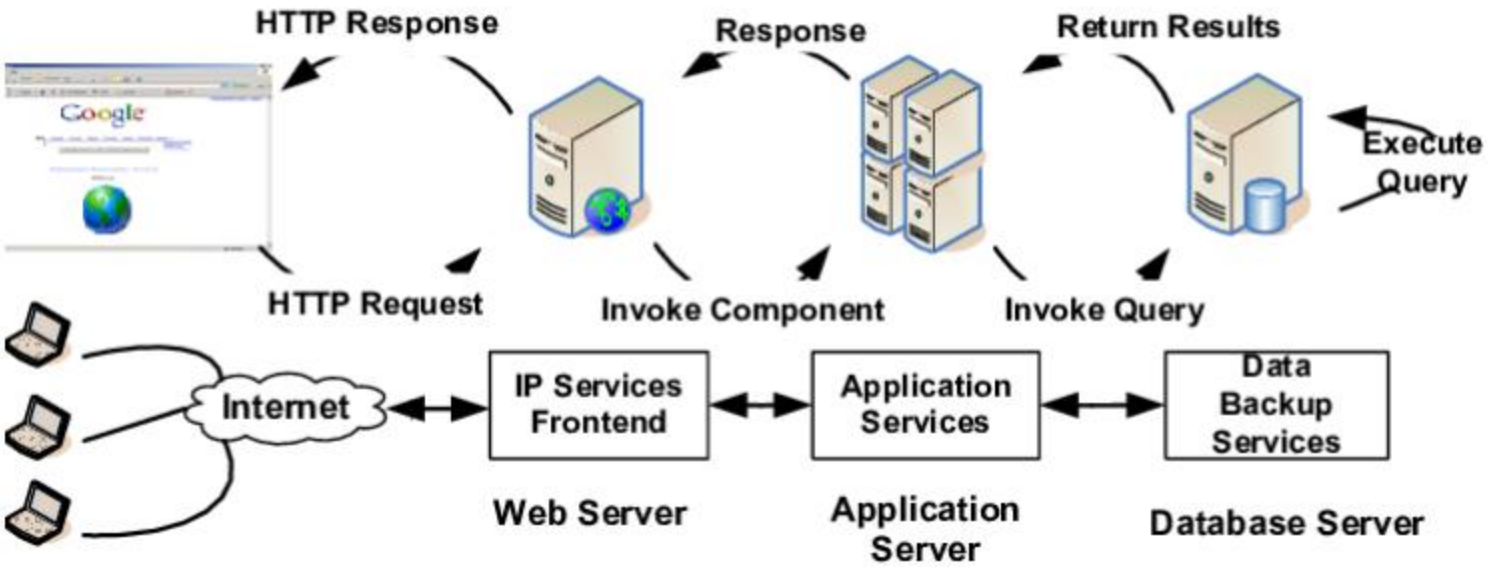

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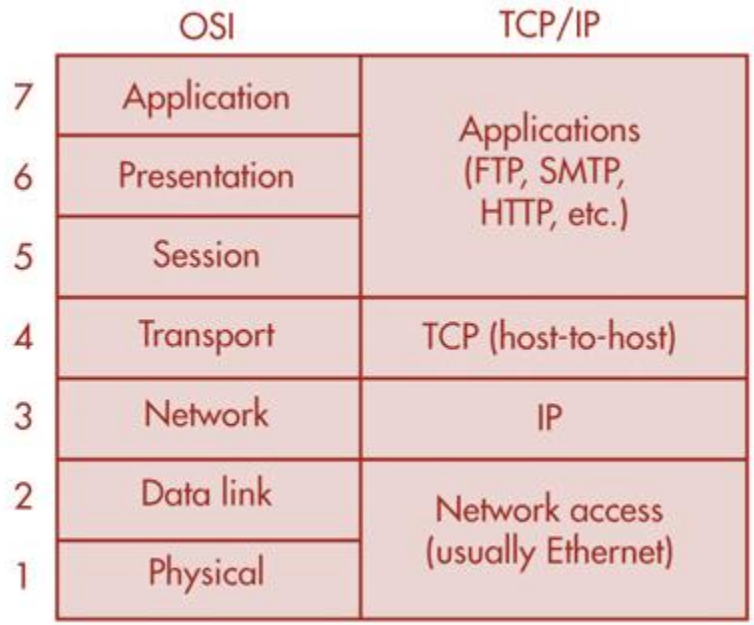

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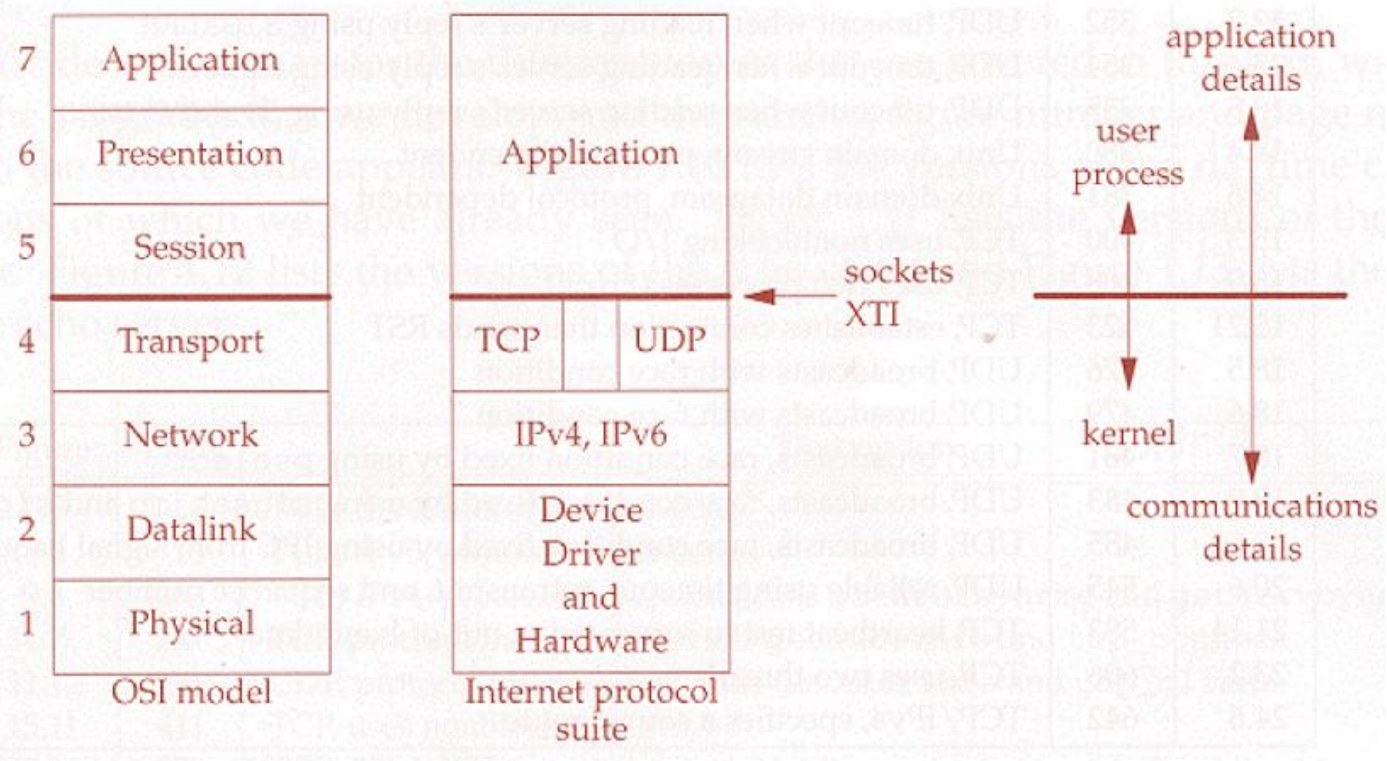

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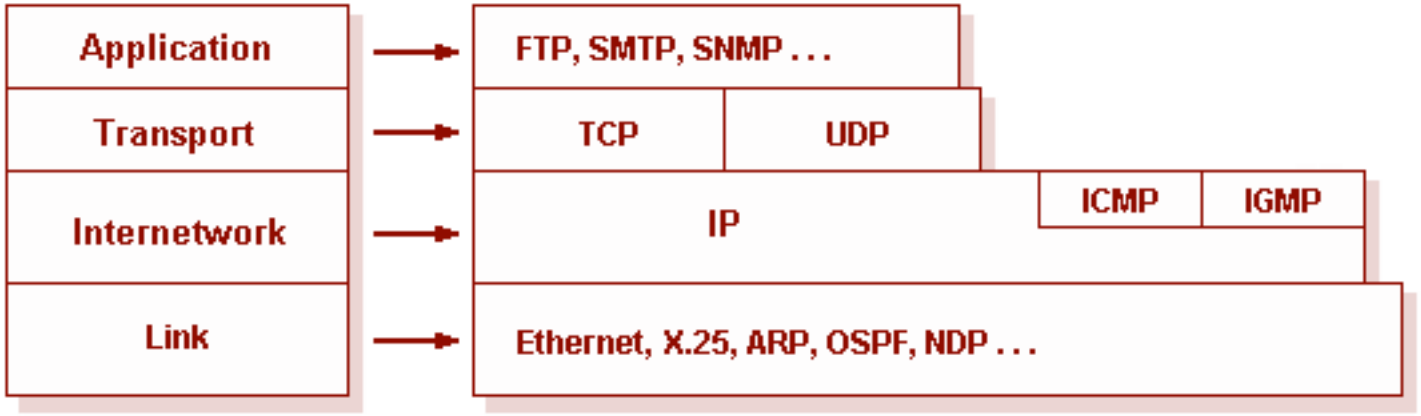


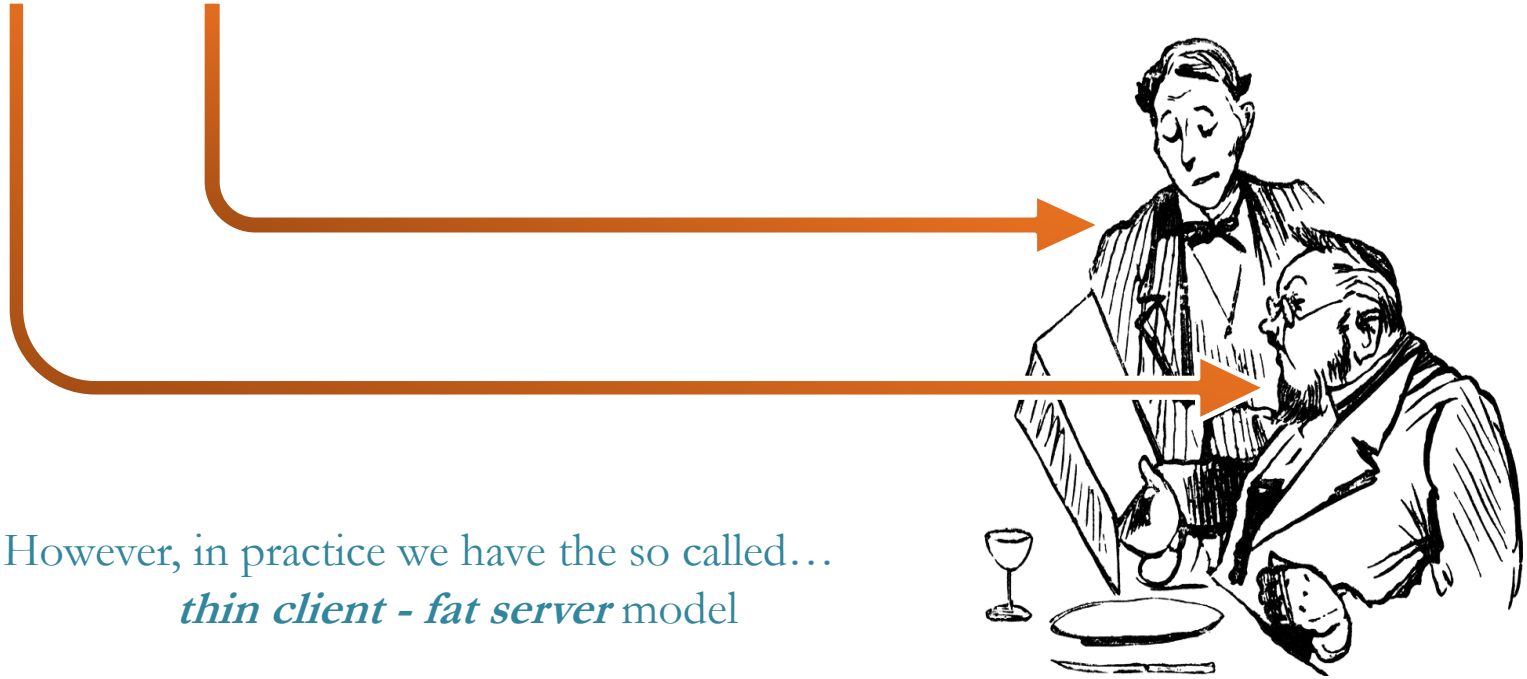
Basis of Advanced Web Technologies

- All the Web Technologies are based on protocols and various ***Internet Services***.
  - ✓ Software-as-a-Service / SaaS

    The application is executed on the Web Server and Application Server
    - Thin Client
    - In other words:
      1. Accessing and managing software through networking processes
      2. Various actions are managed centrally (software update and upgrades), allowing clients to access apps through the Web.
      3. Multi-Tenant Architecture.

Basis of Advanced Web Technologies

- Client – Server Model



However, in practice we have the so called…
thin client - fat server model

Basis of Advanced Web Technologies

- Client – Server Model

  Web Client

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Client – Server Model

Web Client

- ✓ Implement various protocols (e.g. http) and ***scripting*** languages at the side of Client (Client Side Scripting).

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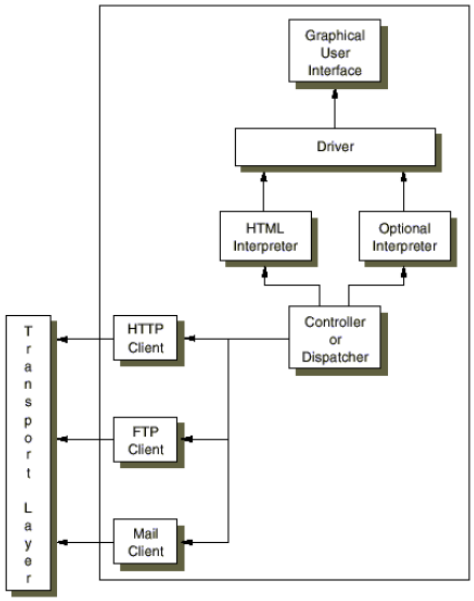

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  Web Server

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  - ✓ Host (serve) dynamic or static pages.

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Client – Server Model

Web Server

- ✓ Host (serve) dynamic or static pages.
- ✓ Manage Various Processes:
  1. Sessions,
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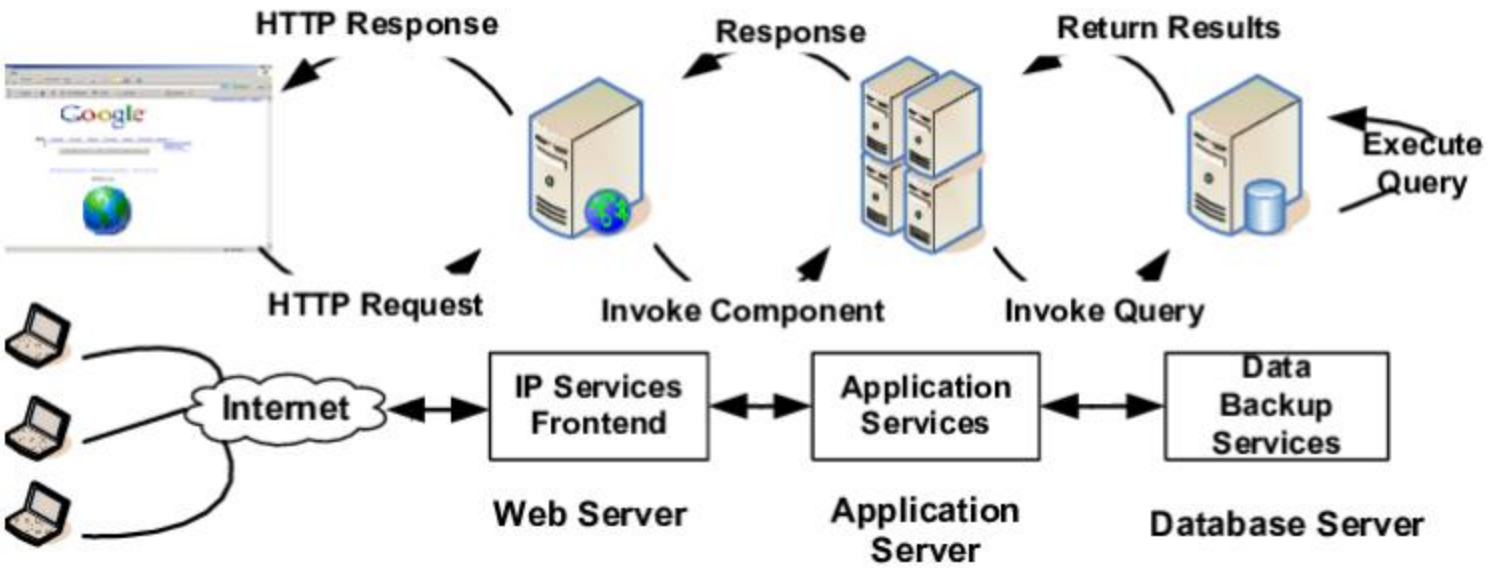

Basis of Advanced Web Technologies

- Anatomy of a Client – Server Model
  - ✓ Basic Type of Web Apps
    - Client-Server is a *Many-to-Many* Relation
    - A Web Server may serves simultaneously many Web Clients
    - A Web Client may be connected to many Web Servers

Basis of Advanced Web Technologies

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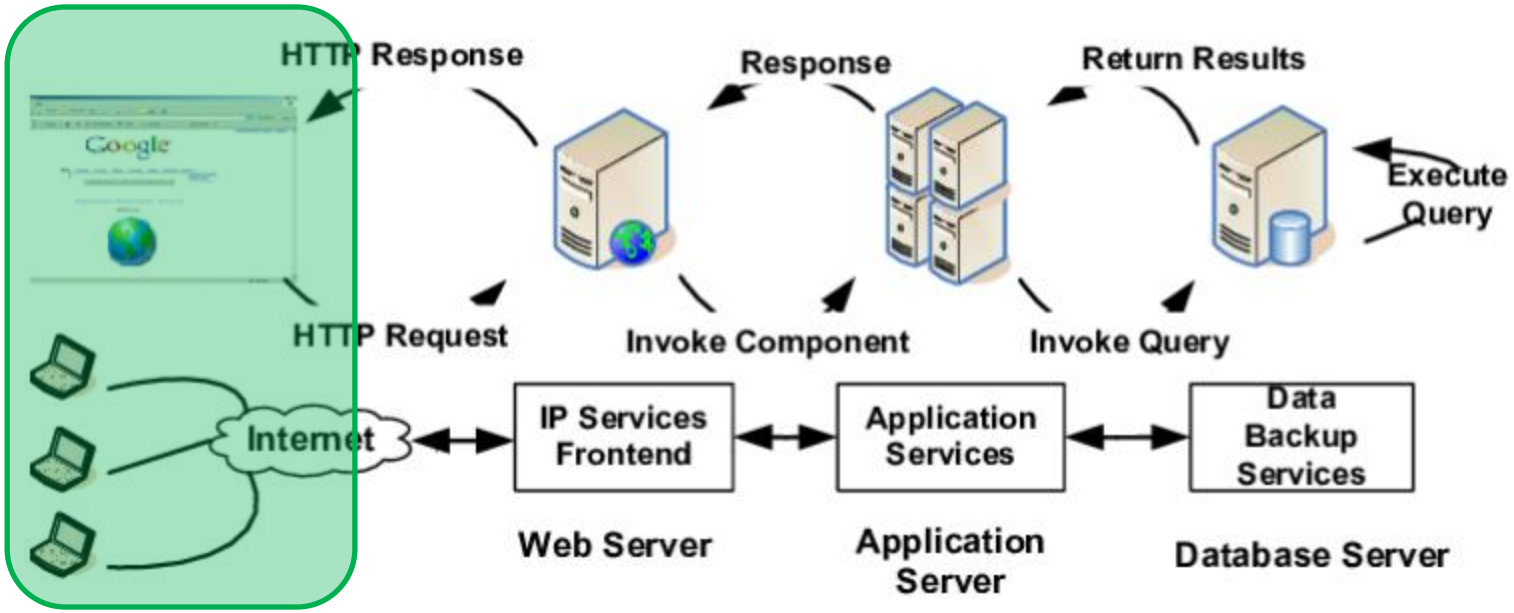

Web Browser

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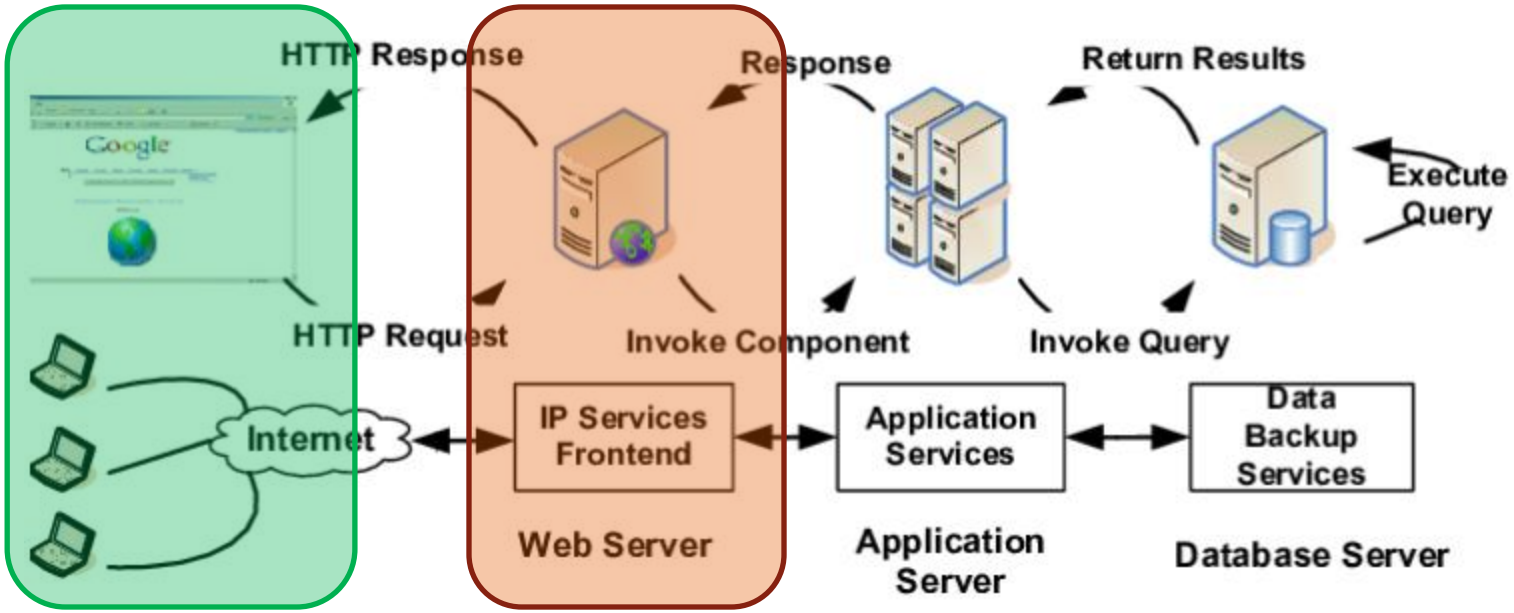

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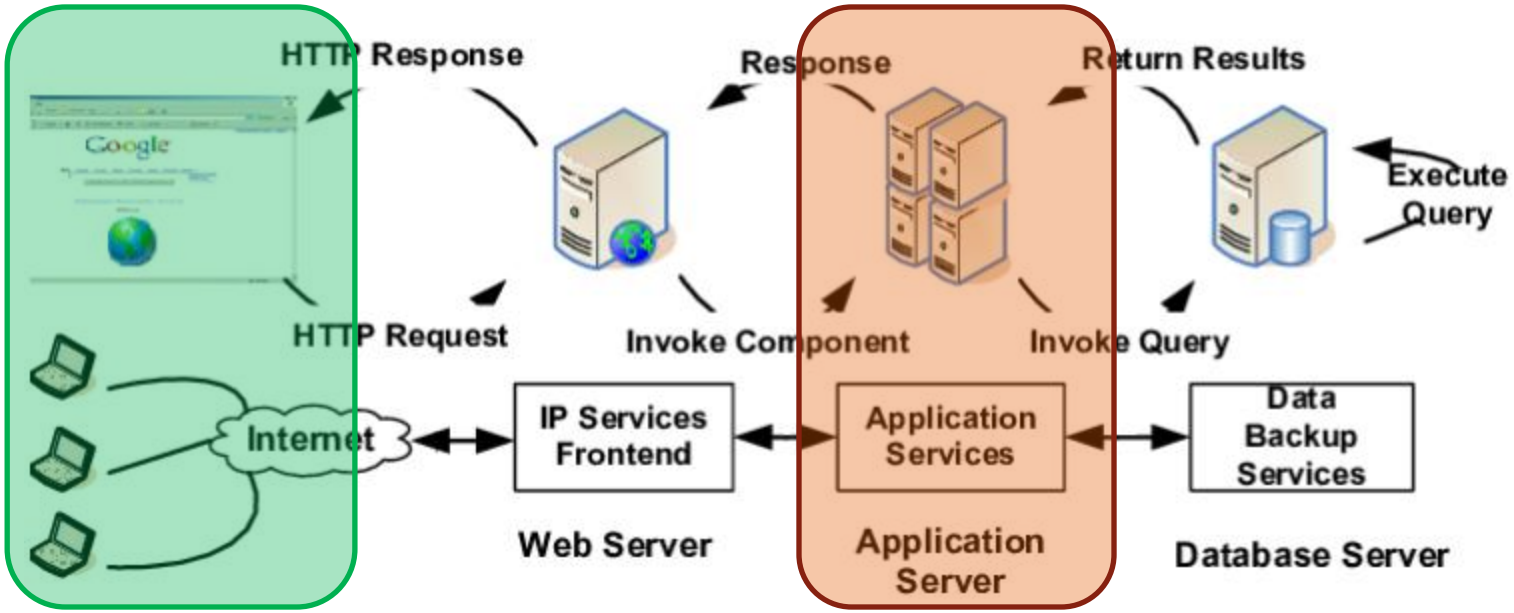

Web Browser

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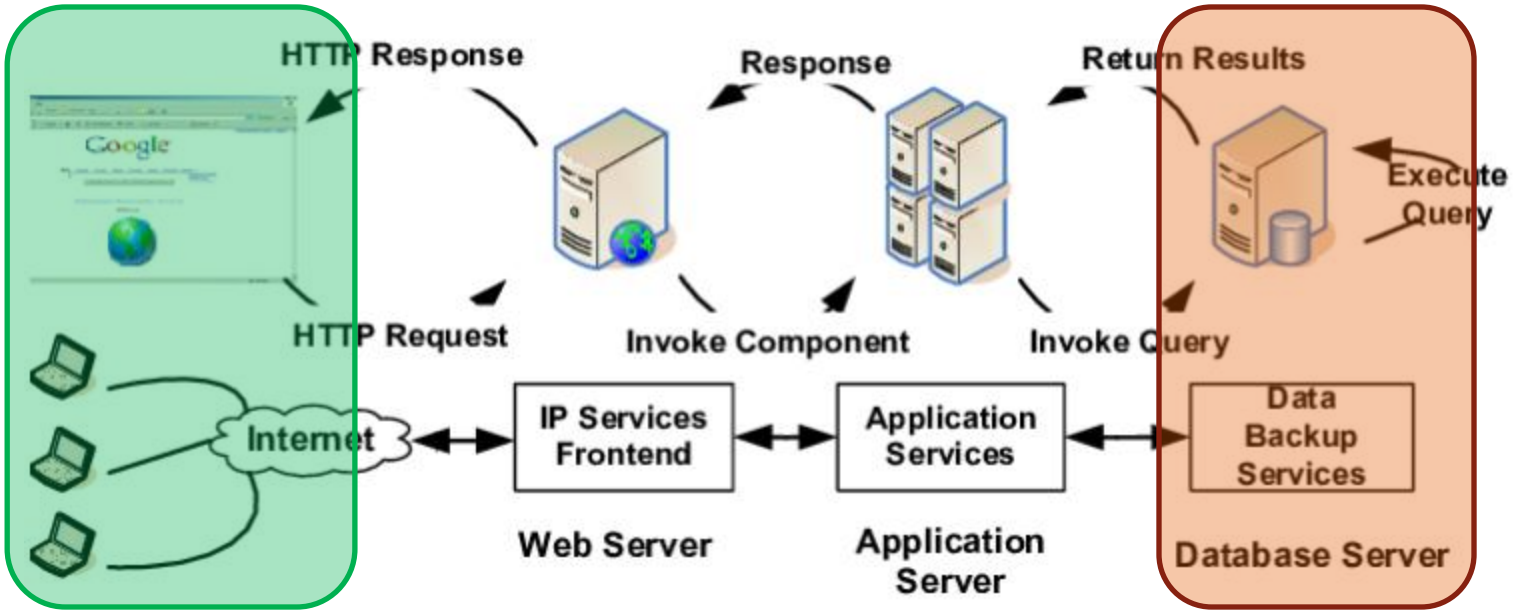

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And …
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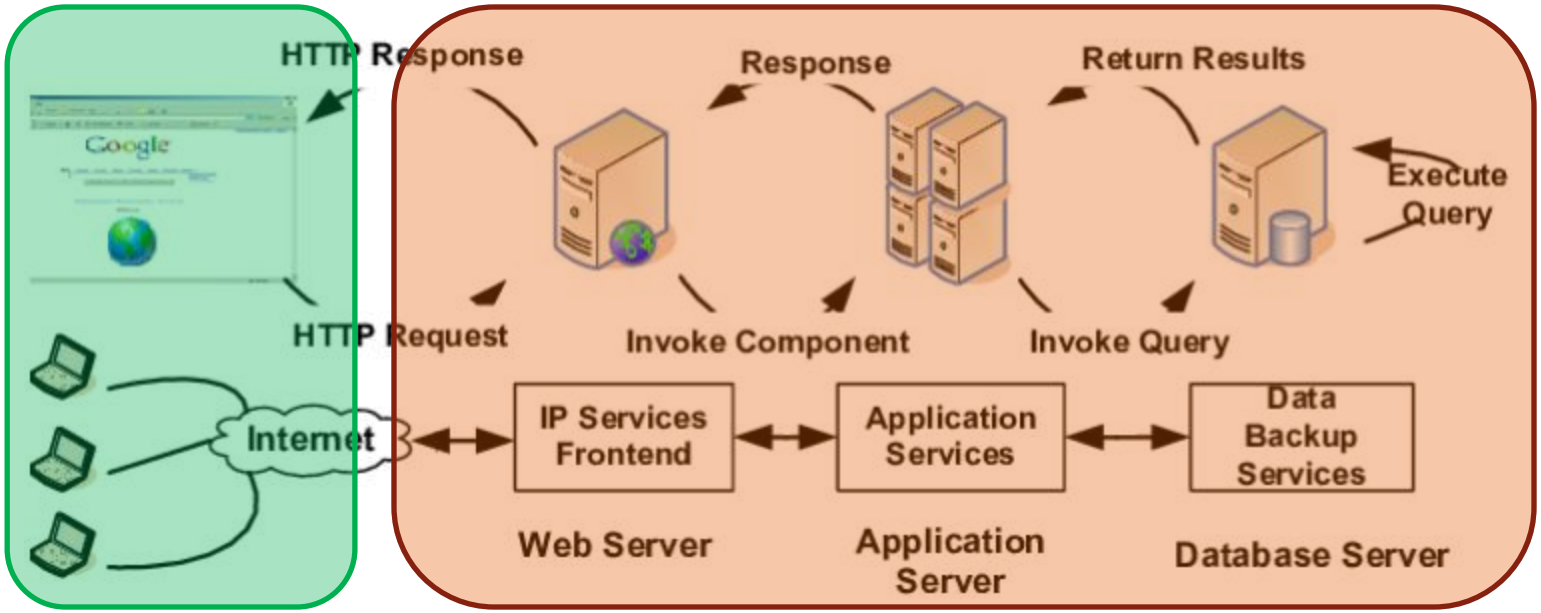

Client Side

Server Side

Client Server Preliminaries

❑ Model Architecture

- ✓ The client–server model is a distributed application structure that partitions tasks or workloads between the providers of a resource or service, called Servers, and service requesters, called Clients.

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- A Server host runs one or more Server programs which share their resources with clients.
- A Client does not share any of its resources, but requests a Server's content or service function.
  - Clients initiate communication sessions with Servers which await incoming Requests …

https://en.wikipedia.org/wiki/Client%E2%80%93server_model

Client Server Preliminaries

Client Server Role (1/2)

- ✓ The Client-Server model describes the relationship of cooperating programs in an application.

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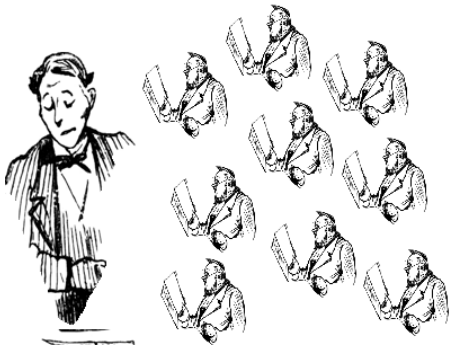

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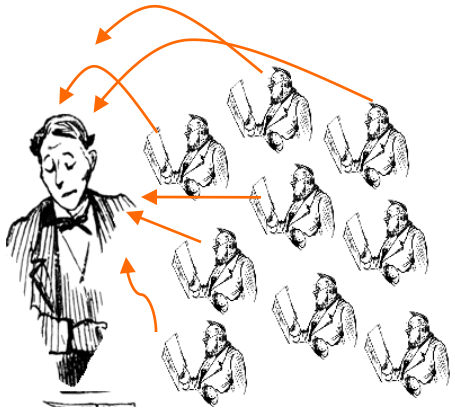

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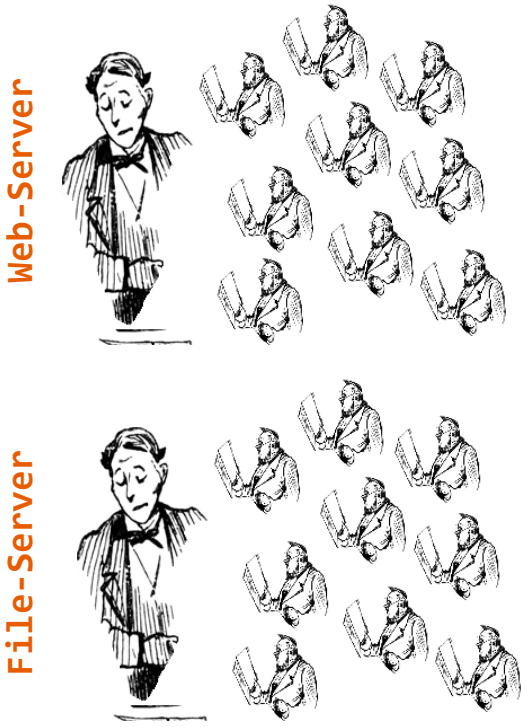

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  - Services are an abstraction of computer resources.
  - A client does not have to be concerned with how the server performs while fulfilling the request and delivering the response.
  - The client only has to understand the response based on the protocol (i.e. the content and the formatting of the data for the requested service)

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  - By abstracting access, it facilitates Cross-Platform data exchange.
  - A Server may receive requests from many distinct Clients in a short period of time.

https://en.wikipedia.org/wiki/Client%E2%80%93server_model

Client Server Preliminaries

Client Server Role (2/2)

- ✓ Whether a computer is a Client, a Server, or both, is determined by the nature of the application that requires the Service functions.
- ✓ What is Server-to-Server communication: communication between Servers, such as to synchronize data.

  Clients and Servers exchange messages in a request–response messaging pattern.

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  - To prevent abuse and maximize availability, Server software may limit the availability to Clients.

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The Denial of Service - DOS attacks are designed to exploit a Server's obligation to process requests by overloading it with excessive request rates.

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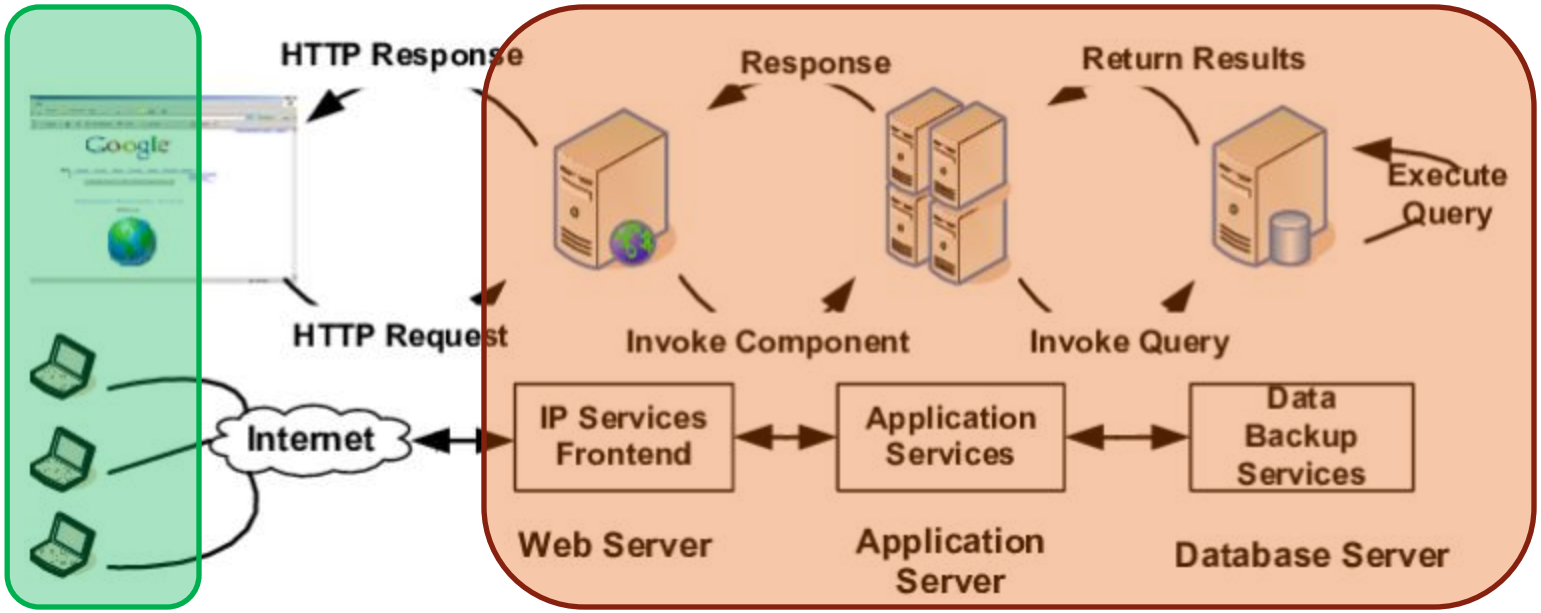
Basis of Advanced Web Technologies

- Anatomy of a Client – Server Model
  Recall: All the Web Technologies are based on protocols !



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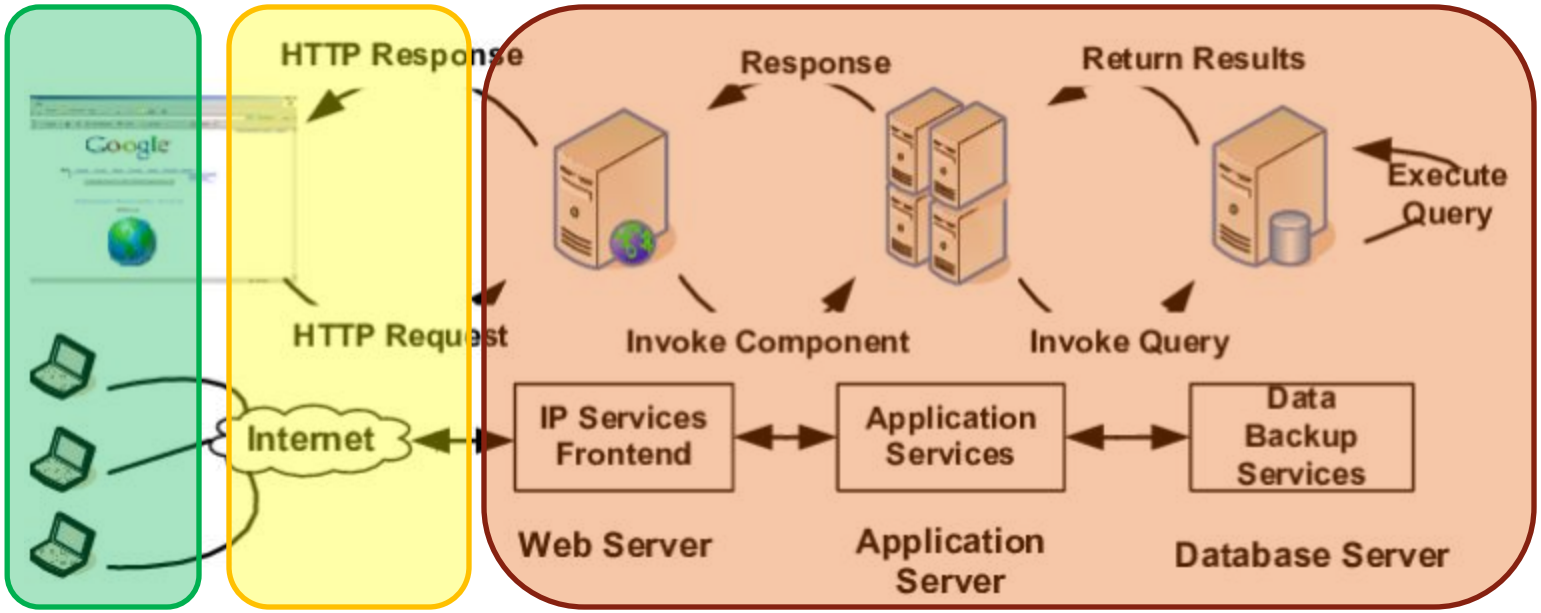

Client *http* Server

Basis of Advanced Web Technologies

- Anatomy of a Client – Server Model

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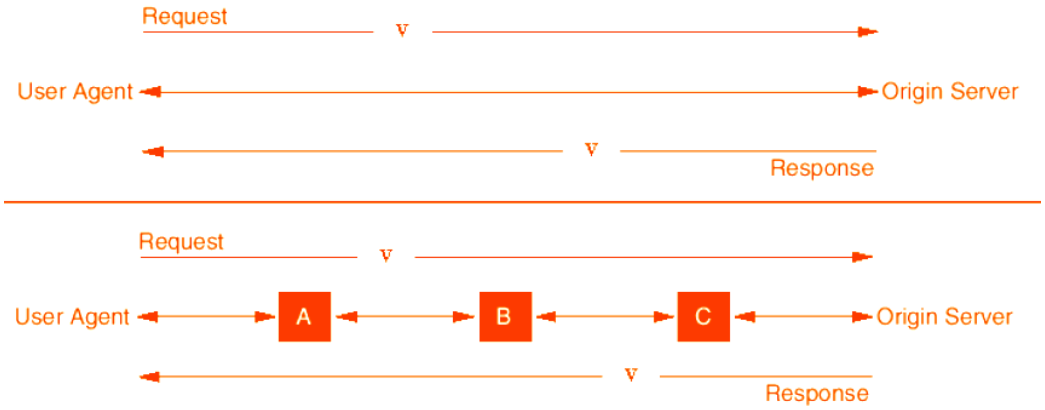
  - ✓ HTTP Protocol

    Answer - Response Model

    - Answers start from the Web Client,
    - Responses start from the Web Server,
    - There may exist intermediate nodes…



Basis of Advanced Web Technologies

- Web Technologies

Basis of Advanced Web Technologies

Web Technologies

Application Servers

They combine:

- Web Servers,
- Abstract access to data and databases,
- Clustering / Data Availability,
- Messaging buses.

Basis of Advanced Web Technologies

Web Technologies

Data Bases

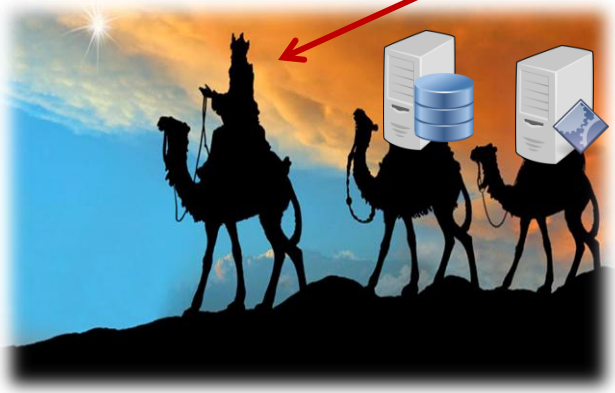
- They store: data, credentials, app. usage data, etc.
- Interact with application servers utilizing:
  1. SQL (ODBC, JDBC)
  2. Object-Oriented DB Access

Basis of Advanced Web Technologies

Web Technologies

WEB Services

- Defined by W3C (Web Consortium),
- Formalization of the interaction between Web Apps,
- Software system for the compatibility of the interaction between different machines.



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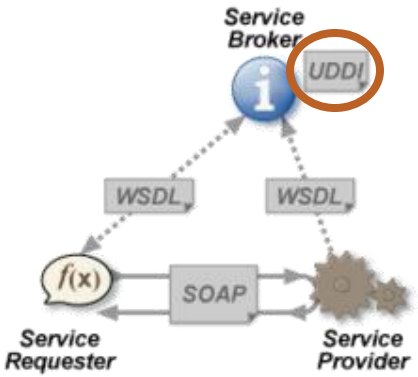
The Universal Description, Discovery and Integration (UDDI) specifications define a registry service for Web services and for other electronic and non-electronic services.

A UDDI registry service is a Web service that manages information about service providers, service implementations, and service metadata.



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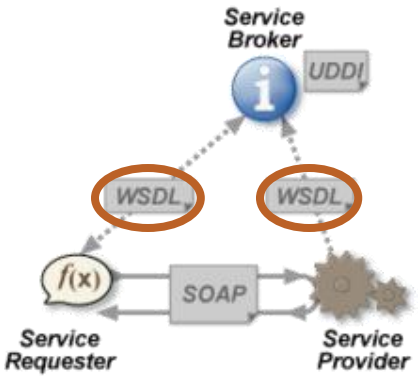
The Web Services Description Language is an XML-based interface definition language that is used for describing the functionality offered by a web service.

The acronym is also used for any specific WSDL description of a web service, which provides a machine-readable description of how the service can be called, what parameters it expects, and what data structures it returns.



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SOAP (Simple Object Access Protocol) is a messaging protocol specification for exchanging structured information in the implementation of web services in computer networks.

Its purpose is to induce extensibility, neutrality and independence.