Web Architecture

AN OVERVIEW
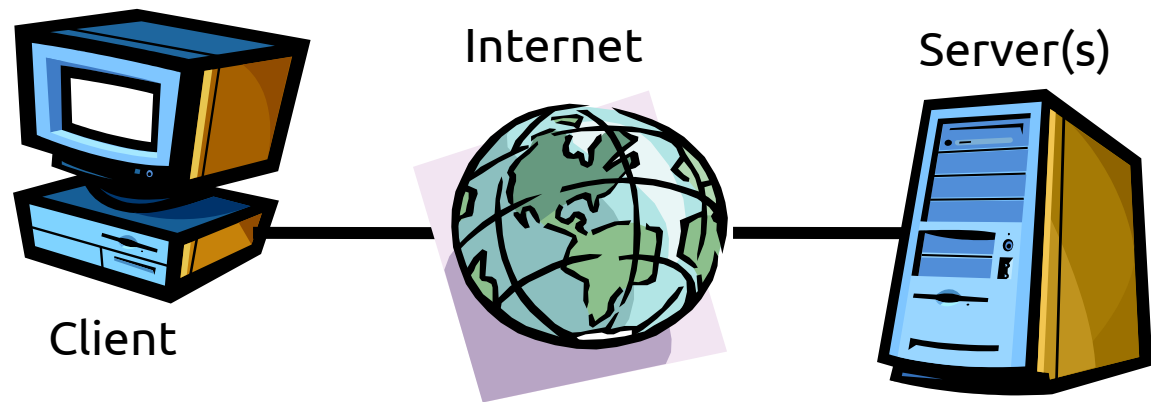
General web architecture

- Historically, the client is a web browser
- But can be also:
  - Mobile application
  - Desktop application
  - Other server application

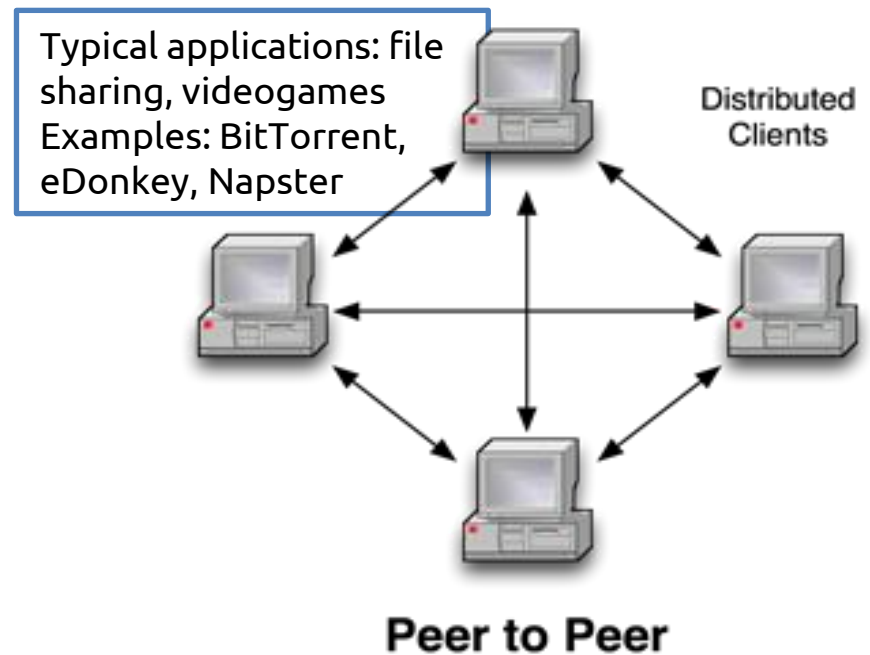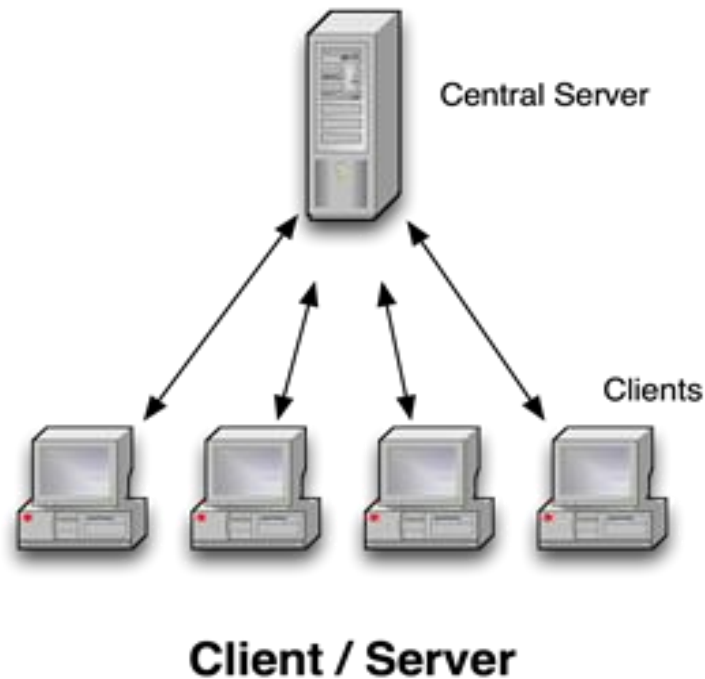Client · Internet · Server(s)

Components

- One or more connections to the Internet by means of an Internet Service Provider (ISP)
- One or more servers implementing each tier/level of the architecture
- One or more physical networks for interconnecting the servers
- One or more network devices (router, firewall, switch) which implement communication and security policies
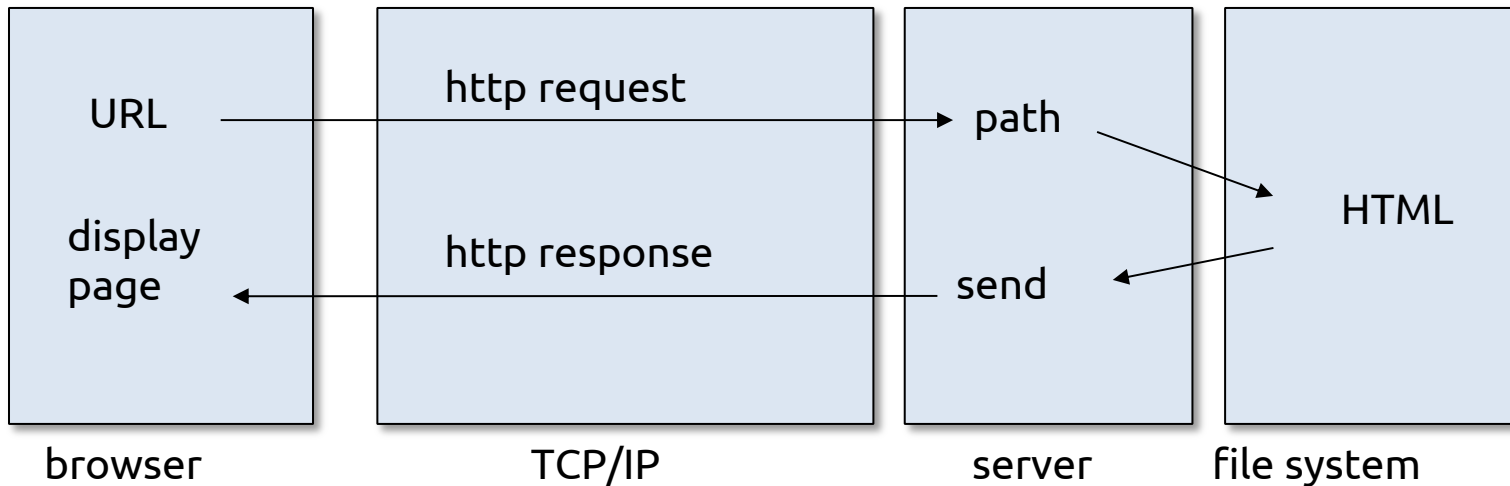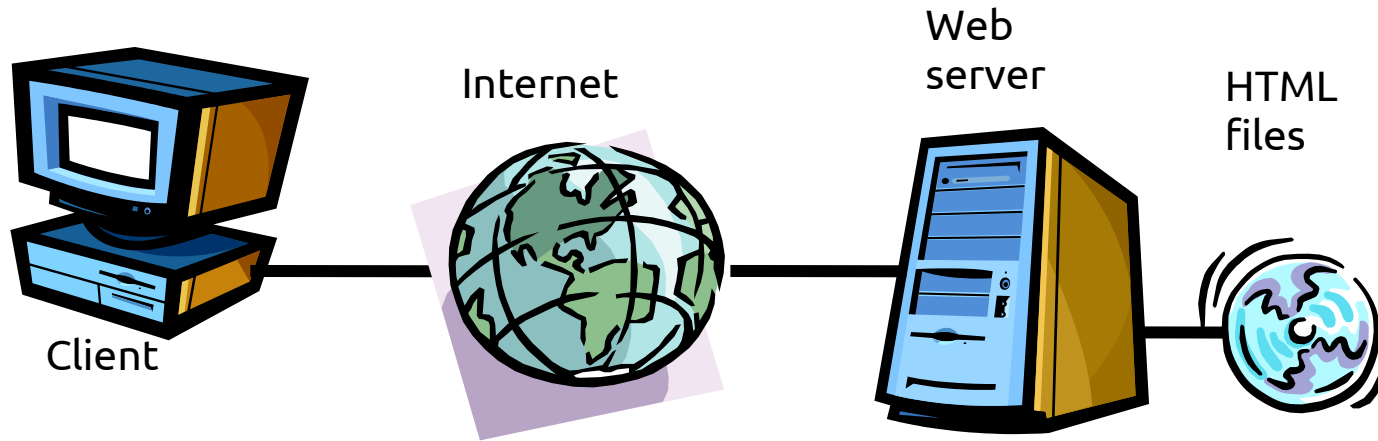
Distributed architecture

- Two main approaches

Central Server

Clients

Client / Server

Typical applications: file sharing, videogames
Examples: BitTorrent, eDonkey, Napster

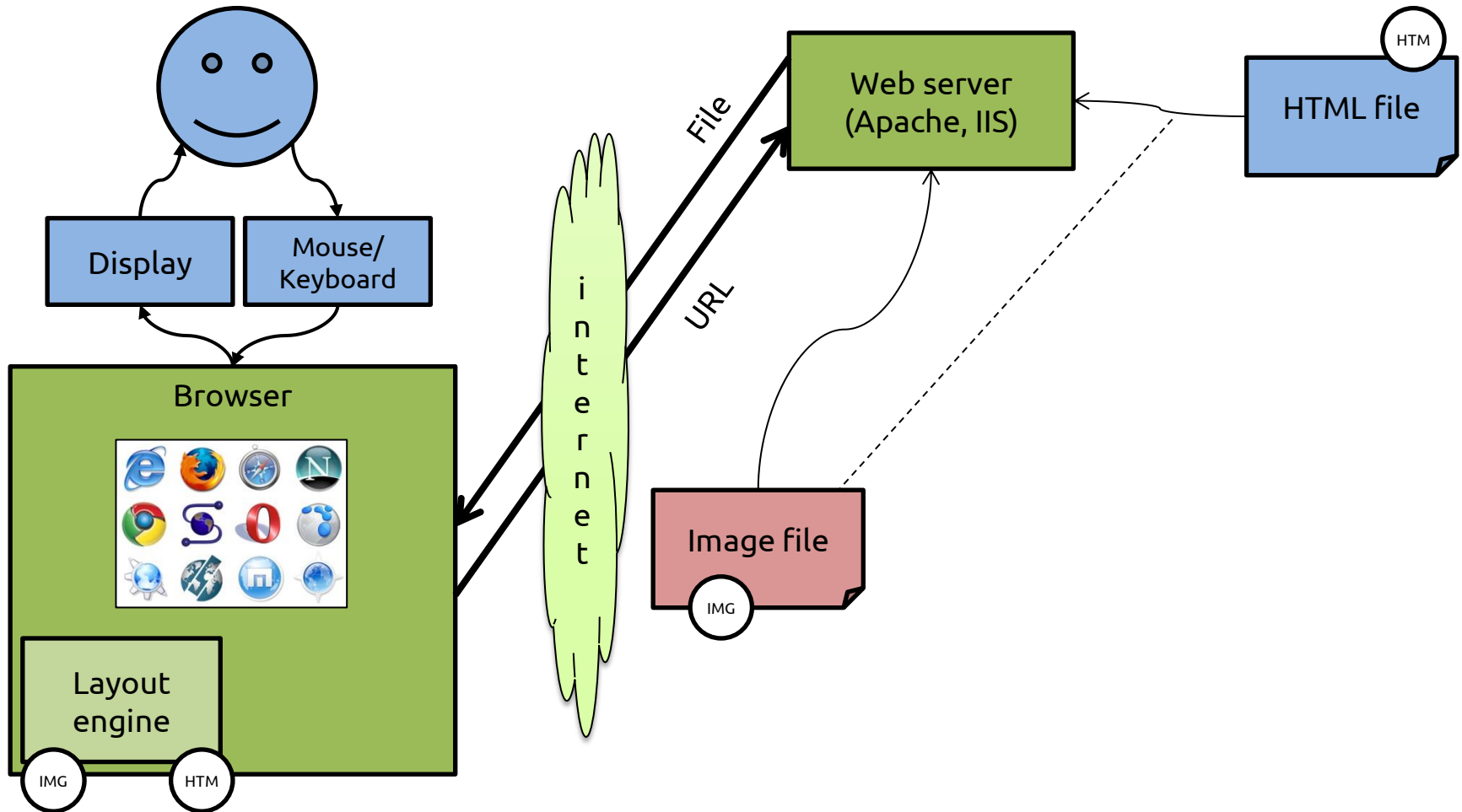Distributed Clients

Peer to Peer

Web server

- Logical definition
  - A process that runs on a host that relays information to a client when the client sends a request
- Physical definition
  - A host computer on a network that holds information (e.g., Web sites) and responds to requests for information
- Manages the HTTP protocol (handles requests and provide responses)
  - Receives client requests
  - Reads static pages/contents from the filesystem
  - Activates the application server for dynamic pages/content generation (server-side)
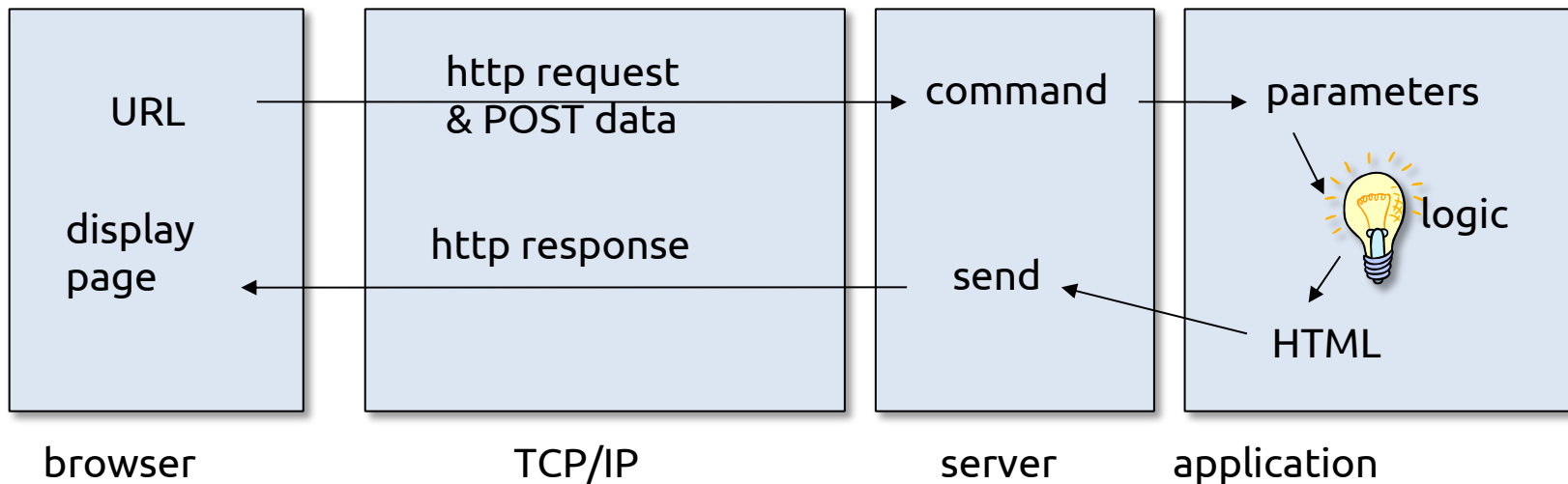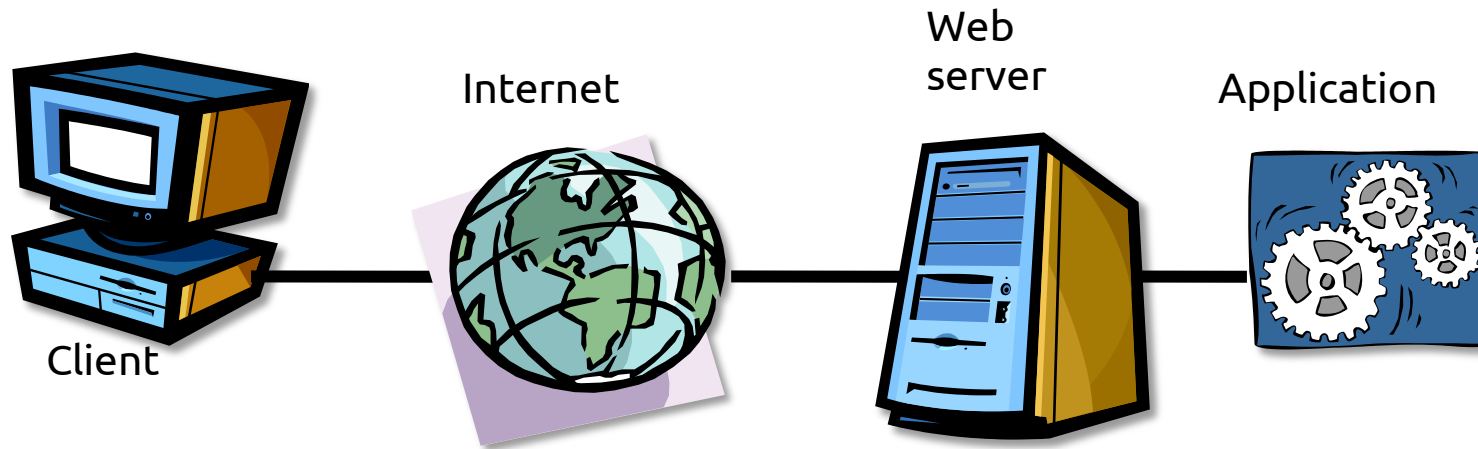 - Provides a file (HTML, or other) back to the client

Static web transaction

browser	TCP/IP	server	file system
URL	http request →	path	
			HTML
display page ←	http response	send	

Static web transaction

Dynamic web transaction

Internet

Web server

Application

Client

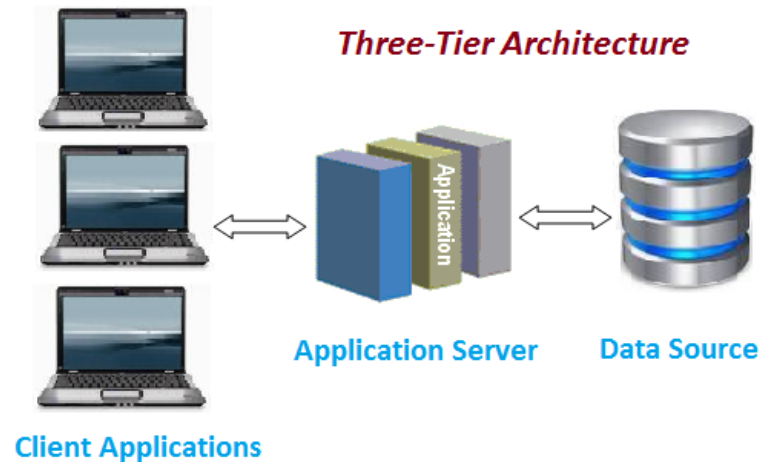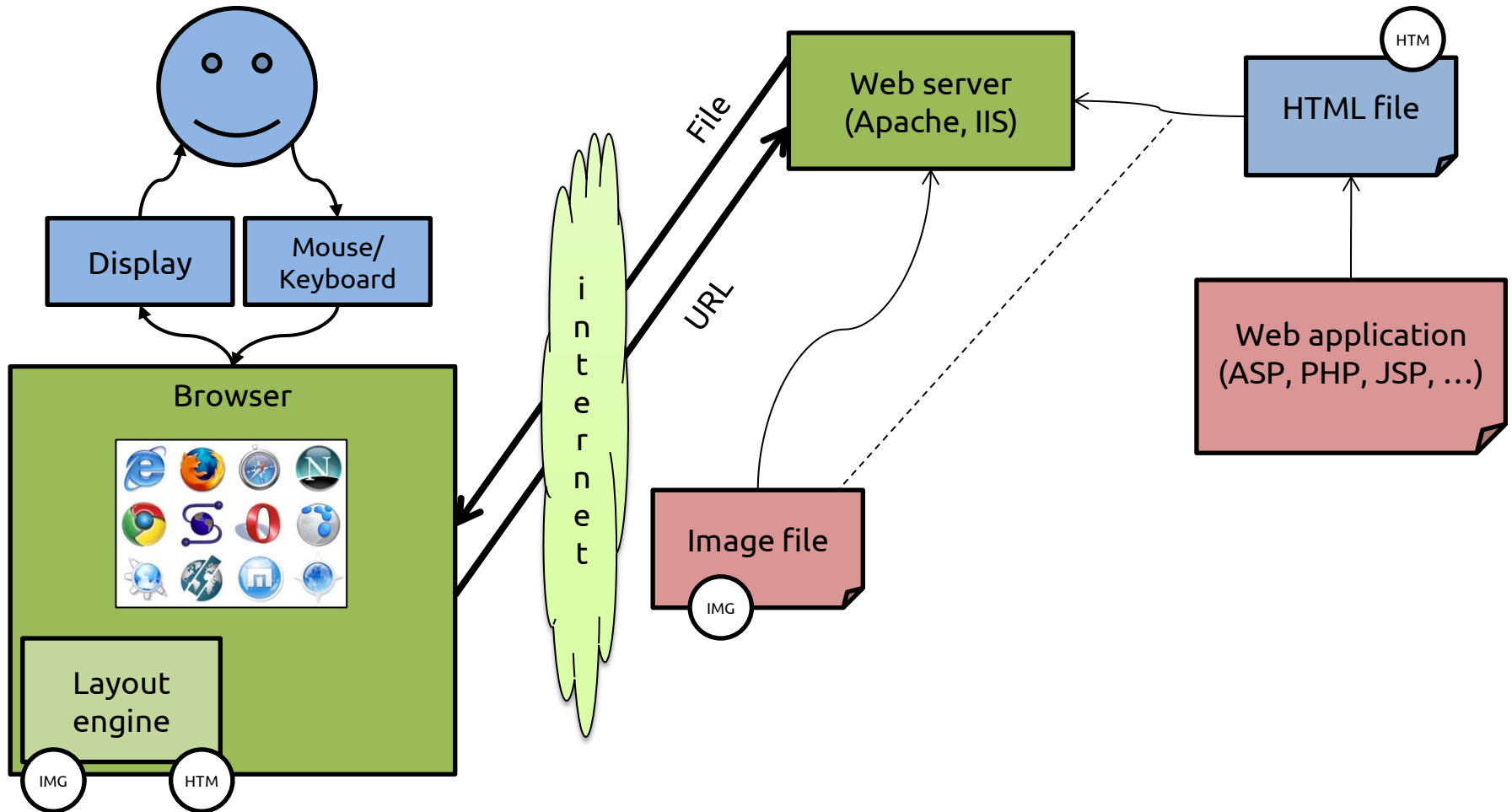| browser	TCP/IP	server	application
URL	http request & POST data	command	parameters
display page	http response	send	logic HTML

Application server

- A server program in distributed network that provides the business logic for an application program
- Dynamic page generation and content generation
- It's the middle tier between the client browser and the data residing on a database
- Implements the session mechanisms
- Different technologies and architectures are available
  - Java servlets, ASP (active server pages), JSP, PHP, PERL, Python, Ruby, …
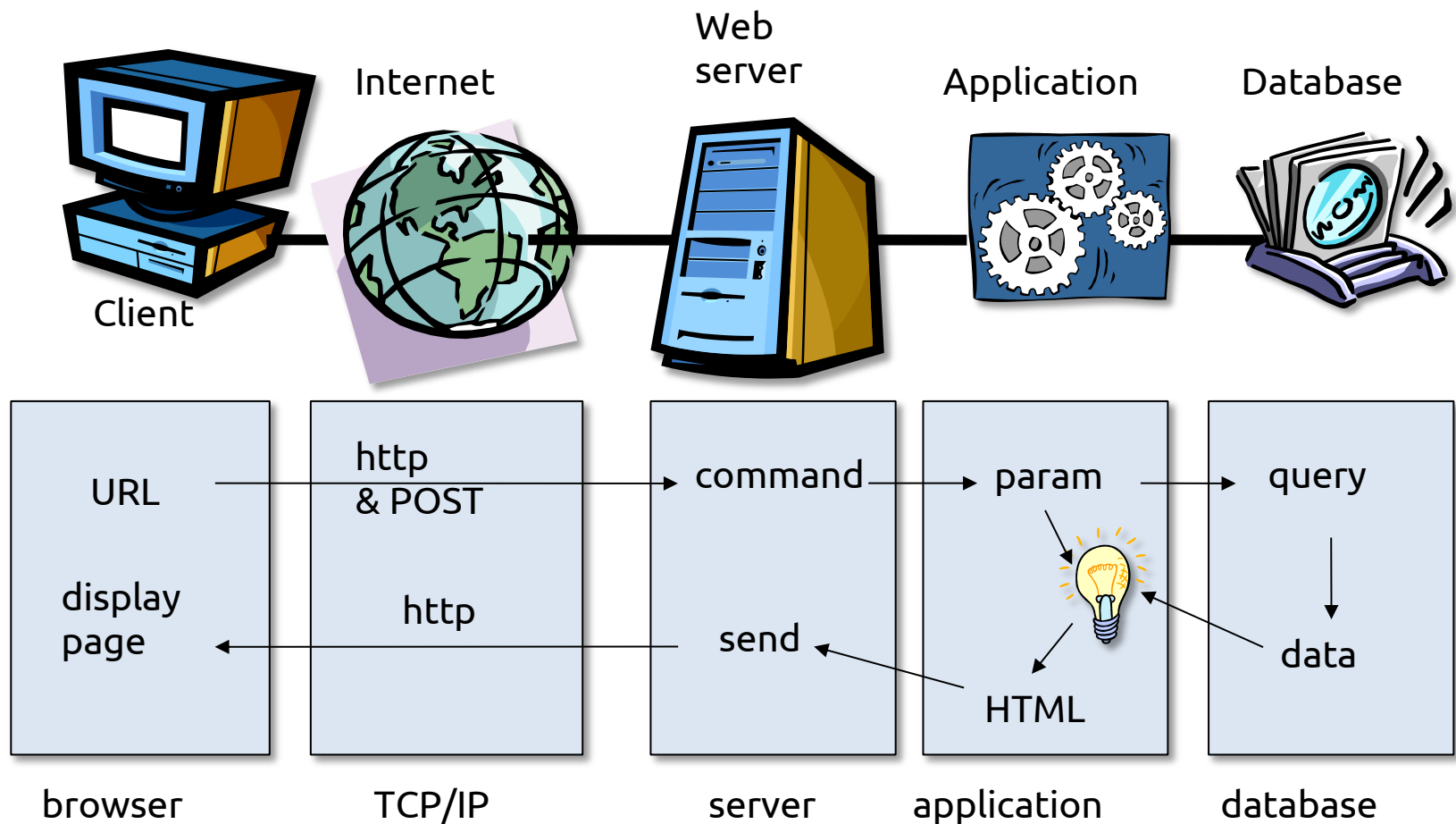
Three-tier architecture

- Client–server software architecture pattern in which the user interface (presentation), functional process logic ("business rules"), computer data storage and data access are developed and maintained as independent modules

- Composed of
  - A first-tier, front-end, Web browser-based graphical user interface, usually at a personal computer or workstation
  - A middle-tier business logic application or set of applications, possibly on a local area network or intranet server
  - A third-tier, back-end, database and transaction server, sometimes on a mainframe or large server

Three-Tier Architecture
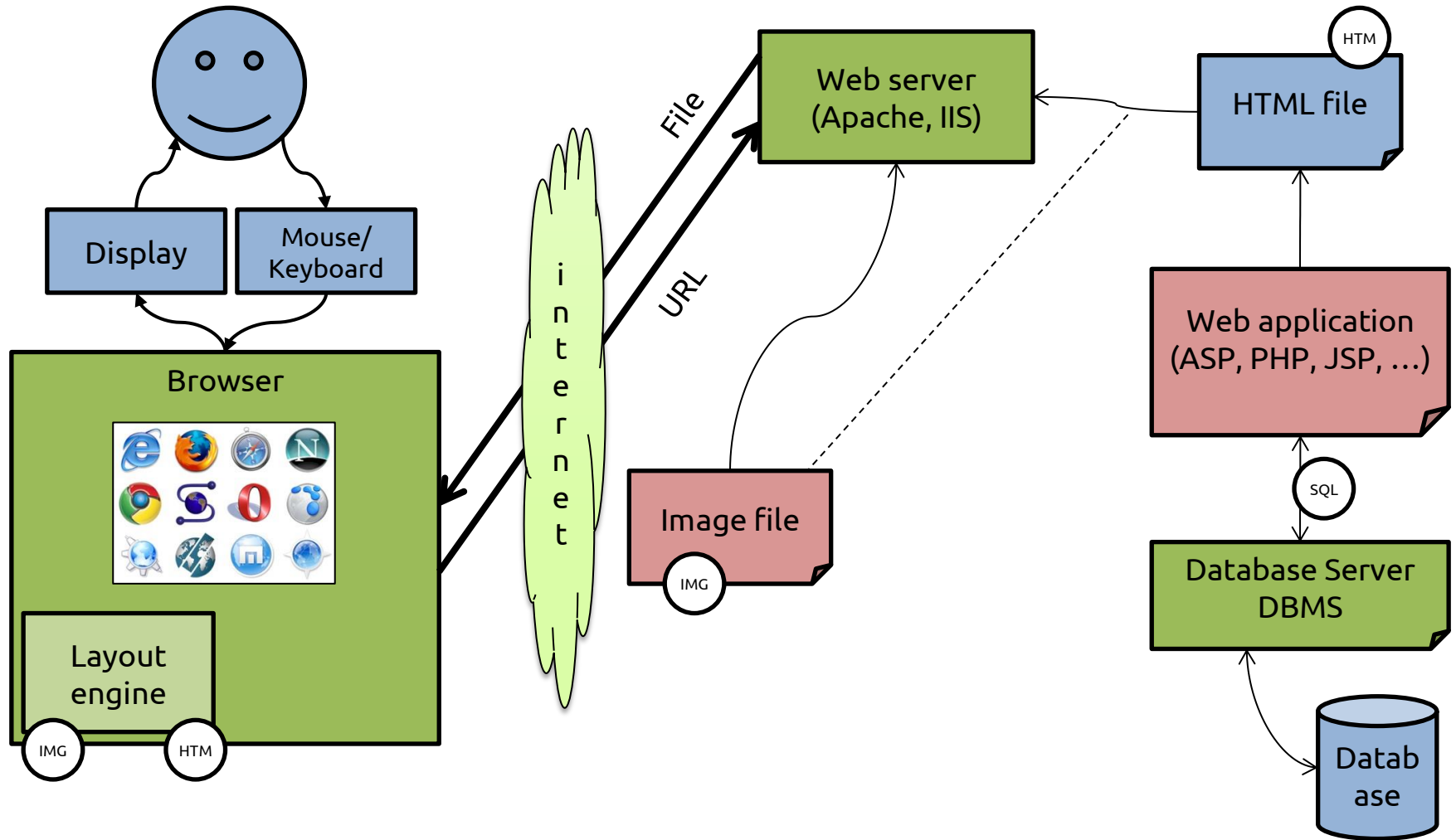
Application Server **Data Source**

Client Applications

Dynamic web transaction

Database-driven transaction

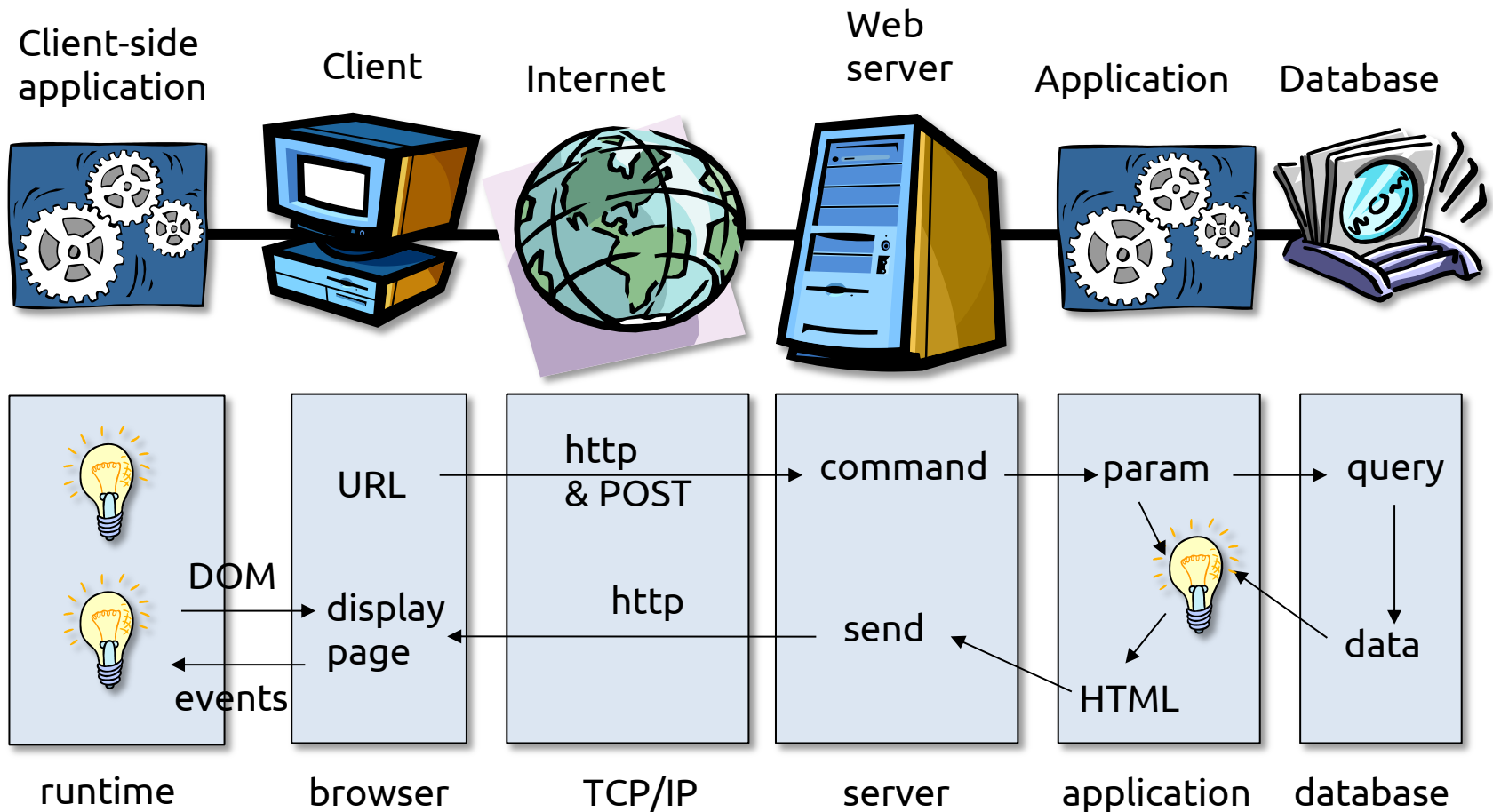| browser	TCP/IP	server	application	database
URL → display page	http & POST / http	command / send	param / HTML	query / data

Database server

- Stores the data on which the application server works
- Executes the queries issued by the application server
  - Updates the stored data
  - Inserts new data
  - Provides query results back
- The most frequent/complex queries can be implemented internally as stored procedures (pre-compiled queries with parameters)
- Standards
  - SQL (structured query language), ODBC (open database connectivity) to access data bases
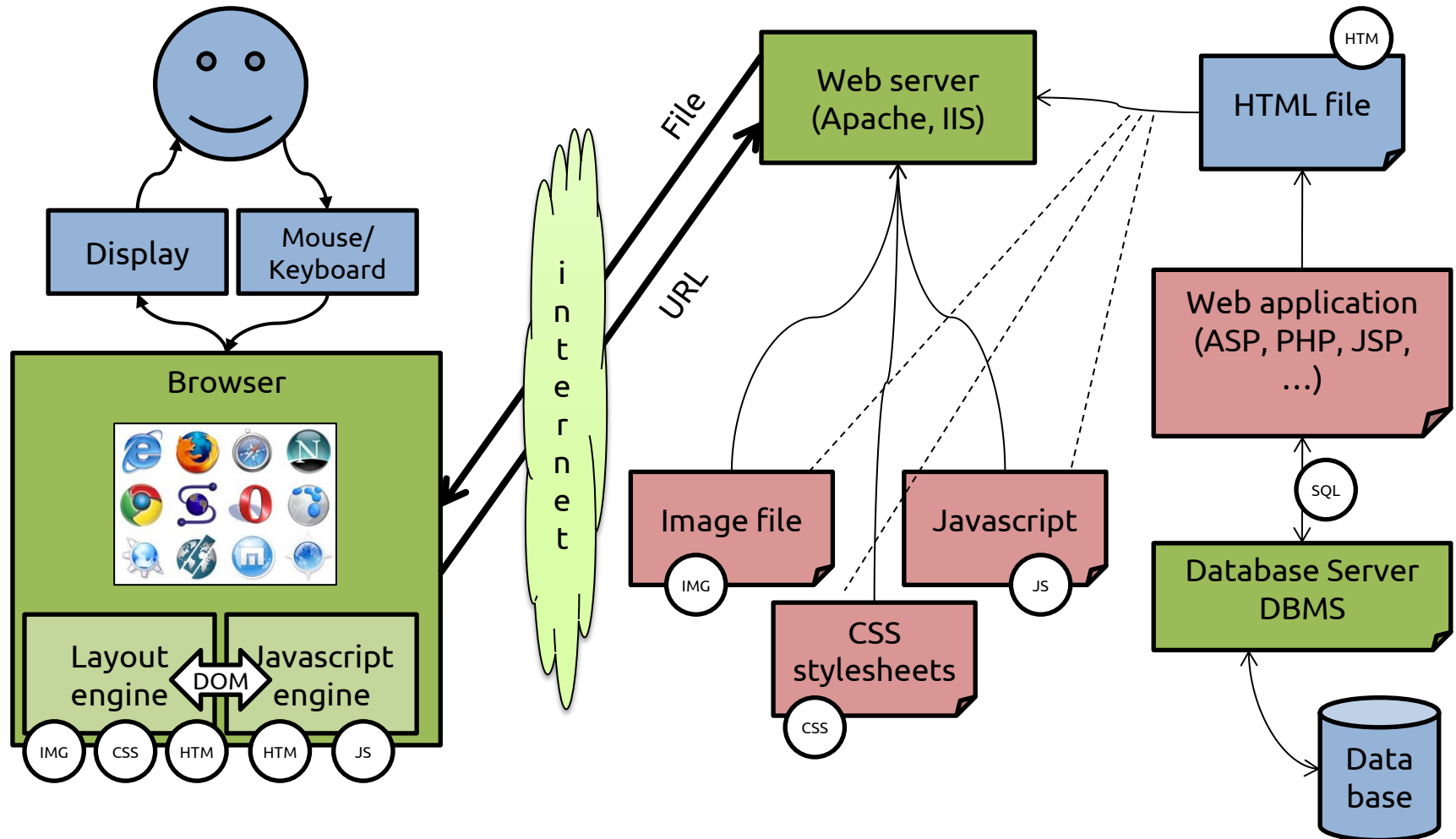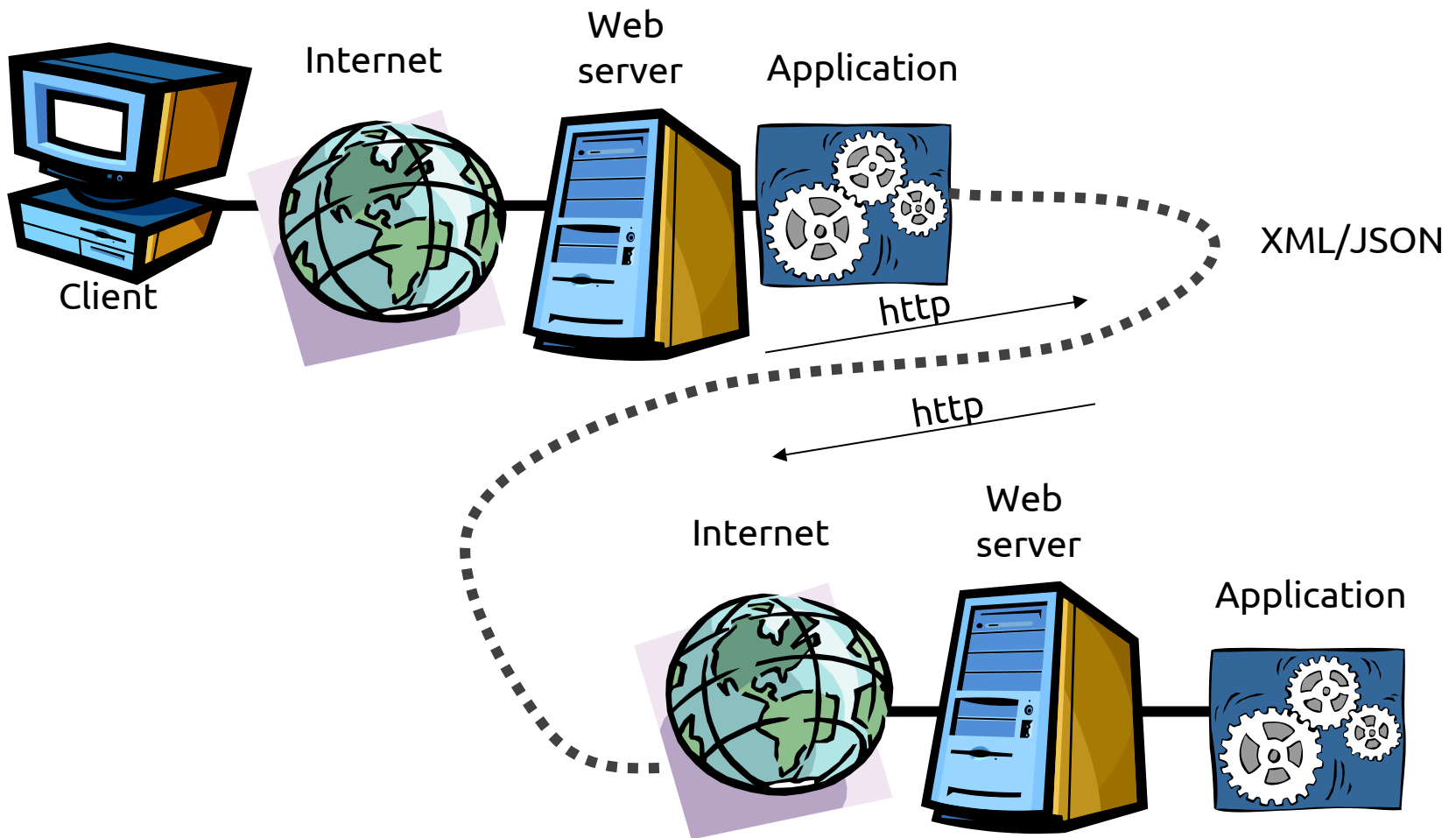
Database-driven transaction

Rich-client asynchronous transactions
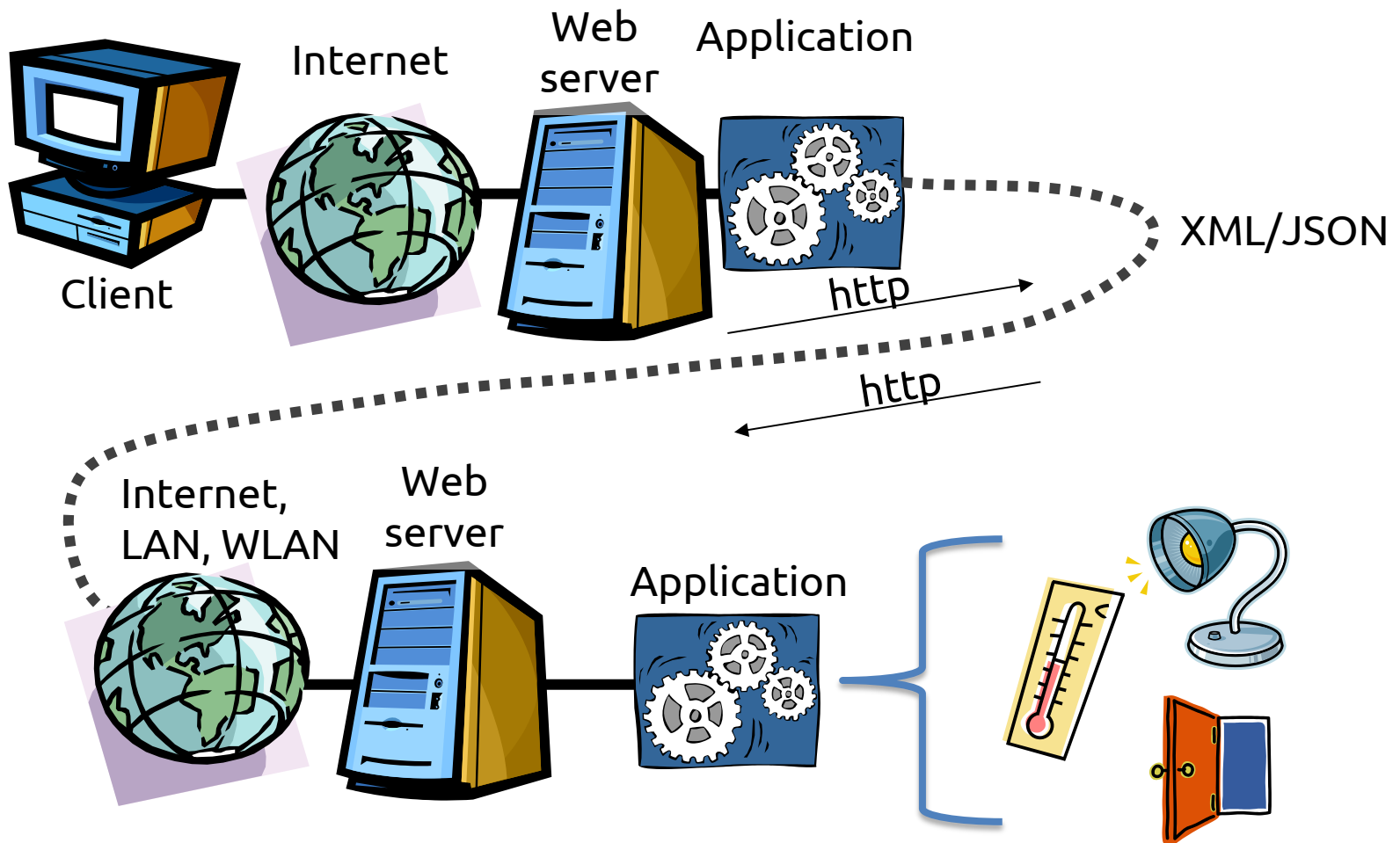

Client-side application · Client · Internet · Web server · Application · Database

URL | http & POST | command | param | query

DOM | display page | http | send | HTML | data

events

runtime · browser · TCP/IP · server · application · database

Rich-client asynchronous transactions

Display

Mouse/
Keyboard

Browser

Layout engine

DOM

Javascript engine

IMG   CSS   HTM   HTM   JS

internet

File

URL

Web server
(Apache, IIS)

Image file

IMG

CSS
stylesheets

CSS

Javascript

JS

HTM

HTML file
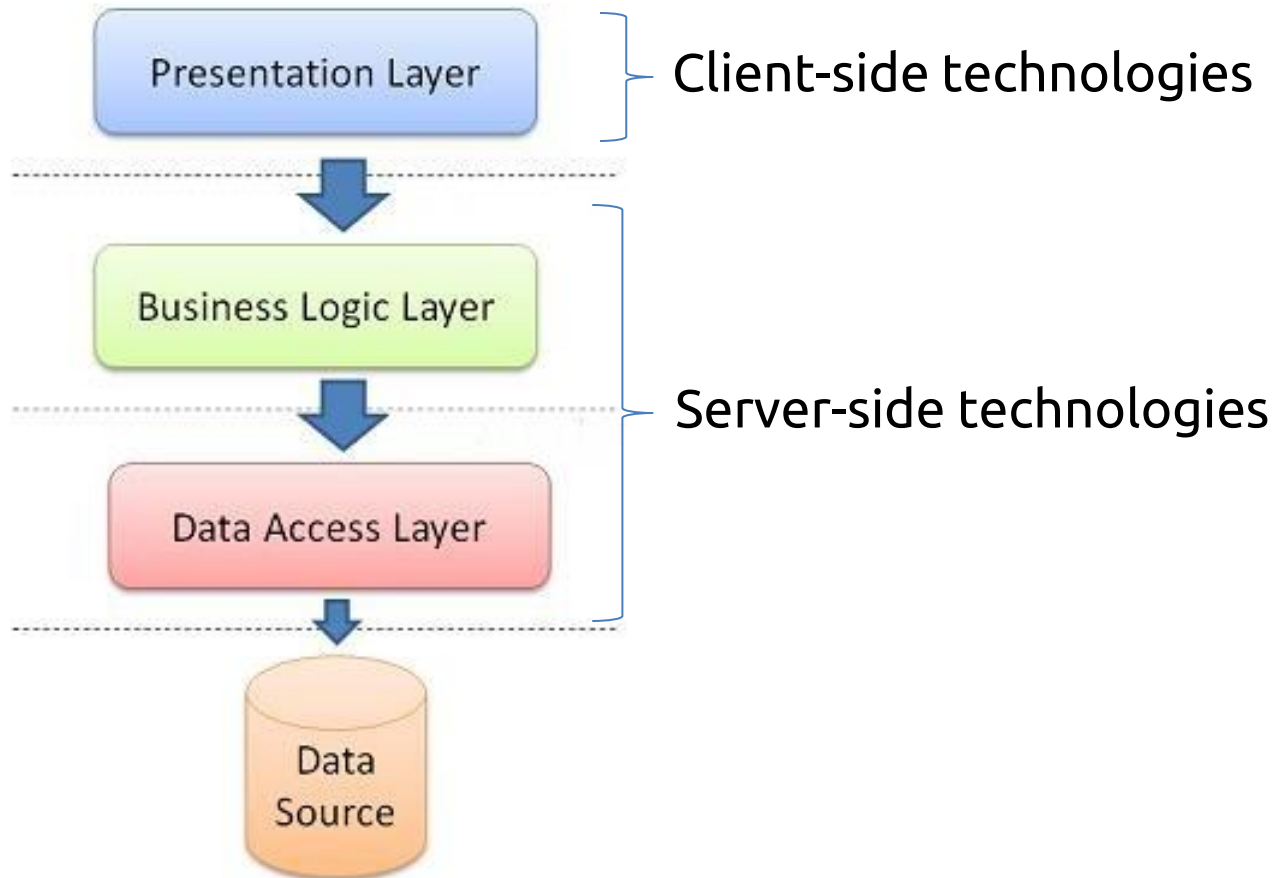
Web application
(ASP, PHP, JSP,
...)

SQL

Database Server
DBMS

Data
base

Distributed transactions

Ambient control

Client — Internet — Web server — Application — http → XML/JSON

http ←

Internet, LAN, WLAN — Web server — Application

Web technologies and languages

Presentation Layer — Client-side technologies

Business Logic Layer

Data Access Layer — Server-side technologies

Data Source

Web technologies and languages

HTML5 + DOM + CSS3
+ JavaScript

PHP, Python, Ruby, Java, …

SQL
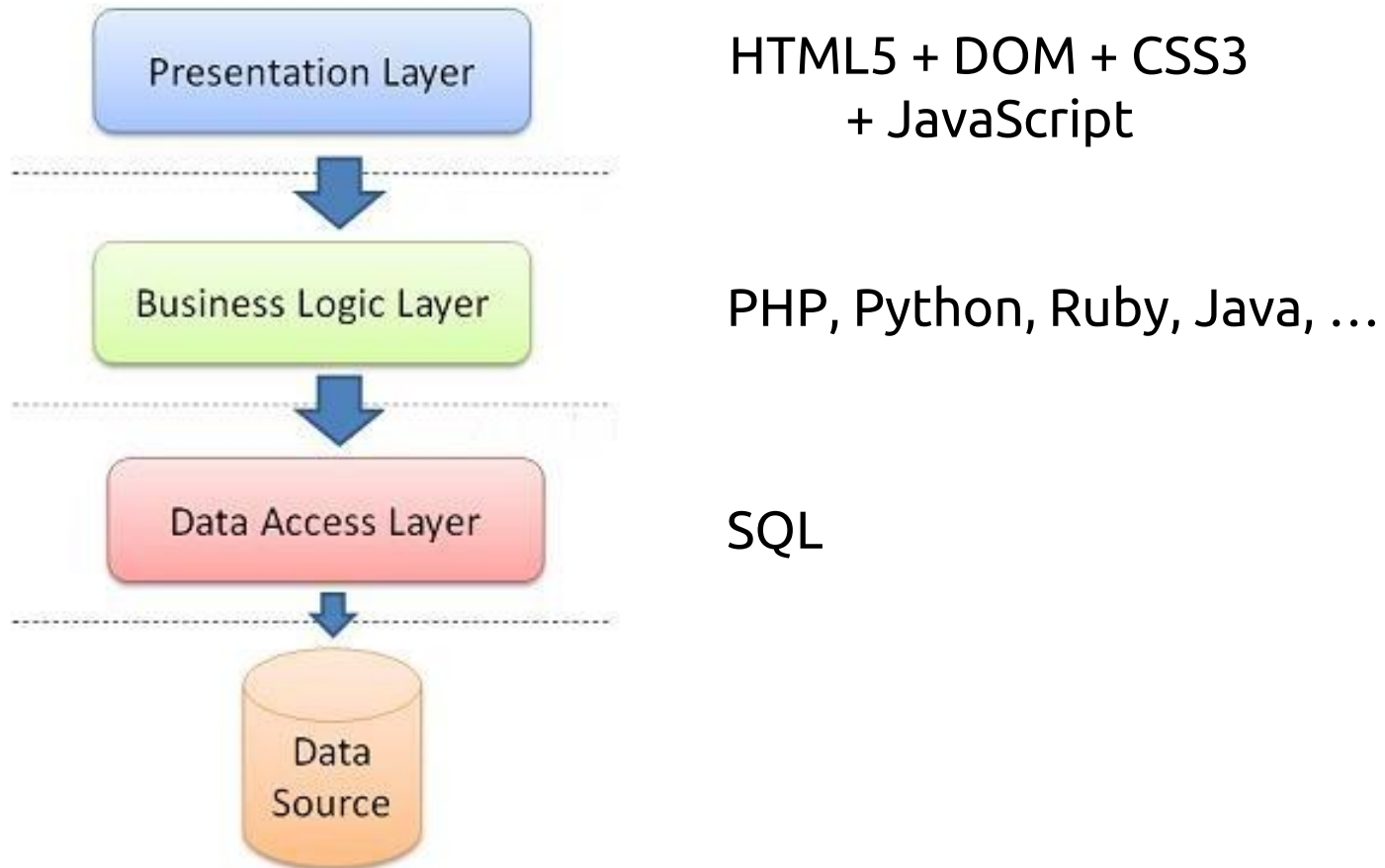
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