Internet and Web Application

Web Programming and Testing

Mario Simaremare, S.Kom., M.Sc.
Program Studi Sarjana Sistem Informasi
Institut Teknologi Del

Objectives

- The objective of this session is the following:
  - The students are able to elaborate the basic concepts of internet, how it works under the hood, and web application.

Outlines

1. Network & the Internet protocols.
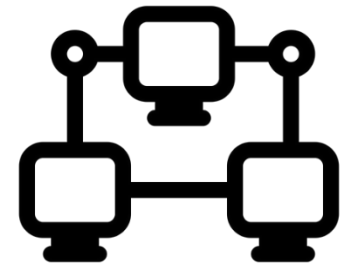2. IP address & domain name.
3. HTTP/S Protocol.

It all starts with Computer Network

Computer Network

- Today, almost everything is connected via Internet.
  - A world-wide scaled computer network.

Q: Why do we need to connect and be connected at the first place?
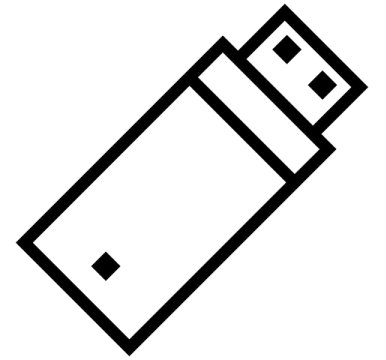
A: Data exchange. And we want it fast.

Computer Network

Q: What the world would be like if Internet was never invented?

A: We won't be meeting in this way.

A: You will send data via flash drive with the help of courier services.

TCP/IP

TCP/IP	OSI
Application	Application
	Presentation
	Session
Transport	Transport
Internet	Network
Link	Data Link
	Physical

- Transmission Control Protocol/ Internet Protocol (TCP/IP)

- The protocol enables computers:
  - to **connect** and **exchange data**.
  - to identify the corresponding host.
   - E.g. 118.97.23.107

IP Address and Domain Name

- IP address is a **unique host identity** in a network.
  - E.g. 118.97.23.107 is the identity for IT Del.
  - Unfortunately, it is hard to remember IP address.
    - Prone to error when typing it down.

- A domain name is an **alias** for an IP address.
  - E.g. del.ac.id, si-playground.com, youtube.com, etc.
  - Much easier to memorize.

Domain Name System (DNS)

- The network protocol is not designed to work with domain names to identify hosts.
  - On the contrary, humans are bad in memorizing IP addresses.

- This is where DNS comes and plays its role.
  - **Translating** domain names to IP addresses.
  - Humans and the computers are now **happy**.
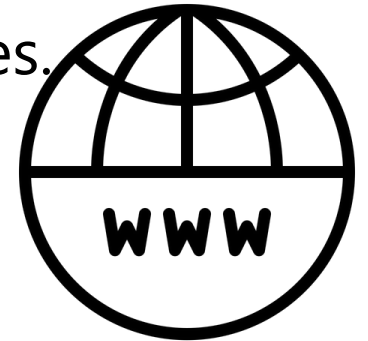
URI and URL

Uniform Resource Identifier (URI)

- URI is a unique string sequence used to identify a resource in the network.

`URI = scheme:[//authority]path[?query][#fragment]`

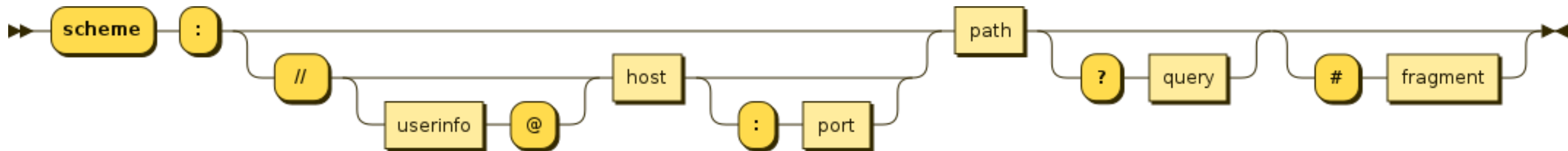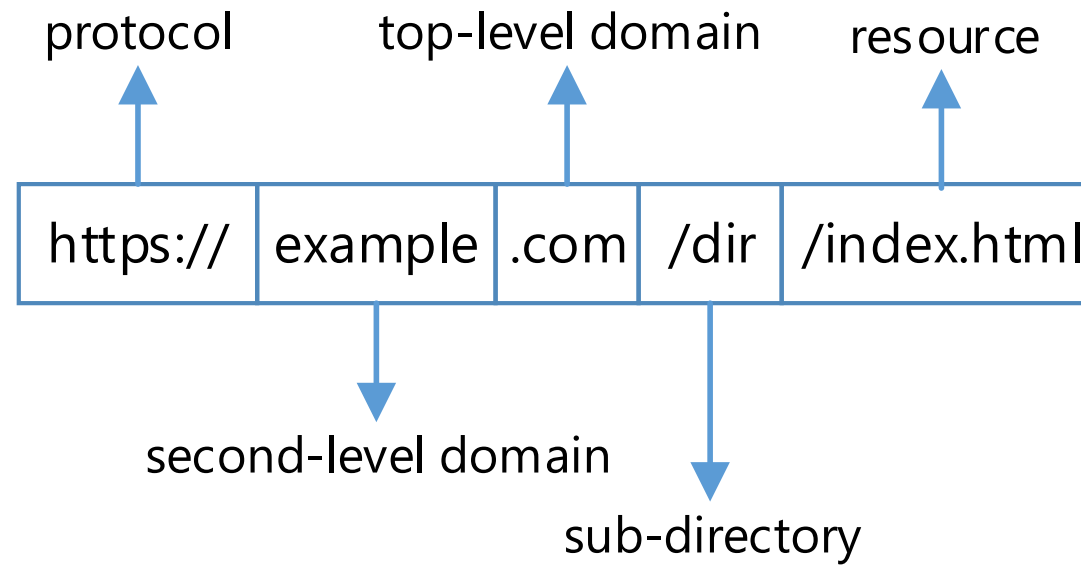`authority = [userinfo@]host[:port]`

Image source: https://en.wikipedia.org/wiki/Uniform_Resource_Identifier

Uniform Resource Locator (URL)

- URL is basically a subtype of URI.

Q: What are the difference between these two?

HTTP/S Protocol

Protocols at the Application Layer

- Many protocols are running on top of the application layer:
  - HTTP (Hypertext Transfer Protocol) / HTTPS (secure).
  - FTP (File Transfer Protocol).
  - SMTP (Simple Mail Transfer Protocol).
  - many more ...

HTTP

- To avoid conflicts, each has its predefined port number.
  - HTTP uses port 80, HTTPS uses port 443,
    FTP uses port 21, SMTP uses port 25, etc.
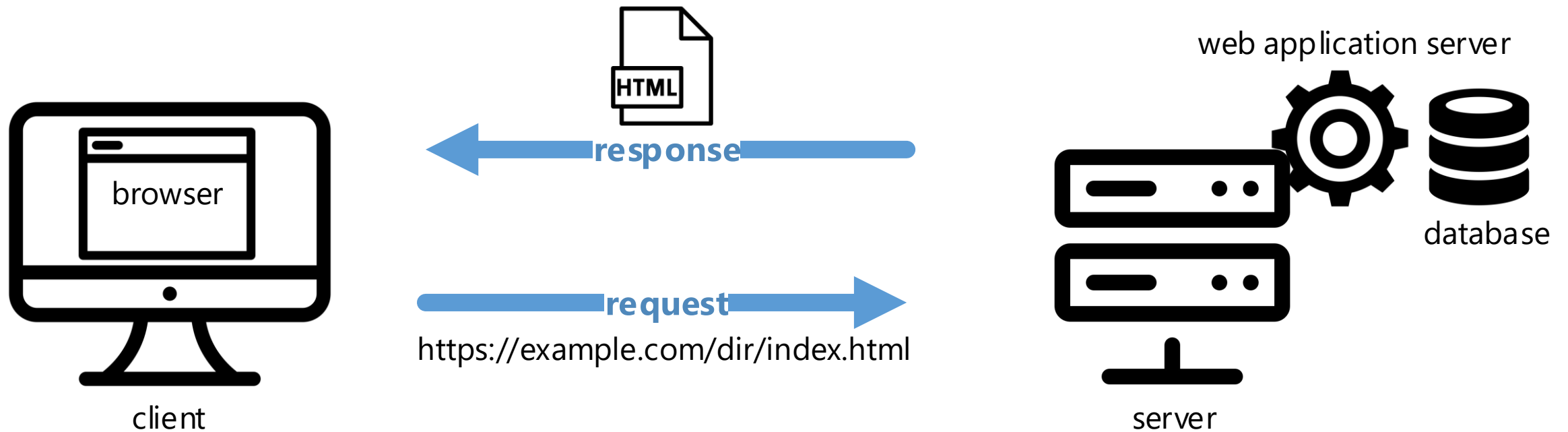 - The default port can be changed if necessary.

HTTP/S Protocol

- It utilizes TCP/IP to transfer data.
  - It is capable to handle text and binary data.

- Dynamic connection.

HTTP

  - Every communication is done in a single **request-response cycle**.
  - The connection is gone once the cycle finish.
  - A new communication will use a new connection.
  - **Do it and forget** (no state is handled or stored).
  - Platform agnostic (platform independent).

Request-Response Cycle

HTML

response

browser

client

web application server

database

request

https://example.com/dir/index.html

server

institut teknologi
del
MARTUHAN-MARBOHA-MARBISUK
2001

HTTP/S: Statelessness

- HTTP/S is a dynamic protocol, it **does not** store any state made at the previous communication.

- This causes any application that runs on top of it to be **stateless**.

- Hence, state must be handled by the participants.
  - Either the client or the server, or both of them.

To-dos

1. Understand the difference between:
   1. URI and URL.
   2. Server and Web Application Server.
   3. Client and Browser.
2. Understand the role of:
   1. IP address and its relationship to port number.
   2. Domain name and DNS.
3. Understand the request-response interaction.
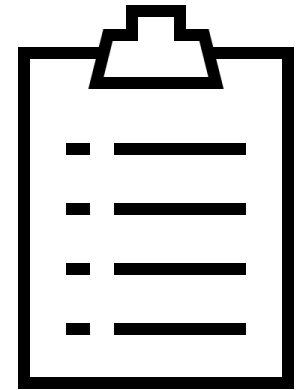
References

Srinivasan, M. (2012). Web Technology: Theory and Practice. Pearson.

RFC3986. Uniform Resource Identifier (URI): Generic Syntax. https://tools.ietf.org/html/rfc3986

Thank
you