Oum El Bouaghi University
Faculty of Exact Sciences, Natural and Life Science
Department of Mathematics and Computer Science

Advanced Web Programming

Introduction to Web Applications

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Concerned students

Faculty	Department	Level	Speciality
ESNL	MI	B3	ISSE

General information

- **Full Module** : 45h

- **Credits** : 4

- **Coefficient** : 2

- **Teaching objective:** Mastery of web application programming.

- **Recomanded Prior knowledge:** Fundational knowledge already aquiered in Web Technologies.

AWP Course Content

- Introduction and reminder

- Introduction to WEB applications and architecture

- Reminder on WEB sites.

- Web application design

- HTML5

- CSS3

- PHP5

- JavaScript language

- JQuery library

- Introduction to AJAX

Introduction

1. ***Network*** :

   - Machines connected together.

   - Set of computers connected to each other using various communication media.

2. ***Internet*:**

   - Network connecting all networks.

   - "Interconnected Networks" or a network of networks. These Networks are interconnected by devices called '*Routers*'.

3. ***WWW:***

   - Invented by Tim Berners-Lee in 1989, chairs the World Wide Web Consortium (W3C).

   - It is a services offered by internet network to navigate (using a browser) and consult pages linked by hypertext links.

Introduction

4. *Web Page:*
    - It's a *document* intended to be viewed using a web browser.

    - Composed of a central resource (usually an HTML document) and possibly related resources (typically images).

5. *Website:*
    - C*ollection of web pages* and potentially other resources, linked together, *published by an owner* (a company, an administration, an individual, etc.)

    - *Hosted* on one or more web servers.

6. *Browser:*
    - Software used for viewing web pages.

Introduction

6. Client/Server Architecture:

- When computers are connected in a network, it becomes interesting to *concentrate* certain *resources* on a *single computer*, and allow other computers to use these resources only when they need them. This is the client-server architecture.

- The *server* is the machine (computer) where a resource is located.

- The *client* is the computer that has the right to access the resource on the server.

7. HTML:

- Markup language used to write web pages.

1. **Email:**

    - E-mail (Electronic mail): is an application for exchanging messages between users.
    - Check mailbox on to read or send messages to correspondents.

2. **Discussion Forums:**

    - Online discussion space operating asynchronously, much like a public mailbox where everyone is free to read messages and respond to them.

3. Files transfer:

- Within Internet, it's possible to transfer files from one computer to another using the FTP (File Transfer Protocol) protocol.

- The file exchange service enables users to deposit files on a remote machine. However, the most common use is to download files.

- Distributing free software, sharing images, audio files, course notes for students, or scientific articles are among the most common uses of this service.

4.   Telnet and SSH

- These services allow an internet user to connect and thus use a machine **remotely** as if they were in front of it.

- This remote control enables the execution of commands, starting or stopping a program, checking the status of the machine, etc.

- Telnet is old and is beginning to be abandoned in favor of SSH for security reasons.

- With Telnet, all transmitted information travels in plain text over the network, including passwords, which allows a potential eavesdropping attacker to intercept sensitive data.

- Conversely, with SSH, all transmitted data is encrypted and therefore unreadable only by the intended recipient.

5.   **Chatting (Chat)**

- *Cyberchatting* refers to activities that allow Internet users to exchange interactively and in real-time with others.

- This form of conversation occurs either textually (chat) or with images/videos or with sound (audio conferencing).

6.   **Personal Journal (Blog)**

- *A Blog* (or Weblog) is an online personal journal that enables an internet user to regularly publish information or comment on current events on a subject.

- *A personal online journal* allows easy publication of news on a subject, to illustrate them in a multimedia way (photos, videos,...).

Web Architecture

- Web architecture: Based on the **Client/Server** model.

- Client can send **requests** to the server, such as:
  - *File transfert.*
  - *Execution of programs in the server.*
  - *Update of files.*

- Manipulated objects are are identified by their **URL**.

- File transfert is done by using **http** protocol. It defines the used langage for the exchanges between the client and the web server. Such a protocol does not obligate permanant session between client/serveur.

Web Architecture

- **Client/Server** model:
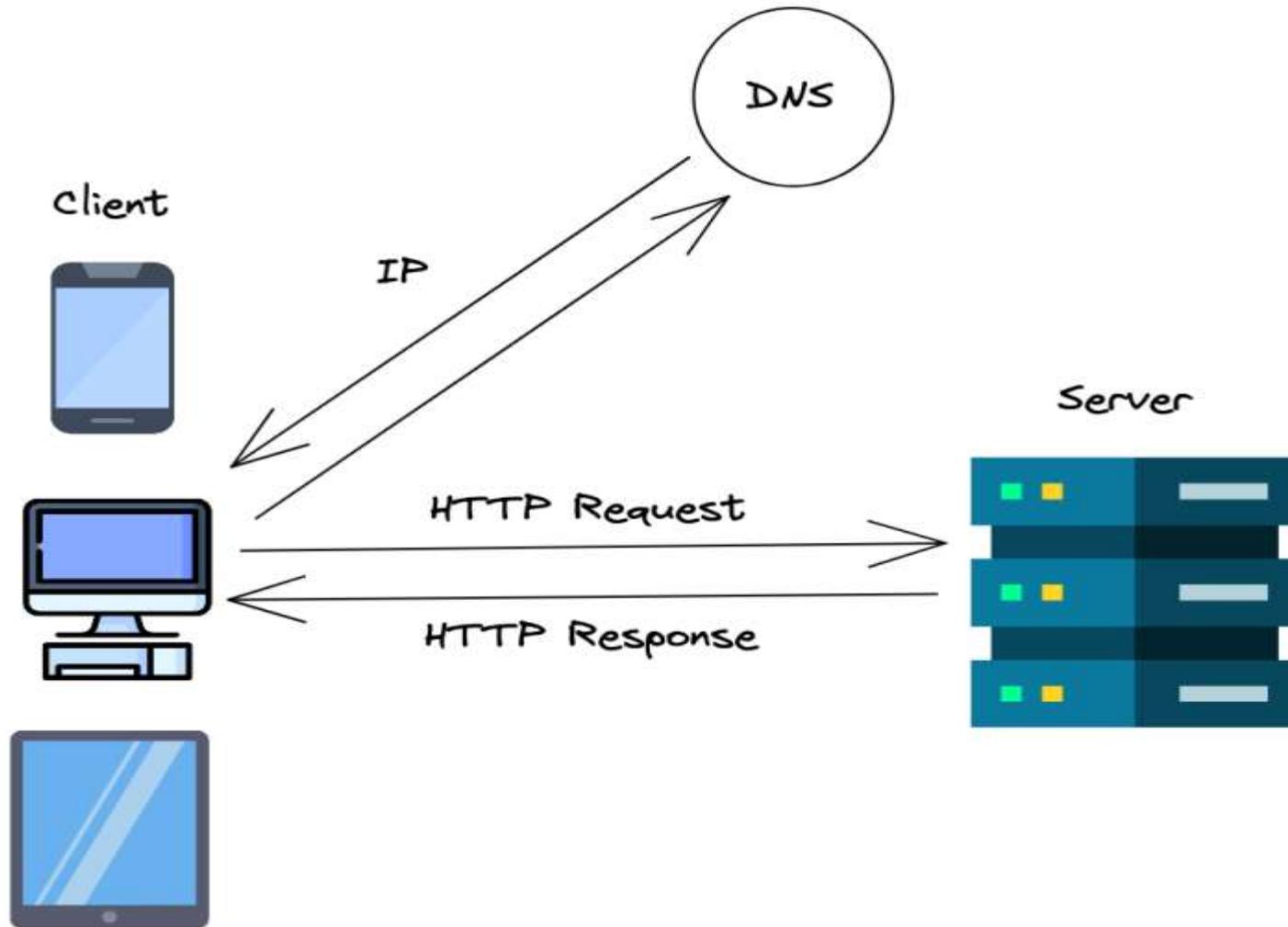
- **Web server:**

  – Computer server replays to World Wide Web requests, mainly by using HTTP protocol.

  – A computer which save files that compose a web site stores these files (ex: HTML pages, images, Steel Sheets (i.e, CSS), JS files) then, send these files to user's device which visit the site.

  – Such a machine connected to internet is accessible using a domain name.

Web Architecture

- **Request process:**

    1. Connexion request.

    2. Waiting for the server's response.

    3. Connexion establishment.

    4. sending an URL request.

    5. Server response.

    6. Response display.

    7. Connexion closure.

Web Architecture

- **DNS Server (Domain Name System)**

  – It is a protocol enabling the association to a domain name (for example **www.mesrs.dz**) an IP adress (for example **140.78.132.45**).

  – Machines connect using IP addresses, whereas domain names are intended *to ease memorization and usage for humans*.

  – It is used for the computer to retrieve the address of the server to connect to; afterward, it no longer needs the DNS server.

Web Architecture

- ## **Domain name**

  – An Internet adress or a domain name is the way with which your contats and clients will find your Internet site in the web.

  – A domain name is essential when creating your web site.

  – An **Internet adress:** Prefix '**www**' and a Domain Name.

  – Domain name is composed of a string of characters and an extension. In the examlpe below, the used extension is relative to France: **.fr**

- Do no negligate this crutial step because you can/must not change.

- If your site is a brand, It's highly recommended to consider using your brand's name if the domain is available.

- Select a domain name among the keywords of your site.

- Remember to check that this domain name is available with the necessary extensions you require.

- Try to obtain a domain name with the .com extension so that your site is accessible to the majority of consumers.

- Ensure that your domain name is easy to type and easy to remember.

- Keep the name as short as possible.

- Avoid hyphens and numbers.

- Use these following two links to find an available domain name.

    https://instantdomainsearch.com/
    https://leandomainsearch.com/

Hypertext Transfer Protocol (HTTP)

- A protocol used to transmit hypermedia documents (ex, HTML).

- Designed for the communication between web servers and web browsers.

- Follows the **client-server** model:
    - client opens a connection,
    - makes a request,
    - waits to receive response.

- It ensures that no data can be lost along the way.

Hypertext Transfer Protocol (HTTP)

- HTTP provides clear rules about the communication between the client and the server:

  – **Clients:** make **HTTP** requests only towards *servers*.

  – **Servers:** *respond* only to a request of a **client**.

  – When a client requests for a file using HTTP, it must provide the URL of the file.

  – **Web server**: respond to all HTTP requests, even if the response is an error message.

Static Website vs. Dynamic Website

- **Server**: serves static content or dynamic content.

- **Static content**: Served as is.

- **Static websites**: Simplest for implementation.

- **Dynamic site**: Server generates the content from information contained in a database.

- **Web host:** company **owning** the servers where information of your website is **stored.**

- **Web hosting**: offer server management, antivirus and other services.

Different Types of Websites

- There are various types of **websites**, each serving a specific purpose:
  - **E-commerce websites or online stores**: primarily focused on online sales.

  - **Brochure websites**: used to present and showcase the

    services of an organization or brand.

  - **Institutional websites**: Present an organization and its values through descriptions of its activities, key figures, and information relevant to the target audience.

  - **Portal websites**: Offering services like messaging, news, etc.

  - **Personal websites**: for individuals who want to share their passion.

- This list is far from exhaustive; there are many other types of websites.

Web Application

- **Web application:** Application software hosted on a server and accessed through a browser.

- Usage of web applications do not require its installation on a computer (unlike classic software).

- Web application users need only to connect to the application using their web browser.

1. **Universal Access** from any device: computers, laptops, smartphones, tablets.

2. **No compatibility issues** with different operating systems. Only a web browser is required.

3. **Remote** Work from any location in the world as long as there is internet.

4. **Data Centralization**.

5. **Data is available** at any time.

6. **With centralized management** and regular backups, there is **less risk of data loss** compared to local solutions.

# Web Application: Heavy application vs. lightweight

- **A heavy application** is designed to run on a **single-user machine**.

- A **lightweight** application is a **client/server** application where the user interface part is visible in a web browser, while the server part (processing + data) is hosted on a server (web + database).

- The advantage of **a lightweight** application is that **it doesn't require installation** on users' machines, its updates occur in one place (the server), and users can access it from different operating systems/devices effortlessly, which is not the case for heavy applications.

An application is composed of three abstraction levels:

1. **Presentation Layer:** Part of the application visible to users (referred to as the user interface). Such a layer in our case is HTML pages containing buttons and forms.

2. **Business Layer:** Represents the application's functional part, describing the operations performed on data based on user requests made through the presentation layer.

3. **Data Access Layer:** This part manages access to the Data Base of the system.

- Web application: Different architectures

  - 1-Tier Architecture
  - 2-Tier Architecture
  - 3-Tier Architecture
  - N-Tier Architecture
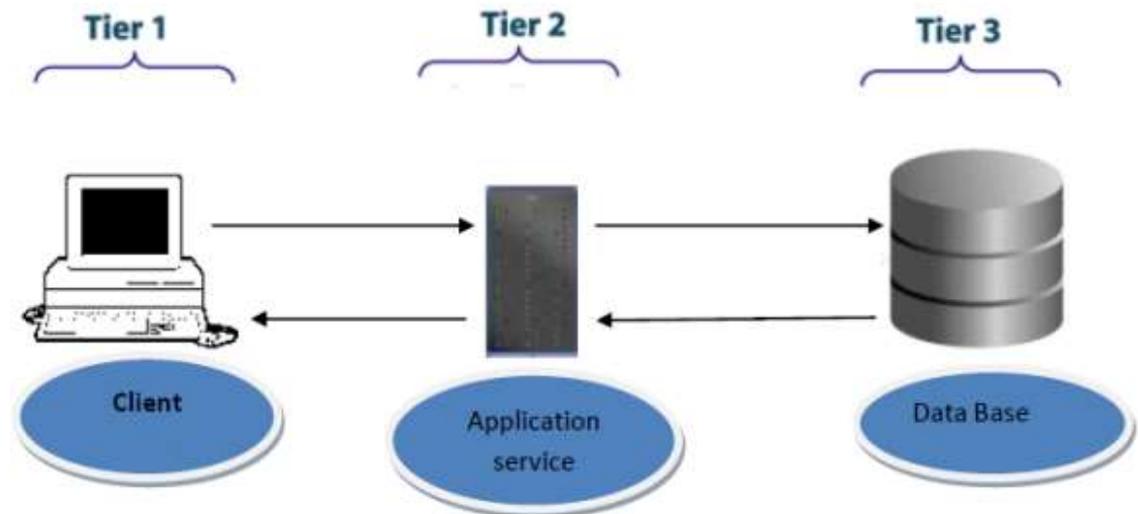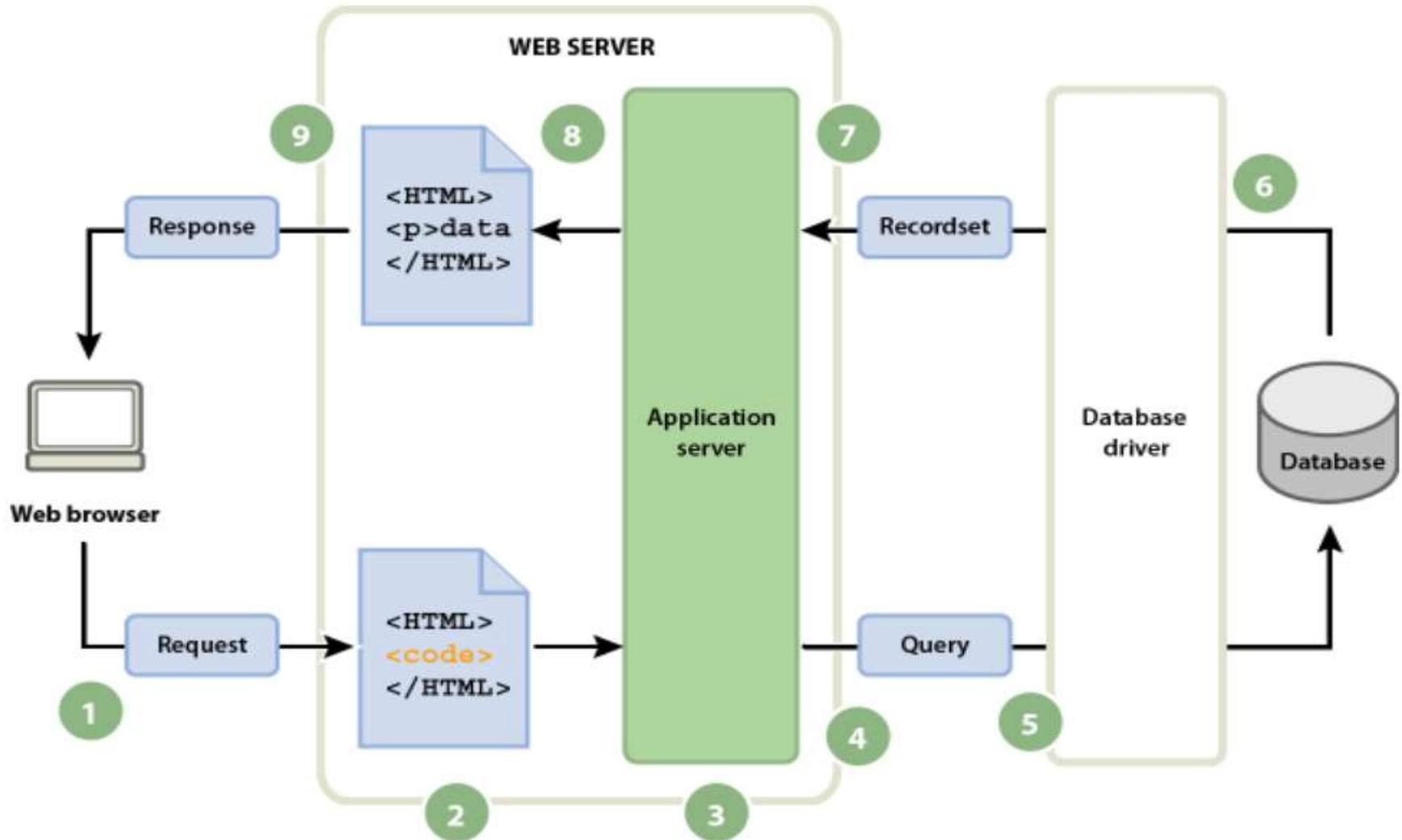
- **HTML:** Page structure,

- **CSS** (Cascading Style Sheets): Visual design,

- **JavaScript:** Client-side scripting, as well as languages like **Java**,

- **PHP**, and others.

- **Definition of Constraints:**

1. **Idetification of target users:**

   - Determine standards and norms to be respected and the global ergonomics.

2. **Study of the technical architecture on the server and network side:**

   - To reduce communication cost, easily manageable, etc.

3. **Identification of standards to be respected**

   The choice of standards may be different if:

   - **The workstation of the client is not well identified and mastered.**

   - **The workstation of the client identified and mastered.**

- **Major design recommendations:**

  – Stay standard,

  – Keep it simple (understandable),

  – Stay modest (avoid overdoing):

    - Avoid multiplying images or animations: *Christmas tree effect*.

    - Flat design + limited number of colors (3-4 meaningful ones per page).

  – Respect the context of the page.

- **Intuitive interface:**

 - **Web Interface is intuitive and predictable:**

    - Not many components (i.e, hyperlinks, buttons and sensitive images) are user friendly, leading to predictable use.

    - Predictability: Primary element for user comfort.

  - **Banishing hybrid interfaces**

  - **Reasons for web adapted design:**

    - User friendly, intuitive, and easy to learn.

- **Page template** (**standard template**)**:**

  — **MENU area:** Contains a summary.

  — **CONTENT area:** Contains the body of the the information.

  — **HEADER zone:** Contains necessary information for the page's presentation.

  — **FOOTER zone:** Author's information, link, etc.
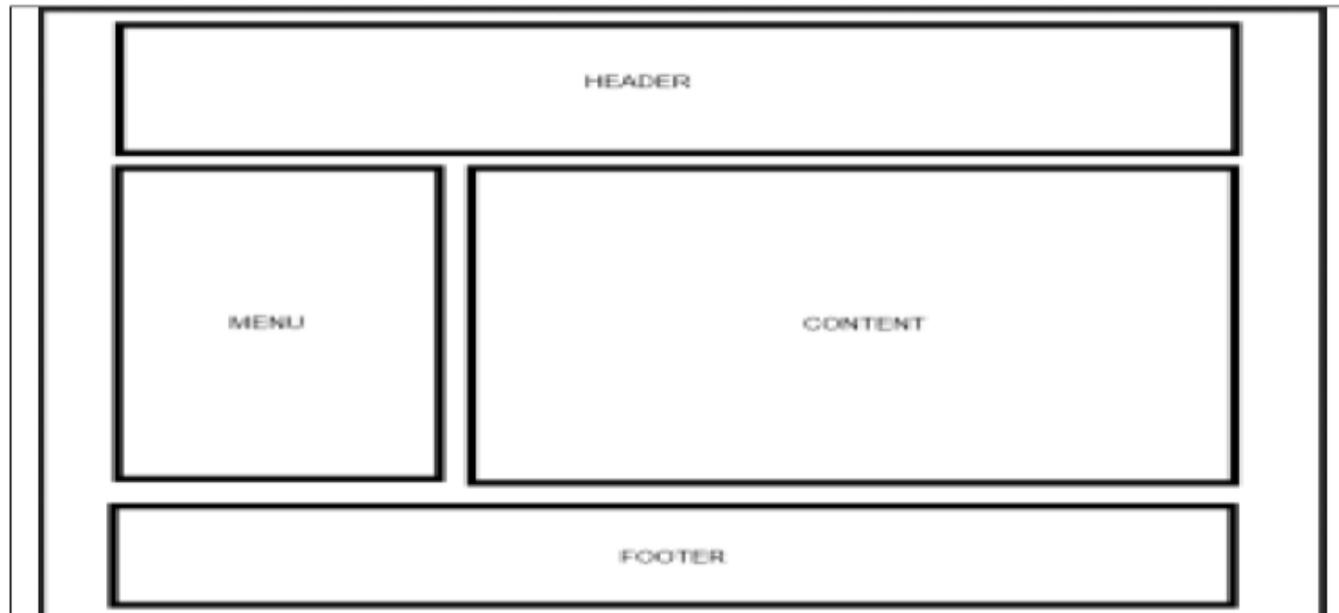
- **Pay attention to:**

  - Avoid Windows like ergonomics,

  - Failure to respect the page mode,

  - Ignoring the page format,

  - Ignoring limits of the universal client,

  - Do not organize navigation within the site,

  - Avoid the Chrismas tree effect.

References

http://deptinfo.cnam.fr/Enseignement/CycleSpecialisation/IHM/annee1011/ergonomieWeb.pdf

http://www.smile.fr/download/LivreBlanc/9108ea582e76ba88.pdf