

## Internet and WWW (Cont'd) and Interactions on the Web

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## Lab this week

This week's lab will be about getting familiar with Git and Gitlab.

Attend the labs for a simple intro to Git and Gitlab.

Your responsibilities before going to the lab?

- Get your CSID
- CSID is something that gives you access to computing resources at the Faculty of Computer Science
- If you don't know what your CSID is, check with the CS Help Desk (1<sup>st</sup> floor, Goldberg CS Building)

# Assignments

All 4 assignments will be available tomorrow.

Project will be available later this week.

They will be available on Brightspace, along with separate Dropboxes for each assignment.

# Recap

**Internet** → global system of interconnected networks

**WWW** → One of the services transferred over the Internet, with a collection of documents and other resources that are stored on servers

***Data exchange on WWW is facilitated by the Internet***

Also remember:

“An internetwork is also referred to as an internet”

“The Internet is the most popular internetwork”

→ The **Internet** is a type of **internet**

→ Similar to, the **iPhone** is a type of **Smartphone**

# World Wide Web (WWW)

So, how does a computer (client) retrieve information from the server?

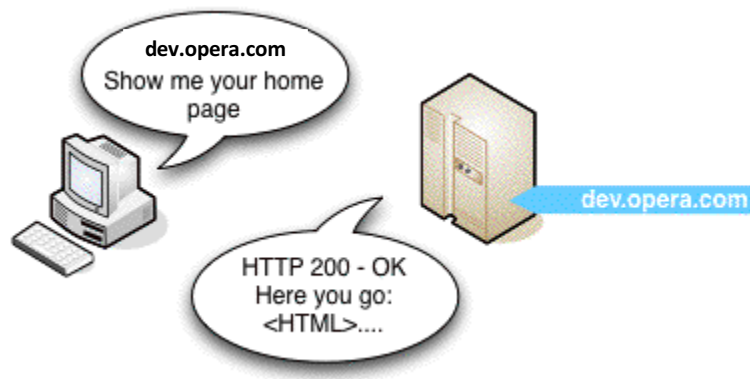
First, user enters URL on browser (client)

Then, server hosting the resource with URL responds with data

Is that all?

Nope! Computers can only understand numbers.

So, URLs have to be “translated” into **IP (Internet Protocol) addresses**



# World Wide Web (WWW)

So, how does a computer (client) retrieve information from the server?

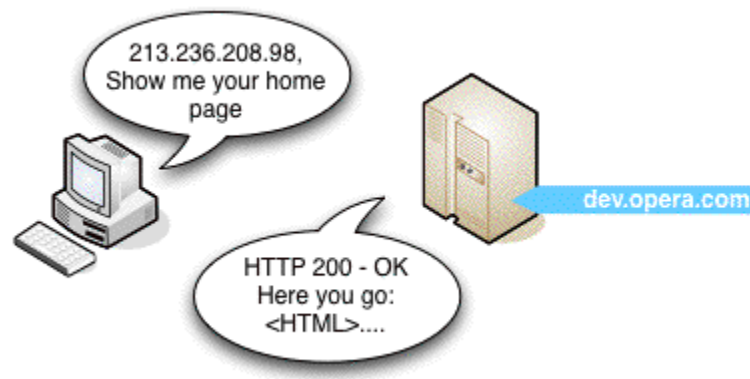
First, user enters URL on browser (client)

URL is then translated into IP address

Browser then sends request to IP address

} Domain Name System  
(DNS)

Then, server (with the specified IP address) hosting the resource with URL responds with data



# Domain Name System (DNS)

Hierarchical and distributed naming system for resources connected to the Internet or any private network

The most important function of DNS is ***translation of domain names*** into IP addresses (e.g. IPv4: 8.8.8.8 and IPv6: 2001:4860:4860::8888)

Think of this like a telephone directory or even Facebook

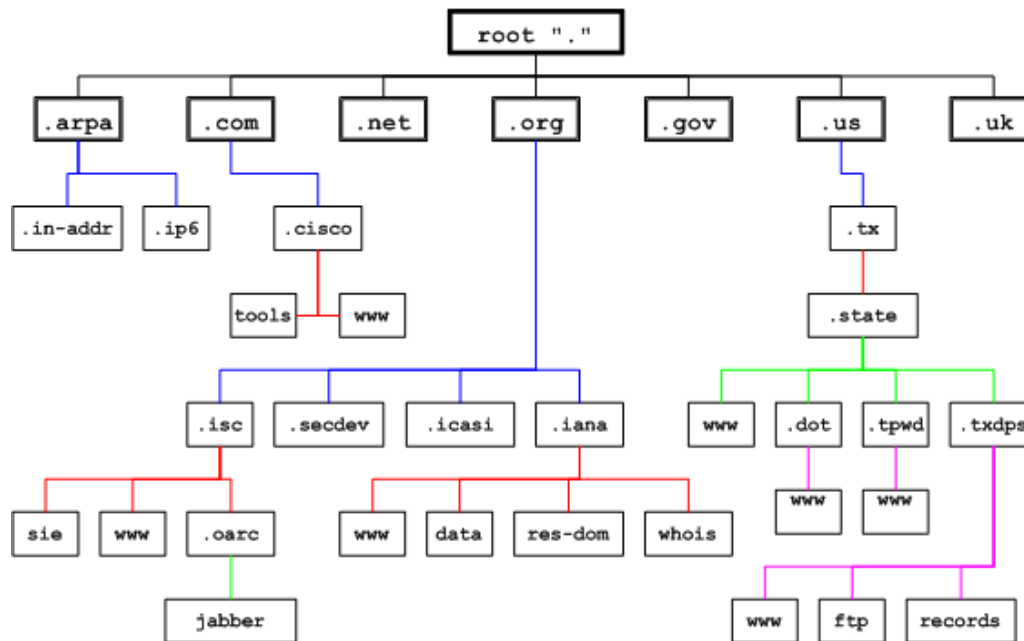
If you want to find someone on Facebook, you search by typing in the person's name, and you can click on the correct result to see the person's profile – without having to remember or know the URL of the person's profile

# Domain Name System (DNS)

How does DNS work?

There is a tree of domain names, called the **domain name space**

General structure: hierarchical



`.arpa`: primarily used for address to host mappings

`.com`, `.net`, `.org`, `.org`: are generic TLDs (gTLD)

`.us`, `.uk`: are country code TLDs (ccTLD)

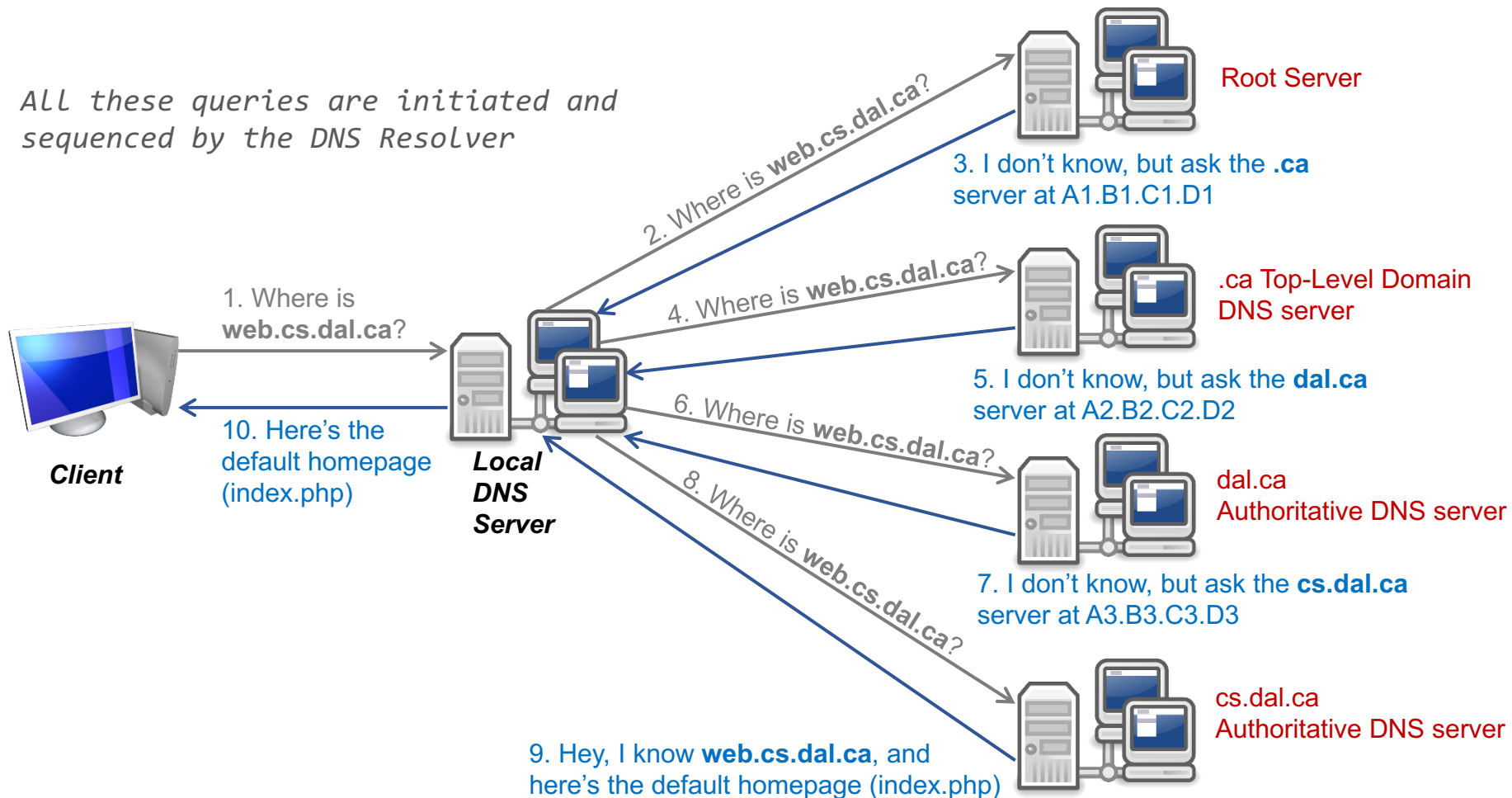


# Domain Name System (DNS)

How does DNS work?

Translation of web address into IP address is managed by a **DNS Resolver**, in a process called resolution

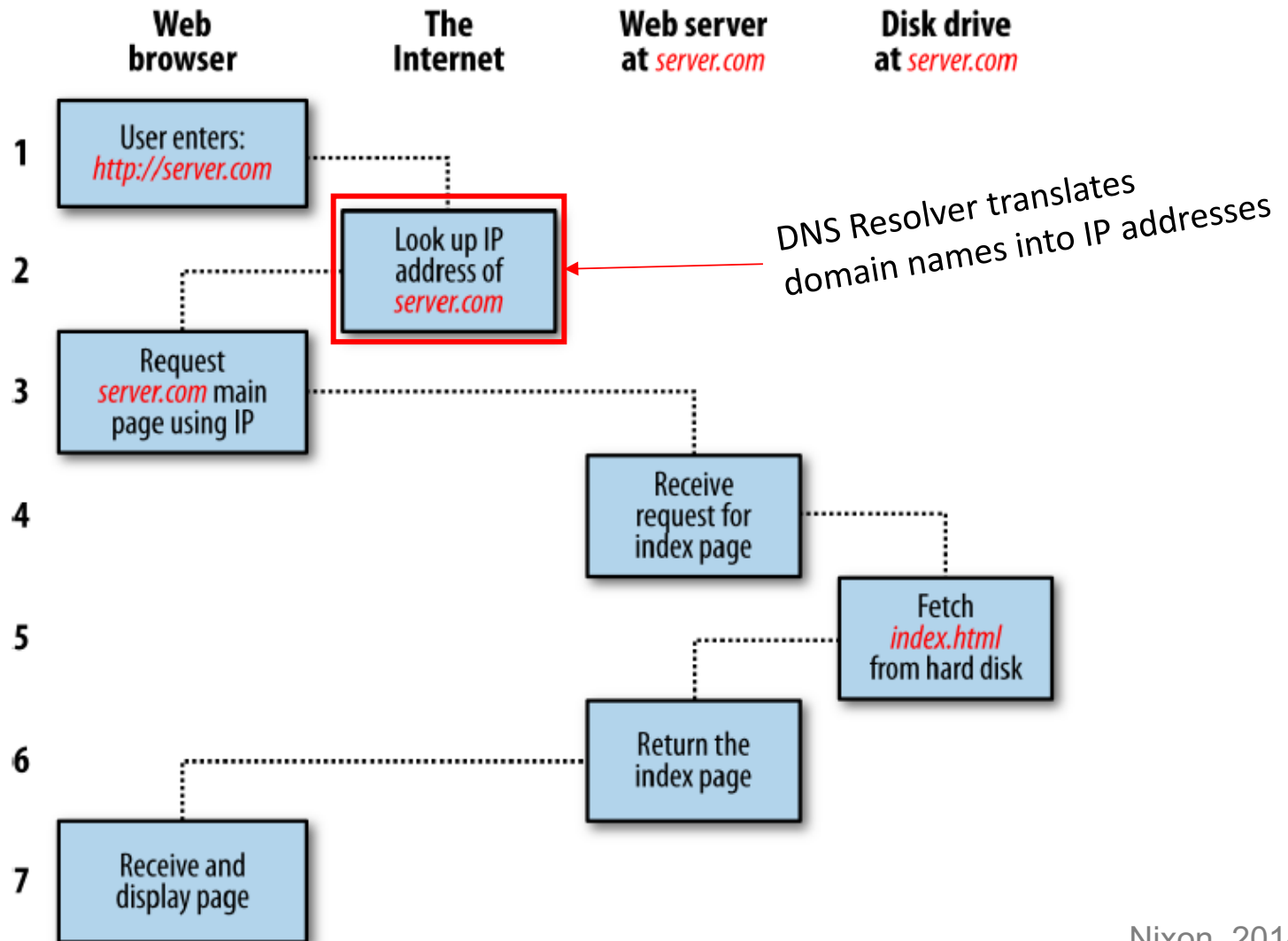
*All these queries are initiated and sequenced by the DNS Resolver*



Meanwhile... on the server...

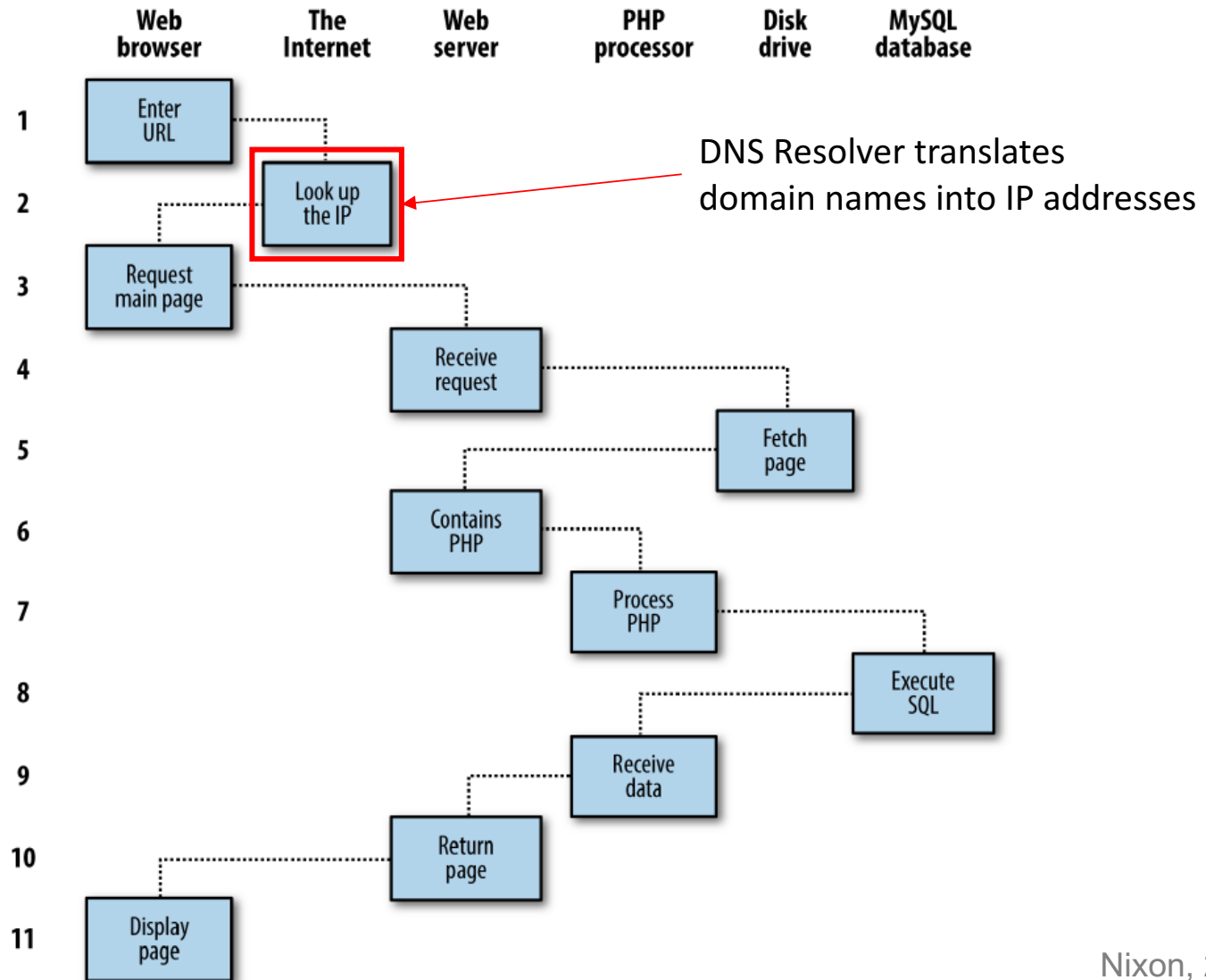
# The Server: What happens when it receives a request?

## Round 1: static web pages



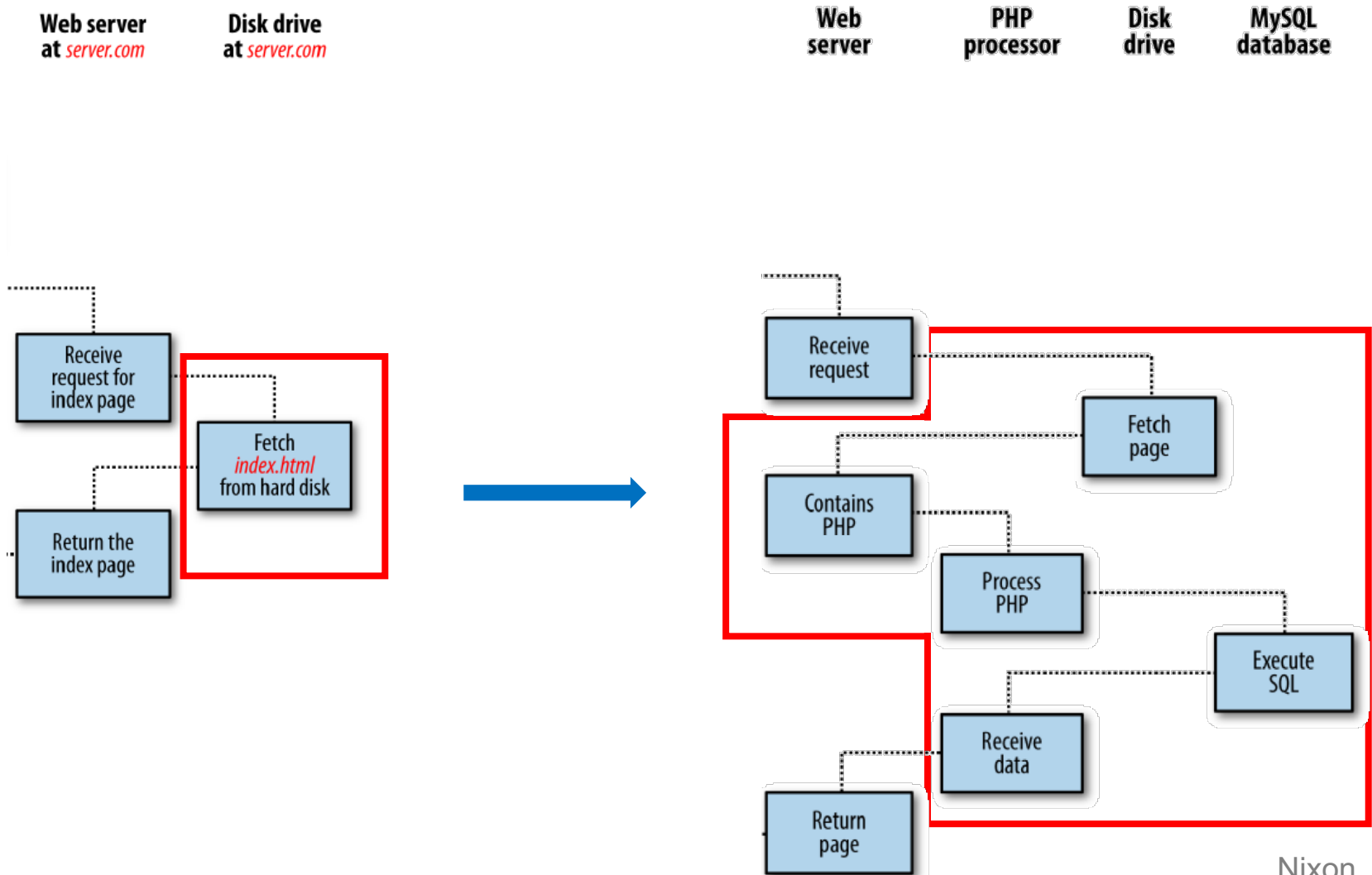
# The Server: What happens when it receives a request?

## Round 2: dynamic web pages



# The Server: What happens when it receives a request?

## *Static v. Dynamic page requests*



How many times have you visited some website and thought:  
*“I wish this website was better to use!!”*

Or

*“Oh my! This website is so good!”*

# INFX 1606

INTRODUCTION TO  
WEBSITE CREATION



**DALHOUSIE  
UNIVERSITY**

FACULTY OF  
COMPUTER SCIENCE

## Interactions on the Web

# Outline

An overview of user interface (UI) design as applied to websites

Website UI design: Best practices

Heuristic evaluation or usability inspection guidelines

- Exercise in class on Wednesday (**bring a notebook or sheets of paper**)



# What are User Interfaces?

***User interface (UI)***: a “platform” that users can use to interact with a system

E.g. **Graphical user interface (GUI)** – desktop applications that let users accomplish tasks on the computer

Depending on the application or the system being used...

- Users can perform various types of “actions” using input devices (e.g. **keyboard**, **mouse**, **gestures**, **touch**, etc.), and
- See / interact with results on an output device (e.g. **monitor**, **touchscreen** etc.)

# What are User Interfaces?

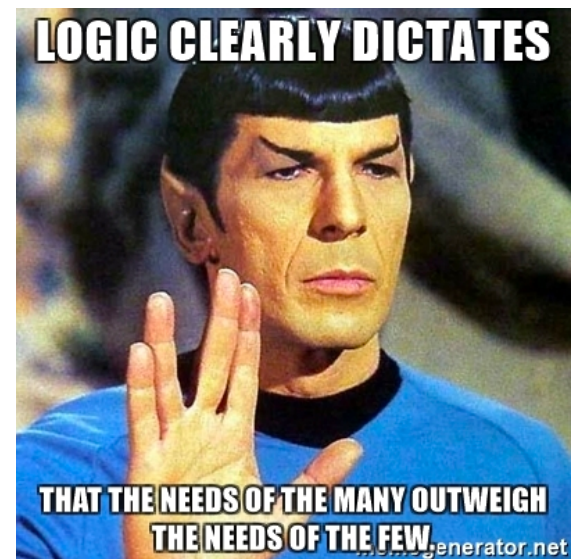
**Users** are central to UI design – after all, you are designing the system to be used by users

To design good UIs, you will have to understand:

- the **purpose of the UI**, and,
- the **needs of users** using the UI

This is because your design has to be sufficiently balanced to allow:

- novice users to understand the necessary interactions quickly, and,
- experts to be able to use their knowledge without much effort



# Website and User Interfaces

Websites are user interfaces that reside on the web

They allow users to interact with a system ***remotely***

i.e. they allow access to documents / information about anything / allow exchanging information via e-mails, etc. from any device / any location

# Website Design

## ***Who are the users?***

- Targeted audience v. “everyone”:  
Is the website planned to be used by anyone who knows how to use a computer?  
Or, is it planned to be used by specific types of users – e.g. *students of a university, residents of a city*, etc.?
- Even if you think your website will be used by everyone, spend some time in thinking about what type of users will visit the website – it is highly unlikely that the website will be used by everyone in the world!
- E.g. *if you have a website selling groceries in Halifax, how is it applicable to someone in Melbourne, Australia?*  
(Exception → a case when there’s someone from Melbourne who’s moving to Halifax; even then, it is not useful for that person when they’re in Melbourne!)

# Website Design

## ***Why will people visit your website? (a.k.a. motivations & goals)***

- They want information:
  - *General information:* E.g. exploring information about a company
  - *Specific information:* E.g. information about a product
- Is the requirement personal or professional?
  - *Are they looking for a product for their use?*
  - *Are they looking for an apartment?*
  - *Are they looking for a business space?*
- Is spending time on this activity essential or just a luxury?
  - *Are they just browsing your website with no specific goals?*

# Website Design

Create a list of reasons why you expect people to visit your website

Then, see if your website needs to be updated more frequently (e.g. **news**, **fashion trends**), or not (e.g. **info about a restaurant**)

This will let you estimate how much effort is needed to update the website when required

# Website Design

Organize the content in a way that makes your website stand out from other websites offering similar content

If you expect users to require specific information when they are interacting with different elements on the page, make it “live” – as though it allows a conversation between the user and the website

E.g. *Let's say a user wants to find information about a smartphone* – they visit your website, which has the required information.

Instead of simply presenting a “datasheet” of information, ask a few questions about the user and present results in a page that says – *“here's how the smartphone is useful for you, User”*

# Website Design

## ***Elements***

Here are a few key elements of websites:

- ***Input controls***

Buttons, dropdown lists, date fields, checkboxes, etc.

- ***Navigation***

Navigation bars and links, search fields, etc.

- ***Informational elements***

Notifications (alerts), progress bars, etc.

- ***Containers***

Content holders



# Best Practices in Website Design

# Best Practices in Website Design

## [1] Patterns

- People today regularly use several websites (e.g. Facebook, Twitter, news websites, etc.)
- There will be some common patterns in such websites (e.g. navigation controls / user account control at the top of the web page, etc.)
- See if you can offer users an interface that captures such patterns
- Helps in reducing the learning activity for the user, and makes interactions easier
- ***Depending on what type of website you are planning you create, visit similar websites and make a list of such observable patterns***

# Best Practices in Website Design

## [2] Consistency

- Once users have learned to perform an action, try not to change its meaning
- E.g. if **Ctrl+C** (or, **Cmd+C**) means “save”, try not to override the functionality to mean something else
- E.g. “**Chat**” feature on a website should allow users to chat with an expert, not have them email the expert! Use a contact page for that!
- Inconsistency implies users spend more time in learning how to use features of the website → leads to dissatisfaction!

# Best Practices in Website Design

## [3] Visual hierarchy

- Having a clear hierarchy will make your website easier to learn
- E.g. *observe the distinction* between different types of headings, paragraph text and links on the Dalhousie website - easy to identify the distinction and learn how to use

# Best Practices in Website Design

About Dalhousie Univer x +

← → ↺

dal.ca/about-dal.html


📖 ☆

☰ ✎ 🔔 ⋮

## Excellence in Academics, Leadership, Research & Innovation

Dalhousie University is internationally known as one of North America's most welcoming universities. **Founded in 1818**, Dalhousie is one of Canada's oldest universities, attracting more than 18,200 students from around the world. Located on **Canada's East Coast**, the university blends world-class academic programs with leading-edge research.


### Academics & research



Our focus on **academic innovation** means we are committed to the continuous development of our programs and courses. And as Atlantic Canada's **leading research university**, Dal attracts over **\$140 million** in research grants and awards each year. Learn more about:

- Dal's academic excellence
- Dal's world-class research

### The Dal experience




Dalhousie's campus reflects a **diverse mix of students** who come from across Canada and around the world, bringing multiple cultures and perspectives to the Dalhousie community.

- Get a glimpse of Dal's student experience
- Book a campus tour to see Dal for yourself


## Dalhousie's impact locally, nationally and globally

Dalhousie is attracting investments and contributing to the economy while our students, staff and faculty are volunteering and collaborating locally and beyond. Discover Dal's significance within our communities.

## Our campuses



## Leadership & vision



Give Feedback

# Best Practices in Website Design

## [3] Visual hierarchy

- Having a clear hierarchy will make your website easier to learn
- E.g. *observe the distinction* between different types of headings, paragraph text and links on the Dalhousie website - easy to identify the distinction and learn how to use

## [4] Feedback

- Try to create interactions in the form of a conversation, perhaps not literally
- Users need to know that they have been successful in performing the action, whatever the result might be
- E.g. if the *user clicks on a link*, have it change colour or get highlighted
- E.g. if the *user clicks submit* on a form, have it animate to indicate button press – the result might be an error, but feedback is important

# Best Practices in Website Design

## [5] Tolerance

- *Forgive them O Website Creator, for they might not know what they do!*
- Be tolerant and provide mechanisms to correct errors
- E.g. **Let's say you have a contact form on your website.**  
The form has format checking, i.e. to ensure entries are in specific types (e.g. e-mail IDs should be in the form "abc@xyz.com").  
If the user makes a mistake in entering some detail, don't fully refresh the page and have the user fill in all details again

## [6] Simplicity

- Use website elements that make sense and are useful for your website and for the interactions expected
- Ask yourself, *"does the user need this element on my website?"*

# Best Practices in Website Design

Key points, in summary:

- See if you can draw inspiration from ***common patterns*** on popular websites
- Try your best to keep interactions ***consistent***
- Ensure a clearly understandable ***visual hierarchy***
- Provide ***feedback*** for user interactions
- Be ***tolerant*** about user errors; allow for correction
- Keep it ***simple***



# Usability Evaluation using Heuristics

## Heuristic guidelines

- Heuristic = a common sense rule

We will use Nielsen's heuristic guidelines for evaluating UI design

[Refer handout – available on Top Hat – for guidelines and for the in-class exercise on Wednesday]

More info here: <http://www.nngroup.com/articles/ten-usability-heuristics/>

# Resources

- Usability.gov website article on Interface design:  
<http://www.usability.gov/what-and-why/user-interface-design.html>
- Interface design fundamentals:  
<http://blog.teamtreehouse.com/10-user-interface-design-fundamentals>
- Heuristic evaluation:  
[https://en.wikipedia.org/wiki/Heuristic\\_evaluation](https://en.wikipedia.org/wiki/Heuristic_evaluation)
- Nielsen Norman Group:  
<http://www.nngroup.com/articles/ten-usability-heuristics/>  
<http://www.nngroup.com/articles/top-10-mistakes-web-design/>