



# CSC309: Introduction to Web Programming

## Lecture 1

*Wael Aboulsaadat*



## Course Info...

- Instructor: Wael Aboulsaadat
- Office: BA4261
- Office-Hours: by appointment
- Email: [wael@cs.toronto.edu](mailto:wael@cs.toronto.edu)
- Course Web page: <http://portal.utoronto.ca/>
- TA: TBA



## Text Book and References

- Programming the World Wide Web, Robert W. Sebesta, Addison-Wesley.
- Standard documents at <http://www.w3.org>
- Student-Guide (Course Website → Course Documents)
- Online Tutorials & Manuals (Course Website → links section)



# Grading

- 4 Assignments 50 %
  - A1 15% Feb 15
  - A2 20% Mar 14
  - A3 10% Apr 4
  - A4 5% Last Day of classes
- Midterm 15 % Mar 5
- Final Exam 35 %



# Policies

- You have to work on the assignments in teams of 2.
- Assignments will be posted on the course's web page.
- Assignments should be submitted electronically.
- **Late course work.** You can turn in your assignment up to 2 days late, but this will cost you 20% of the maximum grade for every day you are late (e.g., an assignment turned 2 days late can get a maximum of 6/10). No assignment will be accepted after 2 days, and will be given a grade of 0. If you are struggling with an assignment, talk to the instructor or the TA's for help **before the deadline.**



# Policies

## ■ Re-marking.

- First, talk to the TA that graded your work.
- The TAs will hold a special remarking session shortly after assignments are handed back to students. Details will be posted on the course newsgroup.
- If you are still dissatisfied after talking to the TA, then email me to set up an appointment.
- **You have up to 7 days from the time the marked assignment is available for hand-back to ask for a re-mark.**  
No assignment will be re-marked after this period.



## Policies

- **Communications.** Your best bet for getting questions answered quickly is to post to the course newsgroup. If you think your question is not appropriate for the newsgroup, feel free to email me. Please make sure to include CSC309 in the subject line of your email. Finally, before you email me, please check the newsgroup; your question may have already been answered.



# Policies

- **Cheating/Plagiarism.** The policy of your faculty or school will be in effect. [See [Arts and Sciences Code of Behaviour on Academic Matters](#), also refer to Francois Pitt's "[How to Avoid Plagiarism](#)".] You are encouraged to discuss problems with your classmates; however, all work that you submit must be your own. When you submit an assignment with your name on it, you are certifying that you have done the work on that assignment yourself. Remember that the penalty for cheating is always worse than handing in the assignment late. If you are struggling with an assignment, talk to the instructor or the TA's for help.





## Tips for getting Good Marks

- Don't submit any compiled code. If you only submit compiled code or bytecode TAs cannot read the source and cannot mark the assignment.
- Make sure you compile and test with the same tools that the markers will be using.
- Ensure that your assignment compiles! If the make fails, the TA isn't required to try to fix it and may give you a failing mark.
- Beware of Java package names. If your submitted code doesn't have the proper directory structure corresponding to the Java package names the build will fail. If you use an IDE to write your Java programs be especially cautious about this when you export the code.



## Tips for getting Good Marks

- Don't submit any shared files (like xerces.jar/saxon.jar), submit only what is required.
- Don't use any third-party software other than what is provided to you (eg. don't use another XML parser because you think it's better).
- Document all your bugs/missing features in your assignments in the README file. If the TAs find them on their own it's much worse!
- Use the CSC 309 newsgroup ([ut.cdf.csc309h](mailto:ut.cdf.csc309h)) to ask questions about the software and the assignments, they'll get answered faster that way. Don't post anything that will potentially give away solutions to part or all of any assignment though.



# What this course is about ?

- Large scale websites
- Communication protocols
- Data Description Standards
- Internet Applications Development



# What students like about this course?

- Hands-on experience
  
- Real project!



# What students don't like about this course?

- Reading manuals!
- Using more than 1 software & standard
- Internet development model is not streamlined
- Lots of coding



# Course Outline & Topics

- Introduction
- HTTP & XHTML
- Cascading Style Sheets
- JavaScript
- DOM
- Java Applets
- Java Servlets
- Concurrency
- Transactions
- XML
- AJAX
- XSL, XSLT
- SOAP and WSDL
- Message Queues and JMS
- Databases

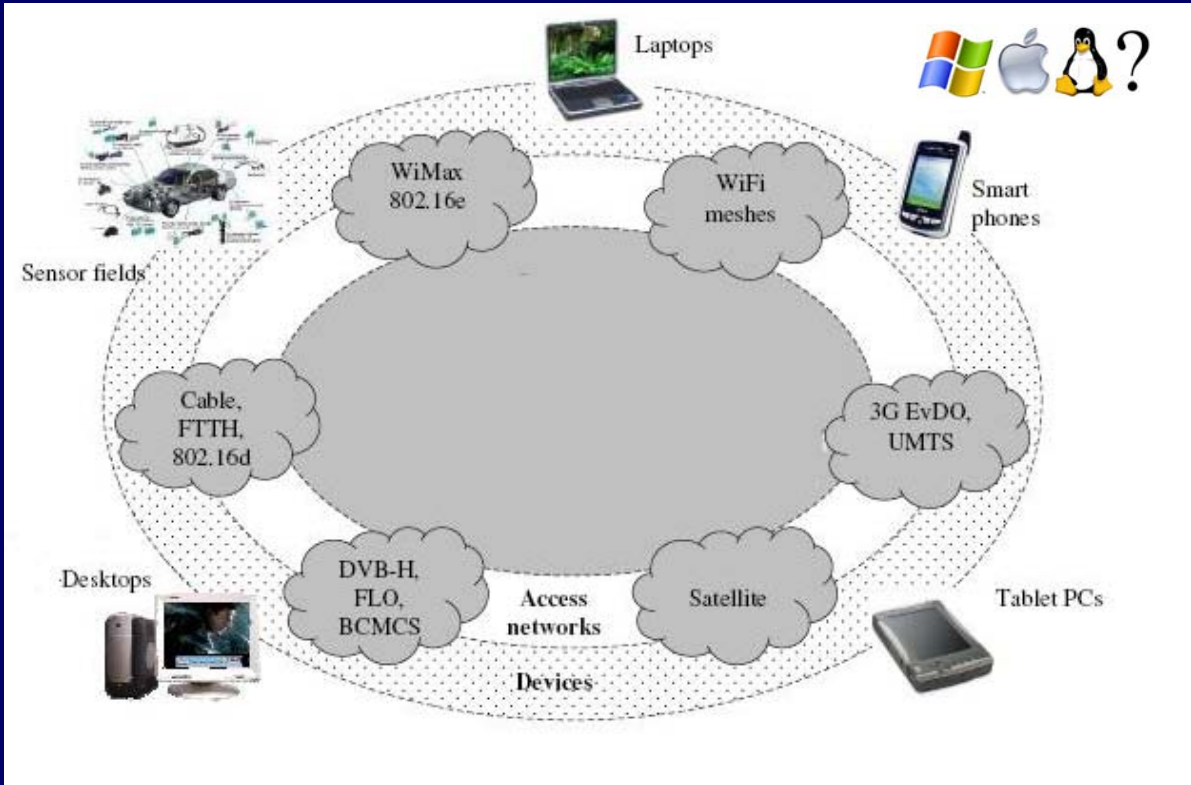


# Internet History...

- Origins in US military war-planning!
- Tough Design Requirements:
  - Distributed: no central point of failure
  - Easy to use: everyone should be able to publish/retrieve information
  - Support for Heterogeneous Devices and operating systems



# Internet Today...







# Architecture of a Web Application

**Client**



**Server**



# Architecture of a Web Application

Client



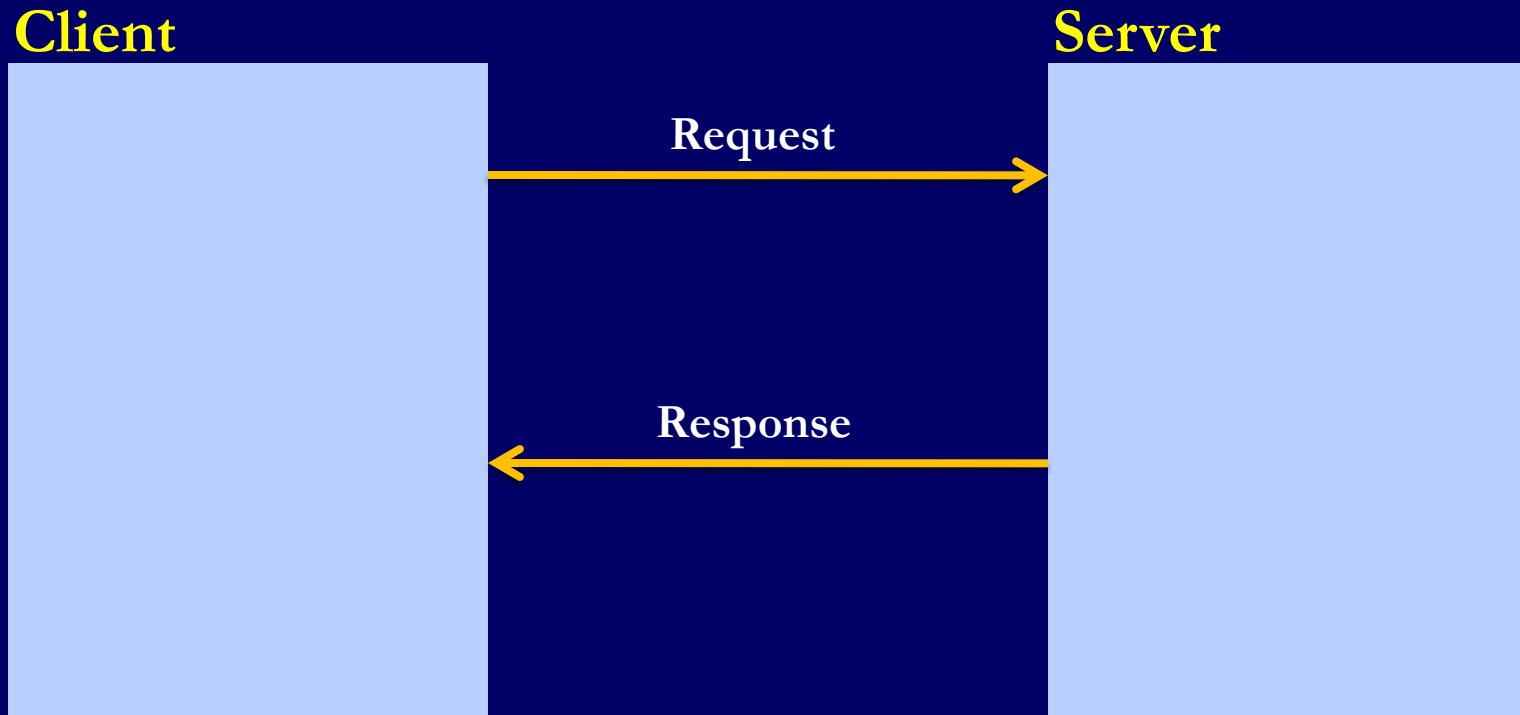
Request



Server



# Architecture of a Web Application





# Architecture of a Web Application

**Client**

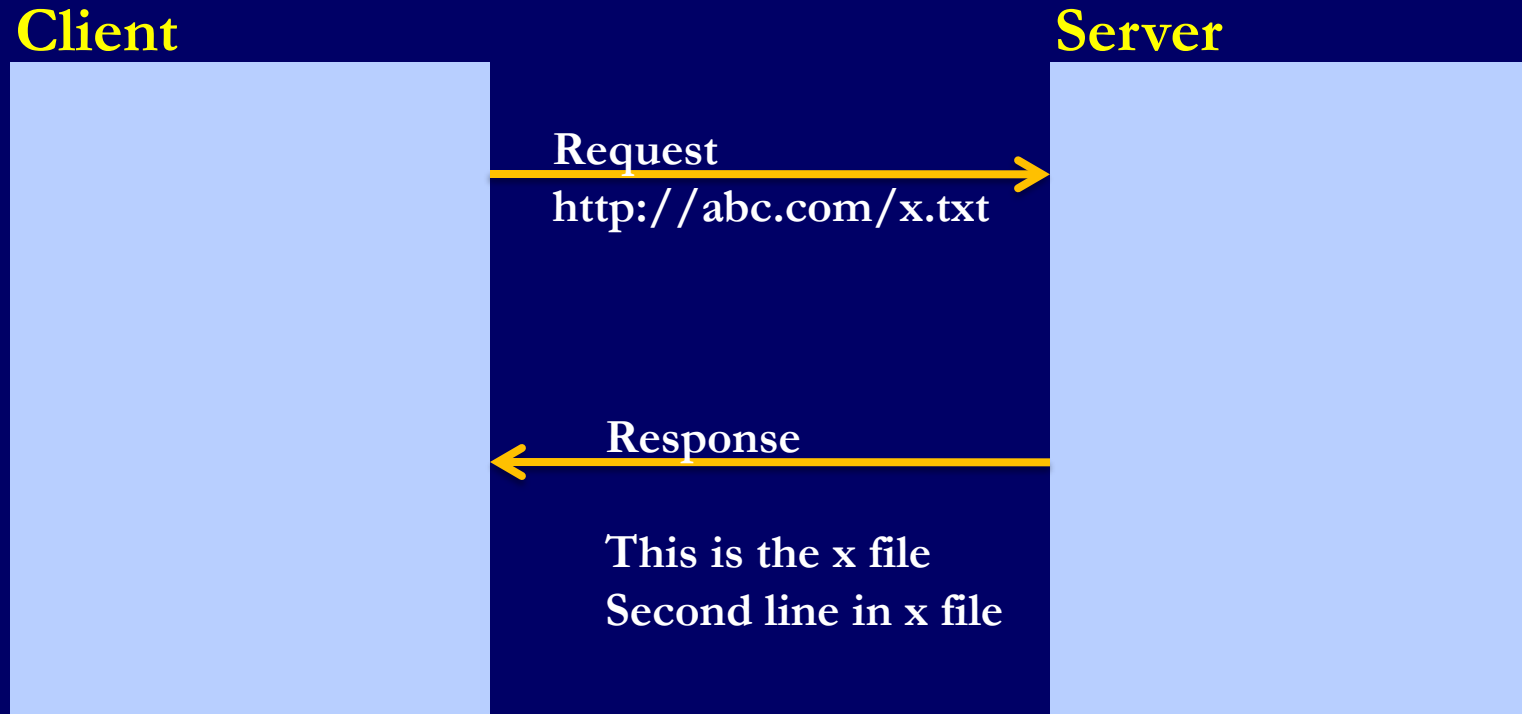


**Server**



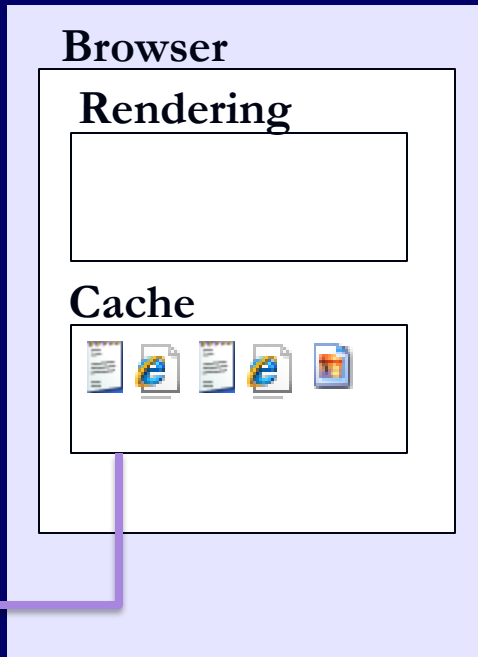


# Architecture of a Web Application



# Architecture of a Web Application

## Client



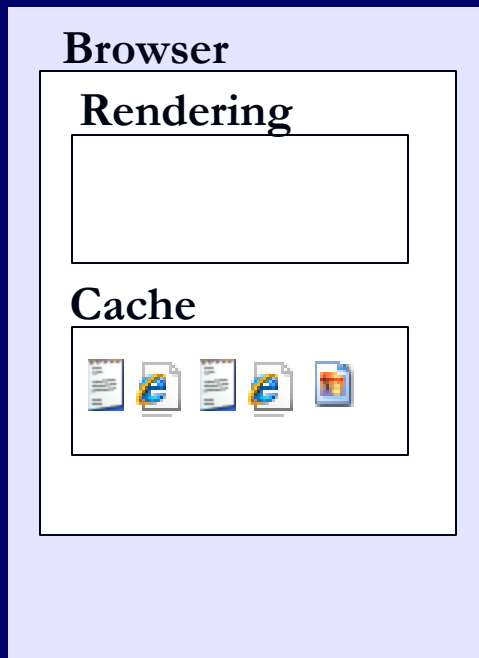
## Server



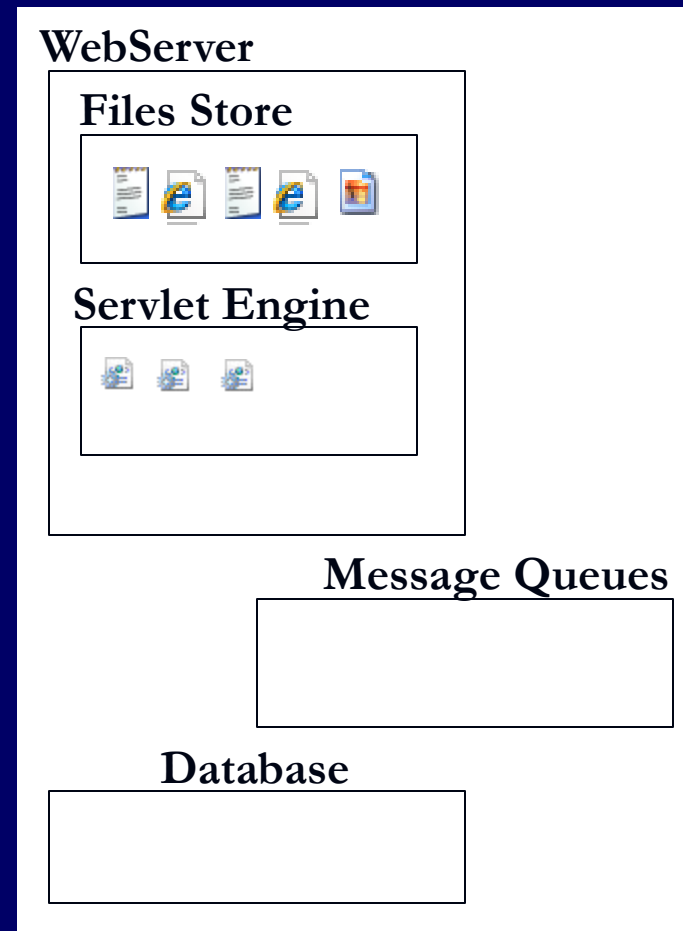
C:\Documents and Settings\Wael Aboulsaadat\Local Settings\Temporary Internet Files

# Architecture of a Web Application

## Client



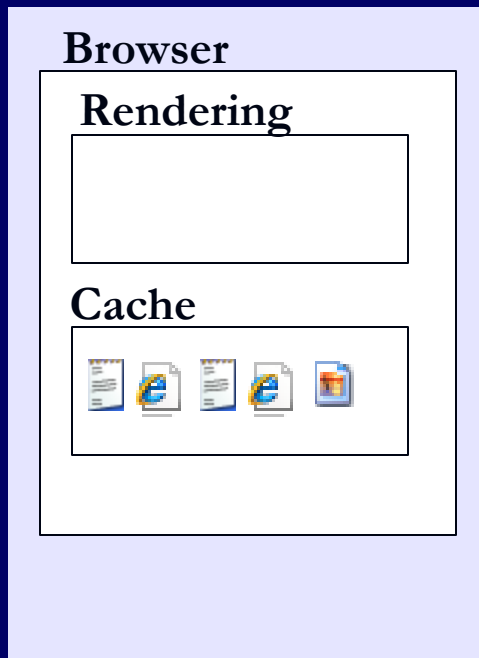
## Server





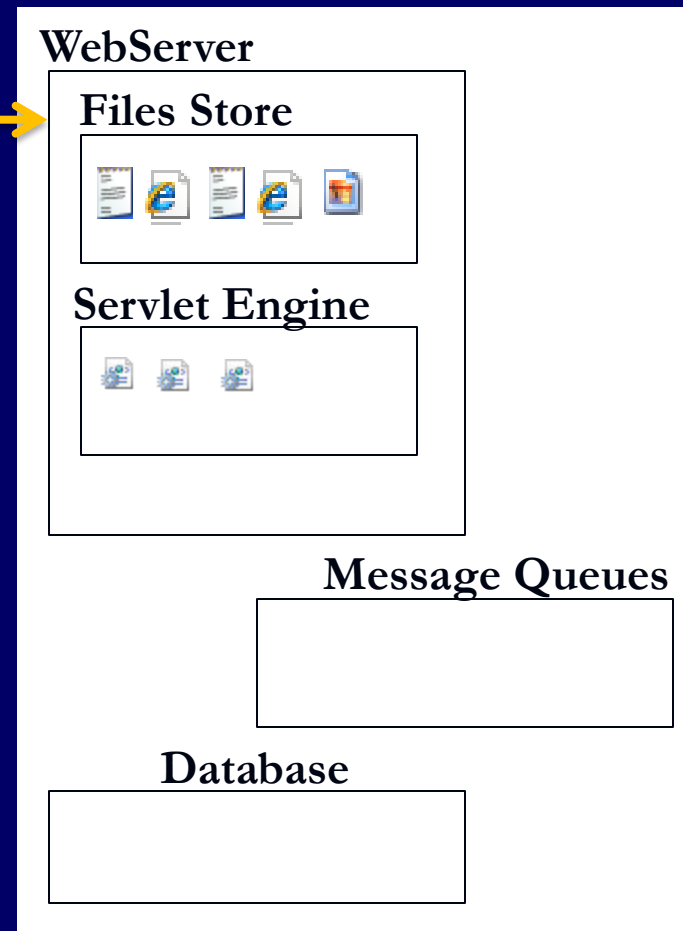
# Architecture of a Web Application

## Client



Request

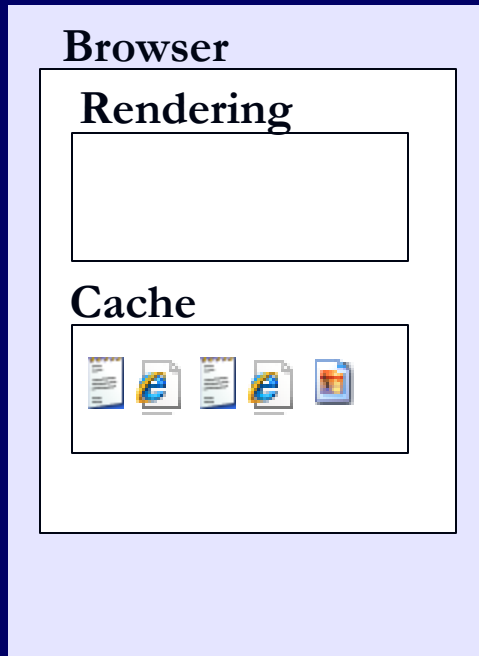
## Server





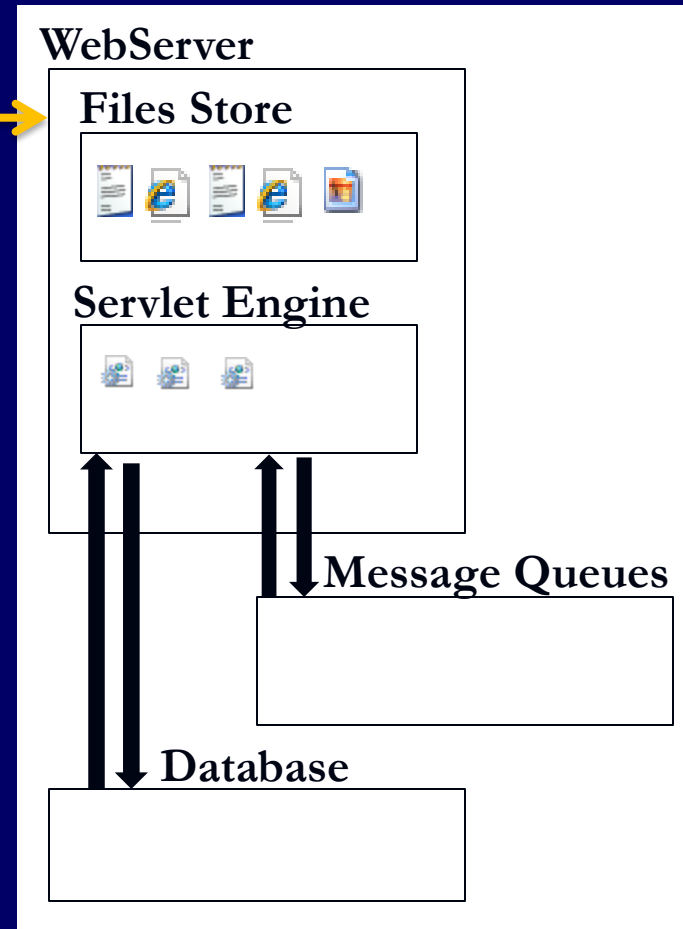
# Architecture of a Web Application

## Client



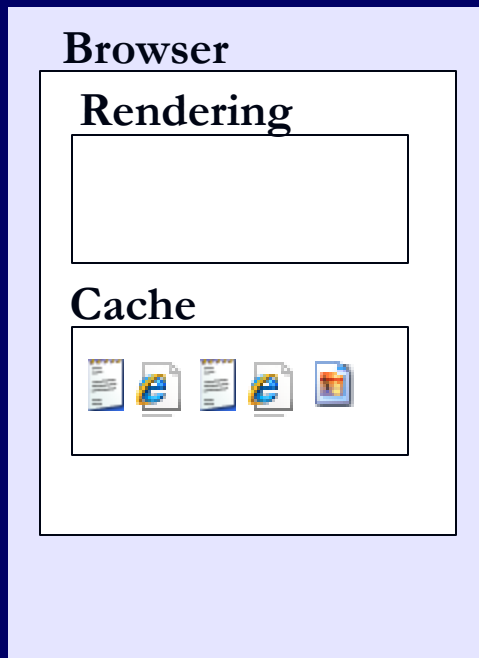
Request

## Server

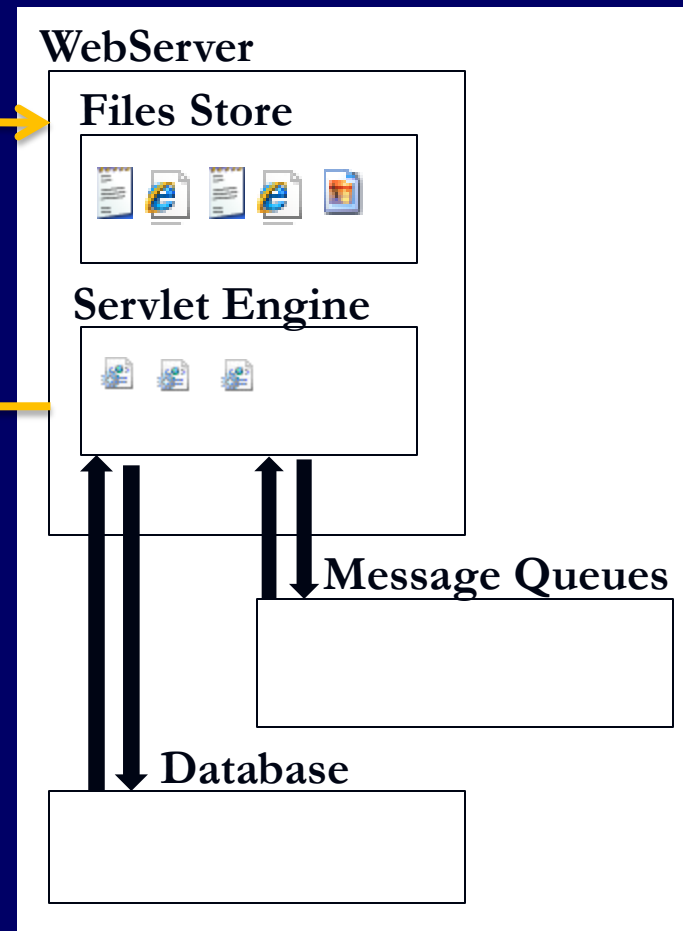


# Architecture of a Web Application

## Client



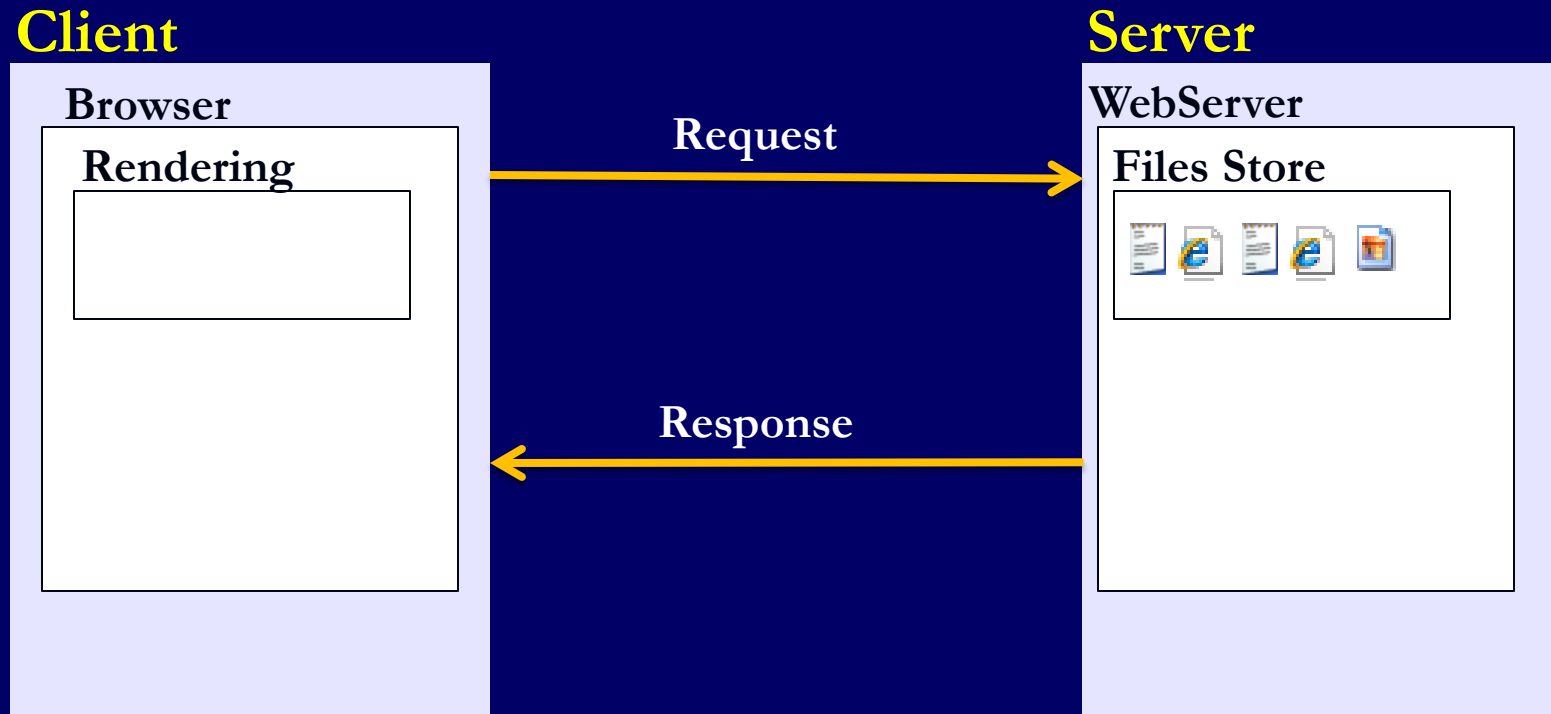
## Server



Request

Response

# A simpler model



- We need
  - 1) a communication protocol: HTTP
  - 2) A data description standard: HTML

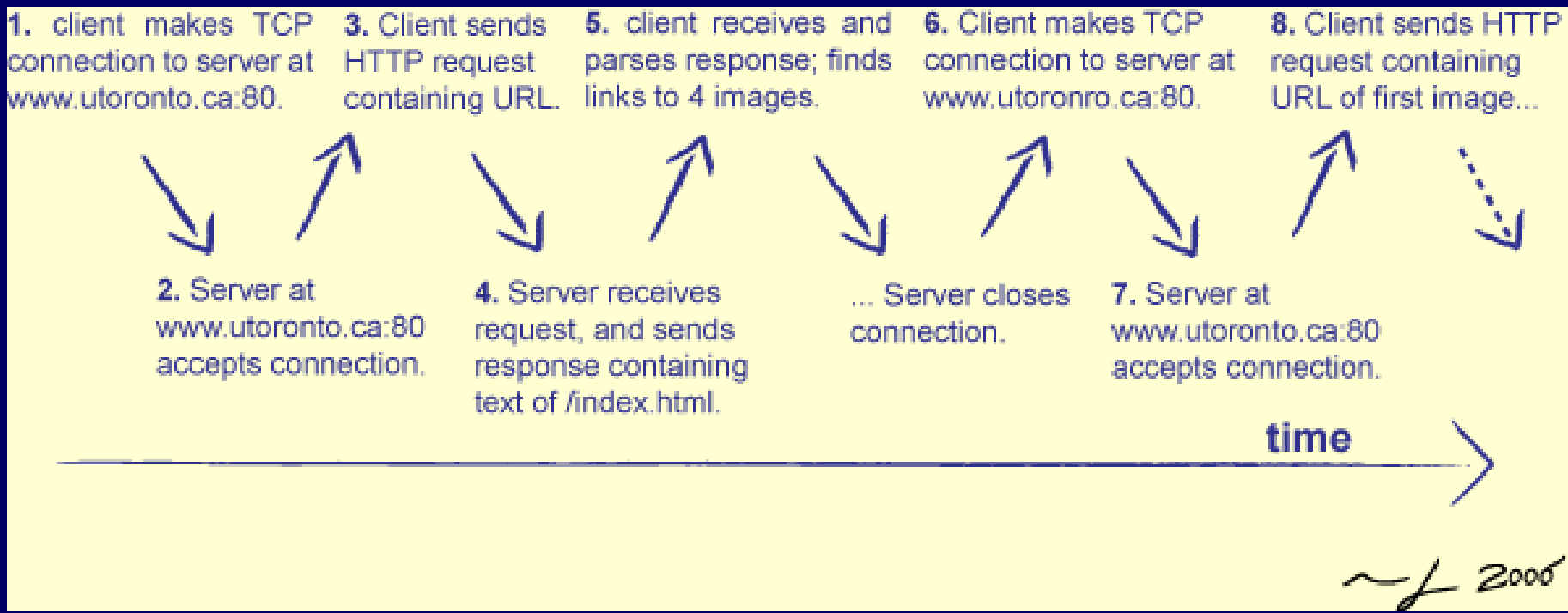


# HTTP

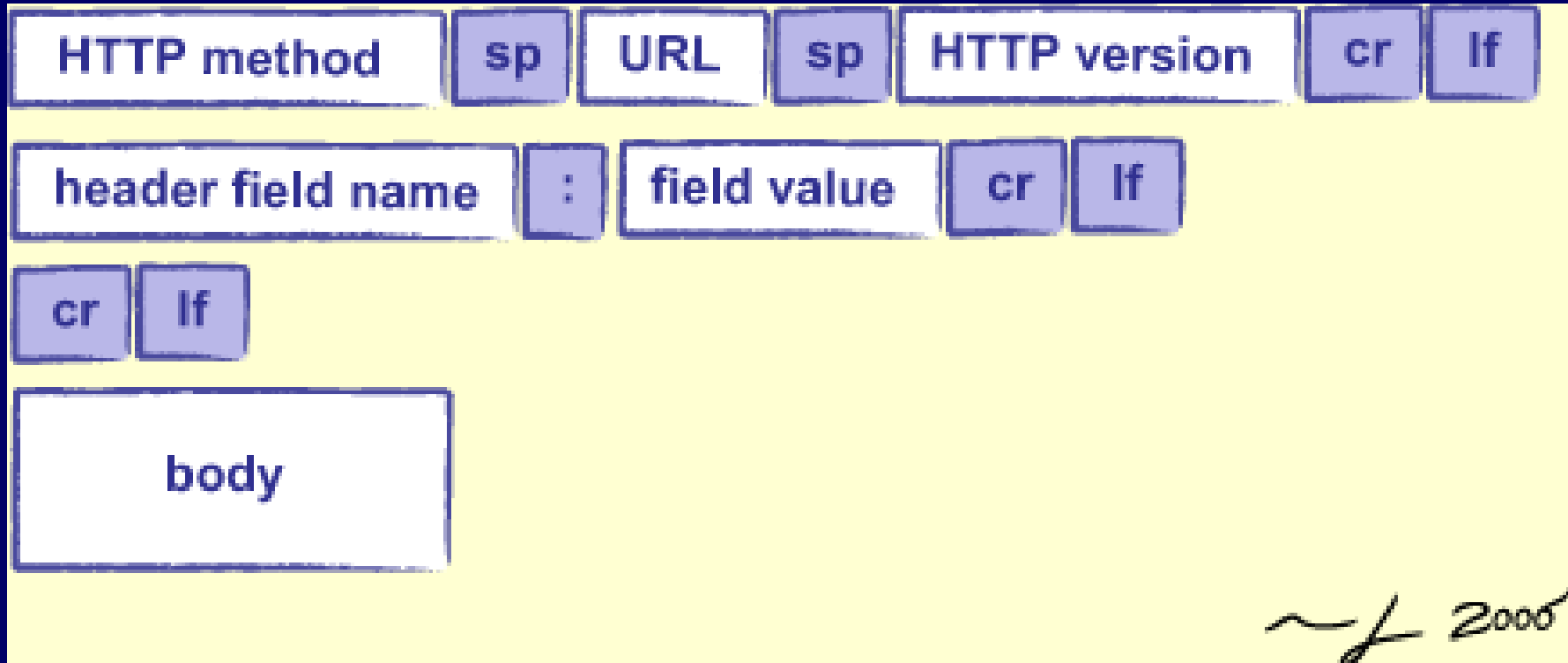
- The HyperText Transfer Protocol (HTTP) describes the kinds of messages web servers can receive and send
- HTTP is a *stateless* protocol
  - Each connection is made on its own
  - The web server doesn't automatically remember anything between connections
- Every transaction is a *request* followed by a *response*



# HTTP

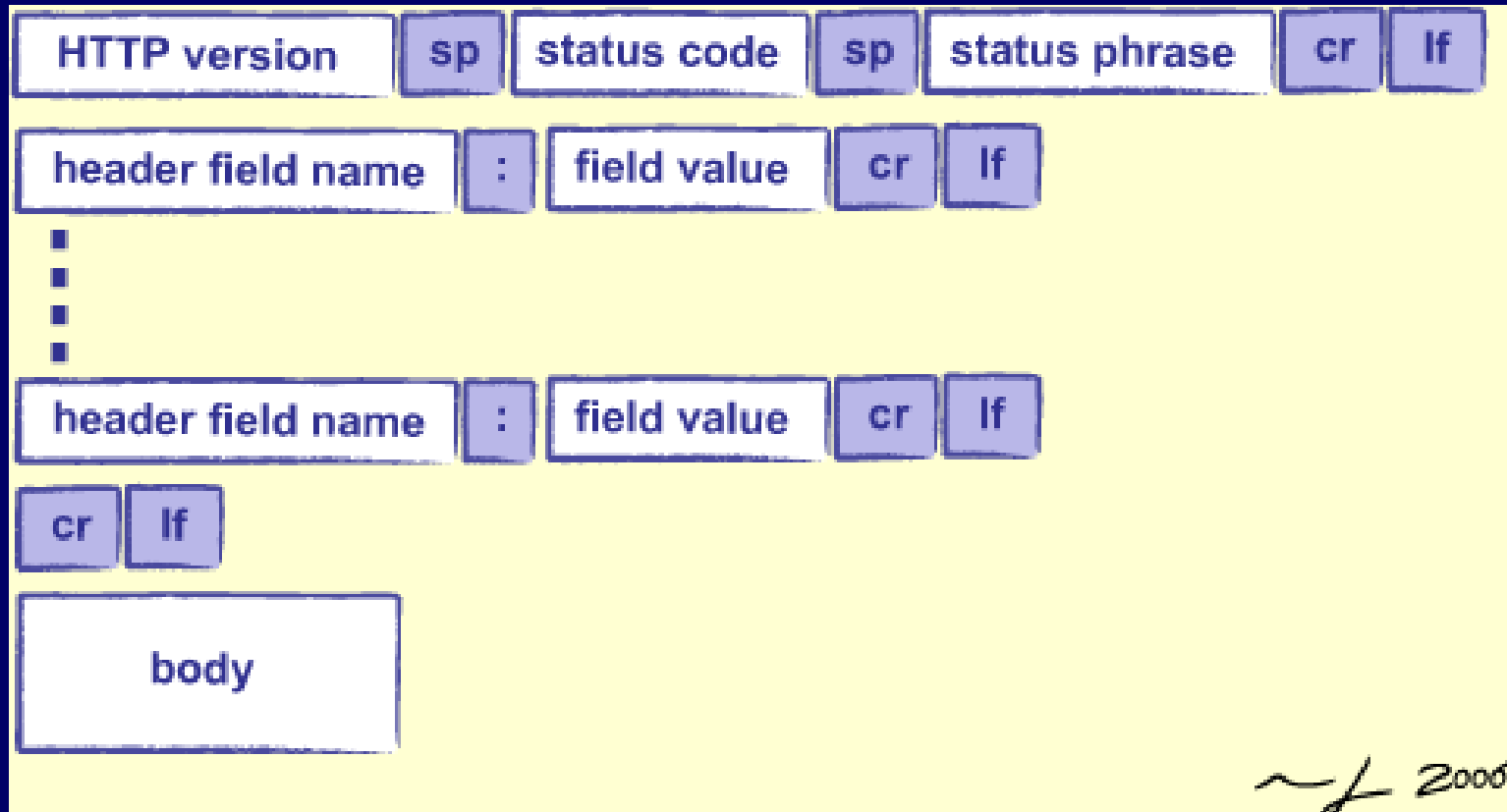


# HTTP Request





# HTTP Response





# HTTP Contents

- HTTP method is usually either:
  - GET (to fetch data)
  - POST (to submit data)
  
- URL identifies what the client wants
  - Typically a path to a file
  - But the server can interpret however it wants





# Headers

- An HTTP header is a key/value pair
  - Accept: text/html
  - Accept-Language: en, fr
  - If-Modified-Since: 16-May-2005
- Unlike a dictionary, a key may appear any number of times
  - So that a request can specify that it's willing to accept many different kinds of content
- Must be a blank line between the headers and the body!



# HTTP Example

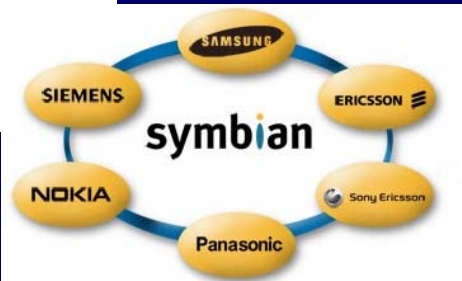
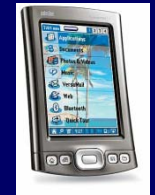
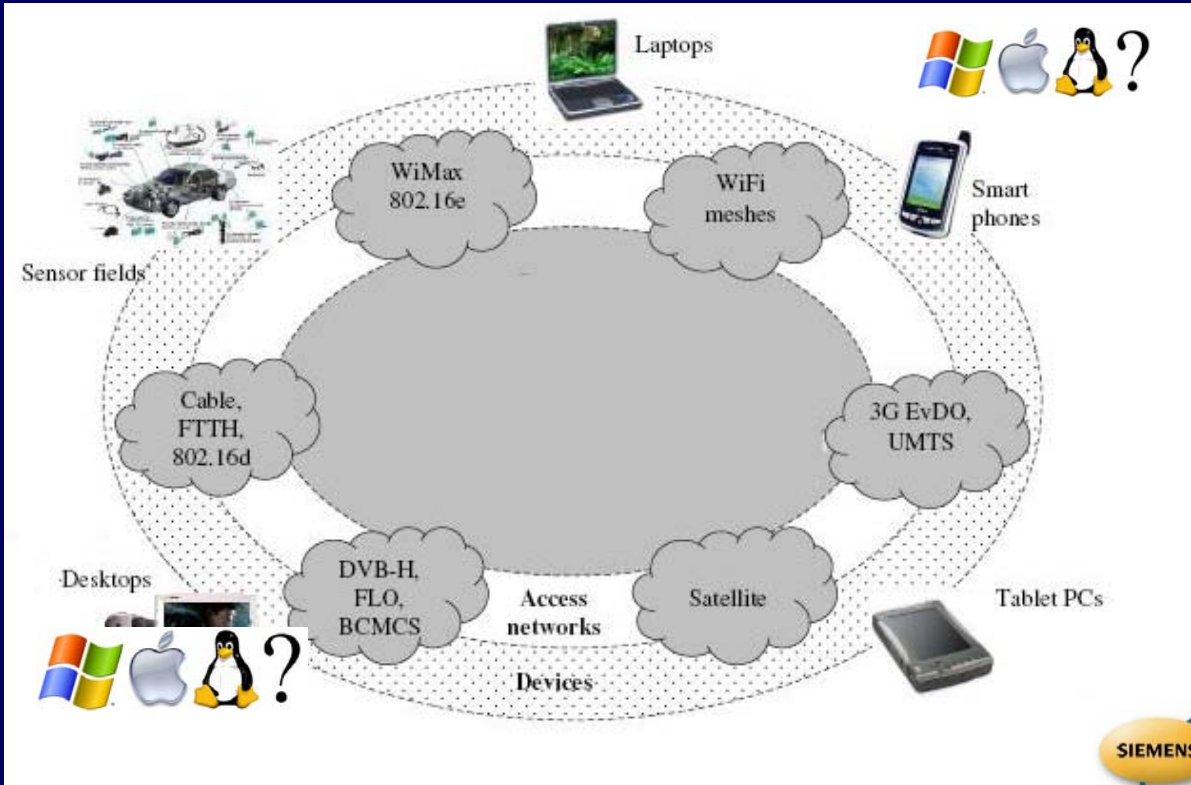
- <http://www.rexswain.com/httpview.html>



## HTML: Historical perspective

- 1989 - Tim Berners-Lee proposed a hypertext system for CERN including HTML and HTTP
- 1993 - Marc Andreessen unleashed the alpha version of Mosaic
- 1993 - (Sept) WWW traffic is 1% of the NFS backbone
- 1994 - more than 200,000 web servers
- 2002 - more than 30,000,000 web servers

# How can we exchange data between heterogeneous systems?



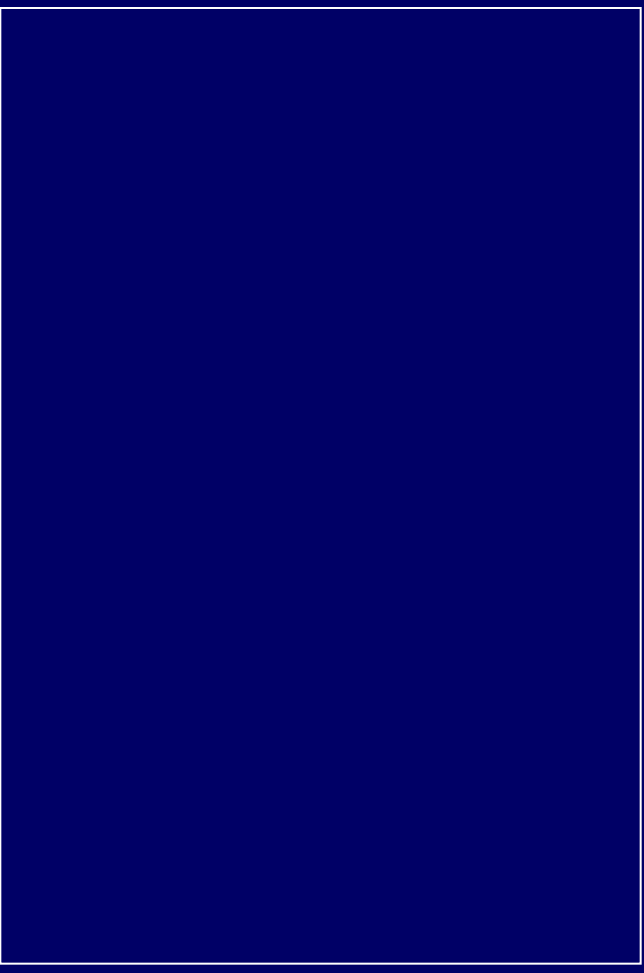
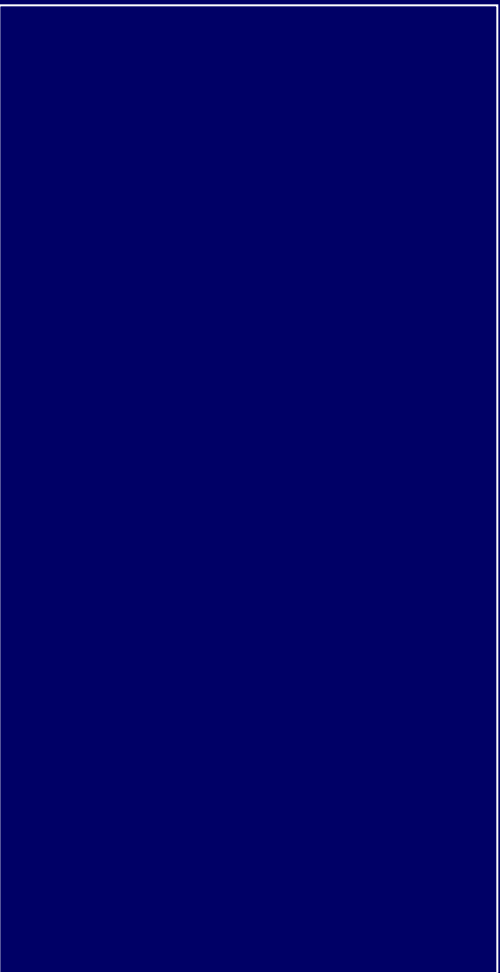


# Message in the Bottle

Degree of "self-description":  
*pretty good*



^@Some Quotations from the Universal Library^M1  
 Famous Quotes^M1.1 By William I^M[2,  
 Sonnet XVIII]^MShall I compare thee to a  
 summer's day?^MThou art more lovely and  
 more temperate.^MRough winds do shake the  
 darling buds of May,^MAnd summer's lease  
 hath all too short a date.^MSometime too hot  
 the eye of heaven shines,^MAnd often is his  
 gold complexion dimmed.^MAnd every fair  
 from fair some declines,^MBy chance or  
 nature's changing course untrimmed.^MBut thy  
 eternal summer shall not fade,^MNor lose  
 possession of that fair thou owest,^MNor shall  
 Death brag thou wander'st in his  
 shade^MWhile in eternal lines to time thou  
 growest.^MSo long as men can breathe, or  
 eyes can see,^MSo long live this, and this  
 gives life to thee.^M1.2 By William II^M[1,  
 p.265]^M\223The obvious mathematical  
 breakthrough would be development of^Man  
 easy way to factor large prime  
 numbers.^MReferences^M[1] W. H. Gates.  
 The Road Ahead. Viking Penguin, 1995.^M[2]  
 W. Shakespeare. The Sonnets of  
 Shakespeare.609.^M^@^@^@^@^@^@^@^@  
 ^@^@^@^@^@^@^@^@^@^@^@^@^@^@





# Two Important Ideas: (1) Markup?

- Information added to a text to make its structure comprehensible
- Pre-computer markup (punctuational and presentational)



# Two Important Ideas: (2) declarative

- Names and structure
- Finer level of detail (most human-legible signals are overloaded)
- Independent of presentation (abstract)
- People often call this “semantic”



# Message in the Bottle

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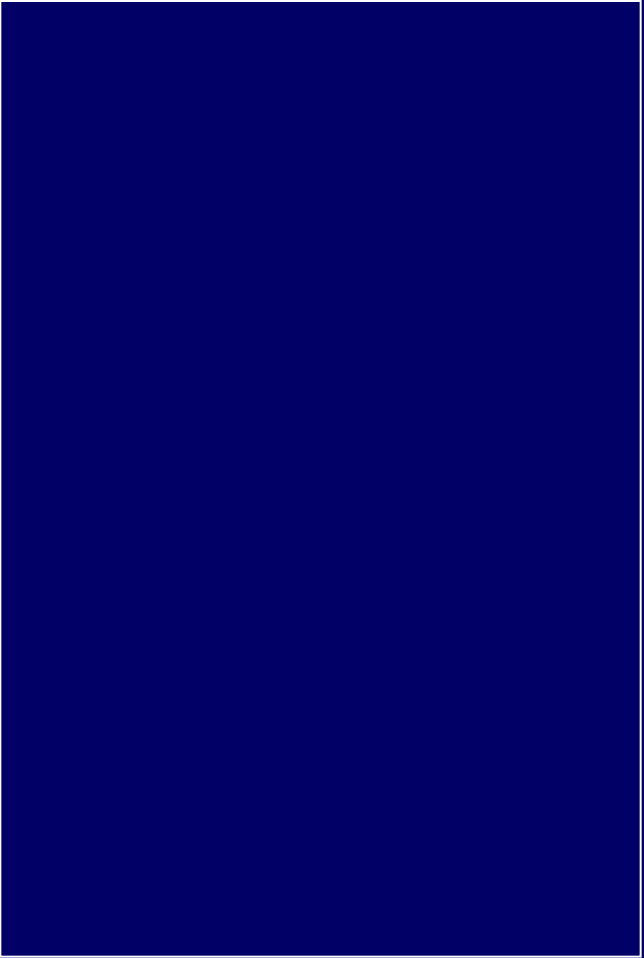


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 ^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@

```

\documentclass{article}
\begin{document}
\title{Some Quotations from the
  Universal Library}
...
\section{Famous Quotes}
\subsection{By William I}
\textbf{\cite{Sonnet
  XVIII}{shakespeare-sonnets-
  1609}}
\begin{verse}
  Shall I compare thee to a summer's
  day?\\
  Thou art more lovely and more
  temperate. \\
  Rough winds do shake the darling buds
  of May, \\
  And summer's lease hath all too short a
  date. \\
  Sometime too hot the eye of heaven
  shines, \\
  And often is his gold complexion
  dimmed. \\
...
\quad So long as men can breathe, or
  eyes can see,\\
\quad So long live this, and this gives
  life to thee. \\
\end{verse}
...
\bibliographystyle{abbrv}
\bibliography{msg}
\end{document}

```







## XML: Basic format

1) *Element*: `<tag>content</tag>`

- basic unit
- tag name defines what the content is
- opening and closing tags enclose content

2) *Attribute*: Information about the data

- Attribute names are usually adjectives
- Stored as `attribute="value"` pairs:

```
<tag attribute="value">  
    content  
</tag>
```



## Rules for well-formed XML

- Elements that contain data must have `<start>` and `</end>` tags!
- Empty tags must be closed `<some-tag />`
- Elements should not overlap  
Bad Nesting:  
`<trunk> <branch> </trunk> </branch>`
- All attribute values must be wrapped in quotes  
`<a href="newpage.html">`
- XML is case sensitive: `<TAG>` and `<Tag>` are treated differently.  
(Standard: use lower case.)



## More XML Rules

- A document begins with:

- an *XML Declaration*

```
<?xml version="1.0" encoding="UTF-8"?>
```

- and a *DocType Declaration*:

```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML  
1.0 Strict//EN"  
"http://www.w3.org/TR/xhtml1/DTD/xhtml1-  
strict.dtd">
```

- *Root element* immediately follows; encloses entire content of the document.

```
<book>  
    everything else  
</book>
```



# Message in the Bottle

Degree of "self-description":  
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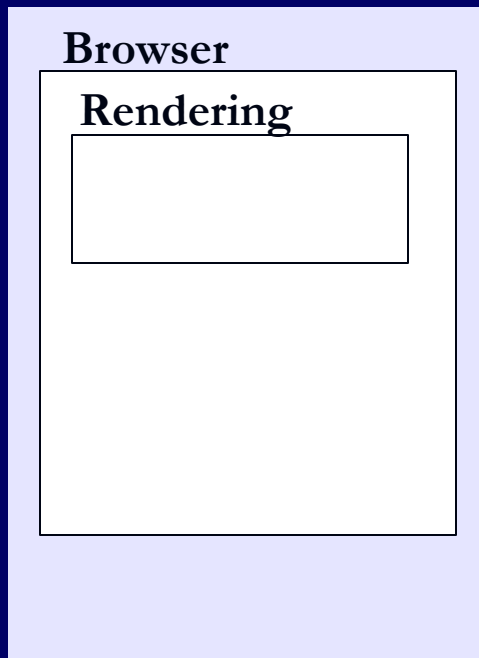
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date. \\
Sometime too hot the eye of heaven
shines, \\
And often is his gold complexion
dimmed. \\
...
\qqquad So long as men can breathe, or
eyes can see,\\
\qqquad So long live this, and this gives
life to thee. \\
\end{verse}
...
\bibliographystyle{abbrv}
\bibliography{msg}
\end{document}
```

```
<?xml version="1.0"?>
<universal_library>
<books>
<book> <title>Some Quotations from the Universal
Library</title>
<section> <title>Famous Quotes</title>
<subsection> <title>By William I</title>
<quote bibref="shakespeare-sonnets-1609">
<title>Sonnet XVIII</title>
<verse>
<line>Shall I compare thee to a summer's
day?</line>
<line>Thou art more lovely and more
temperate. </line>
<line>Rough winds do shake the darling buds of
May, </line>
</verse>
...
<subsection> <title>By William II</title>
<quote bibref="gates-road-ahead-1995">
<title>Page 265</title>
<line>` ` The obvious mathematical breakthrough
would be development of an easy way to factor
large prime numbers.`</line>
</quote>
</subsection>
</section>
</book>
...
</books>
</universal_library>
```

# HTML: an implementation of XML

## Client



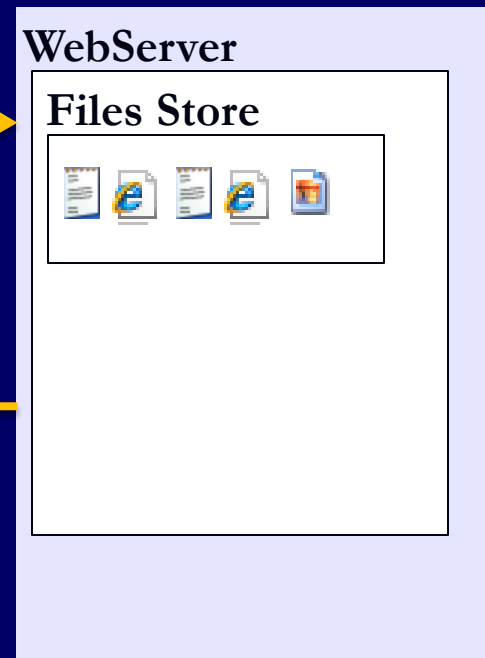
Request

`http://cnn.com/index.html`

Response

```
<html>
<head>....</head>
<body>....</body>
</html>
```

## Server





# What are HTML Tags?

- When a WWW browser displays a page it reads from a text file, and looks for special codes or "Tags" that are marked by the `<` and `>` signs
- The general format for a HTML tag is:
  - `<tag name>string of text</tag name>`
- As an example, the title for a section may use a header tag that looks like the following:
  - `<h3>What are HTML tags?</h3>`
- This tag would tell a WWW browser to display the text "What are HTML tags?" in the style of header level 3



# HTML Tags

- When programming HTML you are essentially telling the browser what to do and when to do it.
- It is like turning switches on and turning them off.



# HTML Tag Types

- HTML tags may tell a WWW browser to:
  - format the text (bold, italicize, etc.)
  - have an in-line image
- make it into a header
- have it be a link to another document
- or any number of other things





## How the Tags Work?

- The first part of the tag `<tag name>` turns the tag on
- The ending part of the tag, `</tag name>`, contains the `"/` slash character.
- This `"/` slash tells a WWW browser to stop tagging the text. Many HTML tags are paired this way. Think of the tag as a container.
- If you forget the backslash, a WWW browser will continue the tag for the rest of the text in your document, producing undesirable results.

