



# Enterprise Collaboration and Innovation Support Systems (GE/IE 498 ECI): The Semantic Web

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# Where did we leave it?

- Focus on how enterprise storage is arranged
- Cover basic notions about relational databases
- A simple example
- Set up the storage system
- Enter and query information from the storage system



# What's the plan for today?

- Giving structure to information exchange
- Markup languages
- XML basics
- The semantic web (RDF)



# Information sharing

- Relational bases hold data, but made not claim about information interoperability
- Sharing and exchanging information requires a standard (or a common language)
- For a long time there has been niche-oriented standards (e.g. EDI for banking)
- Two comfortable pair of shoes:
  - XML (extensible markup language)
  - RDF (resource description framework)





# A HTML example

```
<HTML>
```

```
<HEAD>
```

```
  <TITLE>This a test  
  page</TITLE>
```

```
</HEAD>
```

```
<BODY>
```

```
Hello world! This is a  
  simple page that show  
  some basic HTML markup  
  to describe a page.
```

```
</BODY>
```

```
</HTML>
```

Head section.

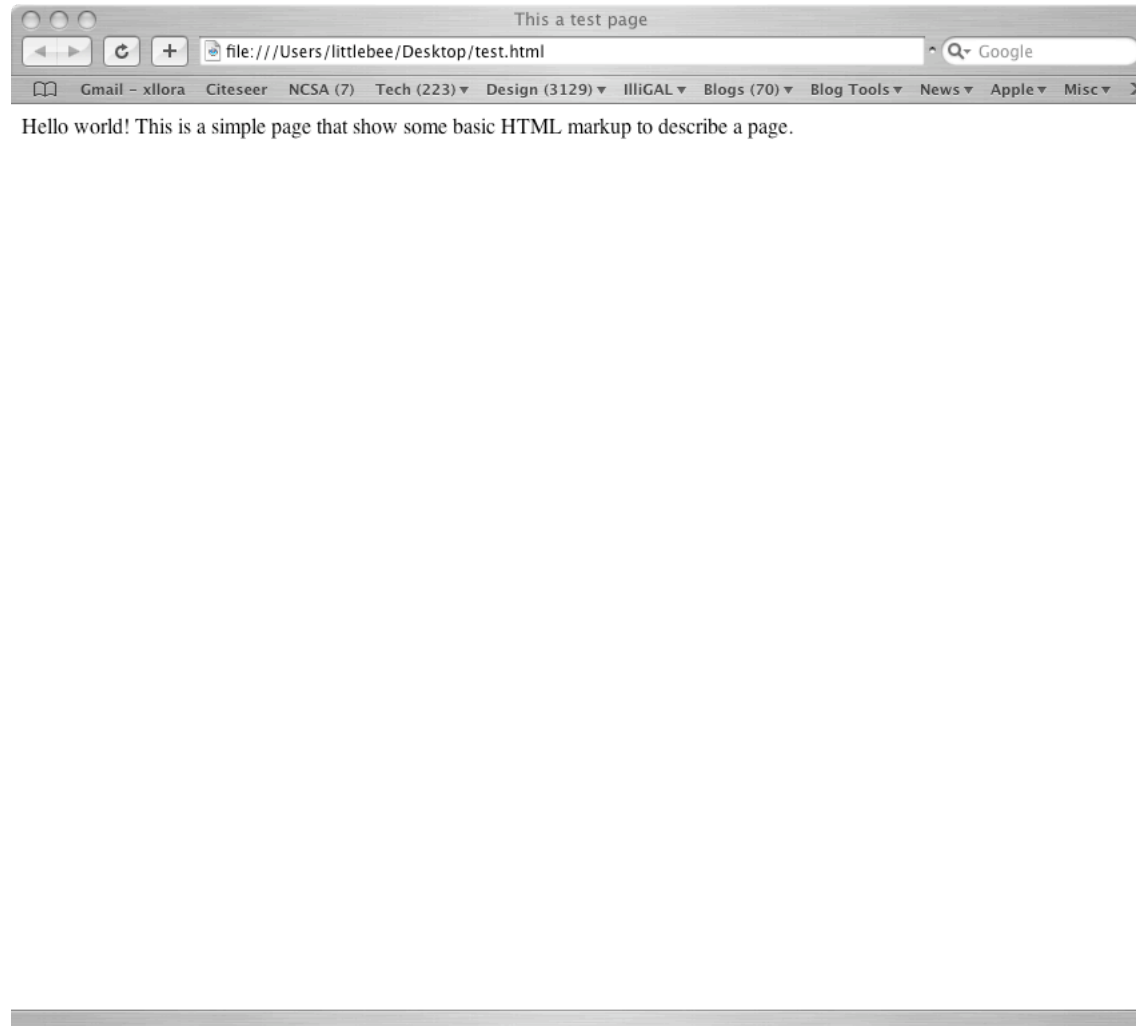
Contains metadata like the title of the page

Body section.

Contains the content to be rendered



# A HTML example





# Some basic HTML content tags

- Sectioning: `<H1>`, `<H2>`,...
- Paragraphs and line breaks: `<P>`, `<BR>`, `<HR>`
- Text presentation: `<STRONG>`, `<EM>`
- Images: `<IMG>`
- Links to other pages: `<A>`
- Tables: `<TABLE>`

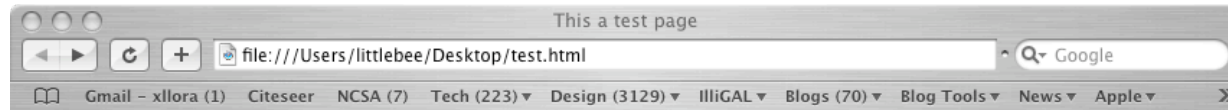


# Another HTML example

```
<HTML>
<HEAD>
  <TITLE>This a test page</TITLE>
</HEAD>
<BODY>
<H1>Presentation</H1>
<P><EM>Hello world!</EM><BR>This is a <STRONG>simple page</STRONG> that show some basic
  HTML markup to describe a page.</P>
<H1>Photos</H1>
<IMG src="http://www-illigal.ge.uiuc.edu/xllora/wp-content/uploads/me.jpg">
You can find more pictures <A href="http://www-illigal.ge.uiuc.edu/xllora">here</a>.
<H1>Table</H1>
<TABLE>
  <TR><TD>Column 1</TD><TD>Column 2</TD></TR>
  <TR><TD>Potato</TD><TD>20</TD></TR>
  <TR><TD>Onion</TD><TD>11</TD></TR>
</TABLE>
</BODY>
</HTML>
```



# Another HTML example



## Presentation

*Hello world!*

This is a **simple page** that show some basic HTML markup to describe a page.

## Photos



You can find more pictures [here](#).

## Table

Column 1	Column 2
Potato	20
Onion	11



# XML

- It is also a markup language
- Basic rules about how to markup information
- It requires to be well formed:
  - Any open tag needs to be closed
  - Proper nesting needs to be provided
  - Tags may have attributes
- General purpose
- Provide mechanisms to describe the possible markups (for instance via *document type definitions*)



# XML preliminaries

- A tag needs to be closed `<XXX> .... </XXX>`
- If a tag is empty as short version can be used `<XXX />`
- Tags may have attributes `<XXX key=value />`
- A tag may contain more tags, content with tags, or unprocessed data
- Any XML document starts with an specific header

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

where `<? ?>` are directives for the parser



# Remember the simple example?

Customer

Customer_ID	First_Name	Middle_Name	Last_Name
0	Joe	John	Doe
1	Jean	Mary	Doe
...	...	...	...
10101	Sembei	Slump	Norimaki

Order

Order_ID	Customer_ID
0	6
1	3
...	...
10101010	9

Order\_Products

Order_ID	Product_ID
0	6
1	3
...	...
10101010	9





# A simple XML

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

```
<Store>
```

```
  <Customers>
```

```
    <Customer Customer_ID="0" First_Name="Joe" Last_Name="Doe"  
      Middle_Name="John" />
```

```
    <Customer Customer_ID="1" First_Name="Jean" Last_Name="Mary"  
      Middle_Name="John" />
```

```
  </Customers>
```

```
  <Orders>
```

```
    <Order Customer_ID="6" Order_ID="0" />
```

```
    <Order Customer_ID="3" Order_ID="1" />
```

```
  </Orders>
```

```
</Store>
```





# The semantic web

- Semantic nets are designed to allow machines to infer semantics out of information
- Semantic web heavily rely on XML
- They use a standardized version of XML documents known as RDF
- Attach descriptions to resources
- Statements have the form (subject predicate object)



# An RDF Example

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

<rdf:RDF
  xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
  xmlns="http://foo.org/store/data#">
  <rdf:Description about="http://foo.org/store/data/customer/0">
    <Customer_ID>0</Customer_ID>
    <Fist_Name>Joe</Fist_Name>
    <Middle_Name>John</Middle_Name>
    <Last_Name>Doe</Last_Name>
  </rdf:Description>
</rdf:RDF>
```



