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# CS-165L SOFTWARE ENGINEERING

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Lab Manual

SESSION: 2020  
SEMESTER: 5TH

## Contents

1.1. Internet .....	11
1.2. World Wide Web (WWW) .....	11
1.2.1 Web Page and Website.....	12
1.2.2 Web Browser .....	12
1.2.3 HTML.....	12
2. Writing First Web Page in HTML.....	12
2.1 Bold Tag.....	15
2.2 Italic Tag .....	15
2.3 Hierarchical structure of HTML.....	16
2.4 Paragraph Tag .....	17
2.5 Break Tag.....	18
Attributes of tags .....	20
3.1 Hyperlink .....	21
3.2 List.....	23
3.2.1 Un-ordered List Tag.....	23
3.2.2 Ordered List Tag.....	24
3.3 HTML Tables.....	25
5.1 Html Forms.....	32
5.1.1 Text input.....	33
5.1.2 Password .....	33
5.1.3 Checkbox.....	34
5.1.4 Radio-buttons .....	35
5.1.5 Drop-Downlist .....	36
5.1.6 Button .....	1
2.2 Inline style .....	4
2.3 Embedded styling.....	6
2.4 External styling.....	7
3.1 Tag Selector.....	8
3.2 ID Selectors .....	10
3.3 Class Selectors.....	12
4.2 Background-repeat .....	18
4.3 Background-position.....	19

What is Plagiarism.....	42
FAQ.....	44
What are copyright laws?.....	44
Are all published works copyrighted? .....	45
Can facts be copyrighted? .....	45
Do I have to cite sources for every fact I use? .....	45
Does it matter how much was copied?.....	45
But can't I use material if I cite the source? .....	45
What are the punishments for plagiarism?.....	45
Does intention matter?.....	46
What is “fair use,” anyway?.....	46
What is the “public domain?” .....	47
How do I know if something is public domain or not?.....	47
What is Citation?.....	47
Identifying Sources in the Body of Your Paper .....	48
Quoting Material.....	49
Listing References .....	51
Preventing Plagiarism: Student Resources .....	57
Why Students Plagiarize .....	59
Unintentional Plagiarism .....	60
Important Terms.....	62
Bibliography A list of sources used in preparing a work .....	62
Student quick start guide.....	65
The student homepage.....	65
Assignment inbox.....	65
Submitting a paper.....	66
Viewing your Similarity Report .....	67
Viewing instructor feedback .....	67
<b>UML - Overview</b> .....	71
Goals of UML.....	71
A Conceptual Model of UML.....	71
Object-Oriented Concepts .....	72
OO Analysis and Design.....	72

Role of UML in OO Design.....	73
UML - Building Blocks.....	73
Things.....	73
Structural Things.....	74
Behavioral Things.....	74
Grouping Things .....	75
Annotational Things.....	75
Relationship.....	75
Dependency.....	75
Association.....	75
Generalization.....	75
Realization .....	76
UML Diagrams .....	76
UML - Architecture.....	76
UML - Modeling Types .....	77
Structural Modeling .....	77
Behavioral Modeling.....	77
Architectural Modeling.....	77
UML - Basic Notations.....	78
Structural Things.....	78
Class Notation.....	78
Object Notation.....	79
Interface Notation .....	79
Collaboration Notation.....	79
Use Case Notation.....	80
Actor Notation .....	80
Initial State Notation.....	80
Final State Notation.....	81
Active Class Notation.....	81
Component Notation.....	81
Node Notation .....	81
Behavioral Things .....	82
Interaction Notation.....	82

State Machine Notation.....	83
Grouping Things .....	84
Package Notation.....	84
Annotational Things.....	84
Note Notation .....	84
Relationships.....	84
Dependency Notation.....	84
Association Notation.....	85
Generalization Notation .....	85
Extensibility Notation.....	85
UML - Standard Diagrams.....	86
Structural Diagrams .....	86
Class Diagram.....	87
Object Diagram.....	87
Component Diagram.....	87
Deployment Diagram.....	87
Behavioral Diagrams.....	87
Use Case Diagram.....	88
Sequence Diagram .....	88
Collaboration Diagram.....	88
Statechart Diagram.....	88
Activity Diagram .....	88
UML - Class Diagram.....	88
Purpose of Class Diagrams.....	89
How to Draw a Class Diagram? .....	89
Where to Use Class Diagrams? .....	90
UML - Object Diagrams.....	91
Purpose of Object Diagrams .....	91
How to Draw an Object Diagram? .....	91
Where to Use Object Diagrams? .....	93
UML - Component Diagrams.....	93
Purpose of Component Diagrams .....	93
How to Draw a Component Diagram? .....	94

Where to Use Component Diagrams? .....	95
UML - Deployment Diagrams.....	95
Purpose of Deployment Diagrams .....	96
How to Draw a Deployment Diagram? .....	96
Where to Use Deployment Diagrams? .....	97
UML - Use Case Diagrams .....	98
Purpose of Use Case Diagrams .....	98
How to Draw a Use Case Diagram?.....	98
Where to Use a Use Case Diagram?.....	99
UML - Interaction Diagrams.....	100
Purpose of Interaction Diagrams.....	100
How to Draw an Interaction Diagram? .....	101
The Sequence Diagram .....	101
The Collaboration Diagram .....	102
Where to Use Interaction Diagrams? .....	102
UML - Statechart Diagrams.....	103
Purpose of Statechart Diagrams.....	103
How to Draw a Statechart Diagram? .....	104
Where to Use Statechart Diagrams? .....	105
UML - Activity Diagrams.....	105
Purpose of Activity Diagrams .....	105
How to Draw an Activity Diagram?.....	106
Where to Use Activity Diagrams? .....	107
What is GitHub? .....	109
No coding necessary .....	110
Step 1. Create a Repository.....	110
To create a new repository .....	110
Step 2. Create a Branch.....	111
To create a new branch .....	112
Step 3. Make and commit changes .....	113
Make and commit changes.....	114
Step 4. Open a Pull Request.....	114
Open a Pull Request for changes to the README.....	115

Step 5. Merge your Pull Request .....	118
Celebrate! .....	118
Software Project.....	120
Need of software project management.....	120
Software Project Manager.....	121
Managing People .....	121
Managing Project .....	121
Software Management Activities.....	122
Project Planning .....	122
Scope Management.....	122
Project Estimation.....	122
Project Estimation Techniques .....	123
Decomposition Technique .....	123
Empirical Estimation Technique.....	123
Project Scheduling .....	124
Resource management .....	124
Project Risk Management.....	124
Risk Management Process .....	125
Project Execution & Monitoring.....	125
Project Communication Management.....	125
Configuration Management .....	126
Baseline.....	126
Change Control .....	126
Project Management Tools .....	127
Gantt Chart.....	127
PERT Chart.....	127
Resource Histogram.....	128
Critical Path Analysis .....	129
Chapter 1: Introduction .....	136
Project Description: .....	136
Scope:.....	136
Vision:.....	136
Work Break Down Structure: .....	136

Timeline/ Gantt Chart: .....	137
Chapter 2: Requirements.....	138
1. Functional requirements: .....	138
2. Business requirements: .....	138
3. Business rules: .....	138
4. User requirements: .....	138
5. Non-functional requirements: .....	138
6. External interfaces: .....	138
7. Physical product Requirements:.....	138
8. Development constraints.....	139
9. Wireframes:.....	139
10. High Level and Low Level Story Boards: .....	139
Chapter 3: Design .....	139
1. Class Diagram:.....	139
2. Use Case Diagram (with detailed use cases): .....	139
3. Object Diagram:.....	139
4. Package Diagram: .....	139
5. Sequence Diagrams:.....	139
6. Collaboration Diagrams: .....	140
7. Deployment Diagram:.....	140
8. Component Diagram:.....	140
9. Activity Diagrams:.....	140
10. State chart Diagrams: .....	140
Chapter 4: Testing.....	140
Test Cases: .....	140
Chapter 5: User Interface .....	141
Screenshots of the software: .....	141

**CLOs:**

**CLO1** Evaluate Requirements and Design software systems using common software principles and industry known tools

**CLO2** Implement, in a programming language, an executable solution to a given problem using best practices.

**CLO3** Apply appropriate software testing techniques and evaluate the quality of a software product at module, integration and system granularity levels.

**CLO4** Collaborate in teams for development of significantly sized software system.

**CLO5** Comply with Plagiarism Policies

**Project Rubrics Table**

Assessments	CLOs	0-5	6-10	10-15
<b>Introduction</b>	1	Project Description, Scope, Vision, Work Break Down Structure, Timeline/ Gantt Chart		
<b>Requirements</b>	1	Poorly defined the following requirements: 1. Functional 2. Business 3. Business rules 4. User requirement 5. Non-functional 6. External interface 7. Physical product 8. Development constraints 9. Wireframes 10. High Level and Low Level Story Boards	Properly defined the following requirements: 1. Functional 2. Business 3. Business rules 4. User requirement 5. Non-functional 6. External interface 7. Physical product 8. Development constraints 9. Wireframes 10. High Level and Low Level Story Boards	
<b>Design</b>	2	Poorly made these UML Diagrams 1. Class Diagram 2. Use Case Diagram (with detailed use cases) 3. Object Diagram 4. Package Diagram 5. Sequence Diagrams	Properly made these UML Diagrams 1. Class Diagram 2. Use Case Diagram (with detailed use cases) 3. Object Diagram 4. Package Diagram 5. Sequence Diagrams	

		<p>6. Collaboration Diagrams</p> <p>7. Deployment Diagram</p> <p>8. Component Diagram</p> <p>9. Activity Diagrams</p> <p>10. State chart Diagrams</p>	<p>6. Collaboration Diagrams</p> <p>7. Deployment Diagram</p> <p>8. Component Diagram</p> <p>9. Activity Diagrams</p> <p>10. State chart Diagrams</p>	
<b>Testing</b>	1, 2, 4	Poorly defined Unit testing, Integration Testing, System Testing, Acceptance Testing and Non-Functional Testing	Poorly defined Unit testing, Integration Testing, System Testing, Acceptance Testing and Non-Functional Testing	
<b>User Interface (HTML, CSS)</b>	2, 4	A working website with few functionality	A working website with few functionality	A complete working website

# **Software Engineering**

## **Lab Manual**

### **Lab 1**

#### **INRODUCTION TO HTML**

## **1.1. Internet**

Internet is an important source of information sharing. Internet means **International Network**. When we share different resources (resources includes information and hardware both) between more than one computers it is called Network and the way of sharing resource among all computers of the world is called Internet. Internet is a global system of interconnected computer networks. Internet is such a network where millions of private, public, academic, business, local and government networks are linked to each other or in other words we can say that internet is collection of many networks.

The Internet carries a vast range of information and services. One of the greatest things about the Internet is that nobody really owns it. It is a global collection of networks, both big and small. These networks connect together in many different ways to form the single entity that we know as the **Internet**.

Via internet you can send and receive e-mail. You can chat with text or voice. You can browse the World Wide Web. And you can perform countless other tasks with the appropriate software.



Internet (a network of networks) [1.1]

## **1.2. World Wide Web (WWW)**

The World Wide Web, or simply Web, is a way of accessing information over the medium of the

Internet. It is an information-sharing model that is built on top of the Internet. We access the Document using URLs (Universal Resource Locators). For example <http://www.google.com> is URL where http is name of protocol and [www.google.com](http://www.google.com) is address of document that we want to view.

### 1.2.1 Web Page and Website

A document over the WWW is call **web-page** it may contain text, images, videos. It may also contain the links to other web pages these links are called Hyperlinks. If we want to write a webpage then we have to do it in HTML. This is language which we use to create web-pages. A **website** is collection of related web-pages. When same kind of web-pages combine and put under into one name that is called website.

### 1.2.2 Web Browser

Web browser is a program that is used to view a web-page/website. We write URL(address) of website that we want to view in address bar of web browser and it will take us to that website. There are different web browsers are available like Internet Explorer (IE), Google chrome, Mozilla Firefox. We can use any of them.

### 1.2.3 HTML

As in last section we discuss that HTML is language that use to create web-pages. HTML stands for Hyper Text Markup Language. Remember it is not a programming language it is a mark up language. HTML documents contain **HTML tags** and plain text.



Fig 1.2 Web-browser and its elements

## 2. Writing First Web Page in HTML

Tags: In html we use **tags** to tell web browser how to show web-page. Everything in html file that start with "<" and end with ">" is called tag. For example <html> , <head> and <body>.

Every HTML page start with <html> and ends with </html> tags. First tag <html> is called opening of tag and second one </html> is called closing of tag. All remaining tags used for developing the web page will be written in these two tags

There are two sub portion of <html> tag one is <head> </head> and other is <body> </body> Both body and head tags have their own uses. The information that we want to show to user should be written

inside opening and closing tags of **body tag**. The purpose of head tag will be discussed in some other course.

We have enough background knowledge to start our first website.

1. **Task:** Open Notepad (Go to start menu click at run and type Notepad )

**Explanatory Note:** To make web site we can use any Text editor .there are many text editors available on the internet: Textpad, notepad++. For this course we will use notepad.

2. **Task:** Write following line of code into text editor.

<p>code</p> <pre>&lt;html&gt; &lt;head&gt; &lt;/head&gt; &lt;body&gt; Its my first webpage &lt;/body&gt; &lt;/html&gt;</pre>	<p>In this code some text is included in body opening and closing tags Whatever written inside &lt;body&gt; tag show to user.</p>
--	---

3. **Task :** Now Save html file (Press ctrl+s) . Type any name for the file and don't forget to change the extension from .txt to html or htm. Also choose All File option from bottom **[important]**.

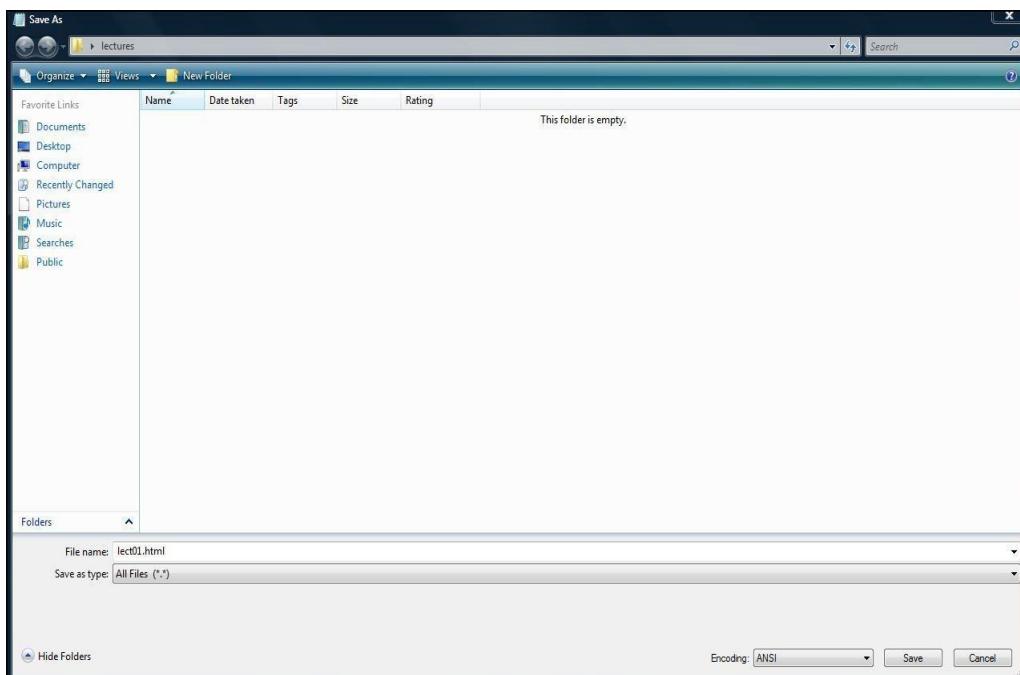
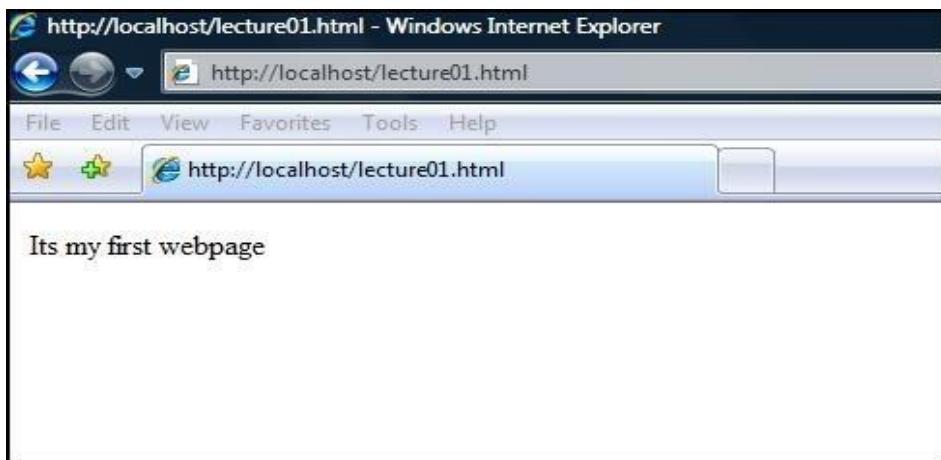


Fig 1.3 Choose a file name and file type

4. Open the file in any web browser by double clicking on it and the output will be:



**Note 1:** Now whenever you need to make changes to your HTML file you can open this file in notepad and make changes and then save it. If you want to view these changes just open this file in your web browser.

**Note 2:** The browser does not display the HTML tags, but uses the tags to interpret the content of the page.

In last we saw how to create a simple web page. We can do lot more than that for example we can bold the text , italic the text and add pictures on web page. In this we get familiar with more html tags; **<b>** , **<i>** , **<p>** , **<br>** .

## 2.1 Bold Tag

**<b>** tag is used to bold the text. Any text written in opening and closing tags of html will get bold.

3. **Task:** Open your html file in Notepad

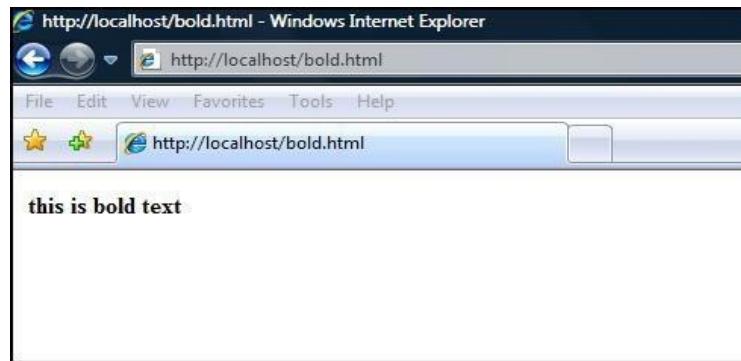
4. **Task:** Write following line of code into text editor.

```
<html>
<body>
< b>
this is bold text
</b>
</body>
</html>
```

In this code b tag is included in body tag and some text is written in the b tag. This text text will be displayed as bold.

5. Now Save html file (Press ctrl+s) .

6. Open the file in any web browser by double clicking on it and the output will be:



## 2.2 Italic Tag

**<i>** tag is used to italicize the text. Any text written in opening and closing tags of html will get italic.

1. **Task:** Open your html file in Notepad

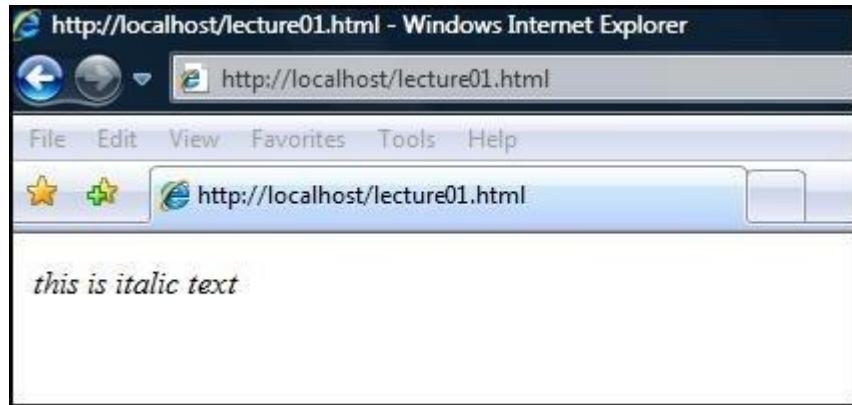
2. **Task:** Write following line of code into text editor.

```
<html>
<body>
<i>
this is italic text
</i>
</body>
</html>
```

In this code i tag is included in body tag and some text is written in i tag. Resultantly this is italic text will be displayed as italicized.

3. Now Save html file (Press ctrl+s) .

4. Open the file in any web browser by double clicking on it and the output will be:



## 2.3 Hierarchical structure of HTML

One thing which is very important to know is that we can use a tag inside another tag.

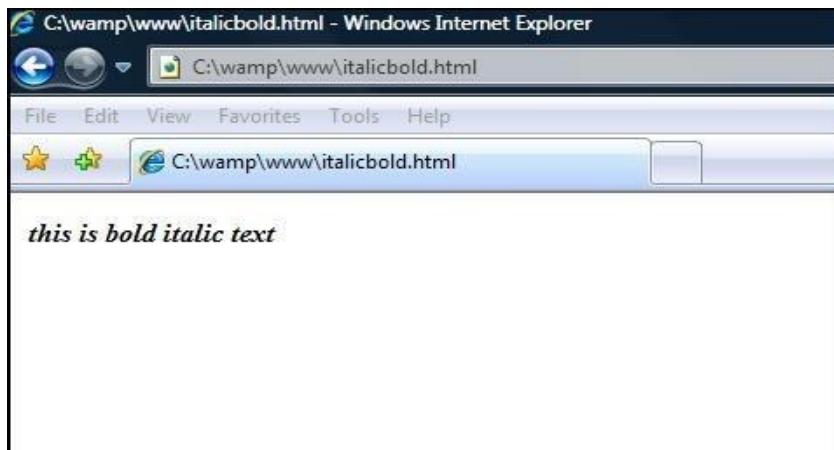
1. **Task:** Open your html file in Notepad
2. **Task:** Write following line of code into text editor.

```
<html>
<body>
<b>< i > this is bold text </i>
</b></body>
</html>
```

In this code i & b tags are included in body tag and some text is written in the innermost tag. Text will take a combined effect from these tags and result will be an italic bold text.

3. Now Save html file (Press **ctrl+s**).

4. Open the file in any web browser by double clicking on it and the output will be:



**Explanatory Note:** That means when we use tag inside tags. Important is inner tag should be closed before the outer tag. You can not write something **<b><i> italic text </b> </i>** this is incorrect method. If a tag open inside another tag then it should be close before opening tag. Correct way to write above is **<b><i>italic text</i></b>**

## 2.4 Paragraph Tag

**<p>** is called paragraph tag. It is used to write a paragraph.

**<p>** tag leaves a line break before and after it.

1. **Task:** Open your html file in Notepad

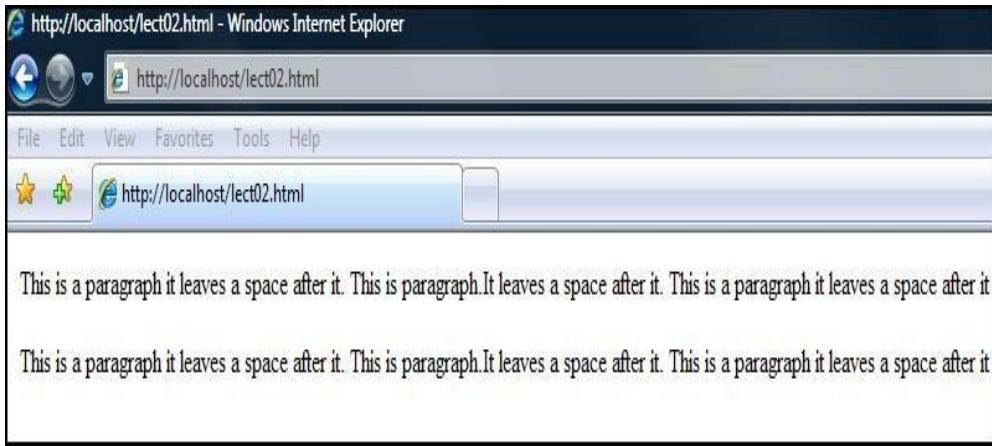
2. **Task:** Write following line of code into text editor.

```
<html>
<body>
<p>
This is a paragraph it leaves a space after it.
This is paragraph.It leaves a space after it.
This is a paragraph it leaves a space after it
</p>
<p>
This is a paragraph it leaves a space after it.
This is paragraph.It leaves a space after it.
This is a paragraph it leaves a space after it
</p>
</body>
</html>
```

In this code some text is separately included in two p tags. These paragraphs will be displayed with one space between them. As p tag leave one line before it and one line after it text

3. Now Save html file (Press ctrl+s).

4. Open the file in any web browser by double clicking on it and the output will be:



## 2.5 Break Tag

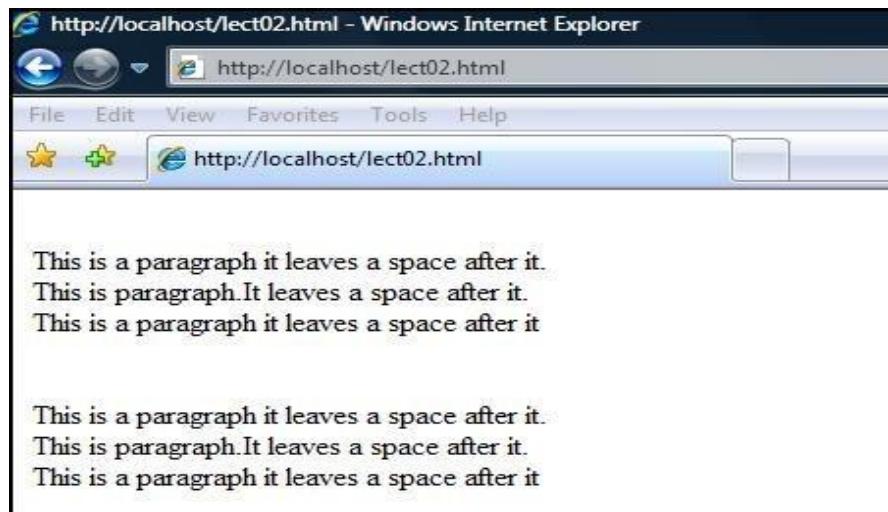
<br> is called break tag. It is used to give a line break after it.

1. **Task:** Open your html file in Notepad
2. **Task:** Write following line of code into text editor.
3. Now Save html file (Press ctrl+s) .

```
<html>
<body>
<p>
<br/>This is a paragraph it leaves a space after it.<br/>
This is paragraph.It leaves a space after it.<br/>
This is a paragraph it leaves a space after it
</p>
<p>
<br/>This is a paragraph it leaves a space after it.<br/>
This is paragraph.It leaves a space after it.<br/>
This is a paragraph it leaves a space after it
</p>
</body>
</html>
```

In this code some text is separately included in two p tags. And a break tag is also included in these tags. Due to br tag a space will be introduced before the stuff where br tag is placed.

4. Open the file in any web browser by double clicking on it and the output will be:



## Attributes of tags

All html tags have a number of attributes. It includes id, class, style etc.id attribute is used to assign a unique value to an element or tag. Class attribute is used to give a unique class name to an element.

### 2.6 Image tag

To put an image on a web page <img> tag is used. For this purpose the attribute of <img> tag that is necessarily be used is src. Src attribute is used to give the path to the image.

1. **Task:** Open your html file in Notepad

2. **Task:** Write following line of code into text editor.

```
<html>
<head> </head>
<body>
Here is image that we have added using img tag.

</body>
</html>
```

Here we have used an image tag to display an image in the browser. "src" property of <img> tag is used to give path of the image

3. Now Save html file (Press ctrl+s) .

4. Open the file in any web browser by double clicking on it and the output will be:



**Note:** Path of the image will be given in this way only when image is located in the same folder as the html document.

Image tag has some other attributes like width and height which are used to control the dimensions of the images that is to be displayed. In this we will learn about some more tags of html that includes links and list tags i.e. `<a>`, `<ul>`, `<ol>`

### 3.1 Hyperlink

We can link pages using hyperlink tag. Linking mean we can go from one web page to other by simply clicking on it. In `<a>` tag `a` stands for anchor. And `<a>` tag must use its attribute `href` to give the website address in it.

5. **Task:** Open your html file in Notepad

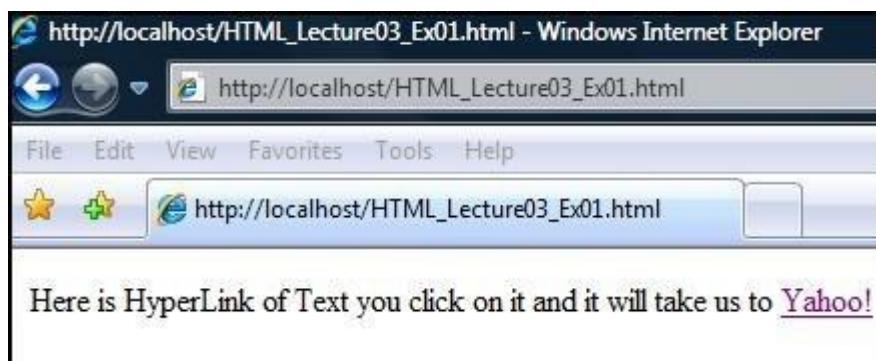
6. **Task:** Write following line of code into text editor.

```
<html>
<head></head>
<body>
Here is HyperLink of Text you click on it
and it will take us to
<a href="http://www.yahoo.com">
Yahoo!
</a>
</body>
</html>
```

In this code a link is applied to text. `href` attribute of anchor tag is used to give URL of the web page. As shown in the last step of this task yahoo is shown as a link to a web page clicking it will take you to yahoo.com

7. Now Save html file (Press `ctrl+s`).

8. Open the file in any web browser by double clicking on it and the output will be:



Up till now we learned to make a hyperlink on a text now we proceed by making a hyperlink over an image. It can be done very easily. As we have already talked in the html hierarchy that we can use a tag within another tag.

To create a link to an image we will use image tag inside the anchor tag.

1. **Task:** Open your html file in Notepad
2. **Task:** Write following line of code into text editor.

```
<html>
<head></head>
<body>
Here is image with hyperlink when you
click at image it will take you to yahoo.com
<br><a href="http://www.yahoo.com">

</a>
</body>
</html>
```

In this code a link is made to yahoo.com web page but this time we have applied link to an image. By clicking on image you can open yahoo.com

3. Now Save html file (Press ctrl+s).
4. Open the file in any web browser by double clicking on it and the output will be:



**Explanatory Note:** Now when you open html file in your browser ,you will see the image whose path has been gave in src attribute now if you place your mouse on displayed image it will change its shape form arrow to hand. By clicking over it you will be directed to the page whose address is given in href attribute. In this case it is yahoo.com.

## 3.2 List

Sometimes we need to show information in numbering or in bullets format. For this html provide us un-order list <ul> and ordered <ol> list.

### 3.2.1 Un-ordered List Tag

HTML offers authors several mechanisms for specifying lists of information. To present list of Information in bulleted format we can use <ul> tag.

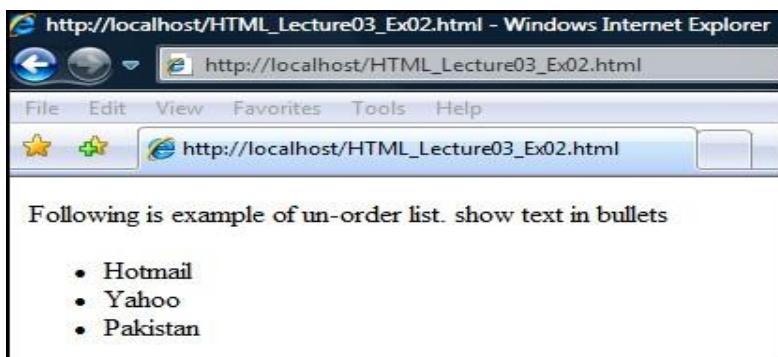
1. **Task:** Open your html file in Notepad
2. **Task:** Write following line of code into text editor.

```
<html>
<head>  </head>
<body>
Following is example of un-order list.
show text in bullets
<ul>
<li>Hotmail</li>
<li>Yahoo</li>
<li>Pakistan</li>
</ul>
</body>
</html>
```

In this example we have presented a list of information in the bullet ed form.

Default bullet is a circular.

3. Now Save html file (Press ctrl+s).
4. Open the file in any web browser by double clicking on it and the output will be:



**Note:** There are different styles of bullets like square ,disc, circle. But customized bullets can be used.

### 3.2.2 Ordered List Tag

To present list of Information in numbering format we can use <ol> tag.

1. **Task:** Open your html file in Notepad

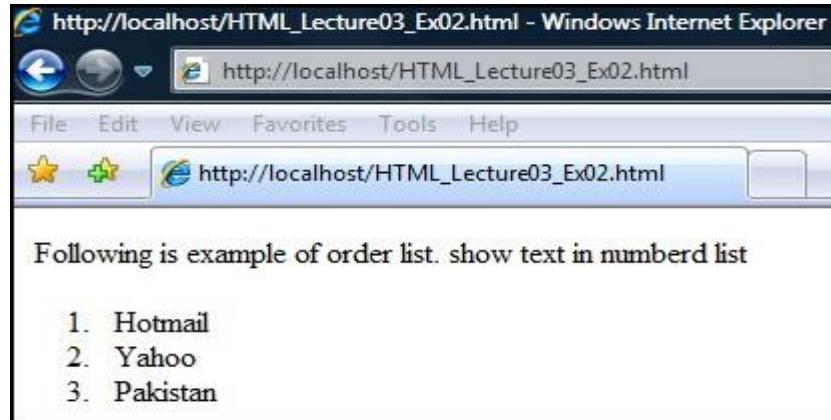
2. **Task:** Write following line of code into text editor.

```
<html>
<head>  </head>
<body>
Following is example of order list.
show text in numberd list <br>
<ol>
<li> Hotmail </li>
<li> Yahoo </li>
<li> Pakistan </li>
</ol>
</body>
</html>
```

In this example we have presented a list of information in the Numbered form. Default Numbering is 1,2,3.....

3. Save html file (Press ctrl+s).

4. Open the file in any web browser by double clicking on it and the output will be:



**Note:** To specify the type of the numbering, type attribute of the <ol> is used.

For different styles of numbering there are three built in types of bullets like A, i, 1.

### 3.3 HTML Tables

HTML also have table tag. Mostly this tag is use to show the data in tabular form. Content that is appearing on a web page can be included in a html table. This is called tabular form. As a table contain rows and columns. In html, to present the rows in a table `<tr>` tag is used, `<tr>` tag is included as many times in table tag as many rows are required in the table. To present the columns `<td>` tag is used , `<td>` tag is included as many times as many columns are required in the table.

The intersection of a row and a column is called a cell. Like other tags of html .table tag also contain the border attribute.

1. **Task:** Open your html file in Notepad

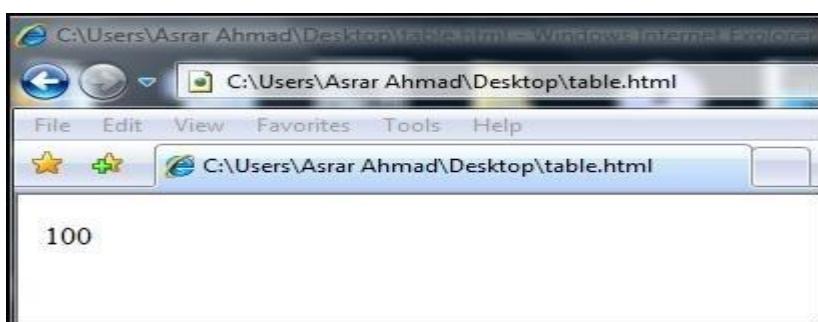
2. **Task:** Write following line of code into text editor.

```
<html>
<body>
<table>
<tr>
<td>100</td>
</tr></table>
</body>
</html>
```

This is simplest form of the table containing only one row and one column.

3. Now Save html file (Press ctrl+s).

4. Open the file in any web browser by double clicking on it and the output will be:



Now we do little bit complex example.

1. **Task:** Open your html file in Notepad

2. **Task:** Write following line of code into text editor.

```

<html>
<head></head>
<body>
Here is example of table with three rows
and two table cells in each row. <br><br>
<table border="1">
<tr>
<td>Row 1 Table Cell 1</td>
<td>Row 1 Table Cell 2</td>
</tr>
<tr>
<td>Row 2 Table Cell 1</td>
<td>Row 2 Table Cell 2</td>
</tr>
<tr>
<td>Row 3 Table Cell 1</td>
<td>Row 3 Table Cell 2</td>
</tr>
</table>
</body>
</html>

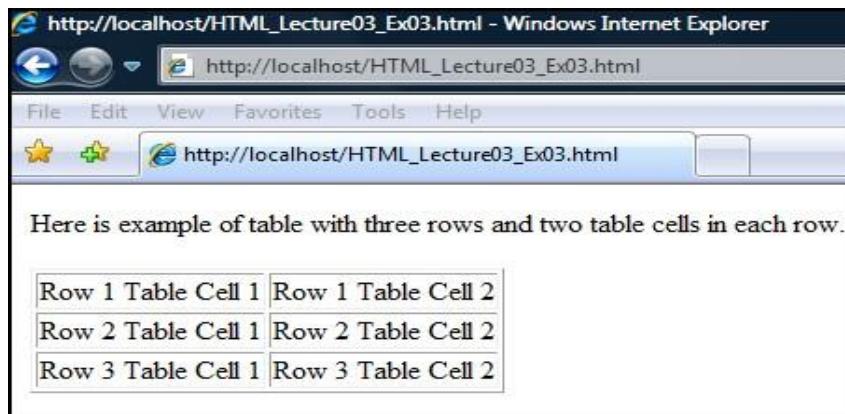
```

This is another table. In this table we have used border attribute to apply a border other than a default border

This table contains 3 rows and two columns for each row

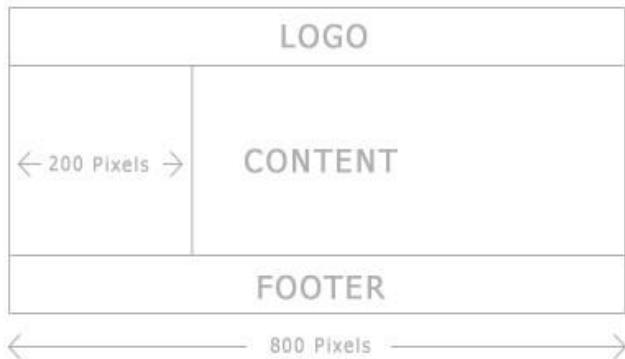
3. Now Save HTML file (Press ctrl+s).

4. Open the file in any web browser by double clicking on it and the output will be:



In this we will see more details of html tables.

To give an organized and appealing look to a web page, its content may be shown within a table. we can define entire structure of the web in a table.



In this picture whole webpage structure in defined in a table

The screenshot shows a website with a green header bar. The header includes the logo "ComputerScience.pk", navigation links for "HOME", "UET COURSES", and "INTRODUCTION TO HTML", and user authentication fields for "Username" and "Password" with a "Login" button. Below the header, there are several sections: "About Computer Science.pk" (describing the platform's mission and free nature), "Available Courses" (listing "INTRODUCTION TO HTML" with a thumbnail image of code), "Course categories" (listing "Tutorials", "UET COURSES", and "All courses..."), "Latest News" (indicating no news has been posted), "Online Users" (listing Samyan walia, ammarah farooq, and Guest User), and "Activities" (listing Forums).

Fig 4.1 web page containing table with rowspan and columnspan

Now we will learn some more attributes of table tag that includes column-span and row-span. **4.1**

### Column-span

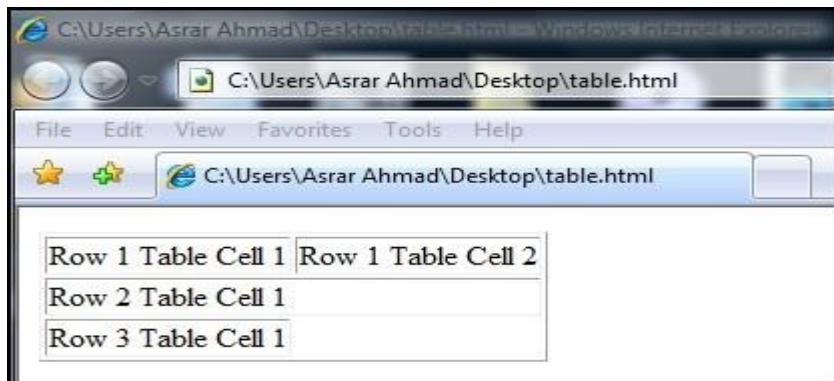
Column-span is applied to increase the size of a column.

1. **Task:** Open your html file in Notepad
2. **Task:** Write following line of code into text editor.

```
<html>
<head></head>
<body>
<table border="1">
<tr>
  <td>Row 1 Table Cell 1</td>
  <td>Row 1 Table Cell 2</td>
<tr>
<tr>
  <td colspan="2">Row 2 Table Cell 1</td>
</tr>
<tr>
  <td>Row 3 Table Cell 1</td>
  <td>Row 3 Table Cell 2</td>
<tr>
</table>
</body>
</html>
```

In this code column-span=2 is applied so that the cell on which this span is applied get space equal to two columns.

3. Now Save html file (Press **ctrl+s**).
4. Open the file in any web browser by double clicking on it and the output will be:



**Explanatory Note:** In this example 2<sup>nd</sup> row of table contain columns that have a span of 2. That means through column-span we gave this cell a space equal to two columns. **4.2 Row-span**

Just like column-span we can also apply row span over the rows of the table.

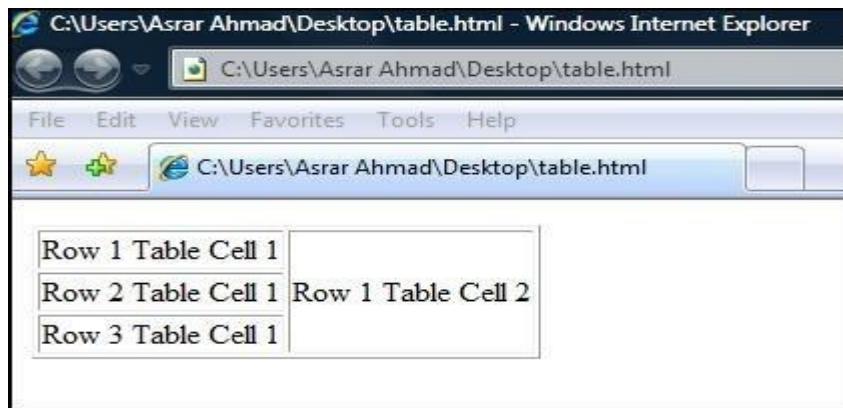
1. **Task:** Open your html file in Notepad
2. **Task:** Write following line of code into text editor.

```
<html>
<head></head>
<body>
<table border="1">
<tr>
<td>Row 1 Table Cell 1</td>
<td rowspan="3">Row 1 Table Cell 2</td>
</tr>
<tr>
<td>Row 2 Table Cell 1</td>
</tr>
<tr>
<td>Row 3 Table Cell 1</td>
</tr>
</table>
</body>
</html>
```

In this code row-span=3 is applied so that the cell on which this span is applied get space equal to three rows.

3. Now Save html file (Press ctrl+s) .

4. Open the file in any web browser by double clicking on it and the output will be:



On a web page along with text content ,image and video content can also be included in a table to make the web page more arranged and attractive.

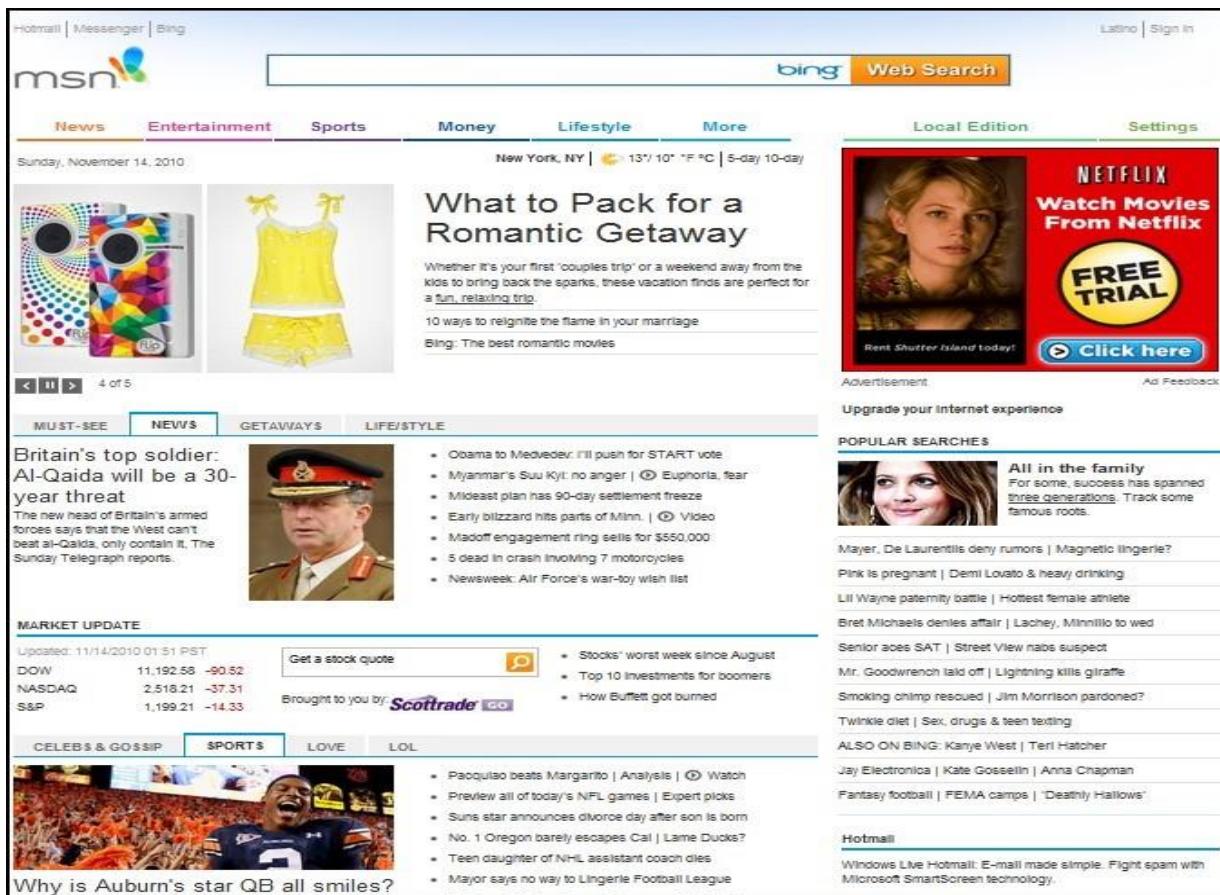


Fig 4.2 This picture is an example of multimedia content on the webpage

This can be done easily. Let see how to do it.

So again we will use anchor tag to add an image to table.

1. **Task:** Open your html file in Notepad
2. **Task:** Write following line of code into text editor.

```

<html>
<head>
</head>
<body>
<table>
<tr>
<td colspan="3" align="center">
<h1>This week in Review</h1></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>
Snooping victim jumps to death</td>
<td align="center">
Remembering Tony Curtis </td>
<td>
Meet 'cheapest family in America'</td>
</tr>
</table>
</body>
</html>

```

In this code we have tried to develop a web page that contains text and images placed inside the table element.

Using Table enhances the look and feel of the page.

3. Now Save html file (Press ctrl+s) .

4. Open the file in any web browser by double clicking on it and the output will be:

## This week in Review



Snooping victim jumps to death

Remembering Tony Curtis

Meet 'cheapest family in America'

# Software Engineering

## Lab Manual

### Lab 2

Till now we only have talked about those tags that are related to make a website “Presentable and organized”.

But now we will talk about html forms that are used to create interactivity between a website and a user. You will not find a single website on the internet that doesn’t include html forms. Every website is using more or less number of tags of html forms.

For example forms are used in an online shopping websites and creating user registration on any website.

The screenshot shows a web page titled "Create your Hotmail account". At the top right is a "Sign in" link. Below the title, it says "This is your Windows Live ID—it gets you into other services like Messenger and SkyDrive. All information is required." There is a note for users already using Hotmail, Messenger, or Xbox LIVE, with a "Sign in now" link. The main form fields include: "Hotmail address:" with a dropdown for ".com", a "Check availability" button, "Create a password:" (with a note about a 6-character minimum), "Retype password:", and "Alternate email address:". At the bottom, there are links for "Or choose a security question for password" and "reset".

Fig 5.1 This picture is an example of forms on a webpage

## 5.1 Html Forms

In this we will read about forms in html and input tags. Form also possess closing and opening tags like html tag

<form>

This is form opening tag

</form>

This is form closing tag

Now remaining form code is typed in these two tags .There are different input items available for forms e.g. Buttons, textboxes, check box, radio buttons etc.

To use these input items ,we have to specify them in the type attribute of the form input tag.

#### 5.1.1 Text input

This item is used to take a single line input from a user. It can be used for typing an email address, username, address etc. Indeed this is the only input item which is very common.

1. **Task:** Open your html file in Notepad

2. **Task:** Write following line of code into text editor.

```
<html>
<body>
<form>
Enter user Name: <input type="text"/> <br>
</form>
</body>
</html>
```

Form input Text is used to include a textbox in html web page

3. Now Save html file (Press ctrl+s) .

4. Open the file in any web browser by double clicking on it and the output will be:



#### 5.1.2 Password

It can be used on the user registration page or on user log in page

1. Open your html file in Notepad

2. **Task:** Write following line of code into text editor.

```
<html>
<body><form>
Enter password: <input type="password"/> <br>
</form>
</body></html>
```

Form input password is used to include a textbox in html based web page that will take the text as hidden text.

3. Now Save html file (Press ctrl+s) .
4. Open the file in any web browser by double clicking on it and the output will be:



#### 5.1.3 Checkbox

This input item is provided to allow users to select more than one options out of a number of available options.

1. **Task:** Open your html file in Notepad
2. **Task:** Write following line of code into text editor.

```

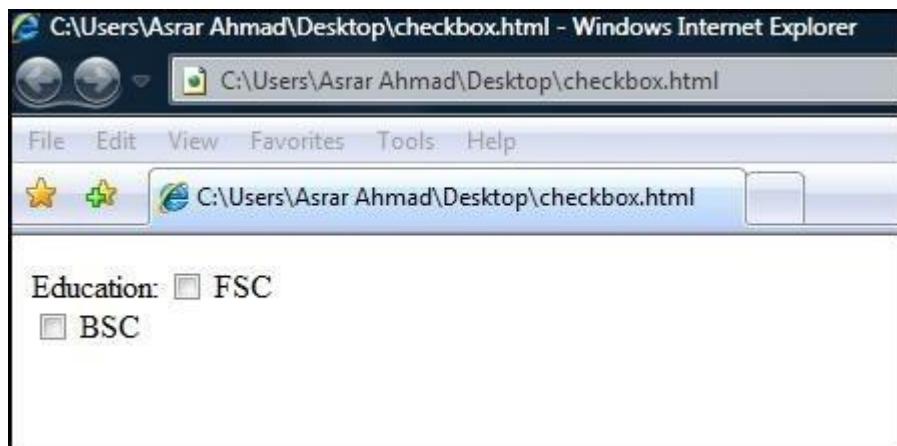
<html>
<body><form>
Education:
<input type="checkbox" name="checkbox"/> FSC <br>
<input type="checkbox" name="checkbox"/> BSC <br>
</form></body>
</html>

```

Here we have used form input checkbox  
 Type attribute is given value checkbox to place a checkbox in the page.

3. Now Save html file (Press ctrl+s) .

4. Open the file in any web browser by double clicking on it and the output will be:



#### 5.1.4 Radio-buttons

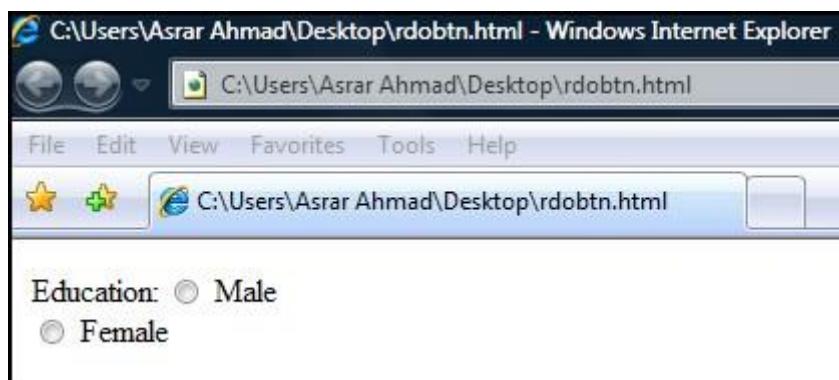
This item is provided to the user to make one selection out of a number of available options.

1. Open your html file in Notepad
2. **Task:** Write following line of code into text editor.

```
<html>
<body>
<form>
Education:
<input type="radio" name="gender"/> Male <br>
<input type="radio" name="gender"/> Female <br>
</form>
</body>
</html>
```

Here we have used form input type =Radio  
Type attribute is given value radio to place a radio-button in the page. Radio button allow user to choose only one option out of many.

3. Now Save html file (Press ctrl+s) .
4. Open the file in any web browser by double clicking on it and the output will be:



### 5.1.5 Drop-Downlist

To select one item out of a large number of available options

1. **Task:** Open your html file in Notepad



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---

2. Write following line of code into text editor.

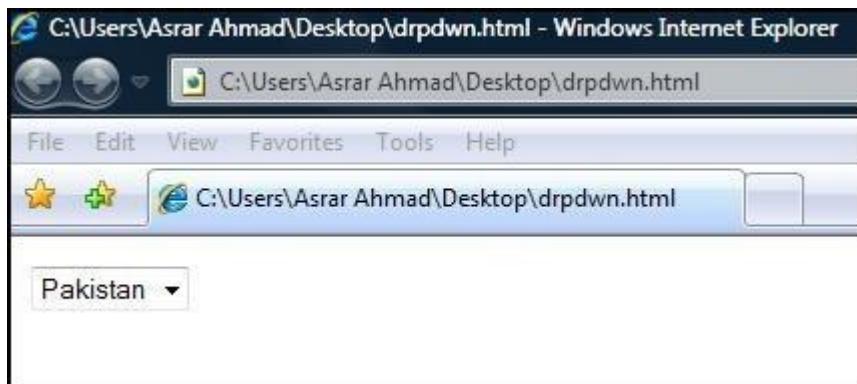
```
<html>
<body>
<form>
<select>
<option> Pakistan</option>
<option> India</option>
</select>
</form>
</body>
</html>
```

this code is including a dropdown or a selection menu in the web page

Select tag is used under the form tag to place a selection menu in the web page

3. Now Save html file (Press ctrl+s) .

4. Open the file in any web browser by double clicking on it and the output will be:



## 5.1.6 Button

To include button which is the most essential part of the forms in html ,it can be added to the web site in this manner.

1. **Task:** Open your html file in Notepad
2. Write following line of code into text editor.

```
<html>
<body>
<form>
<input type="button" value="Register"/>
</form>
</body>
</html>
```

In this code the type property of input tag is assigned a value Button to declare that we want to place a button in our web page.

3. Now Save html file (Press ctrl+s) .
4. Open the file in any web browser by double clicking on it and the output will be:



# Software Engineering

## Lab Manual

### Lab 3

#### INTRODUCTION TO CSS

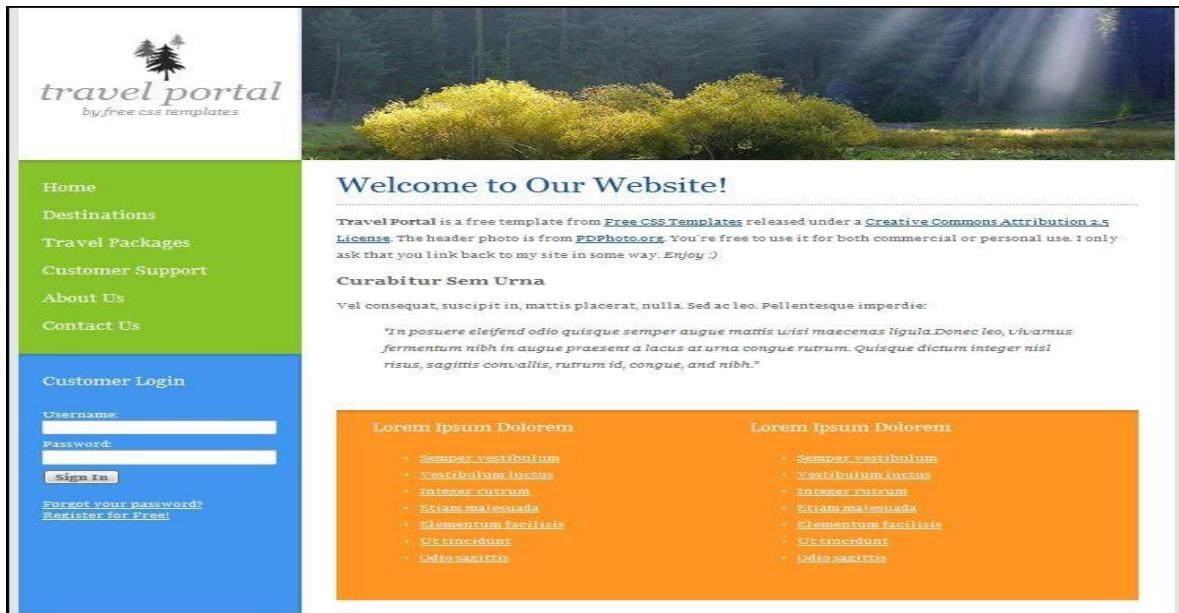
**CSS** stands for **Cascading Style Sheets**. CSS is effectively the clothing that we put on a web page. CSS is an tremendous addition to plain HTML. With plain HTML you define the colors and sizes of text and tables throughout your pages. If you want to change a specific element you will have to change the entire document.

With CSS we define the colors and sizes in "styles". Then as you write your web pages you refer to the styles. In short we can say that we use CSS to control the style and layout of multiple Web pages all at once.

Let us show you how CSS works!

The screenshot shows a basic website template titled "Travel Portal" by "Free CSS Templates". The header includes a navigation menu with links to Home, Destinations, Travel Packages, Customer Support, About Us, and Contact Us. Below the menu is a "Customer Login" form with fields for Username and Password, and links for "Forgot your password?" and "Register for Free!". The main content area features a large, scenic image of a forest with sunlight filtering through the trees. At the bottom, there is a "Welcome to Our Website!" message, a copyright notice, and a "Curabitur Sem Urna" section followed by a "Lorem Ipsum Dolorem" placeholder text.

Simple Web page before applying CSS



Simple Web page after applying CSS

## 2.1 How to define styles?

Styling information for a web page can be defined in three ways

- Inline
- Embedded (page-level style)
- CSS (external style-sheet)

## 2.2 Inline style

As already mentioned, that every HTML tag possesses some attributes. In case of Inline way of styling, we apply the style using the attribute right inside the elements of your HTML code, and this method of styling is referred to as *inline CSS*. This attribute specifies style information for the current element only.

Below is the general form for setting inline CSS in any HTML element.

### Pseudo Code

```
<htmltag style="attribute: value ; attribute : value;"></htmltag>
```

**Task:** Open Notepad (Go to start menu click at run and type Notepad++)

**Explanatory Note:** To add inline styling to a web site we can use any Text editor in this case we are using notepad ++. For this course we will use notepad.

1. **Task:** Write following line of code into text editor.

## Lets add some Inline CSS styling to our html file

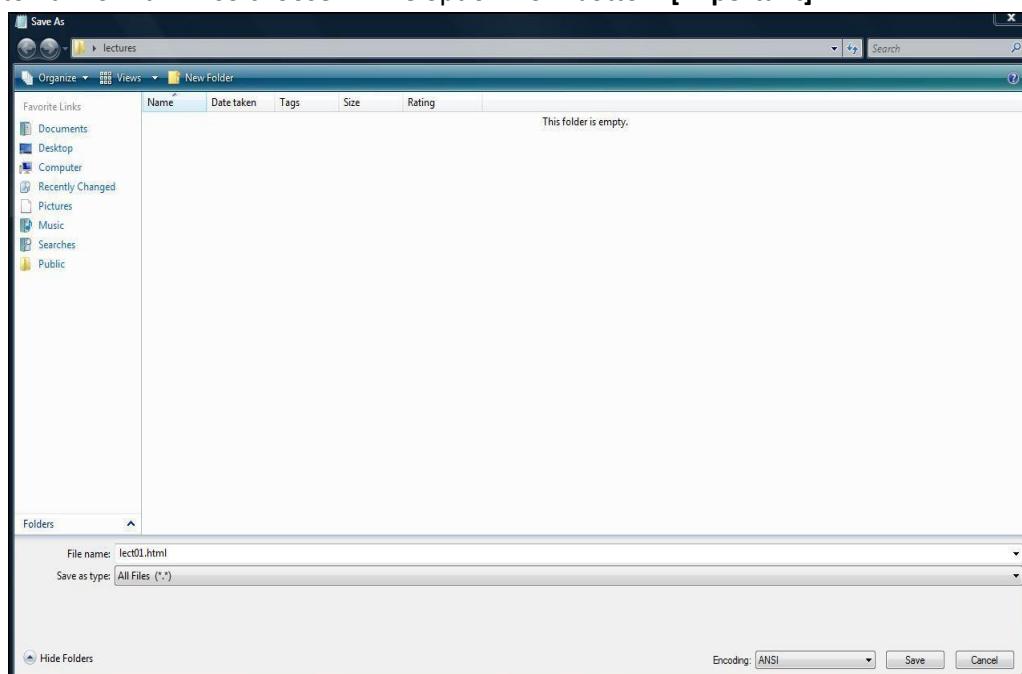
```
<html>
<head>
</head>
<body>
<h1>Paragraph With Inline Style</h1>
<p style="background-color:blue;color:white;width:500px">
This is paragraph tag ?ith background color and foreground color text.
This is one way to apply style on html tag. This is called inline style.
we gave the styling information within the tag.
</p>
</body>
</html>
```

In this code styling information is given within the tag. Inline styling has the highest priority out of any method of styling. This styling detracts from the true aim of using CSS, so we use it rarely.

To use Inline styling we use style attribute defined inside the tag of the element which is to be styled.

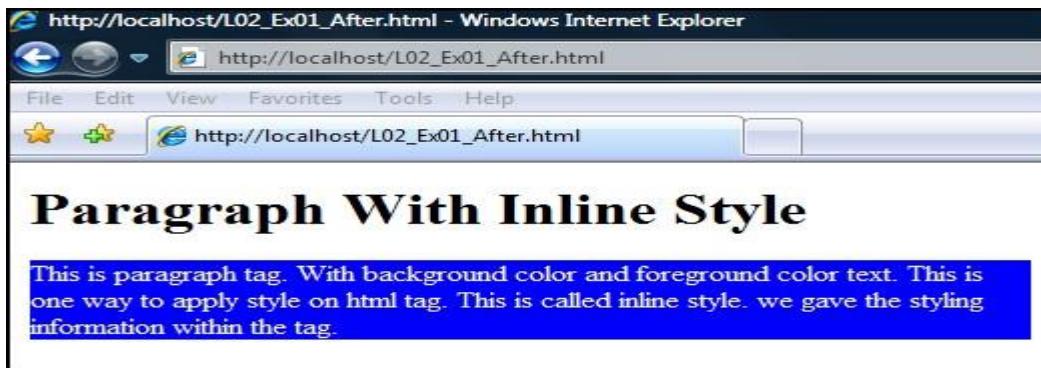
For example, To apply background effect to a paragraph we have used the style attribute of the tag p. This tag is for the paragraph element.

2. **Task :** Now Save html file (Press ctrl+s) . Type any name for the file and don't forget to change the extension from .txt to html or htm. Also choose All File option from bottom **[important]**.



Choose a file name and file type

3. Open the file in any web browser by double clicking on it and the output will be:



## 2.3 Embedded styling

Embedded style is fairly an intermediary between inline styles and an external style sheet. An internal style sheet should be used when a single document has a unique style. The style element requires both start and end tags <style>...</style> which are inserted between the <head>...</head> tags of your html file. The type attribute of the style tag defines the type of style sheet being used so we'll put text/css as the value.

Below is the general form for setting embedded CSS in any HTML element.

### Pseudo Code

```
<style type="text/css"> htmltag{attribute: value;}</style>
```

**Explanatory Note:** To add embedded styling to a web site we can use any Text editor. For this course we will use Notepad++.

#### 1. Task: Write following line of code into text editor.

##### Add This code to your html file

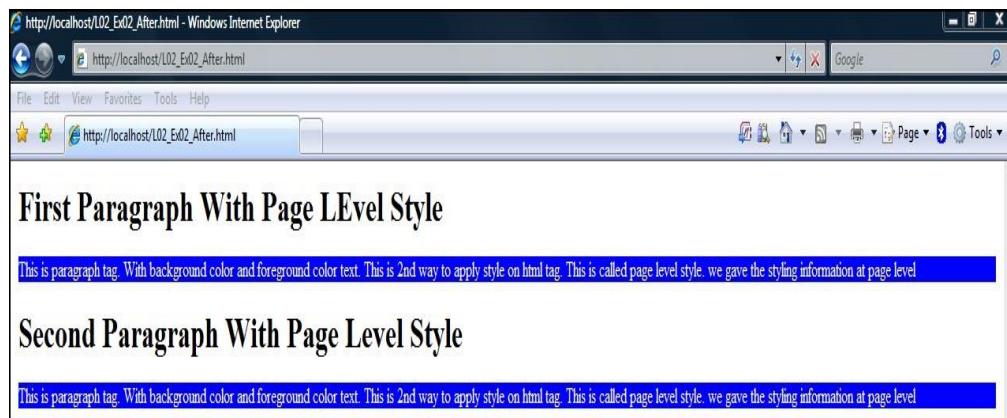
```
<html>
<head>
<style type="text/css">
p
{
background-color: blue;
color:white;
width:500px;
}
</style>
</head>
<body>
<h1>First Paragraph With Page LLevel Style</h1>
<p>This is paragraph tag. With background color and foreground color text.
This is 2nd way to apply style on html tag.
This is called page level style. we gave the styling information at page level </p>
<h1>Second Paragraph With Page Level Style</h1>
<p>This is paragraph tag. With background color and foreground color text.
This is 2nd way to apply style on html tag. This is called page level style.
we gave the styling information at page level </p>
</body>
</html>
```

In this code styling information is given within the tag. Embedded styles are styles that are embedded in the head of the document. Embedded styles affect only the tags on the page they are embedded in.

Styling information is same as we add it into inline style. End result is same only difference is definition of style you will get more on it in next .

#### 2. Task: Now Save html file (Press ctrl+s) .

3. Task: Open the file in any web browser by double clicking on it and the output will be:



## 2.4 External styling

Using external style sheets is the definitive web designer tool in that it allows you to apply formatting to many different web pages at once with a single .css file. An external style sheet is simply a text file containing a list of CSS rules sets. The file is saved with a .css extension and saved to any directory that can be accessed by the web pages using it.

Below is the general form for setting External CSS in any HTML element.

### Pseudo Code

```
Selector {attribute: value;}
```

**Explanatory Note:** To add external styling to a web site we can use any Text editor. For this course we will use notepad++.

We have to perform two tasks separately. **There are two files css and html.**

1. Task: We write our Html file (see HTML for more details)

<p>Add This code to your html file</p> <pre>&lt;html&gt;&lt;head&gt; &lt;link rel="stylesheet" type="text/css" href="L02_Ex03.css"/&gt; &lt;/head&gt;&lt;body&gt; &lt;h1&gt;First Paragraph Getting Style Information From CSS&lt;/h1&gt; &lt;p&gt;This is paragraph tag. With background color and foreground color text. This is 2nd way to apply style on html tag. This is called page level style.&lt;/p&gt; &lt;h1&gt;Second Paragraph Getting Style Information From CSS&lt;/h1&gt; &lt;p&gt;This is paragraph tag. With background color and foreground color text. This is 2nd way to apply style on html tag. This is called page level style.&lt;/p&gt; &lt;/body&gt;&lt;/html&gt;</pre>	<p>In this code one line of code is included in the head tag of HTML. No other changes are required to link the external styling to our web page. Link tag with three attributes <b>rel</b>, <b>type</b> and <b>href</b> are used to include an external styling to our web page. Value of href is equal to name of the file containing our styling whose extension is .css .</p>
---	---

2. Task: Write following lines of code into separate file.

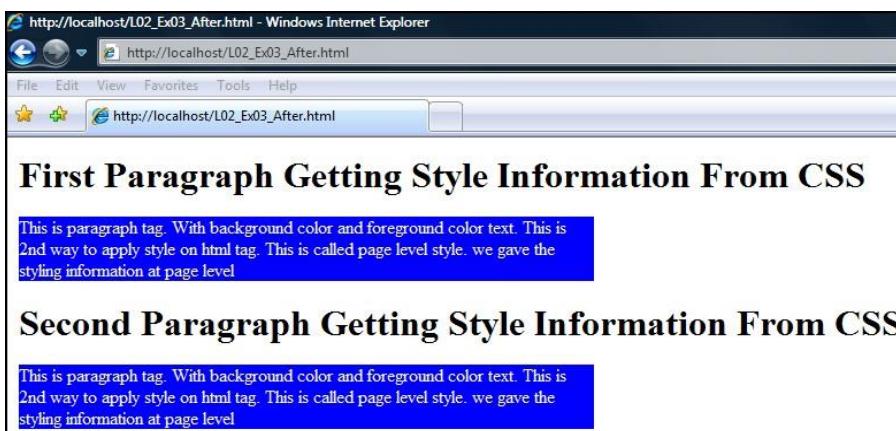
Add this code to your .css file

```
p  
{  
background-color:blue;  
color:white;  
width:500px;  
}
```

In this code styling information for the p tag is typed in our .css file. As a result all the p tags of the web page referenced to this .css sheet will style their p tags according to this formatting.

3. Task: Now Save css file (Press ctrl+s). While creating a style-sheet, Just save the file as *Filename.css* and put it in the same directory as your referenced html file.

4. Task: Open the html file in to web browser by double clicking on it and the output will be:



In this we will get knowledge regarding different types of selectors and the precedence of these selectors.

In addition to setting a style for a HTML element, CSS allows you to specify your own selectors called "Tag", "id" and "class".

### 3.1 Tag Selector

Styling information applied using a default tag of HTML is called a tag selector. The tag selector is used to redefine existing HTML tags. Select this option if you want to change the formatting options for an HTML tag, such as the H1 (heading 1) tag or the UL (unordered list) tag.

If we define css style for a tag then this style will be applied for all appearances of that tag in our html file. For example if we add style for tag p then all <p> that occur in html file will have that style.

**Note:** Html tag is called also selector while Attribute-value pair is called declaration.

We have to perform two tasks separately. **There are two files css and html.** **1. Task:** We write our Html file (see HTML for more details)

### Add This code to your html file

```
<html><head><link rel="stylesheet" type="text/css" href="L03_Ex01_After.css"/>
</head><body>
<h1>First Paragraph </h1><p>Cascading Style Sheets (CSS) is a style sheet language used to describe the presentation semantics (the look and formatting) of a document written in a markup language. Its most common application is to style web pages written in HTML and XHTML.</p>
<h1>Second Paragraph </h1>
<p>CSS is designed primarily to enable the separation of document content (written in HTML or a similar markup language) from document presentation, including elements such as the layout, colors, and fonts.[citation needed] This separation can improve content accessibility, provide more flexibility.
</p>
<h1>Third Paragraph</h1>
<p>
CSS can also allow the same markup page to be presented in different styles for different rendering methods, such as on-screen, in print, by voice (when read out by a speech-based browser or screen reader) and on Braille-based, tactile devices.
</p></body></html>
```

In this code one line of code is included in the head tag of HTML .And this line is referencing our style-sheet. In this code we have used three p tags to display three paragraphs in our web page. Now in our .CSS file we will straightly use name of paragraph tag to apply formatting on all three paragraphs at once.

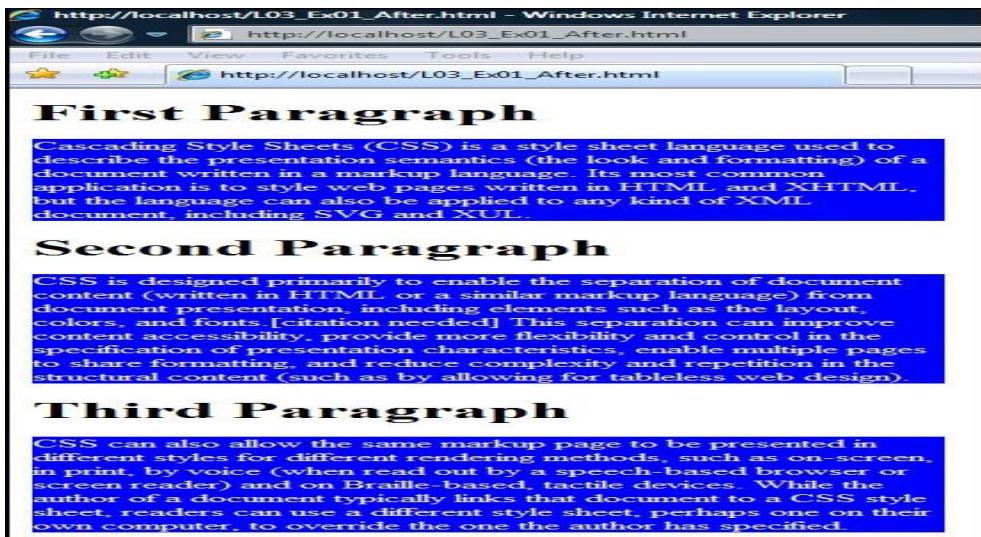
**Task:** Write following lines of code into a separate file.

### Add this code to your .css file

```
p
{
background-color:blue;
color:white;
width:500px;
}
```

In this styling information is typed in our .css file. When you use the tag selector; the style definition is automatically applied to any text or other element that has been formatted with the corresponding tag. Thus, if you've formatted a paragraph with the p tag and then create an p style it will automatically apply to the paragraph.

3. **Task:** Now save css file (Press ctrl+s).While creating a style-sheet, just save the file as *Filename.css* and put it in the same directory as your referenced html file.
4. **Task:** Open the html file in to web browser by double clicking on it and the output will be:



## 3.2 ID Selectors

ID selectors initiate such rules in embedded or external style sheets that focus individual HTML elements. To apply different styling to an Html tag we need to assign a unique name to that element. The id selector uses the id attribute of the HTML element, and is defined with a "#". ID is assigned to an element in the html file while this id is used in .css file to assign styling to the element.

IDs allow you to get very specific about which elements your styles are applied to. This is basically a subject of staying organized and can also help a lot once you start creating more complex CSS selectors.

We have to perform two tasks separately. **There are two files css and html.** **1. Task:** We write our

Html file (see HTML for more details)

### Add This code to your html file

```
<html><head>
<link rel="stylesheet" type="text/css" href="L03_Ex02_After.css"/></head>
<body>
<h1>First Paragraph </h1>
<p id="p1">Cascading Style Sheets (CSS) is a style sheet language used to
describe the presentation semantics (the look and formatting) of a document
written in a markup language.</p>
<h1>Second Paragraph </h1>
<p id="p2">
CSS is designed primarily to enable the separation of document content
written in HTML or a similar markup language) from document presentation,
including elements such as the layout, colors, and fonts.[citation needed].
</p>
<h1>Third Paragraph</h1>
<p>
CSS can also allow the same markup page to be presented in different styles for
different rendering methods, such as on-screen, in print, by voice (when read out
by a speech-based browser or screen reader) and on Braille-based, tactile devices.
</p></body></html>
```

In this code one line of code is included in the head tag of HTML .And this line is referencing our style -sheet. In this code we have used three p tags to display three paragraphs in our web page. In addition to this we have used ID attribute of p tag to assign unique value to the two p tags separately.

### 2. Task: Write following lines of code into a separate file.

#### Add this code to your .css file

```
p
{
background-color:blue;
color:white;
width:400px;
}
#p1
{
background-color:green;
color:white;
width:400px;
}
#p2
{
background-color:red;
color:white;
width:400px;
}
```

In this code styling information is typed in our .css file. Now in our .CSS file we have straightly used id value of paragraph tags to apply formatting on the two paragraphs separately.

### 3. Task: Now save css file (Press ctrl+s).While creating a style-sheet, just save the file as *Filenname.css* and put it in the same directory as your referenced html file.

### 4. Task: Open the html file in to web browser by double clicking on it and the output will be:

The screenshot shows a Windows Internet Explorer window displaying a local file at 'C:\wamp\www\L03\_Ex02\_After.html'. The page contains three paragraphs, each with a different background color and font style, demonstrating the use of CSS classes.

**First Paragraph**

Cascading Style Sheets (CSS) is a style sheet language used to describe the presentation semantics (the look and formatting) of a document written in a markup language. Its most common application is to style web pages written in HTML and XHTML, but the language can also be applied to any kind of XML document, including SVG and XUL.

**Second Paragraph**

CSS is designed primarily to enable the separation of document content (written in HTML or a similar markup language) from document presentation, including elements such as the layout, colors, and fonts. [citation needed] This separation can improve content accessibility, provide more flexibility and control in the specification of presentation characteristics, enable multiple pages to share formatting, and reduce complexity and repetition in the structural content (such as by allowing for tableless web design).

**Third Paragraph**

CSS can also allow the same markup page to be presented in different styles for different rendering methods, such as on-screen, in print, by voice (when read out by a speech-based browser or screen reader) and on Braille-based, tactile devices. While the author of a document typically links that document to a CSS style sheet, readers can use a different style sheet, perhaps one on their own computer, to override the one the author has specified.

**Explanatory Note:** So resultantly we have used id selector and applied different formatting or styling on same type of HTML tag. This is p tag in current example.

### 3.3 Class Selectors

A CSS class selector will allow you to put one or more style declarations into a group and give it any name you like so that you can apply it to specific web page components.

This allows you to set a particular style for any HTML elements with the same class. The syntax you use is simply a "." followed by any name you like . class is assigned to an element in the html file while this class name is used in .css file to assign styling to group of elements.

We have to perform two tasks separately. **There are two files css and html.** **1. Task:** We write our

Html file (see HTML for more details)

### Add This code to your html file

```
<html><head>
<link rel="stylesheet" type="text/css" href="L03_Ex03_After.css"/>
</head><body>
<h1>First Paragraph </h1> <p class="pra1">Cascading Style Sheets (CSS)
is a style sheet language used to describe the presentation semantics
of a document written in a markup language. Its most common application
is to style web pages written in HTML and XHTML.</p>
<h1>Second Paragraph </h1>
<p id="p2">
CSS is designed primarily to enable the separation of document content
(written in HTML or a similar markup language) from document presentation,
including elements such as the layout, colors, and fonts. [citation needed]
</p><h1>Third Paragraph</h1>
<p class="pra1">
CSS can also allow the same markup page to be presented in different styles
for different rendering methods, such as on-screen, in print, by voice
when read out by a speech-based browser or screen reader) and on Braille-based,
tactile devices. </p></body></html>
```

In this code one line of code is included in the head tag of HTML .And this line is referencing our style -sheet. In this code we have used three p tags to display three paragraphs in our web page. In addition to this we have used Class attribute of p tag to assign a class to the two p tags separately. All the elements with the same class name will have same formatting. One ID can be assigned to only one element But one class name can be assigned to more than one elements.

### 3. Task: Write following lines of code into a separate file.

#### Add this code to your .css file

```
p
{
background-color:blue;
color:white;
width:400px;
}
.pra1
{
background-color:green;
color:white;
width:400px;
}
#p2
{
background-color:red;
color:white;
width:400px;
}
```

In this code styling information is typed in our .css file. Now in our .CSS file we have straightly used class name of paragraph tags to apply formatting on the two paragraphs separately. Paragraphs with no class name doest have any formatting so no formatting is applied to them. As there is no tag selector is used as well.

3. **Task:** Now save css file (Press ctrl+s).While creating a style-sheet, just save the file as *Filename.css* and put it in the same directory as your referenced html file.
4. **Task:** Open the html file in to web browser by double clicking on it and the output will be:

The screenshot shows a Microsoft Internet Explorer window displaying a page with three paragraphs. The first paragraph has a green background, the second has a red background, and the third has a blue background. Each paragraph contains descriptive text about CSS.

**First Paragraph**

Cascading Style Sheets (CSS) is a style sheet language used to describe the presentation semantics (the look and formatting) of a document written in a markup language. Its most common application is to style web pages written in HTML and XHTML, but the language can also be applied to any kind of XML document, including SVG and XUL.

**Second Paragraph**

CSS is designed primarily to enable the separation of document content (written in HTML or a similar markup language) from document presentation, including elements such as the layout, colors, and fonts [citation needed]. This separation can improve content accessibility, provide more flexibility and control in the specification of presentation characteristics, enable multiple pages to share formatting, and reduce complexity and repetition in the structural content (such as by allowing for tableless web design).

**Third Paragraph**

CSS can also allow the same markup page to be presented in different styles for different rendering methods, such as on-screen, in print, by voice (when read out by a speech-based browser or screen reader), and on Braille-based, tactile devices. While the author of a document typically links that document to a CSS style sheet, readers can use a different style sheet, perhaps one on their own computer, to override the one the author has specified.

**Note:** A good practice is to name classes according to their *function* rather than their *appearance*. Classes can be a very effective method of applying different styles .The difference between an ID and a class is that an ID can be used to identify one element, whereas a class can be used to identify more than one.

In this we will explore Colors in CSS, color setting methods, Hexadecimal Color codes, background color and background image properties.

#### 4.1 Introduction

The colors selection is very vital part of look and feel of any web site, so please spend a suitable amount of time on surfing a number of websites and ponder on the available color range, color matching and color contrast.

There are many methods to define color in css.

- **Color Name**

- Define colors by simply entering the name of the desired color.

- **Format to define Color name is :**

```
.mycolors{color:blue; background-color:green;}
```

- **Hexadecimal value**

- Define colors with the use of hexadecimal values, similar to defining colors in plain HTML.

- Hexadecimal form is a pound sign (#) followed by at most, 6 hex values (0-F)

- **Format to define Hexadecimal is**

```
.mycolors{color:#00002F; background-color:#FFCE02;}
```

- Hexadecimal number has values from 0 to 9, A , B , C , D , E , F... e.g if you want to write 10 in hexadecimal then you have to write A and if you want to write 255 in hexadecimal then we you have to write FF.

- Hex Code of pure RED color which id FF0000 and GREE Color WHICH is 00FF00 and BLACK color which is 000000 and WHITE COLOR which is FFFF.
- A color code FFAA20 specifies that this color contain RED component equal to FF(255 maximum part of red color) and Green component equal to AA (170 in decimal ) and BLUE is 20(32 in decimal).Look at ref [1] for more details

#### • RGB value

- Define colors with the use of RGB values, by simply entering the values for amounts of Red, Green and Blue.
- **Format to define rgb color is :**

```
.mycolors{color:rgb(255,201,202); background-color:rgb(40,51,110);}
```

- Colors are made up by three components RED GREEN and BLUE.
- In rgb: r stands for red g stands for green and b stands for blue.

Below are a screenshots of some websites presenting the use of very reasonable background colors and background images . he lowest value that can be given to one of the light sources is 0 (hex 00). The highest value is 255 (hex FF).

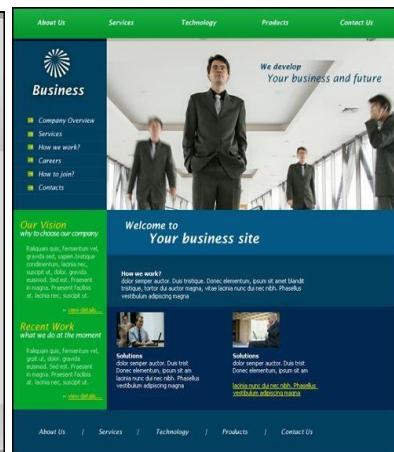
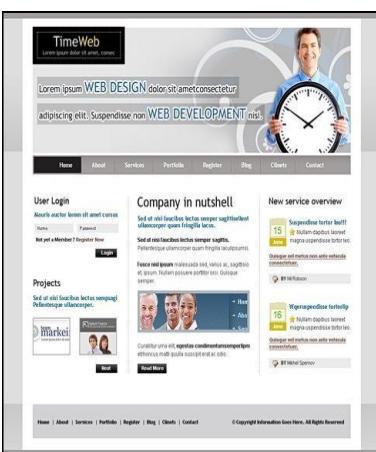


Figure: 1

Figure: 2

Figure: 3

Now let's find out the how we can apply background color and set background image in Html using CSS styling.

CSS properties used for background effects:

- background-color
- background-image
- background-repeat
- background-attachment
- background-position

As name identifies that background color will help us applying a color at the background of an element.

We have to perform two tasks separately. **There are two files css and html.** **1. Task:** We write our Html file (see HTML for more details)

### Add This code to your html file

```
<html><head>
<link rel="stylesheet" type="text/css" href="L04_Ex01_After.css"/>
</head><body>
<h1>Setting background color using hexaDecimal Value [FF0000]</h1>
<p id="p1">
The background of this paragraph is set through hexadeciaml value
we set the value equal to #FF0000 that will generate Red color.</p>
<h1>Setting background color using hexaDecimal Value [000000]</h1>
<p id="p2">The background of this paragraph is set through hexadeciaml
value we set the value equal to #000000 that will generate Black color.
</p><h1>Setting background color using hexaDecimal Value [FF99FF]</h1>
<p id="p3">The background of this paragraph is set through hexadeciaml
value we set the value equal to #FF99FF that will generate shade of pink
color.</p></body></html>
```

In this code one line of code is included in the head tag of HTML .And this line is referencing our style-sheet. In this code we have used three p tags to display three paragraphs in our web page. In addition to this we have used ID attribute of p tag to assign unique value to the two p tags separately.

#### 4. Task: Write following lines of code into a separate file.

##### Add this code to your .css file

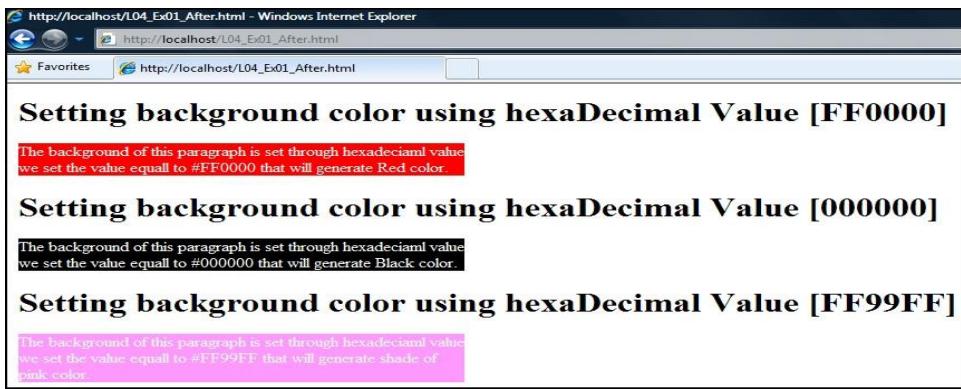
```
#p1 {
background-color: #FF0000;
color:white;
width: 400px;
}
#p2 {
background-color: #000000;
color:white;
width: 400px;
}
#p3 {
background-color: #FF99FF;
color:white;
width: 400px;
}
```

In this case different styling is applied to different paragraphs. Different background colors are applied to different paragraphs While the color attribute is maintained white in all the p elements Default value of a color is black i.e if no color is specified for an element e.g for H1element

,then automatically it will be none other than black.

3. Task: Now save css file (Press ctrl+s).While creating a style-sheet, just save the file as *Filename.css* and put it in the same directory as your referenced html file.

4. Task: Open the html file in to web browser by double clicking on it and the output will be:



As now you just saw that how easily we can add color to the background of any element.

**Note:** Here we have used id selector to apply color to elements. But we can make use of Tag selector (specifically) and class selector (generically) to apply our color styling as well.

Now we learn the how we can add image to the background of any element.

It's very simple just use background image property. And you are done!

We have to perform two tasks separately. **There are two files css and html.**

**1. Task:** We write our Html file (see HTML for more details)

<p style="text-align: center;"><b>Add This code to your html file</b></p> <pre>&lt;html&gt;&lt;head&gt; &lt;link rel="stylesheet" type="text/css" href="L04_Ex02_After.css"/&gt; &lt;/head&gt;&lt;body&gt;  &lt;h1&gt;How to set background image &lt;/h1&gt; &lt;p id="p1"&gt; Here we set background-image of paragraph. following is sample text taken from http://www.russianphotographs.net/doc.vph?id=217 &lt;br&gt; Backgrounds present both opportunities and challenges to photographers. &lt;/p&gt;&lt;h1&gt;By Default Background-Image Repeat Itself &lt;/h1&gt; &lt;p id="p2"&gt;Here we set background-image of paragraph &lt;b&gt;with default repeat option&lt;/b&gt;. following is sample text taken from http://www.russianphotographs.net/doc.vph?id=217 &lt;br&gt; Backgrounds present both opportunities and challenges to photographers. &lt;/p&gt;&lt;h1&gt;Background Image With no-repeat&lt;/h1&gt; &lt;p id="p3"&gt;Here we set background-image of paragraph &lt;b&gt;with no-repeat option&lt;/b&gt;. following is sample text taken from http://www.russianphotographs.net/doc.vph?id=217 &lt;br&gt; Backgrounds present both opportunities and challenges to photographers. &lt;/p&gt;&lt;/body&gt;&lt;/html&gt;</pre>	<p>In this code one line of code is included in the head tag of HTML .And this line is referencing our style-sheet. In this code we have used three p tags to display three paragraphs in our web page. In addition to this we have used ID attribute of p tag to assign unique value to the two p tags separately. Now we will use id's of these paragraphs to apply styling at them.</p>
---	--

**5. Task:** Write following lines of code into a separate file.

### Add this code to your .css file

```
#p1{  
background-image: url('images/background.jpg');  
color:white;  
width:400px;  
}  
#p2{  
background-image:url('images/twitter.jpg');  
width:400px;  
}  
#p3{  
background-image:url('images/twitter.jpg');  
background-repeat: no-repeat;  
width:400px;  
}
```

In this code three paragraphs will be displayed with three different background images. To apply background image to an element, we will use background-image property inside the id of that element. First paragraph will have background.jpg image in its background. Second paragraph will have twitter.jpg in its background. While third paragraph will also have twitter.jpg in its background.

3. **Task:** Now save css file (Press **ctrl+s**). While creating a style-sheet, just save the file as *Filename.css* and put it in the same directory as your referenced html file.

4. **Task:** Open the html file in to web browser by double clicking on it and the output will be:



## 4.2 Background-repeat

In the above example if we see carefully, the width of the each paragraph is 400px. In the paragraph one and two; image is repeated while in the third paragraph image is not repeated.

Reason is that if the Background image is smaller than the given size of the element then the image is repeated along the height and width of the element to completely fill the background of the element.

If we do not want to repeat the background image then we have to explicitly declare that we do not need to repeat the image in background. Method for this is follows

**background-repeat:no-repeat.** By default, the image is repeated in both x and y direction so it covers the entire element.

The background-repeat property sets if/how a background image will be repeated. You can have a background image repeat vertically (y-axis), horizontally (x-axis), in both directions, or in neither direction

## 4.3 Background-position

The background-position property defines the initial position of an element. If you would like to define where exactly an image appears within an HTML element, you may use CSS's background-position. Please take note that there are three different ways of defining position: length, percentages, and keywords. For instance we are using Keyword.

Three ways to define the position of an element

- Keywords
  - center top bottom top left top center top right bottom left bottom center bottom right
- Percentages
  - background-position: 50% 50%;
- Lengths
  - background-position: 200 200;

**Note:** If no background-position has been specified, the image is placed at the default top-left position of the element (0,0), which is located within the top-left corner of the element

See how background repeat and position property works!

### 1. Task: We write our Html file (see HTML for more details)

Add This code to your html file	
<pre>&lt;html&gt;&lt;head&gt; &lt;link rel="stylesheet" type="text/css" href="L04_Ex03_After.css"/&gt; &lt;/head&gt;&lt;body&gt; &lt;h1&gt;Move background-image at specific position. Here it is at top right location &lt;/h1&gt; &lt;p id="p1"&gt;Here we set background-image of paragraph and position of image.following sample text taken from http://www.russianphotographs.net/doc.vph?i=217 &lt;/p&gt; &lt;/body&gt;&lt;/html&gt;</pre>	<p>In this code one line of code is included in the head tag of HTML .And this line is referencing our style-sheet. In this code we have used p tags to display a paragraph in our web page.</p> <p>In addition to this we have used ID attribute of p tag to assign unique value to the p tag.</p> <p>Then we will use id' of the paragraphs to apply styling on it.</p>

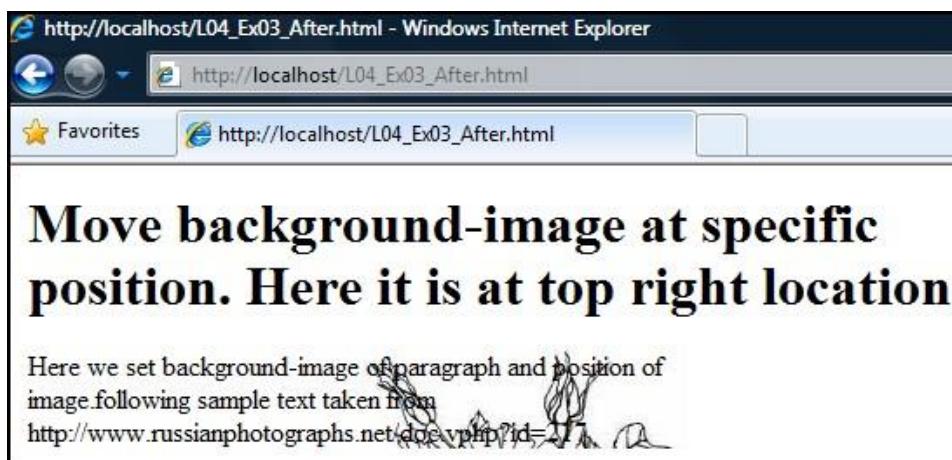
### 2. Task: Write following lines of code into a separate file.

Add this code to your .css file

```
#p1
{
background-image: url('images/tree.jpg');
background-repeat: no-repeat;
background-position: right top;
width:400px;
}
```

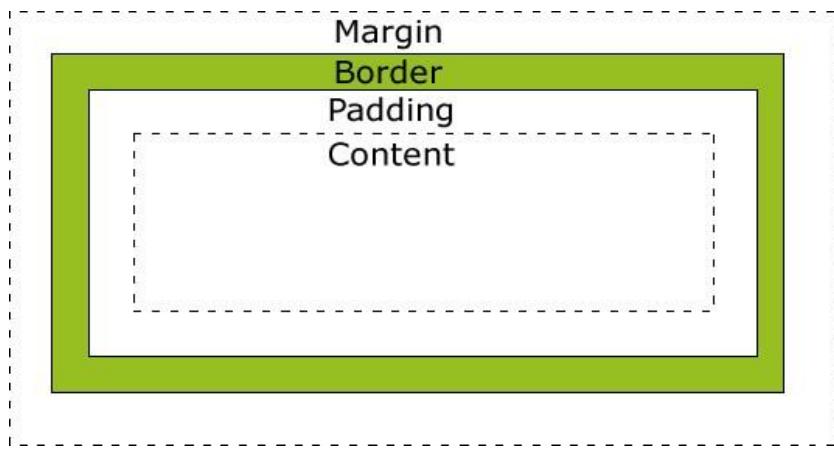
Now in the css file we have specified the position for our element with the p1 id which is a paragraph in this example. It will be displayed at the right top position in the web page.

3. **Task:** Now save css file (Press ctrl+s). While creating a style-sheet, just save the file as *Filename.css* and put it in the same directory as your referenced html file.
4. **Task:** Open the html file in to web browser by double clicking on it and the output will be:

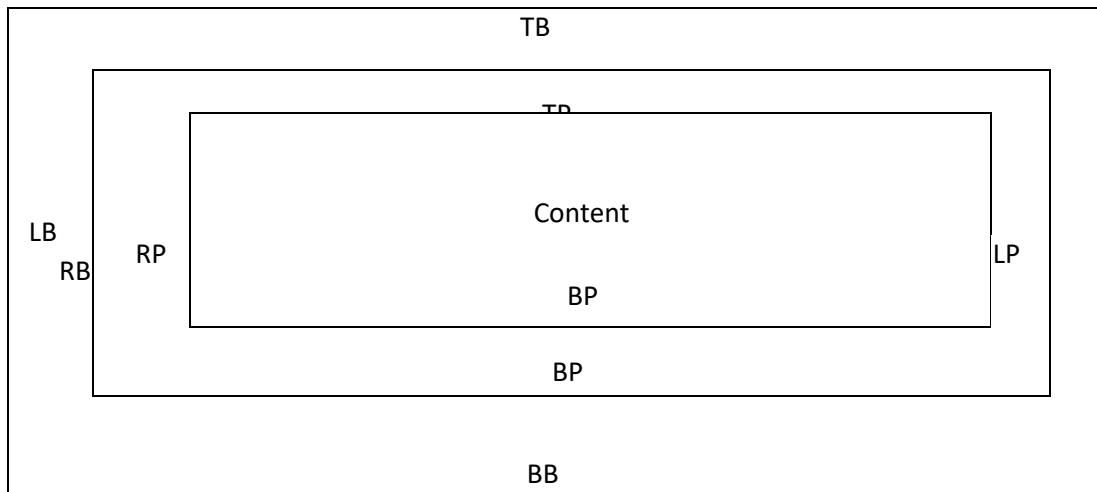


In this we will see that what is html box model, how to set margins, border of an element, how to give padding, how to handle floating Images, text and font Properties.

First of all we take a look at box model followed by the elements of html.



CSS Box Model



**Detail figure of CSS Box Model**

### Stands For?

**TM** stands for top margin **RM**-Right Margin **LM**-Left margin **BM**-Bottom margin **TM**-Top Border **RM**-Right Border **LM**-Left border **BM**-Border Bottom **TP**-Top padding **RP**-Right Padding **LP**-Left Padding **BP**-Bottom Padding

Boundary of any element is called **border**. Distance between the content of any element and its boundary is called **Padding**. While the distance between two elements of html is called **Margin**.

CSS Border, allow you to completely customize the borders that appear around HTML elements. To alter the thickness of your border use the border-width attributes. You may use key terms or exact values to define the border width.

**Note:** You must define a border-style for the border to show up. Available terms: thin, medium, thick. The border has been made visible, in our example work for each element, so you may more readily see the effects of padding margin.

1. **Task:** We write our Html file (see HTML for more details)

<p><b>Add This code to your html file</b></p> <pre>&lt;html&gt;&lt;head&gt; &lt;link rel="stylesheet" type="text/css" href="L05_Ex03_After.css"/&gt; &lt;/head&gt;&lt;body&gt; &lt;h1 id="heading1"&gt;Padding (top,left,bottom) of text is set to 10 pixel each&lt;/h1&gt; &lt;h1 id="heading2"&gt;Top margin is set to 40 px that put it away from top element.&lt;/h1&gt; &lt;/body&gt;&lt;/html&gt;</pre>	<p>In this code one line of code is included in the head tag of HTML .And this line is referencing our style-sheet. In this code we have made two headings.Id of one heading is heading1 and the id of the other heading is heading2 In our CSS file we will set margin and padding of these elements.</p>
---	--

2. **Task:** Write following lines of code into a separate file.

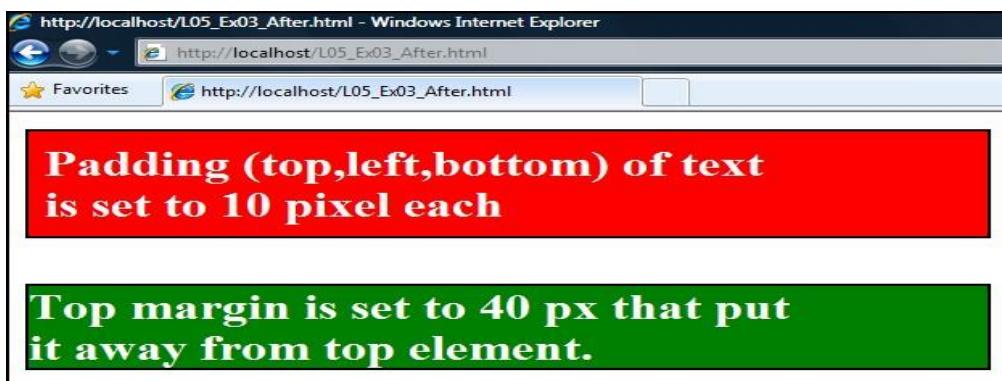
### Add this code to your .css file

```
#heading1{  
width:600px;  
background-color:red;  
color:white;  
border: solid 2px black;  
padding-top: 10px;  
padding-left: 10px;  
padding-bottom: 10px;  
}  
#heading2{  
width:600px;  
background-color:green;  
color:white;  
border: solid 2px black;  
margin-top:40px;  
}
```

In this code heading1 & heading2 are both of white color which means that the text within them will be of the mentioned color value. Both elements are surrounded by the 2 px thick border. The two heading elements will be of 40px apart because margin-top of the lower heading is set to 40px. Here we will get the same result if we do not set the margin-top property of the heading2 but we set the margin-bottom property of the heading1 to be equal to

40px. Both cases will do the same function. While the left top and bottom padding are also defined separately. These settings will create the space between the content of the headings and their boundary. Space between the content of the heading1 and upper boundary will be 10 px as the padding-top while the content of the heading1 will be 10 px away from the left boundary as padding-left=10px

3. **Task:** Now save css file (Press ctrl+s). While creating a style-sheet, just save the file as *Filenname.css* and put it in the same directory as your referenced html file.
4. **Task:** Open the html file in to web browser by double clicking on it and the output will be:



We continue with the formatting text stuff! Basically, we can adjust the size, alignment, style and the weight of our text to be displayed. Let's format our text straight away!

1. **Task:** We write our Html file (see HTML for more details)

### Add This code to your html file

```
<html><head>
<link rel="stylesheet" type="text/css" href="L05_Ex01_After.css"/>
</head><body>
<h1>Setting Font Family to Courier </h1>
<p id="p1">
Font Family of this paragraph is set Courier.
</p><h1>Following is Example of Font Size <br>we have set it to small</h1>
<p id="p2">
The background of this paragraph is set through hexadeciaml value we
set the value equal to #000000 that will generate Black color.
</p><h1>Following is Example of Font<br> Size we have set it to 16 pixels
<br>and Transofrom into Capital Case</h1>
<p id="p3">The background of this paragraph is set through hexadeciaml
value we set the value equal to #FF99FF that will generate shade of
pink color.</p></body></html>
```

This code is typed in the HTML file. We will set different text styling on the paragraphs elements.you can set different font families provided they are installed on client machine.

### 2. Task: Write following lines of code into a separate file.

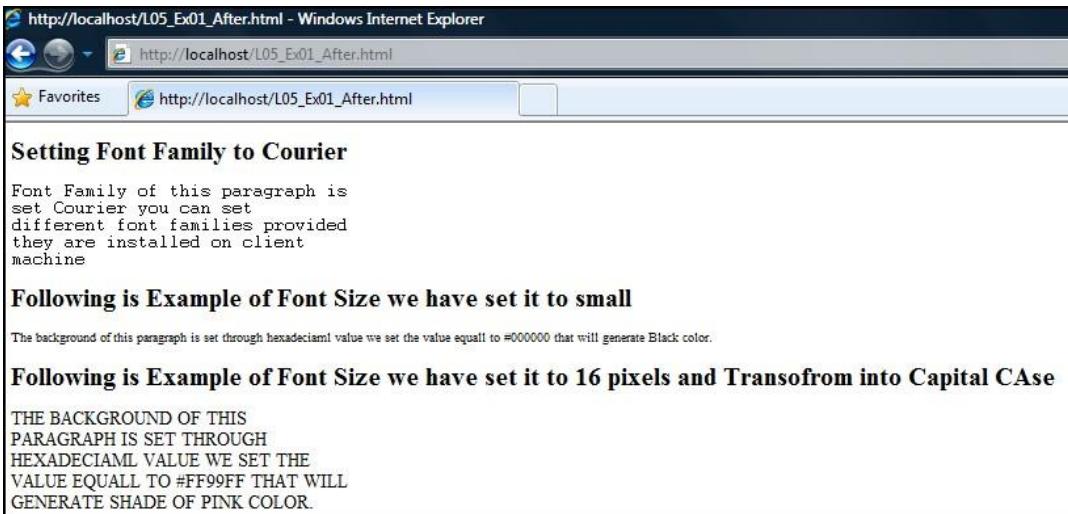
#### Add this code to your .css file

```
#p1{
font-family:courier;
width:400px;
}
#p2{
font-size: small;
}
#p3{
Font-size: 22px;
text-transform:uppercase;
width:400px;
}
```

In this CSS code p1 element font is courier and the width of this paragraph element is set to 400 px. While size of font is set to small in the second paragraph. Font size of an element can be set to large larger medium small smaller and it can be set using px unit e.g 20 px. Texttransform is a quick way to modify the capitalization of your text.

### 3. Task: Now save css file (Press ctrl+s).While creating a style-sheet, just save the file as *Filenname.css* and put it in the same directory as your referenced html file.

### 4. Task: Open the html file in to web browser by double clicking on it and the output will be:



**1. Task:** We write our Html file (see HTML for more details)

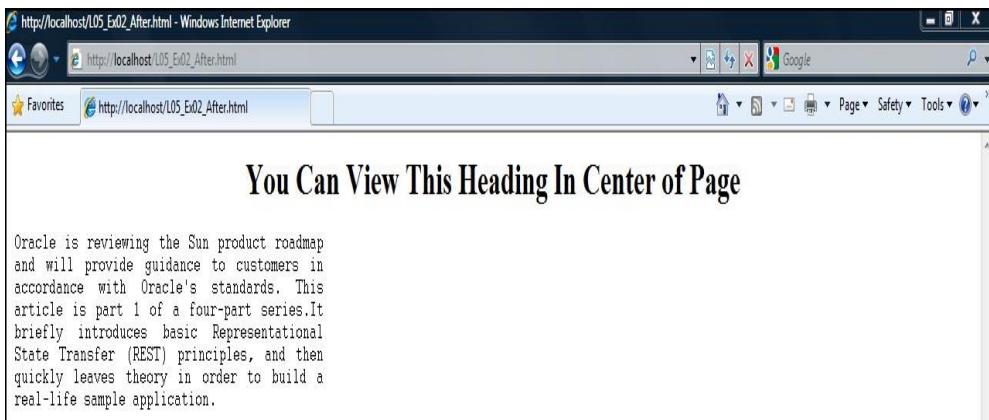
Add This code to your html file	This code is typed in the HTML file. In our CSS file we will apply formatting to our paragraphs and heading elements.
<pre>&lt;html&gt;&lt;head&gt; &lt;link rel="stylesheet" type="text/css" href="L05_Ex02_After.css"/&gt; &lt;/head&gt;&lt;body&gt; &lt;h1&gt;You Can View This Heading In Center of Page &lt;/h1&gt; &lt;p id="p1"&gt;Oracle is reviewing the Sun product roadmap and will provide guidance to customers in accordance with Oracle's standards. This article is part 1 of a four-part series. It briefly introduces basic Representational State Transfer (REST) principles, and then quickly leaves theory in order to build a real-life sample application. &lt;/p&gt;&lt;/body&gt;&lt;/html&gt;</pre>	

**2. Task:** Write following lines of code into a separate file.

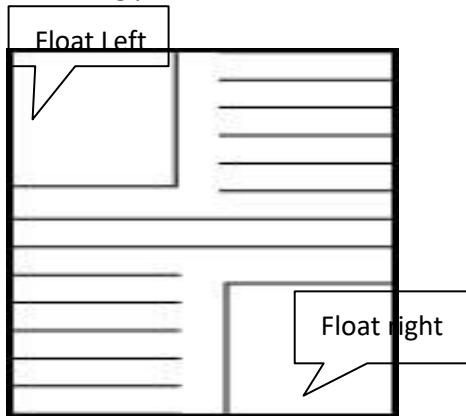
Add this code to your .css file	Different alignments can be set such as center left right justified. In this code paragraph width is set to 400px. Otherwise the paragraph will be displayed straight away along the length of the window of the web browser.
<pre>h1 { text-align:center } #p1 { font-family:courier; text-align:justify; width:400px; }</pre>	

**3. Task:** Now save CSS file (Press **ctrl+s**). While creating a style-sheet, just save the file as *Filenname.css* and put it in the same directory as your referenced html file.

**4. Task:** Open the html file in to web browser by double clicking on it and the output will be:



Now we move to the most interesting part of CSS which is “Floating”. **Float** is a CSS positioning property.



### Left and Right Floating

You can float elements on the web page to the right or the left. With CSS float, an element (text /image) can be moved to the left or right, allowing other elements to wrap around it.

Float is very often used for images.

For example, if you float an image to the left, any text or other elements following it will flow around it to the right. And if you float an image to the right, any text or other elements following it will flow around it to the left. An image that is placed in a block of text without any float style applied to it, will display as the browser is set to display images.

Why Float is used?

#### 1. Task: We write our Html file (see HTML for more details)

##### Add This code to your html file

```
<html><head><link rel="stylesheet" type="text/css" href="float.css"/>
</head><body>
<p id="hed1">i m following box model so i will not let h2
to be placed side by side with me.</p>
<p id="hed2">i m pusehd by h1 to be placed below it
rather than beside it</p>
</body></html>
```

Simple html coding is shown in this example including two paragraphs and reading styling from .css file

- 2. Task:** Write following lines of code into a separate file.

Add this code to your .css file

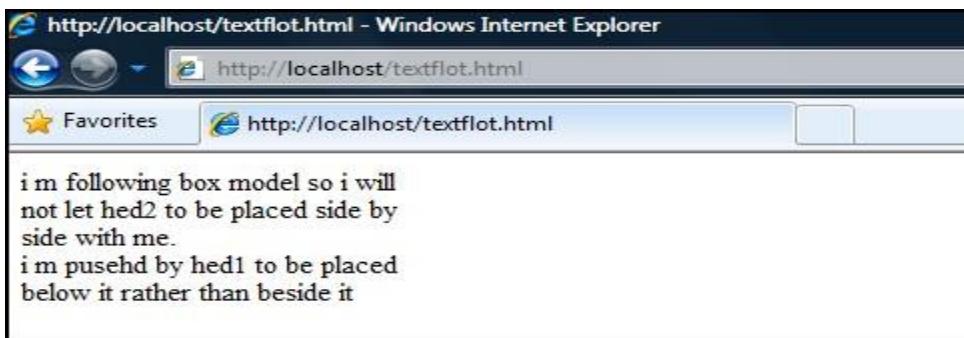
```
#hed1{width:300px;  
margin:0px 0px 0px 0px;  
padding:0px 0px 0px 0px;  
font-size:large;}  
#hed2{width:300px;  
padding:0px 0px 0px 0px;  
margin:0px 0px 0px 0px;  
font-size:large;}
```

In this CSS code we will just notice that how an image is displayed by the browser when it is placed in the paragraph tag with some text without any float. After this in the next example we will apply float property to this image.

By default HTML elements follows Box model, so as there are two paragraph elements hed1 and hed2 described in the HTML file, hed1 is of 300px width and the hed2 of 300px width. Then due to box model, hed1 and will not be placed side by side with hed2 .In fact #hed2 will be placed below #hed1.

- 3. Task:** Now save css file (Press ctrl+s). While creating a style-sheet, just save the file as *Filenname.css* and put it in the same directory as your referenced html file.

- 4. Task:** Open the html file in web browser by double clicking on it and the output will be:



By using float we will place elements side by side.

- 1. Task:** We write our Html file (see HTML for more details)

### Add This code to your html file

```
<html><head><link rel="stylesheet" type="text/css" href="flot.css"/>
</head><body>
<p id="hed1">i m following box model so i will not let h2
to be placed side by side with me.</p>
<p id="hed2">i m pusehd by h1 to be placed below it
rather than beside it</p>
</body></html>
```

In this case we have placed two paragraphs in this file. Paragraphs in this file will take their styling from .css file.

2. Task: Write following lines of code into a separate file.

### Add this code to your .css file

```
#hed1{width:300px;
margin:0px 0px 0px 0px;
padding:0px 0px 0px 0px;
font-size:large;}
#hed2{width:300px;
float:right;
padding:0px 0px 0px 0px;
margin:0px 0px 0px 0px;
font-size:large;}
```

In this example we have added float property to the #hed2 element.so that it is shifted to the right side of #hed1 element and fulfil our objective.

3. Task: Now save css file (Press ctrl+s).While creating a style-sheet, just save the file as *Filenname.css* and put it in the same directory as your referenced html file.

4. Task: Open the html file in web browser by double clicking on it and the output will be:



Up till now we have played with two text elements and why to apply float on them, now we will play with image and text and apply float on them.

1. Task: We write our Html file (see HTML for more details)

### Add This code to your html file

```
<html><head>
<link rel="stylesheet" type="text/css" href="L05_Ex04_After.css"/>
</head><body>
<h1>You Can View This Heading In Center of Page </h1>
<p id="p1">Oracle is reviewing Sun product roadmap and will
provide guidance to customers in accordance with Oracle standards.
This article is part 1 of
a four-part series.</p>
</body>
</html>
```

This coding is showing simple html file with one heading, a paragraph element and an image element inside it.

2. Task: Write following lines of code into a separate file.

### Add this code to your .css file

```
h1{
    text-align:center
}
#p1
{
    font-family:courier;
    text-align:justify;
    width: 400px;
}
#p1 img
{
    width:100px;
    padding-left: 10px;
    padding-top:10px;
    padding-right:10px;
}
```

In this CSS code we will just notice that how an image is displayed by the browser when it is placed in the paragraph tag with some text without any float. After this in the next example we will apply float property to this image.

3. Task: Now save css file (Press ctrl+s). While creating a style-sheet, just save the file as *Filenname.css* and put it in the same directory as your referenced html file.

4. Task: Open the html file in to web browser by double clicking on it and the output will be:



**Explanatory Note:** In this example we have just noticed that if we do not apply floating to the image appearing within the paragraph tag. It will give an unordered and unstructured look and feel.

**Note:** While floating images, it should be noted that a margin should be added to images so that the text does not get too close to the image. There should always be a few pixels between words and borders, images, and other content.

Now in the Following example, we will apply float property to position the image at a suitable place.

- 1. Task:** We write our Html file and save it.(see HTML for more details)

Add This code to your html file	This code is typed in the HTML file. In our CSS file we will apply formatting to our paragraph and image element to get adjusted in the paragraph text nicely.
<pre>&lt;html&gt;&lt;head&gt; &lt;link rel="stylesheet" type="text/css" href="L05_Ex04_After.css"/&gt; &lt;/head&gt;&lt;body&gt;&lt;h1&gt;You Can View This Heading In Center of Page &lt;/h1&gt; &lt;p id="p1"&gt;Oracle is reviewing the Sun product roadmap. &lt;img src="images/births.jpeg"/&gt;This article is part 1 of a four-part series. It briefly introduces basic Representational State Transfer (REST) principles, and then quickly leaves theory in order to build a real-life sample application. &lt;/p&gt;&lt;/body&gt;&lt;/html&gt;</pre>	

- 2. Task:** Write following lines of code into a separate file.

Add this code to your .css file	In this code we have floated our image element to the left as a result text will be moved towards right.
<pre>h1{ text-align:center } #p1 { font-family:courier; text-align:justify; width:400px; } #p1 img { width:100px; float: left; padding-left: 10px; padding-top:10px; padding-right:10px; }</pre>	

- 3. Task:** Now save CSS file (Press ctrl+s).While creating a style-sheet, just save the file as *Filename.css* and put it in the same directory as your referenced html file.

- 4. Task:** Open the html file in to web browser by double clicking on it and the output will be:



Floats can be used to create **entire web layouts**.

In this we will get more knowledge about floating and the scenarios arising when floating is applied, what is clear, and also will get basic understanding of div (division) in CSS.

A already mentioned that one of the powerful tools and the backbone of CSS is floating action. Floating can be even used to design the entire layout of a web site same as what we said about a table in html.

Let's perform floating to place two paragraphs side by side! Obviously using left and right floating.

**1. Task:** We write our Html file and save it.(see HTML for more details)

Add This code to your html file	Type the code shown in the image in your html file.
<pre>&lt;html&gt;&lt;head&gt; &lt;link rel="stylesheet" type="text/css" href="L06_Ex01_After.css"/&gt; &lt;/head&gt; &lt;body&gt; &lt;h1&gt;You Can View This Heading In Center of Page &lt;/h1&gt; &lt;p id="p1"&gt;Oracle is reviewing the Sun product roadmap and will provide guidance to customers in accordance with Oracle's standards. &lt;img src="images/births.jpeg"/&gt;This article is part 1 of a four-part series &lt;/p&gt;&lt;p id="p2"&gt;Oracle is reviewing the Sun product roadmap and will provide guidance to customers in accordance with Oracle's standards. &lt;img src="images/close.jpeg"/&gt;This article is part 1 of a four-part series. &lt;/p&gt;&lt;/body&gt;&lt;/html&gt;</pre>	Type the code shown in the image in your html file.

**2. Task:** Write following lines of code into a separate file.

<p><b>Add this code to your .css file</b></p>	<p>In this Code img element is floated left setting the left, right and top padding. Along with that two paragraphs are floated left and right respectively.</p> <p>But you can see in step # 3 that #p1 didn't allow to give spare place to #p2 as it is box model. That problem will be solved in next task. Go ahead and see its output in step#3</p>
<pre> h1 {     text-align:center } #p1 {     font-family:courier;     text-align:justify;     width:400px;     background-color:blue;     color:white; } #p2 {     font-family:courier;     text-align:justify;     background-color:green;     color:white;     width:400px; } img {     width:100px;     float: left;     padding-left: 10px;     padding-top:10px;     padding-right:10px; } </pre>	

3. **Task:** Now save CSS file (Press ctrl+s).While creating a style-sheet, just save the file as *Filename.css* and put it in the same directory as your referenced html file.
4. **Task:** Open the html file in to web browser by double clicking on it and the output will be:



We just saw from the output that #p1 didn't allow #p2 to lay aside. Again the problem is same as described above that elements are using Box model and didn't allow two paragraphs to lay side by side even if there s some space is left after the first paragraph.And this space is enough to be occupied by the paragraph2,But default behavior of Paragraph to follow box model pushed paragraph2 below it.

How to place them aside by side with each other. Again solution is to use floating.

Also use another useful element of CSS which replaces table of HTML. The <div> element is well-suited to take over from tables as a layout tool. It is an element that is used to *divide* the page into sections, and can hold whatever you

need inside it. Each section can then have its own formatting. Using div it becomes easy to manage and manipulate the web page easily.

**1. Task:** We write our Html file and save it.(see HTML for more details)

<p><b>Add This code to your html file</b></p> <pre>&lt;html&gt;&lt;head&gt; &lt;link rel="stylesheet" type="text/css" href="L06_Ex01_After.css"/&gt; &lt;/head&gt;&lt;body&gt; &lt;h1&gt;You Can View This Heading In Center of Page &lt;/h1&gt; &lt;div id="container"&gt; &lt;p id="p1"&gt;Oracle is reviewing the Sun product roadmap and will provide guidance to customers in accordance with Oracle's standards. &lt;img src="images/births.jpeg"/&gt;This article is part 1 of a four-part series.&lt;/p&gt; &lt;p id="p2"&gt;Oracle is reviewing the Sun product roadmap and will provide guidance to customers in accordance with Oracle's standards. &lt;img src="images/close.jpeg"/&gt;This article is part 1 of a four-part series.&lt;/p&gt; &lt;/div&gt;&lt;/body&gt;&lt;/html&gt;</pre>	<p>Type the code shown in the image in your html file.</p>
---	--

**2. Task:** Write following lines of code into a separate file.

<p><b>Add this code to your .css file</b></p> <pre>h1{     text-align:center } #p1{     font-family:courier;     text-align:justify;     width:400px;     background-color:blue;     color:white;     float:left; } #p2{     font-family:courier;     text-align:justify;     background-color:green;     color:white;     width:400px;     float:right; } #container{     width:820px; } img{     width:100px;     float:left;     padding-left: 10px;     padding-top:10px;     padding-right:10px; }</pre>	<p>In this Code img element is floated left setting the left right and top padding. Along with that two paragraphs are floated left and right. Container div gave us remarkable solution and place two elements side by side which were positioned using Floats.</p>
---	--

**3. Task:** Now save CSS file (Press ctrl+s).While creating a style-sheet, just save the file as *Filename.css* and put it in the same directory as your referenced html file.

**4. Task:** Open the html file in to web browser by double clicking on it and the output will be:



Controlling the width of the container div we can minimize the distance between the two elements .the more we reduce the width .the more they come close to each other.

Elements following a floated element will wrap around the floated element. If you do not want this to occur, you can apply the "clear" property to these following elements. The clear property is used to control how the subsequent elements of floated elements in a document shall behave. By default, the subsequent elements are moved up to fill the available space which will be freed when a box is floated to a side.

**Now we see one problem by the use of float and find out its solution.**

**1. Task:** We write our Html file and save it.(see HTML for more details)

<b>Add This code to your html file</b>  <pre>&lt;html&gt;&lt;head&gt; &lt;link rel="stylesheet" type="text/css" href="L06_Ex02_After.css"/&gt; &lt;/head&gt;&lt;body&gt; &lt;h1&gt;You Can View This Heading In Center of Page &lt;/h1&gt; &lt;div id="container"&gt; &lt;p id="p1"&gt;Oracle is reviewing the Sun product roadmap and will provide guidance to customers in accordance with Oracle's standards. &lt;img src="images/births.jpeg"/&gt;This article is part 1 of a four-part series.&lt;/p&gt; &lt;p id="p2"&gt;Oracle is reviewing the Sun product roadmap and will provide guidance to customers in accordance with Oracle's standards. &lt;img src="images/close.jpeg"/&gt;This article is part 1 of a four-part series.&lt;/p&gt; &lt;p id="p3"&gt;I am third paragraph. My color is black and text color is white. I will show you a common problem and its solution in floating &lt;/p&gt;&lt;/div&gt;&lt;/body&gt;&lt;/html&gt;</pre>	Type the code shown in the image in your html file
---	--

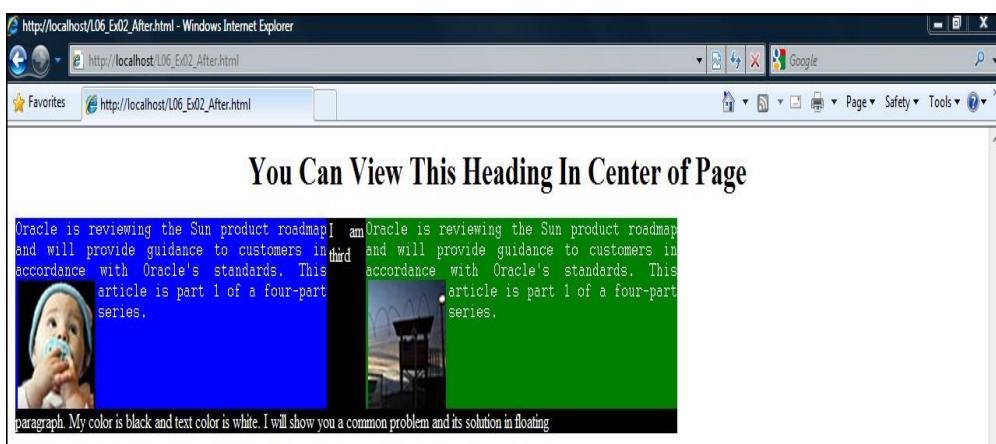
**2. Task:** Write following lines of code into a separate file.

### Add this code to your .css file

```
h1 {  
    text-align:center;  
}  
#p1 {  
    font-family:courier;  
    text-align:justify;  
    width:400px;  
    background-color:blue;  
    color:white;  
    float:left;  
}  
#p2 {  
    font-family:courier;  
    text-align:justify;  
    background-color:green;  
    color:white;  
    width:400px;  
    float:right;  
}  
#p3 {  
    background-color:black;  
    color:white;  
    text-align:justify;  
}  
#container {  
    width:850px;  
}  
img {  
    width:100px;  
    float: left;  
    padding-left: 10px;  
    padding-top:10px;  
    padding-right:10px;  
}
```

In this Code img element is floated left setting the left right and top padding. Now the problem is that third element occupied the space which is left between the two floated elements. This gives the effect of overlapping. And resultantly disturb our design.  
This problem is raised by the use of

3. **Task:** Now save CSS file (Press ctrl+s). While creating a style-sheet, just save the file as *Filenname.css* and put it in the same directory as your referenced html file.
4. **Task:** Open the html file in to web browser by double clicking on it and the output will be:



Now this is the time to take our new element (which is a paragraph at the moment) out of the empty space left due to other floating elements.

#### Use clear as the solution

**Clear property** can be used to clear from left or from right or both. Clear both means that element having clear:both styling defined in its tag should have both lefts and right clear.

1. **Task:** We write our Html file and save it.(see HTML for more details)

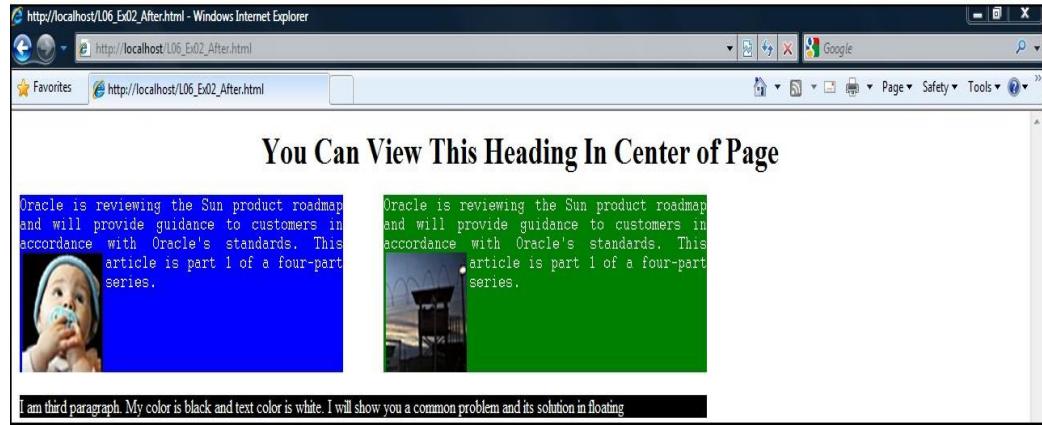
<p><b>Add This code to your html file</b></p> <pre>&lt;html&gt;&lt;head&gt; &lt;link rel="stylesheet" type="text/css" href="L06_Ex02_After.css"/&gt; &lt;/head&gt;&lt;body&gt; &lt;h1&gt;You Can View This Heading In Center of Page &lt;/h1&gt; &lt;div id="container"&gt; &lt;p id="p1"&gt;Oracle is reviewing the Sun product roadmap and will provide guidance to customers in accordance with Oracle's standards. &lt;img src="images/births.jpeg"/&gt;This article is part 1 of a four-part series.&lt;/p&gt; &lt;p id="p2"&gt;Oracle is reviewing the Sun product roadmap and will provide guidance to customers in accordance with Oracle's standards. &lt;img src="images/close.jpeg"/&gt;This article is part 1 of a four-part series.&lt;/p&gt; &lt;p id="p3"&gt;I am third paragraph. My color is black and text color is white. I will show you a common problem and its solution in floating &lt;/p&gt;&lt;/div&gt;&lt;/body&gt;&lt;/html&gt;</pre>	<p>Type the code shown in the image in your html file</p>
---	---

**2. Task:** Write following lines of code into a separate file.

<p><b>Add this code to your .css file</b></p> <pre>h1 {     text-align:center; } #p1 {     font-family:courier;     text-align:justify;     width:400px;     background-color:blue;     color:white;     float:left; } #p2 {     font-family:courier;     text-align:justify;     background-color:green;     color:white;     width:400px;     float:right; } #p3 {     background-color:black;     color:white;     text-align:justify;     clear:both; } #container {     width:850px; } img {     width:100px;     float:left;     padding-left: 10px;     padding-top:10px;     padding-right:10px; }</pre>	<p>In this Code img element is floated left setting the left right and top padding. Problem is solved using clear property. #p3 is given a property Clear:both Use of clear is solving the problem raised by the use of float. Clear is clearing both sides of third paragraph and resultantly placing the this third element of div container without any float at the bottom of the two floated elements within the same div.</p>
--	---

**3. Task:** Now save CSS file (Press ctrl+s).While creating a style-sheet, just save the file as *Filename.css* and put it in the same directory as your referenced html file.

**4. Task:** Open the html file in to web browser by double clicking on it and the output will be:



## Software Engineering Lab Manual

### Lab 4

#### Software Requirement Specification

CLO 1

Make wire frames of the given case studies using Pencil tool

#### Case Study:

We will be designing a simple online shopping portal. The system will allow more than one categories and different brands under that category. A customer can choose different items of different brands of categories. Then the customer login to give payment and card details and address for shipment. The Administrator can update the categories and brands etc. and also verifies customer details.

#### Requirements:

#### User End:

- As a user, I shall select one or more items.
- As a user, I shall register into the system.
- As a user, I shall login into the system using my account before purchasing an item.
- As a user, I shall give card details for shipment of items.

#### Admin End:

- As an admin, I shall login using my account.

- As an admin, I shall confirm user details.
- As an admin, I shall record the details of a shipment.

## Solution:

### Home Page



User

**T1:** As an User, I shall watch and select for buy or more information about this add

**T2:** As an User, I shall choice the product according to the specific brands for buying

**T3:** As an User, I shall choice the products which are most popular according to different visitors

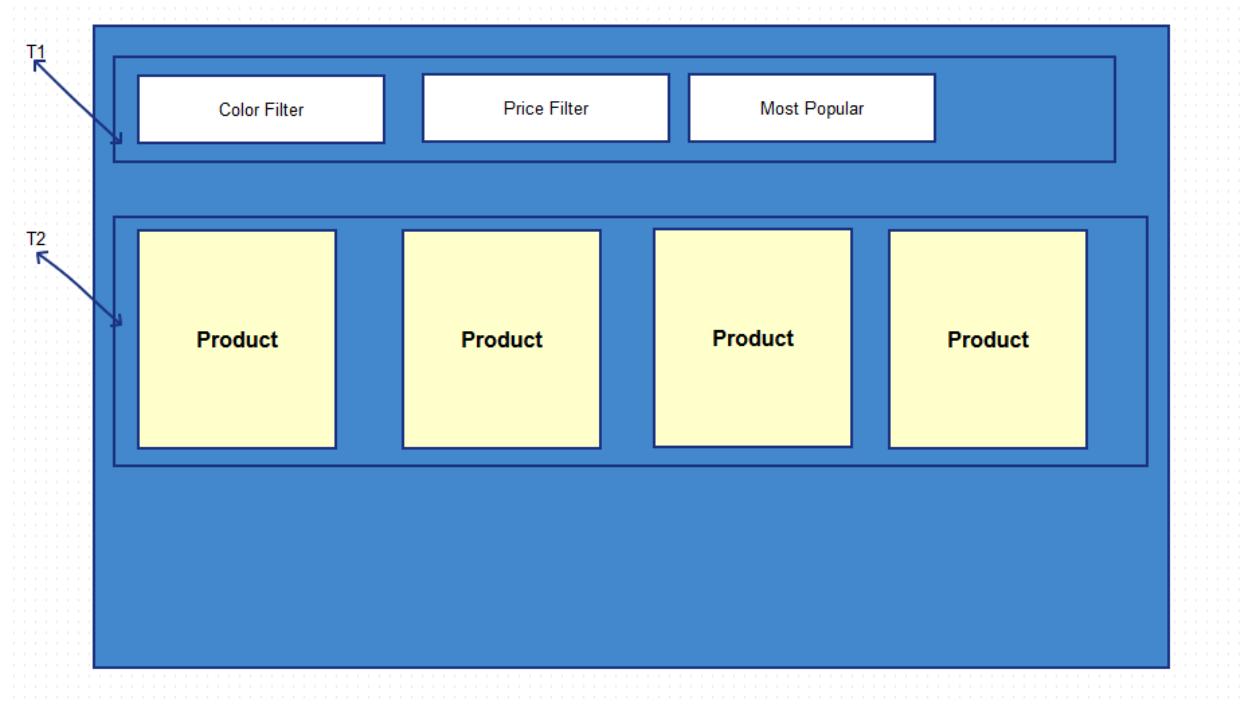
Admin

**T1:** As an Admin, I shall be change this advertisement due to new products

**T2:** As an Admin, I shall be update(Insert, Delete,) Brands

**T3:** As an Admin, I shall be recommend the products whose are most viewed or popular

### Mobile Brand



**User**

**T1:** As a User, I shall pass through a filter of products according to the needs.

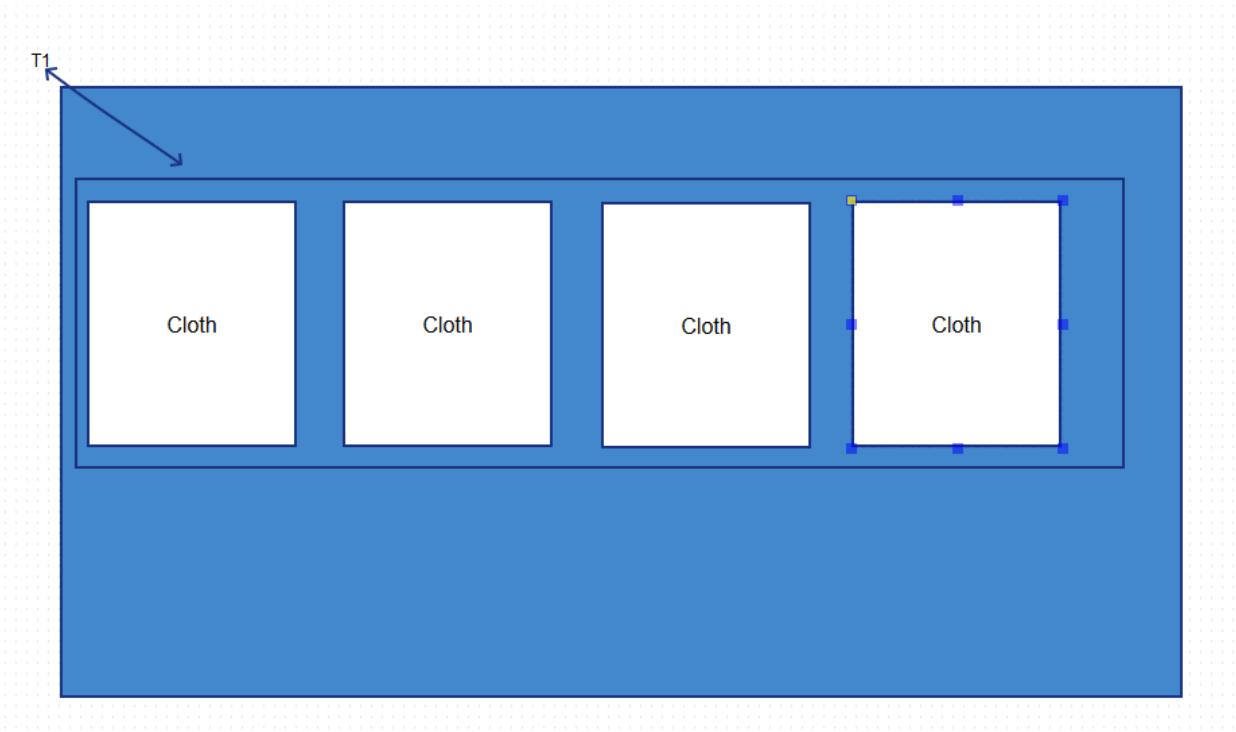
**T2:** As a User, I shall select the product for purchasing and complete description about product

**Admin**

**T1:** As an Admin, I shall give (or provide) the whole description about the product after selection of the product

**T2:** As an Admin, I shall give the whole description about the product after selecting the product

## Clothes



## User

**T1:** As a User, I shall select the products(cloths) according to the session of weather

## Admin

**T1:** As an Admin, I shall be adjusting the clothes according to the session.

## SignUp

Name
Email
Password
Retype Password
Submit

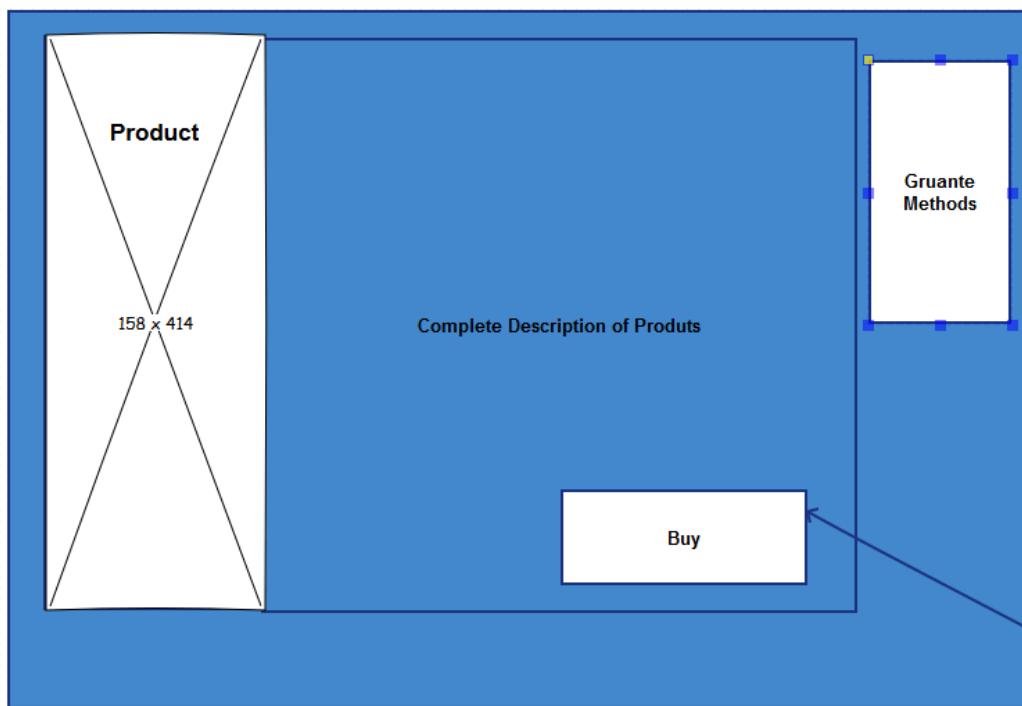
## User

**T1:** As an User, I shall After fill the form submit it for register himself and reserve the products for purchasing

## Admin

**T1:** As an Admin, I shall be authorize the user for getting new updates and buy a products

### Description of Products



## User

**T1:** As an User, I shall booking the order

## Admin

**T1:** As an Admin, I shall be send the notification about the order which user purchase the product

### Non-Functional Requirements:

#### Exercise: Identify the Issues

The usability objective of the AlphaBeta Plus client is to be usable by the intended customer at a 5' distance. The client should be an integrated system that is both reliable and responsive. Reliability and responsiveness are more critical for this device than for PC desktop systems. Reliability should be as good as that of consumer home entertainment devices (e.g., TV or VCR) and response to user interaction should be immediate.

The applications should provide an easy-to-learn, easy-to-use, and friendly user interface, even more so than PC desktop applications. Users should be able to start using the application immediately after installation. Users should be able to satisfactorily use the device with little instruction.

Friendly means being engaging, encouraging, and supportive in use. Users must feel comfortable with the client and must not be given reason to worry about accidentally initiating a destructive event, getting locked into some procedure, or making an error. Feedback for interactions should be immediate, obvious, and appropriate.

**Solution:**

The usability objective of the AlphaBeta Plus client is to be usable by the intended customer at a 5' distance. The client should be an integrated system that is both reliable and responsive. Reliability and responsiveness are more critical for this device than for PC desktop systems. Reliability should be as good as that of consumer home entertainment devices (e.g., TV or VCR) and response to user interaction should be immediate.

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Friendly means being engaging, encouraging, and supportive in use. Users must feel comfortable with the client and must not be given reason to worry about accidentally initiating a destructive event, getting locked into some procedure, or making an error. Feedback for interactions should be immediate, obvious, and appropriate.

# **Software Engineering**

## **Lab Manual**

## **Lab 5**

### **Plagiarism**

### **CLO 5**

#### **What is Plagiarism**

Many people think of plagiarism as copying another's work, or borrowing someone else's original ideas. But terms like "copying" and "borrowing" can disguise the seriousness of the offense:

According to the *Merriam-Webster OnLine Dictionary*, to "plagiarize" means

- 1) to steal and pass off (the ideas or words of another) as one's own
- 2) to use (another's production) without crediting the source
- 3) to commit literary theft
- 4) to present as new and original an idea or product derived from an existing source.

In other words, plagiarism is an act of *fraud*. It involves both **stealing** someone else's work and **lying** about it afterward.

But can words and ideas really be stolen?

According to U.S. law, the answer is yes. In the United States and many other countries, the expression of original ideas is considered intellectual property, and is protected by copyright laws, just like original inventions. Almost all forms of expression fall under copyright protection as long as they are recorded in some media (such as a book or a computer file). All of the following are considered plagiarism:

- turning in someone else's work as your own
- copying words or ideas from someone else without giving credit
- failing to put a quotation in quotation marks
- giving incorrect information about the source of a quotation
- changing words but copying the sentence structure of a source without giving credit
- copying so many words or ideas from a source that it makes up the majority of your work, whether you give credit or not (see our section on "fair use" rules)

**Attention! Changing the words of an original source is *not* sufficient to prevent plagiarism.** If you have retained the essential idea of an original source, and have not cited it, then no matter how drastically you may have altered its context or presentation, *you have still plagiarized*

*Document provided by Turnitin.com and Research Resources. Turnitin allows free distribution and non-profit use of this document in educational settings.*

Most cases of plagiarism can be avoided, however, by citing sources. Simply acknowledging that certain material has been borrowed, and providing your audience with the information necessary to find that source, is usually enough to prevent plagiarism.

### **Types of Plagiarism**

Anyone who has written or graded a paper knows that plagiarism is not always a black-and-white issue. The boundary between plagiarism and research is often unclear. Learning to recognize the various forms of plagiarism, especially the more ambiguous ones, is an important step in the fight to prevent it.

#### **I SOURCES NOT CITED**

##### **1) “The Ghost Writer”**

The writer turns in another’s work, word-for-word, as his or her own.

##### **2) “The Photocopy”**

The writer copies significant portions of text straight from a single source, without alteration.

##### **3) “The Potluck Paper”**

The writer tries to disguise plagiarism by copying from several different sources, tweaking the sentences to make them fit together while retaining most of the original phrasing.

##### **4) “The Poor Disguise”**

Although the writer has retained the essential content of the source, he or she has altered the paper’s appearance slightly by changing key words and phrases.

##### **5) “The Labor of Laziness”**

The writer takes the time to paraphrase most of the paper from other sources and make it all fit together, instead of spending the same effort on original work.

##### **6) “The Self-Stealer”**

The writer “borrows” generously from his or her previous work, violating policies concerning the expectation of originality adopted by most academic institutions.

#### **II SOURCES CITED (but still plagiarized!)**

**1) “The Forgotten Footnote”**

The writer mentions an author’s name for a source, but neglects to include specific information on the location of the material referenced. This often masks other forms of plagiarism by obscuring source locations.

**2) “The Misinformer”**

The writer provides inaccurate information regarding the sources, making it impossible to find them.

**3) “The Too-Perfect Paraphrase”**

The writer properly cites a source, but neglects to put in quotation marks text that has been copied word-for-word, or close to it. Although attributing the basic ideas to the source, the writer is falsely claiming original presentation and interpretation of the information.

**4) “The Resourceful Citer”**

The writer properly cites all sources, paraphrasing and using quotations appropriately. The catch? The paper contains almost no original work! It is sometimes difficult to spot this form of plagiarism because it looks like any other well-researched document.

**5) “The Perfect Crime”**

Well, we all know it doesn’t exist. In this case, the writer properly quotes and cites sources in some places, but goes on to paraphrase other arguments from those sources without citation. This way, the writer tries to pass off the paraphrased material as his or her own analysis of the cited material.

## **FAQ**

### **What is plagiarism?**

Simply put, plagiarism is the use of another's original words or ideas as though they were your own. Any time you borrow from an original source and do not give proper credit, you have committed plagiarism and violated U.S. copyright laws. (See our [What is Plagiarism?](#) page for more detailed information on plagiarism.)

### **What are copyright laws?**

Copyright laws exist to protect our intellectual property. They make it illegal to reproduce someone else's expression of ideas or information without permission. This can include music, images, written words, video, and a variety of other media.

At one time, a work was only protected by copyright if it included a copyright trademark (the © symbol). According to laws established in 1989, however, works are now copyright protected with or without the inclusion of this symbol.

Anyone who reproduces copyrighted material improperly can be prosecuted in a court of law. It does not matter if the form or content of the original has been altered – as long as any material can be shown to be substantially similar to the original, it may be considered a violation of the **Copyright Act**.

For information on how long a copyright lasts, see the section below on the public domain.

Are all published works copyrighted?

Actually, no. The Copyright Act only protects works that express original ideas or information. For example, you could borrow liberally from the following without fear of plagiarism:

- Compilations of readily available information, such as the phone book
- Works published by the U.S. government
- Facts that are not the result of original research (such as the fact that there are fifty U.S. states, or that carrots contain Vitamin A)
- Works in the public domain (provided you cite properly)

Can facts be copyrighted?

Yes, in some situations. Any “facts” that have been published as the result of individual research are considered the intellectual property of the author.

Do I have to cite sources for every fact I use?

No. You do not have to cite sources for facts that are not the result of unique individual research. Facts that are readily available from numerous sources and generally known to the public are considered “common knowledge,” and are not protected by copyright laws. You can use these facts liberally in your paper without citing authors. If you are unsure whether or not a fact is common knowledge, you should probably cite your source just to be safe.

Does it matter how much was copied?

Not in determining whether or not plagiarism is a crime. If even the smallest part of a work is found to have been plagiarized, it is still considered a copyright violation, and its producer can be brought to trial. However, the amount that was copied probably will have a bearing on the severity of the sentence. A work that is almost entirely plagiarized will almost certainly incur greater penalties than a work that only includes a small amount of plagiarized material.

But can’t I use material if I cite the source?

You are allowed to borrow ideas or phrases from other sources provided you **cite them properly** and your usage is consistent with the guidelines set by fair use laws. As a rule, however, you should be careful about borrowing too liberally – if the case can be made that your work consists predominantly of someone else’s words or ideas, you may still be susceptible to charges of plagiarism.

What are the punishments for plagiarism?

As with any wrongdoing, the degree of intent (see below) and the nature of the offense determine its status. When plagiarism takes place in an academic setting, it is most often handled by the individual instructors and the academic institution involved. If, however, the plagiarism involves money, prizes, or job placement, it constitutes a crime punishable in court.

### *Academic Punishments*

Most colleges and universities have zero tolerance for plagiarists. In fact, academic standards of intellectual honesty are often more demanding than governmental copyright laws. If you have plagiarized a paper whose copyright has run out, for example, you are less likely to be treated with any more leniency than if you had plagiarized copyrighted material.

A plagiarized paper almost always results in failure for the assignment, frequently in failure for the course, and sometimes in expulsion.

### *Legal Punishments*

Most cases of plagiarism are considered misdemeanors, punishable by fines of anywhere between \$100 and \$50,000 – and up to one year in jail.

Plagiarism can also be considered a felony under certain state and federal laws. For example, if a plagiarist copies and earns more than \$2,500 from copyrighted material, he or she may face up to \$250,000 in fines and up to ten years in jail.

### *Institutional Punishments*

Most corporations and institutions will not tolerate any form of plagiarism. There have been a significant number of cases around the world where people have lost their jobs or been denied positions as a result of plagiarism.

#### Does intention matter?

Ignorance of the law is never an excuse. So even if you did not realize you were plagiarizing, you may still be found guilty. However, there are different punishments for *willful infringement*, or deliberate plagiarism, and *innocent infringement*, or accidental plagiarism. To distinguish between these, courts recognize what is called the *good faith* defense. If you can demonstrate, based on the amount you borrowed and the way you have incorporated it in your own work, that *reasonably* believed what you did was *fair use*, chances are that your sentence will be lessened substantially.

#### What is “fair use,” anyway?

The United States government has established rough guidelines for determining the nature and amount of work that may be “borrowed” without explicit written consent. These are called “fair use” laws, because they try to establish whether certain uses of original material are reasonable. The laws themselves are vague and complicated. Below we have condensed them into some rubrics you can apply to help determine the fairness of any given usage.

- The nature of your use.

- If you have merely copied something, it is unlikely to be considered fair use. But if the material has been transformed in an original way through interpretation, analysis, etc., it is more likely to be considered “fair use.”
- The amount you’ve used.
  - The more you’ve “borrowed,” the less likely it is to be considered fair use. What percentage of your work is “borrowed” material? What percentage of the original did you use? The lower the better.
- The effect of your use on the original
  - If you are creating a work that competes with the original in its own market, and may do the original author economic harm, any substantial borrowing is unlikely to be considered fair use. The more the content of your work or its target audience differs from that of the original, the better.

We recommend the following sites for more information on “Fair Use” and Copyright laws.

<http://www.umuc.edu/library/copy.html>

[http://www.sp.edu.sg/departments/asd/hk\\_1261.htm](http://www.sp.edu.sg/departments/asd/hk_1261.htm)

What is the “public domain?”

Works that are no longer protected by copyright, or never have been, are considered “public domain.” This means that you may freely borrow material from these works without fear of plagiarism, provided you make proper attributions.

How do I know if something is public domain or not?

The terms and conditions under which works enter the public domain are a bit complicated. In general, anything published more than 75 years ago is now in the public domain. Works published after 1978 are protected for the lifetime of the author plus 70 years. The laws governing works published fewer than 75 years ago but before 1978 are more complicated, although generally copyright protection extended 28 years after publication plus 47 more years if the copyright was renewed, totaling 75 years from the publication date. If you are uncertain about whether or not a work is in the public domain, it is probably best to contact a lawyer or act under the assumption that it is still protected by copyright laws.

### **What is Citation?**

A “citation” is the way you tell your readers that certain material in your work came from another source. It also gives your readers the information necessary to find that source again, including:

- information about the author
- the title of the work
- the name and location of the company that published your copy of the source

- the date your copy was published
- the page numbers of the material you are borrowing

### Why should I cite sources?

Giving credit to the original author by citing sources is the only way to use other people's work without plagiarizing. But there are a number of other reasons to cite sources:

- Citations are extremely helpful to anyone who wants to find out more about your ideas and where they came from.
- Not all sources are good or right – your own ideas may often be more accurate or interesting than those of your sources. Proper citation will keep you from taking the rap for someone else's bad ideas.
- Citing sources shows the amount of research you've done.
- Citing sources strengthens your work by lending outside support to your ideas.

Doesn't citing sources make my work seem less original?

Not at all. On the contrary, citing sources actually helps your reader distinguish your ideas from those of your sources. This will actually emphasize the originality of your own work.

### When do I need to cite?

Whenever you borrow words or ideas, you need to acknowledge their source. The following situations almost always require citation:

- Whenever you use quotes
- Whenever you paraphrase
- Whenever you use an idea that someone else has already expressed
- Whenever you make specific reference to the work of another
- Whenever someone else's work has been critical in developing your own ideas.

### How do I cite sources?

This depends on what type of work you are writing, how you are using the borrowed material, and the expectations of your instructor.

First, you have to think about how you want to identify your sources. If your sources are very important to your ideas, you should mention the author and work in a sentence that introduces your citation. If, however, you are only citing the source to make a minor point, you may consider using parenthetical references, footnotes, or endnotes.

There are also different forms of citation for different disciplines. For example, when you cite sources in a psychology paper you would probably use a different form of citation than you might in a paper for an English class.

Finally, you should always consult your instructor to determine the form of citation appropriate for your paper. You can save a lot of time and energy simply by asking "How should I cite my sources," or "What style of citation should I use?" before you begin writing.

In the following sections, we will take you step-by-step through some general guidelines for citing sources.

## **Identifying Sources in the Body of Your Paper**

The first time you cite a source, it is almost always a good idea to mention its author(s), title, and genre (book, article, or web page, etc.). If the source is central to your work, you may want to introduce it in a separate sentence or two, summarizing its importance and main ideas. But often you can just tag this information onto the beginning or end of a sentence. For example, the following sentence puts information about the author and work before the quotation:

Milan Kundera, in his book The Art of the Novel, suggests that “if the novel should really disappear, it will do so not because it has exhausted its powers but because it exists in a world grown alien to it.”

You may also want to describe the authors if they are not famous, or if you have reason to believe your reader does not know them. You should say whether they are economic analysts, artists, physicists, etc. If you do not know anything about the authors, and cannot find any information, it is best to say where you found the source and why you believe it is credible and worth citing. For example,

*In an essay presented at an Asian Studies conference held at Duke University, Sheldon Garon analyzes the relation of state, labor-unions, and small businesses in Japan between the 1950s and 1980s.*

If you have already introduced the author and work from which you are citing, and you are obviously referring to the same work, you probably don’t need to mention them again. However, if you have cited other sources and then go back to one you had cited earlier, it is a good idea to mention at least the author’s name again (and the work if you have referred to more than one by this author) to avoid confusion.

## Quoting Material

What is quoting?

Taking the exact words from an original source is called **quoting**. You should quote material when you believe the way the original author expresses an idea is the most effective means of communicating the point you want to make. If you want to borrow an idea from an author, but do not need his or her exact words, you should try paraphrasing instead of quoting.

How often should I quote?

Quote as infrequently as possible. You never want your essay to become a series of connected quotations, because that leaves little room for your own ideas. Most of the time, paraphrasing and summarizing your sources is sufficient (but remember that you still have to cite them!). If you think it’s important to quote something, an excellent rule of thumb is that for every line you quote, you should have at least two lines analyzing it.

How do I incorporate quotations in my paper?

Most of the time, you can just identify a source and quote from it, as in the first example above. Sometimes, however, you will need to modify the words or format of the quotation in order to fit in your paper. Whenever you change the original words of your source, you must indicate that you have done so. Otherwise, you would be claiming the original author used words that he or she did not use. But be careful not to change too many words! You could accidentally change the meaning of the quotation, and falsely claim the author said

something they did not.

For example, let's say you want to quote from the following passage in an essay called "United Shareholders of America," by Jacob Weisberg:

"The citizen-investor serves his fellow citizens badly by his inclination to withdraw from the community. He tends to serve himself badly as well. He does so by focusing his pursuit of happiness on something that very seldom makes people happy in the way they expect it to."

When you quote, you generally want to be as concise as possible. Keep only the material that is strictly relevant to your own ideas. So here you would not want to quote the middle sentence, since it is repeated again in the more informative last sentence.

However, just skipping it would not work – the final sentence would not make sense without it. So, you have to change the wording a little bit. In order to do so, you will need to use some **editing symbols**. Your quotation might end up looking like this:

In his essay, "United Shareholders of America," Jacob Weisberg insists that "The citizen-investor serves his fellow citizens badly by his inclination to withdraw from the community. He tends to serve himself badly. . . by focusing his pursuit of happiness on something that very seldom makes people happy in the way they expect it to."

The ellipses ( . . . ) indicate that you have skipped over some words in order to condense the passage. But even this version is still a bit lengthy – there is something else you can do to make it even more concise. Try changing the last sentence from

"He tends to serve himself badly. . . by focusing his pursuit of happiness on something that very seldom makes people happy in the way they expect it to."

to

"He tends to serve himself badly. . . by focusing his pursuit of happiness on [money]."

The brackets around the word [money] indicate that you have substituted that word for other words the author used. To make a substitution this important, however, you had better be sure that "money" is what the final phrase meant – if the author intentionally left it ambiguous, you would be significantly altering his meaning. That would make you guilty of fraudulent attribution. In this case, however, the paragraph following the one quoted explains that the author is referring to money, so it is okay.

As a general rule, it is okay to make minor grammatical and stylistic changes to make the quoted material fit in your paper, but it is not okay to significantly alter the structure of the material or its content.

#### Quoting within Quotes

When you have "embedded quotes," or quotations within quotations, you should switch from the normal quotation marks ("") to *single* quotation marks ('') to show the difference. For example, if an original passage by John Archer reads:

The Mountain Coyote has been described as a “wily” and “single-minded” predator by zoologist Ima Warner.

your quotation might look like this:

As John Archer explains, “The Mountain Coyote has been described as a ‘wily’ and ‘single-minded’ predator by zoologist Ima Warner.”

Note the double quotes surrounding the entire quotation, and the single quotes around the words quoted in the original.

How do I include long quotes in my paper?

The exact formatting requirements for long quotations differ depending on the citation style. In general, however, if you are quoting more than 3 lines of material, you should do the following:

- Change the font to one noticeably smaller (in a document that is mostly 12 point font, you should use a 10 point font, for example)
- Double indent the quotation – that means adjusting the left and right margins so that they are about one inch smaller than the main body of your paper.
- If you have this option in your word-processor, “left-justify” the text. That means make it so that each line begins in the same place, creating a straight line on the left side of the quotation, while the right side is jagged.
- Do NOT use quotation marks for the entire quotation – the graphic changes you have made already (changing the font, double indenting, etc.) are enough to indicate that the material is quoted. For quotations within that quotation, use normal quotation marks, not single ones.
- You might want to skip 1.5 times the line-spacing you are using in the document before you begin the quotation and after it. This is optional and depends on the style preferred by your instructor.

## Listing References

What’s a Bibliography?

A bibliography is a list of all of the sources you have used in the process of researching your work. In general, a bibliography should include:

- the authors’ names
- the titles of the works
- the names and locations of the companies that published your copies of the sources
- the dates your copies were published
- relevant page numbers (optional)

Different kinds of sources, such as magazine articles and chapters in multi-author volumes, may require more specific information to help your reader locate the material.

## Ok, so what’s an *Annotated Bibliography*?

An annotated bibliography is the same as a bibliography with one important difference: in an annotated

bibliography, the bibliographic information is followed by a brief description of the content, quality, and usefulness of the source.

### What are Footnotes?

Footnotes are notes placed at the bottom of a page. They cite references or comment on a designated part of the text above it. For example, say you want to add an interesting comment to a sentence you have written, but the comment is not directly related to the argument of your paragraph. In this case, you could add the symbol for a footnote.

Then, at the bottom of the page you could reprint the symbol and insert your comment. Here is an example:

This is an illustration of a footnote.<sup>1</sup> The number “1” at the end of the sentence corresponds to the note below. See how it fits in the body of the text?

<sup>1</sup> At the bottom of the page you can insert your comments about the sentence preceding the footnote.

When your reader comes across the footnote in the main text of your paper, he or she could look down at your comments right away, or else continue reading the paragraph and read your comments at the end. Because this makes it convenient for your reader, most citation styles require that you use either footnotes or endnotes in your paper.

Some, however, allow you to make parenthetical references (author, date) in the body of your work.

Footnotes are not just for interesting comments, however. Sometimes, they simply refer to relevant sources. In other words, they let your reader know where certain material came from, or where they can look for other sources on the subject.

To decide whether you should cite your sources in footnotes or in the body of your paper, you should ask your instructor.

### Where does the little footnote mark go?

Whenever possible, put the footnote at the end of a sentence, immediately following the period or whatever punctuation mark completes that sentence. Skip two spaces after the footnote before you begin the next sentence. If you must include the footnote in the middle of a sentence for the sake of clarity, or because the sentence has more than one footnote (try to avoid this!), try to put it at the end of the most relevant phrase, after a comma or other punctuation mark. Otherwise, put it right at the end of the most relevant word. If the footnote is not at the end of a sentence, skip only one space after it.

### What's the difference between Footnotes and Endnotes?

The only real difference is placement – footnotes appear at the bottom of the relevant page, while endnotes all appear at the very end of your document. If your notes are very important, footnotes are more likely to get your reader’s attention. Endnotes, on the other hand, are less intrusive and will not interrupt the flow of your paper.

If I cite sources in the footnotes (or endnotes), how's that different from a bibliography?

In footnotes or endnotes, you are citing sources that are directly relevant to specific passages in your paper. In a bibliography, you are citing all of the sources that you researched, whether they relate to any specific part of your paper or not. So your bibliography might contain “extra” sources which you read, but did not specifically cite in your paper. Also, citations in footnotes or endnotes will always have page numbers, referring to the specific passages relevant to that part of your paper, while citations in bibliographies may have none (if you read an entire book, for example, you would not have to list specific page numbers in your bibliography. If you quoted the book, however, you would have to mention the page numbers in your notes). What are “works cited” and “works consulted” pages?

Sometimes you may be asked to include these – especially if you have used a parenthetical style of citation. A “works cited” page is a list of all the works from which you have borrowed material. Your reader may find this more convenient than footnotes or endnotes because he or she will not have to wade through all of the comments and other information in order to see the sources from which you drew your material. A “works consulted” page is a complement to a “works cited” page, listing *all* of the works you used, whether they were useful or not.

Isn't a “works consulted” page the same as a “bibliography,” then?

Well, yes. The title is different because “works consulted” pages are meant to complement “works cited” pages, and bibliographies may list other relevant sources in addition to those mentioned in footnotes or endnotes. Choosing to title your bibliography “Works Consulted” or “Selected Bibliography” may help specify the relevance of the sources listed.

For more information on documenting sources, see Purdue University's Online Writing Lab:  
<http://owl.english.purdue.edu/handouts/research/index.html>

### Citing Sources

Citation styles differ mostly in the location, order, and syntax of information about references. The number and diversity of citation styles reflect different priorities with respect to concision, readability, dates, authors, publications, and, of course, style.

There are also two major divisions *within* most citation styles: **documentary-note style** and **parenthetical style**. *Documentary-note style* is the standard form of documenting sources. It involves using either footnotes or endnotes so that information about your sources is readily available to your readers but does not interfere with their reading of your work.

In the *parenthetical style*, sometimes called the “author-date” style or “in-text” style, references to sources are made in the body of the work itself, through parentheses. An example of this would be the following sentence, taken from page 23 of a book written by Professor Scott in 1999:

Professor Scott asserts that “environmental reform in Alaska in the 1970s accelerated rapidly as the result of pipeline expansion.”  
(Scott 1999, 23)

This is generally considered an abbreviated form of citation, and it does not require footnotes or endnotes, although it does require the equivalent of a “Works Cited” page at the end of the paper. It is easier to write, but might interfere with how smoothly your work reads. See your instructor for information on which form, documentary-note style or parenthetical style, is appropriate for your paper.

With so many different citation styles, how do you know which one is right for your paper? First, we strongly recommend asking your instructor. There are several factors which go into determining the appropriate citation style, including discipline (priorities in an English class might differ from those of a Psychology class, for example), academic expectations (papers intended for publication might be subject to different standards than mid-term papers), the research aims of an assignment, and the individual preference of your instructor.

If you want to learn more about using a particular citation style, we have provided links to more specific resources below. Just choose the appropriate discipline from the menu on the left, or scroll down until you find the style that interests you.

## Humanities

### *Chicago*

- Writer's Handbook: Chicago Style Documentation  
<http://www.wisc.edu/writing/Handbook/DocChicago.html>
- Quick Reference Guide to the Chicago Style  
<http://www.library.wwu.edu/ref/Refhome/chicago.html>
- Excellent FAQ on Usage in the Chicago Style  
<http://www.press.uchicago.edu/Misc/Chicago/cmosfaq/>
- Online! Guide to Chicago Style  
<http://www.bedfordstmartins.com/online/cite7.html>

### *MLA* (Modern Language Association)

- Writer's Handbook: MLA Style Documentation  
<http://www.wisc.edu/writing/Handbook/DocMLA.html>
- The Documentation Style of the Modern Language Association  
<http://www.newark.ohio-state.edu/~osuwwrite/mla.htm>
- MLA Citation Style  
[http://campusgw.library.cornell.edu/newhelp/res\\_strategy/citing/mla.html](http://campusgw.library.cornell.edu/newhelp/res_strategy/citing/mla.html)
- Online! Guide to MLA Style  
<http://www.bedfordstmartins.com/online/cite5.html>
- Useful Guide to Parenthetical Documentation  
<http://www.geocities.com/Athens/Acropolis/1623/document.html>

### *Turabian* (an academic style that works in other disciplines as well)

- Turabian bibliography samples (Ithaca College Library). Based on the 6th edition of Turabian's

*Manual.*

- [Turabian Style: Sample Footnotes and Bibliographic Entries \(6th edition\)](#) (Bridgewater State College)
- [Turabian style guide:](#) (University of Southern Mississippi Libraries)
- [Turabian Citation Style Examples](#) (Northwest Missouri State University)

Sciences

*ACS* (American Chemical Society)

- ACS Style Sheet <http://www.lehigh.edu/~inhelp/footnote/acs.html>
- ACS Books Reference Style Guidelines  
<http://pubs.acs.org/books/references.shtml>

*AMA* (American Medical Society)

- AMA Style Guide  
<http://healthlinks.washington.edu/hsl/styleguides/ama.html>
- AMA Documentation Style  
<http://rx.stlcop.edu/wcenter/AMA.htm>
- AMA Citation Style  
<http://www.liu.edu/cwis/cwp/library/workshop/citama.htm>

*CBE* (Council of Biology Editors)

- Writer's Handbook: CBE Style Documentation  
<http://www.wisc.edu/writetest/Handbook/DocCBE6.html>
- Online! Guide to CBE Style  
<http://www.bedfordstmartins.com/online/cite8.html>
- CBE Style Form Guide  
<http://www.lib.ohio-state.edu/guides/cbegd.html>

*IEEE* (Institute of Electrical and Electronics Engineers)

- Handbook: Documentation IEEE Style  
<http://www.ecf.utoronto.ca/~writing/handbook-docum1b.html>
- Sample IEEE Documentation Style for References  
[http://www.carleton.ca/~nartemev/IEEE\\_style.html](http://www.carleton.ca/~nartemev/IEEE_style.html)
- Electrical Engineering Citation Style  
<http://www.lehigh.edu/~inhelp/footnote/footee.html>

*NLM* (National Library of Medicine)

- NLM Style Guide  
<http://healthlinks.washington.edu/hsl/styleguides/nlm.html>
- Citing the Internet: A Brief Guide  
<http://nnlm.gov/pnr/news/200107/netcite.html>
- National Library of Medicine Recommended Formats for Bibliographic Citation (PDF format)  
<http://www.nlm.nih.gov/pubs/formats/internet.pdf>

### Vancouver (Biological Sciences)

- Introduction to the Vancouver Style  
<http://www.lib.monash.edu.au/vl/cite/citeprvr.htm>
- Vancouver Style References  
<http://www.library.uq.edu.au/training/citation/vancouv.html>
- Detailed Explanation of the Vancouver style  
<http://www.acponline.org/journals/annals/01jan97/unifreqr.htm>

### Social Sciences

#### AAA (American Anthropological Association)

- Citations and Bibliographic Style for Anthropology Papers  
<http://www.usd.edu/anth/handbook/bib.htm>
- AAA Style Handbook (PDF format)  
[http://www.aaanet.org/pubs/style\\_guide.pdf](http://www.aaanet.org/pubs/style_guide.pdf)

#### APA (American Psychological Association)

[if one of the below needs to be deleted, delete APA Style Guide]

- Writer's Handbook: APA Style Documentation  
<http://www.wisc.edu/writing/Handbook/DocAPA.html>
- APA Style Guide  
<http://www.lib.usm.edu/~instruct/guides/apa.html>
- Bibliography Style Handbook (APA)  
[http://www.english.uiuc.edu/cws/wworkshop/bibliography\\_style\\_handbookap.a.htm](http://www.english.uiuc.edu/cws/wworkshop/bibliography_style_handbookap.a.htm)
- APA Style Electronic Format  
<http://www.westwords.com/guffey/apa.html>
- Online! Guide to APA Style  
<http://www.bedfordstmartins.com/online/cite6.html>
- APA Style.org <http://www.apastyle.org/elecref.html>

#### APSA (American Political Science Association)

- Writer's Handbook: APSA Documentation

## Legal Style

- Cornell University's Introduction to Basic Legal Citation  
<http://www.law.cornell.edu/citation/citation.table.html>
- Legal Citation: Using and Understanding Legal Abbreviations  
<http://qsilver.queensu.ca/law/legalcit.htm>
- Legal Research and Citation Style in the USA  
<http://www.rbs0.com/lawcite.htm>

**Other:** General info on citing web documents  
<http://www.lib.berkeley.edu/TeachingLib/Guides/Internet/Style.html>

Recommended Multi-Style Links  
<http://www.researchguide.com/styleguides.html>  
<http://www.dianahacker.com/resdoc/>

## Preventing Plagiarism: Student Resources

In a research paper, you have to come up with your own original ideas while at the same time making reference to work that's already been done by others. But how can you tell where their ideas end and your own begin? What's the proper way to integrate sources in your paper? If you change some of what an author said, do you still have to cite that person?

Confusion about the answers to these questions often leads to **plagiarism**. If you have similar questions, or are concerned about preventing plagiarism, we recommend using the checklist below.

### A. Consult with your instructor

Have questions about plagiarism? If you can't find the answers on our site, or are unsure about something, you should ask your instructor. He or she will most likely be very happy to answer your questions. You can also check out the guidelines for citing sources properly. If you follow them, and the rest of the advice on this page, you should have no problems with plagiarism.

### B. Plan your paper

Planning your paper well is the first and most important step you can take toward preventing plagiarism. If you know you are going to use other sources of information, you need to plan **how** you are going to include them in your paper. This means working out a balance between the ideas you have taken from other sources and your own, original ideas. Writing an outline, or coming up with a thesis statement in which you clearly formulate an argument *about* the information you find, will help establish the boundaries between your ideas and those of your sources.

### C. Take Effective Notes

One of the best ways to prepare for a research paper is by taking thorough notes from all of your sources, so that you have much of the information organized before you begin writing. On the other hand, poor note-taking can lead to many problems – including improper citations and misquotations, both of which are forms of plagiarism! To avoid confusion about your sources, try using different colored fonts, pens, or pencils for each one, and make sure you clearly distinguish your own ideas from those you found elsewhere. Also, get in the habit of marking page numbers, and make sure that you record bibliographic information or web addresses for every source right away – finding them again later when you are trying to finish your paper can be a nightmare!

#### D. When in doubt, cite sources

Of course you want to get credit for your own ideas. And you don't want your instructor to think that you got all of your information from somewhere else. But if it is unclear whether an idea in your paper really came from you, or whether you got it from somewhere else and just changed it a little, **you should always cite your source**. Instead of weakening your paper and making it seem like you have fewer original ideas, this will actually strengthen your paper by: 1) showing that you are not just copying other ideas but are processing and adding to them, 2) lending outside support to the ideas that are completely yours, and 3) highlighting the originality of your ideas by making clear distinctions between them and ideas you have gotten elsewhere.

#### E. Make it clear **who** said **what**

Even if you cite sources, ambiguity in your phrasing can often disguise the real source of any given idea, causing inadvertent plagiarism. Make sure when you mix your own ideas with those of your sources that you always clearly distinguish them. If you are discussing the ideas of more than one person, watch out for confusing pronouns. For example, imagine you are talking about Harold Bloom's discussion of James Joyce's opinion of Shakespeare, and you write: "He brilliantly portrayed the situation of a writer in society at that time." Who is the "He" in this sentence? Bloom, Joyce, or Shakespeare? Who is the "writer": Joyce, Shakespeare, or one of their characters? Always make sure to distinguish **who** said **what**, and give credit to the right person.

#### F. Know how to Paraphrase:

A paraphrase is a restatement **in your own words** of someone else's ideas. Changing a few words of the original sentences does NOT make your writing a legitimate paraphrase. You must change **both** the **words** and the **sentence structure** of the original, **without** changing the content. Also, you should keep in mind that paraphrased passages **still require citation** because the ideas came from another source, even though you are putting them in your own words.

The purpose of paraphrasing is not to make it seem like you are drawing less directly from other sources or to reduce the number of quotations in your paper. It is a common misconception among students that you need to hide the fact that you rely on other sources. Actually it is

advantageous to highlight the fact that other sources support your own ideas. Using quality sources to support your ideas makes them seem stronger and more valid. Good paraphrasing makes the ideas of the original source fit smoothly into your paper, emphasizing the most relevant points and leaving out unrelated information.

## G. Evaluate Your Sources

Not all sources on the web are worth citing – in fact, many of them are just plain wrong. So how do you tell the good ones apart? For starters, make sure you know the **author(s)** of the page, where they got their information, and when they wrote it (getting this information is also an important step in avoiding plagiarism!). Then you should determine how credible you feel the source is: how well they support their ideas, the quality of the writing, the accuracy of the information provided, etc. We recommend using Portland Community College's "[rubrics for evaluating web pages](#)" as an easy method of testing the credibility of your sources. [Preventing Plagiarism: Resources for Educators](#)

The most important steps in preventing plagiarism are those taken to address its causes. The strategies in this section are intended as guidelines to help you:

- 1) become aware of the reasons plagiarism occurs
- 2) identify the different forms of plagiarism
- 3) integrate plagiarism education and prevention techniques into your courses

## Why Students Plagiarize

There are many reasons students plagiarize. Sometimes deadlines come around more quickly than expected, sometimes assignments feel overwhelming, and sometimes the boundaries of plagiarism and research just get confused. But what situations are most likely to result in plagiarism? More importantly, how can they be avoided? Learning to identify the factors that make plagiarism an attractive alternative is the best way to stop it before it starts.

### *Intentional Plagiarism*

Just like hacking into websites, plagiarizing papers can be something of a thrill in itself. For many students it becomes a question of ingenuity: “can I sneak a plagiarized paper past my professor?” But there is usually more behind intentional plagiarism than just the thrill of deception.

#### Searching vs. Researching

Today's students learn quickly that finding and manipulating data on the internet is a valuable skill. With the wealth of information available online, the production of original analysis and interpretation may seem like “busy work” compared to finding the best or most obscure sources.

Teach your students that the real skills they need to learn are interpretation and analysis – how to *process* the information they find. Tell them that anyone with some basic knowledge can *find* information on the internet – it’s what they *do* with that information that is important.

#### “But their words are better”

Some students might think, “Why sweat over producing an analysis that has already been done better,

by someone who knows more?” Students may also be intimidated by the quality of work found online, thinking their own work cannot compare.

Tell your students that what interests you most is seeing how *they* understand the assigned topic, and how they develop their own style and voice. This might go a long way toward making them feel more comfortable with writing. Explain to them that you know writing is a learning process, and that you do not expect them to be as brilliant as experts who have devoted years to the subject. You may also want to let them know that their experiences and the context of your class give them a unique perspective that may give them a far more interesting angle on the issues than those of the “experts.”

#### Making the Grade

Students are under enormous pressure from family, peers, and instructors to compete for scholarships, admissions, and, of course, places in the job market. They often see education as a rung in the ladder to success, and not an active process valuable in itself. Because of this, students tend to focus on the end results of their research, rather than the skills they learn in doing it.

Explain to your students that while they may be able to hide ignorance of particular facts or theories, research and writing skills make themselves very apparent to anyone evaluating them. In other words, your students’ grades won’t matter if they don’t have the skills to show for them.

Also, you may wish to emphasize improvement as a factor in grading, as this can encourage students to try developing their own abilities. This depends entirely upon your own pedagogical style, of course.

#### “Everyone else is doing it”

Students often justify plagiarism by pointing out that since their peers plagiarize, they must do the same to keep up. They feel faced with a choice: put in several hours of work and risk a mediocre grade with less time for other subjects, or do what their peers do and copy something good from the internet for an easy A with time to spare.

One of the only ways to deal with this is by catching those students who do plagiarize. It takes a great deal of the pressure off of those who want to work honestly but are afraid of falling behind their peers.

#### Poor Planning

Students are not always the best judges of how much time their assignments will take. They may not be aware of the extent of work involved in a research paper, or may simply be overwhelmed by the task and put it off until the last minute, leaving them with no time for original work of their own.

Scheduling stages of progress on their papers is a very effective way to deal with this. Having them submit bibliographies, outlines, thesis statements, or drafts on specified dates before the final draft is due will give them a good idea of the amount of work involved. It will also help them organize their time and make the task seem less overwhelming.

### Unintentional Plagiarism

No honest student would walk out of a neighbors’ house accidentally carrying their television. But even the most well-intentioned writers sometimes “appropriate” the work of others without proper authority. How does this happen?

Citation Confusion

Perhaps the most common reason for inadvertent plagiarism is simply an ignorance of the proper forms of citation.

See our printable handout on [how to cite sources properly](#).

Plagiarism vs. Paraphrasing

Many students have trouble knowing when they are paraphrasing and when they are plagiarizing. In an effort to make their work seem “more original” by “putting things in their own words,” students may often inadvertently plagiarize by changing the original too much or, sometimes, not enough.

Doing exercises in class where you hand out paraphrased and plagiarized passages in order to discuss the differences might be very helpful. Explain that your students must retain the essential ideas of the original, but significantly change the style and grammatical structure to fit in the context of their argument.

“I was just copying my notes”

Students often mix their own ideas and those of their sources when they take sloppy notes, creating confusion when they begin writing their papers.

It may be worthwhile to go over some note-taking methods with your students. Teaching them to document their sources using different colored pens and “post- it” tabs to mark pages, for example, will save time and keep references clear.

“I couldn’t find the source”

Students are often sloppy about writing down the bibliographic information of their sources, leaving them unable to properly attribute information when it comes to writing the paper.

Explain how important it is to keep careful track of references during the note- taking stage. Students may be eager to focus entirely on the content of their research, and need to be told that how they handle their reference material is a significant part of the assignment. Having them turn in bibliographies before they turn in the paper itself will also encourage them to pay more attention to their sources.

“I thought we didn’t have to quote facts”

Because the internet makes information so readily available, students may find it difficult to tell the difference between “common knowledge” they are free to use, and original ideas which are the intellectual property of others.

The easiest thing to do is teach your students the maxim, “When in doubt, cite sources.” You can also refer them to our [student guide](#), or go over the difference between material that must be cited and material they are free to use in your class.

Confusion about expectations

Students may not be aware of what proper research requires. They may think they are being asked

simply to report critical commentary, or to “borrow” from a number of sources to show that they have “done their homework.” In either case, it becomes a problem if what they turn in tends to be predominantly the work of others.

One of the most common sources of confusion is the ambiguity of terms such as “analyze” and “discuss.” You should explain to your students that these words have specific meanings in academic discourse, and that they imply a degree of original thought that goes beyond mere “reporting.” Emphasizing your interest in their own ideas will also help them understand what you expect from them.

## Cultural Perspectives on Plagiarism

Not all cultures take the same view of plagiarism. The Western notion that “ideas” can be the property of individuals may actually seem absurd to those with different views on what constitutes shared information or public discourse. Students

from cultures which have a more collective sense of identity, for example, may have a difficult time understanding the distinctions some cultures draw between individual and public property. You might spend some very productive class time discussing your students’ perspectives on this issue.

## Important Terms

**Attribution** The acknowledgement that something came from another source.

The following sentence properly *attributes* an idea to its original author: Jack Bauer, in his article “Twenty-Four Reasons not to Plagiarize,” maintains that cases of plagiarists being expelled by academic institutions have risen dramatically in recent years due to an increasing awareness on the part of educators.

**Bibliography** A list of sources used in preparing a work

**Citation** 1) A short, formal indication of the source of information or quoted material.  
2) The act of quoting material or the material quoted.

**Cite** 1) to indicate a source of information or quoted material in a short, formal note.  
2) to quote  
3) to ascribe something to a source

**Common** Information that is readily available from a number of sources, or so well-known that its sources do not

have to be cited.

The fact that carrots are a source of Vitamin A is common knowledge, and you could include this information in your work without attributing it to a source. However, any information regarding the effects of Vitamin A on the human body are likely to be the products of original research and would have to be cited.

Copyright	A law protecting the intellectual property of individuals, giving them exclusive rights over the distribution and reproduction of that material.
Endnotes	Notes at the end of a paper acknowledging sources and providing additional references or information.
Facts	Knowledge or information based on real, observable occurrences.  Just because something is a fact does not mean it is not the result of original thought, analysis, or research. Facts can be considered intellectual property as well. If you discover a fact that is not widely known nor readily found in several other places, you should cite the source.
Footnotes	Notes at the bottom of a paper acknowledging sources or providing additional references or information.
Fair Use	The guidelines for deciding whether the use of a source is permissible or constitutes a copyright infringement.
Intellectual commercial value	A product of the intellect, such as an expressed idea or Property concept, that has commercial value
Notation	The form of a citation; the system by which one refers to cited sources.
Original	1) Not derived from anything else, new and unique 2) Markedly departing from previous practice 3) The first, preceding all others in time 4) The source from which copies are made
Paraphrase	A restatement of a text or passage in other words  It is extremely important to note that changing a few words from an original source does NOT qualify as paraphrasing. A paraphrase must make <b>significant</b> changes in the style and voice of the original <i>while retaining the essential ideas</i> . If you change the ideas, then you are not paraphrasing – you are misrepresenting the ideas of the original, which could lead to serious trouble. (see examples in the students preventing page....)
Peer Review	Turnitin.com's teaching tool that allows students to anonymously review the work of their peers. This gives students a chance to build critical skills while helping them to see the strengths and weaknesses of their own writing.

Plagiarism	The reproduction or appropriation of someone else's work without proper attribution; passing off as one's own the work of someone else
Public Domain	The absence of copyright protection; belonging to the public so that anyone may copy or borrow from it.  See our section on <a href="#"><u>What is public domain?</u></a>
Quotation	Using words from another source
Self-plagiarism	Copying material you have previously produced and passing it off as a new production. This can potentially violate copyright protection, if the work has been published, and is banned by most academic policies.

## Student quick start guide

New to Turnitin? We're glad to have you with us!

On this page, you'll find everything you need to get started with Turnitin. We'll start by helping you create your account all the way through to submitting your first file and viewing any feedback your instructor has left you.

There are a couple of ways your instructor can add you to a class. They can either add you to a class directly using your email address or give you a class ID and enrollment key to let you self-join. Both methods will create the exact same type of account.

### The student homepage

The student homepage is the first page you see after logging in to Turnitin. You'll see a list of all the classes that you are currently enrolled in. Select the name of your class to open your assignment inbox.

NOW VIEWING: HOME

#### About this page

This is your student homepage. The homepage shows the classes you are enrolled in. To enroll in a new class, click the enroll in a class button. Click a class name to open your class homepage for the class. From your homepage, you can submit a paper. For more information on how to submit, please see our [help page](#).

University of Turnitin					
Class ID	Class name	Instructor	Status	Drop class	
2903018	<a href="#">Natural History</a>	Rachel McBride	Expired		
2921595	<a href="#">English and Philosophy</a>	Arjan Singh	Active		

Want to [learn more](#)?

### Assignment inbox

The **assignment inbox** is the home for any assignment you may be working on. You'll find the key dates for the assignment, and most importantly, when it needs to be submitted by. You'll also have access to any rubrics your

instructor has attached to the assignment. From the assignment inbox, you'll can access any feedback from your instructor, including your Similarity Report.

## Submitting a paper

1. From the assignment inbox, select the blue **Submit button** relevant to your assignment.
2. The paper submission page will open. Enter a title for your paper.
3. There are multiple ways to upload to Turnitin. Select **Choose from this computer** to pick a file that you have saved on your computer. If your file exists in Google docs or Dropbox, you can upload directly from there.
4. Turnitin will generate a similarity report for files in the following formats:
  5.
    - Microsoft Word
    - PowerPoint
    - WordPerfect
    - PostScript
    - PDF
    - HTML
    - RTF
    - OpenOffice (ODT)
    - Hangul (HWP)
    - Google Docs (submitted via the Google Drive submission option),
    - Plain text files

If the assignment is set to accept any file type, students may upload any file type to the assignment.

6. Once you've selected your file, select the **Upload button** to upload your paper.

7. A preview of the paper will be displayed with some details for you to look over. With this extra information, check that the right file has been uploaded. If everything looks good, select the **Confirm button** to send your paper to Turnitin.

Your submission is not complete until you've confirmed your submission.

8. If your submission is successful, you'll see your digital receipt. You can print this page or view it later from within Turnitin Feedback Studio. We'll also email you a copy to your email address.

## **Viewing your Similarity Report**

From the Assignment Inbox, select the Similarity Report icon to the right of your assignment. Need a little help working out what it all means? Check out our [Interpreting the Similarity Report](#) guidance.

If the assignment inbox says that your Similarity Report is not available, your instructor has set up your assignment to not allow students to view it.

## **Viewing instructor feedback**

If your instructor has provided feedback on your paper, you will be able to view it once the post date for the assignment has passed.

# **Software Engineering**

## **Lab Manual**

## **Lab 6,7**

### **UML Modeling**

### **CLO 1**

#### **Exercise (Use Cases) Solution:**

##### **I. Handle a Claim (system)**

**Scope:** "System" means all computer systems combined

**Primary Actor:** Customer

**Preconditions:** none

**Trigger:** Customer reports a claim

##### **Main Success Scenario:**

1. Customer reports a claim (paper, phone or fax) to Clerk
2. Clerk finds the policy, captures loss in System, and assigns an Adjuster.
3. Adjuster investigates the claim and updates claim with additional information.
4. Adjuster enters progress notes over time.
5. Adjuster corrects entries and sets monies aside over time.
6. Adjuster receives documentation including bills throughout the life of the claim and enters bills.
7. Adjuster evaluates damages for claim and documents the negotiation process in System.
8. Adjuster settles and closes claim in System.
9. System purges claim 6 months after close.
10. System archives claim after time period.

##### **Extensions:**

\*a. At any time, System goes down:

\*a1. System group repairs system.

1a. Submitted data is incomplete:

1a1. Insurance Company requests missing information

1a2. Claimant supplies missing information

1a2a: Claimant does not supply information within time period:

1a2a1. Adjuster closes claim in System.

2a. Claimant does not own a valid policy:

2a1. Insurance company declines claim, notifies claimant, updates claim, closes claim.

3a. No agents are available at this time

3a1. (What do we do here?)

8a. Claimant notifies adjuster of new claim activity:

8a1. Clerk reopens claim. Reverts to step 3.

#### **Technology Variations:**

8. Settlement payment is

- a. by check
- b. by interbank transfer
- c. by automatic prepayment of next installment
- d. by creation and payment of another policy

**Frequency of occurrence:** to be documented

**Success End Condition:** Claim is closed

**Failed End Protection:** Claim must be reopened

#### **Stakeholders & interests:**

**The company** - make smallest accurate settlement.

**Customer** - get largest settlement.

**Department of Insurance** - ensure correct procedures

#### **Business Rules:/**

**Data descriptions:** Will be defined in other use cases

**Open Issues:** What are the time periods for archiving claims?

## **II. Buy Goods: a business use case**

#### **Name:**

**Primary Actor:** Buyer, any agent (or computer) acting for the customer

#### **Goals:**

**Preconditions:** We know Buyer, their address, etc.

#### **Summary:**

**Success End Condition:** Buyer has goods, we have money for the goods.

**Failed End Condition:** We have not sent the goods, Buyer has not spent the money.

**Trigger:** purchase request comes in.

#### **Main Success Scenario**

1. Buyer calls in with a purchase request.

2. Company captures buyer's name, address, requested goods, etc.
3. Company gives buyer information on goods, prices, delivery dates, etc.
4. Buyer signs for order.
5. Company creates order.
6. Company ships ordered goods to buyer.
7. Company ships invoice to buyer.
8. Buyers pays invoice.

### **Extensions**

3a. Company is out of one of the ordered items:

3a1. Renegotiate order.

4a. Buyer pays directly with credit card:

4a1. Take payment by credit card (use case 44)

8a. Buyer returns goods:

8a. Handle returned goods (use case 105)

### **Technology Variations**

1. Buyer may use

phone in,

fax in,

use web order form,

electronic interchange

8. Buyer may pay by

cash or money order

check

credit card

### **Related Use Cases:**

Create order (use case 15)

Take payment by credit card (use case 44)

Handle returned goods (use case 105)

**Secondary Actors:** credit card company, bank, shipping service

### **Open issues**

What happens if we have part of the order?

What happens if credit card is stolen?

# **UML - Overview**

UML is a standard language for specifying, visualizing, constructing, and documenting the artifacts of software systems.

UML was created by the Object Management Group (OMG) and UML 1.0 specification draft was proposed to the OMG in January 1997.

OMG is continuously making efforts to create a truly industry standard.

- UML stands for **Unified Modeling Language**.
- UML is different from the other common programming languages such as C++, Java, COBOL, etc.
- UML is a pictorial language used to make software blueprints.
- UML can be described as a general purpose visual modeling language to visualize, specify, construct, and document software system.
- Although UML is generally used to model software systems, it is not limited within this boundary. It is also used to model non-software systems as well. For example, the process flow in a manufacturing unit, etc.

UML is not a programming language but tools can be used to generate code in various languages using UML diagrams. UML has a direct relation with object oriented analysis and design. After some standardization, UML has become an OMG standard.

## **Goals of UML**

*A picture is worth a thousand words*, this idiom absolutely fits describing UML. Object-oriented concepts were introduced much earlier than UML. At that point of time, there were no standard methodologies to organize and consolidate the object-oriented development. It was then that UML came into picture.

There are a number of goals for developing UML but the most important is to define some general purpose modeling language, which all modelers can use and it also needs to be made simple to understand and use.

UML diagrams are not only made for developers but also for business users, common people, and anybody interested to understand the system. The system can be a software or non-software system. Thus it must be clear that UML is not a development method rather it accompanies with processes to make it a successful system.

In conclusion, the goal of UML can be defined as a simple modeling mechanism to model all possible practical systems in today's complex environment.

## **A Conceptual Model of UML**

To understand the conceptual model of UML, first we need to clarify what is a conceptual model? and why a conceptual model is required?

- A conceptual model can be defined as a model which is made of concepts and their relationships.
- A conceptual model is the first step before drawing a UML diagram. It helps to understand the entities in the real world and how they interact with each other.

As UML describes the real-time systems, it is very important to make a conceptual model and then proceed gradually. The conceptual model of UML can be mastered by learning the following three major elements

- UML building blocks
- Rules to connect the building blocks
- Common mechanisms of UML

#### Object-Oriented Concepts

UML can be described as the successor of object-oriented (OO) analysis and design.

An object contains both data and methods that control the data. The data represents the state of the object. A class describes an object and they also form a hierarchy to model the real-world system. The hierarchy is represented as inheritance and the classes can also be associated in different ways as per the requirement.

Objects are the real-world entities that exist around us and the basic concepts such as abstraction, encapsulation, inheritance, and polymorphism all can be represented using UML.

UML is powerful enough to represent all the concepts that exist in object-oriented analysis and design. UML diagrams are representation of object-oriented concepts only. Thus, before learning UML, it becomes important to understand OO concept in detail.

Following are some fundamental concepts of the object-oriented world –

- **Objects** – Objects represent an entity and the basic building block.
- **Class** – Class is the blue print of an object.
- **Abstraction** – Abstraction represents the behavior of a real world entity.
- **Encapsulation** – Encapsulation is the mechanism of binding the data together and hiding them from the outside world.
- **Inheritance** – Inheritance is the mechanism of making new classes from existing ones.
- **Polymorphism** – It defines the mechanism to exists in different forms.

#### OO Analysis and Design

OO can be defined as an investigation and to be more specific, it is the investigation of objects. Design means collaboration of identified objects.

Thus, it is important to understand the OO analysis and design concepts. The most important purpose of OO analysis is to identify objects of a system to be designed. This analysis is also done for an existing system. Now an efficient analysis is only possible when we are able to start thinking in a way where objects can be identified. After identifying the objects, their relationships are identified and finally the design is produced.

The purpose of OO analysis and design can described as –

- Identifying the objects of a system.
- Identifying their relationships.

- Making a design, which can be converted to executables using OO languages.

There are three basic steps where the OO concepts are applied and implemented. The steps can be defined as

OO Analysis → OO Design → OO implementation using OO languages

The above three points can be described in detail as –

- During OO analysis, the most important purpose is to identify objects and describe them in a proper way. If these objects are identified efficiently, then the next job of design is easy. The objects should be identified with responsibilities. Responsibilities are the functions performed by the object. Each and every object has some type of responsibilities to be performed. When these responsibilities are collaborated, the purpose of the system is fulfilled.
- The second phase is OO design. During this phase, emphasis is placed on the requirements and their fulfilment. In this stage, the objects are collaborated according to their intended association. After the association is complete, the design is also complete.
- The third phase is OO implementation. In this phase, the design is implemented using OO languages such as Java, C++, etc.

#### Role of UML in OO Design

UML is a modeling language used to model software and non-software systems. Although UML is used for non-software systems, the emphasis is on modeling OO software applications. Most of the UML diagrams discussed so far are used to model different aspects such as static, dynamic, etc. Now whatever be the aspect, the artifacts are nothing but objects.

If we look into class diagram, object diagram, collaboration diagram, interaction diagrams all would basically be designed based on the objects.

Hence, the relation between OO design and UML is very important to understand. The OO design is transformed into UML diagrams according to the requirement. Before understanding the UML in detail, the OO concept should be learned properly. Once the OO analysis and design is done, the next step is very easy. The input from OO analysis and design is the input to UML diagrams.

#### UML - Building Blocks

As UML describes the real-time systems, it is very important to make a conceptual model and then proceed gradually. The conceptual model of UML can be mastered by learning the following three major elements –

- UML building blocks
- Rules to connect the building blocks
- Common mechanisms of UML

This chapter describes all the UML building blocks. The building blocks of UML can be defined as –

- Things
- Relationships
- Diagrams

#### Things

**Things** are the most important building blocks of UML. Things can be –

- Structural
- Behavioral
- Grouping
- Annotational

#### Structural Things

**Structural things** define the static part of the model. They represent the physical and conceptual elements. Following are the brief descriptions of the structural things.

**Class** – Class represents a set of objects having similar responsibilities.



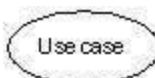
**Interface** – Interface defines a set of operations, which specify the responsibility of a class.



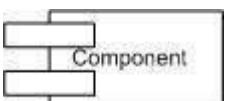
**Collaboration** – Collaboration defines an interaction between elements.



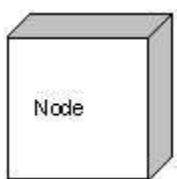
**Use case** – Use case represents a set of actions performed by a system for a specific goal.



**Component** – Component describes the physical part of a system.



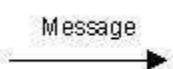
**Node** – A node can be defined as a physical element that exists at run time.



#### Behavioral Things

**A behavioral thing** consists of the dynamic parts of UML models. Following are the behavioral things –

**Interaction** – Interaction is defined as a behavior that consists of a group of messages exchanged among elements to accomplish a specific task.



**State machine** – State machine is useful when the state of an object in its life cycle is important. It defines the sequence of states an object goes through in response to events. Events are external factors responsible for state change



Grouping Things

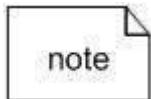
**Grouping things** can be defined as a mechanism to group elements of a UML model together. There is only one grouping thing available –

**Package** – Package is the only one grouping thing available for gathering structural and behavioral things.



Annotational Things

**Annotational things** can be defined as a mechanism to capture remarks, descriptions, and comments of UML model elements. **Note** - It is the only one Annotational thing available. A note is used to render comments, constraints, etc. of an UML element.



Relationship

**Relationship** is another most important building block of UML. It shows how the elements are associated with each other and this association describes the functionality of an application.

There are four kinds of relationships available.

Dependency

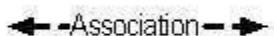
Dependency is a relationship between two things in which change in one element also affects the other.

Dependency



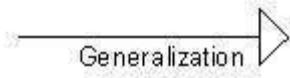
Association

Association is basically a set of links that connects the elements of a UML model. It also describes how many objects are taking part in that relationship.



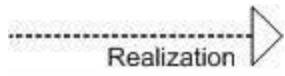
Generalization

Generalization can be defined as a relationship which connects a specialized element with a generalized element. It basically describes the inheritance relationship in the world of objects.



## Realization

Realization can be defined as a relationship in which two elements are connected. One element describes some responsibility, which is not implemented and the other one implements them. This relationship exists in case of interfaces.



## UML Diagrams

UML diagrams are the ultimate output of the entire discussion. All the elements, relationships are used to make a complete UML diagram and the diagram represents a system.

The visual effect of the UML diagram is the most important part of the entire process. All the other elements are used to make it complete.

UML includes the following nine diagrams, the details of which are described in the subsequent chapters.

- Class diagram
- Object diagram
- Use case diagram
- Sequence diagram
- Collaboration diagram
- Activity diagram
- Statechart diagram
- Deployment diagram
- Component diagram

## UML - Architecture

Any real-world system is used by different users. The users can be developers, testers, business people, analysts, and many more. Hence, before designing a system, the architecture is made with different perspectives in mind. The most important part is to visualize the system from the perspective of different viewers. The better we understand the better we can build the system.

UML plays an important role in defining different perspectives of a system. These perspectives are –

- Design
- Implementation
- Process
- Deployment

The center is the **Use Case** view which connects all these four. A **Use Case** represents the functionality of the system. Hence, other perspectives are connected with use case.

**Design** of a system consists of classes, interfaces, and collaboration. UML provides class diagram, object diagram to support this.

**Implementation** defines the components assembled together to make a complete physical system. UML component diagram is used to support the implementation perspective.

**Process** defines the flow of the system. Hence, the same elements as used in Design are also used to support this perspective.

**Deployment** represents the physical nodes of the system that forms the hardware. UML deployment diagram is used to support this perspective.

### UML - Modeling Types

It is very important to distinguish between the UML model. Different diagrams are used for different types of UML modeling. There are three important types of UML modeling.

#### Structural Modeling

Structural modeling captures the static features of a system. They consist of the following –

- Classes diagrams
- Objects diagrams
- Deployment diagrams
- Package diagrams
- Composite structure diagram
- Component diagram

Structural model represents the framework for the system and this framework is the place where all other components exist. Hence, the class diagram, component diagram and deployment diagrams are part of structural modeling. They all represent the elements and the mechanism to assemble them.

The structural model never describes the dynamic behavior of the system. Class diagram is the most widely used structural diagram.

#### Behavioral Modeling

Behavioral model describes the interaction in the system. It represents the interaction among the structural diagrams. Behavioral modeling shows the dynamic nature of the system. They consist of the following –

- Activity diagrams
- Interaction diagrams
- Use case diagrams

All the above show the dynamic sequence of flow in a system.

#### Architectural Modeling

Architectural model represents the overall framework of the system. It contains both structural and behavioral elements of the system. Architectural model can be defined as the blueprint of the entire system. Package diagram comes under architectural modeling.

## UML - Basic Notations

UML is popular for its diagrammatic notations. We all know that UML is for visualizing, specifying, constructing and documenting the components of software and non-software systems. Hence, visualization is the most important part which needs to be understood and remembered.

UML notations are the most important elements in modeling. Efficient and appropriate use of notations is very important for making a complete and meaningful model. The model is useless, unless its purpose is depicted properly.

Hence, learning notations should be emphasized from the very beginning. Different notations are available for things and relationships. UML diagrams are made using the notations of things and relationships. Extensibility is another important feature which makes UML more powerful and flexible.

The chapter describes basic UML notations in detail. This is just an extension to the UML building block section discussed in Chapter Two.

### Structural Things

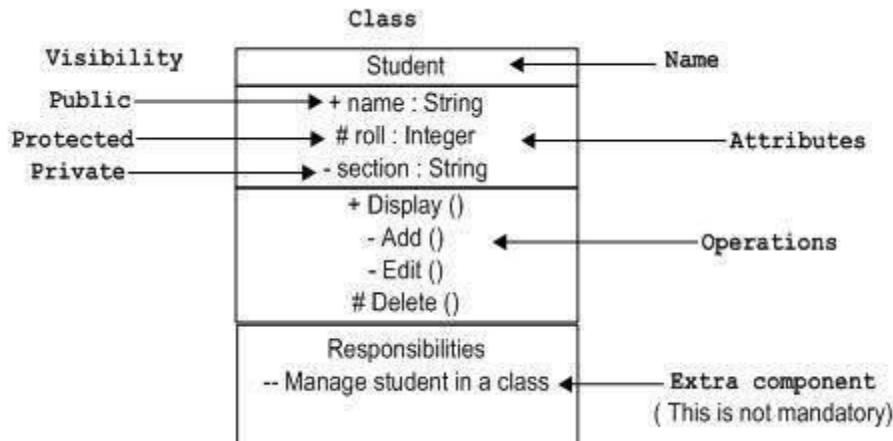
Graphical notations used in structural things are most widely used in UML. These are considered as the nouns of UML models. Following are the list of structural things.

- Classes
- Object
- Interface
- Collaboration
- Use case
- Active classes
- Components
- Nodes

### Class Notation

UML *class* is represented by the following figure. The diagram is divided into four parts.

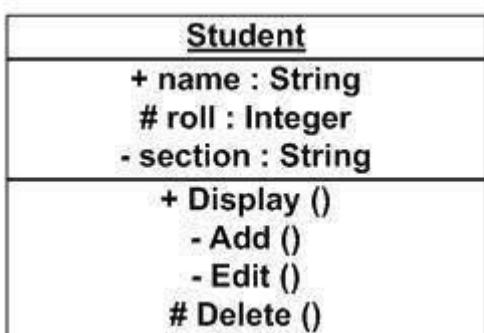
- The top section is used to name the class.
- The second one is used to show the attributes of the class.
- The third section is used to describe the operations performed by the class.
- The fourth section is optional to show any additional components.



Classes are used to represent objects. Objects can be anything having properties and responsibility.

#### Object Notation

The *object* is represented in the same way as the class. The only difference is the *name* which is underlined as shown in the following figure.

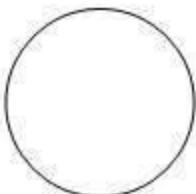


As the object is an actual implementation of a class, which is known as the instance of a class. Hence, it has the same usage as the class.

#### Interface Notation

Interface is represented by a circle as shown in the following figure. It has a name which is generally written below the circle.

#### Interface

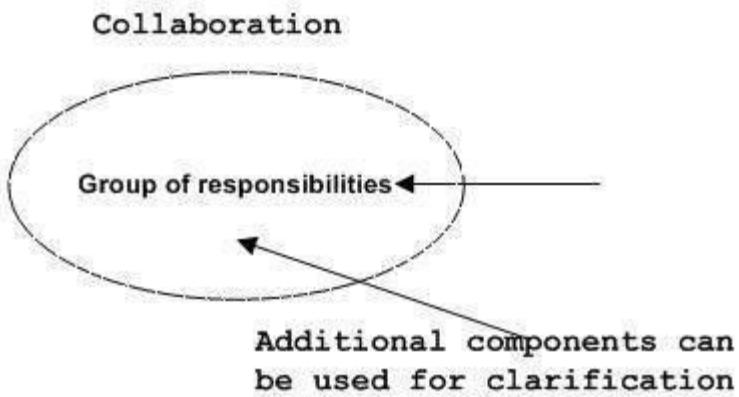


**StudentApplication** ← **Name**

Interface is used to describe the functionality without implementation. Interface is just like a template where you define different functions, not the implementation. When a class implements the interface, it also implements the functionality as per requirement.

#### Collaboration Notation

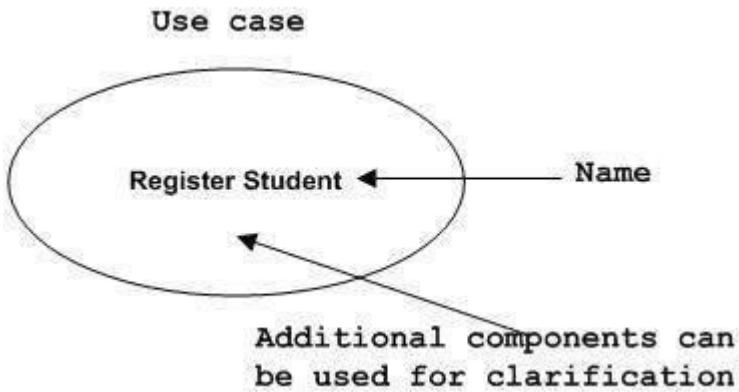
Collaboration is represented by a dotted eclipse as shown in the following figure. It has a name written inside the eclipse.



Collaboration represents responsibilities. Generally, responsibilities are in a group.

#### Use Case Notation

Use case is represented as an eclipse with a name inside it. It may contain additional responsibilities.



Use case is used to capture high level functionalities of a system.

#### Actor Notation

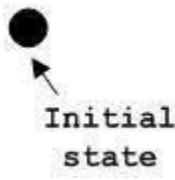
An actor can be defined as some internal or external entity that interacts with the system.



An actor is used in a use case diagram to describe the internal or external entities.

#### Initial State Notation

Initial state is defined to show the start of a process. This notation is used in almost all diagrams.



The usage of Initial State Notation is to show the starting point of a process.

#### Final State Notation

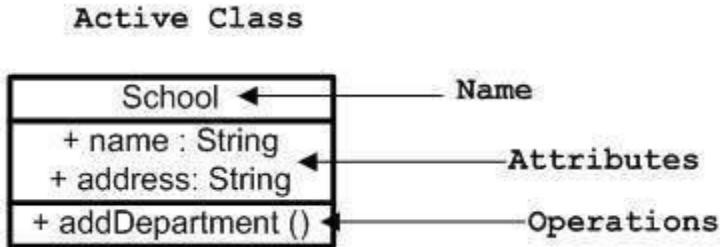
Final state is used to show the end of a process. This notation is also used in almost all diagrams to describe the end.



The usage of Final State Notation is to show the termination point of a process.

#### Active Class Notation

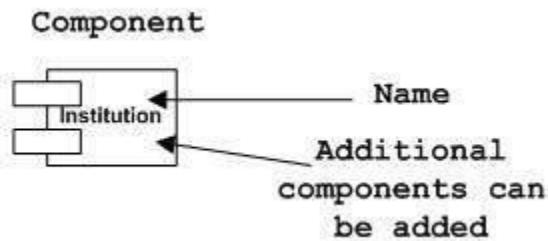
Active class looks similar to a class with a solid border. Active class is generally used to describe the concurrent behavior of a system.



Active class is used to represent the concurrency in a system.

#### Component Notation

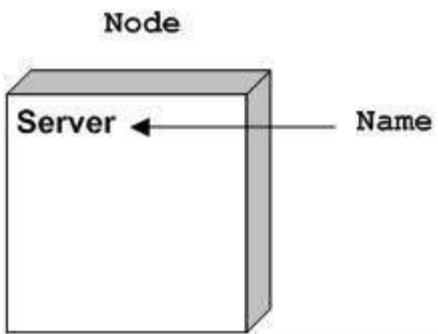
A component in UML is shown in the following figure with a name inside. Additional elements can be added wherever required.



Component is used to represent any part of a system for which UML diagrams are made.

#### Node Notation

A node in UML is represented by a square box as shown in the following figure with a name. A node represents the physical component of the system.



Node is used to represent the physical part of a system such as the server, network, etc.

### Behavioral Things

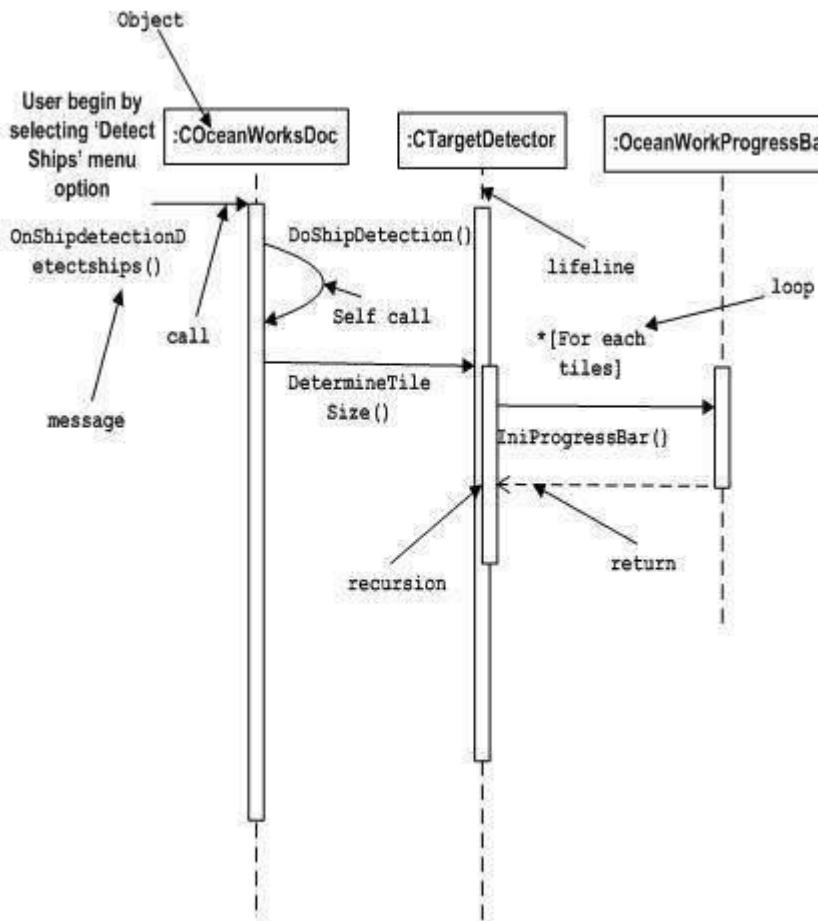
Dynamic parts are one of the most important elements in UML. UML has a set of powerful features to represent the dynamic part of software and non-software systems. These features include *interactions* and *state machines*.

Interactions can be of two types –

- Sequential (Represented by sequence diagram)
- Collaborative (Represented by collaboration diagram)

### Interaction Notation

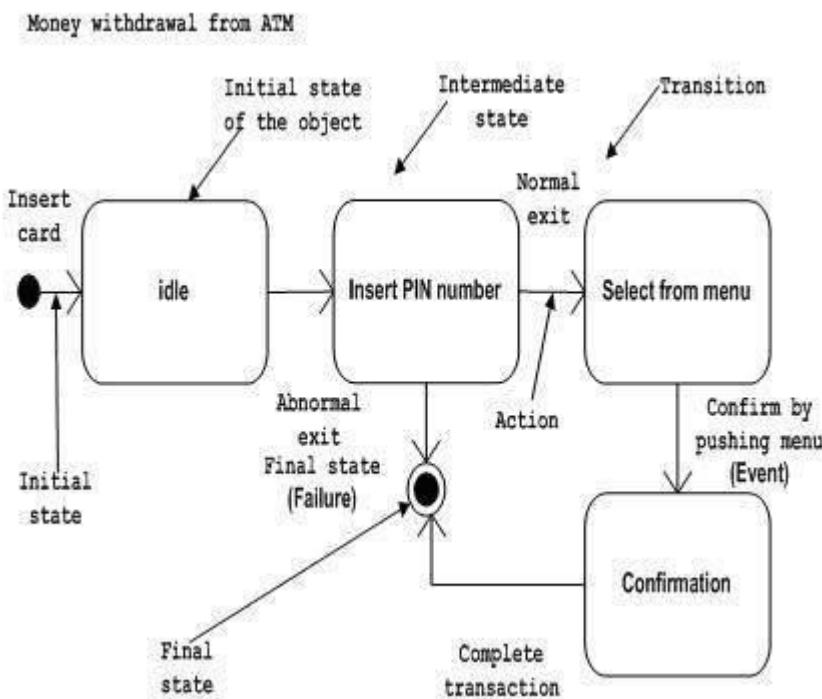
Interaction is basically a message exchange between two UML components. The following diagram represents different notations used in an interaction.



Interaction is used to represent the communication among the components of a system.

#### State Machine Notation

State machine describes the different states of a component in its life cycle. The notations are described in the following diagram.



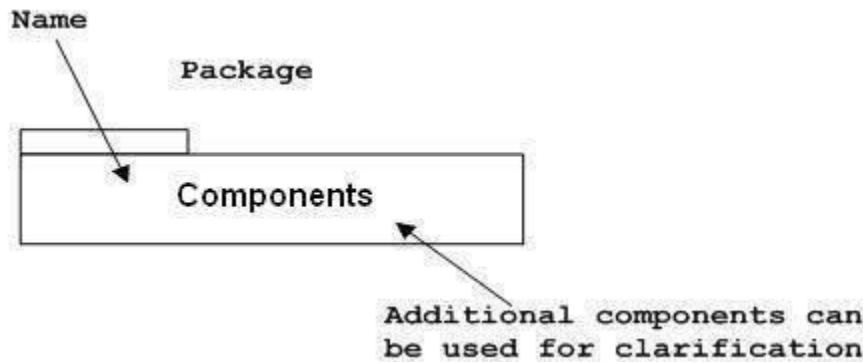
State machine is used to describe different states of a system component. The state can be active, idle, or any other depending upon the situation.

### Grouping Things

Organizing the UML models is one of the most important aspects of the design. In UML, there is only one element available for grouping and that is package.

#### Package Notation

Package notation is shown in the following figure and is used to wrap the components of a system.

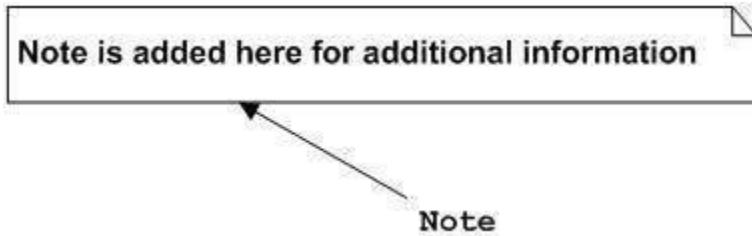


### Annotational Things

In any diagram, explanation of different elements and their functionalities are very important. Hence, UML has *notes* notation to support this requirement.

#### Note Notation

This notation is shown in the following figure. These notations are used to provide necessary information of a system.



### Relationships

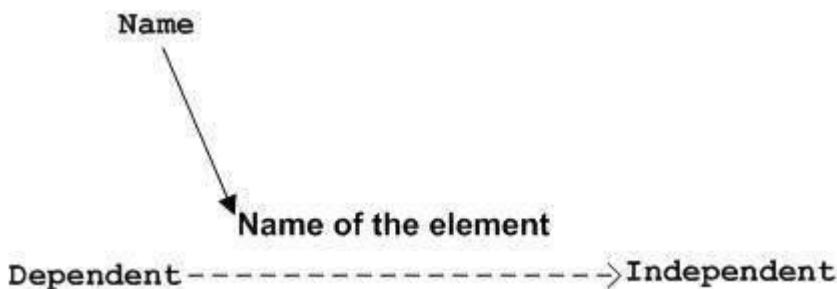
A model is not complete unless the relationships between elements are described properly. The *Relationship* gives a proper meaning to a UML model. Following are the different types of relationships available in UML.

- Dependency
- Association
- Generalization
- Extensibility

#### Dependency Notation

Dependency is an important aspect in UML elements. It describes the dependent elements and the direction of dependency.

Dependency is represented by a dotted arrow as shown in the following figure. The arrow head represents the independent element and the other end represents the dependent element.

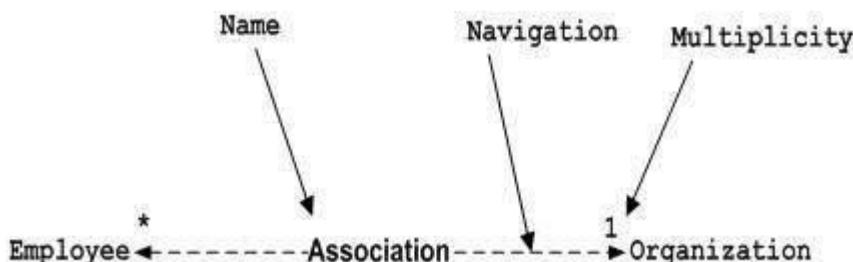


Dependency is used to represent the dependency between two elements of a system

#### Association Notation

Association describes how the elements in a UML diagram are associated. In simple words, it describes how many elements are taking part in an interaction.

Association is represented by a dotted line with (without) arrows on both sides. The two ends represent two associated elements as shown in the following figure. The multiplicity is also mentioned at the ends (1, \*, etc.) to show how many objects are associated.



Association is used to represent the relationship between two elements of a system.

#### Generalization Notation

Generalization describes the inheritance relationship of the object-oriented world. It is a parent and child relationship.

Generalization is represented by an arrow with a hollow arrow head as shown in the following figure. One end represents the parent element and the other end represents the child element.

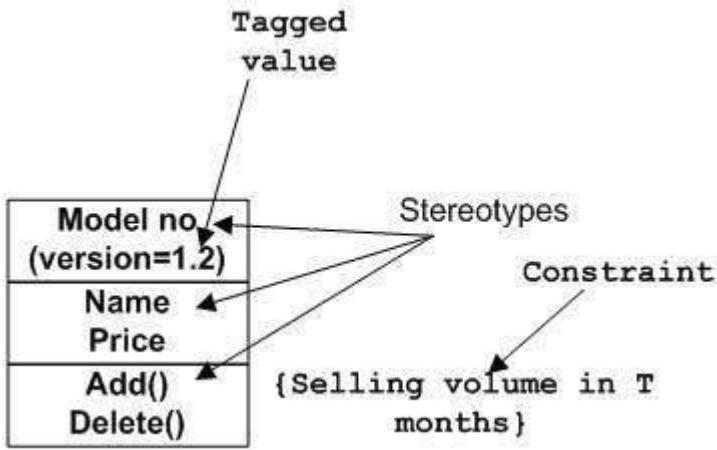


Generalization is used to describe parent-child relationship of two elements of a system.

#### Extensibility Notation

All the languages (programming or modeling) have some mechanism to extend its capabilities such as syntax, semantics, etc. UML also has the following mechanisms to provide extensibility features.

- Stereotypes (Represents new elements)
- Tagged values (Represents new attributes)
- Constraints (Represents the boundaries)



Extensibility notations are used to enhance the power of the language. It is basically additional elements used to represent some extra behavior of the system. These extra behaviors are not covered by the standard available notations.

### UML - Standard Diagrams

In the previous chapters, we have discussed about the building blocks and other necessary elements of UML. Now we need to understand where to use those elements.

The elements are like components which can be associated in different ways to make a complete UML picture, which is known as diagram. Thus, it is very important to understand the different diagrams to implement the knowledge in real-life systems.

Any complex system is best understood by making some kind of diagrams or pictures. These diagrams have a better impact on our understanding. If we look around, we will realize that the diagrams are not a new concept but it is used widely in different forms in different industries.

We prepare UML diagrams to understand the system in a better and simple way. A single diagram is not enough to cover all the aspects of the system. UML defines various kinds of diagrams to cover most of the aspects of a system.

You can also create your own set of diagrams to meet your requirements. Diagrams are generally made in an incremental and iterative way.

There are two broad categories of diagrams and they are again divided into subcategories –

- Structural Diagrams
- Behavioral Diagrams

### Structural Diagrams

The structural diagrams represent the static aspect of the system. These static aspects represent those parts of a diagram, which forms the main structure and are therefore stable.

These static parts are represented by classes, interfaces, objects, components, and nodes. The four structural diagrams are –

- Class diagram
- Object diagram
- Component diagram

- Deployment diagram

### Class Diagram

Class diagrams are the most common diagrams used in UML. Class diagram consists of classes, interfaces, associations, and collaboration. Class diagrams basically represent the object-oriented view of a system, which is static in nature.

Active class is used in a class diagram to represent the concurrency of the system.

Class diagram represents the object orientation of a system. Hence, it is generally used for development purpose. This is the most widely used diagram at the time of system construction.

### Object Diagram

Object diagrams can be described as an instance of class diagram. Thus, these diagrams are more close to real-life scenarios where we implement a system.

Object diagrams are a set of objects and their relationship is just like class diagrams. They also represent the static view of the system.

The usage of object diagrams is similar to class diagrams but they are used to build prototype of a system from a practical perspective.

### Component Diagram

Component diagrams represent a set of components and their relationships. These components consist of classes, interfaces, or collaborations. Component diagrams represent the implementation view of a system.

During the design phase, software artifacts (classes, interfaces, etc.) of a system are arranged in different groups depending upon their relationship. Now, these groups are known as components.

Finally, it can be said component diagrams are used to visualize the implementation.

### Deployment Diagram

Deployment diagrams are a set of nodes and their relationships. These nodes are physical entities where the components are deployed.

Deployment diagrams are used for visualizing the deployment view of a system. This is generally used by the deployment team.

**Note** – If the above descriptions and usages are observed carefully then it is very clear that all the diagrams have some relationship with one another. Component diagrams are dependent upon the classes, interfaces, etc. which are part of class/object diagram. Again, the deployment diagram is dependent upon the components, which are used to make component diagrams.

### Behavioral Diagrams

Any system can have two aspects, static and dynamic. So, a model is considered as complete when both the aspects are fully covered.

Behavioral diagrams basically capture the dynamic aspect of a system. Dynamic aspect can be further described as the changing/moving parts of a system.

UML has the following five types of behavioral diagrams –

- Use case diagram
- Sequence diagram
- Collaboration diagram

- Statechart diagram
- Activity diagram

### Use Case Diagram

Use case diagrams are a set of use cases, actors, and their relationships. They represent the use case view of a system.

A use case represents a particular functionality of a system. Hence, use case diagram is used to describe the relationships among the functionalities and their internal/external controllers. These controllers are known as **actors**.

### Sequence Diagram

A sequence diagram is an interaction diagram. From the name, it is clear that the diagram deals with some sequences, which are the sequence of messages flowing from one object to another.

Interaction among the components of a system is very important from implementation and execution perspective. Sequence diagram is used to visualize the sequence of calls in a system to perform a specific functionality.

### Collaboration Diagram

Collaboration diagram is another form of interaction diagram. It represents the structural organization of a system and the messages sent/received. Structural organization consists of objects and links.

The purpose of collaboration diagram is similar to sequence diagram. However, the specific purpose of collaboration diagram is to visualize the organization of objects and their interaction.

### Statechart Diagram

Any real-time system is expected to be reacted by some kind of internal/external events. These events are responsible for state change of the system.

Statechart diagram is used to represent the event driven state change of a system. It basically describes the state change of a class, interface, etc.

State chart diagram is used to visualize the reaction of a system by internal/external factors.

### Activity Diagram

Activity diagram describes the flow of control in a system. It consists of activities and links. The flow can be sequential, concurrent, or branched.

Activities are nothing but the functions of a system. Numbers of activity diagrams are prepared to capture the entire flow in a system.

Activity diagrams are used to visualize the flow of controls in a system. This is prepared to have an idea of how the system will work when executed.

**Note** – Dynamic nature of a system is very difficult to capture. UML has provided features to capture the dynamics of a system from different angles. Sequence diagrams and collaboration diagrams are isomorphic, hence they can be converted from one another without losing any information. This is also true for Statechart and activity diagram.

### UML - Class Diagram

Class diagram is a static diagram. It represents the static view of an application. Class diagram is not only used for visualizing, describing, and documenting different aspects of a system but also for constructing executable code of the software application.

Class diagram describes the attributes and operations of a class and also the constraints imposed on the system. The class diagrams are widely used in the modeling of object-oriented systems because they are the only UML diagrams, which can be mapped directly with object-oriented languages.

Class diagram shows a collection of classes, interfaces, associations, collaborations, and constraints. It is also known as a structural diagram.

#### Purpose of Class Diagrams

The purpose of class diagram is to model the static view of an application. Class diagrams are the only diagrams which can be directly mapped with object-oriented languages and thus widely used at the time of construction.

UML diagrams like activity diagram, sequence diagram can only give the sequence flow of the application, however class diagram is a bit different. It is the most popular UML diagram in the coder community.

The purpose of the class diagram can be summarized as –

- Analysis and design of the static view of an application.
- Describe responsibilities of a system.
- Base for component and deployment diagrams.
- Forward and reverse engineering.

#### How to Draw a Class Diagram?

Class diagrams are the most popular UML diagrams used for construction of software applications. It is very important to learn the drawing procedure of class diagram.

Class diagrams have a lot of properties to consider while drawing but here the diagram will be considered from a top level view.

Class diagram is basically a graphical representation of the static view of the system and represents different aspects of the application. A collection of class diagrams represent the whole system.

The following points should be remembered while drawing a class diagram –

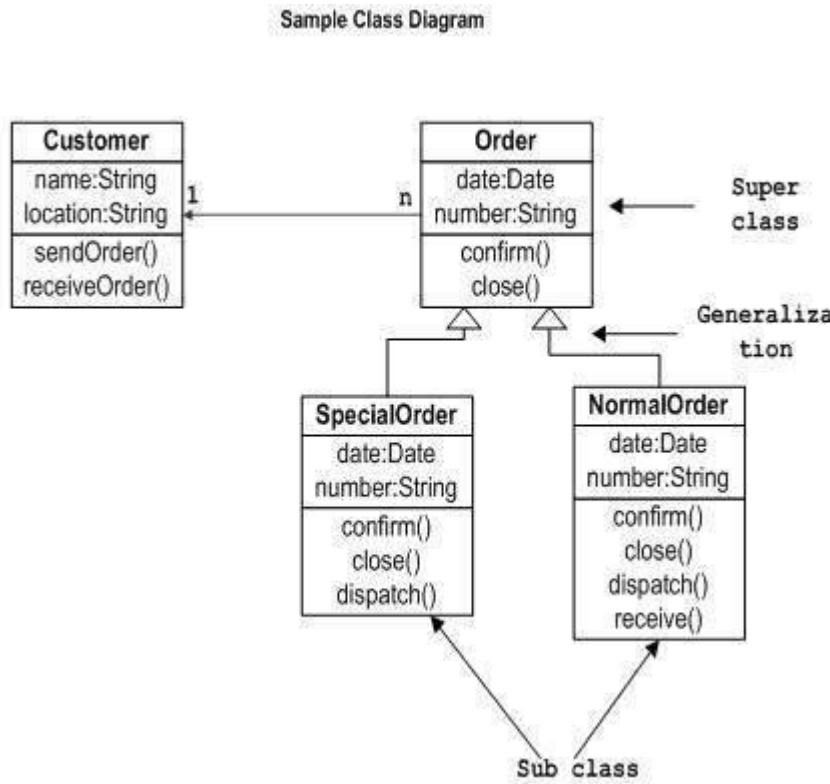
- The name of the class diagram should be meaningful to describe the aspect of the system.
- Each element and their relationships should be identified in advance.
- Responsibility (attributes and methods) of each class should be clearly identified
- For each class, minimum number of properties should be specified, as unnecessary properties will make the diagram complicated.
- Use notes whenever required to describe some aspect of the diagram. At the end of the drawing it should be understandable to the developer/coder.

- Finally, before making the final version, the diagram should be drawn on plain paper and reworked as many times as possible to make it correct.

The following diagram is an example of an Order System of an application. It describes a particular aspect of the entire application.

- First of all, Order and Customer are identified as the two elements of the system. They have a one-to-many relationship because a customer can have multiple orders.
- Order class is an abstract class and it has two concrete classes (inheritance relationship) SpecialOrder and NormalOrder.
- The two inherited classes have all the properties as the Order class. In addition, they have additional functions like dispatch() and receive().

The following class diagram has been drawn considering all the points mentioned above.



### Where to Use Class Diagrams?

Class diagram is a static diagram and it is used to model the static view of a system. The static view describes the vocabulary of the system.

Class diagram is also considered as the foundation for component and deployment diagrams. Class diagrams are not only used to visualize the static view of the system but they are also used to construct the executable code for forward and reverse engineering of any system.

Generally, UML diagrams are not directly mapped with any object-oriented programming languages but the class diagram is an exception.

Class diagram clearly shows the mapping with object-oriented languages such as Java, C++, etc. From practical experience, class diagram is generally used for construction purpose.

In a nutshell it can be said, class diagrams are used for –

- Describing the static view of the system.
- Showing the collaboration among the elements of the static view.
- Describing the functionalities performed by the system.
- Construction of software applications using object oriented languages.

### UML - Object Diagrams

Object diagrams are derived from class diagrams so object diagrams are dependent upon class diagrams.

Object diagrams represent an instance of a class diagram. The basic concepts are similar for class diagrams and object diagrams. Object diagrams also represent the static view of a system but this static view is a snapshot of the system at a particular moment.

Object diagrams are used to render a set of objects and their relationships as an instance.

### Purpose of Object Diagrams

The purpose of a diagram should be understood clearly to implement it practically. The purposes of object diagrams are similar to class diagrams.

The difference is that a class diagram represents an abstract model consisting of classes and their relationships. However, an object diagram represents an instance at a particular moment, which is concrete in nature.

It means the object diagram is closer to the actual system behavior. The purpose is to capture the static view of a system at a particular moment.

The purpose of the object diagram can be summarized as –

- Forward and reverse engineering.
- Object relationships of a system
- Static view of an interaction.
- Understand object behaviour and their relationship from practical perspective

### How to Draw an Object Diagram?

We have already discussed that an object diagram is an instance of a class diagram. It implies that an object diagram consists of instances of things used in a class diagram.

So both diagrams are made of same basic elements but in different form. In class diagram elements are in abstract form to represent the blue print and in object diagram the elements are in concrete form to represent the real world object.

To capture a particular system, numbers of class diagrams are limited. However, if we consider object diagrams then we can have unlimited number of instances, which are unique in nature. Only those instances are considered, which have an impact on the system.

From the above discussion, it is clear that a single object diagram cannot capture all the necessary instances or rather cannot specify all the objects of a system. Hence, the solution is –

- First, analyze the system and decide which instances have important data and association.
- Second, consider only those instances, which will cover the functionality.
- Third, make some optimization as the number of instances are unlimited.

Before drawing an object diagram, the following things should be remembered and understood clearly –

- Object diagrams consist of objects.
- The link in object diagram is used to connect objects.
- Objects and links are the two elements used to construct an object diagram.

After this, the following things are to be decided before starting the construction of the diagram –

- The object diagram should have a meaningful name to indicate its purpose.
- The most important elements are to be identified.
- The association among objects should be clarified.
- Values of different elements need to be captured to include in the object diagram.
- Add proper notes at points where more clarity is required.

The following diagram is an example of an object diagram. It represents the Order management system which we have discussed in the chapter Class Diagram. The following diagram is an instance of the system at a particular time of purchase. It has the following objects.

- Customer
- Order
- SpecialOrder
- NormalOrder

Now the customer object (C) is associated with three order objects (O1, O2, and O3). These order objects are associated with special order and normal order objects (S1, S2, and N1). The customer has the following three orders with different numbers (12, 32 and 40) for the particular time considered.

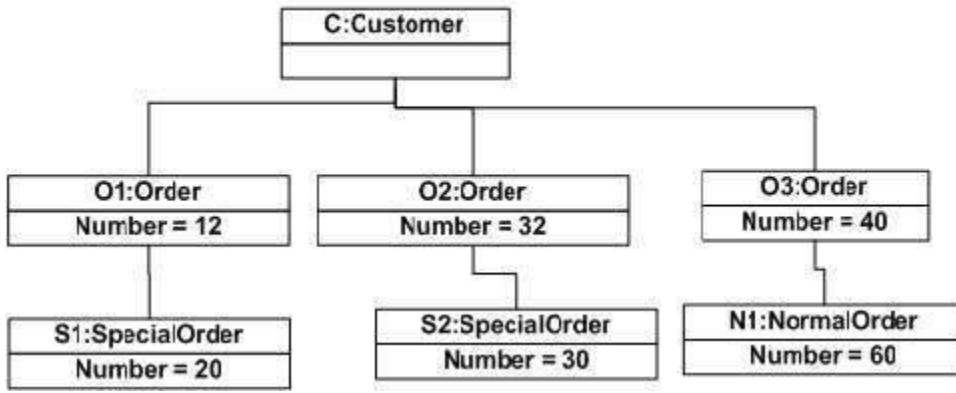
The customer can increase the number of orders in future and in that scenario the object diagram will reflect that. If order, special order, and normal order objects are observed then you will find that they have some values.

For orders, the values are 12, 32, and 40 which implies that the objects have these values for a particular moment (here the particular time when the purchase is made is considered as the moment) when the instance is captured

The same is true for special order and normal order objects which have number of orders as 20, 30, and 60. If a different time of purchase is considered, then these values will change accordingly.

The following object diagram has been drawn considering all the points mentioned above

## Object diagram of an order management system



### Where to Use Object Diagrams?

Object diagrams can be imagined as the snapshot of a running system at a particular moment. Let us consider an example of a running train

Now, if you take a snap of the running train then you will find a static picture of it having the following –

- A particular state which is running.
- A particular number of passengers. which will change if the snap is taken in a different time

Here, we can imagine the snap of the running train is an object having the above values. And this is true for any real-life simple or complex system.

In a nutshell, it can be said that object diagrams are used for –

- Making the prototype of a system.
- Reverse engineering.
- Modeling complex data structures.
- Understanding the system from practical perspective.

## UML - Component Diagrams

Component diagrams are different in terms of nature and behavior. Component diagrams are used to model the physical aspects of a system. Now the question is, what are these physical aspects? Physical aspects are the elements such as executables, libraries, files, documents, etc. which reside in a node.

Component diagrams are used to visualize the organization and relationships among components in a system. These diagrams are also used to make executable systems.

### Purpose of Component Diagrams

Component diagram is a special kind of diagram in UML. The purpose is also different from all other diagrams discussed so far. It does not describe the functionality of the system but it describes the components used to make those functionalities.

Thus from that point of view, component diagrams are used to visualize the physical components in a system. These components are libraries, packages, files, etc.

Component diagrams can also be described as a static implementation view of a system. Static implementation represents the organization of the components at a particular moment.

A single component diagram cannot represent the entire system but a collection of diagrams is used to represent the whole.

The purpose of the component diagram can be summarized as –

- Visualize the components of a system.
- Construct executables by using forward and reverse engineering.
- Describe the organization and relationships of the components.

#### How to Draw a Component Diagram?

Component diagrams are used to describe the physical artifacts of a system. This artifact includes files, executables, libraries, etc

The purpose of this diagram is different. Component diagrams are used during the implementation phase of an application. However, it is prepared well in advance to visualize the implementation details.

Initially, the system is designed using different UML diagrams and then when the artifacts are ready, component diagrams are used to get an idea of the implementation.

This diagram is very important as without it the application cannot be implemented efficiently. A well-prepared component diagram is also important for other aspects such as application performance, maintenance, etc.

Before drawing a component diagram, the following artifacts are to be identified clearly –

- Files used in the system.
- Libraries and other artifacts relevant to the application.
- Relationships among the artifacts.

After identifying the artifacts, the following points need to be kept in mind.

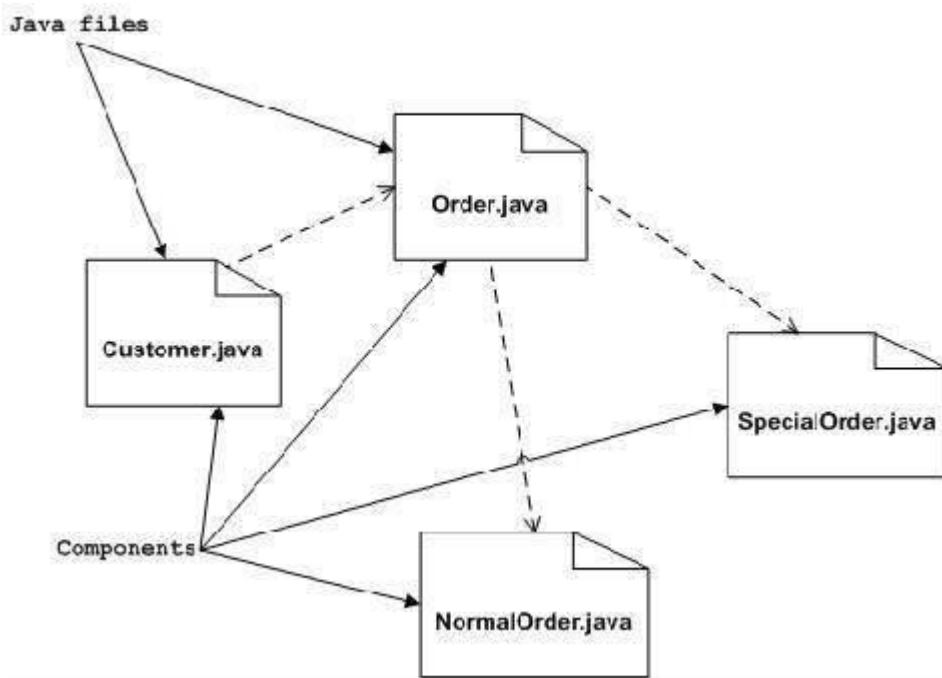
- Use a meaningful name to identify the component for which the diagram is to be drawn.
- Prepare a mental layout before producing the using tools.
- Use notes for clarifying important points.

Following is a component diagram for order management system. Here, the artifacts are files. The diagram shows the files in the application and their relationships. In actual, the component diagram also contains dlls, libraries, folders, etc.

In the following diagram, four files are identified and their relationships are produced. Component diagram cannot be matched directly with other UML diagrams discussed so far as it is drawn for completely different purpose.

The following component diagram has been drawn considering all the points mentioned above.

### Component diagram of an order management system



#### Where to Use Component Diagrams?

We have already described that component diagrams are used to visualize the static implementation view of a system. Component diagrams are special type of UML diagrams used for different purposes.

These diagrams show the physical components of a system. To clarify it, we can say that component diagrams describe the organization of the components in a system.

Organization can be further described as the location of the components in a system. These components are organized in a special way to meet the system requirements.

As we have already discussed, those components are libraries, files, executables, etc. Before implementing the application, these components are to be organized. This component organization is also designed separately as a part of project execution.

Component diagrams are very important from implementation perspective. Thus, the implementation team of an application should have a proper knowledge of the component details

Component diagrams can be used to –

- Model the components of a system.
- Model the database schema.
- Model the executables of an application.
- Model the system's source code.

#### UML - Deployment Diagrams

Deployment diagrams are used to visualize the topology of the physical components of a system, where the software components are deployed.

Deployment diagrams are used to describe the static deployment view of a system. Deployment diagrams consist of nodes and their relationships.

#### Purpose of Deployment Diagrams

The term Deployment itself describes the purpose of the diagram. Deployment diagrams are used for describing the hardware components, where software components are deployed. Component diagrams and deployment diagrams are closely related.

Component diagrams are used to describe the components and deployment diagrams shows how they are deployed in hardware.

UML is mainly designed to focus on the software artifacts of a system. However, these two diagrams are special diagrams used to focus on software and hardware components.

Most of the UML diagrams are used to handle logical components but deployment diagrams are made to focus on the hardware topology of a system. Deployment diagrams are used by the system engineers.

The purpose of deployment diagrams can be described as –

- Visualize the hardware topology of a system.
- Describe the hardware components used to deploy software components.
- Describe the runtime processing nodes.

#### How to Draw a Deployment Diagram?

Deployment diagram represents the deployment view of a system. It is related to the component diagram because the components are deployed using the deployment diagrams. A deployment diagram consists of nodes. Nodes are nothing but physical hardware used to deploy the application.

Deployment diagrams are useful for system engineers. An efficient deployment diagram is very important as it controls the following parameters –

- Performance
- Scalability
- Maintainability
- Portability

Before drawing a deployment diagram, the following artifacts should be identified –

- Nodes
- Relationships among nodes

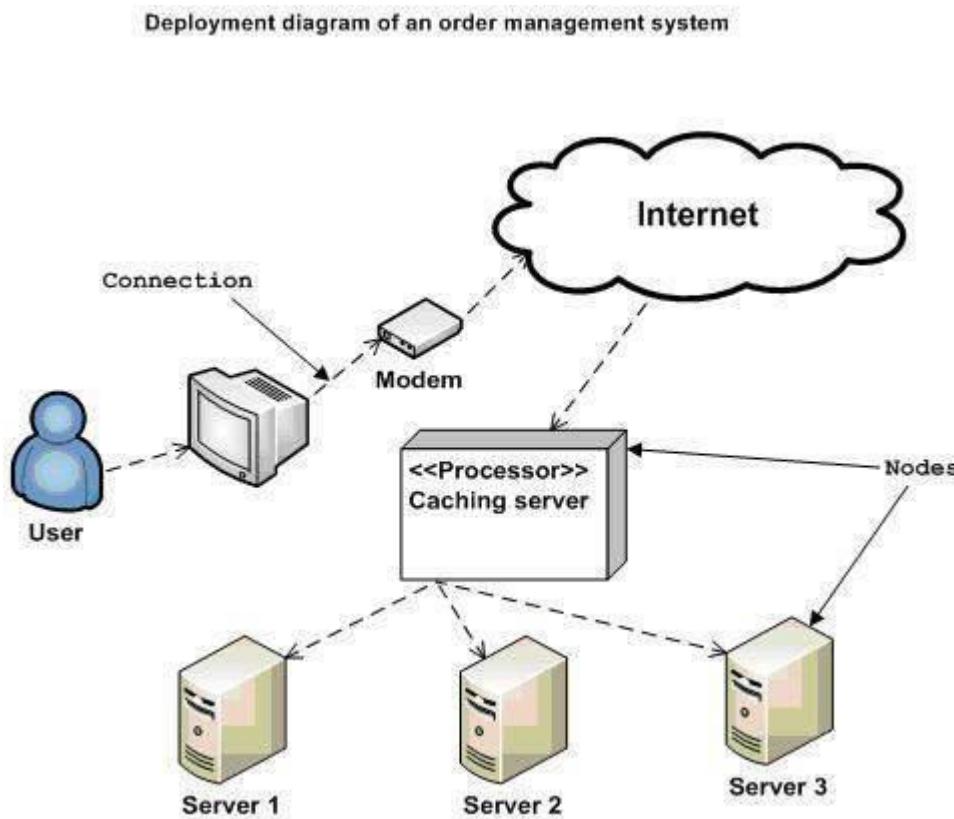
Following is a sample deployment diagram to provide an idea of the deployment view of order management system. Here, we have shown nodes as –

- Monitor
- Modem

- Caching server
- Server

The application is assumed to be a web-based application, which is deployed in a clustered environment using server 1, server 2, and server 3. The user connects to the application using the Internet. The control flows from the caching server to the clustered environment.

The following deployment diagram has been drawn considering all the points mentioned above.



#### Where to Use Deployment Diagrams?

Deployment diagrams are mainly used by system engineers. These diagrams are used to describe the physical components (hardware), their distribution, and association.

Deployment diagrams can be visualized as the hardware components/nodes on which the software components reside.

Software applications are developed to model complex business processes. Efficient software applications are not sufficient to meet the business requirements. Business requirements can be described as the need to support the increasing number of users, quick response time, etc.

To meet these types of requirements, hardware components should be designed efficiently and in a cost-effective way.

Now-a-days software applications are very complex in nature. Software applications can be standalone, web-based, distributed, mainframe-based and many more. Hence, it is very important to design the hardware components efficiently.

Deployment diagrams can be used –

- To model the hardware topology of a system.

- To model the embedded system.
- To model the hardware details for a client/server system.
- To model the hardware details of a distributed application.
- For Forward and Reverse engineering.

### UML - Use Case Diagrams

To model a system, the most important aspect is to capture the dynamic behavior. Dynamic behavior means the behavior of the system when it is running/operating.

Only static behavior is not sufficient to model a system rather dynamic behavior is more important than static behavior. In UML, there are five diagrams available to model the dynamic nature and use case diagram is one of them. Now as we have to discuss that the use case diagram is dynamic in nature, there should be some internal or external factors for making the interaction.

These internal and external agents are known as actors. Use case diagrams consists of actors, use cases and their relationships. The diagram is used to model the system/subsystem of an application. A single use case diagram captures a particular functionality of a system.

Hence to model the entire system, a number of use case diagrams are used.

### Purpose of Use Case Diagrams

The purpose of use case diagram is to capture the dynamic aspect of a system. However, this definition is too generic to describe the purpose, as other four diagrams (activity, sequence, collaboration, and Statechart) also have the same purpose. We will look into some specific purpose, which will distinguish it from other four diagrams.

Use case diagrams are used to gather the requirements of a system including internal and external influences. These requirements are mostly design requirements. Hence, when a system is analyzed to gather its functionalities, use cases are prepared and actors are identified.

When the initial task is complete, use case diagrams are modelled to present the outside view.

In brief, the purposes of use case diagrams can be said to be as follows –

- Used to gather the requirements of a system.
- Used to get an outside view of a system.
- Identify the external and internal factors influencing the system.
- Show the interaction among the requirements are actors.

### How to Draw a Use Case Diagram?

Use case diagrams are considered for high level requirement analysis of a system. When the requirements of a system are analyzed, the functionalities are captured in use cases.

We can say that use cases are nothing but the system functionalities written in an organized manner. The second thing which is relevant to use cases are the actors. Actors can be defined as something that interacts with the system.

Actors can be a human user, some internal applications, or may be some external applications. When we are planning to draw a use case diagram, we should have the following items identified.

- Functionalities to be represented as use case
- Actors
- Relationships among the use cases and actors.

Use case diagrams are drawn to capture the functional requirements of a system. After identifying the above items, we have to use the following guidelines to draw an efficient use case diagram

- The name of a use case is very important. The name should be chosen in such a way so that it can identify the functionalities performed.
- Give a suitable name for actors.
- Show relationships and dependencies clearly in the diagram.
- Do not try to include all types of relationships, as the main purpose of the diagram is to identify the requirements.
- Use notes whenever required to clarify some important points.

Following is a sample use case diagram representing the order management system. Hence, if we look into the diagram then we will find three use cases (**Order**, **SpecialOrder**, and **NormalOrder**) and one actor which is the customer.

The SpecialOrder and NormalOrder use cases are extended from *Order* use case. Hence, they have extended relationship. Another important point is to identify the system boundary, which is shown in the picture. The actor Customer lies outside the system as it is an external user of the system.

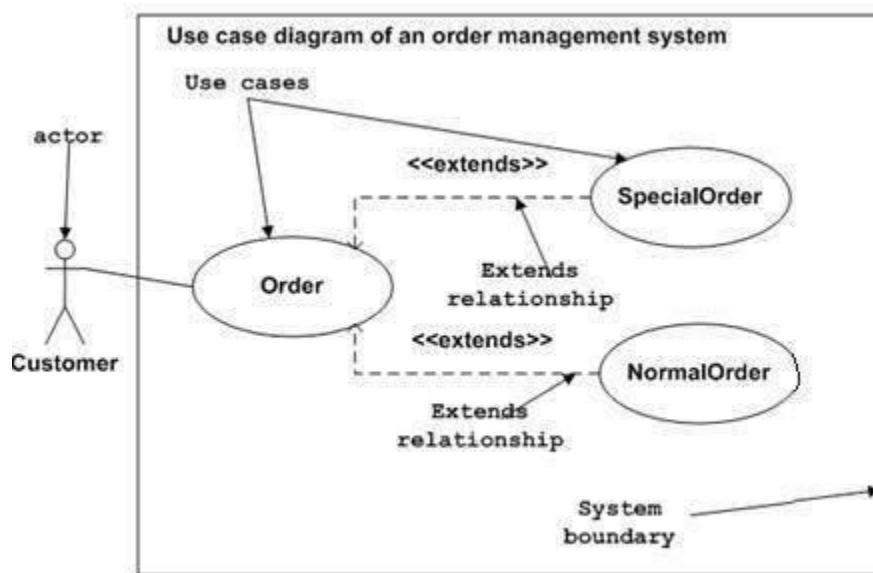


Figure: Sample Use Case diagram

#### Where to Use a Use Case Diagram?

As we have already discussed there are five diagrams in UML to model the dynamic view of a system. Now each and every model has some specific purpose to use. Actually these specific purposes are different angles of a running system.

To understand the dynamics of a system, we need to use different types of diagrams. Use case diagram is one of them and its specific purpose is to gather system requirements and actors.

Use case diagrams specify the events of a system and their flows. But use case diagram never describes how they are implemented. Use case diagram can be imagined as a black box where only the input, output, and the function of the black box is known.

These diagrams are used at a very high level of design. This high level design is refined again and again to get a complete and practical picture of the system. A well-structured use case also describes the pre-condition, post condition, and exceptions. These extra elements are used to make test cases when performing the testing.

Although use case is not a good candidate for forward and reverse engineering, still they are used in a slightly different way to make forward and reverse engineering. The same is true for reverse engineering. Use case diagram is used differently to make it suitable for reverse engineering.

In forward engineering, use case diagrams are used to make test cases and in reverse engineering use cases are used to prepare the requirement details from the existing application.

Use case diagrams can be used for –

- Requirement analysis and high level design.
- Model the context of a system.
- Reverse engineering.
- Forward engineering.

#### UML - Interaction Diagrams

From the term Interaction, it is clear that the diagram is used to describe some type of interactions among the different elements in the model. This interaction is a part of dynamic behavior of the system.

This interactive behavior is represented in UML by two diagrams known as **Sequence diagram** and **Collaboration diagram**. The basic purpose of both the diagrams are similar.

Sequence diagram emphasizes on time sequence of messages and collaboration diagram emphasizes on the structural organization of the objects that send and receive messages.

#### Purpose of Interaction Diagrams

The purpose of interaction diagrams is to visualize the interactive behavior of the system. Visualizing the interaction is a difficult task. Hence, the solution is to use different types of models to capture the different aspects of the interaction.

Sequence and collaboration diagrams are used to capture the dynamic nature but from a different angle.

The purpose of interaction diagram is –

- To capture the dynamic behaviour of a system.
- To describe the message flow in the system.
- To describe the structural organization of the objects.

- To describe the interaction among objects.

#### How to Draw an Interaction Diagram?

As we have already discussed, the purpose of interaction diagrams is to capture the dynamic aspect of a system. So to capture the dynamic aspect, we need to understand what a dynamic aspect is and how it is visualized. Dynamic aspect can be defined as the snapshot of the running system at a particular moment

We have two types of interaction diagrams in UML. One is the sequence diagram and the other is the collaboration diagram. The sequence diagram captures the time sequence of the message flow from one object to another and the collaboration diagram describes the organization of objects in a system taking part in the message flow.

Following things are to be identified clearly before drawing the interaction diagram

- Objects taking part in the interaction.
- Message flows among the objects.
- The sequence in which the messages are flowing.
- Object organization.

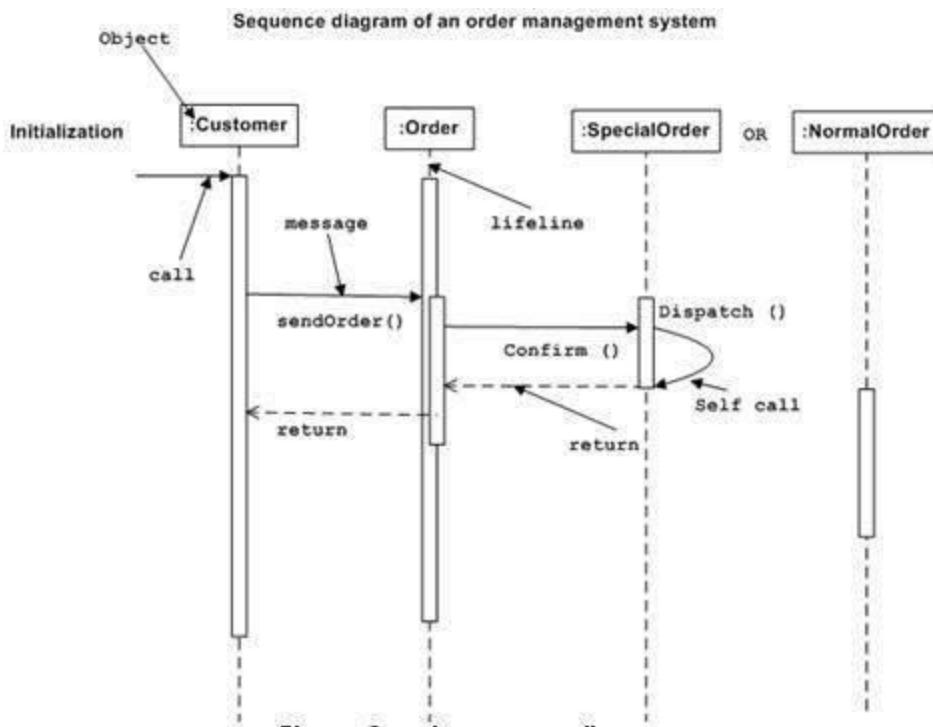
Following are two interaction diagrams modeling the order management system. The first diagram is a sequence diagram and the second is a collaboration diagram

#### The Sequence Diagram

The sequence diagram has four objects (Customer, Order, SpecialOrder and NormalOrder).

The following diagram shows the message sequence for *SpecialOrder* object and the same can be used in case of *NormalOrder* object. It is important to understand the time sequence of message flows. The message flow is nothing but a method call of an object.

The first call is *sendOrder ()* which is a method of *Order object*. The next call is *confirm ()* which is a method of *SpecialOrder object* and the last call is *Dispatch ()* which is a method of *SpecialOrder object*. The following diagram mainly describes the method calls from one object to another, and this is also the actual scenario when the system is running.

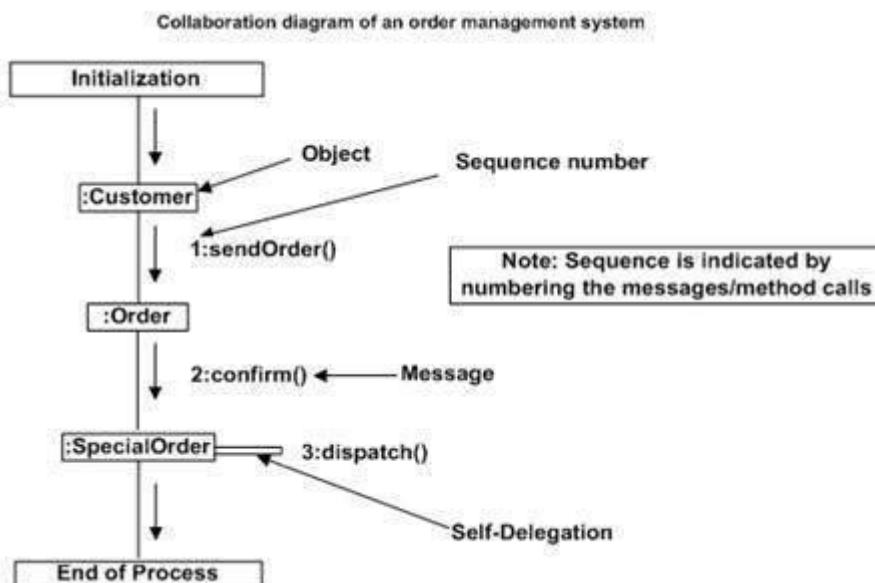


### The Collaboration Diagram

The second interaction diagram is the collaboration diagram. It shows the object organization as seen in the following diagram. In the collaboration diagram, the method call sequence is indicated by some numbering technique. The number indicates how the methods are called one after another. We have taken the same order management system to describe the collaboration diagram.

Method calls are similar to that of a sequence diagram. However, difference being the sequence diagram does not describe the object organization, whereas the collaboration diagram shows the object organization.

To choose between these two diagrams, emphasis is placed on the type of requirement. If the time sequence is important, then the sequence diagram is used. If organization is required, then collaboration diagram is used.



Where to Use Interaction Diagrams?

We have already discussed that interaction diagrams are used to describe the dynamic nature of a system. Now, we will look into the practical scenarios where these diagrams are used. To understand the practical application, we need to understand the basic nature of sequence and collaboration diagram.

The main purpose of both the diagrams are similar as they are used to capture the dynamic behavior of a system. However, the specific purpose is more important to clarify and understand.

Sequence diagrams are used to capture the order of messages flowing from one object to another. Collaboration diagrams are used to describe the structural organization of the objects taking part in the interaction. A single diagram is not sufficient to describe the dynamic aspect of an entire system, so a set of diagrams are used to capture it as a whole.

Interaction diagrams are used when we want to understand the message flow and the structural organization. Message flow means the sequence of control flow from one object to another. Structural organization means the visual organization of the elements in a system.

Interaction diagrams can be used –

- To model the flow of control by time sequence.
- To model the flow of control by structural organizations.
- For forward engineering.
- For reverse engineering.

#### UML - Statechart Diagrams

The name of the diagram itself clarifies the purpose of the diagram and other details. It describes different states of a component in a system. The states are specific to a component/object of a system.

A Statechart diagram describes a state machine. State machine can be defined as a machine which defines different states of an object and these states are controlled by external or internal events.

Activity diagram explained in the next chapter, is a special kind of a Statechart diagram. As Statechart diagram defines the states, it is used to model the lifetime of an object.

#### Purpose of Statechart Diagrams

Statechart diagram is one of the five UML diagrams used to model the dynamic nature of a system. They define different states of an object during its lifetime and these states are changed by events. Statechart diagrams are useful to model the reactive systems. Reactive systems can be defined as a system that responds to external or internal events.

Statechart diagram describes the flow of control from one state to another state. States are defined as a condition in which an object exists and it changes when some event is triggered. The most important purpose of Statechart diagram is to model lifetime of an object from creation to termination.

Statechart diagrams are also used for forward and reverse engineering of a system. However, the main purpose is to model the reactive system.

Following are the main purposes of using Statechart diagrams –

- To model the dynamic aspect of a system.
- To model the life time of a reactive system.
- To describe different states of an object during its life time.
- Define a state machine to model the states of an object.

### How to Draw a Statechart Diagram?

Statechart diagram is used to describe the states of different objects in its life cycle. Emphasis is placed on the state changes upon some internal or external events. These states of objects are important to analyze and implement them accurately.

Statechart diagrams are very important for describing the states. States can be identified as the condition of objects when a particular event occurs.

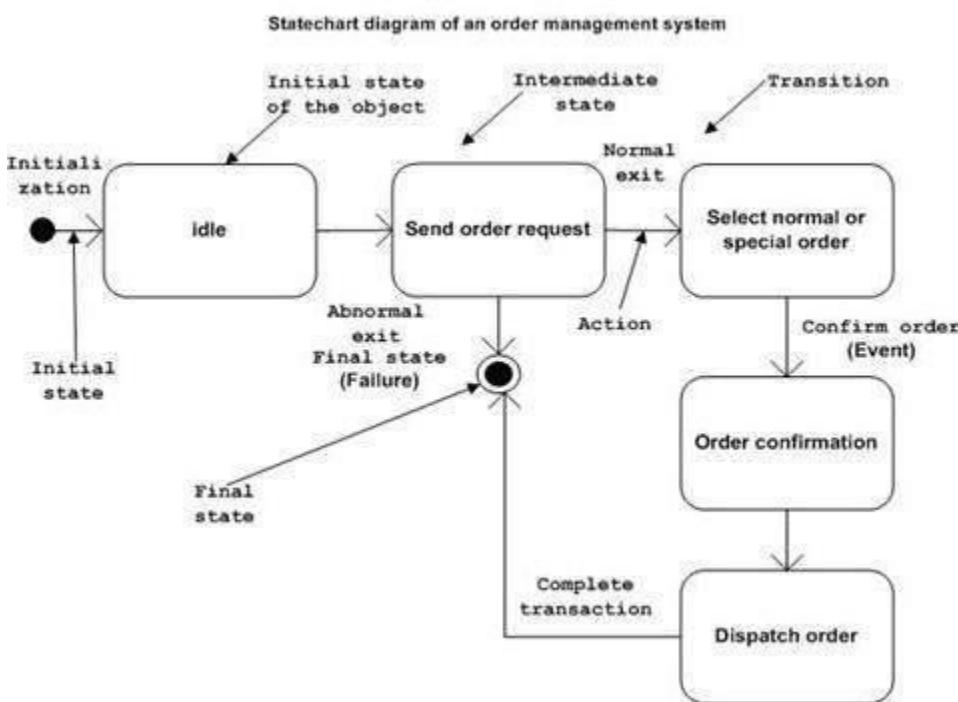
Before drawing a Statechart diagram we should clarify the following points –

- Identify the important objects to be analyzed.
- Identify the states.
- Identify the events.

Following is an example of a Statechart diagram where the state of Order object is analyzed

The first state is an idle state from where the process starts. The next states are arrived for events like send request, confirm request, and dispatch order. These events are responsible for the state changes of order object.

During the life cycle of an object (here order object) it goes through the following states and there may be some abnormal exits. This abnormal exit may occur due to some problem in the system. When the entire life cycle is complete, it is considered as a complete transaction as shown in the following figure. The initial and final state of an object is also shown in the following figure.



## Where to Use Statechart Diagrams?

From the above discussion, we can define the practical applications of a Statechart diagram. Statechart diagrams are used to model the dynamic aspect of a system like other four diagrams discussed in this tutorial. However, it has some distinguishing characteristics for modeling the dynamic nature.

Statechart diagram defines the states of a component and these state changes are dynamic in nature. Its specific purpose is to define the state changes triggered by events. Events are internal or external factors influencing the system.

Statechart diagrams are used to model the states and also the events operating on the system. When implementing a system, it is very important to clarify different states of an object during its life time and Statechart diagrams are used for this purpose. When these states and events are identified, they are used to model it and these models are used during the implementation of the system.

If we look into the practical implementation of Statechart diagram, then it is mainly used to analyze the object states influenced by events. This analysis is helpful to understand the system behavior during its execution.

The main usage can be described as –

- To model the object states of a system.
- To model the reactive system. Reactive system consists of reactive objects.
- To identify the events responsible for state changes.
- Forward and reverse engineering.

## UML - Activity Diagrams

Activity diagram is another important diagram in UML to describe the dynamic aspects of the system.

Activity diagram is basically a flowchart to represent the flow from one activity to another activity. The activity can be described as an operation of the system.

The control flow is drawn from one operation to another. This flow can be sequential, branched, or concurrent. Activity diagrams deal with all type of flow control by using different elements such as fork, join, etc

## Purpose of Activity Diagrams

The basic purposes of activity diagrams is similar to other four diagrams. It captures the dynamic behavior of the system. Other four diagrams are used to show the message flow from one object to another but activity diagram is used to show message flow from one activity to another.

Activity is a particular operation of the system. Activity diagrams are not only used for visualizing the dynamic nature of a system, but they are also used to construct the executable system by using forward and reverse engineering techniques. The only missing thing in the activity diagram is the message part.

It does not show any message flow from one activity to another. Activity diagram is sometimes considered as the flowchart. Although the diagrams look like a flowchart, they are not. It shows different flows such as parallel, branched, concurrent, and single.

The purpose of an activity diagram can be described as –

- Draw the activity flow of a system.
- Describe the sequence from one activity to another.
- Describe the parallel, branched and concurrent flow of the system.

#### How to Draw an Activity Diagram?

Activity diagrams are mainly used as a flowchart that consists of activities performed by the system. Activity diagrams are not exactly flowcharts as they have some additional capabilities. These additional capabilities include branching, parallel flow, swimlane, etc.

Before drawing an activity diagram, we must have a clear understanding about the elements used in activity diagram. The main element of an activity diagram is the activity itself. An activity is a function performed by the system. After identifying the activities, we need to understand how they are associated with constraints and conditions.

Before drawing an activity diagram, we should identify the following elements –

- Activities
- Association
- Conditions
- Constraints

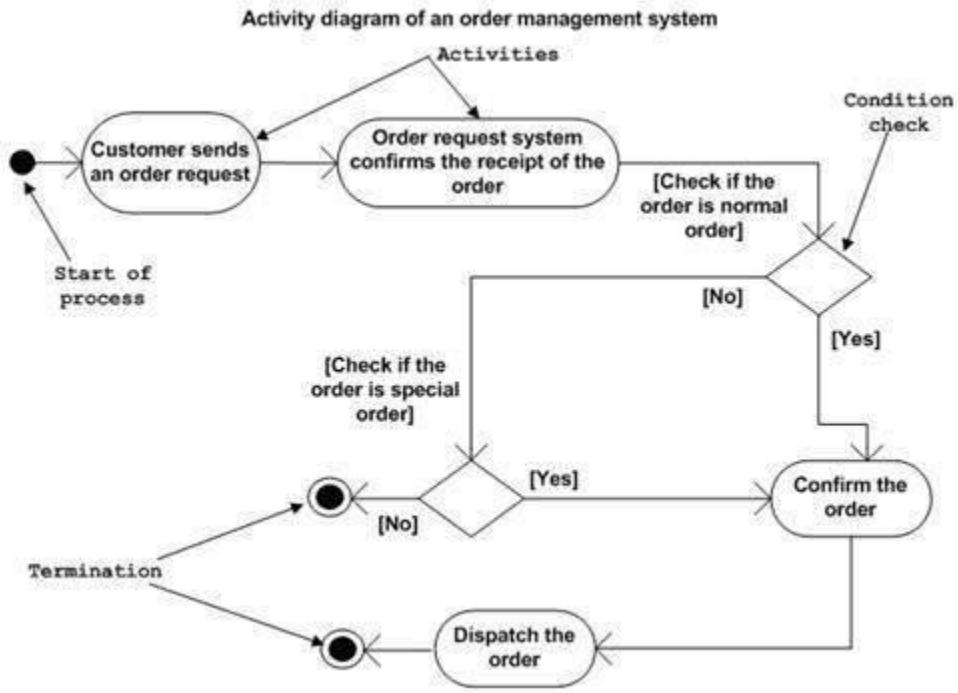
Once the above-mentioned parameters are identified, we need to make a mental layout of the entire flow. This mental layout is then transformed into an activity diagram.

Following is an example of an activity diagram for order management system. In the diagram, four activities are identified which are associated with conditions. One important point should be clearly understood that an activity diagram cannot be exactly matched with the code. The activity diagram is made to understand the flow of activities and is mainly used by the business users

Following diagram is drawn with the four main activities –

- Send order by the customer
- Receipt of the order
- Confirm the order
- Dispatch the order

After receiving the order request, condition checks are performed to check if it is normal or special order. After the type of order is identified, dispatch activity is performed and that is marked as the termination of the process.



### Where to Use Activity Diagrams?

The basic usage of activity diagram is similar to other four UML diagrams. The specific usage is to model the control flow from one activity to another. This control flow does not include messages.

Activity diagram is suitable for modeling the activity flow of the system. An application can have multiple systems. Activity diagram also captures these systems and describes the flow from one system to another. This specific usage is not available in other diagrams. These systems can be database, external queues, or any other system.

We will now look into the practical applications of the activity diagram. From the above discussion, it is clear that an activity diagram is drawn from a very high level. So it gives high level view of a system. This high level view is mainly for business users or any other person who is not a technical person.

This diagram is used to model the activities which are nothing but business requirements. The diagram has more impact on business understanding rather than on implementation details.

Activity diagram can be used for –

- Modeling work flow by using activities.
- Modeling business requirements.
- High level understanding of the system's functionalities.
- Investigating business requirements at a later stage.

**Software Engineering  
Lab Manual**

**Lab 8**

**Code Sharing**

**CLO 4**

Link: <https://guides.github.com/>

**Intro**

The **Hello World** project is a time-honored tradition in computer programming. It is a simple exercise that gets you started when learning something new. Let's get started with GitHub!

You'll learn how to:

- ◆ Create and use a repository Start and
- ◆ manage a new branch
- ◆ Make changes to a file and push them to GitHub as commits
- ◆ Open and merge a pull request

## What is GitHub?

---

GitHub is a code hosting platform for version control and collaboration. It lets you and others work together on projects from anywhere.

This tutorial teaches you GitHub essentials like *repositories*, *branches*, *commits*, and *Pull Requests*. You'll create your own

Hello World repository and learn GitHub's Pull Request workflow, a popular way to create and review code.

No coding necessary

To complete this tutorial, you need a [GitHub.com account](#) and Internet access.

You don't need to know how to code, use the command line, or install Git (the version control software GitHub is built on).

**Tip:** Open this guide in a separate browser window (or tab) so you can see it while you complete the steps in the tutorial.

## Step 1. Create a Repository

A **repository** is usually used to organize a single project. Repositories can contain folders and files, images, videos, spreadsheets, and data sets – anything your project needs. We recommend including a *README*, or a file with information about your project. GitHub makes it easy to add one at the same time you create your new repository. *It also offers other common options such as a license file.*

Your `hello-world` repository can be a place where you store ideas, resources, or even share and discuss things with others.

### To create a new repository

1. In the upper right corner, next to your avatar or identicon, click  and then select **New repository**.
2. Name your repository `hello-world`.
3. Write a short description.

#### 4. Select Initialize this repository with a README.

PUBLIC hubot / hello-world

Great repository names are short and memorable. Need inspiration? How about [petulant-shame](#).

Description (optional)  
Just another repository

**Public**  
Anyone can see this repository. You choose who can commit.

**Private**  
You choose who can see and commit to this repository.

**Initialize this repository with a README**  
This will allow you to `git clone` the repository immediately. Skip this step if you have already run `git init` locally.

Add .gitignore: **None** | Add a license: **None**

**Create repository**

Click **Create repository**.

#### Step 2. Create a Branch

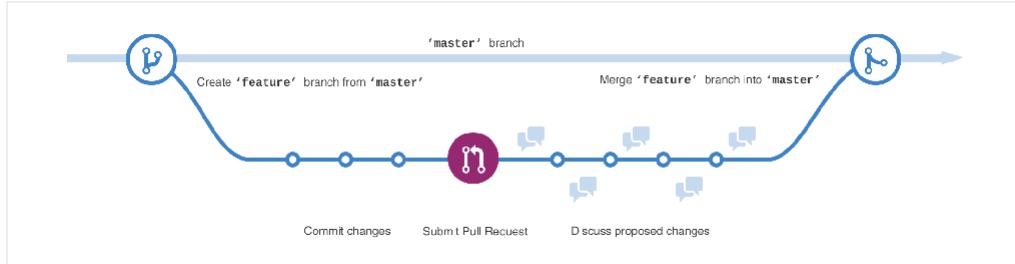
**Branching** is the way to work on different versions of a repository at one time.

By default your repository has one branch named which is considered to be the definitive branch. We use **master** branches to experiment and make edits before committing them to **master**.

When you create a branch off the making **master** branch, you're a copy, or snapshot, of **master** as it was at that point in time. If someone else made changes to the **master** branch while you were working on your branch, you could pull in those updates.

This diagram shows:

- The **master** branch
- A new branch called **feature** (because we're doing 'feature work' on this branch)
- The journey that **feature** takes before it's merged into **master**



Have you ever saved different versions of a file? Something like:

- story.txt**
- story-joe-edit.txt**
- story-joe-edit-reviewed.txt**

Branches accomplish similar goals in GitHub repositories.

Here at GitHub, our developers, writers, and designers use branches for keeping bug fixes and feature work separate from our **master** (production) branch. When a change is ready, they merge their branch into **master**.

## To create a new branch

1. Go to your new repository [hello-world](#).
2. Click the drop down at the top of the file list that says **master**.
3. Type a branch name, **readme-edits**, into the new branch box.
4. Select the blue **Create branch** box or hit "Enter" on your keyboard.

## Just another repository — Edit

The screenshot shows a GitHub repository page for 'hello-world'. At the top, there are two summary boxes: '1 commit' with a circular icon and '1 branch' with a branch icon. Below these are navigation buttons for 'Branches' (green), 'Branch: master' (selected, grey), and a '+' button for creating a new branch. The main content area shows a single commit titled 'Initial commit' with a timestamp and a yellow robot icon. A file named 'README.md' is listed with the status 'Initial'. Below this, there is a large preview area for 'README.md' containing the text 'Hello world!'. A cursor arrow points towards the commit message.

Now you have two branches, `master` and `readme-edits`. They look exactly the same, but not for long! Next we'll add our changes to the new branch.

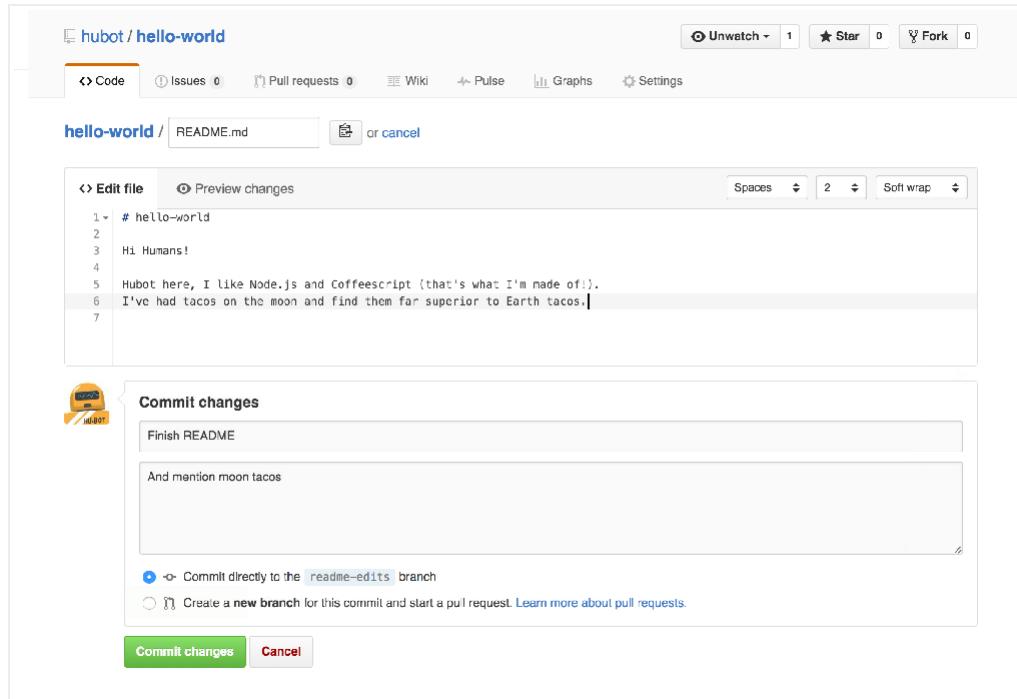
### Step 3. Make and commit changes

Bravo! Now, you're on the code view for your branch, which is a copy of `master`. Let's make some edits.

On GitHub, saved changes are called *commits*. Each commit has an associated *commit message*, which is a description explaining why a particular change was made. Commit messages capture the history of your changes, so other contributors can understand what you've done and why.

## Make and commit changes

1. Click the `README.md` file.
2. Click the pencil icon in the upper right corner of the file view to edit.
3. In the editor, write a bit about yourself.
4. Write a commit message that describes your changes.
5. Click **Commit changes** button.



These changes will be made to just the `README` file on your branch, so

`readme-edits` now this branch contains content  
that's different from `master`.

## Step 4. Open a Pull Request

Nice edits! Now that you have changes in a branch off of `master`, you can open a *pull request*.

Pull Requests are the heart of collaboration on GitHub. When you open a *pull request*, you're proposing your changes and

requesting that someone review and pull in your contribution and merge them into their branch. Pull requests show *diffs*, or differences, of the content from both branches. The changes, additions, and subtractions are shown in green and red.

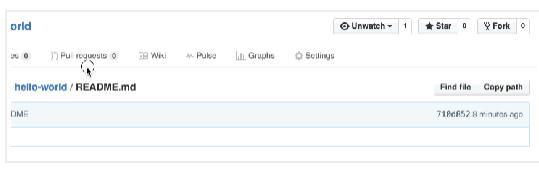
As soon as you make a commit, you can open a pull request and start a discussion, even before the code is finished.

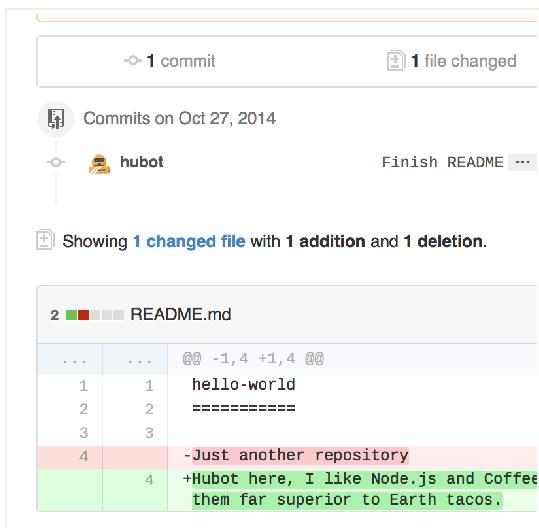
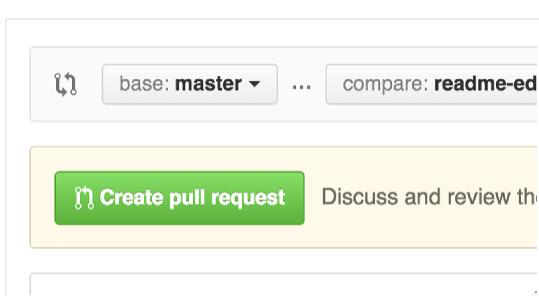
By using GitHub's @mention system in your pull request message, you can ask for feedback from specific people or teams, whether they're down the hall or 10 time zones away.

You can even open pull requests in your own repository and merge them yourself. It's a great way to learn the GitHub flow before working on larger projects.

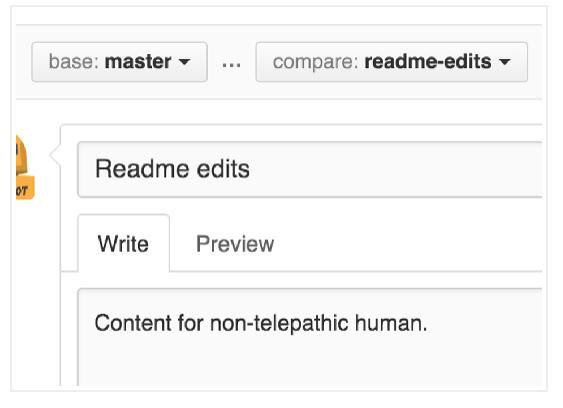
Open a Pull Request for changes to the README

*Click on the image for a larger version*

Step	Screenshot
<p><b>Click the <input type="checkbox"/> Pull Request tab</b>, then from the PullRequest page, click the green <b>New pull request</b> button.</p>	

Step	Screenshot
<p><b>In the Example Comparisons box, select the branch you made, <code>readme-edits</code>, to compare with <code>master</code> (the original).</b></p> 	
<p>Look over your changes in the diffs on the Compare page, make sure they're what you want to submit.</p> 	
<p>When you're satisfied that these are the changes you want to submit, click the big green <b>Create Pull Request</b> button.</p>	

Give your pull request a title and write a brief description of your changes.



When you're done with your message, click **Create pull request!**

**Tip:** You can use emoji and drag and drop images and gifs onto comments and Pull Requests.

## Step 5. Merge your Pull Request

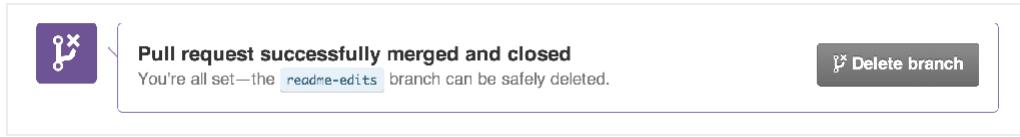
In this final step, it's time to bring your changes together – merging your

branch into the branch.

readme-edits

master

1. Click the green **Merge pull request** button to merge the changes into **master**.
2. Click **Confirm merge**.
3. Go ahead and delete the branch, since its changes have been incorporated, with the **Delete branch** button in the purple box.



## Celebrate!

By completing this tutorial, you've learned to create a project and make a pull request on GitHub!

Here's what you accomplished in this tutorial:

- Created an open source repository Started and managed a new branch
- Changed a file and committed those changes to GitHub
- Opened and merged a Pull Request

Take a look at your GitHub profile and you'll see your new contribution squares!

To learn more about the power of Pull Requests, we recommend reading the [GitHub flow Guide](#). You might also visit [GitHub Explore](#) and get involved in an Open Source project.

**Tip:** Check out our other [Guides](#), [YouTube Channel](#) and [On-Demand Training](#) for more on how to get started with GitHub.

Last updated April 7, 2016



[GitHub](#) is the best way to build and ship software.

Powerful collaboration, code review, and code management for open source and private projects.

## **Software Engineering Lab Manual**

### **Lab 9**

#### **Software Project Planning**

**CLO 4**

The job pattern of an IT company engaged in software development can be seen split in two parts:

- Software Creation
- Software Project Management

A project is well-defined task, which is a collection of several operations done in order to achieve a goal (for example, software development and delivery). A Project can be characterized as:

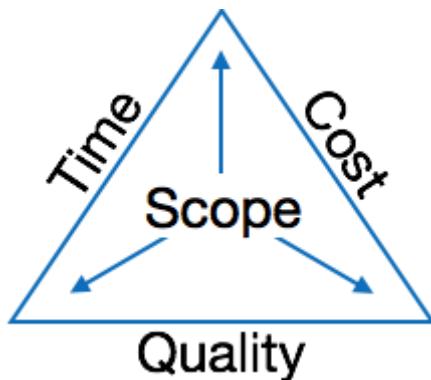
- Every project may have a unique and distinct goal.
- Project is not routine activity or day-to-day operations.
- Project comes with a start time and end time.
- Project ends when its goal is achieved hence it is a temporary phase in the lifetime of an organization.
- Project needs adequate resources in terms of time, manpower, finance, material and knowledge-bank.

#### **Software Project**

A Software Project is the complete procedure of software development from requirement gathering to testing and maintenance, carried out according to the execution methodologies, in a specified period of time to achieve intended software product.

#### **Need of software project management**

Software is said to be an intangible product. Software development is a kind of all new stream in world business and there's very little experience in building software products. Most software products are tailor made to fit client's requirements. The most important is that the underlying technology changes and advances so frequently and rapidly that experience of one product may not be applied to the other one. All such business and environmental constraints bring risk in software development hence it is essential to manage software projects efficiently.



The image above shows triple constraints for software projects. It is an essential part of software organization to deliver quality product, keeping the cost within client's budget constraint and deliver the project as per scheduled. There are several factors, both internal and external, which may impact this triple constrain triangle. Any of three factor can severely impact the other two.

Therefore, software project management is essential to incorporate user requirements along with budget and time constraints.

### Software Project Manager

A software project manager is a person who undertakes the responsibility of executing the software project. Software project manager is thoroughly aware of all the phases of SDLC that the software would go through. Project manager may never directly involve in producing the end product but he controls and manages the activities involved in production.

A project manager closely monitors the development process, prepares and executes various plans, arranges necessary and adequate resources, maintains communication among all team members in order to address issues of cost, budget, resources, time, quality and customer satisfaction.

Let us see few responsibilities that a project manager shoulders -

#### Managing People

- Act as project leader
- Liaison with stakeholders
- Managing human resources
- Setting up reporting hierarchy etc.

#### Managing Project

- Defining and setting up project scope
- Managing project management activities
- Monitoring progress and performance
- Risk analysis at every phase
- Take necessary step to avoid or come out of problems
- Act as project spokesperson

## Software Management Activities

Software project management comprises of a number of activities, which contains planning of project, deciding scope of software product, estimation of cost in various terms, scheduling of tasks and events, and resource management. Project management activities may include:

- **Project Planning**
- **Scope Management**
- **Project Estimation**

### Project Planning

Software project planning is task, which is performed before the production of software actually starts. It is there for the software production but involves no concrete activity that has any direct connection with software production; rather it is a set of multiple processes, which facilitates software production. Project planning may include the following:

### Scope Management

It defines the scope of project; this includes all the activities, process need to be done in order to make a deliverable software product. Scope management is essential because it creates boundaries of the project by clearly defining what would be done in the project and what would not be done. This makes project to contain limited and quantifiable tasks, which can easily be documented and in turn avoids cost and time overrun.

During Project Scope management, it is necessary to -

- Define the scope
- Decide its verification and control
- Divide the project into various smaller parts for ease of management.
- Verify the scope
- Control the scope by incorporating changes to the scope

### Project Estimation

For an effective management accurate estimation of various measures is a must. With correct estimation managers can manage and control the project more efficiently and effectively.

Project estimation may involve the following:

- **Software size estimation**

Software size may be estimated either in terms of KLOC (Kilo Line of Code) or by calculating number of function points in the software. Lines of code depend upon coding practices and Function points vary according to the user or software requirement.

- **Effort estimation**

The managers estimate efforts in terms of personnel requirement and man-hour required to produce the software. For effort estimation software size should be known. This can either be

derived by managers' experience, organization's historical data or software size can be converted into efforts by using some standard formulae.

- **Time estimation**

Once size and efforts are estimated, the time required to produce the software can be estimated. Efforts required is segregated into sub categories as per the requirement specifications and interdependency of various components of software. Software tasks are divided into smaller tasks, activities or events by Work Breakthrough Structure (WBS). The tasks are scheduled on day-to-day basis or in calendar months.

The sum of time required to complete all tasks in hours or days is the total time invested to complete the project.

- **Cost estimation**

This might be considered as the most difficult of all because it depends on more elements than any of the previous ones. For estimating project cost, it is required to consider -

- Size of software
- Software quality
- Hardware
- Additional software or tools, licenses etc.
- Skilled personnel with task-specific skills
- Travel involved
- Communication
- Training and support

## Project Estimation Techniques

We discussed various parameters involving project estimation such as size, effort, time and cost.

Project manager can estimate the listed factors using two broadly recognized techniques –

### Decomposition Technique

This technique assumes the software as a product of various compositions.

There are two main models -

- **Line of Code** Estimation is done on behalf of number of line of codes in the software product.
- **Function Points** Estimation is done on behalf of number of function points in the software product.

### Empirical Estimation Technique

This technique uses empirically derived formulae to make estimation. These formulae are based on LOC or FPs.

- **Putnam Model**

This model is made by Lawrence H. Putnam, which is based on Norden's frequency distribution (Rayleigh curve). Putnam model maps time and efforts required with software size.

- **COCOMO**

COCOMO stands for COnstructive COst MOdel, developed by Barry W. Boehm. It divides the software product into three categories of software: organic, semi-detached and embedded.

### Project Scheduling

Project Scheduling in a project refers to roadmap of all activities to be done with specified order and within time slot allotted to each activity. Project managers tend to define various tasks, and project milestones and arrange them keeping various factors in mind. They look for tasks lie in critical path in the schedule, which are necessary to complete in specific manner (because of task interdependency) and strictly within the time allocated. Arrangement of tasks which lies out of critical path are less likely to impact over all schedule of the project.

For scheduling a project, it is necessary to -

- Break down the project tasks into smaller, manageable form
- Find out various tasks and correlate them
- Estimate time frame required for each task
- Divide time into work-units
- Assign adequate number of work-units for each task
- Calculate total time required for the project from start to finish

### Resource management

All elements used to develop a software product may be assumed as resource for that project. This may include human resource, productive tools and software libraries.

The resources are available in limited quantity and stay in the organization as a pool of assets. The shortage of resources hampers the development of project and it can lag behind the schedule. Allocating extra resources increases development cost in the end. It is therefore necessary to estimate and allocate adequate resources for the project.

Resource management includes -

- Defining proper organization project by creating a project team and allocating responsibilities to each team member
- Determining resources required at a particular stage and their availability
- Manage Resources by generating resource request when they are required and de-allocating them when they are no more needed.

### Project Risk Management

Risk management involves all activities pertaining to identification, analyzing and making provision for predictable and non-predictable risks in the project. Risk may include the following:

- Experienced staff leaving the project and new staff coming in.
- Change in organizational management.
- Requirement change or misinterpreting requirement.
- Under-estimation of required time and resources.
- Technological changes, environmental changes, business competition.

## Risk Management Process

There are following activities involved in risk management process:

- **Identification** - Make note of all possible risks, which may occur in the project.
- **Categorize** - Categorize known risks into high, medium and low risk intensity as per their possible impact on the project.
- **Manage** - Analyze the probability of occurrence of risks at various phases. Make plan to avoid or face risks. Attempt to minimize their side-effects.
- **Monitor** - Closely monitor the potential risks and their early symptoms. Also monitor the effects of steps taken to mitigate or avoid them.

## Project Execution & Monitoring

In this phase, the tasks described in project plans are executed according to their schedules.

Execution needs monitoring in order to check whether everything is going according to the plan. Monitoring is observing to check the probability of risk and taking measures to address the risk or report the status of various tasks.

These measures include -

- **Activity Monitoring** - All activities scheduled within some task can be monitored on day-to-day basis. When all activities in a task are completed, it is considered as complete.
- **Status Reports** - The reports contain status of activities and tasks completed within a given time frame, generally a week. Status can be marked as finished, pending or work-in-progress etc.
- **Milestones Checklist** - Every project is divided into multiple phases where major tasks are performed (milestones) based on the phases of SDLC. This milestone checklist is prepared once every few weeks and reports the status of milestones.

## Project Communication Management

Effective communication plays vital role in the success of a project. It bridges gaps between client and the organization, among the team members as well as other stake holders in the project such as hardware suppliers.

Communication can be oral or written. Communication management process may have the following steps:

- **Planning** - This step includes the identifications of all the stakeholders in the project and the mode of communication among them. It also considers if any additional communication facilities are required.

- **Sharing** - After determining various aspects of planning, manager focuses on sharing correct information with the correct person on correct time. This keeps every one involved the project up to date with project progress and its status.
- **Feedback** - Project managers use various measures and feedback mechanism and create status and performance reports. This mechanism ensures that input from various stakeholders is coming to the project manager as their feedback.
- **Closure** - At the end of each major event, end of a phase of SDLC or end of the project itself, administrative closure is formally announced to update every stakeholder by sending email, by distributing a hardcopy of document or by other mean of effective communication.

After closure, the team moves to next phase or project.

#### Configuration Management

Configuration management is a process of tracking and controlling the changes in software in terms of the requirements, design, functions and development of the product.

IEEE defines it as “the process of identifying and defining the items in the system, controlling the change of these items throughout their life cycle, recording and reporting the status of items and change requests, and verifying the completeness and correctness of items”.

Generally, once the SRS is finalized there is less chance of requirement of changes from user. If they occur, the changes are addressed only with prior approval of higher management, as there is a possibility of cost and time overrun.

#### Baseline

A phase of SDLC is assumed over if it baselined, i.e. baseline is a measurement that defines completeness of a phase. A phase is baselined when all activities pertaining to it are finished and well documented. If it was not the final phase, its output would be used in next immediate phase.

Configuration management is a discipline of organization administration, which takes care of occurrence of any change (process, requirement, technological, strategical etc.) after a phase is baselined. CM keeps check on any changes done in software.

#### Change Control

Change control is function of configuration management, which ensures that all changes made to software system are consistent and made as per organizational rules and regulations.

A change in the configuration of product goes through following steps -

- **Identification** - A change request arrives from either internal or external source. When change request is identified formally, it is properly documented.
- **Validation** - Validity of the change request is checked and its handling procedure is confirmed.
- **Analysis** - The impact of change request is analyzed in terms of schedule, cost and required efforts. Overall impact of the prospective change on system is analyzed.
- **Control** - If the prospective change either impacts too many entities in the system or it is unavoidable, it is mandatory to take approval of high authorities before change is incorporated

into the system. It is decided if the change is worth incorporation or not. If it is not, change request is refused formally.

- **Execution** - If the previous phase determines to execute the change request, this phase take appropriate actions to execute the change, does a thorough revision if necessary.
- **Close request** - The change is verified for correct implementation and merging with the rest of the system. This newly incorporated change in the software is documented properly and the request is formally closed.

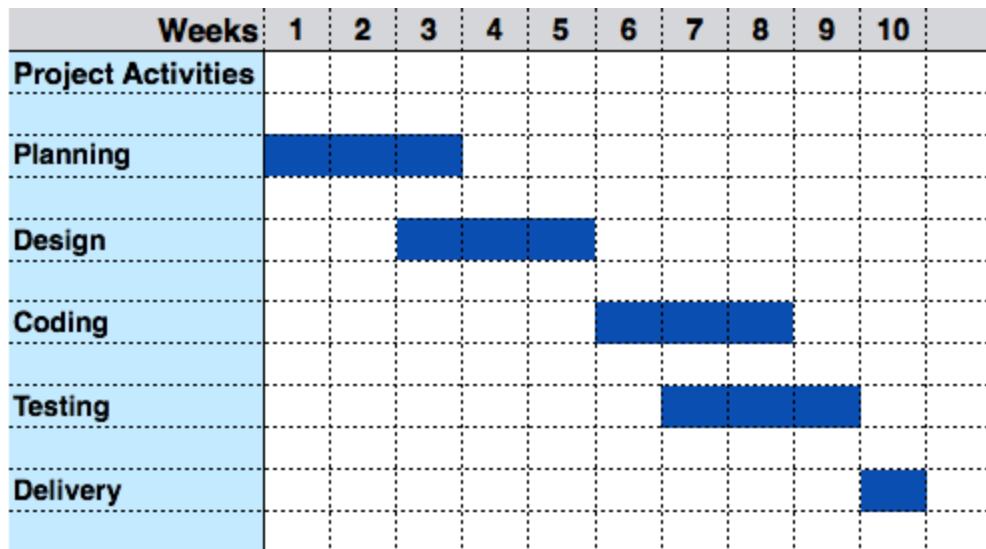
## Project Management Tools

The risk and uncertainty rises multifold with respect to the size of the project, even when the project is developed according to set methodologies.

There are tools available, which aid for effective project management. A few are described -

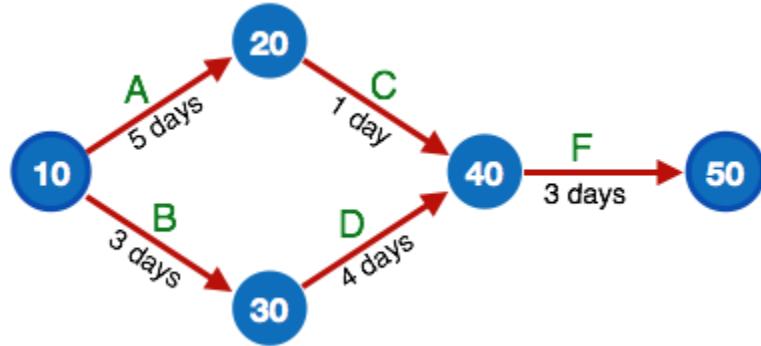
### Gantt Chart

Gantt charts was devised by Henry Gantt (1917). It represents project schedule with respect to time periods. It is a horizontal bar chart with bars representing activities and time scheduled for the project activities.



### PERT Chart

PERT (Program Evaluation & Review Technique) chart is a tool that depicts project as network diagram. It is capable of graphically representing main events of project in both parallel and consecutive way. Events, which occur one after another, show dependency of the later event over the previous one.

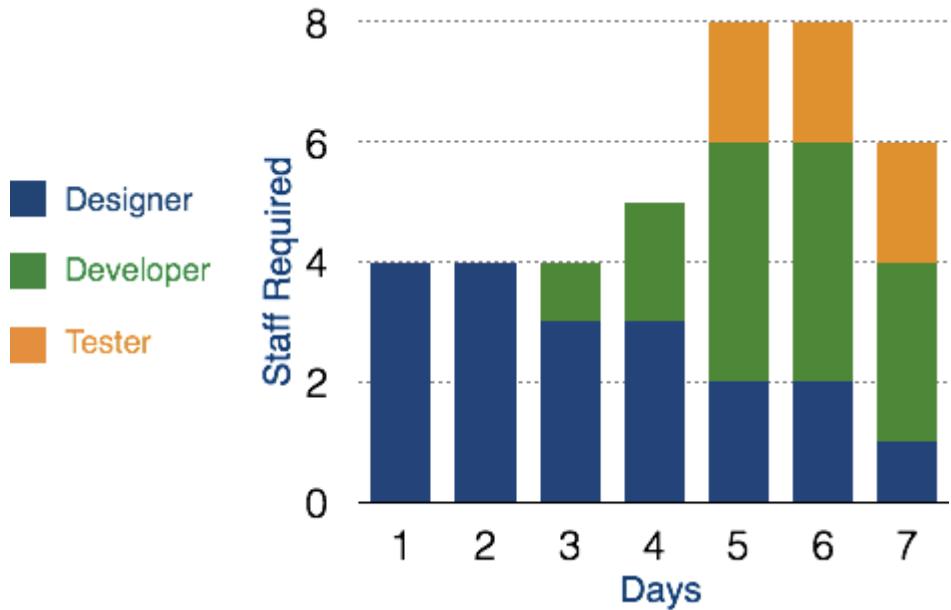


Events are shown as numbered nodes. They are connected by labeled arrows depicting sequence of tasks in the project.

### Resource Histogram

This is a graphical tool that contains bar or chart representing number of resources (usually skilled staff) required over time for a project event (or phase). Resource Histogram is an effective tool for staff planning and coordination.

Staff	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
<b>Designer</b>	4	4	3	3	2	2	1
<b>Developer</b>	0	0	1	2	4	4	3
<b>Tester</b>	0	0	0	0	2	2	2
<b>Total</b>	4	4	4	5	8	8	6



### Critical Path Analysis

This tool is useful in recognizing interdependent tasks in the project. It also helps to find out the shortest path or critical path to complete the project successfully. Like PERT diagram, each event is allotted a specific time frame. This tool shows dependency of event assuming an event can proceed to next only if the previous one is completed.

The events are arranged according to their earliest possible start time. Path between start and end node is critical path which cannot be further reduced and all events require to be executed in same order.

# **Software Engineering**

## **Lab Manual**

## **Lab 10**

### **Project Implementation**

**CLO 1,2,4,5**

#### **Health Insurance Management System: (Applying for Health Insurance)**

1. Draw Class Diagram of the above mentioned system
2. Draw Sequence Diagram of the above mentioned system
3. Draw Use Case Diagram of the above mentioned system
4. Write Detailed Use Case of the above mentioned system
5. Program the above mentioned system in Java in two parts as
  - a. Admin (who can add user's data, and give different policies i.e. individual or family)
  - b. And user (who can login using admin assigned username and password, and can view policies added by admin, and can use them to apply for Health Insurance)

#### **Bank Accounts Management System: (Opening New Account)**

1. Draw Class Diagram of the above mentioned system
2. Draw Sequence Diagram of the above mentioned system
3. Draw Use Case Diagram of the above mentioned system
4. Write Detailed Use Case of the above mentioned system
5. Program the above mentioned system in Java in two parts as
  - a. admin (who can add user's data, and give different accounts categories i.e. saving account or current account)
  - b. User (who can login using admin assigned username and password, and can view accounts categories added by admin, and can use them to apply for new account)

#### **Library Management System:**

1. Draw Class Diagram of the above mentioned system
2. Draw Sequence Diagram of the above mentioned system
3. Draw Use Case Diagram of the above mentioned system
4. Write Detailed Use Case of the above mentioned system
5. Program the above mentioned system in Java in two parts as
  - a. Admin (who can add books and user's data)
  - b. And user (who can login using admin assigned username and password, and can view books added by admin, and can apply for the issue)

#### **Hospital Management System:**

1. Draw Class Diagram of the above mentioned system
2. Draw Sequence Diagram of the above mentioned system
3. Draw Use Case Diagram of the above mentioned system
4. Write Detailed Use Case of the above mentioned system

5. Program the above mentioned system in Java in two parts as
  - a. Admin (who can add patients, staff, and hospital related data) and
  - b. And user as staff (who can login using admin assigned username and password, and can view patient's data added by admin, and can issue Medical Transcriptions)

## **Software Engineering Lab Manual**

# Lab 11

## Project Testing

## CLO 3

Quality assurance in software involves many different approaches to testing. It's nearly impossible to test everything, but you can certainly get close by narrowing in on the different types of test cases that do and ask specific things. To discover which type to use for which purpose, you need to consider all the different types of testing and filter the test cases best suited for helping you to test that uses for its base achieve the highest quality product.

Some of these areas can overlap with others, but in general, each type of software testing and each category of test case has a specific purpose. In this post we're going to look at some of the most common types of test cases in the world of software testing.

### Different types of test cases:

#### Functionality Test Cases

Functionality test cases are used to discover if an application's interface works with the rest of the system and its users. The tests identify the success or failure of functions that the software is expected to perform.

The cases are a type of black-box testing that uses for its base, the specifications or user stories of the software under test. This allows the tests to be performed without needing access to the workings or internal structures of the software being tested. The QA team are usually the writers of functionality test cases because the task falls within normal QA processes. They can be written and run as soon as development makes a first function available for testing. To help steer development, they can be written in advance of the code, if all the tester has access to are the requirements.

As specified above, they can be written and run as soon as it is viable to do so and they should be repeated whenever updates are added, right through to when customers become a possibility.

*Example:* Confirming a user can successfully upload a profile photo.

#### User Interface Test Cases

User interface test cases are used to verify that specific pieces of the Graphical User Interface (GUI) look and work as expected. These types of test cases can be used to identify cosmetic inconsistencies, grammar and spelling errors, links, and any other elements the user interacts with or sees.

These cases are usually written by the testing team but the design team may also be involved as they are most familiar with the interface. User interface test cases are the types of test cases in software testing that usually drive cross-browser testing. Browsers tend to render things differently, and user interface test cases help ensure your application behaves consistently across multiple browsers.

These test cases will be run once the development phase is complete and the UI is hooked up to the database.

*Example:* What happens when the website is viewed on a small screen such as a mobile phone? Does the UI break?

## **Performance Test Cases**

Performance test cases validate response times and overall effectiveness of an application. That is, after executing an action, how long does it take for the system to respond? Performance test cases should have a very clear set of success criteria.

The testing team typically writes these test cases and they are often automated. A large application can have hundreds or thousands of performance tests. Automating these tests and running them frequently helps expose scenarios where the application is not performing at the expected level.

Performance test cases help with understanding how the application will perform in the real world. These cases can be written once the testing team has received performance requirements from the product team. However, many performance issues can be identified manually without having specified requirements.

*Example:* How long does it take for the system to authenticate a user, and load the next page? When multiple people login at the same time, does the application remain stable?

## **Integration Test Cases**

Integration test cases are meant to determine how different modules interact with each other. The main purpose with integration test cases are to ensure interfaces between the different modules are working properly.

The testing team identifies which areas should undergo integration testing, while the development team will have input on how those test cases should be written. Either of these two teams may work to write the cases.

They verify that modules that are already working individually, are also able to work together.

*Example:* Checking the link between the home page and the “favorites” section. When you add an item as a “favorite”, from the homepage, does it appear in the “favorites” section?

## **Usability Test Cases**

Usability test cases can often be referred to as “tasks” or “scenarios”. Rather than providing detailed step-by-step instructions to execute the test, the tester is presented with a high level scenario or task to complete.

Usability test cases help identify how a user naturally approaches and uses the application. They help guide the tester through various situations and flows. No prior knowledge of the application is necessary.

These test cases are typically prepared by the design team alongside the testing team. Usability testing should be done prior to user acceptance testing.

*Example:* Can the user successfully add more than one item to their shopping cart? How is that experience?

## **Database Test Cases**

Test cases for database testing examine what’s happening behind the scenes. The user interface is clean, and everything appears to be working... but where is all that data going?

In order to write these test cases, you need to have a strong understanding of the entire application, the database tables, and the stored procedures. The testing team will often use SQL queries to develop database test cases.

Database tests are used to verify the developer has written the code in a way that stores and handles data in a consistent, safe manner.

*Example:* Let's consider the creation of a user profile. When the user submits their profile, the following should be tested in regards to the database.

Did the application store the inputted data in the database?

Was any data lost in the process?

Partially performed data should not have been saved.

Unauthorized users should not be able to view or access the user's information.

### **Security Test Cases**

Security test cases help ensure the application restricts actions and permissions wherever necessary. These test cases are written to protect data when and where it needs to be safeguarded.

Security test cases are used to drive penetration testing and other types of security-based tests.

Authentication and encryption are often the main focus in security test cases. The security team (if one exists) is usually responsible for writing and conducting these tests.

*Example:* If a user reaches X number of failed login attempts, does the account become locked? Is a user able to upload data without being logged in?

### **User Acceptance Test Cases**

User acceptance test cases, or "UAT" test cases, help the team test the user acceptance testing environment. These test cases should be broad, covering all areas of the application.

The purpose of these test cases isn't to find bugs (hopefully they've already been found and fixed in previous testing), but to verify the application is acceptable to the user. So, when they execute a test, are the results of that test, and the experience of that test acceptable?

Since many other types of testing have already been done by the time UAT starts, the focus is not so much on a granular level, but more so on the bigger picture. User acceptance test cases are used by the end-user or client and prepared by the testing team or product manager. This is perhaps the most important phase of testing as it is the last step before going into production.

*Example:* If testing for instance, a photo management application for a photography studio, the client (the user) should test that they are able to upload and manage their photos in a way that fits their business needs.

### **Finally**

Test cases come in all different shapes and sizes. Depending on the type of test case being written, you may need a more technical background, or one in UX in order to effectively write a good test case.

Each type of software testing requires different types of test cases. By considering the above types of test cases when you design your tests, you'll maximize test coverage and go into the release with more confidence.

# Software Engineering Lab Manual

## Lab 12

### Project Testing Form

<b>Test Case ID</b>	BU_001	<b>Test Case Description</b>	Test the Login Functionality in Banking	
<b>Created By</b>	Mark	<b>Reviewed By</b>	Bill	<b>Version</b> 2.1

#### QA Tester's Log

Review comments from Bill incorporate in version 2.1

<b>Tester's Name</b>	Mark	<b>Date Tested</b>	1-Jan-2017	<b>Test Case (Pass/Fail/Not Executed)</b>	Pass
----------------------	------	--------------------	------------	---	------

S #	Prerequisites:
1	Access to Chrome Browser
2	
3	
4	

S #	Test Data
1	Userid = mg12345
2	Pass = df12@434c
3	
4	

#### Test Scenario

Verify on entering valid userid and password, the customer can login

Step #	Step Details	Expected Results	Actual Results	Pass / Fail / Not executed / Suspended
1	Navigate to http://demo.guru99.com	Site should open	As Expected	Pass
2	Enter Userid & Password	Credential can be entered	As Expected	Pass
3	Click Submit	Customer is logged in	As Expected	Pass
4				

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## **Software Engineering Lab Manual**

### **Lab 13**

#### **Chapter 1: Introduction**

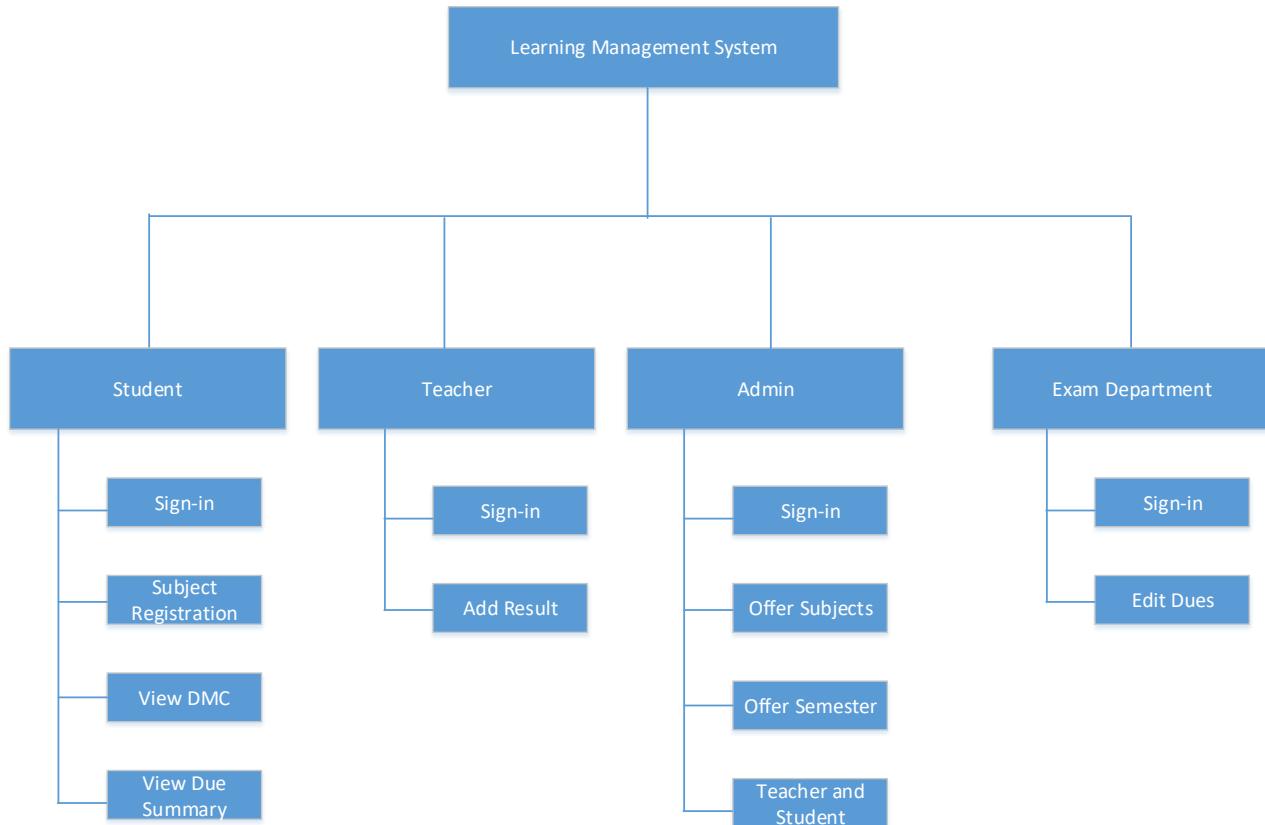
##### **Project Description:**

We will be designing a simple Learning Management System. The system will allow students, teacher, admin and exam dept. to sign-in to their accounts. Students can register in more than one subjects in one semester while admin will offer the semester and subjects in that semester. Students can view their DMC while Teacher can add results. Students can view their dues summary while exam branch can edit, generate the dues. Administrator can update, change the account information of both teachers and students.

##### **Scope:**

##### **Vision:**

##### **Work Break Down Structure:**



### Timeline/ Gantt Chart:

Steps	First Week (1 May 2021 to 8 May 2021)	Second Week (9 May 2021 to 15 May 2021)	Third Week (16 May 2021 to 22 May 2021)	Fourth Week (23 May 2021 to 29 May 2021)
Scope, Vision of the Project				
Requirements of the project				
Story Boards of the Project				
Use Cases				
UML Diagrams of the Project				
Test Cases				
Building of the Prototype				

## Chapter 2: Requirements

1. Functional requirements:
2. Business requirements:
3. Business rules:
4. User requirements:
5. Non-functional requirements:
6. External interfaces:
7. Physical product Requirements:

8. Development constraints

9. Wireframes:

10. High Level and Low Level Story Boards:

### Chapter 3: Design

1. Class Diagram:

2. Use Case Diagram (with detailed use cases):

3. Object Diagram:

4. Package Diagram:

5. Sequence Diagrams:

6. Collaboration Diagrams:

7. Deployment Diagram:

8. Component Diagram:

9. Activity Diagrams:

10. State chart Diagrams:

## Chapter 4: Testing

Test Cases:

## Chapter 5: User Interface

Screenshots of the software: