1. Coreman – Introduction to Algorithms

PPL

(Principal of Programming language)

(RCS – 503)

1. W. Pratt
2. Sebesta

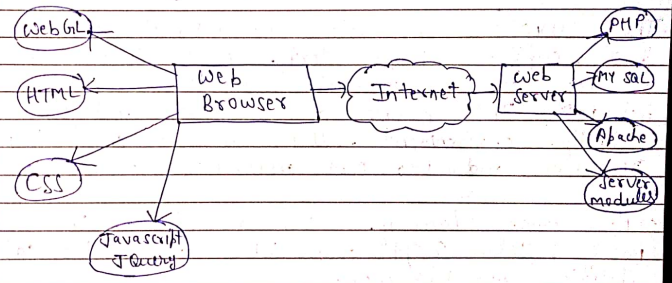
Bit field

a(0)9 to save memory

Date.....

*Web - Tech

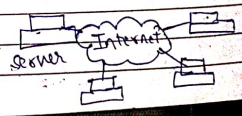
Web Technology refers to the means by which computers communicate with each other using markup languages and multimedia packages. It gives us a way to interact with hosted information. like websites. Web technology involves the use of hyper-text markup language (HTML) and cascading style sheets. (CSS).



* Internet

The internet is a global system of networked computers together with their users and data. Internet refers to:

1. logically linked together by a globally unique address space based on the internet protocol (IP) or it's subsequent extensions.



Spiral

Date

2. is able to support communication using the transmission control protocol / Internet Protocol (TCIP).

3. Provides, uses or makes accessible either publicly or privately, High level services layered on the communication and related infrastructure.

* WWW (World Wide Web)

- The WWW is a system of internet servers that supports hyper-text. WWW is used to accesses several internet protocols on a single interface. This creates a convenient and user friendly environment. This includes email, FTP, TEL Net and Use Net newsres.

→ Programming languages such as Java, Visual Basic, Java Script and XML extend the capabilities of the web.

* Protocols governing Web

- A protocol is a standard that controls or enables the connection, communication and data transfer b/w two computing devices. Protocol is the most fundamental concepts of network communication. A protocol is a formal set of rules that must be followed in order to communicate.

Spiral

Date

(i). Email (simple mail transport protocol or SMTP)

Electronic mail or E-mail allows computer users locally and world-wide to exchange messages. Each user of email has a mailbox address to which messages are sent. For this purpose SMTP is used among. It distributes electronic messages, files to one or more electronic mail-boxes.

(ii) TEL Net (Telnet Protocol)

TEL Net is a program that allows you to log into computers on the internet and use online databases, library catalogues, chat services and more. This can consist of words (logics laws.gov) or (140.147.254.3) Numbers

(iii) File Transfer Protocol (FTP)

This is both a program and the methods use to transfer the file from thousands of host computers on the internet to their personal computer account. Transfers text, or binary files b/w FTP servers and client.

(iv) USE Net (Network Newses Transfer Protocol) (NNTP).

→ USE Net is a global electronic bulletin board system in which millions of computers users.

Spiral

exchange info. on wide range of topics.

(v) HTTP (Hyper Text Transfer Protocol)

Transmits hyper text over networks. This is a protocol of the web.

(vi) SLIP (Serial line Internet Protocol)

This protocol places data packets into data frames in preparation for transport across network hardware media. It is used for sending data across serial lines without any error.

(vii) CSLIP (compressed SLIP)

It is essentially data compression of the SLIP protocol. It is uses WAN, Jacobson compression to drastically reduce the overhead of packets.

(viii) PPP (Point to point Protocol)

It is a form of serial lines data encapsulation that is improvement over SLIP which provide serial bidirectional communication.

(ix) ARP (Address Resolution Protocol)

Enables the packaging of IP, data into ethernet packages. It is the system and messaging

Spiral

protocol that is used to find the ethernet (hardware, address, from a specific IP no.).

(x) IP (Internet Protocol)

Except for ARP and RARP all protocols data packets will be packaged into an IP data packet. IP provides the mechanism to used software to address and manage data packets being sent to computers.

(xi) RARP (Reverse Address Resolution Protocol)

Is used to allow a computer without a local permanent data storage media to determine its IP address from its ethernet address.

(xii) TCP (Transmission Control Protocol)

A reliable connection oriented protocol used to control the management of application level services blw computers. It is used for transport by some applications.

(xiii) UDP (User Datagram Protocol)

An unreliable connection less protocol used to control the management of application level services blw computers. It is used for transport by some applications which must pro

Spiral

their own reliability.

(xiv) ICMP (Internet control message protocol)

Provides management and error reporting to help manage the process of sending data b/w computers. This protocol is used to post connection status back to computers that are trying to connect other computers. For exp It may report that a destination host is not reachable.

(xv) BOOT STRAP PROTOCOL

It is used for assign an IP address to diskless computers and tell it what servers and files to load which will provided with an OS.

(xvi) DHCP (Dynamic Host configuration Protocol)

It is a method of assigning and controlling the IP addresses of computers on a given network. It is a server based service that automatically assigns IP no.s when a computer boots

(xvii) RARP (Reverse Address Resolution Protocol)

It is used to allow a computer without a local permanent data storage media to determine its IP address from its ethernet address.

Spiral

* Cyber laws

In response to the absolutely complex and newly emerging legal issues relating to cyber space, cyber law or the law of Internet came into being. The growth of cyber space has resulted in the development of a new and highly specialized branch of law called cyber law.

In essence cyber law is an attempt to apply law designed for the physical world to human activity on the Internet.

(i) Intellectual property (IP)

It is a legal field that prefers to creation of mind such as musical, literary and artistic works, inventions and symbols, names, images, designes used in commerce. IP rights give creators exclusive rights to their creations, thereby providing an incetive for the author or inventor to develop and share the info. to other than keep it secret.

(ii) Privacy

Privacy is the ability of an individual or group to seclude themselves or information about themselves and thereby reveal themselves selectively.

(iii) Freedom of Expression

It is the right not confined to verbal speech but is understood to protect any act of seeking, receiving and imparting information or ideas regardless of the medium used.

Spiral

(iv) Jurisdiction

Date.....

It is the practical authority granted to the formally constituted legal body or to the political leader or deals with and make pronouncements on legal matters and by implication or administer justice within are defined area of responsibility.

* The need for cyber laws in India.

The beginning of Internet were extremely small and the growth of subscribers painfully small. However as internet has grown in our country the need has been fed to enact the relevant cyber laws which are necessary to regulate internet in India.

1. Firstly, the arrival of Internet signalled the beginning of the rise of new and complex legal issues.
2. Secondly, the existing laws of India even with the most benelovent and liberal interpretation could not interpreted in the light of the emerging cyber space, to include all aspects relating to different activities in cyber space.
3. Thirdly, none of the existing laws gave any legal validity or sanction to the activities in cyber space.
4. Internet requires an enabling and supportive legal infrastructure in tune with the times.

Spiral

Date.....

* Conventional Crimes Vs Cyber Crimes

The crime is a social and economic phenomenon and is as old as the human society. Crime is the legal concept and has the sanction of the laws. Crime or an offence is a legal wrong that can be followed by criminal proceedings which may result into punishments.

While cyber crime is the latest and perhaps the most complicated problem in the cyber world. Any criminal activity that uses a computer either as a instrumentality, target or a means for perpetrating further crimes come within the ambit of cyber crime.

* Types of cyber crimes

1. Unauthorized access to computer system or networks which in other words also known as Hacking.
2. Theft of information contain in electronic form. This includes information stored in computer hard disk, removable storage media.
3. E-mail bombing - This kind of activity refers to the sending of large no. of mails to the victim, which may be individual or a company or even e-mail servers. Thereby ultimately resulting into crashing.

Spiral

4. Data Diddling – This kind of an attack involves altering an raw data just before a computer process it and changing it back after the processing is completed.

5. Slangi attacks – This kind of crime is normally prevelant in the financial institutions or for the purpose of commiting financial crimes. An imp. feature of this type of offince is that the alteration is so small that it could normally go unnoticed.

6. Denial of service attack – The computer of the victim is flooded with more request than it can handle which cause it to crash.

7. Virus or worm attack

Virus are programs that attack themselves to a computer or a file and then circulate themselves to other files and to other computers on a network. They usually affect the data on the computer either by altering or deleting it.

8. Logic worms

These are event dependent programs. This implies that these programs are created to do something only when a certain event (known as a trigger event).

Spiral

9. Trojan Attacks

This terms has its origin in the word Trojan horse. In software field this means an unauthorised program, which passively gains control over another's system by representing itself as an authorised program.

10. Internet Time thefts

Normally in these kinds of thefts the Internet surfing hours of the victim are used up by another person. This is done by gaining access to the login Id and the password.

11. Web Jacking

This term is derived from the term High Jacking. In these kinds of offences the hacker gains access and control over the web of another. He may even modify or exchange the information on the site.

* Planning and Process development

Planning is the only way to ensure that the web project that is to be designed will its objectives in the given time and budget. There are various types of planning that occurs at different phase of development of a web project.

Spiral

1. Early planning -

Date

Early planning is done to present a strategic plan to the client. It is done before actually starting the web project. The steps to accomplish this are know your audience through (a) interviewing (b) Re focus group market research
(c) Gathering end user requirement
(d) defining development stages and strategies
(e) writing the creative brief

2. Creative and Content planning

The different kinds of creative planning that can occur in a web project are-
(i) Creating the concept
(ii) Communicating the concept
(iii) Usability study
(iv) Site architecture schematics

3. Technical Planning

Technical planning is the phase in which the technical team invertigates the technical requirements of the project. Technical involves the following point.

a) Identifying the technical infrastructure.
b) Defining technical development requirements
c) Feasibility and software testing.
d) Planning for maintenance and growth
e) Technical specifications.

Spiral

Date

4. Production Planning

The production Planning comprises of two types of planning i.e. Pre-production planning and Post-production Planning. It takes into consideration the following points.

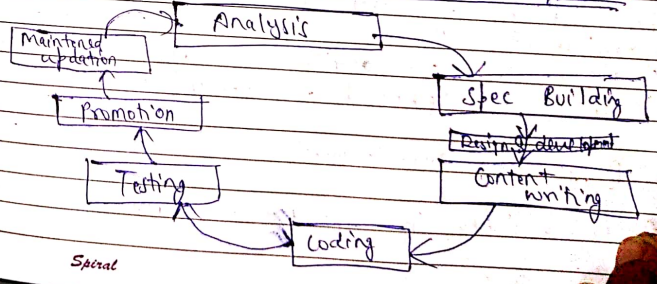
a) Understanding end user requirements
These requirements are browser, platform, connectivity, plugin, software setting

b) Production guide
It keeps track of how the sidewall built and includes all the imp facts about the site. EX- directory structure, file names, coding and scripting notes etc.

c) Production infrastructure

Good Production infrastructure includes tracking content and development site.

* Life cycle of a web project development



Spiral

* Identify the project objectives

Date

The objectives are the result which we get after meeting the requirement of user. They are specific and attainable. Objectives must be SMART meaning that they are

S - Specific
M - Measurable
A - Attainable
R - Realistic
T - Time limited

1. Analysis

As the website going to be a part of the system, It needs a complete analysis as, how the website or the web page application is going to help the present system and how the site is going to help the business.

2. Specification Building

Primarily, preliminary specifications are drawn up by covering up each and every element of the requirement. Large projects will require further levels of the consultation to access additional business and technical requirements.

3. Design and Development

After building the specification, work on the

Spiral

Date

website is scheduled upon the receipt of the signalled proposal, our deposit and any written content materials and graphics you wish to include. Here normally the layouts and navigation will be designed as a prototype.

4. Content writing

This phase is necessary mainly for the websites. There are professional content developers who can write industry specific and relevant content for the site.

5. Coding

Now its programmers turn to add its code without disturbing the design unlike traditional design the developer must know the interface and the code should not disturb the look and feel of the site or application.

6. Testing

Unlike software web based applications need intensive testing, as the applications will always function as a multiuser system with bandwidth limitations.

7. Promotion

This phase is applicable only for websites. Promotion needs preparation of meta tags.

Spiral

constant analysis and submitting the URL to the search engines and directories.

8- Maintenance and updating

Websites will need quite frequent updations to keep them very fresh. In that case we need to do analysis again and all the other life cycle steps will repeat.

* Comparision b/w traditional project and web project

Traditional and web projects have no. of differences) These are as follows:-

Point of difference	Web project	Traditional project
1. Project managers	Project managers and client managers are often same	Project managers and client managers are often different.
2. Pricing	No specific pricing model exists for web projects	No. of pricing models like Cocomo etc. are available for these projects.
3. Standards	There are no Standards available for web projects.	There are standards available like Iso, Cmm.
4. Team roles	Team roles are less specified	Team roles are more specified.
5. Planning cost	Clients are often unwilling to bear the cost of web. development, specially of planning phase.	Here are the cost is paid by client for the whole project including the planning phase.
6. Technologies Used	New, often beta, technologies are used for testing, often without technical support	It is not applicable in developing traditional projects.
7. Responsibilities	Project managers responsibilities are very broad.	Here are the project managers responsibilities are limited.

* What are the various types of tests done on web projects

There are no. of types of tests:-

1. Accessibility testing

It measures how well the sites interface accomodates user's with disabilities.

2. Compatibility testing

It measures how well pages display on different clients. For ex- browsers, different browser versions, different O.S., different machines.

3- Integration testing

Date

They are performed when new code is added to an existing code based. For ex - when a new function is added to a set of existing functions.

4. Performance Testing

It generally describes the processes of making the website and its server as efficient as possible, in terms of download speed, machine resource usage, and server request handling.

5. Regression Testing

It can be applied in two ways -

(i) When a code problem has been fixed, a regression test runs test to verify that the defect is in infact fixed. "Imagine finding an error, fixing it and repeating the test that exposed the problem in the first place.

(ii) Regression testing is a counterpart of integration testing - when new codes is added to existing code, regression testing verifies that the existing code continues to work correctly.

6. Testability Testing

Spiral

Date

Whenever a major change has been made to the code or the site like a new code drop being installed on the server - somebody must sign off on the installation or change as functioning correctly on a broad level.

7- Usability testing

It measures the sites interface for ease and intuitiveness of navigation.

8- User Acceptance Testing

It refers to the process b/w website owners and contractors of setting up criteria for the formal acceptance of the website code.

9. User Scenario Testing

User test are observational test. where a user or a set of users are given task to perform using some software or product.

10. Validation Testing

Validation is the term for verifying that the HTML code in a file needs the DTD (Document Type definition) for any particular version of HTML

Spiral

* Web team

Date.....

Web team must be able to perform all business functions from business strategising to setting up secure network for financial transactions. Like any other project building a website also requires a set of skilled workers this set of workers is also known as a web team. A web team begins with web masters, people who did everything from coding the page to maintaining the web server.

* Types of Team members

Core members

1. Project manager / Producers

~~Like any other project building a website also requires~~

A project manager is responsible for scoping the work, developing, scheduling, allocating, budgeting and managing the whole team.

2. Technical lead

A Technical lead is responsible for the technical aspects of the website. They ensures to manage the programmers, database and other system

Spiral

Date.....

integrators.

3- Web production specialist

He is responsible for integrating the site using JavaScript or HTML. He is also responsible for getting project ready for deployment or delivery to the client.

4. Creative lead

- They determines the creative concepts of the site.
- They acts like an art director for the site.

5- Designer

The designer is responsible for the look and feel of the site. Web designers should have a good understanding of the design principles.

6. Production Artist

A production artist transforms the artwork that the designer creates into web ready art.

7. Quality Assurance Lead

A quality assurance lead makes sure that the product delivered meets the criteria specified in the scope document and functional specification.

Spiral

* Extended Team members

Date

1. Accounts Manager

The accounts manager in the company is responsible for selling in different products and providing the necessary consumer insight and information.

2. Programmer

A programmer develops applications for the web projects. These application can be simple or may be complex depending on site requirements.

3. Network Engineer

A network engineer is responsible for setting up and configuring a web server. Sometimes he is also a database administrator.

4. Information Architect

He is responsible for displaying information visually to users understand how to interact with the website.

5. Tester

A tester tests the web projects based on the test plan that quality assurance (QA)

Spiral

Date

lead rights.

6- Special members

(i) Security Expert -

A security expert provides security strategy for websites

(ii) Audio Engineer -

An audio engineer designs sounds for websites. the sounds could range from music to sound that happen when the user does something.

(iii) Video Engineer

Creates video images and delivers them in digital format to the creative lead.

(iv) 3d modeller

Creates artwork that is in 3d.

(v) Media buyer

He is usually a part of the client advertising agency. He is also responsible for designing the advertisement based on the sizes of the media buy.

Spiral

(vi) Strategic Planners

They are the persons who gives the consumer insight to the team to help the creative team understand the mind of target audience.

* What are the various skills must necessarily be covered by making a web team to make a webproject successfully

(i) Project management skills

This is the ability to manage the man, power, resources, budget and other things so that the desired site can be built in the given time and budget.

(ii) Information design / Architecture skills

This is the ability to design an unusual and useful interface that includes how the user will interact with the interface and will navigate the site.

(iii) Graphic design skills

Ability to transform the information design into visual design.

Spiral

(iv) Content development skills

Ability to develop both written and interactive content for websites.

(v) Programming skills

Ability to create web pages using HTML, Java script and other client server scripting languages.

(vi) Technical / network infrastructure skills

The ability to understand the requirements for serving a website on the internet and to recommend the best strategy based on the clients or stock holders needs.

* Why do we need proper communication channels in webteam?

OR

* What are the communication failures of a web team?

(i) Interdisciplinary people

In a team different members specialize in different fields like design, programming and sales. These members can easily communicate with the members of their own discipline. But it becomes difficult for them to communicate with different discipline members.

Spiral

(ii) Different terminology

Date

There is often lack of mutual understanding of the terminology used by different members. For ex- the same word means different to different people and this may cause confusion.

(iii) Personalities

Sometimes two people have a more difficult time communicating with each other than with other people due to a big different in personalities.

(iv) Hidden agenda

If people on a team have hidden agendas, it will be difficult to communicate as they will be led by their own motivation.

(v) Ineffective meetings

Meetings may also lead to waste of time if are not well-planned and taken.

(vi) Proximity

Members of a team might be scattered in different location which makes communication even more difficult. and is not clear.

(vii) Assumption

Spiral

Date

often people make assumption that the other party already knows certain points which makes communication unclear.

(viii) Poor infrastructure and support

Computer troubles and email incompatibility, file format and other system failures can contribute to the communication breakdown

(ix) Being an expert

Some members that are expert at something. Do not listen to anyone else. as they knows what to do.

(x) Fear

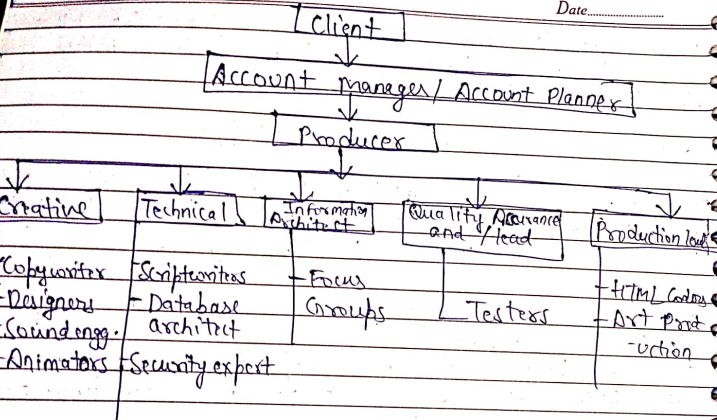
It is some of the biggest barrier to good communication. People go in panic mode and are unable to make others understand their point of view.

(xi) Lack of good communication structure

A good communication structure is made up of communication system that fits the way people work, that have the required information

* What should be chain of communication?

Spiral



Chain of communication of a web Project

* Uses of Internet

1. Communication –

→ Using the internet is that we can communicate with the people living far away from us with extreme ease.

2 – Research

Since the internet came into life everything is available just a click away.

3. Education

There are lots and lots of website which are related to different topics. You can visit them and can gain endless amount of knowledge that you wished to have.

4. Financial transaction

The term is used when there is a exchange of money. Your work has become a lot easier.

5. Real time updates

It means that different parts of the world we came to know about it very easily and without any difficulty.

* Major Internet Services and tools

1. Email

Exchanging electronic letters and messages in form of small files. Ex – yahoo, gmail, hotmail

2. Chatting and instant messaging

It is used for live discussions on the internet Ex – whatsapp.

3. Newsgroups

Date

These are the discussion groups on electronic bulletins board.

4. TELNet

Login into one's computer system and doing work on another.

5. File Transfer Protocol (FTP)

It is a network protocol used to transfer files from one host to another.

6. WWW

It is a system of interlinked hypertext documents accessed via the internet. For retrieving, formatting and displaying information

7. URL (Uniform Resource Locator)

It is a global address of documents and other resources on the WWW. Another name of URL is web address. Ex- http://www.cet.ac.in

* Connecting to Internet

1. Internet Service

It all depends on where you live and how much need you speed.

Eg: Cable, satellite, 3G and 4G.

Spiral

Date

2. Modem

The hardware of connecting to the internet is Modem. It contain Modulation and demodulation.

For eg- DSL Modem, Cable Modem

3. Web Browser

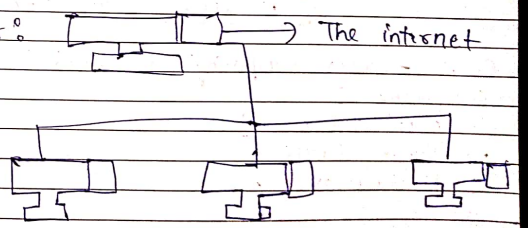
It is a tool to access the web. It's main job is display web pages.

Eg: Mozilla Firefox, Google chrome.

* How does Internet work ?

When we connect our computer to the internet you are connecting to a special type of server which provided and operated by your internet service provider.

The picture shows that internet with several home computers connected to a server

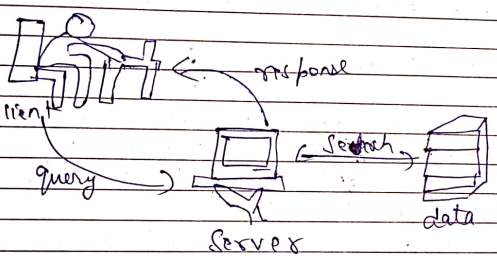


Spiral

Date.....

* Introduction to client - server computing!

Acc. to MIS terminology - Client / Server computing is a new technology that yields solutions to many data management problems faced by modern organizations. The term client / server is used to describe a computing model for the development of computerized system. This model is based on distribution of function blw two types of independent and autonomous processes: Server and client



Client Server Interaction

Client - server computing is divided into three components:
- Client Process
- Server Process
- Middleware

- A client is any process that requests specific services from the server process. The main operations of the client system are to

Date.....

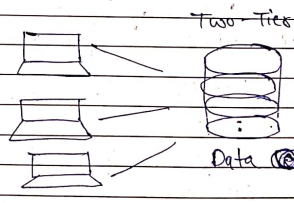
generates database request and transmits to Server.

- Server - A server is a process that provides requested services for the client. Accept and processes database requests from client. Performs query / update processing and transmits responses to client.

- Middleware - Middleware is software that runs blw client and server processes. It makes it possible for them to communicate to each other. Middleware is written in such a way that the user never notices its presence. It delivers secure and transparent services to users.

* 2 - TIER Architecture

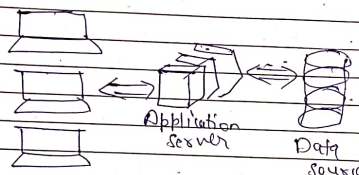
- It is client - server architecture
- Direct communication
- Run faster (tightly coupled)



Date.....

* 3- TIER Architecture

- Web-based application
- Three layers
1. Client layer
2. Business layer
3. Data layer



Client application

Unit-2

* Java

Java is a simple, object oriented, high performance language. It is distributed, portable, multi-threaded and interpreted - mainly intended for the development of object oriented, network based software for internet applications.

Internet implies heterogeneous system, different network Fratures, different windows libraries and different O.S. Java guarantees identical program behaviour on different platforms.

* What is Java? (Features / characteristics of Java)

- A general-purpose object-oriented language
- Write Once Run Anywhere (WORA)
- Designed for easy web/Internet applications.
- Widespread acceptance.

Spiral

Date.....

* Why Java is important?

- Two reasons:

- Trouble with C/C++ language is that they are not portable and are not platform independent languages.
- Emergence of world wide web which demanded portable programs.
- Portability and security necessitated the invention of Java.

* Characteristics of JAVA

- simple
- Object-oriented
- distributed
- interpreted
- robust
- architecture-netural
- portable
- performance
- multithreaded
- dynamic
- secure

* History

- James Gosling - Sun Microsystems
- Cofounder - Vinod Khosla
- Oak - Java, May 20, 1995, Sun World
- JDK Evolutions
- JDK 1.0 (Jan 23, 1996)
- JDK 1.1 (Feb 19, 1997)
- J2SE 1.2 (Dec 8, 1998)

Spiral

Date.....

- J2SE 1.3 (May 8, 2000)
- J2SE 1.4 (Feb 6, 2002)
- J2SE 5.0 (Sep 30, 2004)
- JAVA SE 6 (Dec 11, 2006)
- JAVA SE 7 (July 28, 2011)

• JAVA Editions:

- J2SE (Java 2 Standard EDition) - to develop client-side standalone applications or applets.
- J2ME (Java 2 Micro Edition) - to develop applications for mobile devices such as cell phones.
- J2EE (Java 2 Enterprise Edition) - to develop server-side applications such as Java servlets and Java Server Pages.

* Where is JAVA used?

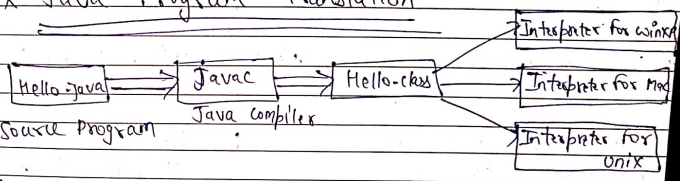
Acc. to the sun, 3 billion devices run java. There are many devices where Java is currently used.

- Desktop Applications - Acrobat reader, Media player, Antiviruses etc.
- Web Applications - ixctc.co.in, javapoint.com etc.
- Enterprise Application - Banking Application, Business Application
- Mobile
- Embedded system
- Games
- Robotics

Spiral

Date.....

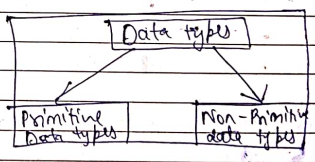
* Java Program Translation



* Data type

- Data type specifies the size and type of values that can be stored in an identifier. The Java language is rich in its data types. Different data types allow you to select the type appropriate to the needs of the application.

- Data types in Java are classified into two types
  - Primitive - which include Integer, character, Boolean and Floating point.
  - Non-primitive - which include - classes, Interfaces and Arrays.



* Primitive Data types

Spiral

Date.....

A primitive data type can be of eight types:
char, boolean, byte, short, int, long, float, double

Once a primitive data type has been declared its type can never change, although in most cases its value can change. These eight primitive type can be put into four groups.

Integers

This group includes byte, short, int, long

Byte: It is 1 byte (8 bits) integer data type. Value range from -128 to 127. Default value zero. example: byte b=10;

Short: It is 2 byte (16 bits) integer data type. Value range from -32768 to 32767. Default value zero. example: short s=11;

int: It is 4 byte (32 bits) integer data type. Value range from -2147483648 to 2147483647. Default value zero. ex: int i=10;

long: It is 8 bytes (64 bits) integer data type. Value range from -9,223,372,036,854,775,808 to 9,223,372,036,854,775,807. Default value zero. ex: long l=100012;

Spiral

Date.....

Floating point Numbers

This group includes float, double

Float: It is 4 bytes (32 bits) float data type. Default value 0.0f. example: float ff=10.3f;

double: It is 8 bytes (64 bits) float data type. Default value 0.0d. example: double dd=11.123;

Characters: This group represents char, which represents symbols in a character set like letters and nos.

Char: It is 2 bytes (16 bits) unsigned unicode character. Range 0 to 65,535. example: char c='a';

Boolean

This group represents boolean, which is a special type for representing true/false values. They are defined constant of the language. boolean b=true;

2. Non-Primitive (Reference) Data type

A reference data type is used to refer to an object. A reference variable is declare to be of specific and that type can never be change.

Identifiers in Java

Spiral

Date

All Java components require names. Name used for classes, methods, interfaces and variables are called identifier. Identifier must follow some rules. Here are the rules!

- All identifiers must start with either a letter (a to z or A to Z) or currency character ($) or an underscore.
- After the first character, an identifier can have any combination of characters.
- A Java keyword cannot be used as an identifier.
- Identifiers in Java are case sensitive, foo and Foo are two different identifiers.

* Variable in Java

- When we want to store any info. we store it in an address of the computer. Instead of remembers the complex address where we have stored our info. We name that address. The naming of an address is known as variable. Variable is the name of memory location.

- Java Programming language defines mainly three kind of variables.
  - Instance variables
  - Static variables
  - Local variables.

Spiral

Date

* Instance Variables in Java

Instance variables are variables that are declare inside a class but outside any method, constructor or block. Instance variable are also variable of object commonly known as field or property. They are referred as object variable. Each object has its c copy of each variable and thus, it doesn't effect the instance variable if one object changes the value of the variable.

```
class Student
{
    String name;
    int age;
}
```

Here name and age are instance variable of student class.

* Static variables in Java

Static are class variable declared with static keyword. Static variables are initialized only once. Static variables are also used in declaring constant along with final keyword.

```
class Student
{
    String name;
    int age;
    static int institudeCode = 1101;
}
```

Spiral

Here institute Code is a static variable. Each object of student class will share institute Code property.

Additional points on static variable:

- Static variable are also known as class variable
- Static means to remains constant
- In Java, it means that it will be constant for all the instances created for that class.
- Static variable need not be called from object.
- It is called by classname static variable name

Note: A static variable can never be defined inside a method i.e it can never be a local variable.

Example:

Suppose you make 2 objects of class student and you change the value of static variable from one object. Now when you print it from other object, it will display the changed value. This is because it was declared static i.e. it is constant for every object created.

```
package studytonight;

Class Student {
    int a;
    static int id = 35;
    void change() {
        System.out.println(id);
    }
}
public class StudyTonight {
    public static void main(String[] args){

        Student o1 = new Student();
        Student o2 = new Student();
        o1.change();
        Student.id = 1;
        o2.change();
    }
}
```

OUTPUT

35
1

* Local variables in Java

Local variables are declared in method, constructor or block. Local variables are initialized when method constructor or block start and will be destroyed once its end Local variable reside in stack. Access modifiers are not used for local variable.

```
Float getDiscount(int price)
{ Float discount;
    discount = price * (20/100);
    return discount;
}
```

Here discount is a local variable.

* Concepts of Array in Java

An array is a collection of similar data types. Array is a container object that hold values of homogeneous type. It is also known as Static data structure because size of an array must be specified at the time of its declaration.

An array can be either primitive or reference type. It gets memory in heap area, index of array starts from zero to size - 1.

* Features of Array

- It is always indexed. index begins from 0
- It is a collection of similar data types.
- It occupies a contiguous memory location

Array Declaration

Syntax:

```
datatype[] identifier;
    or
datatype identifier[];
```

Both are valid syntax for array declaration. But the former is more readable.

Ex: int[] arr;
char[] arr;
short[] arr;

Spiral

long[] arr;
int[][] arr; // two dimensional array

* Initialization of Array

new operator is used to initialize an array.

EX:

```
int[] arr = new int[10]; // this creates an empty array named arr of integer type whose
    or
int[] arr = {10, 20, 30, 40, 50}; // this creates an array named arr whose elements are given
```

* Accessing array element

As metion earlier array index starts from 0. To access nth element of an array. Syntax

```
arrayname[n-1];
```

Example: To access 4th element of a given array

```
int[] arr = {10, 20, 30, 40};
System.out.println("Element at 4th place" + arr[3]);
```

The above code will print the 4th element of array arr on console.

Note: To find the length of an array, we can use the following syntax:

```
array_name.length
```

There are no braces in front of length. Its not length().

Spiral

* Multi - Dimensional Array

A multi-dimensional array is very much similar to a single dimensional array. It can have multiple rows and multiple columns inlike single dimensional array which can have only one full row or one full column.

Array Declaration

Syntax:

```
datatype[][] identifier;
   or
datatype identifier[][];
```

* Initialization of Array

new operator is used to intialize an array.

Example:

```
int[][] arr = new int[10][10]; // 10 by 10 is the size of array.
   or
int[][] arr = {{1,2,3,4,5},{6,7,8,9,10},
               {11,12,13,14,15}};
// 3 by 5 is the size of the array.
```

* Java operators

Java provides a rich set of operators environment

Spiral

Date.....

- Arithmatic operators
- Relation operators
- Logical operators
- Bitwise operators
- Assignment operators
- Conditional operators
- Misc operators

* Arithmatic operators

Arithmatic operators are used in mathematical expression in the same way that are used in algebra.

Operator	Description
+	adds two operands
-	subtract second operators from first
*	multiply two operand
/	divide numerator by denominator
%o	remainder of division
++	increament operator increases integer value by one
--	Decreament operator decreases integer value by one.

* Relation operators

Operator	Description
==	Check if two operand are equal
!=	Check if two operand are not equal
>	Check if operand on the left is greater than operand on the right.

Spiral

Date.....

<	Check operand on the left is smaller than right operand
>=	check left operand is greater than or equal to right operand.
<=	check if operand on left is smaller than or equal to right operand.

* Logical operators

Java supports following 3 logical operator. suppose a=1 and b=0;

Operator	Description	Example
&&	Logical AND	(a&&b) is false
||	Logical OR	(a||b) is true
!	Logical NOT	(!a) is false

* Bitwise operators

Java defines several bitwise operators that can be applied to the integer types long, int, short, char and byte

operator	Description
&	Bitwise AND
|	Bitwise OR
^	Bitwise exclusive OR
<<	left shift
>>	right shift

Spiral

Date.....

Now lets see truth table, &, |, and ^

a	b	a&b	a|b	a^b
0	0	0	0	0
0	1	0	1	1
1	0	0	1	1
1	1	1	1	0

The bitwise shift operators shifts the bit value. The left operand specifies the value to be shifted and the right operand specifies the no. of positions that the bits in the value are to be shifted. Both operands have the same precedence.

Ex- a = 0001000
b = 2
a<<b = 010000
a>>b = 000010

* Assignment Operators

Operator	Description	Example
=	assigns value from right side operands to left side operand	a=b
+=	adds right operand to the left operand and assign the result to left	a+=b is same as a=a+b
-=	subtracts right operand from the left operand and assign the result to left operand	a-=b is same as a=a-b

Spiral

Date.....

*=	multiply left operand with the right operand and assign the result to left operand.	a*=b is same as a=a*b
/=	divides left operand with the right operand and assign the result to left operand	a/=b is same as a=a/b
%=	calculate modulus using two operands and assign the result to left operand.	a%=b is same a=a%b

* Misc. operator

There are few other operator by java language

* Conditional operator

It is also known as ternary operator and used to evaluate boolean expression,

expr1 ? expr2 : expr3

If expr condition is true ? Then value expr2 : otherwise value expr3

* Instance of operator

The operator is used for object reference variables. The operator checks whether the object is of particular type (class type or interface type).

Spiral

Date.....

* Java - Object and Classes

Java is an object-oriented language. As a language that has the object-oriented feature, Java supports the following fundamental concepts -

- Polymorphism
- Inheritance
- Encapsulation
- Abstraction
- Classes
- Objects
- Instance
- Method
- Message passing

* Polymorphism

Polymorphism is the ability of an object to take on many forms. The most common use of polymorphism in OOP occurs when a parent class reference is used to refer to a child class object.

- Real life example of polymorphism: A person at the same time can have different characteristic - like a man at the same time is a Father, a husband, an employee. So the same person posses different behaviours in different situations. This is called polymorphism.

- Polymorphism is considered as one of the important feature of object oriented Programming. Polymorphism allows us to perform a single action in different ways. In other words, polymorphism allows you to define one interface

Spiral

Date.....

and have multiple implementations. The word "poly" means many and "morphs" means forms. So it means many forms.

- In Java polymorphism is mainly divided into two types:
  - Compile time polymorphism
  - Runtime polymorphism

* Inheritance

Inheritance can be defined as the process where one class acquires the properties (methods and fields) of another. With the use of inheritance the info - is made manageable in a hierarchical order.

- The class which inherits the properties of other is known as subclass (derived class, child class) and the class whose properties are inherited is known as superclass (base class, parent class).

* Encapsulation

Encapsulation in Java is a mechanism of wrapping the data and code acting on the data together as a single unit. In encapsulation, the variables of a class will be hidden from other classes and can be accessed only throughout the methods of their current class. Therefore it is also known as data hiding.

Spiral

Date.....

To achieve encapsulation in Java -
- Declare the variables of a class as private
- Provide public setter and getter methods to modify and view the variables values.

Benefits of Encapsulation
- The fields of a class can be made read-only or write-only.
- A class can have total control over what is stored in its fields.

* Abstraction

Abstraction is the quality of dealing with ideas rather than events. For ex, when you consider the case of e-mail, complex details such as what happens as soon as you send an e-mail, the protocol your e-mail server uses are hidden from the user. Therefore to send an email you just need to type the content, mention the address of the receiver and click send.

Likewise in Object-oriented programming, abstraction is a process of hiding the implementation details from the user, only the functionality will be provided to the user. In other words, the user will have the info on what the object does instead of how it does it.

* Classes

Spiral

Date

- A class is a user defined blueprint or prototype from which objects are created. It represents the set of properties or methods that are common to all objects of one type. In general, class declarations can include these components, in order:

- Modifiers: A class can be public or has default access
- Class name: The name should begin with a initial letter.
- Superclass (if any): The name of the class's parent, if any, preceded by the keyword extends. A class can only extend one parent.
- Interfaces: A comma-separated list of interfaces implemented by the class, if any, preceded by the keyword implements. A class can implement more than one interface.
- Body: The class body surrounded by braces { }

* objects

- It is a basic unit of object oriented programming and represents the real life entities. A typical Java program creates many objects, which as you know, interact by invoking methods. An object consist of:

- State: It is represented by attributes of an object. It also reflects the properties of an object. Ex- A dog has states - colour, name, breed.
- Behaviour: It is represented by methods of an object. It also reflects.
- Identity: It gives a unique name to an object and enables one object to interact with other objects.

* Instance

Instance variable in Java is used by objects to store their states. Variables which are defined without the static keyword and are outside any method declaration are object specific and are known as instance variables. They are called so because their values are instance specific and are not shared among instances.

* Method

A Java method is a collection of statements that are grouped together to perform an operation. When you call the system.out.println() method, for ex, the system actually executes several statements in order to display a message on the console.

- Now you will learn how to create your own methods with or without return values, invoke a method with or without parameters and

Spiral

Date

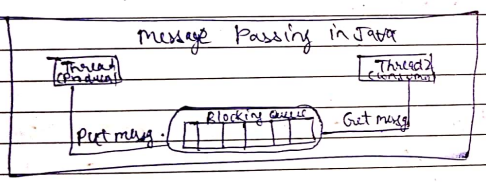
Spiral

Date.....

apply method abstraction in program design.

* Message Passing

Message passing in terms of computers is communication blw processes. It is a form of comm. used in Object-oriented programming as well as parallel programming. Message passing in Java is like sending an object i.e. message from one thread to another thread. It is used when threads do not have shared memory and are unable to share monitors or semaphores or any other shared variables to communicate. Suppose we consider an ex of producer and consumer, if we use what producer will produce the consumer will be able to consume that only. We must use Queue to implement comm. blw friends.



* Exceptions in Java

→ What is an exception?

An exception is an unwanted or unexpected event which occurs during the execution of a program i.e. at run time that disrupts the normal flow of the program's instructions.

Spiral

Date

- Error vs Exception

→ Error: An error indicates serious problems that a reasonable application should not try to catch.

→ Exception: Exception indicates conditions that a reasonable application might try to catch.

→ How programmer handles an exception?

• Customised Exception Handling: Java exception handling is managed via five keywords: try, catch, throw, throws and finally. Briefly, here is how they work. Program statements that you think can raise exceptions are contained within a try block. If an exception occurs within the try block, it is thrown. Your code can catch this exception (using catch block) and handle it in some rational manner.

* Java - Files and I/O

- The java.io package contains nearly every class you might ever need to perform input and output in Java. All these streams represent an input source and o/p destination. The stream in the java.io package supports many data such as primitives, object, localized characters etc.

Spiral

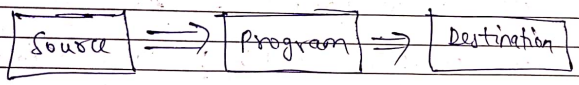
Date.....

• Stream

A Stream can be defined as a sequence of data. There are two kind of streams-

(i) InputStream - The InputStream is used to read data from a source.

(ii) OutputStream - The outputStream is used for writing data to a destination



-Java provides strong but flexible support for I/O related to files and networks but this tutorial covers very basic functionality related to streams and I/O.

* Multithreading in Java

-Multithreading is a Java feature that allows concurrent execution of two or more parts of a program for maximum utilization of CPU. Each part of such program is called a thread. So, threads are light-weight processes within a process.

- Java is a multi-threaded programming language which means we can develop multi-threaded program using Java. A multi-threaded program contains two or more parts that can run

Spiral

Date.....

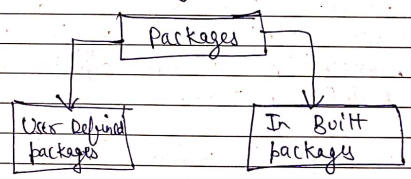
concurrently and optimal use of the available resources specially when your computer has multiple CPU's.

Threads can be created by two mechanisms:
1- Extending the Thread class
2- Implementing the Runnable Interface.

* Package and Interface

Package in Java is a mechanism to encapsulate a group of classes, sub packages and interfaces. In other words, a package in Java refers to a collection of classes, interfaces, abstract classes, and exceptions that will help in a module in Java programming.

Types of packages:



* Differences b/w Packages and Interfaces

A package is a group of classes and interfaces together whereas an interface is a group of abstract methods. Package is created using a keyword package whereas an interface is created using a keyword interface.

Spiral

Date.....

* Applet

An applet is a Java program that can be embedded into a web page. It runs inside the web browser and work at client side. An applet is embedded in a HTML page using the APPLET or OBJECT tag and hosted on a web server.

- Applets are used to make the website more dynamic and entertaining.

- Important points:

- All applets are sub-classes of java.applet.Applet class.
- Applets are not stand-alone programs. Instead, they run within either a web browser or an applet viewer. JDK provides a standard applet viewer tool called applet viewer.
- In general, execution of an applet does not begin at main() method.
- Output of an applet window is not performed by System.out.println(). Rather it is handled with various AWT methods such as drawstrings.

* String handling

Strings which are widely used in Java programming, are a sequence of characters. In Java

Spiral

Date.....

programming language, strings are treated as objects.
The Java platform provides the string class to create and manipulate strings.
The most direct way to create a string is to write -

```
String greeting = "Hello world!";
```

* What is an Event?

- change in the state of an object is known as event i.e. event describes the change in state of source. Events are generated as result of user interaction with the graphical user interface components. For example, clicking on a button, moving the mouse, entering a character through keyword, selecting an item from list, scrolling the page are the activities that cause an event to happen.

- Types of Event

- The events can be broadly classified in two categories -

- Foreground Events - Those events which require the direct interaction of users. They are generated as consequences of a person interacting with the graphical components in Graphical User Interface. For ex, clicking on a button, moving the mouse, entering a character through keyword, selecting an item from list, scrolling the page etc.

Spiral

Date.....

• Background Events – Those events that require the interaction of end user are known as background events. OS interrupts, hardware or software failure, timer expires, an operation completion are the examples of background events.

* Event handling

- Event handling is the mechanism that controls the event and decides what should happen if an event occurs. This mechanism have the code which is known as event handler that is executed when an event occurs. Java uses the delegation Event Model to handle the events. Java provide as with classes for source object.

Java Event classes and listener Interface

Event Classes	Listener Interfaces
ActionEvent	ActionListener
MouseEvent	MouseListener and MouseMotionListener
MouseWheelEvent	MouseWheelListener
KeyEvent	KeyListener
ItemEvent	ItemListener
TextEvent	TextListener
AdjustmentEvent	AdjustmentListener

Spiral

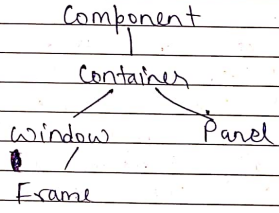
Date.....

* AWT (Abstract Window Toolkit)

- AWT contains large no. of classes and methods that allows you to create and manage graphical user interface (GUI) applications, such as windows, buttons, scroll bars etc. The AWT was designed to provide a common set of tools for GUI design that could coork on a variety of platforms.

The java.awt package provides classes for AWT api such as TextField, Label, TextArea, RadioButton, CheckBox, Choice, List etc.

Java AWT Hierarchy

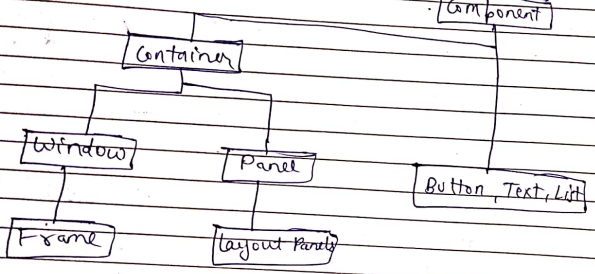


* AWT controls in Java with Examples

The AWT supports the following types of controls
- Labels
- Push buttons
- Check boxes
- Choice lists
- Lists

Spiral

- Scroll bars
- Text Area
- Text field



* Java Layout Managers

The layout managers are used to arrange components in a particular manner. Layout Manager is an interface that is implemented by all the classes of layout managers. The layout manager automatically positions all the components within the container. If we do not use layout manager then also the components are positioned by the default layout manager. It is possible to layout the controls by hand but it becomes very difficult because of the following two reasons.

- It is very tedious to handle a large no. of controls within the container.
- Often the width and height info. of a component is not given when we need to arrange them.

There are following classes that represents the layout managers:

- java.awt.BorderLayout
- java.awt.FlowLayout
- java.awt.GridLayout
- java.awt.CardLayout
- java.awt.GridBagLayout
- javax.swing.BoxLayout
- javax.swing.GroupLayout
- javax.swing.ScrollPaneLayout
- javax.swing.SpringLayout etc.

Unit - 2

Date.....

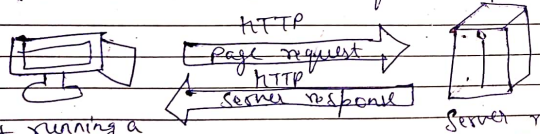
* HTML

- HTML stands for Hypertext Markup language
- HTML is not a programming language but a Markup language that uses <tags> like this.
- Language of the Browser
- It allows users to makes web pages.
- These web pages can include text, graphics and links to other web pages.
- The WWW consortium creates the standards of HTML.

* Working of HTML

- By embedding all markup commands within each HTML file and standardizing them it becomes possible for any web browser to read and format any web page.
- HTML has some predefined tags to simplify the work of users.

WWW use classical client / server architecture
- HTTP is text - based request-response protocol



Date.....

* Structure of an HTML document

All HTML documents follow the same basic structure. They have the root tag as <html> which contain <head> tag and <body> tag - The head tag is used for control info. by the browser and the body tag contains the actual user info. that is to be displayed on the screen. The basic document

- <html> Marks the beginning of your HTML document.
- <head> Begins the heading section of an HTML document.
- <title> ... </title> Gives an HTML document a title that appears on the browser menu bar, also will appear on search engine or bookmarks referencing your site (must appear b/w the <HEAD> ... </HEAD> tags ; should be straight text, no tags.
- </head> Defines the end of the heading
- <body> Defines the body of an HTML doc. (text) contained within the <BODY> ... </BODY> tags appears in the main browser window) can be used with "BGCOLOUR", "TEXT", "LINK" and "VLINK" attributes
- </body>
- </html> Defines the end of your HTML document.

Date.....

* Types of HTML tags

There are two diff types of tags -

- Container Element : Container Tags contains start tag & end tag
  i.e. <HTML> ... </HTML>
- Empty element : Empty element contains start tag i.e.

* Some more Standard HTML Tags

- <hn> ... </hn> - delimits level n heading (h1 to h6)
- ... - set in boldFace
- ... - set in italics
- ... - set in center horizontally
- ... - unordered list (bullets)
- ... - ordered list (numbers)
- ... - an item on the list
-
 - line break
- <p> - paragraph
- <hr> - horizontal rule (line)
- <img src = " "> - displays an image
- ... defines a hyperlink.

* Web page development cycle

Open a Notepad window. Write the HTML tags to the Notepad. Save the file with (.html) / (.htm) extension. View the page in any web

Spiral

Date.....

browser viz. INTERNET EXPLORER, NETSCAPE NAVIGATOR etc. The purpose of a web browser is to read HTML documents and display them as web pages.

EDIT and SAVE the file in your NFS
eg: \WT-Lab\hello-world.html

TEST by BROWSING to the page
E:\Users\Shalu gupta\WT-Lab\hello-world.html

* Lab program: Write simple HTML file to print "Hello World"

Code:

```
<html>
  <head><title>Hello World</title></head>
  <body>
    <h2>Hello World</h2>
  </body>
</html>
```

* File Editors

- HTML files can be created with text editors:
  - NOTEPAD, NOTEPAD ++, PSpad
  - Or HTML editors (WYSIWYG Editors):
    - Microsoft Frontpage
    - Macromedia Dreamweaver
    - Netscape Composer
    - Microsoft Word
    - Visual Studio

Spiral

* Some simple tags

Date.....

- Hyperlink tags

```
<a href = "http://www.telerik.com/"
title = "Telerik"> Link to Telerik website </a>
```

- Image tags

```
<img src = "logo.gif", alt = "logo" />
```

- Text formatting tags

```
This text is <em> emphasized. </em>
<br /> new line <br />
This one is <strong> more emphasized. </strong>
```

* Some simple tags - Example

some-tags.html

```
<!DOCTYPE HTML>
<html>
<head>
    <title> Simple Tags Demo </title>
</head>
<body>
<a href = "http://www.telerik.com/", title = "Telerik site">
                This is a link. </a>
<br />
<img src = "logo.gif" alt = "logo" />
<br />
<strong> Bold </strong> and <em> italic </em> text.
</body>
</html>
```

Output

This is a link

Bold and italic text

* Tag Attributes

- Tags can have attributes
  - Attributes specify properties and behaviours
  - Ex-

```
<img src = "logo.gif" alt = "logo" />
```

- Two attributes can apply to every element:
  - id, style, class, title
  - The id is unique in the document
  - Content of title attribute is displayed as hint when the element is hovered with the mouse
  - Some elements have obligatory attributes

* Heading and Paragraphs

- Sections: div and span

```
<div style = "background: skyblue;">
    This is a div </div>
```

- Paragraph Tags

```
<p> This is my first paragraph </p>
```

Spiral

Spiral

Date

* The <!DOCTYPE> DECLARATION

- The HTML documents must start with a document type definition (DTD)
- It tells web browsers what type is the served code
- Possible versions: HTML 4.01, XHTML 1.0 (Transitional or strict), XHTML 1.1, HTML 5
- Example:

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

- See http://w3.org/QA/2002/04/valid-dtd-list.html for list of possible doctypes

* The <script> tag Example

- The <style> element embeds formatting info. (CSS styles) into an HTML page

```
<html>
  <head>
    <style type="text/css">
      p{ font-size: 12pt; line-height: 12pt;}
      p:first-letter { font-size: 200%;}
      span{ text-transform: uppercase;}
    </style>
  </head>
  <body>
    <p> Styles demo. <br/>
```

Spiral

Date

```
    <span> Test uppercase</span>
    </p>
  </body>
</html>
```

Output

Styles demo.
TEST UPPERCASE

* Colour codes

white - FFFFFF

* Comments: <!--> Tag

- Comments can exist anywhere b/w the <html> </html> tags
- Comments start with <!-- and end with -->

```
<!-- Telerik Logo (a JPG file) -->
<img src="logo.jpg" alt="Telerik Logo">
```

Spiral