



**P.O. Box 342-01000 Thika**

**Email: [info@mku.ac.ke](mailto:info@mku.ac.ke)**

**Web: [www.mku.ac.ke](http://www.mku.ac.ke)**

# **SCHOOL OF PURE AND APPLIED SCIENCES**

**DEPARTMENT OF INFORMATION TECHNOLOGY**

**COURSE CODE: BIT 2102**

**COURSE TITLE: FUNDAMENTALS OF INTERNET**

***Instructional manual for BBIT – Distance Learning***

|   |           |
|---|-----------|
| <b>COURSE OUTLINE .....</b>                           | <b>4</b>  |
| <b>CHAPTER ONE .....</b>                              | <b>6</b>  |
| <b>INTRODUCTION TO THE INTERNET .....</b>             | <b>6</b>  |
| 1.1 History of the Internet.....                      | 6         |
| 1.2 Services Provided by the Internet .....           | 9         |
| 1.3 Requirements for connecting to the internet ..... | 12        |
| 1.4 How to get connected to Internet.....             | 12        |
| <b>CHAPTER TWO .....</b>                              | <b>17</b> |
| <b>STRUCTURE OF THE INTERNET .....</b>                | <b>17</b> |
| 2.1 Important Components of the Web .....             | 17        |
| 2.2 Domain Name System .....                          | 18        |
| 2.3 Routers .....                                     | 21        |
| 2.4 Internet Network hierarchy.....                   | 22        |
| 2.5 Common Internet Protocols .....                   | 27        |
| <b>CHAPTER THREE .....</b>                            | <b>29</b> |
| <b>INTRODUCTION TO WEB PUBLISHING .....</b>           | <b>29</b> |
| 3.1 Web Publishing.....                               | 29        |
| 3.2 Planning Cycle.....                               | 30        |
| 3.3 Design Cycle.....                                 | 30        |
| 3.4 Design Basics .....                               | 31        |
| 3.5 Web page guidelines: Design Considerations .....  | 31        |
| <b>CHAPTER FOUR.....</b>                              | <b>33</b> |

|  |           |
|--|-----------|
| <b>INTRODUCTION TO HTML .....</b>                  | <b>33</b> |
| 4.1    Basic HTML Concepts.....                    | 33        |
| <b>What is HTML? .....</b>                         | <b>33</b> |
| What do you need to create HTML?.....              | 34        |
| 4.2    Creating a Webpage .....                    | 35        |
| 4.3    HTML Tags .....                             | 36        |
| <b>CHAPTER FIVE .....</b>                          | <b>39</b> |
| <b>CHAPTER FIVE .....</b>                          | <b>40</b> |
| <b>FORMATTING TAGS .....</b>                       | <b>40</b> |
| 5.1    Using Heading tags .....                    | 40        |
| 5.2    Using Bold, Italics and Underline tags..... | 41        |
| 5.3    HTML Paragraphs .....                       | 41        |
| 5.4    Typefaces and colors .....                  | 43        |
| <b>CHAPTER SIX .....</b>                           | <b>47</b> |
| <b>INTERMEDIATE DESIGNER TAGS .....</b>            | <b>47</b> |
| 6.1    HTML Hyperlinks (Links) .....               | 47        |
| 6.2    HTML Tables .....                           | 49        |
| 6.3    Lists .....                                 | 53        |

**COURSE OUTLINE**  
**BIT 2102: FUNDAMENTALS OF INTERNET**  
**Purpose of the course**

The aim of this course is to provide a comprehensive understanding of how internet works and to enable a student create simple web pages.

**Main course text**

- i. Southerland K., Understanding the Internet : A clear Guide to Internet Technologies,  
Butterworth –Heinemann

**Reference Books**

- i. HTML: Visual quick reference (3.2 edition).
- ii. Onunga J., The Internet: Information systems Academy

**Assessment:** Examination - 70%: Coursework - 30%

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| <b>Fundamentals of Internet - TOPICS - Details</b> |
|--|

**Week 1 and 2**

**I. Introduction to the internet**

- A. History of the internet
- B. Services provided by the internet
- C. Hardware and software requirements for connecting to the internet
- D. How to get connected to Internet

**Week 3 and 4**

**II. Structure of the internet**

- A. Components of the internet such as web servers and search engine
- B. Domain name system
- C. Internet Routing
- D. Internet Network hierarchy in tiers i.e. tier 1, tier 2 and tier 3
- E. Internet protocols

**Week 5 and 6**

**III. Introduction to Web Publishing**

- A. Web publishing
- B. Planning Cycle
- C. Design Cycle
- D. Design Basics

E. Design considerations

**Week 7 and 8**

**IV. Introduction to HTML**

- A. Basic HTML Concepts
- B. Creating a webpage
- C. HTML Tags

**Week 9 and 10**

**V. Using Basic Formatting tags**

- A. Using Heading tags
- B. Using Bold, Italics and Underline tags
- C. Paragraph tags

**Week 11 and 12**

**VI. Intermediate designer tags**

- A. HTML Hyperlinks
- B. HTML Tables
- C. HTML Lists

## CHAPTER ONE

### INTRODUCTION TO THE INTERNET



#### Learning Objectives

By the end of this chapter the learner shall be able to;

- i. Explain the evolution of the internet and the technological advancements to current
- ii. Explain the different services offered by the internet
- iii. Explain the software and hardware requirements for getting connected to the internet
- iv. Explain the different ways one can get connected to the internet

#### 1.1 History of the Internet



In the late 1950's the Advanced Research Projects Agency (ARPA) was founded in the United States with the primary focus of developing information technologies that could survive a nuclear attack. ( Internet History) In 1967 ARPA university and private sector contractors met with representatives of the Department of Defense to discuss possible protocols for sharing information via computers. In 1969, two years before the calculator was introduced to consumers and the year after National Public Radio was established, the precursor of the Internet, ARPANET, was born. It connected four sites at the University of California at Los Angeles, the University of California at Santa Barbara, Stanford Research Institute, and the University of Utah. Throughout the 1970's researchers concentrated on developing protocols for controlling networks, moving messages across a system of networks, and allowing for remote access to the networks. There were computers connected at about two dozen sites when the first email was sent in 1972, but the number of sites and messages soon mushroomed. By 1975 there were 63 sites. In 1980, 400 host computers were connecting 20,000 people at university, military, and government locations. Twelve years later the number of hosts had grown to more than a million

internationally (BBN Timeline), and in January of 1999 there were more than 43 million. (Hobbes' Internet Timeline v4.1)

If the 1970's were a time of research, the 1980's were a time of development. The TCP/IP protocol was introduced in 1983, and at the University of Wisconsin the name server was developed. The next year domain name server (DNS) was established. In 1986, the National Science Foundation developed a system to connect the growing number of hosts. Regional networks were connected to a backbone network, which became known as the NSFNET. As the "Internet" continued to grow and prosper, ARPANET came to an end in 1989 (BBN Timeline) just before HTML protocol was introduced in 1990. HTML allowed graphics to be sent along with text to create hypertext pages customized to the sender's preference. (Internet History) Everything was now in place for explosive growth.

### **Commercial Development**

In 1963 during the early days of computers and six years before ARPANET, students at MIT developed the first computer game called Space War. It would be twenty years before the TCP/IP protocol stimulated the growth of various networks and nearly thirty years (1991) before the United States government opened the Internet to private enterprise (BBN Timeline), but this game foreshadowed the commercialization of the Internet. In the 1970's and 80's people who were online put out information about furniture and cars they wanted to sell. Debates raged about whether this was an appropriate use of the new research tool, the Internet, but when the Commercial Internet Exchange (CIX) was formed in 1991 the genie would not go back in the bottle.

Commercial contractors have been involved in the development of ARPANET from its inception. As Tang and Teflon began as curiosities of the space program and later became common consumer products, so too have email, web research, and home shopping on the Web. It has only been ten years since the first relay between a commercial entity (MCI Mail) and the Internet was made. Since that time technologies have emerged that have fueled the growth of private enterprise on the Web. In 1992 Paul Linder and Mark McCahill at the University of Minnesota released Gopher, a tool that allowed researchers to retrieve specific data from myriad

locations. The next year Mosaic, a web browser, was developed at the University of Illinois by Netscape founder Marc Andreessen, the World Wide Web became a public domain, and the Pentium processor was introduced by Intel to speed up the whole process. ( The Past, Present, and Future of the Internet) As the technology advanced, the Internet became easier to use and the World Wide Web sites became more intricate and inviting. In 1994 shopping malls arrived on the Net. You could order pizza from Pizza Hut online or bank at First Virtual Bank, the first cyberbank. Of course, the advancements came with a downside. Vladimir Levin of Russia became the first publicly known Internet bank robber when he used the Internet to illegally transfer funds to his account. ( Hobbes' Internet Timeline v4.1 )

1995 saw the introduction of several emerging technologies such as JAVA and JAVAscript, Virtual Environments, and RealAudio which further enhanced the kind of product information which could be made available to consumers. Commercial users now outnumbered research and academic users by a two to one margin, and Bill Gates decided to redefine Microsoft as an Internet company. ( The Past, Present, and Future of the Internet) Today one can shop online for books, food and wine, travel, and real estate. Other business activities include buying stocks and bonds, banking, and retirement planning. Online shopping accounted for over \$9 billion in 1997 and is expected to be \$30 billion by the year 2000. In light of this growth, the U.S. Commerce Department will begin studying the impact of online shopping on total retail activity. ( Commerce Department to Measure Online Sales) Consumer spending via the Internet draws much interest, but business to business activity is also booming. The consulting group Piper Jaffray estimates that by the year 2001 Internet based business to business transactions will total US \$201.6 billion. Forrester Research estimates that by 2002 online business to business transactions will total US \$327 billion, ( Internet Statistics), while other projections indicate that by 2003, consumers will spend \$108 billion, while businesses will spend \$1.3 trillion. ( Spotlight: Corporate E-commerce Kicks Into Gear)

For further information on the history of the Internet, an extensive list of links may be found at the Internet Society Web site).



## 1.2 Services Provided by the Internet

### Electronic Mail

E-mail, also known as electronic mail, is one of the most popular Internet services. E-mail allows you to send messages to one person, or to send a message simultaneously to a group of people. One of the greatest advantages of e-mail over other forms of communication is the convenience to the recipient. Messages wait in your mailbox until you open it. Another advantage of an Internet e-mail account is that you can check your e-mail as you travel; assuming you can access the Internet in the city you are visiting through friends, family, professional organizations, or a public or college library.

#### (i) Features of E-mail:

- One-to-one or one-to-many communications
- Instant communications
- Physical presence of recipient is not required
- Most inexpensive mail service, 24-hours a day and seven days a week
- Encourages informal communication

#### (ii) Components of an E-mail Address

As in the case of normal mail system, e-mail is also based upon the concept of a recipient address. The email address provides all of the information required to get a message to the recipient from anywhere in the world. Consider the e-mail ID

john@hotmail.com

In the example above, "john" is the local part, which is the name of a mailbox on the destination computer, where finally the mail will be delivered. Hotmail is the mailserver where the mailbox "john" exists, .com is the type of organisation on net, which is hosting the mail server.

There are six main categories;

**com**    Commercial institutions or organization

**edu**    Educational institutions

**gov**    Government site

**mil** Military site

**net** Gateways and administrative hosts

**org** Private organizations

## **WWW**

**WWW** are initials that stand for **World Wide Web**. A "web" is a network of fibers or cables connecting different points. (Spiders make webs to catch flies.) The Web is one of the services available on the Internet. It lets you access millions of pages through a system of hyperlinks. Because it is "world-wide", it was originally called the World Wide Web or WWW. This is a special part of the internet that allows people to view information stored on participating computers. It is an easy-to-use, graphical source of information which has opened the internet to millions of people interested in finding out information.

## **FTP (File Transfer Protocol)**

This facility is a method of gaining limited access to another machine in the Internet, and obtaining files from it. You **need full Internet connectivity**, to do ftp interactively. FTP has many advantages, for example, it allows you to get new free software, or updated versions of old programs, as well as useful data for your research. The most common way of using FTP is via **anonymous FTP**. When you start an ftp connection, you will be asked for a user name and a password.

## **Telnet: logging in to Remote Network Computers**

Telnet is the Internet facility that allows you to execute commands on a remote host (another computer, most likely one to which you do not have physical access) as if you were logged in locally. You need to know the name of the machine to which you want to connect, and to have a valid user name in it. There is no such thing as "anonymous" telnet.

The commands for telnet are:

- telnet hostname: it will open a connection to the host you name. For example, "telnet math.sunysb.edu" will connect you to the machine named math.sunysb.edu

- telnet "address": it opens a connection to the host at "address".

## **Usenet Newsgroups**

Usenet newsgroups, also called bulletin boards, are a similar e-mail conferencing system, but are less intrusive to the subscriber than listserves since messages are posted to Usenet sites around the world instead of appearing in each subscriber's mailbox. Usenet refers to the huge collection of messages which are posted to tens of thousands of newsgroups worldwide. Millions of people around the world regularly read newsgroup messages, following their favorite topics of interest. New newsgroups are added and old ones deleted every day.

Usenet can provide a unique information resource not readily accessible from any other source. If you are looking for personal anecdotes about products, especially computer-related hardware and software products, how-to information, practical advice, or the latest news stories, newsgroup archives may be a valuable resource.

## **Internet Chat**

Communication on the Internet goes even further than personal e-mail, newsgroups and mailing lists, to encompass real-time conversations (synchronous communication) among two or more people. Chat is available on the Internet through Internet Relay Chat or IRC. It consists of thousands of chat channels, each covering a different topic and with participants from all over the world.

## **Web Conferencing**

Many institutions are discovering new ways to integrate Internet communications into their organizations. One of the most popular ways is through the use of web or online conferencing.

Web conferencing is currently being used by businesses for employee training, meetings and general communication. Educational institutions are using web conferencing as a way to enhance on-site classes or distance education classes. Web conferencing is a tool which provides a way for "students" to share information, ask questions, get answers, discuss problems and work collaboratively. Conferencing provides opportunities to solve issues by providing a dynamic

exchange of text, graphics, HTML links to information, audio, and video in a structured conversation organized by topic.

Web conferences may take place in "real-time" where all participants are communicating at the same pre-arranged time.

### **1.3 Requirements for connecting to the internet**

**Internet service provider** – an internet service provider provides you with a connection to the internet and the software you will need to navigate.

**telecommunication line** – a telephone line is required to connect you to the internet service provider.

**Modem** – a modem converts a digital signal received from a computer into an analogue signal that can be sent along ordinary telephone lines, and back to digital at the other end.

**Web browser** – a web browser is software used to view and download Web pages and various types of files such as text, graphics and video. Examples are Microsoft Internet Explorer or Netscape Navigator.

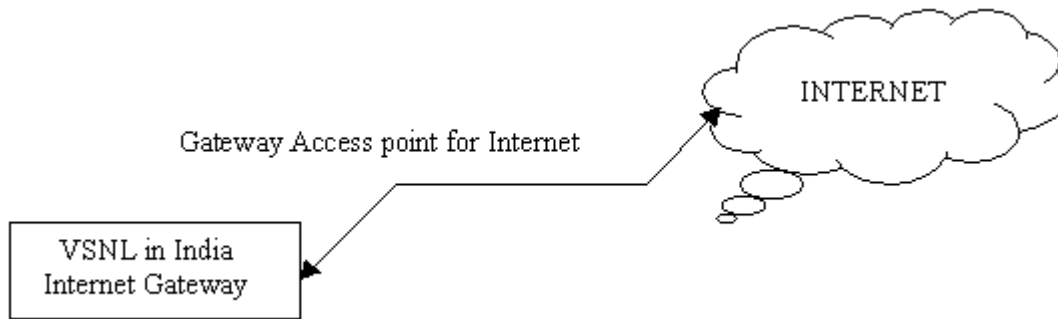
### **1.4 How to get connected to Internet**

There are various type of connectivity to get hook on to Internet. They all can be broadly classified into following category.

#### **(i) Gateway Access**

Gateway Access is also known as Level-One connection. It is the access to the Internet from a network, which is not on the Internet. The gateway allows the two different types of networks to "talk" to each other. But the users of the Gateway Internet have limited access to the Internet. They might not be able to use all the tools available on Internet. The local Internet Service Provider (ISP) normally defines this limitation.

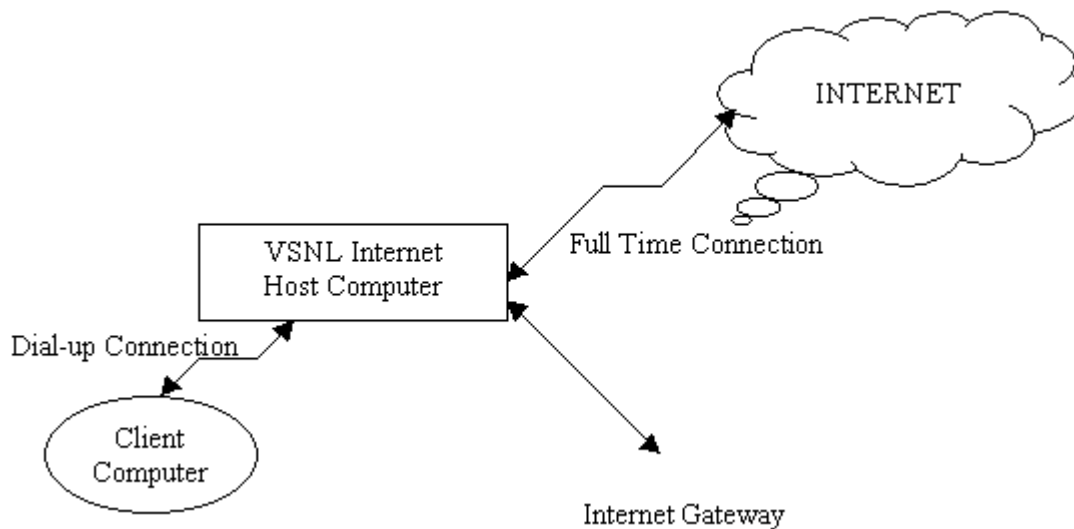
Good example of network with Level One connectivity within India is that of VSNL (Videsh Sanchar Nigam Limited). All access to Internet from India are through VSNL gateway.



**Fig. 1.1**

## **(ii) Dial-up Connection**

'Dial-up' connection is also known as Level Two connection. This provides connection to Internet through a dial-up terminal connection. The computer, which provides Internet access is known as 'Host' and the computer that receives the access, is 'Client' or 'Terminal'. The client computer uses modem to access a "host" and acts as if it is a terminal directly connected to that host. So this type of connection is also known as 'Remote Modem Access' connection. And the host to which the client gets connected is actually connected to the Internet by a full time connection (See Leased Connection).



**Fig. 1.2**

In dial-up connection to Internet, Host carries all the command that are typed on a client machine and forward them to Internet. It also receives the data or information from the Internet on behalf of the \_Client' and passes it to them. The client computer acts as a \_dumb' terminal connected to remote host.

This type of connection can further be divided into two categories.

### **(iii) Shell Connection**

In this type of Internet Connection, the user will get only textual matter of a Web Page. This connection does not support Graphics display. However the user will be able to surf the Internet, do FTP, receive mail. Shell Accounts were the only type of Internet access available for many years before the Internet entered in to the world of graphics and became more users friendly.

### **(iv) TCP/IP Connection**

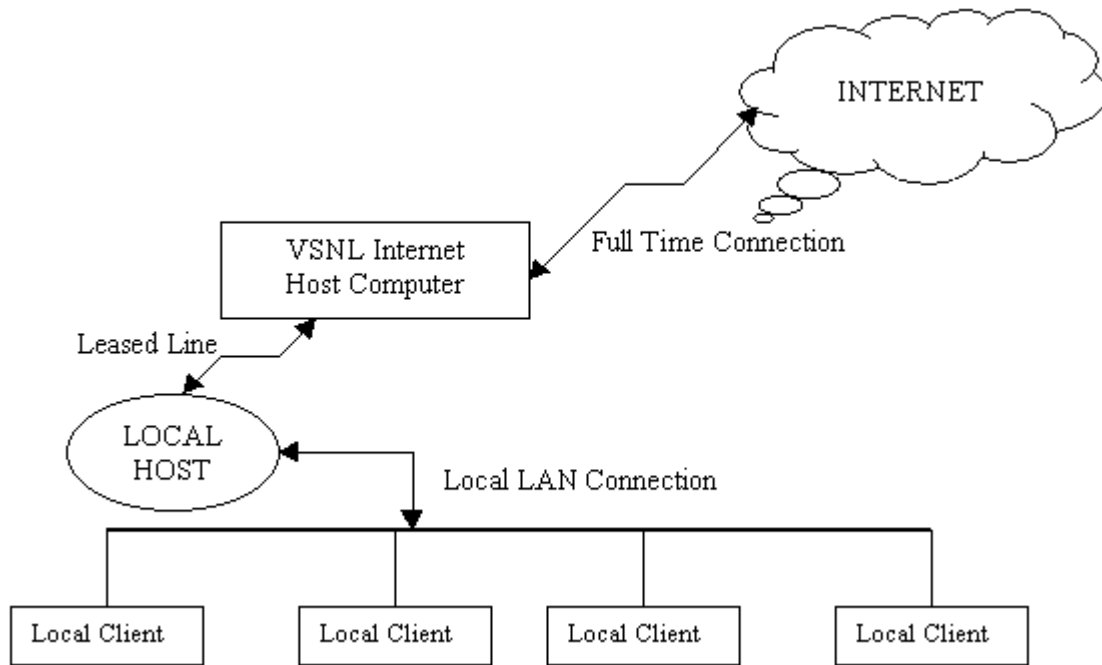
Today's graphical World Wide Web browsers provide easier access with multimedia sound and pictures. The major difference between Shell and TCP/IP account is that, Shell account can only display text and does not support graphics display, whereas TCP/IP can display both. Hence it is more popular Internet connection. Shell accounts are slowly phasing out from the Internet scenario.

**To access any of these dial-up accounts you need the followings;**

- Computer
- Modem
- Telephone Connection
- Shell or TCP/IP account from the ISP
- Internet client software such as Internet browser.

### **(v) Leased Connection**

Leased connection is also known as direct Internet access or Level Three connection. It is the secure, dedicated and most expensive, level of Internet connection. With leased connection, your computer is dedicatedly and directly connected to the Internet using high-speed transmission lines. It is on-line twenty-four hours a day, seven days a week. Leased Internet connections are limited to large corporations and universities who could afford the cost.



*Fig. 1.3*



### Chapter Review Questions

1. State whether the following statements are True or False.
  - (a) WWW is the acronym for the World Wide Web.
  - (b) In TCP/IP connection, the user will get only textual matter of a Web Page.
  - (c) Gateway Access is also known as Level-One connection.
  - (d) Good example of network with Level One connectivity within India is that of VSNL
  - (e) E-mail is known as URL (Uniform Resource Locator).
  - (f) Leased connection is also known as direct Internet access or Level Three connection.
2. Explain in brief the concept of e-mail.
3. What are the basic objectives of FTP?
4. What is the difference between Leased connection and Dialup connection?
5. Explain in brief
  - (a) TCP/IP connection
  - (b) Telnet
  - (c) Gateway Access
  - (d) Shell connection
6. Explain the technological developments of the internet from 1669 to date

**References:** Southerland K., Understanding the Internet : A clear Guide to Internet Technologies, Butterworth –Heinemann

### Suggested Further Reading

Southerland K., Understanding the Internet : A clear Guide to Internet Technologies, Butterworth –Heinemann



## CHAPTER TWO

### STRUCTURE OF THE INTERNET



#### Learning Objectives

At the end of the chapter the learner shall be able to;

- i. Explain the different components of the internet
- ii. Explain the hierarchical structure of the internet and the different levels of the internet service providers
- iii. Explain the Domain naming system and how it works
- iv. Explain the different internet protocols that facilitate the different functionalities of the internet

### 2.1 Important Components of the Web

#### Web Server

A **web server** is a computer program that delivers (serves) content, such as web pages, using the Hypertext Transfer Protocol (HTTP), over the World Wide Web. The term web server can also refer to the computer or virtual machine running the program.

The primary function of a web server is to deliver web pages to clients. This means delivery of HTML documents and any additional content that may be included by a document, such as images, style sheets and JavaScripts.

A client, commonly a web browser or web crawler, initiates communication by making a request for a specific resource using HTTP and the server responds with the content of that resource, or an error message if unable to do so. The resource is typically a real file on the server's secondary memory, but this is not necessarily the case and depends on how the web server is implemented.

A **web search engine** is designed to search for information on the World Wide Web and FTP servers. The search results are generally presented in a list of results and are often called *hits*. The information may consist of web pages, images, information and other types of files. Some

search engines also mine data available in databases or open directories. Unlike Web directories, which are maintained by human editors, search engines operate algorithmically or are a mixture of algorithmic and human input. Examples of search engines are yahoo, google, msn etc

a) A search engine operates, in the following order

1. Web crawling
2. Indexing
3. Searching

Web search engines work by storing information about many web pages, which they retrieve from the WWW itself. These pages are retrieved by a **Web crawler**

**Web crawler** is an automated Web browser which follows every link it sees. Exclusions can be made by the use of robots.txt. The contents of each page are then analyzed to determine how it should be indexed (for example, words are extracted from the titles, headings, or special fields called meta tags). Data about web pages are stored in an index database for use in later queries. Some search engines, store all or part of the source page (referred to as a cache) as well as information about the web pages, whereas others, store every word of every page they find.

When a user enters a query into a search engine the engine examines its **index** and provides a listing of best-matching web pages according to its criteria, usually with a short summary containing the document's title and sometimes parts of the text.

## 2.2 Domain Name System

The **Domain Name System (DNS)** is a hierarchical naming system for computers, services, or any resource connected to the Internet or a private network. It associates various information with domain names assigned to each of the participants. Most importantly, it translates domain names meaningful to humans into the numerical (binary) identifiers associated with networking equipment for the purpose of locating and addressing these devices worldwide.

The Domain Name System makes it possible to assign domain names to groups of Internet users in a meaningful way, independent of each user's physical location. Internet domain names are

easier to remember than IP addresses such as 208.77.188.166 (IPv4) or 2001:db8::1f70:6e8 (IPv6). The Domain Name System distributes the responsibility of assigning domain names and mapping those names to IP addresses by designating authoritative name servers for each domain. Authoritative name servers are assigned to be responsible for their particular domains, and in turn can assign other authoritative name servers for their sub-domains.

The DNS database of Domain names and the corresponding IP addresses can not be held on one machine. As a truly distributed resource, it is maintained by many organisations, each manages a little bit of it. DNS defines a tree structure, and each node on the tree is owned by one of the naming authorities. The owner of a node can create any number of child nodes, but each must have a unique name.

### **How DNS works**

DNS is used to map a domain name to an IP address. When you type a domain into your browser (or "client") e.g. [www.mku.ac.ke](http://www.mku.ac.ke) , the client needs to find the IP address where this site is located. The first place it will check is the operating system. The operating system routes the search (or "query") to the Resolving Name Server.

The resolving name server doesn't know the location of the entire domain, but it does know where the root name server is, so that's where it sends the query first.

The root name server will then tell the resolving name server the location of the top-level domain name server, so that's the next place the resolving name server sends the query.

The top level domain name server, which is updated by the domain registrar, will then be able to direct the query to the authoritative name server, which is usually just referred to as the "name server" of a domain.

This name server knows the location of the IP of the domain, and sends this information back to the resolving name server, which caches the information and routes the browser to the correct place.

### **URLs**

Addresses for web sites are called URLs (Uniform Resource Locators). Most of them begin with http (HyperText Transfer Protocol), followed by a colon and two slashes. For example, the URL for the Florida Center for Instructional Technology is <http://fcit.usf.edu/>.

Some of the URL addresses include a directory path and a file name. Consequently, the addresses can become quite long. For example, the URL of a web page may be: <http://fcit.usf.edu/holocaust/default.htm>. In this example, "default.htm" is the name of the file which is in a directory named "holocaust" on the FCIT server at the University of South Florida.

### **Top-level domain**

Each part of a domain name contains certain information. The first field is the host name, identifying a single computer or organization. The last field is the top-level domain, describing the type of organization and occasionally country of origin associated with the address.

Top-level domain names include:

|      |                         |
|------|-------------------------|
| .com | Commercial              |
| .edu | Educational             |
| .gov | US Government           |
| .int | Organization            |
| .mil | US Military             |
| .net | Networking Providers    |
| .org | Non-profit Organization |

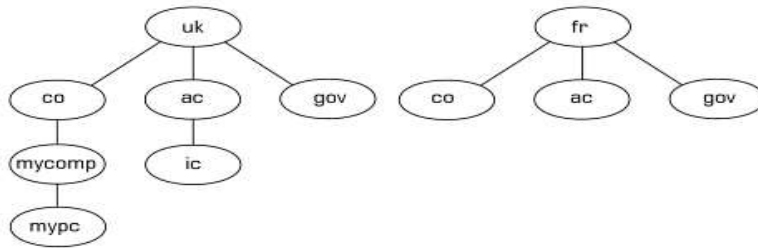
Domain name country codes include, but are not limited to:

|     |                |
|-----|----------------|
| .au | Australia      |
| .de | Germany        |
| .fr | France         |
| .nl | Netherlands    |
| .uk | United Kingdom |
| .us | United States  |

Paying attention to the top level domain may give you a clue as to the accuracy of the information you find. For example, information on a "com" site can prove useful, but one should always be aware that the intent of the site may be to sell a particular product or service.

Likewise, the quality of information you find on the "edu" domain may vary. Although many pages in that domain were created by the educational institutions themselves, some "edu" pages may be the private opinions of faculty and students. A common convention at many institutions is to indicate a faculty or student page with a ~ (tilde) in the address.

To make things more complicated the growth of the internet has resulted to a more complicated structure. The new structure is now organized on a geographical basis as shown below.



## 2.3 Routers

All of these networks rely on Network Access Point (NAPs), backbones and **routers** to talk to each other. What is incredible about this process is that a message can leave one computer and travel halfway across the world through several different networks and arrive at another computer in a fraction of a second!

The routers determine where to send information from one computer to another. Routers are specialized computers that send your messages and those of every other Internet user speeding to their destinations along thousands of pathways. A router has two separate, but related, jobs:

It ensures that information doesn't go where it's not needed. This is crucial for keeping large volumes of data from clogging the connections of "innocent bystanders."

It makes sure that information does make it to the intended destination.

In performing these two jobs, a router is extremely useful in dealing with two separate computer networks. It joins the two networks, passing information from one to the other. It also protects the networks from one another, preventing the traffic on one from unnecessarily spilling over to the other. Regardless of how many networks are attached, the basic operation and function of the router remains the same. Since the Internet is one huge network made up of tens of thousands of smaller networks, its use of routers is an absolute necessity

## 2.4 Internet Network hierarchy

The global Internet is an amalgam of separate, but semiautonomous networks. Each network and server provider is an independent entity with its own policies, services, and customer targets. The binding element of the global Internet is that networks share a common IP addressing and global BGP routing framework that allows all networks to interconnect with each other directly or indirectly. There is little regulation, and network operators are free to decide where, how, and with whom to connect. Generally, smaller ISPs connect to larger networks for delivery of their customers' packets to destinations outside the smaller providers' footprints. Networks are classified by tiers based on the nature of their connection to other networks (see Figure 1). The three tiers range from smallest (tier 3) to largest (tier 1). Tier 1 is further divided into global and regional tier 1 ISPs (see Figure 2).

**FIGURE 1**

Hierarchy of the Global Internet

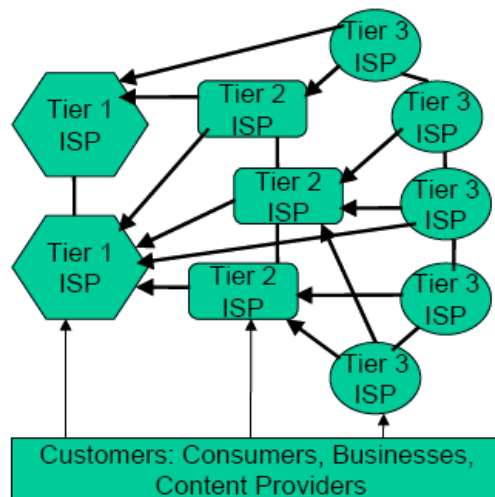
Peering is done between equivalent-sized partners (tier 3 to tier 3).

Transit or fee-based peering is done where there are unequal traffic flows (tier 2 to tier 1).

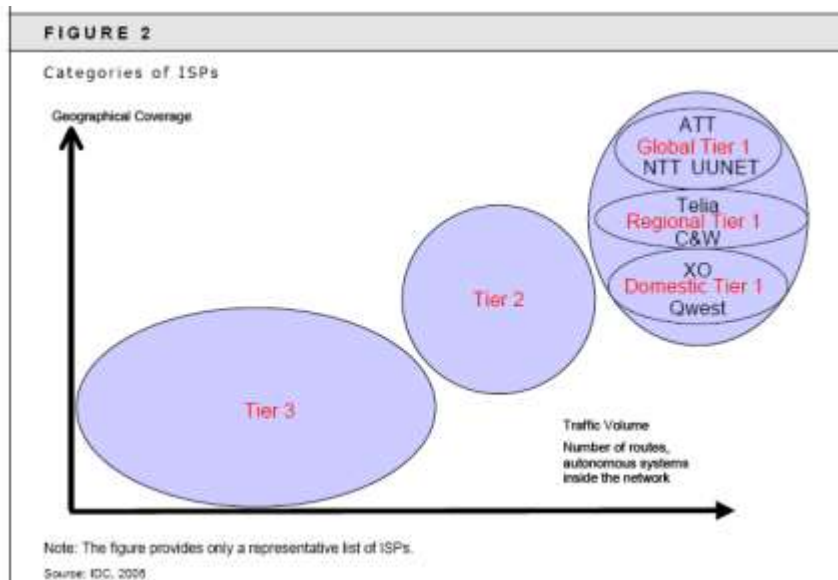
Peering and transit arrangements may be established directly or at third-party exchange points.

Many ISPs have multihoming where they connect to more than one upstream provider for diversity and reach.

Customers can connect to any ISP.



Source: IDC, 2008



## ISP Tiers

Tier 1 ISPs own the operating infrastructure, including the routers and other intermediate devices (e.g., switches) that form the backbone, which is interconnected with other tier 1 ISPs via private peering in a "settlement-free" interconnection. This is also called free peering. They also interconnect at Internet Exchange (IX) points.

Because a significant amount of today's Internet traffic is exchanged via private peering (discussed in the next section), tier 1 ISPs deliver the best network quality and throughput because they have the most direct control over the traffic that flows through these private peering connections. Other ISPs are completely dependent on tier 1 ISPs and their capabilities to properly manage the private peering infrastructure.

Tier 1 ISPs make use of self-owned telecommunications circuits for those parts of their networks in which they have such an infrastructure. However, this may not be the case in every market in which tier 1 ISPs operate. Tier 1 ISPs may choose to make use of circuits provided by alternative carriers because of a number of factors, including lack of self-owned circuits, contractual arrangements (e.g., reciprocity), facility availability (DWDM might be available from another carrier in a specific market before it is available from the carrier that owns the tier 1 ISP), or a desire to maintain some level of carrier diversity to ensure more stability in the network. Global tier 1 ISPs have their own large Internet backbones with international coverage. They have large traffic volumes, large customer bases, and large numbers of routers and support

many ASs inside the network. In addition to size and scale, the key attributes of global tier 1 ISPs are as follows:

They don't pay to have their traffic delivered through similar-sized networks.

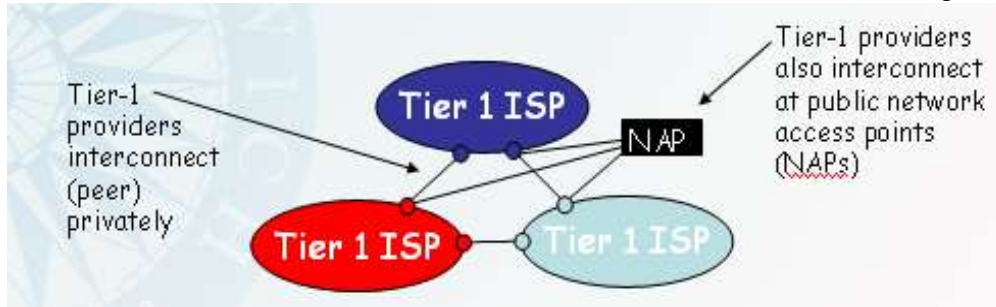
They have access to the entire Internet routing table, solely through their peering relationships,

They peer on more than one continent.

They own or lease transoceanic fiber optic transport.

They deliver packets to and from customers and to and from peers around the world.

Global tier 1 ISPs include: AboveNet (AS 6461), AT&T, Global Crossing etc



## Tier 2

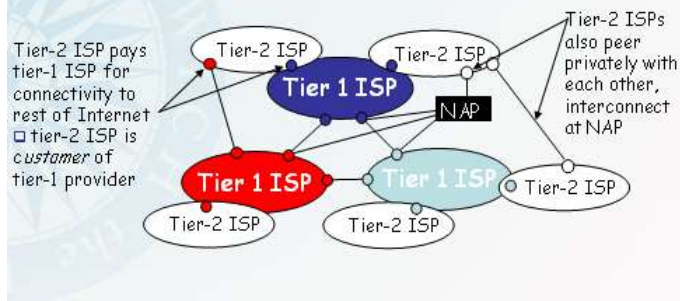
Tier2 networks are smaller than Tier1 networks, and may only offer regional or national coverage. In order to reach the rest of the Internet, tier2 ISPs have to pay and use the services of Tier1 ISPs. A Tier2 ISP is a customer of a Tier1 ISP. Many large companies connect directly to one or more Tier1 or 2 ISPs. An ISP must pay to use the services of a network at a higher level, the actual cost depending on speed. Tier2 networks may choose to connect (peer with each other) directly, without going through a tier1 network. To complicate matters further, some Tier1 ISPs deal directly with end users.

Only a few tier 2 ISPs are able to provide service to customers on more than two continents, thus extending the characteristics. Often, they have lower-quality networks and slower access speeds than tier 1 ISPs. They are at least one router hop away from the core of the Internet. Reach and Singapore Telecom/STIX are examples of tier 2 ISPs.



- “Tier-2” ISPs: smaller (often regional) ISPs

- Connect to one or more tier-1 ISPs, possibly other tier-2 ISPs



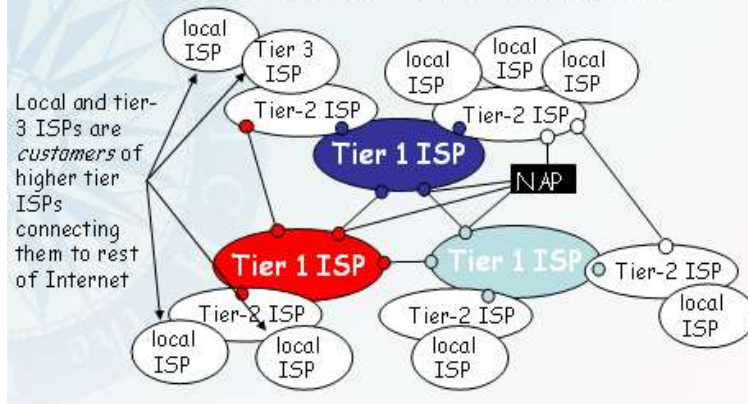
### Tier 3

Below Tier2 come the Tier3 networks, local ISPs etc. They have to pay and interconnect via a higher level network.

Within a network, POPS are where the ISP connects to other networks (above, below or at the same level in the hierarchy). To connect to a POP, a customer has to lease a line from a telecomms provider and connect his router to the ISP's router in the POP. Two ISPs at the same level may choose to interconnect at one or more POPs. They may also have private peering points or at public Network access points or NAPs which are owned and operated by a third party. NAPs relay a lot of traffic between ISPs and are themselves high speed networks within a building.

- “Tier-3” ISPs and local ISPs

- last hop (“access”) network (closest to end systems)



Tier 3 ISPs focus on local retail and consumer markets. They provide the "on ramp" or local access to the Internet for end customers. They have many end users, but no or very few destinations (i.e., servers) on their networks. Their coverage is limited to a specific country or to subregions, such as a metropolitan area, within a country. Tier 3 ISPs are customers of higher-tier ISPs for access to the rest of the Internet. Because tier 3 ISPs' traffic requires several router hops to get out to a URL, these ISPs tend to have relatively low network quality and access speeds.

The disadvantages of tier 2 and tier 3 ISPs are the number of router hops required to get to the Internet and the oversubscription of that bandwidth. Users of lower-tier ISPs share a common gateway to higher»tier ISPs, and the gateway bandwidth may degrade the access bandwidth.

### **Public and Private Peering**

Because the Internet is made up of a complex hierarchy of separate networks, rules are applied to define the technical and business aspects of interconnection. There are three basic forms of interconnection rules: public peering, private peering, and transit. Peering involves the interconnection of networks for the exchange of traffic for the mutual benefit of both parties. There are two types of peering. Private peering involves the direct connection over a Layer 1 or Layer 2 link between two ISPs with similar network capacity and traffic levels. This is a bilateral agreement with traffic exchange dedicated exclusively to the two ISPs connecting. The two parties involved in private peering are committed to maintaining adequate bandwidth to keep packet loss as close to zero as possible. Proper management of private peering by a provider is a key measure of the overall quality of the performance of the Internet for the provider's customers.

Historically, ISPs peered with each other for the express purpose of reducing transit costs and expanding their coverage of packet transfers. A significant percentage of the internet's traffic is exchanged via private tier 1 peering agreements. However, the costs involved with direct peering make it a very exclusive model; typically, the highest-tier ISPs participate in this model.

## 2.5 Common Internet Protocols

The internet protocols are derived from the TCP/IP suite of protocols which is the set of protocols used to communicate across the internet. It is also widely used on many organizational networks due to its flexibility and wide array of functionality provided. Microsoft who had originally developed their own set of protocols now is more widely using TCP/IP, at first for transport and now to support other services. For the purpose of this unit we will discuss the most common and important ones.

**ARP** - Address Resolution Protocol enables the packaging of IP data into ethernet packages. It is the system and messaging protocol that is used to find the ethernet (hardware) address from a specific IP number. Without this protocol, the ethernet package could not be generated from the IP package, because the ethernet address could not be determined.

**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 use software to address and manage data packets being sent to computers.

**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.

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

**UDP** - An unreliable connection less protocol used to control the management of application level services between computers. It is used for transport by some applications which must provide their own reliability.

**FTP** - File Transfer Protocol allows file transfer between two computers with login required.

**HTTP** - Hypertext Transfer Protocol is used to transport HTML pages from web servers to web browsers. The protocol used to communicate between web servers and web browser software clients.

**DHCP** - Dynamic host configuration protocol 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 numbers when a computer boots. This way the IP address of a computer does not need to be assigned manually. This makes changing networks easier to manage. DHCP can perform all the functions of BOOTP.

**RIP** - Routing Information Protocol is used to dynamically update router tables on WANs or the internet. A distance-vector algorithm is used to calculate the best route for a packet. RFC 1058, 1388 (RIP2).

**OSPF** - Open Shortest Path First dynamic routing protocol. A link state protocol rather than a distance vector protocol. It tests the status of its link to each of its neighbors and sends the acquired information to them.

**POP3** - Post Office Protocol version 3 is used by clients to access an internet mail server to get mail. It is not a transport layer protocol.

**IMAP4** - Internet Mail Access Protocol version 4 is the replacement for POP3.

**Telnet** is used to remotely open a session on another computer. It relies on TCP for transport and is defined by RFC854.

**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 use software to address and manage data packets being sent to computers.



#### Chapter review questions

1. Explain what a search engine is giving examples.
2. Explain the term web crawler.
3. A user has typed [www.mku.ac.ke](http://www.mku.ac.ke) on his computer. Explain what happens before the site is displayed.
4. The structure of the internet is hierarchical in nature. Explain.
5. Explain the importance of the common protocols that support the functions of the internet.

#### References:

Southerland K., Understanding the Internet : A clear Guide to Internet Technologies, Butterworth –Heinemann

#### Suggested further readings

1. Southerland K., Understanding the Internet : A clear Guide to Internet Technologies, Butterworth –Heinemann
2. [www.howstuffworks.com](http://www.howstuffworks.com)

## CHAPTER THREE

### INTRODUCTION TO WEB PUBLISHING



#### Learning Objectives

By the end of this chapter the learner shall be able to;

- i. Explain the steps followed during the creation of a web site
- ii. Explain the design cycle for web sites
- iii. Explain the design guidelines to be followed while creating web sites

### 3.1 Web Publishing

When you browse the Internet you will come across quite often the word **home page**. Home page is the entry or starting point of a website. It is more or less in the format of the contents of a book or magazine. In other words it is the welcome page of the website you are visiting, which in most cases gives an overview of what the website contains. One should not be surprised to see only one page in a website. Website can have one or more than one page, or a few long ones, depending on its design. But normally the website contains more than one page. Web pages vary in their look and content, but most of them follow a traditional book or magazine format. At the top of the page resides the master head or heading or banner graphic giving the main theme of the page. Then there is a list of items, such as subjects, with a brief description. The items listed are either hot or cold. When we say they are hot, it means they are linked to other pages within the same website or to other websites. These links are highlighted words in the body of the text, or in a list, or they can even be the images that link to other content. But how you will know the text is *hot* or *cold*. Usually the hot text appears in different colour from the rest of the text – usually in blue and underlined. When one moves the cursor over this text or graphics link, it will change from an arrow to a hand shape. And when you click on the hot text or image, you will be taken to the linked web page or website. Once you come back to a page with a link you have already visited, the hot text or hypertext words will appear in a different colour other than blue, so you know you have already visited there. But that does not prevent you from visiting the link again and again, you can certainly go there as many times, as you like. As the information and links are not static, don't feel surprised if the page looks different and the information has

changed, when you visit a site, next time. The Internet is a dynamic medium of communication for displaying information. To encourage visitors to return to a site, it is very much required to change the look and feel of the web pages from time to time.

### **3.2 Planning Cycle**

Web planning involves a structured approach involving conceptualization of design and organizing the web developer and information resources required making the designing a reality. If the design is for a large and complex site, it is always advisable to note down all the planning, preferably in a notebook. This note book can be used as a guide to deliver all the raw material needed for web designing such as: HTML, Java scripts, graphics, text, animation and icons, etc. You should also get ready with the policies and guidelines to be followed for developmental activities to give the web sites a professional touch.

This requires careful planning. Create the sketch of the site, before the actual development work takes place. This will help to reduce the re-work while development is on. Basically this will act as a site roadmap to be followed by the web designer to create the actual web sites. The most critical part a web page is its content. While working on content for a web page, it is necessary to take the target audience into consideration. Collect all the materials such as brochure, contact information, review, lessons, teaching material, quiz, FAQ's, photographs etc. It is not necessary to use all of them in one go, but they will be handy when something needs to be changed.

Once the conceptualization, collection of materials and creation of roadmap of the site is ready, it is time to decide how you are going to publish your site or how the web users will come to know about your site. Take the help of promotional Internet sites, professional organizations etc.

### **3.3 Design Cycle**

Now let us look how user designs the web page from an information design perspective pointed view and not from a graphics design. Web page contents should not have more graphic page. In fact, the basic idea about a web page is information sharing enhanced by other elements such as graphics, animation, etc.

### 3.4 Design Basics

Following are some basic steps to be followed while creating web pages.

Create a Welcom/Index/first page of your web site.  
Avoid use of heavy graphics in the first page from the user's point of view.  
Page should be descriptive and interactive both as per requirements.

Some minimum technical requirements might include:

Fast loading of pages  
Presentation with clarity and readability - with or without graphics  
Validation of the contents Easy  
and clear navigation Instruction  
on how to use the site.

Identify and address all potential problems such as:

Slow connections  
Physical constraints of the user such as sight or hearing impaired visitors  
Platform support  
Browser support etc.

### 3.5 Web page guidelines: Design Considerations

- ❖ Follow a simple and consistent design. Complex designs can confuse people, so keep it simple. A consistent design will let your readers concentrate on content, without having to waste time figuring out how to maneuver your layout. At Cornell, the time and workstation "power" required to load a Web page are still important considerations when using some of the latest Web authoring tools, especially if your visitor is connecting to campus with a modem.
- ❖ Don't create gratuitous graphics. Graphics are one reason for the interest in the Web by both publishers and readers and should definitely be included on your Web page if possible. Still, it's important not to overuse them. Blinking text and other excessive decorations can be distracting; background colors and textures can affect download time. Think very carefully about the colors and textures you choose for backgrounds and the effects they'll have on the readability of text. Also, don't forget that many people still use monochrome monitors.



- ❖ Give people cross links. Visitors should be able to move from one major page to another on your site without having to go back to your home page. Put cross links to all your major pages at the bottom of all major pages. For a good example, see the bottom of this page.
- ❖ Be careful about "over-linking." While linking to the work of others in your organization and throughout the world can help your readers, it can also lead to information overload. It's important to balance linking within your page design. Too many links can be a visual eyesore on the page and a distraction from the original information you want your readers to concentrate on.
- ❖ Don't create dead end links. Readers can get discouraged from returning to your pages when those pages are filled with empty links with grand labels like Descriptions of All Classes!



### **Chapter Review Questions**

1. Define the term home page
2. Explain the basic steps that should be followed while creating web pages
3. What are the basic design considerations to be followed while creating web pages?
4. What are the minimum technical requirements of a web site?

### **References**

Southerland K., Understanding the Internet : A clear Guide to Internet Technologies, Butterworth –Heinemann

### **Books for further reading**

Southerland K., Understanding the Internet : A clear Guide to Internet Technologies, Butterworth –Heinemann

## CHAPTER FOUR

### INTRODUCTION TO HTML



#### Learning Objectives

By the end of this chapter the learner shall be able to;

- i. Explain the basic concepts of HTML
- ii. Explain the structure of a HTML document
- iii. Create a HTML document and display the results in a web browser

#### 4.1 Basic HTML Concepts

##### What is HTML?

HTML, which stands for HyperText Markup Language, is a markup language used to create web pages it is not a programming language like Java. The basic function of the HTML is to describe the standard (—) how a browser should display text and multimedia elements such as graphics, animation, etc. It works on a limited number of tags and is not difficult to learn and use. Let us learn how it works. The web developer uses "HTML tags" to format different parts of the document. For example, you use HTML tags to specify headings, paragraphs, lists, tables, images and much more.

HTML is a subset of Standard Generalized Markup Language (SGML) and is specified by the World Wide Web Consortium (W3C).

##### How HTML works

The HTML is platform independent that is computer and computer operating system on which it is running. It means that HTML uses a small number of tags to create Web page. Any Web server regardless of their location and operating system can publish these web pages. These web pages can also be viewed or displayed by any Web browser regardless of the platform on which it is running.

As we have discussed, HTML works on *tags*. These HTML tags control the page structure and the style sheet controls the details about page layout and their presentation.

In other words, HTML style sheet provides consistency and creativity to create professional quality web pages.

The basic structure of using tag is <tag\_name> some text </tag\_name>. For example, the tag for making text bold is <b> **this is bold** </b>. And when displayed in a browser it will be displayed, as **this is bold**.

Web page is made up of two sections: head and body. Each of these sections is enclosed within a pair of <html> tags. The head section describes the page content while the body section defines the web page look and feel. Most of HTML tags are used in the body section, whereas the number of tags is limited in the head section. The standard web page structure in HTML is

```
<html>
<head>
<title>Title of the page is given here</title>
</head>
<body>
web page contents go here
</body>
</html>
```

### **What do you need to create HTML?**

You don't need any special equipment or software to create HTML. In fact, you probably already have everything you need. Here is what you need:

#### **Computer**

**Text or HTML editor.** Most computers already have a text editor and you can easily create HTML files using a text editor. Most computers already have a text editor.

Examples of text editors include Notepad (for Windows), Pico (for Linux), or Simpletext/Text Edit/Text Wrangler (Mac).

**Web Browser.** For example, Internet Explorer or Firefox.

**NB** No, you do not need to be online to create web pages. You can create web pages on your local machine. You only need to go online when you want to publish your web page to the web - this bit comes later.

## **4.2 Creating a Webpage**

### **1. Create an HTML file**

An HTML file is simply a text file saved with an .html or .htm extension (i.e. as opposed to a .txt extension).

- a. Open up your computer's normal plain text editor (this will probably be Notepad if you're using Windows or TextEdit if you're using a Mac). You could use a specialized HTML editor such as DreamWeaver or FrontPage if you prefer.

### **2. Type some HTML code**

- a. Save the file as html\_tutorial\_example.html

### **3. View the result in your browser**

Either...

- a. Navigate to your file then double click on it
  - i. ...OR...
- b. Open up your computer's web browser (for example, Internet Explorer, Firefox, Netscape etc).
- c. Select File > Open, then click "Browse". A dialogue box will appear prompting you to navigate to the file. Navigate to the file, then select "Open".

### **4. Repeat the last 2 steps until you're satisfied with the result**

It's unrealistic to expect that you will always get it right the first time around. Don't worry - that's OK! Just try again and again - until you get it right.

## HTML Documents = Web Pages

HTML documents **describe web pages**

HTML documents **contain HTML tags** and plain text

HTML documents are also **called web pages**

The purpose of a web browser (like Internet Explorer or Firefox) is to read HTML documents and display them as web pages. The browser does not display the HTML tags, but uses the tags to interpret the content of the page:

### 4.3 HTML Tags

**Tag** - Used to specify ("mark-up") regions of HTML documents for the web browser to interpret.

Tags look like this: <tag>

**Element** - A complete tag, having an opening <tag> and a closing </tag>.

**Attribute** - Used to modify the value of the HTML element. Elements will often have multiple attributes.

An element consists of three basic parts: an opening tag, the element's content, and finally, a closing tag.

1. <p> - opening paragraph tag
2. **Element Content** - paragraph words
3. </p> - closing tag

Every (web)page requires four critical elements: the *html*, *head*, *title*, and *body* elements.

#### **The<html>Element.</html>**

---

<html> begins and ends each and every web page. Its sole purpose is to encapsulate all the HTML code and describe the HTML document to the web browser. Remember to close your HTML documents with the corresponding </html> tag at the bottom of the document.

## The <head> Element

The *head* functions "behind the scenes." Tags placed within the *head* element are not directly displayed by web browsers.

### HTML Code:

```
<html>  
<head>  
</head>  
</html>
```

## The <title> Element

Place the <title> tag within the <head> element to title your page. The words you write between the opening and closing <title></title> tags will be displayed at the top of a viewer's browser.

Here's the html code:

### HTML Code:

```
<html>  
<head>  
<title>My WebPage!</title>  
</head>  
</html>
```

## The <body> Element

The <body> element is where *all* content is placed. (Paragraphs, pictures, tables, etc). As the menu on the left suggests, we will be looking at each of these elements in greater detail as the module progresses. For now, it is only important to understand that the body element will encapsulate all of your webpage's viewable content.

## HTML Code:

```
<html>
<head>
<title>My WebPage!</title>
</head>
<body>
Hello World! All my content goes here!
</body>
</html>
```



### Chapter review questions

1. What is the standard web page structure in HTML?
2. What do you need in order to create a HTML document?

## References

[www.w3schools.com](http://www.w3schools.com)

## Suggested Further Reading

[www.w3schools.com](http://www.w3schools.com)

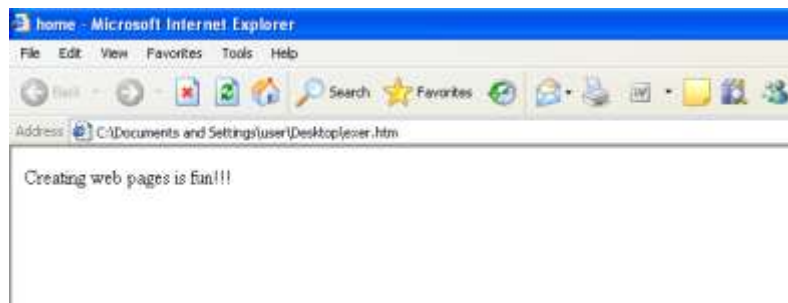
## HTML EXERCISE 1

Create a HTML document in your text editor with the contents shown below and save it as **exer1.htm** and then open it in a web browser.

```
<html>
<head>
<title>Exercise 1</title>
</head>
<body>
This is my first web page! Have a look!
</body>
</html>
```

## HTML EXERCISE 2

Create a web that will display as shown below when opened in a Web browser.





## CHAPTER FIVE

### FORMATTING TAGS



#### Learning Objectives

By the end of this chapter the learner shall be able to;

- i. Use heading tags in a HTML document
- ii. Use Bold, Italics and Underline tags in a HTML document
- iii. Use Paragraph tags in a HTML document
- iv. Using colors in a HTML document

#### 5.1 Using Heading tags

There is a special tag for specifying headings in HTML. There are 6 levels of headings in HTML ranging from h1 for the most important, to h6 for the least important.

Typing this code:

```
<h1>Heading 1</h1>  
<h2>Heading 2</h2>  
<h3>Heading 3</h3>  
<h4>Heading 4</h4>  
<h5>Heading 5</h5>  
<h6>Heading 6</h6>
```

Results in this:

**Heading 1**

**Heading 2**

**Heading 3**

**Heading 4**

*Heading 5*

**Heading 6**

## 5.2 Using Bold, Italics and Underline tags

### Bold

You specify bold text with the `<b>` tag.

Typing this code:

```
<b>This text is bold.</b>
```

Results in this:

**This text is bold.**

### Italics

You specify italic text with the `<i>` tag.

Typing this code:

```
<i>This text is italicised.</i>
```

Results in this:

*This text is italicised.*

### Underlining

You specify underlined text with the `<u>` tag.

Typing this code:

```
<u>This text is underlined.</u>
```

Results in this:

This text is underlined.

## 5.3 HTML Paragraphs

Paragraphs are defined with the `<p>` tag.

## Example

```
<p>This is a paragraph</p>
<p>This is another paragraph</p>
```

**Note:** Browsers automatically add an empty line before and after a paragraph.

## Line Breaks

Use the `<br />` tag if you want a line break (a new line) without starting a new paragraph:

**Typing this code:**

```
<p>Here is a...<br />line break.</p>
```

Results in this:

Here is a  
line break.

## Horizontal Rule

**Typing this code:**

```
Here's a horizontal rule... <hr /> ...that was a horizontal rule :)
```

Results in this:

Here's a horizontal rule...

---

...that was a horizontal rule :)

## 5.4 Typefaces and colors

### Specifying Typefaces

When styling text with fixed or relative type style tags, browsers display the text in the default typeface. The default is set in the user preferences and control text color by including the **FACE=** and **color =** arguments within the **<font** tag.

Note that the font you choose must be installed on the user's system, not just yours. If they are not installed the browser will still display the text in the default typeface. The font face is specified as follows

```
<font Face =||Arial||>
```

### Using colors

The text colors are specified in the **<FONT** tag with the **COLOR=**argument

Example

```
</Font color=||blue||>
```

Both the typeface and the font color can be specified in the font tag at the same time as shown below

```
<FONT FACE=||TAHOMA|| COLOR =||BLUE|| >
```

### example

```
<html>
```

```
<head>
```

```
<title> Tables </title>
```

```
</head>
```

```
<body>
```

```
<FONT FACE=||TAHOMA|| COLOR =||BLUE|| >
```

```
<h1> this is my first web page with color
```

```
<br>
```

```
<font size=3> How do you see it?
```

</body>

</html>

## BODY colors

The colors of the background and text of the text page can be set by the **BGCOLOR** and **TEXT** options in the **BODY** tag.

```
<BODY BGCOLOR = -YELLOW|| TEXT =||BLUE||>
```

This sets the background to yellow and the text to blue.











Values are normally enclosed in -quotes||







## Color Names

The most common methods for specifying colors are by using the color name or the hexadecimal value. Although color names are easier to remember, the hexadecimal values and RGB values provides you with more color options.

Hexadecimal values are a combination of letters and numbers. The numbers go from 0 - 9 and the letters go from A to F. When using hexadecimal color values in your HTML/CSS, you preceed the value with a hash (#). Although hexadecimal values may look a little weird at first, you'll soon get used to them.

There are 16 color names (as specified in the HTML 4.0 specification). The chart below shows these color names and their corresponding hexadecimal value.

| Color   | Color Name | Hexadecimal Value | Color   | Color Name | Hexadecimal Value |
|---|------------|-------------------|---|------------|-------------------|
|  | Black      | #000000           |  | Green      | #008000           |
|  | Silver     | #c0c0c0           |  | Lime       | #00ff00           |
|  | Gray       | #808080           |  | Olive      | #808000           |
|  | White      | #ffffff           |  | Yellow     | #ffff00           |
|  | Maroon     | #800000           |  | Navy       | #000080           |

|   |        |         |   |      |         |
|---|--------|---------|---|------|---------|
|  | Red    | #ff0000 |  | Blue | #0000ff |
|  | Purple | #800080 |  | Teal | #008080 |
|  | Fushia | #ff00ff |  | Aqua | #00ffff |

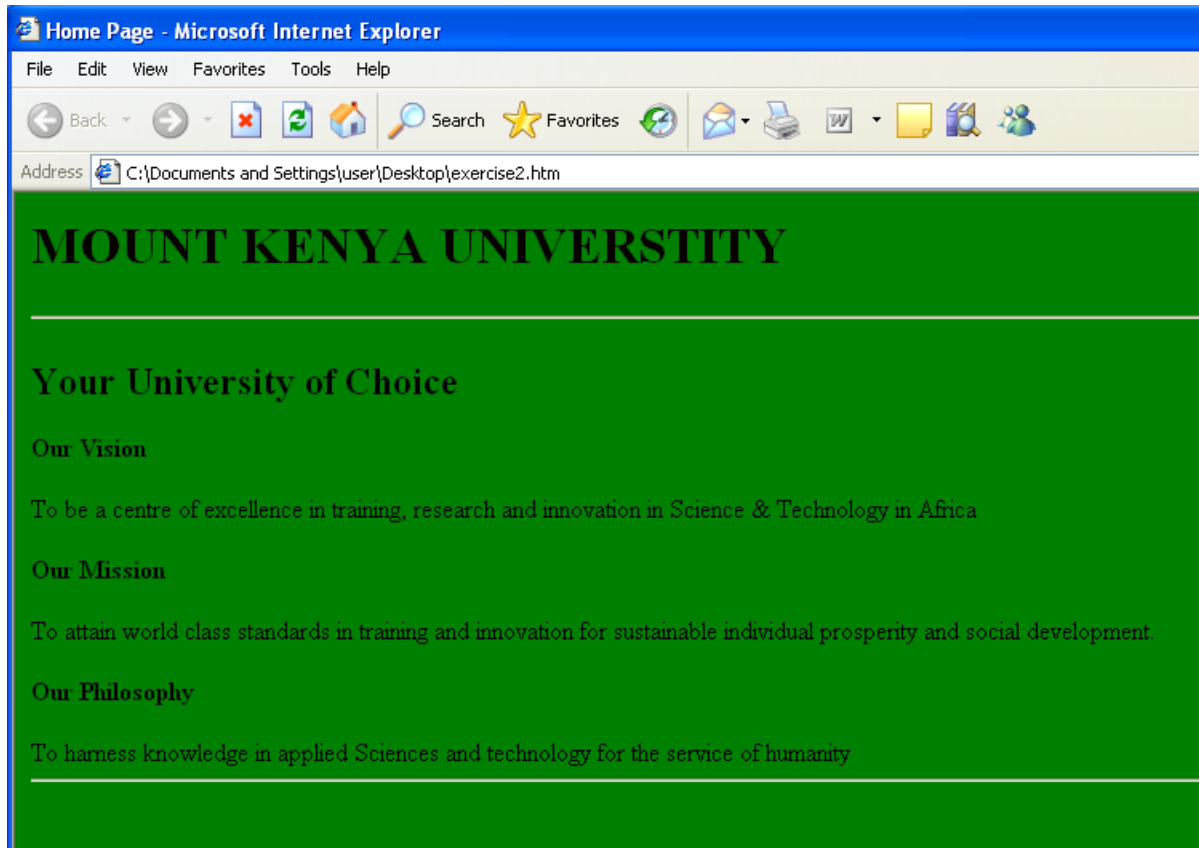
You can make up your own colors by simply entering any six digit hexadecimal value (preceeded by a hash). In the following example, we're using the same code as above. The only difference is that, instead of using "blue" as the value, we're using its hexadecimal equivalent (which is #0000ff):

```
<h3 style="color:#0000ff">HTML Colors</h3>
<html>
<head>
<title> My Gnome Page </title>
</head>
<body bgColor = -#80FFFF|| TEXT = -#008000||>
  <H1>Welcome to my Gnome page</h1>
  <font color=||#FF0000||>
  <H2>Gnomic sayings</h2>
  <font color= -#808000||>
  <p>Every gnome should have one. </p>
  <p> There's no gno place like Gnome. (Old Alaskan proverb)</p>
  <p>Gnome is where the heart is </p>
  <font color=||#0000FF||>
  <H2>Gnome computing</h2>
</body>
</html>
```

## ? Chapter review Exercise

### HTML Exercise 3

Create a web page that will display on the browser as shown below



### References

[www.w3schools.com](http://www.w3schools.com)

### Suggested Further Reading

[www.w3schools.com](http://www.w3schools.com)

## CHAPTER SIX

### INTERMEDIATE DESIGNER TAGS



#### Learning Objectives

By the end of this chapter the learner shall be able to;

- i. Use hyperlinks tags in a HTML document
- ii. Using HTML to create tables
- iii. Using HTML to create Lists

### 6.1 HTML Hyperlinks (Links)

A hyperlink (or link) is a word, group of words, or image that you can click on to jump to a new document or a new section within the current document.

When you move the cursor over a link in a Web page, the arrow will turn into a little hand.

Links are specified in HTML using the <a> tag.

The <a> tag can be used in two ways:

1. To create a link to another document, by using the href attribute
2. To create a bookmark inside a document, by using the name attribute

---

#### HTML Link Syntax

The HTML code for a link is simple. It looks like this:

```
<a href="url">Link text</a>
```

The href attribute specifies the destination of a link.

#### Example

```
<a href="http://www.mku.ac.ke/">Visit Mount Kenya</a>
```



which will display like this: Visit mount Kenya

Clicking on this hyperlink will send the user to \_MKU' homepage.

**Tip:** The "Link text" doesn't have to be text. You can link from an image or any other HTML element.

## HTML The <img> Tag and the Src Attribute

In HTML, images are defined with the <img> tag.

The <img> tag is empty, which means that it contains attributes only, and has no closing tag.

To display an image on a page, you need to use the src attribute. Src stands for "source". The value of the src attribute is the URL of the image you want to display.

**Syntax for defining an image:**

```

```

The URL points to the location where the image is stored.

The browser displays the image where the <img> tag occurs in the document. If you put an image tag between two paragraphs, the browser shows the first paragraph, then the image, and then the second paragraph.

---

## HTML The Alt Attribute

The required alt attribute specifies an alternate text for an image, if the image cannot be displayed.

The value of the alt attribute is an author-defined text:

```

```

The alt attribute provides alternative information for an image if a user for some reason cannot view it (because of slow connection, an error in the src attribute, or if the user uses a screen reader).

## Determining your image size

The size of your image can be assigned by using the width and the height values as shown below

```
<img src=||myimage.gif|| WIDTH=200 HEIGHT=100
```

## 6.2 HTML Tables

Tables are defined with the <table> tag.

A table is divided into rows (with the <tr> tag), and each row is divided into data cells (with the <td> tag). td stands for "table data," and holds the content of a data cell. A <td> tag can contain text, links, images, lists, forms, other tables, etc.

### Table Example

```
<html>

<head>

<title> Tables </title>

</head>

<body>

<table border="1">
<tr>
<td>row 1, cell 1</td>
<td>row 1, cell 2</td>
</tr>
<tr>
<td>row 2, cell 1</td>
<td>row 2, cell 2</td>
</tr>
</table>

</body>

</html>
```

How the HTML code above looks in a browser:

|               |               |
|---------------|---------------|
| row 1, cell 1 | row 1, cell 2 |
| row 2, cell 1 | row 2, cell 2 |

## HTML Tables and the Border Attribute

If you do not specify a border attribute, the table will be displayed without borders. Sometimes this can be useful, but most of the time, we want the borders to show.

To display a table with borders, specify the border attribute:

```
<table border="1">  
<tr>  
<td>Row 1, cell 1</td>  
<td>Row 1, cell 2</td>  
</tr>  
</table>
```

## HTML Table Headers

Header information in a table are defined with the <th> tag.

The text in a th element will be bold and centered.

```
<html>  
  
<head>  
  
<title> Tables </title>  
  
</head>  
  
<body>  
  
<table border="1">  
<tr>  
<th>Header 1</th>  
<th>Header 2</th>  
</tr>  
<tr>  
<td>row 1, cell 1</td>
```

```

<td>row 1, cell 2</td>
</tr>
<tr>
<td>row 2, cell 1</td>
<td>row 2, cell 2</td>
</tr>
</table>

</table>

</body>

</html>

```

How the HTML code above looks in a browser:

| Header 1      | Header 2      |
|---------------|---------------|
| row 1, cell 1 | row 1, cell 2 |
| row 2, cell 1 | row 2, cell 2 |

### Adding Captions

Captions can be added to the table by using the <caption> tag as shown in the example below;

```

<html>
<head>
<title> Tables </title>
<body>
<table border="1">
  <caption>Monthly savings</caption>
  <tr>
    <th>Month</th>
    <th>Savings</th>
  </tr>

```

```
<tr>
  <td>January</td>
  <td>$100</td>
</tr>
<tr>
  <td>February</td>
  <td>$50</td>
</tr>
</table>
</body>
</html>
```

How the HTML code above looks in a browser:

| Monthly savings |         |
|-----------------|---------|
| Month           | Savings |
| January         | \$100   |
| February        | \$50    |

## 6.3 Lists

The most common HTML lists are ordered and unordered lists:

### HTML Lists

#### An ordered list:

1. The first list item
2. The second list item
3. The third list item

#### An unordered list:

- List item
- List item
- List item

### HTML Unordered Lists

An unordered list starts with the `<ul>` tag. Each list item starts with the `<li>` tag.

The list items are marked with bullets (typically small black circles).

```
<ul>
<li>Coffee</li>
<li>Milk</li>
</ul>
```

How the HTML code above looks in a browser:

Coffee  
Milk

|             |                          |  |
|-------------|--------------------------|--|
| <u>type</u> | disc<br>square<br>circle | <b>Deprecated.</b> Use styles instead.<br>Specifies the style of the bullet points of the list items |
|-------------|--------------------------|--|

### Example with the type tag

```
<html>
<body>
<h4>An Unordered List:</h4>
<ul type="square">
  <li>Coffee</li>
  <li>Tea</li>
```

```
<li>Milk</li>
</ul>
</body>
</html>
```

How the HTML code above looks in a browser:

#### **An Unordered List:**

- Coffee
- Tea
- Milk

## **HTML Ordered Lists**

An ordered list starts with the `<ol>` tag. Each list item starts with the `<li>` tag.

The list items are marked with numbers.

```
<ol>
<li>Coffee</li>
<li>Milk</li>
</ol>
```

How the HTML code above looks in a browser:

1. Coffee
2. Milk

```
<html>
<body>
<h4>Numbered list:</h4>
<ol>
<li>Apples</li>
<li>Bananas</li>
<li>Lemons</li>
<li>Oranges</li>
</ol>
```

With a type tag

```
<h4>Letters list:</h4>
```

```

<ol type="A">
  <li>Apples</li>
  <li>Bananas</li>
  <li>Lemons</li>
  <li>Oranges</li>
</ol>

```

|             |                       |  |
|-------------|-----------------------|--|
| <u>type</u> | 1<br>A<br>a<br>I<br>i | <b>Deprecated.</b> Use styles instead.<br>Specifies which kind of bullet points will be used |
|-------------|-----------------------|--|

## HTML Definition Lists

A definition list is a list of items, with a description of each item.

The <dl> tag defines a definition list.

The <dl> tag is used in conjunction with <dt> (defines the item in the list) and <dd> (describes the item in the list):

```

<dl>
  <dt>Coffee</dt>
  <dd>- black hot drink</dd>
  <dt>Milk</dt>
  <dd>- white cold drink</dd>
</dl>

```

How the HTML code above looks in a browser:

Coffee

- black hot drink

Milk

- white cold drink

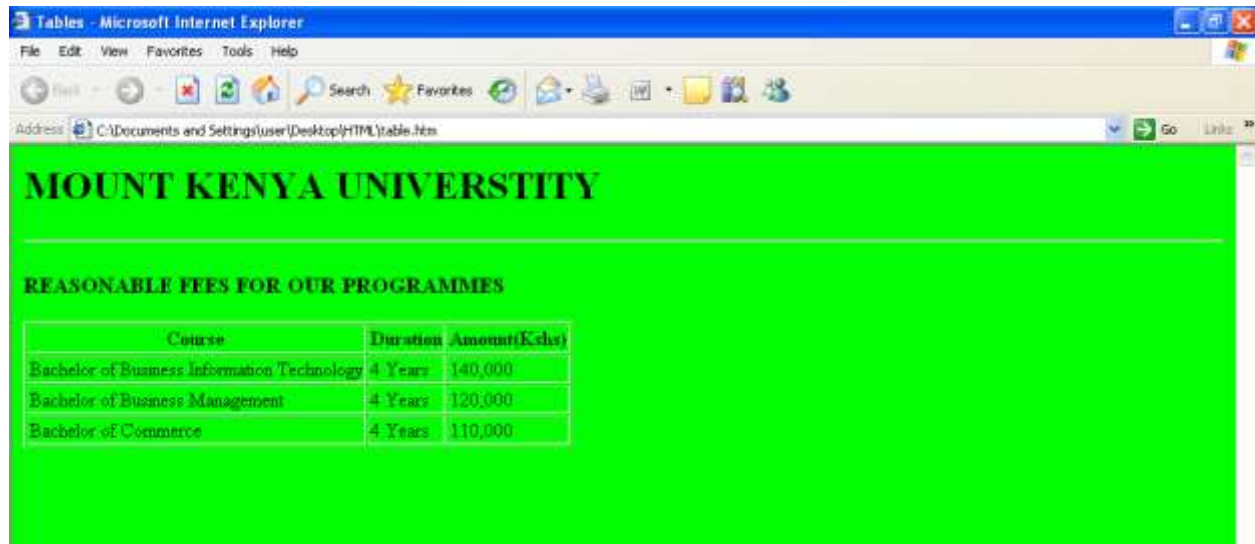




## Chapter review Exercise

### HTML Exercise 4

Create a web page that will display on the browser as shown below



### References

[www.w3schools.com](http://www.w3schools.com)

### Suggested Further Reading

[www.w3schools.com](http://www.w3schools.com)

## Solutions to exercises

### HTML Exercise 2

```
<html>
<head>
<title>home</title>
</head>
<body>
Creating web pages is fun!!!
</body>
</html>
```

### HTML Exercise 3

```
<html>
<head>
<title> Home Page </title>
</head>
<body bgcolor = "#008000" TEXT = "#800000">
  <H1>MOUNT KENYA UNIVERSTITY</h1> <hr />
  <font color= "#000000">
    <H2>Your University of Choice</h2>
    <b>Our Vision</b>
    <p> To be a centre of excellence in training, research and innovation in Science &
Technology in Africa
    <p> <b> Our Mission</b>
    <p> To attain world class standards in training and innovation for sustainable
individual prosperity and social development.
    <p> <b> Our Philosophy</b>
    <p> To harness knowledge in applied Sciences and technology for the service of
humanity <hr />
  </body>
</html>
```

### HTML Exercise 4

```
<html>
<head>
<title> Tables </title>
</head>
<body>
<body bgcolor = "#00ff00" TEXT = "#000000">
  <H1>MOUNT KENYA UNIVERSTITY</h1> <hr />
  <font color= "#000000">
    <H3>REASONABLE FEES FOR OUR PROGRAMMES</h3>
```

```

<table border="1">
<tr>
<th>Course</th>
<th>Duration</th>
<th>Amount(Kshs)</th>
</tr>
<tr>
<td>Bachelor of Business Information Technology</td>
<td>4 Years</td>
<td>140,000</td>
</tr>
<tr>
<td>Bachelor of Business Management </td>
<td>4 Years</td>
<td>120,000</td>
</tr>
<tr>
<td>Bachelor of Commerce</td>
<td>4 Years</td>
<td>110,000</td>
</tr>
</table>
</body>
</html>

```

Sample papers

**Mt Kenya**



**University**

**UNIVERSITY EXAMINATION SCHOOL**

**OF APPLIED SOCIAL SCIENCES**

**DEPARTMENT OF INFORMATION TECHNOLOGY**

**BACHELOR OF BUSINESS INFORMATION TECHNOLOGY**

**END OF SEMESTER EXAMINATION**

**COURSE CODE: BIT 1107**

**COURSE TITLE: FUNDAMENTALS OF INTERNET**

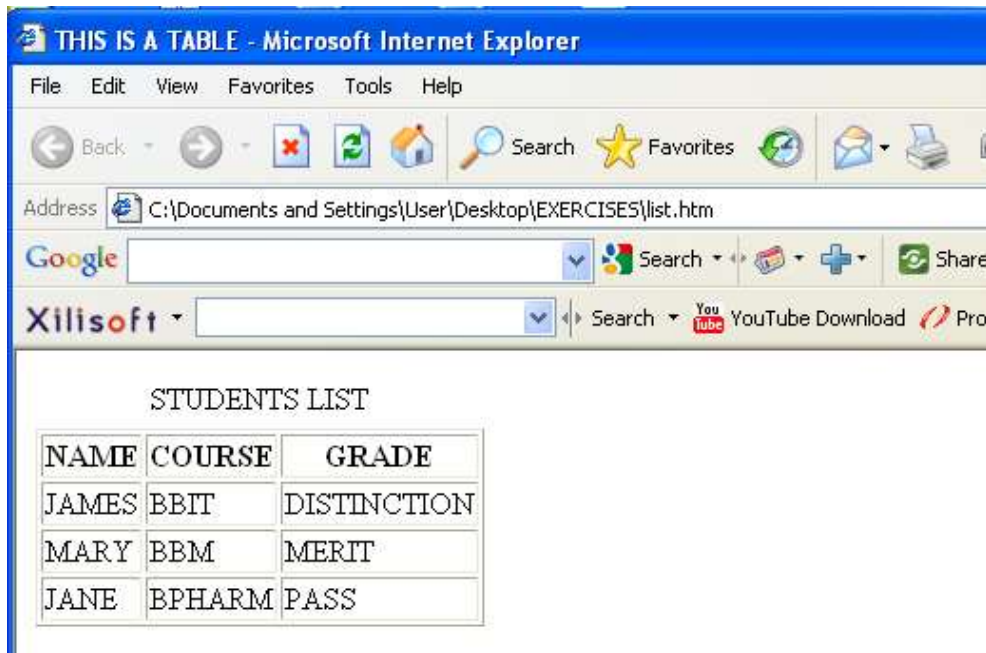
**TIME: 2HRS**

**Instructions:** Question ONE is **COMPULSORY** and any other TWO from section B.

**SECTION A.**

**Question 1**

- a) Explain the different services offered by the internet (10 Marks)
- b) Write the HTLM code that would be used to give the output below



(10 Marks)

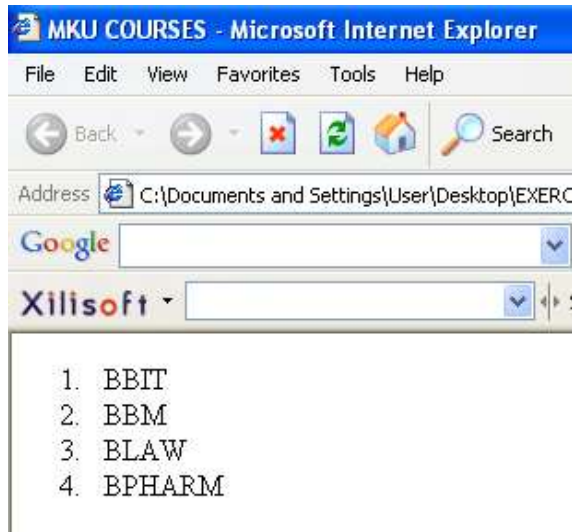
- c) Explain the different protocols used in the internet explaining their importance (5 Marks)
- d) Explain the term domain name system giving its significance (3 Marks)
- e) Explain the major functions of a WWW server (2 Marks)

## Question 2

- a) The internet back bone is hierarchical in nature discuss and illustrate with diagrams where possible. (8 Marks)
- b) Write a brief history of the internet noting the major milestones (8 Marks)
- c) Describe the rules for naming domains on the Internet (4 Marks)

## Question 3

- a) Write the html code that would be used to obtain the list of courses offered at MKU. (8 Marks)



- b) A friend has just bought a new computer and needs an internet connection at home. Advice on the hardware, software and other requirements for him to connect to the internet. (4 Marks)
- c) Explain the different internet protocols that support user applications (8 Marks)

#### Question 4.

- a) Define search engine (2 Marks)
- b) Describe how a search engine works (10 Marks)
- c) Discuss why anyone should use the Internet (8 Marks)

#### Question 5

- a) Explain the following concepts:

- i) Web caching
- ii) Firewall
- iii) Web Hosting
- iv) Browser
- v) Home page

(10 Marks)

- b) A user types `-http://www.example.net/index.html||` in the browser. Explain the steps taken to display the page in the browser.

(10 Marks)

# Mt Kenya



# University

**UNIVERSITY EXAMINATION SCHOOL OF**

**PURE AND APPLIED SCIENCES**

**DEPARTMENT OF INFORMATION TECHNOLOGY**

**BACHELOR OF BUSINESS INFORMATION TECHNOLOGY**

**END OF SEMESTER EXAMINATION**

**COURSE CODE: BIT 1107 COURSE TITLE: FUNDAMENTALS OF INTERNET**

**TIME: 2HRS**

**December 2010**

---

**Instructions:** Question ONE is **COMPULSORY** and any other TWO from section B.

**SECTION A.**

**Question 1**

**a)** Explain the following:

Domain name

Uniform Resource Locator

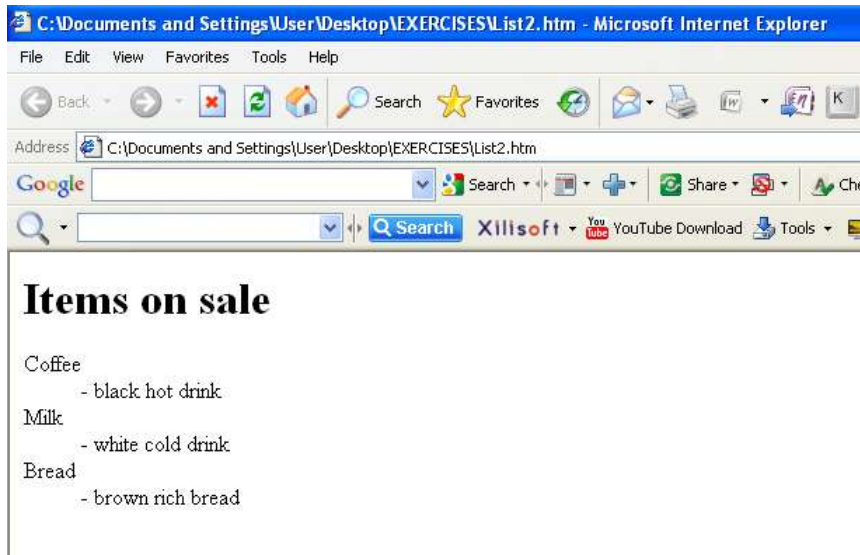
Domain Name System

Web crawler

File Transfer Protocol

**(10 Marks)**

**b)** Write the HTML code that could be used to display the following page



[10 Marks]

c) Write a brief history of the internet development noting the major milestones to date.

[10 Marks]



## **Question 2**

a) Write HTML code to create the following list

(10mks)

### **MT KENYA UNIVERSITY**

#### ***Courses offered***

- i. BBIT
- ii. DBIT
- iii. DIT

#### **Stages**

- iv. CIT
  - v. CBIT
  - vi. CICT
- Stage I
  - Stage II
  - Stage III
  - Stage IV
  - Stage V

b) Differentiate between open tags and closed tags (4mks)

c.) What steps do you use to save your work in HTML (3mks)

d) Outline any three attributes used with the body element (3mks)

## **Question 3**

(a) What is the difference between the Internet and the World Wide Web?

(4 marks)

(b) What facilities (hardware, software etc) are required in order to connect a stand-alone computer to the Internet and start conducting email correspondence and searching?

(7 marks)

(c) Compare and contrast **three** major types of search engine used to find information on the Internet.

(9 marks)

(Total 20 marks)

#### **Question 4**

(a) Explain the meaning of **each** of the following terms, giving an example where appropriate.

(i) ISP

(ii) URL

(iii) SMTP

**(2 marks each)**

(b) The Internet depends on the availability of communications technologies and an agreed protocol.

i) Explain what is meant by a protocol **and** give an example of a protocol you have used.

**(4 marks)**

ii) The Internet is a packet switching network. Explain how a packet switching network works.

**(4 marks)**

iii) In many countries the cost of broadband is comparable to the cost of a 56k dial-up connection. Explain why most people prefer a broadband connection.

**(4 marks)**

#### **Question 5**

a) Briefly explain five different protocols that support the different services offered by the internet **(10 Marks)**

b) The internet has brought about both opportunities and challenges, explain

**(10 Marks)**