Information and Software Technology

Option Topic 5: The Internet and Website development

Figure 1. A Usenet flow map from May 1993 produced by Brian Reid, formerly of DEC. (http://reid.org/brian/index.html) (This picture was found using the Search engine Google/Images and entering the word "internet".)

Outcomes
A student:
5.2.1 describes and applies problem-solving processes when creating solutions
5.2.2 designs, produces and evaluates appropriate solutions to a range of challenging problems
5.2.3 critically analyses decision-making processes in a range of information and software solutions.
What is the Internet?

The picture on page 1 was obtained by using a search engine
To get the answer to this question lets use the internet. Open a browser (Firefox on the Macs and Internet Explorer on Windows) and then Google and enter "define: internet".

![Google](image)

The list that appears has many interpretations but one or two things come out of this. A lot of the definitions mention a "vast collection of interconnected networks" and that “computers are connected on a global basis”.

The Internet was created in the early 1960s by the Department of Defence in the United States of America. Other organisations, such as universities, research groups, NASA (the National Aeronautics and Space Administration) and the National Science Foundation, joined the network to encourage the sharing of research findings. A vast array of information is available on the Internet in the form of text, graphics, sound, video or multimedia files. Information can be as diverse as medical imagery, previews of the latest movie releases, government policy, poetry, scientific data, library catalogues or someone's favourite recipes.

The Internet is a worldwide connection of many thousands of computer networks. All of the networks that comprise the Internet use a common language, Transmission Communication Protocol/Internet Protocol, TCP/IP, to communicate. They are all connected to each other through communications channels, many of which remain permanently open. The Internet enables people who have access to these networks to share information and knowledge.

The Internet is a cooperative community of networks, and thus nobody owns the Internet. It is made up of many small parts in many different countries. Within each country, there is an organisation that supports the Internet and provides the main communication channels. Within the world, there is a group that coordinates the overall network. It is a facility that anyone can use. People often comment that the Internet belongs to everyone and to no one.

The Internet Network

The Internet is structured in a hierarchical form. At the top, each country has at least one major backbone network that carries Internet data between its main cities and centres. These networks consist of high-speed communication channels that carry data and information. There are then many smaller networks that connect homes, schools, universities and commercial users to the backbone networks. A network of many communication channels is then used to connect countries. Today, there are more than eighty thousand networks in more than one hundred and fifty countries worldwide that form the Internet.

![GrangeNet Backbone](image)

Figure 3: Source : Markus Buchhorn's presentation : "What will the New Internet Look Like" <escience.anu.edu.au/.../printNotes.en.html>
Exercise 1:
• Obtain some butchers paper and coloured marker pens.
• On it rule a vertical line and divide it into 50 equal parts.
• On each part write a year starting at 1955 up until the current year. (i.e. 1955 to 2005)
• Search the Net using Google with the words "internet timeline" or use the information on the following site.
• Complete as much information as possible onto your timeline. The image on the next page was found on the net using google and your final poster may look very similar. (If you copy this you will get zero!)

The following questions are to be answered in a word processor.

a) Define: Internet. (Hint: use Google as above)
b) Define the following acronyms.
   WWW, HTML, ARPANET, FTP, HTTP. IBM, WAN, LAN, INTRANET, TCP/IP, IRC, ASCII, AARNET, CERN, W3C.

c) True or false?
   i  The first network underlying internet development was ARPANET.
   ii ISP stands for "internet serial protocol".
   iii FTP was the hypertext component of HTTP
   iv The internet is a global network.
   v The idea of the world wide web came from Tim Berners-Lee.
   vi In 1973, ARPANET was also known as the world wide web.
   vii The world wide web was the beginning of the rapid expansion of the internet amongst general users.
   viii Packet switching networks allowed data packets to efficiently travel different routes to their destinations.
   ix On the internet MUD stands for multi-user development.
   x Satellites, fibre optics and gateways were essential developments in internet expansion.

d) HARDER QUESTION. What was the contribution of connect.com.au to the history of the internet in Australia? (Don't bother using google. You need a different search engine!)

History of the Internet

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>1968</td>
<td>Beginning of the Internet - ARPANET: 4 computers connected</td>
</tr>
<tr>
<td>1969</td>
<td>Telnet Created</td>
</tr>
<tr>
<td>1971</td>
<td>FTP (File Transfer Protocol) created: 23 computers connected</td>
</tr>
<tr>
<td>1972</td>
<td>Vinton Cerf (Father of the Internet) elected chair of Internetworking Networking Group; First email created by Ray Tomlinson</td>
</tr>
<tr>
<td>1973</td>
<td>TCP/IP (Transmission Control Protocol) developed by Cerf</td>
</tr>
<tr>
<td>1976</td>
<td>Ethernet developed by Robert Metcalfe; 1113 computers connected</td>
</tr>
<tr>
<td>1979</td>
<td>USENET created by Tom Truscott &amp; Jim Ellis</td>
</tr>
<tr>
<td>1981</td>
<td>National Science Foundation creates CSDN for those not connected to ARPANET; Cerf proposes interconnection; 2133 computers connected</td>
</tr>
<tr>
<td>1982</td>
<td>Term Internet used for first time;</td>
</tr>
<tr>
<td>1983</td>
<td>U of Wisconsin creates DNS (Domain name Service) so that addresses could be text not numbers (URLs); 562 computers connected</td>
</tr>
<tr>
<td>1987</td>
<td>BITNET and CSDN merge to form CREN (Corporation for Research and Educational Networking); 28174 computers connected</td>
</tr>
<tr>
<td>1990</td>
<td>Tim Berners Lee and CERN create hypertext; 313,000 computers connected; ARPANET disbanded only Internet left</td>
</tr>
<tr>
<td>1992</td>
<td>World Wide Web released by CERN; 1,135,000 hosts</td>
</tr>
<tr>
<td>1993</td>
<td>Marc Anderson creates Mosiac – first web browser; 2,096,000 hosts</td>
</tr>
<tr>
<td>1995</td>
<td>Internet delivers more mail (email) than US Post Office; 6,642,000 hosts</td>
</tr>
<tr>
<td>1996</td>
<td>Internet celebrates 25th anniversary 40,000,000 people connected; 12,000,000 hosts; number of computers on internet doubles every 12 to 15 months</td>
</tr>
<tr>
<td>2000</td>
<td>185 countries connected, 70,000 computer NETWORKS; 300,000,000 people worldwide</td>
</tr>
</tbody>
</table>

What is an Intranet?

Open a browser at this address. 

Our Intranet
NSW Department of Education & Training

This page opens what is known as an **intranet**, but how is this different to the internet?

![Intranet Diagram]

Figure 5: Det intranet.

An intranet is a private network that uses a similar interface to the Web. It usually has a connection to the Internet and consists of many interlinked LANs. (A LAN is a Local Area Network.) The main purpose of an Intranet is to share information and computing resources among the members of an organisation. The information may be such things as staff news, product information, telephone directories, policies, employee manuals or calendars. When the intranet provides access to the Internet, it is through firewalls. Firewalls monitor the flow of data traffic in both directions to maintain the security of the organisation.

![Firewall Diagram]

Originally, the term firewall referred to a construction technique designed to prevent the spread of fire from one room to another. It has also been used to describe the barrier placed between the engine and passenger compartments in cars and ships. In computers it refers to a software barrier which is designed to separate two parts of a network.

Figure 6: Off the mark. www.offthemark.com
The Internet and Website Development

Name: ..............................................................

Page 5

Let's examine our own School's Intranet and how it relates to the Internet at large.

The builders installed cables which link all of the buildings back to the Library. The room in the library which houses all the servers and end points for these cables is known as the Campus Distributor. Each building itself has classrooms with wall sockets, and each wall socket connects with a cable back to a single cabinet which contains switches which connect these cables to the one which links back to the library. So in effect, each classroom is a LAN, and all the classroom LANs are part of the buildings LAN, and the buildings LANs are part of the School's LAN, which itself is part of the DET LAN. So the whole DET LAN is in effect its own INTRANET. This INTRANET then connects to the outside world and the Internet through the DET Firewall, which is currently in North Sydney. Impressive.

Exercise 2

a. Use the map in your diary to draw a diagram to represent the layout of the school's Local Area Network.

b. Draw a second diagram to show how the school's LAN is connected into the Department of School Education's Intranet and the Internet at large.

c. Compare and contrast an Intranet with the internet.

<table>
<thead>
<tr>
<th>Compare</th>
<th>Show how things are similar or different</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contrast</td>
<td>Show how things are different or opposite</td>
</tr>
<tr>
<td>HINT:</td>
<td>Draw a table with one column headed similarities, the other as differences</td>
</tr>
</tbody>
</table>

To be completed by: ………………………………………………………………………………………………………………………

Uses of the Internet.

So what do people use the internet for?

We can identify many uses of the Internet. Here we will consider the following.

• Email
• Mailing lists
• Message Boards
• Discussion Groups
• Newsgroups
• Chatting
• Messaging
• Research
• Access to information with search engines.

1. email

![Hotmail](https://via.placeholder.com/150)

Welcome back!

Figure 7: Email services.
**What is email?**

Electronic mail or email allows you to send messages, text, graphics, photos and more to anyone with an email account. Your message is received within minutes of being sent.

To send and receive email you will need an email address. When you join with any ISP you will be assigned one. Optus offers its customers the option to set up more.

An email address has two main parts; the username and the domain.

```
    domain
    jbloggs@optusnet.com.au
    username    country code
```

Figure 8 email address at OptusNet

The user name identifies you on the OptusNet network. Most people choose a user name that reflects their real name or nickname.

The domain or host name is the name of your Internet Service Provider (ISP).

The two-letter country code identifies the country in which the email address is registered, for example .au means **Australia**, .uk means **The United Kingdom**. The United States, being the inventor of the internet, has no country code.

Each email address is unique and must be used exactly as given - adding spaces, dots or other characters may cause an email to be sent to a different person than it was intended.

Each student at the NSW Department has an email address attached to their e-learning account. A student’s email address is their e-learning account user name and the DET domain, @education.nsw.gov.au.

For example **joe.bloggs@education.nsw.gov.au**

Figure 9 email address at the DET portal

**How email works**

On the network system, one computer acts as the main host and each user has an electronic mailbox on the hard drive of this computer. When a message is posted, it travels along the network to the host computer and the mailbox to whom it is addressed, and is stored there until the recipient checks the mail. The email program downloads the selected messages from the host computer to the user’s computer where they are stored and shown as a list ready to read.
Email

Your e-learning account is web based using a standard browser which opens your email in a separate window which looks very much like the picture of Microsoft Outlook above.

Exercise 3

Go to the website at http://writing.colostate.edu/guides/documents/email/list3.cfm

What are 5 things that email allows users to do?

Complete the worksheet attached to this booklet labelled 4.5 Electronic Mail and hand it in for marking.

To be completed by: .................................................................

Sending an email message -

Many software programs can be used for email, and all produce similar looking messages. There are usually several distinct parts to the forms used to create email messages.

Title - includes the address of the receiver, address of the sender, the subject of the communication(briefly) and sometimes an attachment to send other files with the message.

Body - carries the message in plain text

Signature - senders details are automatically pasted to the end of the message.
Receiving email -
When the user logs into the mail system, and checks the mail, any new mail is downloaded to the user’s inbox. These messages show in a list along with others previously received.
The list shows -

• the date and time each message was sent
• the person who sent the message
• the subject of the message

Answering email -
The usual response to email is of course to reply to it. The reply command displays a blank form addressed to the sender, with the same subject line and the original contents. Responses can be made very quickly.

Exercise 4
Email addresses have 2 parts e.g. jmacintosh@apple.com.au
• the first part of the address identifies the person – e.g. James Macintosh
• the second part names the host computer where the email account is stored – e.g. Apple Australia

What do the following addresses tell you?

(i) plambe@westfields.edu.au
(ii) jcros@microsoft.com.au
(iii) bdaly@bjd.inc.edu.uk

Complete the exercise attached to your booklet called **4.6 Creating email** and hand it in for marking.

To be completed by: .......................................................... .......................................................... .......................................................... .......................................................... .......................................................... ..........................................................

Exercise 5
Email Etiquette.
What is meant by email etiquette?
List 10 rules for email behavior for students which could be inserted into next year’s school diary.

References:
http://www.bpl.org/kids/Netiquette.htm Internet Etiquette for Kids

Others:
https://my.unsw.edu.au/student/Staff/EmailEtiquette.html

Search google for email etiquette, netiquette, internet etiquette.

Complete the worksheet attached to this booklet labelled **4.7 Attachments and netiquette** and hand it in for marking.

To be completed by: ........................................................................................................................................

2. Mailing lists
Mailing lists are groups of people with similar interests who join up or “subscribe” to a list of email addresses. If you subscribe to a mailing list you must supply an email address. It is not a good idea to give your main email address. If you do you could be exposed to unwelcome email, particularly from direct marketers. It is a good idea to sign up, instead, for a free email address from Yahoo, for example. If this account gets overwhelmed with email rubbish then just abandon it. Yahoo will disable it after a while if it is not used.
3. Message Boards

Message boards are like notice boards in a virtual space. You can read what others say. However you can only contribute if you sign up. Australian Idol, for example, ran a message board for people to leave messages whilst the program was running on TV. It closes after the completion of the show.

4. Discussion Groups

Once again, you must subscribe to belong to a discussion group. They combine the functions of both mailing lists and message boards. Such groups may be used to discuss things such as future football results, books worth reading, politics and scientific interests and hobbies.

5. Newsgroups

Newsgroups, like discussion groups, combine the functions of both mailing lists and message boards. Google for example has a section called Google Groups with a wide selection of interests. For example rec.games.empire has lots of discussion about Age of Empires.

Newsgroups are similar to special interest notice boards where anyone can read or post messages. Users don't receive individual email messages and it is not private. Newsgroups allow messages to be:

- read by unlimited numbers of people
- sent by anyone who chooses to subscribe
- reviewed before posting to the newsgroup. This is called a moderated newsgroup.

6. Chatting

Chat allows real time interaction using text-based messaging.

Web-based chatting over the internet allows participants to talk to each other in real time, just like using a telephone but using a browser. In fact the distinction between chatting and telephones has become blurred with Chat services now able to rival telephones for clarity. Voice over IP is an extension of chat where people can talk over vast distance just like using a telephone but actually using a computer and an Internet connection.
IRC (Internet Relay Chatting) connects the user to an IRC server and chat rooms. Yahoo has many different Chat Rooms available. <http://au.chat.yahoo.com/?myHome>. Here you could talk about such things as Australian Idol after signing up. When you sign up you assign an alias to yourself, so you don’t need to reveal your true identity.

As a school student you must not ever reveal your own identity, that of the school or of your family or friends over the internet.

Exercise 6: Outline some of the hazards of giving out your identity over email or in chat groups.
To be completed by: .................................................

7. Messaging

Direct chat, or instant messaging, lets you set up lists of friends and message these directly when both are connected to the internet at the same time.

8. Research

The Internet has revolutionised our access to knowledge. Search Engines are software tools that have stored links to data that is anywhere on the Internet.

Some search engines are: ….. Yahoo, Google, AltaVista, DogPile, Lycos.

1. Bulletin boards

A Bulletin Board system is a messaging and database system accessed via computer. Before the days of the Internet, Bulletin Board systems (BBS) were the main method of group communication, where messages were stored, retrieved and catalogued. These are run by groups of people (ranging from business level CompuServe and Telecom Discovery to clubs, user groups, etc.) and a systems operator (SysOp) as the person who set up and maintained it. Many of these still operate, though at a lower and less professional level these days as the free software and information available is less than on the Internet. The Streamwatch program for high schools is a BBS run by the NSW Dept of Water Resources to monitor the quality of water in local streams and rivers. (http://www.streamwatch.org.au/main.jsp)

When a member logs on and gains access to the BBS a menu is generally displayed and a message informs them of any messages. The user can then read the messages, send a message to another user or group of users, read special board notices and download or upload a notice.

BBS facilities may include -
• forums or conferences where people can exchange ideas, views and information about some area of interest
• dating services
• uploading or downloading of software and files
• booking services for airline tickets and entertainment
• help lines for technical problems e.g. Microsoft

The Internet is really a very large international BBS, as many of the things users did through their local BBS are now incorporated into the Internet over a larger area.

Searching the Internet

One of the advantages and problems of the web is its sheer size. No one knows exactly how many pages and files are on the web at any one time but estimates suggest there are hundreds of millions of web pages accessible to web users. While having this much information at your fingertips can be very advantageous, it is often difficult to know what is there, and valuable information and sites can remain unknown.
Search Engines
Finding information on the World Wide Web is aided greatly by the use of a search engine. There are four main types of search engines.

Category-based search engines (like Yahoo®) — these are like library catalogues which group websites by categories, and to use them effectively you need to know what category you need.

Standard search engines (like Google™) — here you type in a search word or phrase and links are provided to the matching pages along with short descriptions for each page.

Meta search engines (like DogPile) — these engines submit your search to many search engines and return a number of links from each.

Natural-language based search engines (like Ask Jeeves) — you type in a question in the normal way (e.g. 'How many moons does Saturn have?') and these analyse the question and provide links.

Exercise 7.
Complete the worksheet attached to this booklet labelled 4.4 Searching the Web and hand it in for marking.
To be completed by: .............................................................................................................................

Exercise 8.
Use a search engine like Google to find "search engines". Make a list of about 5 Australian and International search engines. Identify the appropriate search tools you would use for each of the following searches about the British explorer Captain James Cook and find answers for each.

1. What was Captain James Cook's wife's name?
2. Describe the appearance of Captain James Cook?
3. What was James Cook’s connection with the planet Venus?
4. Describe the circumstances of James Cook's death and his age at the time.
5. In his own words, what were James Cook's first impressions of the Aborigines?

To be completed by: .............................................................................................................................

Search Engine Features
The different search engines all have different features to attract web users. Some of the features of the different engines include:

• a database of pictures and sounds;
• links to on-line newspapers;
• a database of email addresses;
• subject indexes to enable browsing; and
• links to top WWW sites.

Exercise 9
Research Work
Sir Francis Bacon (1561-1626) is credited with the quote "knowledge is power". Use the internet search engines to find out what Bacon contributed to science and technology. (Most people feel Bacon is responsible for establishing the scientific method that we know today.)

This should submitted as an essay on one page of about 100 words.
To be completed by: .............................................................................................................................
Advantages of Search Engines

There are three very compelling advantages of most search engines.

1. The indexes of search engines are usually vast, representing significant portions of the Internet, offering a wide variety and quantity of information resources.

2. The growing sophistication of search engine software enables us to precisely describe the information that we seek.

3. The large number and variety of search engines enriches the Internet, making it at least appear to be organized.

GUIDE TO CONDUCTING RESEARCH ON THE INTERNET

What this means is that search engines enable us to find information that would not have been available without a search engine. Therefore people are much more likely to make information available if they know it can be located by people using search engines. This was the original intention of the Internet: to allow scientists to share their information. The better the search engines become, the greater the amount of information likely to be found.

Disadvantages of Search Engines.

As a rule, the more bizarre a thing is, the less mysterious it proves to be.

1. Regardless of the growing sophistication, many well thought-out search phrases produce list after list of irrelevant web pages. The typical search still requires sifting through dirt to find the gems.

2. Using search engines does involve a learning curve. Many beginning Internet users, because of these disadvantages, become discouraged and frustrated.

Internet Software

Before we look at the software which is specific to Internet use, let’s revise what is meant by the term software.

All the objects you can physically touch in an information system are called Hardware. This includes the keyboard and mouse, the case (the box the computer is in), the monitor and peripherals such as scanners and printers.
System Software

Systems software is that which controls the different components and devices in the computer and manages the programs which are running.

The systems software runs in the background while the application software lets you perform specific tasks, such as writing email messages and surfing the WWW. Examples of system software you may use are Mac OS X on the Macs at school, and Windows at home. Examples of application software are AppleWorks or Microsoft Word.

Exercise 10

Go to the Computing web site on the school's network and Resources and look at the sections on Mac, MSDOS, Windows and History. Answer the following questions.

a) Who helped Bill Gates write MSDOS for the first IBM PC?
b) What is a GUI? What is the name and manufacturer of the personal computer which had the first GUI?
c) What was the name given to Microsoft's first GUI?
d) What made the Macintosh of 1984 so different to the IBM PC?
e) How does UNIX (and Linux and Mac OSX) differ from Windows 95/8?
f) Define: Operating System (Hint: type this exactly into Google)

To be completed by: ..............................................................................................................................................

Applications Software

While the systems software controls the various components of the computer, the applications software is that which makes the computer perform the tasks we require e.g. word processor, spreadsheet, database, etc.

Exercise 11

1. Make a list of 10 Applications found on your classroom Mac in your diary.
2. At home compare the list from the Mac to what is on your home computer. List the software that appears on both computers. Which software only appears on your home computer and not on the school's Macs.
3. What is Utility software. Give one example.

To be completed by: ..............................................................................................................................................

Internet applications

Programs that let you use the services that the Internet provides are called Internet applications.

Internet software consists of:

   - browsers which enable users to go on the World Wide Web, (e.g. Firefox)
   - authoring software which enables users to create their own web pages which others can see, (e.g. Dreamweaver)
   - utility software which carry out tasks such as uploading web pages to an ISP's server (e.g. CuteFTP).
Exercise 12
Complete the worksheet 4.2 Web Browsers which is attached to the back of this booklet. Make sure you don’t tear any pages as you remove the worksheet. Hand it in for marking.

To be completed by: .................................................................................................................................

Authoring Software

Authoring software allows users to create web pages more professionally without a detailed knowledge of HTML, the language of the web.

HTML

From Wikipedia, the free encyclopedia.

In computing, Hypertext Markup Language (HTML) is a markup language designed for the creation of web pages and other information viewable in a browser. HTML is used to structure information -- denoting certain text as headings, paragraphs, lists and so on -- and can be used to define the semantics of a document.

http://en.wikipedia.org/wiki/HTML

Many software applications like Microsoft Word and PowerPoint have sophisticated HTML functions built into them.

Exercise 13
Microsoft Word will very easily convert a page of text and graphics into a web page by using Save as Web Page from the File menu, or File and Web Page Preview.
However, programs like Word and PowerPoint can save web pages in a very messy way which can be difficult to fix if things go wrong.

Open the Project Gallery in Word and make a new web page. Go to View/Toolbars and show the Web toolbar.
Type the text in the box below with the features described by the callouts. Save the file as a web page with the file name webpage1.html

This is where you type text for your page

Headings can be in different sizes

Clicking these words will take you to the Board of Studies Web Site. This link should be red if you haven't visited the BOS site and green if you have. Examine the HTML code to see if you can tell why this is so.

Select this text and insert a hyperlink to http://www.boardofstudies.nsw.edu.au/

Figure 17 Creating a simple web page

Next open the page in Firefox and see if it behaves properly. Then view the source code (View .. View Source). to see what Word has done to create the page.
Next: Enter the simple html code in the box below into TextEdit, which is a basic text editor. Save it as text with the file name webpage2.html. Open the file using Firefox and then view the source (View .. View Source).
What does Word do to a simple web page when it creates it?

Although this is not a strict test because Word does not need the tags we left on the document it just shows how an application which is not a strict HTML editor can compromise the results.
Copy the text again from the word document and paste it into the Code window of Dreamweaver and view the results again in Safari.
**HTML Code**

```html
<html>
<head><title>My first web page</title></head>
<body bgcolor="#FFFFFF" link="#FF0000" vlink="#00FF00">
<h1 align="right">This is where you type text for your page</h1>
<center>
<h2>Headings can be in different sizes</h2>
</center>
<div align="right">Look at what this tag does!</div>
Clicking these words will take you to the Board of Studies Web Site. This link should be red if you haven’t visited the BOS site and green if you have. Examine the HTML code to see if you can tell why this is so.
</a>
</body>
</html>
```

If you want to learn how to write HTML code from basics then use the free tutorial on the school's Computing Faculty website.

![Computing web page](image)

You can also view the How to file on using Dreamweaver to Create a Website. (Computing/Resources/Tutorials/) (http://10.18.248.33/computing/assets/Creating%20a%20Web%20Site.pdf)

You must use a basic text editor like TextEdit to code HTML from basics on a Macintosh. DO NOT use Word or Appleworks.

Authoring programs like Microsoft FrontPage (http://office.microsoft.com/en-us/frontpage/), Expression Web, and Macromedia Dreamweaver enable you to see roughly what the web page will look like before you load it into a browser. We have a license for Dreamweaver and it is installed in the Computer rooms. You can download a 30 day Trial Version from https://www.adobe.com/cfusion/tdrc/index.cfm?product=dreamweaver

**Protocols**

Protocols are rules that determine how data is handled over the internet.

Without such rules, data handling has no standards and will vary from system to system. The development of the internet as one system accessible to the world and able to allow communications between machines of many different types depended on the development of these protocols or standard rules.
Exercise 14

Protocols
Use the text book available from your teacher to complete the following activity.
Construct a table to show the following protocols. What they mean and for what purpose they are used.


- Transmission Control Protocol/Internet Protocol ..............TCP/IP,
- HyperText Transfer Protocol ........................................http,
- Simple Mail Transfer Protocol ......................................smtp,
- File Transfer Protocol .................................................ftp.

To be completed by:..........................................................

World Wide Web (www)

The World Wide Web is an information medium for the dissemination of information. As such it is an interactive medium where users can make decisions about what they see and do.

The World Wide Web is a fairly recent invention and one that has taken the world by storm. Many feel that those that invented the WWW have invented a system that will change the way the world operates.

The WWW is a worldwide network of computers on the Internet that run WWW software. This software enables some machines called servers, to store WWW pages and other machines called clients to access and view these. It doesn't sound very complex does it? But it is the size of the network that is what makes this system powerful.


World Wide Web Pages

World Wide Web pages are quite different to the paper ones to which you are used. They have many enhancements over paper caused by the fact that they are electronic. Perhaps the major difference is that World Wide Web pages contain links to other World Wide Web pages. Information in one page is linked to the information in another which is accessed by clicking on the link. These links are called hyperlinks and are characteristic of the World Wide Web. This aspect of World Wide Web page display is also called hypermedia.

It is difficult to show on a page like this how a World Wide Web page differs from a paper page. Many of the differences don't show. But if you were to view the Disney page on your computer, here are some of the ways in which it would be different -
What's actually on the WORLD WIDE WEB?

Perhaps a better question is "What's not on the Web?" There is so much information on the World Wide Web, it is hard to know where to start. The list below gives some hint of what you will find when you go surfing on the Web:

- on-line newspapers and television programs;
- electronic copies of famous books;
- hints on how to play computer games;
- places to download free computer games;
- cybercafes where you can chat with other World Wide Web users;
- places to play computer games against other World Wide Web users;
- electronic shops where you can browse and buy things;
- cyberschools, where you can actually get an education from home;
- cybertheatres, where you can preview movies and find out what's coming;
- videoconferencing where you can speak to and look at a person on the other side of the world;
- electronic encyclopaedias and dictionaries;
- sites where you can interact and experiment with science kits;

plus a lot more.

The biggest problem with the World Wide Web is that there is no standard for categorising documents. Many web authors are more concerned with how their page looks than how it can be found. Often they do not include an abstract about their document or such information as subject classification, key words or document type. The development of search tools for the World Wide Web has become a very competitive industry; witness the rise of Google.
Exercise 15 - Complete each of the following -

A. World Wide Web

1. Go to Ask.com and ask What is the World Wide Web?
   Discuss this definition in the context that most students at Westfields have IBM PC type computers at home but in Computing Studies classes students use Macintosh computers. What effect would it have if we switched to using Linux?

2. What changes might the Internet bring about in the way we live and do things?

3. Use Ask.com to find out the definition of a web server.

Go to this site:

6. In which country has the greatest growth in World Wide Web services occurred and why?

7. Which developer has the greatest market share of web server software?

To be completed by - ..............................................................................................................................................

Exercise 16 - Complete each of the following -

Complete the worksheet attached to your booklet called 4.1 World Wide Web and hand it in for marking.
To be completed by - ..............................................................................................................................................

How the World Wide Web Works

The software that supports the World Wide Web uses a client-server protocol, having 2 parts. The client software is installed on the user's machine and the server software is installed on the server. All that passes between the client and server on the Internet is the information and not the software controlling it. Some of the different terms associated with the World Wide Web are shown below -

World Wide Web Browser

The client software which enables users to access the WWW. Common browsers are Apple Safari, Mozilla Firefox and Microsoft Internet Explorer.

World Wide Web Server

A server host which stores World Wide Web pages and which provides these to a browser when a connection is made.

Hyper Text Transfer Protocol (HTTP)

The protocol used to transfer information between the server and the browser.

Hyper Text Markup Language (HTML)

The language used to create and format World Wide Web pages.

All HTML pages contain text only so they can be transferred across the Internet. Tags are embedded in World Wide Web pages to enable the text to be formatted and graphics and other media forms to be displayed. When a World Wide Web browser is first launched and run, it usually displays a Home Page. When a user clicks on a hyperlink in that page, it indicates that another World Wide Web page is required. Then:

1. the client software sends a request to the World Wide Web server where the required HTML page is stored;
2. the server transfers the HTML page across the Internet using HTTP; and
3. the text part of the HTML page is displayed according to the markup in the file. Any graphics which have been embedded using tags are then transferred to the browser and displayed in the required place in the document.
Exercise 16 — Surfing the Web


Q1. Name 6 celebrities who have climbed the bridge.
Q2. What is the temperature today?

Examine this site for the following features.

- Overall layout and GUI (graphical user interface) design
- Internal links
- Links to external related sites
- Frames
- Digital media types used (e.g. graphics, movies, sound, virtual reality)
- plug-ins used as well as deciding the
  - audience
  - purpose of the site and whether this is achieved and commenting on the content and the site's effectiveness overall.

Draw up a table using Microsoft Word with a separate heading for each item listed above in the task description.

Examine the following sites (don't restrict yourself to the home page only) and complete your table under the headings you have listed, using one or two words. I have done one for the Opera House site as an example (see Table below).

1. Catch up on today's news at the Sydney Morning Herald site.
2. Something relevant to your education at the NSW Board of Studies site.
3. Take the virtual Opera House tour by following the links at the Sydney Opera House site.
5. Check out ABC TV and radio at the http://www.abc.net.au site.
6. Create your own newspaper at the http://crayon.net/ site.
7. Find out what you'll need to save for that dream purchase at the Trading Post site.
8. Finally, experience something truly amazing at the Babel Fish site.

<table>
<thead>
<tr>
<th>Site</th>
<th>BridgeClimb</th>
<th>Other Sites</th>
</tr>
</thead>
<tbody>
<tr>
<td>overall design and layout</td>
<td>logical, good use of colour especially backgrounds</td>
<td></td>
</tr>
<tr>
<td>internal links</td>
<td>clear and consistent, navigation logical</td>
<td></td>
</tr>
<tr>
<td>external links</td>
<td>yes, a few</td>
<td></td>
</tr>
<tr>
<td>frames</td>
<td>no</td>
<td></td>
</tr>
<tr>
<td>digital media</td>
<td>text, graphics (2D bitmapped and vector), audio, animation</td>
<td></td>
</tr>
<tr>
<td>plug-ins used</td>
<td>QuickTime®</td>
<td></td>
</tr>
<tr>
<td>audience/purpose/is</td>
<td>Adults, young people over 10 and seniors who are fit.</td>
<td></td>
</tr>
<tr>
<td>purpose fulfilled?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>content/is it effective?</td>
<td>very</td>
<td></td>
</tr>
</tbody>
</table>

Table 1. Create a table like this to evaluate your sites.
Control of access to information on the web.

What is a Cookie?
A cookie is often used to identify a user. A cookie is a small file that the server embeds on the user's computer. Each time the same computer requests a page with a browser, it will send the cookie too. Browsers have preferences or settings places where you can enable or disable cookies and even view their contents.

Figure 20. Cookies

Security
Web browsers have settings which enable you to control the security of your internet experience. For example you can turn off cookies so that web sites can not store information about you. The downside of this is that the web site then has no way of remembering you for your next visit.

If you send files or messages over the Internet, unscrupulous people can intercept your file. One way of making your file useless to someone else is to encrypt it.

What is encryption?
A cipher is a method used to encode a message. Ciphers have been used for thousands of years and are still used by spies in the modern world. Some famous uses of ciphers occurred when the Greeks were at war with the Spartans, during the Second World War when the Germans used a machine Called Enigma to secretly code all their radio transmissions and more recently during the Cold War.

Figure 20. ENIGMA ENCODING MACHINE
During World War II, the Germans used the Enigma, an electromechanical cipher machine, to develop nearly unbreakable codes for sending messages. The Enigma's settings offered 150,000,000,000,000 possible solutions, yet the Allies were eventually able to crack its code.

CIA

This link will allow you to try to understand some ciphers.

https://www.antilles.k12.vi.us/math/cryptotut/transposition.htm

Computers used what is called Public Key Encryption to protect valuable information transmitted over the internet and for securing data.
Internet Addresses

Exercise 17
Complete the worksheet attached to your booklet called 4.3 Internet addresses and hand it to your teacher for marking.
To be completed by: ........................................................................................................................................................................

Case Study - Discovery Store

Discovery Store sells merchandise created for its parent Discover Channel. To protect visitor’s credit card details it uses encryption. When a visitor enters the store the visitor's browser negotiates with the server at the store. The prefix changes from http to https which shows that a secure server is being used.

What is encryption? A traditional encryption system, called a secret-key system, uses a single large number called a key both to scramble (encrypt) and unscramble (decrypt) messages. Secret-key encryption systems are very fast, but they rely on one party communicating the secret key to another party, often by way of a third party such as a courier, before the two parties can exchange encrypted messages. This makes keys vulnerable to theft or tampering while in transit.

DiscoveryStore.com’s system does not use a traditional encryption system. Instead, DiscoveryStore.com uses a form of encryption called "public-key encryption," which ensures the privacy of your credit card and other personal information.

How is public-key encryption different from traditional encryption? Public-key encryption is used by SSL to encrypt and decrypt transmitted data. Unlike secret-key encryption systems, a public-key system uses pairs of keys (key pairs). One key, called the public-key, is used to encrypt messages, while the other, called the private-key, is used to decrypt messages. The two keys are large numbers that are related mathematically in such a way that it takes a very long time to calculate the private-key from the public-key.

DiscoveryStore.com has registered its public-key with Verisign, Inc. When you want to send DiscoveryStore.com an encrypted message, your browser must look up our public-key in a directory maintained by Verisign. The browser then uses DiscoveryStore.com's public-key to encrypt the message, and send us the encrypted message. Only our private-key can decrypt the message sent from you.

Because public-key encryption is much slower than secret-key encryption, SSL uses it only when your browser first connects to the DiscoveryStore.com site to exchange a secret-key called a session key, which both your browser and our server use to encrypt and decrypt transmitted data.

Proxies

A proxy server is a computer used to either block access to sites or to cache (store) frequently used data. Westfields uses a proxy server to speed up access to commonly visited sites and to place another barrier between the internet and the computers within the school. The Department of School Education also uses a proxy server. So when you browse the web your pages may be coming from the school proxy, the DET proxy, or any number of other proxies.
What is a Firewall?

A firewall is a piece of software or hardware placed between the user and the outside internet. It is meant to block access to the user's computer and network from the internet. Broadband cable and ADSL connections are "always on" and a "hacker" could conceivably gain access much easier than through a dial-up connection if no protection was applied. Home users should always have a firewall when connected to broadband. Some ISP's bundle a firewall with their product. The school has a firewall, as does the DET, two levels of defence against hackers.

Figure 20. Firewalls  http://www.microsoft.com/athome/security/protect/windowsxp/firewall.mspx

What are Viruses?

A computer virus is a piece of software that can execute itself (start up without the user) and then replicate itself. (make copies of itself) and distribute itself over the network or computer.

Because computer viruses can replicate themselves they have earned as nasty a reputation as the biological viruses that cause disease. The common cold is an example of a human disease that is transmitted by a virus. HIV is another.

Worms are another category of software that can be downloaded accidentally as software or email attachments. However, any software that can cause a computer to malfunction has been bundled into the common perception as a virus. This sort of software are called malware (malicious software). Software companies have created tools called anti-virus software which is supposed to stop infection of a user's computer. Virus writers, however, create their software almost as rapidly as anti-virus companies create tools to deal with them.

What does an HIV virus look like?

This is an artist's drawing of a single HIV virus. As you can see, the virus has several layers, including an outer layer, an inner layer and a core shell. The outer layer is interrupted by glycoprotein (gp) which play an important role in the lifecycle of the virus, and are targeted by a new type of drugs called "entry inhibitors". Within the core shell lies the genetic material of the virus (RNA), as well as some of the enzymes the virus needs to replicate. This includes Reverse Transcriptase, an enzyme that catalyzes the production of DNA based on the RNA genetic code. NRTI and NNRTI drugs inhibit the Reverse Transcriptase enzyme and thus prevent the virus from replicating.


An example of a recent "virus" which affected the PC's at school was the Blaster worm.
Exercise 19

Complete the following 8 exercises.

**Identify**

1. What precautions need to be taken when using the Internet?

2. What is a cookie?

3. What is a firewall? Does your school's network exist behind a firewall?

**Analyse**

4. Examine your school's website using the same headings you used in the task earlier: content, overall design, links, use of frames, digital media used, coding and plug-ins used, audience, and purpose.

5. Investigate encryption and explain the differences between a public and private key in encryption.

6. Develop a stranger danger strategy for users of the internet between the ages of 5 and 8 years.

**Investigate**

7. You have asked your parents to make a purchase for you through an online store using their credit card. In 200 words, discuss the issues involved. Describe the positives and the negatives of such a purchase.

8. Investigate one issue of privacy concerned with the Internet that has been taken to court in Australia in the past five years. In less than 200 words, summarise the final court judgement.

To be completed by: .......................................................... .......................................................... .......................................................... ..........................................................

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**Website Development**

**What is a home page?**

A home page acts as an introduction to a site and may contain a table of contents for the rest of the site. Web pages are usually developed offline where they can be developed and tested.

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**Exercise 20**

Go to the ABC home page at the Australian Broadcasting Corporation website.

[http://www.abc.net.au/](http://www.abc.net.au/)

and then select the triple j link from the Radio section.

1. What is the target audience for this web page?
2. Who is on air now?
3. Identify and describe the following features present in this page.
   - Address, GUI design, Graphic, Links, tables
4. View the source of the page and list the music genres from the section
   `<meta name="Keywords" content="triple j, jjj,`

5. List 5 hyperlinks from the page.

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**MAKING A WEB PAGE**

**Exercise 21:** You are to construct a web site following the instructions set by your teacher.