JSS 3

COMPUTER SECIENCE

FIRST TERM

TABLE OF CONTENT

Computer Science JSS3 First Term

Week 1

Topic: Search Engine

What is a Search Engine?

A Search engine can be defined as a software program that assists a user in locating various websites or information over the internet. A web *search engine* is a software system that is designed to search for information on the World Wide Web. The search results are generally presented in a line of results often referred to as search engine results pages (SERPs). The information may be a mix of web pages, images, and other types of files.

Search engines are particularly helpful in locating web pages on a certain topic or in locating specific pages for which you do not know the exact URL (uniform resource locator). To find a page or pages you enter a word or phrase called search text or keyword, in the search engine text box. Many search engines use a program called spider to display a list of all web pages that contain the words or phrases you entered. It is also called a crawler or a bot. A spider reads pages on websites in order to create a catalog or index of hit.

A hit is any web page name that is listed as a result of a search. For example, If you want a listing of KFC outlet in your search text. The search engine would return a hit of web page list that contains the phrase of KFC outlet in Lagos.

When you enter search text that contain multiple keywords, the search engine usually locates a site that contains all the words. Some of the popular search websites are Alta vista, Excite, Go, Google, Mammal, ask, Msn, Yahoo!, Reddit, Look smart, Netscape search and Hot bot.

Search Method

Browsing through categories: you can browse categories such as art, science or sport to find information that interest you. When you select a category of interest a list of subcategories appears, you can continue till you get the web page that interest you.

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 HTML markup of the pages. These pages are retrieved by a Web crawler(sometimes also known as a spider) — an automated Web crawler which follows every link on the site. The site owner can exclude specific pages by using robots.txt.

The search engine then analyzes the contents of each page to determine how it should be indexed (for example, words can be extracted from the titles, page content, headings, or special fields called meta tags). Data about web pages are stored in an index database for use in later queries. A query from a user can be a single word. The index helps find information relating to the query as quickly as possible. Some search engines, such as Google, store all or part of the source page (referred to as a cache) as well as information about the web pages, whereas others, such as Alta Vista, store every word of every page they find.

Search by Keyword

You can type a word in a search tool about a web page of your interest. The search tool will display a list of webpages containing the word you specified. Some tools allow you to enter a complete question when searching for web pages.

List of Search Engines according to categories

General – Google, Soso.com, Yahoo! and Bing
Metasearch (A **metasearch engine** (or aggregator) is a search tool that uses another search engine's data to produce their own results from the Internet.) – Info.com, Mamma, Metacrawler, Excite.
Business – Business.com, Genieknows
Education – Noodle Education, Skilledup
Fashion – Fashion Net
Medical – Bing health, WebMD

Computer Science JSS3 First Term

Week 2

Topic: Uses of Search Engine

A Search engine can be defined as a software program that assists a user in locating various websites or information over the internet. A web *search engine* is a software system that is designed to search for information on the World Wide Web. The search results are generally presented in a line of results often referred to as search engine results pages (SERPs). The information may be a mix of web pages, images, and other types of files.

The benefit of search engines, to individuals and society, is immerse. In fact, it is doubtful if the web would would be as advantageous and essential to so many, if it were not for search engines. Certainly, the e-commerce environment would be much different if it were not for search engines, which provide access to many small to medium size enterprises.

Given the amount of information currently on the Web (estimates are at approximately 30 trillion individual pages but increasing continually), one could say that search engines are indispensable to locating the online information that has become essential to the private, social, and professional lives of many individuals. People use search engines to locate and then access information on websites in a variety of areas, including health, business, government, education, entertainment, news, religion, and e-commerce.

Assessment

Briefly explain the term Search Engine and its benefits

News – Yahoo! News, Google News, Bing News
Video games – Wazap
Assessment

- Mention eight search engines

Computer Science JSS3 First Term

Week 3 & 4

Topic: Digital Divide

Introduction

Digital divide refers to the gap between people with effective access to digital and information technology and those with very limited or no access at all. The Digital Divide, or the digital split, is a social issue referring to the differing amount of information between those who have access to the Internet (specially broadband access) and those who do not have access. The term became popular among concerned parties, such as scholars, policy makers, and advocacy groups, in the late 1990s.

In other words, digital divide refers to a situation in which people do not have same degree of access to modern digital information and communication technology (ICT) and for this reason, do not have the same opportunities for social and economic development. It includes the imbalance both in physical access to technology, the resource and skill needed to effectively participate as a digital citizen.

BRIDGING THE DIGITAL DIVIDE

The digital can be bridged but the procedure has to be difference from different country and region. The very basic step would be to provide digital access to those in the community who do not have it. However, to be able to do so, countries would have to reduce the base price of gadgets or subsidise them. This would be too much of a burden on the economy of most developing countries. Steps are being taken to over come this with projects like one laptop per child and so on.

THE OLD ECONOMY VERSUS THE NEW ECONOMY

Earlier, development in the agricultural sector was slow. Agriculture was time consuming because works were done manually, but if we look recently there has been a change because digital equipment have increased the speed of agricultural production. This also applies to other sections too.

FEATURES OF THE OLD ECONOMY

In the old economy, companies were experienced to decline in growth because of the following

1. TIME CONSUMING: Operations were time consuming because of limited technology
2. LABOUR BASE: Man power was much required because work was done manually
3. MECHANICAL: The transport system was mechanical in old time because of the process it passes through from stream engine to work
4. CONSTRAINT OF TIME, SPACE AND DISTANCE: These occur because business owners established their industries far from the city in order to avoid pollution of the atmosphere. Sometimes these machines are large and require lots of space.

FEATURES OF THE NEW ECONOMY

1. DIGITAL**:** Digital technology in the new economy is very fast and it requires less time and man power.
2. TIME, DISTANCE AND SPACE IS IRRELEVANT: All because of the use of latest digital equipment, like mobile phone, internet, laptop, e.t.c which enables information go fast from one place to another, time and distance have become quite irrelevant.
3. TECHNOLOGY DRIVEN: In the world today, technology plays a major role in life of humanity. The brilliance of these technologies is that communication is not limited. Hence it is in continuous revolution.
4. KNOWLEDGE BASED: In recent times labour is not too efficient in day to day activities because digital technology is visible in almost every field of our lives and it will continue to bring to light the areas of limitation of the old economy. In the old economy, method of operation was slow and time consuming.

BENEFITS OF THE NEW ECONOMY

1. The size of equipment is reduced.
2. Business can start with small capital.

Assessment

- Briefly differentiate the Old Economy and the New Economy
- List 5 features each of the Old Economy and the New Economy

Computer Science JSS3 First Term

Week 5 & 6

Topic: Digital Literacy

What is Digital Literacy?

Digital literacy is the ability to effectively and critically navigate, evaluate and create information using a range of digital technology. It requires one to recognize and use the power to manipulate and transform digital media to distribute pervasively and to easily adopt them to new form. Digital literacy does not replace traditional form of literacy. It builds upon the foundation of the traditional form of literacy. **Digital literacy** is the knowledge, skills, and behaviors used in a broad range of digital devices such as smartphones, tablets, laptops and desktop PCs, all of which are seen as network rather than computing devices. Digital literacy initially focused on digital skills and stand-alone computers, but the focus has moved from stand-alone to network devices.

The ability to use digital technology, communication tools or networks to locate, evaluate, use and create information.

The ability to understand and use information in multiple formats from a wide range of sources when it is presented via computers.

A person's ability to perform tasks effectively in a digital environment… Literacy includes the ability to read and interpret media, to reproduce data and images through digital manipulation, and to evaluate and apply new knowledge gained from digital environments.

Digital literacy is the merging of two terms 'DIGITAL AND LITERACY'. However it is much more than a combination of the two terms "DIGITAL" Information is a symbol representation of data and "LITERACY" refers to the ability to read for knowledge, write coherently and think critically about the written word.

Digital literacy research explores a wide variety of topic, including how people find, use, summaries, evaluate, create and communicate information while using digital technologies. A digital literate person can be described as a digital citizen.

THE CHARACTERISTICS OF DIGITAL LITERACY

The characteristics of digital literacy is being aware and able to use the digital tools to identify, manage, access, evaluate, integrate, and analyze digital to understand multiple format, represented by the computer and also create new knowledge.

BENEFITS OF DIGITAL LITERACY

1. **It saves time**: Multiple tasks can be done at the same time.

2. **You learn faster**: Study at your own pace, look up words, facts and figures.

3. **It keeps you informed**: You have access to current happenings and event all around the world.

4. **It keeps you connected**: Technology allows you to talk to anyone, anytime and anywhere.

5. **Decision making**: Digital literacy allows you to search, study, analyze and compare things.

BENEFITS OF DIGITAL LITERACY IN THE CLASSROOM

1. Easily modified for differentiating instruction
2. Effective way to teach vocabulary through intentional scaffolding
3. Provides multiple exposures to academic language
4. Allows for learning with real world context
5. Measures authentic assessment
6. Makes learning easily accessible
7. Encourages peer collaboration (both students and teachers)
8. Increases motivation and self esteem (both students and teachers)
9. Promotes the effective use of technology

Assessment

- Define Digital literacy and state its characteristics
- Mention five benefits of digital literacy

Computer Science JSS3 First Term

Week 7 & 8

Topic: DataBase

WHAT IS DATABASE?

A database is a collection of data organized in a manner that allows access, retrieval and uses of data. In a manual database, it can be recorded on paper and stored in a filing cabinet. While in a computerized database, it is stored in an electronic format on a storage media. A **database** is a collection of information that is organized so that it can easily be accessed, managed, and updated. In one view, databases can be classified according to types of content: bibliographic, full-text, numeric, and images.

A **database** is an organized collection of data. It is the collection of schemes, tables, queries, reports, views and other objects. The data is typically organized to model aspects of reality in a way that supports processes requiring information, such as modelling the availability of rooms in hotels in a way that supports finding a hotel with vacancies.

CONCEPT OF DATABASE

The concept of database is simply described as the terminologies of database such as

1. FIELD
2. RECORDS
3. FILE
4. KEY

FORMS OF DATABASE

The following are the forms of database

1. FLAT FILE DATABASE: flat file database store data in plain text file. Each line of the text file holds one record with field separated by diameters such as command or tabs.
2. HIERARCHICAL DATABASE: in hierarchical database records are linked in a tree like structure and each record type has only one owner. E.g an order is owned by only one customer

3. RELATIONAL DATABASE: This is a collection of data items organized is a set formally. Described table from which data can be accessed or reassemble in many different ways without having to recognize the database table. Each table contains one or more data categories in column. Each role contains unique types of data for the categories defined by columns.

DATABASE MANAGEMENT SYSTEMS

A **database management** system (DBMS) is a computer program (or more typically, a suite of them) designed to **manage** a **database**, a large set of structured data, and run operations on the data requested by numerous users. Typical examples of DBMS use include accounting, human resources and customer support systems.

APPLICATION AREAS OF DATA BASE MANAGEMENT SYSTEMS

1. Banking: For customer information, accounts, and loans, and banking transactions.

2. Airlines: For reservations and schedule information. Airlines were among the first to use databases in a geographically distributed manner – terminals situated around the world accessed the central database system through phone lines and other data networks.

3. Universities: For student information, course registrations, and grades.

4. Credit card transactions: For purchases on credit cards and generation of monthly statements.

5. Telecommunication: For keeping records of calls made, generating monthly bills, maintaining balances on prepaid calling cards, and storing information about the communication networks.

6. Finance: For storing information about holdings, sales, and purchases of financial instruments such as stocks and bonds.

7. Sales: For customer, product, and purchase information.

8. Manufacturing: For management of supply chain and for tracking production of items in factories, inventories of items in warehouses / stores, and orders for items.

9. Human resources: For information about employees, salaries, payroll taxes and benefits, and for generation of paychecks

EXAMPLES OF DATABASE APPLICATIONS

The following are examples of database applications:

computerized library systems
automated teller machines
flight reservation systems
computerized parts inventory systems

Assessment

- Briefly explain the forms of Database
- State five areas Data base management systems can be applied
- Give examples of Database applications

Computer Science JSS3 First Term

Week 9

Topic: Spread Sheet

SPREED SHEET

A Spread sheet application is a productivity software in which a computer user can manage personal and business finance with the help of a spread sheet program.

A **spreadsheet** is an interactive computer application program for organization, analysis and storage of data in tabular form. Spreadsheets developed as computerized simulations of paper accounting worksheets. The program operates on data represented as cells of an array, organized in rows and columns. Each cell of the array is a model–view–controller element that may contain either numeric or text data, or the results of formulas that automatically calculate and display a value based on the contents of other cells.

Spreadsheet users may adjust any stored value and observe the effects on calculated values. This makes the spreadsheet useful for "what-if" analysis since many cases can be rapidly investigated without manual recalculation. Modern spreadsheet software can have multiple interacting sheets, and can display data either as text and numerals, or in graphical form.

Productivity software is a software that assists people to gain more efficiency and effectiveness while performing daily activities. You can use a spread sheet program to perform calculations, analyze data and present information.

Example of spread sheet

1. LOTUS 1-2-3: This is a spread sheet program from lotus software (now part of IBM) which has added integrated charting, plotting and database capabilities
2. STAT VIEWS: This is a spread sheet program than can perform many analyses by template. It creates presentation quality graph and table with a singles of the mouse.
3. MICROSOFT EXCEL: This is powerful spread sheet that allows you to organize data complete calculate take decision, graph data and develop reports. It is also has basic features to help you create, edit and format worksheet

GRAPH IN EXCEL

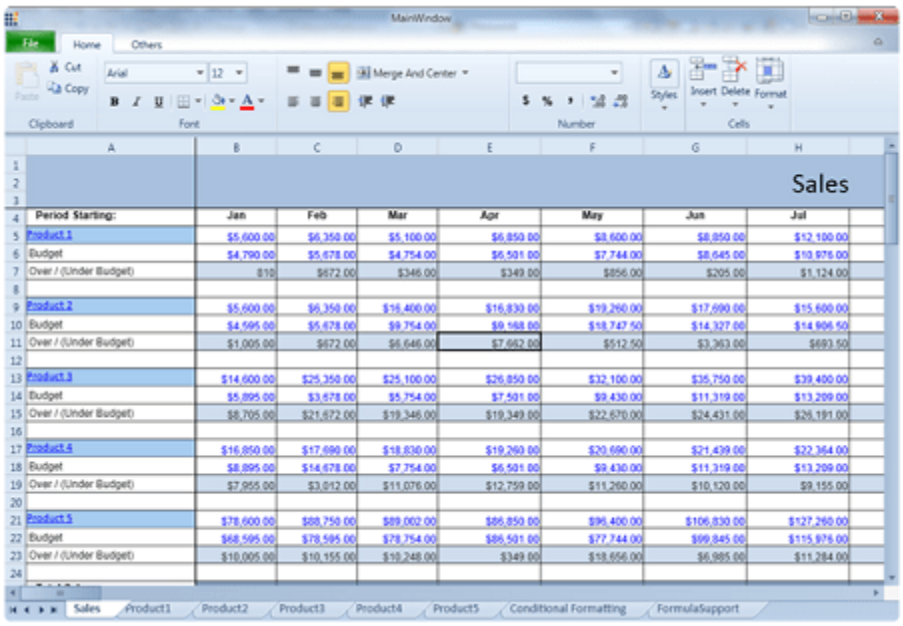
A graph is a great way of representing your data. With graph, data are easily understood and also they are easily edited for better data presentation. You can create dozens of different charts, from pie chart to bar chart and more.

DATA SENSE: This is the foundation of any chart in the worksheet that you use to create. Chart data is the content of a group of related cells, such as one row or column of data in your worksheet.

CUSTOMIZED CHARTS: Any chart created can be customized and can also change to the formatting of the chart, text, change the chart type and much more.

CHART TYPES

1. COLUMN
2. BAR
3. LINE GRAPH
4. PIE
5. SCATTER
6. AREA
7. DOUGHNUT E.T.C



USES OF SPREAD SHEET

- do calculations on data
- visualize relationships with dynamic graphs
- build and use analytical models
- build and use numerical models

Spreadsheet programs also include software that creates graphs and charts from the data provided within the table. This is good for presentations, such as business meetings and research projects, and offers a fresh view of the data. These graphs and charts are customizable and can be specific or general depending on the settings and options chosen.

Assessment

- List examples of spread sheet
- Mention four uses of spread sheet

JSS 3

COMPUTER SCIENCE

SECOND TERM

TABLE OF CONTENT

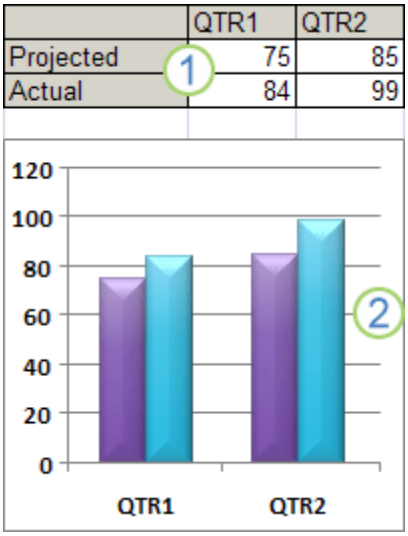
Computer Science JSS3 Second Term

Week 1 & 2

Topic: Creating and Editing Graphs

Charts are used to display series of numeric data in a graphical format to make it easier to understand large quantities of data and the relationship between different series of data.

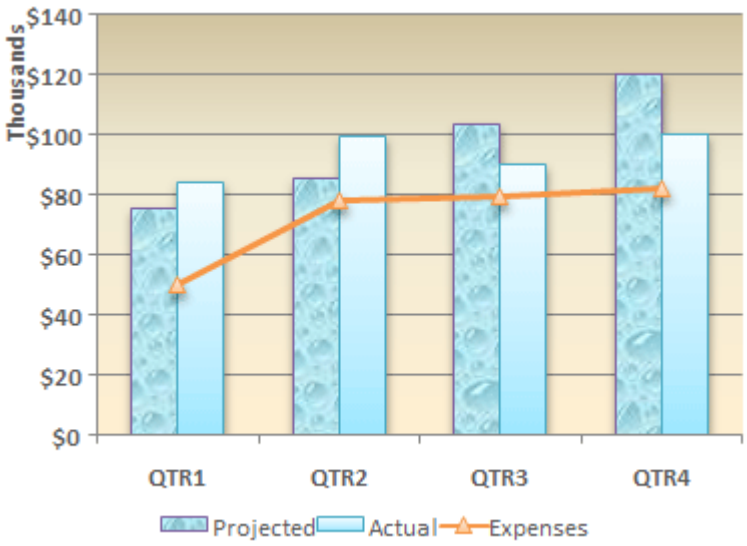
To create a chart in Excel, you start by entering the numeric data for the chart on a worksheet. Then you can plot that data into a chart by selecting the chart type that you want to use on the **Insert** tab, in the **Charts** group.



1. Worksheet data

2. Chart created from worksheet data

Excel supports many types of charts to help you display data in ways that are meaningful to your audience. When you create a chart or change an existing chart, you can select from a variety of chart types (such as a column chart or a pie chart) and their subtypes (such as a stacked column chart or a pie in 3-D chart). You can also create a combination chart by using more than one chart type in your chart.



Example of a combination chart that uses a column and line chart type.

Get to know chart elements

A chart has many elements. Some of these elements are displayed by default, others can be added as needed. You can change the display of the chart elements by moving them to other locations in the chart, resizing them, or by changing the format. You can also remove chart elements that you do not want to display.

1. The chart area of the chart.
2. The plot area of the chart.

3. The data points of the data series that are plotted in the chart.

4. The horizontal (category) and vertical (value) axis along which the data is plotted in the chart.

5. The legend of the chart.

6. A chart and axis title that you can use in the chart.

7. A data label that you can use to identify the details of a data point in a data series.

Modify a basic chart to meet your needs

After you create a chart, you can modify any one of its elements. For example, you might want to change the way that axes are displayed, add a chart title, move or hide the legend, or display additional chart elements.To modify a chart, you can do one or more of the following:

- **Change the display of chart axes** You can specify the scale of axes and adjust the interval between the values or categories that are displayed. To make your chart easier to read, you can also add tick marks to an axis, and specify the interval at which they will appear.
- **Add titles and data labels to a chart** To help clarify the information that appears in your chart, you can add a chart title, axis titles, and data labels.
- **Add a legend or data table** You can show or hide a legend, change its location, or modify the legend entries. In some charts, you can also show a data table that displays the legend keys and the values that are presented in the chart.
- **Apply special options for each chart type** Special lines (such as high-low lines and trendlines), bars (such as up-down bars and error bars), data markers, and other options are available for different chart types.

Apply a predefined chart layout and style for a professional look

Instead of manually adding or changing chart elements or formatting the chart, you can quickly apply a predefined chart layout and chart style to your chart. Excel provides a variety of useful predefined layouts and styles. However, you can fine-tune a layout or style as needed by

making manual changes to the layout and format of individual chart elements, such as the chart area, plot area, data series, or legend of the chart.When you apply a predefined chart layout, a specific set of chart elements (such as titles, a legend, a data table, or data labels) are displayed in a specific arrangement in your chart. You can select from a variety of layouts that are provided for each chart type.When you apply a predefined chart style, the chart is formatted based on the document theme that you have applied, so that your chart matches your organization's or your own theme colors (a set of colors), theme fonts (a set of heading and body text fonts), and theme effects (a set of lines and fill effects).
You cannot create your own chart layouts or styles, but you can create chart templates that include the chart layout and formatting that you want.

Add eye-catching formatting to a chart

In addition to applying a predefined chart style, you can easily apply formatting to individual chart elements such as data markers, the chart area, the plot area, and the numbers and text in titles and labels to give your chart a custom, eye-catching look. You can apply specific shape styles and WordArt styles, and you can also format the shapes and text of chart elements manually.To add formatting, you can use one or more of the following:

- **Fill chart elements** You can use colors, textures, pictures, and gradient fills to help draw attention to specific chart elements.
- **Change the outline of chart elements** You can use colors, line styles, and line weights to emphasize chart elements.
- **Add special effects to chart elements** You can apply special effects, such as shadow, reflection, glow, soft edges, bevel, and 3-D rotation to chart element shapes, which gives your chart a finished look.
- **Format text and numbers** You can format text and numbers in titles, labels, and text boxes on a chart as you would text and numbers on a worksheet. To make text and numbers stand out, you can even apply Word Art styles.

Reuse charts by creating chart templates

If you want to reuse a chart that you customized to meet your needs, you can save that chart as a chart template (*.crtx) in the chart templates folder. When you create a chart, you can then apply the chart template just as you would any other built-in chart type. In fact, chart

templates are custom chart types — you can also use them to change the chart type of an existing chart. If you use a specific chart template frequently, you can save it as the default chart type.

Assessment

- State the steps to modify a chart

Computer Science JSS3 Second Term
Week 3 & 4
Topic: Work Sheet

WORK SHEET

Worksheet commonly refers to a **sheet** of paper with questions for students and places to record answers. The term may also refer to a single array of data in spreadsheet software or an informal piece of paper that an accountant uses to record information.

A worksheet or *sheet* is a single page in a file created with an electronic spreadsheet program such as Excel or Google Spreadsheets. A worksheet is used to store, manipulate, and display data. A worksheet is a collection of cells where you keep and manipulate the data. By default, each Excel workbook contains three **worksheets**.

Each worksheet is composed of a very large number cells – which are the basic storage unit for data in a file or workbook.

The cells are arranged in a grid pattern using rows and columns.

In Excel 2013:

- there are 1,048,576 rows per worksheet;
- there are 16,384 columns per worksheet;
- by default, each new file contains only one worksheet;
- the number of sheets per file is limited only by the amount of memory available on the computer.

* In earlier versions of Excel, the default number of worksheets per file was three.

For Google Spreadsheets:

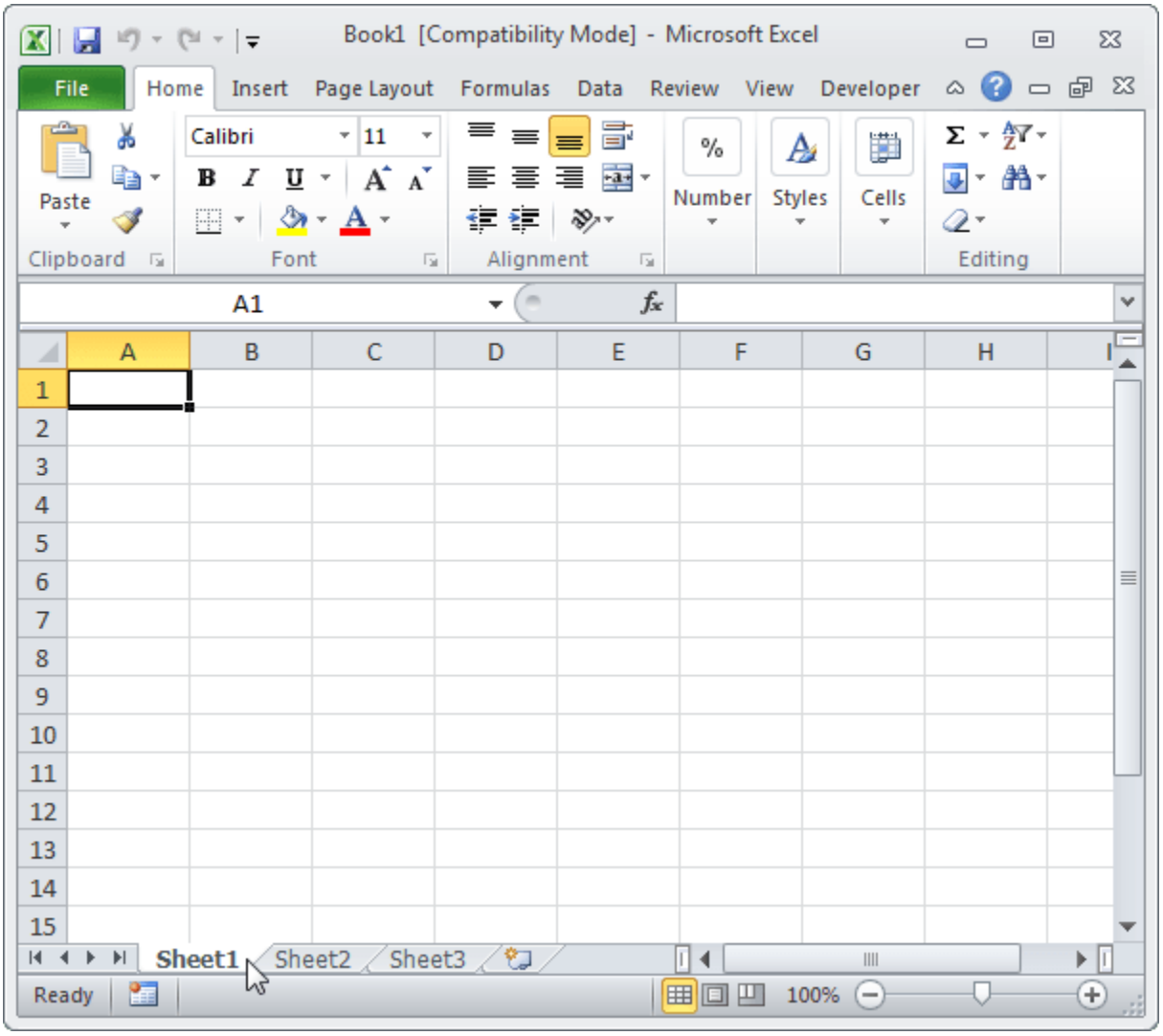
- there is a maximum of 256 columns per sheet;
- the maximum number of cells for all worksheets in a file is 400,000;
- the current default number of worksheets for new files is one;
- there is a maximum of 200 worksheets per spreadsheet file.

Each worksheet also has a name. By default, the worksheets are named *Sheet1*, *Sheet2*, *Sheet3* and so on.

STARTING A WORKBOOK FILE

Workbooks are file that can be created in excel. You can start workbook any time you want to create a new file for your excel data. Steps are

1. Open a new workbook in Excel
2. Point start on the screen of your monitor
3. Click on all programs
4. Point to Microsoft office tab
5. Select Microsoft excel (this will take you to the excel environment)



A good example of how a spreadsheet may be used is creating an overview of your bank's balance. Below is a basic example of what a Microsoft Excel spreadsheet looks like, as well as all the major portions of a spreadsheet highlighted.

What is an active worksheet?

An active worksheet is the worksheet that is currently open. For example, in the picture above, the sheet tabs at the bottom of the window show "Sheet1", "Sheet2", and "Sheet3", with Sheet1 being the active worksheet. The active tab usually has a white background behind the tab name.

Examples of spreadsheet programs

Today, Microsoft Excel is the most popular and widely used spreadsheet program, but there are also many alternatives. Below is a list of spreadsheet programs that can be used to create a spreadsheet.

- Google Docs – Online and collaborative spreadsheet
- iWork Numbers – Apple Office Suite
- Lotus 1-2-3
- OpenOffice – Calc
- Lotus Symphony – Spreadsheets
- Microsoft Excel
- VisiCalc

Assessment

- What are the steps in starting a Workbook file
- List five examples of spreadsheet programs

Computer Science JSS3 Second Term
Week 4
Topic: Hacking

WHO IS A HACKER?

In the computer security context, a **hacker** is someone who seeks and exploits weaknesses in a computer system or computer network. Hackers may be motivated by a multitude of reasons, such as profit, protest, challenge, enjoyment, or to evaluate those weaknesses to assist in removing them. The subculture that has evolved around hackers is often referred to as the computer underground and is now a known community.

Hacking is usually a technical activity, although that does not necessarily mean that attackers are always technically capable. Most of the attackers are *script kiddies*, who know just about enough in order to use other (more competent) hackers' work. That fact aside, it is necessary to know the technical side of hacking, in order to understand the kind of knowledge that some attackers have. This section provides a brief explanation of how to get into a target system and how to exploit this as a full-scale hacking activity.

CRACKING COMPUTER SYSTEMS

There are many ways for attackers to obtain illicit access to computer systems. This kind of access is often called "intrusion", and the first thing an intruder does is usually trying to obtain special/administrative privileges (a root access) on that system. Having a root access is very important for the attackers, since this means that they can do whatever they want on the system, including covering their tracks, strengthening their hold and doing damage.

In general, there are three main ways to intrude into a system:

- **Physical Intrusion**

This kind of intrusion happens when an intruder has a physical access to the target machine. This might allow the intruder to gain full control of the system – for example by booting with a special floppy or by taking the system apart physically (e.g. removing the Hard-drive to another system owned by the attacker, which then enables him/her to read/write to it).

- **System Intrusion**

In this case, it is assumed that the intruder has already got low-level privileges on the system. They then exploit un-patched security vulnerabilities in order to escalate their privileges to administrative level.

- **Remote Intrusion**

With remote intrusion, an attacker tries to get into the system remotely through the network. They initially do not have any privileges to the system, but one way or another – e.g. by finding out some valid account names and cracking their (usually weak) password, or by exploiting common security vulnerabilities (buffer overflow, etc.) – they manage to get in and obtain a root access.

This paper focuses on remote intrusion, as this is the most common type of attack associated with hackers. Nevertheless, there are some cases of system intrusion, for example, the insider attack, where a legitimate user (could be a disgruntled or former employee) performs an attack due to various reasons (revenge, cyber-espionage, etc.).

In order to minimize intrusion, many organizations install *Intrusion Detection Systems (IDS)*. Such a system inspects inbound and outbound network activity and identifies suspicious patterns that may indicate a network or system attack from someone attempting to break into or compromise a system. There are many IDSs available. Most of these are commercial software and are primarily concerned with remote intrusion. We will not discuss IDS in great detail in this paper since our focus is on the attackers along with their hacking activities and some insights into their human aspects.

TYPES OF ATTACKS

Attackers can cause various levels of damage, depending on their skill level and/or their motives. There is a common pattern though: they usually follow a similar set of steps of information gathering before launching the attack.

Foot Printing

The aim of this activity is to obtain a complete profile of the target organization's network and its security arrangement. The information of interest includes the technology that the organization is using (e.g. Internet, Intranet, Remote Access, and Extranet) and its security policies and procedures. Although there are many different methods attackers can use to perform foot printing, there are four general steps that they are likely to follow: – Determine the scope of the foot printing activities. In some cases, it might be a bit too much to determine all entities associated to a Target organization. Therefore attackers often need to narrow down the scope of their Foot printing activities.

Social Engineering

Social Engineering is the term used to describe cracking techniques that rely on weaknesses in *wetware* (i.e. human users attached to the system – administrators, operators, etc.) rather than software. The aim is to trick people into revealing passwords or other information that compromises a target system's security.

Software Bugs

Another way to get into a system is through security vulnerabilities brought by bugs in the software (operating system, server daemons, client applications, etc.). It is almost impossible to have bug-free software and the attackers only need to find one hole in order to break in.

As a result, the program may crash and very often; this gives the attackers a root access and/or allows them to run any arbitrary code. Attackers can find buffer overflow bugs by:

1. browsing the web for known buffer overflow vulnerabilities on certain programs;
2. Searching for these bugs in the program directly if the source code is available;
3. Examining every place the program prompts for input and trying to overflow it with random (massive) data. If the program crashes, there is a chance that by carefully constructing the input, access to the system can be obtained.

Assessment

- Briefly explain the 3 main ways to intrude into a system
- State the types of attacks

Computer Science JSS3 Second Term
Week 5
Topic: Hacker's Community

WHO ARE HACKERS?

Quoting Steele Denning reports that the word *hacker* has taken on many different meanings ranging from a person who enjoys learning the details of computer systems and how to stretch their capabilities to a malicious or inquisitive meddler who tries to discover information by poking around possibly by deceptive or illegal means. Interviewing hackers gave denning a more precise definition. One of them asserted:

"A hacker is someone that experiments with systems… [Hacking] is playing with systems and making them do what they were never intended to do. Breaking in and making free calls are just a small part of that. Hacking is also about freedom of speech and free access to information – being able to find out anything. There is also the David and Goliath side of it, the underdog vs. the system, and the ethic of being a folk hero, albeit a minor one.".

The term "hacker" itself has evolved somewhat from its original meaning. Rogers breaks down the evolution into four generations:

- **First generation: talented students, programmers and scientists (mostly from MIT)**

These were academics or professionals interested in the working of computer code. They enjoyed tweaking the code, in order to produce more efficient or elegant program, or just to create program that can assist them in everyday computing life. They were the technically elite group and were often pioneers in their field (e.g. Richard Stallman).

- **Second generation: technological radicals**

They evolved from the technically elite, with forward thinking to recognize the potential of a second computer niche from mainframe to personal systems. Their radical nature means that minor criminal activity was not uncommon (e.g. phone phreaking).

- **Third generation: young people who embraced personal computers (PC)**

These people recognized the potential entertainment value of PC and began developing games (or making illegal copies of games and cracking their copy-protection).

- **Fourth generation: the current generation, those embracing criminal activity as if it is some sort of game or sport.**

Some of these people got arrested and claimed that the motivation was curiosity or hunger for knowledge, although the actual motivation seems to be greed, power, revenge or other malicious intent.

The public perception is that hackers are usually young males who tend to be working alone. With the proliferation of both the bulletin boards and of tool kits for virus makers, the last characteristic is questionable. On the values side, hackers share some particularities. For instance, Levy identified some behaviors and values in the *hacker ethic*, some of them having an obsession with "hands-on" use of computers, desire that all information should be in the public domain and mistrust of authority. Some more person logical dimensions have been identified by Gordon who examined the ethical development of a large number of virus writers. According to Gordon's results, hackers can be divided into the following

Categories:

- Adolescent, who is not typically concerned by problems caused by their viruses;
- Adult, ethically abnormal;
- Ex virus-writer, undecided concerning the legitimacy of virus writing.

Hacker's ethics

Some hackers' ethics are not that far from more traditional views shared by the public at large. For instance, some hackers are concerned about the increasing amount of information about individuals that is stored in large data banks, and the inability of the individual to have much control over the use of that information.

HACKER'S TAXONOMY

Rogers did a study on hacker community and he proposed hackers taxonomy as follows:

- *Tool Kit/newbie's* are people who are new to hacking and who tend to have limited computer and programming skills. As a result, they usually rely on software (tool kits) already written by other people in order to conduct their attack. These people are often called *script kiddies*.
- *Cyber-punks* consist of people with better computer skills (than newbie's) and some might have programming capabilities. It is their intention to engage in malicious acts, such as web defacement, credit card number theft, telecommunication fraud or spamming (sending junk mails).
- *Internals* are made up of disgruntled employees or ex-employees. It may be surprising to learn that a lot of attacks were actually carried out by people with internal knowledge/connection.
- Coders
- *Old guard hackers* are similar to those of first generation hackers. They appear to be interested on the intellectual endeavor instead of criminal intention, but they seem to have little respect for personal property.
- Professional criminals
- Cyber-terrorists

These groups are not mutually exclusive, but they might help in understanding the motives of those individuals involved in hacking activities.

Assessment

- What are the proposed hackers taxonomy by Rogers

Computer Science JSS3 Second Term

Week 6

Topic: Qualities of a Good Computer Professional

Computer professionals are information technology. The definition has extended to those involved in the internet industry too. Those who deal with the computer industry to develop something. They may design, build, write or sell software. A *computer professional* is a person who works in the field of

A **computer professional** may be:

1. A person working in the field of information technology
2. A person who has undergone training in a computer-related field colleges, universities and computer institutes
3. A person who has an extensive knowledge in the area of computing.

Some of the qualities needed to be most successful in the computer and IT world include the following:

1. **Excellent Analytical Skills**
   Great computer professionals have excellent analytical skills that can be applied to solve problems or develop new ideas.
2. **Versatility**
   A computer professional must be versatile, it is a necessary requirement needed by a professional who wants to be successful. The most successful computer professionals will be the ones who have skills that extend beyond information technology, such as skills in business and finance.
3. **Commitment to Learning**
   Technology is constantly changing, and those who keep abreast of the latest developments in information technology are the ones who will be the most successful. Knowledge and keeping up with the latest trends is the key to success; there is no single person who knows everything.

4. **Good Knowledge of Math**

   Strong mathematical skills are necessary because math is used in many computer applications, such as when dealing with circuits or programming.
5. **The Ability to Learn & Memorize Programming Languages**

   Computer professionals must know many programming languages and how to use a wide variety of computer software programs. A great memory helps keep work efficient. There is a wide range of programming languages that are widely used for coding and writing programs, so memorizing all of them is what a decent specialist should be able to do.
6. **Good Communication Skills**

   The soft skills of verbal and written communication are increasingly important as non-techies rely on technological tools for their everyday business. Understanding a client's needs and the ability to meet those needs depend heavily on a steady stream of open communication. Those who are not familiar with technology can be confused when the computer technology specialist uses a lot of industry register, so you have to be able to switch between work speech and casual speech quickly.
7. **Attention to Detail**

   The slightest mistake can affect how a web page looks or how a program runs. Computer personnel must pay close attention to detail to ensure everything works correctly and efficiently.
8. **Multi-tasking Ability**

   People working with computers are often involved in many tasks at once and must be able to manage all of their responsibilities simultaneously. Time management skills and an ability to prioritize are assets as well.
9. **Solid Problem Solving/Troubleshooting Capabilities**

   Computer professionals are called upon to solve problems with networks, software, and other programs. They are expected to solve these problems very quickly, and having sharp troubleshooting skills most definitely is a benefit.
10. **Technical Writing Skills**

    Technical writing skills help a computer-savvy person explain complex concepts to those who have limited knowledge of the computer world.

QUALITIES OF A GOOD COMPUTER PROFESSIONAL

1. **COMPUTER MANAGER**

- Must have ability to control, coordinate and manage things.
- High level of Computer literacy.
- Versatility in the field of Computer
- Good decision maker when it comes to computer related issues

2. **COMPUTER SCIENTIST**

- Good knowledge of a Computer
- Ability to repair and maintain a computer
- Must be able to identify good computers

3. **COMPUTER ENGINEER/HARDWARE ENGINEER**

- Excellent knowledge of Computer repair
- Computer parts assemblage
- Should be able to build at least a circuit board.

4. **PROGRAMMER/SOFTWARE ENGINEER**

- Good computer programmer must be able to give instruction to computer.
- Use of computer programming language to develop program.
- Ability to develop a good and durable program.
- Must be able to detect or debug problem in a program.

5. **COMPUTER INSTRUCTOR/EDUCATOR**

- Teaches and trains people on the use, misuse and care of computer
- Impacts knowledge into computer illiterates
- Good knowledge of computer and effective operation

6. **COMPUTER TECHNICIANS**

- Good computer technician repairs computer
- Assemblage of computer parts
- Troubles shooting of Computer problems
- Computer hardware maintenance and repair

7. **COMPUTER ANALYST/ SYSTEM ANALYST**

- Ability to analyze data
- Train people on computer usage
- Solve computer problems.
- Computer setup in work places and schools

8. **NETWORKING ENGINEER**

- Computer networking
- Troubleshooting of faulty networks
- Network configuration.
- Internet networking.
- Network update knowledge

9. **COMPUTER OPERATOR**

- Fast typing skills.
- Use of graphics package for design
- Excellent use of computer for documents
- Effective operation of the Computer

Assessment

- State some of the qualities needed to be most successful in the computer and IT world
- State general qualities of a good Computer Professional

Computer Science JSS3 Second Term

Week 7 & 8

Topic: Logic Circuit

LOGIC CIRCUIT

A logic gate is an elementary building block of a digital circuit. Most logic gates have two inputs and one output. At any given moment, every terminal is in one of the two binary conditions *low* (0) or *high* (1), represented by different voltage levels. The logic state of a terminal can, and generally does, change often, as the circuit processes data. In most logic gates, the low state is approximately zero volts (0 V), while the high state is approximately five volts positive (+5 V).

There are seven basic logic gates: AND, OR, XOR, NOT, NAND, NOR, and XNOR.

The *AND gate* is so named because, if 0 is called "false" and 1 is called "true," the gate acts in the same way as the logical "and" operator. The following illustration and table show the circuit symbol and logic combinations for an AND gate. (In the symbol, the input terminals are at left and the output terminal is at right.) The output is "true" when both inputs are "true." Otherwise, the output is "false."

AND gate

Input 1	Input 2	Output
	1	
1		
1	1	1

The *OR gate* gets its name from the fact that it behaves after the fashion of the logical inclusive "or." The output is "true" if either or both of the inputs are "true." If both inputs are "false," then the output is "false."

OR gate

Input 1	Input 2	Output

	1	1
1		1
1	1	1

The *XOR* (*exclusive-OR*) *gate* acts in the same way as the logical “either/or.” The output is “true” if either, but not both, of the inputs are “true.” The output is “false” if both inputs are “false” or if both inputs are “true.” Another way of looking at this circuit is to observe that the output is 1 if the inputs are different, but 0 if the inputs are the same.

XOR gate

Input 1	Input 2	Output
	1	1
1		1
1	1	

A logical *inverter*, sometimes called a *NOT gate* to differentiate it from other types of electronic inverter devices, has only one input. It reverses the logic state.

Inverter or NOT gate

Input	Output
1	
	1

The *NAND gate* operates as an AND gate followed by a NOT gate. It acts in the manner of the logical operation “and” followed by negation. The output is “false” if both inputs are “true.” Otherwise, the output is “true.”

NAND gate

Input 1	Input 2	Output
		1
	1	1
1		1
1	1	

The *NOR gate* is a combination OR gate followed by an inverter. Its output is “true” if both inputs are “false.” Otherwise, the output is “false.”

NOR gate

Input 1	Input 2	Output
		1
	1	
1		
1	1	

The *XNOR (exclusive-NOR) gate* is a combination XOR gate followed by an inverter. Its output is “true” if the inputs are the same, and “false” if the inputs are different.

XNOR gate

Input 1	Input 2	Output
		1
	1	
1		
1	1	1

Using combinations of logic gates, complex operations can be performed. In theory, there is no limit to the number of gates that can be arrayed together in a single device. But in practice, there is a limit to the number of gates that can be packed into a given physical space. Arrays of logic gates are found in digital integrated circuits (ICs). As IC technology advances, the required physical volume for each individual logic gate decreases and digital devices of the same or smaller size become capable of performing ever-more-complicated operations at ever-increasing speeds.

Uses of standard Logic Circuit

1. Logic gates are building blocks of hardware electronic components.
2. It is used in activation of door bells.
3. The AND gates use to combine multiply signals

4. The NOT gate is used in building a switch.

AND

Inputs		Output
A	B	C
0	0	0
0	1	0
1	0	0
1	1	1

OR

Inputs		Output
A	B	C
0	0	0
0	1	1
1	0	1
1	1	1

NOT

Input	Output
A	C
0	1
1	0

Assessment

State the uses of standard Logic Circuit

Computer Science JSS3 Second Term

Week 9

Topic: Computer Career Opportunities

CAREERS IN COMPUTER INDUSTRY

Now a day's computer industry is the largest industry where jobs are created for thousand of people and primary business people and primary businesses which are computer related jobs.

Computers have become a ubiquitous part of modern life, and new applications are introduced every day. The use of computer technologies is also commonplace in all types of organizations, in academia, research, industry, government, private and business organizations. As computers become even more pervasive, the potential for computer-related careers will continue to grow and the career paths in computer-related fields will become more diverse.

The career opportunities for computer science graduates can be classified into different categories. Examples are:

1. General business and IT development
2. Computer equipment field
3. Computer software field
4. Computer service and repair filed
5. Computer sales
6. Computer education and training field
7. IT consultation
8. Programming and Software Development.
9. Information Systems Operation and Management.
10. Telecommunications and Networking.
11. Computer Science Research.
12. Web and Internet.
13. Graphics and Multimedia.
14. Training and Support.
15. Computer Industry Specialists.

Programming and Software Development

- Systems analyst – Determines an organization's needs and designs programs to meet them. Acts as a problem solver who specialize in how information flows from information sources to computers. Supervises lower-level programmers.
- Systems consultant – Works under contract to install or configure hardware or software, write or customize programs, or otherwise help solve information processing problems for an organization. Business-related courses are helpful.
- Software engineer – Designs and writes complex computer programs as part of a software development team. Applies principles of computer science to solve practical problems.
- Systems programmer – Designs and writes programs that interface with a computer's low-level operating system, such as device drivers and utilities.
- Database analyst – Designs and creates programs used to collect, maintain, and analyze data needed by business, government, or other institutions. Adapts programs to changing business needs.

    - Artificial Intelligence programmer – Applies principles of artificial intelligence to design and implement systems that perform complex tasks. Applications include: expert systems that apply rules to making decisions, such as scheduling freight shipments or diagnosing disease; pattern recognition systems that give robots the ability to see and understand objects in their environment; neural network programs that can learn to perform tasks by constantly re-evaluating their performance.
    - Scientific applications programmer – Works closely with scientists and engineers to write programs that simulate natural phenomena or analyze experimental results, or apply scientific or engineering principles to research or manufacturing.
    - User interface designer – Designs the menus, icons, and other features that people will use to interact with a computer program or operating system. Needs to have empathy with computer users and artistic sense of composition.
    - Embedded systems application programmer – Designs and develops applications for appliances and entertainment products such as PDA, mobile phone, mp3 player.

Information Systems Operation and Management

Electronic data processing (EDP) auditor- Closely examines data processing operations to guard against loss through mistakes, carelessness, or fraud. Often work in banks, insurance companies, accounting firms, and other organizations that use a large amount of financial data.

Database administrator – Takes overall responsibility for the usage, accuracy, efficiency, security, maintenance of an organisation's database systems. Coordinates development and use of data resources.

Systems administrator – Responsible for managing the operation of a multi-user computer system or network so that it runs reliably and meets user's needs; updates and configures software and hardware; provides assistance to users and managers.

Computer security specialist – Protects computer systems from illegal intrusions, viruses, data theft, fraud, or other forms of tampering.

Management/IT consultants – Uses problem solving skills and computer knowledge to solve business and management problems for organizations and foster improvement in areas such as organization structure, business communication, and productivity. Defines and analyzes problem, interviews employees, develops possible solutions, and presents options to client.

Information systems manager – Oversees all operations in an organization's information system department, including technical support, training, network, and database operations. Ensures that everyone in the organization has timely, reliable access to the computer system and its databases and other resources.

Chief information officer (CIO) – Serves as the highest information services executive for a major corporation. Responsible for long-term planning and setting organization-wide policy and sta

Telecommunications and Networking

Network engineer/consultant

Plans for the installation or expansion of local or wide-area computer networks. Performs complex configuration of servers, hubs, routers, and other network communications equipment. Writes scripts or programs to automate network operations.

Network administrator

Takes overall responsibility for the operation and planning for a local or wide-area computer network. Plans expansion; selects appropriate network operating system and software tools; configures major features; deals with connection between local network and Internet; establish procedures for support staff and users.

Computer Science Research

Computer scientist/researcher

Applies theoretical expertise to complex problems and develop innovative ideas necessary for the application or creation of new technology. They usually work in research labs or academic institutions.

Computer science professor

Teaches college courses in computer science theory, performs research and supervises student research. May serve as consultant to government or business.

Artificial Intelligence researcher

Develops programs to imitate the thinking and reasoning processes of the human brain; for example, recognize voices and objects, speak in a humanlike voice.

Data miner

Analyzes databases in business, government, or scientific applications in order to extract additional information or find useful patterns. Needs familiarity with major database and statistical packages.

Bioinformatics specialist

Organizes and manipulates information relating to genetic sequences, molecular structure, and other data relevant to the biological sciences. Should be familiar with genetics and biochemistry.

Medical imaging specialist

Develops image processing and pattern recognition algorithms for analyzing medical images to diagnose disease.

Web and Internet

Internet applications programmer

Develops programs that add features such as forms and animation to Web sites or that provide tools to help users get the most out of Internet.

Internet consultant

Uses some combination of analysis, design, programming, and support skills to help clients with the design of Internet sites and configuration of Internet software and connections.

Webmaster

Creates or maintains a Web site. Provides content and programming or supervises writers and programmers. Monitors the performance and popularity of the site. Provides secure forms and transactions for Internet-based businesses.

Internet advertising designer

Creates effective advertising features for Web sites, including animation, sound, and text.

Graphics and Multimedia

Animation/Special effects developer

Develops software programs for creating sequences of computer images for games or movies.

Multimedia developer

Uses design and programming skills to create interactive multimedia products that combine sound, images, and text.

Computer game designer/programmer

Designs or writes computer games or game engines. Develop algorithms that make the characters realistic and intelligent.

Electronic sound producer

Creates the music, voice, and sound effects for multimedia or computer games. Integrates sound into the overall design of the multimedia product.

Training and Support

Technical support representative

Answers questions from computer users and solves problems with the installation or operation of software. Researches problems using manuals, help files, and online knowledge bases.

Trainer, software applications

Teaches specific courses in computer software or operating systems. May work within a corporation or at a school.

Technical writer

Writes instructional guides and other materials that explains how to use computer systems, software, operating systems, or programming tools. Researches and writes reviews and feature articles suited to specific reader profiles.

CERTIFICATE: This is the process of verifying the technical knowledge of an individual who has demonstrated competence in a particular area, today there are more than 200 certificates available, such as.

1. MICROSOFT CERTIFIED APPLICATION SPECIALIST
2. MICROSOFT CERTIFIED APPLICATION PROFESSIONAL
3. MICROSOFT CERTIFIED DESKTOP TECHNICIANS and so many more.

Assessment

- Briefly explain the career opportunities of computer science graduates

JSS 3

COMPUTER SCIENCE

THIRD TERM

TABLE OF CONTENT

Computer Science JSS3 Third Term

Week 1

Topic: Computer Virus

What is a Computer Virus?

Computer viruses are small software programs that are designed to spread from one computer to another and to interfere with computer operation. A virus might corrupt or delete data on your computer, use your e-mail program to spread itself to other computers, or even erase everything on your hard disk.

Computer viruses are often spread by attachments in e-mail messages or instant messaging messages. That is why it is essential that you never open e-mail attachments unless you know who it's from and you are expecting it.

A **computer virus** is a malware program that, when executed, replicates by inserting copies of itself (possibly modified) into other computer programs, data files, or the boot sector of the hard drive; when this replication succeeds, the affected areas are then said to be "infected".

A computer virus is a program or piece of code that is loaded onto your computer without your knowledge and runs against your wishes. Viruses can also replicate themselves. All computer viruses are man-made. A simple virus that can make a copy of itself over and over again is relatively easy to produce. Even such a simple virus is dangerous because it will quickly use all available memory and bring the system to a halt. An even more dangerous type of virus is one capable of transmitting itself across networks and bypassing security systems.

Viruses often perform some type of harmful activity on infected hosts, such as stealing hard disk space or CPU time, accessing private information, corrupting data, displaying political or humorous messages on the user's screen, spamming their contacts, logging their keystrokes, or even rendering the computer useless.

Viruses can be disguised as attachments of funny images, greeting cards, or audio and video files. Computer viruses also spread through downloads on the Internet. They can be hidden in illicit software or other files or programs you might download.

Types of Viruses

There are different types of viruses:

1. **Boot Sector Virus** – targets the boot sector of a hard drive and crucially effects the boot process. Boot sector viruses became popular because of the use of floppy disks to boot a computer. The widespread usage of the Internet and the death of the floppy has made other means of virus transmission more effective.
2. **File Infection Virus** – coded viruses that attach themselves to .exe files; compressed files such as zip or drive files.
3. **Multipartite Virus** – cross between a file virus and a boot sector virus.These type of viruses spread in many different ways. Their actions vary depending on the OS installed and presence of certain files. They tend to hide in the computer's memory but do not infect the hard disk.
4. **Network Virus** – uniquely created to quickly spread throughout the local area network and generally across the Internet as well. Typically moves within shared resources like drives and folders.
5. **Macro Virus** – infects program files that use macros in the program itself, such as word processors. These viruses infect the files created using some applications or programs that contain macros such as doc, pps, xls and mdb. They automatically infect the files with macros and also templates and documents that are contained in the file. They hide in documents shared through e-mail and networks. **Macro viruses include:**

- Relax
- bablas
- Melissa.A
- O97M/Y2K

6. **E-mail Virus –** generally this is a macro virus which multiplies by sending itself to other contacts in your address book, in hopes they'll activate the virus as well. This is a virus spread via an email. Such a virus will hide in an email and when the recipient opens the mail.
7. **Memory Resident Viruses –** They usually fix themselves inside the computer memory. They get activated every time the OS runs and end up infecting other opened files. They hide in

RAM. This type of virus is a permanent which dwells in the RAM memory. From there it can overcome and interrupt all of the operations executed by the system: corrupting files and programs that are opened, closed, copied, renamed etc. **Memory Resident Viruses Include:**

- CMJ
- meve
- randex
- mrklunky

8. **Worm:** This program is very similar to a virus and has the ability to self-replicate leading to negative effects on your computer. **Worm Viruses Include:**

- lovgate.F
- sobig.D
- trile. C
- PSWBugbear.B
- Mapson

9. **Trojans or Trojan Horses:** Another unsavory breed of malicious code (not a virus as well) are Trojans or Trojan horses, which unlike viruses do not reproduce by infecting other files, nor do they self-replicate like worms. Trojans can illegally trace important login details of users online. For example E-Banking is very common among users, therefore, vulnerability of tracing your login details whenever your PC is working without any strong powerful antivirus installed.
10. **Browser Hijacker:** This virus can spread in many different ways including a voluntary download. If infects certain browser functions especially in form of re-directing the user automatically to certain sites. A good example is the cool web search. This type of virus, which can spread itself in numerous ways including voluntary download, effectively hijacks certain browser functions, usually in the form of re-directing the user automatically to particular sites
11. **Polymorphic Virus**: They encode or encrypt themselves in a different way every time they infect your computer. They use different encryption and algorithms. This makes it difficult

for the antivirus software to locate them using signature or string searches (since they are very different in each encryption).**Polymorphic Viruses Include:**

- Marburg
- tuareg
- Satan bug
- elkern

12. **FAT Virus:** The file allocation table or FAT is the part of a disk used to connect information and is a vital part of the normal functioning of the computer. This type of virus attack can be especially dangerous, by preventing access to certain sections of the disk where important files are stored. Damage caused can result in information losses from individual files or even entire directories.
13. **Overwrite Viruses**: These types of viruses delete any information in a file they infect, leaving them partially or completely useless once they are infected. Once in the computer, they replaces all the file content but the file size doesn't change. **Overwrite Viruses Include:**

- Trj. Reboot
- way
- trivial.88.D

14. **Companion Viruses**: Companion viruses can be considered file infector viruses like resident or direct action types. They are known as companion viruses because once they get into the system they "accompany" the other files that already exist. In other words, in order to carry out their infection routines, companion viruses can wait in memory until a program is run (resident viruses) or act immediately by making copies of themselves (direct action viruses).Some examples include: Stator, Asimov.1539, and Terrax.1069

ASSESSMENT

1. What's a computer virus?
2. Highlight SIX types of virus?

Computer Science JSS3 Third Term
Week 2
Topic: Sources of Computer Viruses

The most potent and vulnerable threat of computer users is virus attacks. Virus attacks hampers important work involved with data and documents. It is imperative for every computer user to be aware about the software and programs that can help to protect the personal computers from attacks. One must take every possible measure in order to keep the computer systems free from virus attacks.

The top sources of virus attacks are highlighted below:

1. **Pirated or Cracked Software –** Are you aware of software cracking? Well, every time you open a cracked software, your antivirus software might flag it as a malware as the cracks consist of malicious scripts. Always say "No" to cracks as they can inject malicious script into your PC.
2. **Downloadable Programs –** One of the possible sources of virus attacks is downloadable programs from the web. Unreliable sources and internet newsgroups are one of the main sources of computer virus attacks. Downloadable files are one of the best possible sources of virus. Any type of executable program including games, freeware, screen savers as well as executable files are one of the major sources of computer virus attacks. Executable files having an extension of ".com", ".exe" and "coolgame.exe" contain virus sources too. If in the case you want to download programs from the internet then it is necessary to scan every program before downloading them.
3. **Internet –** One of the easiest ways to get a virus on your device is through the Internet. Make sure to check URL before accessing any website. For a secured URL always look for 'https' in it.
4. **Email Attachments –** Email attachments are one of the other popular sources of computer virus attacks. Hence, you must handle email attachments with extreme care, especially if the email comes from an unknown sender. Installation of a good antivirus assumes prime necessity if one desires to eliminate the possibility of virus attacks. It is necessary to scan the email even if it comes from a friend. There exists a possibility that the friend may have unknowingly forwarded virus along with the email attachment.
5. **Removable Storage Devices –** Floppies are already out of the league. And, CDs started making their way out as well. Now, the pointer goes to flash drives (often referred to as pen

drives or thumb drives) and to external hard disks. You know it is possible to run a program automatically at the time you plug a removable storage device into a PC. The program may be a malware. Always scan your removable media soon after you plug it into the computer. Also, don't forget to turn off auto play feature. Be sure to install any antivirus program to protect yourself from such auto-run.

6. **Malicious Website** – It is better to visit a secure website as there are plenty of snares on the internet with loads of malicious codes and programs. Most times we are distracted a lot by popup and popover. Some websites even install an adware (with other software) that you keep seeing unnecessary ads right from the moment you turn the network on.

ASSESSMENT

1. Highlight FIVE top sources of computer virus?

Computer Science JSS3 Third Term
Week 3
Topic: Virus Warning Signs

Viruses are malicious software – known as malware – that can destroy files, steal personal information and damage your computer.

Here are the top ten signs your PC has a virus.

1. **Slow start up and slow performance –** If your PC is taking longer than normal to start or programs are taking ages to open, then your PC may have a virus. If your computer's performance is sluggish, check first that it isn't due to a lack of RAM memory or hard disk space. If not, the culprit may be a virus.
2. **Applications won't start –** How many times have you tried to run an application from the start menu or desktop and nothing happens? Sometimes another program might even run. This could be another type of problem, but at the very least it's a symptom that tells you that something is wrong.
3. **Programs opening and closing automatically –** Malware can also be present when your programs are opening and closing automatically. However, do check if some programs are meant to behave this way or if they are simply incompatible to run with your hardware first before coming to the conclusion that your computer has a virus.
4. **Pop-ups, websites, toolbars and other unwanted programs –** These are irritating signs that your computer has a virus. Pop-ups come from clicking on suspicious pages, answering survey questions to access a website's service or installing free applications. Don't click on ads where Jane says she earned $8000 a month staying at home. When you get pop-ups appearing out of the blue, refrain from clicking anywhere on the pop-up page and just close out of the window and use your anti-malware tool immediately.
5. **Suspicious hard drive activity –** An excessively active hard disk where it makes continual noise or constantly spins – even though you're not using your computer nor have any programs running – can be a sign your PC is infected with a virus.
6. **Crashes and error messages** – If programs start opening and closing automatically, your system freezes or shuts down for no reason, or you see odd error messages, then you may have a virus infection.

7. **Sudden disappearance of Files** – Where have my files gone? Hopefully nobody will be asking this type of question, although there are still some threats around designed to delete or encrypt information, to move documents from one place to another… If you find yourself in this situation, you really ought to start worrying.
8. **Email is Hijacked** – If friends start receiving emails or instant messages from your social networks asking them to click on an attachment or link, it's likely that a virus is attempting to spread to other computers via your accounts. If so, change your passwords immediately.
9. **My antivirus has disappeared, my firewall is disabled…** Another typical characteristic of many threats is that they disable security systems (antivirus, firewall, etc.) installed on computers. Perhaps if one thing shuts down it might just be a specific software failure; but if all your security components are disabled, you are almost certainly infected.
10. **My computer is speaking a strange language.** If the language of certain applications changes, the screen appears back-to-front, strange insects start 'eating' the desktop… you might just have an infected system.
11. **Browser woes –** Your web browser becoming sluggish, your home page changing or being redirected to unusual websites are all warning signs of a computer virus infection.
12. **Security attacks** – Some viruses are designed to disable your computer's protection. So, if you can't open or install an anti-virus program or your firewall, your computer may be infected.

ASSESSMENT

1. Highlight EIGHT signs to know your PC has virus?

Computer Science JSS3 Third Term
Week 4
Topic: Virus Detection

An antivirus tool is an essential component of most anti-malware suites. It must identify known and previously unseen malicious files with the goal of blocking them before they can cause damage. Though tools differ in the implementation of malware-detection mechanisms, they tend to incorporate the same virus detection techniques. Familiarity with these techniques can help you understand how antivirus software works.

Antivirus software is a **type** of utility used for scanning and removing viruses from your computer. While many **types** of **antivirus** (or "**anti-virus**") programs exist, their primary purpose is to protect computers from viruses and remove any viruses that are found.

Most antivirus programs include both automatic and manual scanning capabilities. The automatic scan may check files that aredownloaded from the Internet, discs that are inserted into the computer, and files that are created by software installers. The automatic scan may also scan the entire hard drive on a regular basis. The manual scan option allows you to scan individual files or your entire system whenever you feel it is necessary.

Antivirus software identifies, prevents, and removes malware from a computer system. Malware is any number of viruses and software bits that intend to harm the computer or steal information, such as viruses, adware, rootkits, backdoors, hijackers, keyloggers, spyware, trojans, and worms. Modern antivirus software employs several methods to detect and remove malware. However, no antivirus software can detect and prevent all possible malware.

Types of Antivirus Software

Norton AntiVirus

Norton is one of the most well-known antivirus software. One of its key features is that it updates every 5 to 15 minutes to make sure you system is up to date.

McAfee Virus Scan Plus

McAfee Virus Scan Plus is another software that shields your PC from viruses and spyware, and includes a firewall that can help prevent hacker attacks to your system.

Trend Micro ("PC-Cillin") Internet Security

Trend Micro provides an award-winning antivirus engine that protects from viruses, spam, spyware, trojans and other online security threats.

Bit Defender

Bit Defender offers protection from viruses, spyware, rootkits, provides anti-phishing help, and offers a gamer and laptop mode. This software is only $29.99 annually and can be used on up to three computers.

AVG Anti-Virus

AVG is unique in that is provides consumers a completely free version. The free version works extremely well if you are just looking for simple antivirus protection without all the bells and whistles.

ASSESSMENT

1. Whats an Ant-Virus Software?
2. List FOUR types of anti-virus software