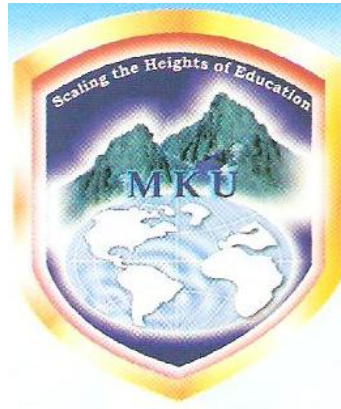


MOUNT KENYA UNIVERSITY



DEPARTMENT OF BUSINESS INFORMATION TECHNOLOGY
RWANDA TOURISM UNIVERSITY COLLEGE (RTUC) Campus, Kigali, Rwanda

INDUSTRIAL ATTACHMENT REPORT CARRIED OUT AT KIGALI HEALTH INSTITUTE

SOLOMON GAI AYUEN AYOM
Registration N^o: BIT/0169/11/F

Under guidance of
Mr. Ngenzi Joseph Lune
Director of ICT at Kigali Health Institute

January 2012

DISCLOSURE PAGE

This is to confirm that I have read the report and the information enclosed is true and contains no confidential information.

Company/Institution/Industry ...

Supervisor's Name:

Supervisor's Signature and stamps.....

Date:-----

ABSTRACT

In which report describes the work done by the novelist **Solomon Gai.A**, Student Number **BIT/0169/11/F** during ten weeks of Industrial Attachment as a component of Bachelor of business Information Technology at Mount Kenya University. The Practical Training was carried out at **Kigali Health Institute** under supervision of Mr. **Ngenzi Joseph Lune** the Director of **ICT**. The work involved Computer Hardware and software maintenance and troubleshooting, computer Networking and repair of different IT equipments. The maintenance work included both curative and preventive maintenance. Repair work was done for devices namely computers, Photocopiers, Printers and fax machines. In networking, our main duties were to provide network support, installation of network devices and troubleshooting network related issues.

DECLARATION

I Solomon Gai Ayuen hereby affirm that to the best of my knowledge, this work is original and has never been submitted for any Academic Award in any other University or Institution of learning in the world. I also understand that any academic dishonesty in form of plagiarism or any other form may attract a penalty as predetermined in RTUC's Academic policy.

I accredited that the content of this report may be made available for Academic purpose within the Library of RTUC.

Solomon Gai Ayuen
01/December/2012

Kigali-Rwanda

CERTIFICATION

This is to certify that Mr. Solomon Gai Ayuen, with the Registration No: **BIT/0169/11/F** a student in RTUC, Department of Business Information Technology in the Faculty of computer successfully completed a ten weeks of Industrial training from 1th December to 30th January , 2012 at Kigali Health Institute.

Industrial training supervisor
Mr. Ngenzi Joseph Lune
Director of ICT Kigali Health Institute

ACKNOWLEDGMENT

I convey my sincerely Gratitude to the staffs of KHI for the excellent working relationship while doing my Industrial Attachment. No word is enough to thank Mr. Joseph the Director of ICT as my Supervisor for accepting to offer me a place in his department. He also took his time out of busy schedule to train me, I owe him special appreciation!

I also recognized the help of my friends and colleagues at the Institute who contribute in any kind during my training.

Another vote of thanks goes to the coordinator for Industrial Training in the Department of BIT In RTUC Mr. KULE who was so helpful to me before and during the industrial Training. I am so grateful to him.

I say all these from the depth of my heart. God bless everybody I interacted with directly or indirectly during my Industrial training. Thank you all.

ABBREVIATIONS

KHI	Kigali Health Institute	LAN	Local Area Network
HTTP	Hyper Text Transfer Protocol	LCD	Liquid Crystal Display
ICT	Information Communication Technology	NBI	Nile Basin Initiative
IMAP	Internet Message Access Protocol	NELSAP	Nile Equatorial Lakes Subsidiary Action Program
IP	Internet Protocol	KIST	Kigali Institute of Science and Technology
IT	Information Technology	NIC	Network Interface Card
APC	Automatic Power Control	PAN	Personal Area Network
CAT5	Category 5	PC	Personal Computer
CAT6	Category 6	POP3	Post Office Protocol 3
CD	compact disc	SFCG	Search for Common Ground
CEIT	Computer Engineering and Information Technology	SMTP	Simple Message Transfer Protocol
DNS	Domain Name System	TCP	Transmission Control Protocol
DSL	Digital subscriber Line	TIA	Telecommunication Industry Association
DVD	Digital Video Disc or Digital Versatile Disc	UPS	Uninterruptible Power Supply or Uninterruptible Power Source
EIA	Electronic Industries Alliance	WAN	Wide Area Network
FAQ	Frequently Asked Questions	WWW	World Wide Web

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STRUCTURE OF KIGALI HEALTH INSTITUTE

Kigali Health Institute is structured through its vision, historical background, campuses, students and management team:

Mission and Vision of KHI

The vision of Kigali Health Institute is: "To be a centre of excellence in training and development of health professionals". The goal of this vision is to develop a pool of well trained and responsive health workers capable to deal with the many health challenges at the global area and in particular our country.

The mission of Kigali Health Institute is: "To train and improve the capacity of health workers".

KHI has different centers among them we are interested by ICT centre.

I.1 HISTORY BACKGROUND

Before the war of the genocide in 1994, Rwanda had inadequate Health workers both in number and Quality; this was worsened by war and Genocide of 1994. To address this situation, the Government of National Unity established KHI in June 1996 and through an act of parliament, law number 07/ 2002 of 22/2/02.

The first three departments to be opened were:

- Anesthesia
- Physiotherapy
- Nursing/midwifery
- Progressively KHI introduced:
- Mental health nursing
- Dentistry
- Medical Laboratory Technology
- Radiography
- Environment Health Sciences

KHI was created on 5th June, 1996 and its statute was ratified by the bias of a law of

parliament N° 0712002 of 22th February 2002. KHI has become organization semi-autonomy with two Ministries: Ministry of Health and Ministry of Education.

DESCRIPTION OF KHI

Kigali Health Institute strives to develop the population's welfare through health care, environment and sustainable development of Rwandans through the training of health workers capable to deal with a number of challenges at the Global Area with an emphasis on our country.

KHI Profile

KHI is located on two campuses:

1. The main campus in Kigali

Kigali Health Institute (KHI) is located at Kigali City, Nyarugenge District near SERENA HOTEL KIGALI

Main campus facilities:

- Library
- Lecture rooms
- Computer labs
- Demonstration labs
- Sports is currently done at circle sportive
- Limited halls of residence for students

P.O Box 3286 Kigali-Rwanda
Tel: +250572172;+25057178
Fax: +2505717878
Website: www.khi.ac.rw

2. Nyamishaba Campus at Kikuyu

P.O Box 03 Kibuye

Tel: 0252568101

About KHI students

The majority of Kigali Health Institute students are government sponsored secondary school leavers with advanced certificate of education in sciences subjects or equivalent. There are few mature entrants. These are students who have been previously employed. KHI also admits a small number of students who come from neighboring countries.

KHI management team

The KHI team comprises the following:

1. The Academic team

The Academic team is distributed in three faculties of KHI; those are that followings:

➤ Faculty of Allied Health Sciences

- This is composed of the following departments:
- Department of Biomedical Sciences
- Department of Medical Imaging
- Department of Dentistry
- Department of Physiotherapy
- Department of Clinical Officers Ophthalmology
- Department of Anesthesia

➤ Faculty of Nursing Sciences

This comprises the following departments

- Department of General Nursing
- Department of Mental Health (psychiatric Nursing)
- Department of Midwifery

➤ Faculty of Community Health Development

This includes the following departments:

- Department of Environment Health
- Department of languages
- Department of Information Computer Technology (ICT)

2. Administrative team:

This team includes the Rector assisted by the followings:

- Head of Public relations
- Internal Auditor
- Head of planning and cooperation
- Vice-Rector in charge of Academic Affairs and Research
- Academic Registrar
- Director of Library
- Head of Examination
- Head of Registration
- Head of Statistics
- Head of Research
- Head of Program
- Vice-Rector in charge of Administration and Finance
- Director of Human Resource
- Director of finance
- Dean of Students Affairs
- Head of personnel
- Center of continuing Medical Education (CEFOCK)

About KHI ICT Center

The ICT centre has been created in response to the government policies among them:

- To transform Rwandese society and economy into an information-rich, knowledge based economy
- Transform education system using ICT with the main of improving accessibility and quality

The vision of Kigali Health Institute ICT Center is “To become a Centre of Excellence in our country where ICT must be the basis of modern learning and research in the health Sector”.

Reference:

<http://www.khi.ac.rw/students.html>

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CHAPTER 1

INTRODUCTION

The industrial attachment was completed at my host Institute premises and in the different other Organizations where the hosting Institute was contracted to offer IT consultancy and ICT equipments maintenance. Details of the institute and fields where this work was performed are listed below:

1.1 THE HOST INSTITUTE

KIGALI HEALTH INSTITUTE

Kigali Health Institute is a technical health located in Kigali city within the compound of KIST in Nyarugenge district

KHI offers the following services.

- Information communication technology as the train their students in ICT center
- Repair and Maintenance of Computers and accessories, Printers, Copiers, Fax machines, scanners and so on.
- Computer Networking and Repair of electronic requirements
- Installation and maintenance of computer lab
- Website maintenance

Supervisor: Mr. Ngenzi Joseph Lune

ICT Director KHI

Tel: +250 252572172 / 252571788

Fax : Fax: (+250) 252571787

Email: rector@khi.ac.rw

Po.Box: 3286 Kigali-Rwanda

Website : www.khi.ac.rw

1.2 THE OBJECTIVES OF THE INDUSTRIAL TRAINING

The input objectives of Industrial training include below;

- I. To interpretation information communication technology experience as the knowledge I have required in the industry but might have not been taught during lectures.
- II. To be relevant to the Knowledge taught during the lecture halls
- III. To have experience in field of working atmosphere.
- IV. To carry and use the experiment gained during the industrial training in discussions in the lecture halls.
- V. To gain experience in report writing in any projects.
- VI. To rendering myself to engineering working ethics.
- VII. To rendering myself to potential future employers.
- VIII. To facilitate myself in choosing the appropriate work upon successful graduation given the experience and knowledge I acquired during the industrial attachment.

1.3 THE WORK MAINS ACTIVITIES IN THE INDUSTRIAL TRAINING

In the course of the industrial training, the following methods of learning were employed.

Table 1: Brief description of activities involved during the industrial training.

Activities of Learning	Description of mains activities
Study and listening	When a new task is being introduced, I watch it being done and I listen to the explanation given by my supervisor.
Demonstration and Illustration	My supervisor explains everything that I didn't understand to me
Asking of questions	I asked questions where I don't understand something or when I needed a help.
Hands on work	The supervisor uses to gives me a task to care it out and a chance of trying it out a task while he will come after to ask me how far I have gone with the task done.
The Assignment task	I could be given out a task which I have to complete on my own to evaluate my understanding on a particular task.
Credentials of the work	Every day work completed is documented on our log sheets.

1.4 THE TASKS COMPLETED OF THE INDUSTRIAL ATTACHMENT

The tasks I did during my industrial attachment are summarized on table 2.

Table 2: Tasks performed during the industrial training.

PROJECTS	THE TASKS INVOLVED
Networking	<ol style="list-style-type: none">1. Configuring of wireless.2. Setting up a network enable printer, configuring, installing printers' drivers, and sharing a printer that has no NIC or wireless capability on a network.3. Crimping cables (straight through and crossed over cables).4. Cabling, adding new connectors or replacing old damaged cables.5. Trouble shooting Internet connection failure.
Hardware maintenance	<ol style="list-style-type: none">1. Curative and preventive maintenance of computers including cleaning, adding components, UPSs and changing UPS batteries.2. Repair and maintenance of printers, Scanners, Photocopiers and fax machines. Replacing tonners and Cartilage.
Software maintenance	<ol style="list-style-type: none">1. System settings2. Installation or upgrade of applications3. Users support4. Repair, upgrade and installation of operating systems5. Installation of computer components6. Web maintenance

CHAPTER 2

NETWORKING ACTIVITIES

Computer networks are essentially important in the field of computing today. Most offices need to share some resources like printers, files disk space among others. Networks also provide central management of resources and users.

This section is devoted to present the work we did with existing networks. No network design and protocols are discussed in this section of this report. The networks we worked with included peer to peer networks, PANs, LANs and WANs.

2.1 CRIMPING NETWORK CABLE WITH RJ45 CONNECTOR

To be able to construct a network, we need cables to interconnect different network devices such as routers, switches, hubs, bridges, PCs, printers and so forth. Therefore, I will describe how I made two types of cable namely straight through and crossover cables during my work with KHI.

We used the TIA/EIA 568B (T568B) standard for the wire alignment for straight through cables and the TIA/EIA 568A (T568A) standard for the one end of the crossover cables.

REQUIREMENTS

- 1) Cat5 / Cat5e or Cat6 cable
- 2) RJ45 connectors
- 3) Crimping tool
- 4) Network cable tester



Figure 1: RJ45

Figure 2: Cable tester

HENRY Crystal Head clamp



Figure 3: Crimping tool

PROCEDURES

1. The first step I did was to measure and cut the required length of the cable.
2. Then I stripped the outer sheath of the cable as show in figure 4.

Category 5, 5e, or 6 cable consists of 4 pairs of wires. (8 individual wires total). The individual pairs are twisted together; and the cable is not shielded, thus the name UTP cable (Unshielded Twisted Pair cable).

The pairs are protected and held together with an outer sheath. So 1/2 to 3/4 inch of the outer sheath is stripped to expose the individual pairs. I used the stripping blade on the crimping tool. A sharp blade can do this also but care should be taken not to damage the inner pairs.



Figure 4: Stripped sheath of the cable

Next I separated the pairs by colors; Orange, Green, Blue and Brown. To ease identification, each pair has a solid color, and a split color (white with a stripe or tip of the main color).

3. I untwisted the pairs and aligned the individual colors following one of the standards shown in table 3 below. For straight through cable all ends of the cable must be aligned using T568B where as for a cross over cable, one end uses the T568B standard and the other end uses T568A standard. These standards are shown on table 3.

T568B	T568A
1. White/ Orange	White / Green
2. Orange	Green
3. White / Green	White/ Orange
4. Blue	Blue
5. White / Blue	White / Blue
6. Green	
7. White / Brown	White / Brown
8. Brown	Brown

Table 3: Color Codes alignment

4. After aligning the wires, I straighten out the wires and trim off the ends using the cutting blade of the crimping tool so that all wires can slide into the RJ45 and touches the end of the connector.
5. And then the wires are inserted into the RJ45 without displacing their order. I make sure no wire is bending. I pushed the wires till they make a contact with the connector's end as show in figure 5.



Figure 5: Wires inserted into the RJ45

The order of the wires' alignment **MUST** be followed so that each wire goes to the right pin of the RJ45. The locking clip of the RJ45 **must** always be oriented down. Each wire number **must** go into their respective pin number on the RJ45 connector. The pin positions are illustrated on figure 6.

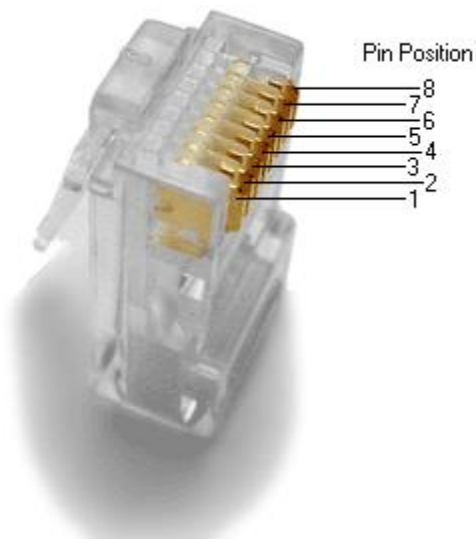


Figure 6: pin positions of RJ45

6. The next task to perform is the crimping of the connector onto the cable. I verify that the cable colors are in the right order and then put the RJ-45 end into the correct spot in the correct way. I Crimp it down as tight as possible so that the wires don't come loose. See figure 7.



Figure 7: Crimping the cable

2.1.1 STRAIGHT THROUGH CABLE

Straight through cable is made by using the T568B color code on all the two ends of the connector. This cable is used to connect a PC or a server to a switch, Hub, or router, Hub to router and switch to router.

2.1.2 CROSS OVER CABLE

Cross over cable has one end of the cable made using the T568B color code and the other end uses the T568A color code. This cable is used when connecting a PC to PC, Switch to Switch, Hub to Hub or Router to Router.

2.13 TESTING THE ETHERNET CABLE

The last task I do after crimping both ends of the cable is to check whether my cable works properly. I turn on the network tester. Next I plug one end of the Ethernet cable I made into the “IN” Ethernet input on the network tester and the other end into the “OUT” input. I then press the “Test” button.

RESULTS

The network cable tester will send a signal across the Ethernet cable. If the signal gets from one end of the cable to the other, a green light will appear on the device, and then I know my test is

successful. A red light will indicate that no signal was received at the other end hence the test is unsuccessful.

When the test is not successful, I inspect the cable connectors and start the process of crimping again following the steps I described on section 2.1.2.

2.2 SETTING UP A PRINTER IN A NETWORK

Setting a printer in a network will allow users to share the printer. This will reduce the cost of having each user with a printer.

2.2.1 A NETWORK COMPATIBLE PRINTER

For a printer that is network compatible with either Ethernet or wireless capabilities, we find a place where the printer is easily accessible by all users and can be connected to the network. We then connect an Ethernet cable to the printer's Ethernet port and the other end of the Ethernet cable to a jack that is connected to the network. Alternatively we could connect the cable directly to a network switch, hub or a router.

For a wireless printer, we connect it to the network wirelessly by configuring the printer's setting on the front panel of the printer to accept settings from the network namely IP address, subnet and router numbers assigned to the printer by the DHCP server. If the network requires all nodes to have static addresses, we look up for the address from other devices and enter them manually. We also enter unique IP address for the printer.

Once we finished connecting the printer to the network, we would install the drivers for the printer from the manufacturer's CD that came with the printer on all computers on that network that will use the printer. Alternatively when there is not CD, we download the drivers for that particular printer from the Manufacturer's support website. Finally we test the printer from every computer that has the drivers installed.

2.2.2 A PRINTER WITHOUT NETWORK COMPATIBLE

For a non-network compatible printer, we connect it to any networked computer via a USB cable or serial cable. Install the printer's drivers on that computer from the CD or download from the manufacturer's website. From the control panel of the computer, we set the preferences to allow for printer sharing. The sequence of command we followed is: **Start >Control panel> Printers and fax>Right click on the printer name>select properties> sharing>ok.**

For other computers on the network to be able to use this printer, we installed the drivers of the printer on all of the computers.

2.2.3 CHECKING PRINTER ON THE NETWORK

After the installation of the drivers of the printer on each network computer, I always check whether each computer on the network can see the printer. If the printer is visible, I test it on each of the computer on the network. The sequence of commands I followed while using windows is: **Start > control panel > printers and Fax**; I could be able to see the names of the printers that are on the network. To continue to test the printer, I select the printer I want to test and **Right click on the printer name > select properties > test printer > ok**. The printer automatically prints a test page.

2.3 TROUBLE SHOOTING INTERNET CONNECTION

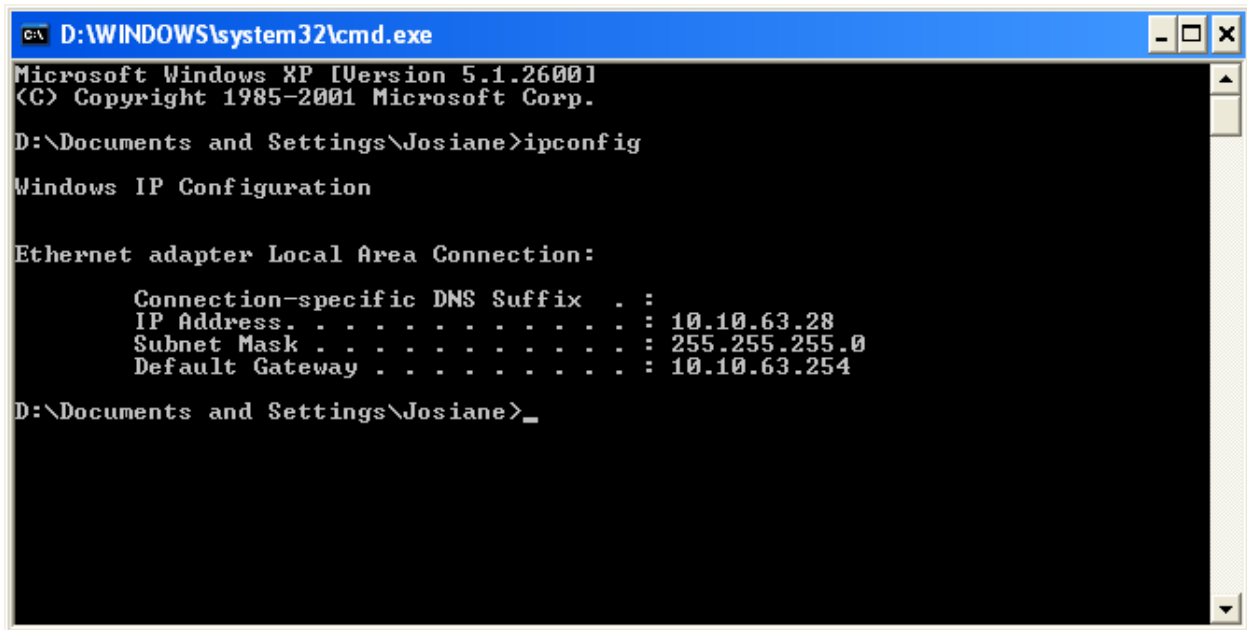
Many of the users we worked with often come to complaint of Internet failure. This sub section of this report covers what we did to identify and fix the problem. Usual one to three steps can solved the problems but in some cases all the below procedures do not solve the problem and in such cases the ISP is contacted.

The following is what I did to determine the cause of the problem to get the DSL connection up and running.

I check the network cables to be sure they are properly attached to the LAN ports (usually at the back) of each computer. When I cannot access to the Internet, it could be because of loose or defective network cables. Generally, if red or orange lights are flashing from the end of the network cable, this means that data is being transmitted. If only one of the computers on a network cannot detect Internet connection, the network cable attached to that computer is probably not functioning properly so I test that cable using a network cable tester. If the problem is the cable I replace it. Otherwise I move onto identify where the problem lies.

If the problem persists, I check the drivers for the Ethernet cards to make sure they are not missing or are properly installed on the network's computers. I right click on the "my computer" icon, select **Manage** and then "**Device Manager**." I check whether there is a "Network Adapter" installed by clicking the plus sign (+) beside it. If I see a yellow exclamation point (!) just beside the "Network Adapter," this means that the driver of the network card is either not properly installed or is corrupted. Therefore I reinstall the Ethernet controller after downloading them from the manufacturer's website. When I detect no problem I move on.

I could check the IP configuration to make sure the IP address is valid. Conflict in IP addresses can cause network failure. No two computers in a network should have the same IP address. I check the IP address by issuing the command ipconfig (**Start > Run > CMD> Enter > ipconfig**). The IP configuration information is shown on a command line window as on figure 9.



```
c:\ D:\WINDOWS\system32\cmd.exe
Microsoft Windows XP [Version 5.1.2600]
(C) Copyright 1985-2001 Microsoft Corp.

D:\Documents and Settings\Josiane>ipconfig

Windows IP Configuration

Ethernet adapter Local Area Connection:

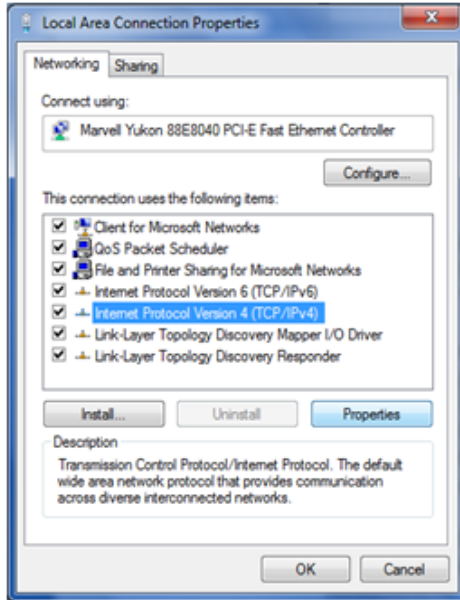
    Connection-specific DNS Suffix  . : 
    IP Address . . . . . : 10.10.63.28
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . : 10.10.63.254

D:\Documents and Settings\Josiane>_
```

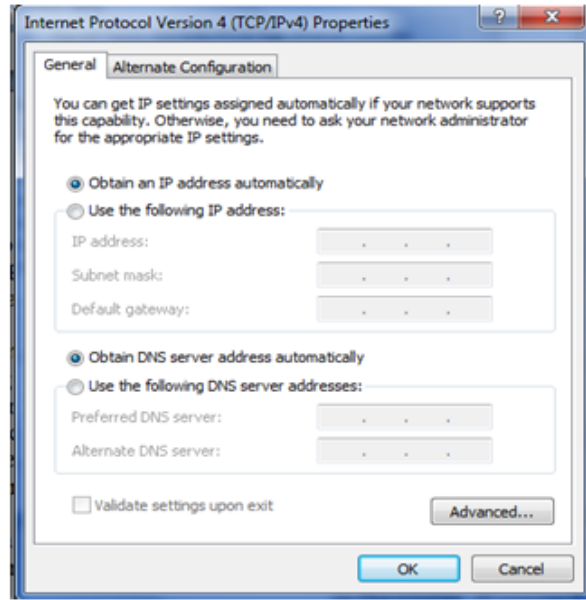
Figure 8: IP Address information

If the media state is disconnected, One of the network Device is down or cannot identify that computer so I refresh the immediate network device (hub, switch or router) or all by powering down and on after five seconds. The media state should now change to connected. If the median state does not change to connected, I Ping the IP address of the default gateway (example **ping 10.10.63.28**) in command line window in shown in figure 9. If the ping is successful, and the computer cannot connect to the internet, the problem is between the default gateway and the ISP's router. Here I recommend the help of the ISP.

In Windows, the most trouble free way to set IP addresses on a computer network is to use the DHCP (Dynamic Host Configuration Protocol) setting. To do this, I click "**Start**," and then "**Control Panel**." Load "Network Connections (network and sharing center and I select change adapter settings for windows 7)," right-click on "**Local Area Connection**, select "**Properties**" and under the "General" tab, select "**Internet Protocol TCP/IP**." And then I click on "**Properties**" and select "Obtain IP address automatically" and "Obtain DNS server automatically" as shown on figure 10 A and B respectively.



A: select TCP/IP.



B: setting DHCP and DNS automatically.

Figure

9: Dynamic Configuration of IP Address

Trouble connecting to the Internet may be a result of a defective modem or router. If the computer is using a router, I detach it from the modem and try to see if I can connect to the Internet with a direct line from the modem. If so, the problem lies in the router. If connecting one of the computers directly to the modem does not solve the problem, the problem may lie in a defective modem, or there was service provider downtime.

Downtime with the Internet connection sometimes happens. So we call the Internet service provider for further assistance, or wait until the Internet connection recommences.

CHAPTER 3

HARDWARE MAINTENANCE

Precautionary and therapeutic maintenance of computers and their accessories is important for the best performance and longer life span of the hardware component. There are various reasons why hardware maintenance should be carried out. Computer components attract dust, dirt, lint, carpet fibers, hair, and smoke particles. Food and drink consumed near the computer can also cause problems to the computer. There are two fans that bring air into the computer to keep the internal components cool. Unfortunately, the air also contains grime, which settles on the components, and can cause a variety of problems. Even the thinnest coating of dust will raise the temperature of the components. The grime build up causes overheating, which eventually results in slow performance or permanent hardware failure. It is for these reasons that we were much involved in both hardware and software maintenance.

The chapter gives a report of hardware maintenance I and the technical staffs of KHI performed during my industrial attachment with KHI. It included cleaning of PCs' components, Laptops, printers, scanners, photocopying and fax machines, mounting of computer components and maintenance of UPSs.

3.1 THE COMPUTER COMPONENTS

The training started with introduction to the different components of the computer, how to disassemble and reassemble a computer and precautions in handling computer components. Therefore, I here present the different parts of the computer to ease understanding in the proceeding sections. The main components inside a PC include the following.

1. Video Card
2. Sound Card
3. Network Card
4. Motherboard
5. Power supply
6. CPU
7. RAM
8. Hard Drive
9. Disk drive

The location of some of these components is shown on figure 11. In addition, there are Input Output (I/O) devices which include Keyboard, Mouse, Scanners and others as input device. The Output devices include; the monitor, printers, speakers and so on.



Figure 10: Inside components of the computer

3.2 CLEANING A PC

This is a preventive computer maintenance relating to the accumulated dust and grime in the computer. Preventive maintenance and cleaning helps avoid overheating, random crashes, lock-up, and component failure, and can save the user money in the long run.

All I used when cleaning a PC are Alcohol, anti static fluid (a mild detergent can work also), pieces of soft lint-free cloth, painter brush, Electrical blower, tweezers, cotton swabs and accessories like screw drivers. Some of the requirements are show on figure on figure 12.



Figure 11: Materials for cleaning a PC

PROCEDURES FOLLOWED

Before starting the cleaning, I properly shut down the computer and disconnect all electrical cords and cables. Then I place the CPU case, monitor, keyboard and the mouse on a table I have prepared for the cleaning. I give the computer at least 15 minutes to cool down before I open the case.

Next I open the case and disconnect all cables from the power supply. But before touching the inside of the computer, I put one of my hands on the metallic frame on the case to avoid transmitting static electricity to the circuitry on the mother board. Then I use an electrical blower to blow out dust from inside the case. I concentrate the airflow past the CPU's heat exchanger; the fans and the power supply. I also equally blow the front and rear outer parts of the computer case.

Then I use a slightly moist cloth to wipe off dust and grime inside the computer case. Sometimes I use Artist's brushes to loosen dust that has settled on fans and other computer components. I never introduce Solutions and wet substance inside the computer. When the computer is very dirty, sometimes it became necessary for me to remove some components like the fans and wipe them thoroughly clean with a moist soft cloth before fixing them back when they are completely dry.

When I have finished cleaning inside the case, I reconnect all the disconnected cables inside and close the case. Then I wipe the exterior parts of the case with a soft cloth moisten with cleaning fluid and wipe it with another dry soft cloth. Then I move on to other devices like the keyboard, monitor and the mouse.

3.2.1 CLEANING THE MONITOR

Monitors (CRT) and LCD screens may have Fingerprints and smudges on them. To remove them I wipe the screen with soft cloth moisture with water followed with a dry one. Sometimes a CRT display may have antistatic coatings, I use a cloth dampened with antistatic fluid or 50% solution of Alcohol to clean it. I then immediately wipe it with a dry cloth.

3.2.2 CLEANING THE KEYBOARD

After disconnecting the keyboard from the CPU, I first turn the keyboard upside down to dislodge any loose debris. Then I blow the key board with an electrical blower to remove more particles. Next, I wipe the keyboard with a piece of cloth moisten with alcohol. I also use a cotton swab moisten with alcohol to remove dirt between buttons.

3.2.3 CLEANING THE MOUSE

Sometimes the mouse cursor may start to move on the screen, without even touching it. Erratic mouse behavior can be caused by a dirty mouse ball. As the mouse ball moves, it picks up lint, hair, dust, and other things and deposits some of this grime inside the mouse ball cavity.

To clean the mouse, I disconnect it from the computer, and then I turn the mouse over, and rotate the plastic ring (usually counterclockwise). I remove the mouse ball and view the mouse cavity. I dislodge grime in the mouse cavity by compressed air from a blower. Next I remove any lint stuck to the rollers by a pairs of tweezers. I rub alcohol on cotton swabs and a piece of cloth to clean the mouse ball and mouse cavity. When all the parts are dry I put the mouse back together and then I finally clean the mouse pad.

For an optical mouse I clean it by wiping it with a lint-free piece of cloth dampened with alcohol.

3.3 CLEANING A PRINTER

Printer users sometimes tell us that their printer leaves spots on the printed document, the printer does not pick up the paper or the paper often gets stack inside the printer. In this case we first clean the printer and check again the problem afterwards.

Whenever I was assigned a printer to clean, I do the following:

- I test the printer to see the problem.
- I then power off the printer and unplug the power cable.
- I open the printer and remove the toner cartridge. For multi color printers with removable Magnetic Transfer belt, I remove it to avoid being damaged while cleaning inner parts.

3.4 CLEANING A PHOTOCOPYING MACHINE

- I unplug the power cord to avoid electric shock while working. I remove the drum, toner cartridge and the fuser.
- The Drum is a photoconductive part of the copier. This means high intensity light makes the drum electrically conductive. This is the part of the copier to which toner and paper adheres. I clean the drum by brushing the surface with a Mylar Bar. The bar is usually in the printer and discharges the negative charge on the drum, removing toner and paper particles.
- I skipped the cleaning of the fuser because I didn't have fuser silicon oil which is used to clean the fuser. The Fuser is the part of the copier that bonds the toner to the printer paper.
- I Blow dust and debris (fragments) out of cracks and crevices with air from a blower. Dust buildup can slow the machine's performance and reduce its print quality.
- Next I lift the copier lid, wipe the glass with a soft cloth and a non-abrasive glass cleaner. I make sure to thoroughly wipe off fingerprints and smudges from the glass so the machine can produce clean copies.
- I Open panels and doors and carefully wipe down the fixtures with the clean cloth. I clean delicate parts with compressed air or a narrow paintbrush. I make sure to clean cracks and crevices so dust doesn't collect.
- I check rollers and other parts for ink smudges and clean them with the cloth and cleaner (Alcohol). This is because even small remnants of ink smudges can affect the quality of copies and clog the machine parts.
- I reinstall the drum, toner and the fuser. Then I wipe the exterior features, such as the machine case, keypad and control panel, with a soft cloth. If stains persist, I lightly moisten the cloth or use a mild detergent.
- Finally I use an improvised paper cleaner (paper dampened with Alcohol). I run this paper through the photocopier like any other document and it cleans the paper path and rollers.
- The last thing to do is always to test the copier.

3.5 CLEANING A SCANNER

Typical scanner user leaves dust and fingerprints on the glass, which degrades the quality of the scans. I followed these steps to clean scanners.

- I check the owner's manual if any to see whether the manufacturer has provided specific instructions to follow. Otherwise I do the following.
- I unplug the scanner.
- Spray glass cleaner on a soft piece of cloth.

- Raise or open the scanner lid.
- Wipe the glass until visible dust specks and grease have been removed.
- Immediately I wipe the screen dry with a dry portion of the rag or a second rag.
- I clean the chassis with the same fluid or with any other product suitable for cleaning plastic. (Some manufacturers recommend mild detergent dissolved in water.)
- I clean under the glass (the underside of the glass and inside of the chassis) only if recommended by the manufacturer. Some manufacturers recommend carefully cleaning the mirror with a camel-hair brush or compressed air.

3.6 CLEANING A FAX MACHINE

Dust, Paper, Dirt and Dried ink are all enemies of the fax machine. Cleaning the fax machine is necessary for the efficient functioning and long lasting of the machine. Below is how I cleaned a fax machine.

First, I unplug the telephone line, then the power cord. I remove the ink cartridge .Then I blow out all the dust and loose dirt that is sitting in the machine with an electrical blower. I wipe any dirt off of the exterior of the unit using a slightly damp cloth. Next, to clean the scanner, I moisten a piece of lint-free cloth with Isopropyl alcohol and use it to remove any dirt from the glass cover of the scanner. Next, to clean the print head, I moisten another lint-free cloth with Windex (glass cleaner) then wipe the edge of the print head until the dirt is removed. Finally, I reconnect the power cord, then the telephone line cord. When I finish the maintenance, I test the machine to ensure it works well.

For some model of fax machines, I run the self clean function for the print cartridge. The clean function will get rid of the dried ink on the cartridge heads. I also wipe them down in addition to the self clean functions with clean lint free cloth. I replace the cartridge when necessary.

I finish the cleaning by running a cleaning sheet which I improvised through the machine and clean the scanning head. This is important as it cleans the paper path and the rollers that may not be easily reached.

3.7 INSTALLATION OF UPS AND MOUNTING NEW BATTERIES

Due to constant power blackout which led to lose of unsaved work on computers, we recommended and installed many UPSs to PCs. We also installed APCs to the Servers of NELSAP to ensure reliability of the servers when power fails. We did this in consultation with the IT staff there. On a different note, the technical staffs at KHI and I also replaced a number of batteries of several UPSs at institute. The Batteries were overdue since their Life span was two years and were mounted more than two years ago. When we had finished we labeled the new

batteries with the date they were mounted. We also carried out repair of some UPSs which were networking.

CHAPTER 4

SOFTWARE MAINTENANCE

4.1 ROUTINE MAINTENANCE OF COMPUTERS

Given the amount of information on hand for download on the internet, it's easy to quickly fill up the important hard drive space and turn the computer into a sluggish, unresponsive monster. Keeping the hard drive clean is essential for the high performance that the latest computers can achieve.

Throughout my Industrial attachment with KHI, it was common for computer users to report to us that their computers are extremely very slow or non responsive. Therefore, before I could go for other solutions, I do the following tasks which I recommend to be done routinely.

I do six simple steps to clear up the hard drive:

4.1.1 UNINSTALLING UNUSED PROGRAMS

Users often install some programs but after some time they stop using it. These programs clutter up the drive and take up valuable space. Some users are tempted to delete these programs from their drive, but doing so will cause problems. The uninstall function of Windows for the program can remove them safely and completely.

To do this, I ask the user to find out which program he or she does not need. Then I click on start, control panel, Programs and select uninstall a program, then I click on the program to be uninstalled and I click on the uninstall tab. I make sure no application is using the program during an installation. Finally when the process is finish, I restart the computer.

4.1.2 CLEANING OUT TEMPORARY FILES

When the computer is not shut down properly, it will pass information from memory into fragmented files. Also, while programs are running, the computer will write information that it does not immediately need into temporary files. Installation files will also expand themselves into the temporary folder and will not always clean up themselves. Therefore I delete these temporary files safely by using the Disk Cleanup option in the System Tools.

To perform the disk cleanup, I clicked on start, all programs, accessories, system tools and then Disk cleanup respectively. Alternatively, I click on start, run and type the command **cleanmgr.exe**. Windows prompt me to choose a disk. Then I click Ok. After windows have finished calculating the space that can be freed, another window will display a list of check boxes and after checking the boxes I click on clean up system files. After a couple of minutes Windows will finish the Disk Clean Process. The screen shots on figure 15 shows the pop up Windows during the Process.

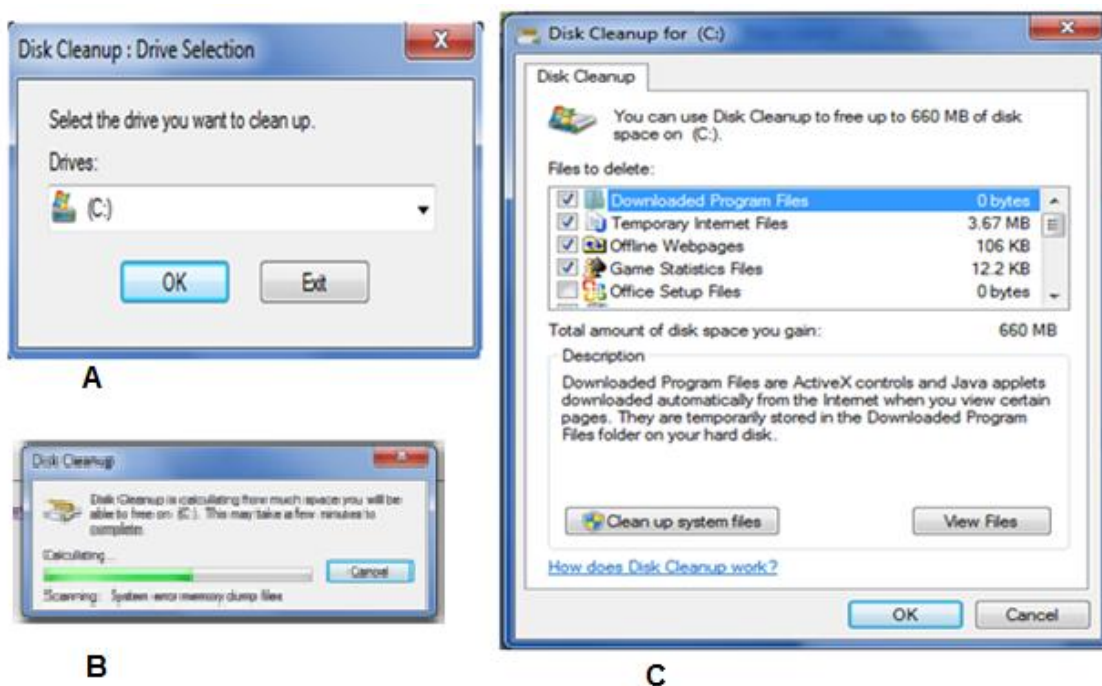


Figure 12: screen shots for Disk Cleanup process

4.1.3 EMPTYING THE INTERNET CACHE

As a user surf the internet the computer stores web pages and images into a temporary internet cache so that it can quickly recall and access information when the user move back and forth between pages. This backup information can quickly add up and eat hard drive space.

Emptying out the cache is quick and it depends on the browser being used. I basically did this on Internet Explorer and Mozilla Firefox.

With **Internet Explorer**, I opened Internet Explorer by double clicking its icon on the desktop. Next I click on the **Tools** button and then click **Internet options**. Then I click on the **General** tab, and under **Browsing History**, I click **Delete**. The Delete Browsing History dialog box is

displayed and I select all the check boxes for the information I want to delete. Then I click **Delete** and then **OK**. After few seconds or minutes the cache will be emptied.

With **Mozilla Firefox**, I opened Firefox and at the top of the Firefox Window, I click on **Tools** menu, and select **Options**. Then I select the **Advance** panel and click on the **Network** tab. In the **offline Storage** section, I click “**Clear now**” and then **OK**.

4.1.4 EMPTYING MAIL PROGRAMS OF CLUTTER.

Many users leave old messages in their mail programs like outlook. One or two messages don't take up much space, but hundreds certainly do. With this regard therefore, I tell users to short out old emails and delete what is not important. I also advise them to create folders and organize what is left. I tell them to make it a habit that when new emails come in, they are either filed immediately or deleted. Then I help them to set their email program to empty the deleted items folder each time they close their mail program.

4.1.5 EMPTYING THE RECYCLE BIN.

Once I have emptied the drive of cluttering, unnecessary programs; I empty the recycle bin to remove what has been placed there in the process. I click on the recycle bin icon on the desk top and then I click on “empty the recycling bin”.

4.1.6 SCANNING THE DISK AND DEFRAGMENTING

When Windows installs programs, it will put the files it needs anywhere that it finds free space, and not directly after the last program installed. As a result, the hard drive has patches of empty space on it that are not big enough to fit a full program, and will result in a drive space error if you attempt to install something new. I Scandisk (**CHKDSK for windows NT, XP, Vista and 7**) the drive to check for lost file fragments and to fix any errors it finds, then I Defrag to pack all of the program files together at the beginning of the drive. This will clear out those empty patches and move all of the free space I have just created to the end of the drive.

To scan the disk, I clicked start; computer, then I select (click) and Right click on the disk drive I want to scan. I then click on **Properties => Tools => check now** under the error checking section. I check the box “**automatically fix file system error**”. Sometimes I check the box “**scan for and attempt recovery of bad sectors**” if I suspect a driver problem. After checking the boxes, I click start. Lastly I click on a “**schedule disk scan**” when prompted to allow a scan the next time the computer is restarted.

For Disk defragmentation, I click on **Start** => **computer** => click on the drive name => Right click on the drive name => **click properties** => **Tools** => **Defragment now** => **Analyze Disk** => and then “**Defragment Disk**”. I also schedule defragmentation for user who may not know how to do it.

4.2 TROUBLESHOOTING OPERATING SYSTEM S RELATED PROBLEMS

Windows XP, 7 and Vista have tools that may be used to solve software issues resulting from installation of Windows update or other applications update that affect the normal functioning of the Operating System or cause System crash.

This section present how I used those tools when ever assigned to resolve a problem involving System crash during my industrial training with KHI. The first assumption I always make is that all Hardware components are working properly unless informed that a new hardware component was installed to the system. And then I use the system file checker to first try to solve the problem. If the problem persists, I then try the system restore tool.

4.2.1 THE SYSTEM FILE CHECKERTOOL

To determine whether the issue presented to me was caused by one or more system files that are used by Windows XP, Vista or 7, I run the System File Checker tool. The System File Checker tool scans system files and replaces incorrect versions of the system files by using the correct versions.

To run the System File Checker tool, I followed these steps:

1. I click **Start**, and then type **cmd** in the **Start Search** box for windows Vista and 7.
2. Right-click **cmd** in the **Programs** list, and then click **Run as administrator**.

If I am prompted for an administrator password or confirmation, I typed the administrator password or clicked **Continue** if there was no password being used.

3. At the command prompt, I type the command “**sfc /scannow**” and then pressed **ENTER**.

When the scan is completed, I test to see whether the issue that I was experiencing was resolved. If the issue was not resolved, I use the “System Restore tool” I describe in section 4.2.2.

4.2.2 THE SYSTEM RESTORE TOOL

Other troubleshooting methods, such as using the System File Checker tool, may not resolve the issue being solved. If the issue is not resolved and the issue being experienced started occurring recently, I use the System Restore tool. By using this tool the computer will be restored to an earlier point in time when the problem was not experienced.

This tool does not determine the problem but restores the operating system to a point in time in which the problem was not experienced. The System Restore tool uses restore points to return system files and settings to an earlier point in time. The Computer is restored to a previous state, programs and updates that are installed are removed.

To restore the operating system to an earlier point in time I followed these steps:

1. I Clicked **Start**, typed system restore in the **Start Search** box, and then click **System Restore** in the **Programs** list.

When prompted for an administrator password or confirmation, I typed the password or click **Continue** if no password existed.

2. In the **System Restore** dialog box, I click **Choose a different restore point**, and then click” **Next**”.
3. In the list of restore points, I click a restore point that was created before the problem began and then click” **Next**”.
4. Finally I Click **Finish**.

The computer restarts, and the system files and settings are returned to the state that they were in at the time that the restore point was created.

If the problem is more complicated that the tools discussed on section 4.2.1 and 4.2.2 do not solved, a repair or reinstallation of the operating system is required before moving to troubleshoot the hardware components.

4.3 REPAIR, UPGRADE AND INSTALLATION OF OPERATING SYSTEM

The system repair function will remove any updates that were previously installed that are not included on the installation CD. Drivers will also be reverted to their original XP, or Vista versions, as well as some settings. Windows may need to be reactivated after reinstalling. All updates may be downloaded from Microsoft Windows Update, because they are all replaced during the repair.

I would recommend repair or reinstallation of windows under the following circumstances;

- When Windows can't start in safe mode.
- When the problem is caused by a recently installed system update (Windows Update, Windows XP service pack, or Microsoft Internet Explorer update).
- The problems can't be solved with system restore, or the system restore can't be accessed.
- When a new motherboard is installed or major hardware changes were made and need the reinstallation of Windows.

The first step before I attempt to repair or reinstall windows is to make a Backup on an external disk. Reinstalling Windows XP and vista will result to lose of all data and settings. Windows 7 will create a folder called” **Windows.old**” in documents containing a backup of the old system. With Windows repair the data will be perfectly safe.

4.3.1 Windows XP

Whether we are performing an upgrade from previous versions of Windows like 98, 200, or NT, Repair, clean installation or parallel installation, the steps are almost the same. It is a matter of making choices in the installation options that are provided.

1. First of all I back up all important information before I perform a clean installation of Windows XP. I save the backup to an external location, such as a CD or external hard disk.
2. Next I start the computer from the Windows XP CD. To do this, I insert the Windows XP CD into the CD drive or DVD drive, and then I restart the computer. If the computer cannot boot from the Windows XP CD, I configure the BIOS settings on the computer to start from the CD.
3. When the message "Press any key to boot from CD" appears, I hit any key on the keyboard to start the computer from the Windows XP CD.
4. At the **Welcome to Setup** screen, I press ENTER to start Windows XP Setup.
5. I Read the Microsoft Software License Terms, and then press F8 to accept.
6. Instructions will appear on the screen which gives a guide to select and format a partition where Windows XP is to be installed.
7. If Windows Setup finds existing Windows installations, Windows will ask to repair an existing window installation, or install a fresh copy of Windows. If no installations are found, then no option to repair is given. This may happen if the data or partition on the drive is too corrupted. At this stage windows provides other options like, repair (R) or install now (ENTER).
8. From here Windows setup provides instructions on the screen to complete the Windows XP Setup. When Windows XP finishes installing, it restarts.

After the installation of windows XP, I would install the drivers from a CD or download them from the manufacturer’s website. Essentials drivers include; VGA controllers, Ethernet controllers, Audio controllers and so forth. Finally I activate Windows XP. It is at this point that I would install Antivirus software and other applications like office and adobe PDF reader.

4.3.2 Windows Vista

I start the installation by inserting the Windows installation disc into the computer's DVD or CD drive. And I restart Windows while running the existing version of Windows.

On the Install Windows page, I click Install now.



Figure 13: Windows Vista installation page.

On the “Get important updates for installation” page, we recommend getting the latest updates to help ensure a successful installation and to help protect the computer against security threats. But this need an Internet connection to get installation updates.

On the “Type your product key for activation” page, I type the 25-character product key to help avoid problems during activation.

On the “Please read the license terms page”, I click accept the license terms.

On the “**which type of installation do you want?**” Page, when I click Upgrade to begin the upgrade. A compatibility report may appear.

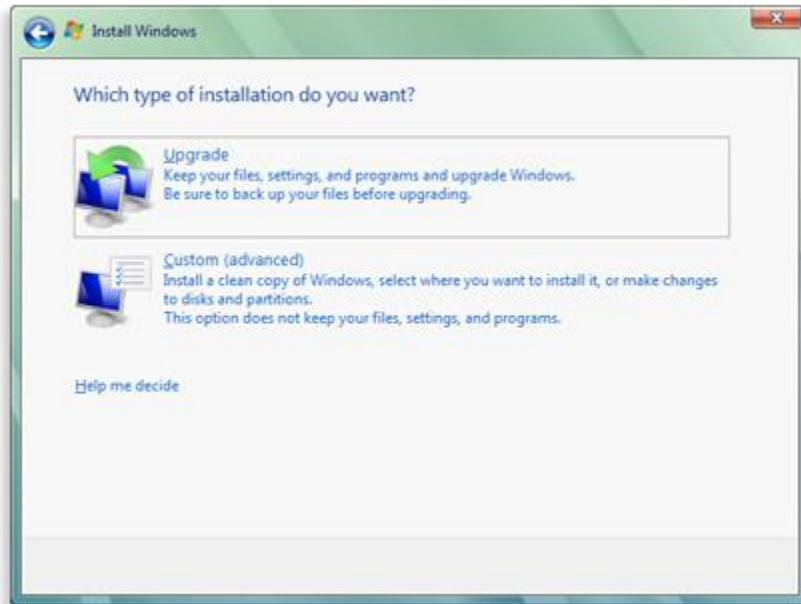


Figure 14: windows installation Options.

But for clean up installation, I click “**custom** (advanced)”. After this the process runs almost automatic with own screen guides which I followed till the installation process is over.

When I finished installing, I install the missing drivers, antivirus, Applications and updates.

4.3.3 Windows 7

Windows 7 is installed from a CD as an Upgrade or clean installation. It is also possible to install Windows 7 from a flash disk.

To install Window 7, I insert the Windows 7CD or DVD into the CD or DVD drive of the PC. And then I restart the PC to boot from the CD. When the setup finished loading, I select the language for installation. I also select the keyboard, time and currency format and then I click “**NEXT**”. A new Windows shows up.

On the Installation windows, I select the required option; “**INSTALL NOW**” does a new installation and “Repair your computer” is used to repair a bad or corrupt Windows 7 operating system.

A license window is shown and after reading through the terms, I click “I accept the terms of the license” and then “**NEXT**”.

A new window would show asking “**Which type of installation do you want?**” Two types of installations are shown here, Upgrade and Custom (Advanced). Choosing **Upgrade** will replace the existing version of Windows while leaving other applications and setting in place. Some

settings are restored to the default. Windows Vista can be upgraded to Windows 7 without any issues, but Windows XP is still a problem. From here Windows 7 setup takes care of the upgrade process.

The **Custom** (Advanced) type of installation installs a fresh copy of Windows 7. Selecting the **Custom** brings another window with the question “**where do you want to install windows?**” Here when “NEXT” is clicked, Windows is installed on the highlighted partition. To delete, modify and create a new partition I click “**Drive options (Advanced)**” and then **next**.

Partitioning/ Creating or Modifying Partitions

I click the **Drive options (advanced)** for advanced partition management options like 'Delete', 'Format', and 'New' and 'Extend'. To create a new partition, I click the **new** button. But if there was a list of partitions in the previous screen, I select the one where I want to install window 7. And then I click **Format** and 'Next' to proceed.

The 'New' option provides a text box to enter the size of the partition you wish to create in MBs. For example, A 15 GB = (15*1024 = 15360 MB). I click the **Apply** button to continue. The message “**To ensure that all Windows features work correctly, windows might create additional partitions for system files**” will appear. This is a new feature in Windows 7 to have a small boot partition for system files. I Click **Ok** to continue. A new primary partition is created along with a **System** type partition of about 200 MB. The partition created is highlighted; I click **next** to continue with the installation.

From here Windows 7 setup begins the installation. The computer restarts several times during the installation. Alerts and notifications are also shown. Other guides lines are also given during the process. When the installation is finished, windows configure the setting for the first time, the computer name, company name and password may be entered to mark up the configuration.

Since Windows 7 installs all the required drivers, the only task left is to activate the windows 7, install antivirus and turn on firewall and installation of other useful applications the user may need.

4.5 UPGRADE AND INSTALLATION OF MICROSOFT OFFICE 2007

There are two options when installing office 2007 namely Upgrade and Customize. Other versions of office also have similar installation options. The Upgrade option will remove previous office installed and replace with the current office being installed. The Customize option will keeps previous version of office and adds the new version allowing both to be use at time unless one choose to remove the previous version during installation.

In both option s the old version of Outlook will be uninstalled and upgraded to the new version of outlook.

The first thing before I would install any version of office is to decide with my user whether to perform an upgrade or a clean installation. Then I proceed with the installation as follows.

- I Insert the Microsoft Office 2007 Enterprise CD and wait for the setup to load. If the Setup Wizard does not automatically begin, then I open the CD in my computer and run **Setup.exe**.
- Next I enter the Product Key from the back of the CD jacket and Click **Continue**.
- I check the box "I accept the terms of this agreement" and click the **Continue** button.
- Next I Choose an installation option, **Upgrade or Customize**.
 - For Upgrade, I click on **Upgrade** and Click "**Install now**".
 - For Customize, I click on "Customize" and then I checked the radio button for "**Keep all previous versions**" (or any of the other two radio boxes depending on the user's demand). Next I click the **Installation Options** tab, select the first drop down box "Microsoft Office" and click **Run all from My Computer** and then I click **Install Now**.
- Installation will begin. It may take 15-30 minutes to finish. Finally I click **Close** to complete the installation.
- The first time any Office program is launch, the user will be prompted to activate the software. As long as there is an active Internet connection, the user can choose the default option and click" **Next**".

4.6 INSTALLATION OF ANTIVIRUS SOFTWARE

Most Antivirus software comes in a sealed CD containing the license key. A user must buy this CD from a vender before installation can be done. No much skill is required for the installation because most of them contain installation instructions that appear as guide during the installation. In most cases I insert the CD into the CD/DVD drive and it loads automatically. If it does not load, I open the CD and look for the file with ".exe" extension. The setup loads and takes care of the process. When asked for Product Key, I enter the key on the CD cover (this is done during activation sometimes). Other procedures usually vary and may be included on the installation instructions.

CHAPTER 5

CONCLUSION AND RECOMMENDATION

5.1 CONCLUSION

Working with KHI was enriching to me during my Industrial Attachment. Firstly, the fact that I was able to work both in the field and at the office was instrumental in giving me the feel of the working Environment. I was impressed to learn most of the common, simple but challenging issues at work which otherwise could not be taught in the class rooms. Working with UPS for example is never given attention in the class, However it was common that we were often consulted for recommendation, installation, supply and maintenance for UPSs.

Based on the objectives of the Industrial Training, I must say the objectives were accomplished. I was able to demonstrate my knowledge practically and gain confidence in myself. I also got an experience of the nature of Job that is most demanding in the Rwanda Job market relevant to what I am studying. This also reflects the same situation in the East Africa region. Working with different partners gave me the experience of transforming Knowledge to meet business requirements.

Of what I did, I really didn't have much trouble with software maintenance and I enjoyed doing it. Hardware Maintenance was little challenging as we handled devices which I never touched on before. Devices like scanners, copiers, printers and fax machines are never seen in our laboratories. In networking we never did much, but I was glad to meet and grasped some practical aspect of networking. This is because sometimes security polices of organization does not allow access to most network resources.

I am glad that with the experience I got from the Industrial attachment, I have a career to undertake.

5.2 RECOMMENDATION

The following are my recommendation to KIST;

1. Equip dedicate laboratories for specific activities. Whereas KIST offers courses in Computer Networks, software development course at the Academy, Therefore KIST should equip Network Laboratories with Network Devices like routers, Switches and hubs, different network cables among others for practical purpose.
2. Facilitate Students in finding Places for Industrial Attachment by signing memorandum of Understanding with different government Institutions, private and Public companies including NGOs.
3. Organize Industrial Attachment and Disseminate information regarding Industrial Attachment to the concerned students in a timely manner. This in turn will help Students who have been allocated places far away to prepare and report to those places in time.
4. Industrial Attachment financing should be done to Trainees in time.

To KHI, I recommend the following;

1. The supervisor should schedule tasks and projects at the beginning of the attachment.
2. Assign tasks or projects that also involve Programming to Trainees
3. KHI should advices her Technical Staffs of the dangers of improvising unfamiliar materials during PC cleaning. Such material may include piece of cloth with line or sharp materials like screw driver for cleaning the Keyboard.
4. Occupy the trainee with assignments during the training as this can measure the reliability of the trainee and build confidence in the trainee.

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