Information and Computer Studies

for Secondary Schools

Student's Book

Form Three

Tanzania Institute of Education

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for Secondary Schools

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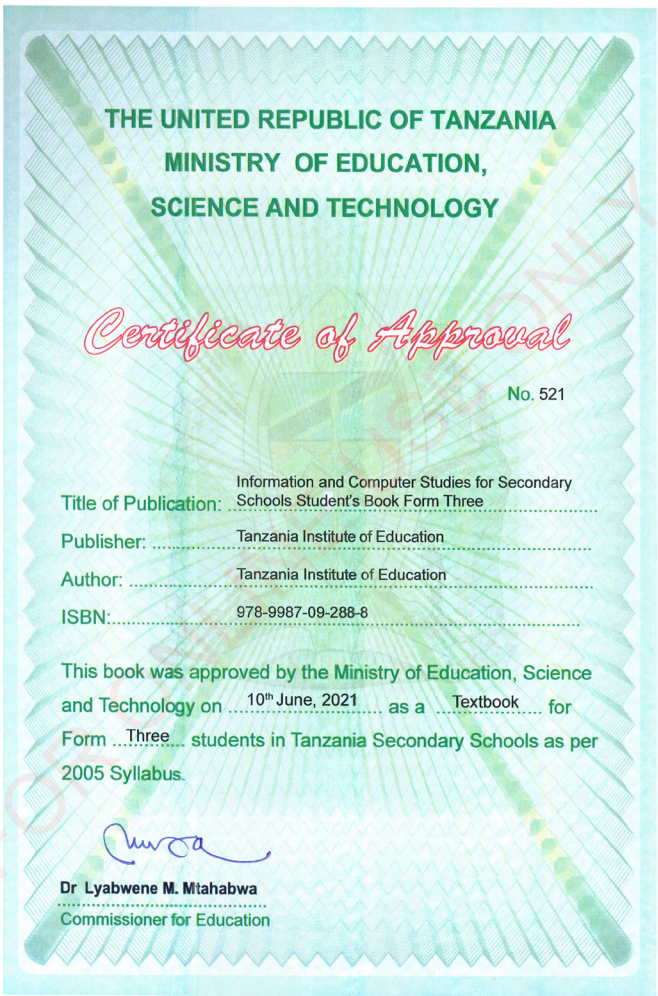

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Preface

This textbook, *Information and Computer Studies for Secondary schools* is written specifically for Form Three students in the United Republic of Tanzania. It is prepared in accordance with the 2005 Information and Computer Studies Syllabus for Secondary Schools, Form I - IV, issued by the then Ministry of Education and Culture.

The book consists of seven chapters, namely The role of ICT in daily life, ICT in creating awareness in the society, and ICT related crimes, security and hazards. Others are Web development, Website publishing, Data processing, and Database as information systems. Each chapter contains activities, illustrations and exercises. You are encouraged to do all activities and exercises in this book together with other assignments provided by your teacher. This will promote the development of the intended competencies for this level.

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Chapter One

The role of ICT in daily life

Introduction

In this chapter, you will learn about the role of ICT in society transformation. Also, you will learn about the role of ICT in business, agriculture, entertainment, medicine, engineering, data management, employment, cultural interaction and education. The competencies developed in this chapter will enable you to use ICT in daily life activities.

Think

1. Kind of information you can get using ICT at your school.
2. Advantages of using mobile phones.

ICT and society transformation

The use of modern ICT facilities contributes significantly to socio-economic development, innovation and cultural development globally and nationally. Modern ICT facilities include mobile phones, radio, television, computer, Internet infrastructure as well as services and applications such as social networks and video conferencing. The use of these facilities improves communication and facilitates economic development on various sectors. For example, nowadays people can do business online, individuals and institutes can conduct online meetings and classes through collaboration tools such as Zoom. In this regards ICT can be used to improve performance in sectors like business, agriculture, entertainment, medicine, engineering, data management, employment, cultural interaction and education.

ICT and business

ICT is widely used in different types and sizes of businesses. For example, many businesses own websites on which they upload information of goods and services they provide. A website can be used to advertise goods and services offered, order these goods and services, pay bills by using credit or debit cards and track the bought goods and services. Also, supermarkets use Point of Sale (POS) terminal machine, and this machine is programmed to read a barcode attached to the item to be sold and relate with the price and hence calculates the total price. The POS terminal is connected to central computer that contains information about stock and price of each item found in the supermarket. Therefore, POS terminal helps not only to calculate the total amount of money the customer is supposed to pay after buying goods, but also it controls the stocks, does inventory, calculates profit gain and prepares financial statements.

In some supermarkets, the terminals also have another machine connected to banks through Internet where you can use your credit or debit card to pay the bill. This reduces the risk of someone carrying a lot of cash for shopping. Such payments, in some cases, are done through mobile money transaction services offered by various cellular phone network providers. In this way, ICT makes the business more efficient, effective and prompt response to customers' needs. Some other ICT services for business include electronic banking (e-banking), electronic ticketing (e-ticketing) and electronic marketing (e-marketing).

Electronic banking

Electronic banking (e-banking) is a system of banking through which financial transactions are done by an exchange of electronic signals in place of transactions that were formerly done through cash and cheque. Before advancement in technology, people visited banks physically to make their transactions but nowadays technology has advanced and people use their devices anywhere to access bank services such as information about account balance, bank statement, deposits, withdraws and loans. This is achieved via Internet or mobile banking services.

Internet banking allows customers to perform financial transactions electronically, mostly using desktop computers, laptops, tablets or smart phones connected to the Internet. An example of Internet banking in the country is the use of banks' credit or debit card to purchase products or services online.

Mobile banking is a service that allows customers to perform banking transactions using a cellular device. An example of mobile banking in the country is when a user who via a mobile phone uses banks' mobile banking services to pay: utility bills such as water and electricity, Internet services and business licences.

Moreover, other common mobile banking services locally available in the country are mobile money transaction services from cellular phone network providers. Generally, these mobile money transaction services are used to transfer funds from one person to another. These funds can be transfered from mobile to bank account and vice versa for paying goods and services. Examples of such services include payments of annual land fees, and a paying small-scale traders.

Electronic ticketing

Electronic ticket (e-ticket) is a digital ticket equivalent to a paper ticket. Ticket reservations are increasingly done electronically for paying services such as booking for transport (air, land and marine) and social events (sports and games). Customers use companies' websites to book and pay for the ticket using e-banking. Examples of e-ticket services in the country are commonly used by Air Tanzania, Azam marine service and football matches. Customers can also pay for their tickets via mobile money services such as M-Pesa and T-Pesa. Figure 1.1(a) shows an example of a process to purchase airline e-ticket via Air Tanzania website.

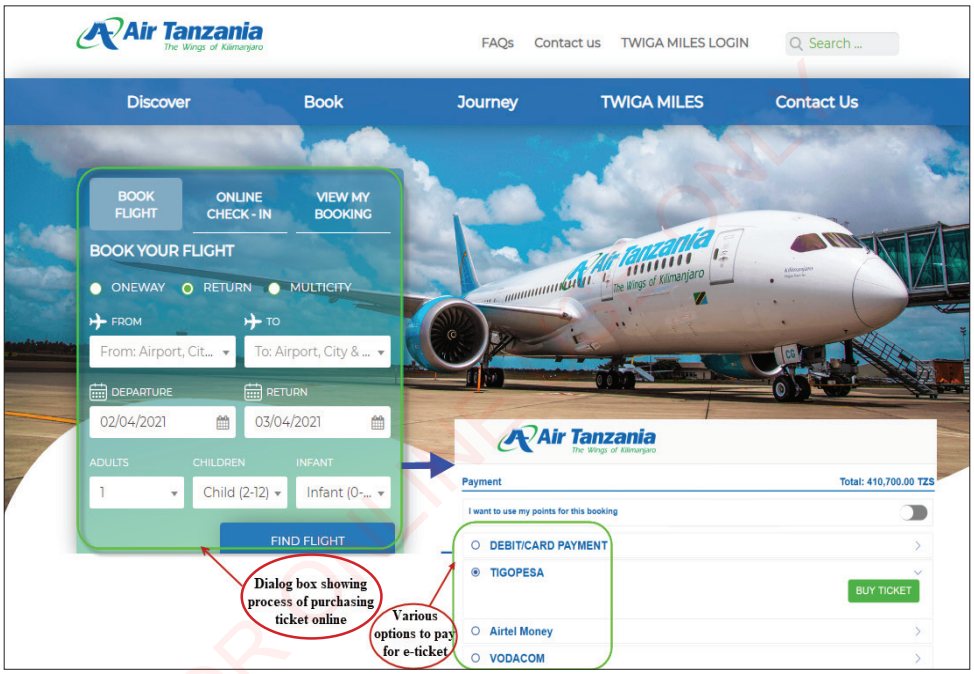


Figure 1.1(a): *Air Tanzania e-ticketing system with payment options*

Source: https://www.airtanzania.co.tz (2021)

In January 2021, Tanzania through Land Transport Regulatory Authority (LATRA) instructed all public transport bus owners to use e-ticketing system. For bus ticketing system which were proposed by LATRA, see Figure 1.1(b) that show an e-ticketing system for upcountry buses, where customers can fill the form online for their travel to different locations.

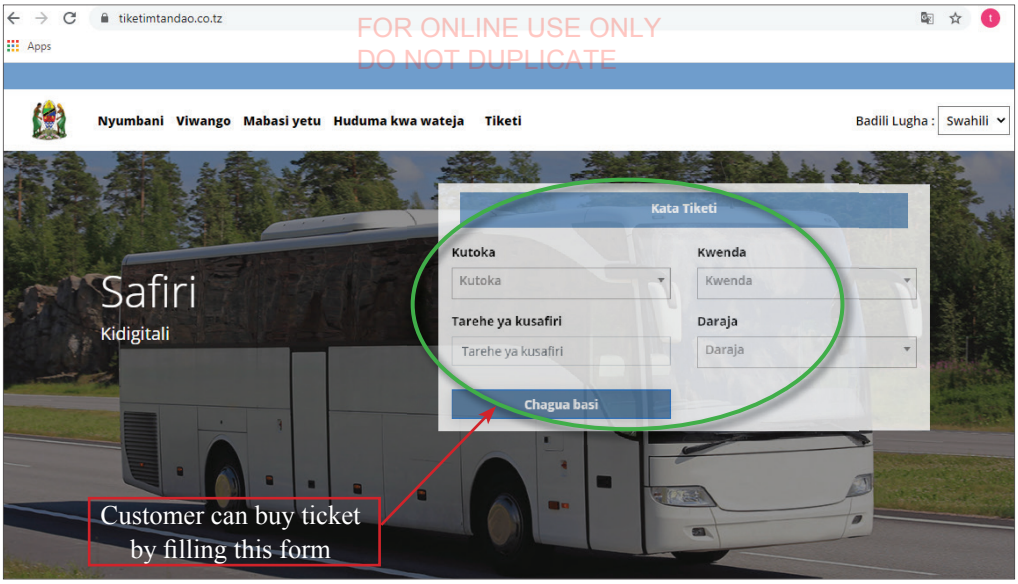


Figure 1.1(b): *LATRA upcountry buses e-ticketing system*

Source: www.tiketimtandao.co.tz (2021)

Electronic marketing

Electronic marketing (e-marketing) helps business firms to make use of ICT facilities to market their goods and services. The tools that facilitate e-marketing are such as TV, mobile phones, e-posters, social media, websites, blogs and radio. Every time upon listening to broadcasting media, you will hear business advertisement. This also applies when you visit websites and social media networks.

Activity 1.1: Searching for an e-marketing platform in Tanzania

Use the Internet to search for the electronic marketing platforms in Tanzania that can help business people to market their products.

A good example of ICT in doing e-marketing is seen in agriculture when small-scale farmers look for markets for their products. Using electronic tools enable farmers to market their products and their promotions reach a wide area within a short time. Figure 1.2(a) shows an example of an e-marketing platform which can help farmers to promote their products.

Figure 1.2(a): *Government owned agricultural e-marketing platform*

Source:www.exts.kilimo.go.tz (2021)

When farmers click the tab written 'Sell Products' they will fill information of the products to be sold in a web based form and save it. The information will be linked to a page under the tab 'MarketPlace' which when clicked, various marketed products will be seen as shown in Figure 1.2(b).

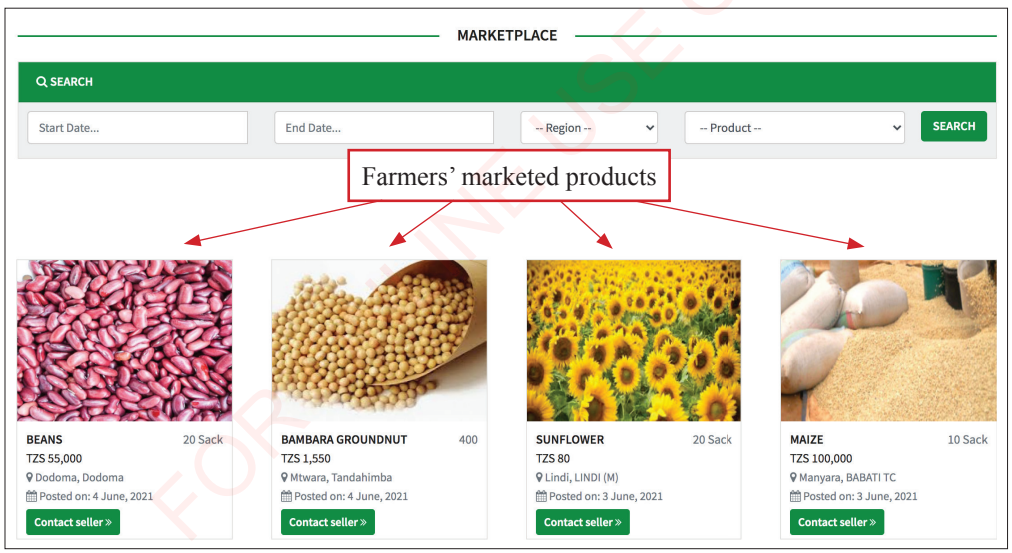


Figure 1.2(b): *Agricultural products e-marketing place*

Source:www.exts.kilimo.go.tz (2021)

Generally, application of ICT in business can play four major roles, such as improving service delivery to customers, improving business organisation's responsiveness to new developments, changing the basis of competition in your industry and improving business organisation's overall performance, as shown in Figure 1.3.

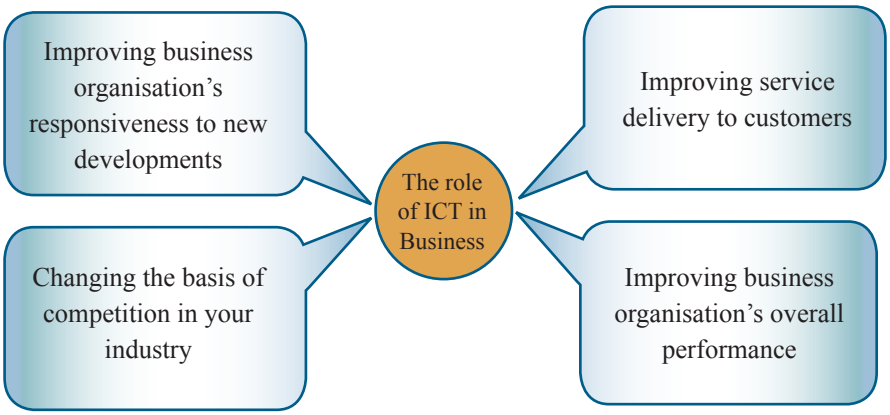


Figure 1.3: *Role of ICT in business*

Improving service delivery to customers

ICT offers tools that help organisations to deliver services efficiently. This is done through integrating the ICT in all forms of service delivery. For example, the use of e-mail or mobile phone to inform customers on the progress of their orders saves time and resources that might have been used for the customers making follow-up. Also, the introduction of e-commerce has been increasingly facilitated by advancement of ICT whereby customers can do online shopping by purchasing and tracking goods or services.

Improving business organisation's responsiveness to new developments

Business organisation's responsiveness refers to how organisations react quickly to the changes that occur in a business-related industry to maintain the potential market. The responsiveness includes the efficiency and effectiveness organisations have in the market. ICT can help a business organisation to connect with other branches, customers, distributors or business partners to extend services outside the organisation. Such use of ICT improves and maintains the customer service in all areas where the organisation operates. Figure 1.4(a) illustrates traditional money transaction services such as Telegraph Money Order (TMO) and Express Money Order (EMO) used to send and receive money via public transportation.

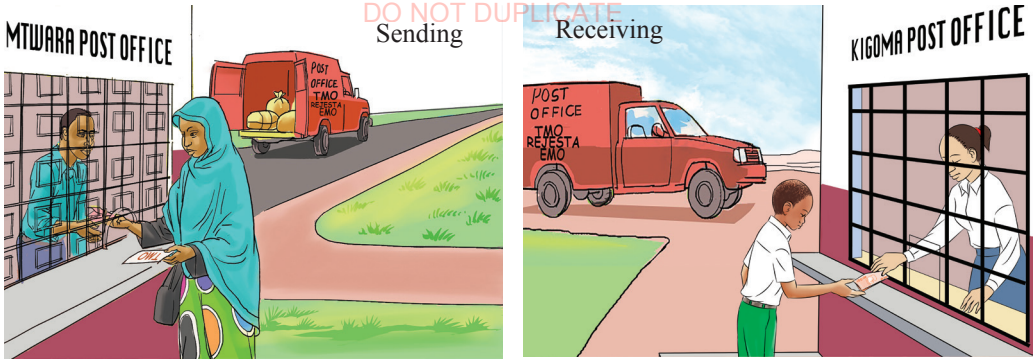


Figure 1.4(a): *Traditional money transaction*

These traditional money transaction services are not very much efficient nowadays. They are addressed by modern money transaction services that are more efficient, secure and can be done in areas with mobile network access even if the areas are not easily reachable by road, as shown in Figure 1.4(b). Modern money transaction is done through cellular phones whereby customers receive money instantly and they are able to transact online using mobile money services.

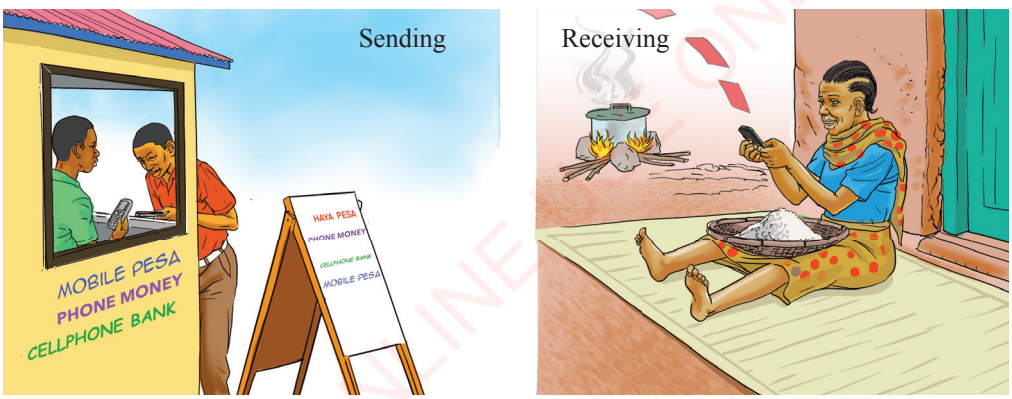


Figure 1.4(b): *Modern money transaction*

Changing the basis of competition in your industry

ICT can make a business organisation more competitive than others by improving its services and becoming a preferred service provider or quality goods producer. For example, an organisation can increase the quality of its services or goods with the use of technology. This is possible by increasing the level of automation, thus reducing hired staff and lowering the cost of production and service provision, which in return reduce the price for goods and services. The work or service, which was done by many staff, may be accomplished through technology with improved

performance and reduced errors. Also, the products and services can be marketed using ICT to gain more popularity and reach a wider market.

Improving organisation's overall performance

The major challenge of a business is to provide quality goods and services. The business that can access new, appropriate and quality technology is usually in a position to attract customers and provide its goods and services efficiently. The introduction of ICT brings changes in business firms that help to restructure operations and run them efficiently. This includes better use of human, material and financial resources such as having human resource and financial management systems and automating core business processes such as sales and customer handling.

Exercise 1.1

Answer the following questions:

1. What are other functions of Point of Sale (POS) terminal apart from being used to calculate the total amount of money the customers are supposed to pay after buying goods?
2. Discuss how m-banking can be accessed and used by individuals.
3. With examples, mention and explain four roles of ICT in business.
4. Is e-banking different from m-banking? If yes, how, if no, why?
5. Discuss with your fellow student and report on any other advantage of application of ICT in business within your community and country at large.

ICT and agriculture

When farmers have to grow crops, raise livestock, or fish, information plays an important role. ICT presents tremendous opportunity for farmers to improve productivity, enhance food security and nutrition, access markets and find employment opportunities in the sector. It also helps in empowering rural people by providing them with better access to natural resources, improved agricultural technologies and effective production strategies. Farmers can now get advice on how to do advanced and productive agriculture by using mobile phone technology without having to leave their farms.

Some agriculture specialists sell their consultation services through mobile phone by using Short Message Service (SMS) which assist farmers to do better in

agriculture. Figure 1.5 illustrates some uses of ICT in agriculture by using SMS system to assist farmers in digging and using manures to plant as well as using drones in irrigation.

Figure 1.5: *e-agriculture to improve production.*

Source: ictworks.org (2021)

ICT and entertainment

ICT has impacted entertainment industry by enhancing and providing different ways in which you would casually spend your time. With the use of these ICTs, the ways in which you entertain yourself have dramatically increased. For example, by using ICTs, recording and editing music, video and movies have become easier. It is accompanied by easy access through the Internet. This has the advantage that anyone can get access to almost anything from the Internet such as online videos and music from YouTube, see an example in Figure 1.6. You can pay for a music track in an online music store and download it to your computer, laptop, smartphone or personal mp3 player such as an iPod. Internet is used as a channel for the distribution of music through music download websites. You can also use widespread social networks such as WhatsApp and Facebook for entertainment purposes like to communicate and socialise with family members and friends.

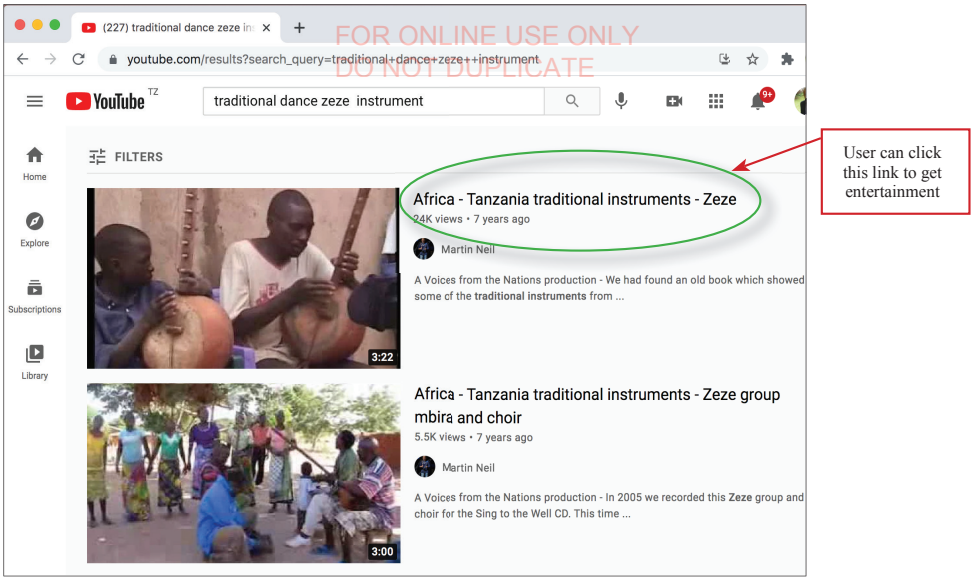


Figure 1.6: *ICT use for entertainment through YouTube*

Source: YouTube (2021)

ICT and medicine

Nowadays, most hospitals are using ICT to improve health services in the process of diagnosing diseases, providing treatment to patients and maintaining proper medical records. Also, medical researchers use ICT as a tool for drugs discovery and finding the causes of diseases. Additionally, via ICT patients can remotely receive services when a doctor and patients are not physically in contact. This situation is called telemedicine. Figure 1.7 summarises various roles of ICT in medicine.

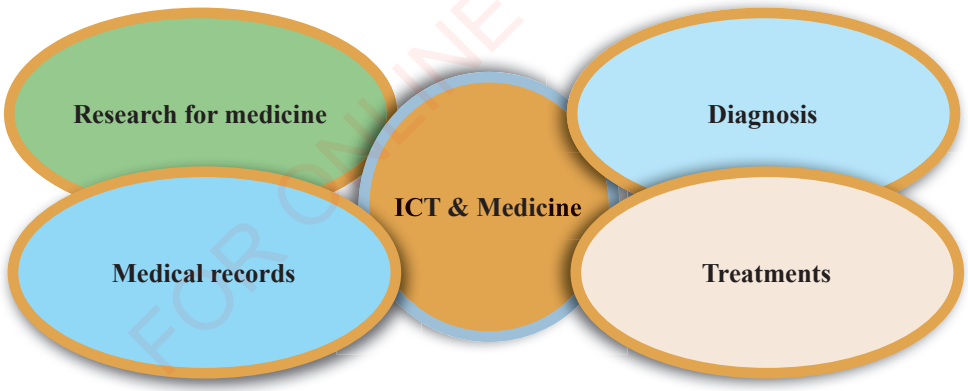


Figure 1.7: *Various applications of ICT in medicine*

Diagnosis

In hospitals, medical experts use ICT-based tools to improve health. Tools like Computerised Tomography (CT) scanners and Magnetic Resonance Imaging (MRI) are famously used in diagnosing diseases by scanning the whole body of a patient focusing on specific part of interest. Figure 1.8 illustrates CT Scanner machine which uses ICT application.

Figure 1.8: *Computer systems in medical diagnosis*

Source: www.raybar.com (2021)

Treatments

In hospitals, patients are attended with the assistance of computers. For example, the sensors which are connected to a computer are attached to a patient for recording heart rates. There are other health conditions like blood pressure, brain activity and breathing that are studied by sensors, and the computer sound an alarm when one of the parameters is below the standard level. When the computer is logged in, the data is analysed to see the changes of a patient's condition and take action.

Patient medical records

Many hospitals use computerised databases. Databases are used to store medical records of different patients and organise them when a patient has to be transferred

to different points of medical services in the hospital. Also, it is used to record the history of patients when they have appointments with doctors. Furthermore, with the hospital's database, it is possible to make an online booking of medical services such as ambulatory services.

Research

Health institutions use ICT in research and clinical practices especially in collecting data electronically and storing health knowledge base for medical purposes like clinical decision support systems, which use computers. Also, computers are used to process, record and share health-researched information from one place to another.

Exercise 1.2

Answer the following questions.

1. What are the applications of ICT in medicine?
2. How is ICT used in medicine?

ICT and engineering

ICT takes a great role in data capturing, processing, storage and dissemination in engineering from conceptualising, designing to maintaining. Its application contributes to improve the efficiency and effectiveness of engineering industry. For example, technology enables the industry to save time in operations when producing new products. Also, the quality of products is improved with the application of advanced technology in the industry.

Think of how engineers and architects use Computer-Aided Design and Computer-Aided Manufacturing (CAD/CAM) applications in their works. CAM refers to the use of computers in all operations in manufacturing plants such as planning, management and storage of information. On the other hand, CAD is the use of computers to aid in the creation, modification, analysis and optimisation of a design.

ICT increases productivity and quality of a design through creation of two or three-dimensional graphical representation of physical objects as shown in Figure 1.9.

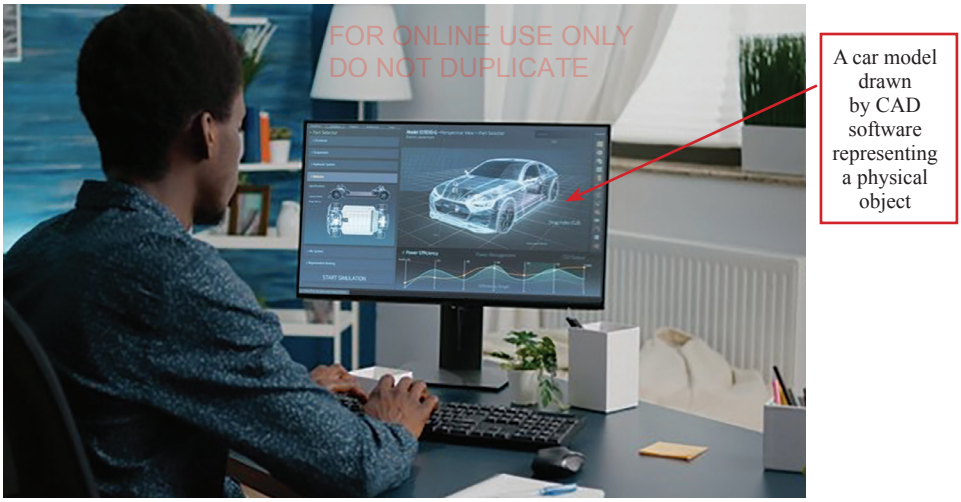


Figure 1.9: *Use of CAD in mechanical manufacturing engineering design*

Source: Creative CAD solutions (2021)

Another example of ICT use in engineering is in motor vehicle manufacturing, whereby scientists have developed software that can help to run a robot. Robot is a complex movement control system that can be used to do several activities. This system is commonly used in heavy industry whereby some activities are too risky to be handled by human beings, for example, in chemical industries, motor vehicle manufacturing and other risky engineering activities. It is also used in areas that need high precision and qualities such as assembling parts of a car during manufacturing. Figures 1.10 shows robotic operations in motor vehicle manufacturing.

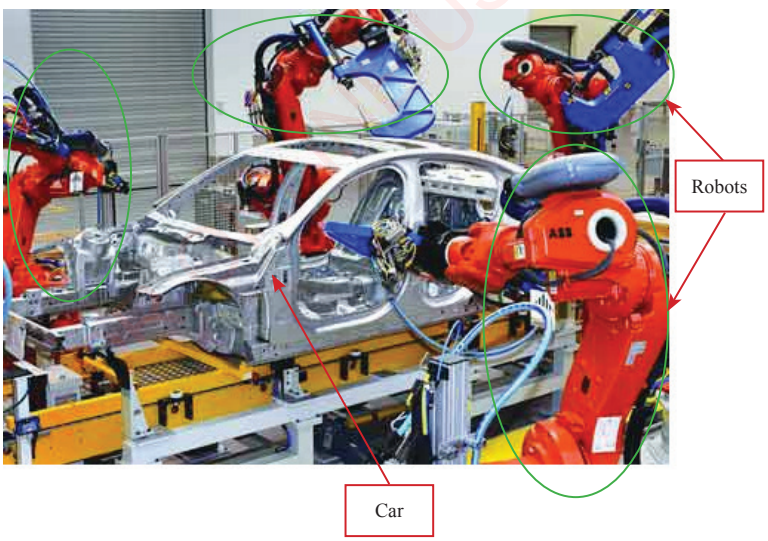


Figure 1.10: *Robotic operation in motor vehicle manufacturing*

Source: https://medium.com (2021)

Activity 1.2: Searching for ICT use in developing various engineering fields

Search information about contribution of ICT in development of any two among the following engineering fields: biomedical, electrical, chemical, mechanical, aerospace, civil, mining and petroleum engineering. Show in detail:

(a) The contribution of advancement of ICT in each of the selected engineering fields.

(b) The difference in the use of ICT between the two selected engineering fields.

ICT and data management

Data management refers to the process of acquiring, processing and storing data for easy access and use by beneficiaries. There are various software designed to manage data from individuals to large organisation's businesses. This range from general application software such as Microsoft Excel (MS Excel), Statistical Product and Service Solutions (SPSS) to sophisticated Database Management Systems (DBMS)-based application software such as the Education Management Information System. Most of the organisations run information systems that are centrally organised. These organisations use database management systems that control the movements of the data in and out of the organisations. Data management help organisations to keep their data centrally controlled and hence ease to access, search, edit, analyse and use for decision making. This also applies to data integrity and security improvement as well as reducing data duplication. Figure 1.11 shows how database provides secured central access of information.

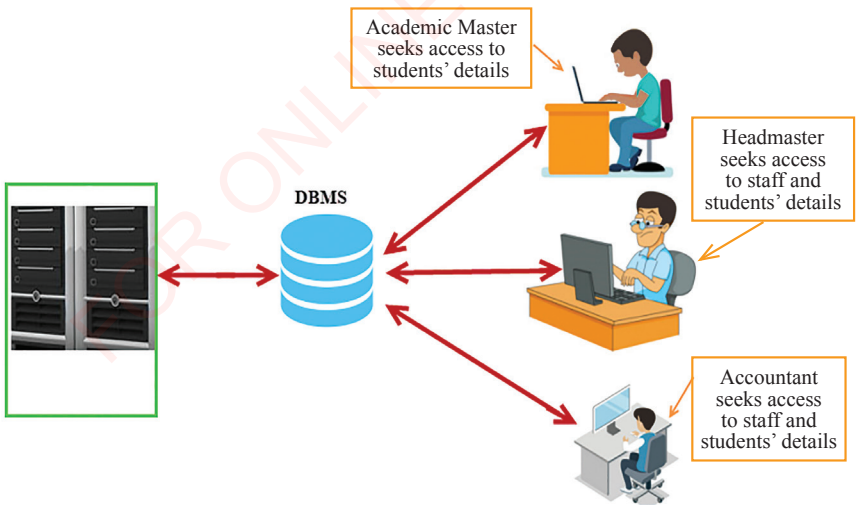


Figure 1.11: *Administrators access files remotely from central database*

Furthermore, the advancement of ICT devices and applications of computing data has led to emergence of data analytics which is the process of analysing raw data to find trends and answer questions such as what has happened, why it has happened, what will happen in future and what should be done. Its analysis including predictions that are made with the help of tools such as big data and high computing devices.

ICT and employment

ICT includes some of the fastest-growing jobs and careers in Tanzania and worldwide. The range of occupational pathways in ICT continues to be stretched as technologies penetrate more in various aspects in our society. Common areas of work for ICT include software engineering, web and mobile application development; instructional design and learning analytics; systems analysis and design; systems and database administration; general ICT governance and management; multimedia development; network design and administration; data analytics and ICT support.

Employment opportunities for ICT are still growing as the ICT industry did not suffer the effects of global financial crisis as compared to many other industries. Also, ongoing investment in IT infrastructures and applications suggest strong employment growth in the future though with changing skills requirements. ICT skills transfer easily from one country to another, thus experienced ICT professionals can expect to find career opportunities almost anywhere in the world.

ICT careers include job titles such as ICT governance or management specialist, software developer, computer or information systems analyst, data communications analyst, database administrator, desktop or application support specialist, help desk technician and forensic specialist. Others are web and mobile application developer, network and system security specialist, network administrator, software engineer, data analytics specialist, telecom engineer, webmaster and wireless network technician. Figure 1.12 shows a telecom engineer at work.

Figure 1.12: *Telecomunication expert working at network tower*

Source: TowerXchange (2021)

ICT and cultural interaction

ICT has significantly changed the way humans are living. Socio-cultural view of globalisation posits that different cultures across the world are continuously evolving to become more integrated and homogeneous. ICT creates awareness in this perspective and it is an important driver of cultural convergence pushing national cultures across the globe to converge towards common cultural values and transparency.

ICT studies track a broad range, and a wider perspective is taken not only by looking at the interaction between human beings and technology but also the interaction among computers or machines themselves. The society has to understand that technology is being made by people, and if it leads to unexpected negative results centrally to our cultural values, people have the right and responsibility to improve or change the way it is used.

ICT and education

The emergency of ICT has impacted the education sector in many ways. ICT has impacted the processes of teaching, learning, administration and management of education. In general, ICT empowers learners and teachers, promotes changes and increases individual skills. It can help to transform teaching and learning processes from being highly teacher-dominated to learner-centered. This transformation can

result in increased learning gains among learners through developing creativity, life long learning and skills in informational reasoning, communication and ICT (word processing, spreadsheet, and educational software). These skills are necessary for individuals' employability in the current and future job market. The roles of ICT in education can be summarized in the following key areas:

Facilitating electronic learning (e-learning) or online learning: ICT in education helps to find new strategies in teaching and learning. E-learning provides opportunities for students to access learning materials in the class when they are at school, at the same time it provides a chance for out of school-compound-students to learn. Figures 1.13(a) and (b) show illustration of online learning.

Figure 1.13(a): *Students using computers to learn*

Source:www.theirworld.org

Figure 1.13(b): *A child learning through listening to the radio*

Source:UNICEF/UNI319836/Kanobana

Promoting inclusive education: The use of ICT in education helps to remove barriers for students with special needs to access essential materials using special ICT tools for their educational needs. For example, the use of non-visual desktop access (NVDA), a free open-source portable screen reader for visually impaired people to use computer. Despite this, ICT opens up new issues related to the 'digital divide' and provides access to ICT tools and resources for those who are less fortunate.

ICT Enhances subject learning: The use of ICT in education can improve the competence in literacy and numeracy. In order for students to develop learning through ICT capability, it is helpful to provide them with hands-on activities which reflects on the content learning areas to be developed.

ICT encourages collaboration: ICT encourages cooperation where students or people can interact by sharing and discussing their work or activities. This leads to open ways for communication, thus leading to interpersonal skills.

ICT use motivates learning: Children like to play. Through the use of ICT, computer games related to learning encourage children to play and learn at school and home.

ICT improves engagement and knowledge retention: Integrating ICT in education promotes students to engage more in their learning activities. This is because technology provides a window for learning of the same contents in various ways such as use of simulations and illustrations that improve understanding of difficult concept to be learned.

Helps in school administration and management: ICT provides important contributions in improving the quality of education. Using ICT in administration and management is popular and essential in schools due to the fact that application of ICT helps in data storage, decision making and knowledge management. For example, students' examinations results, registration and school financial management data are stored in computers by school administrators. This type of data can be used in many administrative and management instances for decision making.

Negative impact of ICT on the society

In spite of the benefits provided by the application of ICT in the society, there are several negative impacts as follows:

Reduced human interaction: People need some form of social interaction in their daily lives. If they do not get time to communicate, a gap is created and the rate of intimacy between people decreases. For example, in some cases, once parents are back from work, most of the time they are busy with mobile phones and computers.

As a result, social interaction with their children is reduced.

Loss of job or reduced employment: This occurs when manual work is replaced by automated machines and systems like computers, robots, networks, software, and Internet technologies.

Road accidents: Improper use of ICT devices also contribute to road accidents. For example, the drivers' distractive behaviour including texting and interfacing with navigation and other communication systems while driving, as shown in Figure 1.14. However, it is not only distraction by drivers that cause problems – texting pedestrians represent an equally big risk, putting themselves and other road users in danger.

Figure 1.14: *Using ICT (mobile phone) while driving*

Exercise 1.3

Answer the following questions

1. Explain the role of ICT in the following sectors:
   (a) Agriculture
   (b) Medicine
   (c) Entertainment
   (d) Engineering
   (e) Education
2. Discuss how mobile phones can help customers to access bank account.
3. What will happen if ICT is not used in medicine?
4. What is the role of ICT in data management?
5. What is the importance of e-banking in social-economic development of a nation?
6. How have traditional business been transformed by the use of ICT in e-business?

Chapter Two

ICT in creating awareness in the society

Introduction

The advancements of ICT such as social media network and mobile technologies have influenced the way of doing advocacy in the society. In this chapter, you will learn about the role of ICT in creating awareness on issues such as gender, Human Immunodeficiency Virus/Acquired Immunodeficiency Syndrome (HIV/AIDS), drug trafficking and abuse, globalisation, family life, corruption and road safety. The competencies developed in this chapter will enable you to rationalise appropriate use of ICT in creating awareness in the society.

Think

1. Use of ICT in increasing people's awareness in the society.
2. Use of ICT in creating awareness to reduce road accidents and improve family life.
3. If your parents/guardians use of their mobile phones affects you in any way.
4. Use of ICT in creating awareness to reduce corruption.

Gender

Gender equality is a basic human right as preserved in the fifth of the seventeen United Nations (UN) Sustainable Development Goals (SDGs). ICT can help accelerate progress towards achieving this goal. This could be by improving lives of women through gendered learning opportunities such as education, research, health care delivery and environmental protection. It could also be via enabling gender balance by spreading information on the benefits of equal rights in gender. ICT media like radio, TV and social media have also been used to spread information on the importance of gender balance. Generally, ICT awareness, skills, application and practices contribute in providing equal opportunity for men and women to participate and benefit in various social-economic development activities and innovations.

HIV/AIDS

Given the wide-spreading of HIV among youths, there is a need for ICT enabled-HIV/AIDS educational prevention activities. ICT helps in fighting HIV/AIDS by increasing awareness of HIV/AIDS prevention especially among young people. The use of ICT can play a complementary and useful role in helping to combat this horrible pandemic. For instance, TV, Radio, websites, emails, mobile apps, blogs, portals and social media networks are being used to disseminate programmes that explain causes and prevention of HIV/AIDS and can link HIV educators globally. Figure 2.1 shows ICT contribution to HIV and AIDS education using website. In addition, ICT promotes access to comprehensive and reliable youth-friendly information which enhances behavioural change. ICT also offers an opportunity for accessing medical information without disclosing identity. It also creates awareness to youth in fighting against HIV/AIDS as ICT is a channel used mostly by them in many other aspects such as entertainment, learning and communication.

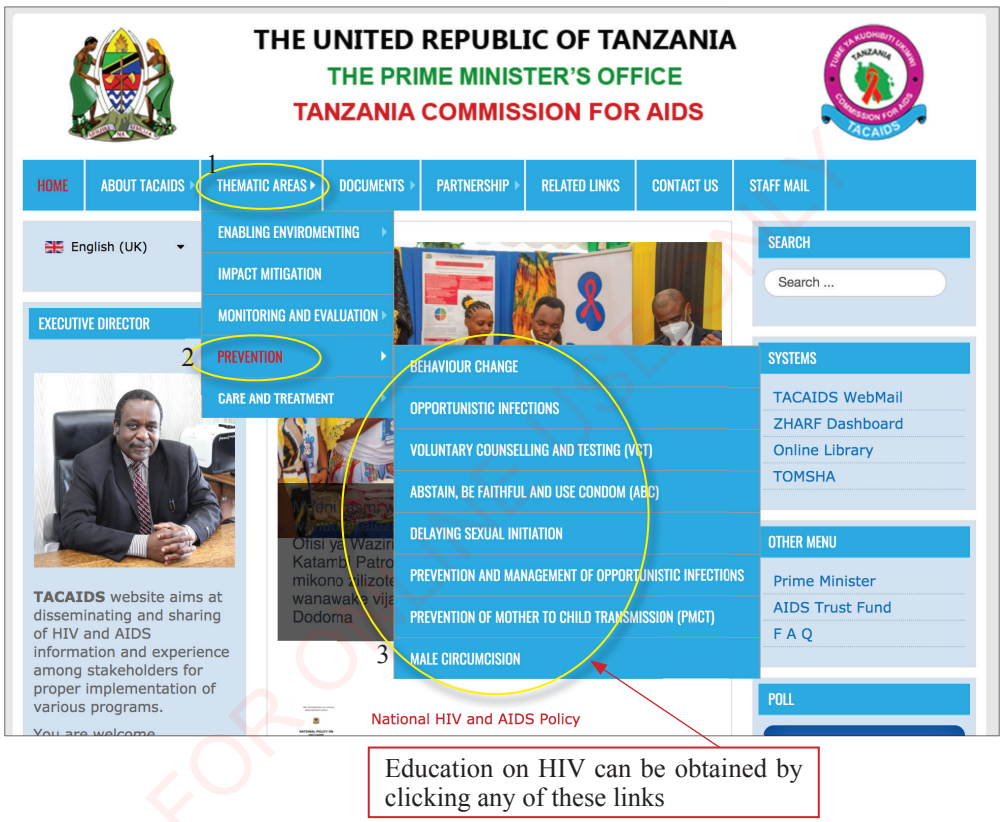


Figure 2.1: *ICT contribution to HIV and AIDS education using website - Prevention*

Drug trafficking and abuse

ICT has been widely used in providing awareness related with combating drug trafficking and abuse. Through the use of multimedia such as radio, TV, websites, social media, mobile apps and magazine, many youth in particular and society in general are educated on the effects of drug abuse and how to address them. Figure 2.2 shows the contribution of ICT in providing awareness information on combating drug trafficking and abuse.

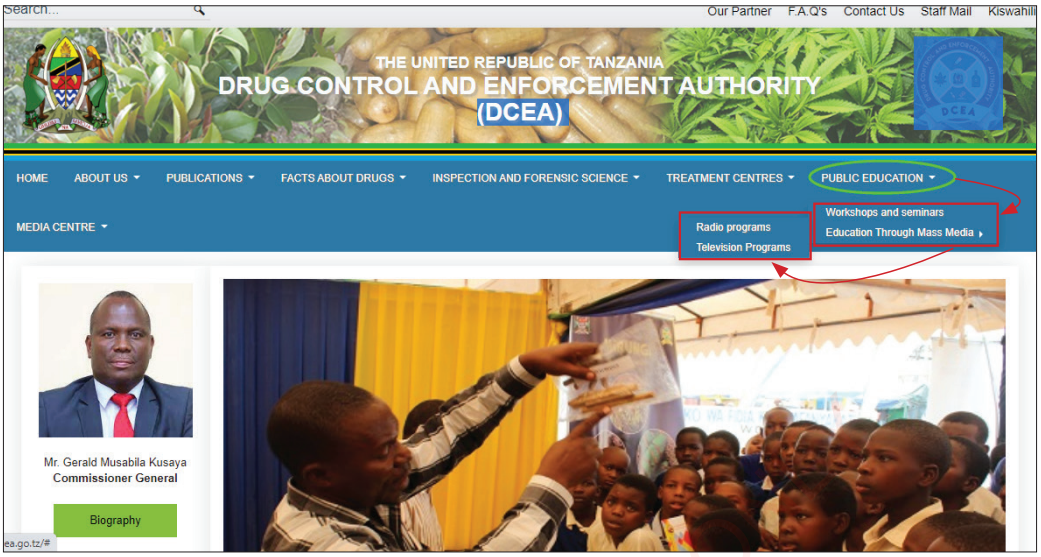


Figure 2.2: *ICT contribution to drug trafficking and abuse education*

Globalisation

The advancements of ICT contribute to create awareness on globalisation, which is a process of interaction and integration among the individuals, companies, and governments located in different nations. Through Internet, the world has become a small village whereby sharing information takes place instantly and exchange of goods and services at national, regional and international levels is efficient. ICT reduces time constraints and space prerequisite to the formation of global economy with the capacity to work as a unit in real time, or chosen time, on a planetary scale. It also allows people to share information and communicate with each other at any time in any place. For example, social media are used to extend business and social interaction. Various ICT collaboration tools allow people to act in response to social, education and business events taking place in distant location. Figure 2.3 shows usage of ICT-based communication tool to facilitate online video conference when H.E. Samia Suluhu Hassan, President of the United Republic of Tanzania and other African leaders and global financial institutions participated remotely in summit on the Financing of African Economies hosted by H.E. Emmanuel Macron the French President.

Figure 2.3: *Online video conference based meeting*

Source: www.fr.tzembassy.go.tz (2021)

Family life

The impact of ICT in creating awareness of various matters related to family lives is a fascinating story. Most of family members own ICT gadgets such as TV, mobile phones, laptops, tablets and iPods. The question is that, how does increasingly usage of ICT affect and will continue to impact today's families? ICT helps today's busy families stay connected to each other. Parents can check in with kids at all times to see where they are and what they are doing. Similarly, kids can easily reach parents if there is an emergency or a problem. However, ICT can also keep families apart. Imagine today's family gathered in the dining room for dinner and parents are keeping an eye on emails and kids are busy on their mobile devices. This family is physically together, but they are not totally focused on paying attention to each other. They are at least partially attentive to a ping or a beep indicating that there is a new message from a social media application, email or missed call. Another aspect is on our working behaviour, whereby work is no longer something you do at a certain time or place. Work can be done anytime and anywhere. Technology opens the boundaries between home and work as a result increases productivity. However, working from home can negatively impact employees' commitment to their partners and children, since they find themselves missing the social aspects which are crucial in family life.

Corruption

ICT is used to create awareness of the effects of corruption, which is the misuse of public power for individual gain. Corruption also is a form of dishonest or unethical conduct by a person entrusted with a position of authority, often to acquire personal benefit. The usage of ICT has resulted in reduction of corruption that includes activities such as bribery and embezzlement of public funds. For example, the usage of government portals in provision of public services confined civil servants from asking any payment unloyally for giving certain services to a citizen. Also, the use of decision making supporting system prevents a decision maker to deviate or demand deviation from the criterion which should rule his or her decision-making in exchange of a reward, while the motives influencing his or her decision-making cannot be part of a justified decision.

Other benefits of using ICT in fighting corruption are as follows:

(a) Reducing information asymmetries between office holders and citizen so that it becomes easy for a citizen to explain his or her rights without corruption interfering. For example, digitisation of government to citizen services (G2C);

(b) Limiting the freedom of office holders to diverge their duties of service provision. For example, ICT enabled fees collection in various government institutions like Tanzania National Parks Authority (TANAPA);

(c) Automating specific processes to reduce direct, frequent and personal interaction between a specific office holder and an individual citizen, a proximity that can foster corruption. For example, use of Government electronic Payment Gateway (GePG) in most of citizen payments to government institutions services;

(d) Cutting out the middle personnel who tend to facilitate bribe payments. For example, government salary payment system that process salaries directly to central and local government employees' bank accounts, instead of paying them through their institutions;

(e) Making transactions with public officials and their performance transparent, documentable and auditable to discourage corrupt behaviours and publish them in institution websites; and

(f) Providing a growing number of collective action tools and platforms for citizens to organise, report and mobilise against corruption. For example, ICT enabled systems such as websites portals and text message to report corruption to Prevention and Combating of Corruption Bureau (PCCB) and other law enforcement organs such as police.

These various ICT interventions can be grouped into two reforms: **transactional** and **transparency** reforms.

Transactional reforms seek to reduce the space for corrupt activities by controlling and automating processes within the government. Also, the reforms seek to increase the detection of corruption by increasing the flow of information into existing government oversight and accountability mechanisms. Often, these developments are framed as part of e-government. A good example is Government of Tanzania-Hospital Management Information Systems (GoT-HoMIS), which is an electronic system that aims to collect and report facility level of clinical information.

Transparency reforms, by contrast, focus on increasing external control rather than internal control over government actors by making the actions of the state and its agents more visible to citizens, civil society and the private sector. A practical example includes various websites by government-related websites and the use of social media networks.

Although there are different theories of change underlying ICT-enabled transactional and transparency reforms, the actual technologies involved can be highly inter-related. For example, digitising information about public services as part of an e-government management process means that there is more transactional and transparent-related systems and services that can reduce corruption. Figure 2.4(a) and (b) indicate access to various TRA-related e-services by government institutions, businesses and citizens.

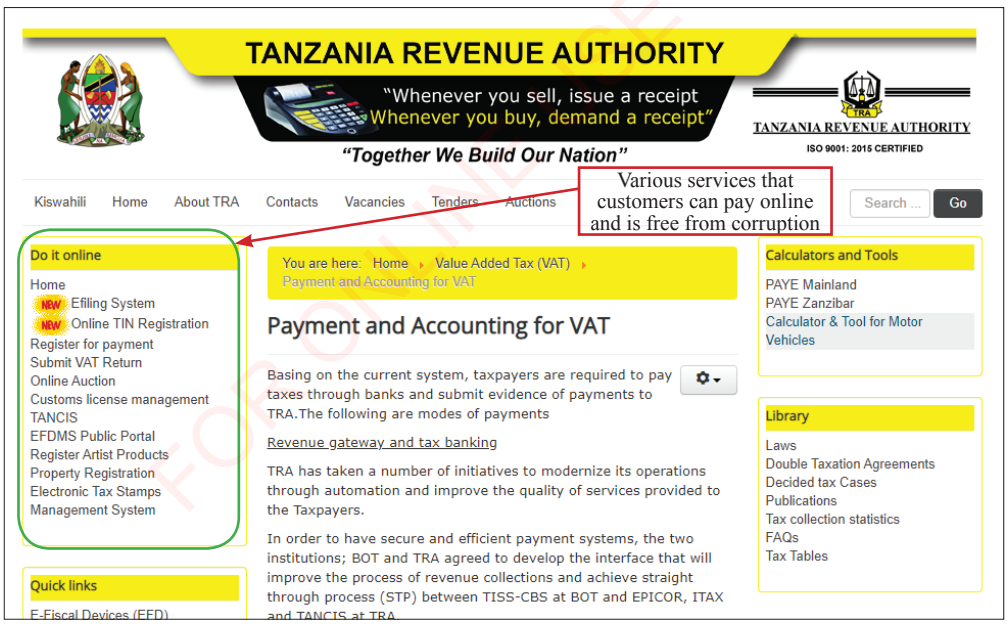


Figure 2.4(a): *e-government systems that simplify payment services for TRA*

Source: https://www.tra.go.tz (2021)

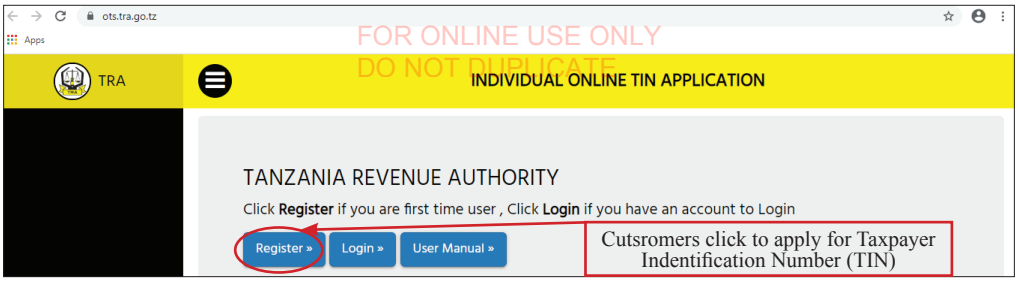


Figure 2.4(b): *TRA- Online TIN application system*

Source: https://ots.tra.go.tz (2021)

In any use of ICTs for anti-corruption, the technology itself is only one part of the picture. Legal frameworks, organisational processes, leadership and campaign strategies may all be necessary complements of digital tools in order to secure effective change.

Road safety

The role of ICT in creating awareness of road safety is mainly on improved connectivity in terms of placing road users in contact with emergency services and roadside assistance. Increasingly, sophisticated traffic management systems have the potential to positively impact on traffic safety. Intelligent transport system is another domain where ICT in particular has a potential role to play. Intelligent transport system helps in making vehicles and the transport infrastructures in cities smarter and safer using sensors and cameras.

Further, Land Transport Authority (LATRA) in Tanzania requires all interregional buses to install vehicle-tracking system that monitors speed and general movement of the buses, which help to minimise accidents. If the buses move at high speed, relevant government authorities such as LATRA and traffic police are informed to take appropriate action. ICT is also used to deliver emergency information to the authority on what is happening on the roads. Some information come directly from road safety intelligence system such as surveillance camera, while others come from users of the road who happen to see the events during its happening or from traffic police officers in-charge. These bring awareness and help the authority to intervene or take standard measures. These ICT tools like TV, Radio, blogs, social media, mobile apps, websites, e-banners and e-magazine are also platforms that are used to educate citizens on the proper use of roads and how to prevent accidents. Thus, it increases road safety through a number of ICT-based interventions.

Exercise 2.1

Answer the following questions.

1. Explain how transparency reforms increase detection of corruption.
2. How is ICT used in creating awareness of corruption? Provide two examples.
3. How does ICT play role in creating awareness of road safety?

Revision Exercise

SECTION A

Answer the following questions.

1. Briefly explain the role of ICT in creating awareness on gender, HIV/AIDS, drug trafficking and abuse, globalisation and family life.
2. Analyse how ICT can create awareness on taxation to the public.

SECTION B

*Write '**True**' for a correct statement and '**False**' for an incorrect statement.*

1. Video Conference facilitates teaching and learning. _____
2. Use of government salary management system for central and local government employees can increase corruption. _____
3. Website with e-banner and other kinds of HIV/AIDS information contributes to prevention of the HIV/AIDS pandemic. _____

Chapter Three

ICT related crimes, security and hazards

Introduction

Despite the ICT advancements and contributions to socio-economic development, there are threats brought about by its use. Such threats trigger the need for security mechanisms. In this chapter, you will learn about ICT-related crimes, information security, and hazards. The competencies developed in this chapter will enable you to identify and avoid effects brought by ICT-related crimes and hazards.

Think

1. About taking precautions while using mobile phone in communicating with others to ensure security of information.
2. The way Police and TCRA warn users to keep electronic information private, the way that information can be kept private and the possible frauds on mobile phones.
3. The way your parents/guardians keep the electronic information in their mobile phone private and if the way they secure their mobile phones affect you in any way.

ICT and crimes

Cybercrime refers to any crime that targets or involves the use of a computer, mobile phone, and a network. Some of the most common cybercrimes globally today are software attacks, theft of intellectual property, identity theft, equipment or information theft, sabotage, and information extortion. The crimes associated with ICT usage may affect business, social and data security. The crimes in businesses include, among others, illegal access to information, interception, data interference, data espionage, system interference, computer-related forgery, and computer-related fraud. On the social side, there are crimes like pornography and identity-related crimes. Also, other crimes against humanity like publication of

false information about someone, racist and xenophobic material which usually motivates insult or genocide.

On public security, there are crimes like disclosure of details of an investigation, obstruction of investigation, cyber bullying and violation of intellectual property rights as well as using ICTs in planning conspiracy to commit offence. This also applies to offenses related to critical information infrastructure such as national fibre optic network. Generally, there are many criminal activities targeted or facilitated by the use of ICT especially computers. The commonly encountered cybercrime or ICT-related criminal activities include computer virus, software piracy, fraud, identity theft, phishing, Denial of Service (DoS), invasion of privacy, hacking, piracy, cyber stalking and eaves dropping.

Computer viruses: these are computer programs that attach themselves to a system or a file and have a tendency to circulate to other computers on a network for an intention of harming computer system or applications.

Software piracy: this is the unlawful download, use or dissemination of copyrighted material without the permission of the owner.

Fraud: this is an act of stealing by false pretend. For example, a fraudster, who can either be an employee of an existing or non-existing company pretends to offer online marketing service such as selling vehicles. This also applies to bank fraud such as stealing money from the holders' accounts via credit cards, ATM or mobile banking.

Identity theft: this is an act of using someone's personal data illegally without his/her knowledge to make unauthorised transactions.

Denial of Service (DoS): this is an explicit attempt by attackers to deny service to intended users of the service. It involves flooding a computer resource with more requests than it can handle consuming its available bandwidth, which results in server overload.

Hacking: this is an act of gaining unauthorised access to information for malicious reasons or any other purpose.

Cyber stalking: this is the use of social media or any other Internet applications or any electronic device to harass an individual, group or organisation.

Eaves dropping: this is an act of taping into communication channel to get information secretly.

Invasion of privacy: the act of someone attempting to intrude on someone else's personal life. This may include hacking to a person's computer to read emails or monitor online activities.

Child pornography: is an act of creating, possessing or distributing pornography images of a child.

Phishing: is a fraudulent action that attempts to obtain sensitive information such as username, password and credit card details by using fake phone, email, website or text message as illustrated in Figure 3.1.

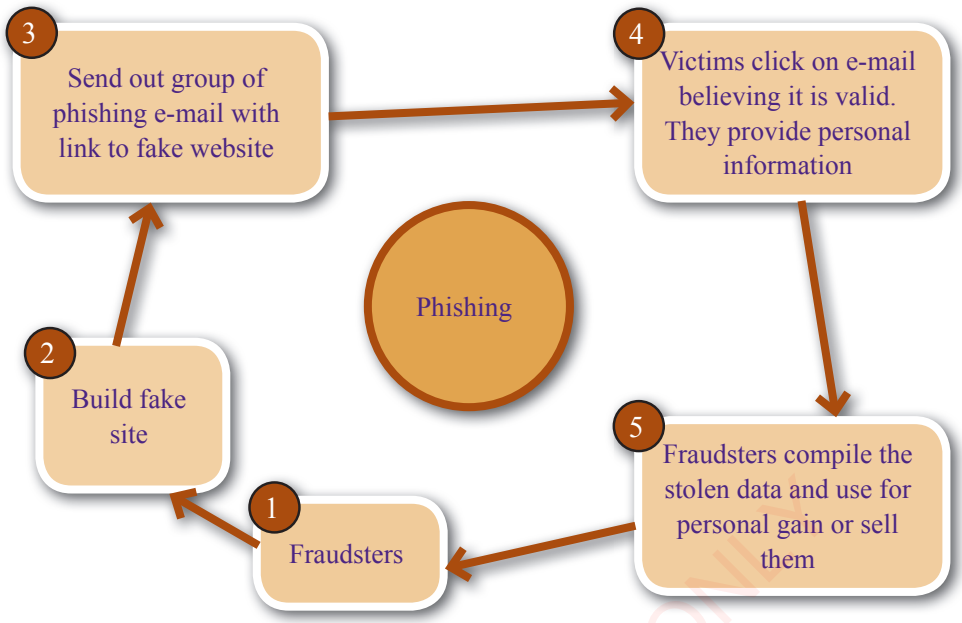


Figure 3.1: *Criminal activities done electronically*

Activity 3.1: Searching cybercrime information

In your computer laboratory or any computer with Internet connection, visit www.parliament.go.tz. Go to 'Documents' and click 'Acts'. Search 'Cybercrime Act of 2015'. Identify five cybecrimes and write short notes on the offences and penalties for each.

Exercise 3.1

Answer the following questions.

1. (a) What is cybercrime?
   (b) With examples, distinguish between:
   (i) Hacking and phishing
   (ii) Software piracy and eaves dropping
2. Explain why is cyber security important?
3. Differentiate between online market frauds and bank frauds.

Information security

Information security is the way practised by an individual, group or an organisation to ensure that data are secure from unauthorised access. In digital age, information is very important and powerful for social development. The more you are informed the more you capture, disseminate, process, guard and use your information to determine your success. That is why there is a lot of theft to key information related to day-to-day wellbeing among individuals and nations. Due to the existence of this ICT-related crimes, many organisations, nations and individuals struggle to protect their information at all cost. Thus, information security means the practice of defending information from unauthorised access, use, disclosure, disruption, modification, perusal, inspection, recording or destruction. It ensures that computer facilities are physically protected for three reasons, firstly to prevent theft or damage to the hardware, secondly, to prevent theft or damage to the information and thirdly to prevent disruption of services.

Information security principles

The basic principles of information security are based on Confidentiality, Integrity and Availability (CIA).

Confidentiality: Confidentiality ensures that data or information that belongs to an individual, group, organisation or country should not be accessed to unauthorised person.

Integrity: Integrity means that data should not be altered or modified by someone else without authorisation from the owner.

Availability: All information within an organisation or a company should be available on demand. This means a computer system for processing and storing of information, security system used for protection and communication channel that is used to access information must be functioning correctly.

Importance of protecting information systems

The first importance of securing information system is to protect it from unauthorised access, damage and theft. Thereafter, it becomes possible to maintain data and information integrity and comply with regulatory requirements and fiduciary responsibility. This as well applies to improve efficiency of the particular information system, meet an expected standard and finally maintain privacy, confidentiality and availability of data and information within the system.

Information security mechanisms

There are different security mechanisms that are used to protect information such as using password, biometric, firewall and data encryption.

Password

Password is a common security mechanism used to protect information in ICT devices and applications against unauthorized access. For example, in a mobile device, one may require entering password for accessing messages or performing mobile money transactions. The following are the tips and procedures to create a strong password:

Tips to create a password

(a) Use a unique password for each of your important accounts.

(b) Use different passwords for different accounts, for example, your email and online banking accounts should not have the same password.

(c) Use a mix of letters, numbers, and symbols to create a strong password. Using numbers, symbols and a mix of upper and lower case letters for complex password makes it harder for criminals to guess your password.

(d) Do not use personal information (first name, surname, date of birth, spouse name and others) or common words as a password. Create a unique password that is unrelated to your personal information and uses a combination of letters, numbers, and symbols. For example, you can select a random word or phrase and insert letters and numbers into the beginning, middle, and end to reduce the possibility of guess. For example, a password like Yoh&mat_201 is difficult to guess.

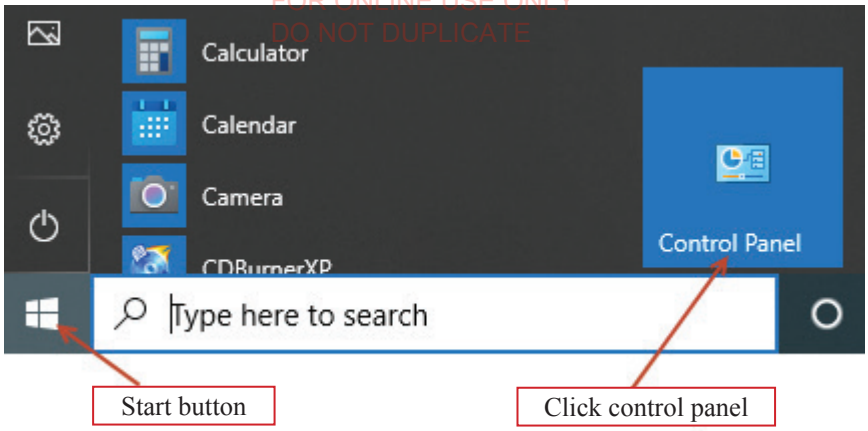
(e) Do not use simple words or phrases like "password" or "letmein," keyboard patterns such as "qwerty" or "qazwsx," or sequential patterns such as "abcd1234" which make your password easier to guess.

Note: Some information system guides you with specified criteria to create passwords, for example, when creating an email account such as Gmail.

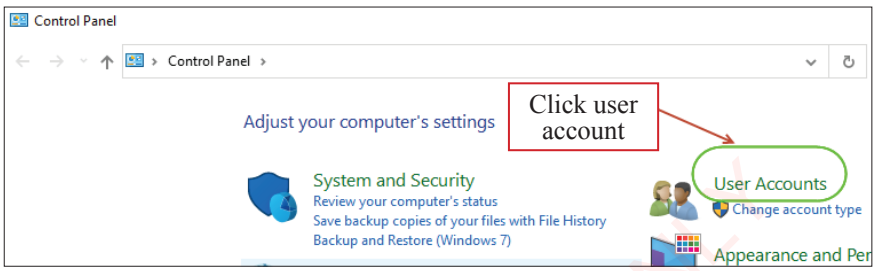
Procedures for creating a computer password

Creating passwords has different steps depending on the type of computer operating system you are using. For example, in Windows 10, the following are some steps you must follow in order to create your password.

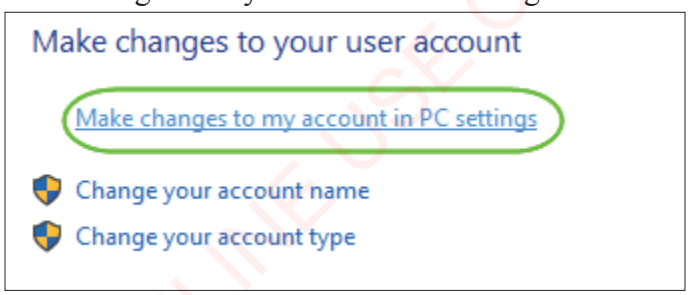
1. Click start button to open the control panel



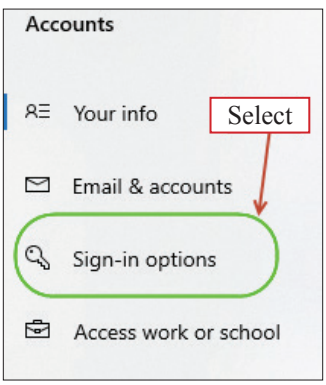
2. Select 'User Accounts' and then click to open



3. Choose 'Make changes to my account in PC settings'



4. Select 'Sign-in options' from the left



5. Under the Password area, choose Add.
   Note: A strong password is the one mixed with numbers or special symbols and a word like Kisebe_ngo@790.
6. Re-enter (confirm) password on the new dialogue box.
7. Indicate password hint. A password hint might be the word that reflect what is in the password to help you remember in case you forget your password.
8. Then, click the word "Next" at the bottom of your browser.
9. Lastly, click the word "Finish".

Activity 3.2: Creating a password

In your computer laboratory, take one computer and use it to create a password named **MoEST&2021**. Make your password hints to be the word **"AUTHORITATIVE INSTITUTE."**

Biometric

Biometric is one of the mechanisms to protect against crimes. It uses software which are customised to recognise users of devices or premises based on their behavioural or biological characteristics. The biometric technology commonly used in physical access control or identification is a fingerprint recognition because of its lower price and ease of use. Figure 3.2(a) illustrates the use of fingerprint biometric to secure identification.

Figure 3.2(a): *Fingerprint biometric device to secure identification*

Source: The East African (2018)

Other biometric identifications include facial and sound recognition. Figure 3.2(b) shows the facial recognition in mobile phone security. The user can access a mobile phone when the face is recognised, otherwise a person apart from the phone owner, may not succeed to log in the phone because the face can not be recognised. The facial recognition is based on the extraction of the vectors of the images of your facial features.

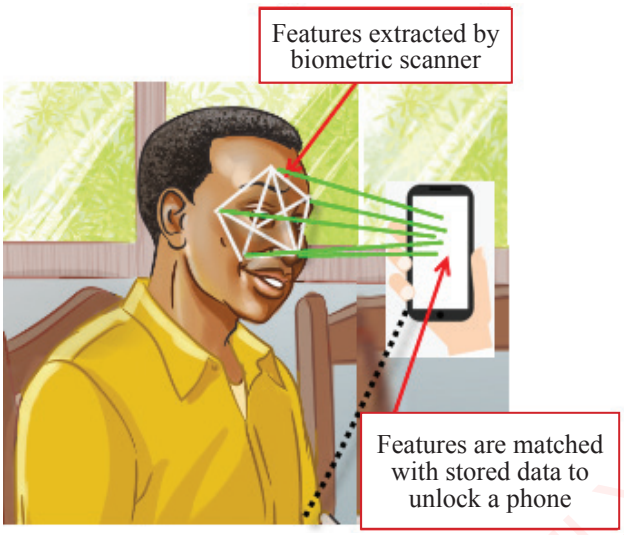


Figure 3.2(b): *Biometric facial recognition to secure identification*

Encryption

By data encryption, the written text is treated by changing letters in such a way that they cannot be read easily by unauthorized people. Figure 3.3(a) shows text to be encrypted and encrypted text.

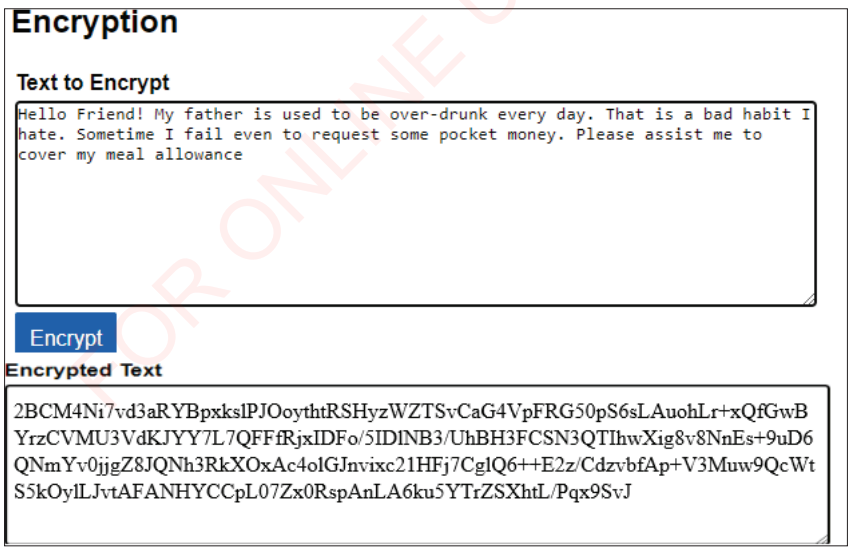


Figure 3.3(a): *Encryption process*

The encrypted message can be decrypted to readable text when it arrives to the receiver. Before decrypting, the message can not be read. Figure 3.3(b) shows the decryption process with encrypted and decrypted text.

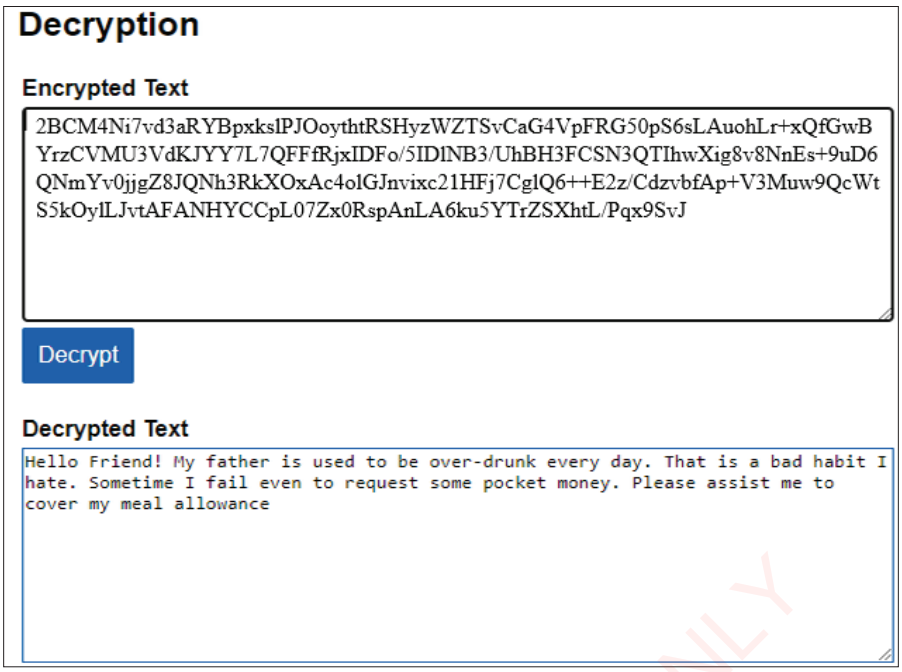


Figure 3.3(b): *Decryption process*

Firewall

A firewall is a dedicated machine or computer through which every message must pass before it is allowed onto a network to prevent viruses and unauthorised access or doing any damage to the system as shown in Figure 3.4.

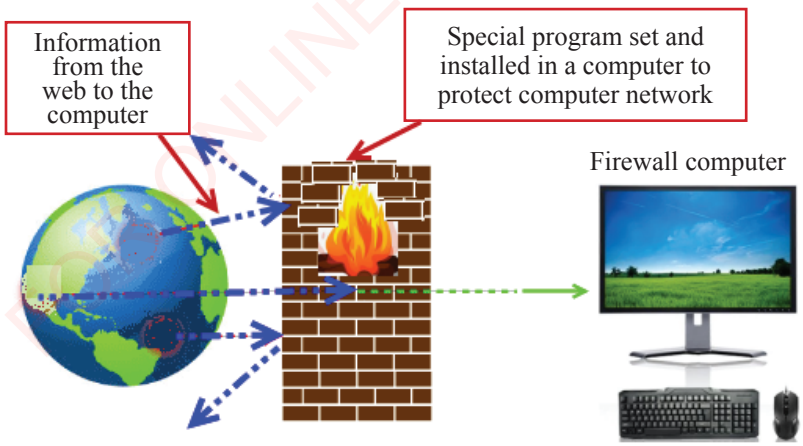


Figure 3.4: *Firewall for protecting computer system*

Home and commercial related security

This concerns cases in which a criminal steals personal and business-related information. Thus, digital detection aids such as Closed Circuit Television (CCTV) camera footage, often provide ground for arresting a suspect in a commercial or home establishment. Figure 3.5 shows the CCTV camera used in a bank to ensure security of premises.

Figure 3.5: *Use of ICT such as CCTV for ensuring security*

Exercise 3.2

Answer the following questions:

1. Why is information security important?
2. What are the three common security measures practised to protect information?
3. Differentiate between biometric fingerprint and facial recognition.

ICT hazards

ICT hazard is anything that could be harmful to a user of a computer system and surrounding. For example, too much or improper use of the keyboard and mouse can cause carpal tunnel. Also, improper posture when using the computer can cause all types of pains and other health issues over time. Likewise, when ICT devices are disposed improperly, they may lead to environment destruction and climate change.

Health related ICT hazards

You may think that using computers is not dangerous. There are few situations like trailing cables, drinking or eating food, heavy objects, improper environmental surrounding computer use, overloaded power sockets that can result in accidents when using computers. Also, some health problems that you can suffer when you use ICT devices incorrectly or for long time include Repetitive Strain Injury (RSI), back and neck strain, eyestrain and headache.

Repetitive Strain Injuries (RSI): these are injuries resulting from wrist, hand, arm and muscle strain due to forced repetitive movement e.g. when entering data using keyboard. These are caused by typing on a computer for too long, using a mouse for a long time and incorrect holding of the mouse. You can prevent RSI by resting, sitting in a relaxed position and changing typing techniques.

Eyestrain and headaches: since computer users have their eyes at close range with the monitor, there is a danger of developing computer vision syndrome (CVS). CVS is characterised by eyestrain, headaches, double vision and fatigue. Some causes of eyestrain and headaches include staring at a computer screen for a long time, working in a room with poor light, using computer screen with glare or flickers and dirt screens. You can prevent eyestrain and headaches by:

(a) Using monitors with good resolution;
(b) Fit monitors with antiglare screens that filters excess light;
(c) Adjust the brightness of the screen to the intensity that is comfortable to the eyes;
(d) Use flat panel screens that do not emit so many radiations;
(e) Use good overhead fluorescence tubes;
(f) Clean screen regularly;
(g) Avoid flickering monitors and lighting systems;
(h) Have interludes of rests; and
(i) Tilt the monitors to a convenient position.

Safety issues related to ICT use

Drinks or food: when liquid spills on computer as shown on Figure 3.6, it may damage a computer or cause electrical shock to the user.

Figure 3.6: *A laptop with spilt drink*

Source: www.laptoprepair.sydney (2021)

Overloaded power sockets: when too many power cables are plugged into a socket it may lead to overheating and possibility of starting fire.

Trailing cables: when cables are laying on the floor without proper and firm arrangement, they may cause people to fall down and get injured.

The effects of disposing ICT devices

Disposing electronic materials on the environment can lead to climatic change and environmental destruction.

Climatic changes: the absence of rules and the lack of code of practice related to the usage of ICT infrastructure lead to acceleration of the climate change. This is based on the fact that electronic waste (e-waste) disposal contributes to climate change, because the chemicals that are released when burning materials of the nature of copper iron and aluminium accumulate in the air and destroy the ozone layer as a result there is environment destruction, as shown in Figure 3.7.

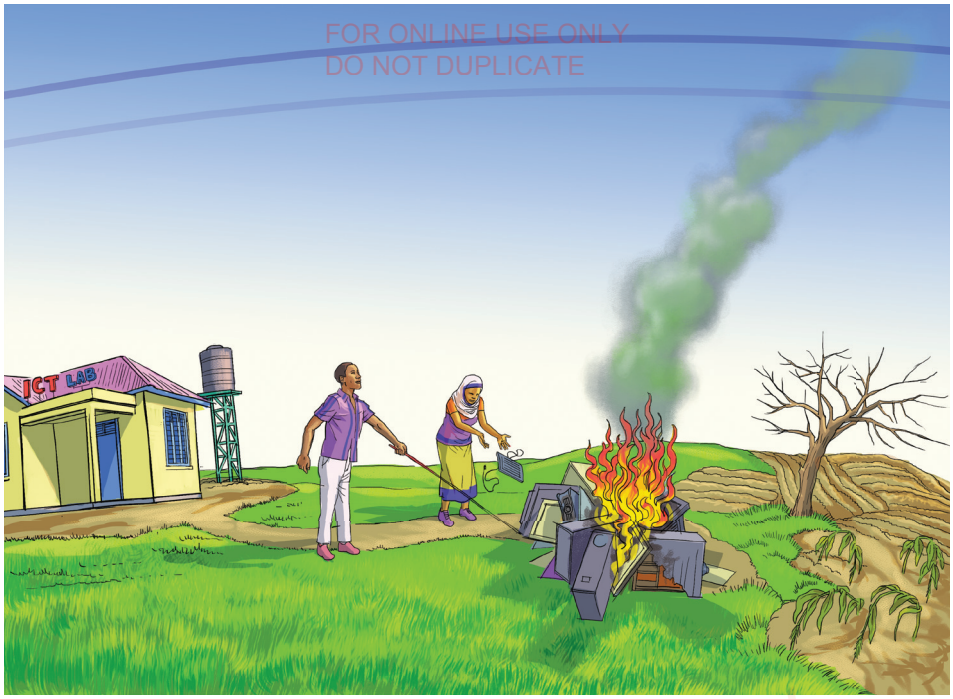


Figure 3.7: *Improper e-waste disposal in environment*

Activity 3.3

Search the solutions for the presented ICT hazards from various sources

Exercise 3.3

Answer the following questions.

1. Describe two health issues caused by prolonged use of computer. For each case advise how to prevent it.
2. Identify any two safety issues for computer users and how they are caused.
3. Explain the effects of disposing electronic equipment to the environment and how better they should be disposed.

Revision Exercise

SECTION A

Answer the following questions:

1. How does information technology create environmental, mental-health and workplace problems?
2. Rapid development of technology has brought many positive impacts in the societies, but also there are negative impacts. Briefly explain five-health hazards facilitated by the use of ICT.
3. Explain five criminal activities facilitated by ICT and security measures that can be applied to avoid them.
4. Outline the importance of protecting information systems.
5. Explain various ways to protect information against unauthorised access.
6. Some information systems fail due to security reasons. Assume you are an ICT manager, how can you advise a customer on what to be done to avoid failure of information system.
7. Discuss if it is better to use Biometric fingerprint than password to protect unauthorised access.

SECTION B

*Write '**True**' for a correct statement and '**False**' for an incorrect statement.*

1. Computer crime is also called cyber crime._____
2. CCTV cameras are used in security. _____

Chapter Four

Web development

Introduction

Web design and development has become a very critical aspect in online activities due to advancement in online technology and innovation. By the end of 2020, it was approximated that there are nearly 1.7 billion websites present online. These include corporate, e-commerce, portals, blogs, social media and other websites. Website is one of the ICT tools that fosters success on the online activities in this digital age. In this chapter, you will learn about the concept, structure and design of the webpage. The competencies developed in this chapter will equip you with the ability to develop websites.

Think

About the way you get notes for your ICS subjects either by finding them from the Internet or reading books with relevant contents available in the library.

Concept of webpage

A webpage is a document commonly written in Hyper Text Mark-up Language (HTML) that is accessible through the Internet or other networks using a web browser. In other words, you can see a webpage of a website when you open a website using a web browser with an Internet connection or from a locally hosted website.

When you read a book, every time you open each page, those pages have various knowledge from the content you are looking for. Every page has its own contents written different from other pages which may have texts, images or any other relevant media. This single page of a book with its information is the same as a webpage. Several webpages form a website which can be accessible via Internet connection or local host. Information in a webpage is written in a Notepad or

Notepad++ using HTML that is visible through the screen of a computer or other output devices. An example of a webpage is the homepage of the Ministry of Education, Science and Technology website as shown in Figure 4.1. A website refers to a collection of related multiple webpages that is addressed to a Uniform Resource Locator (URL) or domain name such as www.moe.go.tz.

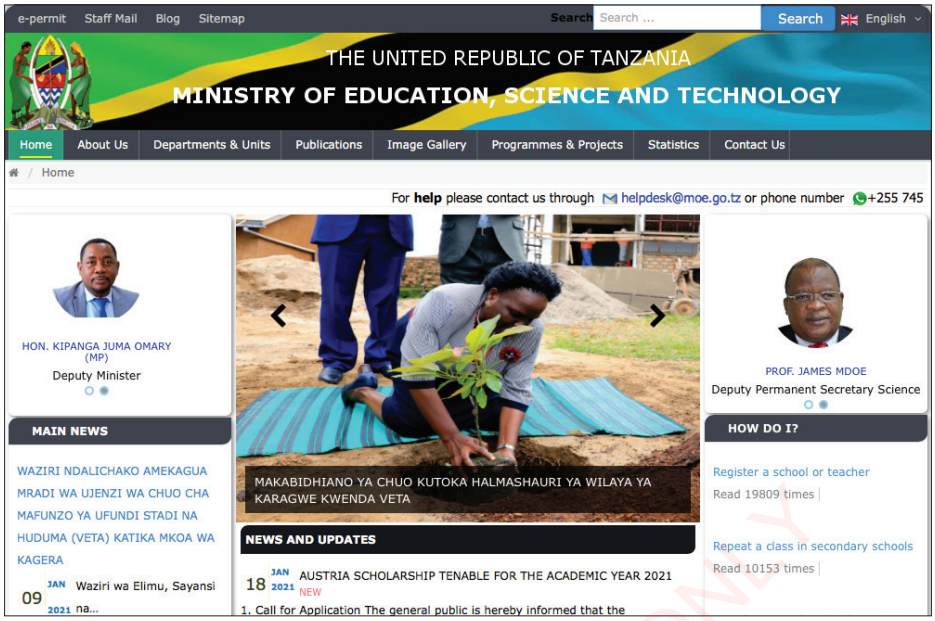


Figure 4.1: *An example of a webpage*

Source: MOEST (2021)

Properties of quality webpage design

User-friendly navigation: if you visit a particular website, you will probably need to access quickly information from an intended webpage. This is very important when your website comprises of many webpages, whereby you will need to see the easy way to use navigation. Therefore, when you design a website make sure navigation menus are simple and self-explanatory. Using a broad menu with a variety of submenus may help the users of your website arrive easily to the webpage they need.

Webpage speed: one of the important properties of a good quality webpage design is speed. Website visitors are often bored of slowly loading pages. The selection of the medium to use on each individual webpage determines the website loading speed. For best loading speed, it is recommended to use images which have been converted to web quality standard.

Visually attractive images: one of the qualities of well-designed website includes having good quality images. Images should be well captured, have good resolution and be well arranged on webpages.

Responsive design: Internet users utilise different devices to connect to the Internet. Common devices include desktop computers, laptops, smartphones and tablets. A user with any of these devices should be able to view or see your website. When you open a website using a smartphone, you should be able to get the same effect but different layout as shown in Figure 4.2. The website should be responsive to all devices and to different web browsers that are used to open it.

Figure 4.2: *Example of responsiveness of website on desktop, laptop, tablet and smartphone*

Activity 4.1: Observation of various qualities of webpages

1. Open a website of any education institution like a school, college or university by typing its URL on address bar of your preferred browser, for example www.udom.ac.tz or www.dit.ac.tz.
2. Navigate to heading with information like course program or department
3. Go to course program or department of your choice.
4. Share experiences with your fellow students on how you were able to arrive and access information. What is your experience in relation to properties of quality webpage design?
5. Use another type of device and follow step 1 to 4 (if you were using a computer, now use a smartphone from your teacher for this purpose or the other way around).
6. Do you get the same effect in retrieving information as in a previous device? What have you experienced?

Importance of webpage design

Webpage design is a creation of the webpage layout based on the choice of a right colour scheme, page layout, fonts, content and more. The following are some importance of webpage design:

Impressing your audience: when you visit a particular website for the first time, there are some aspects which make you judge what the site does. A more impressive website makes you become positive about it. A well-designed website with exceptional layout can appear more appealing to the visitors and attract them to engage more with the webpages. An attractive and updated page impresses the visitors with services you are offering, and therefore it limits visitors' attempt to quit to other site.

Creating trust to your audience: if you navigate to a poorly designed webpage and has an outdated information, it is hopeful you will never trust the website. Therefore, a well-designed website makes its audience trust on what is in the website and they may stay longer in the site and frequently visit it. Visitors who stay longer in a website have more chances of sharing information contained in the website. Also, use of secured protocol for connection to the web builds visitors' trust to a website. For example, the website is more secured when you use Hypertext Transfer Protocol Secure (HTTPS) instead of Hypertext Transfer Protocol (HTTP).

Creating competitiveness: to attract more visitors, you must design a good quality website to compete with other sites running related business. If your website is of poor quality, its performance will be low compared to those of your competitors, leading visitors to seldomly use your website.

Consistency in branding your online business: a website that is not consistent is not professional and it may lose a lot of visitors or customers. To maintain customers because of the brand you have created from your business, make all pages consistent. Consistency in design needs you to ensure that layouts, font styles, types, colour and other relevant media are the same across all pages of your website.

Accessing the website

A website is accessed by visiting the home page of the website using a web browser. For example, President's Office Regional Administration and Local Government (PO-RALG) or '*TAMISEMI*' website URL address is https://www.tamisemi.go.tz. Viewing this site requires web browser where you enter the URL in the address bar. An alternative way of finding the website on the Internet when you are not familiar with its URL is to use a search engine. Therefore, it is important to understand the concept of World Wide Web, web browser and search engine to be able to access the website via Internet.

World Wide Web

World Wide Web also known as the Web is an interconnected system of public webpages identified by URL and accessible via the Internet. It is important to know that the Web is one of many applications built on top of the Internet.

In March 1989, a vision to invent World Wide Web was laid out by Sir Tim Berners-Lee in a document called 'Information Management: A proposal'. By October 1990, Tim Berners-Lee (the inventor of the web) wrote three technologies that remained to be the fundamental of the today's web. These technologies included HTML, Uniform Resource Identifier (URI) and HTTP.

The inventor also developed the first webpage editor called World Wide Web app and the first web server known as Hypertext Transfer Protocol Daemon (HTTPD). By the end of 1990, the first web was served on the open Internet. From 1991, people were invited to join the new web community, which today is accessed via web browsers.

Web browser

A web browser is an application software for accessing information on the World Wide Web. There are commonly used browsers to connect the website to the World Wide Web such as Mozilla Firefox, Google chrome, Safari, Opera and Microsoft edge as shown in Figure 4.3.

Figure 4.3: *Commonly used web browsers*

Search engine

This is a special type of website designed specifically to search and identify items in a database that correspond to keywords or characters specified by the user. Search engines are commonly used for searching information on the Internet through the world wide web (www). Popular examples of search engines are Google, Yahoo, Bing and Microsoft Network (MSN). They resemble normal websites, but their major task is to search information from other websites on the www as requested by users.

Importance of websites

The following are some aspects that make a website important:

(a) Websites save time and cost; for example, they offer online shopping, hence saves time and cost for physically visiting markets and shops. Also, through e-banking and m-banking, the website saves time that would have been spent in banks and other financial institutions to process various transactions;

(b) Websites offer service flexibility for 24 hours seven days a week. The time when other physical services like banks and markets are closed during the night, weekends or holidays, the services may be provided online through website;

(c) Websites are used by media houses such as TV stations, radio and newspapers to sell and publish news and other information;

(d) Websites provide reliable means for companies and public and private organisations to share important information about activities and services they provide; and

(e) Websites are used by individuals, universities and schools to publish learning and teaching resources in different formats such as videos, audios, documents and images.

Activity 4.2: Observation of a poorly designed website

Use the following steps to observe poorly designed websites.

Step 1: Visit the following websites:

(a) www.websitesthatsuck.com

(b) www.worstoftheweb.com

Step 2: Write down your views about these sites.

Step 3: From each site, choose two features of quality webpage design and identify aspects that indicate a poor design.

Step 4: Open five (5) websites of any Tanzanian universities and compare the qualities of their design.

Exercise 4.1

Answer the following questions:

1) Explain the following terms: webpage, website and search engine.
2) You want to search information about prestigious schools in Tanzania such as Mzumbe, Ilboru, Kilakala, Shaaban Robert, St. Francis and Msalato but you do not know their URL addresses. Discuss with your fellow students how you can get access to their websites without asking for help.

Webpage structure

A webpage structure refers to the way pages of your site are linked to one another. Webpage structure range from the way information in your website is organised and presented to how pages will be navigated. The layout of a webpage may be structured by creating an HTML document that contain commands in a respective page.

HTML document structure

The basic structure of a webpage contains three important elements: html, head and body. To create a webpage, an HTML document with these elements or tags must be created. Tags are codes or commands that describe how the contents of the webpage should be displayed on the web browser. Figure 4.4 is an example of a webpage structure illustration.

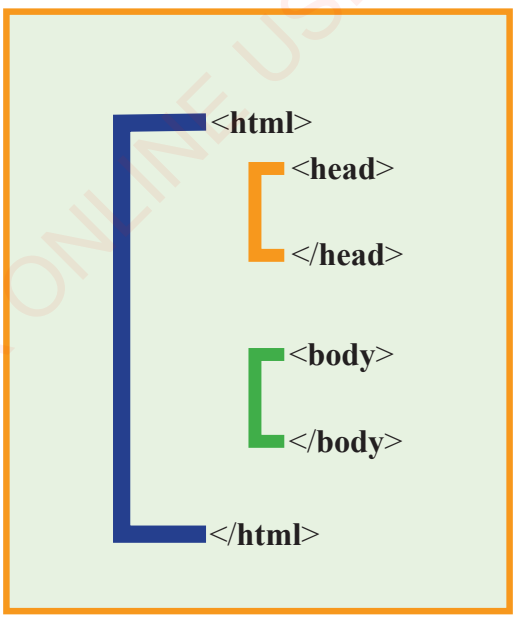


Figure 4.4: *Structure of HTML Webpage*

A webpage can be understood in two concepts: first being the rendered output (rendered by a browser) and the second being the rear html code structure which has html, head and body sections written in a plain text editor such as Notepad and run in a web browser such as Google chrome.

Understanding HTML

HyperText Markup Language (HTML) is a language commonly used to create webpages using HTML codes. When the web browser opens a webpage, it should read the codes and translate them to display the content. The user of the website does not see the codes. The creator of the website is the one who knows the way these codes are arranged to make the webpage appear the way the user sees it.

HTML comes in different versions which change periodically due to technological needs for updates. HTML5 is an updated version of the previous mark-up language. To start writing codes for a webpage, you are going to use simple text editors, which are types of computer program used to edit plain text. What you see on the website is the result of HTML. HTML is the language that all web browsers understand.

HTML Tags

Tags come in pairs: an opening one and a closing one. The first pair of tags is the HTML tags themselves. You put one HTML tag at the top, and one at the bottom:

<HTML>

</HTML>

Note that what differentiates the opening tag and the closing tags is a forward slash(/) inside the pair of angled brackets. All tags must be surrounded by the angle brackets < >. This tells the browser that there is some HTML code that needs to be executed. There are some tags that work without closed tags, these are
 , <hr> and <img>.

Attributes

Attributes are used to provide additional information to tags. Attributes come in pairs as name and value. For example in <TD align = “left”>, align represents name and left represents value.

Elements

An element is made up of three parts: a start tag, content and an end tag. Example of an element is:

< Body>

This is my first HTML paragraph

</Body>

Tags and attributes are not case sensitive. It is possible to use an opening tag in upper case while its closing tag is in lower case for example, for <html>…..</html>, <table>…</table>.

HTML editor

HTML editor is the place or electronic sheet where you write your HTML codes. There are various text editors such as Notepad, Notepad++, Vim and Atom. A text editor such as Notepad is used to write HTML tags. In this case, you will use a Notepad.

Activity 4.3: Procedures of starting a Notepad on Windows 10 Operating System

Use your computer to create a file with name "mybegin" using the following steps:

1. Go to Start as shown in Figure 4.5(a).

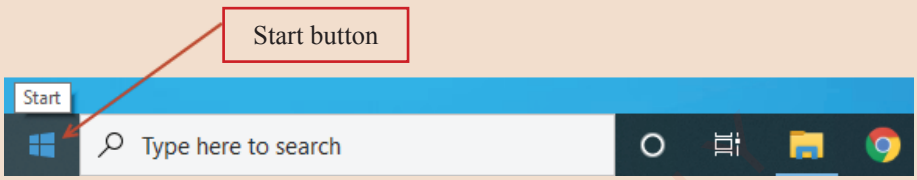


Figure: 4.5(a): *Starting a notepad-Start button*

2. Go to where all Programs are listed
3. Click 'Windows accessories'.
4. Click Notepad as shown in Figure 4.5(b).

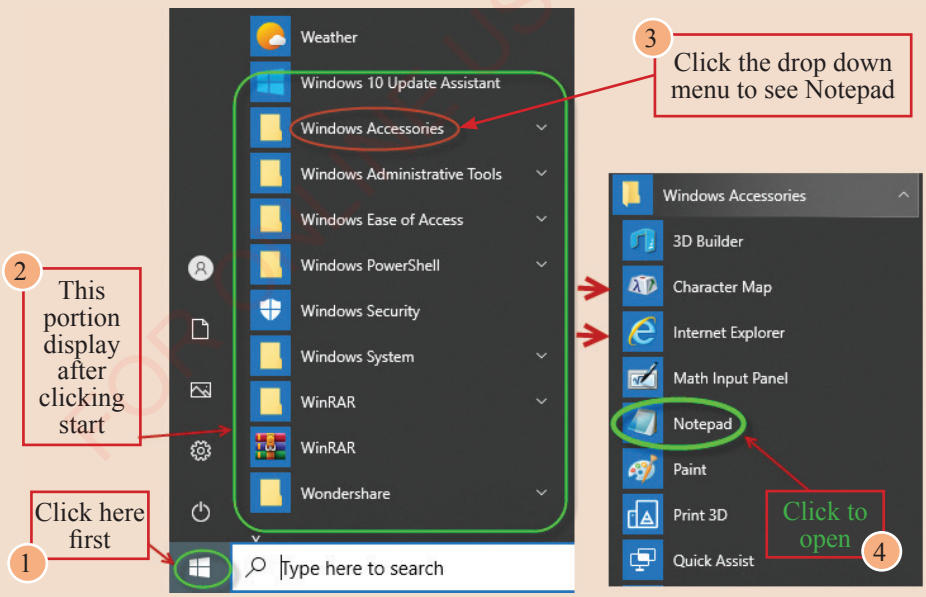


Figure: 4.5(b): *Starting a Notepad*

5. In the Notepad, type your surname and class. Save this file on the desktop as mybegin.txt.
6. Load by dragging the file mybegin.txt into the browser.
7. The text contained in the mybegin.txt will be displayed.
8. Again, go back to Notepad and add the text “my world of technology”, and save the file.
9. From the Web browser refresh to load the document.
10. If you are able to see the text, then you have created your notepad file, as seen in Figure 4.5(c).

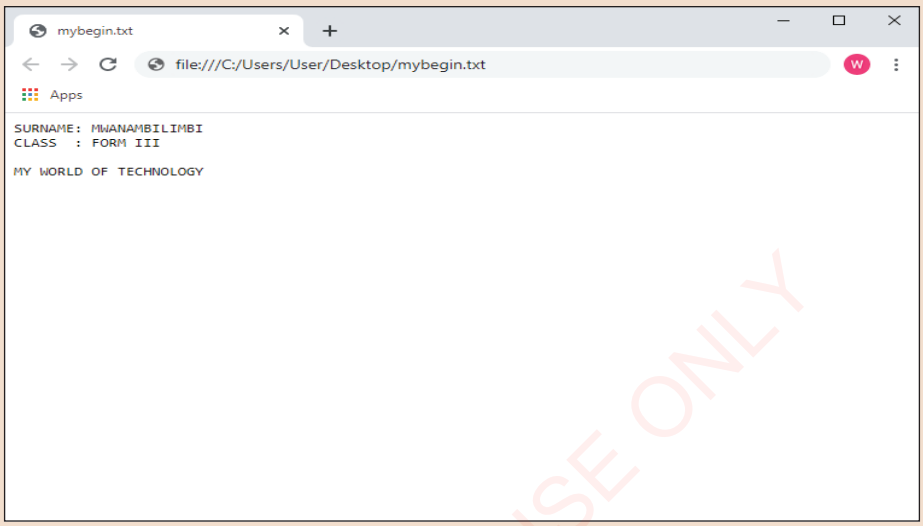


Figure: 4.5(c): *Simple webpage view*

HTML page structure

Standard HTML document structure format uses tags <HTML>, <HEAD>,<TITLE> and <BODY>. The tags <HTML> and </HTML> tell the browser that there is some HTML code that needs to be executed. When these codes are executed, then the information that is placed in-between two tags will be displayed. The Notepad in Figure 4.6, when opened by browser will display nothing, only the empty white background space. This will be possible after saving the file in html format (.html).

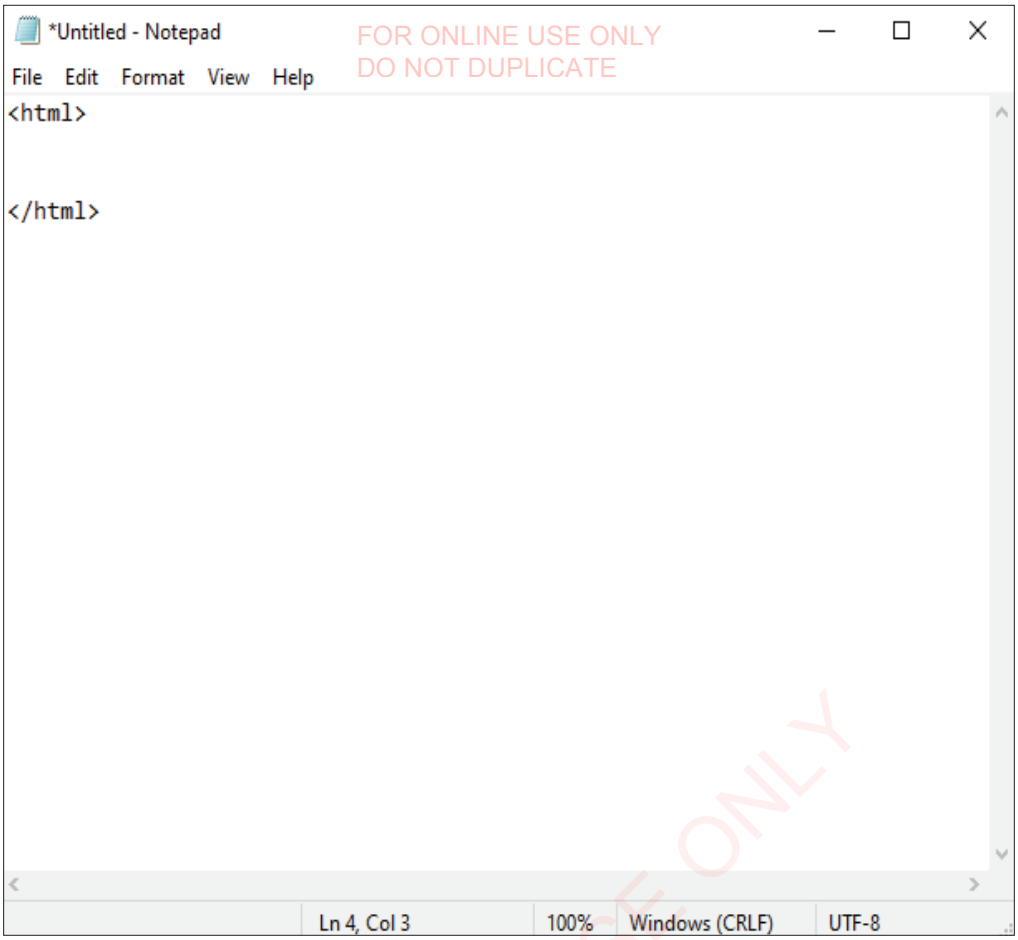


Figure: 4.6: *Notepad showing the tags to be executed*

HTML element

An HTML element is defined by a start tag, some content and an end tag such as <tagname>Contents…</tagname>. The element is everything from the start tag to the end tag as shown in Figure 4.7. Example of an HTML element is <title> My First Webpage </title>.

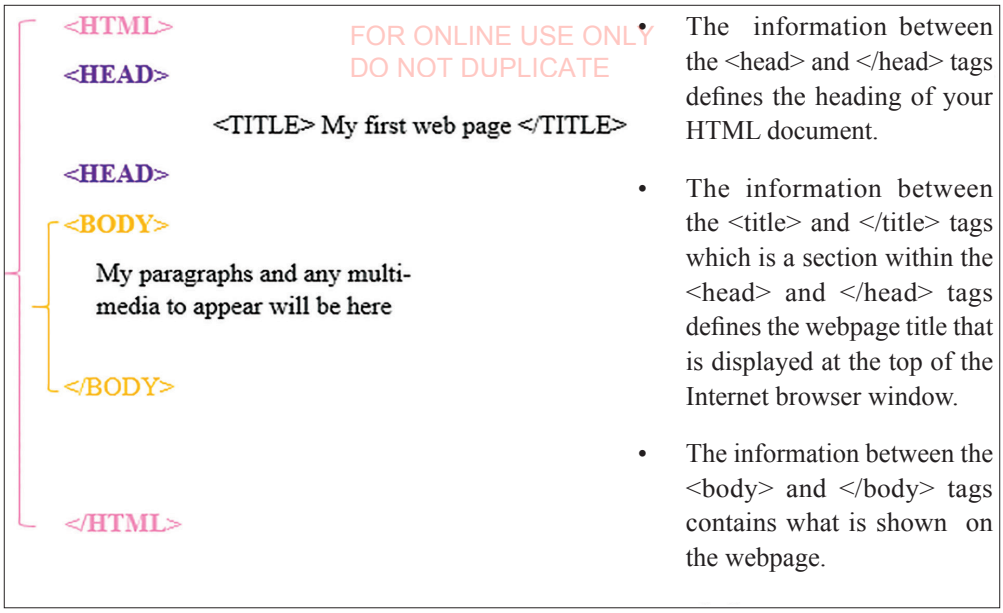


Figure: 4.7: *Description of HTML document structure*

Exercise 4.2

Fill in the blanks with the following given words:

HTML	Closing	website	Markup
<body>	Webpage	image	tag

1) A _____is a group of webpages that are connected together.
2) _____ is a computer language used to create websites.
3) A _____is an instruction written in a text file that is given to the web browser.
4) A _____ is part of a website that contains specific information.
5) A tag can be an opening tag or a _____tag.
6) HTML stands for Hyper Text _____Language.
7) The tag <img> defines _____ in a HTML document.
8) The _____ tag contains all the contents of an HTML page, such as text, images, videos and hyperlinks.

Webpage design

The process of creating a webpage starts with a visual concept, which can be drafted on a piece of paper or with software like Microsoft publisher. Once the sketch is available, HTML and Cascading Style Sheet (CSS) are used to build the website. HTML handles the basic structure and 'skeleton' of your page, while CSS handles the style and appearance.

Creating a webpage

Now you are going to create your first webpage. Open the Notepad which you will be using to write HTML Tags.

Activity 4.4: Creating a simple webpage

By using the following steps, create a simple webpage:

Step 1. Open the Notepad application

Open the text editor for writing your HTML codes by navigating to **Start->Windows Accessories->Notepad** (Refer to steps 1-4 in Activity 4.3)

Step 2. Write Html, Head and Body tags

Type the HTML codes for the HTML page structure ready to write the relevant information in particular tag. For example, type between the <title> tags as shown in Figure 4.8, a title of your webpage as "WELCOME TO MY LOVELY COUNTRY TANZANIA". Then, between the <Body> tags, type information, "THIS IS TANZANIA, THE COUNTRY BLESSED BY GOD WITH LOTS OF NATURAL RESOURCES, WHICH YOU AND ME AS PATRIOTS, WILL PROTECT AGAINST DEPRAVED PEOPLE AND COUNTRIES" that will appear on your webpage.

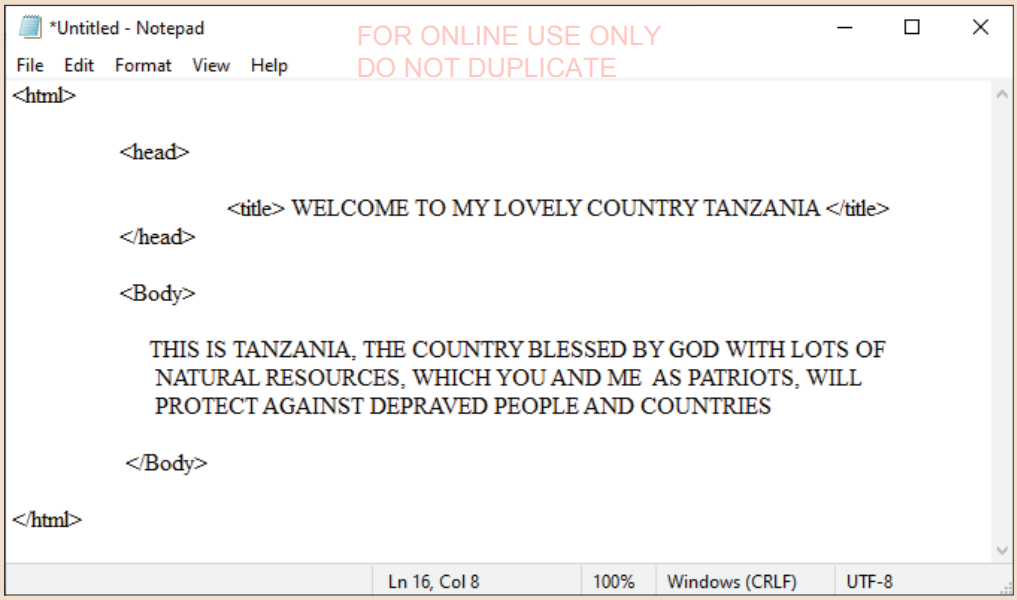


Figure 4.8: *HTML codes for a simple webpage*

Step 3. Save the Notepad file you have created on the desktop with the extension '.html' as shown in Figure 4.9. Type file name as 'MyFirstWebpage'.

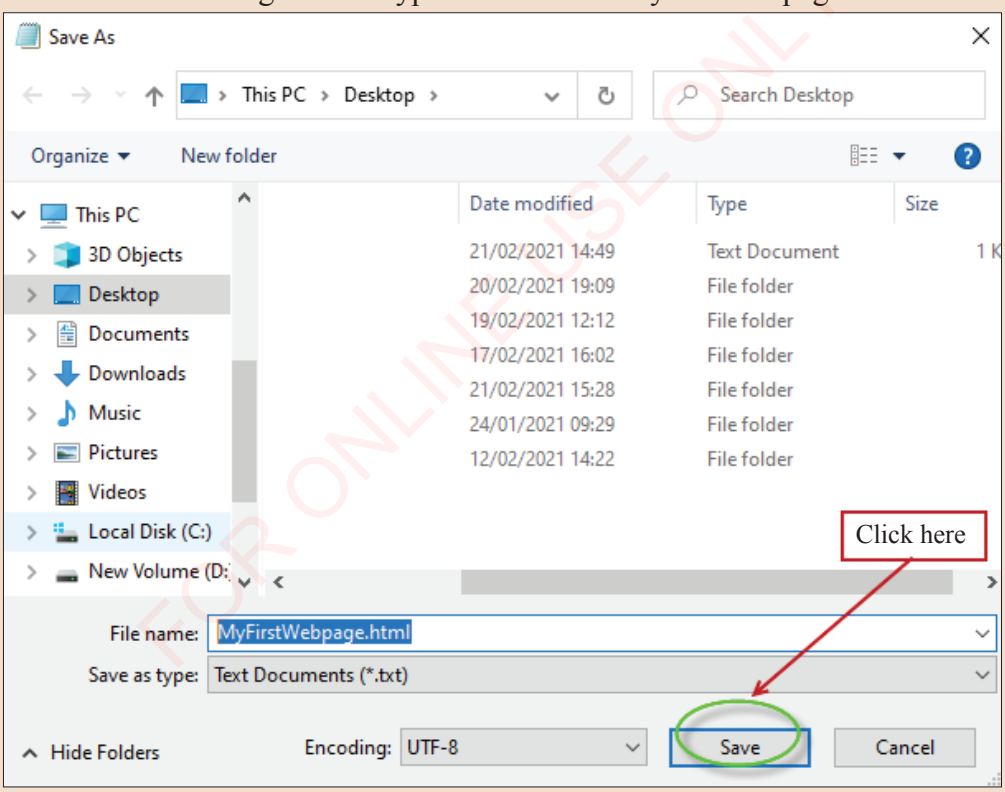


Figure 4.9: *Saving a HTML document*

After clicking 'Save', your HTML file will have the name you saved at the title bar of the file. See Figure 4.10.

Figure 4.10 *Saved HTML file in Notepad view*

If you are using Google Chrome as your default browser, then your 'MyFirstWebpage.html' file will look similar to Figure 4.11. Otherwise, the icon will be like the default browser you are using.

Figure 4.11: *HTML document in browser icon view*

Step 4: Double click to open the file you have saved. The first webpage with the text you have typed will appear as in Figure 4.12. Note that the number of lines seen will depend on your screen size and font size used.

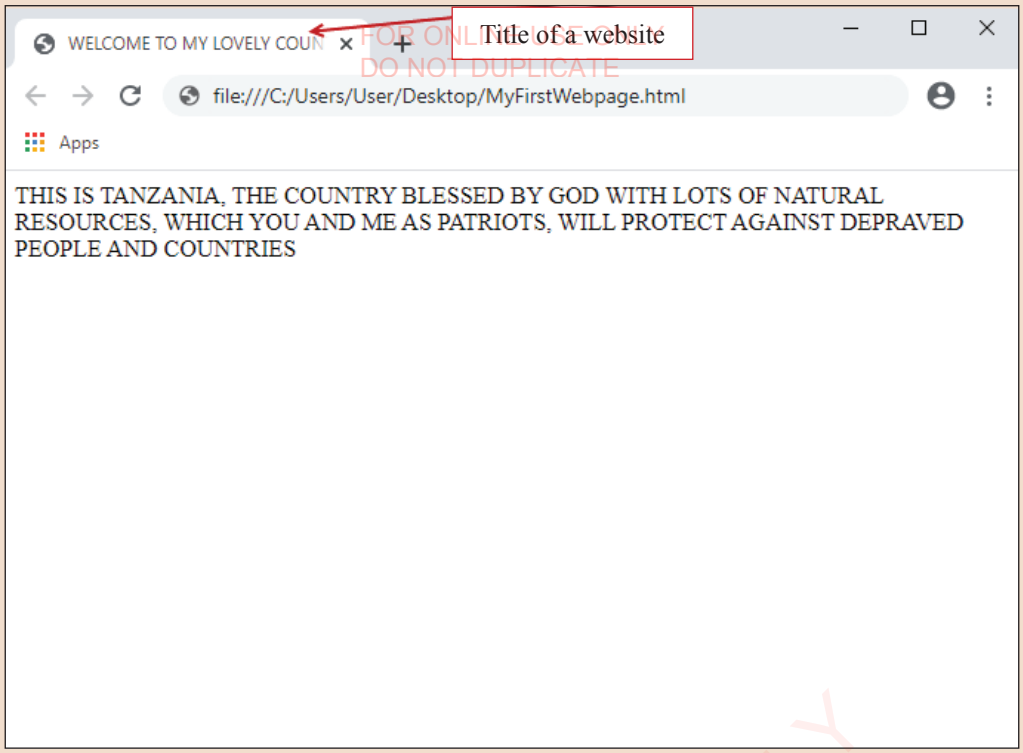


Figure 4.12: *The first webpage view*

Previewing webpage : After writing html codes for your basic website, you can verify how the webpage looks like when displayed on a web browser as shown in Figure 4.12. The notepad file you have created is stored in your computer locally, this means you do not need to connect to the Internet to view your webpage.

Up to now, you have created your first webpage. Next you will have to modify your webpage by adding various attributes.

Modifying your webpage

Before you start writing codes for your webpage, you have to be familiar with tables, frames, heading, font styles, hyperlinks and backgrounds to modify your webpage.

HTML Attributes

HTML attributes provide additional information about HTML elements and they are always specified in the start tag of an element. For example, <img src= “myphoto.jpg” width = “500” height = “ 600” >.

Activity 4.5: Adding background colour

The colour of a webpage background is written in body tag while the colour for a table background is written on the table tag.

If you want to put the colour of your webpage, the tag followed by its attribute, <body **bgcolour= "red**"> is used. The bgcolour= "red" attribute changes the background colour of whole page to be red. The background colour attribute (bgcolour colour) must be written inside the body tag <body bgcolour="red">.

If you want to change only the content on your webpage such as table, you can write this attribute on the table tag <table **bgcolour="red**">.

Step 1: Right click your file 'MyFirstWebpage.html', then open with Notepad as shown in Figure 4.13.

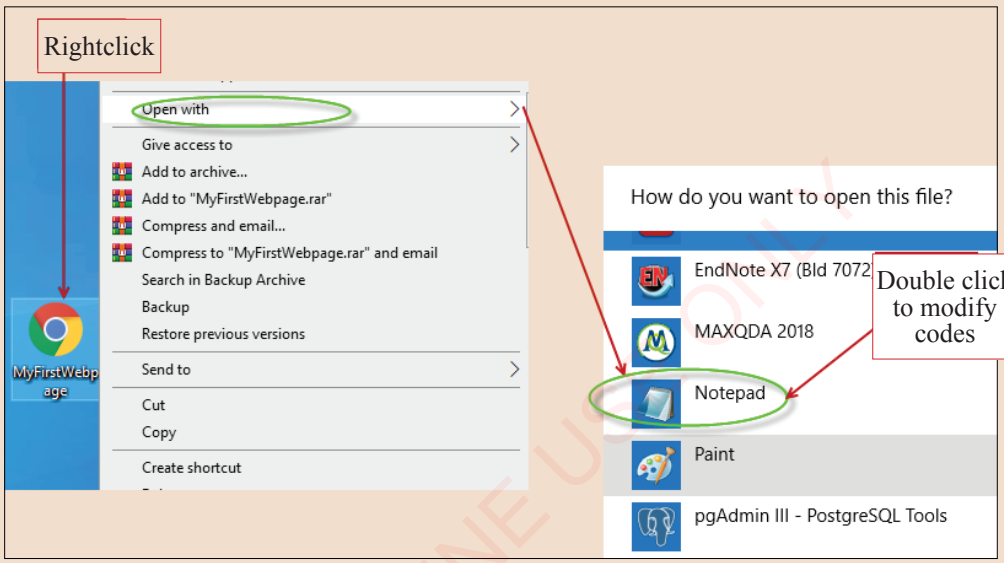


Figure 4.13: *Opening webpage in Notepad view*

Step 2: Type the code **bgcolour="pink**" for background just one space after word body in the <body> tag as shown in Figure 4.14(a).

```
<Body bgcolor="pink">

    THIS IS TANZANIA, THE COUNTRY BI
    NATURAL RESOURCES, WHICH YOU
    PROTECT AGAINST DEPRAVED PEOP

</Body>
```

Figure 4.14(a): *Body tag with bgcolor attribute*

Step 3: Save the file and open it using the web browser to see the result as shown in Figure 4.14(b).

Figure 4.14(b): *Webpage view with background added*

Activity 4.6: Adding line breaks in the webpage

Line break is a tag that is used to return the text to the next line or jump down the text. This tag does not have a closing tag. The tag for break is
.

Step 1: Open the file as you did in 'Step 1' of Activity 4.5.

Step 2: Type the code **
** for breaking your paragraph as shown in Figure 4.15(a).

```
<Body bgcolor="pink">

   THIS IS TANZANIA, THE COUNTRY BLESSED BY GOD <br> WITH LOTS OF
   NATURAL RESOURCES, WHICH YOU AND ME <br> AS PATRIOTS, WILL
   PROTECT AGAINST DEPRAVED PEOPLE AND COUNTRIES

</Body>
```

Line break

Line break

Figure 4.15(a): *Webpage view with line breaks added- Notepad view*

Step 3: Save the html file and then double click the file to open it using the web browser to see the result or refresh the browser if the file was still open on the browser to see the
 changes, see Figure 4.15(b).

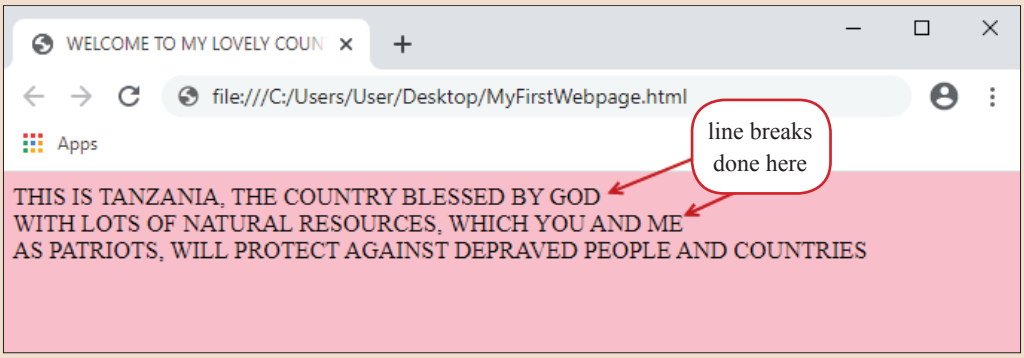


Figure 4.15(b): Webpage view with line breaks added

Activity: 4.7: Using Notepad to format documents

Step 1: Open your Notepad editor to create html code that will display the following information:

Mt. Kilimanjaro: a beautiful place to visit in Tanzania

Mount Kilimanjaro is a famous and the highest mountain in Africa. The mountain's beauty is well known and attractive to every traveller who visits it. The place is also among the National Parks in the country with inviting glacial ice fields, observed when approaching the summit of Uhuru Peak.

Step 2: Put your heading to center alignment.

Step 3: Save your work as Tanzania.html then preview in any web browser

Heading

Heading tags are also set of HTML tags. There are headings one to six, written <h1>, <h2>, <h3>, <h4>, <h5> and <h6>. The text that are placed within the <h1> tags has large font size when displayed, followed by <h2> tags with slight smaller font size and so on descending in size to <h6>. For example, you can write your title topic using <h1>, subtopic with <h2> and sub-sub section using <h3> and so on.

Activity 4.8: Defining heading in a webpage

Step 1: Open the file **MyFirstWebpage.html** as you did in step one of Activity 4.5

Step 2: Type the code **<h1>** for heading 1 in the first sentence, <h2> for the second sentence and <h3> for the last sentence as shown in Figure 4.16(a).

```
<Body bgcolor="pink">

  <h1>THIS IS TANZANIA, THE COUNTRY BLESSED BY GOD</h1> <br><h2> WITH LOTS OF
  NATURAL RESOURCES, WHICH YOU AND ME </h2><br><h3>AS PATRIOTS, WILL
  PROTECT AGAINST DEPRAVED PEOPLE AND COUNTRIES</h3>

</Body>
```

Figure 4.16(a): *Modifying Webpage by heading styles-Notepad view*

Step 3: Add some more texts so that you will reach to heading 6. Save the html file and then double-click it to open using the browser to see the result as shown in Figure 4.16(b).

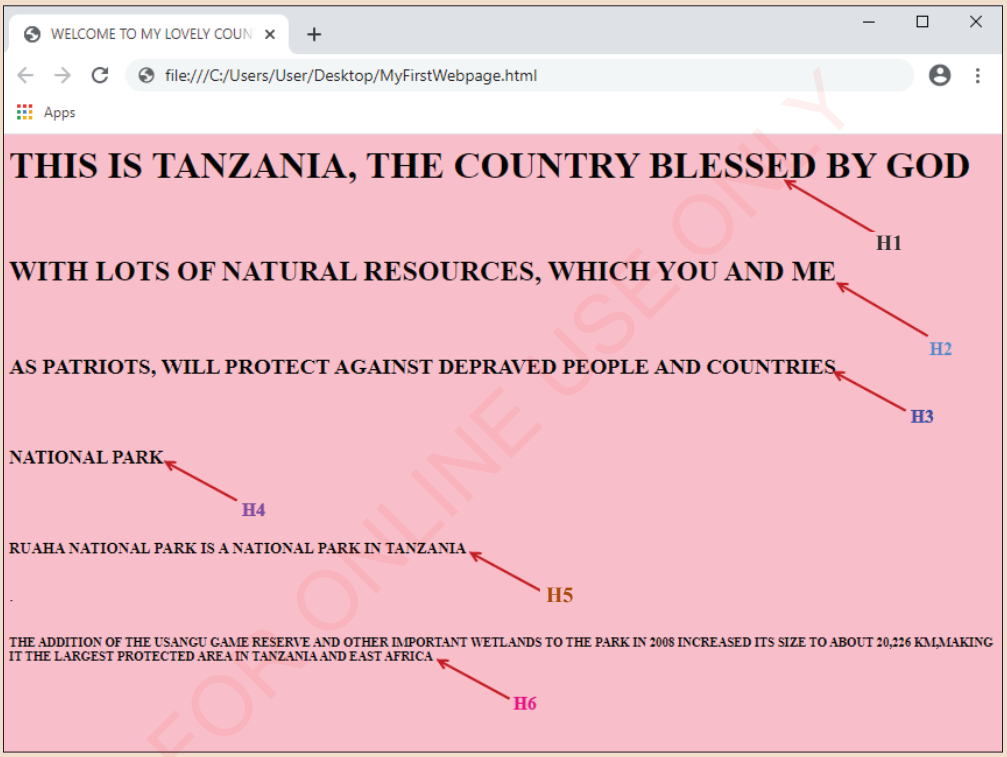


Figure 4.16(b): *Modified Webpage by heading styles*

In this section, you have learnt how to modify the contents of the webpage including how to use different html tags. The next part demonstrates how to code the tags in order to have an output of the webpage layout you have designed in hand sketch.

Coding tags

To code tags requires an understanding of frameset concept, tables and CSS usage. In this section, you will learn how to use a frameset and table codes using HTML. The use of CSS will not be covered in this book. Most websites are customised using specially developed tools available in open access source (free to download) because of advancement in technology. Although you will use the ready-made tools, you need some basics to understand what is going on in the backdoor of the components. Some of web design tools which you can use on your own for designing a more standard website instead of coding from the scratch using HTML include WordPress, AdobeDreamweaver, GoogleWeb Designer, Photoshop, Bluefish, InVision studio and ProofHub.

Note: You can learn more about HTML and CSS on w3schools website by visiting https://www.w3schools.com.

Hyperlink

This is a tag used to navigate a page and move from one page to another. After creating your website of two or more pages, it should be possible to navigate between them. When you click on a certain linked text or button, the page directly moves to another page. Hyperlink refers to data (word, phrase or image) that links you to a new page or section. A text that is hyperlinked is known as hypertext. For example, in contact us , the word 'contact us' is a text when clicked directs you to a page called contact.html. Assuming there are two pages; home page and contact us page as two separate pages as shown in Figure 4.17.

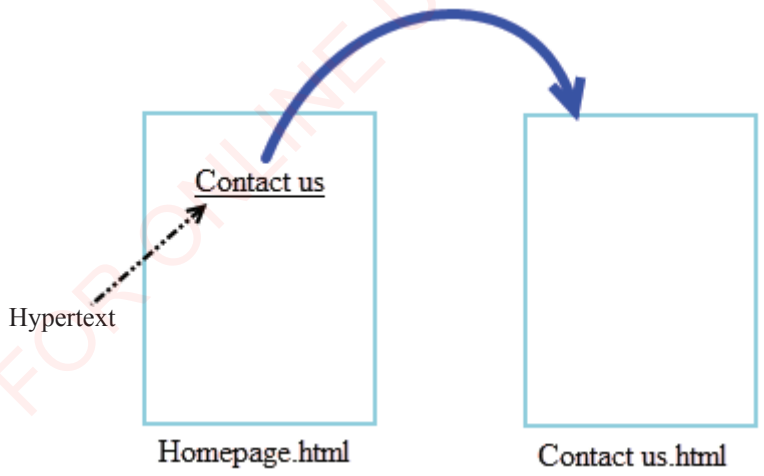
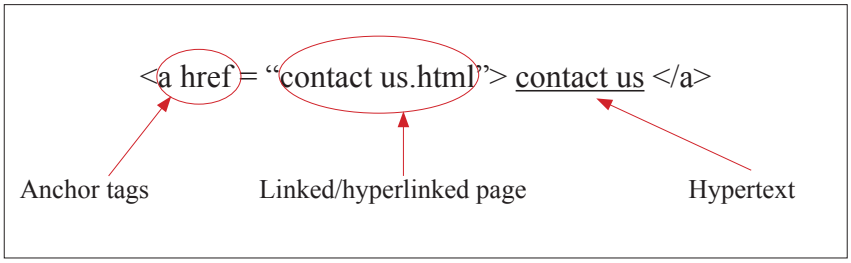


Figure 4.17: *Hyperlink pages*

Hypertext is a text or document that is interconnected by hyperlink. From the previous example, the following statement can be classified as follows:



In other words, a hypertext is a text with a link to another page.

Linking webpages in HTML

To link a page to an HTML, use the <a>, the tag that indicates where the link starts and the tag that indicates where the link ends. Whatever text is added in between these tags will work as a link. The URL for the linked text is added in the tag . The URL works like an address that locates where the linked data is obtained.

Note that, <a>… tags are used between <body> and </body> tags, for example:

```
<html>
                    <head><title></title></head>
        <body>
                    <a href = "url"> text </a>
        </body>
</html>
```

Output is:

text

Activity 4.9: Using Notepad to create linking pages

Step 1: Using Notepad or Notepad++ create two pages, the first Homepage.html and the second ContactPage.html. Both created pages must be put in the same folder on the desktop.

Step 2: The home page contains the following content:

Ruaha National Park

Ruaha National Park is one of the country's most outstanding wilderness area. It is the second largest National Park, covering an area of 20,226 square kilometres located in South-Central Tanzania. During the dry season, when game viewing is at its best, animals are drawn to the Great Ruaha River and other water sources. The name Ruaha was derived from the Hehe word called ''Luhava'' meaning the great river.

Contact Us

Step 3: The contact page contains the following:

Ruaha National Park

Postal address: P.O.Box 369, IRINGA
E-mail: ruaha@tanzaniaparks.com
Phone: +255689062338, +255767536129

Home Page

Step 4: After creating two pages now **link** the word contact us in HomePage to Contactpage.

Step 5: Link the word **Home Page** in Contactpage to HomePage.

Step 6: Save again the two pages.

Step 7: Preview the home page using any web browser and test whether the link works.

Prepare webpage layout

A webpage layout is a pattern or framework that defines a website structure. It has a role of structuring information presented on the website. It provides clear paths for the navigation within webpage and links between homepage and other webpages.

Common layout sketch

To start sketching a common layout for each of your pages, there are important issues to consider:

(a) The need for a header and footer, which are common to each page.
(b) The need for a consistent method of navigation on each page.
(c) The need for any marketing requirements that must be fulfilled. For example, sticking to certain fonts and colour schemes that the layout must base on as the best colour to all visitors.

(d) The need for any legal requirements such as copyrights.
(e) The need to use sketches as a model to design webpages in HTML using webpage layout. You might use a table for the skeletal structure, or layout of the page.

Once the layout is defined, you can fill it with contents such as text, hyperlinks, pictures and interactive buttons. Figure 4.18 demonstrates a webpage layout design.

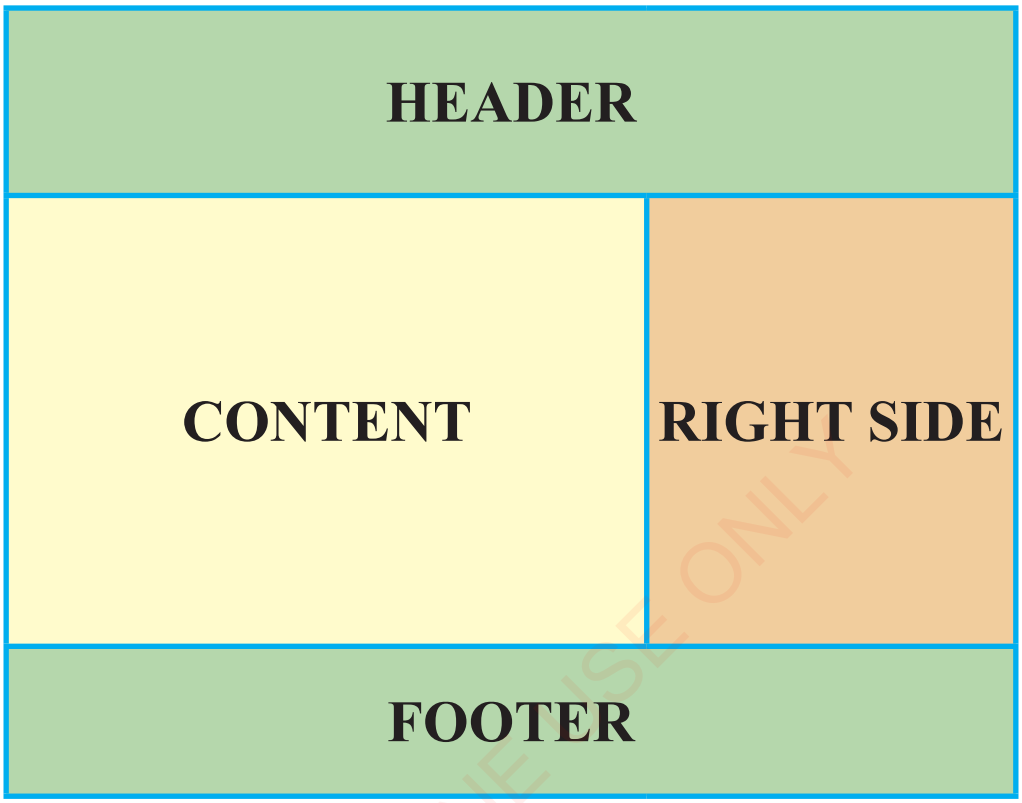


Figure 4.18: *Example of a webpage layout*

Using frames to develop webpage layout

Frames are webpage layout devices capable of calling and displaying multiple HTML documents in a single window of any web browser. A frame document has no part of <Body> tag as in HTML document. Frames replace the part of BODY.

The <FRAMESET> tag defines the layout of the frames in a web browser window. The <FRAME> tags are used to define the content to be contained in the frames. The frames are coded in between the <FRAMESET> and </FRAMESET> tags.

The attributes of frameset tag are columns and rows. Their values can be percentage between 1 and 100 or relative scaling values.

Activity 4.10: Developing webpage layout using <frame> and <frameset> tags

Step 1: Open the Notepad, then create the frameset document using HTML tags as seen in Figure 4.19.

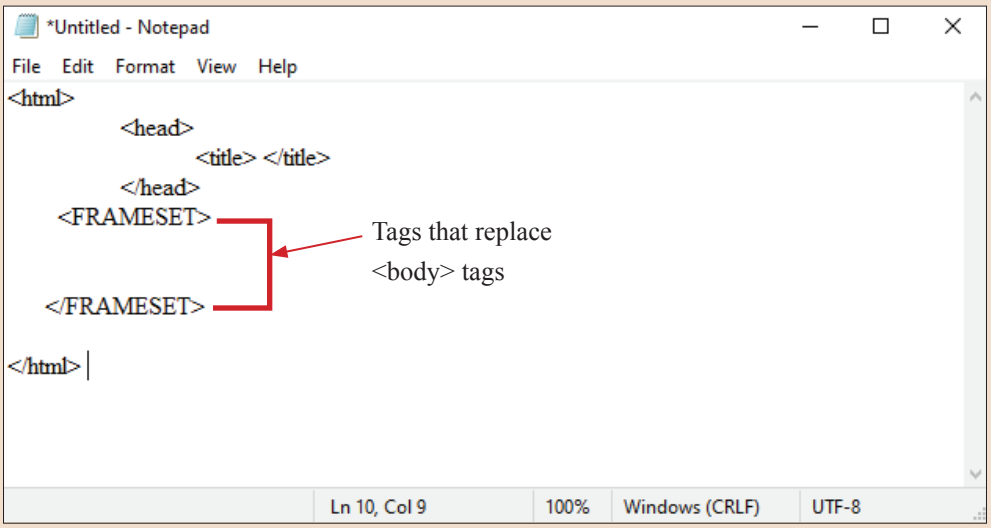


Figure 4.19: *Developing webpage layout - Frameset tags*

Step 2: Save the file as MyClassWebsite.html as shown in Figure 4.20

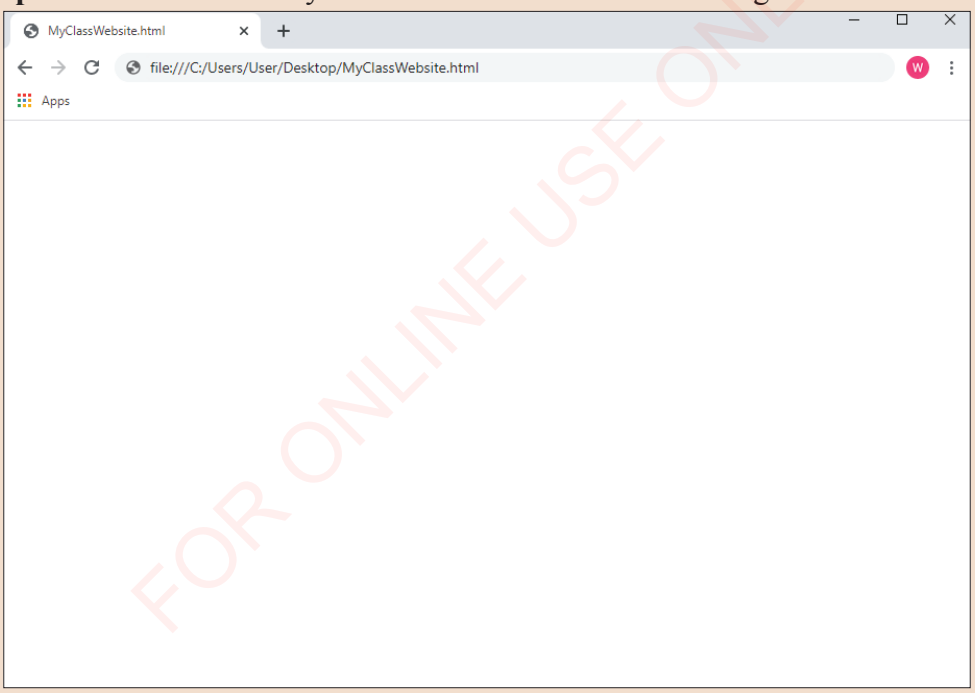


Figure 4.20: *Webpage layout- output of Frameset tags in browser view*

Step 3: Write the codes to divide the portion of frameset document in three rows then to columns as shown in Figure 4.21.

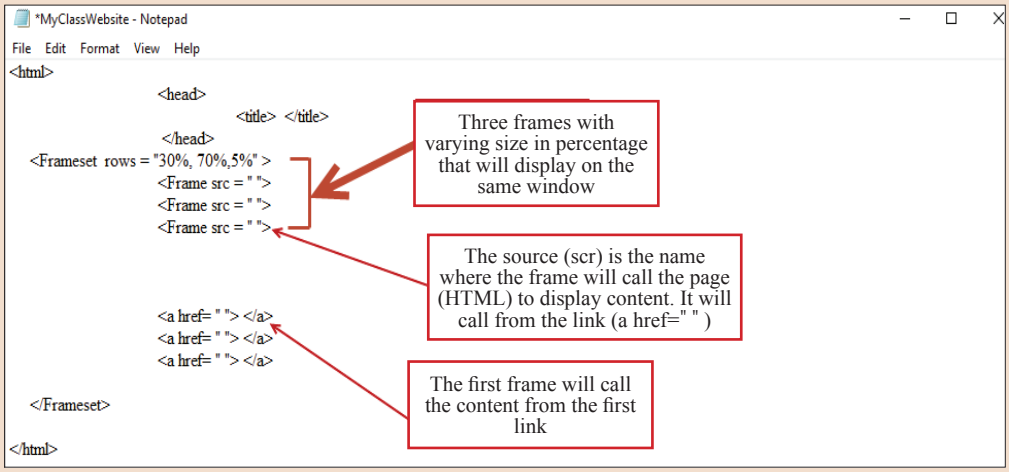


Figure 4.21 *Webpage layout - frames and link in Notepad view*

The window will display the layout as shown in Figure 4.22:

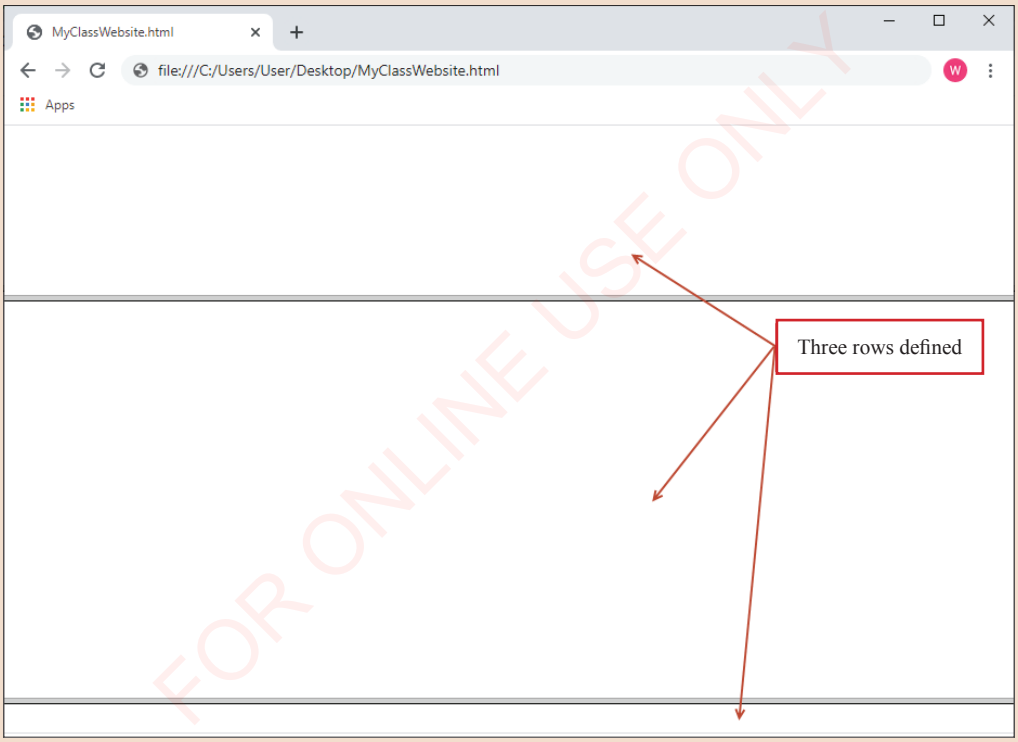


Figure 4.22 *Webpage layout - output of frames and link in web browser view*

Step 4: Write the codes to divide the second row into two columns as shown in Figure 4.23.

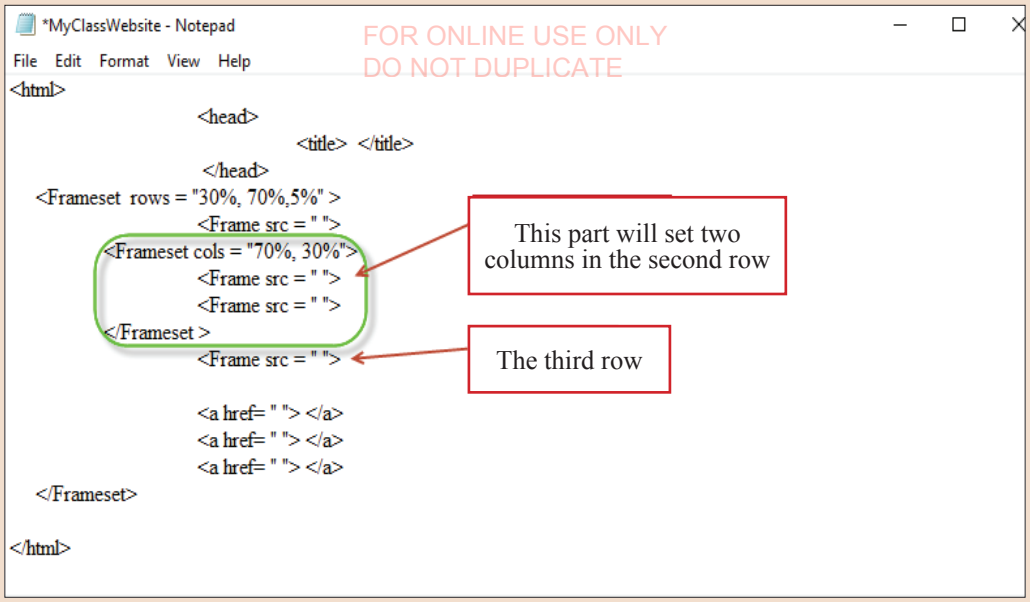


Figure 4.23: *Webpage layout - frames setting rows and columns in Notepad view*

The window will display as shown in Figure 4.24:

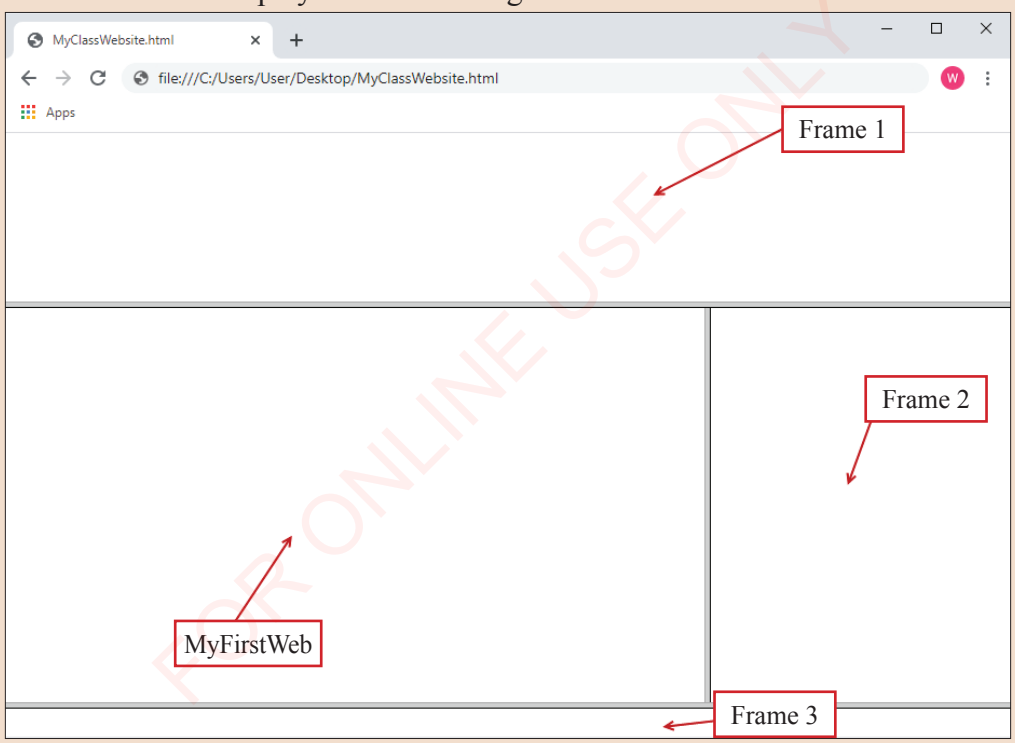


Figure 4.24: *Webpage layout - output of frames setting rows and columns in web browser view*

Step 5: Prepare four different HTML documents for displaying in the same browser window. Call them frame1.html, frame2.html, frame3.html and the fourth is your

first webpage (MyFirstWebpage.html). These html files must be in the same location or folder.

The HTML document for frame1, frame2, frame3 and MyFirstWebpage are as shown in Figures 4.25, 4.26, 4.27 and 4.28, respectively.

*frame1 - Notepad

File Edit Format View Help

```
<html>
        <head>
                <title> MY_CLASS_WEB_SITE </title>
        </head>
<body bgcolor="ORANGE">
    <Center><Strong><h1><font color= " white">MY CLASS WEB SITE</font color= " white"></h1></Strong></Center>
        <img src="img1.png" align="left center" width=70" height="70">
    <center>
         <a href = " CONTACT US.html " >CONTACT US</a>
        <a href = " HOME.html " >HOME</a>
        <a href = " ABOUT US.html " >ABOUT US</a>
        <a href = " SOCIAL ISSUES.html " >SOCIAL ISSUES</a>
        <a href = " ENTERTAINMENT.html " >ENTERTAINMENT</a>
    </center>
</body>

</html>
```

Figure 4.25: *HTML document for frame1*

*frame2 - Notepad

File Edit Format View Help

```
        <head>
                <title> SPORTS_ARENA </title>
        </head>

        <body bgcolor=" GOLD">
                <Center><Strong><h1><font color= " Purple">SPORTS ARENA</Center></Strong></h1></font >
                <p> Sports is a very important part of human life. When people are engaged with body exercise,
                    they are using sports as an agent of healthy development. In sports we swim, jump, play
                    football and run. <p>Other activities we do in sports include swimming, trotting and climbing hills and mountains.
                We also do boxing in sports, but boxing is very dangerous. When we need to do boxing we seek for special permission
                from our teachers or guardians.  <p>See our most enjoyable events below (Source: google.com/sports images:
                <p> <img src="img2.jpg" align="left center" width="70" height="70"> <img src="basket.png" align="left center" width="70" height="70">
                <img src="bycycle.png" align="left center" width="70" height="70"><img src="mpira.png" align="left center" width="70" height="70">
        </body>

</html>
```

Figure 4.26: *HTML document for frame2*

frame3 - Notepad

File Edit Format View Help

```
<html>
        <head>

                <title> COPYRIGHT PAGE</title>
        </head>

                <body bgcolor=" SILVER">
                        <center>©TIE,2021</center>
                </body>

</html>
```

Figure 4.27: *HTML document for frame3*

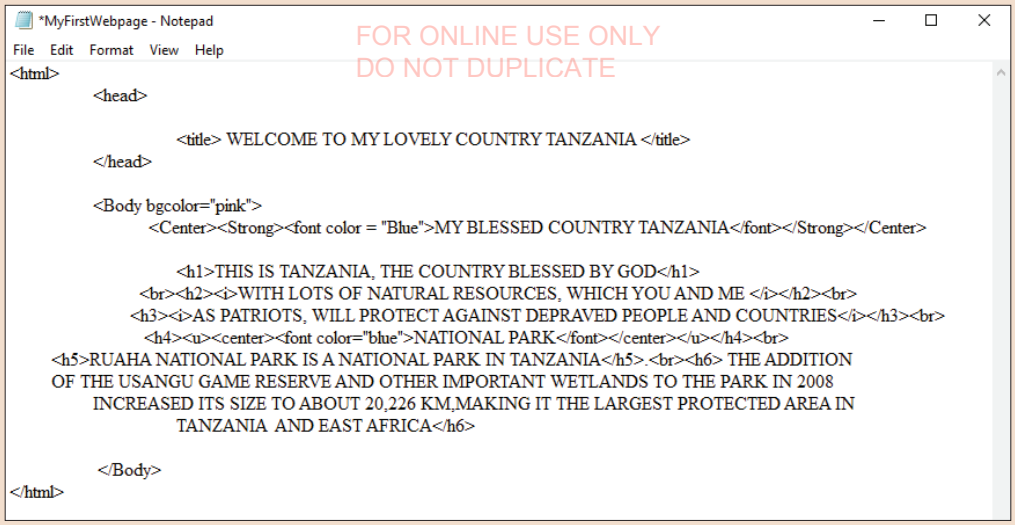


Figure 4.28 *HTML document for MyFirstWebpage*

The four independent webpages are combined together to be displayed in the same window by the MyClassWebsite HTML document as shown in Figure 4.29.

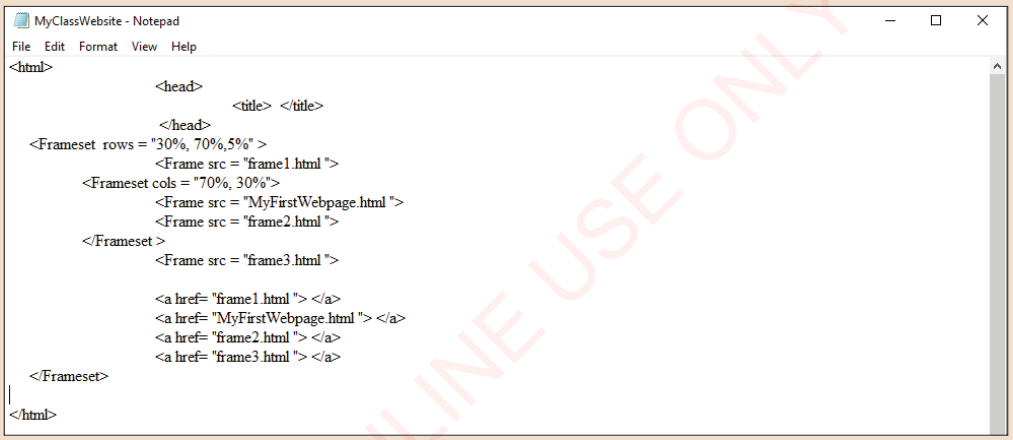


Figure 4.29: *Four combined HTML frames in Notepad view*

The output of the webpage you have developed will display as the one in Figure 4.30.

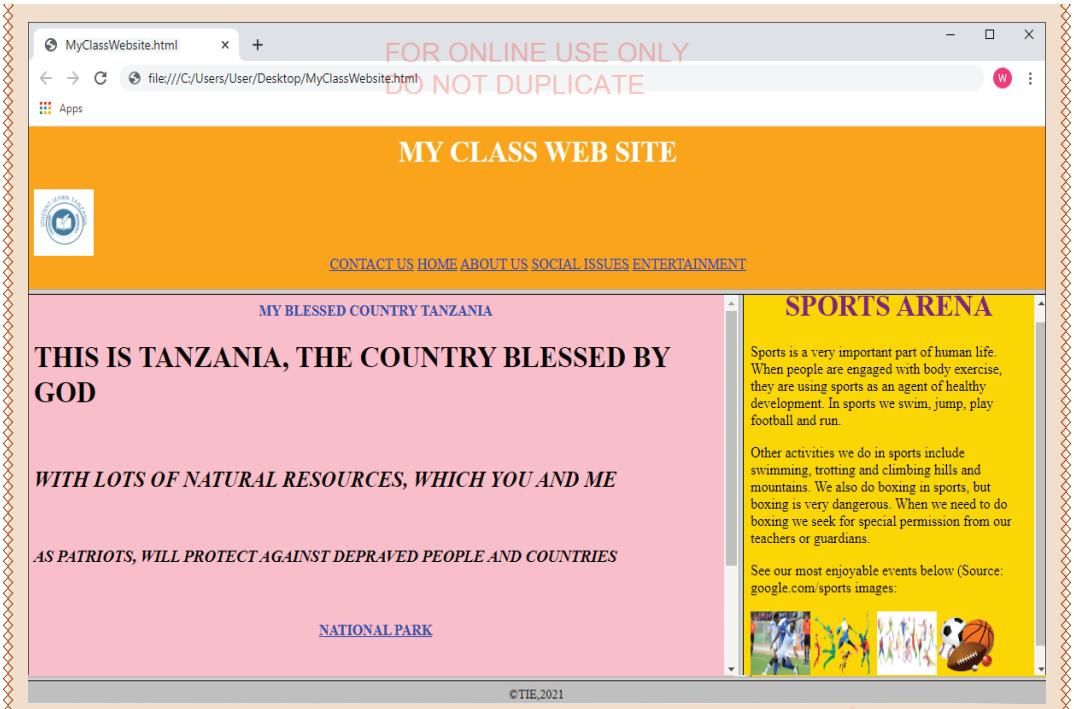


Figure 4.30: *Four combined HTML frames in browser view*

Other basic HTML tags

Horizontal line

The <hr> tag in HTML is used to insert a horizontal rule or a break in an HTML page. It helps to separate document sections. The <hr> tag does not have an end tag and is used as shown in Figure 4.31 and 4.32.

Example:

```
<html>
        <head>
                <title> SPORTS_ARENA </title>
        </head>

        <body bgcolor=" GOLD">
                <Center><Strong><h1><font color= " Purple">SPORTS ARENA</Center></Strong></h1></font >
                <p> Sports is a very important part of human life. When people are engaged with body exercises,
                    they are using sports as an agent of healthy development. In sports we swim, jump, play
                    football and run <hr> <p>Other activities we do in sports include swimming, trotting and climbing hills and mountains.
                We also do boxing in sports, but boxing is very dangerous. When we need to do boxing we seek for special permission
                from our teachers or guardians.  <p>See our most enjoyable events below (Source: google.com/sports images:

        </body>

</html>
```

Horizontal line tag that separates paragraph

Figure 4.31 *HTML document-format using< hr> tag in Notepad view*

Output:

Figure 4.32 *HTML document-Format using <hr> tag in browser view*

Paragraph

HTML <p> tag is used to keep line of texts or block of texts into paragraph. The <p> tag requires a text to start in a new line.

Example:

```
<html>
        <body>
                <p> This is the first paragraph </p>
                <p> This is the second paragraph </p>
                <p> Chief Mirambo was among the chiefs in Tanzania </p>
        </body>
</html>
```

Output:

This is the first paragraph

This is the second paragraph

Chief Mirambo was among the chiefs in Tanzania

Marquee

The <marquee> tag is a tag used for creating scrolling texts or images within a webpage from either left to right and vice versa, or top to bottom and vice versa.

Example:

<marquee> TET </marquee>. The marquee will move the word 'TET'. You can make it move to either left, right, up or down. Now, add attribute 'direction' to marquee tag. <marquee direction = "left"> TET </marquee> and observe the movement of TET text.

Center

Center tag is used to place an object at the center.

Example:

<**center**> Information Communication Studies</**center**> the words Information Communication Studies will align to center.

Creating table in HTML

The basic structure of a table in HTML consists of three tags which are table tags <table> </table>, row tags <tr></tr> and cell/data tags <td></td>. Inside the table <th> and </th> define a heading cell and by default they center the heading and display it in bold type.

Table Row is the element of table that expresses the rows on table, it is expressed by <tr> </tr> tag.

Table data is the content of table row element that is used to express the data content on the table, such as <td> </td>.

Example:

Assume that you want to create a table on your website to show three books available in the Tanzania Institute of Education (TIE) bookshop. The following tags can be used:

```
<Html>
        <head>
                <title> TIE BOOK</title>
        </head>
        <body>
                <table>
                        <tr>
                                <th>Sn</th>
                                <th>Book name</th>
                                <th>Author</th>
                        </tr>
                        <tr>
                                <td>1</td>
                                <td>ICS FORM ONE</td>
                                <td>TIE</td>
                        </tr>
                        <tr>
                                <td>2</td>
                                <td>ICS FORM TWO</td>
                                <td>TIE</td>
                        </tr>
                        <tr>
                                <td>3</td>
                                <td>ICS FORM THREE</td>
                                <td>TIE</td>
                        </tr>
                </table>
        </body>
</Html>
```

Output:

Sn	Book name	Author
1	ICS FORM ONE	TIE
2	ICS FORM TWO	TIE
3	ICS FORM THREE	TIE

Formating a table (Adding a border, title, and headings)

Note: For the content to be displayed in the web browser, the corresponding tags must be written inside the body tag of the HTML element.

<Table> is a tag that has the attribute of border ="1" by default, the border is used to show the table border on a website. Width is also the wideness of your table, you can set it either by percentage or pixel. Use attributes in <table border="1" width="80%"> to modify the table from previous example. After adding border, the output will be as shown in Figure 4.33.

Sn	Book name	Author
1	ICS FORM ONE	TIE
2	ICS FORM TWO	TIE
3	ICS FORM THREE	TIE

Figure 4.33: *Table tag with attribute of border = "1" and width ="80%"*

Again, you can use *cellpadding*= "6" to increase the distance between cell borders and the content within a cell, and the *cellspacing*= "5" to increase the space between table cells. You can use the *align*="center" to place information in 'Book name' and 'Author" columns in the center of the cell. Align attribute can be used on the table tag to align the entire table left, center or right. Align attribute can also be used on the <td> tag to align cell contents to the left, center or right.

Use attributes in <table border= "5" width= "80%" cellpadding= "6" cellspacing= "5"> to modify table in Figure 4.33.

The output will be as shown in Figure 4.34.

Space from one cell to another increased

Space between cell border and word increased

Sn	Book name	Author
1	ICS FORM ONE	TIE
2	ICS FORM TWO	TIE
3	ICS FORM THREE	TIE

Figure 4.34: *Table tag with cellspacing and cellpadding attribute*

Merging columns and rows

You may also use colspan to merge two or more columns into a single column or rowspan to merge two or more rows. In this case, you can merge 'Book name' and 'Author' columns and rewrite to be 'Book Information'. You can also use rowspan to merge 'sn 2 and 3' to be 2 as shown in Figure 4.35(a). These changes are for specific cells, so they must go direct to a particular row or column and not where the whole table is defined like where cellpadding and cellspacing are placed.

```
<Html>
        <head>
                <title> TIE BOOK</title>
        </head>
        <body>
                <table  border= "5" width="80%"  cellpadding= "6"  cellspacing= "5" >
                        <tr >
                                <th>Sn</th>
                                <th colspan ="2">Book Information</th>
                        </tr>

                        <tr align= "center">
                                <td>1</td>
                                <td>ICS FORM ONE</td>
                                <td>TIE</td>
                        </tr>

                        <tr align= "center">
                                <td rowspan= "2">2</td>
                                <td>ICS FORM TWO</td>
                                <td>TIE</td>
                        </tr>

                        <tr align= "center">
                                <td>ICS FORM THREE</td>
                                <td>TIE</td>
                        </tr>

                </table>
        </body>
</Html>
```

Cell for Author, deleted

Two rows become one row, when you span remember to delete the codes for eliminated cell

Cell for sn 3, deleted

Figure 4.35(a): *HTML tag with colspan and rowspan attributes*

The output after spanning the rows and columns will be as shown in Figure 4.35(b).

Spanned cells

Sn	Book Information	
1	ICS FORM ONE	TIE
2	ICS FORM TWO	TIE
	ICS FORM THREE	TIE

Figure 4.35(b): *Table with merged column and merged rows*

Moreover, you can add the background colour to your table using an attribute bgcolour in the table tag, <table border= “5” width=”80%” cellpadding= “6” cellspacing= “5” bgcolour=”pink”>. The output will be as shown in Figure 3.36.

Sn	Book Information	
1	ICS FORM ONE	TIE
2	ICS FORM TWO	TIE
	ICS FORM THREE	TIE

Figure 4.36: *Table formatted with bgcolour attribute*

There are several HTML tags that are useful and you may need to use in your website when performing a particular task, like listing objects in your website. These include ordered list, unordered list, description list and the form. You can create ordered list using the <ol> element. The objects to be listed start with the <li> element. You may use ordered lists when the order of the listed items you make is important.

Ordered List

This is the arrangement of objects with each of items numbered in sequential order.

Example:

```
<body>
        <ol> Ordered list
            <li>  Orange </li>
            <li>  Mango </li>
            <li>  Apple </li>
        </ol>
</body>
```

Output:

Ordered list
1. Orange
2. Mango
3. Apple

The default numbering for ordered list is numerical number 1, 2, 3, 4… but with the help of *type* attribute of <ol> tag, this can be changed to upper case letters A,B,C,... or lower case letters a,b,c,… ,upper case Roman numerals I,II,III,…, lower case Roman numerals i,ii,iii,… etc

Example:


```
<ol type= "i">
        <li>  </li>
        <li>  </li>
</ol>
```

Unordered list

In this type of list, usually use bullets to list the objects. Sometimes you can choose the type of bullet, for example square, circle, ellipse and others. Unordered list use <ul> element and objects to be listed start with <li> without any particular order. The output list comes with bullets.

Example:

```
<body>
        <ul> Un ordered list
            <li>  Orange </li>
            <li>  Mango </li>
            <li>  Apple </li>
        </ul>
</body>
```

Output:

Un ordered list

- Orange
- Mango
- Apple

The default 'bullet' for these lists is a 'disc', however it can be changed to ' circle' or a ' square' with the help of the *type* attribute .

```
<ul type= "square" >
        <li>  </li>
        <li>  </li>
</ul>
```

Description lists

This was previously called 'definition list', but it has been renamed to 'description list' in HTML5. It associates specific names and values within a list.

Description lists are flexiblet, that is, you can associate more than one value with a single name or vice-versa. For example, the term "coffee" can have several meanings that can be shown one after another.

Example:

```
<html>
                    <head>
                              <title>Description list  </title>
                     </head>
   <body>
          <DL>
                    <DT> Coffee </DT>
                         <DD> a beverage made from roasted, ground coffee beans</DD>
                         <DD> a cup of Coffee </DD>

                    <DT> Ugali </DT>
                         <DD> a staple food for most Tanzanians </DD>
                         <DD> food produced  from maize flour </DD>
          <DL>
   </body>
</html>
```

Key: DL – Description List
DT – Description Term
DD – Description Definition

Output:

```
Coffee
        a beverage made from roasted, ground coffee beans
        a cup of Coffee
Ugali
        a staple food for most Tanzanians
        food produced from maize flour
```

Activity 4.11: Preparing html document

Prepare a html document that displays the followings:

(a) heading of the page "MY CLASS", use heading (h1);

(b) five names of your classmates by ordered list;

(c) six subject names you like. The type list should be circle; and

(d) description list defining any five Information and Computer Studies terms of your interest.

Save the document as class.html, then view the output of the saved document on the browser.

Creating forms using HTML form tags

In your website, you may need to collect some user information like user inputs such as name, email address, phone numbers, and bank account information using HTML forms.

Forms contain controls like checkbox, radio-button, input box and submit button. Therefore, the users of your website may need to interact with a form by entering text, selecting items and submitting the form. The <form> tag starts and it is used to create HTML forms, ending with </form>.

Two main properties or attributes of the <form> tag are 'method' and 'action'. Method attribute has the 'post' value that sends information from the form or 'get' value that is used by search engines. Action specifies the location or email where the form data can be sent.

Activity 4.12: Creating a form which has text field entry

Use the <Input> tag to create a form with 'text' data type field to input your name. Write the HTML structure codes in your Notepad, then between body tags insert the form tags and attributes.

```
<body>
        <form >
                Your Name: <Input Type="text" Size="40" Maxlength="30" NAME="your name" >
        </form >
</body>
```

The output of the code:

Your Name: [ ]

A form with data which are ready to be sent to an email will have the following codes:

```
<body>
        <form METHOD= "post" ACTION= "mailto: myclassweb@gmail.com" >
                Your Name: <Input Type="text" Size="40" Maxlength="30" NAME="your name" >
        </form >
</body>
```

The method and action have no effect to the output of the codes in the form. This works with the web server. Sometime an attribute VALUE can be used to clarify what should be done.

Example:

```
<body>
        <form METHOD= "post" ACTION= "mailto: myclassweb@gmail.com" >
                Your Name: <Input Type="text" Size="40" Maxlength="30" NAME="your name" VALUE="---Type your Name here---" >
        </form >
</body>
```

The output for these codes is:

Your Name: ---Type your Name here---

Value

Activity 4.13: Creating text input box form

Create a form in the HTML document with the following:

1. A field where you can write your name. It should be able to contain 25 characters and size of 20;
2. A field where you can type your e-mail which is not more than 35 characters long; and
3. A field where you can write three different addresses including physical address, each address field should be 35 characters long.

Creating forms having radio buttons

Example: Create a form in the HTML document that displays information for user to select about their gender using radio buttons.

```
<body>
        <form >
                <Input Type="radio"  NAME="Gender" VALUE="Male" >   Male
                <Input Type="radio"  NAME="Gender" VALUE="Female" > Female
        </form >
</body>
```

The output of the codes is shown below:

○ Male ○ Female

Example: Create a form in the HTML document that displays information that needs Mwalimu Katozi Mwanambilimbi's students to answer an ICS question written in a form on a school website using radio buttons.

```
<body>
        <form >
                Do you agree that ICT has greater positive impact in Tanzania economy?<br>
                <Input Type="radio"  NAME="positive_impact" VALUE="Strongly agree" > Strongly agree<br>
                <Input Type="radio"  NAME="positive_impact" VALUE="Agree" > Agree<br>
                <Input Type="radio"  NAME="positive_impact" VALUE="Disagree" > Disagree<br>
                <Input Type="radio"  NAME="positive_impact" VALUE="Strongly disagree" > Strongly disagree<br>
        </form >
</body>
```

The output of the codes above is as follows:

Do you agree that ICT has greater positive impact in Tanzanian economy?
- ○ Strongly agree
- ○ Agree
- ○ Disagree
- ○ Strongly disagree

Creating forms having check boxes

Example: Create a form in the HTML document that displays information that needs Mwalimu Katozi Mwanambilimbi's students to answer an ICS question written in a form on the school website using check box:

```
<body>
        <form >
                Choose three elements that are used in a database<br>
                <Input Type="checkbox"  NAME="Test" VALUE="Website" > Website<br>
                <Input Type="checkbox"  NAME="Test" VALUE="Record" > Record<br>
                <Input Type="checkbox"  NAME="Test" VALUE="Field" > Field<br>
                <Input Type="checkbox"  NAME="Test" VALUE="Table" > Table<br>
        </form >
</body>
```

The output for the codes will look as follows:

Choose three elements that are used in a database
- ☐ Website
- ☐ Record
- ☐ Field
- ☐ Table

Note: To display some objects as checked, you write the word 'checked' just after value

Creating 'submit and reset' buttons

Creating the 'submit and reset' buttons in your website will help website users to send forms filled with data for processing, or clear the already filled fields in the form. For example, users filling an online questionnaire select responses by check box or radio button and send the form by clicking submit button. If users wish to clear the responses and refill the form then they click a reset button.

Example: The following are the codes for submit and reset button.

```
<body >
        <form  METHOD="post" ACTION="mailto:myclassweb@gmail.com">
                This research seeks to find out the importance of learning ICS to primary scholars. <br>
                Select level of your acceptance to this idea: <br>
                <Input Type="radio"  NAME="Learning_ICS" VALUE="Very Important"> Very Important<br>
                <Input Type="radio"  NAME="Learning_ICS" VALUE="Important" > Important<br>
                <Input Type="radio"  NAME="Learning_ICS" VALUE="Less Important" > Less Important<br>
                <Input Type="radio"  NAME="Learning_ICS" VALUE="Not Important" > Not Important<br>
                <Input Type="submit"   VALUE="Submit response" >
                <Input Type="reset"   VALUE="Clear response" >
        </form >
</body>
```

The output for the codes will display as follows:

This research seeks to find out the importance of learning ICS to primary scholars.
Select level of your acceptance to this idea:

- ○ Very Important
- ○ Important
- ○ Less Important
- ○ Not Important

Submit response | Clear response

Activity 4.14

Use your computer to perform the following activities

1. You are a student at Kayuki Secondary School. Your headmaster expects to receive form one students as new comers. He wants you to assist him to create a form in the school website for parents to select the types of food their children eat with the check boxes as shown in the Figure 4.37. Create a form as it appears in the following list.

Food my child can eat:

- ☐ Sweet potatoes
- ☑ Bananas
- ☑ Stiff porridge (Ugali)
- ☐ Rice & beans
- ☐ Yams
- ☐ Pumpkins

Figure 4.37: *Form with check boxes*

Write HTML codes to make sure this is done online. Note that the other food (bananas and stiff porridge) are checked because it is mandatory for all students. These information should be sent for processing.

2. You have been given a position to work at your school as a temporally web designer after completing your studies. Using HTML codes, create a form with five elements: Student Id, E-mail, Password, reset and submit button .

Activity 4.15

Your school needs to have school website for publishing activities and events done at school. You are the best student selected to design the website of your school. The first thing you are required to do is to create at least three pages to show your audience (school board). If the school board accepts your design, then you will proceed to design the rest of the pages. The school board has approved your design. Now create a webpage like the one shown in Figure 4.38 so that you will present in the second meeting, use any image of your choice for logo:

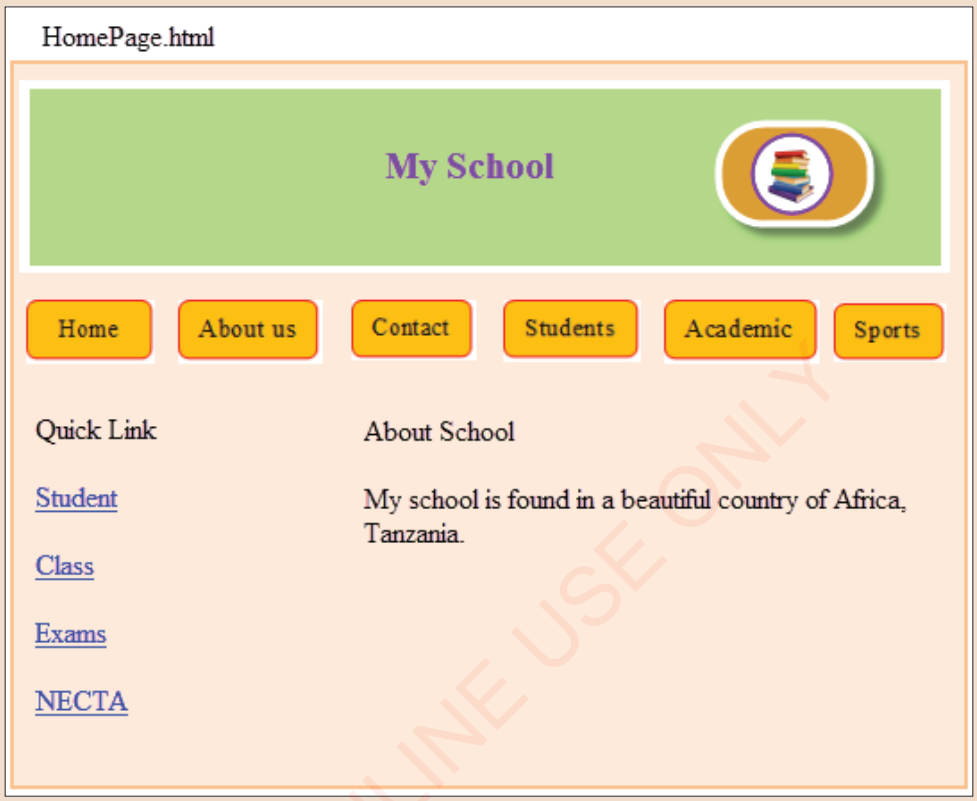


Figure 4.38: *Sample school webpage design*

Activity 4.16

Find any photo image of your interest and rename it with the name bahari. Remember to identify the format of the image if it is jpeg, tiff or png. Save your image to the 'My Document' folder of your computer. Prepare HTML document, save in My Document using .html extension. Use the following html tags to define image (img), source (src) of photo and size that should be displayed: <img src = "yourphoto.tiff" width = "500" height = "600">. Test the output by opening the file using a web browser of your computer

Exercise 4.3

Answer the following questions.

1. Write HTML codes for a form with three elements: Name, gender and a submit button. Both genders should be radio buttons and one of them checked. The background of the form should be pink.
2. What are the roles of HTML form on website?
3. When creating a form by using input tag, is there a maximum size of text to recommend? If yes, which attribute is used to limit the size of text to enter? If no, why do you think there should be no limit?
4. One function of an input element in HTML button is_____.
   (a) to reset data
   (b) to submit data
   (c) to perform actions of creating interactive controls

Chapter Five

Website publishing

Introduction

In order to access website via Internet, you must save and publish the webpages in a web server hosted locally or in cloud to make it available to the public. In this chapter, you will learn about the concept of webpage publishing, requirements for publishing webpages, web hosting and transferring webpages to host servers. The competencies developed in this chapter will equip you with the ability to publish a developed website and its contents.

Think

1. On how you can access online materials from the Internet.
2. On how you can make your website to be seen in the Internet.

The concept of webpage publishing

When you have created your webpage, the next step is to publish it so that it can be public. The process of uploading the contents of webpages to the Internet is called webpage publishing. The process includes creating, uploading and updating webpages and posting contents to the website. Contents that are posted in the webpage include videos, texts, digital images and other types of media.

Domain name and web server

Domain name and web server are important aspects in the process of publishing the websites.

Domain name

Domain name is the address that people type into the web browser address bar so as to visit the website. Imagine when your friend wants to visit your home place, whereby your house is located in a certain street and has a block and house number. By using the street name, the block and house number of your house, a friend will be able to arrive at your home place. For example, Nonani is living at Mitindi street, in block B and a house number 45, written on the wall of a house

as Mitd/Block B/045. This is a house address, similar to a domain name. Another example is the old technology of sending mail using postal address. When you have a postal address like P.O. Box 3546 Kilwa-Tanzania, then any document sent through this address from any part of the world will reach you.

Any computer, when connected to a network, a unique Internet Protocol (IP) address must be assigned. For example, IP address looks like 41.93.33.6, this address represents the domain name for *www.costech.or.tz* or simply *costech.or.tz*. Therefore, if you imagine that *COSTECH* is a house then *costech.or.tz*, which is a domain name, is an address that will guide a guest to this destination using a web browser via Internet connection. Domain name is unique like your fingerprint. There is nobody else who can have the same fingerprint as that of yours. The last part in a COSTECH address, which is (.tz) is known as domain. The domains are categorized in different levels based on their position in the domain name. In some addresses like *www.necta.go.tz* and *www.dit.ac.tz*, the (.go) and (.ac) are also domains. But due to these domains' position in these addresses, they are categorized as Second Level Domain (SLD). On the other side, in the address w*ww.google.com* and *www.costech.or.tz*, the (.com) and (.tz) are regarded as Top-Level Domains due to where they are positioned. Figure 5.1 illustrates categories of domains and domain names.

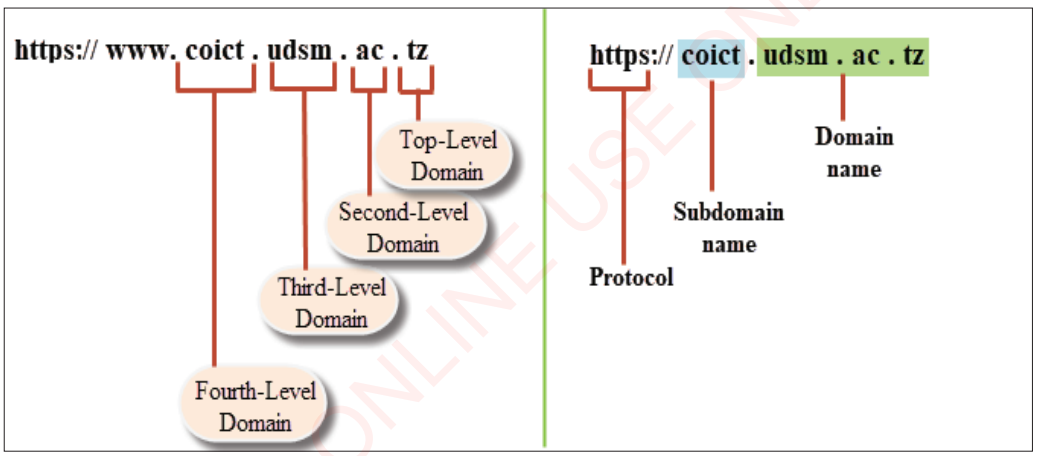


Figure 5.1: *Categories of domains and domain names*

Note: A subdomain is an additional part of the main domain name. It is like a component or section of a website meant to organise websites with many pages for easy access and navigation to specific information. For large institutions such as universities, websites of individual departments are organised as subdomains of the university domain name. For example www.coict.udsm.ac.tz is the website of the College of Information and Communication Technologies of the University of Dar es Salaam, hence a subdomain.

Some domains include .com, .edu, .net, .gov, .org and .co. These are domains, not domain names and they are used depending on the nature or kind of activities done by website's owner. For example, .org is for organisations, .go or .gov is for governments, .ac or .edu is for academic institutions, .com is for commercial, and .mil for military. Website domains are also identified by countries of owning organisation. The country code is added at the end of the address as the top level domains, for example the code represents *tz- Tanzania, ke- Kenya, uk-United Kingdom, ug-Uganda, ca- Canada* and *za-South Africa*. When you write the address in the browser of your computer, it will be welcomed and joined in the web. The World Wide Web (WWW) will have the information of your website and therefore easy to retrieve its information from anywhere.

Web server

A web server is a computer installed with software (server software) which is used to provide access of webpages to other computers called clients. Websites are installed and run in web servers which store, process and deliver webpages to users through the HTTP on client devices. An example of a web server and its relationship with clients is shown in Figure 5.2.

Figure 5.2: *Client-web server relationship*

Requirements for publishing a webpage

Three important things needed for publishing a webpage include text editor (webpage development software), web server and Internet connectivity. The link between the three is when the text editor is used to code the webpage. Then, the coded webpages are stored in a web server that is connected to the Internet. Figure 5.3 shows the relationship between webpage, web server and the world of users.

Figure 5.3: *Relationship of webpage, web server and world of users*

Webpage development software

A webpage development software is the one used to build the webpages for your website. In this book, Notepad is used as a webpage development software. There are other development software such as Bootstrap, wordpress and Adobe dreamweaver.

Internet connectivity

When you need to publish your website, you will require an infrastructure with Internet connection that will help you to link your location or computer to a web server where your website will be hosted.

Web server

This is a computer where your website will be hosted. Through a web server, the contents of your website after being published may be updated regularly from a remote area.

Consideration before publishing website online

There are two issues that you must address before you publish your website. These are registering your domain name and signing for web hosting service.

Registering domain name

The process of registering for domain name depends on the particular registrar you have chosen to register your domain name. Domain name registrar describes its own steps to follow in order to accomplish the whole exercise. In this book, you are going to observe the procedures used to register 'myclassweb.sc.tz'.

When your website is ready to be published, you may register your domain name through the public organisation such as Tanzania Network Information Center (TZNIC) by using the following steps. Note: The images extracted from TZNIC site for these steps may change in the future due to site updating.

Step 1: Go to www.tznic.or.tz. The tznic.or.tz webpage will display as shown in Figure 5.4.

Step 2: Click 'Register a .tz domain'.

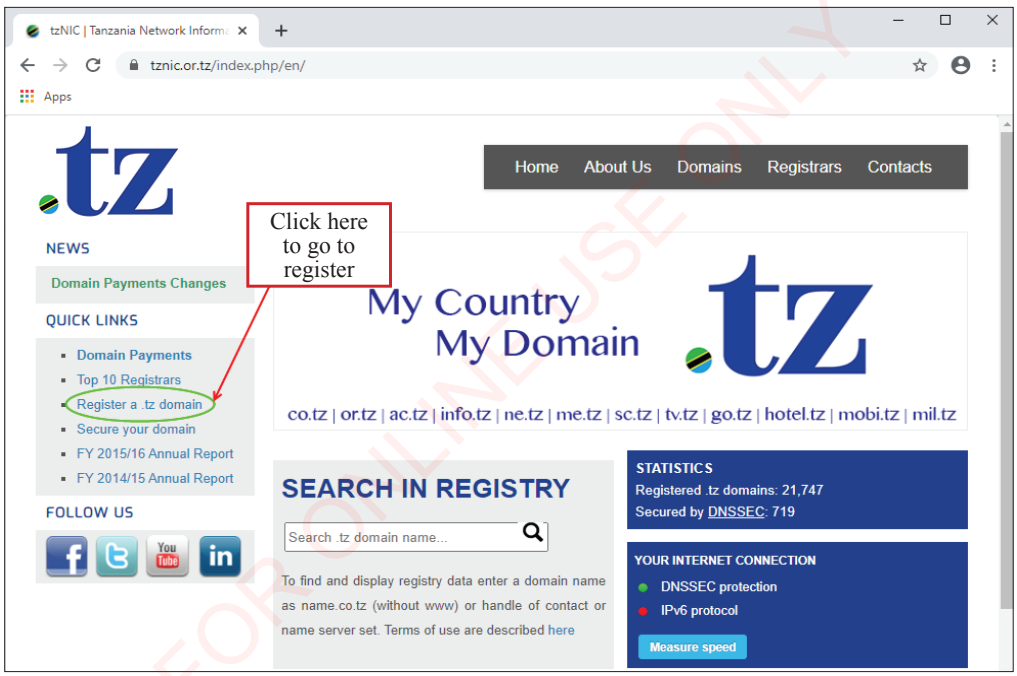


Figure 5.4: *Requesting domain registration through TZNIC*

Step 3: Click 'Register' icon/button as shown in Figure 5.5 to see policy and rules for domain registration.

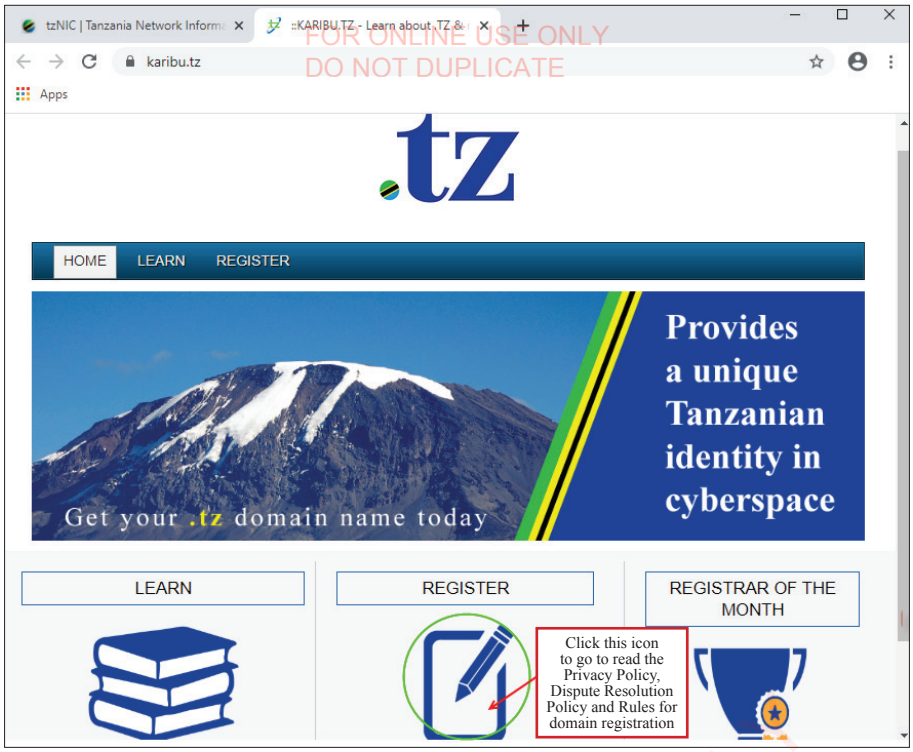


Figure 5.5: *Registering*

Step 4: After registering, you will be prompted to the policy and rules for domain registration as shown in Figure 5.6. Read the policy and rules, if you accept them, tick the box and click submit button.

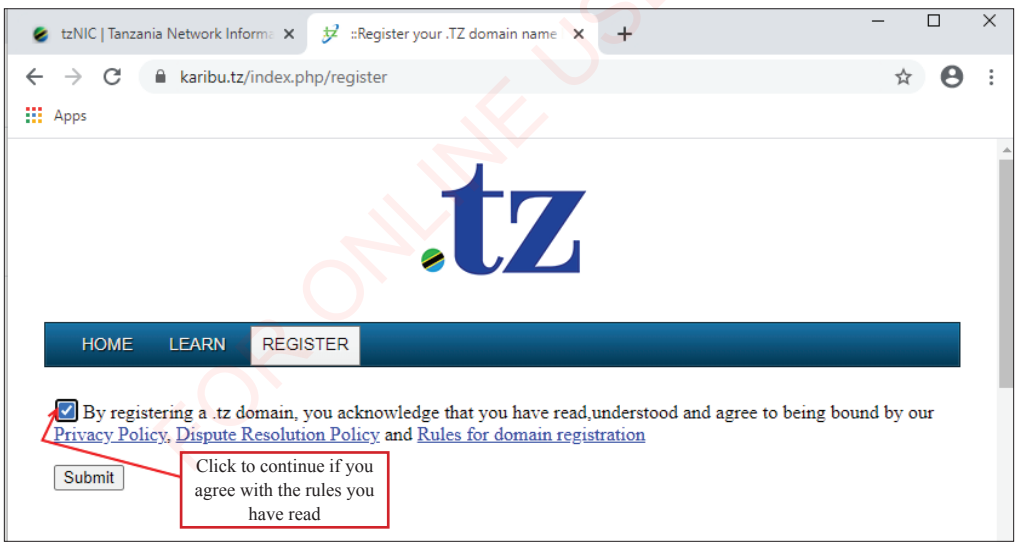
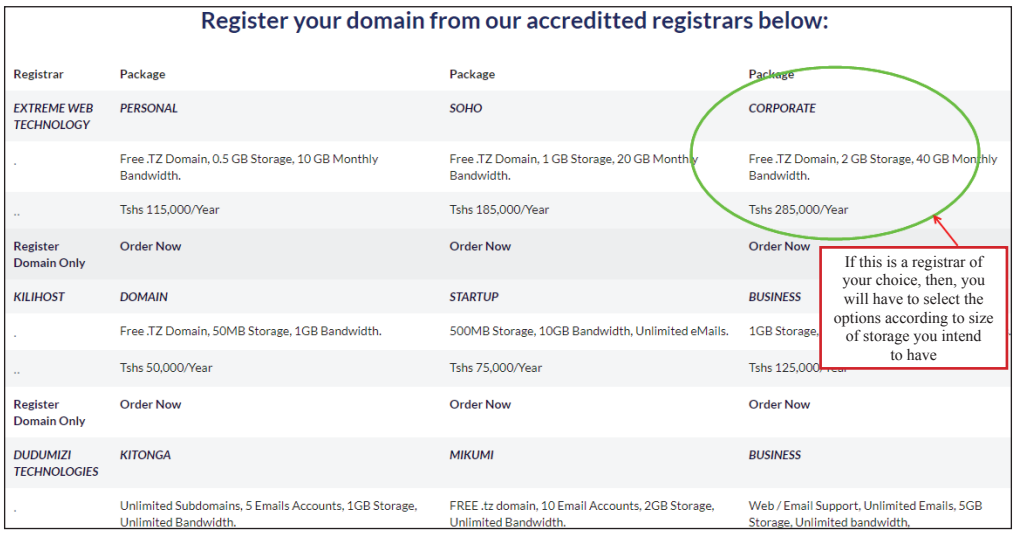


Figure 5.6: *Policy and rules for domain registration*

Step 5: After you submit the form, TZNIC will bring you the list of authorised domain registrars companies as shown in Figure 5.7. There is a *long list* of registrars. Select a registrar and click 'Order Now'.



Register your domain from our accreditted registrars below:

Registrar	Package	Package	Package
EXTREME WEB TECHNOLOGY	*PERSONAL*	*SOHO*	*CORPORATE*
.	Free .TZ Domain, 0.5 GB Storage, 10 GB Monthly Bandwidth.	Free .TZ Domain, 1 GB Storage, 20 GB Monthly Bandwidth.	Free .TZ Domain, 2 GB Storage, 40 GB Monthly Bandwidth.
..	Tshs 115,000/Year	Tshs 185,000/Year	Tshs 285,000/Year
Register Domain Only	Order Now	Order Now	Order Now
KILIHOST	*DOMAIN*	*STARTUP*	*BUSINESS*
.	Free .TZ Domain, 50MB Storage, 1GB Bandwidth.	500MB Storage, 10GB Bandwidth, Unlimited eMails.	1GB Storage,
..	Tshs 50,000/Year	Tshs 75,000/Year	Tshs 125,000/Year
Register Domain Only	Order Now	Order Now	Order Now
DUDUMIZI TECHNOLOGIES	*KITONGA*	*MIKUMI*	*BUSINESS*
.	Unlimited Subdomains, 5 Emails Accounts, 1GB Storage, Unlimited Bandwidth.	FREE .tz domain, 10 Email Accounts, 2GB Storage, Unlimited Bandwidth.	Web / Email Support, Unlimited Emails, 5GB Storage, Unlimited bandwidth.

If this is a registrar of your choice, then, you will have to select the options according to size of storage you intend to have

Figure 5.7: *Choosing a registrar from a list*

Step 6: After you choose a registrar and place an order, you will be prompted to choose your domain, enter your preferred domain name as shown in Figure 5.8; for example **myclassweb.sc.tz**, to verify if there is no one else who has registered with your domain name. Click check to continue.

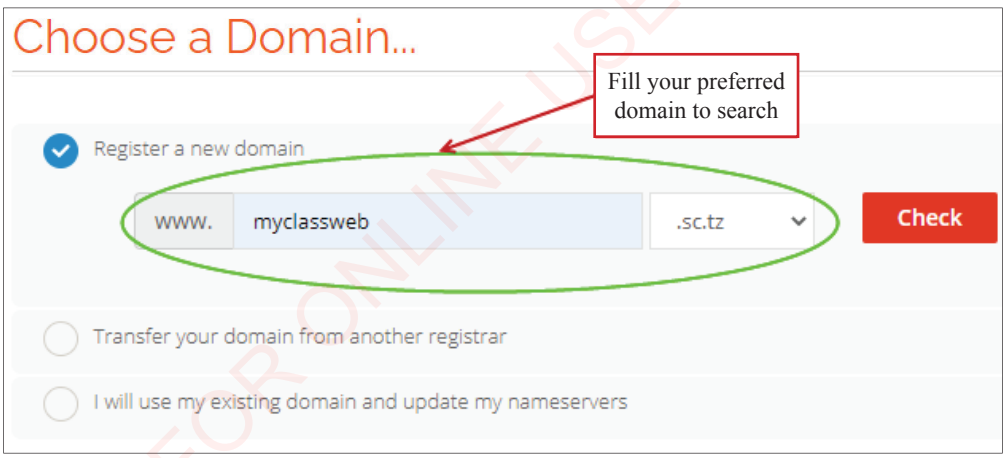


Figure 5.8: *Searching for domain name*

The result of the search is shown in Figure 5.9:

Figure 5.9: *Result showing myclassweb.sc.tz domain name is available*

Step 7: When you click 'Continue', you will be prompted to review the order, and edit as shown in Figure 5.10, you can edit the total that includes web hosting. If you do not change anything, click 'Checkout' to fill the form as shown in Figure 5.11, then complete the order and payments. In regard to this registration example, the registrar chosen is Simbanet.

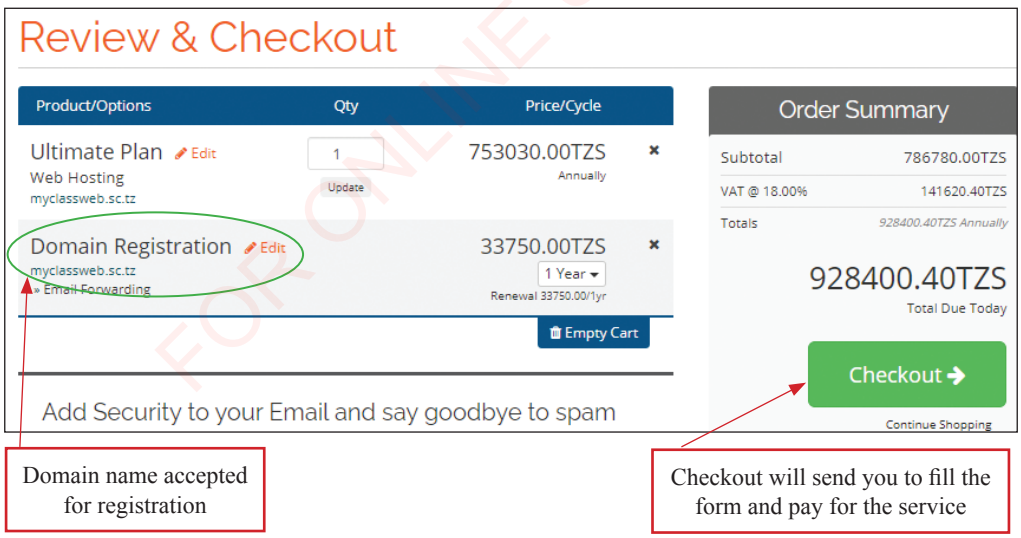


Figure 5.10: *Result showing order review and checkout*

Domain Registration Form

PLEASE DO NOT ALTER THIS APPLICATION IN ANY WAY

To register in CO.TZ, OR.TZ, NE.TZ, AC.TZ, GO.TZ or MIL.TZ send the completed form to tzNIC<rajisi@tznic.or.tz> or any accredited Registrar of your choice.

Registration rules and price list are detailed in the tzNIC website

<http://www.tznic.or.tz>

E-mail contents below as plain text as instructed above.

---------- cut here1----------

1. REGISTRATION TYPE
   * (N)ew (M)odify (D)elete..: Modify
2. * FULLY-QUALIFIED DOMAIN NAME:

3. ORGANIZATION INFORMATION

3a.* Organization Name.....:

3b.* Address Line 1.....:

3b.* Address Line 2.....:

3c.* City.....:

3d.* Postal Code.....:

3e.* Country.....:

4. * DESCRIPTION OF ORG/DOMAIN:

5. Date Operational.....:

6. ADMINISTRATIVE CONTACT OF ORG/DOMAIN

6a. NIChandle (if known)..:

6b.* Whole Name.....:

6c. Organization Name.....:

6d.* Address Line 1.....:

6d. Address Line 2.....:

6e.* City.....:

6f.* Postal Code.....:

6g.* Country.....:

6h.* Voice Phone.....:

6i.* Electronic Mailbox....:

7. TECHNICAL AND ZONE CONTACT

7a. NIChandle (if known)..: same as above

7b.* Whole Name.....:

7c. Organization Name.....:

7d.* Address Line 1.....:

7d. Address Line 2.....:

7e.* City.....:

7f.* Postal Code.....:

7g.* Country.....:

7h.* Voice Phone.....:

7i.* Electronic Mailbox....:

7j.* Registration Mailbox..:

7k. Fax Number.....:

Figure 5.11*: Example of domain registration form*

After you have filled the form, it is sent to Simbanet for evaluation: The registrar will send a confirmation email notifying that your domain name has been registered with a link attached in your email as shown in Figure 5.12.

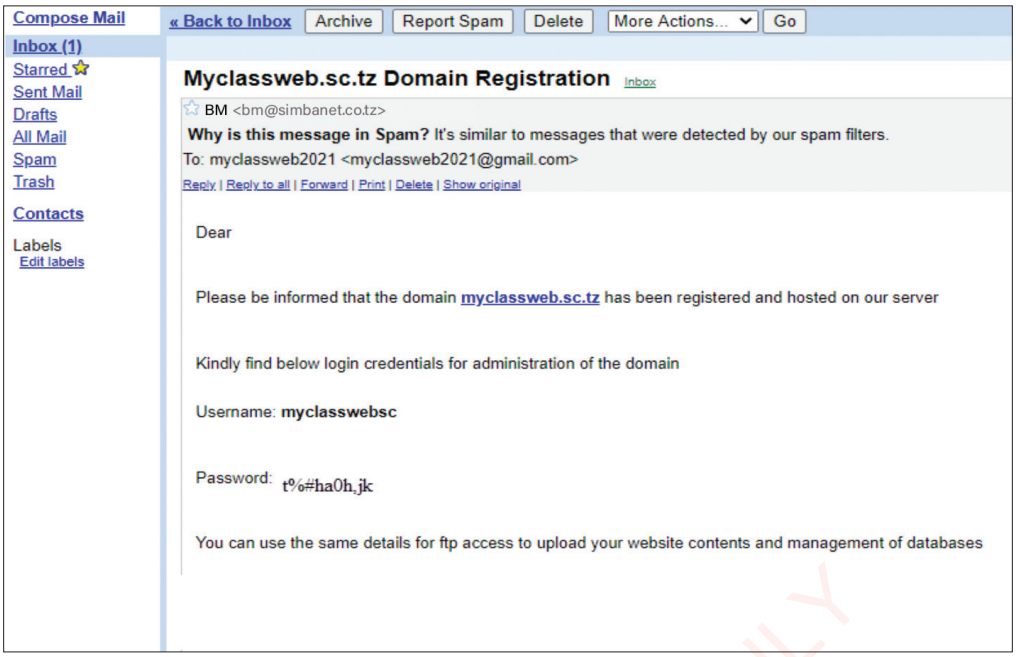


Figure 5.12: *Example of confirmation email from domain name registrar*

Up to this moment, the procedure for domain name registration is complete. Moreover, you will be needed to process some procedures for webhosting. Figure 5.13 shows one of the messages from host server side panel which indicates the time the domain name was registered.

```
Interactive input completed. [Press Enter]
Command to issue:
create_domain myclassweb.sc.tz ADM-MYCLASSWEB NULL NS-SIMBANET.CO.TZ NULL (1 y) (ADM-MYCLASSWEB, ACC01-SIMBANET, DNS01-SIMBANET)
Do you really want to send this command to the server? (y/N): Y

Domain name:                    myclassweb.sc.tz
Created on:                     2021-04-15T17:42:22+03:00
Expiration date:                2022-04-15
```

Figure 5.13: *Domain creation information from host server side panel*

The procedure for webhosting starts after the final stage of registering domain, whereby you will be given the backend (the control panel) to proceed with hosting. Some registrars do not provide both domain name registration and webhosting services, they provide only domain registration. In the case of our example, Simbanet provides both services. By following the link https://myclassweb.sc.tz/cpanel sent by host server, the link will connect to the web host server control panel (cPanel) for a website owner to configure the website as shown in Figure 5.14. To some hosting company, hosting configuration may take several steps depending on the

company you have chosen. For **Simbanet**, a large part of hosting procedure has been done during domain registration with the host server.

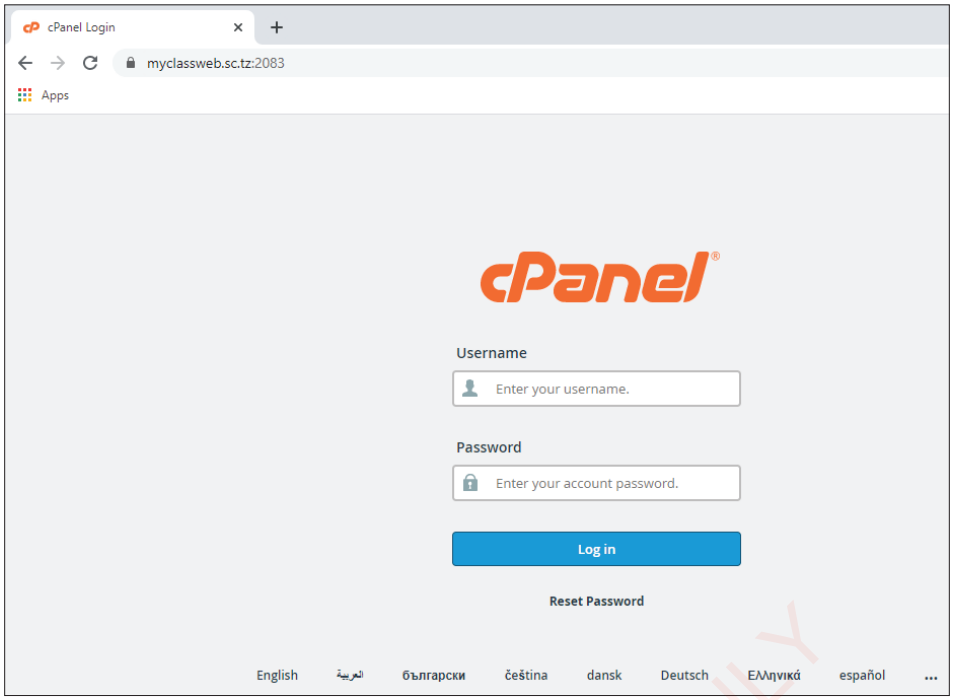


Figure 5.14: *Backend control panel (cPanel) provided for hosting service*

Web hosting

Think of the domain name concept with an example that related it to your home address as it was explained in the previous section. Where is your house built? On the ocean, river, lake or land? Hopefully, it is built on the land. Like a house that rests on a land, web host is an area where webpages are kept. Literally, website owners rent some web space in the web servers to keep their web-based applications. This makes a web hosting service provider who owns the servers and makes your website accessible through the World Wide Web similar to your landlord. Therefore, web hosting is a process of storing and maintaining websites.

When setting up with a web hosting company, it is recommended to verify the following information.

Domain Registration: verify that the company allows your organisation to have a domain such as .tz and find out whether they can set it up for you, and how much it will cost.

E-Mail forwarding: see if the company offers e-mail forwarding option to forward e-mail for example from myclasswebsc@myclassweb.sc.tz to another e-mail address such as your personal e-mail address.

Support: verify the hours of operation for phone and online based support.

Changing hosting companies: verify their policy and how easy it will be to change to another hosting company when there is a need for better or reliable services.

Site statistics: although it is not necessary, check if the company offers site statistics for your webpage. The site statistics allow you to monitor how frequently your website is visited.

Business account: check if the hosting company will charge you additional fees if you begin to sell services or products using your website.

Bandwidth limitations: verify that the company does not have strict bandwidth limitation, which may limit the amount of traffic you are capable of receiving. It is important to realise that all companies have limitations but make sure the company will provide what is promised.

Steps for web hosting configuration

Recall Figure 5.15. Now, you are at the backend of your host server and you need to complete the following steps for hosting configuration:

Step 1: Open the link sent to you by your web host, in our case, it is https://myclassweb.sc.tz/cpanel. The control panel will show up.

Step 2: Provide the Username and Password which were sent by a web host server during domain registration that you were directed to use to access your account created at host server. The credentials will be filled in the fields shown in Figure 5.14. The window shown as in Figure 5.15 will display after you log in.

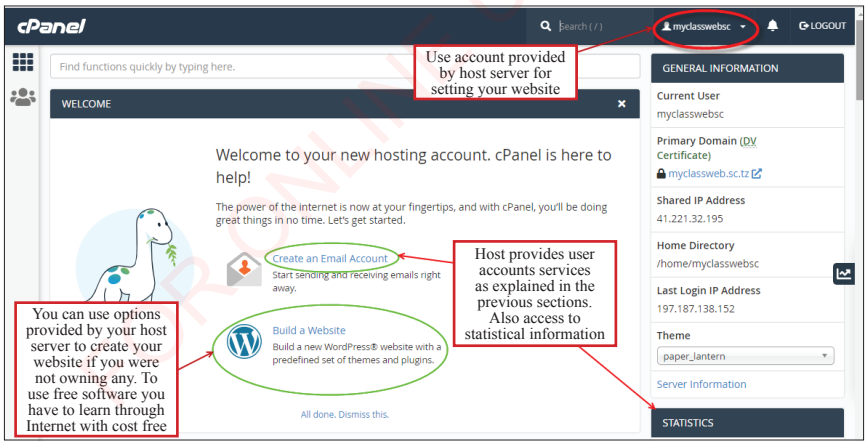


Figure 5.15*: User account back-end cPanel for hosting service configuration*

There are various tools available on the dashboard of a control panel (cPanel) for customising your website including email settings, statistics check and others as

shown in Figure 5.16. If you are not sure with some technical issues in Information Technology (IT) find someone for consultation who will assist you to finalise the hosting setup.

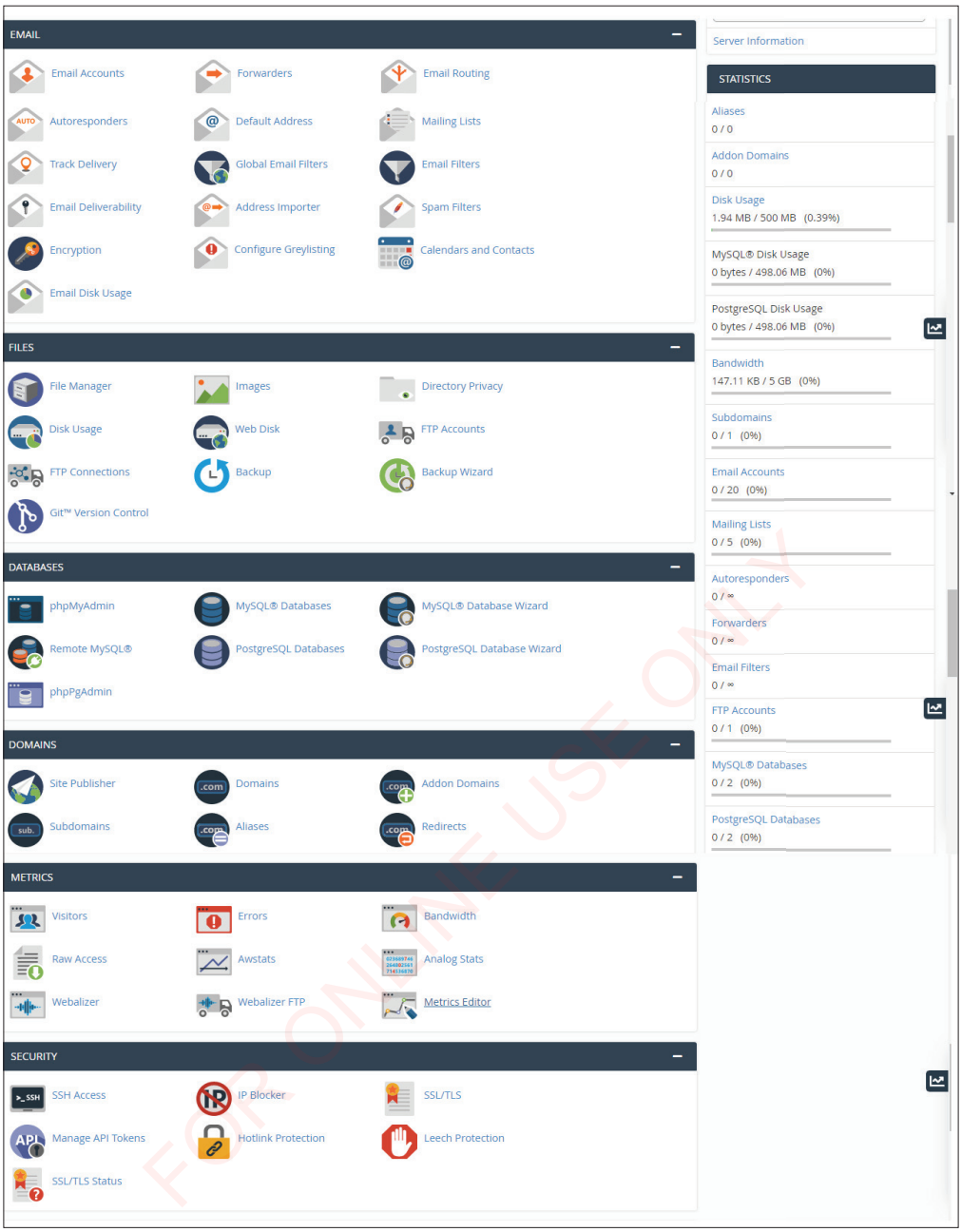


Figure 5.16: *Dashboard showing various tools for setting a website*

Transferring webpages to host server

There are various procedures (steps) you have to follow in order to upload your website to web server.

Procedures of transferring website files to web server

Procedures to transfer website files to a web server depend on the way a hosting company has set the steps in the process of uploading. This process starts after you have registered your domain name and setup your hosting account such as **myclasswebsc**. The process of transferring webpages are done within the account after your account has been accepted. Means of transferring files include using the open source applications such as FileZilla and Apache web server. Also, several IT companies use cPanel (a free software) which is used to manage the process of hosting the website. In our case, you are directed to a control panel which is already customised for that purpose. The following are the steps for website contents transfer based on cPanel application:

Step 1: Go to 'File' tab in the control panel, click the 'File Manager' button as shown in Figure 5.17.

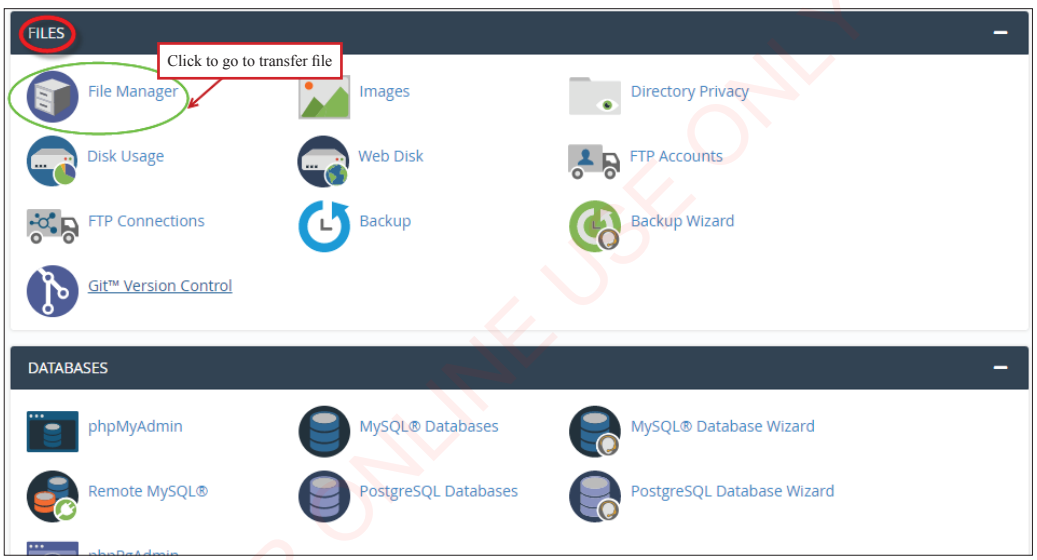


Figure 5.17: *cPanel interface for managing files and database*

Step 2: After clicking the File Manager, the window shown in Figure 5.18 will appear. Click the folder 'public_html'.

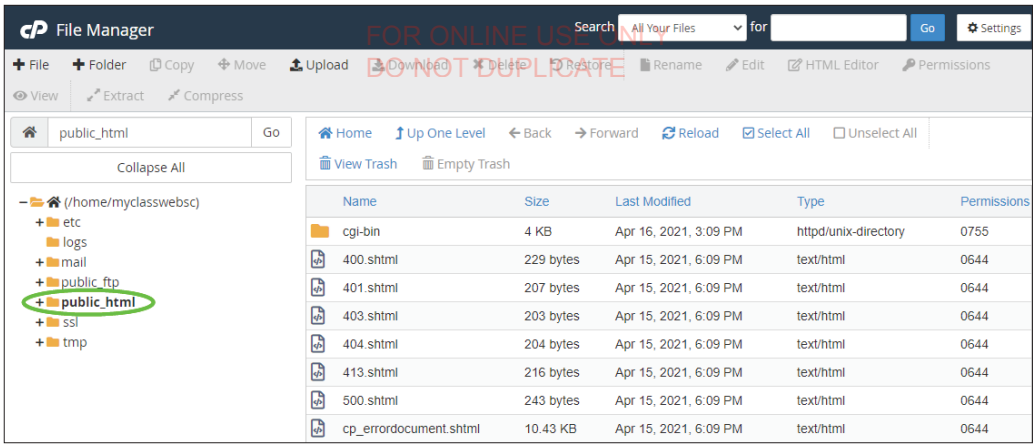


Figure 5.18: *File manager window-opening public_html*

Step 3: Once you click the folder 'public_html', the server will be searching directory, then you will be exposed to the window shown in Figure 5.19. Click 'upload' which is at the top of the tool bar to upload the file.

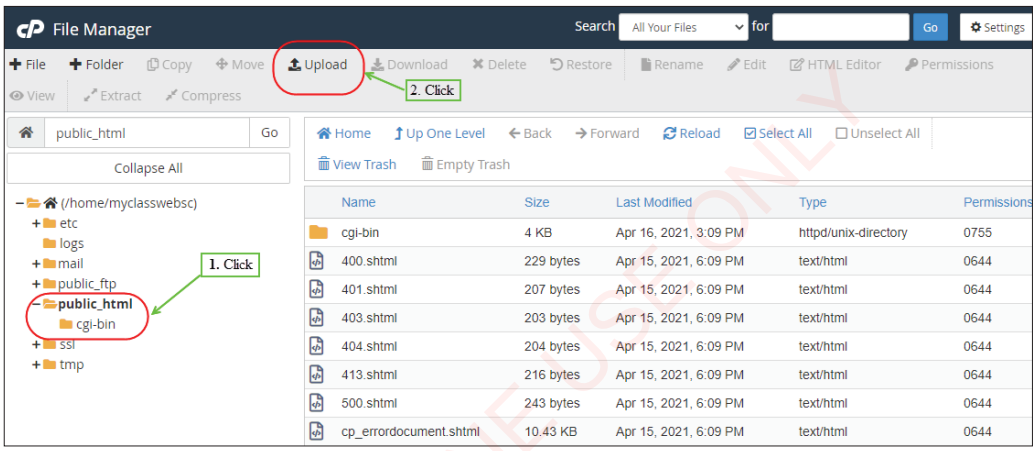


Figure 5.19: *File manager window-uploading in public_html*

Step 4: Once 'File Upload' window is opened as shown in Figure 5.20(a), it will guide you to select or browse your web contents which you have prepared, as shown in Figure 5.20(b). This includes the ***.index*** file which links all your files. The index file is a file which displays your website on the world wide web. You can upload one file after another.

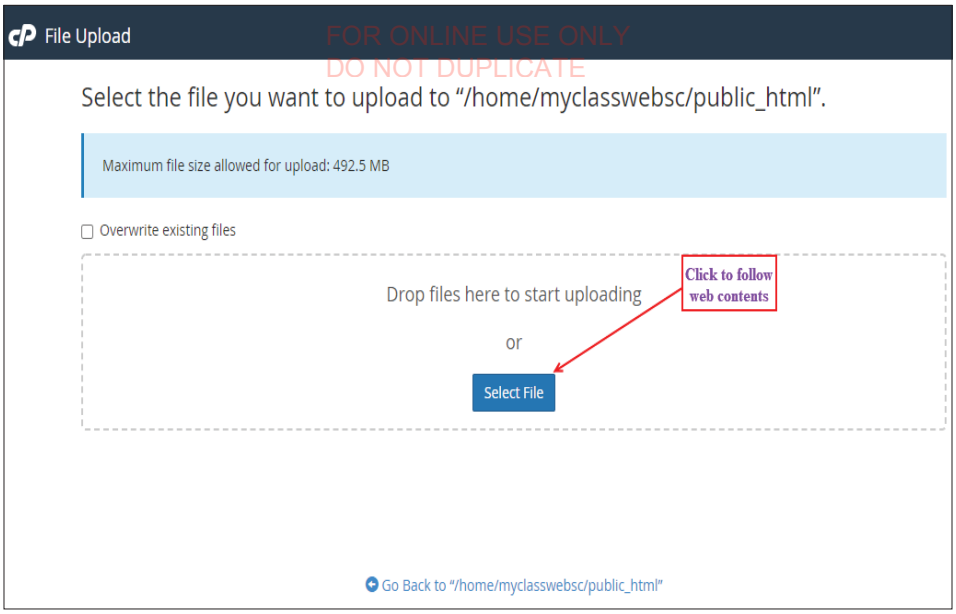


Figure 5.20(a): *Selection button to upload files*

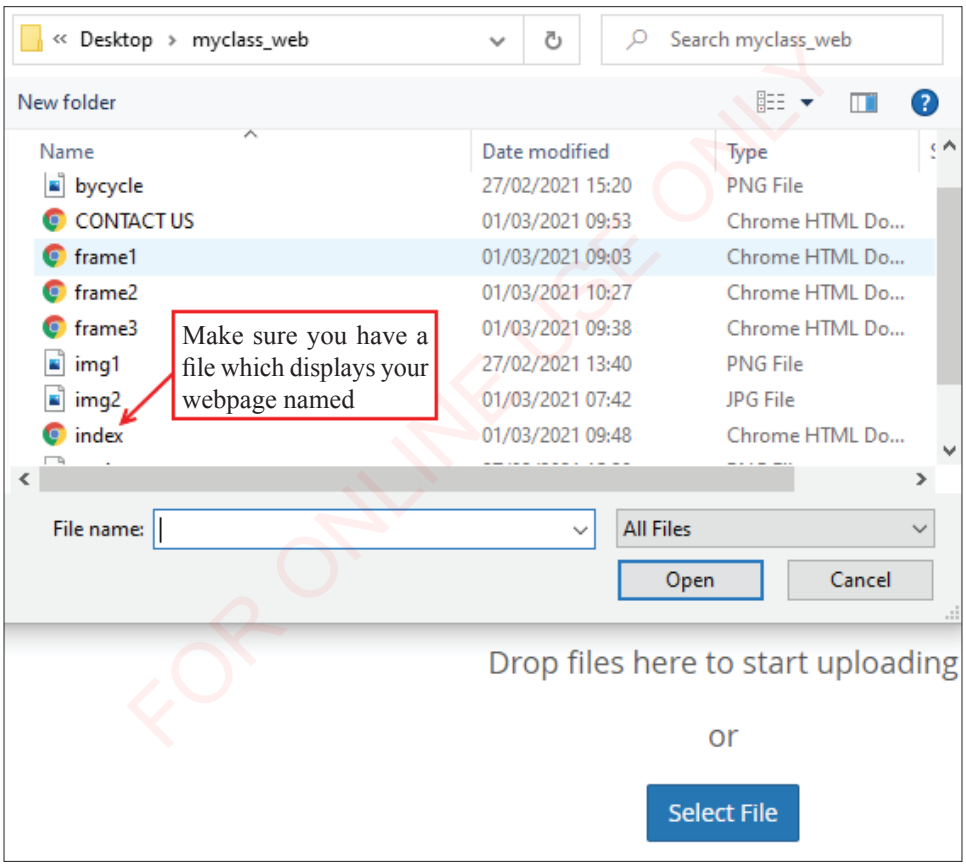


Figure 5.20(b): *Web contents to be uploaded*

In this case, the files are in the folder 'myclass_web' on the desktop. Figure 5.21 shows a folder that contains files to be transfered.

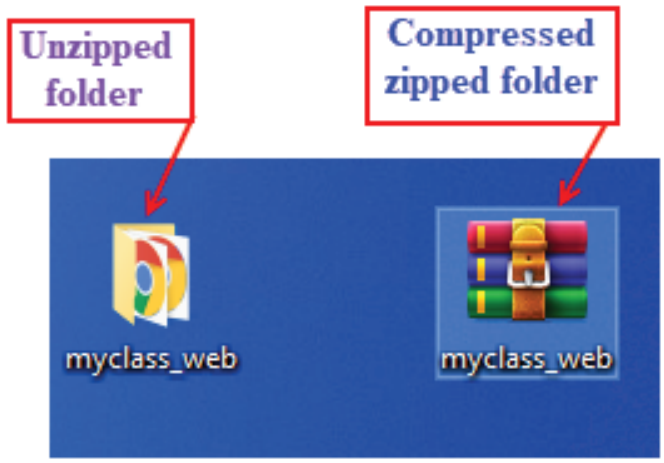


Figure 5.21: *Web contents in a folder*

Note: If your website has many web content files, compress the file to zip folder then upload it. Once the zipped file's contents have been transferred to the 'public_html' folder, you may copy them out of zip folder and paste to the folder. There is an alternative way for the zipped file to be linked to the world wide web. You can define the path from the path name where the folder 'public_html' have been located. Then, you can identify the file folder that contains your contents.

Step 5: Select one file after another to upload, as shown in Figure 5.22

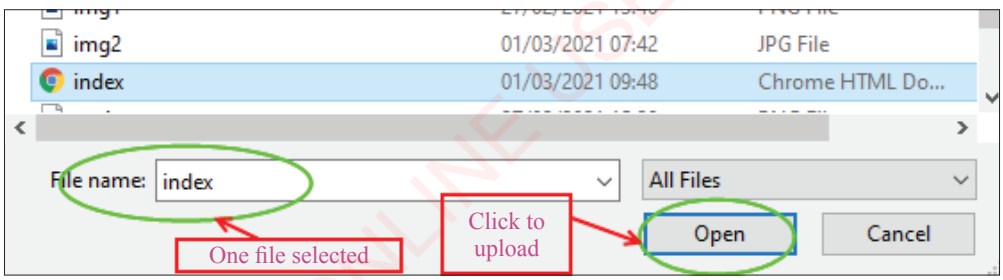


Figure 5.22: *Uploading file to host server*

Once the files have been transferred, the host server will show the response that it has received the uploaded files by showing window as in Figure 5.23.

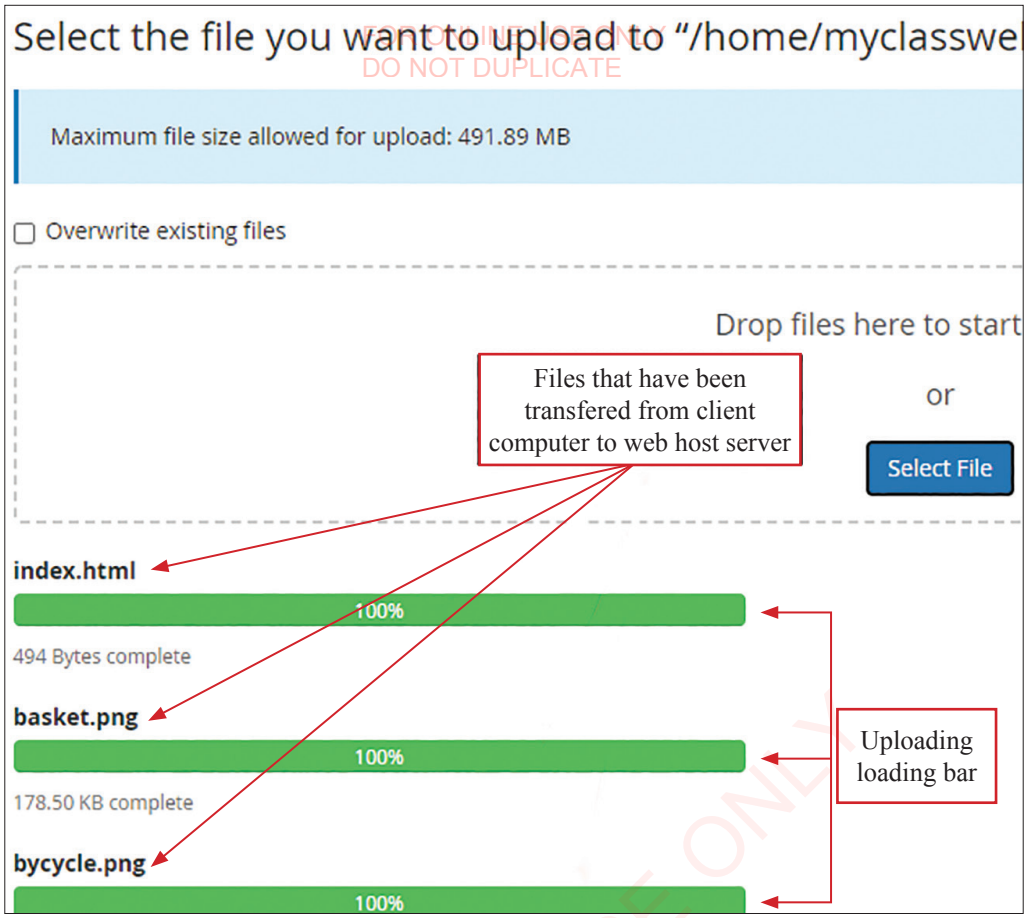


Figure 5.23: *Uploaded files*

Previewing website

The purpose of previewing a website is to test and check if the website you have developed and published can be seen in the world wide web**.**

Step 6: Open the web browser, then write the domain name of your website. In this case, the registered domain name which was provided by the web host has been written, that is myclassweb.sc.tz. Once you have put your domain name address in the web browser's address bar and press go, the web site that you created must display. In this case, the webpage is displayed as in Figure 5.24.

Figure 5.24: *Output of the published webpage*

Step 7: Log out on your cPanel account.

Activity 5.1: Registering domain name

Go online and use Google search to find any web server of your choice, demonstrate how to register domain name and note down several steps you can undergo to arrive to a stage where you are requested to do transaction to pay for the service, then stop. Use the procedure they have described to sign up.

Materials: Computer with Internet connection, an online web server.

Activity 5.2: Signing to web hosting service

Create your simple website and then use an education tool (public web host for schools as directed by your teacher) to host your website contents. Use the procedures described by web host to sign up for hosting your simple website.

Materials: Computer with Internet connection, file transfer software (such as Filezilla), web server.

Activity 5.3: Uploading a website to web server

Use a free file transfer application (use Filezilla) that you have installed in your computer to transfer website files you created to the free online web server. Show the steps you have used.

Materials: Computer installed with file transfer software, free online web server.

Activity 5.4: Developing a simple school website

Use the knowledge and skills you have acquired to do the activity as explained in the guideline that follows.

The headteacher has announced a competition to develop a simple website for the school. Participants should be only students who have covered a topic on Website design and publishing and acquired the necessary skills through hands-on practice. To participate in the competition, the following criteria will be considered:

1. The student should describe all the necessary materials needed to develop a simple school website.
2. The student should develop a school website with seven webpages describing about:
   a. The teachers.
   b. Subjects taught.
   c. Students registered to the school.
   d. School fees.
   e. The importance of ICT in the society and how the school is promoting ICT studies.
   f. School terms and public holidays.
   g. Games and sports played in the school.
3. Each webpage should contain at least one photo and information in a table. Webpages should be consistently designed and attractive.
4. The school colours (which are light blue, orange, and green) should be considered in the design of the website.
5. The student should propose a relevant school website address (domain name), describe how the domain name will be registered, how and where the website will be hosted for parents and everyone else to access.
6. The student should advice the school on how it can minimise or avoid the cost of hosting the website online.

You can use w3Schools website to assist you doing it more practically.

Exercise 5

Answer the following questions.

1. Explain how you can evaluate and choose a company to host your website.
2. Mention any three things you should know when you plan for hosting a website.
3. What is the difference between web hosting and domain name?
4. Explain the uses of a control panel which is provided by the web hosting company to website owner through a link.
5. Mention files and tools which are used for transferring files in the control panel.

Revision questions

1) Explain the following: web server, web hosting and domain name registration.
2) What is a difference between domain name and domain?
3) Why do you think each device on network must have a unique IP address?
4) Why do we use domain name to open websites instead of their IP address?
5) You want to search information about prestigious universities in Tanzania such as University of Dar es Salaam (UDSM), University of Dodoma (UDOM), Sokoine University of Agriculture (SUA), Mzumbe University (MU), University of Iringa (UoI) and St. Augustine University of Tanzania (SAUT), but you do not know their domain names and their IP addresses. Discuss with your fellow students how you can get access to their websites without asking for help.

Chapter Six

Data processing

Introduction

In everyday life, we capture, organise, store and manage data for application in many areas including business, health, education and agriculture. When you have large amounts of data, it is useful to convert them into desirable form using predefined sequence of operations. In this chapter, you will learn about manual data processing systems, mechanical data processing systems and electronic data processing systems. The competencies developed in this chapter will enable you to convert raw data into more readable format (useful information).

Think

1. The way you can analyse maize harvest of a certain year in Iringa Region.
2. Measures you can use to compare maize production in different wards in Iringa Region.
3. How you can summarise data on maize production in Iringa Region.

Meaning of data processing

Each organisation, regardless of its size or purpose generates data to keep a record of events and transactions that take place within the business. The process of generating and organising data in a useful way is called data processing.

Data processing is the process through which facts, figures and other related raw data are collected, assigned meaning, communicated to others and/or retained for future use. Figure 6.1(a) shows input-output data processing cycle.

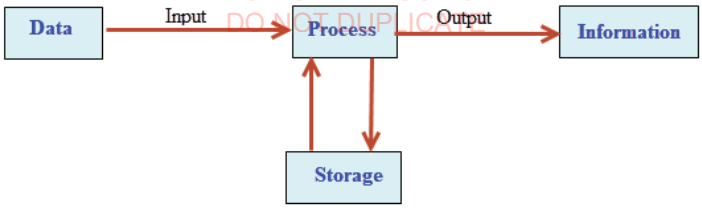


Figure 6.1(a): *Input-output data processing cycle*

Thus, data processing can be defined as a series of actions or operations that convert data into useful information. The ultimate goal of data processing is to transform data into information.

Data

Data is the plural form for datum, which means fact, observation, assumption or occurrence. Specifically, data are representations of facts related to people, their ideas, things and events. Data can be represented by symbols like numerals, letters of the alphabets or other special symbols.

Information

Information can be defined as data that have been transformed into a meaningful and useful form for specific purposes. Also, you have to note that data are not useful unless they are subjected to a process through which they are manipulated and organised and contents generated are analysed and evaluated to create a meaningful information. Figure 6.1(b) illustrates a summary of steps for data processing to create meaningful information.

Figure 6.1(b): *Example on steps for data processing*

Certain tools are available to help in data processing. These include manual tools such as pencil and paper, mechanical tools such as filing cabinets, electromechanical tools such as adding machines and typewriters, and electronic tools such as calculators and computers. These resources used for data processing are also known as data processing systems.

Exercise 6.1

A student has been investigating on how long do ten swings of a pendulum vary with length. From the investigation, explain the following.

(a) Why units are important in data analysis?

(b) How will a graph from the data help to analyse pattern and trends?

(c) How will the student evaluate the quality of data before making any conclusion?

Data processing system

Data processing is usually performed by a system or group of components. It is a group of components (machine, people and process) which relate to each other with the same intention of accepting inputs and producing outputs in a well organised process. For example, a production system accepts raw material as input and produces finished goods as output. Similarly, a data processing system can be viewed as a system that uses raw data as input and processes the data to produce information as output. Figure 6.2 illustrates the data processing system.

Figure 6.2: *Data process system*

Types of data processing

There are three types of data processing categorised according to how data are manipulated, namely manual data processing, mechanical data processing and electronic data processing.

Manual data processing

Manual data processing is the one that processes data manually using tools such as pen, chalk, pencil, filing cabinet and paper. It requires human effort in recording, sorting and processing of data. Examples of manual data processing include manually filling students' examinations reports, verifying score sheets records and organising students' grades based on their performance and gender. In such office, incoming tasks (inputs) are stacked in tray (output) and processing of each task involves a person using brain in order to respond to queries. Figure 6.3 shows a person who is manually processing data from various files.

Figure 6.3: *Manual data processing system*

Advantages of manual data processing

1. It is generally cheap.
2. It is simple to operate.
3. It is easily adaptable to changes.
4. It is easily accessible.

Disadvantages of manual data processing

1. May take long time to complete.
2. Difficult to handle large volumes of data.
3. Generally prone to human errors.
4. Requires a lot of manpower.

Mechanical data processing

A mechanical data processing system processes data mechanically through a combination of manual processes and mechanical devices to carry out the function. Examples of devices are such as typewriters, calculators and bookkeeping machines. As shown in Figure 6.4, human effort must be used to operate a typewriter, press calculators and use a pen and paper.

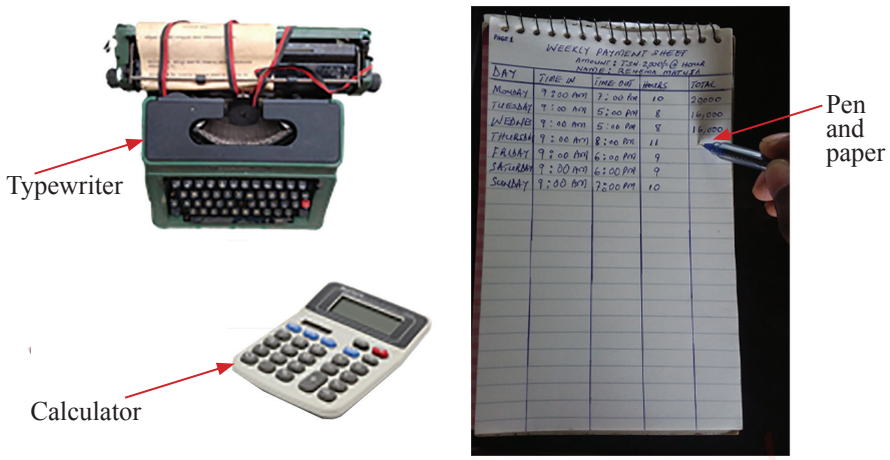


Figure 6.4: *Mechanical data processing system*

Advantages of mechanical data processing

1. It can be used in large and small organisations.
2. It can serve as an input to electronic system.
3. It generates improved quality and level of output as compared to manual method .
4. It requires less manpower than the manual method.

Disadvantages of mechanical data processing

1. Costly to purchase and maintain.
2. High possibility of equipment breakdown.
3. Produces a lot of noise due to moving parts in the equipment.
4. Usually slow in operation compared to electronic data processing.

Electronic data processing

Electronic data processing is any process that use computer program to enter, summarise, analyse or convert data into usable information. It involves recording, sorting, summarising, calculating, analysing, storing and disseminating data. Since data are most useful and informative when well-presented, data processing systems are often referred to as information systems. Examples of electronic data processing is the use of computers in transactions of processing students' results.

Figure 6.5 illustrates electronic data processing system for student information.

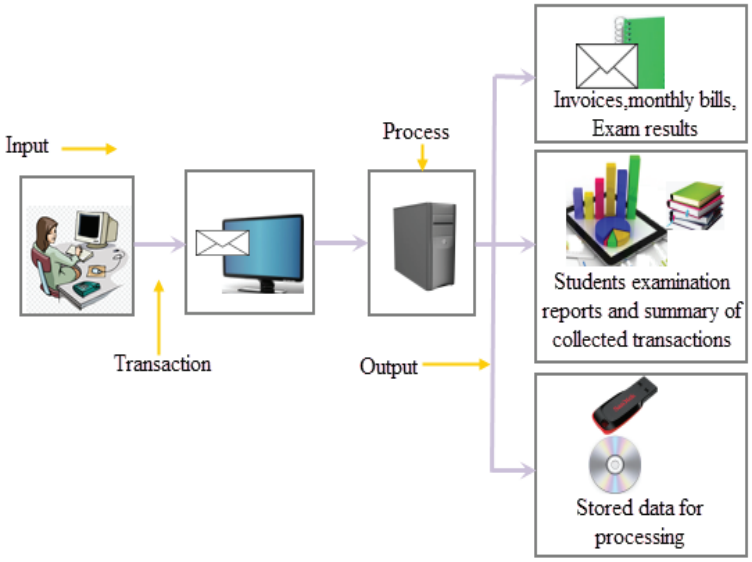


Figure 6.5: *Electronic data processing system*

The following are some advantages and disadvantages of using electronic data processing systems.

Advantages of electronic data processing

1. It is the fastest method in analysing and processing data.
2. It handles complex calculations and problems.
3. It provides information in different formats.
4. It provides more accurate results than the other two methods.
5. It performs heavy workload with minimum difficulties.
6. It provides standardisation of method, and therefore frees staff from clerical tasks.

Disadvantages of electronic data processing

1. Initial acquisition and maintenance costs may be high.
2. It may require experts to operate.
3. It may decrease innovation as tasks become standardised.

Exercise 6.2

In population census, a lot of data is collected which needs processing.

(a) Which type of data processing systems is most appropriate for such processing?

(b) What type of information can be learned from such data?

(c) What knowledge can be gathered from the information?

Comparison between manual and electronic data processing systems

The similarities and differences between manual and electronic data processing system are as follows:

Manual data processing system	Electronic data processing system
Similarities	
• They can be used in small and large organisations • They are operated and managed by human beings • It is easy to obtain and use the data processing tools	
Differences	
• Data processing requires more efforts • Data are transferred physically from place to place • Large manpower is required to process data • It processes small quantities of data • It is easy to operate the processors • Calculations and logical operations are done manually (e.g. entering marks, fee receipts and other financial calculations). • Data processing is very slow and prone to errors	• Data processing requires less efforts • Data are transferred electronically; no physical movement is required • Less manpower is required to process data • It processes large amount of data for short time • It requires an expert to operate the processor • The data in the system is processed through a computer (e.g. students' results and bank accounts of customers) • Data processing is fast with high reliability and accuracy

Importance of data processing

Organisations conduct research and collect information periodically about the kind of business they have to do and services they want to provide in a particular area. The collected data need to be processed to produce useful information and stored for the future reference. The following are some importance of data processing:

Reports are created easily: the processed data, facts, and figures collected simplify analysis and help users to produce reports easily.

Speed and accuracy: converting raw data into electronic format simplifies the data processing, which is done quickly. For example, processing students' scores in universities with large number of students can be done accurately within a short time. Data processing also helps users to easily and automatically check errors and correct them within a short time. Therefore, this process helps organisations to maintain high accuracy of information management.

Storage made easy: processing data electronically helps to store a large amount of data in a computer or any other electronic storage device. This also helps managing and modifying information directly and easily from a computer rather than a paper work.

Information decisions: the information output of well-analysed or processed data helps decision makers to make informed decisions.

Lowered costs: although it is important to process data, it is also expensive in terms of time and finance. However, data processed electronically have low cost compared to processing and maintaining data in paper documents. The cost is low because the stationaries required to process and store information will already have been reduced using electronic processes.

Applications of data processing system

Data processing system can be used in several areas in real life such as agriculture, hospitals, banking and education sectors. Some of the applications include:

1. Organising examination records

Data processing system organises academic records by performing the following steps:

(a) The subject teacher collects marked examination papers;

(b) The subject scores are entered on score sheets;

(c) The score sheets are given to the class teacher;

(d) The class teacher calculates the total and the average score of each student; and

(e) A report card for each student is produced and then a master report sheet for the class is kept for future reference.

2. *Preparing payslips*

Payslips are prepared through the data processing system by performing the following:

(a) The details of the hours worked by each employee are recorded on a time sheet;

(b) The data are checked for accuracy and copied into a summary sheet;

(c) At the end of the month, the documents are given to the accountant;

(d) The accountant works out the wages for each employee using the total number of hours worked; and

(e) Payslips are generated and distributed to the employees.

Revision Exercise

1. What is data processing?
2. Why is data processing important?
3. What are the steps involved in data processing?
4. Computer software is necessary in data processing. Give examples of software useful in data processing.

Chapter Seven

Database as information systems

Introduction

Various works of life such as business, health, education and agriculture usually generate large amounts of data. Databases can be used to manage large amounts of data and help users to execute multiple tasks at a time. In this chapter, you will learn about database concepts and terminologies. Also, you will learn about types of database systems and database design. The competencies developed in this chapter will enable you to create and use database for capturing, organising, storing and retrieving information.

Think

1. How you can link related data.
2. How you can avoid data redundancy.
3. How you can secure your data.
4. How you can share your data.

Database concepts and terminologies

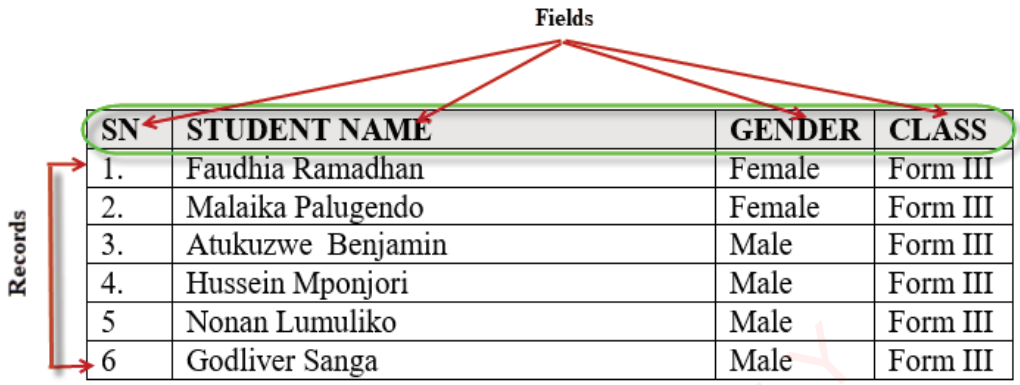
A database is a depository area of data or collection of related files. It is implemented using special programs and access to a database controlled by a software package called the Database Management System (DBMS). DBMS is a computerised record-keeping system which is used to create databases, store and maintain data stored in the database. It also permits an organisation to centralise data, manage data efficiently, and provide access to the stored data. In some cases, users may interact with the DBMS directly or through another program. Examples of database management systems are SQL Server, Oracle, MySQL and Access 2016. In this book, Access 2016 will be used for demonstration.

Terminologies used in database

The following are some terminologies used in DBMS.

Field refers to a specific item of information containing homogeneous set of values throughout the table. Thus, fields appear as columns in a table.

Record is a collection of related fields. In other words, a record is an individual list of related information consisting of a number of related fields stored in a table. A record is also called a row in the datasheet. Figure 7.1 illustrates records and fields in a database table.



SN	STUDENT NAME	GENDER	CLASS
1.	Faudhia Ramadhan	Female	Form III
2.	Malaika Palugendo	Female	Form III
3.	Atukuzwe Benjamin	Male	Form III
4.	Hussein Mponjori	Male	Form III
5	Nonan Lumuliko	Male	Form III
6	Godliver Sanga	Male	Form III

Figure 7.1: *Database table showing records and fields*

Query is a request for a particular collection of data in a database or a tool that is used to ask specific questions about the data in the database.

Record set is a set of information resulting from running a query.

Form is a structured document with specific areas for displaying data from or entering data to a database table. Forms can be constructed in columnar, tabular, datasheet or a simple justified format.

File is a collection of related records.

Primary key in a file is a field (or fields) whose value uniquely identifies a record among others in a data file. The field (or fields) in one table that refers to the primary key in another table is called a foreign key.

Foreign key is the key field in a table that uses a primary key of another table.

Table is an arrangement of related information stored in columns and rows.

Report is a formatted collection of information organised to provide printed data on a specific subject. A report cannot be edited and it is only used to view information retrieved from a table.

Object is a component of a database such as a table, query, form, or report.

Activity 7.1: Identifying a primary and foreign key

Use the knowledge and skills you have acquired to do the activity as guided by the explanation below:

The doctor in-charge of Kimweri Secondary School dispensary has two lists of names. The first contains full names of students and their registration numbers and classes. The second list contains names of parents or guardians of all students and their National Health Insurance (NHI) numbers.

When a student goes to the dispensary for treatment, the doctor firstly identifies the student in the first list and then uses it to identify the NHI number of his/her parent by which a student is billed after being treated. If the NHI number is recorded as part of the student's record, the doctor will use it to identify the name of the parent or guardian in the second list. Use the two lists to explain which fields are primary and foreign keys between them.

Database systems

A database system refers to organisation of components that define and regulate collection, storage, management and use of data within a database environment.

A database can be manual or computerised. Before digital era, people used local methods to collect, store, and analyse data. This is manual database. In our everyday life, examples of manual and electronic databases are such as attendance registers, calendars and student diaries or phone directories.

Components of database systems

A computerised or electronic database system contains four main parts, which are data, hardware, software and users.

Data: from the user's point of view, the most important component of database system is perhaps the data. This is what is stored and shared among users.

Hardware: all the physical devices of a computer are termed as hardware. The computer can range from the personal computer to a minicomputer, network computer, single mainframe, depending on the size of the organisation, processor speed, memory and storage devices.

Software: a software is the basic interface between the physical database and

the user. It is most commonly known as DBMS. It comprises of the application programs together with the operating system software. All requests from the user to access the database are handled by the DBMS. DBMS provides various facilities such as adding and deleting files, retrieving and updating data in the files and so on.

Users: users are the people that interact with the database in any way. There may be various categories of users including a programmer who writes the program, the end user who interacts with the system office or online, the database administrator who manages the DBMS and the designer who designs the system.

Types of database systems

There are two major types of database system. These are flat file database and relational database.

Flat file database

A flat file database is a type of database that stores data in a single table. Such databases are generally in plain-text form, where each line holds only one record. The fields in the record are separated using delimiters such as tabs and commas. If you decide to merge data between two flat files, you need to copy and paste relevant information from one file to the other. Figure 7.2 shows an example of a flat file database.

Students General Information				
No	**Name**	**Class**	**Combination**	**Age**
1	Aidan Mkong'oto	Form V	PCM	19
2	Kajuni Mtikisiko	Form VI	EGM	20
3	Kamtu Sabai	Form V	HKL	23

Figure 7.2: *Example of a flat file database*

Relational database

A relational database, on the other hand, incorporates multiple tables with methods for the tables to work together. The relationships between data in tables can be collated, merged and displayed in database forms. Most relational databases offer functionality to share data across networks over the Internet, with laptops and other electronic devices such as mobile phones and with other software systems.

Relational databases allow you to define certain fields such as keys or indexes to perform search queries, join table records and establish integrity constraints. Search queries are faster and more accurate when based on indexed values than other approaches. Table records can be easily joined by the indexed values. Integrity

constraints can be established to ensure that table relationships are valid. These relations are primary key and foreign key.

Normally, the table that contains a foreign key is called the child table and the table containing a primary key is called the parent table. The importance of foreign key is to link tables.

Relational databases offer more robust reporting than a flat file database with report generators that filter and display selected fields. Relational databases also offer the capacity to build your own reporting modules and the capacity to import and export data from other software. For example, in Figure 7.3, a relationship is created in the field of class between 'Student Table' and 'Teachers Teaching Table'.

Student Table

ID. No	Name	Date of Birth	Group	Class
2345	Mutozi Kabungu	March 3, 1997	Tiger	4A
2446	Faudhia Ramadhan	April 24, 1998	Lion	4C
2547	Boaz Katemulo	June 31, 2000	Horse	4A
2648	Malaika Palugendo	Febr 3, 1996	Rhino	4A

Teachers Teaching Table

Class	Teacher's Name	Block
4A	Magulu Mulumba	7B
4C	Kaiser Kaswagala	J5

Figure 7.3: *Example of relational database*

Importance of database systems

Database systems provide the following importance:

(a) **Sharing data:** the data of various users can be combined and shared among authorised users, allowing all users access to a greater pool of data. Several users can have access to the same piece of data and still use it in a variety of ways.

(b) **Controlling redundancy:** with database processing, data that were formerly kept separately in a file-oriented system are integrated into a single database; so it reduces multiple copies of the same data. For example, with the file system approach each user group has its own copy of each customer's address. With the database approach, customer's address would occur only once, thus eliminating redundancy. By database eliminating redundancy, database not only saves space but also makes the process of updating data easier. In this way, redundant data are avoided; see Figure 7.4 for occurrence of redundancy.

School prefects accommodation						
Reg. Number	**Form**	**Student Name**	**Combination**	**Dormitory**	**Capacity**	**Dormitory Leader**
2021	Form 3	Kharoub Moshoeshoe	PCM	Azimio	80	Boaz Katemulo
2022	Form 5	Epifania Chabruma	PCM	Mandela	90	Ruth Mgayamacho
2023	Form 2	Mkombozi Kushiye	HGL+GS	Lumumba	70	Maisha Stomini
2024	Form 6	Baruti Mwanga	HGL+GS	Mandela	90	Ruth Mgayamacho
2022	Form 5	Salima Ishmail	PCM	Mandela	90	Ruth Mgayamacho
2021	Form 3	Yakobo Upozile	PCM	Azimio	80	Boaz Katemulo

High data redundancy

Figure 7.4: *Redundancy occurrence in a flat file*

(c) **Efficiency:** any request for information that necessitates accessing data from more than one file in a file system can be extremely difficult. In some cases, for all practical purposes, it is impossible. When all the data for various systems are stored in a single database, the information becomes available and hence the process of getting them becomes quick and efficient. For example, a database for a student management system that has admission, registration, examination and payment information can be easily accessed than if similar information are accessed from different files.

(d) **Easy data validation:** data validation is a process used to determine if data are accurate and complete. Data can be validated before they are stored into the database, which is not the case with flat file systems.

(e) **Easy data access**: database users such as data entry clerks, persons responsible with printing reports and staff who may view personal data are given different rights of access to the database. Responsible personnel for management system can easily track files with a single click in database system when provided with log-in credentials. Hence, security of data is reasonably guaranteed as opposed to conventional file system in which files are tracked manually, giving room for anyone to tamper with data.

(f) **Easy to link data**: the relationships of different data such as student details and their results can be linked together.

(g) **Supports simultaneous access:** multiple users for example more than one students can view their examination results at the same time in database system.

Exercise 7.1

1. Mention other manual database systems you know apart from attendance registers, calendars, student diaries or phone directories.
   a) .....
   b) .....
   c) .....
   d) .....
2. What is DBMS used for?
3. Why is the use of DBMS recommended? Explain some of its major advantages.
4. List four (4) examples of Database Management System (DBMS).
5. What is a relational database?
6. Define the following terms and indicate their importance:
   a) Primary key
   b) Foreign key

Database design

When you are about to create a database, there are various aspects to be considered including designing a database.

Designing a database

Designing a database is a process of producing a detailed data structure of a database. The structure contains all the needed logical and physical design choices which can then be used to create a database. A fully attributed database structure contains detailed attributes for each entity. An attendance register is a simple example of understanding an organisation of a database. The attendance register as shown in Figure 7.5 is an organised set of data which consists of fields and records called a table. A database file can have many tables.

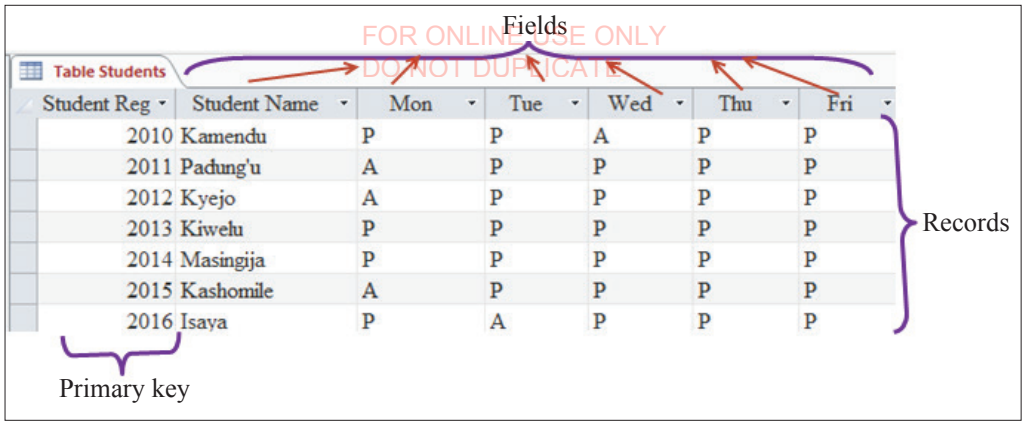


Figure 7.5: *Attendance register table*

The term database design can be used to describe many different parts of the design of an overall database system. Principally and most correctly, it can be thought of as the logical design of the database structures used to store data. In the relational model, these are the tables. However, the term database design can also be used to refer to overall process of designing not just the database structures but also the forms and queries which are used as part of the overall database application within the DBMS.

The designing of a database involves the following steps:

(a) Determine the purpose of your database: this is the first step that helps to design a required database. For example, the design of a database that holds students records would be different with that of holding patients records.

(b) Find and organise required information: gather all types of information you might want to record in the database such as students' and teachers' information which might include name, date of birth, physical address etc.

(c) Divide the information into entities: divide the gathered information items into major entities or subjects such as student description, course description and student marks. Each entity becomes a table.

(d) Identify attributes: decide what information you want to store in each table. Each item becomes an attribute or a field that is displayed as a column in the table. For example, teachers' table might include fields such as Last Name and Hire Date.

(e) Specify primary keys: choose each table's primary key. The primary key is an attribute or field that is used to uniquely identify each row. An example might be Student ID, Staff ID, and Course ID.

(f) Set up table relationships: look at each entity and decide how the data in one entity is related to the data in other entities. Add foreign keys to entities or create new entities to establish the relationships, as necessary.

(g) Refine your design: This step requires you to analyse your design for errors. Create tables and add a few records of sample data. See if you can get results you want from your tables. Adjust the design as needed. This might involve the use of DBMS.

Access 2016 program as DBMS

Access 2016 is a popular database application for Windows. Access 2016 allows users to create custom databases that store information in an organised structure. The program also provides a visual interface for creating custom forms, tables, and SQL queries. Access 2016 is a powerful, yet easy to learn relational database application.

Start Access 2016 program

There are several ways which can be used to start the Access 2016 program. The following procedure in Figure 7.6(a)–(b) demonstrates one of the recommended methods to use when starting Access 2016 program.

Activity 7.2: Starting Access 2016 program

Use the following step by step guide to start the Access 2016 program.

Step 1: Click **Start button** as shown in Figure 7.6(a)

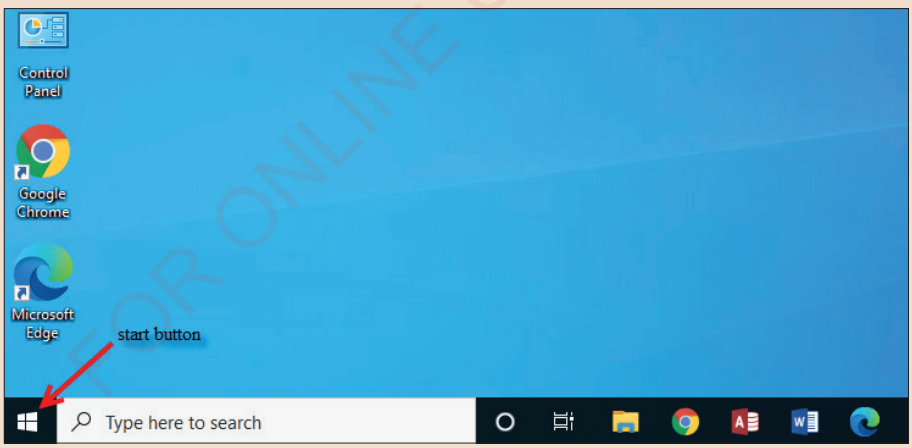


Figure 7.6(a): *Windows 10 start button*

Step 2: Go to the list of all programs displayed and scroll up to Microsoft Office 2016.

Step 3: Click **Microsoft Office 2016** as shown in Figure 7.6(b).

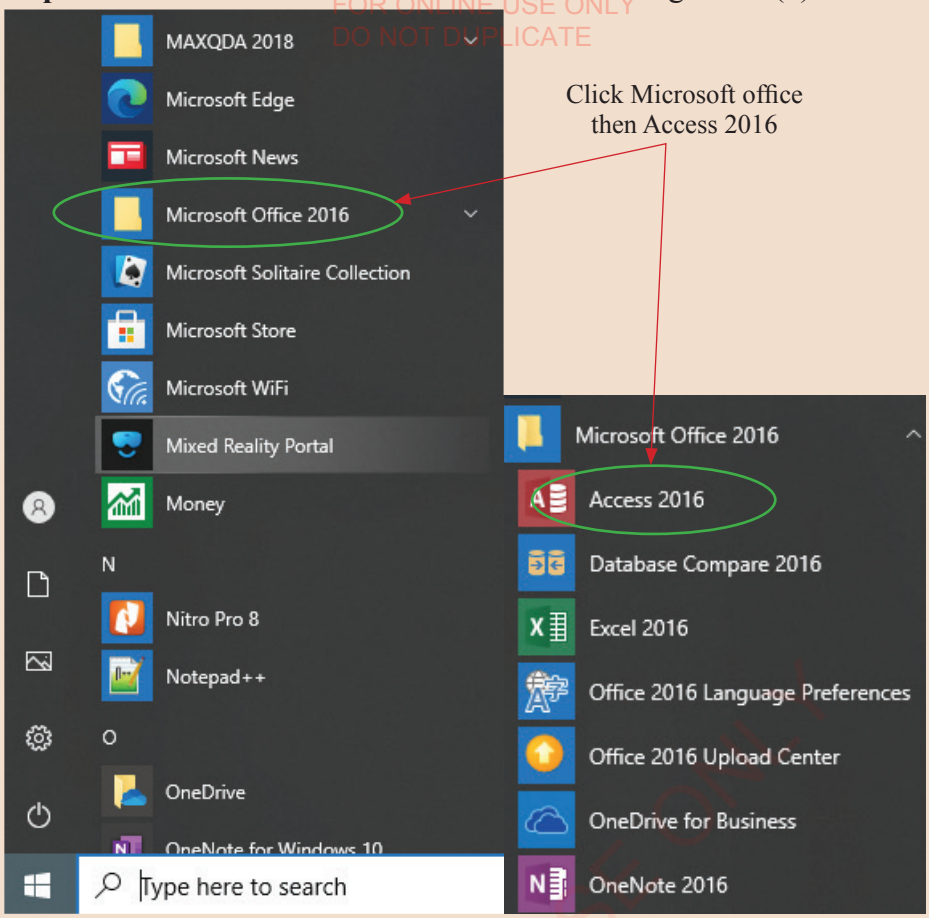


Figure 7.6(b): *Starting a new Access 2016 database*

Step 4: Click Access 2016, a window similar to the one shown in Figure 7.7 will display.

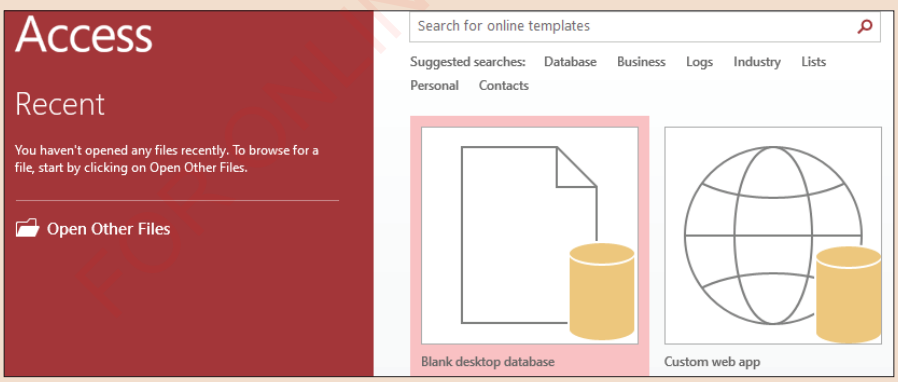


Figure 7.7: *Creating a new database in Access 2016*

Step 5: After the program has finished to load, click on the **Blank desktop database** as in Figure 7.7, another window similar to the one shown in Figure 7.8 will open.

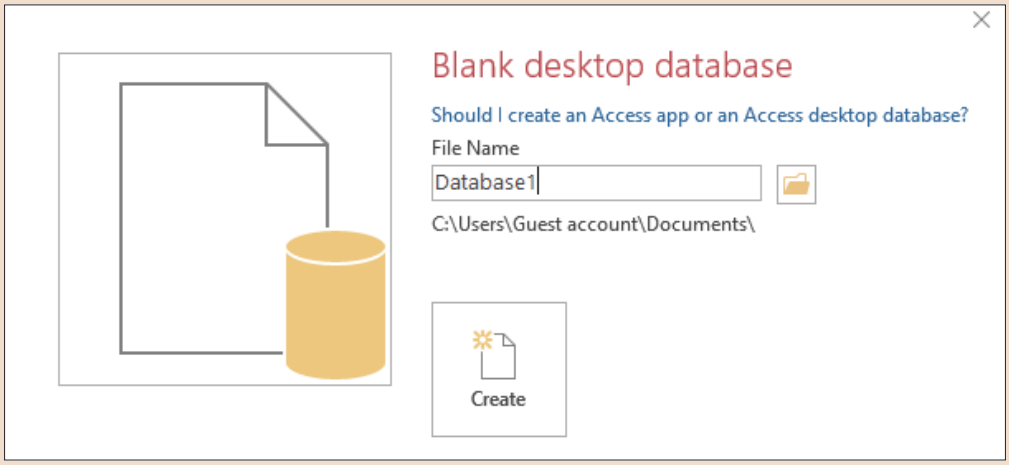


Figure 7.8: *Blank desktop database dialog box for Access 2016*

Step 6: In the blank desktop database window, do the following to create a new database.

i. Under File Name box, type the name of your database as 'school'.
ii. Click **create** button.

When the create button is clicked, the Access 2016 will display a window as the one shown in Figure 7.9

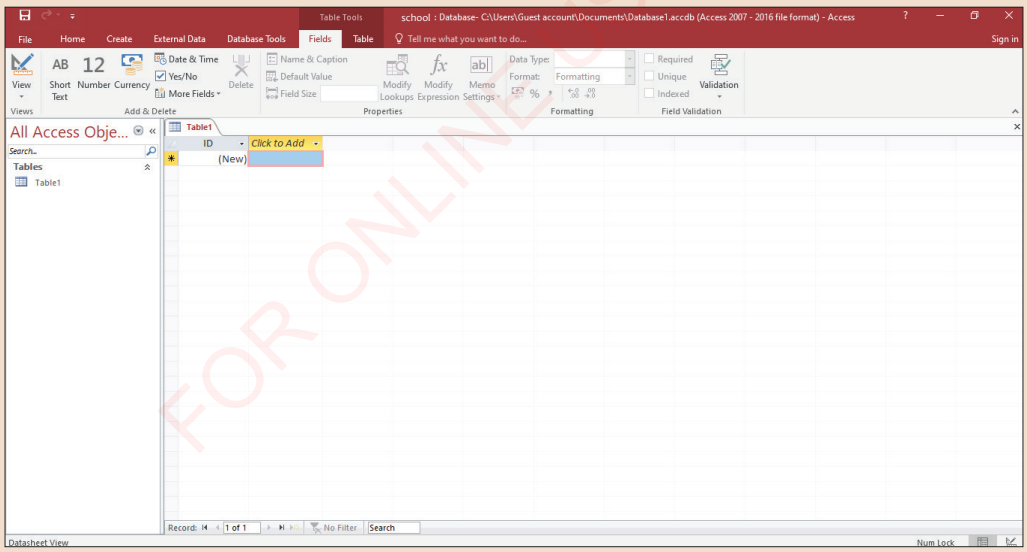


Figure 7.9: *Access 2016 window*

Features found in Access 2016 window

Access 2016 program contains features which enable users to navigate, explore and use the program. The following are some of the common features of Access 2016 as shown in Figure 7.10.

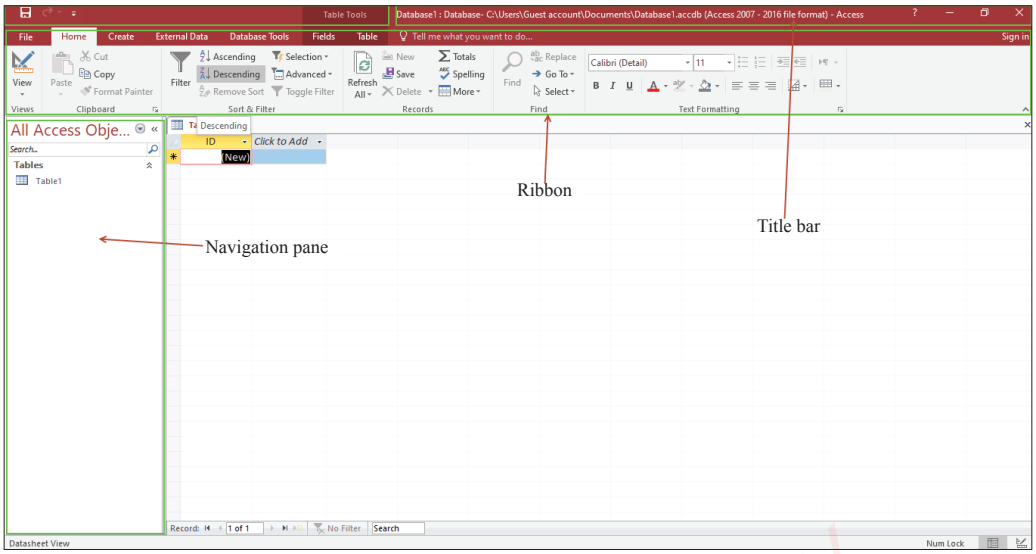


Figure 7.10: *Access 2016 window's common features*

Preparing a table for data entry

The first step in building any database is to create a table. Tables hold raw data that the DBMS will work with. To create a new database table, you first must determine what kind of data will be stored in each table. In other words, table's field must be defined with the following three parameters:

1. Name of the field, for example 'StudentID'.
2. Field type as shown in the Data type in Figure 7.11.
3. Field size in field property as shown in Figure 7.11.

Examples of data types

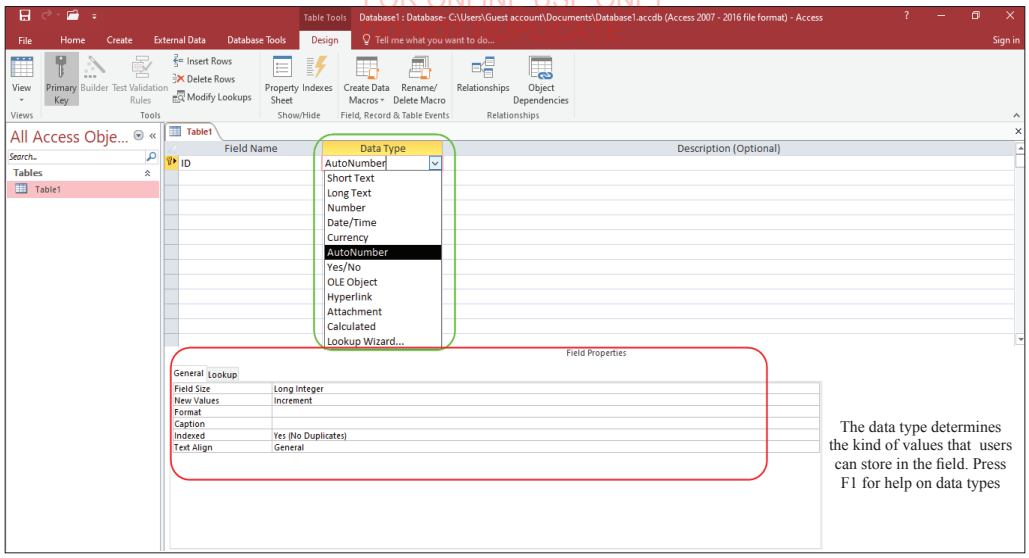


Figure 7.11: *Examples of data types and field properties*

The description of data types are as follows:

Data type	Description
Short text	Short, alphanumeric values such as last name or street address. Field with this data type is limited to 255 characters.
Number	This displays numeric values such as distances. **Note:** This is not used for currency, there is a separate data type for currency.
Currency	It is useful for storing financial and other values that need precision. Upper limit is 922 Trillion. By default, values displays using currency symbols which is set in the windows regional setting.
Yes/No	These are fields that contain only one of two values which is Yes or No, True or False and On or Off. The field is never null.
Date/Time	Contains date and time values from 100 through 9999 years.
Rich Text	Text or combinations of texts and numbers that can be formatted using colour and font controls.

Data type	Description
Calculated Field	Results of a calculation. The calculation must refer to other fields in the same table and create an expression that uses data from one or more fields. You would use the Expression Builder to create the calculation.
Attachment	Attached images, spreadsheet, documents, charts, and other types of supported files to the records in your database, similar to attaching files to e-mail messages.
Hyperlink	Text or combinations of texts, and numbers stored as text and used as a hyperlink address.
Memo	Long blocks of text. A typical use of a Memo field would be a detailed product description.

Date/Time

The data type date/time can be explained or presented in various formats.

Format	Description
Short Date	Displays the date in a short format, depends on your regional date and time settings. For example, 3/14/2001.
Medium Date	Displays the date in medium format. For example, 3-Apr-09.
Long Date	Displays the date in a long format, depends on your regional date and time settings. For example, Wednesday, March 14, 2001.
Medium Time	Displays the time followed by AM/PM.
Time 24 hour	Displays the time only using a 24 hour format that responds to changes in the regional date and time settings.

Yes/No

Data Type	Description
Check Box	Displays a check box.
Yes/No	Displays Yes or No options
True/False	Displays True or False options.
On/Off	Displays On or Off options.

Object Linking and Embedding (OLE) Object: displays OLE objects such as Word documents.

Field size property

After creating a field and setting its data type, you can set additional field properties. The field data type determines which other properties that you can set. For example, you can control the size of a text field by setting its **Field Size** property.

For Number and Currency fields, the **Field Size** property is especially important because it determines the range of field values. For example, a one-bit Number field can store only integers ranging from 0 to 255.

The **Field Size** property also determines how much memory space each Number field value requires. Depending on the field size, the number can use exactly 1, 2, 4, 8, 12, or 16 bytes.

Note: Text and Memo fields have variable field value sizes. For these data types, **Field Size** sets the maximum space available for any value.

Preparing table for data entry

Activity 7.3: Preparing a table

You now have your database called school saved on your desktop. You are required to create a table called Student that contain Student ID, Student Name, Class, Phone Number and Gender then save.

The following are the fields and data types you will include in your database (see Figure 7.12):

Field Name	Data Type
Student ID	Auto number
Student Name	Short Text
Class	Short Text
Phone Number	Number
Gender	Short Text

Figure 7.12: *Data fields and types*

Requirements: Computer with Access 2016 installed.

Procedure:

Use the following steps to create the table.

Step 1: Write the Field Name for Student ID by double clicking in the field written ID and edit the field, as shown in Figure 7.13(a).

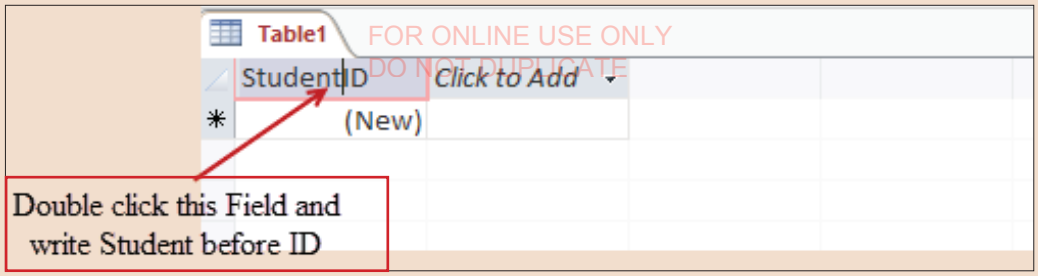


Figure 7.13(a): *Adding field name for student ID*

Step 2: Click on icon 'Click to Add' and choose 'Short Text' as shown in Figure 7.13(b)

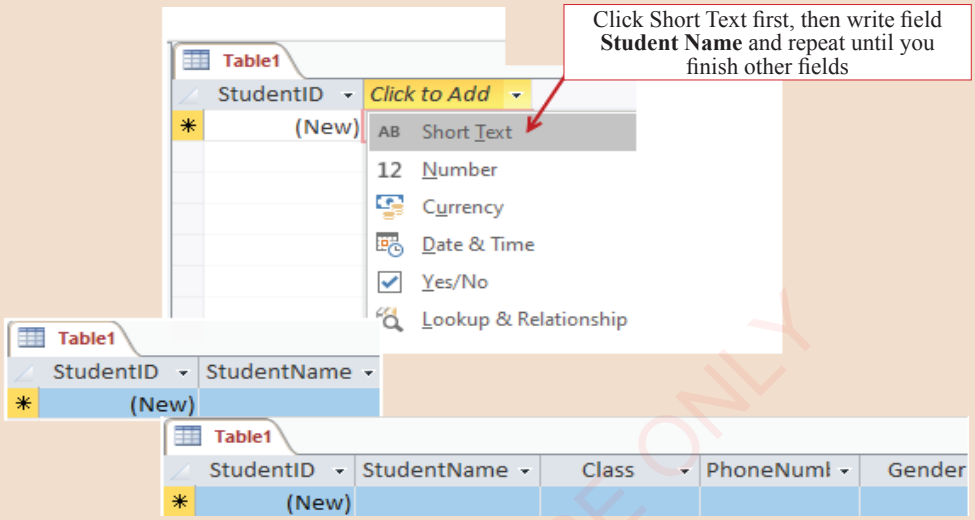


Figure 7.13(b): *Adding field names in Access 2016*

Step 3: Select 'Design View' to write the **Data Types** by clicking 'View' then 'Design View' as shown in Figure 7.13(c).

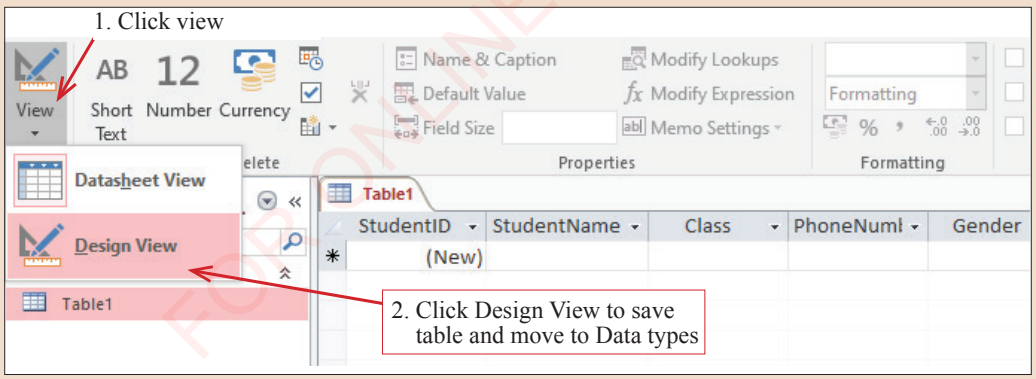


Figure 7.13(c): *Switching to design view in Access 2016*

The Save As dialog box will appear, the name of the table before saving is written table1, table2, table3, and so on. depending on the number of unsaved tables, remove the **Table1** as shown in Figure 7.13(d) then write your table name as "**Student**", then click OK.

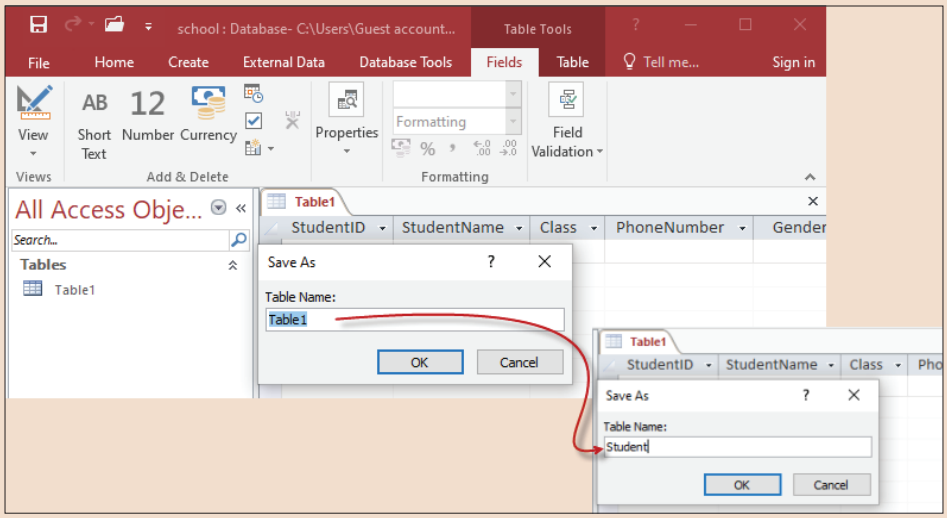


Figure 7.13(d): *Renaming default table name*

After clicking OK, the screen will be displayed as shown in Figure 7.13(e) where you will fill the data types.

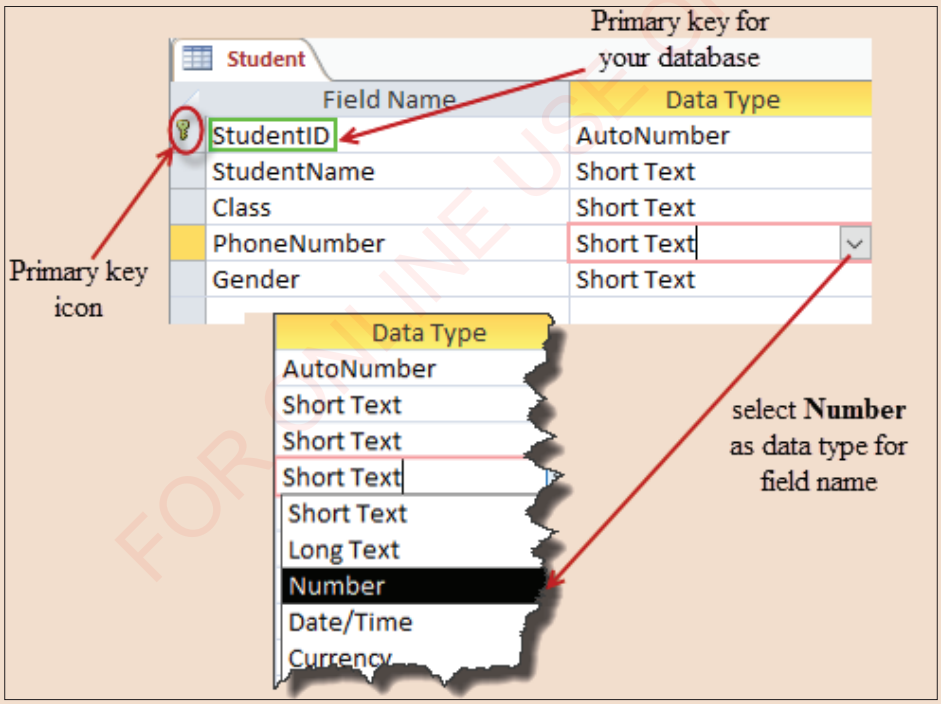


Figure 7.13(e): *Changing field's data type in Access 2016*

When you are in a datasheet view, your table will have already been renamed and look like the table in Figure 7.13(f).

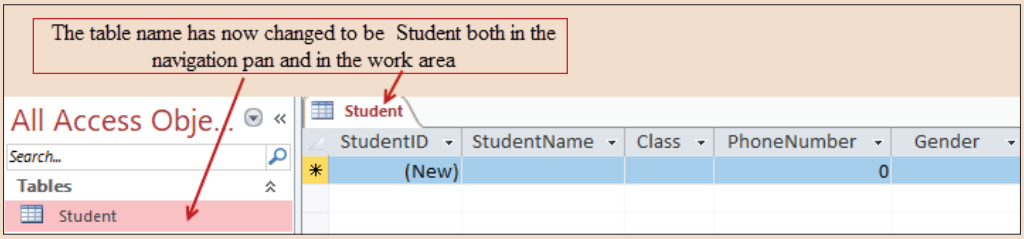


Figure 7.13(f): *Renamed table in Access 2016*

Step 4: Open the datasheet view to display a table ready to input data as shown in Figure 7.13(g).

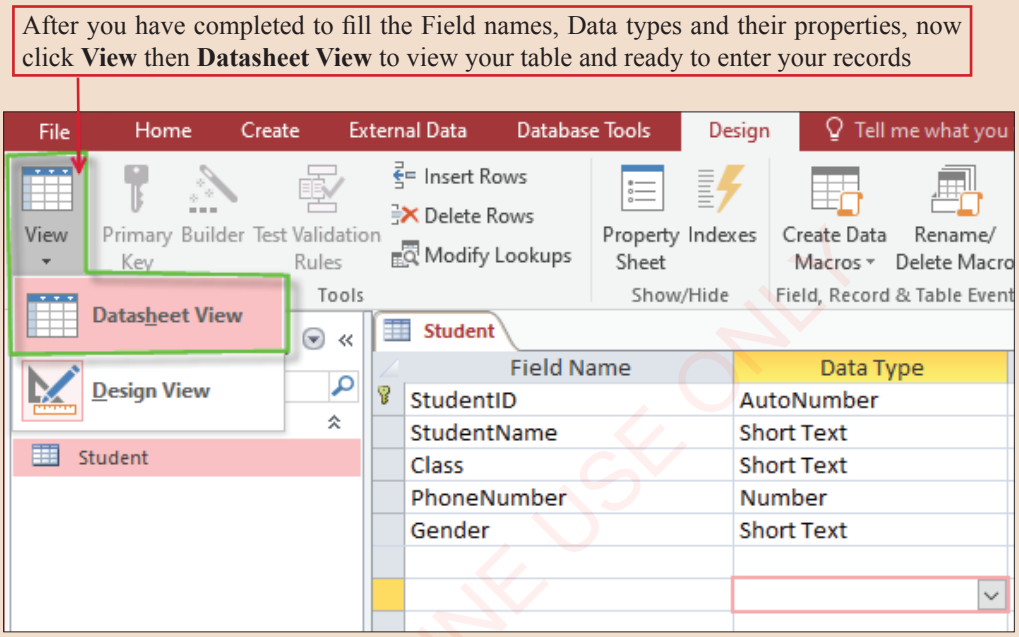


Figure 7.13(g): *Opening datasheet view in Access 2016*

Step 5: Save the table, the popup box will appear as shown in Figure 7.13(h).

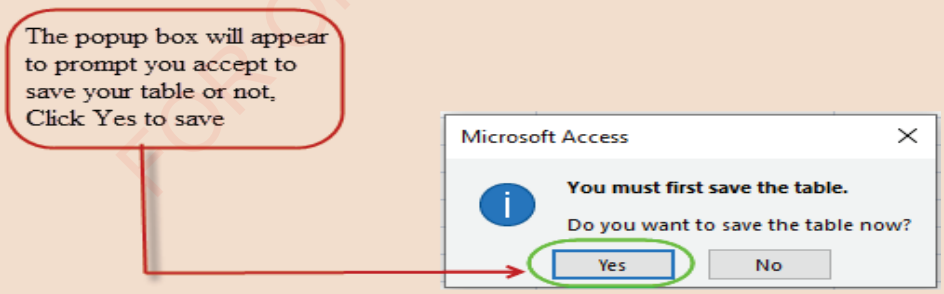


Figure 3.13(h): *Saving the table*

After saving the table, the table is now ready to receive the input record for your database as shown in Figure 7.13(i):

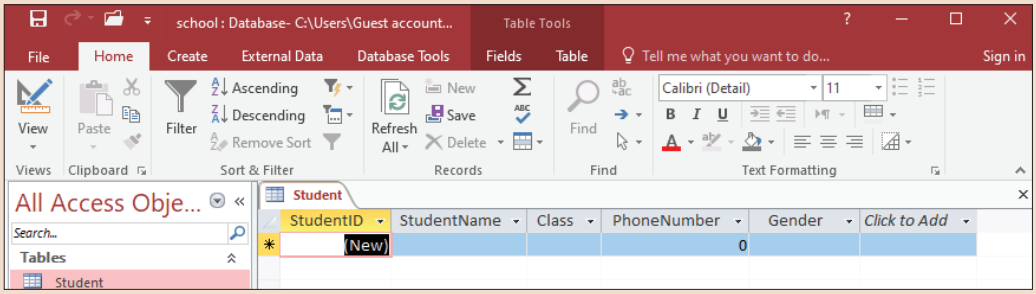


Figure 7.13(i): *Table created ready for data entry*

Entering record in the Database

Activity 7.4: Entering data in a database

Requirements: Computer with Access 2016 installed

Procedure: You have already created your database named "school" and the table called "Student", perform the following steps to enter ten students' records.

Step 1: Enter the first record by filling in the second field and so on. The first field is for ID number of a student, which increases automatically from the first record to last record as shown in Figure 7.14(a).

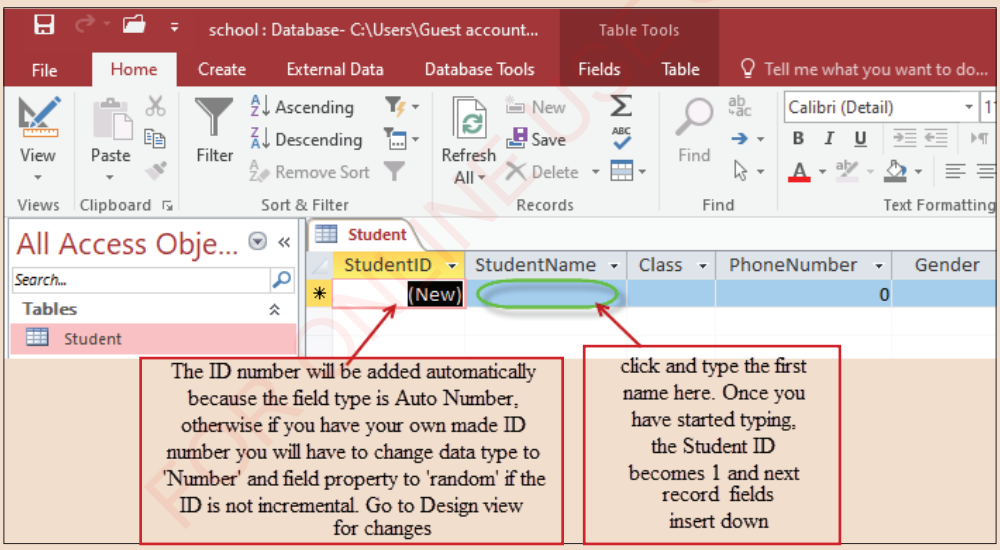


Figure 7.14(a): *Adding field value*

Step 2: You are now ready to enter your records as shown in Figure 7.14(b). Enter your records in the database you have created.

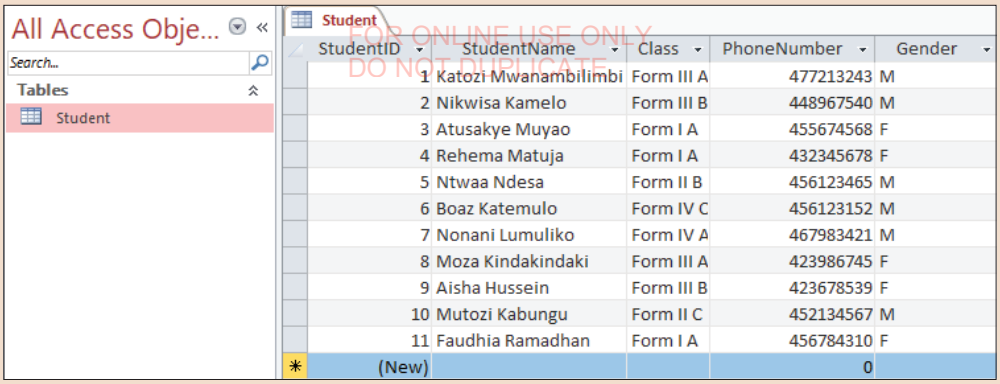


Figure 7.14(b): *Access 2016 table with records and fields*

Updating Database

Updating a database involves entering new records, editing and deleting of the existing records.

Activity 7.5: Searching record in a database for modification

To search for a particular record, you should first move to the field you want to search using the following steps:

Step 1: Open the database 'school' and table 'Student'.

Step 2: Press the **Tab** key to move to the field you want, for example 'Student Name', see Figure 7.14(c).

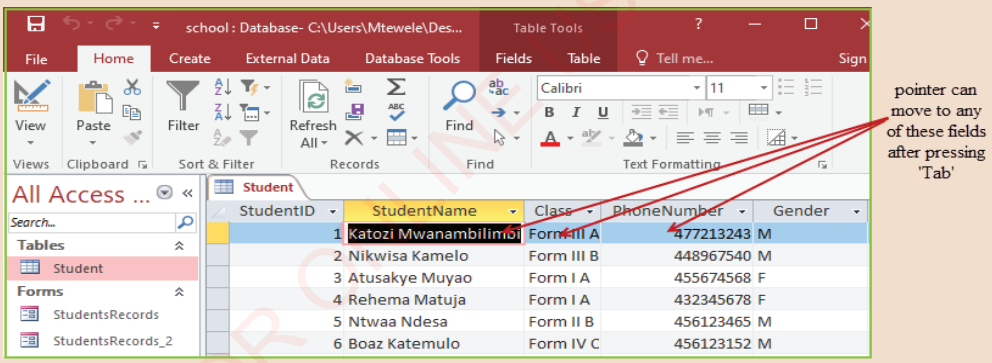


Figure 7.14(c): *Searching a database record-I*

Step 3: Click 'Find' button to the Home tab or press **Ctrl + F**. The 'Find and Replace' window will show up, see Figure 7.14(d).

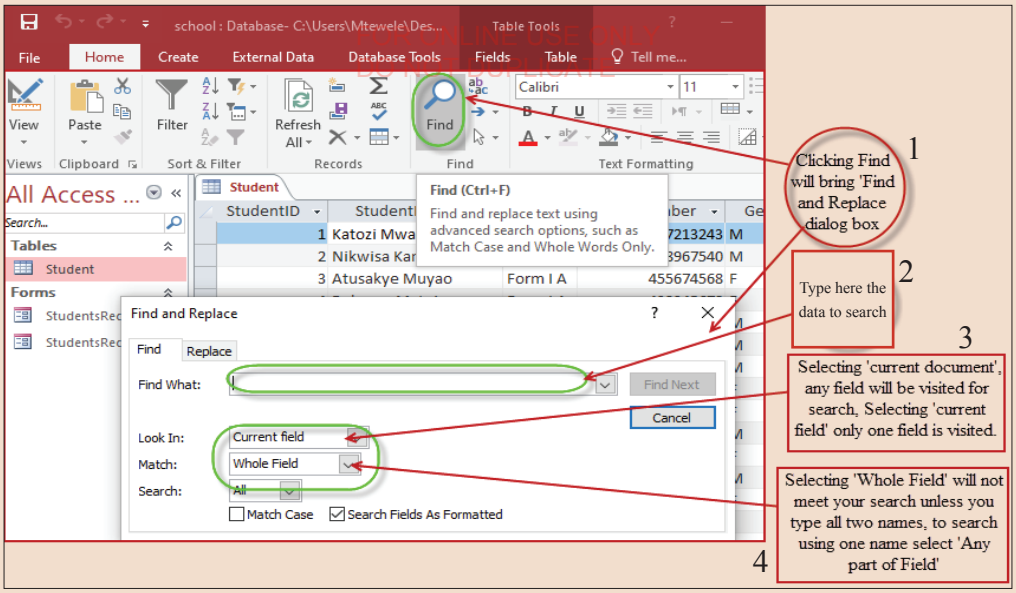


Figure 7.14(d): *Searching a database record-II*

Step 4: Type the name in the search box, in this case, 'Muyao' as shown in Figure 7.14(e)

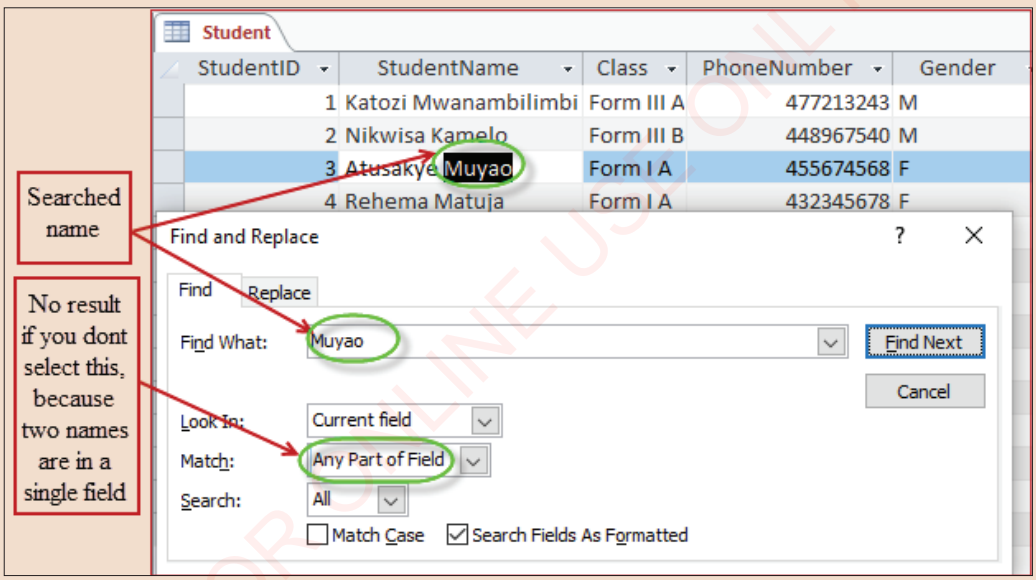


Figure 7.14(e): *Searching a database record-III*

Search set to 'All' will find in all records. Other options use Up and Down to search depending on where a pointer is located at that time. Match Case lets you search the field the way it is formatted (If the data is written starting with upper case, it should be typed in search box with upper case, otherwise you will have no result and you will have to unselect 'Match case').

Finally, Search Fields as Formatted is an option useful to find data as displayed (e.g. a date format). Pressing **Enter** or clicking **Find Next** will carry out the search. When first find does not give result, keep pressing **Enter** until the whole document is searched and a message 'search item was not found' is displayed.

Activity 7.6: Inserting, renaming and deleting fields

You can now decide anything on data you have entered in your table. You can modify the table you have created by right clicking on specific field and select one of the options that shows up as illustrated in Figure 7.15.

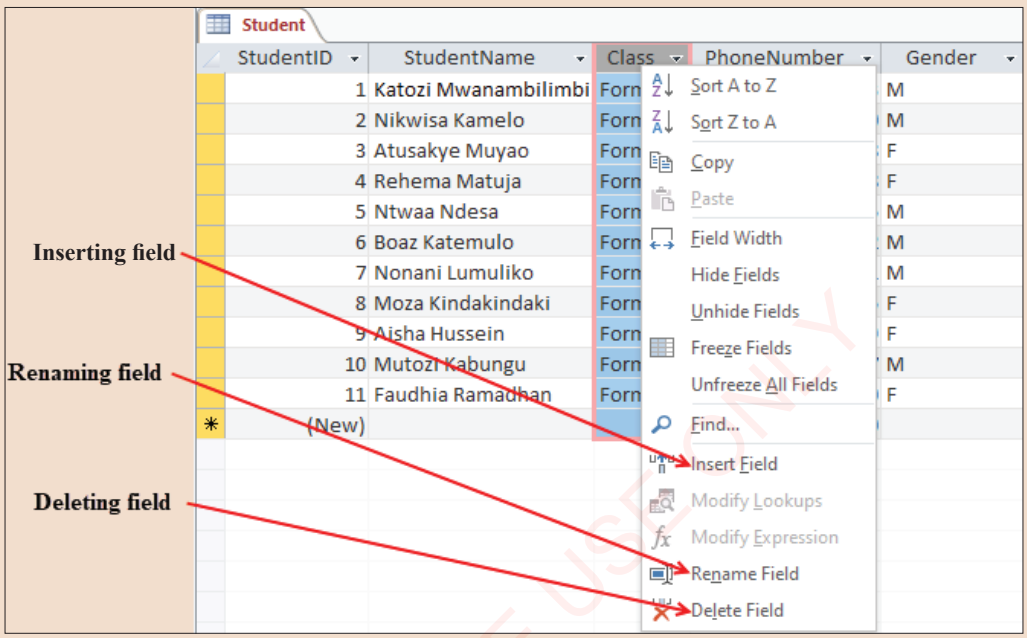


Figure 7.15: *Inserting, renaming and deleting fields*

Activity 7.7: Modifying and deleting data in a table

Modify record

When you want to modify the record, just click in the cell that contains the specific data you want to modify and then rewrite.

Delete record

When you want to delete a record, place a cursor at the start of the record, right click the pointed area then select the **Delete Record** as illustrated in Figure 7.16.

Note: The steps discussed in searching (Activity 7.5) can be used to find the data to be modified or deleted from the table.

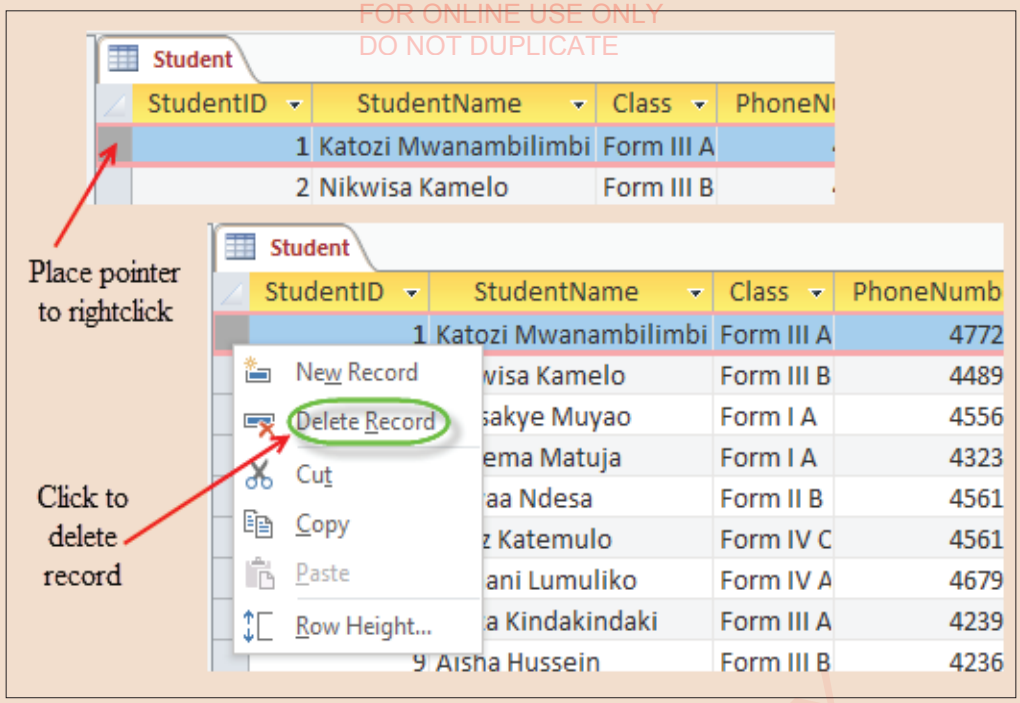


Figure 7.16: *Deleting fields*

Activity 7.8: Deleting records

Step 1: Open the table **student** you have created.

Step 2: Delete records for Nonan Lumuliko and Mutozi Kabungu.

Step 3: Observe what has happened to the data for all records. When the record is deleted, the auto number skips some ID

Step 4: Modify the ID field so that the remaining data are still incremental.

Note: Dealing with database requires you to be sensitive and careful with what you are doing. Reading instructions from pop up window when modifying data records is a part of database management process. Sometimes, it is difficult to change the auto number format when you have deleted a record and you want to add another record. An alternative way to make sure you have the same table with ID number in auto number, you have to create another table which has the same number of fields and field type as the original table. You will have to copy all fields except the auto numbered field. Paste the data copied from the original student table by matching fields to another table you have created. Close and rename the original table to something else. Close by accepting the dialog box to save and rename the

table with the name of the original table. Now you have the same table with ID number incremented by one.

Activity 7.9: Sorting and filtering records

Use the table 'Student' you have created in your database 'school' to perform the following:

a) Filter data so as a reader could see Atusakye Muyao, Boaz Katemulo and Faudhia Ramadhan. Use the same procedure used in Activity 7.5 or by using sort & filter tab.

b) Sort data so that the list of students in a table are arranged in an ascending order.

Note: Sometimes, to change fields properties like time format, size, text alignment and input mask, wizard under field properties is done by clicking triple dot button for various formats. You have to make sure your database is in a design view and find those attributes to be changed. Some types of data require to start a control panel of your operating system and change the regional setting. Changing regional setting in the operating system, make sure the database you are working with is closed.

Activity 7.10: Changing phone number format

In the table 'Student' of database 'school', Moza Kindakindaki phone number is 0423986745. Change her phone number to (2534)23986745. The code number for her country is +253. Show how it will appear in a table.

Exercise 7.2

1) Create a new database file called **SportsGround**, then create a table as shown in the table. The table name should be **Player.**

Field Name	Data Type
Player ID	Auto number
First Name	Short Text
Last Name	Short Text
Play Position	Short Text
Contract Date	Date/Time
Salary	Currency

2) Insert the following records in the table **Player** as shown in Figure 7.17

Player

PlayerID	FirstName	LastName	PlayPositior	ContractDat	Salary
1	Kaushibe	Ngomayachuma	Mid Field	12-Jan-21	$42,000.00
2	Machokodo	Kipanga	Full Back	14-Jan-21	$58,500.00
3	Kiambule	Masantula	Left Wing	17-Jan-21	$23,400.00
4	Kachori	Kibama	Striker	20-Jan-21	$76,000.00
5	Mbwiga	Mfalme	Mid Field	03-Feb-21	$85,370.00
6	Mitimirefu	Mwiba	Striker	07-Feb-21	$8,690,670.00
7	Mashine	Mtata	Goal Keeper	10-Feb-21	$97,800.00
8	Katuni	Msasati	Right Winger	15-Feb-21	$60,000.00
(New)					$0.00

Figure 7.17: *Records in a database table*

3) Modify the following details in the table **Player**:
   a) Kaushibe Ngomayachuma has changed play position and is now playing Right wing.
   b) Kiambule Masantula has been sold to another team, so delete his record.
   c) Add a new record at the end of the table for Mpilimbi with the following details:

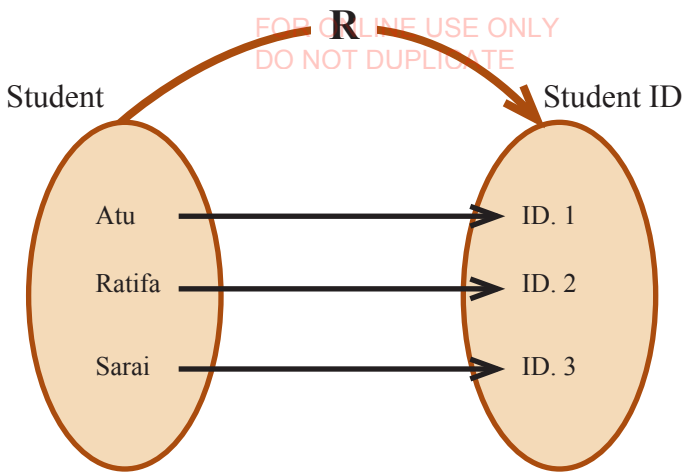
      Mpilimbi, Kambikatoto, Striker, today's date, $72,000.00

Linking two tables in Access database

You have seen how to create table in your Access 2016 database. Now, the created tables may be combined together if they are related. For example, if you create a table patient and ward, both tables have relationship. Table 'student' and table 'course', tables 'father' and 'child' are also related. Tables can be related by linking a field in each table. Links or relationships define how tables interact with each other. The following are types of linking tables (relationships):

One-to-one relationship: this is created when data relating to one theme or issue is split to two different tables where each record in the first table links to one record in the second table.

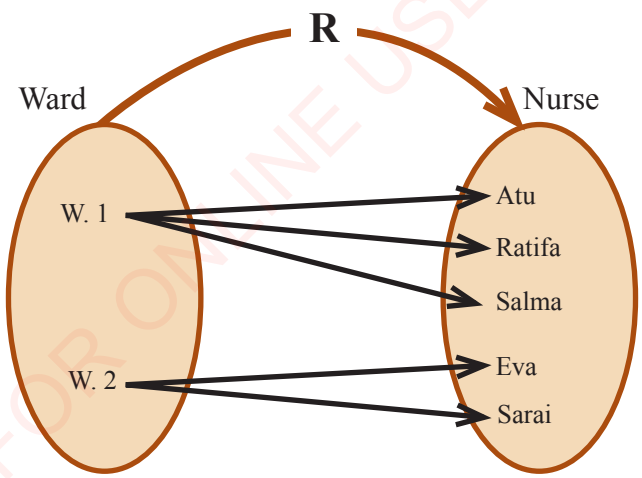
Example of this relationship is in a school database where each student has only one StudentID and each StudentID is assigned to only one person. This relationship is not common because most related information are stored in one table, see Figure 7.18.



In database language, it is represented as:

Figure 7.18: *One-to-one relationship*

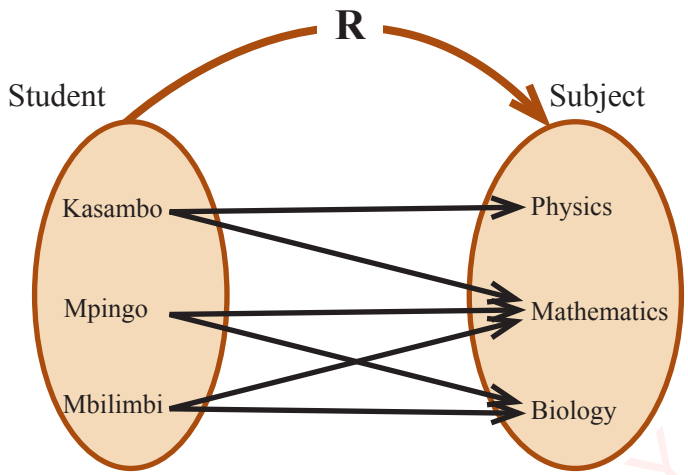
One-to-many relationships: a record in the first table is linked to one or more records in the table, and a single record in the second table is related to only one record in the first table. Example of this relationship is hospital database where one ward may be served by many nurses but each nurse is assigned to serve only one ward, see Figure 7.19.



In database language, it is represented as:

Figure 7.19: *One-to-many relationship*

Many –to- many relationships: a record in the first table is linked to several records in the second table, and record in second table links to several records in the first table. Example of this is when one student tallies to many subject and each subject is taught to many students. This relationship is fulfilled by creating a third table known as a junction table whose primary key consists of two fields which are primary keys from first table and second table, see Figure 7.20.



In database language, it is represented as:

Figure 7.20: *Many-to-many relationship*

In order for two tables to be related, three simple rules apply:

a) Both tables must be in the same database.

b) Both fields to be linked must have same data type.

c) If linked fields are number fields, they must have the same field size.

Activity 7.11: Creating a relationship between two tables

You have the database called 'school' with the table 'Student'. Now create another table called 'StudentBestResults' with fields StudentID, CourseCode, CourseName and Marks.

Step 1: Open the database 'school' and create the table 'StudentBestResults'.

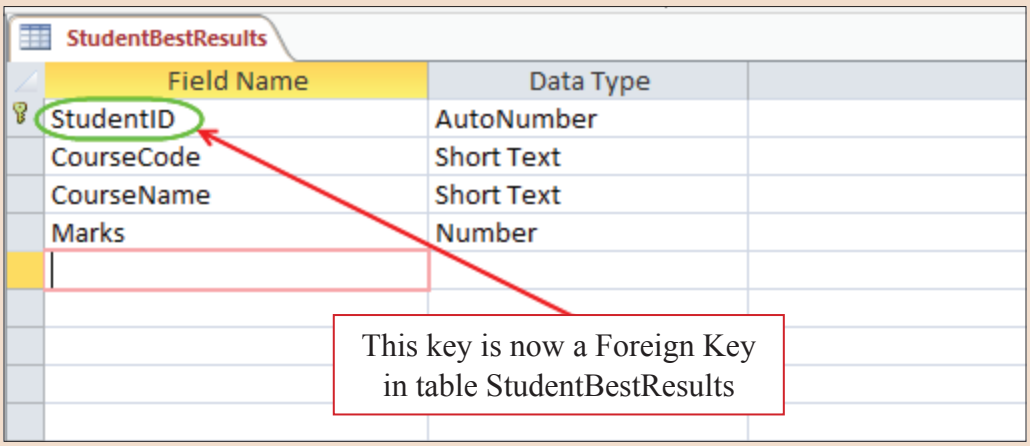


Figure 7.21(a): *Foreign key*

Step 2: On '**Database Tools**' tab, in Relationships groups, click **Relationships**, as shown in Figure 7.21(b)

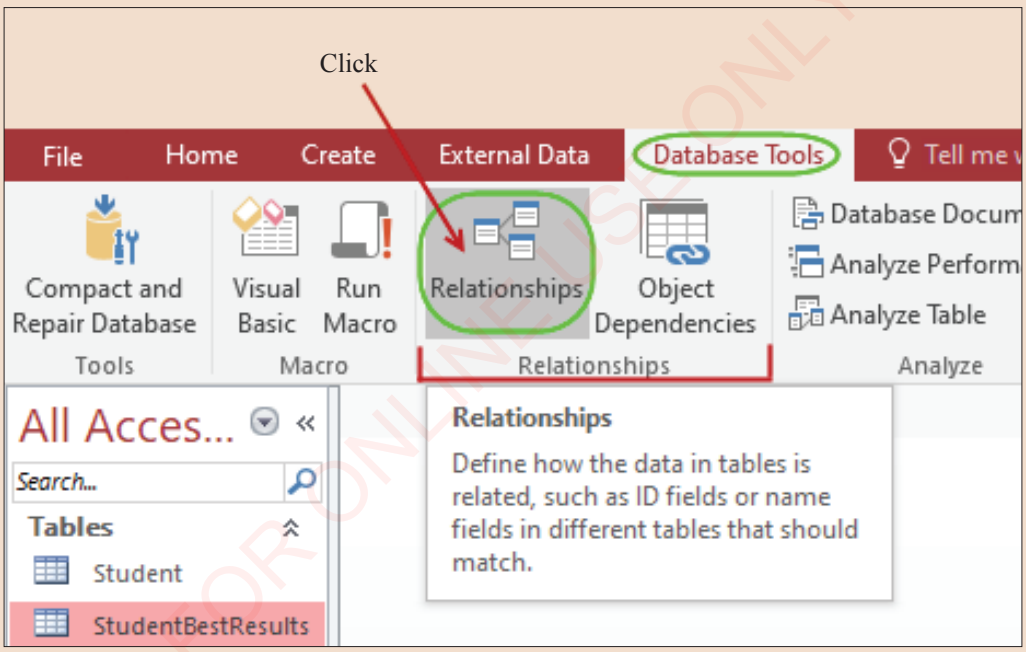


Figure 7.21(b): *Creating table relationships*

Step 3: On show table dialog box, click **Tables**.

Step 4: Select table '**Student**' then click **Add** button as shown in Figure 7.21(c).

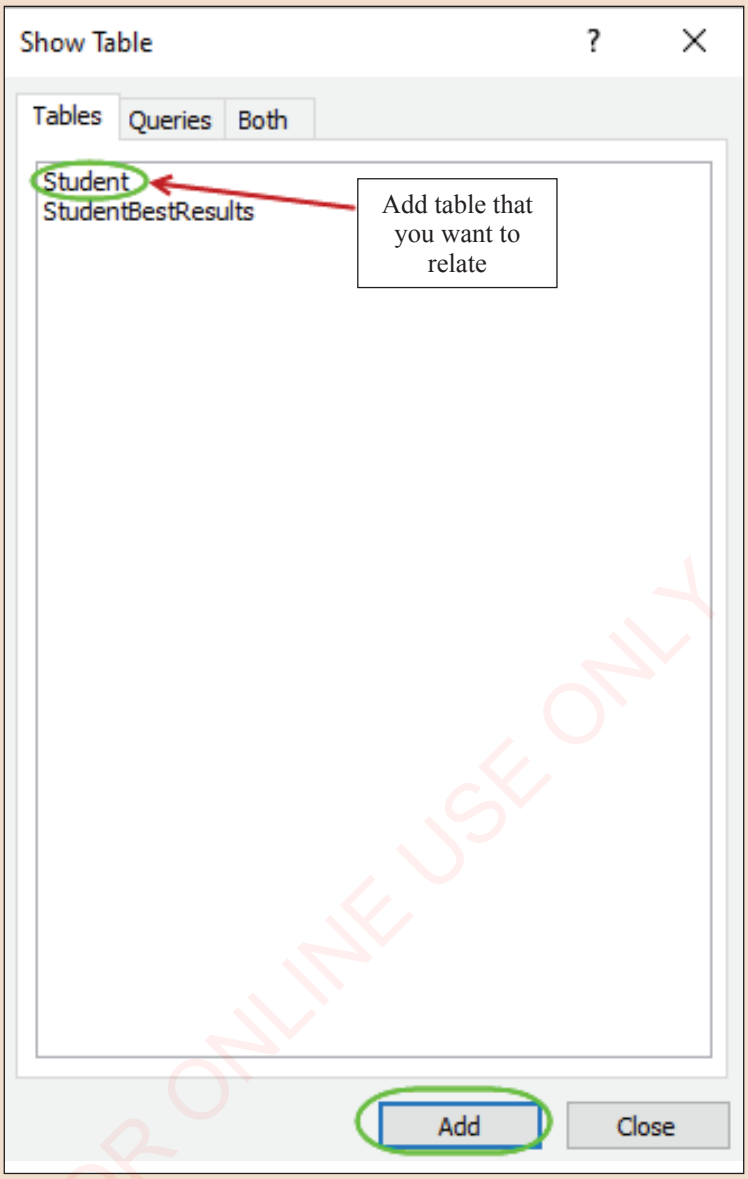


Figure 7.21(c): *List of tables for creating relationships*

Step 5: Select another table '**StudentBestResult**' then click '**Add'** button.

Step 6: Close the dialog box. The added tables will look as shown in Figure 7.21(d).

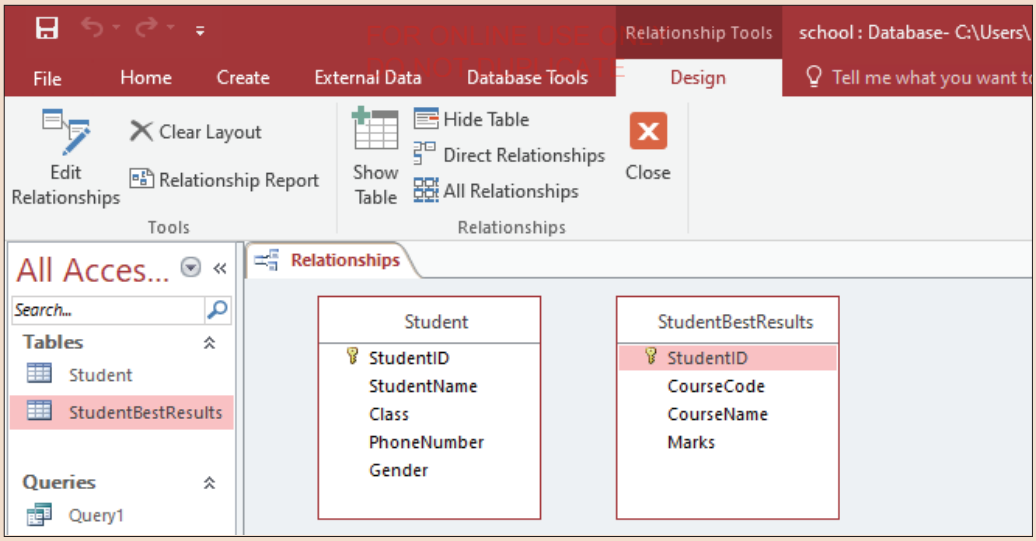


Figure 7.21(d): *Adding tables for relationship creation*

Step 7: To create a relationship between these two tables, use the mouse, click and hold StudentID field from table 'Student' and drag and drop that field on the StudentID to the table 'StudentBestResults'. After releasing, the following window shown in Figure 7.21(e) will show up.

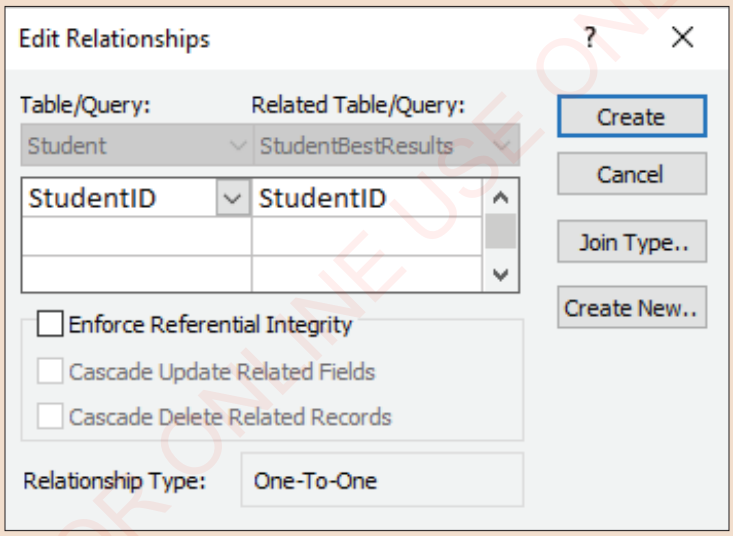


Figure 7.21(e): *Creating relationship between two tables*

The window in Figure 7.21(e) relates StudentID of table 'Student' to StudentID of table 'StudentBestResults'.

Step 8: Click on the '**Create**' button. The relationship will be created as in the Figure 7.21(f).

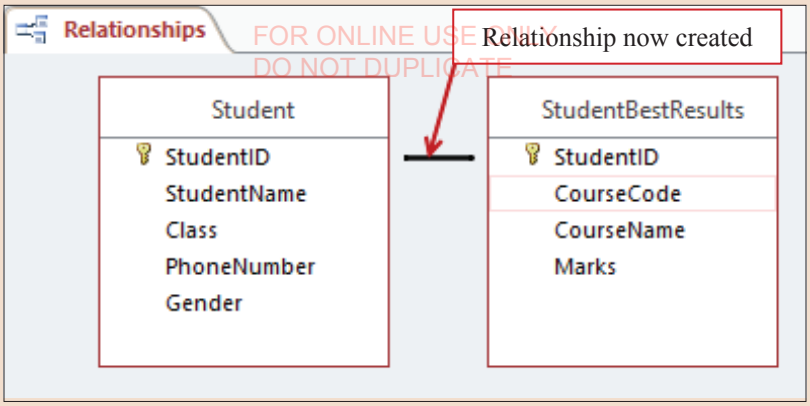


Figure 7.21(f): *Two tables showing relationship*

The created relationship is now saved automatically. Now go to the tables' side to observe the relationship.

Step 9: Open table 'Student' as shown in Figure 7.21(g), and click '+' sign of any student to expand as shown in Figure 7.21(h).

Student

StudentID	StudentName	Class	PhoneNumber	Gender
1	Katozi Mwanambilimbi	Form III A	477213243	M
2	Nikwisa Kamelo	Form III B	448967540	M
3	Atusakye Muyao	Form I A	455674568	F
4	Rehema Matuja	Form I A	432345678	F
5	Ntwaa Ndesa	Form II B	456123465	M
6	Boaz Katemulo	Form IV C	456123152	M
7	Nonani Lumuliko	Form IV A	467983421	M
8	Moza Kindakindaki	Form III A	423986745	F
9	Aisha Hussein	Form III B	423678539	F
10	Mutozi Kabungu	Form II C	452134567	M
11	Faudhia Ramadhan	Form I A	456784310	F
12	Mponjori Hashim	Form I D	453908764	M
13	Malaika Palugendo	Form II A	453287610	F

The '+' sign has been added to table 'Student', that is a table is in relationship. When you expand the sign, you will be able to see information from another table 'StudentBestResults'.

Figure 7.21(g): *Plus sign (+) indicating a table in relationship*

Note: If the '+' sign shown in Figure 7.21(g) does not appear, close your database and re-open.

Student

StudentID	StudentName	Class	PhoneNumber	Gender
1	Katozi Mwanambilimbi	Form III A	477213243	M
2	Nikwisa Kamelo	Form III B	448967540	M
3	Atusakye Muyao	Form I A	455674568	F
4	Rehema Matuja	Form I A	432345678	F
5	Ntwaa Ndesa	Form II B	456123	
6	Boaz Katemulo	Form IV C	456123152	M
7	Nonani Lumuliko	Form IV A	467983421	M
8	Moza Kindakindaki	Form III A	423986745	F
9	Aisha Hussein	Form III B	423678539	F
10	Mutozi Kabungu	Form II C	452134567	M
11	Faudhia Ramadhan	Form I A	456784310	F
12	Mponjori Hashim	Form I D	453908764	M
13	Malaika Palugendo	Form II A	453287610	F
(New)			0	

CourseCode | CourseName | Marks | Click to A

HT 100 | History | 90

0

Information from another table

Figure 7.21(h): *Parent table showing records from a foreign table-I*

Step 10: Save, close, then open table 'StudentBestResults', click '+' sign of StudentID to expand as in Figure 7.21(i).

StudentBestResults

StudentID	CourseCode	CourseName	Marks	Click to Add
1	ICS 201	Information	100	
2	PH 200	Physics	98	
3	CH 300	Chemistry	85	
4	HT 100	History	90	
5	GE 101	Geography	85	
6	CV 103	Civics	100	
7	PH 200	Physics	95	
8	HT 100	History	85	
9	CH 300	Chemistry	75	
10	ICS 201	Information	95	
11	PH 200	Physics	90	
12	GE 101	Geography	73	
13	CV 103	Civics	98	

StudentName | Class | PhoneNumber | Gender

Nonani Lumuliko | Form IV A | 467983421 | M

0

Figure 7.21(i): *Parent table showing records from a foreign table-II*

In this table, as you can observe from Figure 7.21(i), there are also some information from table 'Student'.

Preparing a data entry form

A form is a database object which can be used to enter, edit or display data from a table or query. Other database objects in the context of Microsoft access include report, table and query. When you enter data in a form, it goes directly into one or more tables. You can use forms to control access of data. You can limit fields or records of data to be displayed to users so that they view few data using a form. For example, you may have a table of more than nine fields and a user wants to view only three fields, you will have to prepare a form for user's access. There are various ways of creating a form depending on the control you want over the design of a form as explained in the following tools:

Form: quickly creates forms with all fields in a table.

Form wizard: creates forms but with this you are able to control the layout and number of fields you like to appear in the form.

Blank form: creates form and gives you flexibility with amount of fields.

Form design view: creates a new blank form and gives you the greatest control of number of fields and field properties. You can modify colour and font scheme using theme command.

These tools are obtained in forms group located on '**Create**' tab as shown in Figure 7.22.

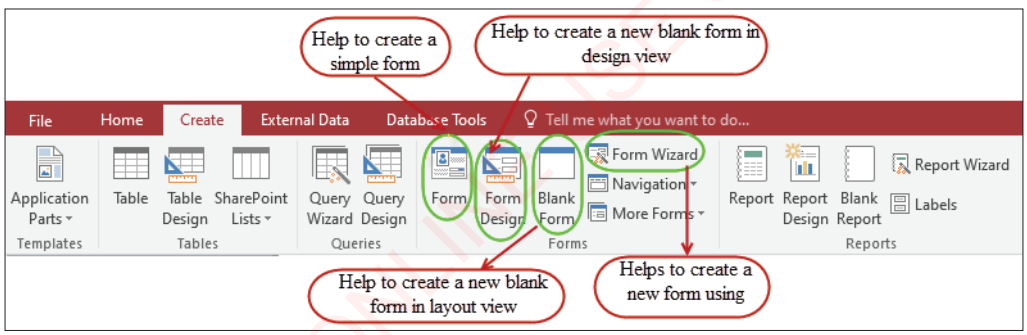


Figure 7.22: *Tools for preparing a data entry form*

Activity 7.12: Creating a form using Form Wizard

Use the database **school** you created with the table **Student** to create the form 'StudentRecords'

Step 1: Open the database 'school'

Step 2: In the 'Create' tab, in the 'Forms group', click the **Form Wizard** button and the following chart will show up as shown in Figure 7.23.

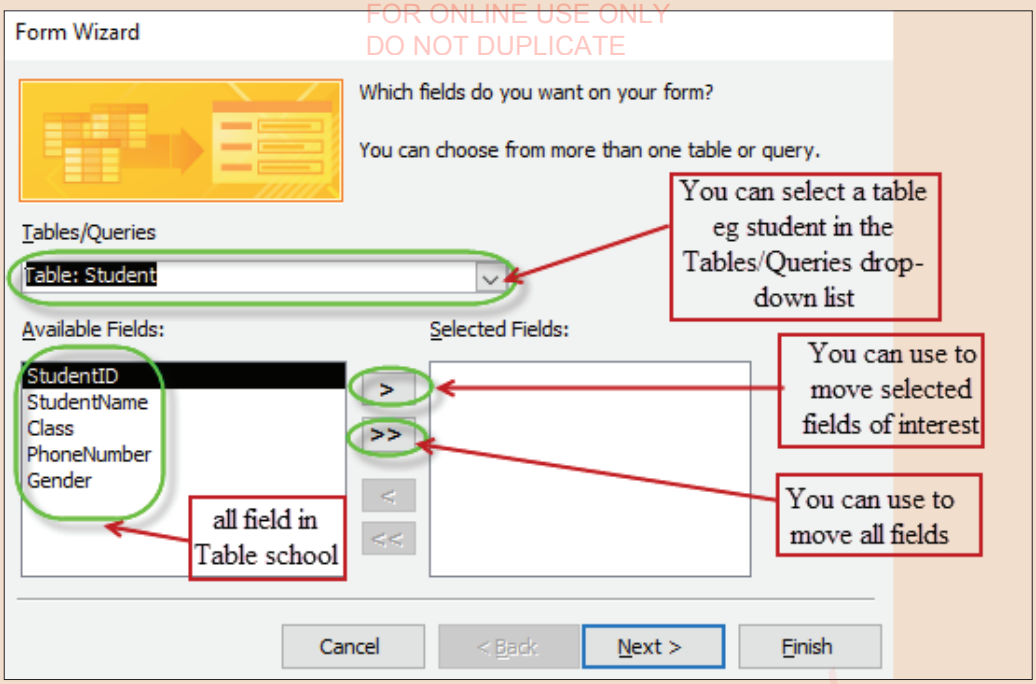


Figure 7.23: *Form Wizard-I*

Step 3: Click >> button to move all fields from '**Available Fields**' box to '**Selected Fields**' box in Figure 7.23.

Step 4: Click **Next** button to move to next stage of Form Wizard as shown in Figure 7.24.

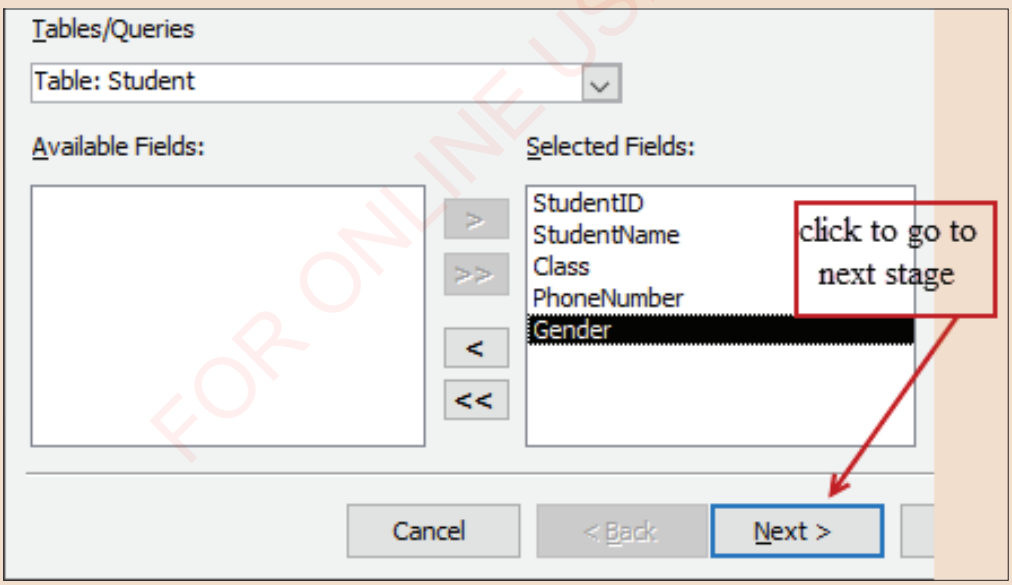


Figure 7.24: *Form Wizard-II*

Step 5: Select **Columnar** in this case and click 'Next' to move to last page of Form Wizard as shown in Figure 7.25.

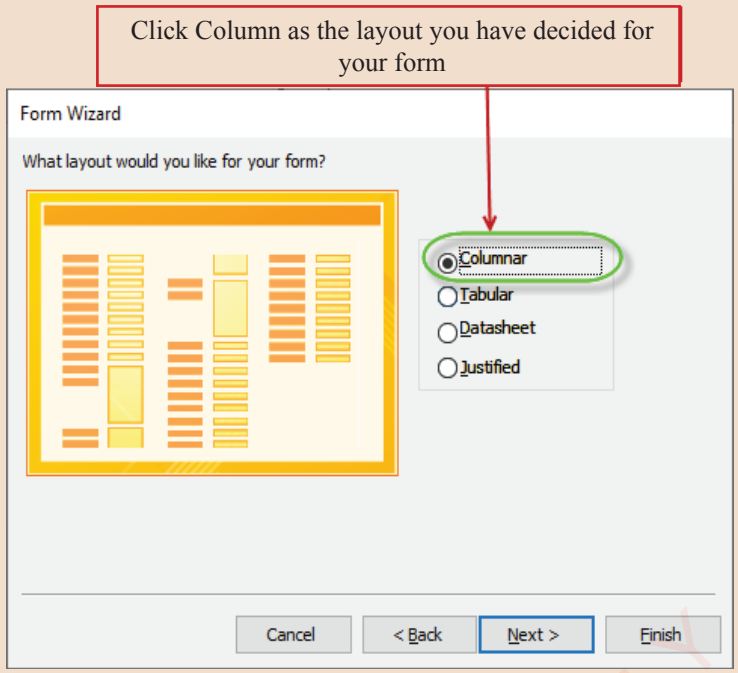


Figure 7.25: *Form Wizard-III*

Step 6: Type StudentsRecord as the title of the form to be created, then click '**Finish**' as shown in Figure 7.26.

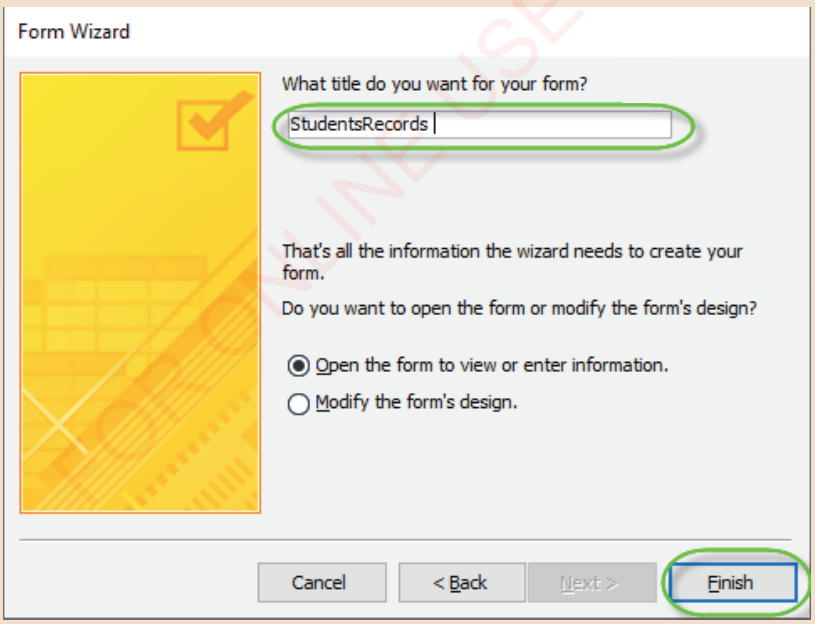


Figure 7.26: *Form Wizard-IV*

Step 7: After clicking **Finish** button, your form will look like the one in Figure 7.27:

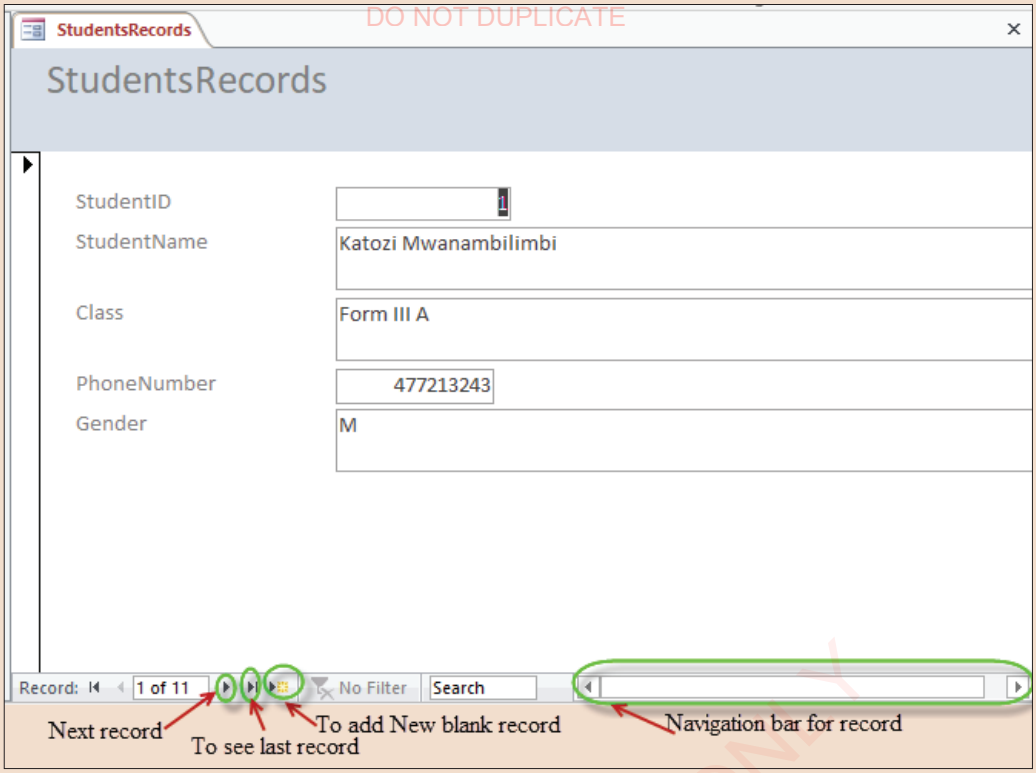


Figure 7.27: *Form Wizard-V*

You have now created your form 'StudentsRecords' which may assist users of your database to see display of data or one record at a time from the table 'student'.

Activity 7.13: Entering data using Forms

Use the following steps to enter more records in table 'Student' using the 'StudentsRecords' form.

Step 1: Using the form you have created, click the '**New (blank) Record**' which is at the bottom of the form as shown in Figure 7.28(a).

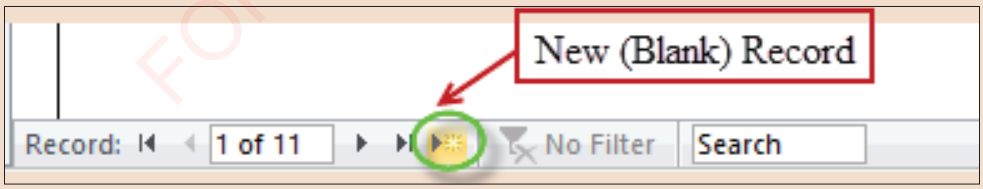


Figure 7.28(a) *Clicking New (blank) record*

Step 2: Press once to the **Tab** key of your keyboard, then enter the following records in respective fields as shown in Figure 7.28(b) and (c).

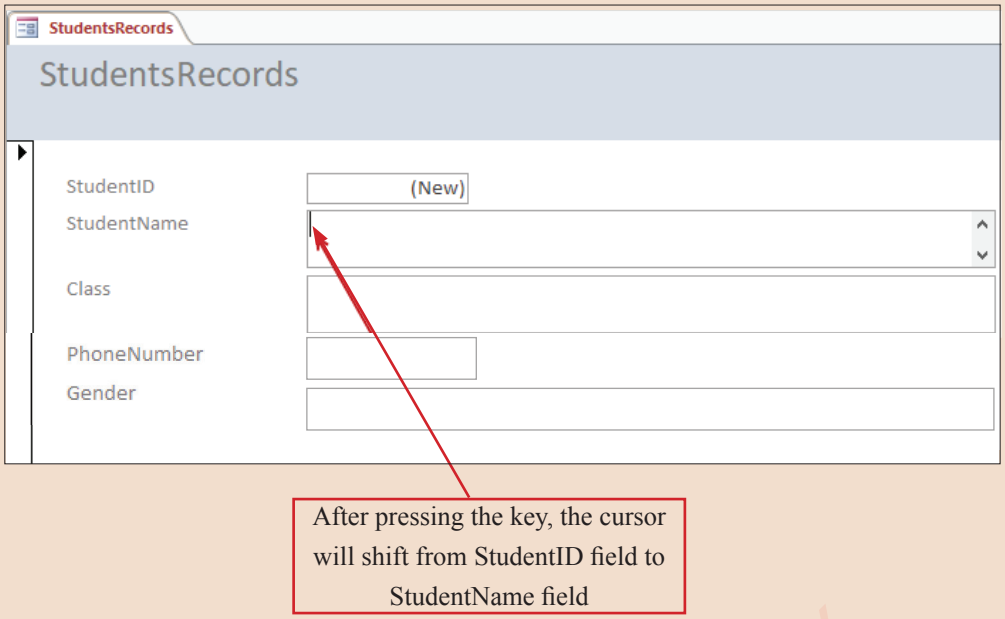


Figure 7.28(b): *Entering data using form-I*

Records:

Student Name	Class	Phone Number	Gender
Mponjori Hashim	Form I D	0453908764	M
Malaika Palugendo	Form II A	0453287610	F

Figure 7.28(c): *Entering data using form-II*

Step 3: After having entered the data into the form, press the **Tab** key. Your entered records will be saved and the new blank record will show up again.

Step 4: Click the **close** button on the form, then the form will show up on navigation pane as shown in Figure 7.28(d):

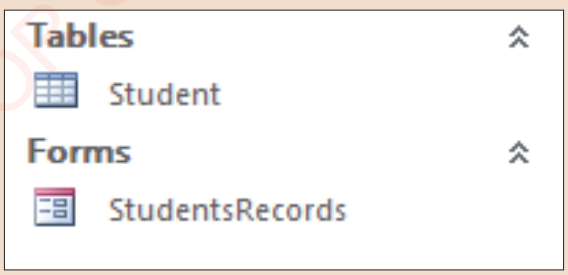


Figure 7.28(d): *Form field on navigation bar*

Step 5: Double-click the table 'Student' to open it in datasheet view. The last two records as shown in Figure 7.28(e) are the ones you have added by using a form.

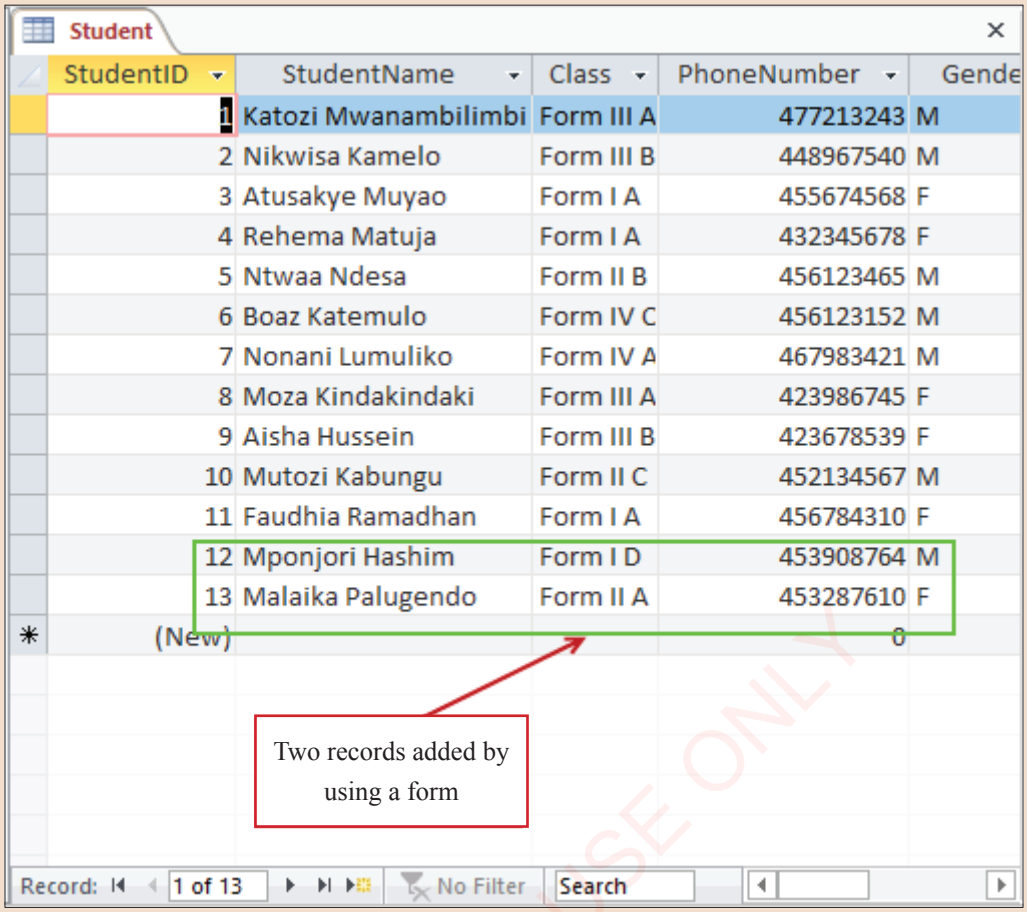


Figure 7.28(e): *Records added by using a form in Access 2016 table*

Step 6: Close the database 'school' to exit.

Activity 7.14: Creating a form using Form Design tool

Open the database 'school' created earlier and use it to create a form through the following steps:

Step 1: Click the **Form Design** button in the Forms group of the 'Create Tab'. A new blank form will show up in design view as shown in Figure 7.29(a):

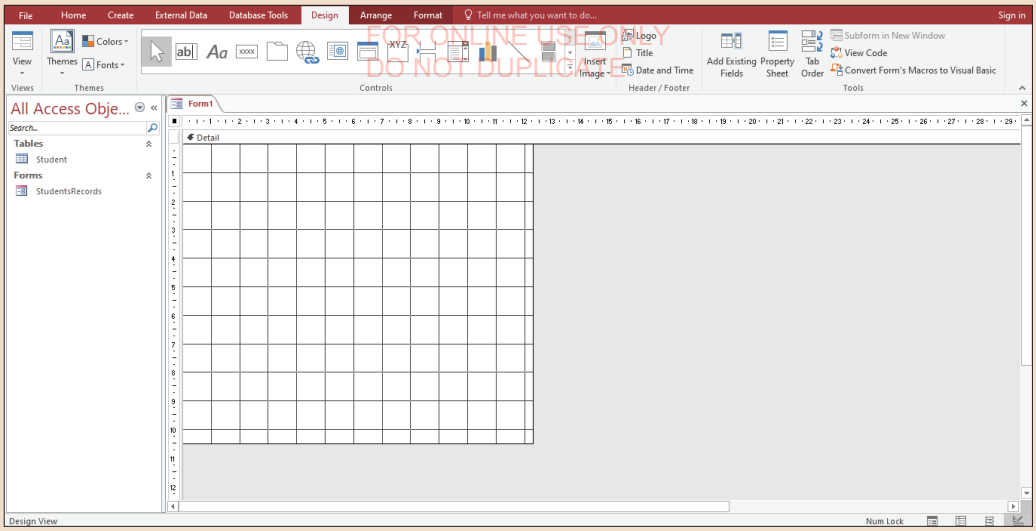


Figure 7.29(a): *Form design-I*

Step 2: Click the **Add Existing Fields** button on the Form Design Tools in the Tools group, the Field List pane will show up on the right side of the page as in Figure 7.29(b).

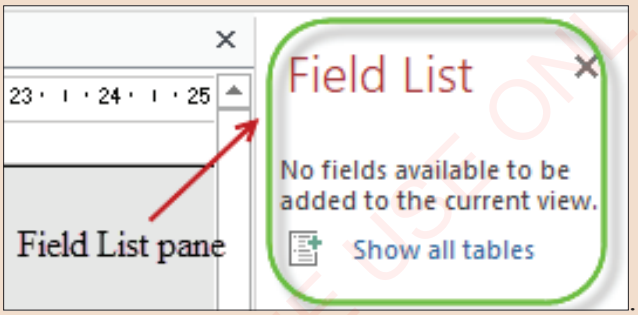


Figure 7.29(b): *Form design-II*

Step 3: Click the **Show all tables** link then plus sign (+) to the left of table name to expand as shown in Figure 7.29(c).

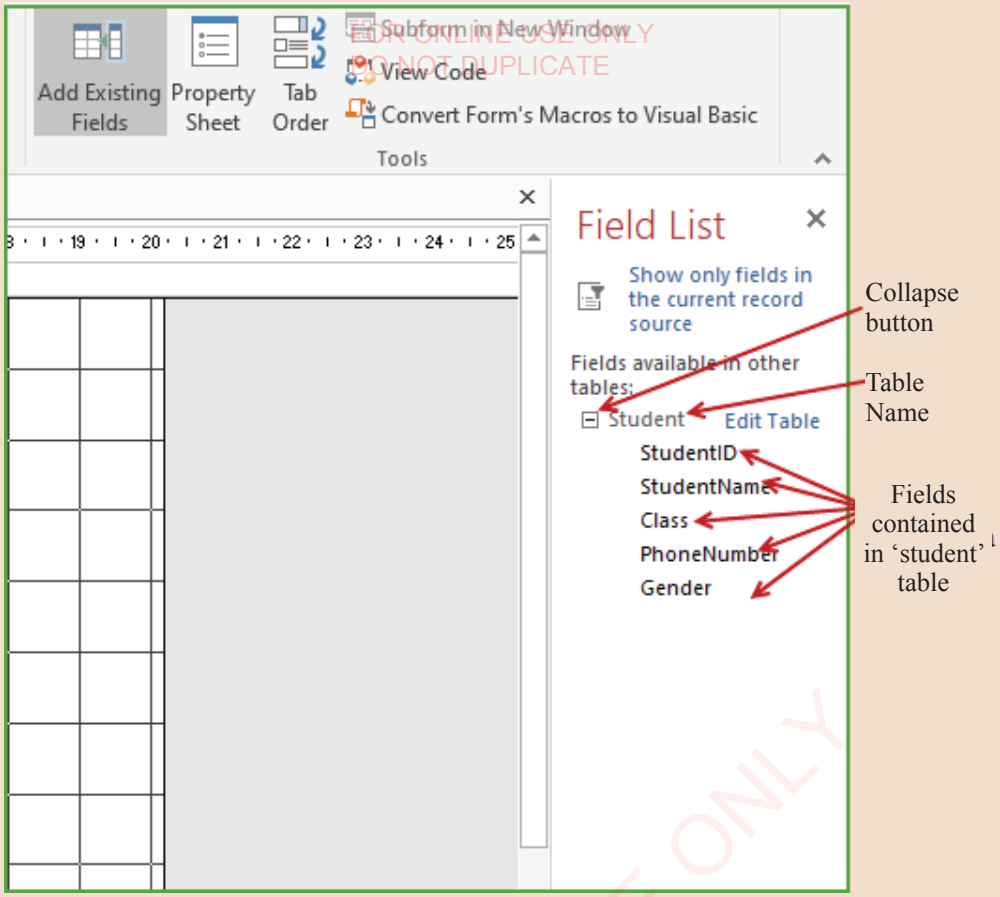


Figure 7.29(c): *Form design-III*

Step 4: Double-click one field after another to add it to a form. Your form will look as shown in Figure 7.29(d).

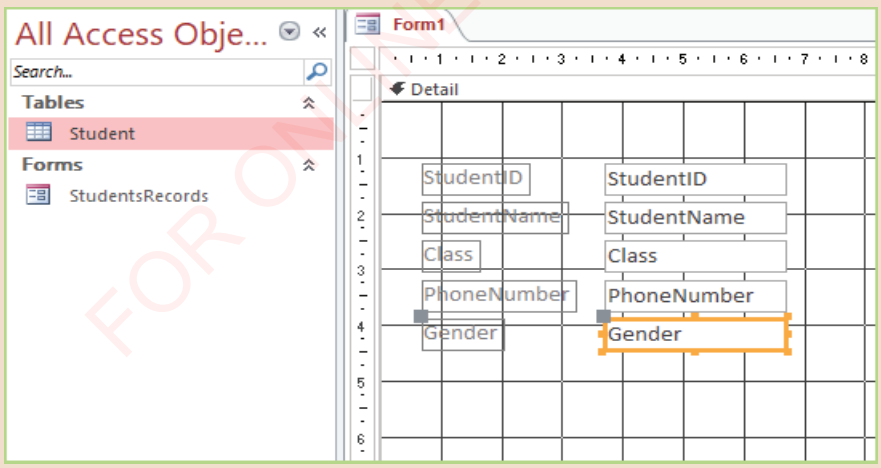


Figure 7.29(d): *Form design-IV*

Step 5: Click the **File tab** then click **Save** .

Step 6: In the 'Save As' box type **StudentsRecords_2** then click **OK** to save your form.

Step 7: In the views group of the '**Design**' tab, click **View** then click **Form view** as shown in Figure 7.29(e) for the form to show up in Form View.

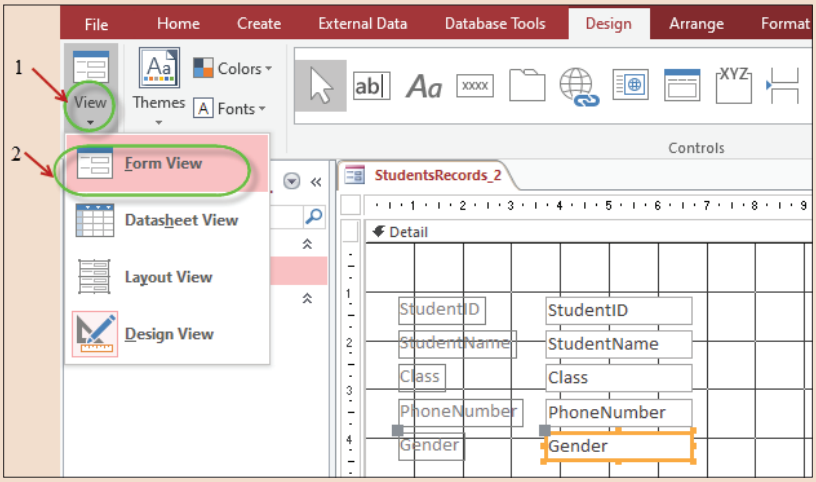


Figure 7.29(e): *Form design-V*

After completing all the seven steps, your final form will look as the one shown in Figure 7.29(f).

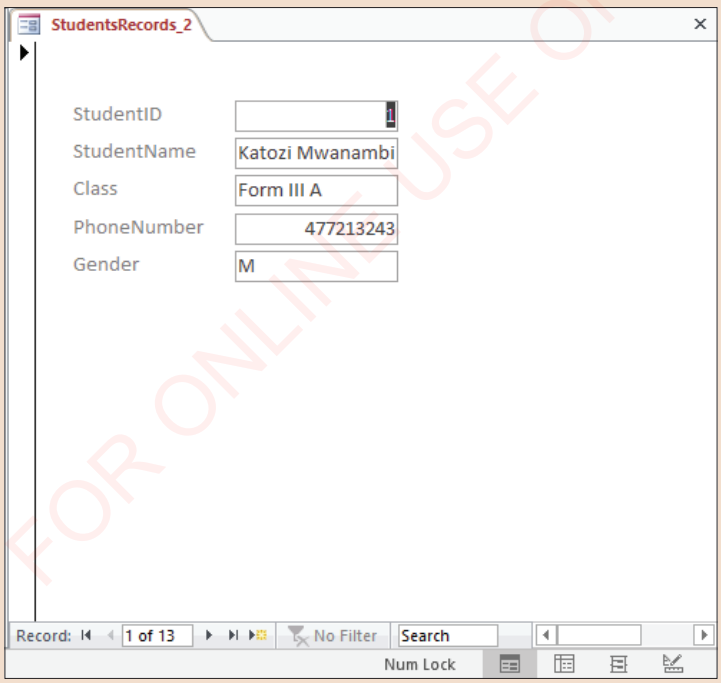


Figure 7.29(f): *Form design View*

Step 8: Click **close (x)** button to exit the form.

Using help facility in Microsoft Access database

Microsoft Access 2016 help facility is connected with online services. Access 2016 uses question mark symbol (?) as a link to help facility. Figure 7.30 (a) shows where to locate a help facility for Microsoft Access 2016.

Activity 7.15: Using Help Facility

Step 1: Go to start button to open the Access 2016

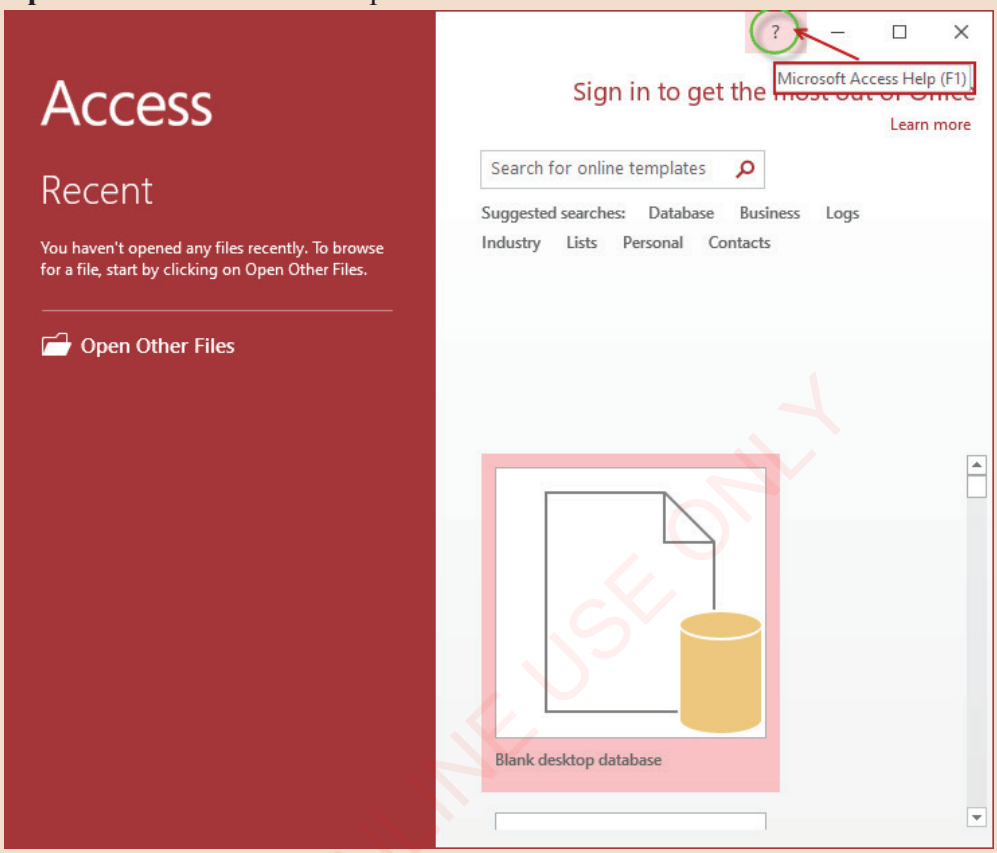


Figure 7.30(a): *Access 2016 Help facility*

Step 2: Click the question mark symbol (?) to open the search box for Access 2016 help. With a single click in help facility button, the box to write what you want to search will display as shown in Figure 7.30(b).

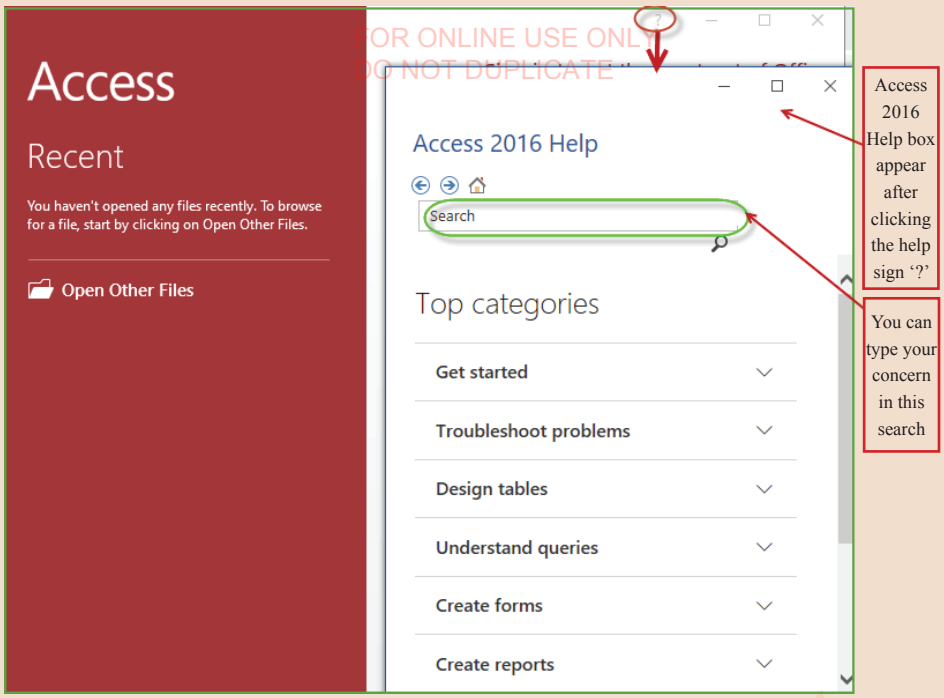


Figure 7.30(b): *Help Facility search box-I*

Step 3: Type in a **Search** box **create form by Form tool** as shown in Figure 7.30(c)

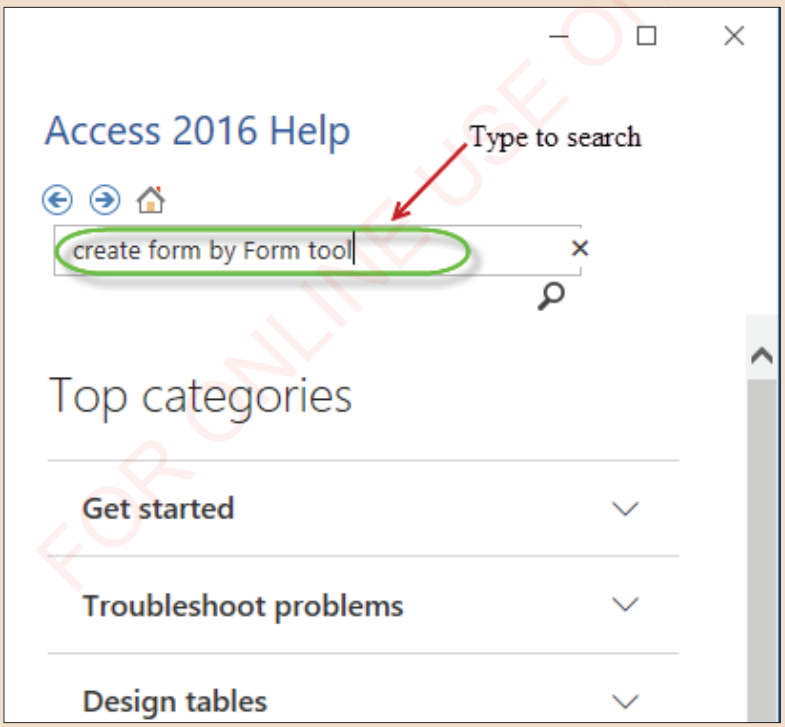


Figure 7.30(c): *Help Facility search box-II*

After the search has completed, the result of your search will display as shown in Figure 7.30(d)

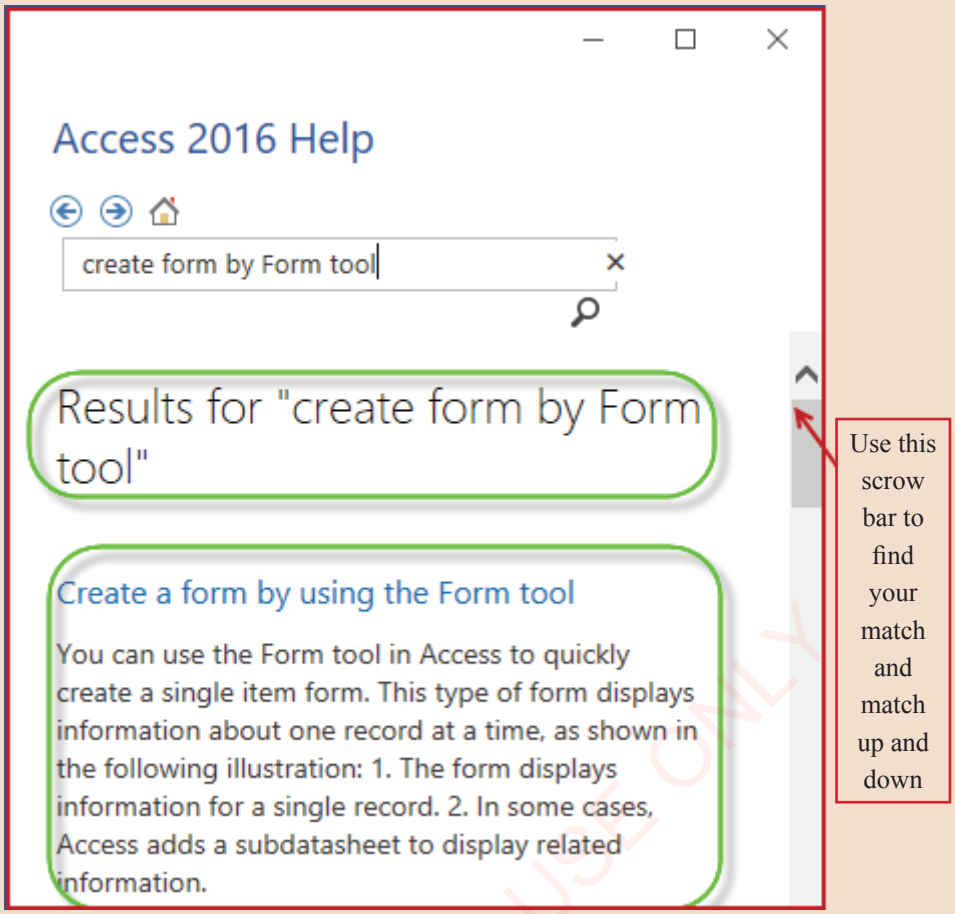


Figure 7.30(d): *Information obtained using Help Facility search box*

Creating a query

A set of instructions that is used to work with data in the database is known as a query. Creating a Microsoft Access query is like asking the database a question for it to give an answer. When you run a query, the instructions are taken to a database and answers are provided. The results brought by a query can be filtered, sorted or grouped. A query can perform calculations, combine data from different tables and add, change or delete. There are several types of queries including the following:

Select queries

The most common type of query is 'select queries' which retrieve data from one or more tables (using criteria you specify) and display the results in a datasheet. '**Select queries**', may be used to group records as well as perform calculations including sums, counts and averages.

Parameter queries

When this query is executed, it displays its own dialogue box prompting you for information, such as criteria for retrieving records or a value you wish to insert in a field.

Crosstab queries

You can use crosstab queries to calculate and restructure data for easier analysis. Use a crosstab query to calculate sum, average, count, or other type of total for data that is grouped by two types of information.

Action queries

An action query uses just one operation to make changes or move many records. There are four types of action queries: Delete, Update, Append, and Make-Table Queries.

When you create a query, sometimes you use search criteria and logical operators as shown in Table 7.1 and 7.2 so as to retrieve specific data like numbers, terms or date/time.

Table 7.1: *Examples of query criteria:*

Criteria Name	Symbol with expression	Function
Equal to	= “x” or =x	Searches values which are equal to x
Less than	< x	Searches all values which are smaller than x
Greater than	> x	Searches all values larger than x
Does Not Equal	Not in (“x”)	Searches for all values except those equal to x
Null	Is Null	Searches for empty fields
Not Null	Is Not Null	Searches for non-empty fields
Contains	Like “*x*”	Searches for all values that contain x
Do Not Contain	Not like “*x*”	Searches for all values except that which contain x
Between	Between “x” and “y”	Searches for values in the range between x and y
Less Than or Equal To	<= x	Searches for all values smaller than or equal to x
Greater Than or Equal To	>= x	Searches for all values larger than or equal to x
Today	=Date()	Searches for all records containing today’s date

Table 7.2: *Examples of logical operators*

Operator	Criteria	Example
AND	CourseCode= "ICS201" AND Marks >=60	Displays students with course code ICS 201 who have marks 60 and above 60
OR	CourseCode= "ICS201" OR Marks >=60	Displays all students with course code ICS 201 who have marks 60 or other students who have marks 60 or above 60
NOT	CourseCode NOT "ICS201"	Displays all students who do not have ICS 201

Activity 7.16: Creating a simple Query using Query Wizard

Create a query using the table 'StudentCourse' from the 'school' database you have created earlier.

Step 1: Start Access 2016 and open the database 'school' which must have the table 'StudentCourse' that you have to create as shown in Figure 7.31(a).

studentCourse

RegNumb	FirstName	SurName	CourseCo	CourseNa	Marks
1110	Aidan	Mkong'oto	ICS 201	Information	80
1111	Edgar	Kaseko	PH 200	Physics	45
1112	Kajuni	Mtikisiko	ICS 201	Information	79
1113	Proud	Sadiki	CH 300	Chemistry	100
1114	Staha	Karubandiko	CH 300	Chemistry	45
1115	Kamtu	Sabai	ICS 201	Information	80
1116	Mainess	Julius	ICS 201	Information	50
1117	Antonio	Seleman	ICS 201	Information	40
1118	Sarai	Mzirai	CH 300	Chemistry	35
1119	Fridanga	Msasati	PH 200	Physics	70
1120	Ndegejohn	Kigoda	CH 300	Chemistry	80
1121	Kwale	Mpori	PH 200	Physics	75
1122	Tukuzeni	Ahimidiwe	ICS 201	Information	97
1123	Rukia	Abdul	PH 200	Physics	85
1124	Misenene	Kamuzu	CH 300	Chemistry	75
1125	Majengo	Mzuzu	ICS 201	Information	45
1126	Mbuzi	Majige	PH 200	Physics	85
1127	Simbilisi	Kanzige	ICS	Information	30
1128	Chakwenu	Lawama	ICS	Information	25

Figure 7.31(a): *Access 2016 database table*

Step 2: Go to '**Create**' tab in the '**Query Group**' and click '**Query Wizard**' button. The New Query Wizard dialog box will show up as in Figure 7.31(b).

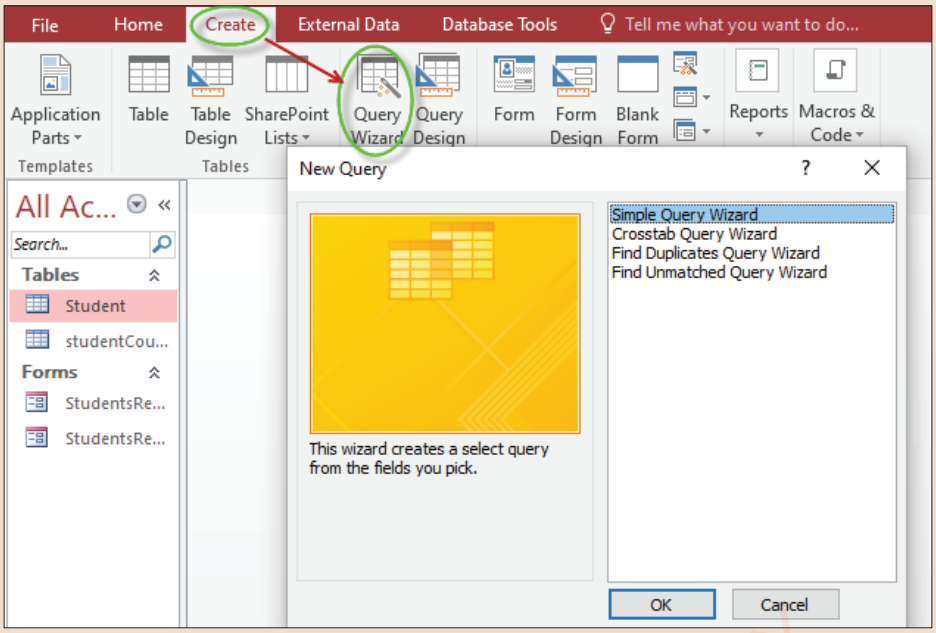


Figure 7.31(b): *Creating simple query*

Step 3: First click **Simple Query Wizard** then click **OK.** The Simple Query Wizard will show up as shown in Figure 7.31(c)

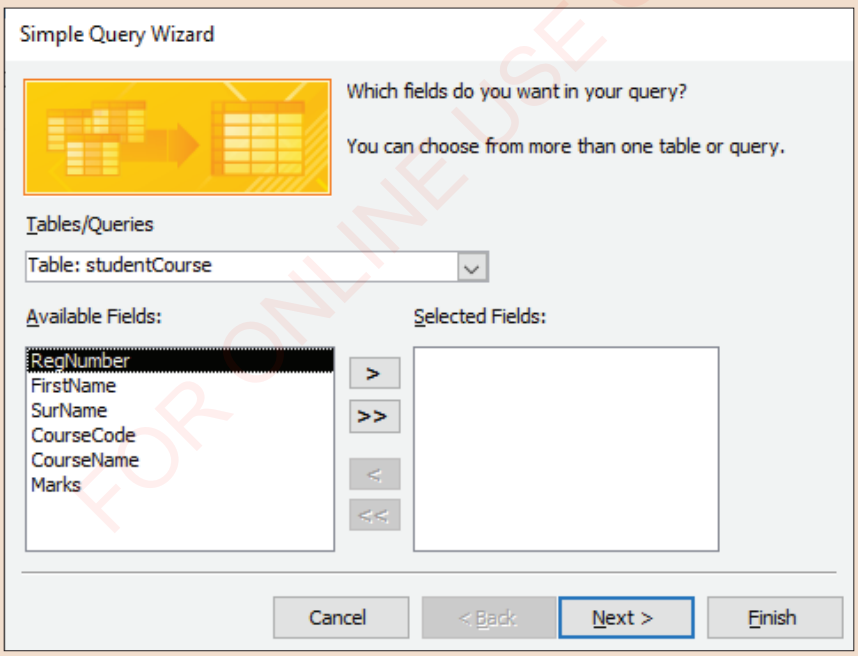


Figure 7.31(c): *Creating simple query selecting fields-I*

Step 4: In the Table/Queries drop down menu, select the table '**studentCourse**'.

Step 5: Double-click one field after the other present under '**Available Fields**' as shown in Figure 7.31(d) to move to '**Selected Fields**' side. Then, click '**Next**'.

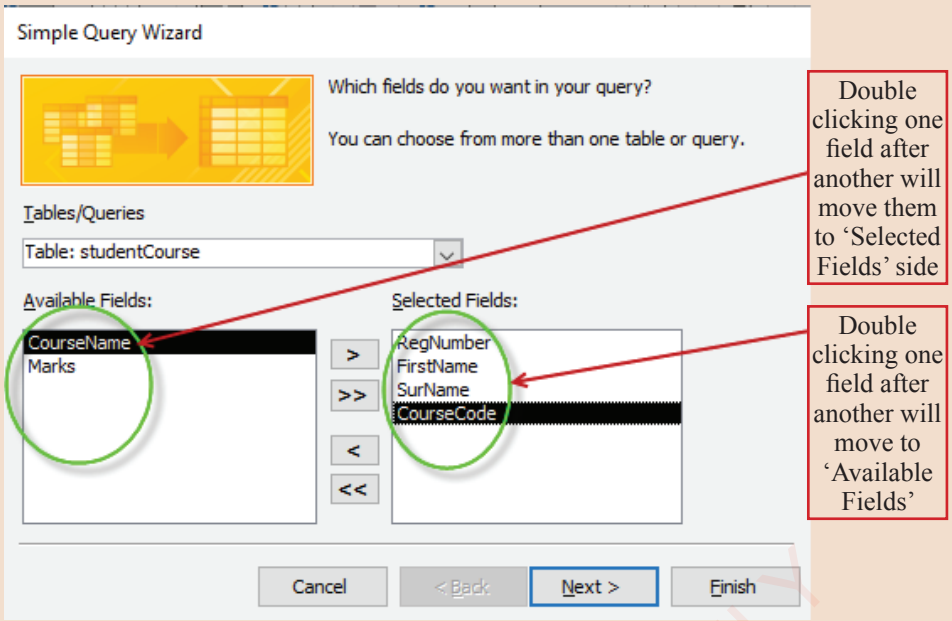


Figure 7.31 (d): *Creating simple query selecting fields-II*

Step 6: Figure 7.31(e) will appear, click **Next** to proceed

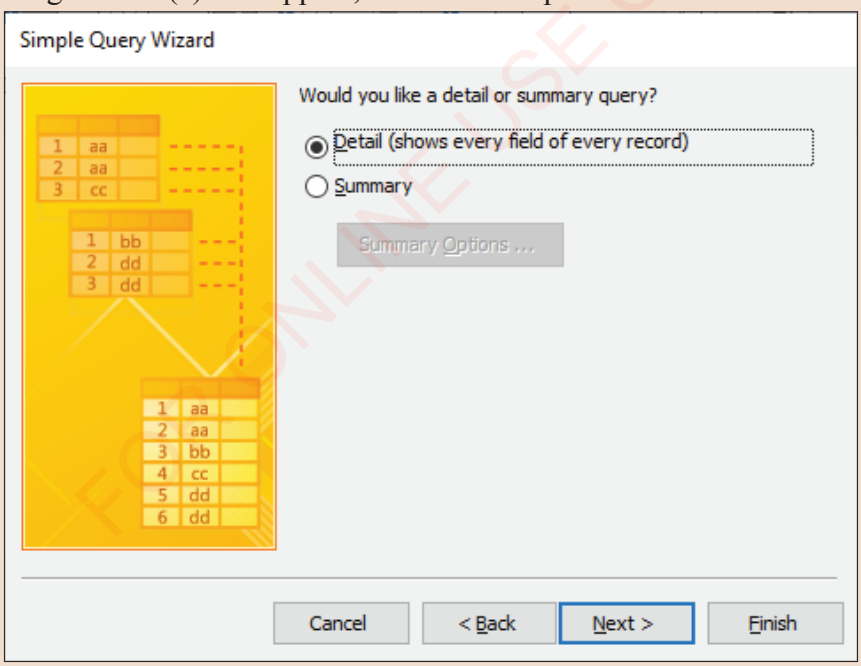


Figure 7.31(e): *Creating simple query-detail query*

Step 7: Select 'Modify the query design' then click **Finish** as shown in Figure 7.31(f)

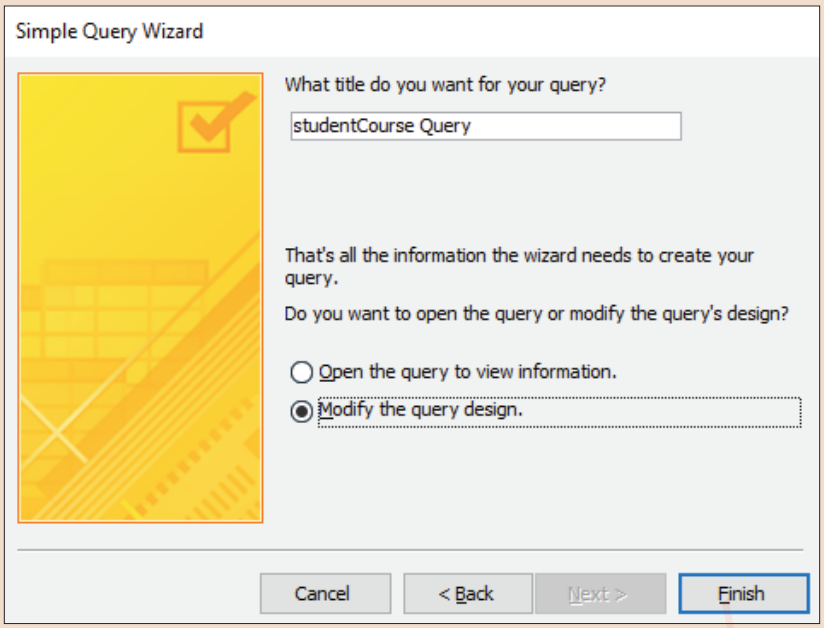


Figure 7.31(f): *Creating simple query–modify query*

Step 8: Click **Finish** to display the Query. In the Criteria row of the CourseCode Field, type "ICS 201" to show up the records for students with CourseCode ICS 201, sort them in **ascending** order as shown in Figure 7.31(g).

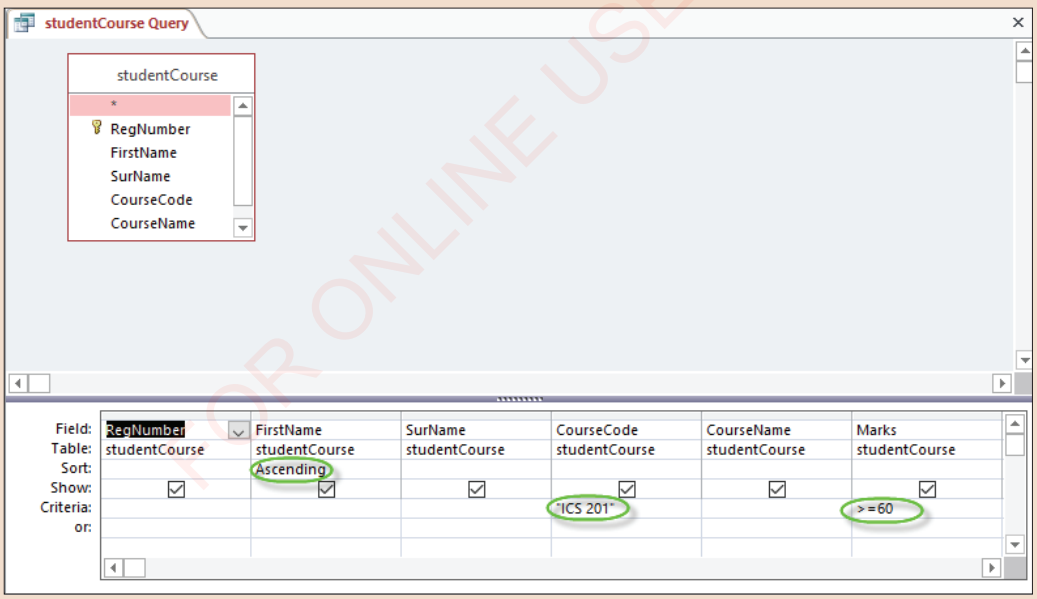


Figure 7.31(g): *Creating simple query –checking and unchecking fields*

All the check boxes in the 'show' row are ticked. This shows that all selected fields will show up in the query result. If you intend to show few fields in the query results, then you have to untick the check boxes.

Step 9: In the '**Results Group**' of '**Query Tools Design**' tab, first click View button and then click '**Datasheet View**' as shown in Figure 7.31(h).

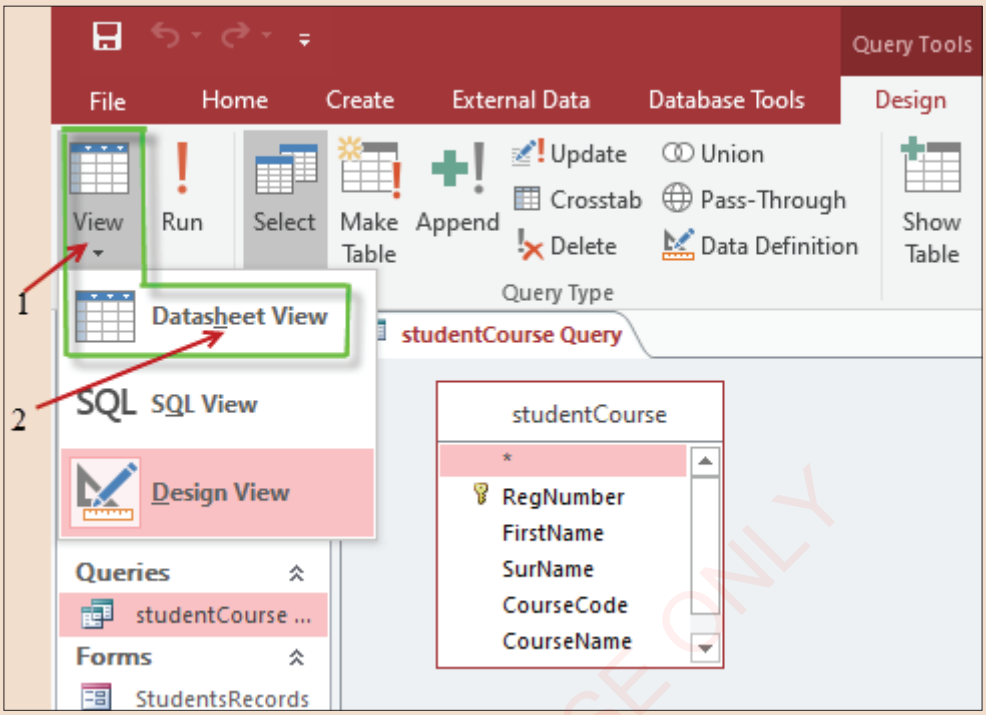
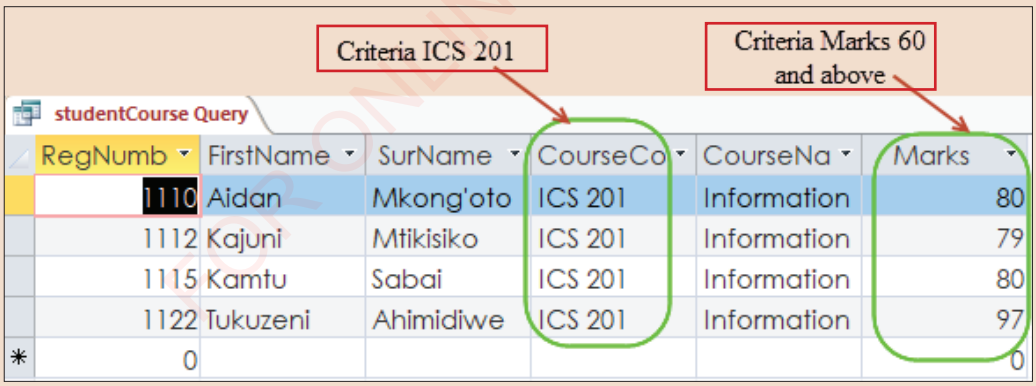


Figure 7.31(h): *Viewing created query*

The query results display all students who study CourseCode 'ICS 201' and have Marks 60 and above as shown in Figure 7.31(i).



RegNumb	FirstName	SurName	CourseCo	CourseNa	Marks
1110	Aidan	Mkong'oto	ICS 201	Information	80
1112	Kajuni	Mtikisiko	ICS 201	Information	79
1115	Kamtu	Sabai	ICS 201	Information	80
1122	Tukuzeni	Ahimidiwe	ICS 201	Information	97
*	0				0

Figure 7.31(i): *Query output by query wizard-I*

Trying when condition is ‘ CourseCode ICS 201 OR Marks <=60. The query results are as shown in Figure 7.31(j)

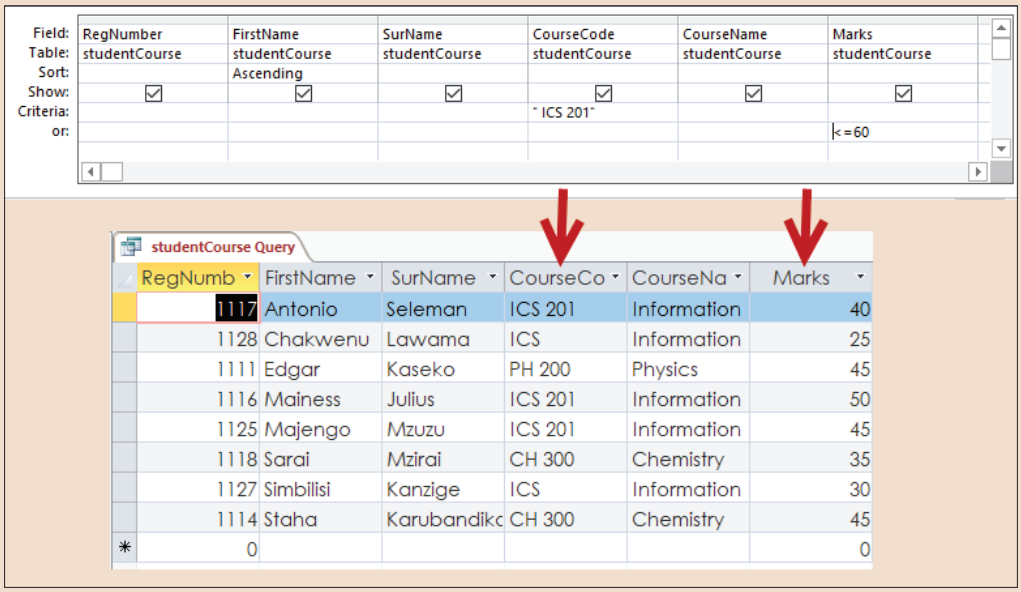


Figure 7.31(j): *Query output by query wizard-II*

Activity 7.17: Creating a query in Design View

Most of the queries described may be created using a query wizard. However, design view is useful for creating queries that are more complex and revising existing queries.

Step 1: Open database ‘school’

Step 2: On the **Create** tab, in **Queries Group**, click **Query Design** button as shown in Figure 7.32(a)

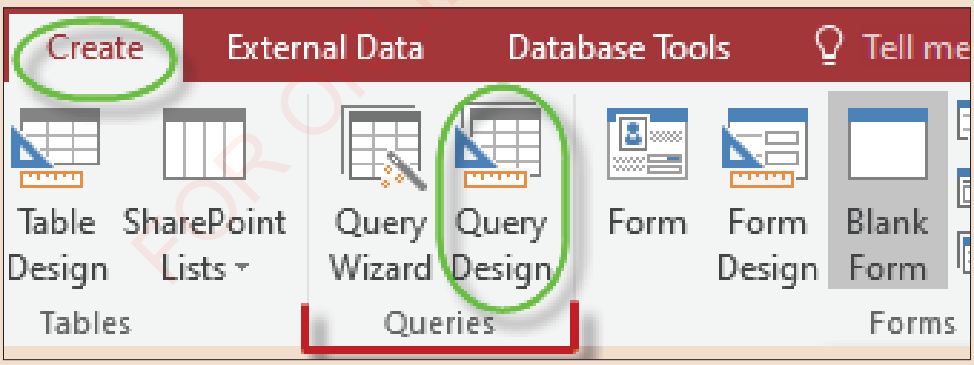


Figure 7.32(a): *Creating query using query design button*

The **Show Table** window will appear as shown in Figure 7.32(b)

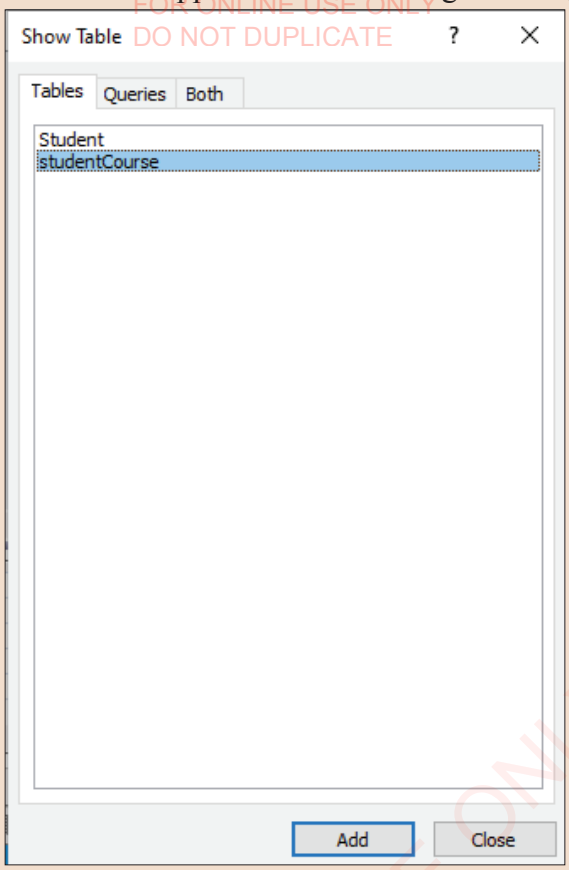


Figure 7.32(b): *Creating query –selecting table-I*

Step 3: Click the name of the table you wish to query, in this case select studentCourse table.

Step 4: Click the button labelled **Add**. The selected tables will appear at the top of the query window as shown in Figure 7.32(c)

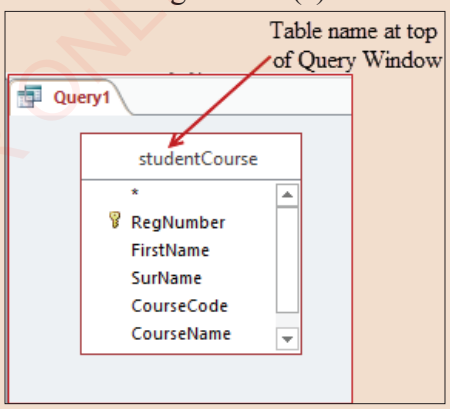


Figure 7.32(c): *Creating query –selecting table-II*

Step 5: Double click on the name of each field you wish to add to your query.

Step 6: On the **Design Tab**, click the **Run** button. Your query results will appear in datasheet view as seen in Figure 7.32(d):

Query1

RegNumb	CourseName	Marks	CourseCode
1110	Information	80	ICS 201
1111	Physics	45	PH 200
1112	Information	79	ICS 201
1113	Chemistry	100	CH 300
1114	Chemistry	45	CH 300
1115	Information	80	ICS 201
1116	Information	50	ICS 201
1117	Information	40	ICS 201
1118	Chemistry	35	CH 300
1119	Physics	70	PH 200
1120	Chemistry	80	CH 300
1121	Physics	75	PH 200
1122	Information	97	ICS 201
1123	Physics	85	PH 200
1124	Chemistry	75	CH 300
1125	Information	45	ICS 201
1126	Physics	85	PH 200
1127	Information	30	ICS
1128	Information	25	ICS
*	0	0	

Record: 1 of 19 No Filter Search

Figure 7.32(d): *Query output from query design view*

Creating Query using two relational tables

Activity 7.18: Creating query for two related tables

Step 1: On the '**Create**' tab, in the '**Queries group**', click '**Query Wizard**'.

Step 2: In the dialog box that appear, click **Simple Query Wizard**, then click **OK**.

Step 3: In the Tables/Queries dialog box, click the table **Student** to include in your query.

Step 4: Click all fields you want to include in your query one after the other using single right arrow button to move them to the '**Selected Fields**' list.

Step 5: In the dialog box again, click the table **StudentBestResults**. Then, repeat step four.

Step 6: Add the fields that you want to use to enhance your query results to the '**Selected Fields**' list and then click **Next,** then **Finish**. Figure 7.33(a) will show up, if it does not show up click '**DesignView**' in '**View**' button of the '**Home**' tab.

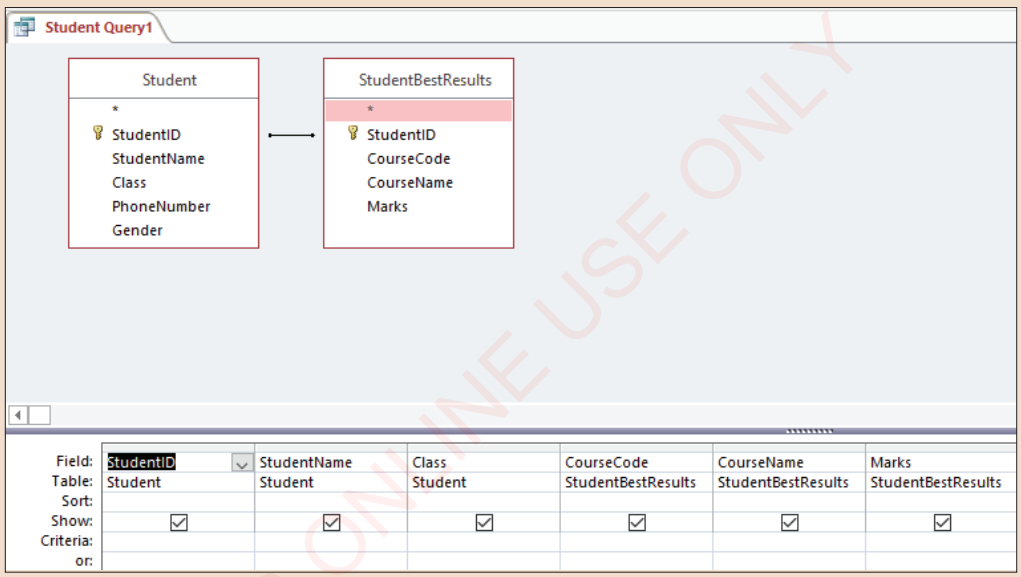


Figure 7.33(a): *Creating query for two tables-adding fields*

Step 7: Run the query to view the results. Figure 7.33(b) shows a query result obtained from two related tables.

Student Query1

StudentID	StudentName	Class	CourseCode	CourseName	Marks
1	Katozi Mwanambilimbi	Form III A	ICS 201	Information	100
2	Nikwisa Kamelo	Form III B	PH 200	Physics	98
3	Atusakye Muyao	Form I A	CH 300	Chemistry	85
4	Rehema Matuja	Form I A	HT 100	History	90
5	Ntwaa Ndesa	Form II B	GE 101	Geography	85
6	Boaz Katemulo	Form IV C	CV 103	Civics	100
7	Nonani Lumuliko	Form IV A	PH 200	Physics	95
8	Moza Kindakindaki	Form III A	HT 100	History	85
9	Aisha Hussein	Form III B	CH 300	Chemistry	75
10	Mutozi Kabungu	Form II C	ICS 201	Information	95
11	Faudhia Ramadhan	Form I A	PH 200	Physics	90
12	Mponjori Hashim	Form I D	GE 101	Geography	73
13	Malaika Palugendo	Form II A	CV 103	Civics	98
(New)					

Figure 7.33(b): *Query output generated from two related tables*

Generating reports

Data entered in the database may be needed for future use in various activities including decision-making. Access 2016 provides a number of tools that help the user to quickly build attractive and easy-to-read reports that present data in a way that best suits the needs of its users.

Commands tab can be used to create a simple report with a single click. Report Wizard can also be used to create a more complicated report. Furthermore, report can be created by adding all the data and formatting elements individually. Whichever chosen method, you will probably need to make at least few changes to the design of the report to make it display the data the way you wish.

In order to have a well-designed and organised report from the database, there are some important things that need to be considered.

(a) *Decide how to layout your report*

To design a report, you must first consider the type of data to be reported and how you want them to be arranged on the page and stored in the database. During the design process, you might find that the arrangement of data in tables would not create the desired report. That will be an indication that the tables need modification.

(b) Use control layouts to align your data

Control layouts is one of the Access 2016 features. They are guides that can be manipulated like text-box and added to a report while opened in Layout view or Design view. Access adds control layouts automatically when you use the Report Wizard to build a report, or when you create a report by clicking **Report** in the

Reports group of the **Create** tab. A control layout is like a table, of which each cell can contain a label, a text box, or any other type of control as shown in Figure 7.34.

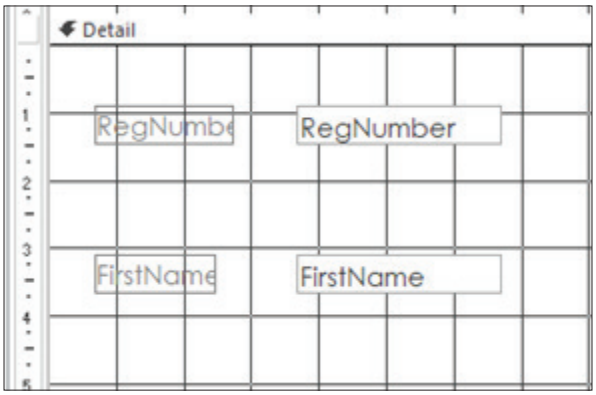


Figure 7.34: *Example of control layout*

Create Report Layout Using Design View Mode

Reports are created from one or more tables or queries. To use several tables, you would first create a query to retrieve data from those tables. There are three basic ways to create a report: single mouse click, **Report wizard**, or **Design view**. For the purpose of this book, you will create a report by using '**Design View**'.

'Design View' gives you total freedom and control in designing of report right from the beginning. Controls can be bound to data from your database and displaying data directly or unbound without a link to a data source such as descriptive text, dividing lines, a logo, etc.

Activity 7.19: Creating a report in Design view

Use the table 'StudentCourse' you created in the database 'school' to create report.

Step 1: Open Access 2016

Step 2: On the **Create** tab, in Reports group click **Report Design** as it is shown in Figure 7.35(a).

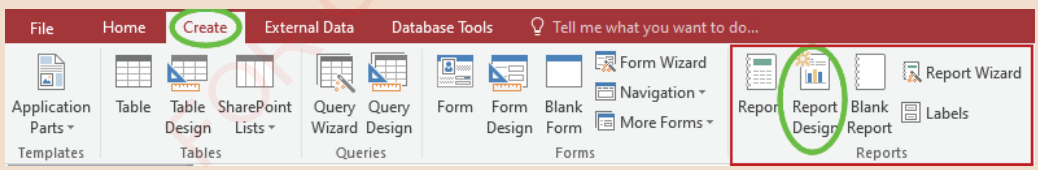


Figure 7.35(a): *Creating report -design view button*

The report blank page appears as in Figure 7.35(b):

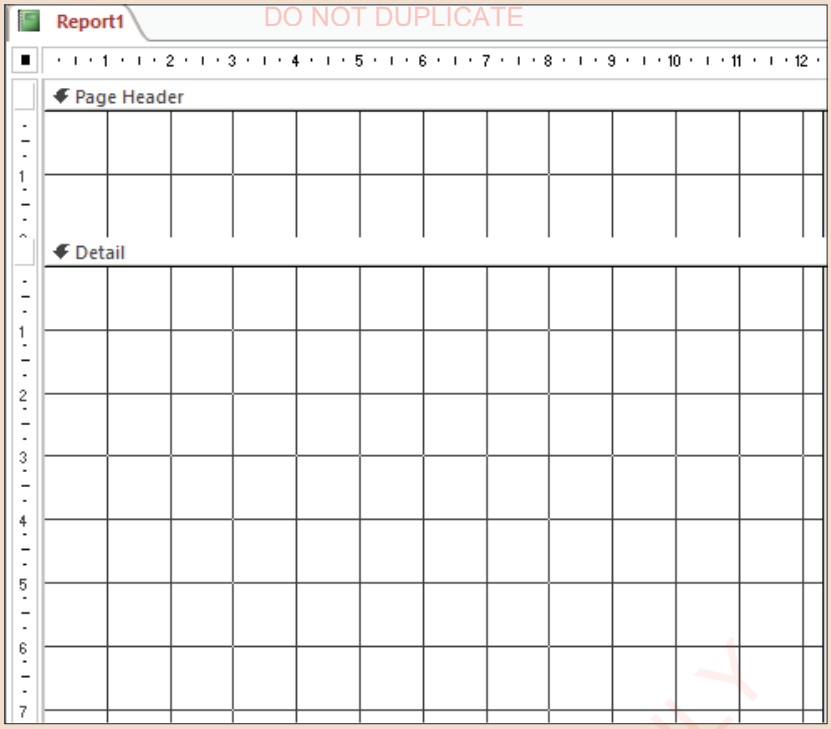


Figure 7.35(b): *Report blank page*

Step 3: On the **Design** tab in the **Tools Group**, click **Add Existing Fields** button to see a list of tables/fields as shown in Figure 7.35(c).

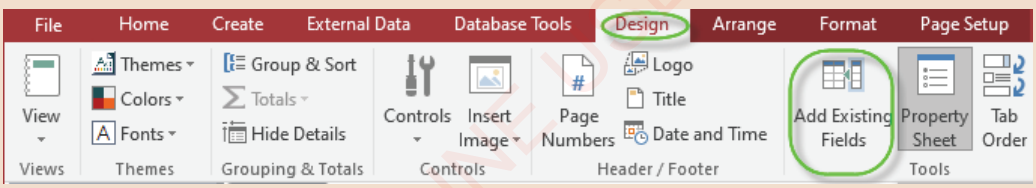


Figure 7.35(c): *Creating report –adding fields*

The list of tables/fields appears to the right side of the screen as shown in Figure 7.35(d).

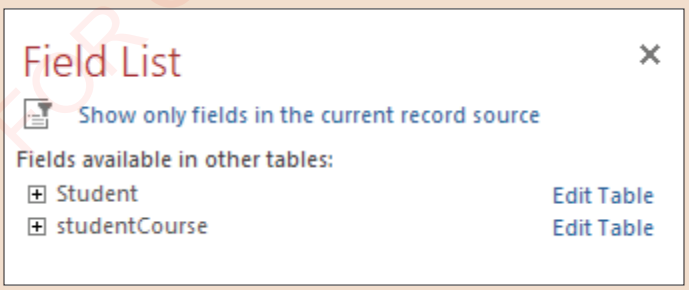


Figure 7.35(d): *Creating report –field list*

Perform page setup

After displaying the list of tables on the 'Field List' window as shown in Figure 7.35(d), it is time to start the report setup. The setup will determine how your report will be displayed in the printout.

Step 4: Expand the tables to view the fields in the tables that you want to use in a report by clicking on the (+) sign as shown in Figure 7.35(e).

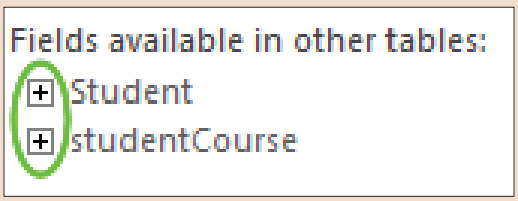


Figure 7.35(e): *Creating report –expanding tables*

Step 5: Double click on the intended field to send it in the setup page as demonstrated in Figure 7.35(f).

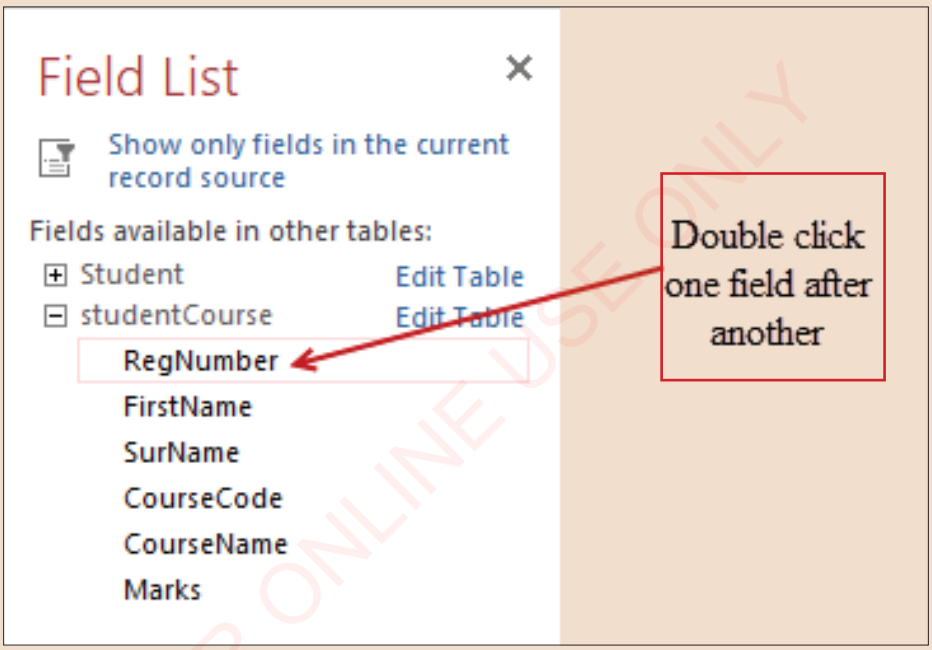


Figure 7.35(f): *Creating report –adding fields-II*

Step 6: Arrange the fields in the setup page to fit to your need as shown in Figure 7.35(g).

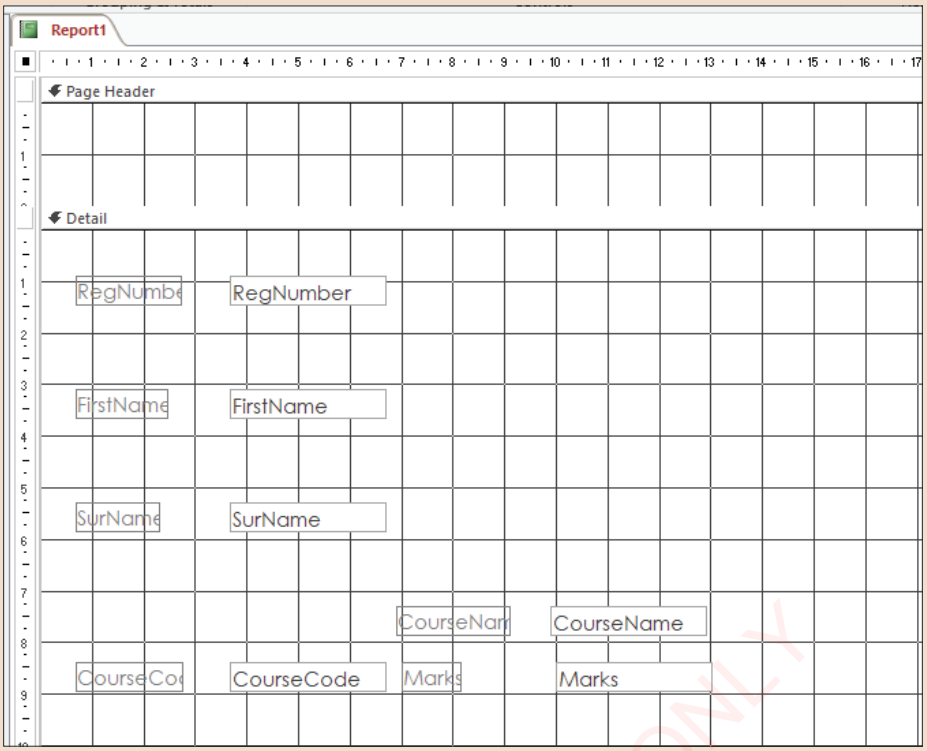


Figure 7.35(g): *Report design view*

Preview report

During the setting up of the report, report preview can be performed to see how the report will look like when printed.

Step 7: On '**Design**' tab, in **View**, click '**Report View**' button or the '**Print Preview**' on the submenu as shown in Figure 7.35(h).

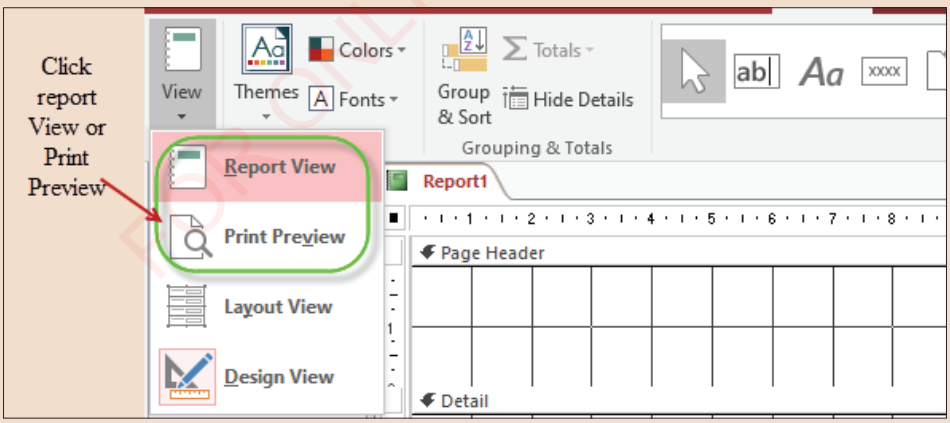


Figure 7.35(h): *Previewing report*

The output of the form will look like the one shown in Figure 7.35(i):

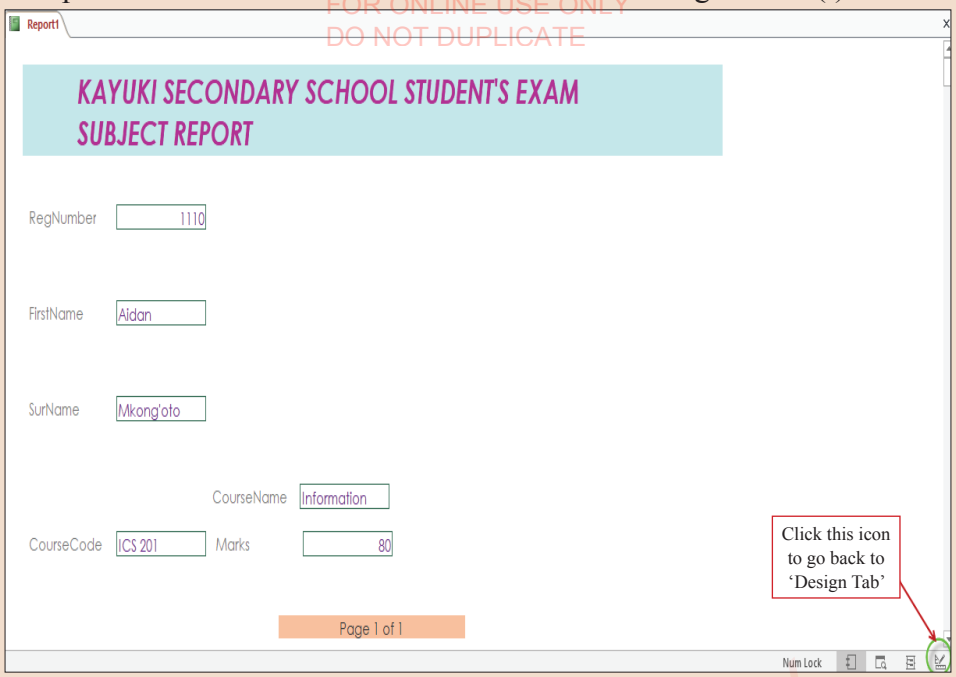


Figure 7.35(i): *Report view*

Step 8: On the '**Design Tab**', in '**Header/Footer**' group, click the '**Title**' button to insert the title of the report as shown in Figure 7.35(j)

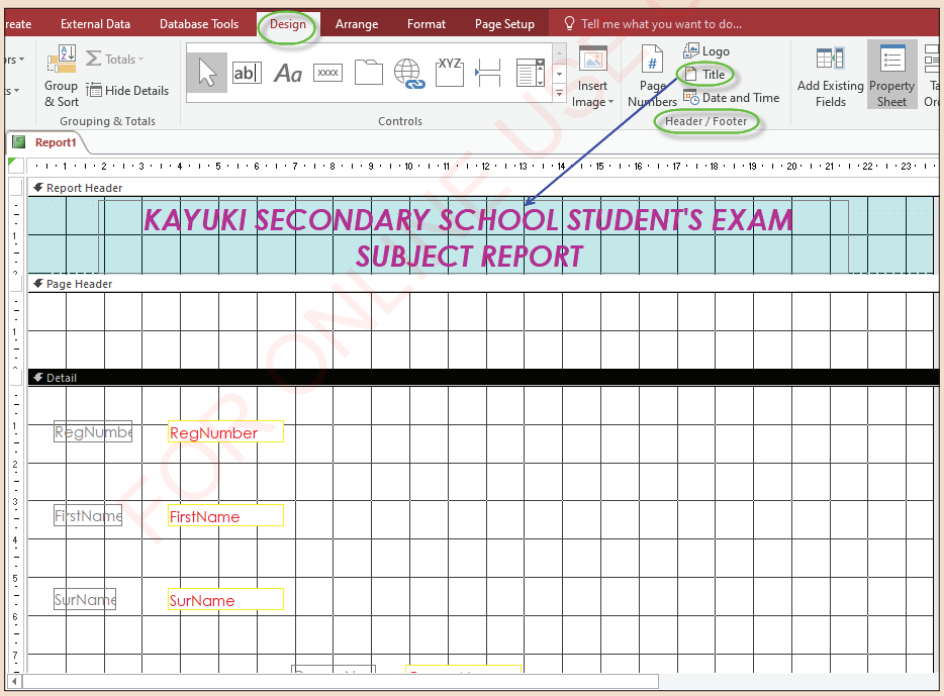


Figure 7.35(j): *Adding title on a report*

Step 9: On the '**Design**' tab, in '**Header/Footer**' group, click the '**Page Number**' button as shown in Figure 7.35(k) to insert the page number of your report

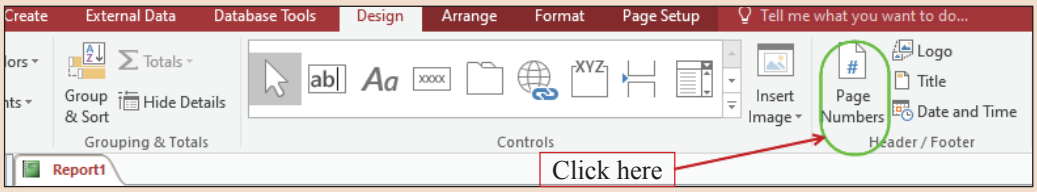


Figure 7.35(k): *Inserting page number on report*

Printing a report

After all the setup works are done, the report can be printed.

Step 10: Click on the **file** menu

i). Choose **Print** (from the print commands you can choose quick print or print preview which gives room to see how the report will appear on the paper and make any changes if needed) as shown in Figure 7.35(l)

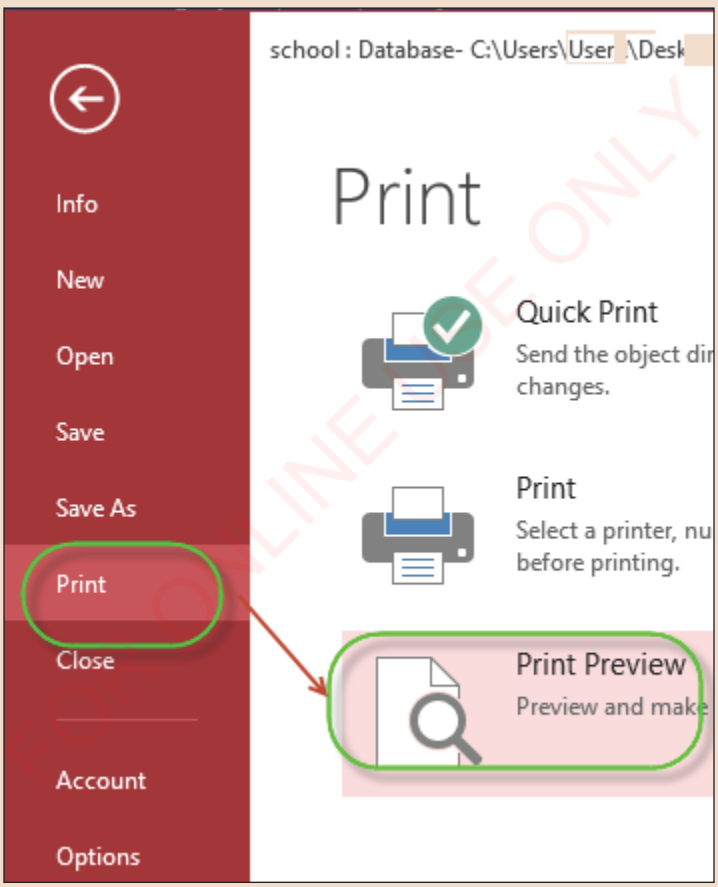


Figure 7.35(l): *Printing report*

ii). Print the report.

You can apply different colours for sections (Header, Details and Footer) in a report as shown in Figure 7.35(m).

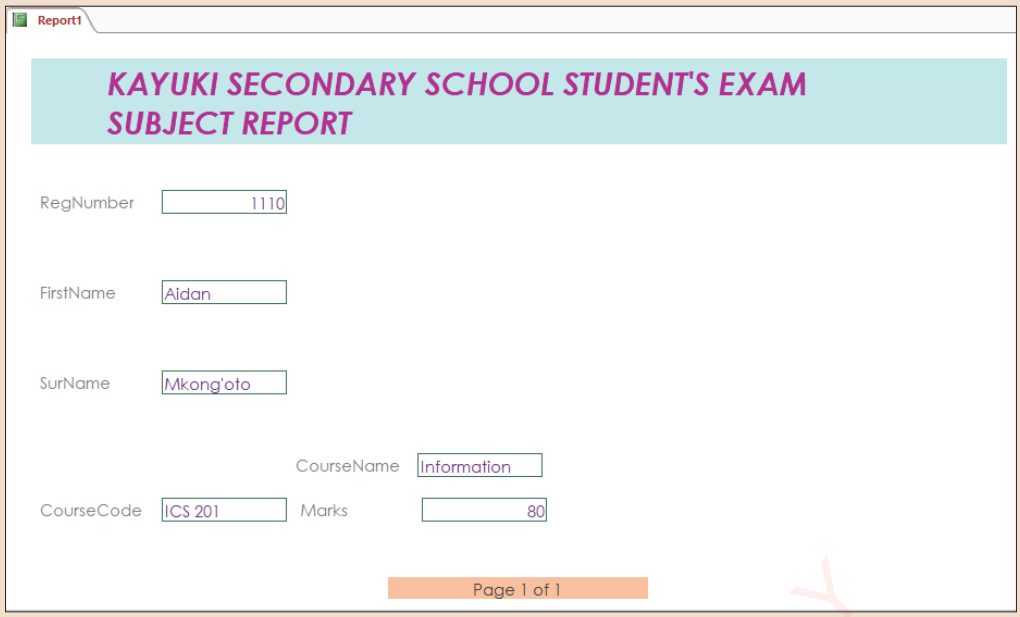


Figure 7.35(m): *Final printed report showing a single record*

Revision Exercise

Section A

Answer the following questions:

1. What type of relationships can be formed between data of different tables?
2. Explain how you can build relationship between different tables in Access 2016.
3. What does a query mean in Access 2016?
4. Mention how you can create a simple query in Access 2016.
5. Illustrate how you can create a form in Access 2016.
6. What are the different ways of entering data in Access 2016 table?
7. Distinguish between flat file database and relational database.

Section B

*Match each item in **Column A** against its corresponding item in **Column B**.*

S/n	Column A	Column B
1.	Record	a. Row in a database table
2.	Field	b. Database object that asks a table a question
3.	Query	c. Database object that simplifies the process of entering, editing and displaying data
4.	Form	d. Column in a database table
5.	Data type	e. Kind of information a field contains
		f. Database object that is created from a report
		g. Database object created from a query

SECTION C

*Write "**True**" for a correct statement and "**False**" for an incorrect statement.*

1. Any list you make for specific purpose, even a grocery list, can be considered as a simple database. _____
2. By default, the navigation pane appears on the right side of the Access screen each time you create or open a database. _____
3. Forms, queries and reports are examples of database objects. _____
4. In a database table, data are stored in rows and columns similar to spreadsheet. _____
5. An important principle to consider when planning a database is to try to record each piece of information as many times as possible for easy access. _____

6. In a database table, the category of information is called field. _____
7. One of the stages in designing a database is to analyse tables more closely and create a relationship between them. _____
8. Data definition is the stage in database design where one gathers and lists all necessary fields for the database project. _____
9. The plus (+) sign before a record on a database table indicates that the table is a foreign table. _____
10. Primary key uniquely identifies each database record. _____

SECTION D

Choose the letter of the most correct answer.

1. Which method can be used to choose fields from standard database tables when creating a new table?
    a) Create table in design view
    b) Create table using wizard
    c) Create table by entering data
    d) None of the above

2. What happens when a mouse pointer is released after dropping a primary key of a table into foreign key of another table?
    a) A relationship is created
    b) Edit relationship dialog box appears
    c) Error occurs
    d) Nothing happens

3. In order to create table relationship:
    a) Drag the primary key of a table into foreign key of another table
    b) Drag a foreign key of a table into the primary key of another table
    c) Drag any field from parent table and drop it on a child table
    d) Any of the above can be done to create relationship

4. Which data field types will you select when creating a new table for entering long text in the field?
   a) Text
   b) Memo
   c) Currency
   d) Hyperlink
5. Which of the following database objects holds data?
   a) Forms
   b) Reports
   c) Queries
   d) Tables

Glossary

Biometric This is human physical or behavioural characteristics that can be used to digitally identify a person who needs an access to electronic system. Biometrics includes facial recognition, voice and fingerprints.

Branding The promotion of a product, service or company by means of advertising and design. It is how your customers recognise and experience your website. Branding can be reflected in customer service style, layouts, colour and navigation styles of your website.

CGI CGI stands for Common Gateway Interface. This is a protocol for executing scripts via web requests. It refers to rules and standards that define how information is exchanged between web servers and custom scripts. CGI scripts receive HTTP requests, and return HTTP responses.

CSS It is an abbreviation for Cascading Style Sheet. This is the language that describes how webpages are presented in form of colours, layout and even fonts. CSS allows you to adapt the presentation to different types of devices such as large screen, small screen or printers.

Domain Name-System (DNS) The Domain Name System (DNS) is an Internet system for mapping alphabetic names to numeric Internet Protocol (IP) addresses. It plays a role like when a phone book maps person's name to a phone number.

Digital divide This is the economic, educational and social inequality between those who have ready access to computers and the Internet, and those who do not have.

E-advertisement E-advertisement also is known as online advertisement, online marketing, Internet advertisement or digital advertisement. This is a form of marketing which uses the Internet to deliver messages for promoting business to customers. Online advertisement may use email, search engine, social media, web banners and mobile phones.

E-banking E-banking stands for electronic banking. This is a form of banking where transactions are done by means of exchange of electronic signals rather than exchange of checks or cash. When you withdraw an amount from an ATM or when you pay by using your credit card, your fund is transferred electronically.

E-marketing E-marketing stands for electronic marketing. Sometimes it is known as digital marketing, Internet marketing (web marketing) or online marketing where products or services are marketed electronically through the use of ICT. E-marketing uses technology and media to connect customers and business.

Home page This is the webpage, always shown in a web browser when a website starts up.

HTML Stands for Hypertext Markup Language. It is a standard markup language for documents designed to be displayed in a web browser.

HTML5 This is the fifth version of Hypertext Markup Language that is used to structure and present content in the World Wide Web.

HTTP HTTP stands for Hyper Text Transfer Protocol. This is a communication protocol used to transfer data over the Internet from client computers to web servers.

HTTPD HTTPD stands for Hyper Text Transfer Protocol Daemon. This program runs in the web servers, answers the requests from client computers automatically and serves the Hyper Text and multimedia documents using HTTP.

HTTPS HTTPS stands for Hypertext Transfer Protocol Secure. This protocol is used for secure communication over the computer networks.

Web browser This is a software application that is used to access information on the world wide web. When users want to access information from a website, the address is written in the browser and a browser finds and retrieves information from web server for users. There are many kinds of browsers including Google Chrome, Firefox, Microsoft Edge and others.

Internet-Protocol	This is a set of rules for sending data from one computer to another over the Internet.
Perl	This is a programming language developed by Larry Wall in 1987. This is one of the languages used for CGI programming.
PHP Script	PHP stands for Hypertext Pre-processor. This is a server side scripting language.
PIN	PIN stands for Personal Identity Number. Bank accounts cards and mobile phone chips can require PIN for a person to access the information.
URI	URI stands for Uniform Resource Identifier. URI identifies the logical and physical resources over the Internet.
Website	This is a collection of webpages.

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