

COLLEGE OF COMPUTING AND INFORMATION SCIENCES

DEPARTMENT OF COMPUTER SCIENCE

COURSE: BACHELOR OF SCIENCE IN COMPUTER SCIENCE

COURSE UNIT: DIGITAL INNOVATION AND COMPUTATIONAL THINKING

NAME: GROUP I

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| --- | --- |
| NAME | REG NO. |
| KEWODA JOANITAH | 24/U/05727/EVE |
| NANSEREKO HOUSNAH | 24/U/09631/EVE |
| NABUUKERA SUMAYAH KASWA | 24/U/07899/EVE |
| TAMALE DENIS VALELIAN | 24/U/11433/EVE |
| SUUNA RAYMOND | 24/U/11403/EVE |

**HISTORY OF COMPUTING**

The history of computing as documented by the Computer History Museum can be traced through various major milestones:  
**1. Early Mechanical Calculators**: In the 17th century, inventors such as Blaise Pascal and Gottfried Wilhelm Leibniz created mechanical calculators capable of basic arithmetic operations, laying the foundation for computing.  
**2. Charles Babbage and Ada Lovelace**: In the 19th century, Charles Babbage designed the Analytical Engine, often considered the first concept of a general-purpose computer.  
**3. The 1930s - Turing and Zuse:** Alan Turing developed theoretical ideas about computing and algorithms, known today as the Turing machine  
**4. The 1940s - Early Electronic Computers:** The ENIAC (Electronic Numerical Integrator and Computer) was built during World War II, becoming the first large-scale, programmable electronic computer.  
**5. The 1950s to 1960s - Mainframes:** Companies like IBM developed large, powerful mainframe computers used by businesses and governments.  
**6. The 1970s - Personal Computers**: The introduction of the microprocessor by Intel in 1971 made personal computers possible.   
**7. The 1980s to Present - Rapid Growth and Networking:** With the development of graphical user interfaces (GUIs), computers became more user-friendly. The 1990s brought about the World Wide Web.

From the computer history museum ([computerhistory.org](https://www.bing.com/ck/a?!&&p=90b3e461f64d52a5JmltdHM9MTcyNzY1NDQwMCZpZ3VpZD0wMjFmNTE3Mi04ZWE2LTY2ZDYtM2RhZi00NTgzOGYzMDY3MzYmaW5zaWQ9NTE5Mg&ptn=3&ver=2&hsh=3&fclid=021f5172-8ea6-66d6-3daf-45838f306736&psq=computer+history.org+timeline&u=a1aHR0cHM6Ly93d3cuY29tcHV0ZXJoaXN0b3J5Lm9yZy90aW1lbGluZS9jb21wdXRlcnMvIzp-OnRleHQ9Q29tcGxldGVkIGluIDE5NTEsIFdoaXJsd2luZCByZW1haW5zIG9uZSBvZiB0aGUgbW9zdCBpbXBvcnRhbnQ&ntb=1))

**ORIGIN OF THE WORLD WIDE WEB**

The World Wide Web (WWW) originated from the efforts of Tim Berners-Lee, who proposed a new way to link and access information over the internet while working at CERN (the European Organization for Nuclear Research) in 1989. The idea was to create a system of interlinked documents accessible through a network, using hypertext to connect information.

In 1990, Berners-Lee built the first web browser/editor and the first web server, called httpd.  
In 1991- the World Wide Web became available to the public.

In 1993-the first popular web browser, Mosaic, helped further expand its use.

Berners-Lee later founded the World Wide Web Consortium (W3C) in 1994 to ensure the web’s development as an open platform accessible to all.  
from [w3.org](https://www.bing.com/ck/a?!&&p=a4949be2cd576813JmltdHM9MTcyNzY1NDQwMCZpZ3VpZD0wMjFmNTE3Mi04ZWE2LTY2ZDYtM2RhZi00NTgzOGYzMDY3MzYmaW5zaWQ9NTMyNQ&ptn=3&ver=2&hsh=3&fclid=021f5172-8ea6-66d6-3daf-45838f306736&psq=w3&u=a1aHR0cHM6Ly93d3cudzMub3JnL1dXVy8&ntb=1)

**ORIGIN OF THE INTERNET**

The origin of the Internet dates back to the late 1960s when ARPA (Advanced Research Projects Agency), part of the U.S. Department of Defense, initiated ARPANET, a project aimed at creating a decentralized network to maintain communications during emergencies. ARPANET is considered the direct predecessor of the modern Internet, as it was the first network to use the packet-switching technology that is fundamental to today's Internet.  
In **1973**, the concept of a global "network of networks" emerged, led by Vinton Cerf and Bob Kahn, who developed the TCP/IP protocols, which became the backbone of Internet communication.

**1980s**, TCP/IP became the standard for ARPANET, leading to the development of a true global network. In **1983**, the term "Internet" was officially adopted. **In 1989**, the NSFNET (National Science Foundation Network) replaced ARPANET.The World Wide Web, introduced in **1991** by Tim Berners-Lee, popularized the Internet From [internetsociety.org](https://www.bing.com/ck/a?!&&p=acc614352e3d7afeJmltdHM9MTcyNzY1NDQwMCZpZ3VpZD0wMjFmNTE3Mi04ZWE2LTY2ZDYtM2RhZi00NTgzOGYzMDY3MzYmaW5zaWQ9NTM4Mg&ptn=3&ver=2&hsh=3&fclid=021f5172-8ea6-66d6-3daf-45838f306736&psq=internet+society&u=a1aHR0cHM6Ly93d3cuaW50ZXJuZXRzb2NpZXR5Lm9yZy9pbnRlcm5ldC9oaXN0b3J5LWludGVybmV0L2JyaWVmLWhpc3RvcnktaW50ZXJuZXQv&ntb=1)

**HOW THE INTERNET SPANS THE GLOBE:**

**1. Internet Backbone:** The core of the internet is made up of high-capacity fiber-optic cables, known as the internet backbone. These cables are laid across continents, often under the ocean, connecting different regions and making international communication possible. **2. Internet Service Providers (ISPs):** ISPs act as intermediaries that connect individual users and businesses to the internet.  
**3. Routing and Switching:** Data is routed between networks using routers and switches that decide the most efficient path for data to travel.  
**4. Domain Name System (DNS**): The DNS acts as the "phonebook" of the internet, translating human-readable domain names into IP addresses **5. Data Centers and Content Delivery Networks (CDNs):** Data centers around the world host the websites and online services we use. FROM [ACM DIGITAL LIBRARY](https://www.bing.com/ck/a?!&&p=d4ac4817b0132f72JmltdHM9MTcyNzY1NDQwMCZpZ3VpZD0wMjFmNTE3Mi04ZWE2LTY2ZDYtM2RhZi00NTgzOGYzMDY3MzYmaW5zaWQ9NTI5Mg&ptn=3&ver=2&hsh=3&fclid=021f5172-8ea6-66d6-3daf-45838f306736&psq=internet+society+how+the+internet+spans+the+globe&u=a1aHR0cHM6Ly9kbC5hY20ub3JnL2RvaS9lcGRmLzEwLjExNDUvMzM3MTQxMSM6fjp0ZXh0PUhvdyB0aGUgSW50ZXJuZXQgU3BhbnMgdGhlIEdsb2JlIFRoZSBtb2Rlcm4gSW50ZXJuZXQgaXM&ntb=1)  
**b)Examples of ISPs in Uganda:**  
1. MTN Uganda  
2. Airtel Uganda  
3. Liquid Telecom  
**Reasons for Choosing One ISP Over Another:**  
**1. Speed and Reliability:** Different ISPs offer varying speeds depending on the type of infrastructure they use. Choosing an ISP with a reliable connection and higher speed is ideal for tasks like streaming or gaming.  
**2. Coverage**: The coverage area is a major factor in choosing an ISP. Some ISPs may provide better coverage in certain regions of Uganda compared to others.  
**3. Cost**: Pricing plans and packages also influence the choice of ISP. Users may select an ISP that provides affordable and flexible plans.

**D)Examples of internet crimes:**

1. Phishing: This involves attempting to acquire sensitive information like usernames, passwords, and credit card details by pretending to be a trustworthy entity, usually via email or fake websites.  
2. Hacking: Unauthorized access to computer systems is a significant internet crime.

3. Online Fraud and Scams: This includes financial fraud such as online shopping scams, **Solutions to Internet Crimes:**1. **Education and Awareness:** Users should be educated about internet threats and best practices for online safety, such as recognizing phishing attempts and avoiding suspicious links.  
2. **Strong Authentication and Encryption:** Using multi-factor authentication (MFA) and encryption helps protect personal accounts and data from unauthorized access.  
4. Antivirus and Security Software: Installing reputable antivirus software, keeping systems updated, and using firewalls can help reduce the risk of cyberattacks.  
5. Regular Backups: Regularly backing up data ensures that even if an attack occurs (such as ransomware), data can be recovered without paying a ransom.

**QUESTION 2**

**CLOUD COMPUTING**

**1. Definition of Cloud Computing**  
  
Cloud computing refers to the delivery of computing services over the internet, including storage, processing, and networking, without the need for direct user management. Services are often categorized as:  
IaaS (Infrastructure as a Service): Provides virtualized computing resources like servers and storage.  
PaaS (Platform as a Service): Supplies platforms that allow developers to build and deploy applications.  
SaaS (Software as a Service): Delivers software applications over the internet.  
**2. History and Evolution**  
The idea of cloud computing was introduced in the early 2000s. Major milestones include the launch of Amazon Web Services (AWS) in 2006, which was the first significant commercial cloud service. The concept expanded with major players like Microsoft Azure, Google Cloud, and others developing cloud solutions that have transformed how businesses manage IT infrastructure.  
**3. Types of Cloud Deployment Models**  
**Public Cloud:** Owned and operated by third-party providers (e.g., AWS, Azure, Google Cloud), accessible to anyone who wants to use their resources.  
**Private Cloud**: A cloud infrastructure dedicated to a single organization, often on-premises or hosted by a third-party service provider.  
**Hybrid Cloud:** A mix of public and private cloud services, offering the flexibility to handle workloads more efficiently.  
  
  
**4. Key Characteristics of Cloud Computing**  
**On-Demand Self-Service**: Users can easily provision computing resources as needed.  
  
**Broad Network Access:** Services are accessible from anywhere with an internet connection.  
  
**Resource Pooling:** Resources are shared across multiple customers to maximize efficiency.  
  
**Scalability:** Cloud computing allows rapid scalability up or down depending on demand.  
  
**Measured Service:** Users pay only for what they use, similar to utility billing.  
  
  
**5. Benefits of Cloud Computing**  
**Cost Efficiency**: Reduces capital expenditure on hardware and maintenance.  
**Scalability and Flexibility**: Allows businesses to scale their resources up or down based on demand.  
  
**Disaster Recovery**: Provides secure backups and enables data recovery in case of data loss.  
**Accessibility:** Users can access data and applications from anywhere, fostering remote working and collaboration.  
  
  
**6. Challenges of Cloud Computing**  
**Security and Privacy**: Storing sensitive data in the cloud raises concerns over data breaches and privacy issues.  
**Downtime**: Outages in cloud services can affect businesses that rely on them.  
**Compliance:** Organizations must comply with data regulations, which can be challenging with cloud storage across different geographic regions.  
  
  
**7. Use Cases and Examples**  
**Business and IT Services**: Cloud computing is used for hosting websites, managing big data, and providing business analytics tools.  
**Storage Solutions:** Companies like Dropbox, Google Drive, and OneDrive offer cloud storage for both personal and professional use.  
**AI and Machine Learning:** Cloud platforms like Google Cloud and Azure provide machine learning models that can be used to develop intelligent applications.  
  
  
**8. Leading Cloud Service Providers**  
**Amazon Web Services (AWS):** A pioneer in cloud services, offering a wide range of infrastructure, AI, and application development tools.  
**Microsoft Azure:** Provides cloud solutions integrated with Microsoft tools, popular for enterprise businesses.  
**Google Cloud Platform (GCP):** Focuses on high-performance computing and big data analytics.  
For more in-depth research on cloud computing, consider exploring the following resources:  
Amazon AWS: [aws.amazon.com](https://docs.aws.amazon.com/whitepapers/latest/aws-overview/what-is-cloud-computing.html#:~:text=Cloud%20computing%20is%20the%20on-demand%20delivery%20of%20compute%20power,%20database,), Microsoft Azure Documentation: [azure.microsoft.com](http://azure.microsoft.com), Google Cloud Blog: [cloud.google.com](https://cloud.google.com/learn/what-is-cloud-computing)

The search engines that were used were mainly google and bing

The websites included [w3.org](https://www.w3.org/WWW/),internetsociety.org ,[acmdigitallibrary.org](https://www.bing.com/ck/a?!&&p=d4ac4817b0132f72JmltdHM9MTcyNzY1NDQwMCZpZ3VpZD0wMjFmNTE3Mi04ZWE2LTY2ZDYtM2RhZi00NTgzOGYzMDY3MzYmaW5zaWQ9NTI5Mg&ptn=3&ver=2&hsh=3&fclid=021f5172-8ea6-66d6-3daf-45838f306736&psq=internet+society+how+the+internet+spans+the+globe&u=a1aHR0cHM6Ly9kbC5hY20ub3JnL2RvaS9lcGRmLzEwLjExNDUvMzM3MTQxMSM6fjp0ZXh0PUhvdyB0aGUgSW50ZXJuZXQgU3BhbnMgdGhlIEdsb2JlIFRoZSBtb2Rlcm4gSW50ZXJuZXQgaXM&ntb=1) and [cloud.google.com](https://cloud.google.com/learn/what-is-cloud-computing)