GROUP 5 TASK 2
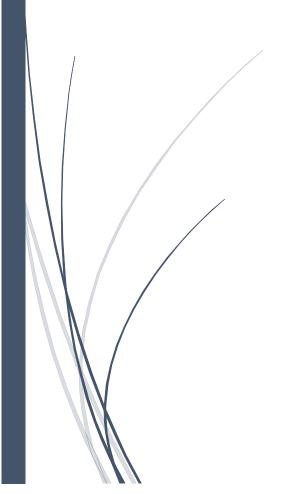
MURANG'A UNIVERSITY OF TECHNOLOGY
BSC. (MATHEMATICS AND COMPUTER SCIENCE)
INFORMATION TECHNOLOGY TRENDS TASK 2
GROUP 5

Name	*Reg. No.*
1. **ONDIEKI STEPHEN**	AS261/0902/2018-Group leader
2. **JOHN MAINA**	AS261/0180/2018
3. **SAMUEL MAINA**	AS261/0872/2018
4. **RENAY SIOLOMPE**	AS261/0884/2018
5. **ANNE MWAU**	AS261/1144/2017
6. **DENIS KIPLAGAT**	AS261/0909/2018
7. **HANNAH MWANGI**	AS261/1161/2017

Question 1

1.a) What Is a Blockchain?

A blockchain is a distributed database that is shared among the nodes of a computer network. As a database, a blockchain stores information electronically in digital format. Blockchains are best known for their crucial role in cryptocurrency systems, such as Bitcoin, for maintaining a secure and decentralized record of transactions.

b.) Major Elements of a Block Chain System

1. Node Application

Each Internet-connected computer needs to install and run a computer application specific to the ecosystem they wish to participate in. Using the case of Bitcoin as an example ecosystem, each computer must be running the Bitcoin wallet application.

2. Shared Ledger

This is a logical component. The distributed ledger is a data structure managed inside the node application. Once you have the node application running, you can view the respective ledger (or blockchain) contents for that ecosystem.

3. Consensus Algorithm

This, too, is a logical component of the ecosystem. The consensus algorithm is implemented as part of the node application, providing the 'rules of the game' for how the ecosystem will arrive at a single view of the ledger. Different ecosystems have different methods for attaining consensus depending on the desired features the ecosystem needs. For example, Bitcoin arrives at consensus of the ledger in a few minutes, the Lightning ecosystem provides Guardtime's industrial blockchain platform provides sub-second consensus formation times, and Ripple guarantees consensus in a few seconds.

4. Virtual Machine

A virtual machine is a representation of a machine (real or imaginary) created by a computer program and operated with instructions embodied in a language. It is an abstraction of a machine, held inside a machine. To some degree we are already are accustomed to abstraction of real world objects and entities as virtual objects in a computer. Think of a button in a graphical user interface of an application. You press the button on the screen and the state of the program inside the computer changes. Another example might be your driver's license as it represented in a government computer. It is an abstraction of your real-world legal authorisation to operate a

motor vehicle and it is largely what counts these days, rather than the real-world physical printed driver's license.

c. Areas where block chain has been   employed

Financial services: block chain has transformed the financial sector in the sense operations have been simplified through real time and multi-party tracking management of bank guarantees.
Healthcare: used in the healthcare sector to preserve and exchange patient data through hospitals, labs and pharmacies. Also, it has necessitated accurate flaw detention in medicine practice.
Education: employing blockchain technology in the education sector can help in record keeping. Blockchain technology can help improve the tracking of student's class attendance an overall academic performance.
Government and the private sector: the current system are systems are vulnerable and insecure. Therefore, incorporation of blockchain technology provides framework that is secure at secure , reliable and adaptable.

Question 2

2. Approaches recommended for better big data management, mining and understanding

Data mining is the process of discovering patterns in large data sets involving methods at the intersection of machine learning, statistics, and database systems to identify future patterns. Big Data is a term used for any data that is large in quantity. It is used to refer to any kind of data that is difficult to be represented using conventional methods like Database Management Systems or Microsoft Excel. In this paper we are discussing the characteristics applications of Big Data processing model and Big Data revolution, from the data mining view.

As these methods rely on diverse disciplines, the analytics tools can be applied to both big data and other smaller datasets:

- **A/B testing**
- This data analysis technique involves comparing a control group with a variety of test groups, in order to discern what treatments or changes will improve a given objective variable. McKinsey gives the example of analysing what copy, text, images, or layout will improve conversion rates on an e-commerce site.[12] Big data once again fits into this model as it can test huge numbers, however, it can only be achieved if the groups are of a big enough size to gain meaningful differences.
- **Data fusion and data integration**
- By combining a set of techniques that analyse and integrate data from multiple sources and solutions, the insights are more efficient and potentially more accurate than if developed through a single source of data.
- **Data mining**
- A common tool used within big data analytics, data mining extracts patterns from large data sets by combining methods from statistics and machine learning, within database

management. An example would be when customer data is mined to determine which segments are most likely to react to an offer.

- **Machine learning**
- Well known within the field of artificial intelligence, machine learning is also used for data analysis. Emerging from computer science, it works with computer algorithms to produce assumptions based on data.[14] It provides predictions that would be impossible for human analysts.

- **Natural language processing (NLP).**
- Known as a subspecialty of computer science, artificial intelligence, and linguistics, this data analysis tool uses algorithms to analyse human (natural) language.[15]

- **Statistics.**
- This technique works to collect, organise, and interpret data, within surveys and experiments.

Virtual Reality (VR) is a computer-generated environment with scenes and objects that appear to be real, making the user feel they are immersed in their surroundings.

I can talk to other people, play games, or just go for a walk and enjoy the view. I can do anything I like in that environment, as long as the software has made it possible.
Application

- **Automotive industry**

- VR allows engineers and designers to experiment easily with the look and build of a vehicle before commissioning expensive prototypes.

- **Healthcare**

- VR is making a significant impact in healthcare. In November 2021, the FDA approved prescription-use EaseVRx for the treatment of pain reduction in adults.

- **Retail**

- The way we shop online is set to drastically change with 'the metaverse'. With VR retail experiences and body-scanning technology, we will be able to try on clothes in the virtual world to see what they'd look like in person.

- **Tourism**

- There's nothing like a global pandemic and lockdowns to make you miss the freedom to travel to different countries, visit world-famous landmarks, and experience a glimpse into another culture.

- **Real estate**

- If you'd prefer to stay closer to home, you can look around properties from the comfort of your [existing] home - no estate agent appointments or sacrificing your weekend needed.

Advantages

- Virtual reality creates a realistic world

- It enables user to explore places.

- Through Virtual Reality user can experiment with an artificial environment.

- Virtual Reality make the education more easily and comfort.

Disadvantages of Virtual Reality

- The equipment used in virtual reality are very expensive.

- It consists of complex technology

- In virtual reality environment we cant move by our own like in the real world.

What Is Augmented Reality?

Augmented reality (AR) is an enhanced version of the real physical world that is achieved through the use of digital visual elements, sound, or other sensory stimuli delivered via technology. It is a growing trend among companies involved in mobile computing and business applications in particular.

Applications

- AR in Your Mobiles
- AR is Mixing Up Well with the Entertainment Industry
- AR is Open for Travel 'N' Tourism
- AR in Classroom Education
- AR for Public Safety

Advantages

i. The AR system is highly interactive in nature and operates simultaneously with real time environment.

ii. It reduces line between real world and virtual world.

iii. It enhances perceptions and interactions with the real world.

iv. Due to its use in medical industry, life of patients have become safer. It helps in efficient diagnosis of diseases and in early detection of them.

v. It can be used by anyone as per applications.

vi.It can save money by testing critical situations in order to confirm their success without actually implementing in real time.

vii. It can be used by military people without putting their life in danger by way of battle field simulation before the actual war. This will also help them in actual war to take critical decisions.

Disadvantages

i. It is expensive to develop the AR technology based projects and to maintain it. Moreover production of AR based devices is costly.

ii.Lack of privacy is a concern in AR based applications.

iii. In AR, people are missing out on important moments.

iv. Low performance level is a concern which needs to be addressed during testing process.

v. lt requires basic learning to effectively use AR compliant devices.

Mixed reality

Mixed reality (MR) is a user environment in which physical reality and digital content are combined in a way that enables interaction with and among real-world and virtual objects

Application

Construction - supervisors can use MR to cue workers about what work needs to be completed. For example, a supervisor might drop a virtual pin to signal that a specific piece of equipment is not working correctly. Workers will be alerted and use their headsets to view schematic diagrams and diagnose what needs to be repaired.

Manufacturing - inspectors can use MR headsets during plant tours and view real-time data for specific mechanical components. Information about the component's performance and energy

consumption can be transmitted with Near Field Communication (<u>NFC</u>) technology and will update when the inspector's gaze turns toward a different component.

Design - designers can use MR to interact with new products before they are built. For example, MR could allow spacecraft engineers to view and interact with full-scale digital prototypes of a new Mars rover in order to identify potential design issues, reducing the overall development time and cost.

B2B communication - international corporations can use MR to provide simulated face-to-face meetings with geographically dispersed product teams. Participants can view a life-size, 3-D version of the product being discussed, while translation services can be integrated, eliminating language barriers.

Healthcare - surgeons can use MR to practice inserting an extremely small medical implant into a specific patient's body. It's expected that in the near future, medical students will also be using MR imaging, instead of cadavers, in anatomy classes.

Supply chain management - a supply chain manager can view a pallet through his smartphone's camera or smart glasses, verbally ask a question about the pallet's shipping history and view an immediate answer on the display.

Advantages
- Its interactive and immersive nature allows the user to absorb and retain more information;
- You are able to share your experiences with other people in real-time over long distances;
- Simplifies and streamlines complex processes;
- It can help you get a competitive advantage by capturing and contextualizing data.

Disadvantages
- The high cost of development;
- Additional costs to procure head-mounted displays;
- There is a learning curve for the everyday uses of mixed reality.