CREATE.INNOVATE.DEVELOP

TECHNO-VUCA

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

OCTOBER 2017

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VISION

Department is committed to provide Intellectual, Innovative & Inspirational environment and contribute to academic, scientific, research and technical knowledge through excellence through excellence and to produce technocrats, researchers and bureaucrats.

MISSION

M1: To improve the problem-solving capability of students through continual learning so as to produce quality engineers in the field of Computer Science.

M2: To bridge the gap between industry and academia by bringing state-of-the-art technology.

M3: To encourage innovation through multidisciplinary research and development activities.

M4: To inculcate human values and ethics into students to serve the society in all possible ways.

PROGRAM SPECIFIC OUTCOMES (PSO'S)

PSO 1: The ability to design and develop the hardware and software systems.

PSO 2: An understanding of interdisciplinary computing techniques and an ability to apply them in the design of advanced computing.

PSO 3: An understanding of Programming methodology, Software development Paradigms, Design and Analysis of Algorithms, Operating Systems, digital Logic Design, Theory of Computation, discrete Mathematics, Compiler design, etc.

PSO 4: The ability to integrate and manage the various phases/components of software development projects.

Dr. Sarojini Agarwal
(Chairperson)

The future lies before you like a hidden mass of snow, be careful how you tread on it, for every mark will show.

-Dr. Sarojini Agarwal

Dr. Om Prakash Agarwal
(Managing Director)

Success is not a one-shot process. It is an valuable opportunity to rectify errors and move forward. Failure in working for a good cause is better than success in working for a wrong cause. Over the years now, NIET has built quite a special position in the private higher education sector. With its distinctive culture, it provides a clear student-centered environment in which to explore existing technical knowledge, and gain new learning at the leading edges of technology development. Our unique educational system ensures that you gain not just depth and breadth in your chosen area of specialization, but also a holistic set of skills that will equip you to face the real world.

-Dr. Om Prakash Agarwal

Dr. Neema Agarwal
(AMD)

In the course of last 20 years many technical & management institutes have sprung up all over the country. Graduates passing out every year are highly optimistic, that technical courses ensure a rewarding career. Beyond the academics, the curriculum at NIET is strongly linked with several recent themes like latest technologies needed by organizations, soft skills, communication, among others. Our approach has resulted in programs of study relevant to the leadership trends and challenges of tomorrow. Students regularly undergo personality development and grooming sessions that leads to both extrinsic and intrinsic confidence boosting and prepares them for the corporate world.We appreciate your interest and want you to know that we are here to bring you a leading edge technical education.

-Dr. Neema Agarwal

Mr. Raman Batra
(EVP)

This new generation is an interesting one. Most of them were born into a world where technology has always been at the forefront. These students rely on Google, texting, social media and Wi-Fi, and they view email - not letter writing- as a formal form of communication.NIET has been helping students write their own stories since its inception. Committed to providing the best jobs by creating life-changing educational opportunities and collaborative learning environments, we have stayed at the forefront of innovation in higher education, providing the tools our students need to make them industry ready from day one and make an impact in the world.

-Mr. Raman Batra

Dr. Ajay Kumar
(Director)

Through the efforts of our accomplished faculty, our talented students and exceptional alumni, we have been able to make rapid progress on our path of continuous growth and innovation.I wish you the very best as you choose to become a part of this exciting and vibrant learning community.

-Dr. Ajay Kumar

Prof. Dr. Chandra Shekhar Yadav
(HOD OF CSE DEPARTMENT)

Students must keep pace with the changing world by acquiring knowledge about latest technologies. This will help them to achieve success and reach new heights in their life.

-Prof. Dr. C.S Yadav

Editorial Board

Faculty Editors

Ms. Shubhi

Mr. Rahul Sharma

Editorial Board

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Kartik Gupta

Manya

About the Department

In Computer Science, NIET is definitely the place to bet on. You can become a part of the tradition of excellence. With rapidly evolving technical and the continuous need for innovation, the department has always produced quality professionals and holds an important position in software industry in India and abroad.

The Department of Computer Science and Engineering at NIET is renowned for its cutting edge research and imparting state-of-the-art education. The department attracts the bright students and faculty members. The faculty members are leaders in advanced computer technologies such as Genetic Algorithm, parallel processing, data mining, computer graphics, and software engineering, cloud computing, mobile applications & network programming.

Some Articles By Students

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ANDROID

BY-

NIBHA SINGH

CSE Second Year

Android is a name that was introduced by Google Inc. It is a very popular technology in mobile phones these days, as it is an operating system which is capable of running multiple application programs. It is a complete revolution in the mobile technology industry after iPhones. This **essay** is a feature on Android technology.

Android is a revolutionary name which is an open-source software assemble of an operating system, middleware and key applications for mobile devices. In 2005, Google Inc. purchased the initial developer of the software; Android Inc and developed it. Android's mobile operating system is based on a modified version of the Linux kernel. (Lee P.)

Android is the most popular mobile platform in the world. Android delivers a complete set of software for mobile devices; an operating system, middleware and key mobile applications. ("Android Overview", Open Handset Alliance 2010)

In 2005, Google acquired the startup company Android Inc. to start the development of Android platform for mobile. The Android SDK was first release in November 2007. Google announced the availability of Android SDK Candidate 1.0. Google offers a comprehensive software development kits with a variety of packages that are available a la carte under the Android SDK Manager. In October 2008, Android is an open source and Google releases the code under Apache License. ("Android Overview", Open Handset Alliance 2010)

STRENGTHS

Google – Google is one of the most well known technology company in the world. Android is backed up by Google in collaboration with Open Handset Alliance. Most of the potential partners, venders and developers will believe that Google will give more attention and credibility on Android OS compare to other mobile OS because of the brand.

Device – Unlike the Apple's IOS where you have the only one option for hardware supplier which is Apple Inc. The Android OS is open source and it is compatible with most of the devices such as Samsung, HTC, Sony and etc. This will provides consumers wider choices from which manufacturer to choose to buy their devices.

Open source – The Android OS is built from a Linux based using JAVA language for the programming. Most of the developers, especially freelancer they will choose to develop mobile application by using Android where we can get the information and source code easily. This makes developers to create many free Apps for Android market (Currently known as Goggle Play Store). ("Android SWOT analysis", Arun Kumar 2012)

WEAKNESSES

Multimedia Support – Android Multimedia Support is less unlike the Apple which has centralized in iTunes application and marketplace. Android does not have a central source of multimedia material.

Upgrading of OS reliance on mobile manufacturers – When Google releases a new version of Android OS, it has to wait for the mobile manufacturer to make a compatibility test and modify the code to make sure it works properly on their hardware configuration.

Least of security- Since Android Application development is open source, so it was always prone to external threats like malwares.

Strengths	Weaknesses
• More flexible than the pure waterfall model. • If there is personnel continuity between the phases, documentation can be substantially reduced. • Implementation of easy areas does not need to wait for the hard ones.	• Milestones are more ambiguous than the pure waterfall. • Activities performed in parallel are subject to miscommunication and mistaken assumptions. • Unforeseen interdependencies can create problems.

Advantages and Disadvantages

List of those features that android phones do better than the iPhone

- Browsing
- Desktop
  - Connectivity
  - PC Connection
  - Multi-notification
  - Endless personalization
- Market
  - Goggle integration
  - Open source
  - Open to carriers

OPPORTUNITIES

Compatibility – Android OS not only compatible with mobile, it also compatible for tablet PC and e-book reader. There have been several release of Android tablets over last few months from computer machine manufacturer such as HP, ASUS, Dell and ACER.

Developing Countries – Google has a huge opportunity to develop inexpensive devices using the Android platform in developing countries. (Hylander 2010). Android also has high potential growth in Asia and Africa Countries and it has triggered up the sales of smart phones and tablet PCs.

Developer friendly – Android give the opportunities to developers to develop advance application and earn some revenue from the sales of application and advertising.

THREATS

Competitive – There were many competitors in the market are going to fight with Android for their share of the market. For example, Symbian, RIM, iOS and Windows.

System Crashed – Downloading of application from un-trusted website may make the operating system crash or affect other application in the smart phone.

Android's cheaper initialize installation in low cost mobile phone which will affects the buyer compared to other platform such as iOS in IPhone.

Advantages:

- Android is Linux based open source operating system , it can be developed by any one
- Easy access to the android apps
- You can replace the battery and mass storage, disk drive and UDB option
- Its supports all Google services
- The operating system is able to inform you of a new SMS and Emails or latest updates.
- It supports Multitasking
- Android phone can also function as a router to share internet
- Its free to customize
- Can install a modified ROM
- Its supports 2D and 3D graphics

Why Android?

There are so many reasons you should choose Android platform for mobile application development.

1) Zero/negligible development cost

The development tools like Android SDK, JDK, and Eclipse IDE etc. are free to download for the android mobile application development. Also Google charge a small fee $25, to distribute your mobile app on the Android Market.

2) **Open Source-** The Android OS is an open-source platform based on the Linux kernel and multiple open-source libraries. In this way developers are free to contribute or extend the platform as necessary for building mobile apps which run on Android devices.

3) Multi-Platform Support

In market, there are a wide range of hardware devices powered by the Android OS, including many different phones and tablet. Even development of android mobile apps can occur on Windows, Mac OS or Linux.

4) Multi-Carrier Support

World wide a large number of telecom carriers like Airtel, Vodafone, Idea Cellular, AT&T Mobility, BSNL etc. are supporting Android powered phones.

5) Open Distribution Model

Android Market place (Google Play store) has very few restrictions on the content or functionality of an android app. So the developer can distribute theirs app through Google Play store and as well other distribution channels like Amazon's app store.

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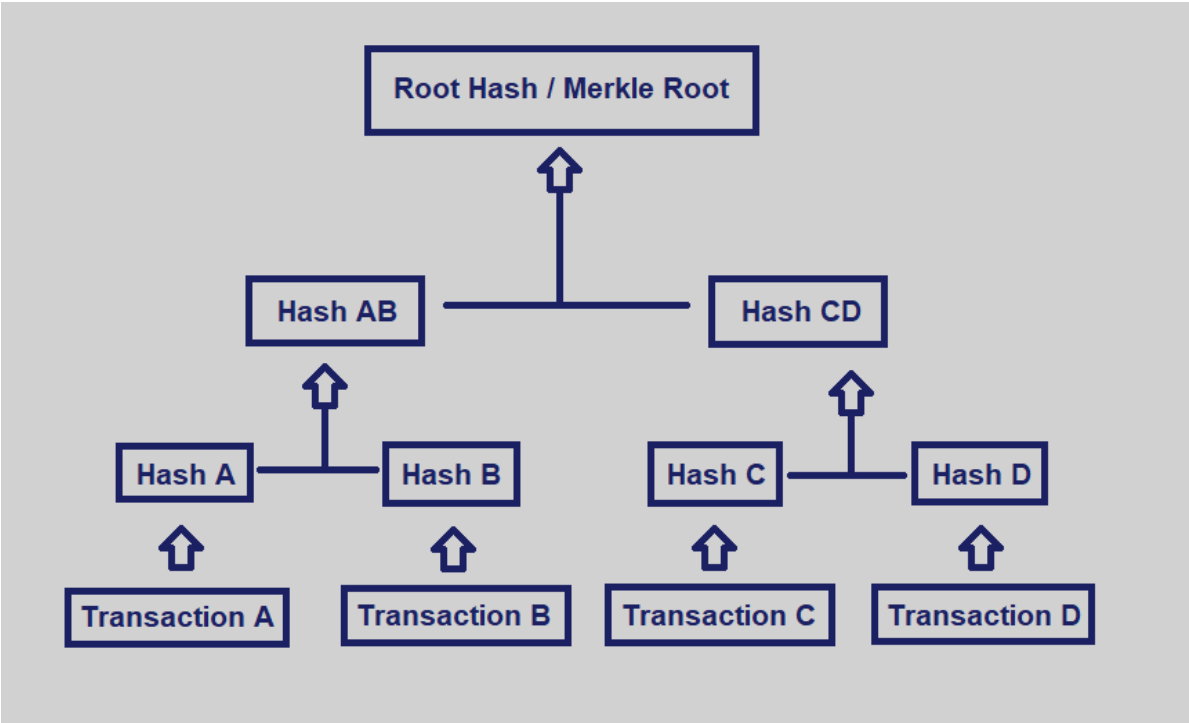
BLOCKCHAIN

BY-
SHALBIN BENNY

CSE Second Year

Over the past few years, the term “blockchain” has been getting a lot of attention. What does “blockchain” mean? What is its significance in the modern world? Why is it getting all the attention? Does it possess the potential to change the way of computing? These are some of the questions that might pop into any tech-enthusiast’s mind and the curiosity to know more about blockchain has sped up the rise of this technology.

So, what is blockchain? Is it another programming language or is it just a platform? The answer is neither. The wikipedia definition is: “A blockchain, originally block chain, is a growing list of records, called blocks, that are linked using cryptography.Each block contains a cryptographic hash of the previous block, a timestamp, and transaction data”.



The Merkle Tree/Hash Tree for transactions A,B,C & D

Precisely, Blockchain is an open, distributed ledger that can record transactions between two parties efficiently and in a verifiable and permanent way. Blockchain is represented using a Merkle/Hash Tree, and hash trees are used to verify any kind of data stored, handled and transferred in and between computers. They can help ensure that data blocks received from other peers in a peer-to-peer network are received undamaged and unaltered, and even to check that the other peers do not lie and send fake blocks. This feature of hash trees has made it the most important factor in building a blockchain. Every leaf node is labelled with the hash of a data block, and every non-leaf node is labelled with the cryptographic hash of the labels of its child nodes and is typically managed by a peer-to-peer network collectively adhering to a protocol for inter-node communication and validating new blocks.

The first blockchain was conceptualized by a person (or group of people) known as Satoshi Nakamoto in 2008. Nakamoto improved the design in an important way using a Hashcash-like method to timestamp blocks without requiring them to be signed by a trusted party and introducing a difficulty parameter to stabilize rate with which blocks are added to the chain. The words block and chain were used separately in Satoshi Nakamoto's original paper, but were eventually popularized as a single word, blockchain, by 2016.

A blockchain database is managed autonomously using a peer-to-peer network and a distributed timestamping server. A blockchain can maintain title rights because, when properly set up to detail the exchange agreement, it provides a record that compels offer and acceptance.

By storing data across its peer-to-peer network, the blockchain eliminates a number of risks that come with data being held centrally. The decentralized blockchain may use ad hoc message passing and distributed networking. Peer-to-peer blockchain networks lack centralized points of vulnerability that computer crackers can exploit; likewise, it has no central point of failure.

The pillars of blockchain is its openness and decentralized structure. This allows various users to simultaneously access, view and work without affecting the previous works. The peer-to-peer network also removes presence of privacy issues. The network built using strict mathematical structures boasts a highly confidential and strong data transfer and manipulation system.

Blockchain is broadly classified into four main categories:

- Private blockchains
- Public blockchains
- Consortium blockchains
- Hybrid blockchains

Private blockchains is restricted to the network administrators and anyone with a valid invite from the network administrators. It is permissioned and any new participant or a validator access is strictly prohibited without permission from the current network administrator. Private blockchains are typically used in enterprise solutions to solve business cases and underpin corporate software solutions.

In a public blockchain, there are absolutely no restrictions regarding a participant and a participant can become a validator by participating in the execution of consensus protocol. The interesting part about public blockchain is that anyone with an internet connection can easily complete transactions and be a valid member of the network without actually compromising the security and privacy of the previous transactions. Instead of keeping the network under an administration, the network provides users with economic incentives to users who help in securing and utilizing any sort of proof of work or proof of stake algorithm.

The consortium blockchain is a system that is ‘semi-private’ and has a controlled user group, but works across different organizations. Consortium blockchain is a sweet-spot between fully open, decentralized systems and fully centrally-controlled. There’s more likely to be a trusted consensus, as multiple organizations have a stake in the outcome.

Hybrid blockchains boasts a combination of both centralised and decentralised features taken from both the private and public blockchains. The exact workings of the chain can vary based on which portions of centralization decentralization are used.

Even though blockchain is full of promises, there are various issues that plague the implementation and working of blockchains. The Bank for International Settlements has criticized the public proof-of-work blockchains for high energy consumption. Nicholas Weaver, of the International Computer Science Institute at the University of California, Berkeley examines blockchain's online security, and the energy

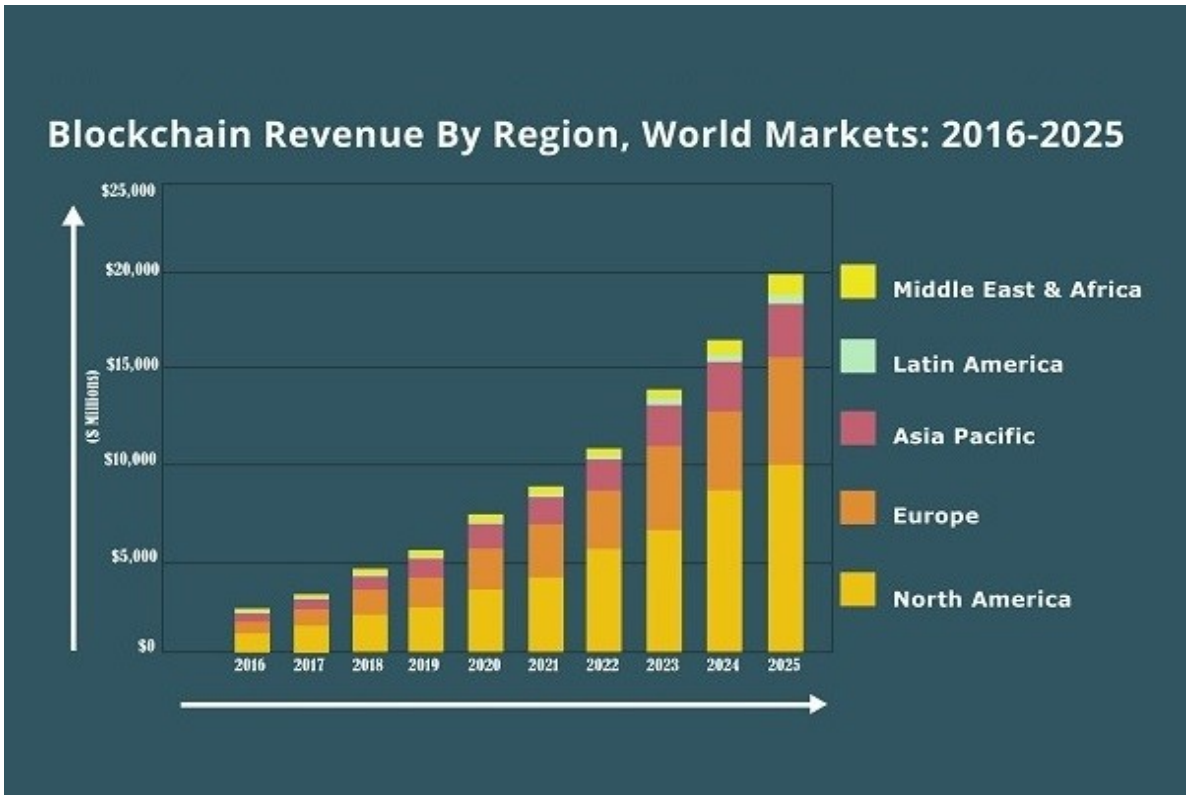
efficiency of proof-of-work public blockchains, and in both cases finds it grossly inadequate.

Another issue that haunts blockchain is the risk of exposure of the transactions. Since the ledgers used in blockchains are public, the transactions are visible to any participant of the network. There is a lack of efficient auditors for the networks. This lack of auditors brings about much risk and threats to the blockchain network.

Even if the flaws of blockchain network are fairly visible, this has not stopped people from implementing its features in various fields ranging from music to cryptocurrency. The first and foremost use of blockchain is in the field of cryptocurrency. Since the networks are extremely secure to perform transactions and the availability of peer to peer networks enables the functioning of cryptocurrency. Most cryptocurrencies use blockchain technology to record transactions.

Blockchains are also used to create smart contracts. Blockchain-based smart contracts are proposed contracts that can be partially or fully executed or enforced without human interaction. One of the main objectives of a smart contract is automated escrow. An IMF staff discussion reported that smart contracts based on blockchain technology might reduce moral hazards and optimize the use of contracts in general. But "no viable smart contract systems have yet emerged."
Blockchain technology can be used to create a permanent, public, transparent ledger system for compiling data on sales, tracking digital use and payments to content creators, such as wireless users or musicians.In 2017, IBM partnered with ASCAP and PRS for Music to adopt blockchain technology in music distribution.Imogen Heap's

Mycelia service has also been proposed as blockchain-based alternative "that gives artists more control over how their songs and associated data circulate among fans and other musicians.



Blockchain revenue by region (2016-25)

The revenue from blockchain has been increasing exponentially over the decade and it is projected to reach over $200 billion by the end of 2025. The technology has received overall mixed responses with some being openly accepting and some giving a lukewarm reaction. As per the global market report, the industry is showing promise of growth in the majority of the nations in both the public and private sectors.

The media focus around blockchain over the last five to ten years has shifted from the currency bitcoin to the underlying database technology,

which is a distributed ledger technology(DLT), now used in a wide variety of use cases.

As the digital transformation of global businesses continues, blockchain will naturally evolve as the best transactional platform across the globe. With the continued development of blockchain technology, we are not far from a reality where people can exchange value in a peer-to-peer manner without powerful market regulators and central authorities. Value transactions could be programmed and enforced in code, verified through mass collaboration, making fraud or any other interference an impossible task.

This technology opens up new opportunities. It could potentially revolutionize the current models of commerce, energy, finance, politics, real estate, and many more industries.

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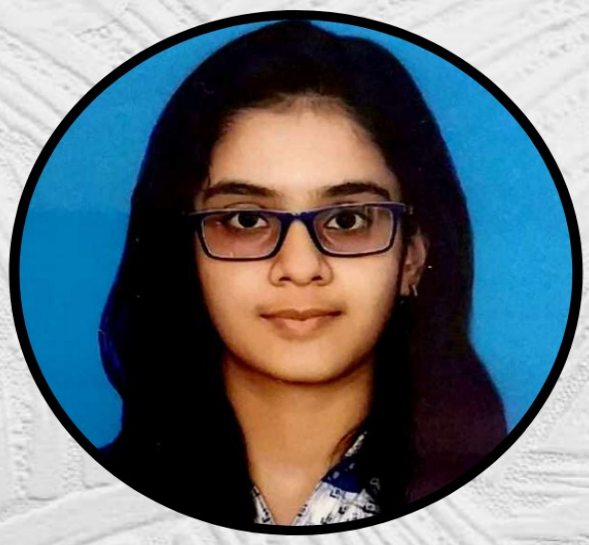
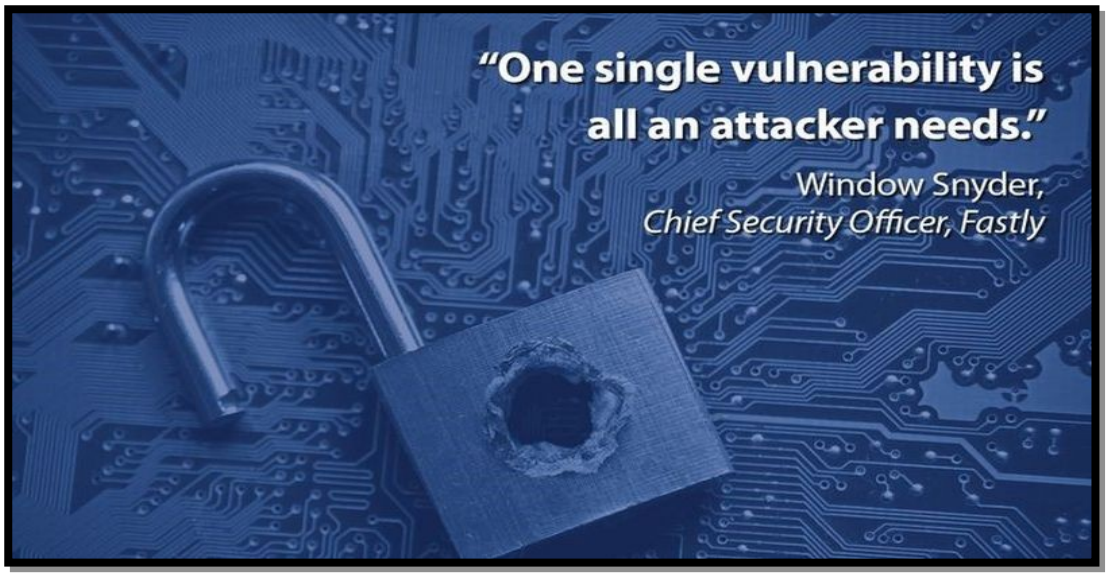
CYBER SECURITY

BY-
RIYA CHOUDHARY



CSE Second Year



Cyber security by windows

"If you spend more time on coffee than on IT security, you will be hacked. What's more, you deserve to be hacked."

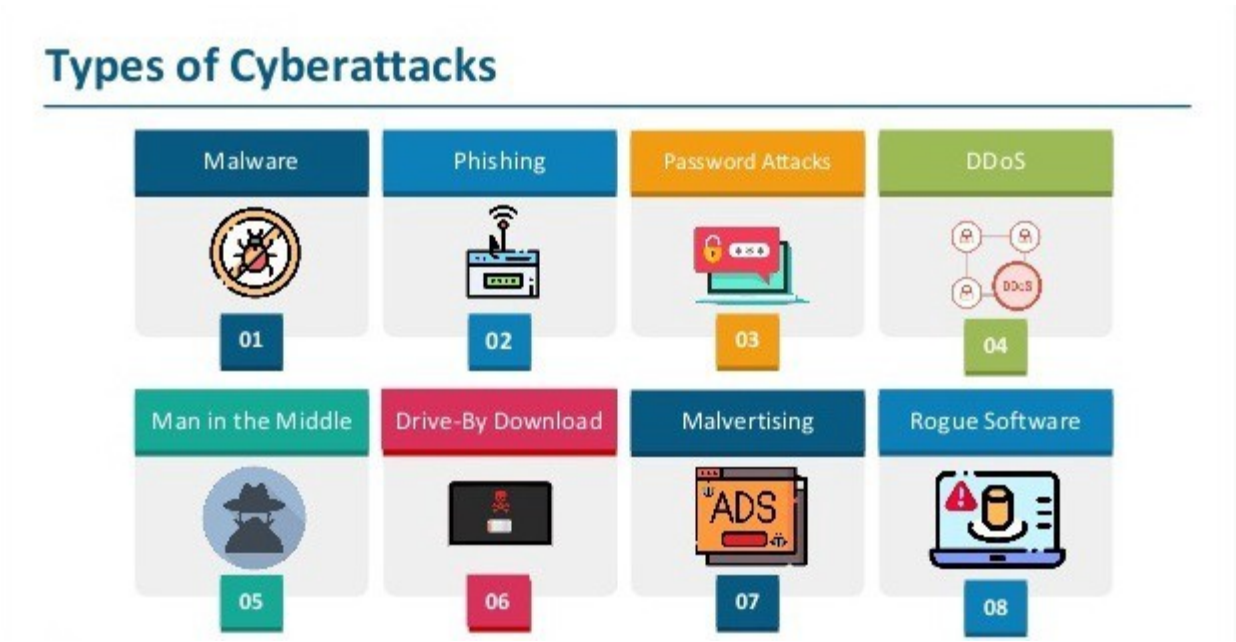
– Richard Clarke
(White House Cybersecurity Advisor, 1992-2003)

Cyber Security refers to the body of technologies, processes, and practices designed to protect networks, devices, programs, and data from attack, damage, or unauthorized access. Cyber security may also be referred to as information technology security.
According to EY's latest Global Information Security Survey (GISS) 2018-19 – India edition, one of the highest number of cyber threats have been detected in India, and the country ranks second in terms of targeted attacks. Although Banking and Telecom are the most attacked sectors but Manufacturing, Healthcare, and Retail have also faced a significant number of cyber attacks.

Motives behind Cyber Attacks

- To seek commercial gain by hacking banks and financial institutions.
- To attack critical assets of a nation.
- To penetrate into both corporate and military data servers to obtain plans and intelligence.
- To hack sites to virally communicate a message for some specific campaign related to politics and society.

Types of Cyber Attacks



Cyber Attack types

- Malware, short for malicious software refers to any kind of software that is designed to cause damage to a single computer, server, or computer network. Ransomware, Spy ware, Worms, viruses, and Trojans are all varieties of malware.
- Phishing: It is the method of trying to gather personal information using deceptive e-mails and websites.
- Denial of Service attacks: A Denial-of-Service (DoS) attack is an attack meant to shut down a machine or network, making it inaccessible to its intended users. DoS attacks accomplish this by flooding the target with traffic, or sending it information that triggers a crash.
- Man-in-the-middle (MitM) attacks, also known as eavesdropping attacks, occur when attackers insert themselves into a two-party transaction. Once the attackers interrupt the traffic, they can filter and steal data.
- SQL Injection:

  - SQL (pronounced “sequel”) stands for Structured Query Language, a programming language used to communicate with databases.
  - Many of the servers that store critical data for websites and services use SQL to manage the data in their databases.
  - A SQL injection attack specifically targets such kind of servers, using malicious code to get the server to divulge information it normally wouldn’t.

- **Cross-Site Scripting (XSS):**
  - Similar to an SQL injection attack, this attack also involves injecting malicious code into a website, but in this case the website itself is not being attacked.
  - Instead the malicious code the attacker has injected, only runs in the user's browser when they visit the attacked website, and it goes after the visitor directly, not the website.
- **Social engineering** is an attack that relies on human interaction to trick users into breaking security procedures in order to gain sensitive information that is typically protected.

Need for Cyber Security

For Individuals: Photos, videos and other personal information shared by an individual on social networking sites can be inappropriately used by others, leading to serious and even life-threatening incidents.

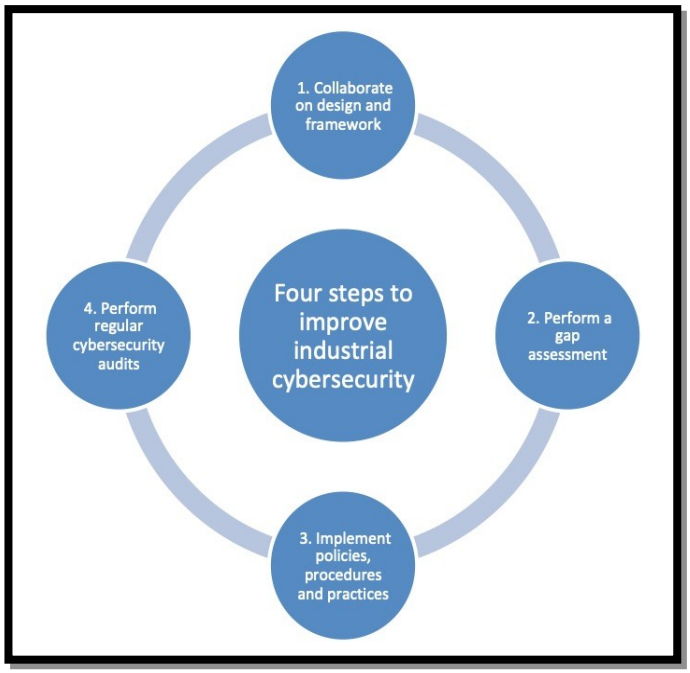
For Business Organizations: Companies have a lot of data and information on their systems. A cyber attack may lead to loss of competitive information (such as patents or original work), loss of employees/customers private data resulting into complete loss of public trust on the integrity of the organization.

For Government: A local, state or central government maintains huge amount of confidential data related to country (geographical, military

strategic assets etc.) and citizens. Unauthorized access to the data can lead to serious threats on a country.

Challenges

- Increased use of mobile technology and internet by people.
- Proliferation of Internet of Things (IoT) and lack of proper security infrastructure in some devices.
- Cyberspace has inherent vulnerabilities that cannot be removed.
- Internet technology makes it relatively easy to misdirect attribution to other parties.
- It is generally seen that attack technology outpaces defence technology.
- Lack of awareness on Cyber security.
- Lack of Cyber security specialists.
- Increased use of cyberspace by terrorists.



Steps for industrial security

Recent Steps taken by Government

- **Cyber Surakshit Bharat Initiative:** It was launched in 2018 with an aim to spread awareness about cybercrime and building capacity for safety measures for Chief Information Security Officers (CISOs) and frontline IT staff across all government departments.

- **National Cyber security Coordination Centre (NCCC):** In 2017, the NCCC was developed. Its mandate is to scan internet traffic and communication metadata (which are little snippets of information hidden inside each communication) coming into the country to detect real-time cyber threats.

- **Cyber Swachhta Kendra:** In 2017, this platform was introduced for internet users to clean their computers and devices by wiping out viruses and malware

- Training of 1.14 Lakh persons through 52 institutions under the **Information Security Education and Awareness Project (ISEA)** – a project to raise awareness and to provide research, education and training in the field of Information Security.

- **International cooperation:** Looking forward to becoming a secure cyber ecosystem, India has joined hands with several developed countries like the United States, Singapore, Japan, etc. These agreements will help India to challenge even more sophisticated cyber threats.

With growing internet penetration, cyber security is one of the biggest necessity of the world as cyber security threats are very dangerous to the country's security. It is not only the government responsibility but also the citizens to spread awareness among the people to always update your system and network security settings and to the use proper anti-virus so that your system and network security settings and to use proper anti-virus so that your system stays virus and malware free.

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GRADLE

BY-

MAHIMA NEGI

CSE Second Year

Gradle is an open-source build-automation system that builds upon the concepts of Apache Ant and Apache Maven and introduces a Groovy-based domain-specific language (DSL) instead of the XML form used by Apache Maven for declaring the project configuration. Gradle uses a directed acyclic graph ("DAG") to determine the order in which tasks can be run.

Gradle was designed for multi-project builds, which can grow to be quite large. It supports incremental builds by intelligently determining which parts of the build tree are up to date; any task dependent only on those parts does not need to be re-executed.

- Gradle is a general-purpose build tool.
- The core model is based on tasks.

Gradle has several fixed build phases.

- Gradle is extensible.
- Build scripts operate against an API.

Features

Declarative builds and build-by-convention − Gradle is available with separate.
Domain Specific Language (DSL) based on Groovy language. Gradle provides a declarative language element. Those elements also provide build-by-convention support for Java, Groovy, OSGI, Web and Scala.

1. Language for dependency-based programming − The declarative language lies on a top of a general-purpose task graph, which you can fully leverage in your build.

2. Structure your build − Gradle finally allows you to apply common design principles to your build. It will give you a perfect structure for build, SO that you can design well-structured and easily maintained, comprehensible build.

3. Deep API − Using this API it allows you to monitor and customize its configuration and execution behavior to its core.

4. Gradle scales − Gradle can easily increases their productivity, from simple and single project builds to huge enterprise multi-project builds.

5. Multi-project builds − Gradle supports for multi-project builds and it supports partial builds. If you build a subproject Gradle takes care of building all the subprojects that it depends on.

6. Different ways to manage your builds − Gradle supports different strategies to manage your dependencies.

7. Gradle is the first build integration tool − Gradle fully supported for your ANT tasks, Maven and lvy repository infrastructure for publishing and retrieving dependencies. Gradle also provides a converter for turning a Maven pom.xml to Gradle script.

8. Ease of migration − Gradle can easily adapt to any structure you have. Therefore, you can always develop your Gradle build in the same branch where you can build live script.

9. Gradle Wrapper − Gradle Wrapper allows you to execute Gradle builds on machines where Gradle is not installed. This is useful for continuous integration of servers.

10. Free open source − Gradle is an open source project, and licensed under the Apache Software License (ASL).

11. Groovy − Gradle's build script are written in Groovy. The whole design of Gradle is oriented towards being used as a language, not as a rigid framework. And Groovy allows you to write your own script with some abstractions. The whole Gradle API is fully designed in Groovy language.

12. Highly customizable — Gradle is modelled in a way that is customizable and extensible in the most fundamental ways.

13. Fast — Gradle completes tasks quickly by reusing outputs from previous executions, processing only inputs that changed, and executing tasks in parallel.

14. Powerful — Gradle is the official build tool for Android, and comes with support for many popular languages and technologies.

Advantages of Gradle:

- The possibility to write your build script with a functional programming language.
- Possibility to write your own tasks in Groovy (tasks are based on task Ant model).

- POM generation.
- Integration with Ivy repositories
- Configure and intercept all build phases of your project with the use of plugins
- Dependency management
- Distribution management
- Well integrated with Continuous Integration environments such as Jenkins.

Why Choose Gradle?

Gradle build scripts are declarative, readable, and clearly express their intention. Writing code in Groovy instead of XML, sprinkled with Gradle's build-by-convention philosophy, significantly cuts down the size of a build script and is far more readable

It's impressive to see how much less code you need to write in Gradle to achieve the same goal. With Gradle you don't have to make compromises. Where other build tools like Maven propose project layouts that are "my way or the highway," Gradle's DSL allows for flexibility by adapting to non-conventional project structures.

Gradle doesn't force you to fully migrate all of your existing build logic. Good integration with other tools like Ant and Maven is at the top of Gradle's priority list.

Popular open source projects like Groovy and Hibernate completely switched to Gradle as the backbone for their builds. Every Android project ships with Gradle as the default build system.

Gradle also had an impact on the commercial market. Companies like Orbitz, EADS, and Software AG embraced Gradle as well, to name just a few.

VMware, the company behind Spring and Grails, made significant investments in choosing Gradle. Many of their software products, such as the Spring framework and Grails, are literally built on the trust that Gradle can deliver

Issues have been fixed in Gradle 6.0.1.

Attribute disambiguation rule for 'org.gradle.category' can cause unexpected type exception

- Kotlin DSL: `fileTree(mapOf(...))` has unexpected behaviour
- Incremental Java compilation is broken with Android 3.5.1 and Gradle 6.0
- Unable to properly resolve dynamic dependencies from mavenLocal() repo
- maven-metadata.xml SHA256 and SHA512 checksums prevent publishing to Nexus
- Implicit capabilities not always applied/detected
- Unable to use a Provider as an artifact for the maven-publish plugin.

Introduction to Gradle for Android Studio

In Android Studio, Gradle is used for building our android application projects, hence playing the role of a build system. Before Android Studio, in Eclipse we used to compile and build the applications using command line tool which was soon taken over by GUI based steps to build and run Android Applications in eclipse using ANT. Every android application development tool has to compile resources, java source code, external
libraries and combine them into a final APK.

Gradle is a build system, which is responsible for code compilation, testing, deployment and conversion of the code into .dex files and hence running the app on the device.

As Android Studio comes with Gradle system pre-installed, there is no need to install additional runtime softwares to build our project. Whenever you click on **Run** button in android studio, a gradle task automatically triggers and starts building the project and after gradle completes its task, app starts running in AVD or in the connected device.

A build system like Gradle is not a compiler, linker etc, but it controls and supervises the operation of compilation, linking of files, running test cases, and eventually bundling the code into an apk file for your Android Application.

There are two build.gradle files for every android studio project of which, one is for **application** and other is for **project level(module level) build files**.

Disadvantage of Gradle:

Gradle is the poor integration with eclipse.