Wall For All

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Dear Readers

The nostalgic feeling that one experiences while sifting through the dusty old pages of the college magazine cannot be expressed in words. However, very few of us have retained those copies, and most of those precious articles that we wrote during those golden days with enthusiasm are lost forever. With the advent of e-books and other online media, the days of paper-bound college magazines are gone, and the digital platform has paved way to allow retention of such publications without much effort.

Wall-for-All, the e-Magazine published by the Department of Computer Applications, is one such effort that was started with an intent to provide a chance to all students and faculty members to share their thoughts and knowledge, and hone their skills in creative writing.

I am happy to see the enthusiasm of eminent members of the department to contribute to Wall *for All*. This shows the positive and creative energy of the contributors. However, it would be really wonderful if we can see the articles contributed by more students in the next editions, for this e-Magazine is intended to be a writing pad for each member of the department.

I proudly present the current edition of *Wall for All*.

Dr. Jaiteg Singh

Professor & Dean

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Important Technical Inventions of the Past 100 years

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What we enjoy today would have not been possible without these 10 inventions. While these are very simple inventions but our world is shaped by these marvellous ones.

Picture life in 1918:

World War I was in its closing months, a Ford Model T cost $500, and home radio units were just coming into being.

Source: State Library of QueensLand
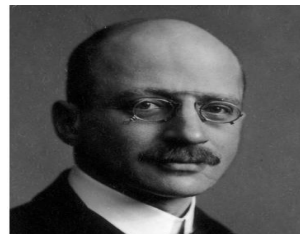
1918: Artificial Fertilizer revolutionizes Agriculture

German chemist Fritz Haber invented a method of pulling nitrogen out of the air to create ammonia, for which he was awarded a Nobel prize in 1918.

Source: Find a Grave/TechRepublic

1924: Wireless Faxing

The ability to send images and text over wire. Richard H. Ranger invented the photo radiogram, which was able to transmit an image of President Calvin Coolidge from New York to London--wirelessly--in 1924.

The wireless fax started a business communication revolution, allowing for the transmission of higher-quality images faster than ever before.

Source: Afax.com

1926: Rocketry

The age of modern rocketry--that is, liquid-propelled rockets--began in 1926 with Robert H. Goddard's first successful rocket flight.

Goddard's rocket made many inventions possible, including space travel (though that would take several decades).

Source: NASA

1927: Electronic Television

The first electronic television was invented by Philo T. Farnsworth in 1927, when he was only 21 years old. Electronics company RCA offered to buy Farnsworth's electronic TV patent for $100,000, but he refused, kicking off a lengthy legal battle that ended with RCA paying royalties to Farnsworth to use some of his patented components in its mass-market television sets.

**Source: University of Utah**
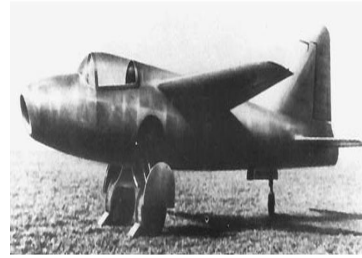
1930: The Jet Engine

The 1930s raised a wall in the path of aviation technology: Propellers, no matter how big or how fast they spun, could only get so fast.

Two engineers developed the modern jet engine, which uses the expulsion of fluid to create thrust, almost simultaneously. The first, proposed by Frank Whittle in 1928, later became the engine behind the UK's Gloster Meteor aircraft. In 1930, the first patent for a jet engine was submitted.

The second jet engine inventor, German Hans von Ohain, made the first actual jet engine, and his experimental Heinkel He 178 became the world's first aircraft to be solely propelled by jet engines in 1939.

While slow, the first jet engine made the world much smaller as it improved, leading to worldwide commercial flights that are now a common part of life.

Source: US Air Force
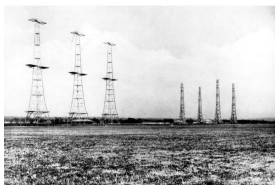
1935: Radar

Modern radar technology first came into being in 1935, thanks to the work of Scottish engineer Robert Watson-Watt. His experiments involved using radio signal to detect aircraft, and tests starting in 1935 led to the development of project Chain Home, a line of radar installations that warned the UK of incoming German aircraft.

We now use radar to track aircraft, predict weather, help ships navigate safely, map the Earth's crust, and more.

**Source: Royal Air Force Museum**

1940s: Color TV

While the first mechanical color television was created in 1928, it wasn't until the 1940s that commercially viable color TV technology came into being. RCA later invented the world's first fully electronic color system, which the FCC adopted in 1953. It wasn't until 1960s that color broadcasts became widespread.

Source: Research Gate
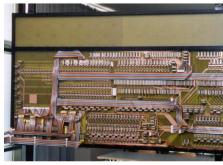
1941: The first Turing-complete computer

A Turing-complete computer is one that is able to perform general calculations, as opposed to a non-Turing complete machine, which is built to perform one specific purpose.Turing completeness was a fundamental step in computing technology, and in 1941, German engineer Konrad Zuse built the first electronic computer to be fully Turing complete. Zuse's Z3 was used during World War II to solve wing flutter problems in German military aircraft. It was destroyed in an allied bombing raid in 1943; the Z3 pictured above is a reproduction. Turing-complete electronic computers are all around us in the modern world, for which we have Konrad Zuse to thank.

Source: Nick Heath/TechRepublic

1994: The first smartphone

We may think of the iPhone as the world's first modern smartphone, but it was preceded by another touchscreen device by over a decade: The IBM Simon personal communicator.

You'll be forgiven for not knowing of the existence of this 1994 proto-smartphone: It only sold for six months and moved a measly 50,000 units.

Regardless, the Simon was truly the world's first touchscreen smartphone. It was able to receive email and faxes, and had apps including a calendar, address book, notepad, world clock, appointment scheduler, calculator, and other applications we typically associate with smartphones.

It was also roughly on par with the price of a modern flagship device: Its sole carrier, Bellsouth Cellular, offered it for $890 USD ($1,516 in 2018) with a two-year contract, or $1,099 ($1,872 in 2018) without a contract.

Source: Microsoft

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Unique Payment Interface (UPI) : The Future of Digital Payments

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Developed by NPCI (National Payments Corporation of India) and under the regulation of the Reserve Bank of India (RBI), **Unified Payments Interface** (UPI) is an instant real-time payment system used for facilitating inter-bank transactions. The interface works by enabling instant transfer of funds between two bank accounts on a mobile platform. 142 banks as per NPCI (March 2019) were live on UPI with a monthly volume of 799.54 million transactions and a value of ₹1.334 trillion (US$19 billion).

The tremendous growth of smartphones in India has made India a potential superpower in e-commerce. Within e-commerce we have the sub-category of e-payments which primarily consist of e-wallets or mobile wallets, and new payment gateways such as UPIs (unified payment interface). Post-demonetization, UPIs seem to have taken a march ahead of e-wallets in value terms and also slowly matching up to e-wallets in volume terms (Figure 1).
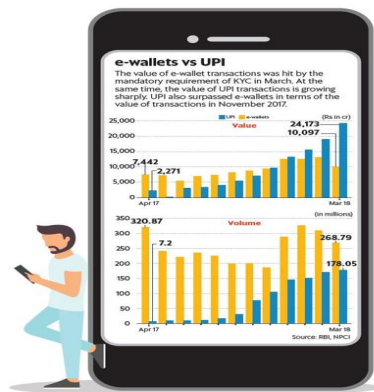

Figure 1: e-wallets vs UPIs (Source: www.livemint .com 4 reasons why UPI may overtake mobile wallets soon)

The fast pace of acceptance of UPIs augurs well for the digital Indian campaign of the Government of India given that the use of physical currency is known to cost USD 3 billion to the Indian economy – which is among the several benefits of going online as far as payments are concerned. The immediate competing service of a UPI is an e-wallet. UPIs gain upper hand vis-à-vis e-wallets because e-wallets need to be loaded first with money, on the other hand, UPIs

work on the IMPS (immediate payment service) function and payments made are real-time. Another major advantage is that any UPI client app may be used and multiple bank accounts may be linked to a single app. Through a UPI app users can send or receive payments by any of the following methods:

- Virtual Payment Address (VPA) or UPI ID: Send or request money from/to bank account mapped using VPA.
- Mobile number: Send or request money from/to the bank account mapped using mobile number.
- Account number & IFSC: Send money to the bank account.
- Aadhaar: Send money to the bank account mapped using Aadhaar number.
- QR code: Send money by QR code which has enclosed VPA, Account number and IFSC or Mobile number.

The Bharat Interface for Money (BHIM) app, was amongst the first UPIs to be launched in India and played a major role in generating awareness about the UPI ecosystem in India. India, with its young population, growing smartphone penetration, and changing attitudes, is likely to emerge as one of the most significant consumer of UPI in the world. (BHIM) is one such app that is aimed at making Indians go cashless. BHIM lets users make simple, easy and quick transactions using the Unified Payments Interface platform. It is available in 13 vernacular languages, is live on 111 banks and has clocked 43 million app downloads until April 2019. The number of transactions on the app was at 14.9 million in March 2019, while the total value of the transactions stood at ₹6,417 crore, according to National Payments Corporation of India data. In order to give a boost to UPIs, the government is planning to make the use of UPIs mandatory for certain transactions. For instance, come July, any retail investor looking to subscribe to an initial public offering will have to whip out his or her phone and apply using the Unified Payment Interface or UPI platform. The rules, being implemented in phases, will lead to quicker verification of applicants and speed up the IPO process, the regulator hopes (Palepu, 2019).

With several global players now in the market e.g. Amazon and Google; it seems UPIs are here to stay in the long run. In a study on the adoption of UPIs, Gupta, Mittal and Mittal (2019) found out that UPIs are easy to use and are considered useful as well. As per the technology adoption model (TAM; Davis, 1989) usefulness and ease of use are the two most important variables that explain the adoption of any new technology. Thus, research and current trends suggest a very bright future for UPIs and with the re-election of the previous government, there is hope of consistency in policies.

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A Survey on Software Defined Networking: OpenFlow Protocol and Controllers

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I.   Introduction & Background

The increasing services of cloud have undertaken the researchers to think again on the today's architecture of network [1,2]. In traditional networks, many devices of the network have the routers and switches that comprise of forwarding plane, control plane and application plane and these are embedded into the network device [3]. In SDN, control plane (how the packets are forwarded and where to forward the packets) and data plane (handles the packet with respect to the rules that are defined in the control plane) are decoupled from each other. By decoupling, it has changed the resources of the network into programmable and automation and network control enabled to make it more scalable and flexible enough.

II.   Architecture of Software Defined Networking

The main component of SDN layer is Control Layer as controller is embedded into it. It works like a brain of the network as its coordinates and control the flow of traffic by the use of flow tables.

In SDN Architecture, we have defined the terms: Data (Infrastructure), Control and Application Planes. The lower most layer is known as Data Plane which consists of many network elements, which has data paths of SDN that have explored the capabilities of Control Data Plane Interface (CDPI) Agent. The middle most layer is known as Control Plane which is also coined as SDN Controller. This converts the requirements and explores the lower level control over the data paths when giving the information to the applications of SDN [1]. The top most layer is known as Application Plane which interacts for their requirements with Northbound Interface (NBI) Drivers.
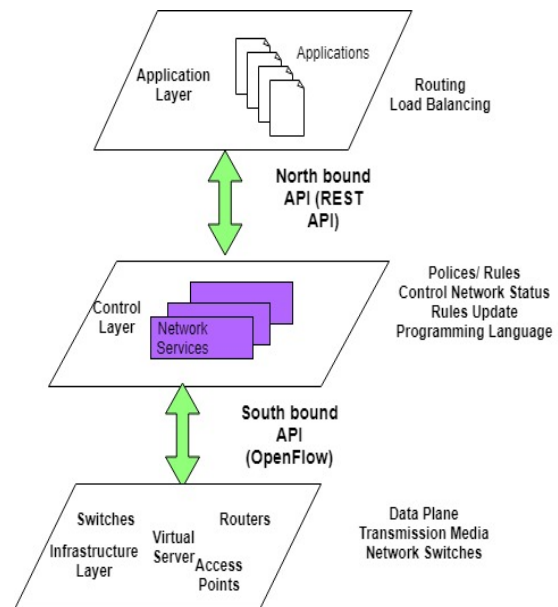

Figure 1: Architecture of Software Defined Networking

III.   SDN Controllers

Controllers in SDN is coined as the "brain" of the controller network and it is considered as the NOS (Network Operating System). It coordinates and manages the flow of control to the routers or switches below (via South bound Interfaces) and the business logic applications above (via North bound Interface) to under vent the intelligent networks [8]. There are various variety of controllers available in SDN: POX, Ryu, Trema, OpenDaylight, Floodlight and there are various other controllers other than the listed above including Beacon, NOX, Maestro, FlowVisor, RouteFlow and many others.

Table 1: SDN Controller

BASICS	POX	RYU	TREMA	OpenDayli ght	Floodlight
Language Supporte d	Python	Python and Message passing reference	Ruby and C	Java	Java and any language that uses REST API
Platform Supporte d	Linux, Mac OS, Windows	Linux	Linux only	Linux	Linux, Mac OS, Windows
Productiv ity	Medium	Medium	High	Medium	Medium
Developer	Nicira	NTT, OSRG group	NEC	Multiple Contributor s	Big Switch
OpenFlo w Version	1.0	1.0, 1.2, 1.3, 1.4		1.0, 1.3	1.0
Used for	Open source platform SDN controller	Used to give logically centralize d control and API's of this develops new control	Used to create open flow controller s using C and Ruby program ming		It is based on the implementati on of Beacon that works with OVSDB.

IV. Protocol used in Software Defined Networking (OPENFLOW)

OpenFlow is the most famous and popular protocol of SDN and it separates the control logic from forwarding data. It was developed by the Stanford University and it is now transformed by the Open Network Foundation (ONF). It is most widely used in larger networks like GENI and JGN-X. It is the intermediate between dumb device and controllers in SDN, and these dumb devices are known as forwarding data and controllers are known as control logic [5].

Table 2: OpenFlow Versions

Version	Year	Features	Cause	Cases
1.0-1.1	1.0 released in December 2009	Multiple tables, Group tables, Full VLAN support.	Avoid explosion in the flow entries, enables the actions applying to the group of flows.	Load Balancing, Link failure etc.
1.1-1.2	1.1 released in February 2011	Multiple Controllers	Load Balancing and scalability.	Controller Load Balancing.
1.2-1.3	1.2 released in December 2011	Table miss entry, meter table.	Provides the flexibility and add Quality of Service (QoS).	
1.3-1.4	1.3 is the most deployed version	Synchronization of table.	Increase the scalability, increases the synchronization of switch.	Configuration of various switches.
1.4-1.5	1.4 released in October 2013	Egress table.	Increases the synchronization of switches, processing should be completed on the output port.	

V. Software Defined Networking using MININET

Mininet is an emulator that works over many networks having limited number of resources. It is an emulator in which we can create the topologies of very small size to large. This emulator is used to run the gathering of end-hosts, switches, routers and maintain a link by using the

Linux kernel. To work with mininet, we require hosts, switches and wires/cables to have a connection between controllers and switches [7,8].

VI. Conclusion

Traditional networks are quite difficult, and they are vendor-specific. The main reason for vendor-specific is their combination of control logic and forwarding data, networking devices are tightly coupled to line products and versions. Every product line has its own configuration and interfaces. This latest and most enhancing technology is SDN and it is to be considered as one of the most promising solutions to meet and cater the demands.

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Technology in Sports for Decision Review System

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The technology has been used significantly in sports for decision making. The technology like image processing and artificial intelligence has been widely used in almost all the games. The use of technology in sports has made the on field umpire's job easy to take the important decisions. In game like cricket, third umpire use the technology to check whether a catch has been clearly taken, to check a fair delivery, to check LBW (Leg Before Wicket), to check stumping decision etc. DRS (Decision Review System) is a technology-based system used in cricket to assist the match officials for decision-making. Now, through this system a player can object to overturn the on field umpire's decision. It was first time used in test cricket in the year 2008 in a match between India and Sri Lanka. ICC (International Cricket Control Board) has adopted this system from 24th November, 2009. Since then, this technology has been used effectively in all the formats of the cricket.

DRS for the Catch

Through snicko meter, which uses directional micro phone for sound detection, third umpire can make it sure whether ball has been touched with any object or not. If ball has been touched with any of the object like bat, leg pad or thigh pad it then it can be

Figure 1: Use of Snicko Meter
Source: https://www.quora.com/How-does-a-snickometer-in-cricket-actually-work

diately shown on the screen in form of snicko graph. But the problem with this technology is that umpire cannot make it sure that ball has been actually hit with the bat or with some other object, so umpire can use hot spot technology .The hot spot technology helps to check the spot where ball has been actually hit. It is an infrared imaging system that helps to find the edges.
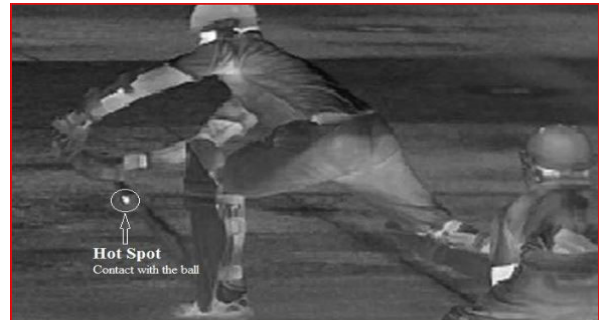

Figure 2: Use of Hawk-Eye for detecting Edges
Source: https://livesportworld.com/cricket-hotspot-device/

DRS for the Leg Before Wicket Decision

Hawk-eye technology is used by the third umpire to check a fair LBW decision. It is a virtual ball tracking technology. It tracks the trajectory of the ball after hitting the bat, therefore helps to detect whether ball is going to hit the stumps or missing.
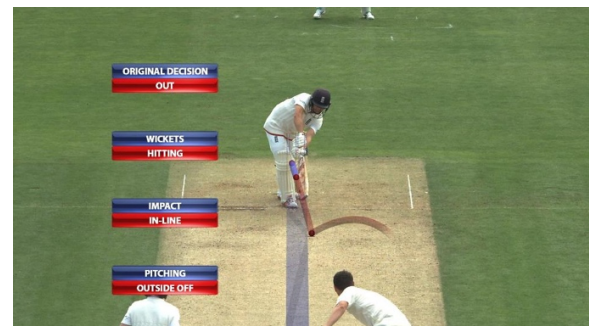

Figure 3: Use of Hawk-Eye for LBW decision
Source: https://www.hawkeyeinnovations.com/sports/cricket

About 74% referrals are for the LBW decisions whereas 18% have been taken for the caught behind decision. The overturn rate for LBW decision was 22% and against caught behind wicket was 40% since 2016 In future, more advance technologies can be seen in sports for decision making.

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Artificial Intelligence

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Artificial Intelligence is a wing of intelligence created by observing the work of natural intelligence reacting with the environment to perform learning, implementing and solving problems. Artificial Intelligence is something which "clones" the human intelligence using computers.

AI is an intelligence of processing on the analytical data and solving complex problems by using algorithms to produce the desired results. As a the term "Artificial Intelligent" simply states intelligence by machines.

Origin of AI

In 1940s, invention of programmable digital computer inspired many scientist to begin serious discussion on possibility of inventing an electrical brain.

The field of AI research was founded at a workshop held on the campus of Dartmouth College during the summer of 1956 where "John MCcarthy" known as father of AI coined the first "Artificial intelligence" term. Investment and interest in AI boomed in the first decades of the 21st century when machine learning was successfully applied to many problems in academies and industry due to the presence of powerful computer hardware.

 "AI is not a science fiction anymore .It has become a reality"

Foundational Areas of AI

The core of AI is the study of machine learning algorithms and big data.

Algorithms form the basis of AI and machine learning which made it possible to solve complex tasks. Machine Learning is a science of designing and applying algorithms for machines to learn things and improve experience.

Without the help of Big data, AI could not have been flourished. Big Data provided explicit knowledge for machines to form basis of any system.

Logical, Mathematical Concepts, Decisions support , augmented human capabilities led to fast growth of

artificial intelligence .
The pursuit of AI does not occur in isolation. Fields such as philosophy, linguistics, neural networks and theoretical computer science, have played important role in development of AI.

Sub Divisions of AI

Expert Systems - like Flight Tracking Systems, Clinical Systems
Neural Networks - e.g. Brain Modelling, Time Series Prediction,
**Pattern Recognition system** - such as face, character and handwriting recognition.
Algorithmic Computation - e.g. genetic algorithms. Robotics - e.g. intelligent control, autonomous exploration **Natural Language Processing**- e.g. speech recognition Machine Learning - e.g. decision tree learning.

Future of AI

All that we have been used in our day to day life like biometric systems and from smart devices to smart houses all has been enhanced by AI.
The growth of AI is fast increasing in areas like automated transportation, robot control, remote sensing, 3D reality and cyborg technologies.

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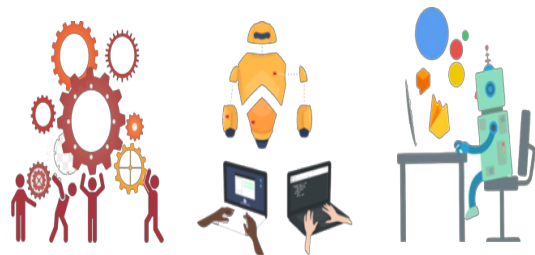
Top AI Companies

Google : It is one of the leading companies that are working in AI. Google Assistance & Deep Mind have been developed by AI.

Apple : Apple has used AI in wide range of applications from the famous 'SIRI' to optimizing battery usage.

Facebook : The head of Facebook's AML group, has said at a conference in 2017 "Facebook today cannot exist without AI," Every time you use Facebook or Instagram or Messenger, you may not realize it, but your experiences are being powered by AI."

Volkswagen, BMW : are working on self driven car.

Call for Articles

At Chitkara University, the endeavor has always been to hone the skills of learners. Keeping in line with this tradition, the Department of Computer Applications, Chitkara University, Punjab had come up with an online magazine titled **Wall for All**. This magazine was proposed to provide a platform to the budding learners to share their knowledge and general information pertaining to the computing field. **Wall for All** is available for free download in PDF format from CA departmental website: *ca.chitkara.edu.in.*

The students and faculty members are invited to be a part of this venture and contribute their articles to the magazine. The students may forward the articles through their respective mentors while faculty members may send the same directly to the editors of **Wall for All.**

Flutter with Dart- is it Worth it?

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Introduction

At Mobile World Congress in Barcelona , Google Launches version 1.2 of Flutter , its an open source mobile UI framework that helps developers to build native apps for Android and iOS. The Company also launches a new web-based suite of programming called Dart DevTools to help Flutter Developers to Debug and Analyze their apps.

What is Flutter?

Flutter is a mobile app SDK for building high-end apps for iOS and Android from a single code. The goal of Flutter is to enable developers to deliver high-end apps that feel realistic on different platforms.

Why use Flutter?

- Flutter is highly productive
  o   We can develop iOS and Android apps from one single code.
  o   We can do more with less code , even on a single OS.
- Create beautiful, highly customized user experiences
  o   Realize custom interface , beautiful designs without any limitations.
  o   Benefits from a rich sets of Material Designs and Cupertino(iOS Flavor).

What is Dart?

Dart is an client-optimized programming language for fast apps on multiple platforms. It is developed by Google and is used to build mobile , desktop , backend and web applications.

Dart is an Object Oriented , class defined , garbage collector language using a C style syntax that trans compiles optionally into Javascript. It supports interfaces , abstract classes , reified generics , static typing and a sound type System.

Why Dart?

- Easy to Learn

  o   The reality is that you probably already know Dart but you just don't realize it.
  o   If you already have experience with OOPS or Java as well as some Javascript then Dart is an Easy Language to Learn.
- Natively Compiled Shared Codebase
  o   While other Frameworks allow you to share portions of codebase in different platforms, Dart takes this to entirely new level.

Why Flutter Uses Dart?

- Dart is AOT (Ahead Of Time) compiled to fast, predictable, native code, which allows almost all of Flutter to be written in Dart.

- Dart makes it easier to create smooth animations and transitions that run at 60fps.

- Dart allows Flutter to avoid the need for a separate declarative layout language like JSX or XML, or separate visual interface builders, because Dart's declarative, programmatic layout is easy to read and visualize. With all the layout in one language and in one place, it is easy for Flutter to provide advanced tooling that makes layout a snap.

- Developers have found that Dart is particularly easy to learn because it has features that are familiar to users of both static and dynamic languages.

Pros and Cons

- **Pros**
  o   Faster Code Writing
  o   One code for 2 Platforms
  o   Less Testing
  o   Faster Apps
  o   Cool Designs
  o   Perfect for Minimum Viable Product

- **Cons**

  o   Libraries & support – Impressive, but still not so rich as for the native development

Conclusion

This is an exciting time for Dart. People who use Dart love it, and the new features in Dart 2 make it an even more valuable addition to developer's arsenal of tools. If you have not used Dart, I hope this article has provided you with valuable information about what is new or different about Dart, and that you will give it — and Flutter — a try.

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Cyber Security: A Major Issue

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In this technically driven world, where Internet has reached new heights, our security at the hands of this technology still remains at stake. Thus, Cyber Security is the need of the hour!

What exactly is Cyber Security?

Computer security, cyber security or information technology security (IT security) is the protection of computer systems from the theft of or damage to their hardware, software, or electronic data, as well as from the disruption or misdirection of the services they provide.

Need for Cyber Security

The internet is both a boon and a bane in today's era. From operating huge machineries to billions of dollars lost to cyber-attacks, the World Wide Web has exposed us to newer threats and privacy exploitations in the form of data breaches and cyber-crimes. In this never ending flow of data, lie vulnerabilities which are always prone to newer and more severe attacks every day.

The internet and computer pose great threats which can have disparaging impacts on civilizations.

Earlier, cybercrime was committed mainly by individuals or notorious tech enthusiast, presently, it is observed that there is highly complex cybercriminal networks that commit real time crimes.

The 21st century has seen a major hike in the number of Cyber Attacks, some of which are:-

1. **WannaCry**- This was a ransomware attack in May 2017, led by a hacking group called the Shadow Brokers which leaked a block of code by United States National Security Agency called EternalBlue. This attack took control over millions of computers and negotiated their decryption with amount in bitcoin (cryptocurrency transactions).

2. **GitHub**

Huge projects and repositories were at the stake in Feb 2018 when the site faced a denial-of-service with 1.3TB of traffic reaching the site per minute. This attack outpaced the huge attack on Dyn in late 2016 which peaked at 1.2 TB of traffic hitting the site per second.

3. **Ethereum**

With the welcome of cryptocurrency, the transactions took a hike and their security was something to be worried about. Ethereum is one such cryptocurrency which evolved on a huge scale but a data leak led to $7.4 million loss in Ethereum and later on after a week the same attack led to $34 million of Ethereum. This sent the security of block-chain currency into question.

4. **Equifax**

Another data leak was brought to knowledge when criminals exploited a U.S. website application vulnerability to gain access to certain files. To prevent such breaches from happening requires a shift in culture and resources; this was not a technical issue, as the technical fix was already known. Equifax certainly had the resources, but it clearly did not have the right

culture to ensure the right processes were in place and followed.

5. Yahoo

In 2013, Yahoo faced a massive data leak where 3 billion yahoo email accounts were affected and it was brought into notice in 2017 Stolen information included passwords and backup email addresses encrypted using outdated, easy-to-crack techniques, which is the sort of information attackers can use to breach other accounts

Conclusion

Cyber Security is a major issue to be concerned about and it always will be. Since technology is getting smarter and smarter, so are these criminals. The only way left to prevent these threats is to stay updated with current technology and report to cyber cells if any such issue occurred.

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