ISSUE 01 JANUARY 2020

Techno Wizz

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Editorial Board

Tharanga Peiris Umanga Pilapitiya Nipunu Wijesingha

Message from CEO Dr. Athula Pitigala Arachchi

Development of the whole person is at the heart of education. APIIT Sri Lanka has the added responsibility of training its students to become professionals, who will make a valuable contribution to society while pursuing rewarding careers and fulfilling lives. In order to meet this challenge, it is imperative that we provide a holistic education. This requires not only the provision of academic programs of high quality and standard for intellectual enrichment, but also the promotion of extracurricular activities for personal development. The students entering APIIT are highly talented. Some excel in sports, others in music and drama, and still others in creative writing. It is our desire to ensure that these inborn talents are nurtured, hidden talents are brought out and new ones are embedded. To achieve this objective, each school organizes a number of extracurricular activities. Techno-Wizz, an e-magazine, is the latest initiative by the School of Computing. This will provide a platform for students and staff to share knowledge and express their points of view. In particular, students will have the opportunity to hone their writing skills and become competent communicators. The ability to communicate effectively is an essential life skill in today's world. I congratulate the School of Computing on this timely undertaking and wish Techno-Wizz magazine great success.

Message from Head of School - Computing Prof. Priyantha Kumarawadu

I am quite pleased to celebrate the launch of the magazine of the School of Computing – Techno Wizz, with this inaugural issue. This magazine is a new communication medium for us, with the goal of giving a glimpse into what sets the APIIT School of Computing apart. It is important that we share our stories with those who may not be familiar with this dynamic place of computing education, professional training and innovative research. Through innovative and engaging learning, we want our students to gain a deep understanding of cutting-edge technologies and to be prepared for a meaningful career. As the Head of the School of Computing, I am exceptionally proud of our dedicated faculty and staff who are the most valuable resources at APIIT. They are committed to academic excellence and to the success of our students. I believe, together, we can make a difference. I congratulate our dedicated editorial team for their determined efforts in bringing out this magazine.

I invite you to join hands and share the exciting journey we have to offer.



Content Delivery Networks (CDN): The Invisible Backbone of Modern Websites

By: D.C. SHEHAN MARASINGHE

Popular web sites like Google, Facebook and eBay load their web pages on your web browser within milliseconds. But to make it fast as it is now, these organizations have overcome many technical problems which cause latency in web communication such as limited performance of the webserver, size of the web page content and the geographical distance between the web server and the visitor. Latency has critical become а performance criteron of web services. Web latency can be defined as the time delay in loading a web page.

In order to overcome the latency caused by the geographical distance between the web server and the visitor, the modern web architectures include a Content Delivery Network or CDN component which is designed to optimize the web content delivery. A CDN is a globally distributed and interconnected server group which caches the contents such as images, videos, JavaScript, CSS files hosted on origin web servers. It serves content for the requests of visitors from the geographically closest CDN server known as CDN PoP (Point of Presence).

Why CDN?

Being faster is not the only reason to adopt a CDN solution for a website. A CDN is able to prevent a webserver crash, by distributing heavy traffic loads across multiple servers. CDN increases the conversation rate of a website: Conversation rate is a web metric that defines the number of visitors who have performed the intended actions of the web owner. When a CDN is implemented, it enhances the web loading performance for every visitor and indirectly influences the growth of the conversation rate of the website.

CDN reduces the bounce rate of a website: If a website, does not load within a reasonable amount of time, visitors simply bounce to another website to achieve their requirements. The number of visitors who leave the website after their first impression is indicated by the web bounce rate. This is one of the main reasons for modern web site owners to be concerned about CDN implementation for their websites regardless of their scale.

How does a CDN Work?

The functioning of a CDN can be explained through the telegram service that used to be available in our country. The sender's post office can be assumed as the origin server and post office closest to the receiver is the CDN PoP in this scenario.

Modern CDNs offer services beyond mere content delivery. They also offer security solutions to websites such as DDOS protection, DNSec and also image / HTML compression to minimize the web page size in order to reduce load time for the visitor.

Wrapping Up

Approximately 8.8 million websites in the world wide web use CDN to optimize their web content delivery. CDN had a market value of around \$9.24 Billion in 2018. This number is still growing and the need of CDNs for websites is now critically discussed in the corporate ecosystem more than ever. However, time to time, several data breaches have been reported from these third-party CDN providers. Therefore, the future of CDNs mayevolve towards building private CDN solutions for corporate websites through cloud technologies and container orchestration in a reliable manner giving more infrastructure and software control to the web site owner.

🖊 Firebase

Why Firebase?

Firebase is an application platform for the web, Android and iOS. Firebase gives you a suite of services that you merely have to use within your development effort. All of Firebase's services are fully integrated. In short, Firebase saves you time. More than 50% reduction in developer workload can be achieved for even simple projects. Your codebase stays smaller. Your bugs stay fewer. And you can ship more features in the same project.

Cloud Functions for Firebase

Cloud Functions for Firebase let you automatically run backend code in response to events triggered by HTTPS Firebase features and Your code is stored in requests. Google's cloud and runs in a managed environment. There's no need to manage and scale your own servers.

Lifecycle of a background function

 The developer codes the new function, selecting an event provider (such as Realtime Database)

2. The developer deploys the function, and Firebase connects it to the selected event provider. 3.When the event provider generates an event, that matches the function's conditions, the code is invoked.

4.If the function is busy handling many events, Google creates more instances to handle work faster. If the function is idle, instances are cleaned up.

5. When the developer updates the function by deploying updated code, all instances for the old version are cleaned up and replaced by new instances.

In addition to listening for events with a background function, you can call functions directly with an HTTP request or a call from the client.

FireStore

Cloud FireStore is a flexible, scalable database for mobile, web, and server development from Firebase and Google Cloud Platform. Like Firebase Realtime Database, it keeps your data in sync across client apps through real-time listeners and offers offline support for mobile and web.

Firebase Functions and FireStore

By: IMESH RANAWAKA

Difference between Realtime Database and Cloud FireStore

A Cloud FireStore supports enhanced functionality, scalability, performance and more powerful features.

First of all, both FireStore and Realtime Firebase database are cloud-hosted NoSQL databases. While simple data is easy to store in both databases, complex hierarchical data is harder to organize in Firebase. FireStore is required to organize such data. Also, cloud FireStore offers less denormalization and data flattening.

The Realtime firebase database gives you the advantage of offline support on iOS and Android only whereas the Cloud FireStore provides offline support for iOS Android and Web clients. The queries in Realtime Firebase database are deep by default whereas queries in FireStore are indexed by default.

Firebase supports basic write and transaction operations whereas FireStore supports Atomic write and transaction operations.

APIIT School of Computing Highlights 2019

ICT seminar at Musaeus College

20th September 2019

Prof. Priyantha Kumarawadu gave a speech on future career prospects in the field of IT and Dr. Harinda Fernando joined in with a speech on Industry 4.0



Educators are constantly on the lookout for innovative and inspiring teaching and learning tools to enhance the learning experience of their student. Recent studies suggest that the everyday laptop could be such a vital teaching and learning tool.

During the past several years, educational institutes have encouraged students to use laptops in classrooms for their learning. Studies suggest that the use of laptops in the learning process has provided a positive outcome to the student and the student's learning experience. As a result, a positive outcome on the performances. students' ls this entirely true? The laptop has now become a common device among students with manv along smartphones. iPads and other technologically advanced devices which can connect to the web in seconds.

Laptops in Learning By: MALSHA FERNANDO

It can facilitate students' engagement with online course material, access to reliable and rich sources of research and of course, communication with friends and peers through social media. It is now a common sight to see students taking notes on their laptops rather than taking handwritten notes. They opt to use the laptops in class so they can access the online lecture slides while in class, refer ebooks and search the web for related study material. The faculty can take this trend as an opportunity, but then again it can be taken as a potential distraction for the learning process as well. Recent study done by the University of Stanford show that there is a positive association between the use of laptops in class and student performance. The study discusses about the students' perception on how laptops can affect their attentiveness, engagement and learning.

The survey was conducted for both undergraduate and postgraduate study. The faculty can use laptops to enrich the teaching process with the use of online course material, incorporation of multimedia, use of social media for discussion and even virtual reality and simulations. Faculty must carefully plan on how to incorporate and integrate the use of laptops in their course learning material to heighten the motivation, engagement, effectiveness of the student and in return providing them with an enriched learning experience.

In conclusion, it can be stated that the laptop is a good tool to be used to enhance the learning experience of students if it is used in the right way and right time.



"The scientists of today think deeply instead of clearly.

One must be sane to think clearly, but one can think deeply and be quite insane"

Nikola Tesla

APIIT becomes EC-Council Academy

EC-Council is a global leader in InfoSec Cyber Security certification programs like Certified Ethical Hacker and Computer Hacking Forensic Investigator. APIIT is the official academy in Sri Lanka for EC-Council. The CEH certification is considered as one of the essential certifications for someone who intends to pursue his or her career in the cyber security domain. The first CEH training workshop will be held at APIIT premises on 21st Jabuary 2020. This will be a 5-day training workshop conducted by a high profile trainer in the cyber security domain. Additionally, a CEH exam workshop will be conducted for the participants who have successfully attended the training





IoT Influenced Healthcare

By: Krishnadeva Kesavan

The Healthcare industry has experienced numerous benefits, including the ability to continuously monitor health condition, from the Internet of Things (IoT). IoT has paved the way for remote health monitoring and a future where a patient's home will be the Emergency Care Unit. Most healthcare organizations will use IoT enabled bio sensors within a couple of years. Cryptographic strategies need to go beyond high-end devices to address the needs of a world of internet-connected heart-rate monitors, implantable defibrillators and insulin pumps. One of the tough challenges the IoT influenced healthcare industry will face is how to get an extra bit of battery life for the innovative security solutions to start making practical sense to customers. In answer to this challenge, several light weight security mechanisms have been proposed recently by taking resource constraints into account. There is a concern that processing and transmission resources are wasted in IoT devices if security is over-provisioned. If the same level of security is applied to information without considering threats unique to the wireless environment it is likely to result in inefficient and inadequate usage of available security methods and tools. As such, there is an urgent need for an adaptable security mechanism for the wireless communication environment.

The involvement of IoT in healthcare has given rise to many applications such as remote health monitoring, chronic disease monitoring, private health and fitness, and elderly care also known as Ambient Assisted Living. The United States Census Bureau and The National Institute of Aging (NIA) reported recently that there is a spike in the senior population and predicts that this population will be double by 2050. This increases the interest in developing solutions to assist the elderly citizens. Today, remote health monitoring through IoT has given birth to a new Internet of Healthcare Things (IoHT). IoT promises to revolutionize modern healthcare by enabling a more personalized, preventive and collaborative form of care.

Healthcare data is sensitive and needs higher security. Data on religious orientation, on sexual orientation, finance and health are considered highly sensitive. Also, It is evident that high volumes of data are generated by medical sensors. As such, IoT based healthcare may be a target for attackers. The security requirements for IoT based health care services are confidentiality, integrity, authentication, availability, non-repudiation, authorization, resiliency, data freshness, fault tolerance and selfhealing (if one device runs out of energy, the remaining devices should ensure minimum security services). Security of Internet of Things has become a hot research topic due to its wide deployment, therefore lots of light weight security mechanisms are proposed by taking resource constraints into account. These mechanisms provide identical security services for every IoT device including highend and low-end devices participating in the communication. There is a concern that processing and transmission resources are wasted in IoT devices if security is over-provisioned. The same level of security is applied for information without considering its sensitivity level. This courses inefficient and inadequate usage of available security methods and tools. Therefore, there is a huge need for adaptation security mechanism based on current status of the IoT devices and the of the wireless communication characteristics environment. Machine learning is an artificial intelligence application. This automates analytical model building which constructs algorithm learning and creates predictions based on data. This model is proposed for decision making on security adaptation which will make IoT healthcare devices to withstand against dynamic changing attacks and utilize the resources efficiently.



Humans vs Technology, who will win?

by, THEJA SIRIWARDENA

It has come to a point where all humans use smart phones in their daily lives. We are so engrossed with this new technology that we have not realized that technology has taken over. We have forgotten how to directly communicate with eah other. So right now, ask yourself who's smarter? You or, the computer or mobile device with which you are reading this article. As humans, of course we cannot perform multiple tasks as efficiently as a computer. Because, a computer may learn things faster it has the ability to grasp complex situations and make optimal decisions. when large amounts of information are given.

On the other hand, humans are still superior to computers in many ways. A human has the ability to think and create based on their intelligence and life experiences. A computer can be programmed with vast libraries of information, but they can't experience life the same way we do.

Intelligence has two components, says Professor Shlomo Maital, Senior Researcher for the S. Neaman Institute at Technion Israel Institute of Technology. "One is the ability to learn, the other is the ability to solve problems". And in those areas, computers can be smarter than humans. Computers have no concept of meaning, says Jana Eggers, CEO of artificial intelligence company Nara Logics. "Even if the computer can determine an emotion, it does not understand what experiencing an emotion means," according to Eggers. Nevertheless, experts generally agree that the computers of tomorrow will possess some of the traits that today are seen as uniquely human.

In conclusion, we can see that there will be a deep relationship between humans and computers; a combination of organic thinking and machine calculating where one cannot exist without the other.

APIIT School of Computing Highlights 2019

Round table discussion on Cyber security

A panel discussion was conducted on 29th August at APIIT auditorium. The panel consisted of cyber security experts from industry and APIIT.

Introduction to Angular

NGULAR

"Angular" has now become a word often heard and used in the software engineering industry. Let's look into the inception and the upbringing of angular and why it became a game changer in many developer's lives.

Angular is an open-source, front-end JavaScript framework that really shines when building those dynamic, single page applications (SPAs). Angular 2 is a TypeScript-based, web application development platform that makes the switch from MVC (modelview-controller) to a componentsbased approach to web development.

So, what made developers think about angular all of a sudden?

Well, When AngularJS first hit the front-end web development back in 2009, the web was still coming of age, transitioning from static web pages and clunky UIs to the dynamic, interactive web apps of today. By 2014, AngularJS was beginning to show its age with the introduction of cutting-edge technologies like React and other component-based web development technologies.

Responsive web apps that worked well across desktop and mobile became a necessity.

By INURI GALHENA

It was with all this in mind that the Angular team announced its decision to revamp the platform for the modern web at the ng-Europe developer conference back in September 2014. Nearly two years later, after some initial developer releases, the final release version of Angular 2 shipped on September 14, 2016.

Angular has been around for quite some time. The first stable release of Angular 2 was published in 2016, and since then AngularJS started to lose its popularity in favor of the new version. One of the main features of Angular 2 was the ability to develop for multiple platforms: web, mobile, and native desktop.

Then, by the end of 2016, Angular 4 was released. "So, where is version 3?", you might wonder, as it appears, version 3 was never published at all. As explained in the official blog post, maintainers decided to stick with the semantic versioning since Angular 2. Likewise, the latest version is Angular 8 with many features and modifications. Angular has come a long way since Angular 2 to what it is now enabling developers to develop interactive applications from single page applications to large scale applications across different platforms

So, why Angular? Well, because it's supported on various platforms (web, mobile and desktop native), it's powerful, modern and has a nice ecosystem. Angular presents you not only the tools but also design patterns to build your project in a maintainable way. Angular is built with TypeScript, which in turn relies on JS ES6. You don't need to learn a totally new language, but you still receive features like static typing, interfaces, classes, namespaces, decorators etc. Angular is meant to be thoroughly tested and it supports both unit and end-to-end testing with tools like Jasmine and Protractor and the list goes on which I probably can't cover within one article so let's wrap things up here.

Last but not least, if you're a developer looking to remain competitive in the ever-evolving world of web development, angular should probably be one of your picks.



"My favorite things in life don't cost any money.

It's really clear that the most precious resource we all have is time"

Steve Jobs



Abstract-Wireless technologies have been evolving rapidly for а considerably long time. As these wireless communicates networks through radio transmissions, they are vulnerable to attacks. Thus, to minimize these attacks a number of key management algorithms are introduced under 802.11 standards. The author discusses the algorithms cryptographic used in generating the keys of wireless networks.

Introduction to Wireless networks

The main principle that governs wireless networks is mobility. Communication in wireless networks happen between a transmitter and a receiver by using radio signals as the medium of transmission. [3]

The benefits of WLANs are mobility, scalability, flexibility, low cost, ease of installation, reliability and reduced installation time. The IEEE standard for wireless networks is 802.11.

There are a number of IEEE standards introduced for wireless networks. These standards differ by their range, frequency, data rates and some other characteristics.

Introduction to Cryptography

Cryptography uses mathematical functions to encrypt or decrypt a message communicated within a network. The main component of a cryptographic algorithm is the key used for communication. The key should always be a secret.

A good cryptographic algorithm should possess the following characteristics:

- · Should not display patterns
- One-way-ness
- simple but secure

Introduction to WEP

Wired Equivalent Privacy (WEP) has been the main security provision as well as one of the most common security protocols introduced for 802.11 standard (Wi-Fi). As the name implies WEP was introduced to provide privacy equivalent to that of wired networks.

The goals of introducing the WEP protocol was as follows:

- Avoid eavesdropping
- · Protect the privacy of information
- · Prevent manipulation of data
- · Detect tampering of data

WEP operation

WEP operation is a two-step procedure. The two steps are authentication and, encryption and decryption. The following section provides a detailed explanation about the four steps.

Encryption and Authentication Mechanisms of Keys Used in Wireless Networks

By: Divya Amunugama

Step 01 - The client sends an authentication request to the access point to get connected to the wireless network.

Step 02 - Once the AP receives the request the AP sends a plaintext challenge to the client who sent the request.

Step 03 - The client encrypts the challenge by using the pre-shared WEP key and sends the encrypted challenge response to the AP.

The AP then decrypts the Challenge response using the pre-shared WEP key and matches it with the original plaintext challenge sent.

Step 04 - Once the matching is done, the AP sends a confirmation message, mentioning if it was successful or not.

This is the 04-way handshake of the WEP authentication process between the client and the Access point.

Encryption process

WEP uses Rivest Cipher 4 (RC4) algorithm for the encryption process. RC4 is a widely used stream cipher algorithm in software applications.

The RC4 algorithm consists of two main operations

i.Pseudo Random Number Generation (PRNG)

ii.Creating a key stream

P.8

Step 01 - The sender of the message does an integrity check on the plaintext to be sent and obtains an Integrity Check Value (ICV).

Step 02 - An Initialization Vector (IV) concatenated with the pre-shared WEP key is sent into the RC4 algorithm. (IV = 24 bits and WEP key = 40 bits)

RC4 creates a Pseudo Random Number using the PRNG operation.

This PRNG is used to generate the key stream.

Step 03 - The generated key stream is XOR ed with the plain text and the ICV.

Step 04 - The output of the XOR function provides the cipher text. This cipher text / encrypted message is sent to the receiver together with the IV.

Decryption process

The decryption process is the same process as the encryption process, just reversed.

Step 01 - The initialization vector is obtained from the header of the packet received from the sender.

Step 02 - The IV is concatenated with the PSK of WEP and sent through the RC4 algorithm function.

Step 03 - The key stream output of the RC4 algorithm is XOR ed with the cipher text sent by the sender.

Step 04 - The output of XOR is the plaintext.

Step 05 - Further this plaintext is sent through an integrity check and the value received is matched with the original ICV.

Step 06 - If the values are matched the receiver receives the message. [2] [7]

Weaknesses of WEP

WEP keys can easily be cracked in a couple of minutes by simply using a laptop [5]. The attacks while using WEP can be due to the following factors:

i. Weak IV

ii. IV collision

- iii. Message modification
- iv. Message Injection
- The other problems with WEP are;

i. The IV is sent as plain text. Thus, anyone who can get hold of the secret key will be able to read or interfere with the communication.

ii. WEP checksum is linear and predictable.

Introduction to WPA

Wi-Fi Protected Access (WPA) is a solution to the limitations of WEP that was discussed in the section above. WPA has 2 operation modes. The operation modes are as follows:

a. Personal mode

This mode has no authentication server and the secret key is shared between the client and the access point. It is also known as WPA-PSK.

b. Enterprise mode

This mode uses an authentication server that has security controls to avoid unauthorized access.

Similar to WEP, WPA also contains 03 steps as follows: - authentication, encryption and decryption.

Authentication

WPA uses 802.1x and EAP for authentication of users.

Encryption

The weaknesses of WEP are avoided by using Temporal Key Integrity Protocol (TKIP) as the encryption algorithm. The use of TKIP assures that data will remain protected. In WPA, the key is changed for every frame and change is communicated between the AP and the client. Unlike in WEP, the key is automatically distributed and there are dynamic session keys.

The encryption process consists of the following parameters,

- Initialization Vector
- Data Encryption Key
- Source Address
- Destination Address
- Priority Field Value
- · Data Integrity Key

Features of WPA

Allows only authorized users to access the network and protects data.

Interoperable with all IEEE wireless standards.

Uses dynamic session keys

.com/ccnp-ont-exam-certification-guide/802-1x-andeap-authentication-protocols/



APIIT hosted their open day on the 12th of September at APIIT premises. The event incorporated School of Computing Final Year Project demonstrations, an ethical hacking workshop, gaming arena and discussions on student life.



Blockchain was introduced to the world by cryptocurrencies such as Bitcoin. Many business organizations do not intend to use cryptocurrencies.

A blockchain network can be defined as an encrypted, publicly shared, and verified database. According to Daniel & Guida(2019), a blockchain is a decentralized, distributed ledaer which provides persistency of verified transactions. The transactions are grouped into blocks and connected to each other using a hash key mechanism. Each block acts as a record. Blocks are immutable, which means once they are created they changed. Therefore, cannot be updating or changing records is impossible.

There are two types of blockchain networks; permissioned blockchain and permissioneless blockchain. The type is based on how the blockchain shared among users.

Permissioned blockchain

A permissioned blockchain network is only shared within an approved set of users. According to the user's role he/she gets the permission to perform transactions. Permissioned blockchains are appropriate for private business organizations with sensitive data.

"A blockchain network can be simplydefined as an encrypted, publicly shared, and verified database"

Permisionless blockchain

A permisionless blockchain is a public blockchain which is shared with an unlimited number of anonymous users. Bitcoin and Ethereum are examples of permissionless blockchain networks. Users of these networks cannot be trusted.

What is Blockchain?

By: MANUJA KASUN RAJAKARUNA

Consensus

Blockchain networks use concepts such as consensus to ensure the integrity of the network. Consensus can be used to prevent double spending of cryptocurrencies. Smart Contracts and Proof of Work (POW) are the most popular consensus mechanisms available.

Smart Contracts

According to Biswas, et al. (2018), a smart contract is a piece of code which defines the transaction rules between a sender and a receiver. It is the agreement between the parties who interact with each other.

Conclusion

Blockchain is a decentralized, immutable and distributed collection of records. Blockchain networks use a peer to peer network architecture. There are two types of blockchain networks; permissioned and permissionless.



"I think a simple rule of business is, if you do the things that are easier first,

then you can actually make a lot of progress"

Mark Zuckerberg



"The ambition of GitHub is to create an open, collaborative environment where the world's repositories (buckets of code) live, breathe and evolve over time"

As a developer, have you ever been afraid of losing your code, saving backups in your external hard drives or USB devices incase if things take a terrible turn? The currently trending solution to this problem is an online technology, GitHub can act as your hard drive and is capable of much more.

What Is GitHub Exactly?

GitHub is a cloud-based service that provides version controlling for developers. It allows developers to update their projects, keep track of progress and if needed backtrack and revert to an older version.

Unless you are using a specific tool to maintain your code I'm pretty sure you store many different versions of your project before your final deployment. Version control allows you to maintain different versions of your project so that you can keep track of the changes you make. This is really helpful if a team keeps updating your codebase.

GIT aka VCS (Version Control System)

Git is the tool that makes version control possible. This is an open source software that comes with a Command Line Interface. GitHub is the hosting environment for Git. Git helps manage your repository or codebase through branching, cloning, merging, tagging etc.

Intimidated by the terminologies? Don't worry, that's where we are focusing next.

Familiarize yourself with Git/GitHub terms

Repository/Repo – Your project is basically defined as a repository. This repository may consist of simple image files and text files to complex code files.

Branching – When you create a repository in Git, the project will be saved initially as the master branch. The master branch is the version of your project that you will deploy as your final product. In addition to the master branch a Git repo can have additional branches. This is a feature that is extremely helpful when it comes to working in a team. Each member will be working on their own individual feature and maintaining their own branch.

All the commands you perform with the branch is performed via a version control software, which in this case is Git.

Why use GitHub?

It is easier to collaborate with a team and develop new features. It ensures that you are using the latest version of the project instead of having to constantly check what the latest version is. If you want to make life easier when working in projects well then GitHub is a path you should definitely try out.



"Once in your life, try something.

Work hard at something.

Try to change. Nothing bad can

happen"

Jack Ma



Beginners' Guide to Instrumentation Testing in Android

By: AVISHKA JAYASUNDARA

Since the introduction of the Android platform the testing experience in Android has never been easy. Mobile testing itself is considered to be a challenge due to the large number of devices. Testing has been difficult due to poor tool options and sparse documentation. But this has changed in the last few years.

The most common tests on the Android platform are local unit tests and instrumented tests.

Local unit tests can be run locally on your developer computer. JUnit is the most commonly used tool for unit testing.

"Instrumentation" refers to the ability to monitor or measure the level of a product's performance, to diagnose errors and to write trace information in the context of computer programming. Instrumentation is implemented in the form of code that monitor specific components in a system. This type of testing is carried out on physical devices or emulators. User interactions can be automated and tested using Instrumentation testing.

Setting up your first Instrumentation test

When a project is created or when a new app module is added to an existing project, Android Studio automatically generates the test sets for unit testing as well as instrumentation testing. In order to create a new test these steps should be followed.

1. Open the Java file containing the code you want to test.

2. Click the class or method you want to test, then press Ctrl+Shift+T.

 In the menu that appears, click Create New Test. In the Create Test dialog, edit any fields and select any methods to generate, and then click OK.

Before creating a new test ensure that the test library dependency is added to your application.

The main advantage of using instrumented tests is that they have high fidelity. This is due to the fact that these tests run on a device or an emulator.



Traditional MIS vs. Industry 4.0

By: Tharanga Peiris

A traditional MIS aids managers/ decision makers gather information from several sources, format the collected data and present summary information. It is a tool to transform raw data into knowledge that the company could use in its decision-making.

Traditional MISs are increasingly failing to handle large and growing datasets generated by industry. They face the following challenges:

 Inability to perform large-scale data integration from several sources especially when it is realtime and time-series based data

•Inability to process growing amounts of data

Inability to cater to dynamic and emerging requirements

According to Bernard Marr "Industry 4.0 is the fourth industrial revolution that has occurred in manufacturing. It brings together automation and smart autonomous systems. It is a mechanism supported by real time data and machine learning".

Smart manufacturing-based industry 4.0 equipped with big data analysis techniques manufacture intelligence. Every aspect of the factory is monitored, optimized and visualized.

Industry 4.0 has many advantages compared to traditional MIS:

 Ability to come up with important information for decision making which is invisible in traditional MIS

•Knowledge-embedded facilities - Unlike traditional MIS, industry 4.0 systems can use existing facilities and intelligent ability to improve processes.

•Predictive and preventive operations - Smart manufacturing has transformed traditional MIS capabilities such as being reactive and responsive, to being predictive and preventative.

•Performance-based operations - Smart manufacturing focuses on performance over compliance with an emphasis on minimizing energy and material usage, while maximizing sustainability, health and safety, and economic competitiveness.

Smart manufacturing has several phases, namely, automating data ingestion, embedding fault tolerance and improving scalability in order to create the above advantages. Let us elaborate how these phases have improved industrial data analysis vis a vis traditional MISs.

Automating and simplifying data ingestion

Data ingestion is the process of extracting and loading data from several sources. Data ingestion can occur at different times during the analysis process. Based on the type of industry process, data ingestion could happen either real-time or batch-wise.

How data ingestion automation differs from approaches used by traditional MISs

The ingestion engines run as background applications on local servers and communicate their status to the site manager. Accordingly, time-series data is transmitted as and when needed. Hence, data loading is also autonomous. The expert ruleset embedded in the ingestion engine could automatically identify the appropriate data mapping for each source.

Advantages of autonomous data ingestion compared to data extraction in traditional MISs

 Ability to cater to increased volumes of emerging industrial data

•Reduced response time for industrial data analysis

 Autonomous data ingestion agent-based environments allow legacy devices to exist in a network of smart devices. •Cross-network communication is also possible as ingestion engines can function across different networks, as there are no local dependencies and cloud data processing.

 Increasing reliability achieved by adding more ingestion engines. The status of each engine is autonomously monitored.

How embedding fault tolerant behavior in systems differs from fault tolerance in traditional MISs

Fault tolerance is how well an MIS operates in the event of failure of some of its components. When there is a fault, an intelligent system should identify it and take necessary action to make the system at least partially available.

Advantages of fault tolerance in Industry 4.0 compared to that of traditional MISs

•Fault tolerance during data ingestion

Adding more ingestion engines to the processes ensures fault tolerance. These ingestion engines are controlled by the data collection instructions sent by the site manager. In case of an ingestion engine failure, these instructions are re-assigned to another ingestion engine.

•Fault tolerance by enabling scalability

Deploying additional ingestion engines across machines and networks results in a higher capacity data pipeline given that more ingestion jobs can run in parallel. Having a number of ingestion engines will ensure fault tolerance too as discussed earlier.

•Fault tolerance in data processing

Resource and data requirements may grow drastically whilst the information systems are operational. The ability to scale resources based on demand ensures fault tolerance in data processing.

•Fault tolerance in industrial analytics

During industrial information analytics, cloud computing technologies enable fault tolerance. E.g. file storage and delivery services in the cloud (e.g. Amazon S3) can provide a distributed, low latency and fault tolerant platform for serving time-series data.

In conclusion, Industrial 4.0 enables higher scalability, and fault tolerance compared to traditional MISs. If nations could digest the initial high capital for Industrial 4.0 transformation, they could benefit by improving their process efficiencies.



CSR Project organized by the APIIT School of Computing



A community outreach project was initiated by the School of Computing on Tuesday the 7th January 2020. Classroom amenities were handed over to the happy group of children of the Thillanduwa Junior School, Negombo.



ASP.net ore 2

By: Nipunu Wijesinghe

Partial views are markup files, which we refer to as razor pages in asp.net core that render HTML content within another razor page.

When should we use Partial views?

You can use partial views if you have a page with complex and lengthy markup, which you can put into several small pages. This increases the maintainability and readability since the main page only contains page structure while the partial views contain their markup sections. Partial views allow us to logically group page content.

When you have markup code, which duplicate across the page, you can create a single partial view from the duplicating markup section and render the partial view. This also increase maintainability. If you need to change the markup of the duplicating section, you can just modify it in the partial view and all the places, which use the partial view, will be rendered with the updated markup.

Partial views are not...

 A solution to maintain common layout sections or to define page structure. You should use Layout files for such requirements. •Suitable if your page requires complex logic or code to render the markup. Since partial views do not contain a page model and if your page contains complex logic or code then the solution is View Components.

A Partial view can access its parent view's "ViewData" data structure. As a practice, partial view file names start with an underscore (_) just like the layout files.

Following is a simple example of using a partial view

List - Razor page with table

@page

@model BuyBooks.Pages.Books.ListModel

@{

ViewData["Title"] = "List";

}

<h1>Books</h1>

@foreach (var book in Model.Books) {

@book.Name

@book.Author

@book.Genre

<a asp-page="./Detail" asp-route-bookId="@book.Id">Details

<a asp-page="./Edit" asp-route-bookId="@book.Id">Edit

<a asp-page="./Delete" asp-routebookId="@book.Id">Delete

}

Summary - Partial view created with the above table content

@using BookModel

@model Book

<div class="card">

<div class="card-header">

h4>@Model.Name</h4>

```
</div>
```

<div class="card-body">

Location : @Model.Author

Genre : @Model.Genre

</div>

<div class="card-footer">

<a asp-page="./Detail" asp-routebookId="@Model.Id">Details

<a asp-page="./Edit" asp-routebookId="@Model.Id">Edit

<a asp-page="./Delete" asp-routebookId="@Model.Id">Delete

</div>

</div>

<

View component is also similar to a partial embedded inside view another view. Generally, view components are invoked through a layout page. In order to render, ASP will call the Invoke method inside the view component page. This method will return an IViewComponentResult, which is somewhat similar to an IActionResult.

View components use an action method such as Invoke to build a model and then passes that model to a view, which returns a view result. This is very much similar to how MVC works. Therefore, view components also support the separation of concerns (SOC) design principle.

Here are some of the common scenarios where you can use view components. In these scenarios, there is a complex reusable rendering logic, which is not suitable to implement via partial views.

- Login component
- •Dynamic navigation menus
- Shopping cart

The most important aspect of view components is that they can use any service to access data, build their own model, render their own view and plug that into a preferred view to display data.

Microsoft ASP.NET Core Open Source

Public class BookCountViewComponent : ViewComponent

{

private readonly IBookData bookData;

public BookCountViewComponent(IBookDa ta bookData)

this.bookData = bookData;

public IViewComponentResult Invoke()

{

var bookCount bookData.GetCountOfBooks();

return View(bookCount);

}

In this example, IBookData is the service used to retrieve data. In addition, with the help of the Invoke action method the view component creates its own model named bookCount and returns it via a view. If you do not specify the name of the view as follows, then the name of the view is "Default".

return View("MyView", bookCount);

To summarize, view components can access the data they need, build the models required and can be used in any view. Partial view depends on the model information coming from its parent view whereas view components are fully independent. "The Internet is becoming the town square for the global

Bill Gates

village of tomorrow"





By: MANUJA KASUN RAJAKARUNA

"React's primary aim is to be fast, scalable, and easy"

Unlike browser DOM elements, React elements are plain objects and are cheap to create. React DOM takes care of updating the DOM to match the React elements. The reason for this is that JavaScript is very fast and it's worth keeping a DOM tree to speedup its manipulation.

Although React was conceived to be used in the browser, because of its design it can also be used on the serverside as well with Node.js

Who's using React?

- Facebook
- Netflix
- Instagram
- Dropbox
- WhatsApp
- The New York Times

React is an open-source library which is used for building user interfaces specifically for single page applications. It's used for handling the view layer for web and mobile apps and has been developed by a Facebook engineer, Jordan Walke. It's only 4 years from its first release.

You may be familiar with the MVC (Model-View-Controller) model. React works like the view component in the MVC model. And what does that imply? Well, you can design the entire front end, or user interface, of your application with React. React enables developers to generate large web apps which do not execute expensive page reloads. React uses user interfaces for fetching data to populate the user interface.

How does it work?

While building client-side apps, a team at Facebook developers realized that the DOM is slow. The Document Object Model (DOM) is an application programming interface (API) for HTML and XML documents. It defines the logical structure of documents and the way a document is accessed and manipulated. To speed things up, React implements a virtual DOM that is basically a DOM tree representation in Javascript. So, when read or write to the DOM is required, the virtual representation of the DOM is updated. Then the virtual DOM will try to find the most efficient way to update the browser's DOM.



"A brand for a company is like a reputation for a person.

You earn reputation by trying to do hard things well"

Jeff Bezos



Music Therapy by Umanga Pilapitiya

Music is the art of combining vocal and/or instrumental sounds to express emotion. Therapy is a treatment intended to relieve or heal a disorder or stress. When music therapy is applied to patients, the healing effects and the mental elation it creates in the human body is amazing. Even scientists are so surprised by the wonderful results it produces. They conclude that the human mind is pre-wired to music to evoke a positive response.

Cancer patients, children having communication, attention, motivation, and behavioral problems, heart patients, adults having social problems, and people having issues such as depression can benefit immensly by music therapy. Even though it is still not very popular in Sri Lanka, most developed countries such as, Australia, United Kingdom, United States and India use this way of healing patients. In these countries hospitals use music therapy to releave pain in patients.

Let us now discuss the effects of music on humans. Researchers have shown that music can stimulate brainwaves to resonate (vibrate) in synchronization with the beat. Faster tempo beats improve the concentration and alert thinking, and slower tempo beats allows generating a calm, meditative state of mind. A positive state of mind is the ultimate result of music therapy, which will response while prevent stress optimizing all other human activities. Changes or alterations in brainwaves or brain state may cause changes in most of the systems in the human body, governed by the autonomic nervous system. As a result, slower breathing, slower heart rate, normal blood pressure, and an activation of the relaxation response will take place which immensely helps patients with cardiac problems. Current research shows that, when music therapy is used in conjunction with traditional therapy, it improves rates of recovery and emotional and social deficits resulting from stroke.

All music and all musicians cannot do music therapy. There are special music therapists and carefully designed mind relaxing music which involves in the process of music therapy. Be aware that irrelevant music may increase tension and stress. If you are familiar with Mozart's piano sonata K448, that is a proven piano piece which can be used in music therapy.

You can experience this important discipline, on your own. Please take into consideration that everyone has different tastes in music. When you are stressed and depressed listen to the music that you feel comfortable. It is true that music is an effective tool for stress management, and can be used to improve the lifestyle of all humans. Finally consider, a person can be healed by his own calm state of mind.



"No problem can be solved from the same level of consciousness that created it"

Albert Einstein

APIIT School of Computing Highlights 2019

APIIT Code Camp

5-hour Coding Event

One Winner

Industry Evaluation and Recognition

APIIT Code Camp

Code Camp is a coding competition for students to showcase their coding talent. Students focus on the most important aspects of coding and apply their coding skills to solve real-world problems.

APIIT School of Computing conducted their first ever Code Camp on 5th December 2019.





Message From The Editorial Board

Our heartfelt gratitude goes out to all who contributed by submitting articles, reviewing articles and providing valuable suggestions for the first issue of Techno Wizz. We thank APIIT Management for continues encouragement and support. We hope Techno Wizz would contribute towards the journey in enhancing a positive writing culture at APIIT.



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