Hello students,

I’m very happy and proud to be the Dean of the school of Computing which offers such a high quality of education to so many students but more importantly to be the dean of the department with such sharp and talented young minds. I hope that you all learn a lot and make great advances in the field of Computer Science.

I am also extremely happy that there is a healthy relationship within our department between students of different years with the seniors helping out the juniors and also between the teachers and the students which goes a long way in ensuring a smooth education process. Our department has always been one that has helped students and supported them throughout their study here.

The aim of this magazine is to educate you all about a few of the things in the universe of Computer Science and to get you insights on the experiences of fellow students and seniors.

I hope you find this issue of the magazine interesting and useful.

With best wishes,
Dr. Umamakeswari A,
Dean, School of Computing
# Index

1. Block Chain Technology and its applications 4
2. Father of Computer Science 6
3. Cryptokitties - The Digital Pets 7
4. Cyberwar!! 10
5. Internet Of Things 11
6. My Love affair with Data ware-house and Mining aka My favourite subject 12
7. Risk of Artificial Intelligence 14
8. Smart Contracts 18
9. Kotlin 20
10. Quantum Computing 22
11. Farewell 2015-19 25
12. Department Events 27
13. Interview Experiences 28
Block Chain Technology and its applications

Harsha Nadendla

BITCOIN is not the spelling of block chain and there are several other implementations of it. If not, it would be as foolish as describing e-mail as internet. Remember the number "23". We will talk about it a little later.

Let’s get into a small kitty party. Usually a bunch of women gather, have fun, crack jokes and pour in some money and re-distribute it to each and every one of them. In this entire thing the last item, I mean the money part is the most important thing and that is what explains you about the block chain clearly.

All this money is collected and stored in a place and the money is re-distributed among themselves in such a way that every one of them gets the entire money collected by all of them, once a year in most cases. What is happening here? Money is not the only thing which is being distributed here. Along with money even their trust upon the remaining group members is also being transferred. Each and every woman is treated equally and there are no fancies like super-woman or so. The centralised trust is being converted to a distributed trust. This term distributed trust is the heart of a block chain. All the women act as ledgers who keep notes of transactions and participate and the money being transferred is like crypto currency or the so called BITCOIN.

Strictly speaking, a block chain refers to a transparent and verifiable system which will change the way that people think about the exchanging of values and assets, enforcing contracts and sharing of the data. This technology is a shared and secured ledger of transac-
tions distributed among the full network of computers rather than resting with a single provider. In this business world, block chain can be a common data layer to enable all new classes of applications. Nowadays, business processes and data can be shared across multiple organisations which has eliminated the waste, reduced the risk of fraud and created new revenue streams.

Coming to the other worthy implementations of block chain, let us get back to our number "23". Sadly 23 is the average number of farmers losing their lives in India in a single day.

Yeah it’s a fact. Ever wondered why is that happening? 90% of the deaths are because of financial reasons. They try lending loans from banks, from which they end up getting rejected. Now their only source is a local landlords or a money lender to whom they need to repay it along with interest. Things go well only if the farmers are profited after the harvest which happens almost once in a blue moon. Their next alternative is suicide. Stop reading for a while and think how can block chain help them out. Did you figure it out? We can actually create an UBER of tractors or a KITTY PARTY where farm equipment is invested. Let’s say there are 12 farmers in kitty party ;), I mean a group. All the expenses are now distributed just like the money in the kitty party. Eventually there will be no more fraud landlords or money lenders who are the soul reasons for the loss of farmers lives. They will even like the idea that their money is being transferred among themselves and being used by themselves.

Now shift to the power production in rural areas. Ever thought how is it done? In urban areas we have a centralised system which produces power according to our usage. But things don’t work in similar fashion when it comes to rural areas because in rural areas the power consumption varies from house to house to a great extent unlike urban areas. So how can block chain be implemented here? As in the above case where we have imagined a kitty party of equipment to exist, here we need to implement a kitty party of power. Power must
be supplied limitedly. Large guys donate to small guys and small guys lend from a large guy. The Large guy refers to a house with greater power consumption and the small guy refers to a house with lesser power consumption. On a whole the power is distributed along with the bills. Even here centralised trust is transformed to distributed trust. The entire rural area gets sufficient power and thus we can progress as soon as possible.

These are some of the best ways one can implement block chain technology in villages or the so called rural areas. Many start-ups have already been working on this. States like Andhra Pradesh have already implemented this in their rural areas. Block chain could possibly be the next big thing after the internet if not misguided. Many Indian leaders support the idea of Block Chain. Sadly, a large portion of the youth are not completely aware of block chain and its potential. Let’s join our brains and make India a better place.

Father of Computer Science

Venkateshwar, 2nd Year

Artificial Intelligence is the hottest domain of computer science in the recent years. The name sounds really apt and conveys the real meaning. An Artificially intelligent system is one that learns from the surroundings and solves problems on its own. It was all started by a great man, Alan Turing, who is credited to be the father of theoretical Computer Science and Artificial Intelligence for his ground breaking works.

He decoded the “Enigma” code, a Nazi encryption system which was used by the Germans to communicate with each other. It resulted in a lot of lives being saved. Turing used a machine to decode it. He published his work on computable numbers with an application to
the Entscheidung’s problem. It was mind boggling and at the time as he devised a model that can simulate any computer algorithm, years before digital computers were invented. He devised the “Turing Machine” or popularly called as “Computers”.

The famous “Turing Test” was developed by him. It is an evaluation involving two participants (a machine and a human) and a judge. The judge will interrogate the participants without visual contact and will differentiate between the participants based on their answers. The machine is said to have passed the test if the judge is not able to differentiate between the two participants. This is the basic foundation for Artificial Intelligence.

In recent years, there has been an exponential growth in the field of AI. AI is a very powerful tool and can be used in multitude of fields like medicine, astrophysics etc. Alan Turing’s work has opened the door for newer and unexplored possibilities in field of science and technology. The entire world owes him a great deal.

Cryptokitties- The Digital Pets
Swathi G, 119003177, 4th Year

A simple cartoon? A complex piece of engineering? Yes, yes, they are both right. Forget cryptocurrencies. Cryptocollectibles are here. CryptoKitties, a start-up that raised $12 million in March 2018, is a viral block chain based game that sparked a global craze for virtual cats. It represents one of the earliest attempts to deploy blockchain technology for recreational and leisurely purposes. While a company based on digital felines may sound frivolous, the fact that CryptoKitties is significant is because the firm represented one of the first popular applications of the blockchain’s digital ledger technology.
CryptoKitties is a game centred around collectible and adorable creatures that can be bred called as the CryptoKitties. Each cat is one-of-a kind and 100% owned by you; it can not be replicated, taken away or destroyed. You can buy, sell, or trade your CryptoKitty like any traditional collectible, say baseball cards, but these are secure in the knowledge that blockchain will track ownership at a new level. They can be bought and sold using Ether, and bred to create new cats with exciting traits and varying levels of cuteness.

And this is how it works. Every 15 minutes, the company Axiom Zen releases a new CryptoKitty, from their 50,000 “Gen 0” cats, that only one person can buy via a smart contract on the Ethereum blockchain. The first CryptoKitty was Genesis, born on December 2, 2017. This is the first of the Gen 0 kitties and all other kitties produced henceforth either belong to Gen 0 or are produced by breeding after that point.

Each CryptoKitty comes with a set of traits called the Cattributes, that make them unique and they are baked into its code. Their physical appearance is decided upon by 12 features based on the following Cattribute template. (Fig in the bottom)

These Cattibutes carry the traits of the cat. Some CryptoKitties have “mewtations”, which are rare Cattributes and can only be reproduced in an offspring. However, the genetic algorithm that drives CryptoKitty reproduction, is kept a secret. So this drives people to spend a lot of money breeding them on the chance to getting their dream cat. The price depends on the generation number and on what traits are on high demand. And since these crypto kitties are built on the Ethereum block chain, you will have to buy them with “Ether”. Ether is an “altcoin”, which means it’s a cryptocurrency that isn’t Bitcoin. However, the CryptoKitty is not a currency token but a “digital asset” that is stored on the Ethereum blockchain.

A blockchain basically provides a decentralised system for recording transactions, making fraud and piracy a lot harder. But in the end, the truth is that the CryptoKitty is not all yours. You own the code for the cat, but not the actual image. Basically you do not own copyrights to the image of the cat. This leaves you with just a string of
letters and numbers on the blockchain with no art attached to it at all. This is because the decentralised systems are not mature enough to support art in a robust way.

A lot of online forums have also sprung up, surrounding the whole concept of CryptoKitties by conducting contests. The most popular kitty411.com conducted an enormous number of contests. Though the site was taken down, the full list of gold medal winners in the competition is available on cryptokitties411.com.

With the CryptoKitties becoming a happening topic in China, the cat-based game felt a little out of place in the Year of the Dog 2018 and this led to the creation of the DogCat. DogCats are exclusive interspecies CryptoKitties. And what is interesting is that, only 88 DogCats will ever be possible, making it one of the most limited Fancy Cats to date. However, the CryptoKitties team have minted 16 special Exclusive Golden DogCats. Eight of these DogCats have been distributed to the top crypto-influencers in China. The remaining eight will be given away through community events throughout the year.

Trivia trivia. In May 2018, CryptoKitties launched their first celebrity-branded CryptoKitty with Stephen Curry, an American professional basketball player called the CurryKitties. As part of the partnership, Curry was given three CryptoKitties with special imagery.
Cyberwar!!

Vashanth S, 2nd Year

Risk factor in the internet is rising at an exponential rate as everything is being digitized and put online. There are lots of advantages in it, but it does come with a lot of risks and people are becoming more and more vulnerable.

White hat hackers are the hackers who find vulnerabilities in a system and they do it for a good cause. Black hat hackers hack for money and they misuse the existing technology. Gray hat hackers are people who don’t hack for money but still don’t help in solving vulnerabilities even if found by them.

Nowadays, in every website they have kept a log-in to use the functionalities of a site, so in every website a password is required. So, people tend to keep the same weak password for every website they visit as they tend to forget strong different passwords. So, Google is offering a strong password which contains a lot of random characters and numbers and it will save the password and we don’t need to remember but still our accounts will be protected safely.

Bank accounts are the prime targets for black hat hackers. They try to intervene in the transaction gateway between the bank and the customer and try to exploit the present features of the transaction processing to extract money.

It is the common people’s mistake and no one should be blamed rather than themselves. Every time they install an app it would ask for various permissions and without giving heed to what it says people tend to allow all permissions, some hackers exploit this perfectly and hack their cameras, saved passwords and also could keep track of locations.
SQL-injection, brute force attack, Server-side attack, Client-side attack and lot of attacks are there to misuse the technology. Client-side attack is interesting. In this a malware is updated to a software or a file and sent to the target computer and once the target opens the file, the target’s computer will be infected with malware. Penetration testing tools can be used to check the vulnerability of a system.

So, cyber security is an on-demand topic and lots of ethical hackers are required in protecting the systems and preventing a cyber-war. Also, ethical hacking is awesome and interesting but it won’t be easy to master and do complex things in a short span of time as they show in movies. In movies they do hacking like an easy myth. But in real life also it’s interesting but one should have the patience and courage to pursue career in the field of cyber-security.

Internet Of Things
Varun Karthik N , 2nd Year

A techie discussion would be incomplete without the topic ‘IoT’. Yeah! In recent years this concept has gained enormous momentum, and is now one of the most talked about things in the world of technology today.

So what’s IoT?

The Internet of Things (IoT) is a global network that links physical objects using Cloud computing, web applications, and network communication. For instance, think of a pen with which you could write in different colors with a single click of a button! IoT applications enable device-to-device and human-to-device interactions in a reliable and robust manner. IoT devices and machines generate enormous amounts of data and transmit it to business analytics tools for hu-
IoT-based big data is also transforming the healthcare product industry. For example, Proctor & Gamble developed an interactive electric toothbrush to provide users with a smarter, more personalized oral care routine. The interactive electric toothbrush records brushing habits with mobile technology while giving mouth-care tips alongside news headlines! Doesn’t that sound interesting.

Smart Home has become the revolutionary ladder of success for IoT. Wouldn’t you love if you could switch on air conditioning before reaching home or switch off lights even after you have left home? It’s makes our life simpler!

But there are also some challenges we face with IoT. Due to the explosion of data generated by IoT machines, data centers will face challenges in security, consumer privacy, data itself. So, IoT has some challenges that are yet to be solved. We are heading to a future where things around us could be controlled just by our single whisper.

My Love affair with Data ware-house and Mining aka My favourite subject

Monica Kannan , 4th Year

I would consider myself a non-techy computer science engineer. A decent coder with a basic knowledge of technologies at best. As I shovelled through 4 years of engineering, slobbering over records, sleeping in classes and taking a coffee break every once in 2 hours, I was sadly never fascinated by anything that was taught. While DAA fascinated many and networks beckoned a lot, DS had its own share of fans and OS and COCA, well those were the people who loved get-
ting physical. Semester by semester, each one of my classmates found their one true love and settled in their respective fields while I struggled to get lucky with any subject. As I sat dejected, my heart heavy and mournful, that is when I was introduced to the world of Data Warehousing and Mining.

There was no clear sign as in the movies, no music in the background, no pigeons flying about and certainly no butterflies in my stomach. It most definitely wasn’t love at first sight but rather a slow affair. Classes came and went. While I bunked most, the classes that I attended I fell asleep and worse the classes that I decided that I would listen to, the teacher was in no mood to teach. Exams were nearing and so was my impending doom. Finally, one horrible day I sat down and started reading. Honestly, the main reason I even started liking Data Warehousing and Mining was because it was easy to read and even easier to understand. As I continued reading, well into the night I became fascinated with the wonderful structures that stored data and how data was had its own closet for everyday wear and old data was stored in a special closet, its very own warehouse. The snowflake schema, the star schema, the fact constellation schema, I was in my very own galaxy sketching out intricate maps to store data secretly. As fun as it was hiding and storing data, the best part was learning how to stealthily retrieve that data and manipulate it. I learnt to play around with the Special Forces in the world of data – ETL tools. Then there was the part about learning to clean and pre-process data. After that was the most fun part. Playing around with data, classification and clustering algorithms – Decision Tree, Naïve Bayes, hierarchical clustering, KNN, K means and so on. Then there where those splendid few weeks spent on the mathematical part of identifying patterns, associations and correlations. Our tryst ended with a small introduction to spatial and web mining.

All jokes apart, Data Warehousing and Mining has been one the best subjects I’ve studied so far. Wonderfully intricate yet so beautifully simple. It was one of the very few subjects that I studied knowing that I would actually use in it in real life.
Risk of Artificial Intelligence

Salai Vinoth SA and Ranjani U, 3rd Year

Introduction:

From Google Assistant to self-driving automobiles, artificial intelligence (AI) is progressing rapidly. While science fiction often portrays AI as robots with human-like characteristics, AI can encompass anything from Google’s search algorithms to IBM’s Watson to autonomous weapons.

Most current AI systems are ‘narrow’ applications – specifically designed to tackle a well-specified problem in one domain, such as a particular game. Such approaches cannot adapt to new or broader challenges without significant redesign. While it may be far superior to human performance in one domain, it is not superior in other domains. However, a long-held goal in the field has been the development of artificial intelligence that can learn and adapt to a very broad range of challenges.

For instance, the human species currently dominates other species because the human brain has some distinctive capabilities that other animals lack. If AI surpasses humanity in general intelligence and becomes "super intelligent", then this new super intelligence could become powerful and difficult to control. Just as the fate of the mountain gorilla depends on human goodwill, so might the fate of humanity depend on the actions of a future machine super intelligence.

There are two sources of concern with the existential AI system. One concern is that a sudden and unexpected "intelligence explosion" might take an unprepared human race by surprise. On the other hand, controlling a superintelligent machine (or even instilling it with...
human-compatible values) may be an even harder problem than sup-
posed.

How AI can be dangerous?

*Phishing scams could get even worse*

Phishing scams, in which criminals send seemingly legitimate emails bundled with malicious links, could become even more preva-
 lent and effective thanks to AI. The report outlines a scenario in
which people’s online information and behaviour, presumably
scraped from social networks like Twitter and Facebook, could be
used to automatically create custom emails that entice them to click.
These emails, bad websites, or links, could be sent from fake ac-
counts that are able to mimic the writing style of people’s friends so
they look real.

*Hackers start using AI like financial firms*

If banks and credit card firms adopt machine learning to improve
their services, so too will hackers. For instance, the report said that
criminals could use AI techniques to automate tasks like payment
processing, presumably helping them collect ransoms more quickly.
Criminals could also create chatbots that would communicate with
the victims of ransomware attacks, in which criminals hold people’s
computers hostage until they receive payment. By using software
that can talk or chat with people, hackers could conceivably target
more people at once without having to actually personally communi-
cate with them and demand payments.

*AI could make weapons more destructive*

Advances in AI could enable people, even a “single person,” to
cause widespread violence, a report said. With the widespread avail-
ability of open-source technologies like algorithms that can detect
faces or help drones navigate, the authors are concerned that crimi-
nals could use them for nefarious purposes. Think of self-flying
drones with the ability to detect a person’s face below it, and then
carry out an attack.

The AI is programmed to do something devastating: Autono-
mous weapons are artificial intelligence systems that are pro-
grammed to kill. In the hands of the wrong person, these weapons
could easily cause mass casualties. Moreover, an AI arms race could
inadvertently lead to an AI war that also results in mass casualties. To
avoid being thwarted by the enemy, these weapons would be designed to be extremely difficult to simply “turn off,” so humans could plausibly lose control of such a situation. This risk is one that’s present even with narrow AI, but grows as levels of AI intelligence and autonomy increase.

*The AI is programmed to do something beneficial, but it develops a destructive method for achieving its goal.*

This can happen whenever we fail to fully align the AI’s goals with ours, which is strikingly difficult. If you ask an obedient intelligent car to take you to the airport as fast as possible, it might get you there chased by helicopters and covered in vomit, doing not what you wanted but literally what you asked for.

*Robots killing humans*

There is a danger that we shift responsibility and accountability to robots and algorithms. That collateral victims of a drone strike are due to malfunction, and not due to the inherent risk of such an action, which can win over more traditional methods of assassination. The killer drones when unleashed in a large number can destroy half of a nation.

"*Computer says 'no!'*"

There is a danger that humans lose their common sense (a feature of humans that most AI systems do not even try to mimic), because they give too much authority to what is simply a big partly-intelligent database. Computers are strict and not lenient: They do not know what it feels like to drive your pregnant wife to the hospital, so they won’t waive a ticket and stop the electric car at every red light.

*Political incorrectness.*

A computer is honest. A computer may very well engineer its own features. Thus, all things equal, a computer may rank two black individuals acting suspiciously near a window front higher than two white individuals acting suspiciously near a window front, because it has learned from optimization and statistics, that skin color is an informative feature for predicting crime.
AI wielding humans as a weapon (Intelligent worms)

Assuming that manipulation is a skill that can be learned and can be surpassed in human accuracy, then a smart AI may manipulate humans to do its bidding. All our human attempts to in any way contain the AI and hard-code its morality and ultimate laws, will be as futile as monkeys building cages for humans. The AI will know all the blind spots of all biological life, and can hide in this to avoid detection.

Unemployment

Automation is the biggest challenge for humans as it has eliminated human roles in redundant jobs and hence can lead to large scale unemployment.

Threat to privacy

An AI program that recognizes speech and understands natural language is theoretically capable of understanding each conversation whether it is through e-mails or telephones.

Emotion

Some people think that making AIs emotional is the real danger. An AI is safe as long as it doesn't want anything, because as soon as it has ambition, it will try to take over the world.

Warnings about AI

Stephen Hawking

“Success in creating AI would be the biggest event in human history,” wrote Stephen Hawking in an op-ed, which appeared in The Independent in 2014. “Unfortunately, it might also be the last, unless we learn how to avoid the risks. In the near term, world militaries are considering autonomous-weapon systems that can choose and eliminate targets.” Professor Hawking added in a 2014 interview with BBC, “humans, limited by slow biological evolution, couldn’t compete and would be superseded by A.I.”

Elon Musk

Mr. Musk cites his decision to invest in the Artificial Intelligence firm, DeepMind, as a means to “just keep an eye on what’s going on with artificial intelligence. I think there is potentially a dangerous outcome there.”
Bill Gates

A few decades after that though the intelligence is strong enough to be a concern. I agree with Elon Musk and some others on this and don’t understand why some people are not concerned.”

Conclusion

In conclusion, artificial intelligence has its share of benefits and risks. The fact that it has a chance of creating the best outcomes for companies in ensuring they can develop high-quality products is quite important. Artificial intelligence also ensures that companies have the ability to carry out the process of logistics. Through the given case, they would have the capacity to look into the general rate of movement of the different goods that are involved in a bid to ensure they can reach their destination in a timely fashion. The process would also contribute to ensuring that hospitals handle various patients correctly. On the flip side, artificial intelligence has the overall risk and misconception of replacing the very element of human beings as well as being less mindful of their emotional dimension, thereby, viewing them more of machines than human beings. When used well, artificial intelligence can be used to transform customer engagement.

Smart Contracts

Hariraj Venkatesan, 4th Year

Smart contracts help us in exchanging money, property, shares or anything of value in a transparent fashion and without involving a third party or middleman. Normally, for filing any agreement, we would visit a lawyer or any legal entity of that sort, pay them and then spend hours waiting for a confirmation (Example: hostel permission). Basically, a smart contract is a computer protocol that allows
the performance of credible transactions without third parties. These transactions are trackable and irreversible.

Smart contracts were first proposed by Nick Szabo, who coined the term, in 1994. A formal definition could be this:

Smart Contracts are self-executing contractual states, stored on the block chain, which nobody controls and therefore everyone can trust.

Szabo's first publication, "Smart Contracts: Building Blocks for Digital Free Markets" was published in Extropy and then reworked several times, until 1996. Presently, because of block chains, "smart contract" is used more specifically in the sense of general purpose computation that takes place on a block chain or distributed ledger. For example, payment based on accuracy or number of hits of an algorithm.

Two important properties of block chain are: immutable and distributed. Smart Contracts perform an inheritance kind of operation and extends it further to act like a child of the blockchain class. So, when the contract has been defined, that is scripted in a language, it goes into a ready state. As soon as the conditions are met on both ends, execution starts immediately. It cannot be tampered by any adversary, by the virtue of block chain. Moreover, the database is distributed, hence all users will have a copy of it. Thus, non-repudiation associated acts are also eliminated. Basically, when the contract starts executing, it gets added into the block chain.

Smart contracts are not restricted to being an alternative for legal contracts or agreements. Any task or piece of code that runs on the block chain can be made into a smart contract. Funds transfer between friends and family, viewing paid content (like hotstar premium), etc. Shared accommodation is a nice example. If the house is equipped with IoT gadgets, then the owner living in a remote place can restrict the access for non-paying tenants; bonds - very interesting for a government that could run on block chain, everything can be implemented as a smart contract. Think how SASTRA would be eg: leave permission, no need to wait! The self-driving car is a pretty intriguing case, maybe a self-driving food truck, might look like the ultimate vehicle ever witnessed on the road.
**ETHEREUM:**

Ethereum is a platform built specifically for creating smart contracts. Actually, bitcoin was the first to support basic smart contracts. Maybe because it was one of the earliest successful implementations of blockchain. But the problem is, bitcoin is limited to currency use.

Ethereum was initially described in a white paper by Vitalik Buterin, in late 2013. He had the goal of building decentralized applications that utilized cryptocurrencies. And then he built a team and started working on it. They gathered money through crowdfunding and then deployed and brought it into working. In 2016, Ethereum had to split into two - a new one named Ethereum ETH and the other older which was now called Ethereum classic or ETC.

Ether is the cryptocurrency for operations on the Ethereum platform. When you code a contract and try to add that block, it is first validated to ensure safety and feasibility for running, that is based on the complexity to run the block and maintain it on the blockchain. This is because the blockchain consumes a lot of energy and also calls for the need for security. Different blocks are rated based on a term called gas, analogous to a car. Ether is used to spend for the gas, the unit of consumption used in transactions. Each user is given an Ethereum VM on which they work and connect with the chain. A cryptocurrency wallet stores the public and private keys that will be used for spending the ether.

---

**Kotlin**

*M. Leela Prasad, 2\(^{nd}\) Year*

Kotlin is a statically typed programming language for modern multiplatform applications and Kotlin stands out in a sea of new pro-
SASTRA Deemed University - CSE

...rogramming languages because of its focus on the ecosystem: JetBrains understand that productivity comes from more than just convenient syntax. Kotlin runs on the Java Virtual Machine and can compile into JVM bytecode or JavaScript. Kotlin is interoperable with Java. It means we can use previous java projects with new kotlin classes also and all java frameworks are still available. The IDE plugin works smoothly. Now we go through pros and cons of Kotlin.

Kotlin is concise and drastically reduces the amount of boilerplate code. Adding the data annotation to a class triggers autogeneration of boilerplate like equals, hashCode, toString, a copy method and variable spreading support. This gives you convenient immutable classes without the need for builders.

Nulls are one of the most error-prone points you get when you are coding in Java. If you look at your bug manager, I’m sure that more than 90% of the errors you see are NullPointerException. In Kotlin, you’ll work in a much safer environment even with Java libraries, which will minimize these problems. Nulls in kotlin don’t exist until you specify otherwise i.e. no variable by default can be set to Null. Kotlin protects you from mistakenly operating on nullable types. And if you check a type is not null, the compiler will auto-cast it for you.

A higher-order function is a function that takes functions as parameters, or returns a function. Kotlin functions are first-class, which means that they can be stored in variables and data structures, passed as arguments to and returned from other higher-order functions. You can operate with functions in any way that is possible for other non-function values. To facilitate this, Kotlin, as a statically typed programming language, uses a family of function types to represent functions and provides a set of specialized language constructs, such as lambda expressions.

Wrapping up, Kotlin is the merger of both functional and procedural approach and aims to bring out the best from the two. Kotlin usage highlights are in Pinterest, Gradle, Uber in its internal tools, Coursera Android App (which is partially written in Kotlin) and even more. Once you gain an experience in Java application development, you will have an even better understanding and appreciation for Kotlin.
Quantum Computing

Malolan B, 4th year

A quantum computer is any device for computation that makes direct use of distinctively quantum mechanical phenomena, such as superposition and entanglement, to perform operations on data. However, Classical computers do not exploit these quantum principles for the purpose of computing (we simply don’t use it). This is the primary difference between quantum computers and their classical counterparts.

In a classical (or conventional) computer, information is stored as bits; in a quantum computer, it is stored as qubits (quantum bits). Just as bits are the fundamental object of information in classical computing, qubits (quantum bits) are the fundamental object of information in quantum computing.

Structure of a qubit (theoretically)

While a bit, or binary digit, can have value either 0 or 1, a qubit can have a value that is either of these or a quantum superposition of 0 and 1. (thus we use superposition in storing information in qubits)

The state of a single qubit can be described by a two-dimensional column vector of unit norm, that is, the magnitude squared of its entries must sum to 11. This vector, called the quantum state vector, holds all the information needed to describe the one-qubit quantum system just as a single bit holds all of the information needed to describe the state of a binary var-
Thus a single qubit can have infinitely many states (not restricted to two)

**QUANTUM COMPUTING USERS AND APPLICATIONS**

As noted at the start of this article, anticipated applications for quantum computing include molecular and material modelling, logistics optimization, financial modelling, cryptography, and pattern matching activities such as deep learning artificial intelligence. Already some large businesses are also actively researching exactly what quantum computing may do for their research and development, their products and services, and their bottom line. As so below I just a few examples.

Daimler is working with both IBM and with Google to investigate how quantum computers may be used in logistics to help optimize vehicle delivery routes, or the flow of parts through factories. The company is also researching how quantum computers could be used to simulate chemical structures and reactions inside batteries, and so assist in the improvement of electric vehicles.

Also in the automotive sector, Volkswagen has been working with both Google and D-Wave Systems to see how quantum computers may assist with traffic flow optimization problems, as well as to help it develop better batteries.

Over in the financial sector, JPMorgan is working with IBM to explore how quantum computers may assist with trading strategies, portfolio optimization, asset pricing and risk analysis. Similarly Barclays is also participating in the IBM Q Network to investigate if quantum computers could be used to optimize the settlement of large batches of financial transactions.

As already noted, in 2011 aerospace giant Lockheed Martin was the first purchaser of a quantum computer manufactured by D-Wave Systems, and has continued to investigate use the technology for applications including air traffic management and system verification. Airbus is similarly investigating how quantum computers could speed up its research activi-
ties, and has invested in the quantum computing software company QC Ware.

Meanwhile, Accenture Labs, biotech innovator Biogen and quantum software company 1QBit are researching how drug discovery could be accelerated by using quantum computers to make molecular comparisons. Highlighting the possibilities, in September 2017, IBM used its 7 qubit hardware to simulate the structure of a three-atom beryllium hydride molecule. In October 2017, Google and Rigetti also announced Open Fermion, which is software for running chemical simulations on a quantum computer.
Farewell 2015-19
B.Tech CSE
Department Events
Interview Experience

General Electric

Raghul Ravi, 119003122, B.Tech CSE (2015-19)
tagul.roshan@gmail.com
https://www.linkedin.com/in/toraghulravi/

Eligible branches: B.TEch: CSE/IT/ICT

Criteria: 7 CGPA and above with no standing arrears

Only unplaced students and students placed with Astra Zeneca, Bridgei2i, Value labs, Musigma, Fresh works, Rockwell Collins, Zoom rx Associate TA-TA Elxsi, Zoho 4.6 are eligible to apply.

Around 200 students took the online test.

First round (online test) - 3 sections - Aptitude, Technical Aptitude and Coding. The Aptitude questions were easy, tech apt were moderate and the coding question required us to solve it with least time and space complexity. My coding question was to find if a string2 (given) was a permutation of string1 (given).

Around 60 were selected for the next round. I was one among the 60.

Second round (Group Discussion) - We were made into batches of 10 for the group discussion. The recruiter wanted to select people who are confident and gave at least one relevant point in the discussion. Our GD topic was "Is India ready for Digital Economy?". Around 32 were selected for the next round. I was one among them.

Third round (Technical + HR) - This round was solely based on your resume and some behavioral questions. A thorough knowledge about what you have written in the resume and how you implemented it was sufficient to clear this round.

Around 6 were finally selected and I was one among them.

We were given options to choose our place of internship - Hyderabad and Bangalore.
Eze Software

Jonah Angelus, 119003068, B.Tech CSE (2015-19)

Location : Hyderabad

Role : Software Engineer

Eligibility: CGPA 7 and above; CSE, IT, ICT and ECE Dept

Round 1:

An online Hackerrank test which had 20 MCQ questions from topics like data structures, Java output questions, sorting and some aptitude questions. It also had 2 coding questions both were of easy level.

Round 2:

A group discussion where they just check for basic communication skills and how we put up our ideas. Topics for the GD were very general topics like "Is linking Aadhar mandatory".

Round 3:

There were three personal interview rounds where they wanted to check our understanding on data structures, dynamic programming and oops concepts. We were asked to write code in each of the personal interview round like longest palindromic sequence, deletion in BST, output questions in CPP related to pointers etc. They also asked about the projects done and its use in the real world.

Round 4:

It was a HR round, Questions were asked from the resume regarding the extra curricular activities that we have participated and other general questions like Why Eze? Etc.

They basically just wanted to check our level of understanding in subjects studied so far - Data Structures, Design and Analysis of Algorithms, Java, CPP and coding skills in any language.
Tata Communications

Muvvala Bharatha Lakshmi Vyshnavi, 119003226, B.Tech CSE (2015-19)

Eligibility Criteria: Above 7 CGPA

First round was aptitude and technical related to CS, notably Computer Networks.

Second was coding round

Next was 2 technical rounds. one based on my resume and area of interests and other based on general random technical questions that are to be explained by a real time examples.

Next was hiring manager round which will be a stress interview.

Next was HR round about yourself why that company, goals, about company.

Prepare well on these topics

Data structures

Database management system

Operating systems

Coding

Genesys

E Phani Kaushik, 119003047, B.Tech CSE (2015-19)

Eligibility Criteria : 7.5 & above CGPA with no standing arrears

Round 1 : Online test with 5 sections , each section covering around 10 questions on topics like Aptitude, Computer Networks and Operating Systems, Programming (C , C++ , Java) and one coding question (complete working code not mandatory pseudocode is sufficient). Coding question was of moderate difficulty . Section wise timer and negative marks were there.
Round 2: Face to Face Interviews, 2-3 technical rounds and 1 HR round. In technical interviews, they asked some questions on projects, computer networks, algorithm written in the previous round (they are keen on your approach), optimising the code (they are focusing more on the different ways you can solve the same problem), some logical puzzles. Above rounds they concentrate on your ability to think on the spot.

**TCS**

Saravana Priya S, 119003143, B.Tech CSE (2015-19)

Hiring process was based on a contest "Codevita" which was conducted nationwide.

First round was online coding for 6 hours and 6 problem statements were given. Those who solved at least one problem were called for an interview at TCS office, Chennai.

Interview panel contained 3 members 2 technical and 1 HR. Questions were asked based on the code which I solved and Projects done.

I was offered for TCS ninja with 3.36LPA.

Preparation Tips: Be good at coding.

**Zoho Corporation**

Pydimarri Harish, 119003230, B.Tech CSE (2015-19)

Eligibility Criteria: CGPA limit is 6 with any number of arrears.

Round 1:

Pen and Paper test on Aptitude and C, C++ Fill in the blanks (mainly focused on tracing Recursions and Pointers). Duration: 1:30 Hrs

C and C++ 10 questions 1 mark each

Advanced C and C++ 5 questions 2 marks each

Aptitude 10 questions 1 mark each
Around 1500 students appeared out of which only 250 got selected for next round.

Round 2:

Competitive coding in our campus labs offline. Duration: 3 to 5 hours

There are five questions to solve. Even if you solve 3 you will get into next round. Anyone can solve 2 questions so question selection is important here. They observe the following in your code:

- Quality
- Modularity
- Boundary test cases
- Efficiency

The questions range from easy level to medium in Hackerrank. No language restriction but Java is preferred. Some invigilators won't accept to use inbuilt functions and libraries.

Round 3:

System Design and Development. Duration: 3 to 5 hours

Our task was to implement Kanzo Interpreter. The process was divided into 5 Levels, in each level we have to build a module which leads to final task.

- Modularity of code is very important
- Cleanliness of code
- Boundary Conditions

They won't expect complete implementation, they observe the approach. Chances for next round are very high if the mentor likes your approach and data structures used. Again language is not a restriction but Java is preferred and expected by them.

Technical Interview:

During round 3 itself they test you technically. This round is overlapped with Round 3. For some students they conducted this round separately.
HR:

Only few were called for HR round. It is almost 90% sure that they will get selected unless student mention plan for higher studies.

They announced results soon after HR. Around 16 students got full-time offer and 7 got internship offer.

All they test is your coding skills. Practice coding well.

**Tata Elxsi**

R Lakshmi Priya, 119003084, B.Tech CSE (2015-19)

Eligibility Criteria: CGPA 7.5 and above

First Round: Quants, Logical and Technical aptitude (from all main subjects)

Second round: Technical interview- about projects, interns, and also will check domain knowledge and area of interest

Third round: HR interview- formality questions like introduce yourself, about the company. Once you have entered HR, 90% you'll be selected.

Tips:

Go through all important topics of all important subjects like OS, Networks, DBMS, Data Structures, Digital Electronics etc.,

**TCS Digital**

Munaga Sai Pavan Kalyan, 119003225, B.Tech CSE (2015-19)
saipavan.munaga@gmail.com
in.linkedin.com/in/sai-pavan-kalyan-101851143

Package: 7LPA CTC

Roles Offered: Full Stack Developer, Dev Ops Engineer, Data Scientist, Product Engineers, System Research Engineers.

The Hiring Process consisted of 2 rounds.
1st Round:

Divided into 6 sections: English, Quantitative Aptitude, Lateral thinking, Agility, Programming Logic, Advanced Coding.

I didn’t get output in both Programming Logic and Advanced Coding rounds but got selected into the 2nd round. So, no need to get discouraged, if you don’t get the output (but you should do well in other sections).

2nd Round:

It consists of Technical Interview (happens through a video call) and HR Interview (Face To Face)

Tech Interview:

They asked to tell about my Intern which I have done in TCS itself (which I think would have given me an edge over others). The intern is related to Data Science.

When asked about the comfortable language which I know, I told JAVA and they asked me a lot of questions on Multithreading.

And finally they asked me which role you want to choose for which I told Data Scientist. So they asked basic questions related to Data Mining, Tools used, etc.

They checked how fascinated I am to learn new technologies.

HR Interview:

He asked me some basic HR questions like introduce yourself, any location constraints, what is the most disappointing thing in your life, etc.

Placement Hacks:

Practice well in Hackerrank, Codechef, etc.

Be clear with your basics like DBMS, DS, OS, Networks, and DAA (better read GeeksforGeeks)

Have at least one project or intern. Speak boldly in the interview.
Freshworks


Contact: vseshgopal@gmail.com

There was 5 rounds in total including online Coding, technical and HR interviews.

Online Coding Round:-

Three Simple programming questions on arrays and string manipulations were given. The test was for an hour. If you are good in coding and can solve basic medium level programming questions on GeeksforGeeks and can manage time efficiently you can easily solve those questions. Only people who solved all three questions were selected for next round.

Paper based coding test:-

A coding question on permuting strings was given. It is a 30 min test. Students who wrote flawless code using any coding language of their convenience were selected for next round.

First Technical interview:-

Interviewer went through my resume and asked me my area of interest. Since I like data structures and Algorithm and have done projects on it, I told him the same. He asked me some programming problems on circular linked lists and binary search tree. I solved them quickly. Then came questions on DBMS. He asked me to design schemas and he also asked me to write some SQL queries. Then he asked about my project. He was impressed with it and I was selected for second Technical interview. This round went for 1hr approx.

Second Technical interview:-

Discussions began with my project and my areas of interest. He gave me some coding question on recursion and I solved it. He was quiet convinced about my coding skills. And then came puzzles. He gave me some and I solved it getting some clues from him. Then came basic ques-
tions on OOPS concepts. I could answer all his questions. This round again went for an hour and I was selected for HR round.

HR round:-

I was asked to introduce myself. Then came trivial questions like why Freshworks? Why should I hire you? Where you see yourself after three years? What if you were not selected? Carrier after graduation or higher studies? Any idea to build your own startup in future? He tried to screw me with my own reply. But I came up with convincing replies. This round went for some 40mins and ended up with him wishing me best of luck for my results. The next day results were announced, and I was selected as a developer along with 39 other students who were offered different roles.

ABCO

ABCO – Advisory Board Company (Acquired by OPTUM) Interview Experience

The eligibility criteria was 7.5+ CGPA with no standing arrears. Around 200 were eligible.

Round 1:

The first round was hosted in Hackerrank. It consisted of 20 MCQs (aptitude, algorithms, DS, O/P and programming questions), 2 Coding questions (1 – Easy and 1 – Medium) and 3 DBMS queries.

Around 16 were shortlisted to the next round.

Round 2:

The first round was followed by series of 2 Tech interviews and 1 HR. In the first tech round, I was asked a lot of DBMS (especially queries based on join) and puzzle questions – (geeksforgeeks puzzle section is more than enough). The Second tech round consisted of DS and DBMS questions and went on for a hour. Both the interview were elimination round.
Post the 1st tech interview 8 were left and post the 2nd only 3 were left. I was eliminated.

Round 3:
The final round was a usual HR round, with the same age old questions about where you see yourself in 5 years etc., and all the 3 were placed

Informatica LLC

Raghul Ravi, 119003122, B.Tech CSE (2015-19)

Informatica came for on campus recruitment, with eligible criteria being, CGPA of 8+ with no history of arrears.

Round 1:
The first consisted of 30 technical aptitude questions, (60% of DS, 30% of OS and 10% of DBMS) to be solved in 20 minutes. DS – Mostly involved tracing O/P’s like what would be O/P after 4th iteration of the given array using QuickSort with element ‘x’ as the pivot element, for OS, it was mostly related to deadlocks, banker’s algorithm etc. for DBMS, it was query based. Out of 120 students, 45 were shortlisted for the coding round. I was one among the 45.

Round 2:
Coding Round:
The coding round consisted of 4 questions, 2 questions worth 5 marks and 2 more worth 10 marks each, but which was worth what was unknown. Languages allowed were C, C++, C# and Java. Out of the 45, 13 were selected to the next round, preferably those who completed 2+ questions. I was one among them.

These are the questions asked to me:

Find maximum subarray

If a linked list specified was a->b->c->d->e->f, change the “same” linked list into a->f->b->e->c->d.

If an array contained [1, 10, 3, 5, 2, 7] and k = 2, combine the set as {110,
35, 27}, sort the set \{27, 35, 110\} and split the set into array as \([2, 7, 3, 5, 1, 10]\)

Given as set \([1, 5, 7, 3, 2, 9]\), make subsets of 2 and 3 elements each and such that sum of each set was a multiple of 3. i.e \([1, 5]\)[7, 2][3, 9][1, 2][1, 5, 3][7, 2, 3] etc.,

Round 3:

Technical Round 1:

The next 3 rounds were the most interesting, there would be a maximum of 3 rounds and a minimum of 1 for every individual selected, Assume the first individual who interviews gives you a +1, you would moving to the next round and a -1 (cumulative, negative at any stage) and you would be eliminated. My first round primarily consisted of OS and Networks and I excelled (OS & Networks being my interests), receiving a +1, which guarantees, I will have 2 more rounds. Questions were primarily based on Race Conditions, CDN, HttpResponse/HttpRequest, and a bit from your resume. Out of 13, 7 were selected for the next round.

Technical Round 2:

This was one half of the DS rounds, I would name this as DS-1, I was asked questions on printing nodes level wise, such that the nodes at each level, to be in different line and given an array consisting of only 0’s and 1’s, rearrange as all 0’s followed by all 1’s without using any type of count variable. Out of 7, 4 moved to final technical interview and I was one among them.

Technical Round 3:

This was the second DS-2, this was where I flunked, Questions were moderate, such as find of the O/P given char pointers and strcpy() and threads and function based and One more was finding the maximum height of a binary tree.

Out of 4, 2 moved to HR round, 1 was called for another technical round and I was out.

HR Round:

A formality round, 2 were selected fulltime + intern and 1 was kept in
Paypal India

Aswin Nagarajan, 119003025, B.Tech CSE (2015-19)
https://www.linkedin.com/in/aswin-nagarajan-a957b8149/

Eligibility: Cgpa : 7.5

Coding Round
Two coding questions of Medium - Hard difficulty to be solved within 1.5 hrs. The number of testcases passed was not the only factor involved in selecting the candidates. They might also look into the code. A total of 14 people made it to the interview round.

Interview

Round 1
This was a general tech interview which started from generic questions like "what is supervised learning" to "how does a block chain network work".
One coding question was asked and I was asked to write the code on a piece of paper without any language restrictions.

At the end of the round it came to 6 candidates

Round 2
Two coding questions were given and was asked to write the code. Few questions based on my resume were asked.

This was a non eliminative round
Round 3
This was the HR cum Tech round. Questions like "Why do you want to join PayPal", "where do you see yourself in ten years" were asked. Technical questions based on my internship were asked. Another non eliminative round

Round 4
This was another general tech round where I explained my projects and the purpose that they serve.

Out of the six people I had 4 rounds of interviews, three more people had three rounds and two people had two rounds.

In the end, 2 people got full time offers and 2 got intern and I was one of them.
The Team

We hope that you found this issue of the magazine helpful and thought-provoking. This is but a simple step in propagating some of the knowledge which is available in abundance with our friends.

We would like to thank the management of SASTRA, Dean-SOC, AD-CSE and all other staff for always being kind and inspiring us. We also express our gratitude to all those who have helped us with the content. We wish that you achieve many laurels and are confident that most of you will go to great heights in your respective areas of interest.

Elangovan L
https://www.linkedin.com/in/elangovanl

Rohith Jayaraman
https://www.linkedin.com/in/rohith-jayaraman-01b29892

Sri Ram E
https://www.linkedin.com/in/sri-ram-eswaran-792b33135

Cipher on Social Media
sastraplacementexperience.blogspot.com
www.facebook.com/ciphercseasastra