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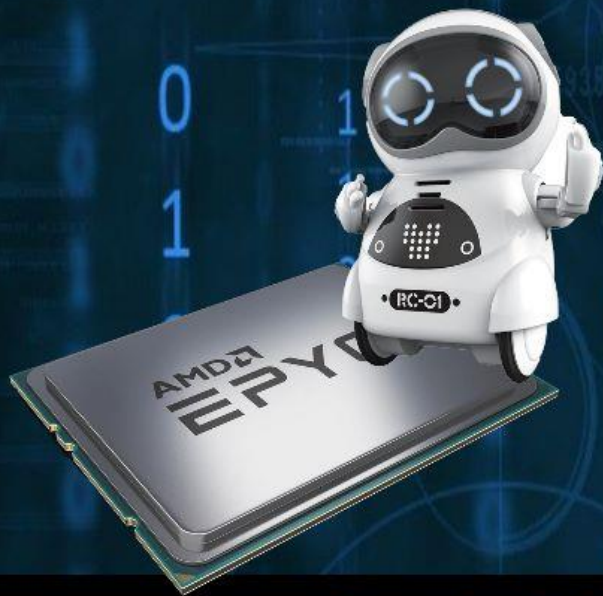
DEPARTMENT OF COMPUTER TECHNOLOGY AND INFORMATION TECHNOLOGY

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KUBERNETES

Kubernetes is an open-source container management tool that automates container deployment, container scaling, descaling, and container load balancing (also called a container orchestration tool). It is written in Golang and has a vast community because it was first developed by Google and later donated to CNCF (Cloud Native Computing Foundation). Kubernetes can group 'n' number of containers into one logical unit for managing and deploying them easily. It works brilliantly with all cloud vendors i.e. public, hybrid and on-premises.

Kubernetes is an open-source platform that manages Docker containers in the form of a cluster. Along with the automated deployment and scaling of containers, it provides healing by automatically restarting failed containers and rescheduling them when their hosts die. This capability improves the application's availability.

Features of Kubernetes

1. **Automated Scheduling**: Kubernetes provides an advanced scheduler to launch containers on cluster nodes. It performs resource optimization.

2. **Self-Healing Capabilities**: It provides rescheduling, replacing and restarting the containers which are dead.

3. **Automated Rollouts and Rollbacks**: It supports rollouts and rollbacks for the desired state of the containerized application.

4. **Horizontal Scaling and Load Balancing**: Kubernetes can scale up and scale down the application as per the requirements.

5. **Resource Utilization**: Kubernetes provides resource utilization monitoring and optimization, ensuring containers are using their resources efficiently.

6. **Support for multiple clouds and hybrid clouds**: Kubernetes can be deployed on different cloud platforms and run containerized applications across multiple clouds.

7. **Extensibility**: Kubernetes is very extensible and can be extended with custom plugins and controllers.

8. **Community Support:** Kubernetes has a large and active community with frequent updates, bug fixes and new features being added.

Architecture of Kubernetes

Kubernetes follows the client-server architecture where we have the master installed on one machine and the node on separate Linux machines. It follows the

master-slave model which uses a master to manage Docker containers across multiple Kubernetes nodes. A master and its controlled nodes(worker nodes) constitute a Kubernetes cluster. A developer can deploy an application in the docker containers with the assistance of the Kubernetes master.
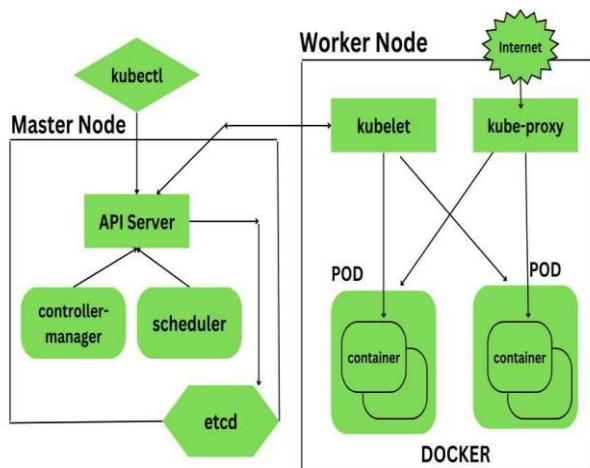
Master Node Components

Kubernetes master is responsible for managing the entire cluster, coordinates all activities inside the cluster and communicates with the worker nodes to keep the Kubernetes and your application running. This is the entry point of all administrative tasks. When we install Kubernetes on our system we have four primary components of Kubernetes Master that will get installed. The components of the Kubernetes Master node are:

a) API Server: The API server is the entry point for all the REST commands used to control the cluster. All the administrative tasks are done by the API server within the master node. If we want to create, delete, update or display in Kubernetes object, it has to go through this API server.API server validates and configures the API objects such as ports, services, replication, controllers and deployments and it is responsible for exposing APIs for every operation. We can interact with these APIs using a tool called kubectl**.** kubectl is a very tiny go language binary that basically talks to the API server to perform any operations that we issue from the command line. It is a command-line interface for running commands against Kubernetes clusters.

b) Scheduler: It is a service in the master responsible for distributing the workload. It is responsible for tracking the utilization of the working load of each worker node and then placing the workload on which resources are available and can accept the workload. The scheduler is responsible for scheduling pods across available nodes depending on the constraints you mention in the configuration file it schedules these pods accordingly. The scheduler is responsible for workload utilization and allocating the pod to the new node.

c) Controller Manager: Also known as controllers. It is a daemon that runs in a non-terminating loop and is responsible for collecting and sending information to the API server. It regulates the Kubernetes cluster by performing lifestyle functions such as namespace creation and lifecycle event garbage collections, terminated pod garbage collection, cascading deleted garbage

collection, node garbage collection and many more. Basically, the controller watches the desired state of the cluster if the current state of the cluster does not meet the desired state then the control loop takes the corrective steps to make sure that the current state is the same as that of the desired state. The key controllers are the replication controller, endpoint controller, namespace controller and service account controller. So in this way controllers are responsible for the overall health of the entire cluster by ensuring that nodes are up and running all the time and correct pods are running as mentioned in the specs file.

d) etc: It is a distributed key-value lightweight database. In Kubernetes, it is a central database for storing the current cluster state at any point in time and is also used to store the configuration details such as subnets, config maps etc. It is written in the Go programming language.

Worker Node Components

Kubernetes Worker node contains all the necessary services to manage the networking between the containers, communicate with the master node and assign resources to the containers scheduled. The components of the Kubernetes Worker node are:

a) Kubelet: It is a primary node agent which communicates with the master node and executes on each worker node inside the cluster. It gets the pod specifications through the API server and executes the container associated with the pods and ensures that the containers described in the pods are running and healthy. If kubelet notices any issues with the pods running on the worker nodes then it tries to restart the pod on the same node. If the issue is with the worker node itself then the Kubernetes master node detects the node failure and decides to recreate the pods on the other healthy node.

b) Kube-Proxy: It is the core networking component inside the Kubernetes cluster. It is responsible for maintaining the entire network configuration. Kube-Proxy maintains the distributed network across all the nodes, pods and containers and exposes the services across the outside world. It acts as a network proxy and load balancer for a service on a single worker node and manages the network routing for TCP and UDP packets. It listens to the API server for each service endpoint creation and deletion so for each service endpoint it sets up the route so that you can reach it.

c) Pods: A pod is a group of containers that are deployed together on the same host. With the help of pods, we can deploy multiple dependent containers together so it acts as a wrapper around these containers so we can interact and manage these containers primarily through pods.

d) Docker: Docker is the containerization platform that is used to package your application and all its dependencies together in the form of containers to make sure that

your application works seamlessly in any environment which can be development or test or production. Docker is a tool designed to make it easier to create, deploy and run applications by using containers. Docker is the world's leading software container platform. It was launched in 2013 by a company called Dot cloud. It is written in the Go language. It has been just six years since Docker was launched yet communities have already shifted to it from VMs. Docker is designed to benefit both developers and system administrators making it a part of many DevOps toolchains. Developers can write code without worrying about the testing and production environment. Sysadmins need not worry about infrastructure as Docker can easily scale up and scale down the number of systems. Docker comes into play at the deployment stage of the software development cycle.

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GOOGLE CLOUD PLATFORM (GCP)

Google Cloud Platform is a set of cloud computing services provided by Google that allows you to store, manage and analyze data. It is also used for developing, deploying and scaling applications on Google's

environment. It was announced as the leading cloud platform in Gartner's IaaS Magic Quadrant in 2018. Likewise, it provides tools for developers to build and deploy applications in a secure and reliable manner, with access to advanced security features. Services of Google Cloud Platform can be accessed by developers, cloud administrators and other enterprise IT professionals through the public internet or through a dedicated network connection.

Three Categories **of** Cloud Services

Infrastructure as a Service (IaaS): It provides you all the hardware components you require such as computing power, storage, network etc.

Platform as a Service (PaaS): It provides you a platform that you can use to develop applications, software and other projects.

Software as a Service (SaaS): It provides you with complete software to use like Gmail, google drive etc.

Google Cloud Platform

Starting from 1998 with the launch of google search. google has developed one of the largest and most Powerful IT Infrastructure in the world. Today, this infrastructure is used by billion of users to use services such as Gmail, Youtube, Google Photo and Maps. In 2008, Google decided to open its network and IT infrastructure to business customers, taking an infrastructure that was initially developed for consumers

application to public service and launching google cloud platform. All the services listed above are provided by Google hence the name Google Cloud Platform (GCP). Apart from these, there are so many other services provided by GCP and also many concepts related to it that we are going to discuss in this article.

Regions and zones
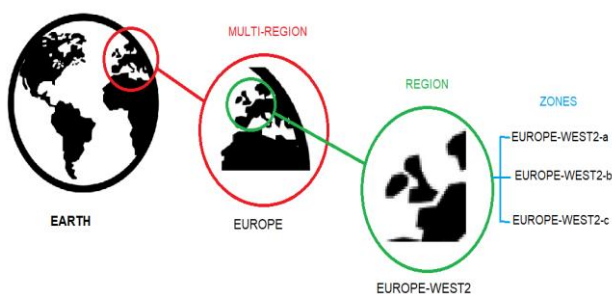
Let's start at the finest grain level (i.e. the smallest or first step in the hierarchy), the Zone. A zone is an area where Google Cloud Platform Resources like virtual machines or storage is deployed. For example, when you launch a virtual machine in GCP using Compute Engine, it runs in a zone you specify (suppose Europe-west2-a). Although people consider a zone as being sort of a GCP Data Center, that's not strictly accurate because a zone doesn't always correspond to one physical building. You can still visualize the zone that way, though.

Zones are grouped into regions which are independent geographic areas and much larger than zones (for example- all zones shown above are grouped into a single region Europe-west2) and you can choose what regions you want your GCP resources to be placed in. All the zones within a neighbourhood have fast network connectivity among them. Locations within regions usually have trip network latencies of under-five milliseconds.

As a part of developing a fault-tolerant application, you'll need to spread your resources across multiple zones in a region. That helps protect against unexpected failures. You can run resources in different regions too. Lots of GCP customers do this, both to bring their applications closer to users around the world, and also to guard against the loss of a whole region, say, due to a natural disaster.

A few GCP Services supports deploying resources in what we call a Multi-Region. For example, Google Cloud Storage, lets you place data within the Europe Multi-Region. What that means is that it is stored redundantly in a minimum of two different geographic locations, separated by at least 160 kilometers within Europe. Previously, GCP had 15 regions.

Pricing

Google was the primary major Cloud provider to bill by the second instead of rounding up to greater units of your time for its virtual machines as a service offering. This may not sound like a big deal, but charges for rounding up can really add up for customers who are creating and running lots of virtual machines. Per second billing is obtainable for a virtual machine use through Compute Engine and for several other services too.

Compute Engine provides automatically applied use discounts which are discounts that you simply get for running a virtual machine for a big portion of the billing month. When you run an instance for at least 25% of a month, Compute Engine automatically gives you a reduction for each incremental minute you employ it. Here's one more way Compute Engine saves you money. Normally, you choose a virtual machine type from a typical set of those values, but Compute Engine also offers custom virtual machine types, in order that you'll fine-tune the sizes of the virtual machines you use. That way, you'll tailor your pricing for your workloads.

Open API's

Some people are afraid to bring their workloads to the cloud because they're afraid they'll get locked into a specific vendor. But in many ways, Google gives customers the power to run their applications elsewhere, if Google becomes not the simplest provider for his or her needs. Here are some samples of how Google helps its customers avoid feeling locked in. GCP services are compatible with open source products**.** For example, take Cloud Bigtable, a database that uses the interface of the open-source database Apache HBase which provides customers the advantage of code portability. Another example, Cloud Dataproc provides the open-source big data environment Hadoop, as a managed service etc.

Why choose GCP?

- GCP allows you to choose between computing, storage, big data, machine learning and application services for your web, mobile, analytics and back-end solutions.
- It's global and it is cost-effective.
- It's open-source friendly.
- It's designed for security.

Advantages of GCP

- **Good documentation:** We are talking about many pages in total, including a reasonably detailed API Reference guide.
- **Different storage classes for every necessity:** Regional (frequent use), Nearline (infrequent use) and Coldline (long-term storage).
- **High durability:** This suggests that data survives even within the event of the simultaneous loss of two disks.
- **Many regions available to store your data:** North Ameria, South America, Europe, Asia, and Australia.
- The "Console" tab within the documentation allows you to try for free of charge different SDKs. It's incredibly useful for developers
- One of the simplest free layers within the industry. $300 free credit to start with any GCP product during the primary year. Afterward, 5 GB of

Storage to use forever without any charges.

Disadvantages of GCP

- The support fee is sort of hefty: Around 150 USD per month for the foremost basic service (Silver class).

- Downloading data from Google Cloud Storage is expensive. 0, 12 USD per GB.

- Google Cloud Platform web interface is somewhat confusing. Sometimes I am lost while browsing around the menus.

- Prices in both Microsoft Azure (around 0.018 USD per GB/month) or Backblaze B2 (about 0.005 USD per GB/month) are less than Google Cloud Storage.

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GAME HACKING APPS FOR ANDROID

Gaming appeals to many people, whether a free, lightweight mobile app or a high-grade multi-player RPG-type game. Developers consistently create and release new game options related to varying sectors and styles for users. However, even if you find a new game that seems interesting, it might have restrictions, like limiting restricted access to certain features/versions/games to certain user groups.

These ethical game-hacking apps securely and efficiently cut through the restrictions undetected, allowing users to access the gameplay safely. Of course, some solutions require rooting beforehand and a few of them break through Google PlayStore policies. So, a lot of these options are available as APK installers.

1. AndroRAT

AndroRAT is a Windows-based tool for users who want simple and efficient software to control Android devices remotely. This is probably one of the best gaming hacker apps which allows users to activate the software and connect their tablet or smartphone to the system the app is downloaded on. Then, the software allows users to add a port number or IP address to connect to the secondary device remotely.

The programs run on Java which the developers used to upgrade the software from the previous version. The newer version comes with rich features like GPS location monitoring, contact information checking, access to a list of all sent/received messages, call logs checking, taking camera photos and more.

2. HackerBot

This game-hacking software helps offer software patches for gaming software, operating as an Android-based Cheat Engine that allows users to hack games. This is because of the wide range of information available on this app for gameplay-related details, like tips, cheats, and tricks across different platforms. This app offers a cheat sheet guide for diverse games, like PUBG, Garena Free Fire, etc.

3. cSploit

Another outstanding choice in this list of the best game-hacking apps for Android is cSploit. While it is not a traditional type of application, this Android network nalysis/penetration suite aims towards the improved productivity of IT security professionals. These experts get this toolkit of resources for diverse types of network security assessment runs via Android smartphones. After users activate the program, it becomes easy to map their network, search the system for vulnerabilities and handle real-time web traffic manipulation, among others.

4. Xmodgames

This is a capable game-hacking app that users can use to find and then add mods to Android-based games like Subway Surfers, Clash of Clans, Minecraft, Clash Royal, etc.

This software allows users to access and utilize the built-in screen recording functionality for gameplay recording. Furthermore, users can also capture screen grabs and share them directly via Xmod discussion threads. Streamers can utilize the app to access data about games and use its functions. However, it is essential to mention that the app is accessible only on some established devices and is essentially an amusement collaboration-centric portable app.

5. DroidSheep

DroidSheep is an Android-centric hacking app that handles quick and intensive WiFi traffic auditing processes. It can efficiently evaluate the available data to properly study and capture crucial data from online services like passwords or game access protocols. This gaming hacker app helps read all available data packets users receive or send across one connected WiFi network on their device. The app adopts an ethical hacking functionality and does not allow the unauthorized acquisition of other users' details or passwords.

6. Lucky Patcher

Another notable Android-based game-hacking app that is worth mentioning is Lucky Parcher. This application allows users to access and modify the specifications of installed games and apps. While operating the

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software, users can access apps surpassing the license limitations in place including new features, removing ads etc. The ability to remotely activate premium-level features and upgrade gameplay benefits by changing app permissions makes this app highly valuable to Android users. Again, this APK software follows ethical rules for its practices, assuring usage safety for all.

7. Game Killer

This Android app for game hacking is a full-scale guide to game cheat sheets for different game types. Users operating this APK on their Android devices can access a comprehensive list of cheat codes and gameplay command information for varying games with high difficulty levels and because of its ability to bypass it so easily, it is often considered among the best apps to hack games. Gamers can activate this app's functionality and access the app they installed offline. Following that, it is helpful to use the unlimited number of commands and values that will come up for cracking all game sequence parts. However, you need to root the Android device beforehand and use this app only with offline games.

8. GameGuardian

Android users can operate the GameGuardian app to access different games on their smartphone or tablet and operate it smoothly. After installing the APK installer, one has to access the app and allow it to work in the background while playing the game on an Android smartphone. Using this app, games can trick the internal time counting mechanism of the app by mocking the waiting time passage period. This way, the software counts the new set time as the overall time spent, adjusting the player's level accordingly. For example, this is useful for games like Criminal Case, where users must wait for evidence analysis to complete. You can pass the time and acquire objects faster by activating this app.

9. Cheat Engine

Cheat Engine is constantly maintaining popularity as one of the top apps to hack Android games a few times. This app has come up with regular modifications, making it capable enough to manipulate many popular applications and games. It effectively works on debugging problems people experience with those games and modifying the problematic settings of the single-player games. With Cheat Engine, a gamer can change the difficulty setup of different single-player games. Cheat Engine can be used for debugs, speed hacks, direct 3D manipulation, disassembler, assembler, system inspection and so on. Furthermore, it is worth noting that the new users will find the in-build tutorial to understand how it works.

10. Leo Playcard

Leo Playcard is one of the best hacking apps for Android you can find on the internet.

You do not have to pay a single penny to download this powerful app. Furthermore, a great feature of this hack for the game app is that it allows its users to download paid Android gamers free of cost easily. Besides this, an individual can use or integrate the app to manipulate famous games such as Temple Run. It also helps its users increase the number of their gems, lives, or cards in the game. With Leo Playcard, users can hack into the stable functioning or different games, like Temple Run. After that, one can easily manipulate the software to give them more rewards than standard gameplay. For example, you can get more episode passes for offline RPG games and lives/gems/game coins (Temple Run).

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WEB DEVELOPMENT

Web development refers to the creating, building and maintaining of websites. It includes aspects such as web design, web publishing, web programming and database management. It is the creation of an application that works over the internet i.e. websites.

The word Web Development is made up of two words, that is:

- Web: It refers to websites, web pages or anything that works over the internet.
- Development: It refers to building the application from scratch.

Web Development can be classified into two ways:

- Frontend Development
- Backend Development

The part of a website where the user interacts directly is termed as front end. It is also referred to as the 'client side' of the application.
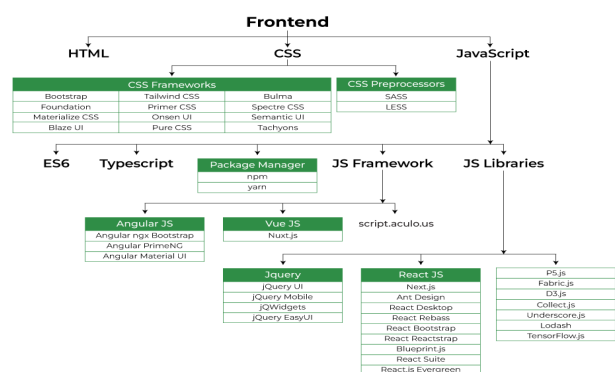
Frontend Roadmap

Popular Frontend Technologies

- HTML: HTML stands for HyperText Markup Language. It is used to design the front end portion of web pages using markup language. It acts as a skeleton for a website since it is used to make the structure of a website.

- CSS: Cascading Style Sheets fondly referred to as CSS is a simply designed language intended to simplify the process of making web pages presentable. It is used to style our website.

- JavaScript: JavaScript is a scripting language used to provide a dynamic behavior to our website.

- Bootstrap: Bootstrap is a free and open-source tool collection for creating responsive websites and web applications. It is the most popular CSS framework for developing responsive, mobile-first websites. Nowadays, the websites are perfect for all browsers (IE, Firefox, and Chrome) and for all sizes of screens (Desktop, Tablets, Phablets, and Phones).

Backend Development

Backend is the server side of a website. It is part of the website that users cannot see and interact with. It is the portion of software that does not come in direct contact with the users. It is used to store and arrange data.

Backend Roadmap
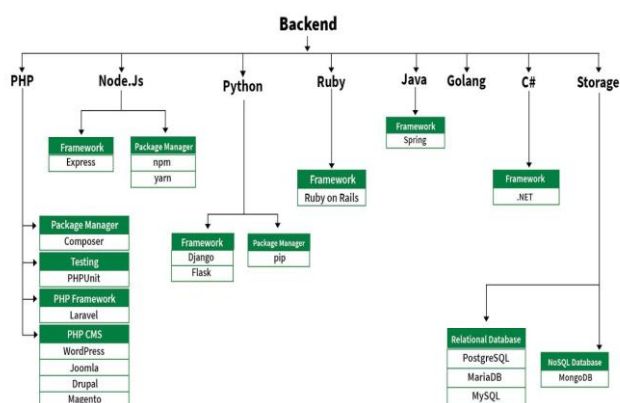
Popular Backend Technologies

- PHP: PHP is a server-side scripting language designed specifically for web development.

- Java: Java is one of the most popular and widely used programming languages. It is highly scalable.

- Python: Python is a programming language that lets you work quickly and integrate systems more efficiently.

- Node.js: Node.js is an open source and cross-platform runtime environment for executing JavaScript code outside a browser.

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HOMOMORPHIC ENCRYPTION

Homomorphic encryption is the conversion of data into ciphertext that can be analyzed and worked with as if it were still in its original form. Homomorphic encryption enables complex mathematical operations to be performed on encrypted data without compromising the encryption. In mathematics, homomorphic describes the transformation of one data set into another while preserving relationships between elements in both sets. The term is derived from the Greek words for same structure. Because the data in a homomorphic encryption scheme retains the same structure, identical mathematical operations will provide equivalent results regardless of whether the action is performed on encrypted or decrypted data.

Homomorphic encryption differs from typical encryption methods because it enables mathematical computations to be performed directly on the encrypted data, which can make the handling of user data by third parties safer. Homomorphic encryption is designed to create an encryption algorithm that enables an infinite number of additions to encrypted data.

There needs to be a relationship between both plaintext and ciphertext for homomorphic encryption to perform mathematical operations on encrypted data. Plaintext is ordinary readable text, while ciphertext encrypted text is transformed from plaintext using an encryption algorithm. Two ciphertexts in homomorphic encryption, for example, should be able to be added or multiplied together with the same results as if the encryption were performed on two plaintexts. Homomorphic encryption is implemented so that it's hidden from observers.

Types of homomorphic encryption

Enabling an infinite number of additions or multiplications to encrypted data is difficult, however. As a result, homomorphic encryption can be divided into different types of encryption, depending on how it's designed.

If an algorithm is additively homomorphic, then adding two ciphertexts together provides the same result as encrypting the sum of the two plaintexts. Likewise, if an algorithm is multiplicatively homomorphic, then multiplying two encrypted ciphertexts with the same key is equivalent to raising the product of plaintexts to the power of a secret key.

Homomorphic encryption can be either additive or multiplicative, while also being partially, somewhat or fully homomorphically encrypted:

- **Partially homomorphic encryption:** A defined operation can be performed infinite times on the ciphertext. These encryption schemes are relatively easy to design.

- **Somewhat homomorphic encryption:** A limited number of addition or multiplication operations are allowed, as opposed to an infinite number of one operation. It's more difficult to design a homomorphic encryption system that supports a set number of operations than one operation infinite times.

- **Fully homomorphic encryption.** An infinite number of additions or multiplications for ciphertexts is enabled. Programs for any functionality can be run on encrypted inputs to produce an encrypted output.

Applications of homomorphic encryption

Homomorphic encryption could play an important role in cloud computing, enabling organizations to store encrypted data in a public cloud to take advantage of the cloud provider's analytic services.

Currently, it may be challenging for organizations to outsource data for storage, processing or analytics to a third-party cloud environment securely. However, with homomorphic encryption, data processing or analytics can be outsourced to a third party without needing to trust that party's data security. Without the correct decryption key, the original data can't be accessed, which means sensitive data can be sent and analysed while still remaining encrypted. This can be used to preserve customer privacy in industries such as healthcare, financial services and IT.

Homomorphic encryption can also help with regulatory compliance. For example, it can help companies outside of the European Union (EU) adhere to General Data Protection Regulation (GDPR) requirements. GDPR requires EU data to remain in the EU or in countries with equivalent data security standards, but these rules don't apply to encrypted data. Homomorphic encryption can also help organizations protect themselves from cybercriminals attacking their supply chain. If data provided to a third party is encrypted and stays encrypted, then a breach at the third party won't interrupt the organization's supply chain.

Some organizations, such as Meta formerly Facebook sell user data to third parties for targeted advertising. However, homomorphic encryption enables Meta to perform analytics on user data without being able to view the original data. This could provide more private targeted advertising.

The future of homomorphic encryption

Homomorphic encryption could be incredibly useful for data security; however, it's still too slow to have any practical use, as the ciphertexts need to be correctly added or multiplied an infinite number of times. Fully homomorphic encryption is upward of 1 million times slower than equivalent operations in plaintext.

Organizations such as IBM and Microsoft are currently working on the encryption format by decreasing the computational overhead needed for homomorphic encryption. In 2018, Microsoft released SEAL which is an open source homomorphic encryption library. It can be run on Azure but is also cross-platform software. Also in 2018, IBM released a version of the open source HElib C++ library that implements homomorphic encryption. It was almost 2 million times faster than IBM's original version but still 1 million times slower than plaintext operations. A single operation that would take a plaintext operation one second would take this version of HElib 11-12 days to complete. There's still much more work needed to make this encryption format practical.

Further standardization of homomorphic encryption could aid in creating a consistency in methods and help simplify the process. However, homomorphic encryption may never realize its full potential due to its inefficiency and it is being replaced by newer alternatives.

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AI-BASED NEUROSURGICAL TRAINING

A new study from the Neurosurgical Simulation and Artificial Intelligence Learning Centre at The Neuro (Montreal Neurological Institute-Hospital) of McGill University, however, shows that human instruction is still necessary to detect and compensate for unintended, and sometimes negative, changes in neurosurgeon behaviour after virtual reality AI training.

In the study, 46 medical students performed a tumour removal procedure on a virtual reality simulator. Half of them were randomly selected to receive instruction from an AI-powered intelligent tutor called the Virtual Operative Assistant (VOA), which uses a machine learning algorithm to teach surgical techniques and provide personalized feedback. The other half served as a control group by receiving no feedback. The students' work was then compared to performance benchmarks selected by a team of established neurosurgeons.

Comparing the results, AI-tutored students caused 55% less damage to healthy

tissues than the control group. AI-tutored students also showed a 59 per cent reduction in average distance between instruments in each hand and 46 per cent less maximum force applied, both important safety measures.

However, AI-tutored students also showed some negative outcomes. For example, their dominant hand movements had 50 per cent lower velocity and 45 per cent lower acceleration than the control group, making their operations less efficient. The speed at which they removed tumour tissue was also 29 per cent lower in the AI-tutored group than the control group.

These unintended outcomes underline the importance of human instructors in the learning process, to promote both safety and efficiency in students.

"AI systems are not perfect," says Ali Fazlollahi, a medical student researcher at the Neurosurgical Simulation and Artificial Intelligence Learning Centre and the study's first author. "Achieving mastery will still require some level of apprenticeship from an expert. Programs adopting AI will enable learners to monitor their competency and focus their intraoperative learning time with instructors more efficiently and on their individual tailored learning goals. We're currently working towards finding an optimal hybrid mode of instruction in a crossover trial."

Fazlollahi says his findings have implications beyond neurosurgery because many of the same principles are applied in other fields of skills' training.

"This includes surgical education, not just neurosurgery, and also a range of other fields from aviation to military training and construction," he says. "Using AI alone to design and run a technical skills curriculum can lead to unintended outcomes that will require oversight from human experts to ensure excellence in training and patient care."

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THE LATEST INNOVATIONS IN ROBOTICS

Robear

The Robear is a high-tech teddy bear that helps to raise an elderly patient from a bed into a wheelchair. Toshiharu Mukai, a researcher at the Riken-SRK Collaboration Center for Human-Interactive Robot Research who heads the Robot Sensor Systems Research Team, designed Robear. The third robot bear created by the team was named Robear. This innovation in robotics technology will become a greater help in the healthcare industry.

Asimo

ASIMO is a humanoid robot developed by Honda. It has hand dexterity as well as the capacity to run, hop, jump, climb and descend stairs. ASIMO's capabilities include face recognition and voice identification. It can also identify the faces and voices of many individuals speaking at the same time. ASIMOV can also predict what you'll do next based on your past actions with remarkable accuracy.

Bionicswift

The German invention firm Festo has created a concept for a flock of robotic birds, called BionicSwift. The BionicSwifts are adaptable, nimble, and capable of executing loops and sharp turns. The five robotic birds

may move independently in a coordinated formation in a defined air space through the use of a radio-based indoor GPS system.

Spot

Boston Dynamics is perhaps best known for the Spot, a four-legged, quadrupedal robot that looks like a cross between C3PO and R2D2. The Spot is a 73-kilogram robot that can walk, trot, climb and take a kick while remaining upright.

Bird-Legged Drone

Engineers at Stanford have created a new robot with claws, curled toes and flexible legs that are inspired by a bird. It can land on trees and other surfaces in a similar manner to a bird. This will make future drones and robots' landings significantly easier.

Robohon

A smartphone that appears as a robot is called ROBOHon. The tiny robot serves as a regular phone with a screen in its abdomen, but it also performs various functions. It has a variety of features, including the ability to walk and talk. Because it has a projector in its face, it may lean forward and project larger images on surfaces. This might be useful for viewing photos, videos or simply as a hands-free alternative.

Nao

The Nao is a $8,000 bipedal android from Aldebaran Robotics. Nao can speak Japanese, English and Chinese as well as answer questions about how to open a bank account and more.

ElliQ

ElliQ is the best companion for aged people. It is a constant source of companionship, entertainment and pleasure while also encouraging you to achieve your health and wellness objectives. The unique design, natural motions and body language of the robot create a "special bond" between ElliQ and its owner.

Kuratas

Coming down to the list of Latest Robotics Innovation, Kuratas is a powerful robot, and it resembles a machine from the movies. It measures 3.8 meters tall and weighs 5 tons and it has a BB Gatling cannon that can shoot out 6,000 bullets per minute.

Cafe X

CafeX is a fully automated coffee bar. It uses sophisticated automation to provide the highest quality specialty coffee.

Foldimate

Foldimate takes the concept one step further by folding your clothes as well. This robotic laundry folding machine might be a real game-changer or it may at least alleviate the burden of housework.

Insect Robots

A tiny, insect-inspired robot that can stand and jump on water. Wyss Institute for Biologically Inspired Engineering at Harvard University developed this robot. The robot is not using surveillance technology, but it was there in a project that aimed to explore sea mobility in a tiny-scale robot.


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RECENT ADVANCEMENTS IN LAPTOP PROCESSORS

The latest processors are improving every aspect of performance and efficiency. As much as they are getting faster, they are also more energy-efficient and reliable. They are now capable of machine learning and deep learning, ensuring reliability and efficient operation regardless of the workload.
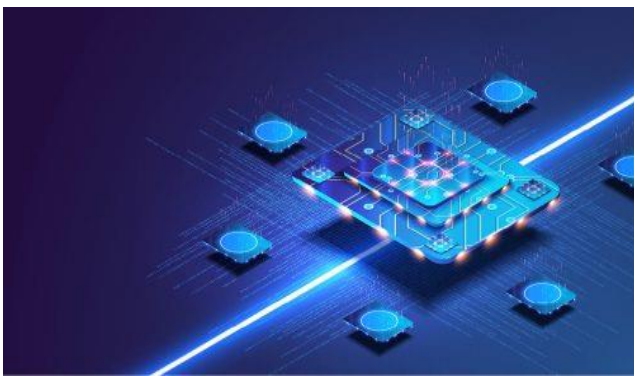
Amongst many types of laptops being manufactured, selecting the right laptop is usually based on computing needs and requires a vast amount of not only research but also resources. It is important to understand some of the significant parameters and technologies associated with laptop processors. Since last year, there have been many advancements in this area. Let's have a look at some of the trends that have scaled the laptop processors industry.

More cores and threads

In order to increase system performance, having multiple processing cores inside a single chip proves to be very effective.

First came the dual-core processors that employed two processing units, followed by the quad-core processors having four. Nowadays we find octa-core processors that have eight processing cores.

These multiple processing cores allow parallel execution of the tasks which simply means that the tasks are broken down into sub-tasks, and each sub-task is processed by multiple processing units in a specific time. Parallel processing is an efficient way of processing multiple tasks at the same time.

There are other advantages associated with multi-core processors such as keeping the clock speed at an efficient level while also increasing the processing power when multiple cores are implemented on the same die. Moreover, in multi-core processors, the individual cores are running at the same speed as a single core, resulting in consumption of less energy though clock speed is multiplied.

Threads, on the other hand, logically manage the processes to enhance the speed. Threading is like pipelining, where a CPU is allowed to execute multiple tasks at the same time. Multithreading, like the name suggests, runs multiple threads of execution within an operating system that can include multiple system processes. Hence, threads are a virtual component that manages tasks to improve throughput and computational speed-up. Most of the latest laptop processors feature sixteen

threads, which means sixteen sets of instructions can be managed within a single processing core.

Higher boost speeds and overclocking

Clock speed is the number of calculations the processor can perform in one second. High clock speed refers to fast speed and processing, requiring more power, the result of which is more heat being generated. Every processor has a base clock speed. Most processors nowadays mention boost frequency. For example, Intel i9-11980HK processor has a base clock speed of 2.6GHz and turbo boost speed of 5GHz. But most of the time you might not need 5GHz speed or even the base speed of 2.6GHz.

This is where overclocking comes in. It is a process that takes in a clock frequency and changes its multiples. Every processor has a low-level clock frequency like 200MHz. A 13x multiplier has a clock speed of 2.6GHz. Therefore, for the right processing power, upscale and downscale of frequencies can be done. The turbo boost modes in processors are essentially overclocks, but in this case the system chooses the speed. Whenever there is a need for more clock cycles, the system will first check the temperature. If there is sufficient thermal overhead for overclocking, it will boost the speed as long as the system requires the boost. The amount of time the speed is boosted also depends on the processor's temperature.

The boost modes and overclocking efficiently utilise the power and simplify thermal management. The AMD Ryzen 9 5900HS features a boost clock frequency of 4.6GHz, similar to Intel i7-11800H processor. However, Ryzen 9 5980HS and Intel i7-11850H processors specify a maximum boost speed of 4.8GHz. To provide maximum performance by overclocking and turbo boost mode, Intel processors combine a set of software tools used to tune the system for maximum performance and customise advanced system settings for such things as overclocking and graphics. The software tools provide users and OEMs the ability to customise the laptop or computer performance according to their needs. The software tools help the system adapt this customisation by using machine learning algorithms and advanced power control settings.

Improved graphics performance

Latest laptop processors deliver outstanding graphics performance. The graphics frequency, processing cores, threads, display support, and resolution have been significantly improved in the latest processors. The number of graphical processing unit (GPU) cores embedded in the processors have increased. AMD's latest Ryzen processors include eight graphical processing cores. Intel's latest core i9 processors feature 32 graphical execution units, which are compute processors optimised for simultaneous multi-threading for

high throughput compute power. Apple M1's integrated GPU includes eight cores capable of running nearly 25,000 threads simultaneously, providing high graphics performance and also being very efficient at the same time. In terms of the graphics frequency, the latest Intel processors' maximum is 1.45GHz.

The graphics performance, however, mostly depends on the core architecture. The new GPU architectures will often lead to more efficient performance, accompanied by lower power consumption and the use of new technologies to enhance the user experience. The newly released AMD Zen3 core architecture aims to improve graphic performance of the processor by focusing on single-core performance, energy efficiency, and reduced latencies. According to AMD, this allows the frames per second (FPS) to increase up to 11% in certain games. It has higher instructions per clock cycle. In particular, it can extract an average of 19% additional performance from every MHz of frequency relative to the Zen2. Higher IPC and unified 8-core complex is a potent combination for increased graphics performance.

Intel Xe GPU architecture also focuses on improved graphics performance, efficient multitasking, and high-quality video calling. Its family consists of a series of microarchitectures, ranging from integrated low-power (Xe-LP) to high-performance gaming (Xe-HPG), datacentre/high-performance (Xe-HP), and high-performance computing (Xe-HPC).

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NEW PROGRAMMING LANGUAGES TO LEARN

Learning a new programming language does more than just educate users on one specific area of coding. It can also help them sharpen problem-solving skills, boost their job opportunities and get a better understanding of technology as a whole.

The following are the top new programming languages to learn

- F#
- Clojure
- Elixir
- PureScript
- Swift
- Go
- Dart
- Apache Groovy
- Java 17
- Crystal

1. F#

F# is an open-source, cross-platform language that takes on more of a hybrid position between general and functional

languages. Many programmers find F# to offer the same kind of simplicity as Python while delivering a more seamless experience than C# and Java. This may be because the language avoids the clutter of semicolons, curly brackets and other symbols, so developers don't have to worry about clarifying their object type. As a result, tasks such as list processing and applying complex type definitions are easier when working in F#.

The hybrid nature of F# also makes it compatible with other styles, including databases, websites and .NET entities. Whatever elements designers are working with, they can rely on the programming language's strong type system to root out common errors. These factors all contribute to the flexibility and convenience of F#, which is why it remains a popular programming language.

2. CLOJURE

Clojure is a general-purpose language designed for concurrency, which means it supports multiple computations happening at the same time. But Clojure is also a Lisp language, keeping its syntax to a minimum. These elements facilitate a coding environment where developers can easily preserve code while building on previous projects to make changes as needed.

This programming language was also made for the Java Virtual Machine (JVM), so it pairs well with any system related to the JVM. It's no surprise then that many companies have

added Closure to their tech stacks including Adobe, Apple and Netflix.

3. ELIXIR

"There was this subset of the Ruby community that wandered down the Erlang rabbit hole, and they came out with Elixir," Grove senior developer David Rogers said.

Elixir, however, is easier to write than Erlang, with the functional programming concepts of a language like Haskell. Elixir runs on the Erland virtual machine which works well for low-latency distributed systems. The platform prioritizes scalability and fault tolerance. Lightweight threads of events or processes send messages to each other. Those processes can run concurrently, maximizing machine resources and making it easier to scale vertically or horizontally. If something goes wrong, the platform shows the developer the last known state that's sure to work.

4. PURESCRIPT

PureScript is a purely functional programming language that compiles to JavaScript. Most comparable to Haskell, PureScript is best used for developing web applications and server-side apps. Like Haskell, it uses algebraic data types, pattern matching and type classes.

PureScript's types are expressive and support type inference, meaning that it requires far fewer explicit type annotations than other languages. One of its biggest strengths is its

interoperability with other languages that target JavaScript.

5. SWIFT

Swift is a general-purpose compiled programming language developed by Apple that allows developers to write software for phones, servers, desktops or really anything else that runs on code. Originally developed as a replacement for Apple's earlier programming language, Objective-C, Swift combines ideas from other languages like Objective-C, Rust, Ruby and Python to help reduce common programming errors. The language combines a powerful type inference with a modernized syntax that helps ideas to be clearly expressed through code. Swift is an especially important skill for those seeking iOS developer roles in 2023.

6. GO

Go is a C-style language created by engineering leads at Google. Sleeker than C++ or Java and more typesafe than Ruby or Python, Go comes with benefits and drawbacks.

Some drawbacks: Typing is strict. You can't mix signed and unsigned integers or integer sizes. Go also has some noticeable omissions: There are no generics and no inheritance. But Go's simplicity creates some marked advantages. Namely, the language is easy to use. There's less hiding behind the written code, and the lack of inheritance helps developers avoid webs of

dependencies, making it a solid language for data science in 2023. Tight definitions and thread safety seem to be Go priorities, Rogers said.

7. DART

Another C-style language from Google, Dart is like JavaScript with type safety. It can easily compile to JavaScript, Java for Android, native machine code or a standalone Dart VM. It can also run back-end code. Dart is good for building user interfaces with event-driven code. The hot reload command lets developers see changes to their applications instantaneously. Some other Dart advantages, according to one Dart team member: optional static types, minimal compile-time errors and a strong, built-in editor.

8. APACHE GROOVY

Apache Groovy integrates with the Java platform and was made with the purpose of making life easier for Java developers. The programming language showcases concise and flexible syntax, allowing developers to reduce the time it takes to complete projects. This trait is also one of many reasons why Apache Groovy comes with a flat learning curve, rivaling the simplicity of languages like Python.

Developers don't have to choose between static and dynamic languages since Apache Groovy supports both types. These features are what make Apache Groovy a great

programming language for conducting tests. The syntax is designed to be test-friendly, leading many Java developers to embrace this language.

9. JAVA 17

While the Java lineage extends over the course of two decades, Java 17 provides a fresh spin on this renowned programming language. This latest Java version embraces a simpler syntax, addressing the wordiness of previous Java versions. Besides confusing syntax, previous Java versions also had no great way to troubleshoot bugs when a program failed. Java 17 is equipped with a NullPointException feature, singling out faulty variables.

To keep up with tech developments, Java 17 also comes with the latest updates that make it compatible with the cloud and newer Apple computers. Developers and organizations now have more options when deciding how to apply Java to their tech stacks.

10. CRYSTAL

Crystal is an object-oriented programming language that employs easy-to-learn syntax, especially for Ruby developers since the language takes its cue from Ruby's simple syntax. The language is also static, allowing it to catch errors earlier on in the development process. This feature spares teams from making expensive mistakes during runtime such as overlooking null references.
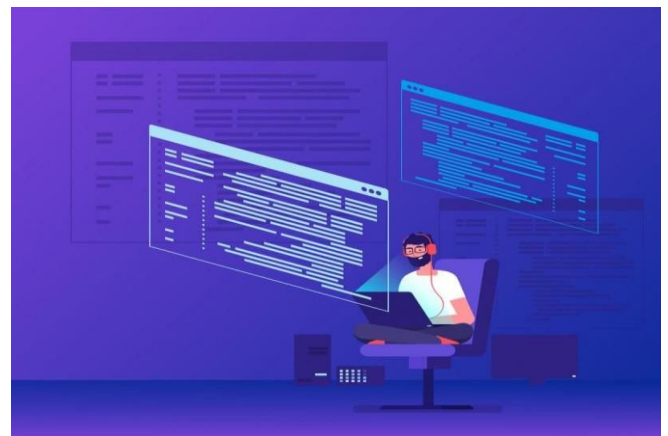
As an extra measure, Crystal provides built-in type inference, so developers don't have to clarify which language they're using every time. Crystal also supports concurrency with a fiber system, allowing developers to perform more computations without draining memory.

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SOFTWARE ENGINEERING PERSPECTIVES

What Is Software Engineering?

Software engineering is a discipline that covers all aspects of software development, including designing, building, testing, distributing and maintaining software products. The field requires engineering principles, problem-solving abilities and programming language skills to design software that meets various user needs.

What sets software engineering apart from other disciplines is the flexibility it

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demands. Teams should feel comfortable applying Agile and Waterfall methods the former promoting a more fluid approach, the latter offering a more structured option. And while languages like C++, Java and Python are common in software engineering, the discipline is constantly evolving to include new programming languages like F#, Clojure and Apache Groovy. Those who excel in software engineering know how to juggle complex projects, pivot between different work methods and keep up with the latest industry technologies and trends to provide the best digital experiences possible.

At the heart of this discipline are software engineers. These computer science professionals use their understanding of engineering principles, methods and languages to create, maintain and update computer software. The software engineering field is very broad, with engineers having various roles and areas of technical expertise.

Types of Software Engineering

All parts of the software development life cycle budgeting, analysis, design, development, testing, integration, maintenance and retirement are considered a part of software engineering. These tasks often fall into three separate buckets depending on the needs of the project: operational software engineering, transitional software engineering and software engineering maintenance.

Operational Software Engineering

Operational software engineering involves tasks related to how software interacts with a system, including tasks and decisions made on its budget, how it works for teams and customers, its functionality within the system and any risks it may pose.

Transitional Software Engineering

Transitional software engineering involves tasks related to the software's flexibility and scalability when it's shifted out of its initial environment.

Software Engineering Maintenance

Software engineering maintenance covers tasks related to improving and debugging existing software to account for changes in environment, emerging technologies or vulnerabilities and bugs that may have been neglected during a previous development cycle. Eventually, maintenance is phased out and retirement is initiated.

Types of Software Engineer Roles

Software engineers have unique skill sets that allow them to perform certain computer engineering tasks. It usually takes a whole team of different types of engineers to efficiently produce successful applications. Below are just a few of the most in-demand types of engineers.

Front-End Engineer

Front-end engineers specialize in the development of customer-facing products. These user interface (UI) engineers deal with everything from cross-browser compatibility and fixing bug issues to incorporating design elements that provide the smoothest user experience on applications and websites.

Back-End Engineer

Back-end engineers specialize in the logic, performance and coding of the application that users don't see. These engineers focus heavily on the code that is able to execute every action you take when using an application. Back-end engineers rely on different databases, caches, programming languages and Application Programming Interfaces (APIs) to make sure the back-end is free of bugs and running smoothly.

Full Stack Engineer

Full stack engineers are highly sought after because they have the knowledge and skills to handle both front- and back-end engineering tasks. Not only can these engineers create clean, working code on the backend, they also can implement design elements that help to create the best possible user experience.

Security Engineer

Security engineers are becoming highly sought after because of their importance in maintaining the health of an entity's cyber infrastructure during disruptions such as natural disasters or cyberattacks. Security engineers use varying forms of cybersecurity tools to make sure their databases, systems and infrastructure are always safe from harm. The need for security engineers will grow even larger as cyber threats grow larger and more advanced than ever before.

DevOps Engineer

DevOps is a portmanteau of the phrases "software (dev)elopment" and "information-technology (op)erations." DevOps engineers are in high demand because they are familiar with the DevOps practices that help reduce the time it takes to take an application from inception to launch, without reducing the overall quality of the work. In other words, DevOps engineers are highly skilled at improving the efficiency of software development.

Software Engineering Job Outlook

Software engineers have one of the healthiest job outlooks of any occupation in the world. Software engineers will always be in demand as technology keeps evolving and innovation keeps growing at high rates. Software employment will grow by 25 percent from 2021 to 2031.

- Hiring of software engineers specifically will grow at 26 percent from 2021 to 2031.
- California, Texas, Washington, New York and Virginia have the highest

employment levels of software engineers.

How to Become a Software Engineer?

There isn't one exact formula to becoming a software engineer. A degree in computer science helps you understand the basics of software engineering, but that isn't the only way to get your foot in the door. Software engineers come from all walks of life, but are often united by one major characteristic: passion. Whether it's passion for the tech industry, the technologies you work on, the code you write or the product you're building.

Software engineers typically possess the ability to communicate and act as team players. Everything needs to be communicated precisely so a line of code isn't written wrong or a design isn't installed incorrectly. One small miscommunication could result in the breakdown of an entire project. Successful software engineers constantly work on sharpening their written and verbal communication skills to be the best asset possible to their team.

What are some tangible things aspiring engineers can do to boost their skill sets? There are hundreds of bootcamps, hackathons, conferences and networking events that can help you learn valuable skills and meet industry professionals who can help you along your journey to becoming a software engineer.

These could help you to get a good grasp on what languages you would like to use (Golang, Python, etc.), what type of engineer you want to become (front-end, back-end, etc.) or even what sector you would like to work in. Gaining as much knowledge as possible about the industry and about its varying career paths will help you become a confident software engineer.

What are some other ways to get noticed in the industry? According to industry veterans, one of the best ways to get your name out there is to maintain an active portfolio on open source repositories like Github, Bitbucket and CodePen. This way, you can show off your skills, get inspired by other engineer's work and find code for your next project. The open source aspect to these sites allows important industry professionals, from engineers to hiring managers, to check your work to make sure you're the right fit for any project or company.

Software engineers are highly sought-after for a reason. They're analytical, focused, communicative, knowledgeable and passionate. They're willing to go above and beyond to do their part in creating the future of technology.

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PRINCIPLES OF LEAN SOFTWARE DEVELOPMENT

Lean software development is an iterative and customer-centric approach to developing software. It aims to maximize the efficiency of the development process, minimize waste, and deliver value to customers as quickly as possible. Lean software development focuses on creating high-quality software that meets customer needs while maintaining a lean and efficient workflow. The seven principles of Lean Software Development are:

- Eliminate waste.
- Build in quality.
- Amplify learning.
- Delay commitment.
- Fast delivery.
- Respect people.
- Optimize the whole.

1. Eliminate Waste

This principle focuses on identifying and eliminating all forms of waste in the software development process. Waste refers to any activity or resource that doesn't add value to the final product. Examples of waste include unnecessary code, redundant features and excessive documentation. Eliminating waste helps streamline the development process and optimize resource usage.

2. Build in Quality

Instead of relying solely on testing and bug fixing, lean encourages building quality into your product from the beginning. You achieve this quality through practices like continuous integration, test-driven development and pair programming. By addressing defects as soon as they arise in the process, teams can create more reliable and maintainable software.

3. Amplify Learning

Lean software development emphasizes the importance of knowledge sharing and learning within a team. This principle encourages cross-training, code reviews and documentation to ensure that knowledge isn't siloed or isolated within individual team members. Sharing knowledge improves collaboration, reduces dependencies and enhances the team's overall capabilities.

4. Delay Commitment

Delaying commitment involves making important decisions as late as possible in the development process. This principle allows teams to gather more information, reduce uncertainty and adapt to changing requirements or market conditions before making decisions. By deferring commitment, teams can consistently make more informed choices, reducing the risk of costly mistakes.

5. Fast Delivery

Lean promotes rapid and incremental delivery of software. Rather than waiting for a complete, fully featured product, teams release smaller increments or iterations to gather feedback from users. This approach allows for faster validation of ideas and provides opportunities for continuous improvement based on real-world usage.

6. Respect People

This principle emphasizes the value of individuals within the development team. It encourages open communication, trust and mutual respect among team members. By fostering a positive and collaborative work environment, teams can improve morale, foster creativity and boost productivity.

7. Optimize the Whole

Optimizing the entire value stream involves looking at the end-to-end process of software development. Instead of focusing on individual components or stages, lean encourages teams to identify bottlenecks, constraints and areas of improvement across the entire workflow. By optimizing the whole system, teams can achieve greater efficiency and deliver more value to customers.

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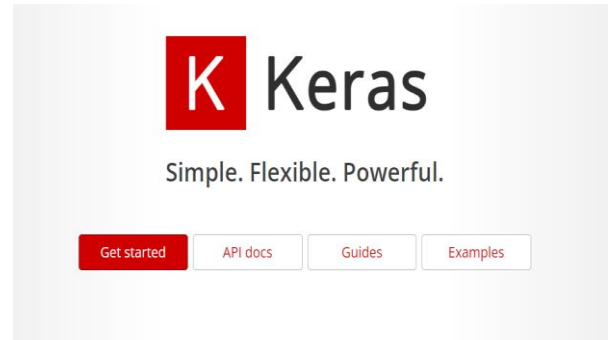
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MACHINE LEARNING TECHNOLOGIES

Following are the various machine learning technologies that are extensively used for machine learning and deep learning projects:

Keras

Designed by Google engineer François Chollet, Keras is an open-source deep-learning framework. The primary focus of Keras is to simplify the procedure of creating deep learning models and to offer fast experimentation with deep neural networks. Keras is extremely handy and easy to use for newbies in deep learning; it is considered the best framework for beginners to start with and is referred to as user-friendly. It is syntactic and has easy read and apply syntax. It is also familiar for its simplicity, modularity, fast prototyping and ease of extensibility.

In the backend, Keras supports TensorFlow, also used for model deployment. It runs optimally on both CPUs (central processing units) and GPUs (graphics processing units) and has the same Python code for both processing units. Keras can be Written in Python and deployed on other technologies including TensorFlow, Theano, Microsoft Cognitive Toolkit, R, and PlaidML. It is used

by major organizations such as CERN, Yelp, Google, Netflix and Uber.

TensorFlow
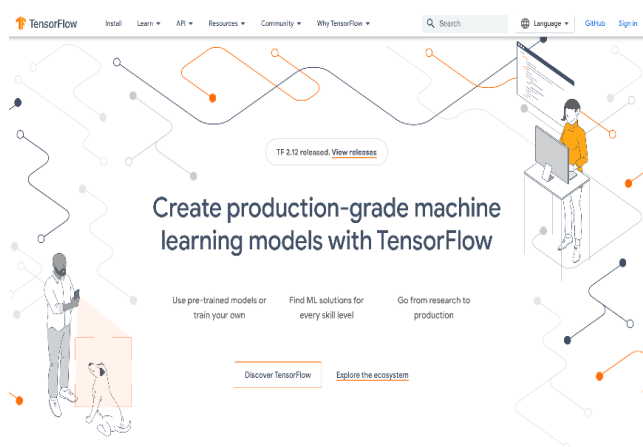
Released in 2015, Google designed TensorFlow to support its research and production goals. This open-source software is available in various languages including Python, C++, Haskell, Java, Go, Rust and JavaScript. TensorFlow is a symbolic mathematics library enabling the development of neural networks. TensorFlow, a well-maintained and immensely used framework for machine learning, is known for documentation and training support. It is suitable for dataflow programming across numerous tasks. It enables developers to build and deploy machine learning-based applications easily.

This comprehensive and flexible solution is easy to use. It can have scalable production and deployment options, provides various abstraction levels to build and train models and supports other platforms like Android. Prominent companies widely use it across industries and domains, like Intel, Twitter, Dropbox, eBay and Uber.

PyTorch

Torch, the oldest ML technology of all was released in 2002. It offers a plethora of deep learning algorithms. Written using the scripting language LUA, Torch has an underlying implementation in C. The primary characteristics of Torch consist of N-dimensional arrays, linear algebra routines and numeric optimization tasks. It offers effective GPU support and supports platforms, including iOS and Android.

The tech giants, including Google, Facebook, Google, Twitter and NVIDIA use Torch's deep learning framework. Based on Torch, PyTorch was developed by Facebook's AI Research Lab (FINE) in 2017. This open-source library in Python is mainly used for computer vision and NLP use cases. It has modules such as torchtect, torchvision and torchaudio to conduct CV and NLP tasks.

PyTorch is beginner-friendly, easy for beginners to start coding and has a Pythonic way of executing deep learning models. It is known for its simplicity, flexibility and speed. It is easy to apply without facing unnecessary complexities in the process. Additionally, it has

effective memory usage and dynamic computational graphs.

Theano

Theano, originally released in 2017, is an open-source Python library allowing us to create numerous machine-learning models. It is considered a benchmark for the industry since it is one of the oldest libraries. It enables users to define, evaluate, optimize and assess mathematical expressions, including multi-dimensional arrays and matrix-valued expressions.

Theano has inspired development for deep learning and is curated to train deep neural network algorithms. It can run on both CPU and GPU. It also can handle and transform structures into efficient code integrating with libraries such as NumPy and BLAS and has code-testing capabilities as well. Additionally, it offers symbolic differentiation, i.e., it can find the derivative of a given formula concerning a specified variable resulting in a new formula.

Caffe

Developed by Yangqing Jia, Convolutional Architecture for Fast Feature Embedding, or Caffe, is an open-source deep learning framework. Written in C++, Caffe includes a Python interface and can perform computations on both CPU and GPU. Researchers, academics, and industries extensively use it.

Caffe is known for its speed, expressiveness and modularity. It is largely used for computer vision applications rather than other use cases. The library daily can process sixty million images using only a single NVIDIA K40 GPU. Its main use case is Convolutional Neural Network. Facebook, in 2017, expanded the framework by including advanced deep learning architecture, such as Recurrent Neural Networks, in the repertoire of Caffe.

Microsoft Cognitive Toolkit (CNTK)

In 2016, Microsoft released its open-source deep learning framework called Cognitive Microsoft Toolkit which was

earlier known as CNTK. Microsoft claims its framework is competent in "training deep learning algorithms to function like the human brain." It's also said to be the fastest among its counterparts and can take machine learning projects to the next level.

The key attribute of the toolkit is that it can handle data from Python, C++, or BrainScript. It is easily integrable with Microsoft Azure, can internally operate with NumPy, and offer resource usage. Products such as Skype, Cortana, Bing, and Xbox widely use the Microsoft Cognitive Toolkit.

Scikit-learn

Scikit-learn (Sklearn), first released in 2007, is the most comprehensive library for ML in Python. It is a complete package to build and evaluate any machine learning algorithm. This open-source library is built upon other ML technologies, namely NumPy, SciPy and Matplotlib. It is a power-packed library for all machine learning solutions, including data preprocessing, data transformation, statistical modeling including regression, classification, clustering, dimensionality reduction, testing and validating data using cross-validation and metrics to evaluate the models.

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MICROSOFT INTRODUCES CLOUD-NATIVE APPLICATION PLATFORM

The open source Radius platform allows developers and operators to collaborate on delivering and managing cloud-native apps across public clouds and private infrastructure.

Microsoft has unveiled Radius, an open-source, cloud-native application platform that enables developers, IT teams, and platform engineers to collaborate on delivering and managing applications across public clouds and on-prem infrastructure. Radius was introduced October 18 by the Microsoft Azure Incubations team. The platform supports deployment of applications across private clouds and the Microsoft Azure and Amazon Web Services clouds with support for more cloud providers to come.

- A simplified and consistent development experience, with the same application definition used to deploy to any cloud provider or on premises.

- Standardizing and scaling of deployments with a clear separation of concerns between developers and

operators. Pre-definable templates automate the provisioning of infrastructure and environment configurations.

- An application graph that provides visibility into the resources and relationships that comprise an application.

Radius, accessible at radapp.io, is designed to address a situation in which applications have become more complex and managing them in the cloud has become increasingly difficult. Cloud-native applications are composed of interconnected services and deployed to multiple public clouds and private infrastructure.

While Kubernetes is a key enabler of cloud-native apps, many users build abstractions over Kubernetes, usually focused around compute, to get around its limitations, Microsoft said. But Kubernetes has no formal definition of an application, mingles application and infrastructure concepts and is complex. Developers also often find their applications need more than Kubernetes, including support for dependencies such as APIs, front ends, key-value stores, and caches, the company said.

Radius supports Kubernetes and infrastructure tools such as Terraform and Bicep, integrates with CI/CD systems such as GitHub Actions, and helps developers see

and understand all of the components of their applications. When new components are added, Radius automatically connects them, taking care of permissions, connection strings, and other issues, Microsoft said.

Further, Radius ensures that cloud infrastructure used by applications meets requirements for costs, operation and security. These requirements are captured in "recipes," which are defined by IT operators, platform engineers or security engineers. Documentation for the Radius project can be accessed from GitHub.

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ORACLE UNVEILS JAVA DEVELOPMENT EXTENSION FOR VISUAL STUDIO CODE

Oracle said that its Oracle Java Platform extension would support current JDK releases and the next upcoming JDK version.

Oracle has released the Oracle Java Platform extension for Visual Studio Code, bringing full-featured Java development

for Maven and Gradle projects to Microsoft's popular code editor.

Available in the VS Code portion of the Visual Studio Marketplace, the Oracle Java Platform extension was unveiled October 18. The extension covers the development cycle from editing to compiling to debugging and testing, Oracle said, with class-level and variable refactorings supported. The initial release offers features such as a project view, auto-completion, error highlighting and jump-to-definition capabilities, along with unit testing support for Junit.

Oracle said the increasing popularity of Visual Studio Code as a universal IDE has changed the relationship between programming languages and their IDEs. Previously, developers picked a language and then an IDE; now many developers expect that language-agnostic IDEs like VS Code will offer good support for every language that developers use. A large number of Java developers use VS Code, particularly students and developers using other languages alongside Java.

To support a programming language, a VS Code extension has a language server at its core, Oracle said. This back end operates the language's tools and communicates with the IDE using the Language Server Protocol. Oracle's Java language server is a slimmed down version of one developed for the Apache NetBeans project.

Leveraging the OpenJDK javac compiler for code editing and compilation, Oracle's language server will enable VS Code support for new JDK (Java Development Kit) features as soon as they are introduced. Oracle's VS Code extension will support current JDK releases and the next upcoming JDK version. The current version is JDK 21, released in September. Microsoft also provides Java development tools for VS Code, including an Extension Pack for Java. It features a collection of extensions for writing, testing and debugging Java applications.

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THE TECHNOLOGY YOU USE
IMPRESSES NO ONE. THE
EXPERIENCE YOU CREATE WITH IT
IS EVERYTHING

-SEAN GERETY-