100+ DevOps Essential concepts

🔄 CI/CD

#Continuous Integration (CI): The practice **of** merging all developers' working copies **to** a shared mainline several **times** a day.

#Continuous Deployment (CD): The practice **of** releasing **every** change **to** customers **through** an automated pipeline.

🏗️ Infrastructure as Code (IaC)

The process of managing **and** provisioning computer data centers through machine-readable definition files, rather than physical hardware configuration **or** interactive configuration tools.

📚 Version Control Systems

#Git: A distributed version control system **for** tracking changes **in** source code during software development.

#Subversion: A centralized version control system characterized by its reliability as a safe haven **for** valuable data.

🔬 Test Automation

#_Test Automation involves the use of special software (separate from the software being tested) to control the execution of tests and the comparison of actual outcomes with predicted outcomes. Automated testing can extend the depth and scope of tests to help improve software quality.

#_It involves automating a manual process necessary for the testing phase of the software development lifecycle. These tests can include functionality testing, performance testing, regression testing, and more.

#_The goal of test automation is to increase efficiency, effectiveness, and coverage of software testing with the least amount of human intervention. It allows for the repeated running of these tests, which would be otherwise difficult to perform manually.

#_Test automation is a critical part of Continuous Integration and Continuous Deployment (CI/CD) practices, as it enables frequent and consistent testing to catch issues as early as possible.

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⚙️ Configuration Management

The process of systematically handling changes to a system in a way that it maintains integrity over time.

📦 Containerization

#Docker: An open-source platform that automates the deployment, scaling, **and** management of applications.

#Kubernetes: An open-source system **for** automating deployment, scaling, **and** management of containerized applications.

👀 Monitoring and Logging

The process **of** checking **the** status **or** progress **of** something over time **and** maintaining **an** ordered record **of** events.

❇️ Microservices

An architectural style **that** structures an application **as** a collection **of** services **that** are highly maintainable **and** testable.

📊 DevOps Metrics

Key Performance Indicators (KPIs) used to evaluate **the** effectiveness **of a** DevOps team, like deployment frequency **or** mean time to recovery.

☁️ Cloud Computing

#AWS: Amazon's cloud computing platform **that** provides a mix **of** infrastructure **as** a service (IaaS), platform **as** a service (PaaS), **and** packaged software **as** a service (SaaS) offerings.

#Azure: Microsoft's public cloud computing platform.

#GCP: Google's suite **of** cloud computing services **that** runs **on the** same infrastructure **that** Google uses internally **for its end**-user products.

🔒 Security in DevOps (DevSecOps)

The philosophy **of** integrating security practices **within the** DevOps process.

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🗃️ GitOps

A way **of** implementing Continuous Deployment **for** cloud native applications, **using** Git **as a** 'single source of truth'.

🌍 Declarative System

In **a** declarative **system, the** desired **system** state is described **in a** file (**or** set **of** files), **and it**'s the system's responsibility to achieve this state. This contrasts **with an** imperative **system**, where specific commands are executed to reach **the** desired state. GitOps relies **on declarative specifications to manage system configurations**.

🔄 Convergence

In the context of GitOps, convergence refers **to** the process of the system moving towards the desired state, as described **in** the Git repository. When changes are made **to** the repository, automated processes reconcile the current system state with the desired state.

🔁 Reconciliation Loops

In GitOps, reconciliation loops are the continuous cycles of checking the current system state **and** applying changes **to** converge towards the desired state. These are often managed by Kubernetes operators **or** controllers.

💼 Configuration Drift

Configuration drift refers **to** the phenomenon where environments become inconsistent over time due **to** manual changes **or** updates. GitOps helps **to** avoid this by ensuring all changes are made **in** the Git repository **and** automatically applied **to** the system.

💻 Infrastructure as Code (IaC)

While this isn't exclusive **to** GitOps, IaC **is** a key **component of** the GitOps approach. Infrastructure as Code involves managing **and** provisioning computing resources through machine-readable definition files, rather than manual hardware **configuration or** interactive **configuration** tools.

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🔑 Git-based Change Management

In GitOps, all changes **to** the system are made through the Git repository. This provides a clear audit trail of all changes, supports easy rollbacks, **and** ensures all changes are reviewed **and** approved before being applied **to** the system.

🚀 Canary Deployments

Canary deployments involve releasing new versions of a service **to** a small subset of users before rolling it out **to** all users. This approach, often used **in** conjunction with GitOps, allows teams **to** test **and** monitor the new version **in** a live environment with real users, reducing the risk of a full-scale deployment.

🚫💻 Serverless Architecture

A software design pattern where applications are hosted by a third-party service, eliminating the need **for** server software **and** hardware management.

🏃 Agile Methodology

An approach **to** project management, used **in** software development, **that** helps teams respond **to the** unpredictability **of** building software **through** incremental, iterative work cadences, known **as** sprints.

👨‍💼 IT Operations

The **set of** all processes **and** services that **are both** provisioned **by** an IT staff **to** their internal **or external** clients **and** used **by** themselves.

📜 Scripting & Automation

The ability **to** write scripts **in** languages like Bash **and** Python **to** automate repetitive tasks.

🔨 Build Tools

Tools **that** automate **the** creation **of** executable applications **from** source code (e.g., Maven, Gradle, **and** Ant).

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🌐 Networking

Understanding **the** basics **of** networking is crucial **for** creating **and** managing applications **in the** Cloud.

⏱ Performance Testing

Testing conducted **to** determine how a system performs **in** terms of responsiveness **and** stability under a particular workload.

🔁 Load Balancing

The process of distributing network traffic across multiple servers **to** ensure no single server bears too much demand.

💻 Virtualization

The process of creating a virtual version of something, including virtual computer hardware systems, storage devices, **and** computer network resources.

🌍 Web Services

Services used by the network **to** send **and** receive data (e.g., REST **and** SOAP).

💾 Database Management

Understanding databases, their management, and their interaction with applications is **a** key skill (e.g., MySQL, PostgreSQL, MongoDB).

📈 Scalability

The capability of a system **to** grow **and** manage increased demand.

🔥 Disaster Recovery

The area of security planning that deals with protecting an organization **from** the effects of significant negative events.

🛡 Incident Management

The process to identify, analyze, **and** correct hazards to prevent **a** future re-occurrence.

🚦 Traffic Management

The process of managing the incoming **and** outgoing network traffic.

⚖️ Capacity Planning

The process **of** determining **the** production capacity needed **by an** organization to meet changing demands **for** its products.

📝 Documentation

Creating high-quality documentation is **a** key skill **for any** DevOps engineer.

🧪 Chaos Engineering

The discipline **of** experimenting **on** a system **to** build confidence **in the** system's capability **to** withstand turbulent conditions **in** production.

🔐 Access Management

The process of granting authorized users the right **to** use a service, **while** preventing access **to** non-authorized users.

🔗 API Management

The process **of** creating, publishing, documenting, **and** overseeing APIs **in a** secure **and** scalable environment.

🧱 Architecture Design

The practice **of** designing **the** overall architecture **of a** software **system**.

🏷️ Tagging Strategy

A strategy **for** tagging resources **in** cloud environments **to** keep track **of** ownership **and** costs.

🔍 Observability

The ability **to** infer the internal states of a system based on the outputs it produces.

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📦 Artifact Repository

A storage space **for** binary and source **code** artifacts (e.g., JFrog Artifactory).

🧰 Toolchain Management

The process **of** selecting, integrating, **and** managing **the** right set **of** tools to support collaborative development, build, test, **and** release.

🔢 On-call Duty

The responsibility **of** engineers to be available to troubleshoot **and** resolve issues that arise **in a** production environment.

🎛️ Feature Toggles

A technique that allows teams **to** modify system behavior without changing code.

📑 License Management

The process **of** managing **and** optimizing **the** purchase, deployment, maintenance, utilization, **and** disposal **of** software applications **within an** organization.

🐳 Docker Images

Docker images are lightweight, stand-alone, executable packages **that** include everything needed **to** run a piece **of** software.

🔄 Kubernetes Pods

A pod **is** the smallest **and** simplest **unit in** the Kubernetes **object** model that you create **or** deploy.

🚀 Deployment Strategies

Techniques **for** updating applications, **such as** rolling updates, blue/green deployments, **or** canary releases.

⚙️ YAML, JSON

These are **data** serialization languages often used **for** configuration files and in applications **where data is** being stored or transmitted.

🖥️ Virtual Machines

A software emulation of a physical computer, running an operating system and applications just like a physical computer.

💿 Disk Imaging

The process of copying the contents of a computer hard disk into a data file or disk image.

📚 Knowledge Sharing

A key aspect of DevOps culture, involving the sharing of knowledge and best practices across the organization.

🌐 Cloud Services Models

Different models of cloud services, including IaaS, PaaS, and SaaS.

💤 Idle Process Management

The management and removal of idle processes to free up resources.

🕸️ Service Mesh

A dedicated infrastructure layer for handling service-to-service communication, often used in microservices architecture.

💼 Project Management Tools

Tools used for project management, like Jira, Trello, or Asana.

📡 Proxy Servers

Servers that act as intermediaries for requests from clients seeking resources from other servers.

🌉 Cloud Migration

The process of moving data, applications, and other business elements from an organization's onsite computers to the cloud.

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🌉 Hybrid Cloud

A cloud computing environment **that** uses a mix **of on**-premises, private cloud, **and third**-party, public cloud services **with** orchestration **between the** two platforms.

🕸️ Helm in Kubernetes

Helm **is** a package manager **for** Kubernetes **that** allows developers **and** operators **to** more easily package, configure, **and** deploy applications **and** services **onto** Kubernetes clusters.

🔐 Secure Sockets Layer (SSL)

A standard security technology **for** establishing an encrypted link between a server **and** a client.

👥 User Experience (UX)

The process **of** creating products **that** provide meaningful **and** relevant experiences **to** users.

🔁 Reverse Proxy

A type of proxy server that retrieves resources on behalf of a client **from** one **or** more servers.

👾 Anomaly Detection

The identification **of** rare **items**, events, **or** observations which raise suspicions **by** differing significantly from **the** majority **of the** data.

🗺️ Site Reliability Engineering (SRE)

#_ A discipline **that** incorporates aspects **of** software engineering **and** applies them **to** infrastructure **and** operations problems. The main goals are **to** create scalable **and** highly reliable software systems. SRE **is** a role **that** was originated **at** Google **to** bridge **the** gap **between** development **and** operations **by** applying a software engineering mindset **to** system administration topics. SREs use software **as** a tool **to** manage systems, solve problems, **and** automate operations tasks.

#_ The core principle **of** SRE **is to** treat operations **as if it**'s a software problem. They define a **set of** work **that** includes automation, continuous integration/delivery, ensuring reliability **and** uptime, **and** enforcing

performance. They work closely **with** product teams **to** advise **on the** operability **of** systems, ensure they are prepared **for** new releases **and** can scale **to the** demands **of the** business.

🔄 Autoscaling

A **cloud** computing feature that automatically **adds or** removes compute resources depending upon actual usage.

🔑 SSH (Secure Shell)

A cryptographic network protocol **for** operating network services securely over an unsecured network.

🧪 Test-Driven Development (TDD)

A software development process **that** relies **on the** repetition **of** a very short development cycle: requirements are turned **into** very specific test cases, **then the** code **is** improved so **that the** tests pass.

💡 Problem Solving

The process **of** finding solutions to difficult **or** complex issues.

💼 IT Service Management (ITSM)

The activities **that** are performed **by** an organization **to** design, plan, deliver, operate **and** control information technology (IT) services offered **to** customers.

👀 Peer Reviews

The evaluation **of** work **by** one **or** more people **with** similar competencies who are **not the** people who produced **the** work.

📊 Data Analysis

The process **of** inspecting, cleansing, transforming, **and** modeling data **with the** goal **of** discovering useful information, informing conclusions, **and** supporting decision-making.

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🖌 UI Design

The process of making interfaces in software or computerized devices with a focus on looks or style.

🌐 Content Delivery Network (CDN)

A geographically distributed network of proxy servers and their data centers.

👁 Visual Regression Testing

A form of regression testing that involves checking a system's graphical user interface (GUI) against previous versions.

🔄 Canary Deployment

A pattern for rolling out releases to a subset of users or servers.

✉ Messaging Systems

Communication systems for exchanging messages between distributed systems (e.g., RabbitMQ, Apache Kafka).

🔐 OAuth

An open standard for access delegation, commonly used as a way for Internet users to grant websites or applications access to their information on other websites but without giving them the passwords.

👤 Identity and Access Management (IAM)

A framework of business processes, policies and technologies that facilitates the management of electronic or digital identities.

🗄 NoSQL Databases

Database systems designed to handle large volumes of data that do not fit the traditional relational model (e.g., MongoDB, Cassandra).

🏝 Serverless Functions

Also known as Functions as a Service (FaaS), these are a type of cloud service that allows you to execute specific functions in response to events (e.g., AWS Lambda).

🔷 Hexagonal Architecture

Also known **as** Ports **and** Adapters, this **is** a design pattern **that** favors **the** separation **of** concerns **and** loose coupling.

🔁 ETL (Extract, Transform, Load)

A data warehousing process that uses batch processing **to** help business users analyze **and** report on data relevant **to** their business focus.

📚 Data Warehousing

The process of constructing **and** using a data warehouse, which is a system used **for** reporting **and** data analysis.

📊 Big Data

Extremely large data sets that may **be** analyzed computationally to **reveal** patterns, trends, **and** associations, especially relating to human **behavior and** interactions.

⛅ Edge Computing

A distributed computing paradigm **that** brings computation **and** data storage closer **to the** location **where it is** needed, **to** improve response **times and** save bandwidth.

🔍 Log Analysis

The process **of** reviewing **and** evaluating log files from various sources to identify trends **or** potential security threats.

🎛️ Dashboarding

The process **of** creating **a** visual representation **of** data, which can be used to analyze **and** make decisions.

🔑 Key Management

The administrative control **of** creating, distributing, **using**, storing, **and** replacing cryptographic keys **in a** cryptosystem.

🔍 A/B Testing

A randomized experiment **with** two variants, A **and** B, which are **the** control **and** variation **in the** controlled experiment.

🔒 HTTPS (HTTP Secure)

An extension **of the** Hypertext Transfer Protocol. It **is** used **for** secure communication **over** a computer network, **and is** widely used **on the** Internet.

🌐 Web Application Firewall (WAF)

A firewall that monitors, filters, **or** blocks data packets as they travel **to and from** a web application.

🖊️ Single Sign-On (SSO)

An authentication scheme that allows a user **to** log **in** with a single ID **and** password **to** any of several related, yet independent, software systems.

🔁 Blue-Green Deployment

A release management strategy **that** reduces downtime **and** risk **by** running two identical production environments called Blue **and** Green.

🌫️ Fog Computing

A decentralized computing infrastructure **in** which data, compute, storage, **and** applications are distributed **in the** most logical, efficient place between **the** data source **and the** cloud.

⛓️ Blockchain

#_ Blockchain is a type of distributed ledger technology that maintains a growing list of records, called blocks, that are linked using cryptography. Each block contains a cryptographic hash of the previous block, a timestamp, **and** transaction data.

#_ The design of a blockchain is inherently resistant **to** data modification. Once recorded, the data **in** any given block cannot be altered retroactively without alteration of all subsequent blocks. This makes blockchain technology suitable **for** the recording of events, medical records, identity management, transaction processing, **and** documenting provenance, among other things.

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🚀 Progressive Delivery

A methodology **that** focuses **on** delivering new functionality gradually **to** prevent issues **and** minimize risk.

📝 RFC (Request for Comments)

A type of publication **from** the technology community that describes methods, behaviors, research, **or** innovations applicable **to** the working of the Internet **and** Internet-connected systems.

🔗 REST (Representational State Transfer)

An architectural style **for** designing networked applications, often used **in** web services development.

🔑 Secrets Management

The process **of** managing digital authentication credentials like passwords, keys, **and** tokens.

🌤️ Cloud-native Technologies

Technologies that empower organizations **to** build **and** run scalable applications **in** modern, **dynamic** environments such **as public**, **private**, **and** hybrid clouds.

⚠️ Vulnerability Scanning

The process of inspecting potential points of exploit on a computer **or** network **to** identify security holes.

🔐 HSM (Hardware Security Module)

A physical computing device that safeguards **and** manages digital keys, performs encryption **and** decryption functions **for** digital signatures, strong authentication **and** other cryptographic functions.

🔗 Microservices

An architectural style **that** structures an application **as** a collection **of** loosely coupled services, which implement business capabilities.

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🔑 JWT (JSON Web Tokens)

An open standard (RFC 7519) that defines **a** compact and self-contained way **for** securely transmitting information between parties as **a** JSON **object**.

🔬 Benchmarking

The practice **of** comparing business processes **and** performance metrics **to** industry bests **and** best practices **from** other companies.

🌉 Cross-Functional Collaboration

Collaboration between different functional areas **within an** organization to achieve common goals.

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