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.

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🚦 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.

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🖥️ 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

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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).

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💠 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.

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🔍 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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