CoGrammar

Welcome to this session: Advanced Deployment Techniques

The session will start shortly...

Questions? Drop them in the chat.
We'll have dedicated moderators answering questions.

Safeguarding & Welfare

We are committed to all our students and staff feeling safe and happy; we want to make sure there is always someone you can turn to if you are worried about anything.

If you are feeling upset or unsafe, are worried about a friend, student or family member, or you feel like something isn't right, speak to our safeguarding team:

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- The use of disrespectful language is prohibited in the questions, this is a supportive, learning environment for all - please engage accordingly. **(Fundamental British Values: Mutual Respect and Tolerance)**
- No question is daft or silly - **ask them!**
- There are **Q&A sessions** midway and at the end of the session, should you wish to ask any follow-up questions. Moderators are going to be answering questions as the session progresses as well.
- If you have any questions outside of this lecture, or that are not answered during this lecture, please do submit these for upcoming Academic Sessions. You can submit these questions here: **Questions**

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- For all **non-academic questions**, please submit a query: ***www.hyperiondev.com/support***
- **Report a safeguarding incident: *www.hyperiondev.com/safeguardreporting***
- We would love your feedback on lectures: *Feedback on Lectures*
- If you are hearing impaired, please kindly use your computer's function through Google chrome to enable captions.

Which type of scaling involves adding more servers to distribute traffic?

A) Vertical Scaling

B) Horizontal Scaling

C) Static Scaling

D) Manual Scaling

Which service have you used or heard about for load balancing?

A) Nginx

B) AWS Elastic Load Balancer

C) Google Cloud Load Balancer

D) I haven’t used any load balancers yet

Learning Outcomes

- Explain the importance of CI/CD pipelines, containerization, and load balancing in modern web deployment.
- *Implement a CI/CD pipeline using GitHub Actions or Jenkins to automate the deployment process.*
- *Compare different deployment strategies (e.g., blue-green, canary, rolling) and evaluate their impact on system performance and reliability.*
- Assess the security and scalability implications of various deployment methods, including containerized and serverless architectures.

Advanced Deployment Techniques

- **Brief recap of basic deployment concepts** (e.g., using Netlify, Vercel, or basic server hosting).
- **The need for advanced deployment techniques in real-world applications:** scalability, security, performance, and CI/CD.
- **Overview of key topics:**
  - CI/CD Pipelines
  - Docker & Containerization
  - Load Balancing & Scaling
  - Serverless Deployment
  - Monitoring & Logging

CI/CD Pipelines

Definition:

- Continuous Integration (CI): Automatically testing and integrating code.
- Continuous Deployment (CD): Automatically deploying changes after passing tests.

Popular CI/CD Tools:

- GitHub Actions – Integrates with GitHub for automated builds and deployments.
- Jenkins – Open-source automation server.
- GitLab CI/CD – Native GitLab solution.

Example Workflow

- Code is pushed to GitHub → GitHub Actions triggers.
- Automated tests run (unit tests, integration tests).
- Build process executes (e.g., bundling, compiling assets).
- Deployment script runs to deploy to a server or cloud

Docker and Containerization

Why Use Containers?

- Ensures consistency across different environments (local, staging, production).
- Reduces dependency conflicts.
- Efficient resource utilization compared to virtual machines.

Key Concepts:

- Dockerfile: Instructions for building a container image.
- Docker Compose: Managing multi-container applications.
- Container Orchestration (Kubernetes): Automating scaling and deployment of containers.

Load Balancing and Scaling

Why Load Balancing?

- Distributes traffic among multiple servers to prevent downtime.
- Improves application performance and availability.

Types of Load Balancers:

- DNS Load Balancing: Routes traffic to different IPs.
- Application Load Balancer (Layer 7): Routes based on URL paths, headers, etc.
- Network Load Balancer (Layer 4): Routes based on IP and TCP connections.

Scaling Strategies

- **Vertical Scaling:** Adding more power (CPU, RAM) to a single server.
- **Horizontal Scaling:** Adding more servers to handle load.
- **Auto-scaling** with AWS, Google Cloud, or Azure

Serverless Deployment

- **What is Serverless?**
  - No need to manage servers manually.
  - Pay-per-use model.
  - Scales automatically.
- **Popular Serverless Providers:**
  - AWS Lambda (with API Gateway)
  - Google Cloud Functions
  - Azure Functions
  - Firebase Functions

Monitoring & Logging

Why is Monitoring Important?

- Detect issues before they affect users.
- Improve system performance.

Monitoring and Logging

Popular Tools:

- Prometheus & Grafana (for real-time monitoring).
- ELK Stack (Elasticsearch, Logstash, Kibana) (for logging and analysis).
- AWS CloudWatch / Google Stackdriver (for cloud-based monitoring).

What is the best approach to securely store environment variables in a CI/CD pipeline?

A. Hardcode them in the pipeline script for consistency
B. Store them in a .env file and commit it to the repo
C. Use a secrets manager (e.g., AWS Secrets Manager, HashiCorp Vault)
D. Encrypt them using Base64 and store in a public repo

Which of the following is a key limitation of serverless computing?

A. It requires manual server scaling
B. It does not support API integrations
C. Cold starts can increase response times
D. It cannot process real-time data

Questions and Answers

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Thank you for attending

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