Cloud Engineering Learning Syllabus

Week 1–2: Cloud Computing Fundamentals

- **Topics to Cover**:
    - Overview of Cloud Computing: IaaS, PaaS, SaaS.
    - Major Cloud Providers: AWS, Azure, GCP (focus on AWS).
    - AWS Core Services: EC2, S3, RDS, IAM.
- **Tools/Resources**:
    - AWS Free Tier account.
    - AWS documentation and tutorials.
    - Courses: *AWS Cloud Practitioner Essentials* (AWS Training).
- **Assignments**:
    - Set up an AWS account.
    - Launch and terminate an EC2 instance.
    - Store and retrieve files using S3.

Week 3–4: Networking and Security

- **Topics to Cover**:
    - Networking Basics: VPC, subnets, routing, NAT gateways.
    - Security Groups, IAM Roles, Policies.
    - Best practices for securing cloud environments.
- **Tools/Resources**:
    - AWS VPC Wizard.
    - Videos: *AWS Networking Fundamentals*.
- **Assignments**:
    - Create a VPC with public and private subnets.
    - Configure IAM roles for EC2 and restrict access.

Week 5–6: Infrastructure as Code (IaC)

- **Topics to Cover**:
    - Introduction to Terraform.
    - Writing Terraform configurations for AWS resources.
    - Terraform State and Modules.
- **Tools/Resources**:
    - Terraform CLI.

- ○ Tutorial: *HashiCorp Learn Terraform for AWS*.
- **Assignments**:
  - ○ Use Terraform to create an EC2 instance and S3 bucket.
  - ○ Build a reusable module for VPC creation.

Week 7: Containerization with Docker

- **Topics to Cover**:
  - ○ Basics of Docker and containerization.
  - ○ Creating Dockerfiles and managing containers.
  - ○ Docker Compose.
- **Tools/Resources**:
  - ○ Docker Desktop.
  - ○ Tutorials: *Docker Getting Started Guide*.
- **Assignments**:
  - ○ Containerize a simple React App.
  - ○ Push a container image to Docker Hub.

Week 8–9: Application Deployment

- **Topics to Cover**:
  - ○ AWS Elastic Beanstalk for application hosting.
  - ○ Deploying Dockerized applications to AWS ECS/Fargate.
- **Tools/Resources**:
  - ○ AWS Elastic Beanstalk.
  - ○ AWS ECS/Fargate.
- **Assignments**:
  - ○ Deploy the React App using Elastic Beanstalk.
  - ○ Deploy a containerized application to ECS.

Week 10: CI/CD Pipelines

- **Topics to Cover**:
  - ○ Introduction to Continuous Integration/Deployment.
  - ○ GitHub Actions for CI/CD.
  - ○ AWS CodePipeline and CodeBuild.
- **Tools/Resources**:
  - ○ GitHub.
  - ○ AWS CodePipeline documentation.

- **Assignments**:
  - Create a CI/CD pipeline for the React App.
  - Automate application deployment to AWS.

Week 11: Advanced Topics

- **Topics to Cover**:
  - Monitoring and Logging: AWS CloudWatch.
  - Serverless Computing: AWS Lambda, API Gateway.
- **Tools/Resources**:
  - AWS CloudWatch.
  - AWS Lambda documentation.
- **Assignments**:
  - Set up monitoring and alerts for your deployed application.
  - Create a serverless function with AWS Lambda.

Week 12: Portfolio and Job Preparation

- **Topics to Cover**:
  - Documenting projects for your portfolio.
  - Cloud certification preparation (e.g., AWS Solutions Architect).
  - Job search strategies and interview prep.
- **Tools/Resources**:
  - GitHub.
  - Mock interviews and resume reviews.
- **Assignments**:
  - Create a GitHub repository with all projects.
  - Write detailed READMEs for each project.
  - Apply for internships or entry-level cloud engineering roles.
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