Internet2 Course Outline

Updated and approved on 2022-10-18

Two-week intensive program: 1 week synchronous training (led by Tech Data), 1 week deep-dive (led by Internet2)

Multi-cloud Synchronous training will cover the following topics:

Total ~30 hours of synchronous materials. 5 days of training, 7 hours/day

# Updated Outline

* **Introduction to the cloud (1 hour)**
  + Cloud case studies
  + Patterns of moving to cloud (lift and shift vs native architectures)
  + Objectively evaluating cloud platforms
  + Cloud best practices
  + Labs:
    - Get access to various cloud systems
    - Tour of Qwiklabs for AWS and Google Cloud
    - Azure Labs introduction
* **IAM user management (4 hour)**
  + Users, groups and roles
  + Cloud security principles
  + How to tie in with enterprise authentication systems
  + Security case studies
  + Best practices
  + Labs
    - AWS: Introduction to AWS Identity and Access Management (IAM)
    - GCP: Cloud IAM: Qwik Start
    - Azure: ID management
    - Introduction to audits
* **Cloud storage and databases (3 hours)**
  + Introduction to Cloud storage fundamentals
  + File / blob storage
  + SQL datastores
  + NoSQL datastores
  + Various tiers of cloud storage
  + Getting data into the Cloud
  + Performance and cost considerations
  + Case studies
  + Best practices
  + Labs
    - File / blob storage
      * AWS: S3 storage
      * GCP: Google storage
      * Azure: Azure File storage
    - SQL datastores
      * AWS: RDS
      * GCP: MySQL
      * Azure: SQL Server
    - NoSQL datastores
      * AWS: Dynamo DB
      * GCP: Bigtable / Spanner
      * Azure: Cosmos
* **Networking and Data Movement (2 hours)**
  + Networking fundamentals: VPC, firewall rules
  + Setting up a VPC
  + Setting firewall rules for a system
  + Case studies
  + Best practices
  + Labs
    - Virtual Private Cloud (VPC) setup on AWS / GCP / Azure
    - Setting up firewall rules on AWS / GCP / Azure
* **Containerization (4 hours)**
  + Docker
  + Kubernetes
  + Deploying containers
  + Managing container lifecycle
  + Case studies
  + Best practices
  + Labs:
    - Exploring container images
    - Building custom container images
    - Deploying containers on AWS / GCP / Azure
    - Kubernetes on AWS / GCP / Azure
    - Deploy a web service using Kubernetes on a Cloud
* **Computing, elasticity, and scaling (~~6~~ 4 hours) \*NOTE shorten this to 4 hours**
  + Virtual machines, images, snapshots
  + Serverless compute
  + Load balancers
  + Auto-scaling with load balancing
  + Load testing tools
  + Case studies
  + Best practices
  + Labs
    - Virtual machines on AWS / GCP / Azure
    - Serverless compute on AWS / GCP / Azure
* **Cost management (4 hours)**
  + Deep dive into cost models of clouds
  + Exploring billing dashboards
  + Case studies
  + Best practices
  + Labs
    - Cost estimators on AWS / GCP / Azure
    - BIlling dashboards on various cloud systems
* **AI, Deep Learning, Machine Learning (3 hours)**
  + Quick intro to AI / ML / DL
  + Jupyter notebook environments
  + Cloud native ML systems
  + Case studies
  + Best practices
  + Labs
    - ML systems on AWS / GCP / Azure
    - Doing end to end ML on a cloud system
* **Multi-cloud Infrastructure-as-code (IAS) (3 hours)**
  + IAS tools overview (Terraform ..etc) \*\*
  + Wrappers, generating config files
  + Case studies
  + Best practices
  + Labs
    - Design a current production system in the cloud (see below)
* **Mini Project (Time Permitting) ( 3 - 4 hrs)**
  + Attendees to work as groups to complete an end-to-end project
  + And demo their work to the class
  + Ideas - TBD