Presidential Initiative for Artificial Intelligence and Computing (PIAIC)

https://www.piaic.org

Cloud Native and Mobile Web Specialist Program

Course Syllabus

Quarter IV: Cloud-401 Server Development and Deployment using Amazon Web Services (AWS)

Version 1.0.0 - 2020 (12 Weeks)

Teaching Team: Hira Khan, Aamir Pinger, Daniyal Nagori, Yusuf Qutubudin, Abdullah Mustaqeem, Ameen Alam, Faraz Jahangir, Irfan Ali, Muhammad Hanzala, Muhammad Osama, Muneeb Khan, Najam Shehzad, Osama Khan, and Zarak Mughal

Class Duration: 3 hours

Course Description:
The course is designed to teach you how to implement best practices to develop cloud-based applications with Express/Node.js using AWS architecture and pass the latest AWS Developer Certification Exam. We will learn to build secure, reliable cloud-based applications using AWS technology.

Textbooks:
1. Express in Action: Writing, building, and testing Node.js applications by Evan Hahn
   https://www.amazon.com/Express-Action-Writing-building-applications/dp/1617292427/ref=sr_1_1
2. AWS Certified Developer Official Study Guide: Associate (DVA-C01) Exam by Nick Alteen, Jennifer Fisher, Casey Gerena, Wes Gruver, Asim Jalis, Heiwad Osman, Marife Pagan, Santosh Patlolla, Michael Roth
   https://www.amazon.com/Certified-Developer-Official-Study-Guide/dp/1119508193/ref=sr_1_1

PIAIC Announcements Facebook Group: https://www.facebook.com/groups/piaic/

Course Facebook Group: https://www.facebook.com/groups/mobilecloudapps/

Portal for online and onsite students:
https://portal.piaic.org/

Ask Questions:
https://ask.piaic.org/

Chat on Telegram:
Channel Name: PIAIC-Web
https://t.me/piaic_web

Grading:
Students will be graded based on Percentile
https://en.wikipedia.org/wiki/Percentile

A-Grade: 78 - 99 Percentile
B-Grade: 41 - 77 Percentile
C-Grade: 23 - 40 Percentile
D-Grade: 1 - 22 Percentile
F-Grade: Anyone who doesn't appear in two or more exams

Note: Anyone who receives an F-grade will be removed from the program. Students who receive a D-Grade will be put on probation, and be required to earn a grade of C or above in the next quarter, to remain in the program. Anyone absent from an exam will be deemed to have received a score of zero.

Important Note:
If a PIAIC candidate doesn't appear in a Quiz at the scheduled time announced by management 10% score will be deducted from the test score for every week of delay.

Course Outline:

1. **Writing Express/Node.js Applications**

2. **Amazon Elastic Compute Cloud – EC2**
   Instances
   Security Group
   SSH
   SSH troubleshooting
   Instance Connect
   Public vs Private IP's
   User Data
   Meta Data
   AMI
   EBS
   EFS
   ELB
   Elastic Load Balancer (SSL Certificate)
   ASG (AutoScaling)
   Elastic Network Interfaces

3. **Databases – RDS**
   Read Replicas
   Multi-Availability Zone
   Encryption and Security
   Elastic Cache and Elastic Cache Strategies

4. **Route 53**
   EC2 with Route 53
   Route 53 CName
   Route 53 TTL
   Route 53 Alias
   Routing Policy (Simple / Weighted / Latency / Failover / Geolocation / Multivalue)
   Route 53 Health Check

5. **VPC**
   VPC
   Subnets
   IGW
   NAT

Logs
Three-tier architecture

6. **S3**
   Buckets and Objects
   Versioning
   Multi-part upload
   MFA Delete
   Encryption
   Bucket Policy
   Access Control List
   Security
   Signed URL
   S3 Static website
   CORS
   Storage Classes
   Persistence Optimization
   S3 Glacier
   Life Cycle

7. **VPC**
   VPC
   Subnets
   IGW
   NAT
   Logs
   Three-tier architecture

8. **AWS CLI**

9. **Elastic Beanstalk**
   Environments
   Deployment Mode
   Life Cycle Policy
   Application Versions
   Beanstalk Extensions

10. **CI/CD**
    Code Commit
    Code Pipeline
    Code Build
    Code Deploy
    Code star

11. **Cloud Formation**
    Stacks
    Update/Delete Stack
    Resources
    Parameters
    Mappings
    Outputs
    Conditions
    Intrinsic functions
    Rollback

12. **Monitoring**
    CloudWatch metrics
    CloudWatch alarms
    CloudWatch logs
    CloudWatch events
    X-ray
    Cloud trail

13. **SQS**
    Standard Queue
    Delay Queue
    Dead Letter Queue
    Long polling
    FIFO queue
    Deduplication

14. **SNS**
    PUB/SUB

15. **Kinesis**
    Shards

16. **Lambda**
    Functions
    Triggers
    Concurrency

17. **API Gateway**
    Gateway stages
    Deployment
    Configuration
    API Gateway Integration Types & Mappings
    Gateway Caching
    API Gateway Monitoring / Caching/logging and Tracing
    API Gateway CORS
    API Gateway Authentication and Authorization

18. **DynamoDB**
    Primary Key
    Sort Key
    WCU and RCU
    Indexes
    Concurrency and Conditions
    DAX
    Streams
    TTL

19. **SAM**
    SAM policies

20. **ECS**
    Docker
    ECS task
    ECS service
    ECS service with load balancer
    ECS cluster
    Fargate

21. **KMS**
    Keys / Encryption / Decryption
    Data Key and Envelop Encryption

22. **SSM**
    Parameter store
    Secrets Manager
    Cloud Watch logs Encryption

23. **IAM**
    Users
    Groups
    Roles
    Policies

24. **STS**
    Decode Error Message
    Assume Role
    Federated Identities

25. **Cloud Front**
    Cloudfront Security
    Cloudfront Signed URL / Cookies