AN INTERNSHIP FINAL REPORT ON

AWS CLOUD VIRTUAL INTERNSHIP

SUBMITTED TO THE SAVITRIBAI PHULE PUNE UNIVERSITY, PUNE

BACHELOR OF ENGINEERING (COMPUTER ENGINEERING)

SUBMITTED BY

YOGESH AMAR KANWADE Roll No. TC229

"" येथे बहुतांचे हित ""

DEPARTMENT OF COMPUTER ENGINEERING

MARATHWADA MITRA MANDAL'S COLLEGE OF ENGINEERING,

KARVENAGAR, PUNE-411052

SAVITRIBAI PHULE PUNE UNIVERSITY

A. Y. 2022-23 SEM-II

CERTIFICATE

This is to certify that the project report entitles

"AWS CLOUD VIRTUAL INTERNSHIP"

Submitted by

Yogesh Amar Kanwade   Roll No: TC229

is a bonafide student of this institute and the work has been carried out by him under the supervision of **Prof. Rupali Dalvi** and it is approved for the fulfillment of TE Internship, the requirement of Savitribai Phule Pune University.

(Prof. Rupali Dalvi)   (**Dr. K. S. Thakre**)
College Mentor   Head,
Department of Computer Engineering   Department of Computer Engineering

(Dr. V. N. Gohokar)
Principal,
Marathwada Mitra Mandal's College of Engineering, Karvenagar, Pune – 411052

Place: Pune
Date: 19-05-2023

ABSTRACT

The internship involved a comprehensive exploration of AWS's core services, such as Amazon Elastic Compute Cloud (EC2), Amazon Simple Storage Service (S3), Amazon Relational Database Service (RDS), and Amazon Virtual Private Cloud (VPC). Through practical exercises and projects, I developed a solid understanding of these services and their functionalities, including provisioning virtual servers, deploying scalable storage solutions, managing relational databases, and creating isolated network environments. Additionally, the intern actively participated in designing and implementing cloud architectures using AWS services. This involved utilizing AWS CloudFormation to create infrastructure as code, setting up auto-scaling policies to ensure optimal resource utilization, and configuring load balancers to distribute traffic efficiently. Furthermore, I gained experience in securing AWS resources through the implementation of appropriate access controls, encryption mechanisms, and monitoring solutions using AWS Identity and Access Management (IAM) and Amazon CloudWatch. During the internship, I had the opportunity to work on a real-world project. The internship provided a valuable learning experience in cloud computing and AWS, enabling me to acquire essential skills and knowledge in managing and deploying applications on a cloud platform. Overall, the internship in the cloud computing domain, with a focus on AWS, served as a significant stepping stone in my professional growth, equipping me with practical skills and insights into the cloud computing industry. The experience gained during the internship will undoubtedly contribute to my future endeavors in the field of cloud computing and enable me to make informed decisions when leveraging AWS services for building scalable and secure applications.

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1. INTRODUCTION

In today's rapidly evolving digital landscape, businesses are seeking innovative solutions to enhance their operational efficiency, scalability, and cost-effectiveness. Cloud computing, a game-changing technology that is reshaping the digital landscape, can propel businesses towards greater success and innovation. I wanted to learn more about the realm of cloud computing—a transformative technology that revolutionizes the way organizations leverage computing resources.

My aim was to explore the vast potential of cloud computing and its impact on businesses across various sectors. By harnessing the power of the cloud, we can address critical aspects such as cost savings, scalability, accessibility, and security. I tried to uncover the advantages and challenges associated with cloud computing. I started by trying to understand different cloud service models—Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS)—to understand their unique capabilities and the scenarios where they can be most beneficial. Moreover, during internship I examine real-world case studies, showcasing how organizations have successfully migrated to the cloud, optimizing their operations, streamlining workflows, and fostering innovation.

By the end of this internship, I aim to equip myself with the knowledge and practical skills necessary to make informed decisions about cloud adoption. Learnings from this internship will provide valuable insights for businesses seeking to embrace cloud computing, enabling them to make strategic choices that align with their specific needs and goals.

1.1 MOTIVATION

Cloud computing is a rapidly evolving field with constant advancements and updates. I was motivated by the opportunity to continually learn and expand my skill set, staying at the forefront of technological advancements and remaining competitive in the job market. Cloud computing has a global reach, enabling professionals to work on projects that transcend geographical boundaries. They have the opportunity to contribute to solutions that benefit businesses and individuals worldwide, making a positive impact on a larger scale. Cloud computing projects often involve cross-functional teams and collaboration with experts from various domains. This collaborative environment fosters networking opportunities and the chance to learn from diverse perspectives, enhancing professional growth and knowledge sharing. Cloud computing is in high demand, and professionals with expertise in this domain have ample opportunities for career growth. The market for cloud-related skills is expanding, making it an attractive field for individuals looking to advance their careers and explore new professional avenues.

1.2 Problem Definition

To facilitate the learning of cloud computing, encompassing service models, business case studies, cloud economics and billing, and practical implementation using Amazon Web Services (AWS).

2. SPECIFICATIONS OF COMPANY

EduSkills is a Non-profit organization which enables Industry 4.0 ready digital workforce in India. Our vision is to fill the gap between Academia and Industry by ensuring world class curriculum access to our faculties and students. We want to completely disrupt the teaching methodologies and ICT based education system in India. We work closely with all the important stakeholders in the ecosystem Students, Faculties, Education Institutions and Central/State Governments by bringing them together through our skilling interventions. Our three-pronged engine targets social and business impact by working holistically on Education, Employment and Entrepreneurship.

AWS Academy is an initiative by Amazon Web Services (AWS) that provides educational institutions with a comprehensive curriculum to teach cloud computing skills and prepare students for careers in the cloud industry. AWS Academy offers a structured learning pathway, including instructor-led courses, hands-on labs, and resources, to deliver industry-recognized cloud computing education. AWS Academy offers a set of courses designed to develop students' skills in cloud computing and AWS services. The curriculum covers a range of topics, including cloud architecture, security, databases, machine learning, and more. The courses are designed to align with industry-recognized certifications, such as AWS Certified Solutions Architect and AWS Certified Developer. Hands-on labs are an essential component of AWS Academy courses. These labs provide students with the opportunity to gain practical experience by working directly with AWS services and building real-world projects. By completing hands-on exercises, students can apply their theoretical knowledge and develop the skills necessary to work with AWS technologies. By participating in AWS Academy, students can acquire in-demand cloud computing skills, gain hands-on experience with AWS services, and increase their employability in the rapidly growing cloud industry. The program provides a structured learning path, access to industry-recognized certifications, and collaboration with educational institutions and industry partners, creating a comprehensive educational experience for students pursuing cloud computing careers.

3. REPORTS

3.1 Offer Letter

YOGESH KANWADE <yogeshkanwade2020.comp@mmcoe.edu.in>

Congratulations-Shortlisted for AICTE- EduSkills Virtual Internship Cohort-4
1 message

EduSkills Foundation <noreply@eduskillsfoundation.org>   Mon, Dec 19, 2022 at 7:46 PM
To: Yogesh Kanwade <yogeshkanwade2020.comp@mmcoe.edu.in>

Dear Yogesh,

EduSkills is pleased to inform you that you have been shortlisted for AICTE-EduSkills Virtual Internship Cohort-4.

Student Name= Yogesh Kanwade

Domain Name= CLOUD VIRTUAL INTERNSHIP

College Name=Marathwada Mitra Mandal's College of Engineering

Please follow the AWS Cloud Internship process document to complete the AICTE- EduSkills Virtual Internship.

Process document link for CF: https://tinyurl.com/5n6hth6n

Process document link for SA: https://tinyurl.com/5n6chdeh

Please complete the following courses and upload both course completion certificates to get the AICTE-EduSkills Internship Certificate by **15th January,2022**

1. AWS Academy Cloud Foundations

2. AWS Academy Cloud Architecting

Course completion Certificate Upload Link: https://eduskillsfoundation.org/aicte-internship-certificate/

You are advised to contact your institution SPoC/HoD/Concerned Faculty Member immediately for all your queries.

Please Click on - **https://t.me/+g6_9EzO7hTFhNTFl** and join the Telegram group to get all updates about EduSkills Programs.

Please Click on - https://t.me/+gWCuVCINl980NGZI and join the Telegram group to get all updates from EduSkills Team related to **AICTE - EduSkills Cloud Virtual Internship.**

Congratulations and All the Best for your Internship!

Best Regards

EduSkills Team

3.2 Completion Certificate

3.3 Log Report

Note: for writing Output/Assignments , you can maintain a separate sheet/ at the end of this file write suggestions pointwise and date wise.(in online mode/offline mode)

Name of Student: Yogesh Amar Kanwade

Name of Company(Fullname): EduSkills

Name of Company Mentor: —

Name of College Mentor: Prof. Rupali Dalvi

Mode of Internship(online/ offline): Online

Date of the Internship(From_date to To_date) : Dec 2022 to Feb 2023

Sr. No.	Date	Time	Topic Discussion with Company Mentor	Output/Assignments specified by Company Mentor
1	20 Dec 2022	6:00 to 8:00 pm	Cloud Concept Overview	Learnt about different cloud models like IaaS, PaaS, SaaS
2	22 Dec 2022	6 to 8 pm	Cloud Economics & Billing	Learnt how to calculate costs for AWS services

3	24 Dec 2022	6 to 8 pm	AWS Global Infrastructure Overview	Learnt about AWS availability zones and availability during disaster
4	29 Dec 2022	5 pm	Compute, Storage & Databases	Learnt about Amazon EC2, Storage services like EFS & RDB
5	23 Jan 2023	4 pm	AWS Cloud Architecture	Overview of Cloud Architecture
6	26 Jan 2023	11 am	AWS EC2, S3, VPC	Learnt & performed lab on creating Amazon EC2 instance, storage using S3 & VPC
7	1 Feb 2023	4 pm	AWS CloudFront	Learnt about CloudFront & dynamic streaming
8	5 Feb 2023	4 pm	AWS IAM & Security	Learnt about cloud security using different IAM roles for authorization
9	7 Feb 2023	5 pm	AWS Elastic Load Balancer	Learnt about Elastic Load Balancer that routes traffic to healthy instances
10	11 Feb 2023	3 pm	AWS Auto Scaling & Automation	Auto Scaling automatically adjusts capacity to maintain steady & predictable performance

4. SYSTEM DESIGN

4.1 SYSTEM ARCHITECTURE
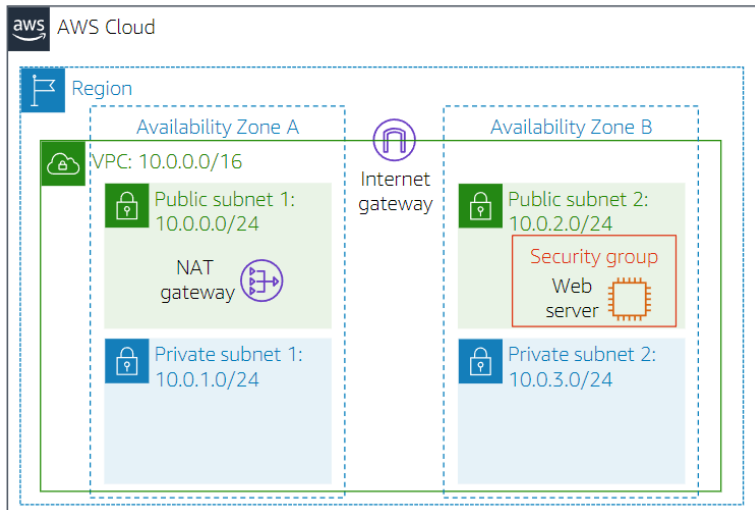
Above architecture diagram represents how NAT Gateway (Network Address Translation) and Internet Gateway are configured to allow inbound traffic. An internet gateway is a highly available VPC component that allows communication between your VPC and the internet. It supports IPv4 and IPv6 traffic. An internet gateway enables resources in your public subnets (such as EC2 instances) to connect to the internet if the resource has a public IPv4 address or an IPv6 address. Similarly, resources on the internet can initiate a connection to resources in your subnet using the public IPv4 address or IPv6 address. For example, an internet gateway enables you to connect to an EC2 instance in AWS using your local computer. If a subnet is associated with a route table that has a route to an internet gateway, it's known as a public subnet. If a subnet is associated with a route table that does not have a route to an internet gateway, it's known as a private subnet.

To enable communication over the internet for IPv4, your instance must have a public IPv4 address. You can either configure your VPC to automatically assign public IPv4 addresses to your instances, or you can assign Elastic IP addresses to your instances. Your instance is only aware of the private (internal) IP address space defined within the VPC and subnet. The internet gateway logically provides the one-to-one NAT on behalf of your instance, so that when traffic leaves your VPC subnet and goes to the internet, the reply address field is set to the public IPv4 address or Elastic IP address of your instance, and not its private IP address. Conversely, traffic that's destined for the public IPv4 address or Elastic IP address of your instance has its destination address translated into the instance's private IPv4 address before the traffic is delivered to the VPC. Instances in the private subnet can't communicate with the internet over the internet gateway, even if they have public IP addresses. To provide your instances with internet access without assigning them public IP addresses, you can use a NAT device instead. A NAT device

enables instances in a private subnet to connect to the internet, but prevents hosts on the internet from initiating connections with the instances.
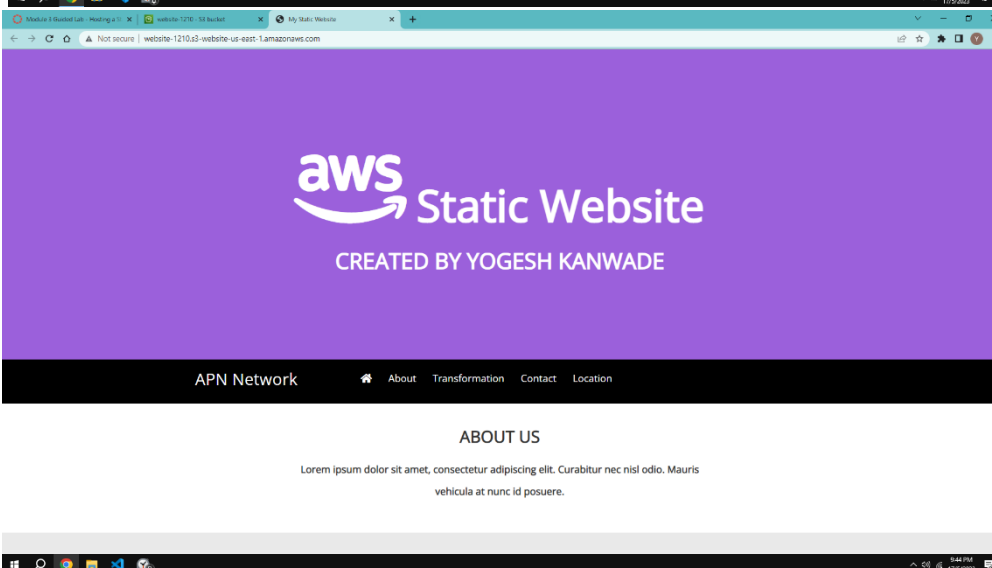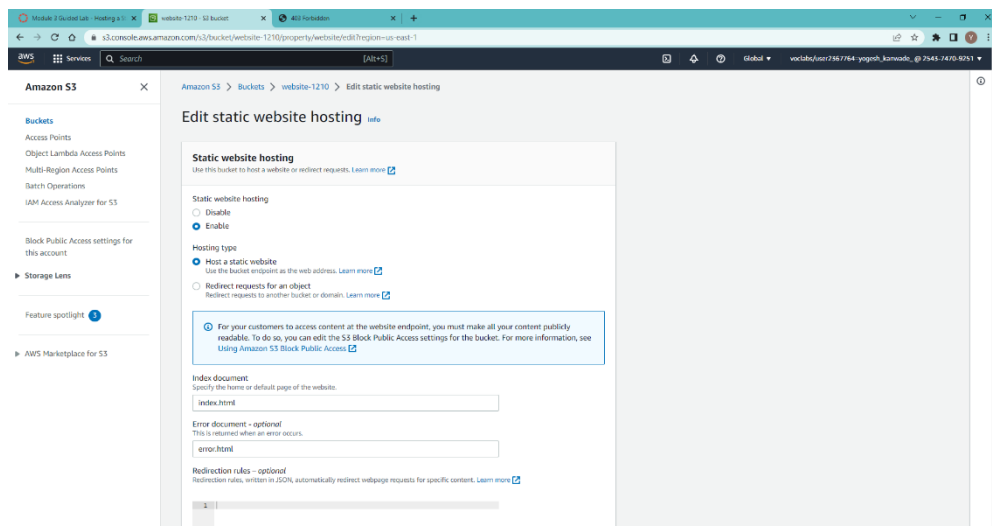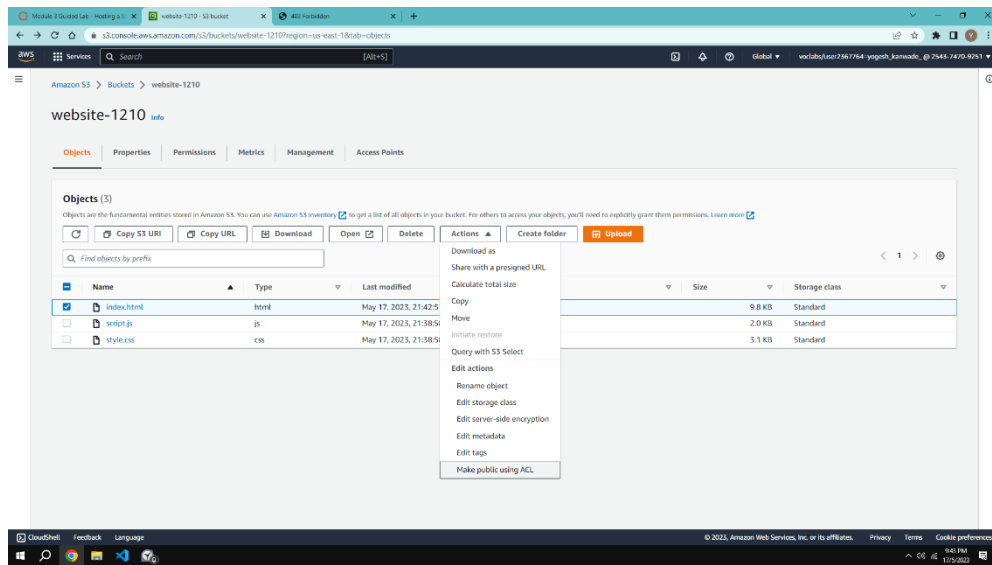
5. Other Specification

5.1 Advantages

Cloud computing offers several advantages, including:

1. Cost savings: Cloud computing can significantly reduce infrastructure costs as it eliminates the need for on-premises hardware and the associated maintenance costs.

2. Scalability: Cloud services allow for the easy scaling up or down of resources to match changing business demands.

3. Accessibility: Cloud computing allows for remote access to applications and data from anywhere in the world, making it ideal for mobile workers or remote teams.

4. Reliability: Cloud services are often designed with redundancy and failover mechanisms, ensuring high availability and uptime.

5. Flexibility: Cloud computing provides flexibility in terms of deployment options, such as public, private, or hybrid clouds, depending on business requirements.

6. Security: Cloud providers often invest heavily in security measures to protect their infrastructure and customers' data, making it more secure than traditional on-premises systems in some cases.

7. Collaboration: Cloud computing enables teams to work collaboratively on projects in real-time, regardless of their location.

Overall, cloud computing offers businesses increased agility, efficiency, and cost savings, making it an attractive option for many organizations.

5.2 Limitations

Cloud computing, despite its numerous advantages, also has certain limitations that are important to consider. Some of the key limitations include:

1. Internet Dependency: Cloud computing relies heavily on internet connectivity. If there is a network outage or poor internet connection, it can disrupt access to cloud services and applications, affecting productivity and business operations.

2. Security and Privacy Concerns: Storing and processing data in the cloud raises security and privacy concerns. Organizations may be hesitant to entrust sensitive data to third-party providers due to potential risks such as data breaches, unauthorized access, or data loss. Adequate security measures and encryption protocols must be implemented to mitigate these concerns.

3. Limited Control and Customization: Cloud computing services are typically offered as standardized solutions, limiting the level of control and customization available to users. Organizations may have to adapt their processes to fit within the constraints of the cloud provider's offerings, which might not align perfectly with their specific requirements.

4. Vendor Lock-In: Once an organization migrates its infrastructure and applications to a specific cloud provider, it can be challenging to switch to a different provider due to dependencies and integration complexities. This vendor lock-in can limit flexibility and bargaining power, potentially leading to higher costs in the long run.

5. Downtime and Service Disruptions: Cloud service providers strive to provide high availability, but they are not immune to outages or service disruptions. Unplanned downtime can impact business continuity, leading to productivity loss and potential financial implications. It's crucial for organizations to assess the reliability and track record of cloud providers before committing to their services.

6. Cost Management: While cloud computing can offer cost savings, it can also result in unexpected costs if resources are not managed effectively. Organizations must carefully monitor and optimize resource usage to avoid unnecessary expenses, such as overprovisioning resources or leaving unused instances running.

7. Compliance and Legal Considerations: Depending on the industry or geographical location, businesses may have specific compliance and legal requirements regarding data storage, handling, and privacy. Ensuring cloud services align with these regulations can be complex and may require additional measures to achieve compliance.

It's important to note that while these limitations exist, many of them can be addressed or mitigated through careful planning, selecting the right cloud service provider, implementing robust security measures, and understanding the specific needs and challenges of the organization.

5.3 Applications

Cloud computing has a wide range of applications across various industries and sectors. Here are some common applications of cloud computing:

1. Data Storage and Backup: Cloud storage services provide organizations with scalable and cost-effective solutions for storing and backing up data. It eliminates the need for on-premises infrastructure and offers reliable data storage and disaster recovery options.

5. Artificial Intelligence and Machine Learning: Cloud computing offers the necessary computational power and resources for training and deploying AI and machine learning models. Organizations can leverage cloud platforms to process large datasets, train complex models, and implement AI-powered applications and services.

6. Internet of Things (IoT): Cloud computing provides the infrastructure and data processing capabilities for managing and analyzing data generated by IoT devices. It enables real-time data collection, storage, and analysis, facilitating the development of smart homes, industrial automation, healthcare monitoring, and more.

7. Content Delivery and Streaming: Cloud-based content delivery networks (CDNs) help deliver digital content efficiently to end-users worldwide. Streaming services for videos, music, and other media heavily rely on cloud infrastructure to ensure reliable and scalable content distribution.

8. Virtual Desktop Infrastructure (VDI): Cloud-based VDI allows users to access virtual desktop environments hosted in the cloud. It enables remote work, centralized management, and flexibility in accessing desktop applications and data from any device with an internet connection.

9. Gaming: Cloud gaming platforms leverage cloud computing to stream games to various devices without the need for powerful local hardware. Users can play games on low-end devices while the cloud handles the heavy processing and rendering.

10. Scientific Research and High-Performance Computing: Cloud computing offers the computational power and scalability needed for scientific simulations, data analysis, and high-performance computing tasks. Researchers can access on-demand resources to process large datasets, run complex simulations, and collaborate globally.

These are just a few examples of the diverse applications of cloud computing. The versatility and flexibility of cloud services make them applicable to various industries, providing scalable and cost-effective solutions for different business needs.

6. CONCLUSION AND FUTURE WORK

In conclusion, working on basic cloud computing projects involving Amazon Web Services (AWS) has provided valuable insights into the power and potential of cloud computing. Through this internship, I gained a solid foundation in understanding cloud service models, explored real-world business case studies, and acquired hands-on experience with AWS.

By leveraging AWS services, I have experienced firsthand the scalability, flexibility, and cost-effectiveness that cloud computing offers. I have learned how to provision and manage cloud resources, deploy applications, and implement security measures to ensure the integrity and confidentiality of data. Through this project, I have also recognized the transformative impact of cloud computing on businesses across various industries. I witnessed how organizations can optimize their operations, improve efficiency, and foster innovation by embracing cloud technologies. The flexibility and accessibility provided by cloud computing have revolutionized the way businesses operate and collaborate.

Building upon foundational knowledge and experience with basic cloud computing projects involving AWS, there are several avenues for future work and exploration in this field. Some potential areas of focus include:

1. Advanced Cloud Services: Expanding our understanding and proficiency in advanced cloud services offered by AWS, such as AWS Lambda for serverless computing, AWS Elastic Kubernetes Service (EKS) for container management, and AWS Glue for data integration and analytics.

2. Hybrid Cloud: Exploring the concept of hybrid cloud environments, which combine on-premises and cloud infrastructure, and understanding the benefits and considerations associated with this approach.

3. Cloud Security and Compliance: Further exploring cloud security best practices, encryption techniques, and access control mechanisms to strengthen the security posture of cloud deployments.

4. Cloud-native Development: Exploring cloud-native development practices, including containerization, microservices architecture, and leveraging AWS services like AWS Elastic Beanstalk, AWS App Runner, and AWS Fargate for building and deploying scalable and resilient cloud-native applications.

By diving deeper into these areas, we can continue to enhance our skills and expertise in cloud computing, staying at the forefront of industry trends and advancements. This will enable us to contribute effectively to organizations seeking to leverage cloud technologies for their digital transformation initiatives and propel innovation in the ever-evolving world of cloud computing.