

CSA1526

CLOUD COMPUTING

Assignment - 2

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CLOUD Federation for Multi-National Enterprises:

* A federation Cloud Strategy allows a global technology company to integrate multiple cloud providers for different regional operations. This approach ensures flexibility, scalability and resilience while adhering to regional compliance and optimizing cost and performance.

Cloud - Federation Architecture

The architecture for federating AWS, Azure and Google Cloud should ensure seamless interoperability between different cloud platforms while optimizing regional performance.

- * Cloud management platform
- * Inter-cloud connectivity
- * Load Balancing & Traffic Routing

Data Synchronization:

To ensure Real time updates and seamless data flow across different cloud Regions, implement Robust Synchronization Mechanisms:

- * Data Replication
- * Distributed Databases
- * Multi-cloud Data Lake

Security & Compliance

Security and Compliance are critical when operating across multiple Regions, each with different laws and Regulations.

- * Identity and Access Management
- * Encryption
- * Compliance Auditing & Reporting
- * Regional Data Residency

Cost & Performance Optimization

Efficient Cost Management and high-Performance delivery are crucial in a Multi-Cloud Federation

- * Cost Management
- * Resource Optimization
- * Performance Monitoring
- * Cross Cloud Cost Optimization tools

Best Practices for Implementation

- * Multi-Cloud Strategy
- * Automation & DevOps
- * Disaster Recovery & High Availability

→ By carefully designing the Cloud Federation architecture, focusing on data Synchronization, security, Cost management, the Company can effectively manage to drive global success

a. Propose a federated Cloud Architecture for a Multi-National Enterprise.

In a Multi-National Enterprise, a federated Cloud Architecture must be flexible, scalable, secure and cost effective while allowing seamless integration across various Cloud Providers.

Below is a Proposed Architecture that takes into account different geographical, Regulatory and business needs.

Key Components for Federated Cloud Architecture.

1. Cloud Providers

* AWS

* Microsoft Azure

* Google Cloud

2. Centralized Management Layer

- * Cloud Management Platform
- * Automated Provisioning
- * Centralized Monitoring and Alerts

3. Network Connectivity

- * Inter Cloud Networking
- * Virtual Private Networks
- * Software Defined Networking

Implementation Considerations

1. Data Sovereignty
2. Disaster Recovery & High Availability
3. Service Level Agreements
4. Governance and Risk Management

b. Recommend a Real-time data Synchronization Strategy between Cloud Providers

When Synchronizing data between Multiple Cloud Providers in Real time, You want to ensure that the solution is efficient, secure, Scalable and fault tolerant.

1. Event driven Architecture

- * Event Sources
- * Event BUS
- * Consumers

2. Data Replication Using managed Services

- * AWS Database Migration Service
- * Google Cloud Dataflow
- * Azure Data Factory

3. API Gateway with Webhooks / REST API

Integration

- * REST API or GraphQL API
- * API Gateway
- * Webhooks

4. Cross Cloud Data Mesh

- * Decentralized Data ownership
- * Federated Querying
- * Data Integration Layer

Key Considerations!

- * Latency
- * Security
- * Data Integrity
- * Cost

C. Address Security and Regulatory Compliance Challenges in Cloud Federation.

While Implementing Cloud Federation, which Involves Integrating and Managing Multiple Cloud Environments across different Providers, Security and Regulatory Compliance are crucial Concerns.

1. Data Security & Privacy

- * Data Breach
- * Encryption
- * Data Localization

2. Identity Access Management

- * Inconsistent IAM Policy
- * Access Control
- * Role Based Access Control.

3. Regulatory Compliance & Data Sovereignty

- * Data Residency
- * Multi-cloud Governance
- * Cross border Data transfers

Strategies for Vendor Lock-In & Portability:

- * Cloud Abstraction Layers
- * Cross Cloud tools
- * Compliance by Design

D. Suggest Cost Optimization Strategies in a federated Cloud Model.

Cost Optimization is a federated Cloud Model where workloads and data are spread across multiple cloud providers. Requires careful planning, monitoring and adjustment.

1. Right Sizing Resources

- * Perform Regular Resource Audit

* Right size Instance

* Leverage auto scaling

2. Implement Effective Governance and

Cost Allocation Tags

* Tagging and Resource Allocation

* Governance Policy

Conclusion:

Cost optimization in a federated Cloud Model

Requires a multi-pronged approach, focusing

on efficiency across Compute, Storage,

data transfer and management tools.

Regular monitoring, Centralized Cost Management

and strategic use of pricing models such

as spot instances.