Architectural Decision Record (ADR) for Choice of AWS Cloud Provider for Fish Watch System

Decision Summary

Utilize the architectural decisions for choice of AWS cloud provider for fish watch system.

Context

Our organization is developing the Fish Watch System, a real-time monitoring and analytics platform for fisheries management. This system aims to collect, process, and analyze data from various sources, including IoT sensors, satellite imagery, and weather forecasts, to support sustainable fishing practices and marine conservation efforts. We need to select a cloud provider to host and manage the infrastructure for this system.

Decision:

After thorough evaluation and consideration of different cloud providers, we have decided to utilize Amazon Web Services (AWS) as the cloud provider for the Fish Watch System.

Rationale:

Several factors influenced this decision:

1. **IoT and Data Analytics Capabilities**: AWS offers a comprehensive set of services tailored for IoT and data analytics workloads, including AWS IoT Core, Amazon Kinesis, Amazon Redshift, and Amazon SageMaker. These services provide the necessary tools and scalability to ingest, process, and analyze large volumes of data from IoT sensors and other sources in real-time.
2. **Machine Learning and AI Services**: AWS provides a rich set of machine learning and AI services, such as Amazon Rekognition for image analysis and Amazon Comprehend for natural language processing. These services enable us to extract insights from unstructured data, detect patterns, and make data-driven predictions to enhance fisheries management and conservation efforts.
3. **Geospatial Capabilities**: AWS offers geospatial services, such as Amazon Location Service and Amazon Ground Station, which are essential for processing and analyzing satellite imagery, geospatial data, and mapping applications. These capabilities allow us to incorporate geospatial intelligence into the Fish Watch System for monitoring fishing activities, identifying fishing hotspots, and enforcing regulations.

4. **High Availability and Reliability**: AWS's global infrastructure provides high availability and reliability, with multiple availability zones and regions across the world. This ensures that the Fish Watch System remains operational and accessible to users, even in the event of hardware failures or network disruptions.
5. **Security and Compliance**: AWS adheres to rigorous security standards and compliance certifications, such as ISO 27001, SOC 2, and GDPR. This ensures that sensitive data collected by the Fish Watch System is stored, processed, and transmitted securely, maintaining confidentiality, integrity, and compliance with regulatory requirements.
6. **Ecosystem and Integration**: AWS has a vast ecosystem of services, third-party integrations, and developer tools, enabling seamless integration with existing systems, APIs, and frameworks. This allows us to leverage AWS's ecosystem to enhance the functionality and interoperability of the Fish Watch System, integrate with partner solutions, and accelerate development cycles.
7. **Cost-Effectiveness**: AWS offers flexible pricing models, pay-as-you-go billing, and cost optimization tools to manage and optimize costs effectively. By leveraging AWS's cost management capabilities, such as AWS Cost Explorer and AWS Budgets, we can monitor usage, identify cost-saving opportunities, and optimize resource allocation to align with budget constraints and maximize ROI.

Consequences:

By selecting AWS as the cloud provider for the Fish Watch System, we anticipate the following consequences:

1. **Technical Expertise**: Our team may need to acquire or enhance their skills in AWS services, architectures, and best practices to effectively design, deploy, and manage the system on AWS infrastructure. Training and knowledge transfer activities will be required to ensure proficiency and competency.
2. **Vendor Lock-in**: There is a risk of vendor lock-in when relying heavily on a single cloud provider like AWS. To mitigate this risk, we will adopt cloud-agnostic architectural patterns, such as containerization with Docker and Kubernetes, and implement infrastructure-as-code practices using tools like AWS CloudFormation or Terraform.
3. **Scalability and Performance**: AWS's scalability and performance capabilities enable us to handle varying workloads, accommodate growth, and deliver responsive user experiences for the Fish Watch System. Properly architecting and configuring the system for scalability will be essential to meet future demands and maintain performance under load.

4. **Data Governance and Privacy:** We must implement robust data governance and privacy measures to ensure compliance with data protection regulations, such as GDPR and CCPA, and protect the privacy rights of individuals whose data is collected and processed by the Fish Watch System. This includes implementing access controls, encryption, anonymization, and data retention policies as per regulatory requirements and best practices.

In summary, selecting AWS as the cloud provider for the Fish Watch System offers the necessary capabilities, scalability, security, and cost-effectiveness to support our objectives of sustainable fisheries management and marine conservation. With proper planning, execution, and ongoing optimization, we believe AWS will empower us to build a robust and scalable platform for monitoring and protecting marine ecosystems.