**Case Study: Enterprise Architecture Cost Reduction Project at United Airlines**

**Business Challenge**

United Airlines faced high egress costs associated with Artifactory, which was used for deploying applications to AWS services: Elastic Kubernetes Service (EKS) and Elastic Container Service (ECS). A significant portion of these costs - around 70% - stemmed from publicly available third-party images being pulled through Artifactory instead of directly from third-party repositories. This inefficiency led to unnecessary expenses.

**Business Requirements**

* Reduce egress costs for United Airlines related to Artifactory usage.
* Ensure minimal impact on application development teams during the transition.
* Maintain system reliability, availability, and security.
* Migrate applications from Artifactory to a more cost-effective AWS-native solution.

**Our Approach and Solution**

United was paying unnecessary fees to pull publicly available images through Artifactory. To eliminate these costs, we implemented a solution using Amazon Elastic Container Registry (ECR). This allows the images to be stored locally in AWS, so applications can access them without incurring any additional charges.

**Strategy**

* Identify an alternative solution that meets business and technical requirements.
* Evaluate Amazon Elastic Container Registry (ECR) as a replacement for Artifactory.
* Design a scalable, cost-effective architecture leveraging AWS services.
* Implement a solution with minimal disruption to application teams.

**Execution**

* **Research & Evaluation:** Assessed AWS ECR’s capabilities to determine if it met United’s needs.
* **Architecture Design:** Developed a solution using AWS Route 53, an application load balancer, and AWS ECR.

**Implementation**

* Migrated applications to use AWS ECR for caching and retrieving third-party images.
* Created vanity URLs to ensure applications didn’t require major pipeline changes.
* Increased ECR quota limits to avoid bottlenecks.

**Testing & Deployment**

* Began rollout in development (Dev) and quality assurance (QA) environments.
* Planned for gradual implementation in higher environments (production).

**Business Benefit**

* **Cost Savings:** Estimated annual savings of $720,000 (based on a monthly overage cost of $60,000).
* **Operational Efficiency:** Reduced reliance on Artifactory, leading to lower maintenance and operational overhead.
* **Seamless Transition:** Ensured minimal impact on application teams through a well-architected migration approach.

**Impact**

* **Users Affected:** Internal United Airlines teams deploying applications to AWS.
* **Scale:** Approximately 500 applications were planned for migration.
* **Improved Resilience:** Designed a more reliable and scalable deployment architecture.

**Technology Stack**

**Old System:** Artifactory.

**New System:** **AWS-based solution using:**

* Route 53.
* Application Load Balancer.
* AWS Elastic Container Registry (ECR).
* Lambda functions for managing and monitoring deployments.

**Team Size**

* **Kevin Dooley** - Enterprise/Solution Architect (worked on the ECR migration project) from Creospan.
* **Jenny** - Principal Enterprise Architect at United Airlines (worked with Kevin on the ECR migration).
* **Cloud Engineering Team** (Consultants & internal UAnited Airlines employees).
* **Platform Engineering Team** (Consultants & internal United Airlines employees).

**Others who are part of the United Enterprise Architecture team but not part of the ECR project:**

* **Ron Smith** – Enterprise/Solution Architect (focused on other aspects of enterprise architecture) from Creospan.
* **Shyamsundar Venkataraman** – Enterprise/Solution Architect from Creospan.
* **Two Additional Principal Enterprise Architects** - Part of United’s enterprise architecture team, but not directly involved in the ECR project but worked with Ron and Shyam.

**Project Timeline**

* Project is ongoing.
* **Start Date:** November 2024.
* **Phase 1 Completion (Dev & QA Environments):** Q1 2025.
* **Phase 2 Completion (Production Rollout):** Expected by Q2 2025.

**Industry**

Aviation/Transportation.

**Domain**

Enterprise Architecture & Cloud Cost Optimization.

**Person Interviewed**

Kevin Dooley - Enterprise/Solution Architect, Creospan (Consultant at United Airlines).

**Department:** Part of the Enterprise Architecture Team.

Part of Krishna Srinivasan’s team (Director - Arch, Cloud & DevOps).

Report to Veronica Kennedy (Application Support Manager).

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