CASE STUDY: Pilot Pay Engine (FOP) Modernization Project at United Airlines

PROBLEM STATEMENT: United Airlines undertook a strategic initiative to modernize its Pilot Pay Engine (Form of Payment - FOP), a critical system responsible for processing pilot compensation. It faced scalability limitations, security vulnerabilities, and compliance risks in handling Personal Identifiable Information (PII) and Protected Health Information (PHI). To enhance efficiency, security, and regulatory compliance. A cloud-native migration to AWS was necessary to modernize the system, improve resilience, and ensure long-term scalability.

OBJECTIVES

- **Migrate the Pilot Pay Engine** to a modern AWS cloud-native environment
- **Enhance scalability, reliability, and integration** with enterprise applications
- **Strengthen security** to ensure compliance with data privacy regulations
- **Automate workflows** to improve efficiency and reduce manual effort
- **Implement disaster recovery and Role Based Access Control (RBAC)** for secure access

SOLUTION

PROCESS

- Identified system inefficiencies, security vulnerabilities, scalability limitations and compliance risks
- Re-platformed the application to AWS, integrating microservices and improving infrastructure
- Implemented RBAC, end to end encryption, TLS 1.2, and Active Directory based Single Sign-On (SSO) to safeguard PII/PHI data
- Implemented automated failover with 50-min Recovery Time Objective (RTO) and 24-hour Recovery Point Objective (RPO)
- Integrated monitoring tools for improved system reliability and troubleshooting
- Reduced processing time by optimizing Kafka queues, parallel execution in EMR batch jobs, and fine tune inter-cluster communication
- Utilized CI/CD (Harness), Datadog/Dynatrace for observability, and structure role-based system management

DELIVERED

+ Cloud-Native Pilot Pay Engine: Migrated to AWS, ensuring scalability, reliability, and improved processing power
+ Enforced RBAC, end-to-end encryption, and regulatory compliance (PII/PHI 7-year retention requirement)
+ Streamlined Kafka messaging and optimized EMR batch jobs for faster processing
+ Implemented a disaster recovery mechanism: 50-minute RTO, 24-hour RPO, enabling business continuity
+ Automated ticket resolution, pay audits, and reduced manual effort for pay analysts and pilots

IMPACT

50-55% REDUCTION IN REPLY PROCESSING TIME	Reduced reply processing time from 46+ hours to 20-25 hours
$204,528 IN ANNUAL COST SAVINGS	40% decrease in Kafka processing latency and 40-50% reduction in inter-cluster latency
IMPROVED DATA FLOW EFFICIENCY	30- 40 % improvement in Spark streaming batch time from 180 minutes to 90-120 minutes
OPTIMIZED WORKLOAD DISTRIBUTION	5000 requests per minute supported, with seamless integration into CFA and UCrew payroll systems
ENHANCED SECURITY, COMPLIANCE & SYSTEM RESILIENCE	Faster and more reliable pilot payroll processing, allowing 17,500+ pilots to access registers, report discrepancies, and resolve payment issues efficiently