QBurst | A High AI-Q™ Company

Redefining In-Flight Entertainment with IoT Edge Computing

Maximizing the passenger experience by leveraging AWS IoT Greengrass to replace traditional in-flight servers, enabling seamless connectivity, Over-the-Air (OTA) updates, and streamlined cloud operations.

Overview

A leading US aviation technology provider sought to revolutionize its IFE systems by moving from legacy on-board servers to a cloud-centric, IoT edge computing solution.

- Leveraged AWS IoT Greengrass to enable Local Compute and Over-the-Air (OTA) Updates for in-flight devices, replacing manual software management.
- Designed and maintained a robust CI/CD pipeline (Jenkins) that automated cloud infrastructure provisioning and included comprehensive security checks (DAST/SAST), boosting operational efficiency.
- Achieved seamless connectivity and accelerated feature releases through full-stack automation testing (UI, API, Performance) conducted in dedicated device labs.
- Enhanced passenger experience, improved operational efficiency by reducing manual effort, and provided a single software platform for managing multiple connectivity options.

Client

Based in the US, the client is a key player in the aviation sector, providing connectivity and IFE services to various airlines and manufacturers globally. Their focus is on innovation to enhance air travel comfort and accessibility.

Challenges: Manual Management and Scalability

The client's traditional IFE infrastructure created significant operational hurdles:

- **High Manual Effort:** Software installation and management on board required extensive manual intervention, severely limiting operational efficiency and scalability.

- **Outdated Architecture:** Reliance on physical on-board servers made real-time content updates and personalization difficult, hindering passenger experience.
- **Fragmented Connectivity:** Lack of a single, unified platform to manage diverse connectivity options across different fleets.
- **Complex Deployments:** The complexity of cloud-to-device interaction required robust, but missing, strategies for secure development, deployment, and testing.

Solution: IoT Edge Computing with AWS Greengrass

QBurst collaborated with the client across the entire project lifecycle—Development, DevOps, and QA—to deliver an innovative, scalable, and automated IFE connectivity management solution leveraging AWS IoT Greengrass.

- **IoT Edge Computing Foundation:** Implemented AWS IoT Greengrass to enable local compute on the in-flight devices, allowing them to execute code, run containerized applications (via Docker), and store data locally, ensuring offline functionality.
- **Seamless Connectivity & Updates:** Developed demand-based internet connection management software and enabled OTA (Over-the-Air) Updates for seamless software installation and remote device management.
- **CI/CD Automation:** Designed and implemented a robust Jenkins pipeline to streamline build and deployment processes. This pipeline automated AWS CloudFormation for effortless infrastructure provisioning and included static and dynamic application security checks (SonarQube, ZAP for DAST).
- **Full-Stack Quality Assurance:** Conducted rigorous, device-specific testing in QBurst's device labs. Automation testing using Selenium, Rest Assured, and JMeter ensured platform stability, performance, and security across the full stack (UI, API, IoT device).

Technical Highlights

Key technologies that drove automation and enhanced IFE capabilities:

- **Edge Technology:** AWS IoT Greengrass for local compute, remote management, and secure communication (end-to-end encryption).
- **CI/CD Automation:** Jenkins pipelines used AWS CloudFormation and AWS SDK for automated cloud infrastructure provisioning.
- **Network Management:** Custom-developed software for demand-based internet connection management running natively on the IoT device.
- **Full-Stack Testing:** Utilized JMeter for performance testing and integrated ZAP (Dynamic Application Security Testing) directly into the CI/CD workflow for security hardening.
- **Containerization:** Docker was used for containerized device and automation setups, ensuring consistency.

Impact

The migration to the IoT edge computing platform delivered significant benefits to the client's operations and end-users:

- **Accelerated Feature Releases:** Automated testing and streamlined CI/CD accelerated the delivery of new features and improvements.
- **Efficient Cloud Operations:** Automation of cloud infrastructure provisioning reduced manual effort and improved efficiency.
- **Seamless Connectivity Management:** Airlines now manage multiple connectivity options with a single software platform, improving operational simplicity and user experience.
- **Enhanced Performance and Security:** Provided robust performance benchmarking and integrated security measures (e.g., end-to-end encryption) to protect the device interactions and data.
- **Reduced Manual Intervention**: OTA updates and remote management drastically reduced the need for manual software installation on board.