Qantas - API Management Platform

Architectural Evolution of API Management at Qantas and Jetstar Airways

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About Qantas

- Established 1920 in Queensland's outback as **Q**ueensland **A**nd **N**orthern **T**erritory **A**erial **S**ervices Ltd
- Australia's largest domestic and international airline
- Recognized globally for safety, reliability, and operational excellence
- Revolutionising air travel with ultra long-haul routes
  https://www.qantas.com/in/en/about-us/our-company/fleet/new-fleet/project-sunrise.html

About Me

Waleed Ahmed

Principal Engineer @ Qantas IT

Integration and Engineering

Background

- Computer Engineering
- Worked in Software Architecture, Software Development and DevOps over the past 20 years in verticals including Telecom, Finance and Aviation

Qantas Role

- Technical lead of API management platform
- Define architecture and key-design decisions for the platform and its continuous improvement

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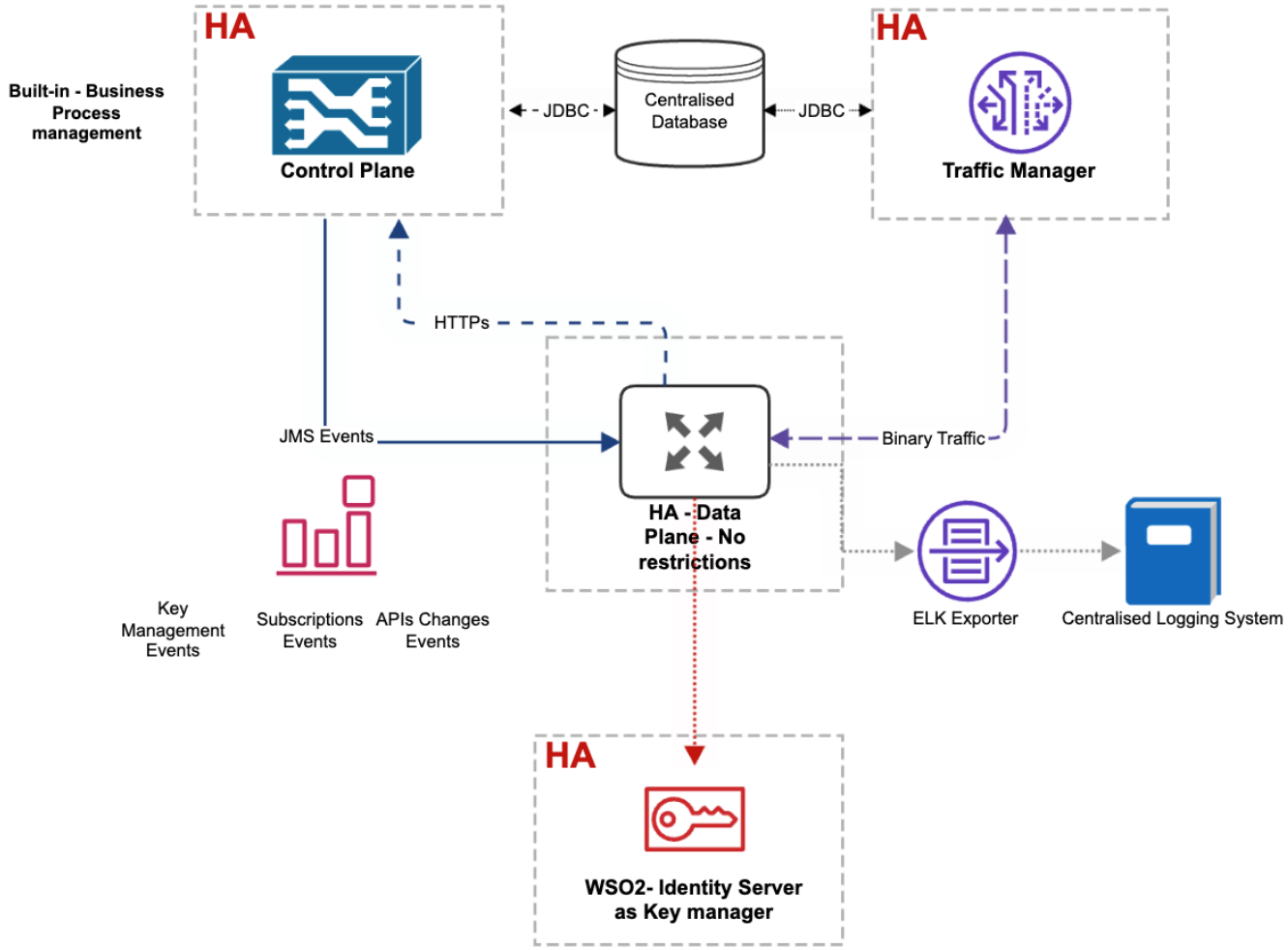
Qantas API Management Platform - Overview

- A critical infrastructure component and strategic enabler for the organisational pillars of safety, operational reliability, engineering excellence, and outstanding customer service & experience
- Widely adopted across business domains to support modernisation and transformation initiatives
- Built on WSO2 API Management since 2018, offering a secure, scalable, and governed environment for digital innovation
- Since its adoption, multiple successful upgrades and migration projects have been implemented

Today's focus: the latest architectural advancements introduced to the platform.

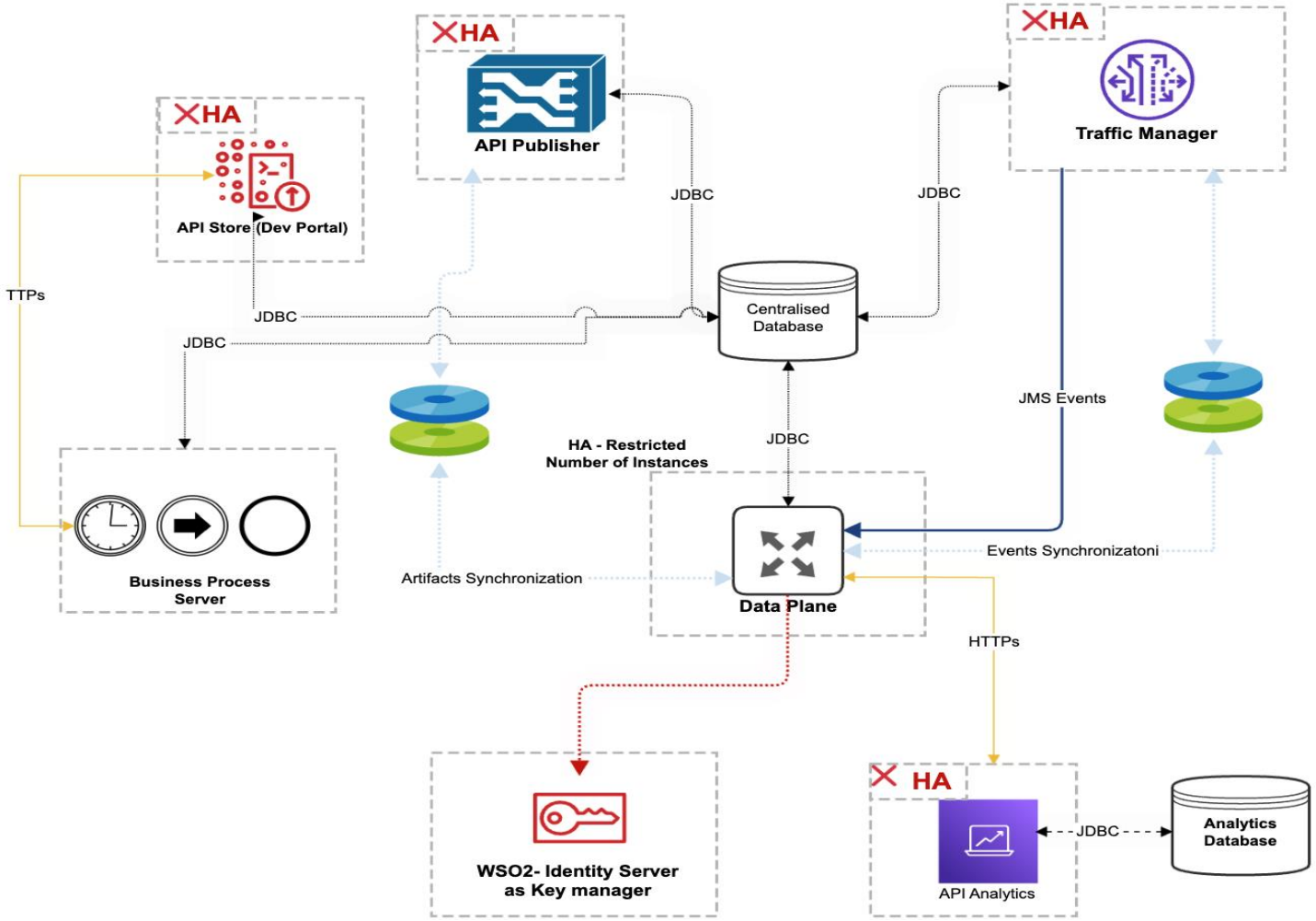
Key Platform Architectural Changes

1. Adoption of Event Hub Architecture
2. Containerised Deployment
3. Enhanced Observability and Logging Capabilities
4. Open Standards Driven - API Lifecycle Management



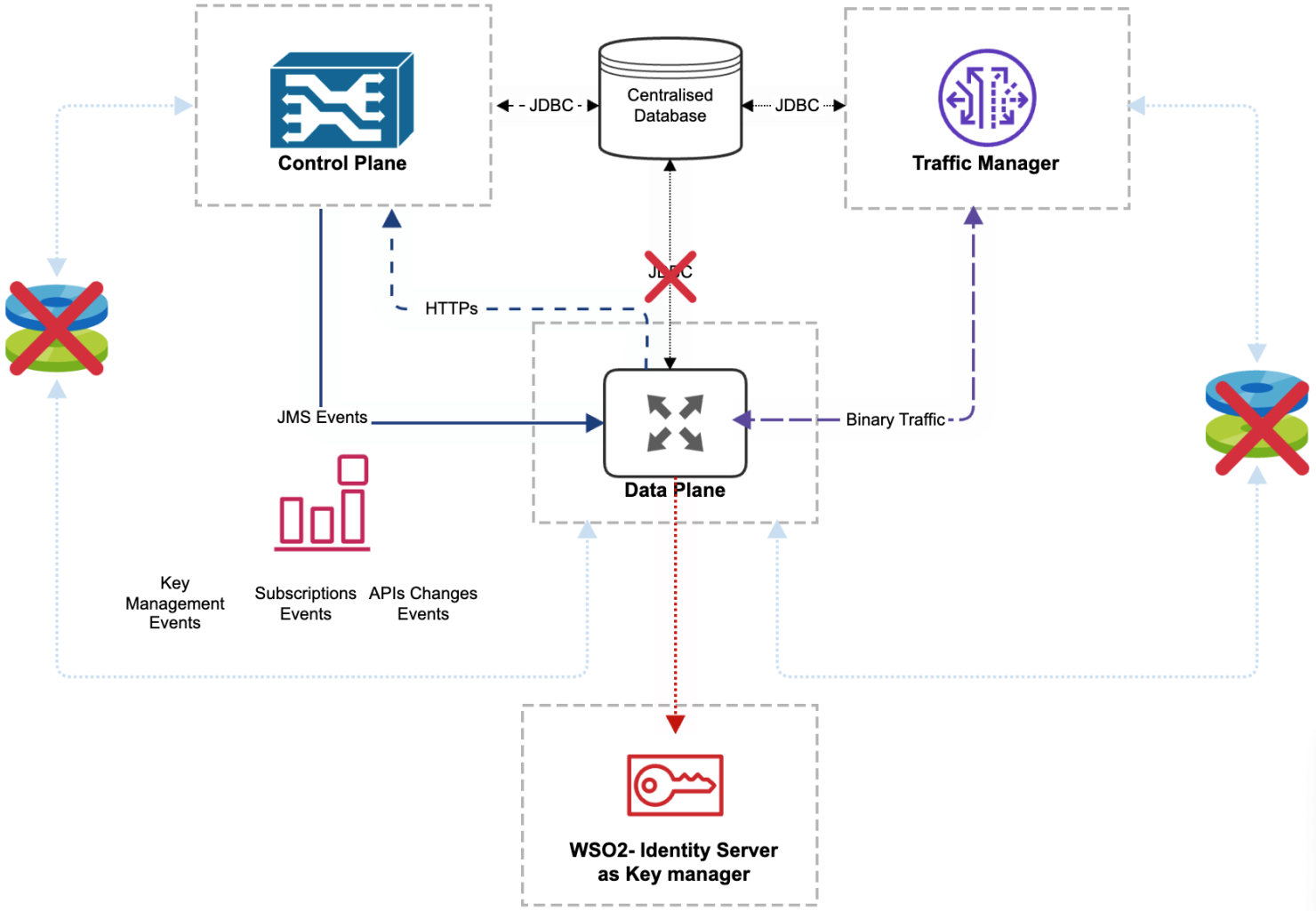
Platform Architecture Prior to Upgrade to WSO2 API Manager 4.x

- Key Components:
  - API Publisher
  - Traffic Manager
  - Business Process Server
  - WSO2 Identity Server (acting as Key Manager)
  - API Analytics
- Components connected to centralised database
- Some state sharing via disk storage
- Dependency on WSO2 - Analytics deployment for traffic logging



1: Adoption of Event Hub

- Transitioned to an event-hub architecture to streamline state handling across platform components
- Removed the need for **disk-based storage**, enhancing performance and simplifying infrastructure
- Shifted data planes to use **local databases only**, ensuring clear separation from the central platform database for improved scalability and security



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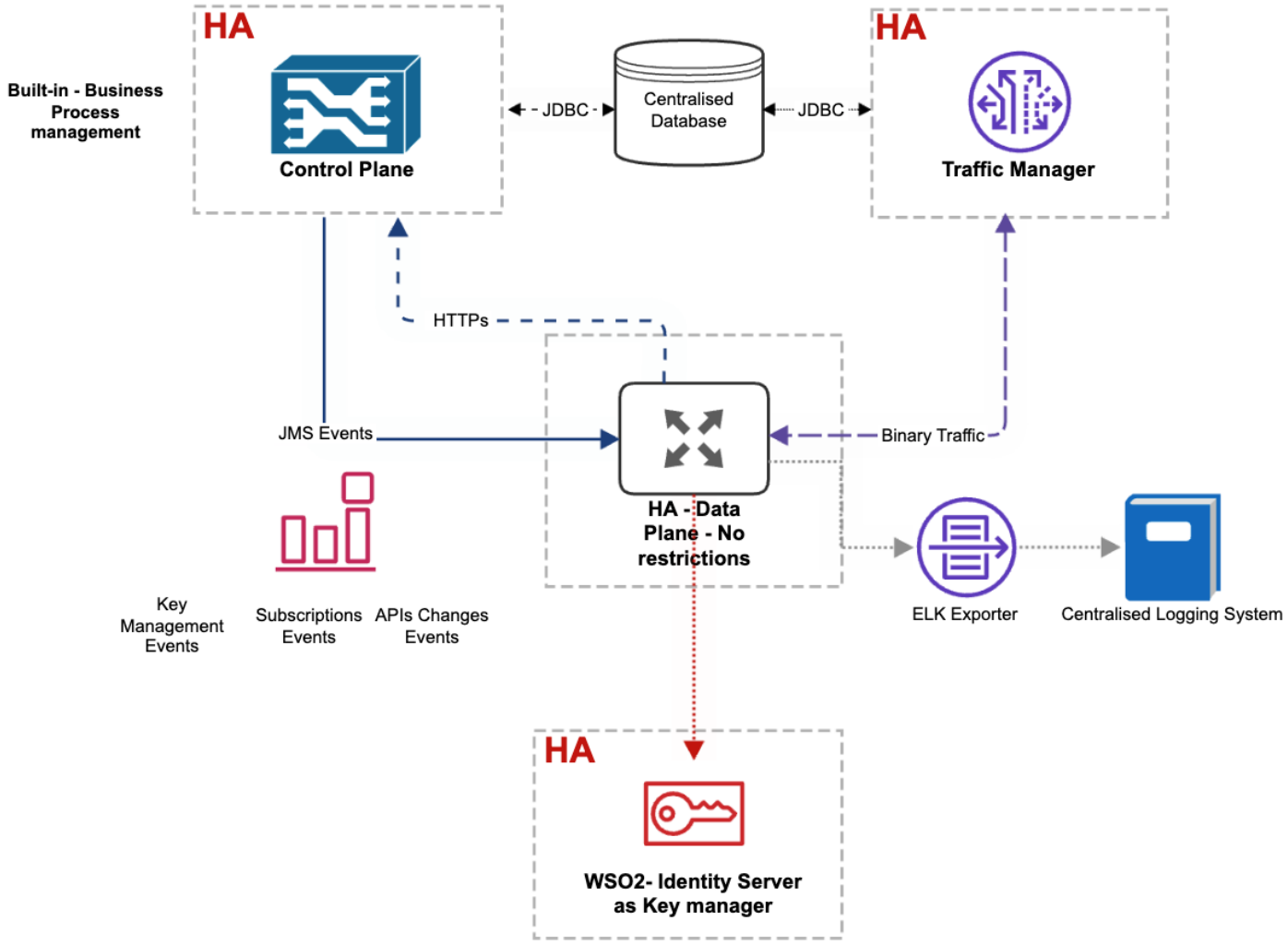
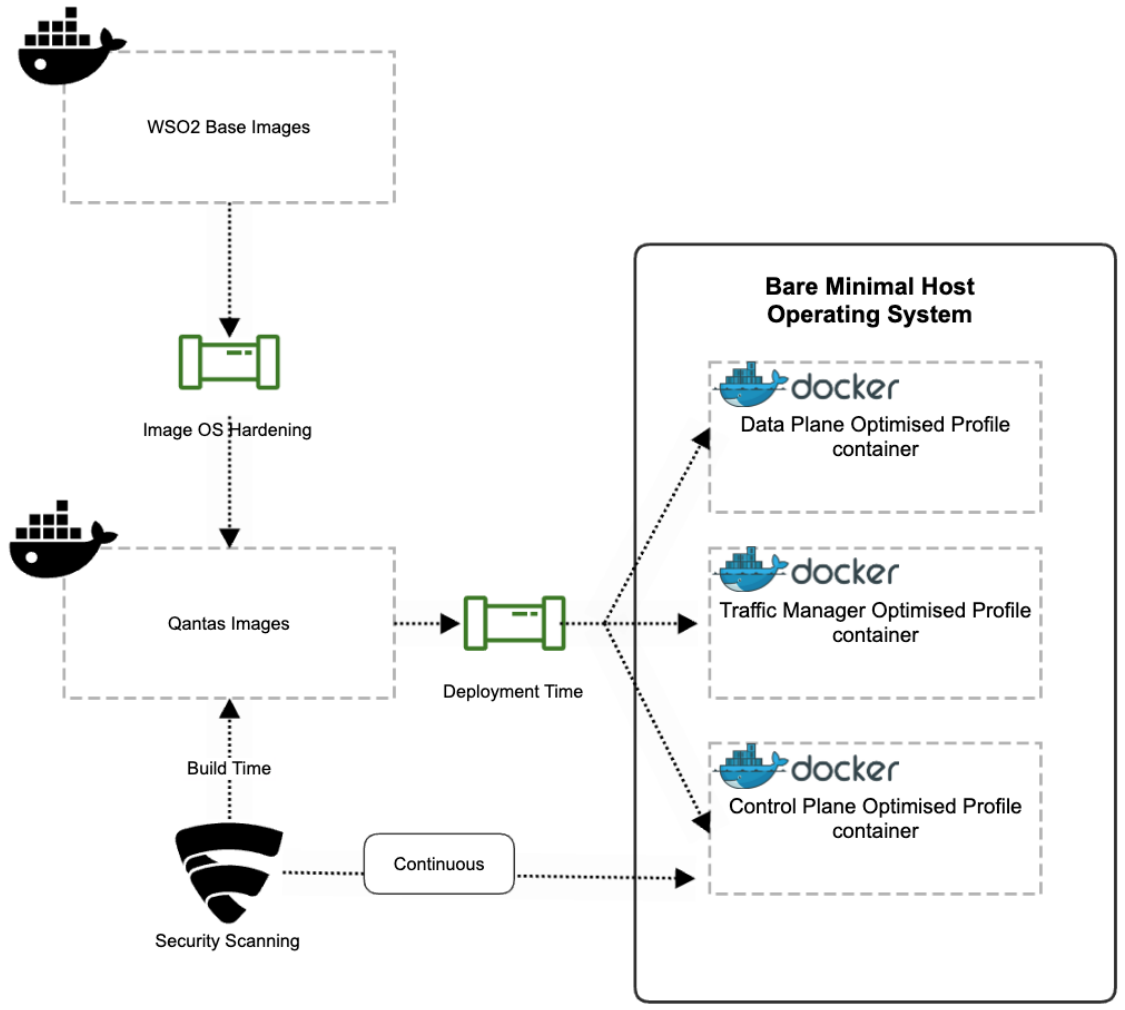
New Platform Architecture

- High availability in control plane and traffic manager components
- Consistent state sharing between control and data planes
- Loose coupled data planes
- In-memory throttling store and no disk storage



2: Containerised Deployment

- Qantas has adopted containerised deployment of API management platform utilising WSO2 base images
- Containerised deployment enforced our strategy of immutable deployment across all the platform environments
- With container-based deployments, we were able to harden the base images according to the Qantas Group security standards
- A minimal host operating system allowed the team to shift efforts left to harden the platform images



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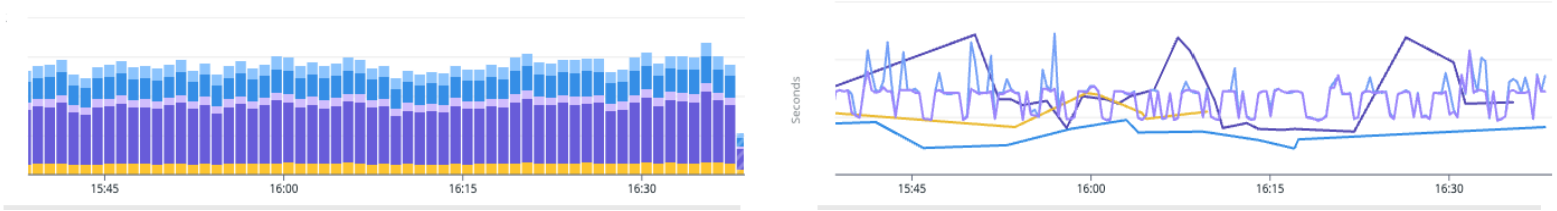
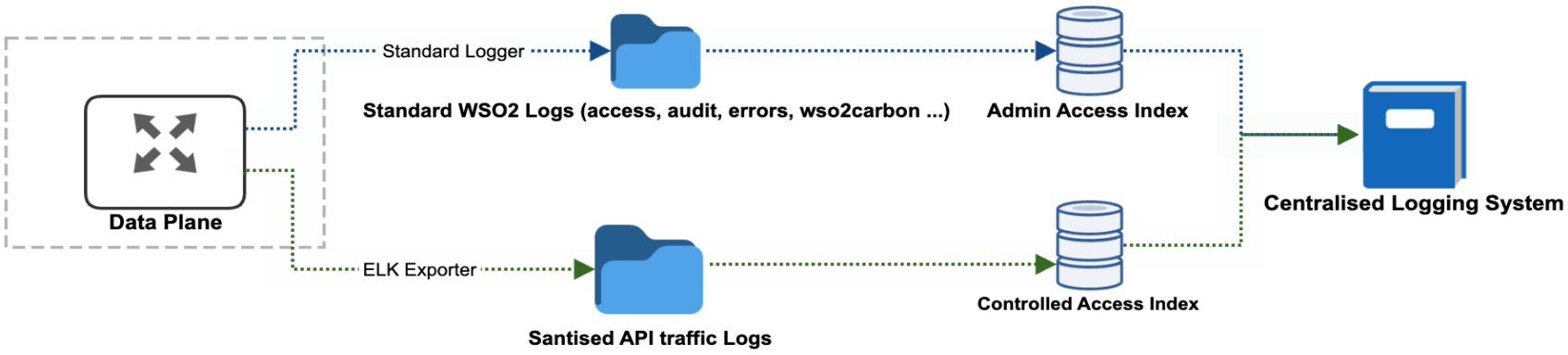
3: Observability and Logging Enhancements

- With WSO2 products following standard Java Runtime architectures, we were able to utilise standard JVM instrumentation to monitor all aspects of API resource routing. Little overhead on the platform computing resources enables proactive issue resolution.



- For comprehensive logging of API traffic following the group logging policies, we were able to use the WSO2 built-in elastic-stack (ELK) logger exporters to ship sanitised API traffic logs to our centralised logging platform.

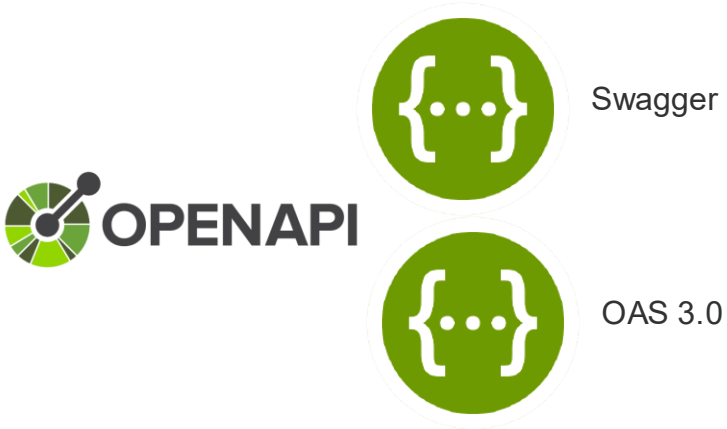


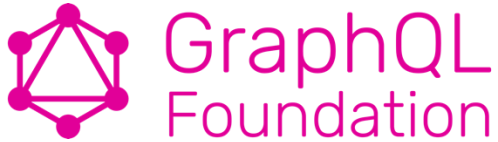
4: Open Standards Driven - API Lifecycle Management

- Utilising WSO2 Product APIs Qantas has built a unified API management interface that facilitates creation, update and versioning of APIs from codified API definitions following industry standards

- The unified interface has built-in governance and control logic to ensure all the APIs managed via the unified API management interface follow our governance and security policies

- The unified interface manages:
  - REST APIs with Swagger and Open API 3.0 Specifications
  - Graph QL APIs following Standard SDL specifications
  - XML - SOAP APIs
  - And lately WSO2 API Products (renamed as API bundles within Qantas developer community)





SOAP over XML

Key Outcomes

- **Loose coupling** between platform components has enabled **horizontal scalability** and seamless adaptation to changing traffic patterns
- Consistent Growth in the platform usage based on the adoption of **open standards** (OAuth2, OIDC, OpenAPI, etc.) with governance and adherence to the group policies in every aspect of the platform
- **Proactive issue management** with in-depth observability and logging capabilities
- **Fault Tolerance** through clear isolation of failures and lower maintenance overhead

Thank You

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