ORACLE

EHTP

Expand Infrastructure as Code Support in Graal CI

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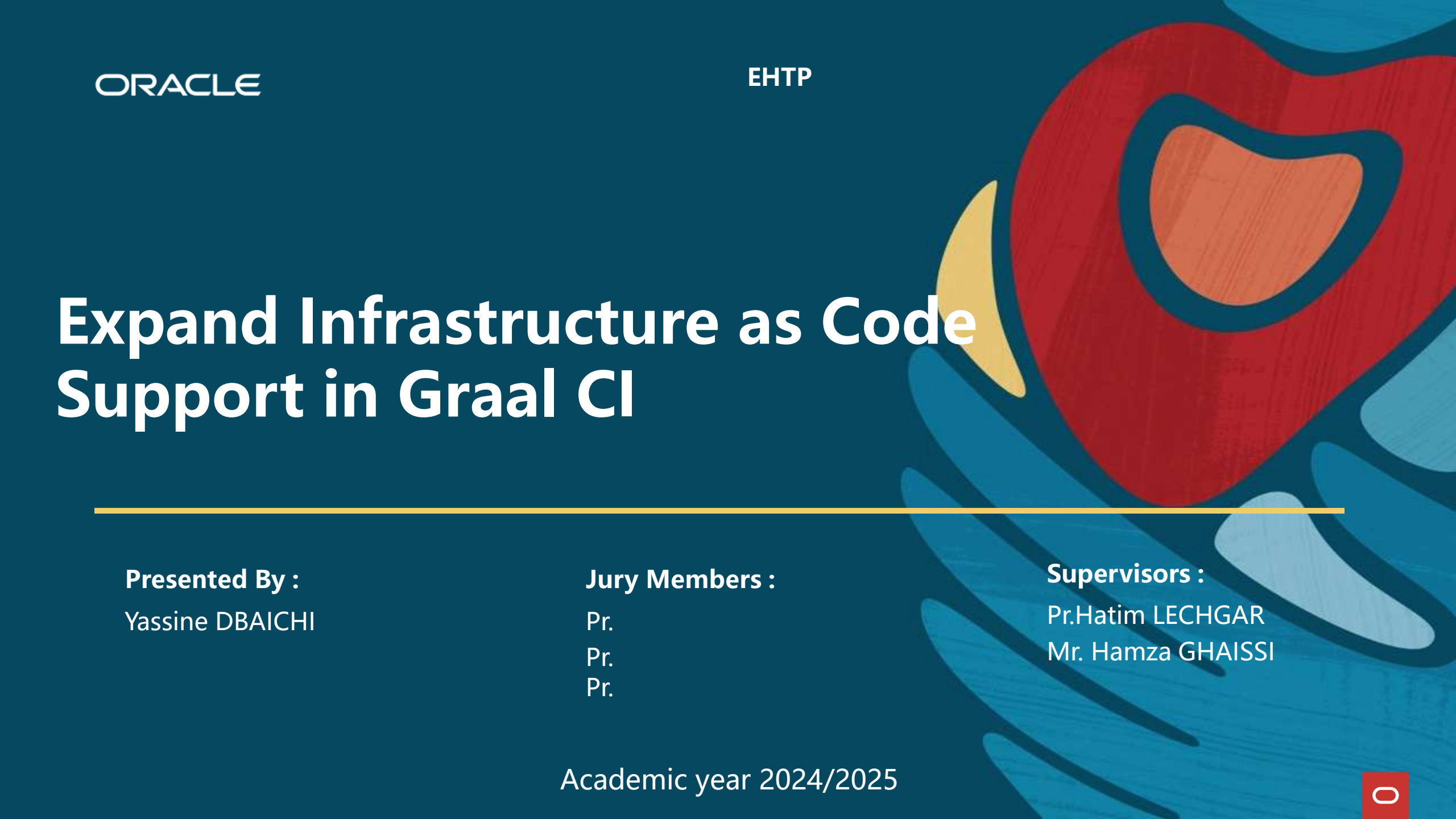
Academic year 2024/2025



Plan

1 Company & Team Context

2 Problem & Solution Overview

3 Project Management

4 Technical Implementation

5 Results & Validations

6 Future Enhancements

Company & Team Context

Oracle Corporation

- Founded 1977, Austin Texas headquarters
- 47-year track record of enterprise software
- Third-largest software company globally (2020)
- Serves 430,000+ customers worldwide
- Database software and cloud computing leader

Oracle Labs

ORACLE Health

- Formed through $28.3 billion Cerner acquisition (June 2022)
- Mission: Modernize healthcare through cloud-based solutions and AI capabilities
- #2 position in U.S. EHR market (23.4% market share)
- $5.9 billion annual revenue
- Focus: Improving patient outcomes through technology innovation

GraalVM – RISQ Team

What is **OHPAS**?

- **O**racle **H**ealth **P**atient **A**dministration **S**ervices.
- Enterprise patient scheduling & registration solution.
- Cloud-native SaaS built on Oracle Cloud Infrastructure

Team Focus :

- Front desk workflows for healthcare providers.
- Patient self-service capabilities.
- Mission: Improve user efficiency & patient satisfaction

Problem & Solution Overview

Healthcare IT Challenges

Healthcare organizations face significant IT infrastructure challenges that impact operational efficiency and patient care quality.

Fragmented Systems

Healthcare organizations often operate with disparate systems that don't communicate effectively, creating data silos and incomplete patient records.

"Disparate systems hinder coordinated patient care and data-driven insights."

Manual Data Re-entry

Lack of system integration necessitates manual re-entry of patient data, increasing error risk and consuming valuable staff time.

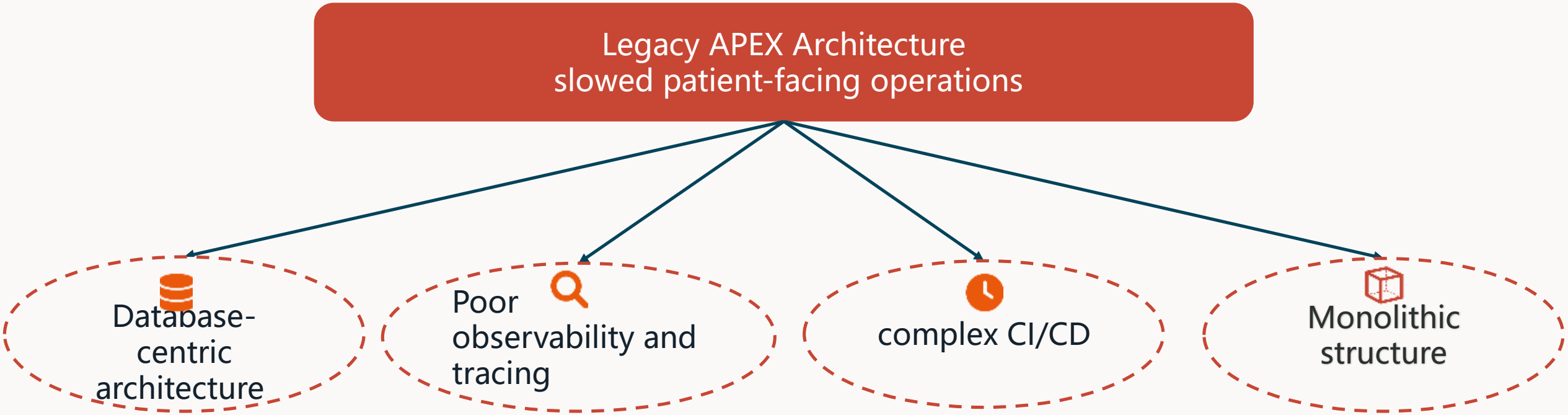
"Repeated data entry creates bottlenecks in workflows and increases operational costs."

Legacy Architectures

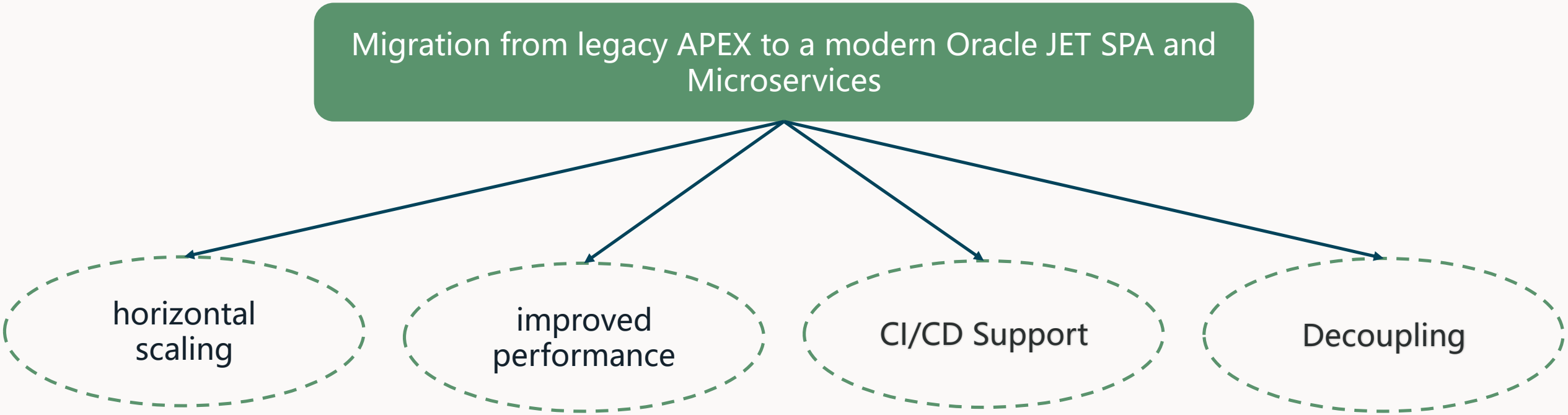
Many healthcare IT systems are built on outdated architectures that are difficult to update, scale, and maintain, slowing critical patient operations.

"Outdated infrastructure hinders adoption of new technologies and patient-centered care models."

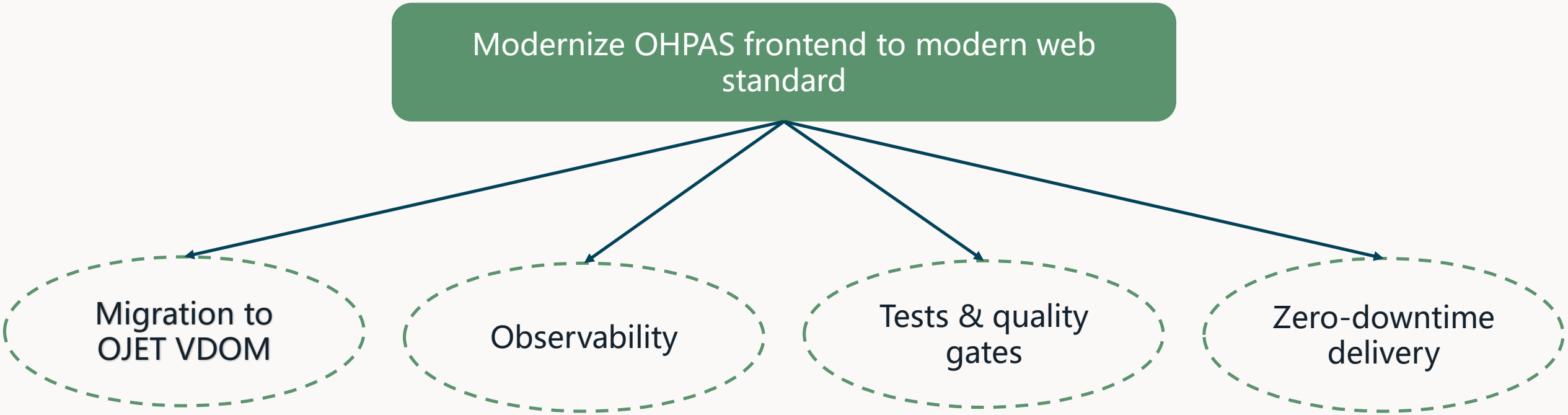
Legacy APEX Limitations



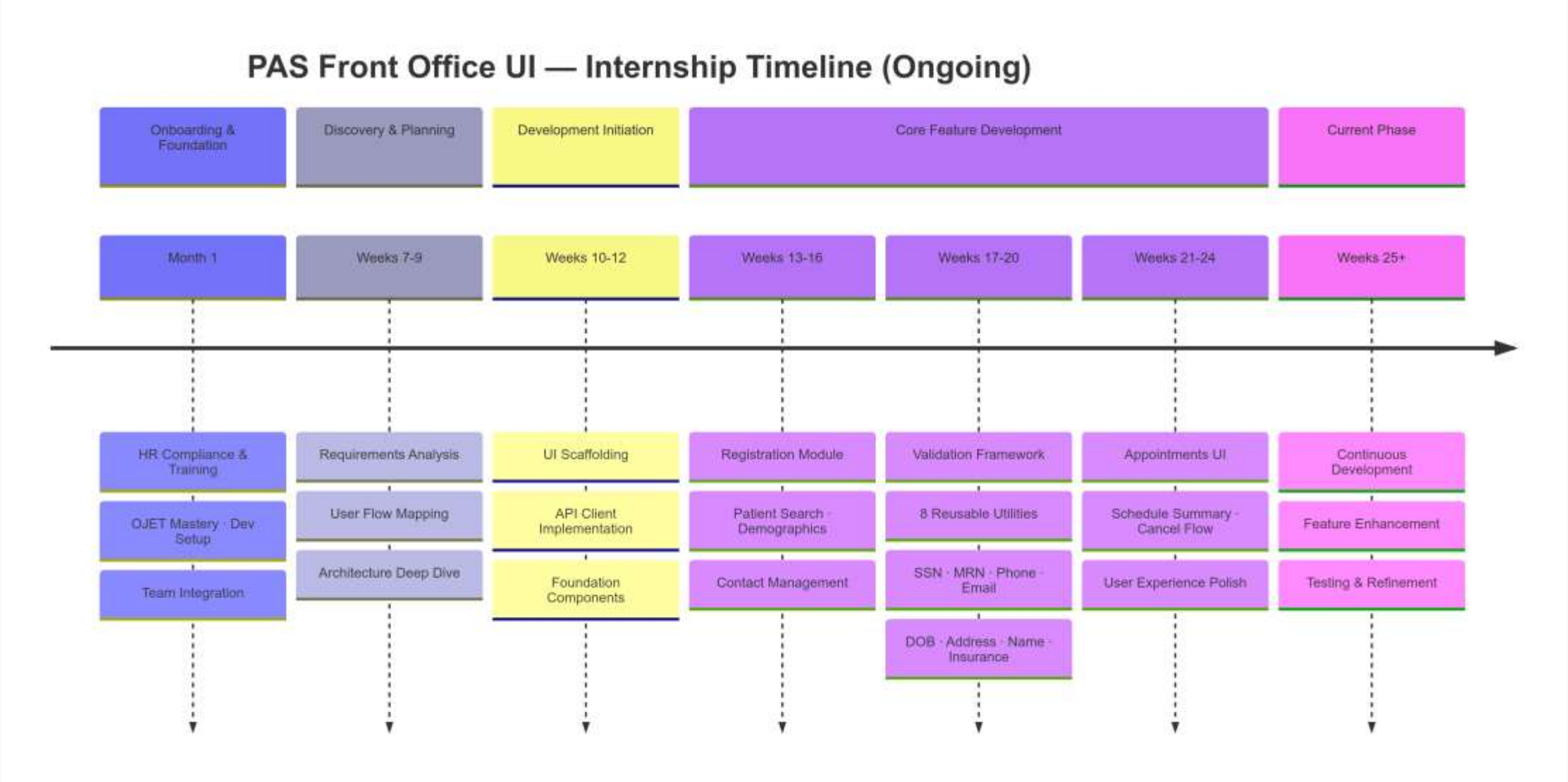
Solution Approach



Project Objectives



Project Management


PAS Front Office UI — Internship Timeline (Ongoing)
Onboarding & Foundation
Discovery & Planning
Development Initiation
Core Feature Development
Current Phase
Month 1
Weeks 7-9
Weeks 10-12
Weeks 13-16
Weeks 17-20
Weeks 21-24
Weeks 25+
HR Compliance & Training
OJET Mastery · Dev Setup
Team Integration
Requirements Analysis
User Flow Mapping
Architecture Deep Dive
UI Scaffolding
API Client Implementation
Foundation Components
Registration Module
Patient Search · Demographics
Contact Management
Validation Framework
8 Reusable Utilities
SSN · MRN · Phone · Email
DOB · Address · Name · Insurance
Appointments UI
Schedule Summary · Cancel Flow
User Experience Polish
Continuous Development
Feature Enhancement
Testing & Refinement

Communication & Collaboration Tools

- Weekly mentorship meetings
- Knowledge Transfer sessions
- Code review/Demo meetings

- Quick questions
- Status updates
- Meeting scheduling
- Daily communication with Mentor

- Managing emails
- Using Calendar to visualize and track meetings

- Company knowledge base
- Reading technical documentation

- Code collaboration
- Repository Hosting
- Pull request reviews

Technical Implementation

System Architecture

The OHPAS UI operates on a multi-layer architecture designed for resilience, scalability, and clear separation of concerns.

Presentation Layer
JET/Preact SPA providing the user interface

Delivery Layer
CDN for content delivery and WAF for security

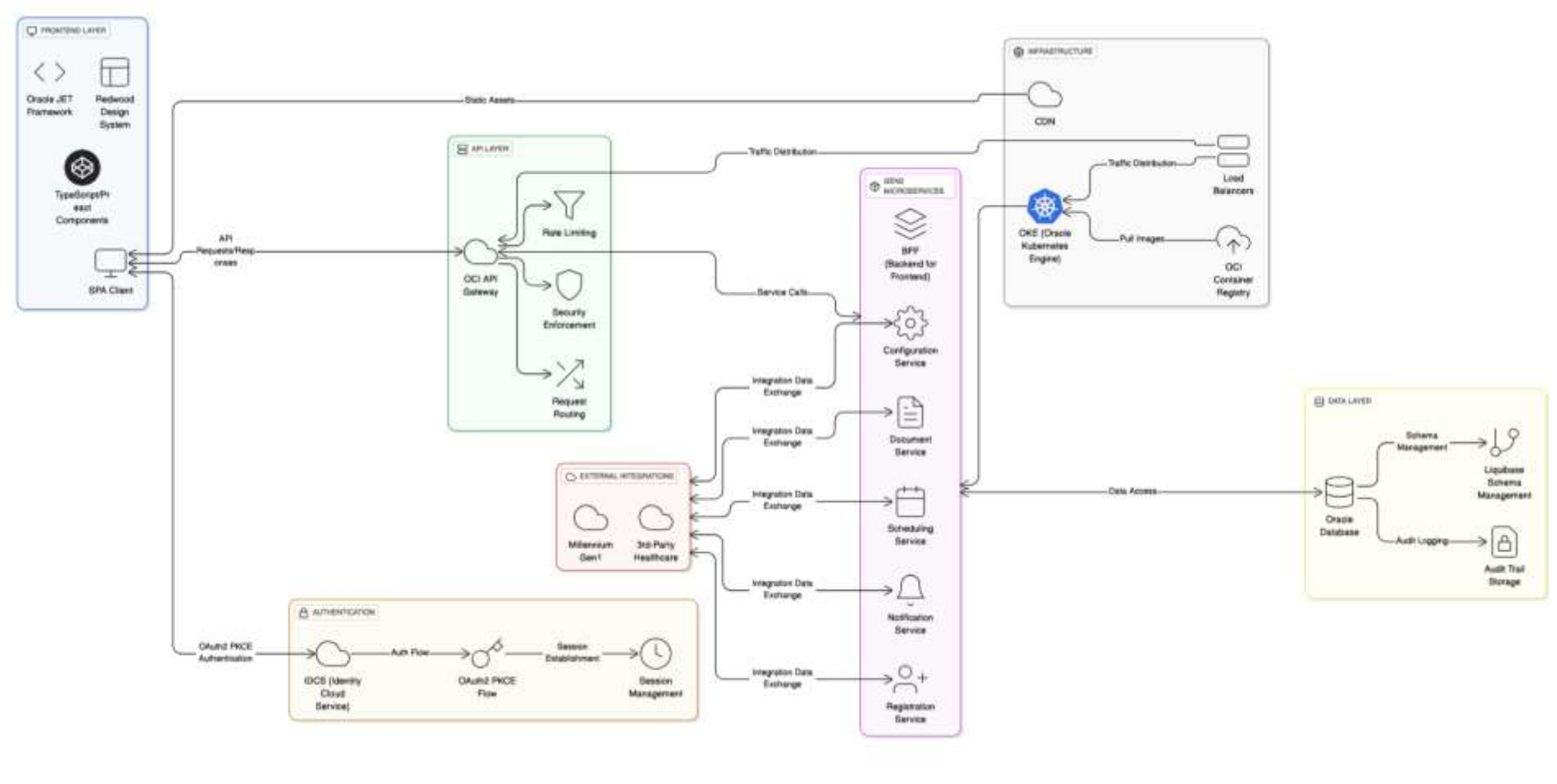
API Gateway
Single entry point for client requests

Authentication Layer
IDCS for user authentication and authorization

Gen2 Microservices
Collection of loosely coupled services

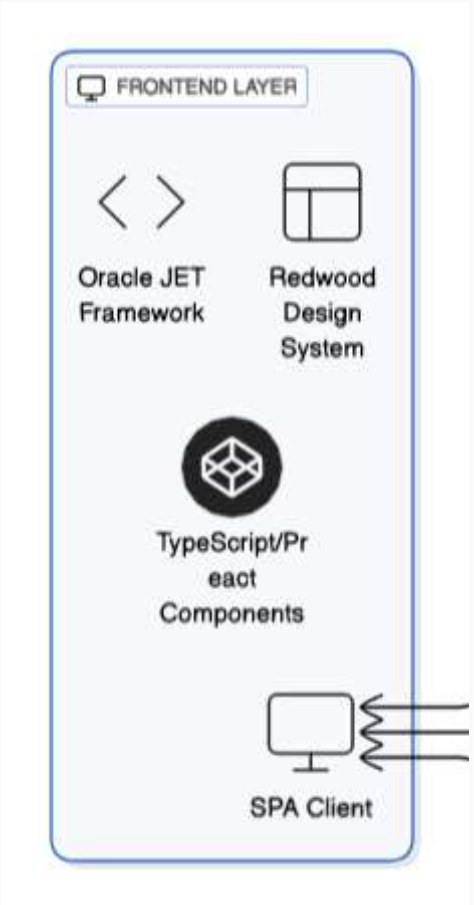
Observability
APM with distributed tracing for monitoring

System Architecture

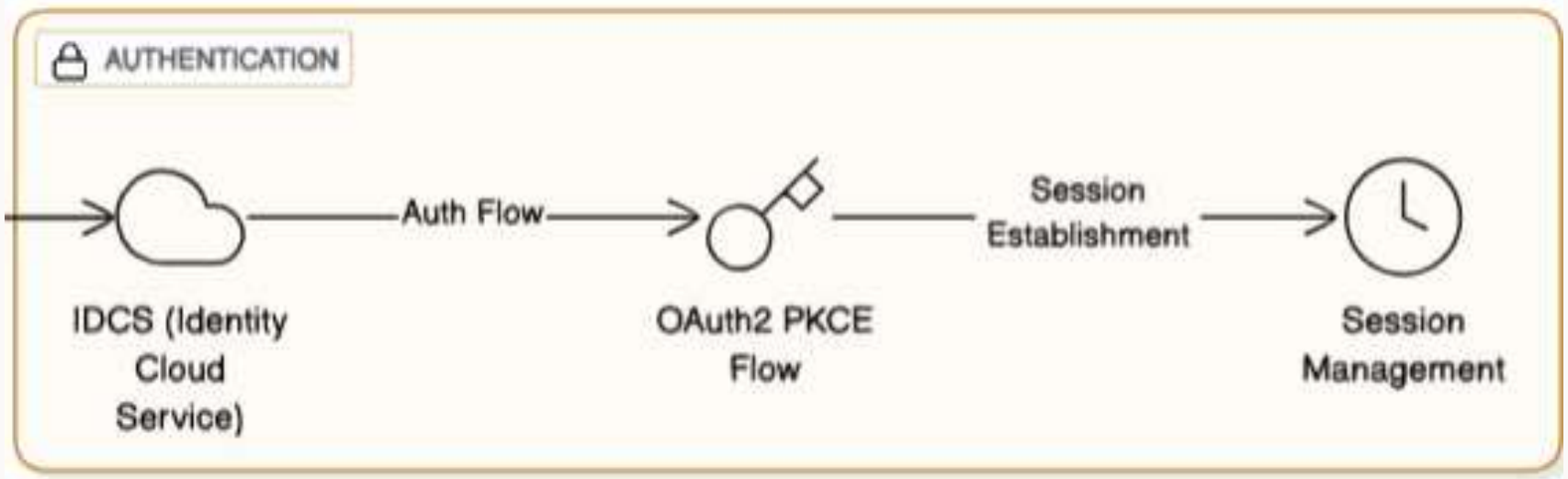


Multi-Layer Design of the

System Architecture



System Architecture



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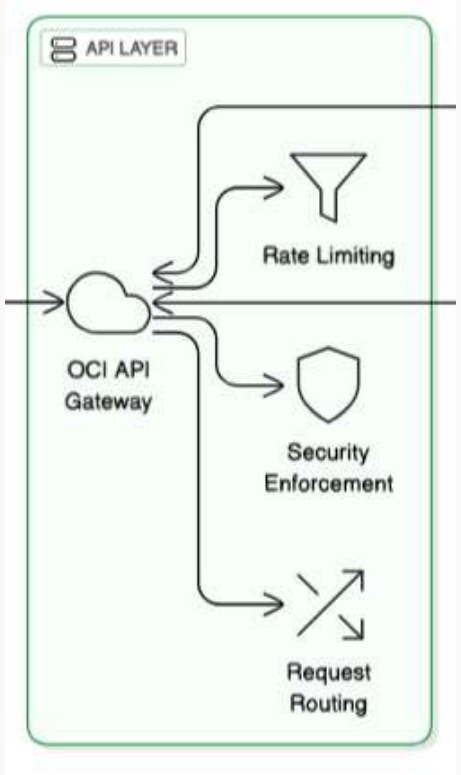
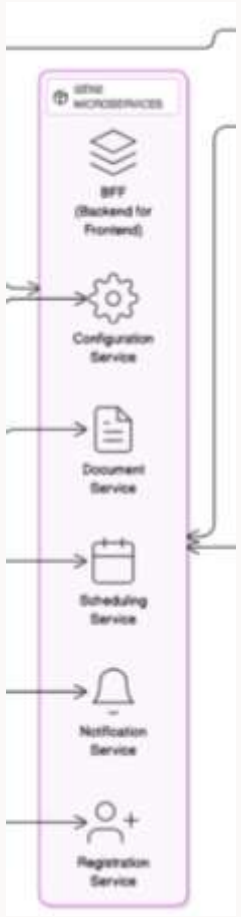
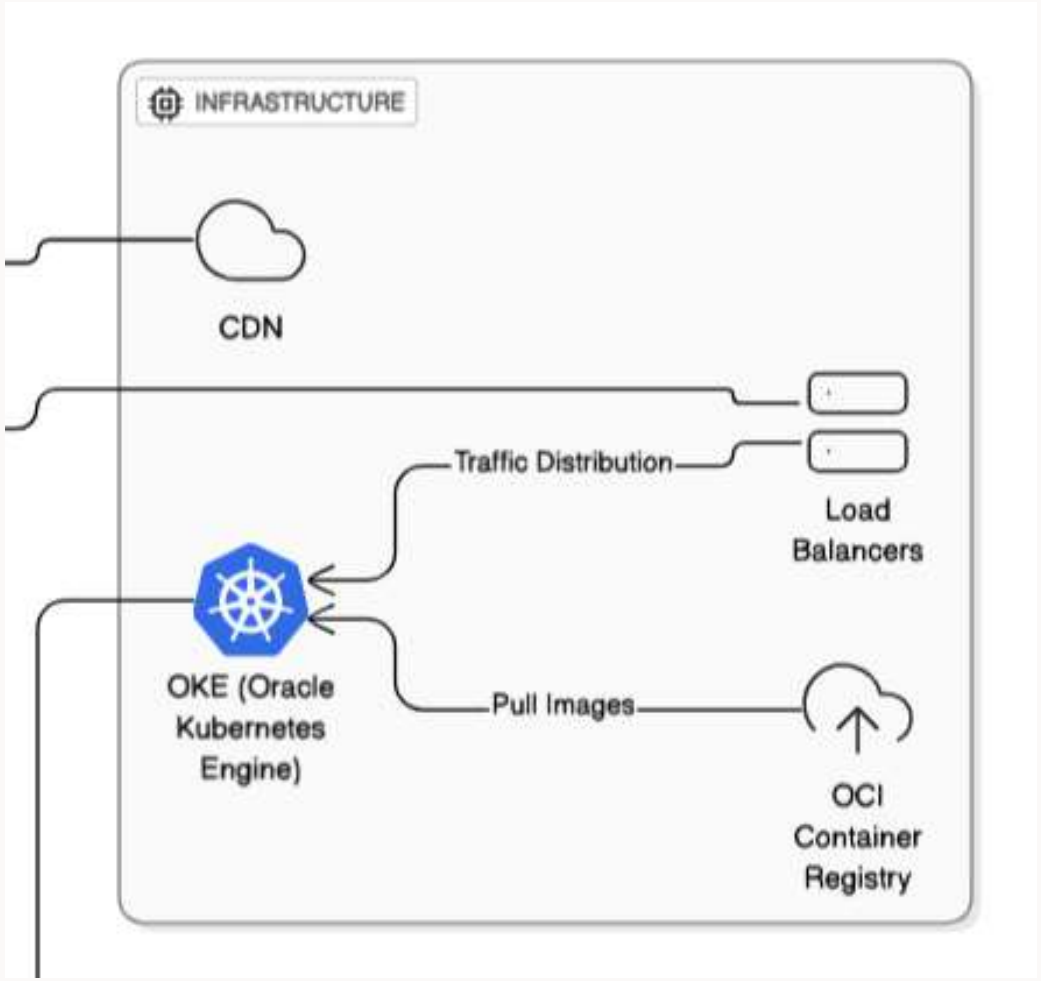


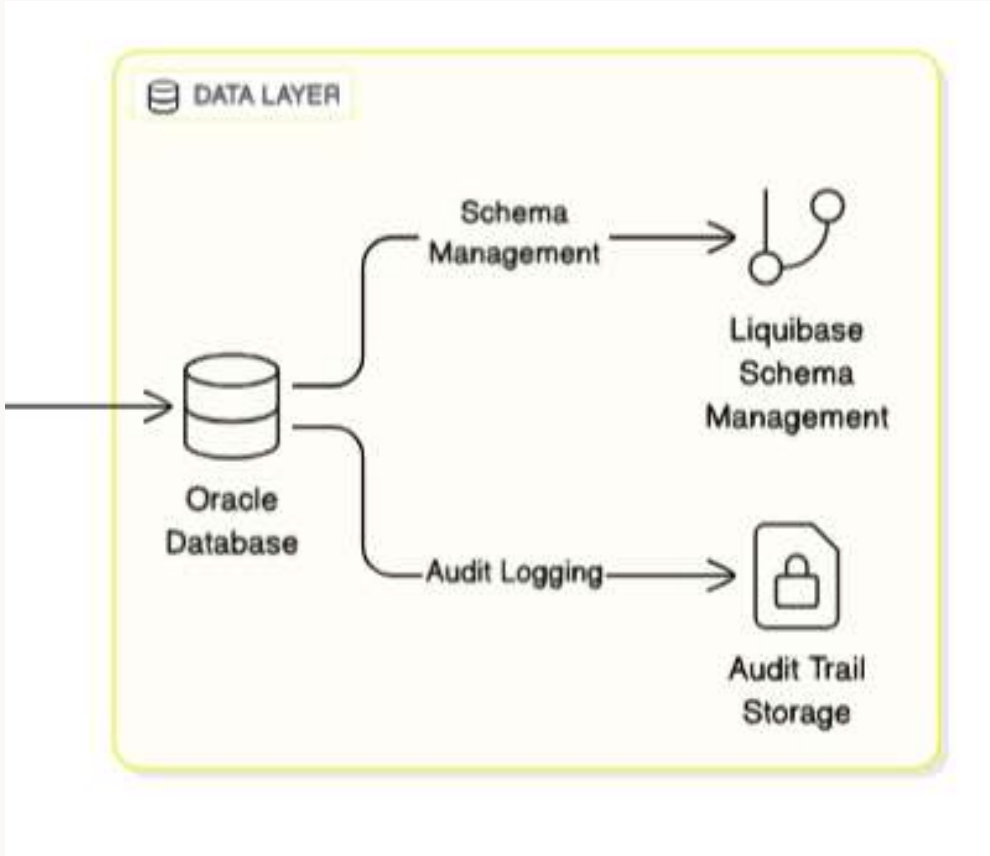
System Architecture



System Architecture



System Architecture



PAS UI Front Office Deliverables

Patient Registration Module

Multi-criteria search
Efficiently search for existing patient records with flexible search parameters

Registration forms
Comprehensive forms for new patient intake, capturing essential demographic and medical information

Self-registration
Enable patients to initiate their registration process independently, reducing front-desk workload

Emergency contacts
Manage and update emergency contact details for patients

Appointment Management Features

Summary pages
Clear overviews of scheduled appointments

Cancellation workflow
Streamlined process for all users

Gen2 integration
Seamless integration with the Gen2 microservices for appointment management

Reusable Infrastructure

A core aspect of the project was developing reusable components and utilities to promote consistency and accelerate future development.

8 Validation Utilities

SSN
Validates Social Security Numbers with proper formatting and checksum verification

MRN
Ensures Medical Record Numbers follow proper format and contain valid characters

Insurance
Validates insurance details including plan types and coverage periods

Phone
Checks phone numbers for proper formatting and valid country codes

Email
Verifies email addresses with proper syntax and domain validation

Address
Validates physical addresses including street, city, state, and postal code

DOB
Ensures Date of Birth is in proper format and a valid date

Patient Name
Validates patient names with proper capitalization and special character handling

Additional Reusable Components

Form State Preservation
Mechanisms to maintain form data across user interactions, preventing data loss

Error Boundaries
React error boundaries to handle UI errors and prevent application crashes

Telemetry Hooks
Custom hooks for integrating telemetry and logging, enabling better observability

Component Architecture

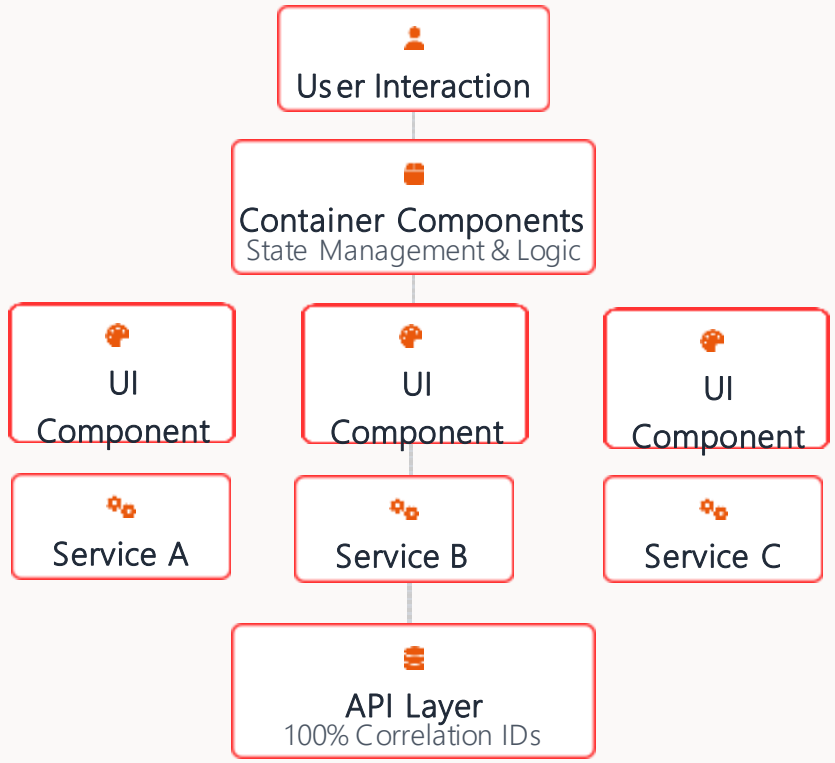
Container/Presentation Separation
Clear distinction between container components (managing state and logic) and presentation components (handling UI display).

Custom Hooks for Logic Encapsulation
Extensive use of custom React hooks to encapsulate business logic, promoting reusability and reducing component complexity.

Strict TypeScript Validation
Utilizing strict mode for enhanced type checking and data integrity validation across the entire codebase.

Contract-Driven Development
API contracts defined using TypeSpec, ensuring consistency between frontend and backend services.

Component Architecture Visualization



Key Insight: 100% of API calls were instrumented with correlation IDs for enhanced distributed tracing and debugging

Self Service UI example

Testing Excellence

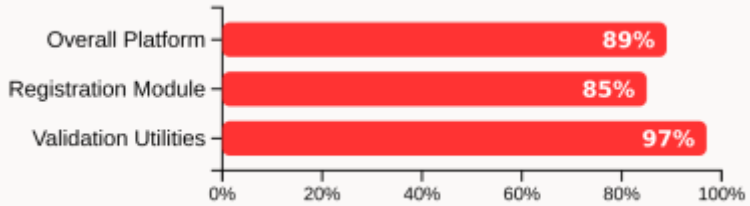
Test Coverage

89%

Overall Platform Coverage

- 428 test suites
- 2,093 individual tests

Module Coverage



Testing Strategy

Comprehensive testing approach ensuring reliability and stability across the OHPAS UI platform.

Tools Utilized

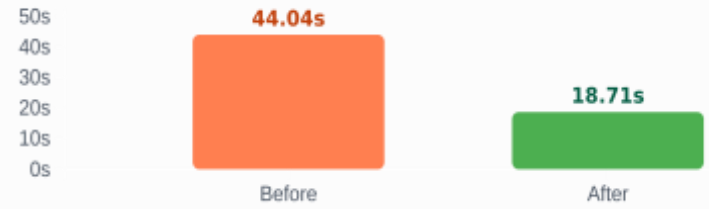
- **Jest** — Unit testing
- **Preact Testing Library** — Component snapshot testing
- **ircf-ui-testing Library** — Custom hook testing

Results & Validations

Performance Improvements

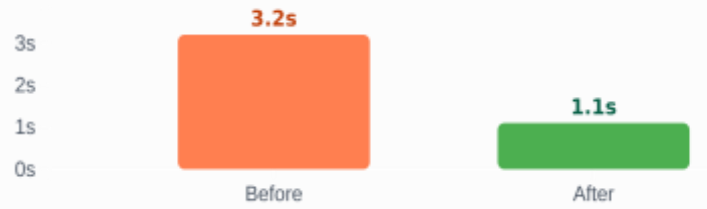
The modernization project delivered significant performance improvements across all critical workflows, ex

Appointment Workflow — 57.5% Faster



Before: 44.04s | After: 18.71s | Improvement: 25.33s

Patient Search — 65.6% Faster



Before: 3.2s | After: 1.1s | Improvement: 2.1s

Initial Load Time — 68.2% Faster

Before: 8.5s | After: 2.7s | Improvement: 5.8s

System Availability

Before: 97.2% | After: 99.8% | +2.6%

Operational Benefits

The OHPAS UI Modernization project implemented advanced DevOps practices, resulting in enhanced operational efficiency and system resilience.

Zero-Downtime Deployments

Implemented blue-green deployment strategy enabling seamless updates without service interruption.

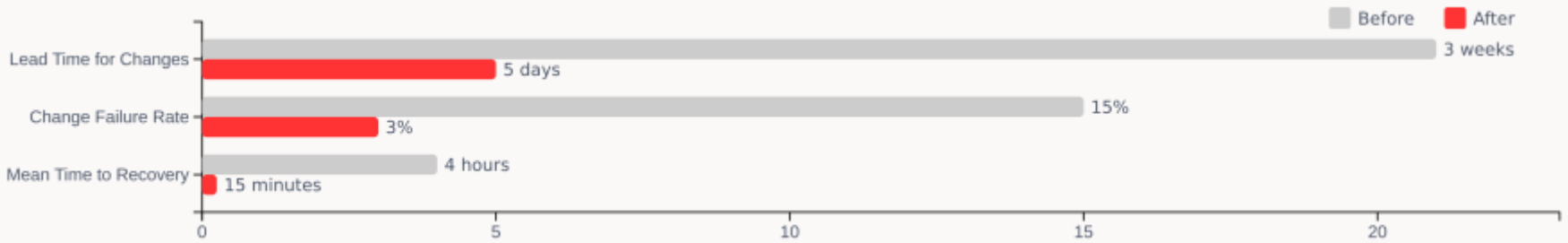
API Correlation IDs

100% of API calls now instrumented with correlation IDs for enhanced distributed tracing.

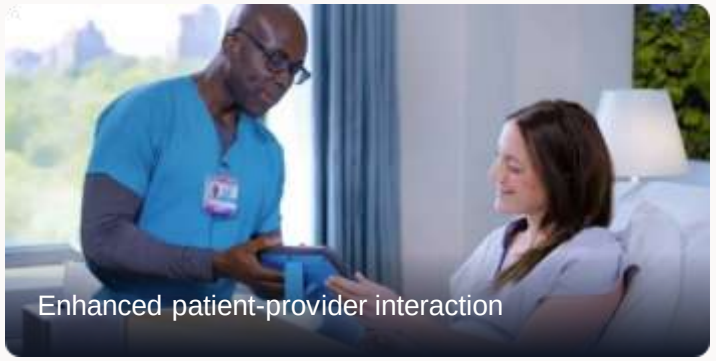
Deployment Frequency

Increased from monthly to daily deployments, enabling faster delivery of features.

Key Metrics Improvements



Operational Benefits


Enhanced patient-provider interaction

The OHPAS UI modernization delivers tangible business value by streamlining patient operations, improving data accuracy, and enhancing the overall patient and provider experience.

Faster Registration

Reduced wait times directly contribute to higher patient satisfaction.

Improved Data Accuracy

Minimizes errors and rework, ensuring data integrity.

Enhanced Patient Experience

Self-service capabilities empower patients and reduce front-desk workload.

Simplified Operations

Reduced maintenance overhead through simplified technology stack.

Key Achievements

Migration to Oracle JET
Successfully transitioned the OHPAS UI from legacy APEX to a modern Oracle JET Single Page Application, enhancing performance and scalability.

Reusable Validation Utilities
Created 8 robust validation utilities for critical healthcare data fields (SSN, MRN, insurance, phone, email, address, DOB, name).

Zero-Downtime Deployments
Implemented blue-green deployment strategy enabling seamless, zero-downtime updates for continuous service availability.

UI Component Delivery
Developed and delivered over 15 new UI components, enhancing the user interface and experience for healthcare providers and patients.

High Test Coverage
Achieved impressive 89% overall test coverage across the platform, ensuring reliability and stability.

HIPAA-Compliant Security
Ensured all development and deployment practices adhered to HIPAA regulations, safeguarding patient data.

Future Enhancements

INPT

Development and Enhancement of the OHPAS UI

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