



Breeze - Architecture & Technology Stack



Contents

- ❖ Requirements & Approach
 - What problems can Breeze solve?
 - What capabilities does Breeze deliver?
- ❖ Architecture Blueprint
 - Modular breakdown of a typical digital product
 - Blueprint mapping to application requirement
- ❖ Technology Platforms
 - Technology options and recommendations for various modules
- ❖ Development Process
 - Agile Development & Iterative Releases
 - UX and UI Design
 - Testing and QA
 - DevOps Automation





Requirements & Approach



What problems can Breeze solve?

Current Status

- ❖ Enterprises have implemented technology solutions that address their internal requirements and processes
- ❖ Customers today expect services via multiple service delivery channels including web portals, mobile, API integration as well as over-the-counter.
- ❖ Enterprises are seeking to reinvent their internal solutions into customer facing digital products or Software as a Service (SaaS) model

Current Technology Stack

- ❖ Enterprises currently use proprietary technologies that have been extensively customized
- ❖ Digital products and SaaS platforms are being built using cloud native and open source technologies
- ❖ This requires significant reengineering or solutions, and reinvention of user experience
- ❖ Breeze helps accelerate this reengineering process significantly



What capabilities does Breeze deliver?

❖ Product Capabilities

- **Flexibility:** It should have the flexibility for easy customization to fit different customer requirements
- **SaaS:** It should be possible to provide the product as a hosted platform with a multi-tenant architecture
- **Scalable:** It should be scalable so that it can maintain performance under high loads
- **Cost Effective:** It should be cost effective for customers and hence should minimize any external dependencies
- **Future Proof:** It should be future proof from technological obsolescence

❖ Design Capabilities

- **Build For Change at Scale:** Use modern architectural models that leverage emerging technologies to provide highly flexible and scalable products and to future proof the product
- **Open Source:** Use open source technologies that are cost effective, provide full control, and are well proven in the industry
- **Agile Development:** Create a design and development process that is able to keep the product abreast of new technologies and innovations
- **Automation:** Use automation for seamless process from design to development to deployment





Architecture Blueprint



Accion Breeze - A Design Framework for Digital Products

- ❖ Accion Breeze is a Digital Product Blueprint that is a scalable architecture that leverages open source emerging technologies
- ❖ Breeze has been used to develop several digital products for industries ranging from retail, healthcare, e-governance, finance and insurance
- ❖ Breeze is available in the form of an architectural blueprint as well as out of the box platforms and services with automated deployment and centralized management
- ❖ We propose to use Breeze as a framework to accelerate application development



Sample Products Portfolio



Entertainment
Partners



AMERICAN WATER



Wolters Kluwer

FuzioN



The first name in enclosure systems



CHANGE
HEALTHCARE™



Management
Science
Associates, Inc.



Grant Thornton



CBC Innovis

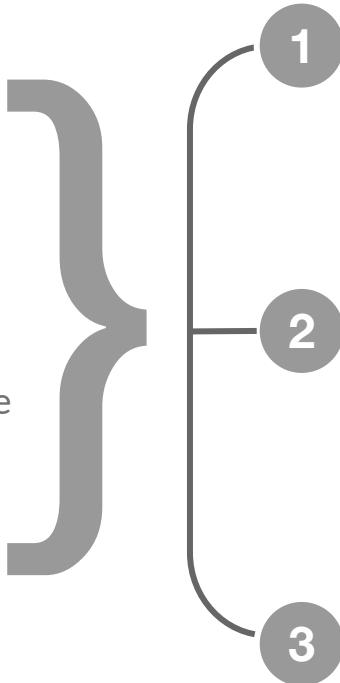
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RAPID



Breeze

- a blueprint
for designing innovative
digital products



Modern Digital User Experience

- Zephyr - a conversational interface
- Alizeh - a predictive, personalized web interface

Scalable Architecture

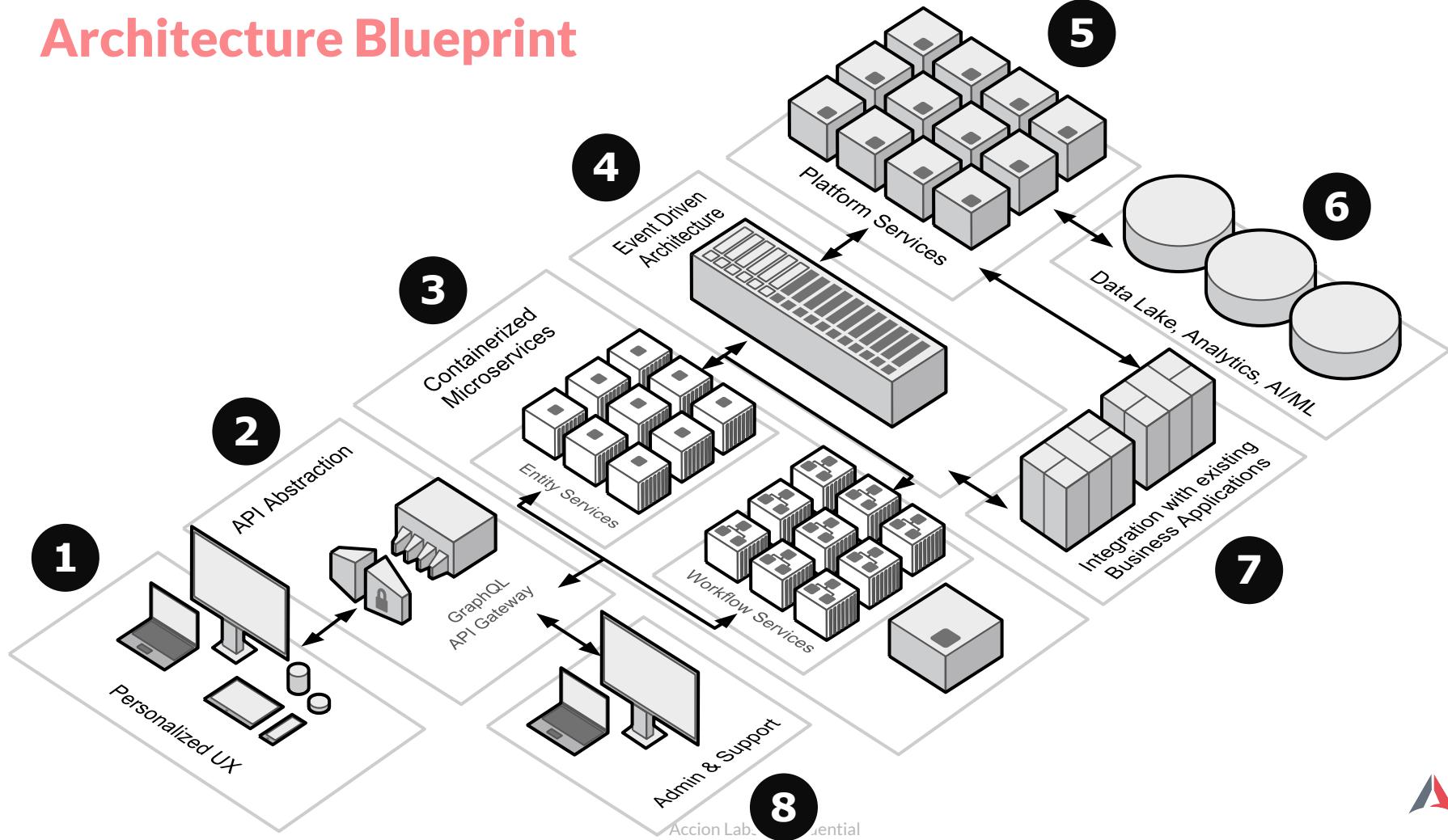
- Application MicroServices
- SaaS Platform Services
- Integration with Business Applications
- Data Lake, Analytics, AI/ML

Automation Driven Process

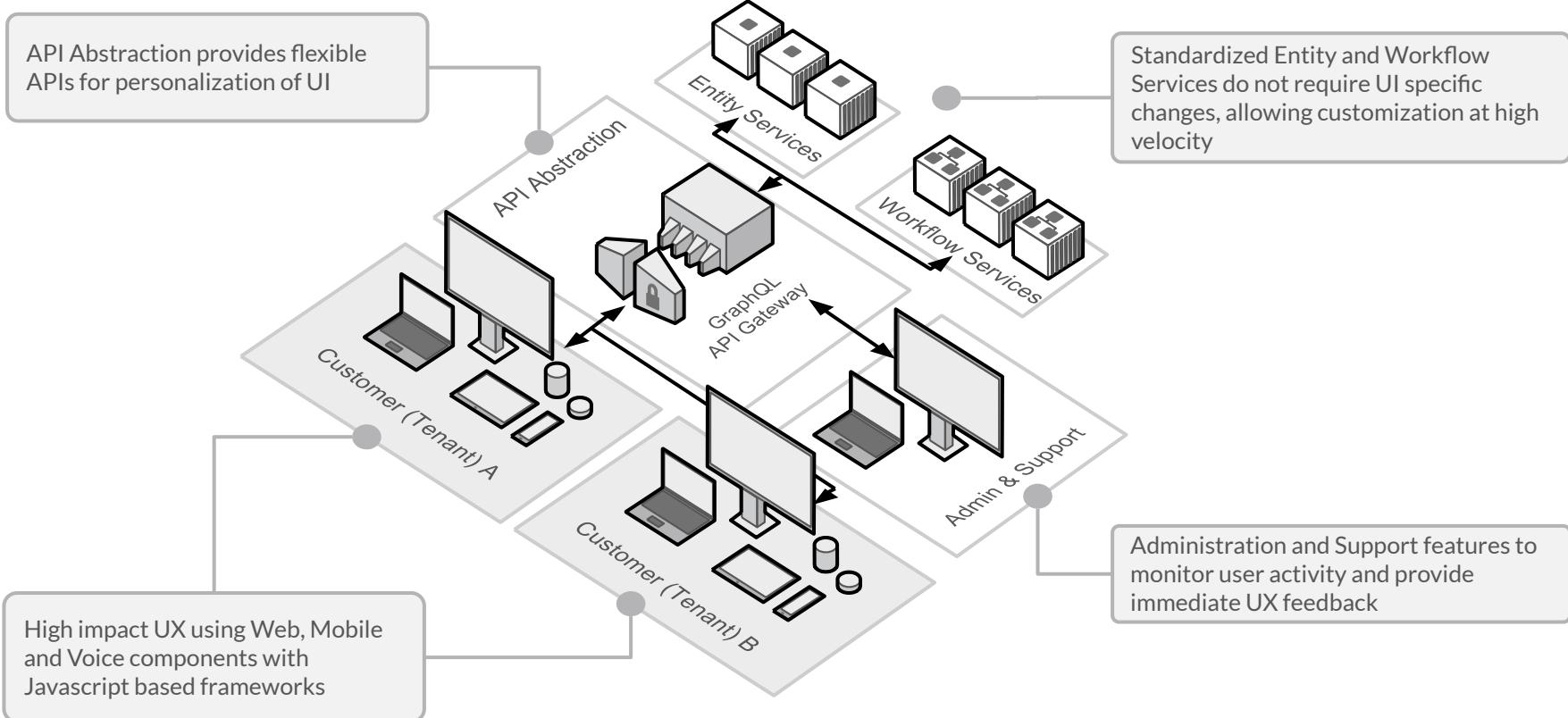
- Product Design Process
- Technology Architecture Blueprint
- Product Component Catalog
- Automated Deployment & Monitoring



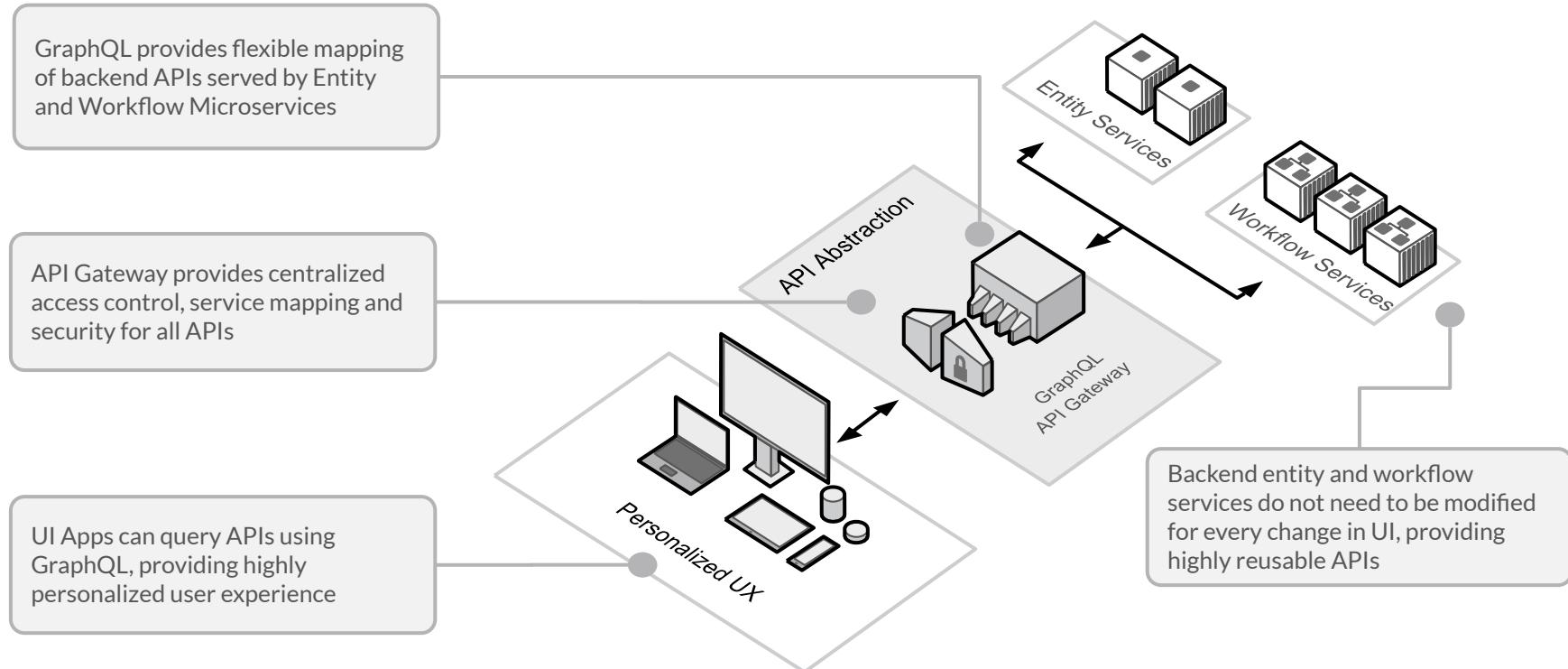
Architecture Blueprint



Personalized User Experience

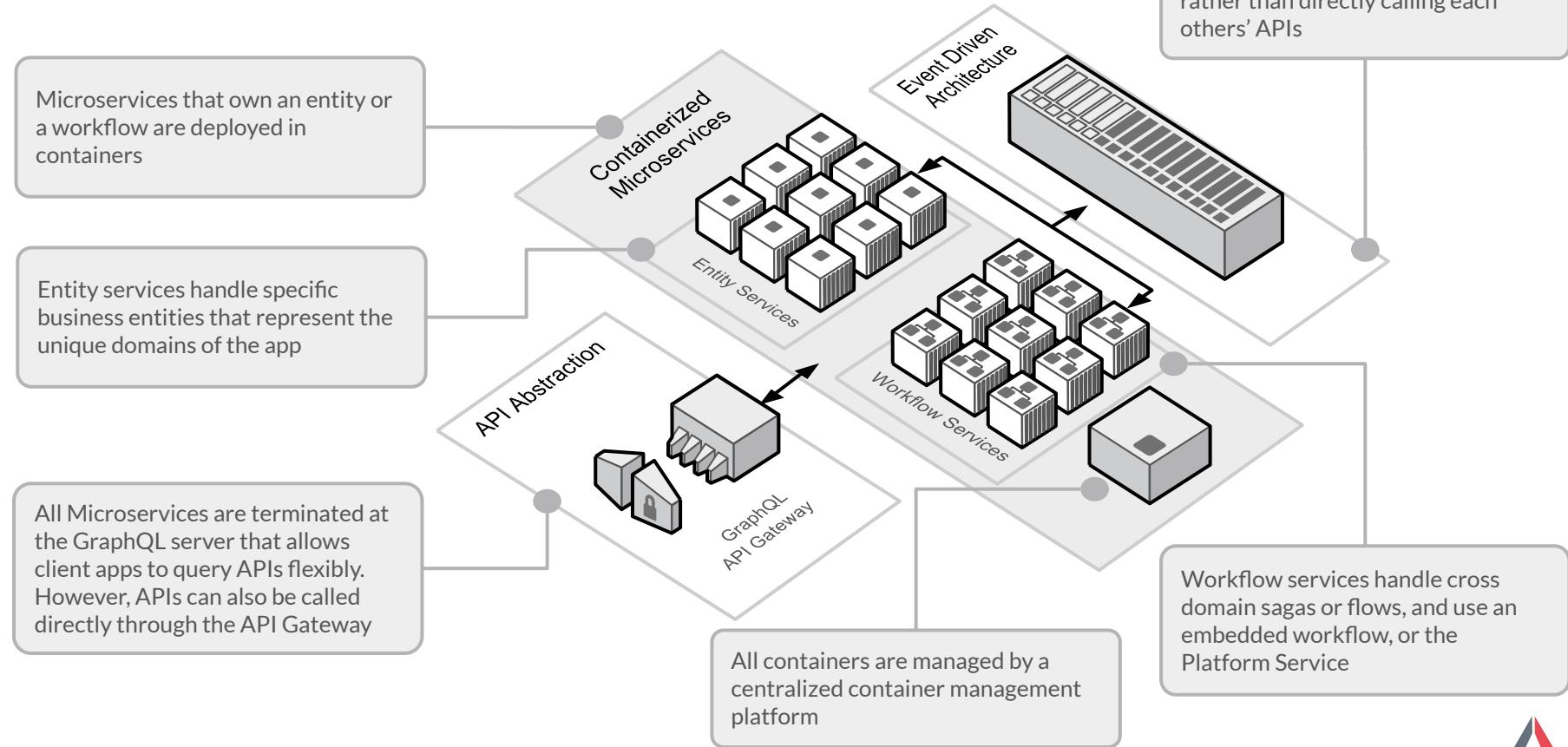


API Abstraction

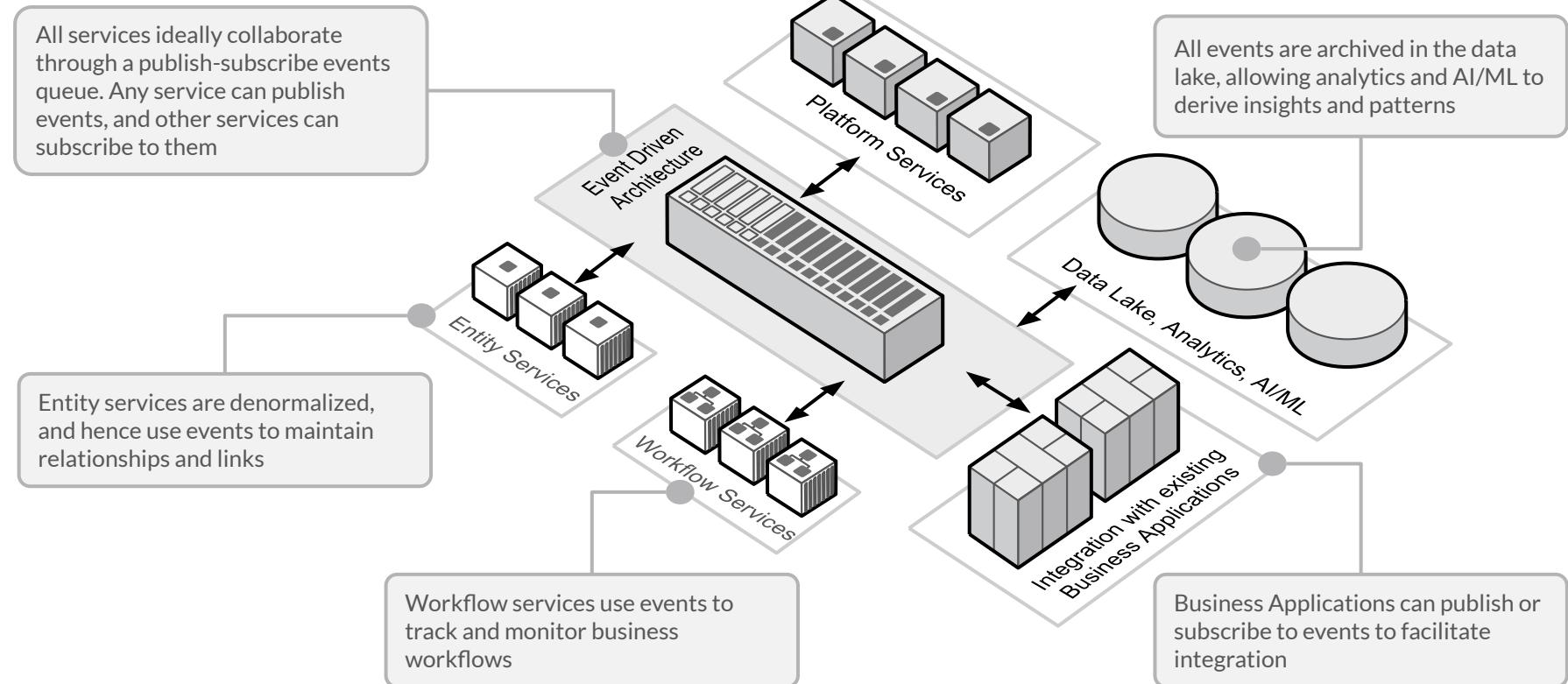


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Containerized Microservices

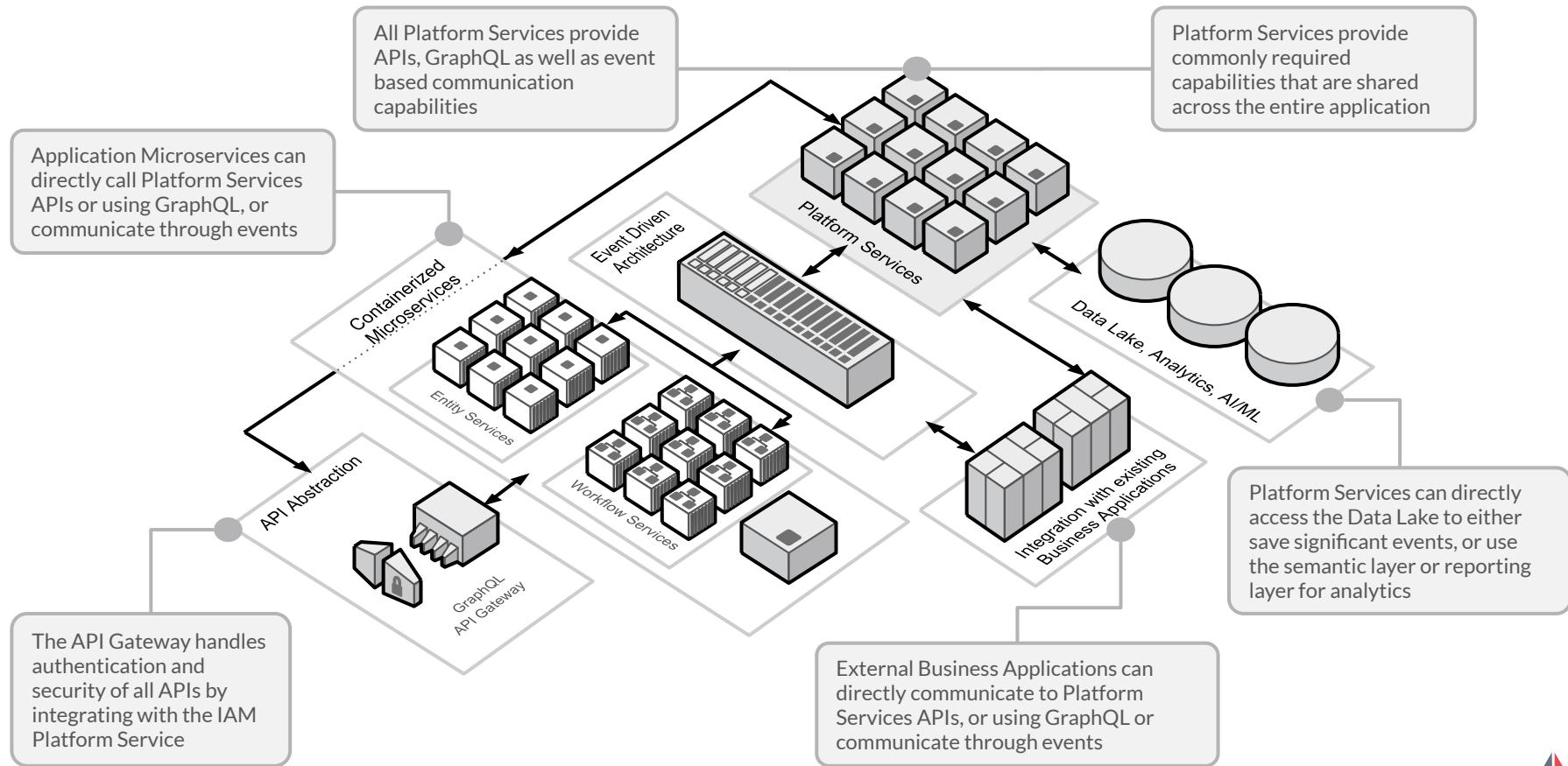


Event Driven Architecture

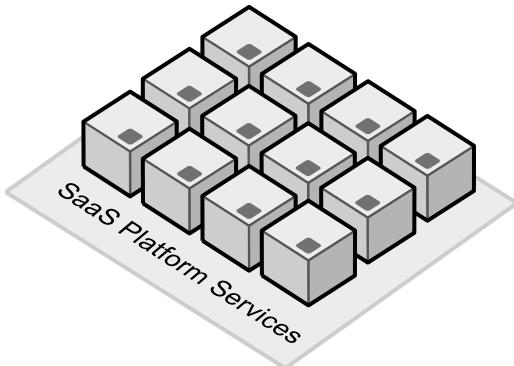


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Platform Services



Platform Services

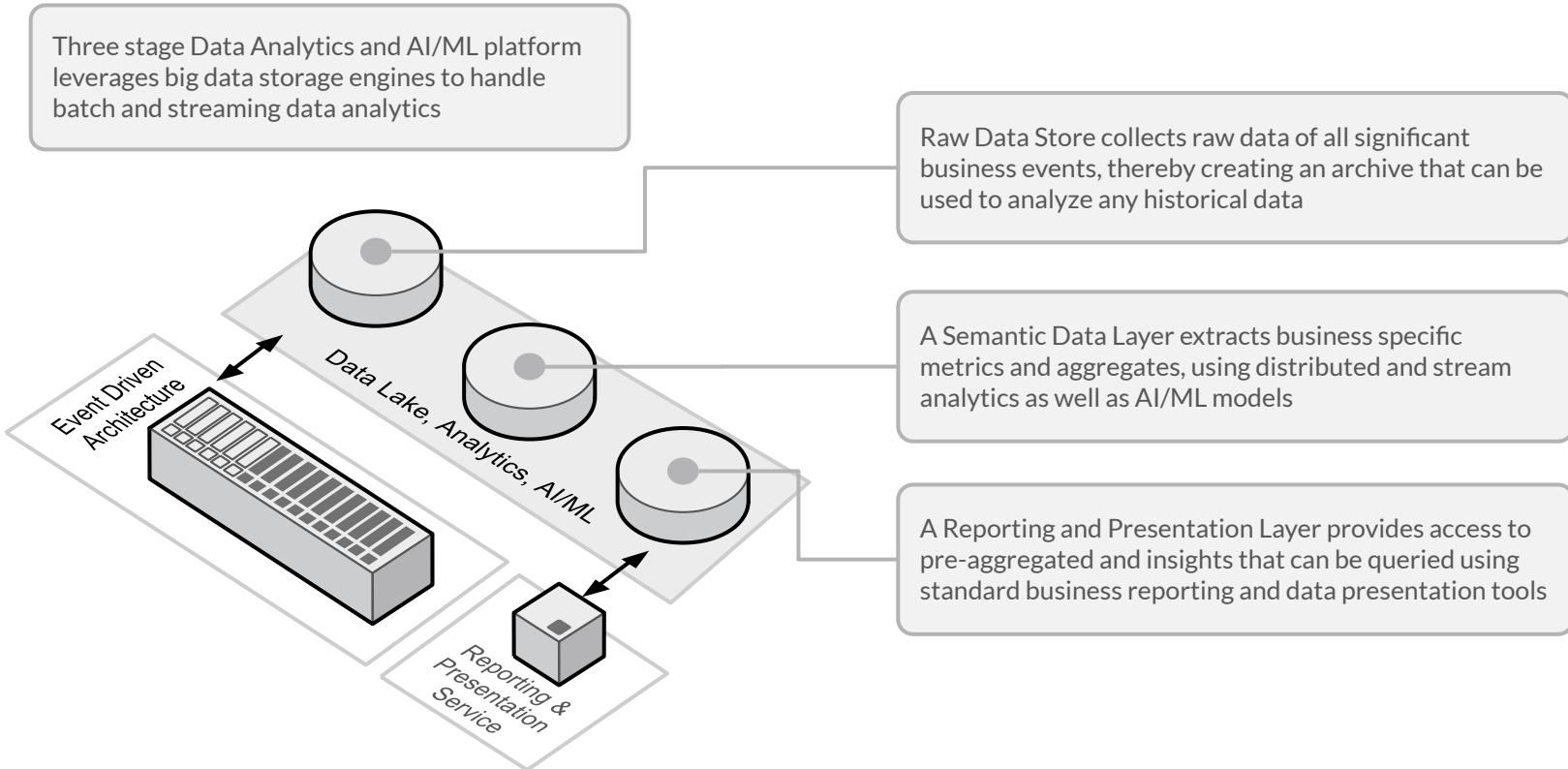


Platform Services provide capabilities that are mandatory for all contemporary digital products

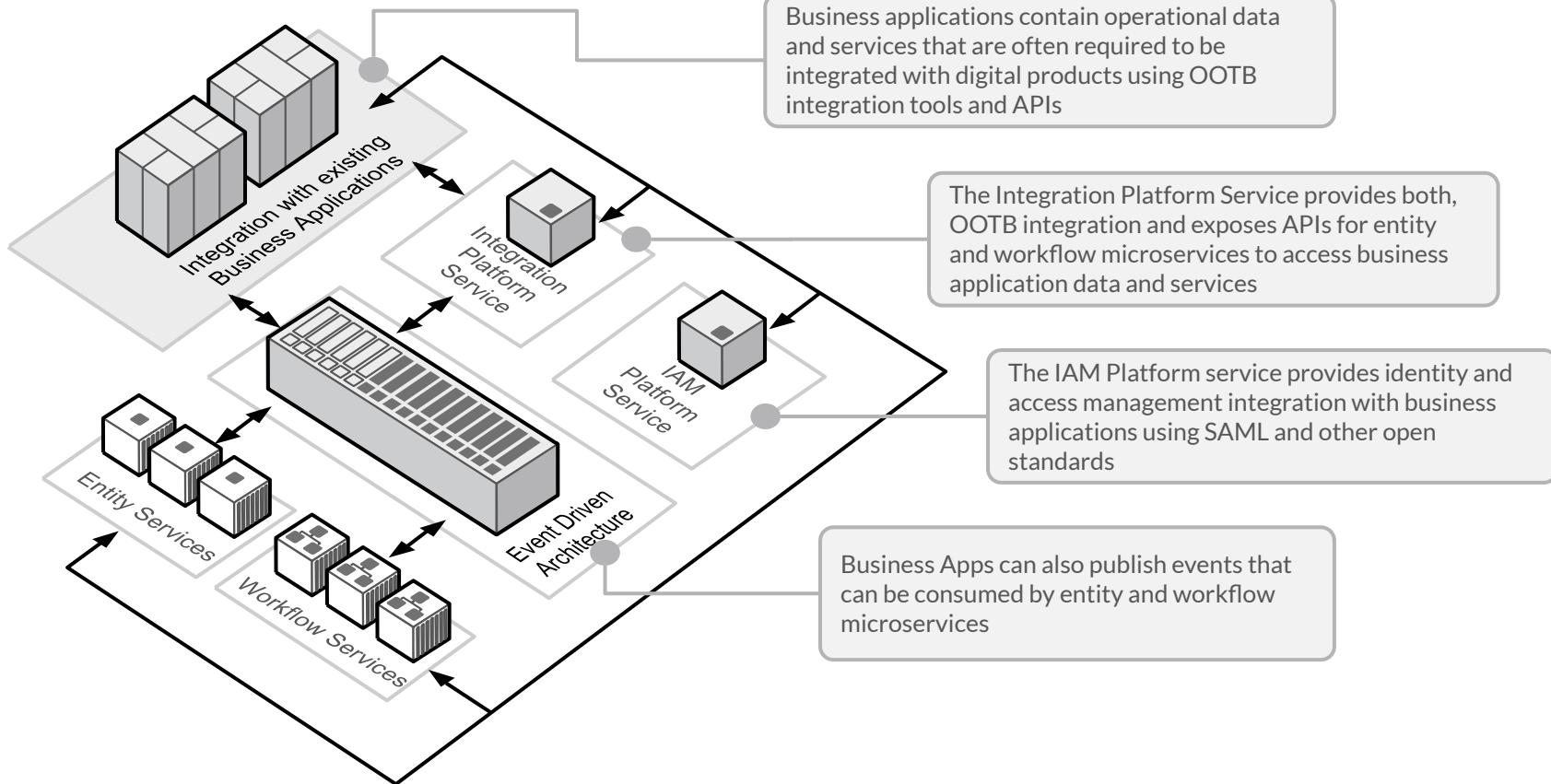
- **Identity and Access Management** - Service for securely initiating, storing and managing user identities and access permissions
- **Integration Service** - API driven integration with third party platforms such as Billing, CRM, Marketing, Analytics and AI/ML
- **Recommendation Engine** - AL/ML based recommendations by monitoring user activity provides intelligent personalization
- **Workflow Engine** - Provides choreography of business workflows used largely by Workflow Microservices
- **Alerts and Notifications** - A notification engine that sends notifications like Push, SMS, email, etc. to any device
- **User Activity Logging/Logger** - Stores logs generated based on events; this component is mainly used for error tracking and application monitoring.
- **Template Engine** - Used to generate standardized reports, documents, emails, etc.
- **Conversational UI** - Computer program/AI entity that can be integrated with messaging platforms, websites, etc.
- **Mail & Calendar Service** - Connects with Office 365 for reading/sending emails + view/create calendar events from custom application
- **Form Builder** - Service to support user defined forms and data collection
- **Search Engine** - Advanced search capabilities like fuzzy search, highlights, autocomplete, etc.
- **Reporting Engine** - Integration with a reporting engine that can be used by all business microservices
- **Usage Monitoring** - Monitor the usage of different units like CPU, memory, disk, etc.
- **Headless CMS** - Back-end only content management system that makes content accessible via a RESTful API for display on any device



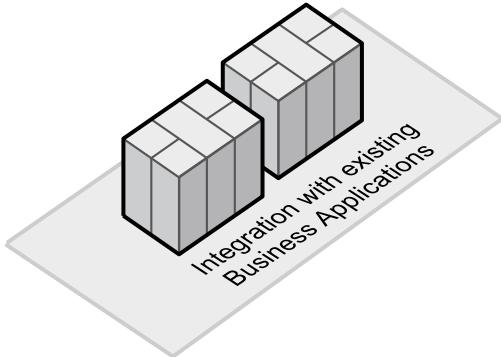
Data Lake, Analytics and AI/ML



Integration with Business Applications

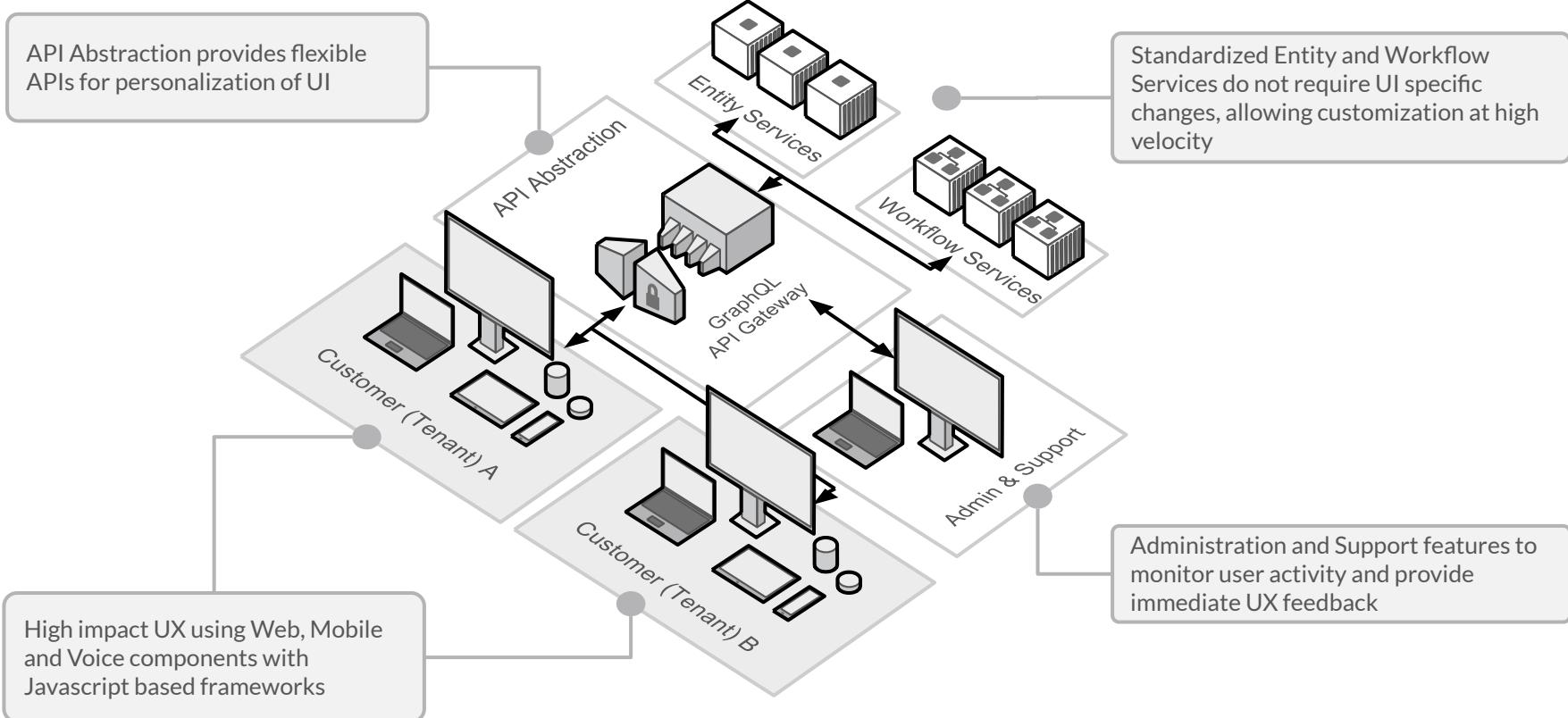


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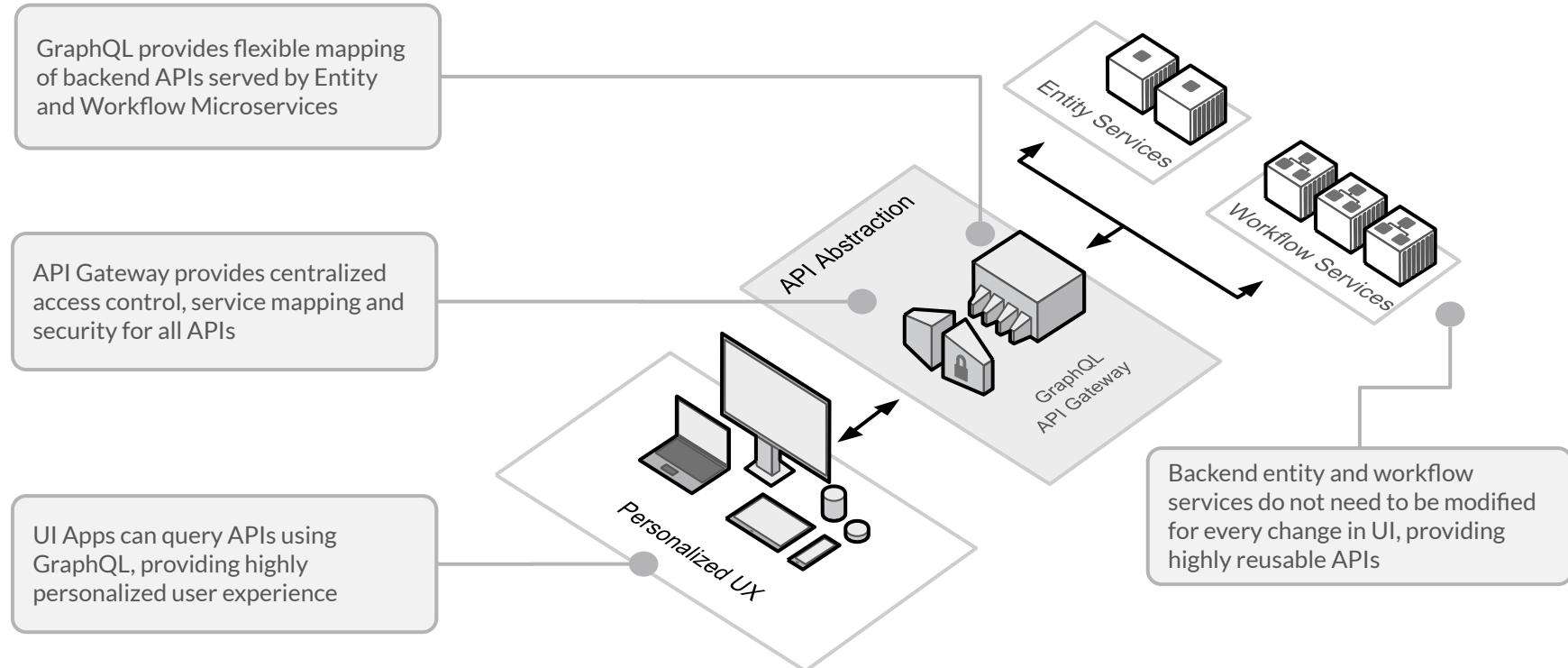


- **Active Directory** - authentication of admin and support users
- **SAP** - transaction system for billing and payments
- **Google Apps** - email, calendar, tasks
- **Office.com** - email, calendar
- **Sharepoint** - content, team sites, documents
- **Learn Management System** - provides training courses and hours of training completed or pending.
- **Zuora** - billing, payment and subscription
- **Keycloak** - Identity and Access Management, SSO
- **Pingdom** - SSO with AD
- **SecureAuth** - SSO with AD/LDAP
- **Salesforce CRM** - Customer master, Customer interactions, purchases
- **Microsoft Dynamics CRM** - All master entities including products and customers are created and managed here.
- **ETS Payment Gateway** - handles all payments from enrolled customers. Provides APIs for payment processing and webhooks for renewal reminders etc.
- **Paymenturs Payment Gateway** - handles all payments from customers. Provides APIs for payment processing and webhooks for renewal reminders etc.
- **Cloudinary** - CDN, Image optimisation

Personalized User Experience

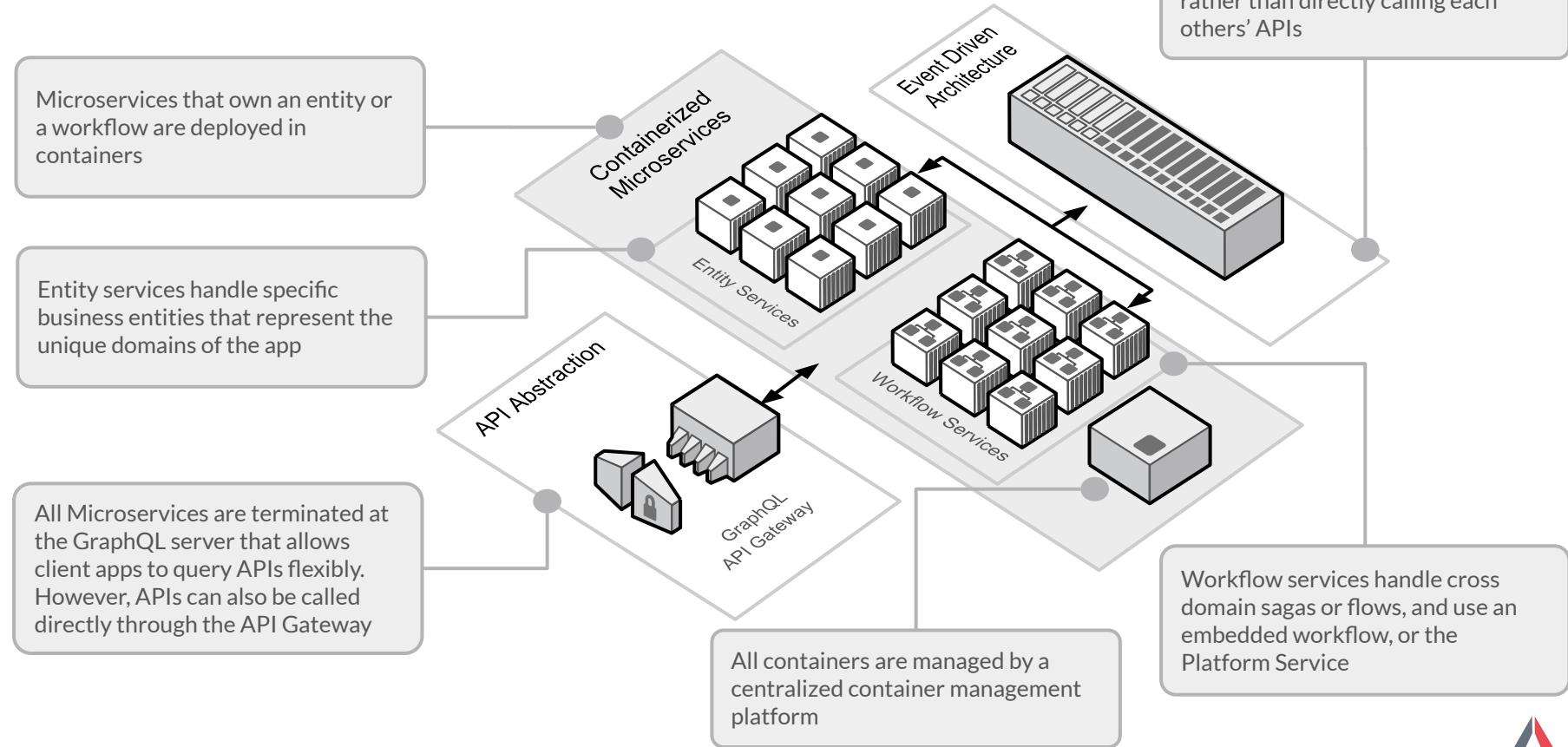


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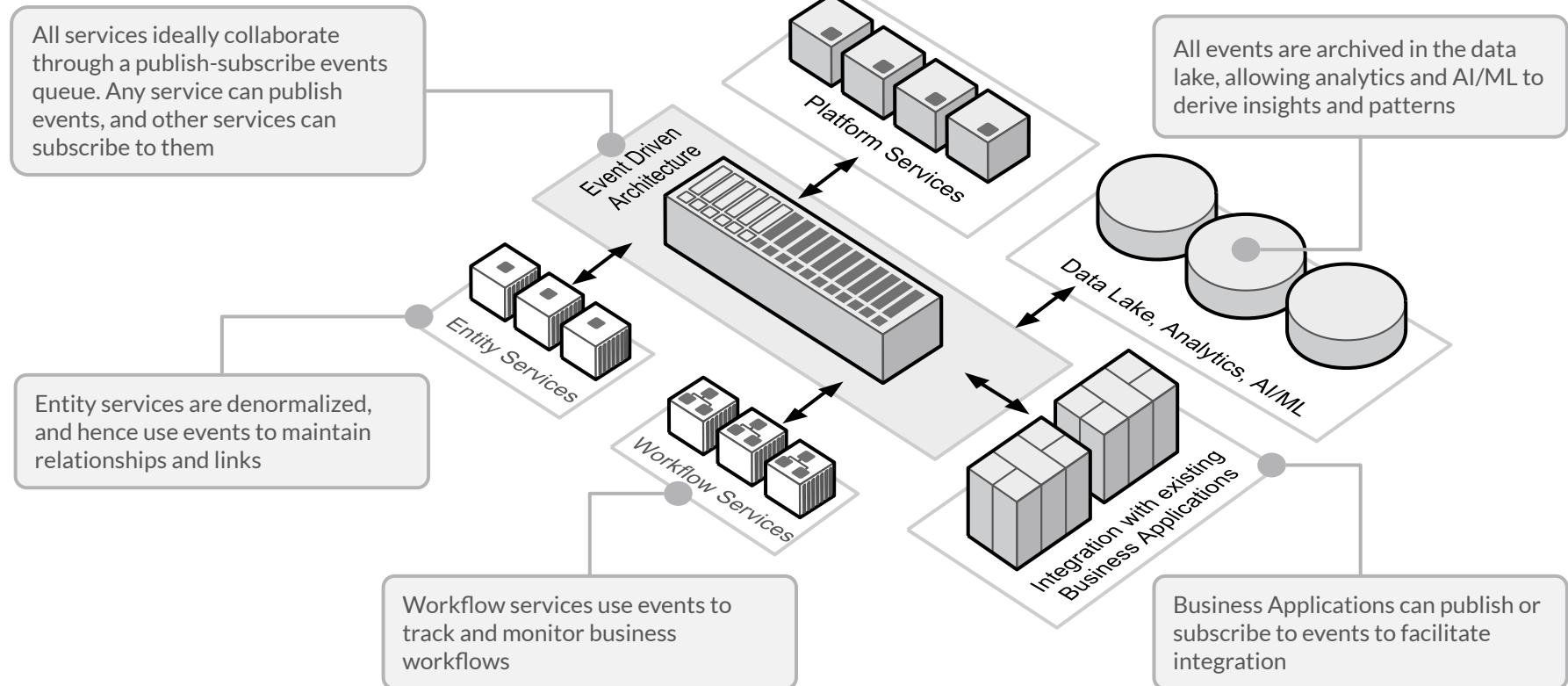


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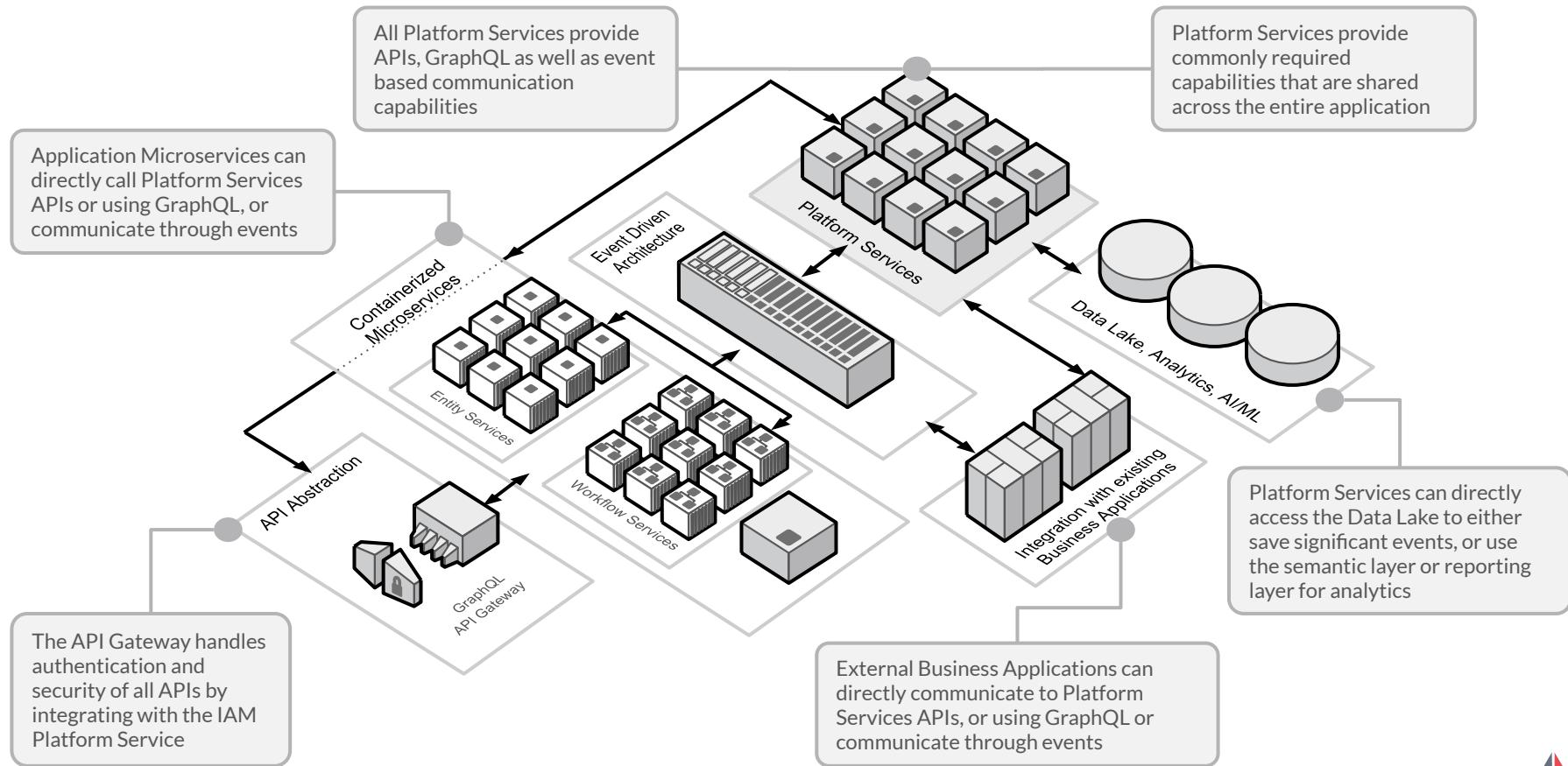


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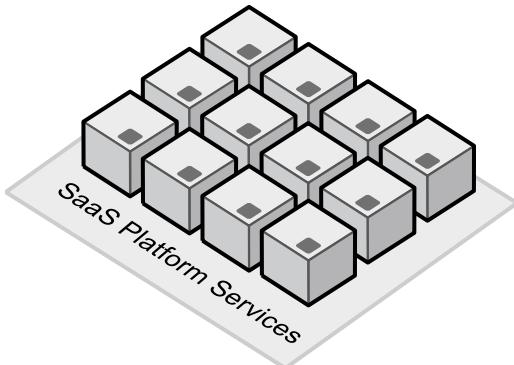


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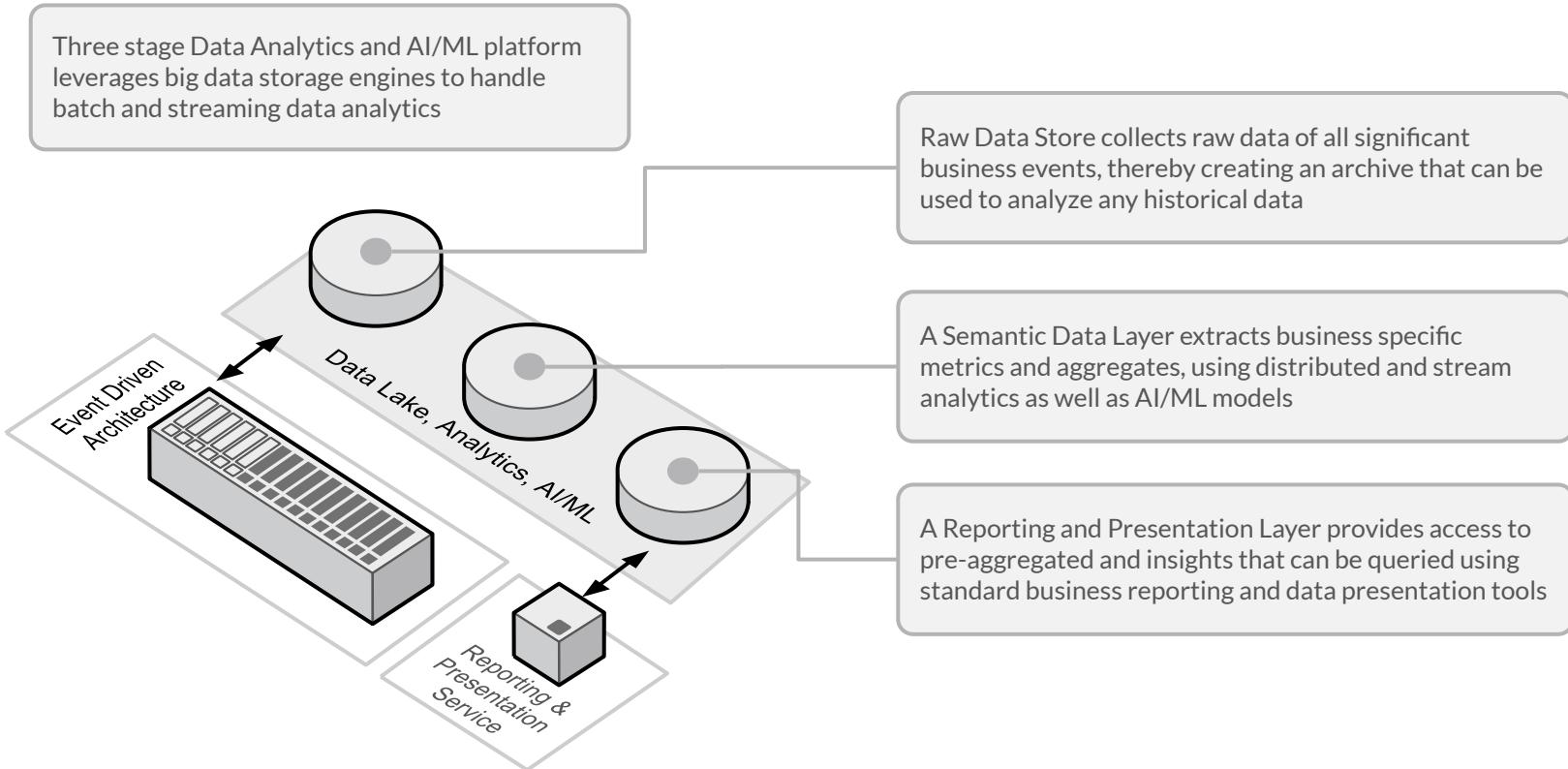


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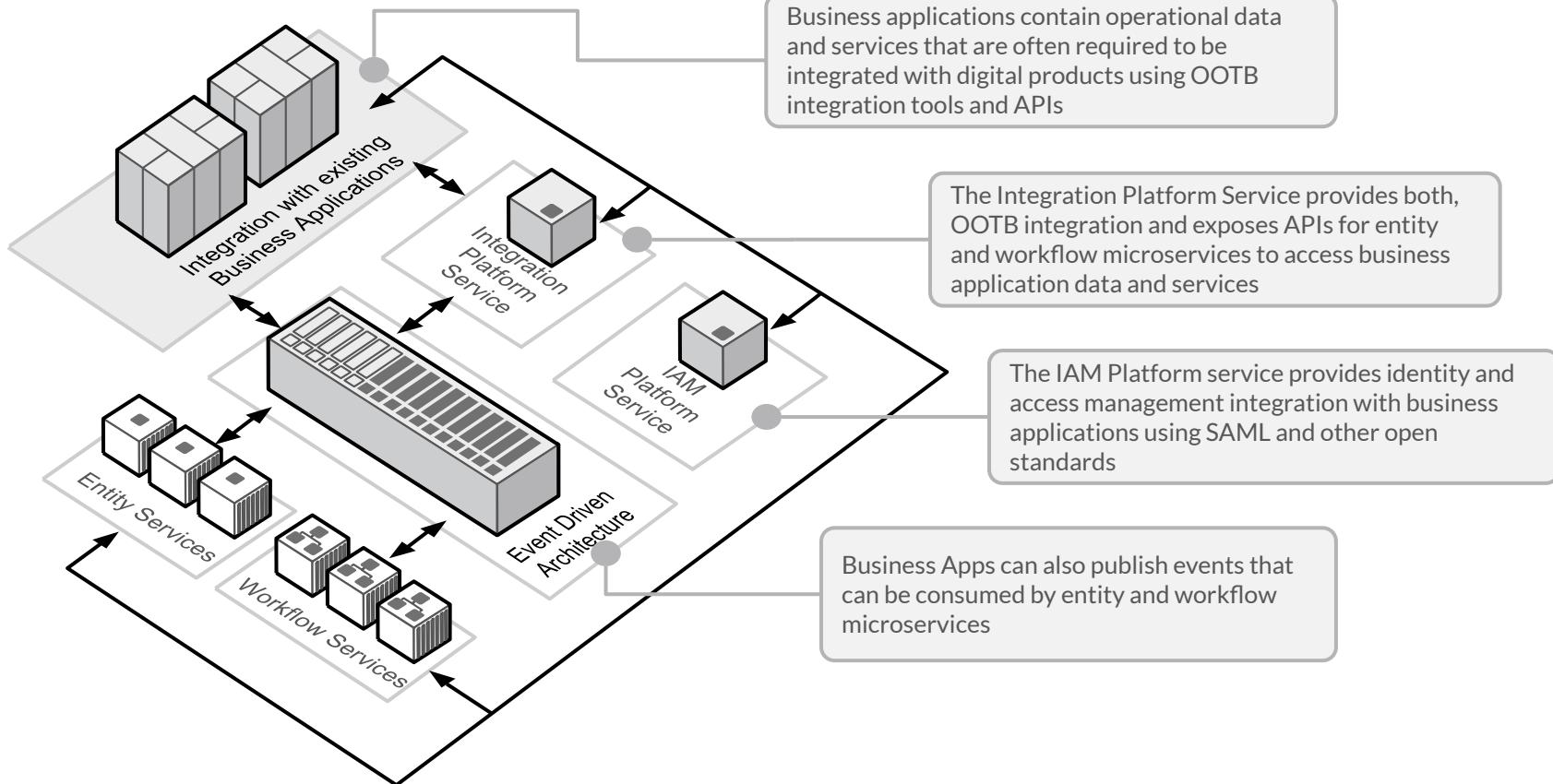
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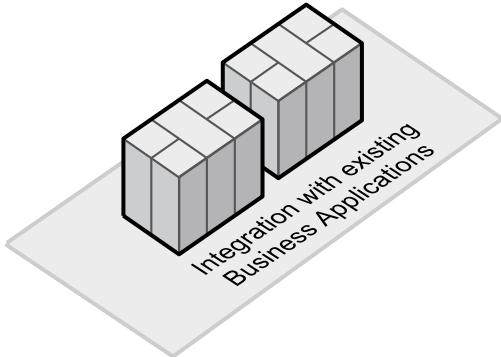
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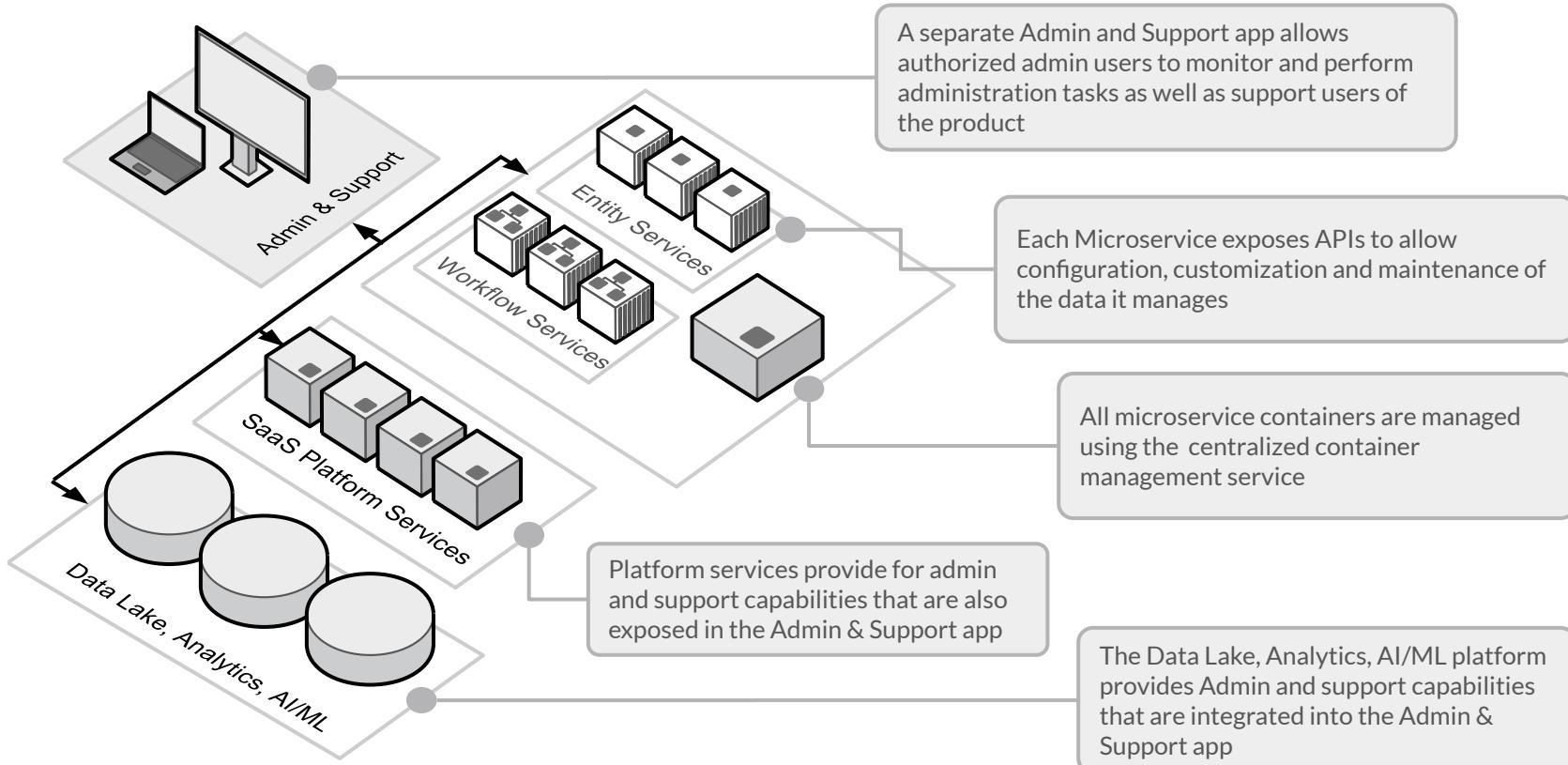


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Administration and Support





Technology Platforms



Frontend Development

Technology	AngularJS	React
Developer	Google	Facebook
Technology type	Full-fledged MVC framework written in JavaScript	JavaScript library (View in MVC; requires Flux to implement architecture)
Concept	Brings JavaScript into HTML Works with the real DOM Client-side rendering	Brings HTML into JavaScript Works with the virtual DOM Server-side rendering
Data binding	Two-way data binding	One-way data binding
Dependencies	Manages dependencies automatically	Requires additional tools to manage dependencies
Language	JavaScript + HTML	JavaScript + JSX
Last version	AngularJS 6	React 15
Suits best	Best for SPAs that update single view at a time	Best for SPAs that update many views at a time



Frequently Used UI Components

Component	AngularJS	React
Data Grid	AG Grid - a feature rich grid component capable of handling complex and large grids	React Table - highly scalable grid component with full set of features
Charts / Data Visualization	ChartJS - Standard chart components NGX Charts - Advanced chart components	ChartJS - Standard chart components React Vis - Advanced chart components
Forms	NG Dynamic Forms - fully automated form UI creation with a set of maintainable form control models and dynamic form control components	Formik with Yup - Tightly integrated form components with validation
Maps	NGX Leaflet - provides for complex interactive maps	React-Leaflet - provides for complex interactive maps
Calendar	Arshaw Full Calendar - great for displaying events, but it isn't a complete solution for event content-management	React-Big-Calendar - provides for a Google Calendar / Outlook type interface for time-based events UI



API Gateway, Management and Security

Product	Description	Deployment	Code	Recommendation
<u>Anypoint API Manager</u>	Product created by MuleSoft. Salesforce bought Mulesoft in 2018.	Cloud based SaaS or on-premise	Open source community edition. Closed source commercial components	Suitable to be used in case Mulesoft is also used as an integration platform
<u>Kong API Gateway</u>	Kong API Gateway is an open source API gateway based on Nginx and OpenResty.	Cloud based SaaS or on-premise	Open source (Nginx + Lua). Kong Enterprise version also available.	Suitable to be used with NginX
<u>Apigee Edge</u>	Apigee Edge enables API platform delivery, management, and analytics. Acquired by Google in 2016	Cloud based SaaS and on-premise installation	Closed source. Apigee maintains open source element of their platform called Micro gateway.	Suitable to be used in SaaS version. On Premise version is still not very mature
<u>Istio</u>	Primarily supported by Google, it is a collaboration between Google, IBM and Lyft	On Premise	Open Source. Integrates with Kubernetes	Suitable to be used with Kubernetes



Microservices

Recommended Tech Stack for Microservices in Java is Spring Boot

- ❖ Develops stand-alone Spring applications
- ❖ Embeds Tomcat, Jetty or Undertow directly without requiring WAR files deployment
- ❖ Provides opinionated 'starter' POMs to simplify Maven configuration
- ❖ Automatically configures Spring whenever necessary
- ❖ Provides production-ready tools such as metrics, health checks and externalized configuration
- ❖ No need for code generation

Alternative Tech Stacks:

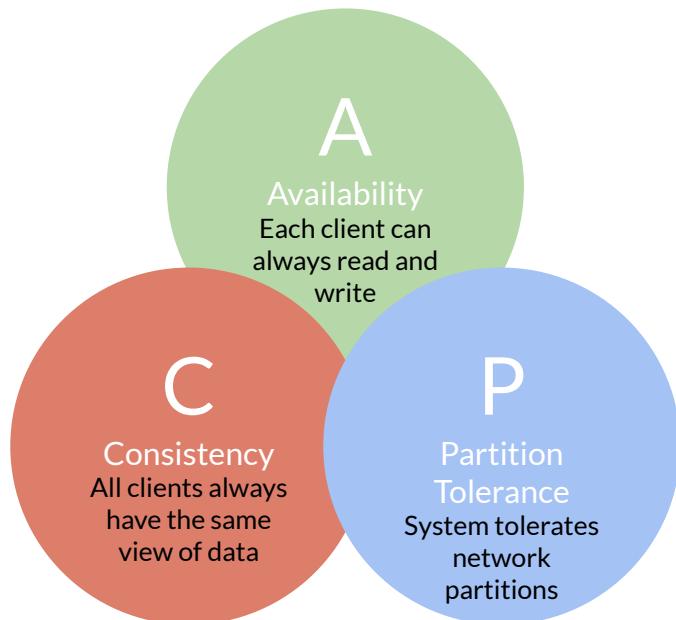
- ❖ Node JS
- ❖ Python with Flask
- ❖ Scala with Akka

Accion has delivered several large projects using Spring Boot as well as NodeJS as the major framework for microservices using the best practices that are incorporated in the Breeze Framework

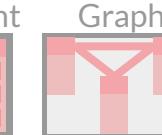
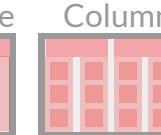
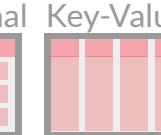


Databases - Polyglot Persistence

CAP Theorem
Pick Any Two!



Data Models



Data Model, Engines	Capabilities	Applications	Limitations
Key-Value <u>BerkleyDB</u> , <u>MemcacheDB</u> , <u>Redis</u> , <u>DynamoDB</u>	- The simplest model where each object is retrieved with a unique key, with values having no inherent model - Utilize in-memory storage to provide fast access with optional persistence - Other data models built on top of this model to provide more complex objects	- Applications requiring fast access to a large number of objects, such as caches or queues - Applications that require fast-changing data environments like mobile, gaming, online ads	- Cannot update subset of a value - Does not provide querying - As number of objects becomes large, generating unique keys could become complex
Document-oriented <u>MongoDB</u> , <u>CouchDB</u> , <u>Apache Solr</u> , <u>Elastic Search</u>	- Extension of key-value model, where value is a structured document - Documents can be highly complex, hierarchical data structures without requiring pre-defined "schema" - Supports queries on structured documents - Search platforms are also document-oriented	- Applications that need to manage a large variety of objects that differ in structure - Large product catalogs in e-commerce, customer profiles, content management applications	- No standard query syntax - Query performance not linearly scalable - Join queries across collections not efficient
Column-Oriented <u>Cassandra</u> , <u>BigTable</u> , <u>HBase</u> , <u>Apache Accumulo</u>	- Extension of key-value model, where the value is a set of columns (column-family) - A column can have multiple time-stamped versions - Columns can be generated at run-time and not all rows need to have all columns	- Storing a large number of time-stamped data like event logs, sensor data - Analytics that involve querying entire columns of data such as trends or time series analytics	- No join queries or sub-queries - Limited support for aggregation - Ordering is done per partition, specified at table creation time
Graph-oriented <u>Neo4J</u> , <u>OrientDB</u> , <u>Apache Giraph</u> , <u>AllegroGraph</u>	- Models graphs consisting of nodes and edges with properties (meta-data) describing them - Implement very fast graph traversal operations - Also support indexing of meta data to enable graph traversal combined with search queries	- Applications that deal with objects with a large number of inter-relations - Applications like social networking friends-networks, hierarchical role based permissions, complex decision trees, maps, network topologies	- Difficult to scale for large data sets for generic graphs - [Giraph](http://giraph.apache.org) uses the [Bulk Synchronous Parallel](http://en.wikipedia.org/wiki/Bulk_synchronous_parallel) model to overcome some of the scalability limitations
Relational <u>MySQL</u> , <u>PostgreSQL</u> , <u>MariaDB</u> , <u>Oracle</u> , <u>SQL Server</u>	- Conventional RDBMS structure consisting of fixed schema with [ACID](http://en.wikipedia.org/wiki/ACID) properties - Provides well documented and widely supported SQL syntax - Capable of complex queries including subqueries and joins	- Transactional data applications like ERP, CRM, Banking etc. - Applications where data volume is limited and schema are by and large fixed	- Lacks horizontal scalability and hence limited in handling "big data" - Not efficient at handling complex multi-level nested data - Cannot handle "unstructured" data where structure is not known at design time



Recommended Database Engines

- ❖ Relational - Postgresql
 - Open Source, light weight and also most importantly it gives the flexibility of using both Relational Data as well as unstructured data (Json Data)
- ❖ Document - MongoDB
 - Open Source NoSQL Document Database
- ❖ Search - Elasticsearch
 - Open source distributed, RESTful search and analytics engine
- ❖ Columnar - Cassandra
 - Typically used for Big Data Analytics use cases
- ❖ DB Viewer - DB Visualizer
 - Allows to interact with almost all RDBMS databases
- ❖ Caching - Redis
 - Support included with Breeze



Event Queues

Feature	Apache Kafka	RabbitMQ
License	Apache (Open Source)	Mozilla Public License (Open Source)
Programming Language	Scala	Erlang
AMQP Compliant	No	Yes
Built-in and available clients	Java + 10 languages including Python and NodeJS	Java, .Net, Erlang and 13 languages including Python, PHP and NodeJS
Documentation, examples and community	Immature but growing fast	Mature
Primary Storage	Disk	Memory
Queue Persistence	Complete and mandatory	Temporary and optional
Message Deletion	After reaching size or time limit	Immediately after confirmed consumption
Queue Data Compression	Yes	No
Multiple subscribers to same messages	Yes	Needs queue duplication
Advanced / conditional message routing	Message to partition only	Yes
Permissions and ACL support	No	Yes
SSL Support	No	Yes
Batch Delivery	Yes	No
Push Delivery	No	Yes
Async Publish	Yes	No
Message Replay Capability	Yes	No



Platform Services

Platform Service	Recommended Technology	Rationale
Configuration Management	<ul style="list-style-type: none">• Hashicorp Consul (Service Discovery, Runtime Configuration)• Hashicorp Vault (For Storing secrets)	Other choices are Zookeeper and etcd. However Consul apart from service discovery also has healthcheck support, TTLS. Biggest advantage is both Consul and Vault works out of the box with Spring Boot
IAM	<ul style="list-style-type: none">• Keycloak	Keycloak is the only IAM that has no license cost and has all the features an Enterprise IAM should have. Its backed by Redhat and has huge community support. All other IAMs are licensed with a community version and not truly open source
Workflow Engine	<ul style="list-style-type: none">• Camunda / Zeebe• Activiti• jBPM	All are open source, provide Drools integration but jBPM has Drools inbuilt. Camunda has a separate design tool while others have an integrated UI. None have good enough forms engine and requires an external forms engine (link) May need to reengineer workflows for Zeebe!
Forms Engine	<ul style="list-style-type: none">• Form.io	Open source, full featured forms engine (link)
Rules Engine	<ul style="list-style-type: none">• Drools	Drools is a defacto standard for a Java based rules engine



Platform Services (continued)

Platform Service	Recommended Technology	Rationale
Cognitive Search	<ul style="list-style-type: none">Elastic Search	Full featured full text search with customizable data models. Accion has used Elastic for most applications.
Integration Services	<ul style="list-style-type: none">MulesoftApache Camel	<p>Mulesoft has community version but it does not have the features that most integration platform will need. Many of the connectors like Oracle/SAP connectors are missing in Community.</p> <p>Community edition also does not provide High availability. For complex integration projects Mule Community is not suited.</p> <p>Camel is fully open source but it does not come with its own visual IDE and it relies on Fuse IDE which is acquired by Red Hat.</p> <p>Pre built connectors are also limited. Developers need to invest time and build the connectors that may be required for their integrations</p>
Reporting Engine	<ul style="list-style-type: none">Knowage	Knowage community version as of now has same features as the enterprise except support and critical bug fixes and makes this the right choice

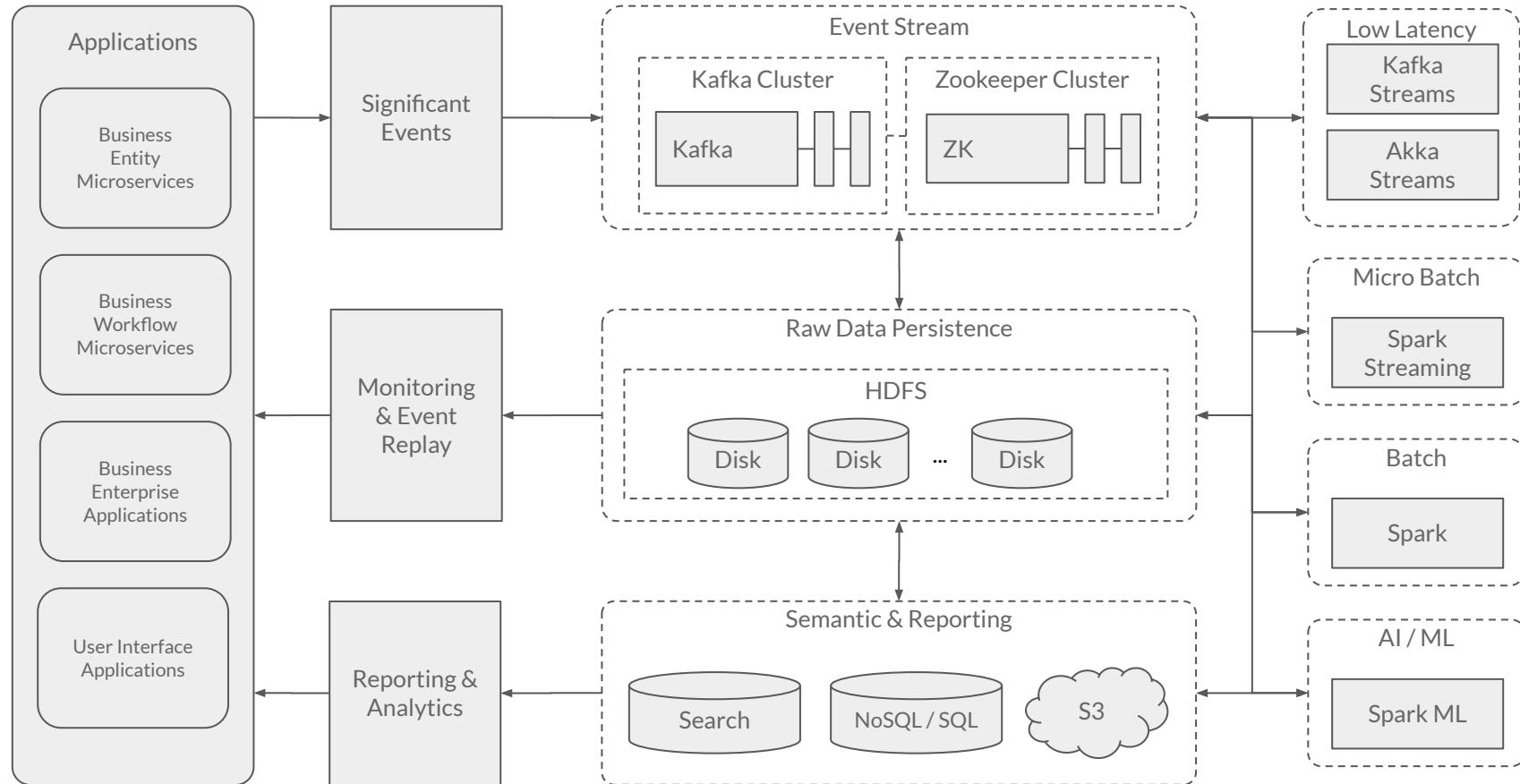


Big Data Analytics

- ❖ NoSQL / Data lake
 - **Apache HBase / Cassandra** - Columnar Data model.
 - **Apache NiFi** - Data Ingestion, Data routing, transformation, and system mediation logic.
- ❖ Data Processing (Low latency, High Throughput, In memory computing)
 - **Apache Spark, Spark Structured Streaming** - Batch & Micro-streaming.
 - **Apache Flink** - Real time Stream Analytics, Event Driven Data pipelines.
 - **Apache Livy** - Spark / Flink Cluster over Rest Interface.
 - **Apache Kafka** - Streaming / Publisher - Subscriber mechanism.
- ❖ Data Pipelines Scheduling
 - **Apache Airflow** - Scheduling, Orchestration and monitoring of Data pipelines.
- ❖ Distributed Storage
 - **Parquet, Avro, Arrow** at **HDFS, S3** etc.
- ❖ Processed Data Warehouse
 - **Distributed PostgreSQL / MongoDB.**



Big Data Analytics - Reference Architecture





Development Lifecycle



Development Lifecycle

Ideation and Strategy

Innovation & Strategy Workshop

- Concept, Assumptions and Core Value Proposition
- Target Users, Pain Points, Goals
- Competitive Differentiation

Key Technology Enablers

- Current Technology or Solution Limitations
- Emerging technologies as innovation levers
- Innovation SWOT Analysis

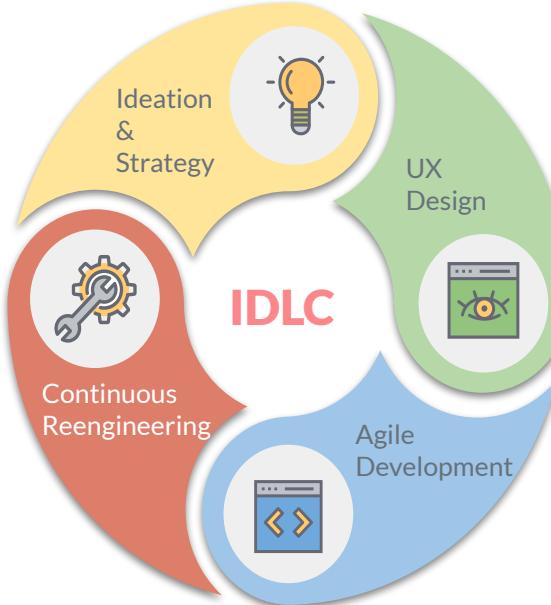
Continuous Reengineering

Continuous Innovation

- Monitoring of User Activity and Feedback
- Feature Rationalization and Expansion
- Automation and Simplification of User Flows

Technology Evolution

- Tracking Technical Debt and Refactoring
- PoCs and Spikes for New Technologies
- Upgrades and Restructuring of Modules
- Architectural and Performance Improvements



UX Design

UX Discovery and Design

- Stakeholders and Users Interviews
- User Persona and User Journeys
- Information Architecture, Wireframes and Prototypes
- User Testing and Validation of Interface Models

User Interface Design

- Design System Design including Branding and Style Guide
- High Fidelity & Functional Prototypes
- Goal-based Task and Workflow Testing

Agile Development

Iterative Development to Manage Risk

- Development conducted in iterative sprints
- Multiple sprints in each release
- Complex tasks broken into smaller deliverables
- Continuous user feedback in every sprint

Continuous Integration & Deployment

- Automated process from development through deployment
- Containerization and Container Management
- Deployment for private cloud, public cloud and hybrid cloud environments



Ideation & Strategy

Finding the right balance of focus and features

Innovation & Strategy Workshop

- Concept, Assumptions and Core Value Proposition
- Target Users, Pain Points, Goals
- Competitive Differentiation

Key Technology Enablers

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UX Design Process



User Interview

Stakeholder Interviews

Persona Identification

User Journey Maps

Validation

UX Design

Information Architecture

Wireframes

Rapid Prototypes

Validate & Iterate

UI Design

High Fidelity Mockups

Detailed UI Design

Branding

Style Guides

Prototyping

Functional Prototypes

HTML, CSS and JS

Interactions

Validate & Iterate

Usability Tests

Testing Key User flows

Selected based on Personas

Goal Based Task Testing

Think Aloud Testing

Validate results and Iterate



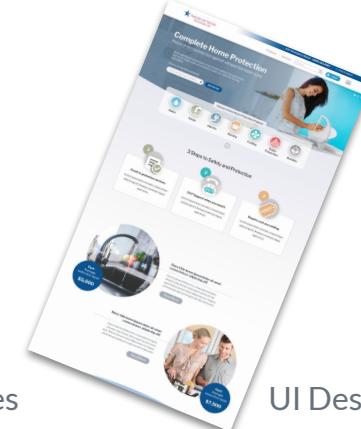
Storyboards



User Personas



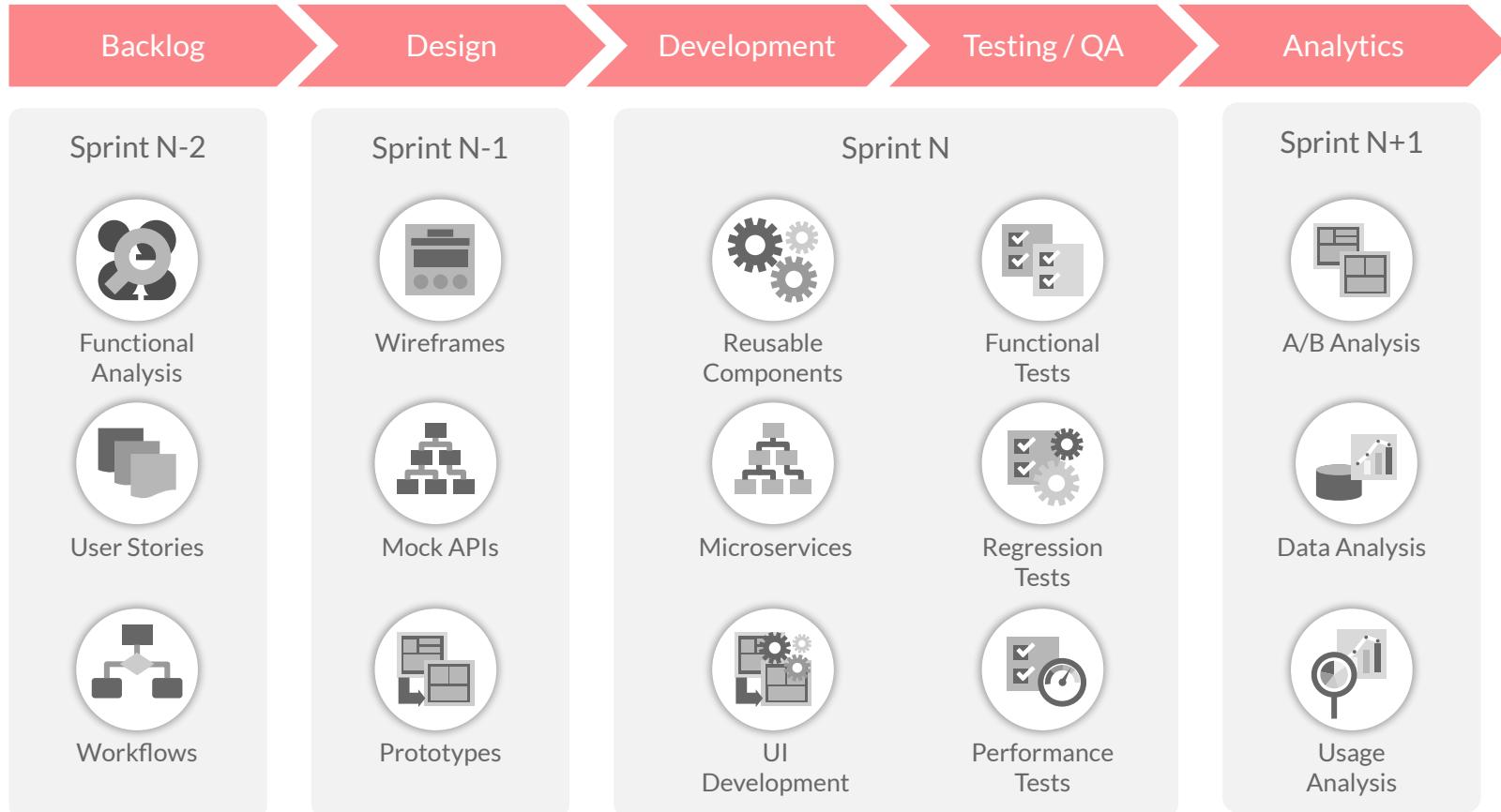
Wireframes



UI Designs



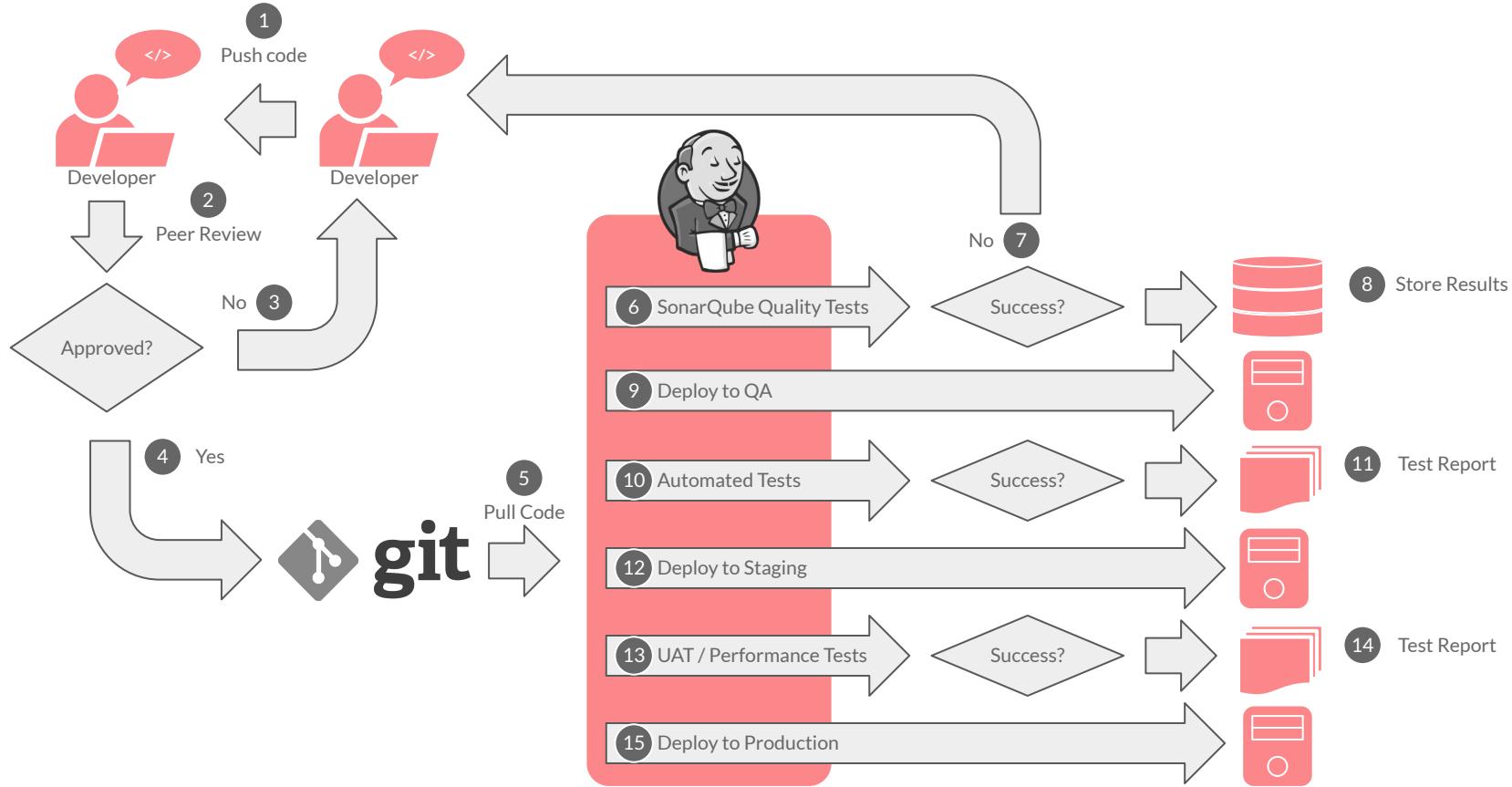
Agile Development & Releases



Agile Development Tools & Technologies



Continuous Integration & Deployment Process



Continuous Integration & Deployment Technologies

Source Repositories	Continuous Integration Server	Automated Testing	Artifact Repositories	Ops Console and Resource Model	Infrastructure Manager
GitHub	Jenkins	REST-assured POSTMAN	artifactory	CHEF Elastic Beanstalk	amazon web services
 git	 Gradle	 Protractor end to end testing for AngularJS  Webdriverio	 Nexus	 App Engine  CloudBees	
 maven		 Loadrunner  Burpsuite Extensions		 HEROKU	
		 sonarqube		 puppet labs	 Terraform
		Perfaccion			

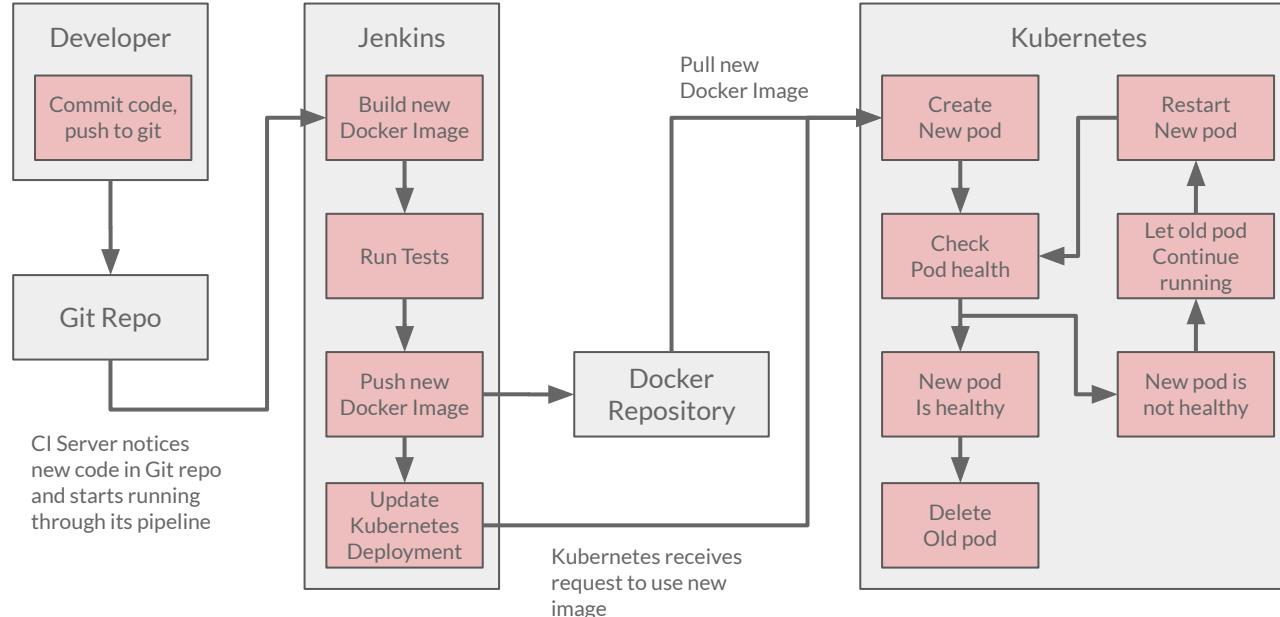


Containers & Container Management

- ❖ Deploying microservices
 - Developers may build a new microservice and deploy it through all environments, including production, with little to no DevOps involvement.
- ❖ Container promotion between environments
 - Containers builds are based on commit and only built once per commit. The exact same artifact deployed to DEV may be deployed to PROD without being rebuilt.
- ❖ True CI/CD to ALL environments
 - Configurable by team and based on preference
- ❖ Automated scaling of containers
 - Based on CPU or Memory (configurable by devs as well).
- ❖ Baked in centralized logging
 - For all logs sent to STDOUT or STDERR from container.
 - All logs are searchable in Kibana by the developer configured "service_name" applied to the container deployment.
- ❖ Developer empowered configuration
 - Many docker run configuration options are exposed to developers for configuration.
 - Developers can modify memory / cpu resources reserved for their container deployments, health checks, load balancer timeout settings, etc.



Container Deployment Automation Process

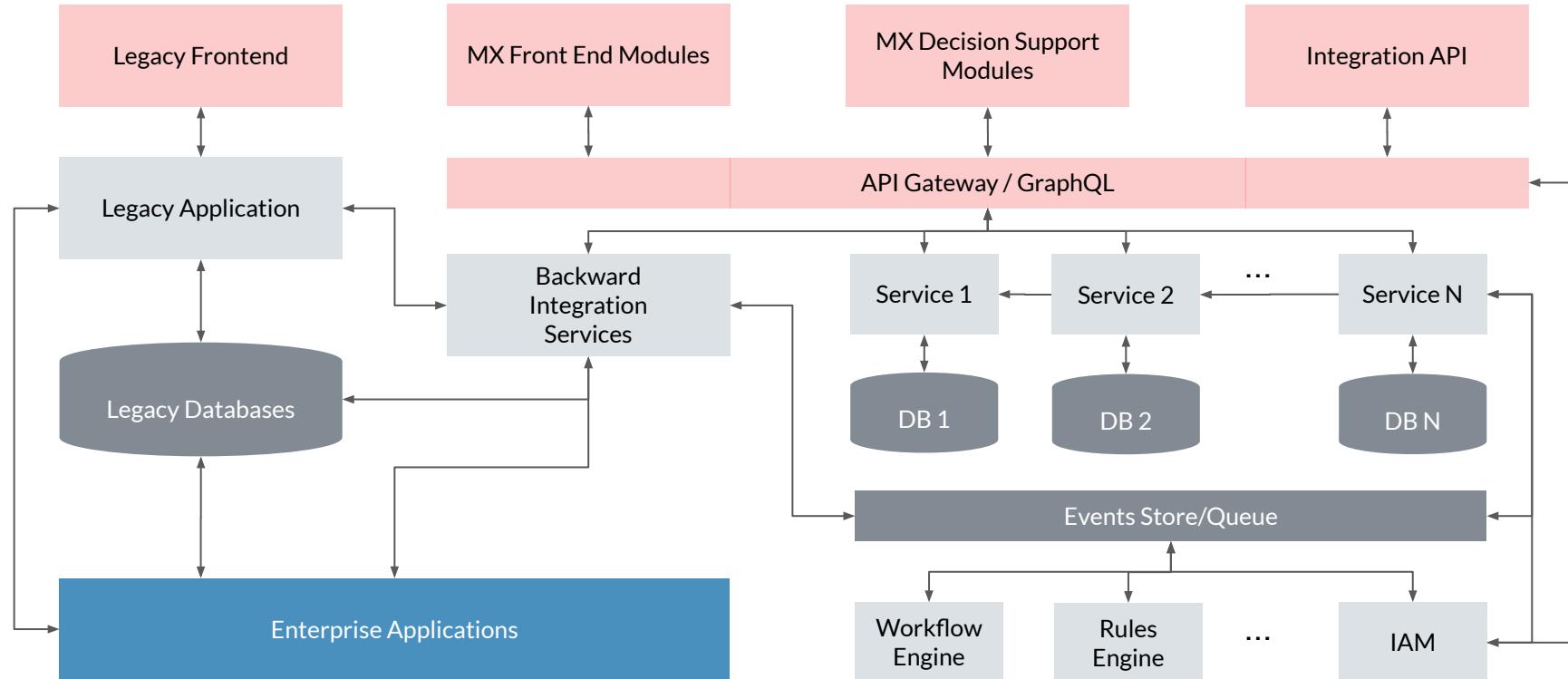




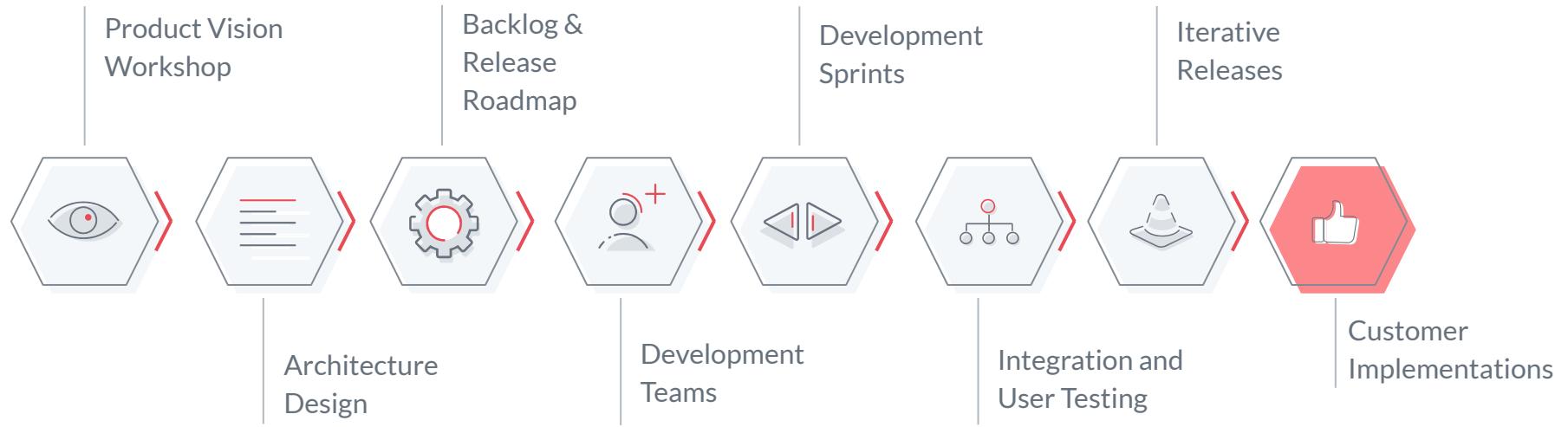
Next Steps



Incremental Reengineering Approach



Proposed Next Steps





Appendix A

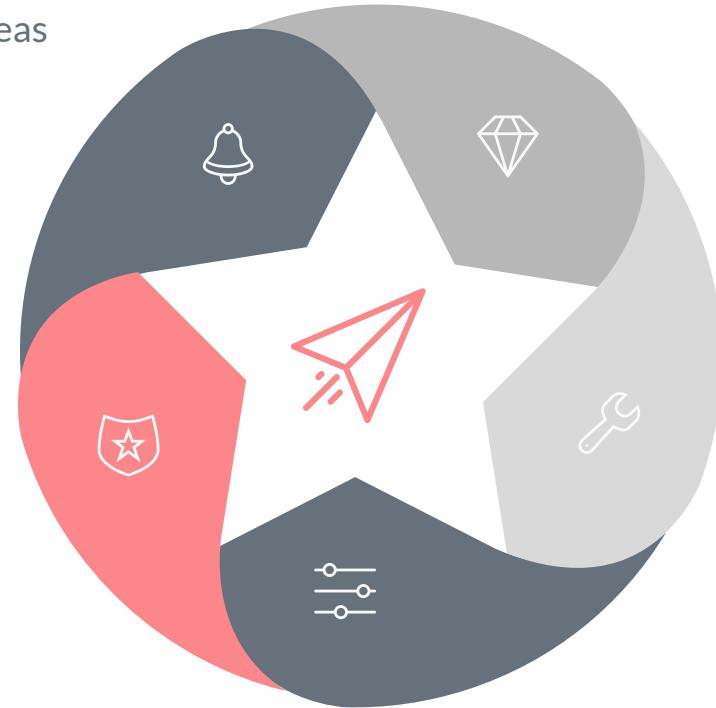
Engagement Models



Engagement Models

Flexible models designed to suit specific needs and gap areas

- Extended Delivery Center (EDC)
- Turn-key & Co-owned Project Services
- Specialized Pro-Staffing Services
- Extended Professional Services
- Co-IP development
- Build-Operate-Transfer Centers
- Offshore Joint-Venture



Extended Delivery Center

A distributed, agile, collaborative team set up and customized for the customer to ensure the highest degree of success and optimal returns for the customer.

1
2
3
4

Built upon the principles of co-development and virtual teams

A range of services (New Development, Sustenance, QA, Support and PS etc)

Built on a strong Operational framework and an Agile ready governance model

A 100% “white-box” model



Turnkey & Collaborative Project Services

Accion's agile project execution methodology ensures that the triple constraints (Time, Cost, Scope) are kept in check all the time, ensuring that the risks on the project are minimized.



A range of execution models –

Managed T&M, Turn Key, Outcome-Oriented



Several execution options available –

Onsite, Onsite-Offshore, Fully offshore



A Tool Driven Project Management approach –

Agile Management Tools, Project, Test & Config. Management Tools



An experienced PMO organization with

Metrics-driven Digital Dashboards, Earned Value Calculations, KM Tools, Induction Guide



A well defined delivery methodology with a repository of accelerators

Tools, Scripts, templates, checklists and frameworks



Prostaffing Services

A comprehensive staffing services model that provides coverage from Relationship, Resource and Technology perspectives.

Ability to provide highly qualified Contract, Contract to Hire and Perm candidates

Ability to offer volume discounts

Strong competency in emerging technologies

Ability to attract highly talented resources from other tech firms

Ability to provide both Senior Leadership level and execution level resources

Heavy reliance on networking for hiring – Large pool of 14K+ resources

Comprehensive 8 Step Metrics driven selection process

Ability to set up a customized, client specific screening process

Highly scalable process – Ability to hire up to 20-30 resources/month/client





Appendix B: Sample Case Studies



Case Study: Employee Engagement Portal

An interactive, personalized, voice-enabled, conversational UI to engage employees

The image displays two side-by-side screenshots of an Employee Engagement Portal. Both screens feature a top navigation bar with a search bar, user profile, and various icons. The left screenshot is a desktop view showing a news article titled "Elected-officials learn about unique river-crossing project" with a "READ MORE" button. Below it is a "What's New Today" section with five cards: "American Water is enhancing the..." (with a blue starburst icon), "GIS, Engineering And Operations Partner..." (with a group photo), "Celebrating Hispanic Heritage Month" (with a red banner), "Employee Achieves Certification..." (with a gold seal icon), and "T&I career fair seeks candidates with..." (with a blue cloud icon). The right screenshot is a mobile view showing a news article titled "Don't miss out on AmeriCANs in Action!" with a "READ MORE" button. Below it is a "What's New Today" section with one visible card: "GIS, Engineering And Operations Partner For..." (with a group photo).



Employee Engagement Portal



Business Challenges

- Organizations generate high volume of content, but lack a platform for efficient dissemination
- Employees are spread geographically, without a global communication and collaboration platform
- Users have a wide range of interests and need content that is relevant and current to them as individuals
- Users want instant answers to questions that are expressed in natural language

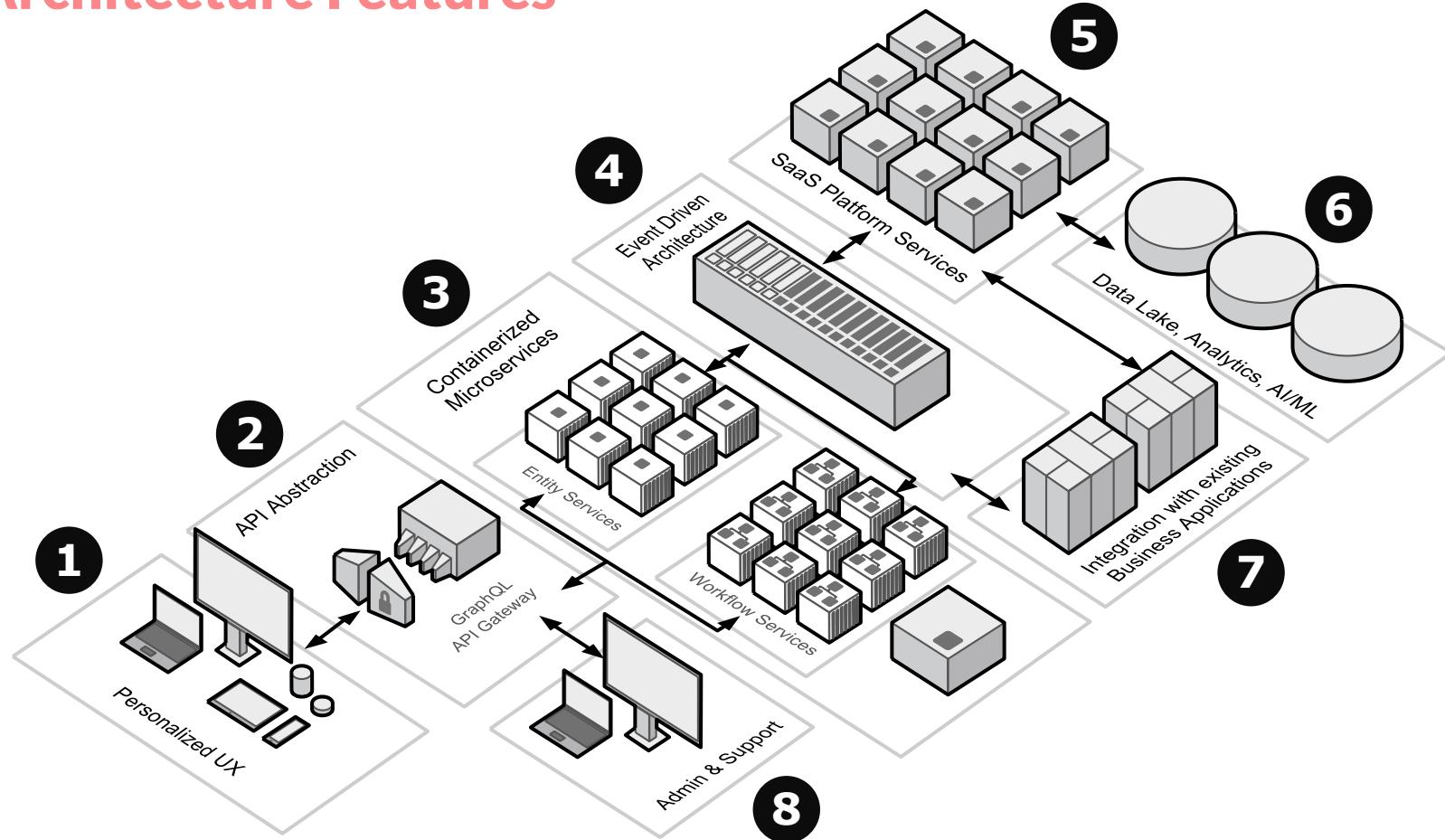


Solution Capabilities

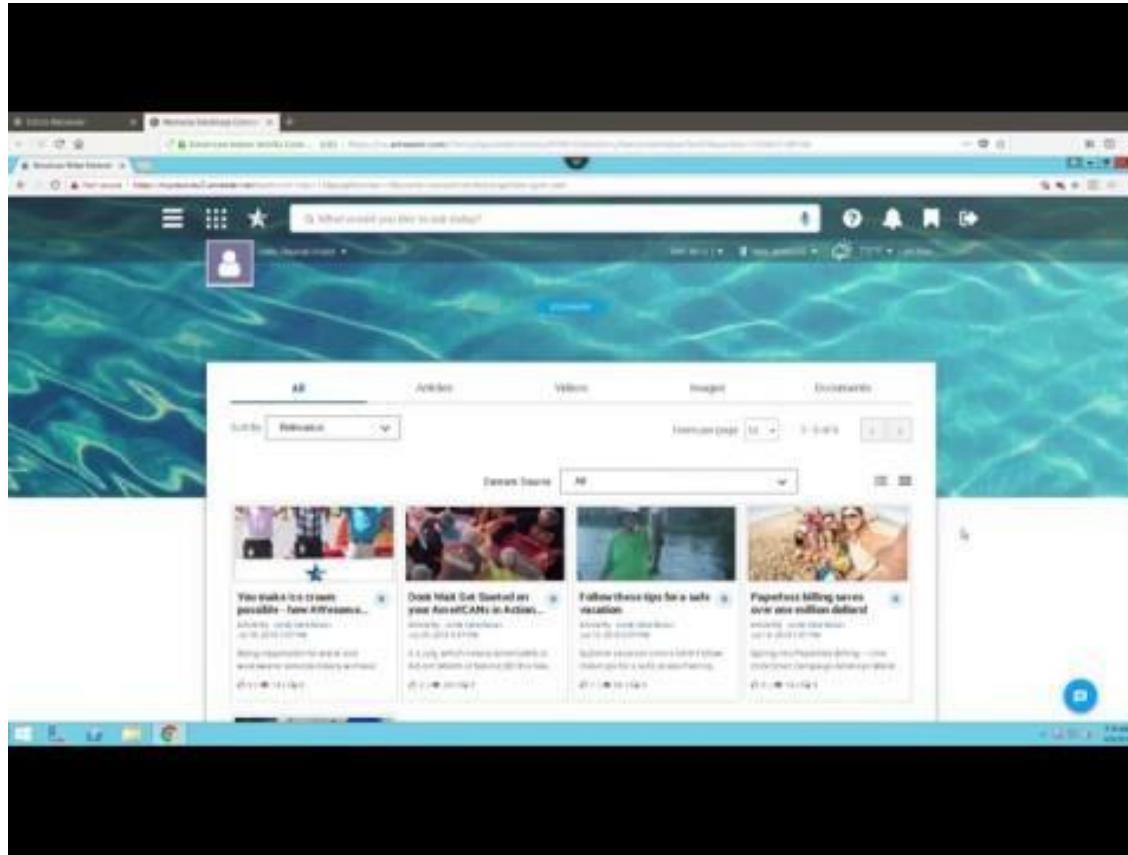
- A platform that provides access to enterprise content that is highly personalized and driven by conversational UI
- Content metadata is managed automatically and allows the creation of knowledge structures (ontologies)
- Content and collaboration tools that can be accessed on any device
- Customized widgets can be incrementally added by different departments as business apps



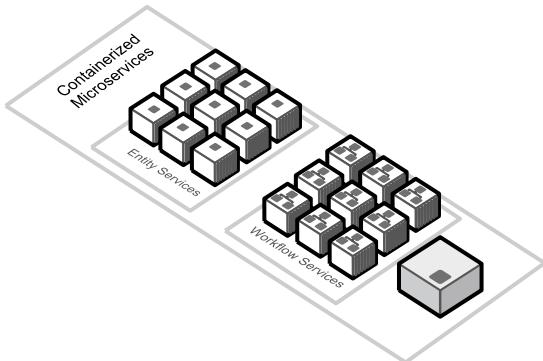
Architecture Features



UI Demo



Microservices



Entity Services

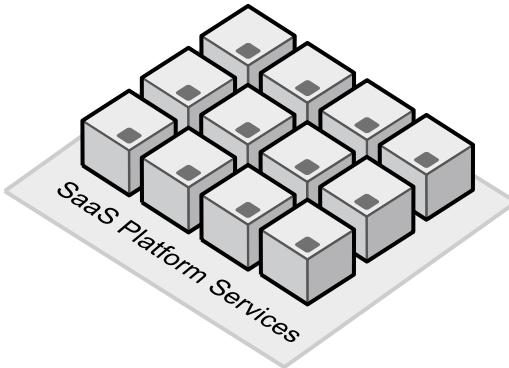
- **Profile Management** - Allows to access and maintain user profile
- **My Apps** - It provides the quick access to some of the basic tools and also it redirects to appropriate sites
- **Learn Tool** - Learn Tool helps to track the progress of your learning in the form of Graphs. Also, helps to find your upcoming and current assignments.
- **Videos** - Renders view links
- **Article Lookups** - Article content, related article, people also viewed and trending section are displayed. User can like, share and bookmark the article
- **Survey** - To get the user feedback and suggestions
- **Message** - notifies users through the various way like Email notification, Push notification

Workflow Services

- **User Workflow Editor** - Managing user profile, roles and permission.
- **Internal Jobs** - Data syncup from CMS application to recommendation engine
- **User Interests** - Allows user to opt for categories and location of their interest.
- **Learn Management** - Learn Management helps to track the progress of your learning in the form of Graphs. Also, helps to find your upcoming and current assignments.
- **Location Wise Data** - weather forecast based on user's current location



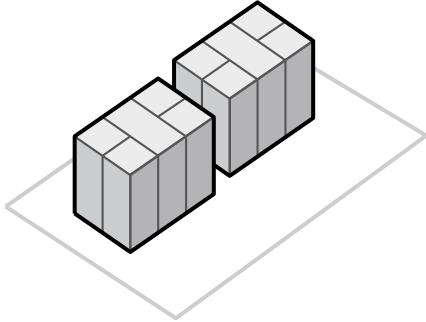
SaaS Platform Services



- **Identity and Access Management** - Service for securely initiating, storing and managing user identities and access permissions
- **Recommendation Engine** - AI/ML based recommendations by monitoring user activity provides intelligent personalization
- **Integration Service** - API driven integration with third party platforms such as CRM < Mulesoft >
- **Alerts and Notifications** - A notification engine that sends email notifications
- **User Activity Logging/Logger** - Stores logs generated based on events; this component is mainly used for error tracking and application monitoring.
- **Template Engine** - Used to generate standardized reports, documents, emails, etc.
- **Conversational UI** - Computer program/AI entity that can be integrated with messaging platforms, websites, etc.
- **Mail Service** - Connects with Office 365 for reading/sending emails + view/create calendar events from custom application
- **Headless CMS** - Back-end only content management system that makes content accessible via a RESTful API for display on any device < Liferay >
- **Preference Engine** - Predicts and learns user preferences based on users' ratings of items or individual/global popularity
- **Smart Search** - Advanced search capabilities like fuzzy search, highlights, autocomplete, etc. < ES >
- **Usage Monitoring** - Monitor the usage of different units like CPU, memory, disk, etc. < Kibana >



Integration with Business Apps



- **Learn Management System** - provides training courses and hours of training completed or pending.
- **Active Directory** - all internal users are maintained in AD, and authentication of admin and support users needed to be done via AD



Case Study: Customer Portal

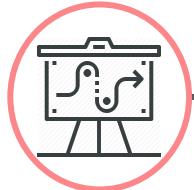
An interactive dashboard for customers, enabling them to view, track and purchase products and services, with analytics related usage, alerts and notifications for various events, avail of product support using conversational UI and connect with other customers

The image displays three views of the California American Water customer portal:

- Top View:** A desktop browser window showing the main dashboard. It includes a user profile for "Thomas Boyle", a "Make a Payment" section (Amount Due: \$104.18), an "Account Summary" table, and a "Service Request" section. The dashboard also features a "MESSAGES", "ALERTS", and "OPEN REQUESTS" navigation bar.
- Middle View:** A mobile phone screen showing the same dashboard content as the top view, adapted for a smaller screen.
- Bottom View:** A mobile phone screen showing a promotional landing page for home repair coverage. It features a smiling couple, the text "Invest in home peace of mind.", and a "Check pricing and availability" button. Below this are icons for various home protection services: Interior Electric Line Protection, Water Heater Repair & Replacement, Power Surge Protection, Heating System Repair, Cooling System Repair, and Exterior Electric Line Protection.

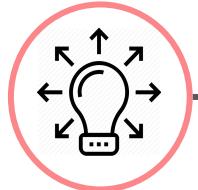


Customer Portal



Business Challenges

- End-to-end platform reengineering along with moving huge volumes of unstructured business + customer data
- Creating dashboards containing rich interactive visualizations
- Increased scalability and seamless corporate integration
- Develop web and mobile solutions with end-user and admin users



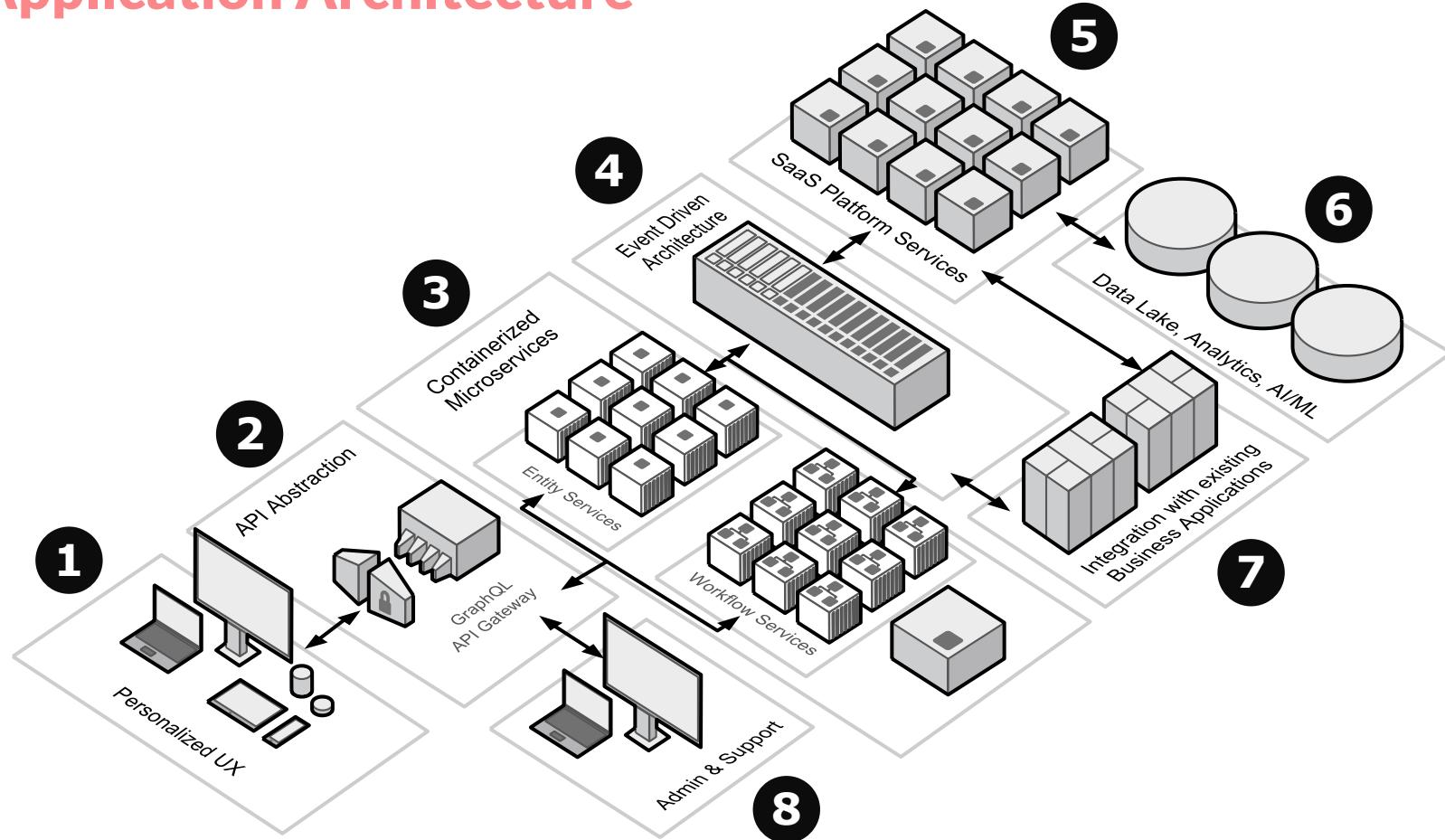
Solution Delivered

- Microservices-powered architecture for improved scalability and flexibility
- Seamless B2B platform integration
- Separate web and mobile portal access for end users and administrator
- Interactive dashboards with visualization, enabling end users to understand data quickly

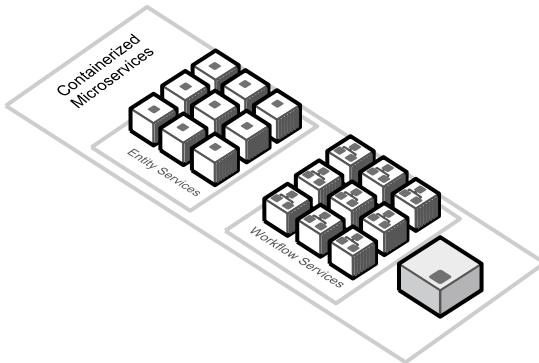
UI Demo



Application Architecture



Microservices



Entity Services

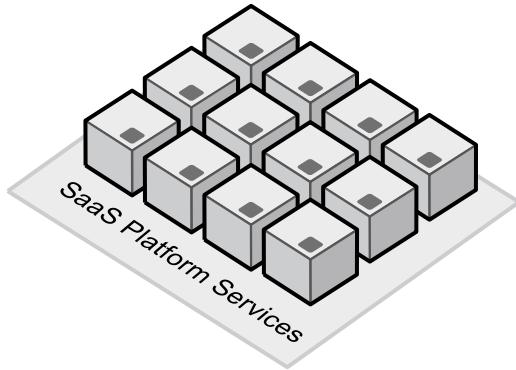
- **Profile Management** - Allows to access and maintain user profile.
- **Bill Management** - Maintain user billing information.
- **Survey** - To get the user feedback and suggestions
- **Message and Alerts** - Notify users about their updates.

Workflow Services

- **Content Management** - CMS application for editing and managing contents
- **Usage Analytics** - Analyse the users specific usages.
- **Payment** - Allow user to make a bill payment.
- **Service Request** - Allow a user to subscribe, unsubscribe and reconnect for different services.
- **Internal Jobs** - Data syncup from CMS application to recommendation engine



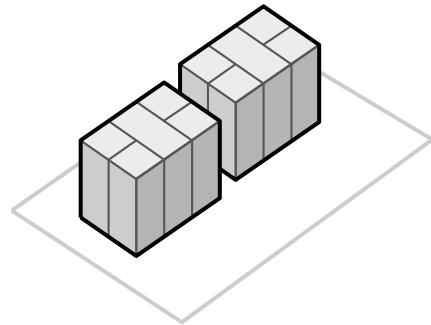
Platform Services



- **Identity and Access Management** - Service for securely initiating, storing and managing user identities and access permissions
- **Recommendation Engine** - AL/ML based recommendations by monitoring user activity provides intelligent personalization
- **Integration Service** - API driven integration with third party platforms such as CRM < Mulesoft >
- **Alerts and Notifications** - A notification engine that sends email notifications
- **User Activity Logging/Logger** - Stores logs generated based on events; this component is mainly used for error tracking and application monitoring.
- **Template Engine** - Used to generate standardized reports, documents, emails, etc.
- **Headless CMS** - Back-end only content management system that makes content accessible via a RESTful API for display on any device < Liferay >
- **Preference Engine** - Predicts and learns user preferences based on users' ratings of items or individual/global popularity
- **Data Masking Service** - Users can view data they require, while sensitive elements remain obscured
- **Smart Search** - Advanced search capabilities like fuzzy search, highlights, autocomplete, etc. < ES >
- **Usage Monitoring** - Monitor the usage of different units like CPU, memory, disk, etc. < Kibana >



Integration with Business Apps



- SAP - transaction system for billing and payments
- Aclara - meter data for consumption
- Paymenturs Payment Gateway - handles all payments from customers. Provides APIs for payment processing and webhooks for renewal reminders etc.



Case Study: Home Owner Systems

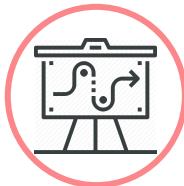
American Water Resources (AWR) offers utility service line warranties that protect homeowners against unexpected home repair costs.

Accion Labs designed an interactive, intelligent and intuitive ecommerce portal for customers and agents.

The image displays two views of the American Water Resources (AWR) website. The top view is the desktop homepage, featuring a dark header with the AWR logo, a contact phone number (1.855.800.5195), a login/register button, a shopping cart icon with '0' items, and a menu icon. The main content area has a background image of a smiling couple. It features the headline 'Invest in home peace of mind.', a sub-headline 'Get coverage for repairs to your home systems', and a paragraph: 'When it comes to your home, you deserve to rest easy knowing you're protected against the unexpected.' Below this is a 'Learn More' button, a search bar with 'Enter Your Zip Code' placeholder and a 'GET STARTED' button, and a horizontal menu of services with icons: Interior Electric Line Protection (blue plug), Water Heater Repair & Replacement (orange water heater), Power Surge Protection (pink lightning bolt), Heating System Repair (orange flame), Cooling System Repair (blue fan), and Exterior Electric Line Protection (yellow house). The bottom view is a mobile screenshot, which shows a simplified version of the same content, including the service icons at the bottom.

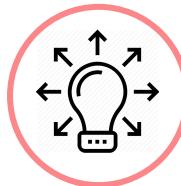


Home Owner Systems



Business Challenges

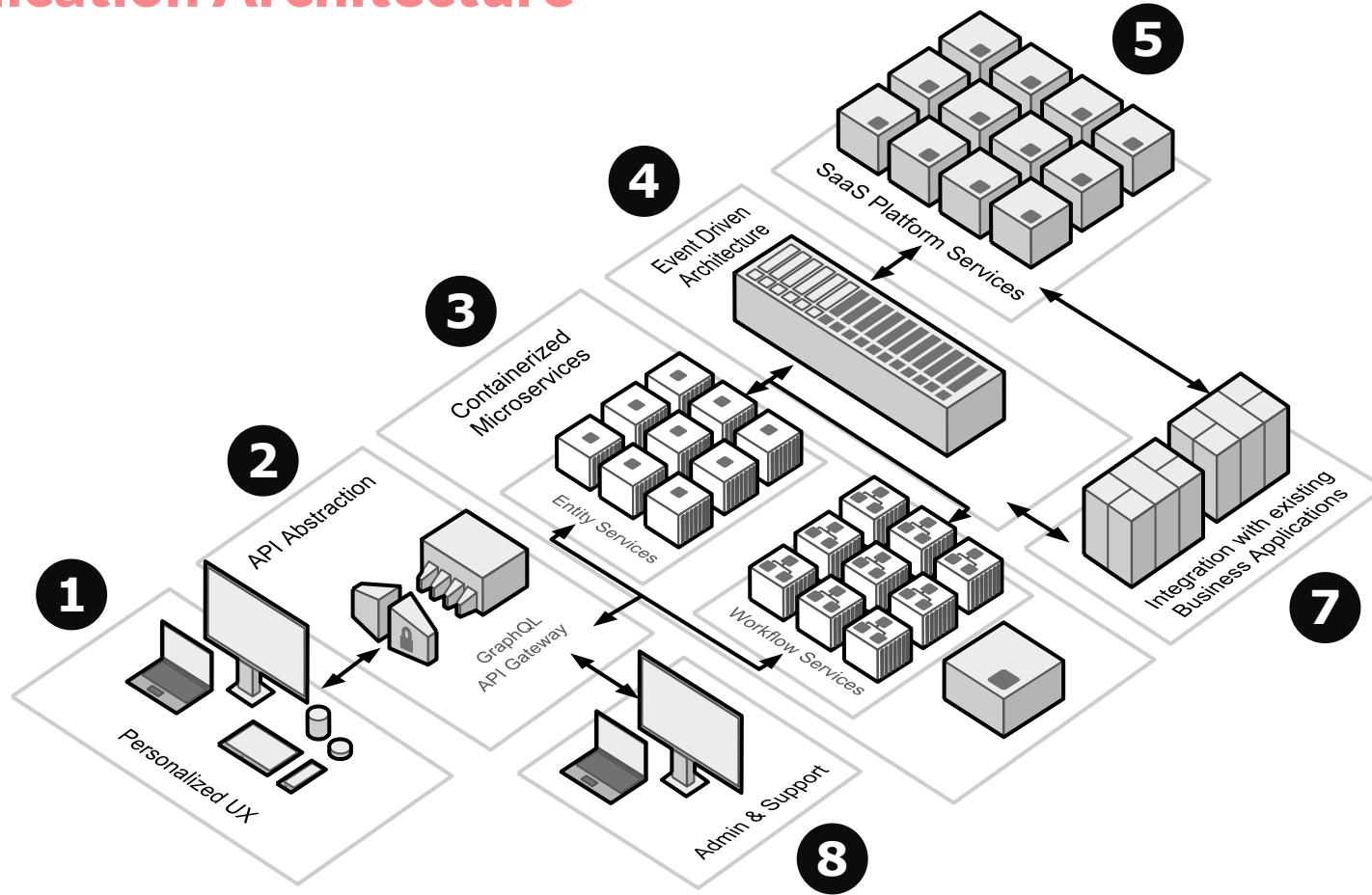
- Offline customer relationship management
- Information distributed in silos with no unification of claims management.
- Bundling of claims difficult to track and service
- Online customer interface absent
- No self-service feature for customers regarding claims status and other queries online



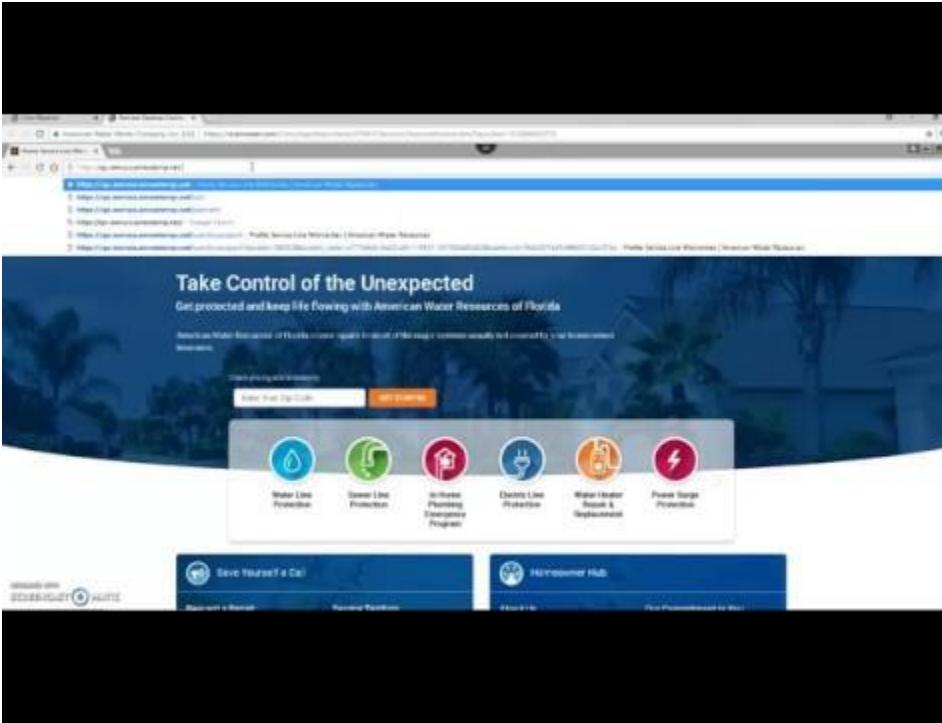
Solution Delivered

- Microservices-powered architecture for improved scalability and flexibility
- Seamless B2B platform integration
- Separate web and mobile portal access for end users and administrator
- Interactive dashboards with visualization, enabling end users to understand data quickly

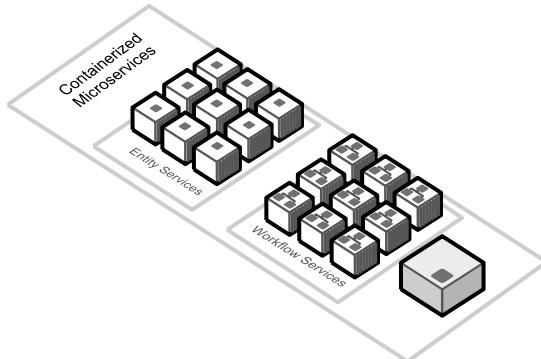
Application Architecture



Customer UI App



Microservices



Entity Services

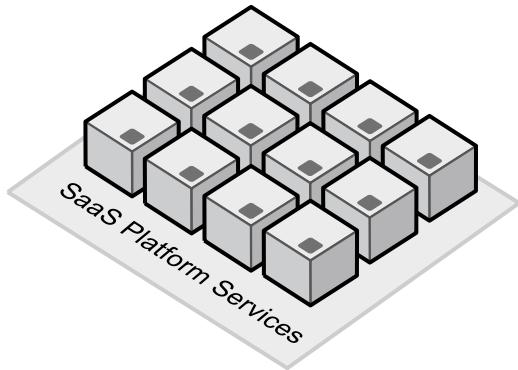
- **T&C Service** - Service for terms and conditions management
- **Customer Service** - Service for customer management
- **Product Service** - Service for product management, enrichment and sync operations.
- **Partner Service** - Service for business partners management
- **CRM Customer Search Service** - Service to search for existing CRM customers
- **CRM Integration Service** - Service to integrate with CRM and Mulesoft API's.
- **CRM Contact Service** - Service for management of contacts in CRM
- **Content Service** - Service for partner microsite data management

Workflow Services

- **Order Service** - Service for enrollment management
- **Location Service** - Service for location management, enrichment and sync operations.
- **Cart Service** - Service for cart management according to business rules
- **EFT Service** - Service for payment gateway integration
- **CRM SYNC Services** - Multiple services for syncing data from CRM system to HOS system



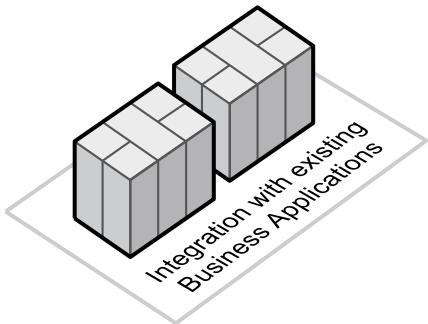
Platform Services



- **Identity and Access Management** - Service for securely initiating, storing and managing user identities and access permissions
- **Integration Service** - API driven integration with third party platforms such as CRM < Mulesoft >
- **Alerts and Notifications** - A notification engine that sends email notifications
- **User Activity Logging/Logger** - Stores logs generated based on events; this component is mainly used for error tracking and application monitoring.
- **Template Engine** - Used to generate standardized reports, documents, emails, etc.
- **Mail Service** - Connects with Office 365 for reading/sending emails + view/create calendar events from custom application
- **Headless CMS** - Back-end only content management system that makes content accessible via a RESTful API for display on any device < Liferay >
- **Smart Search** - Advanced search capabilities like fuzzy search, highlights, autocomplete, etc. < ES >
- **Usage Monitoring** - Monitor the usage of different units like CPU, memory, disk, etc. < Kibana >



Integration with Business Apps

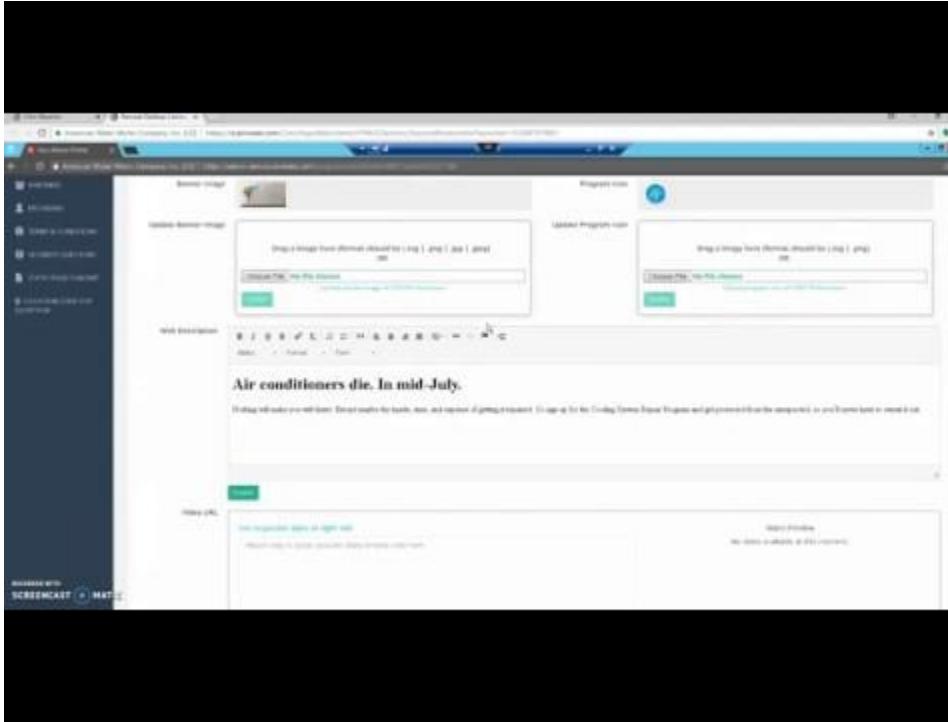


- **Microsoft Dynamics CRM** - the entire manual process was previously handled in MS Dynamics CRM. All master entities including products and customers are created and managed here.

The new solution created an alternate product and customer master using MongoDB, and we synchronized all data to MS Dynamics CRM
- **ETS Payment Gateway** - handles all payments from enrolled customers. Provides APIs for payment processing and webhooks for renewal reminders etc.
- **Active Directory** - all internal users are maintained in AD, and authentication of admin and support users needed to be done via AD



Admin and Support App



Case Study: MCA Protect - Lending Portal

MCA Protect is a portal that brings together small business owners, funders and brokers

The portal allows small business owners and funders to find each other and do the complete due diligence process online

The image displays two views of the MCA Protect platform. On the left, a laptop screen shows the 'Deals Pipeline' dashboard, which lists various business applications with columns for Name, Status, Application ID, Deal Value, and Offered On. A large red banner at the bottom of the dashboard reads 'BREAKTHROUGH ALTERNATE LENDING TECHNOLOGY'. On the right, a mobile device screen shows the login page, featuring the MCA Protect logo, fields for E-mail and Password, a 'Keep Me Logged In' checkbox, and a prominent red 'Login' button.

Deals Pipeline

Dashboard Lending Programs Merchant Applications Scored Applications

John Doe

Deals Pipeline

Name Status Application ID Deal Value Offered On

SFG Inc. Under Review \$225,000 12/06/2016

Hanover Needs Fund \$100,000 12/06/2016

Center Needs Fund \$100,000 12/06/2016

BFM Builders Under Review \$100,000 12/06/2016

Global Inc. Under Review \$100,000 12/06/2016

Global Merchants Under Review \$100,000 12/06/2016

Merchant Mkt Under Review \$100,000 12/06/2016

Lakefield Chiefs Under Review \$100,000 12/06/2016

Transcan Under Review \$100,000 12/06/2016

Under Waiting 24

Need More Info 32

Lost 94

Renewal 0

Performance Comparison

Custom Range

2015 - 1st Quarter

12.4%

Broker Brokerage

@ E-mail

● Password

Keep Me Logged In

Login

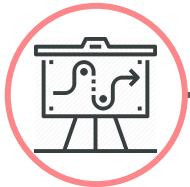
Forgot Password | New User

About Us Terms & Conditions Privacy

@2017 MCA Protect All rights Reserved

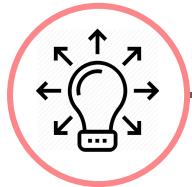


MCA Protect - Lending Portal



Business Challenges

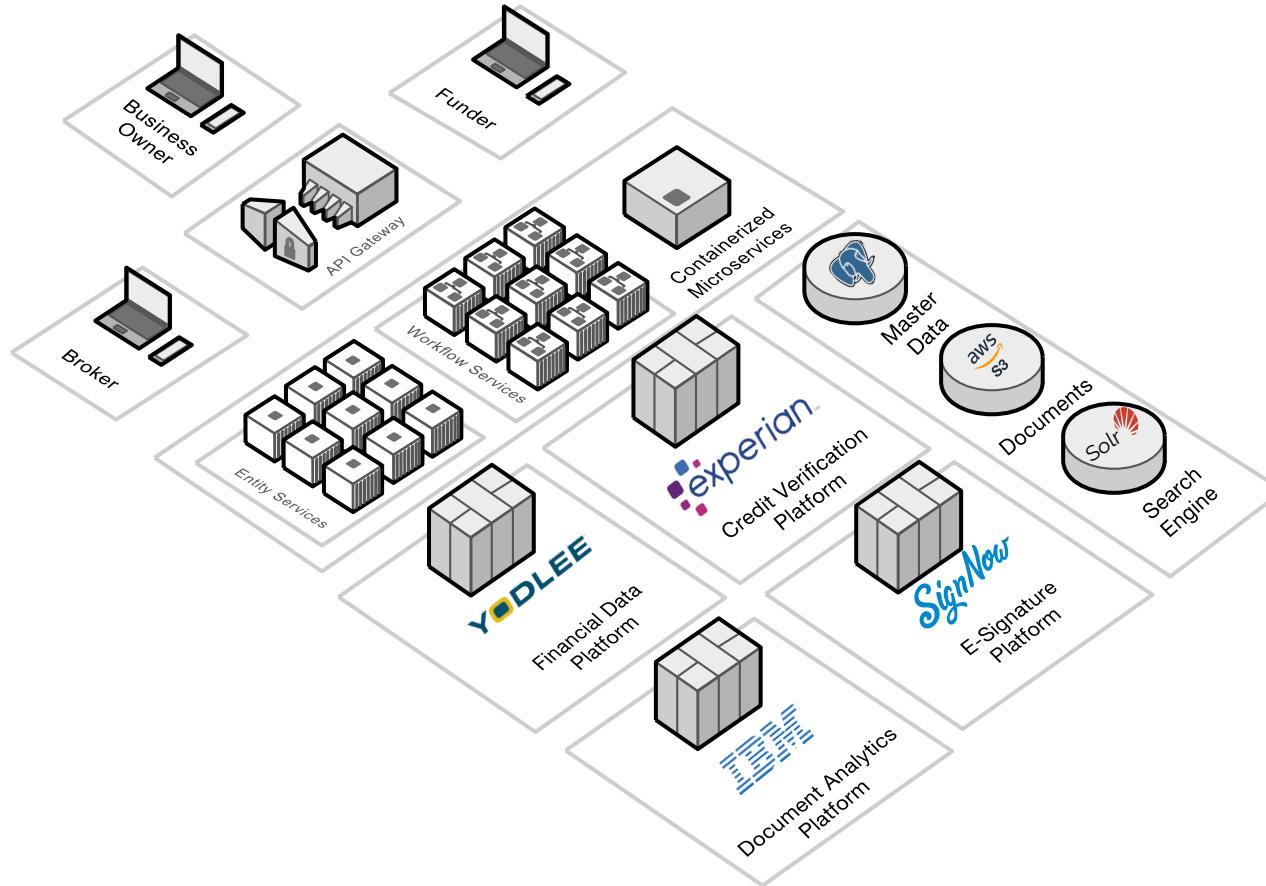
- Large number of small business need to be addressed
- Funders need detailed information from applicants that requires cumbersome forms to be filled
- Funders need customization of forms based on their preferences
- Several reports are required to be shared with multiple investors that participate in the fund



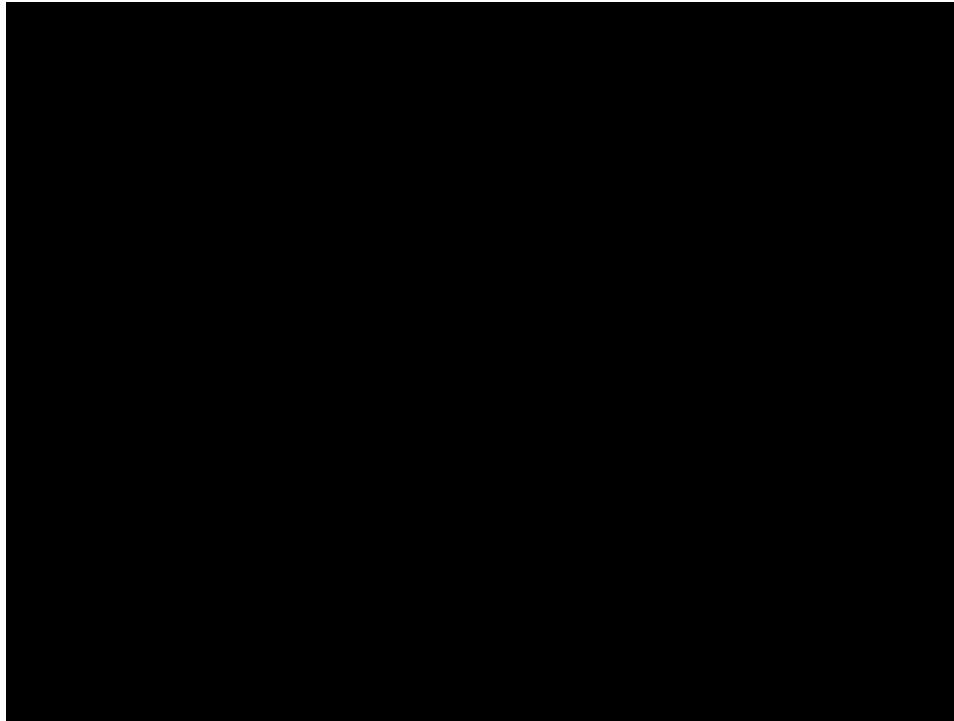
Solution Delivered

- Accelerated MVP development using Breeze
- High performance web UI designed using AngularJS
- User defined forms can be put together using the Form Wizard component
- Reports are generated by using flexible grid layouts and data widgets

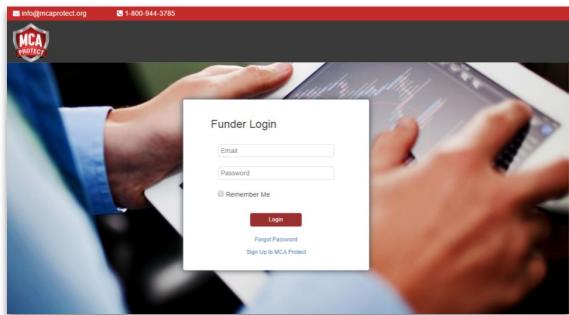
Application Architecture



Product Overview



Sample Screens



A screenshot of a web-based application titled 'Deal Pipeline'. The header includes the MCA Protect logo and navigation links for 'DASHBOARD', 'APPLICATIONS', 'FUNDING PROGRAM', and 'BROKER REFER'. A sub-header says 'Take control of your pipeline and fund more deals. View every application and their status below.' Below this is a table with columns 'Status', 'Application', 'Deal Value', and 'Avg Deal'. The table lists various deal stages: New, Underwriting, Need More Stips, Funded, DNQ, Lost, and Renewal. Each row shows a count of applications and their respective deal values.

A screenshot of a web-based application titled 'Applications'. The header includes the MCA Protect logo and navigation links. A sub-header says 'Search...'. Below is a table with columns 'Submitted On', 'Business Name', 'Months', and 'Loan Value'. The table lists several business names with their submission dates, loan months, and values. At the bottom, it says 'Showing 1 to 10 of 20 results' and includes a 'Prev' button, page number '1', and a 'Next' button.

A screenshot of a mobile application for brokers. The top bar shows 'Search', signal strength, '12:10 PM', and '79%'. The header has the MCA Protect logo and navigation icons. Below is a 'Broker' tab. The main area shows sections for 'New' deals (0), 'Underwriting' deals (0), and 'Need More Stips' deals (1). Each section includes 'Deal Value' and 'Average Value'. At the bottom are buttons for 'Deals Pipeline', 'Performance Comparison', and 'Deals Funded'.

A screenshot of a mobile application for brokers. The top bar shows 'Airtel' signal, '12:11 PM', and '79%'. The header has the MCA Protect logo and navigation icons. Below is a 'Brokerage' tab. The main area shows sections for 'New' deals (0), 'Underwriting' deals (0), and 'Need More Stips' deals (1). Each section includes 'Deal Value' and 'Average Value'. At the bottom are buttons for 'Deals Pipeline', 'Performance Comparison', and 'Deals Funded'.

A screenshot of a mobile application for merchants. The top bar shows 'Airtel 4G', '12:12 PM', and '79%'. The header has the MCA Protect logo and navigation icons. Below is a circular placeholder for a user profile picture with the name 'Vinay Kumar'. The main area shows sections for 'Dashboard', 'Merchant Applications', 'Saved Applications', 'Funding Programs', 'Ask Funder', and 'Sign Out'. At the bottom is a footer with the text 'Version 0.0.1'.

A screenshot of a mobile application for merchants. The top bar shows 'Airtel', '12:11 PM', and '79%'. The header has the MCA Protect logo and navigation icons. Below is a 'Deals Pipeline' tab. The main area shows sections for 'Deals Pipeline', 'Performance Comparison', and 'Deals Funded'. At the bottom is a footer with the text 'Deals Pipeline', 'Performance Comparison', and 'Deals Funded'.

A screenshot of a mobile application for merchants. The top bar shows 'Airtel', '12:11 PM', and '79%'. The header has the MCA Protect logo and navigation icons. Below is a 'Performance Comparison' tab. The main area shows a chart comparing performance between 'Current Month' and 'Current Quarter' for '# of Applications Submitted', '# of Deals Funded', and 'Avg. Size of Deals Funded'. At the bottom is a footer with the text 'Deals Pipeline', 'Performance Comparison', and 'Deals Funded'.

A screenshot of a mobile application for merchants. The top bar shows 'Airtel', '12:11 PM', and '79%'. The header has the MCA Protect logo and navigation icons. Below is a 'Notifications' tab. The main area lists notifications with icons and dates: 'Funder funds the FUNDEN!!! Congratulations, Vinay1' (06/20/2017), 'Need More Stipulations' (06/20/2017), 'Lender approves the The application for Vinay1 is in' (06/19/2017), 'Merchant accepts Vinay1 has accepted a funding' (06/19/2017), 'Funder rejects the Vinay1 did not qualify.' (06/09/2017), 'Funder comments on Funder has posted a comment' (06/09/2017), and 'Funder comments on Funder has posted a comment' (06/09/2017). At the bottom is a footer with the text 'Deals Pipeline', 'Performance Comparison', and 'Deals Funded'.

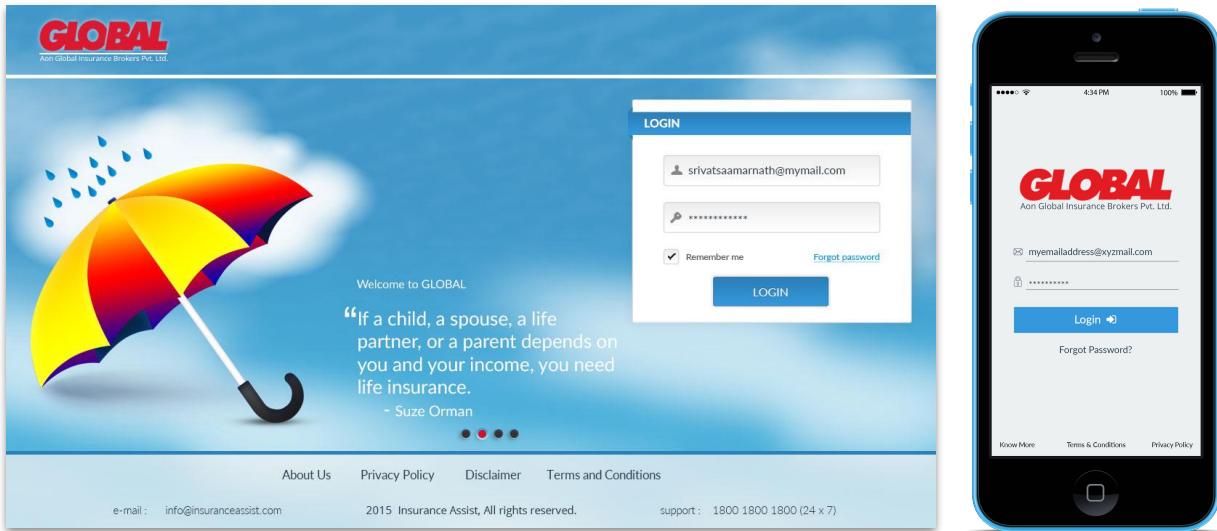


Case Study: Insurance Assist

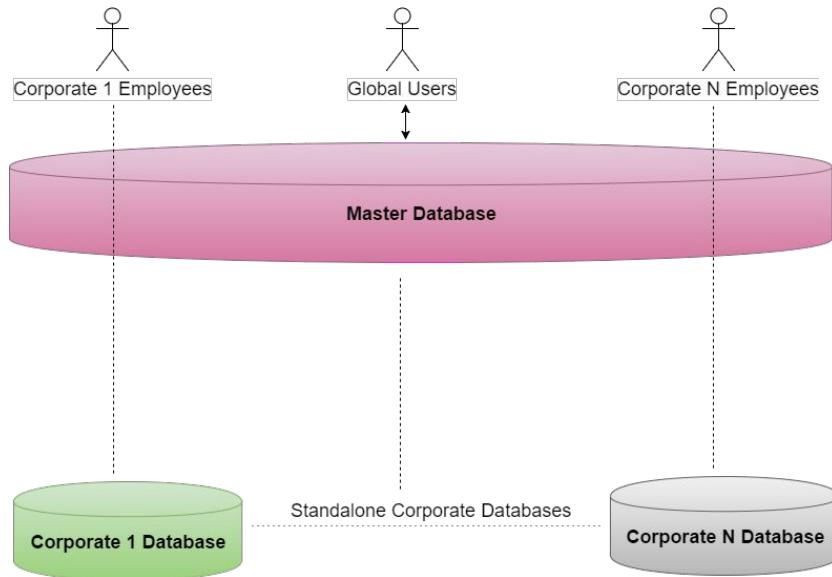
A customizable B2B SaaS platform for Insurance Brokers to setup custom policies for corporates

The UI and policies can be customized for each broker and integrated with each corporate's internal HR application

A Hybrid mobile app is available on both, Android and iOS



Application Workflow



Sample Screens

GLOBAL Assurance

About Us FAQ Ask a Question 1800 1234 5678 Login

GPA (Group Personal Accident) **GTL** (Group Term Life) **GMC** (Group Medical) **Top-Up** (Policy Top Up)

Get a Quote

Employee Demographics

Claims

Broadcast

All Locations: Bangalore, Delhi

Locationwise: 65% Mumbai, 35% Bangalore

Relation Chart: 60% Self, 30% Spouse, 10% Parents

No. of Years in Company: 0-1 yrs: 20%, 1-2 yrs: 30%, 2-3 yrs: 30%, 3+ yrs: 20%

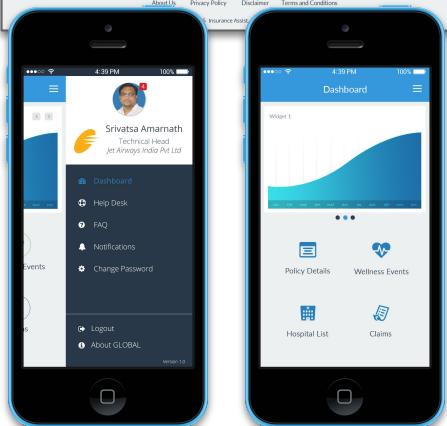
2015 Year Graph - Employee Enrollment

Why Choose Us ?

Why Choose Us ?

Our Partners

Two mobile phones showing the Global Assurance app interface.



GLOBAL Assurance

JET AIRWAYS

Employee Dashboard

My Insurance Benefit

- GPA**: Sum Insured, View Policy
- GTL**: Sum Insured, View Policy
- GMC**: Sum Insured, View Policy
- Top-Up**: Sum Insured, View Policy
- Mandatory**: Sum Insured, View Policy

My Members Covered

Policy Type	Relationship	Name
GPA	Self	Srivatsa Amarnath
GPA	Spouse	Anuradha
GPA	Child	Gehokar

My Claims

Policy Type	Status
GPA	Claim Process
GPA	Claim Forms
GTL	Claim Process
GTL	Claim Forms

My Wellness

- Tip
- Calculator
- Event

JET AIRWAYS

Group Term Life - GTL

Payment Info

Premium Payment

NEFT Details

Bank Details

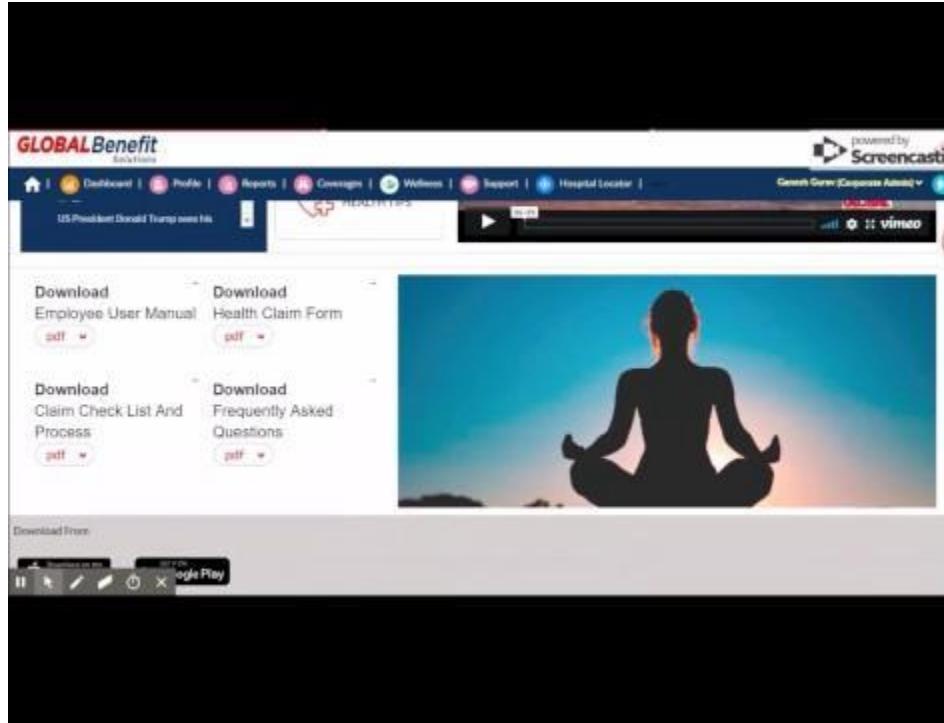
Receiver's Details

IFSC Code

Back **Save Plan**



Short Demo





Thank you!

Accion Labs develops and maintains the Breeze Framework and continuously updates and upgrades the framework

Accion Labs uses the Breeze Framework to provide product development services to customers

<http://accionlabs.com>



Machine Learning

- ❖ NoSQL / Data lake
 - Hadoop
 - Hive
- ❖ Data Processing (Low latency, High Throughput, In memory computing)
 - Apache Spark
 - AWS SQS - Streaming / Publisher - Subscriber mechanism.
- ❖ Data Pipelines Scheduling
 - Apache Airflow - Scheduling, Orchestration and monitoring of Data pipelines.
- ❖ Distributed Storage
 - Parquet, Avro, Arrow at HDFS, S3 etc.
- ❖ Processed Data Warehouse
 - MongoDB.



Machine Learning - Reference Architecture

