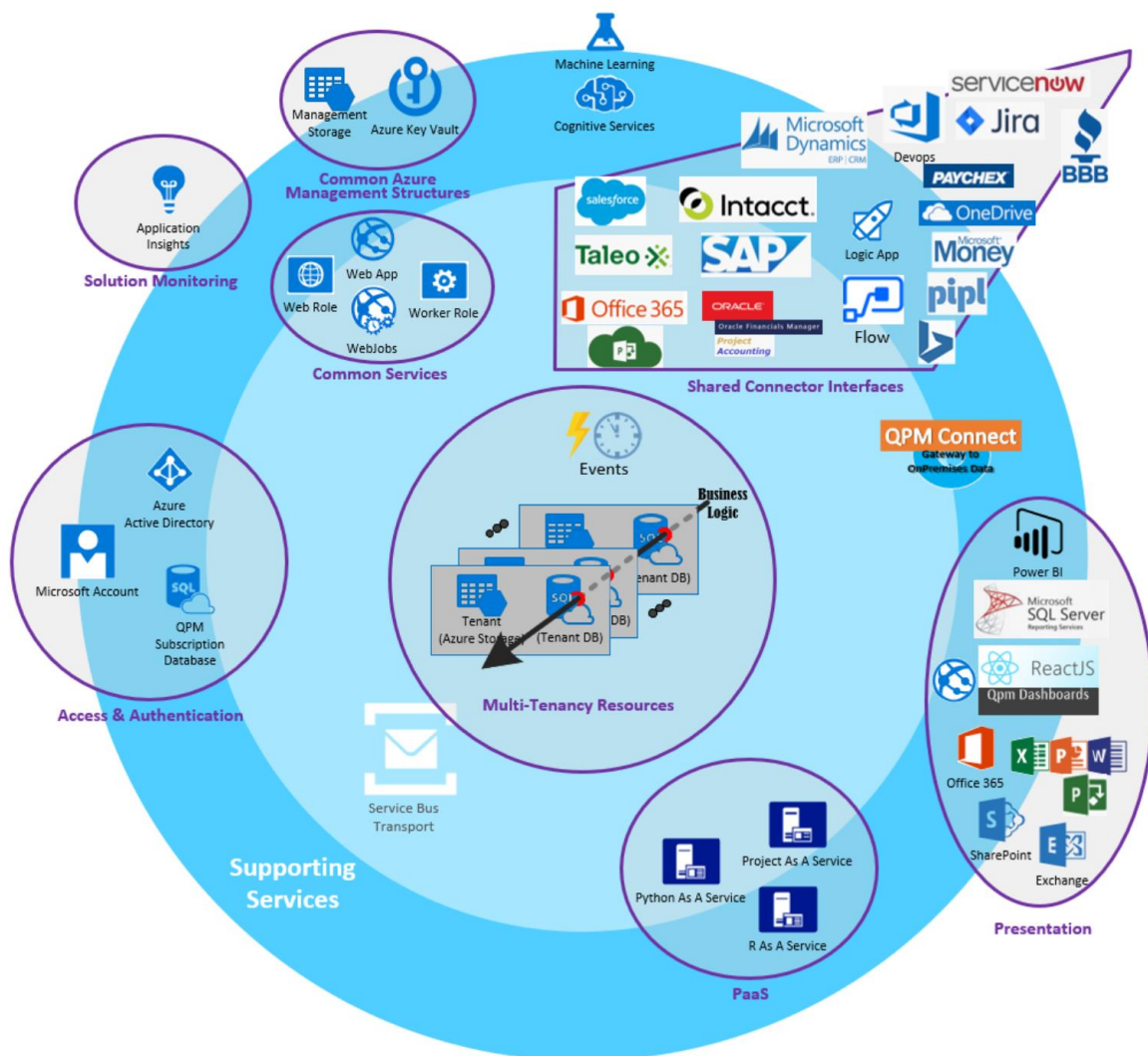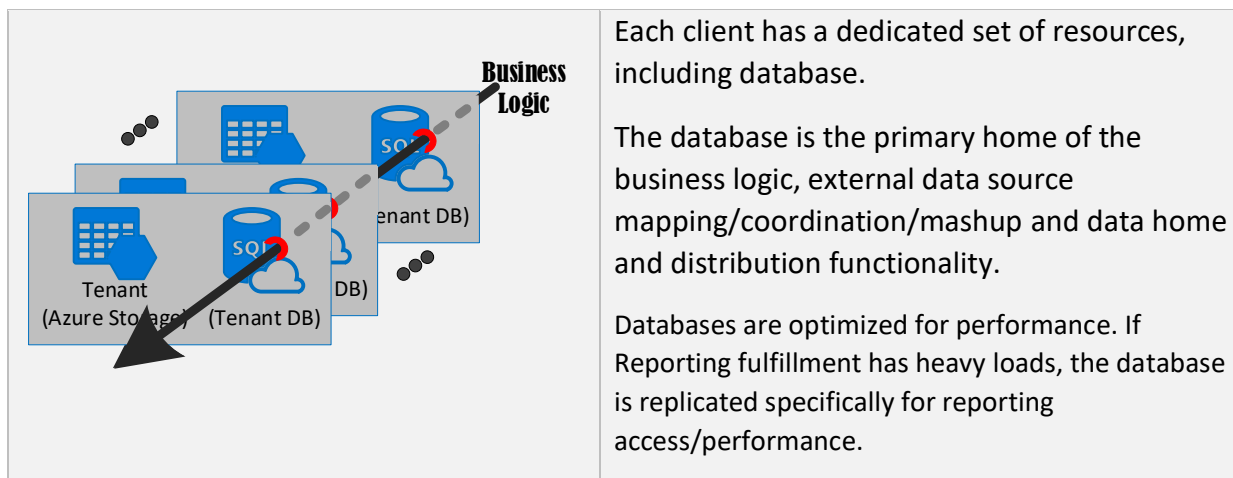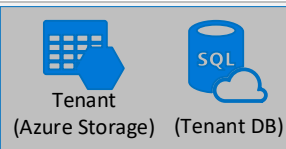# BIAdvantage Solution Architecture Overview

BIAdvantage is a Software-as-a Service (SaaS) business integration and intelligence solution that connects cloud systems with on-premise systems. It enables the flow of data between systems to give you access to real-time data that can be used to drive success in your business. BIAdvantage is an integration hub that provides tactical business intelligence, business-rule driven data management and information delivery capabilities. It supports snapshot and trend analysis, enterprise reporting and can support any integration. Data access is limited solely by what is supported by a system's APIs. Your business processes, your governance - all supported on an enterprise level across systems - rather than a pre-defined process from a point-to-point interface. BIAdvantage is powered by Microsoft's Azure Cloud providing the security, scalability, maintenance and performance of Microsoft.

![QuantumPM logo]

Multi-Tenancy Resources

Multiple independent database and storage account instances that operate in a shared BIAdvantage environment. They are all logically isolated, but physically integrated.

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Each client has a dedicated set of resources, including database.

The database is the primary home of the business logic, external data source mapping/coordination/mashup and data home and distribution functionality.

Databases are optimized for performance. If Reporting fulfillment has heavy loads, the database is replicated specifically for reporting access/performance.

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<td></td>
<td>Tenant Configuration</td>
<td>Azure Storage is used as a temporary data store for collection data then processing/merging data into the SQL Azure database. Business logic lives in the Tenant database protected by schema separation. Clients have direct access to specific schemas in the Tenant database.</td>
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<tr>
<td>Business Logic</td>
<td>Business Logic</td>
<td>Much of the Business Logic and Flow logic is configured within the tenant databases in a specific schema. Business logic reacts to events and data to continually incorporate incoming new data and initiate other activities.

For example: Email notifications that specific conditions have been met (Data quality, data availability, user actions etc.)</td>
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<td>
Events</td>
<td>Events</td>
<td>Events can be external Webhooks or internally generated and flow into the system to trigger activities. Scheduled events are also supported.
The Solution promotes Near-Real-Time capture as much as possible.
As Webhooks are not guaranteed delivery, multiple layers of scheduled timer-based fallback events (for example every 15 min or 30 min) retrieve mod-date timestamps to compare with existing database values and trigger retrievals as necessary.</td>
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Service Bus Transport

A communication system between core BIAdvantage components.

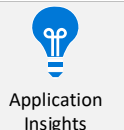|	Service Bus Transport	Service Bus is used to transport messages and commands between various structures and connector interfaces.

Access & Authentication

Human to solution and app to solution access.

	Microsoft Account	A Microsoft Office 365 account end user uses his/her account to access their apps or data in BIAdvantage
	Azure Active AD	Validates the Microsoft account and proves the identity.
	QPM Subscription database	Validates the Microsoft Account and Azure AD against a BIAdvantage subscription database and extends the user identity with custom information and configuration settings.

Solution Monitoring

Live solution monitoring and anomalies detection.

	Application Insights	Diagnostics logs and system outages detections and prevention.

Common Azure Management Structures

Used internally only, system configuration.

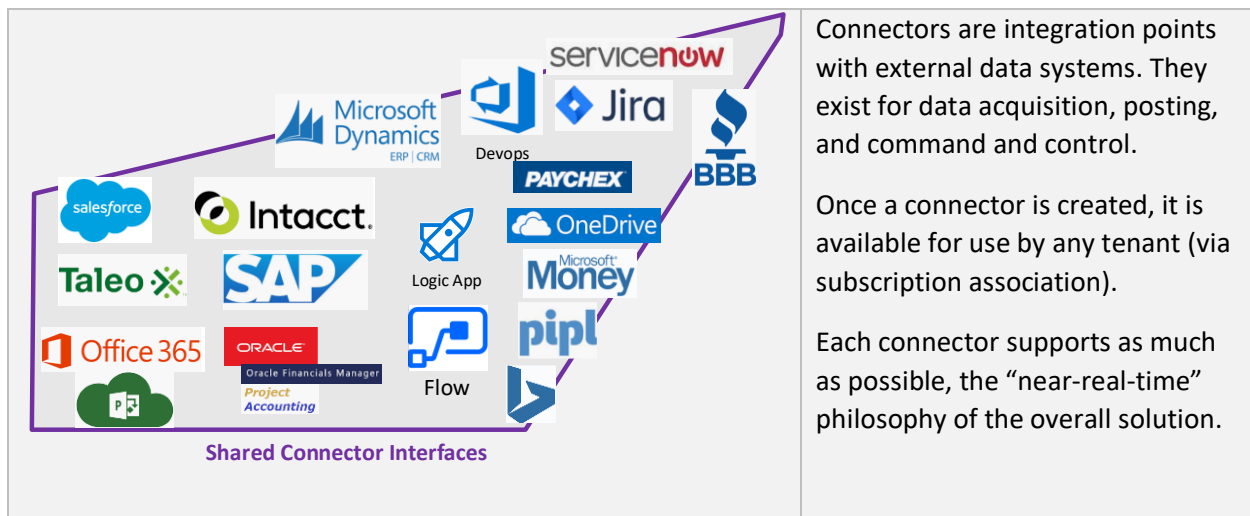|	Management Storage	Stores tenant configurations. Tenant database connection strings, Storage account settings, etc.
	Azure Key Vault	Stores secrets such as connection strings to systems global configuration resources. (Databases, storage accounts, and other resources)

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Common Structures

Core BIAdvantage components.

WebJobs	Web Jobs	System web jobs. Timer-based, service bus triggered, etc. It enables messages and data exchange between system components.
Worker Role	Worker Role	System worker role. It takes care of heavier tasks and enables messages and data exchange between system components.
Web App	Web App	System Web API gateway allows other system components to access customer's tenant database using REST API.

Shared Connector Interfaces

This is a sample of some of the services available for integration with BIAdvantage.

Shared Connector Interfaces

Connectors are integration points with external data systems. They exist for data acquisition, posting, and command and control.

Once a connector is created, it is available for use by any tenant (via subscription association).

Each connector supports as much as possible, the "near-real-time" philosophy of the overall solution.

Presentation

This layer provides the ability to monitor data, status or business flow and see the most important metrics at a glance. The visualizations on a dashboard may come from one underlying dataset or many, and from one underlying report or many. The user sets are end-

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user roles and/or client-side administrators/operators (ensuring and resolving issues with integrations or process).

	QPM Dashboards	A secured platform that enables interactive web interface to customer's data within the SQL Azure Tenant database dedicated to the customer. (Custom dashboards, Reports, etc.)
	Office desktop apps • Auto-generation and • VSTO add-ins	.Net C# Framework that integrates VSTO add-ins and BIAdvantage platform. For presentation, BIAdvantage also generates Office 365 documents and posts them to SharePoint sites. Example: add-in to MS Project that Guards schedule template structure and provides additional information (mashup info from connectors to financial systems) to the PM. Context sensitive within the schedule.
SharePoint	SharePoint extensions	Js framework to integrate SharePoint Add-ins with BIAdvantage platform. Example: Project Online Timesheet Add-in
Power BI	Power BI	Power BI is recommended for Client reporting and easily accesses the tenant database dedicated for a client. BIAdvantage improves report performance/timeliness when large volumes of data are involved by creating snapshots or aggregating specifically for reports. In keeping with the overall philosophy of near-real-time data updates to the tenant database, reporting data is commonly updated dynamically as changes come in.

On-Premises Gateway

Core BIAdvantage component and a reverse proxy to allow Client on-premises data to be used by BIAdvantage.

	QPM Connect	Gateway Application installed within a Client's network to regularly gather data from on-premises data sources and safely transport it to BIAdvantage tenants
QPM Connect Gateway to OnPremises Data		

AI

AI is an evolving area in the solution. Anonymous data analysis can optionally be performed for pattern abnormalities/insights and to understand better Human behavior / Process combinations to help ensure quality and guide and mature client application use.

	Machine Learning	BIAdvantage can create model and pass information to Microsoft's ML in Cognitive Services
Machine Learning		
Cognitive Services	Cognitive Services	Bot framework integration with BIAdvantage platform

PaaS

Platform as a Service area uses Applications scaled across virtual machines to accomplish tasks that require remoting of specific applications.

Example: Project as a service is used to facilitate migrations from on-premise Project Servers to Project Online Infrastructure.

	Project as a Service	BIAdvantage can create models and pass information to Microsoft's ML in Cognitive Services
Project As A Service		
Python As A Service	Python as a Service	Legacy. Moving to take advantage of new Azure capabilities to leverage Python algorithm services.
R As A Service	R as a Service	Legacy. Moving to take advantage of new Azure capabilities to leverage R algorithm services.