Design Solutions by using Platform Services

Design Solutions by using Platform Services (10-15%)

- Design for Artificial Intelligence Services
  - Determine when to use the appropriate Cognitive Services, Azure Bot Service, Azure Machine Learning, and other categories that fall under cognitive AI
- Design for IoT
  - Determine when to use Stream Analytics, IoT Hubs, Event Hubs, real-time analytics, Time Series Insights, IoT Edge, Notification Hubs, Event Grid, and other categories that fall under IoT
- Design messaging solution architectures
  - Design a messaging architecture; determine when to use Azure Storage Queues, Azure Service Bus, Azure Event Hubs, Event Grid, Azure Relay, Azure Functions, and Azure Logic Apps; design a push notification strategy for Mobile Apps; design for performance and scale
- Design for media service solutions
  - Define solutions using Azure Media Services, video indexer, video API, computer vision API, preview, and other media related services

Design for Artificial Intelligence Services

Microsoft

Cognitive Services
Bot Services
Machine Learning

Cognitive Services

Vision

- Computer Vision
- Content Moderator
- Custom Vision Service PREVIEW
- Emotion API PREVIEW
- Face API
- Video Indexer PREVIEW

Speech

- Bing Speech Service
- Custom Speech Service PREVIEW
- Speaker Recognition PREVIEW
- Translator Speech

Language

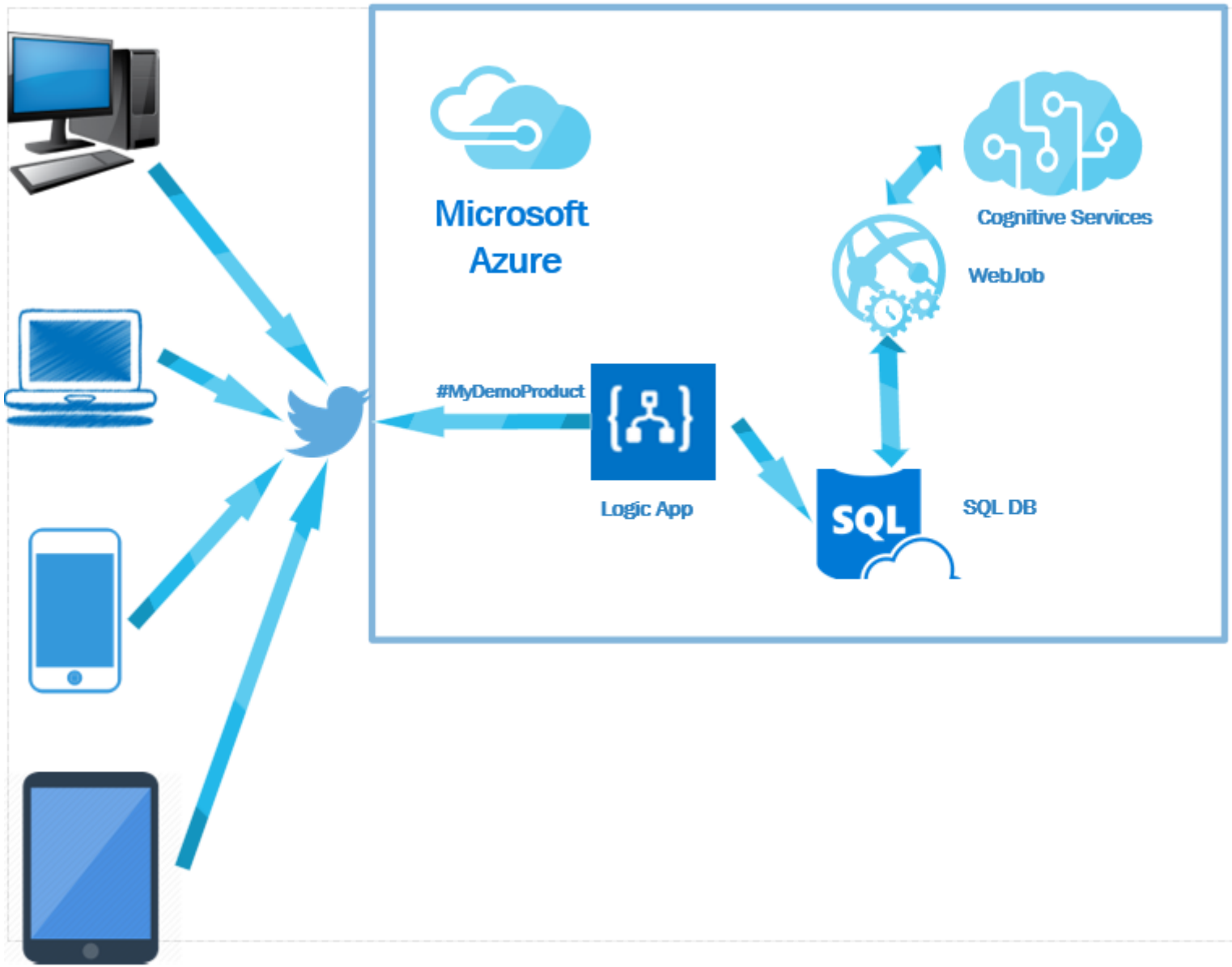
- Bing Spell Check
- Language Understanding (LUIS)
- Linguistic Analysis PREVIEW
- Text Analytics
- Translator Text
- Web Language Model PREVIEW

Knowledge

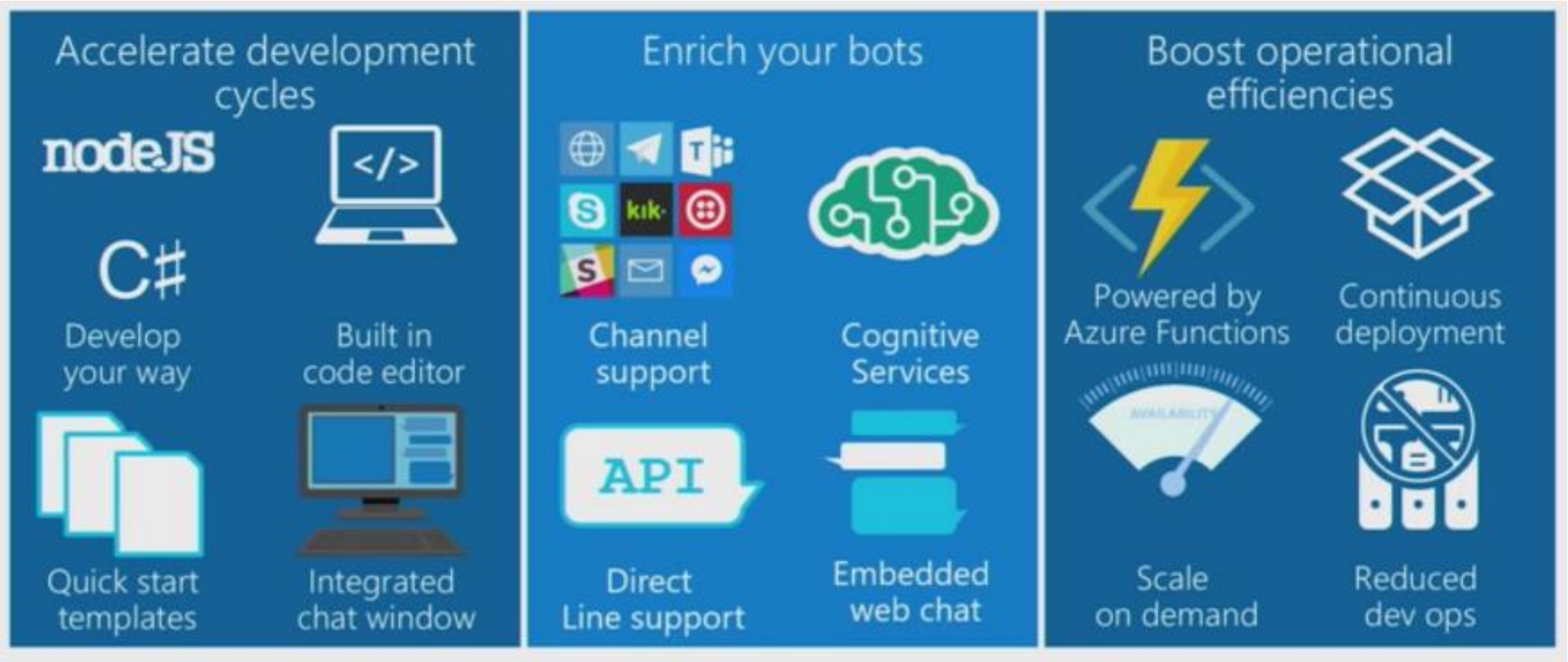
- Custom Decision Service PREVIEW
- Entity Linking PREVIEW
- Knowledge Exploration Service (KES) PREVIEW
- QnAMaker PREVIEW
- Recommendations PREVIEW
- Academic Knowledge PREVIEW

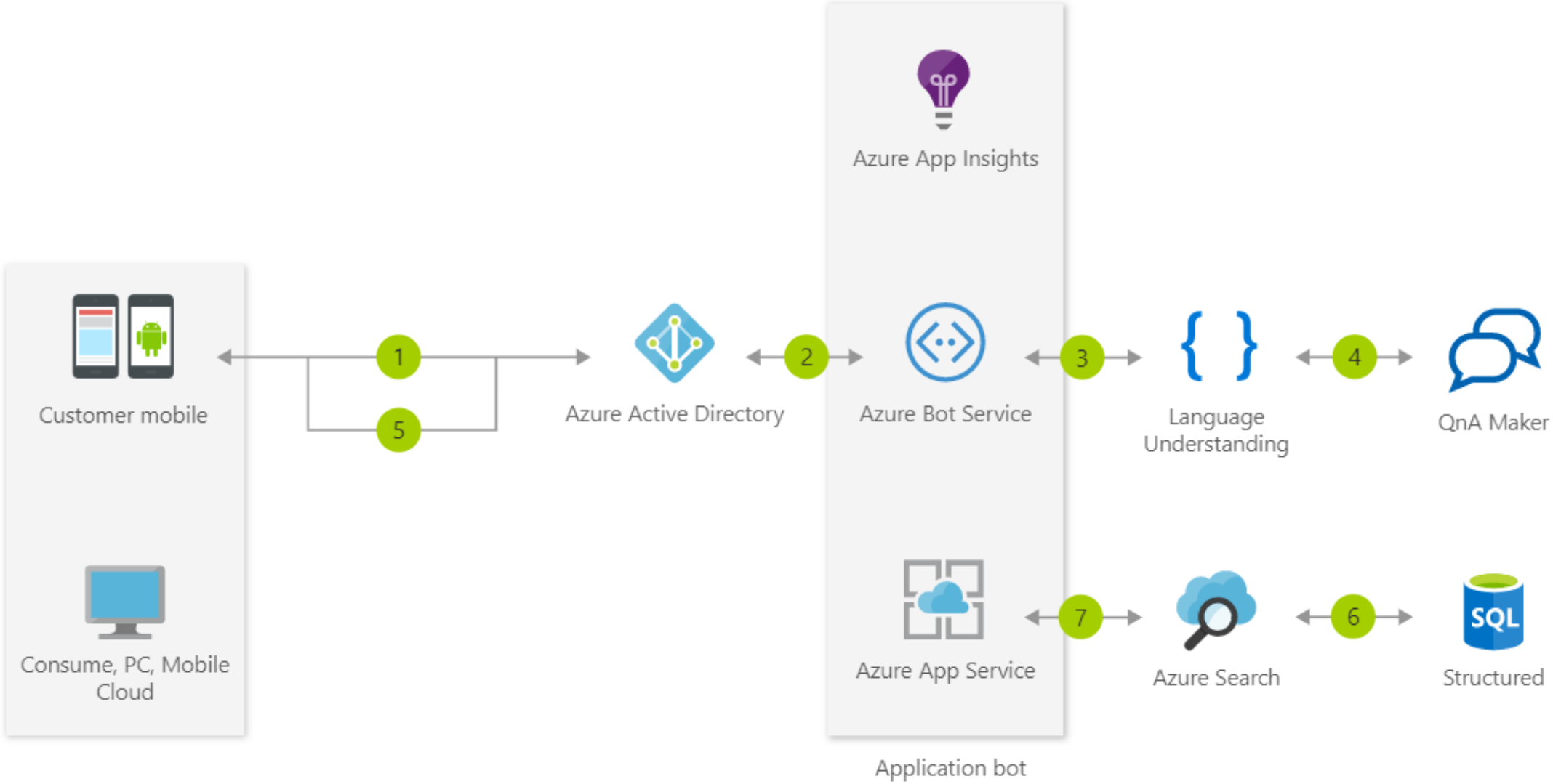
Search

- Bing News
- Bing Video Search
- Bing Web Search
- Bing Autosuggest
- Bing Custom Search
- Bing Entity Search PREVIEW
- Bing Image Search


Microsoft
Azure
Cognitive Services
WebJob
#MyDemoProduct
Logic App
SQL
SQL DB

Bot Services




Azure App Insights
Customer mobile
1
5
Azure Active Directory
2
Azure Bot Service
3
Language Understanding
4
QnA Maker
Consume, PC, Mobile Cloud
Azure App Service
7
Azure Search
6
SQL
Structured
Application bot

Some Modelling Techniques in Azure ML

MULTICLASS CLASSIFICATION

Predict failures with their causes within a future time period

Predict remaining useful life within ranges of future periods

REGRESSION or SURVIVAL ANALYSIS

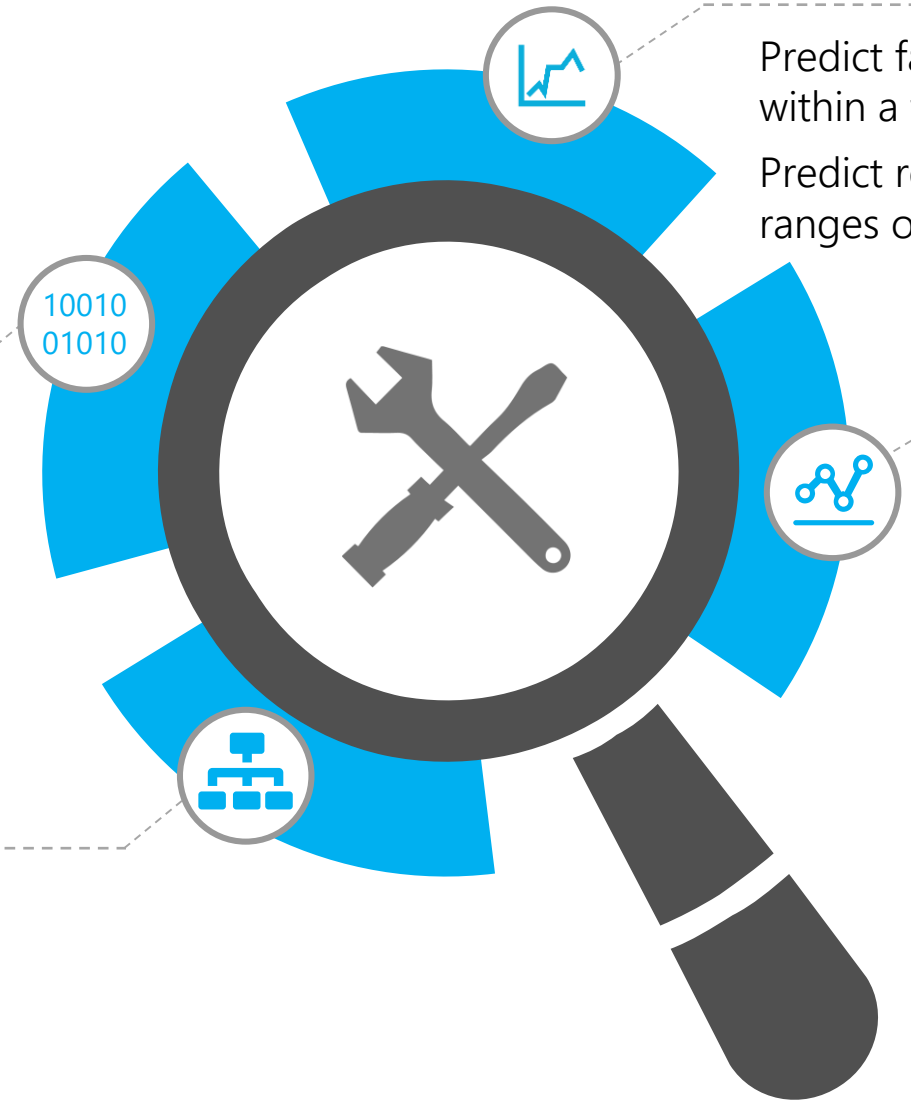
Predict remaining useful life, the amount of time before the next failure

ANOMALY DETECTION

Identify change in normal trends to find anomalies

BINARY CLASSIFICATION

Predict failures within a future period of time



Design for Design for IoT

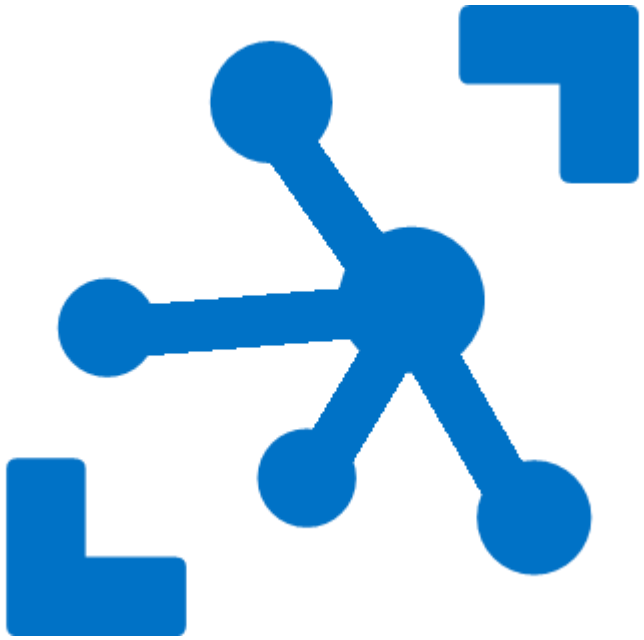
Microsoft

Stream Analytics
IoT Hubs
Time Series Insights
IoT Edge

Stream Analytics

- Instantly analyze data from all your IoT devices and gateways
- Develop massively parallel Complex Event Processing (CEP) pipelines with simplicity
- Start in seconds, scale instantly, pay per job
- Build real-time dashboards in minutes
- Enterprise grade availability, auditing and support

IoT Hub

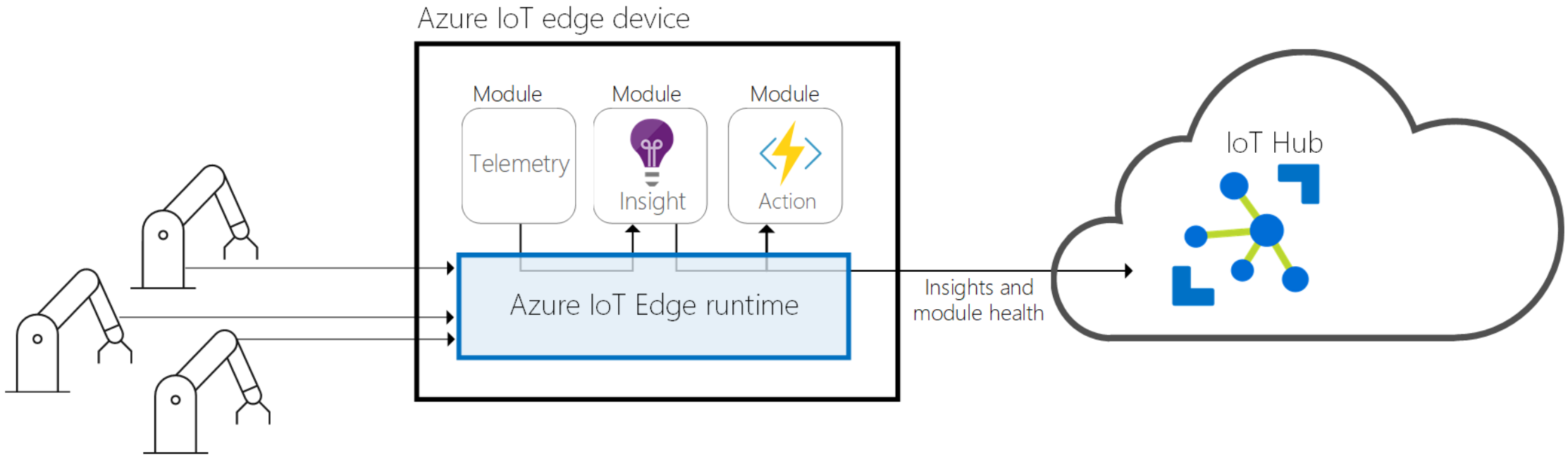


- Establish bi-directional communication with billions of IoT devices
- Authenticate per device for security-enhanced IoT solutions
- Register devices at scale with IoT Hub Device Provisioning Service
- Manage your IoT devices at scale with device management

Time Series Insights

- Find actionable insights in seconds
- Start in seconds, scale in minutes
- Create a global view of your IoT-scale data
- Apply Time Series Insights to your apps and solutions
- Access enterprise-grade security and support

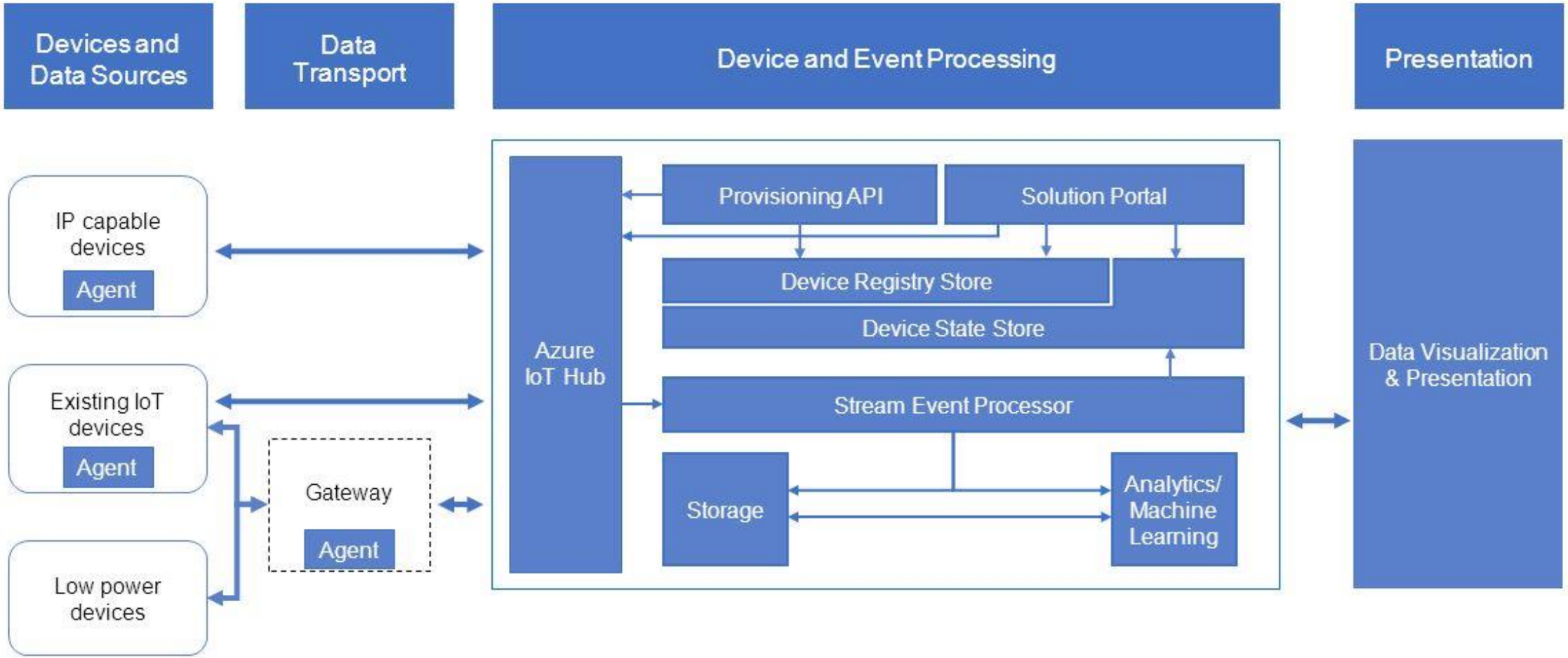
IoT Edge



- Extend cloud intelligence to edge devices
- Run artificial intelligence at the edge
- Perform edge analytics
- Deploy IoT solutions from cloud to edge

- Manage devices centrally from the cloud
- Operate with offline and intermittent connectivity
- Enable real-time decisions
- Connect new and legacy devices
- Reduce bandwidth costs

Azure IoT Reference Architecture

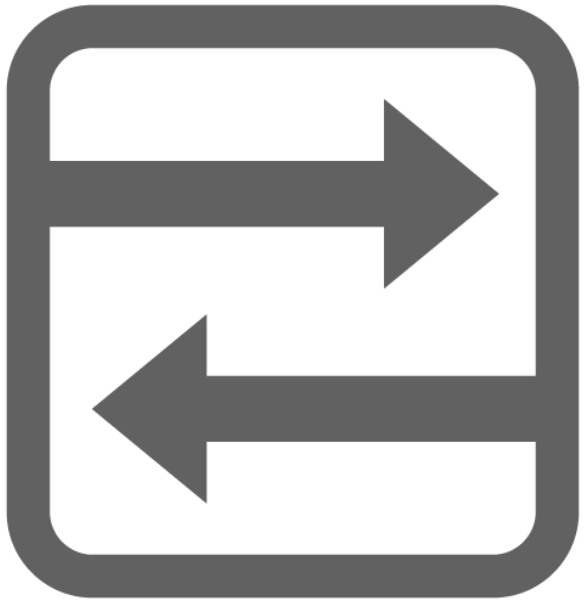


Messaging

Service Bus
Queues
Topics
Azure Relay
Service Bus Tiers
Azure Storage Queue

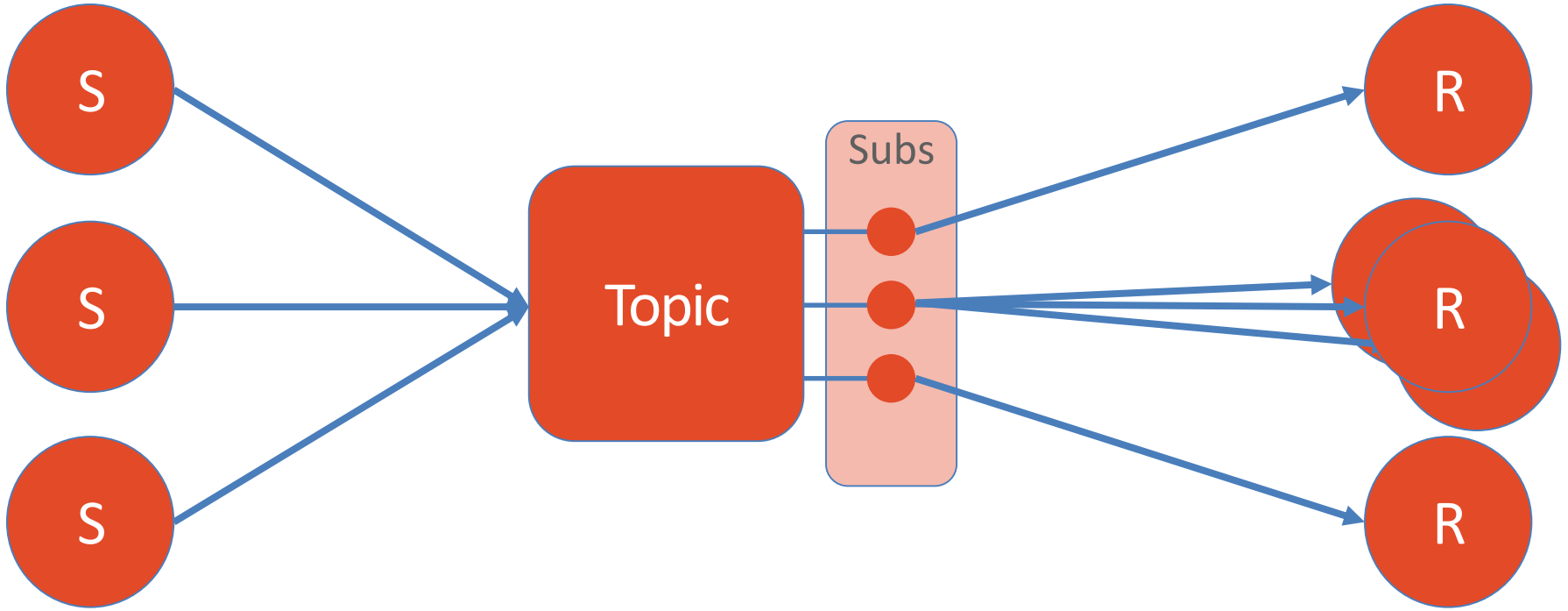
Microsoft

Service bus



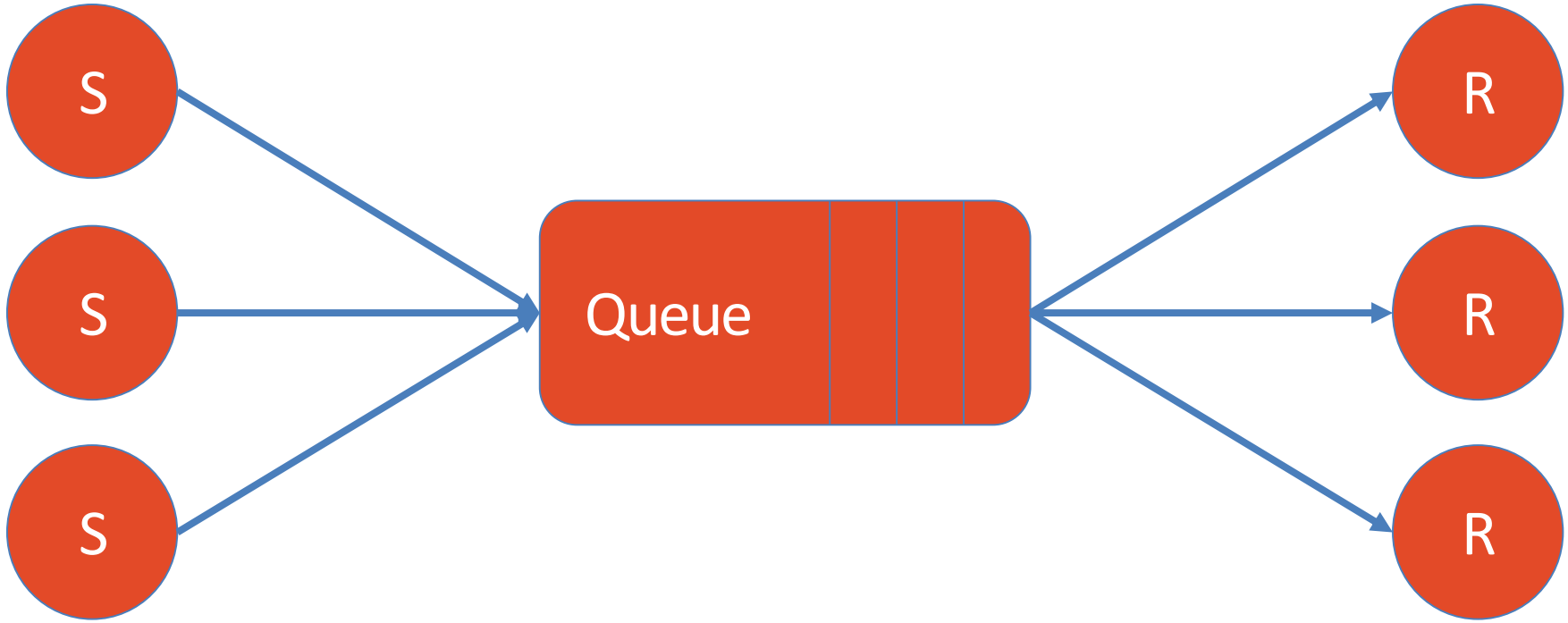
- PaaS with no Infrastructure management
- Relay capabilities to build hybrid apps
- Supports AMQP and common protocols such as HTTP
- Contains Event Hub, a cloud scale telemetry ingress service.

Service Bus Topic



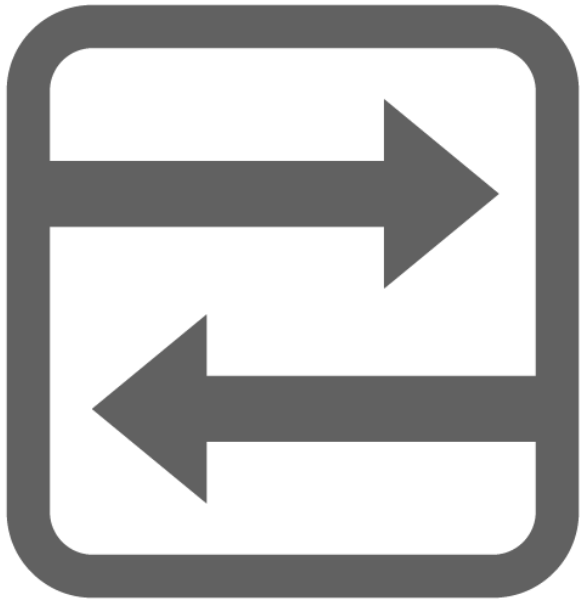
- One to many broadcasting scenarios
- Filter messages
- Use ReceiveBatch() or ReceiveBatchAsync() to receive a batch of messages

Service Bus Queue



- Point to point communication
- FIFO order guarantee
- Supports Batch Receive and Batch Send

Event Hub

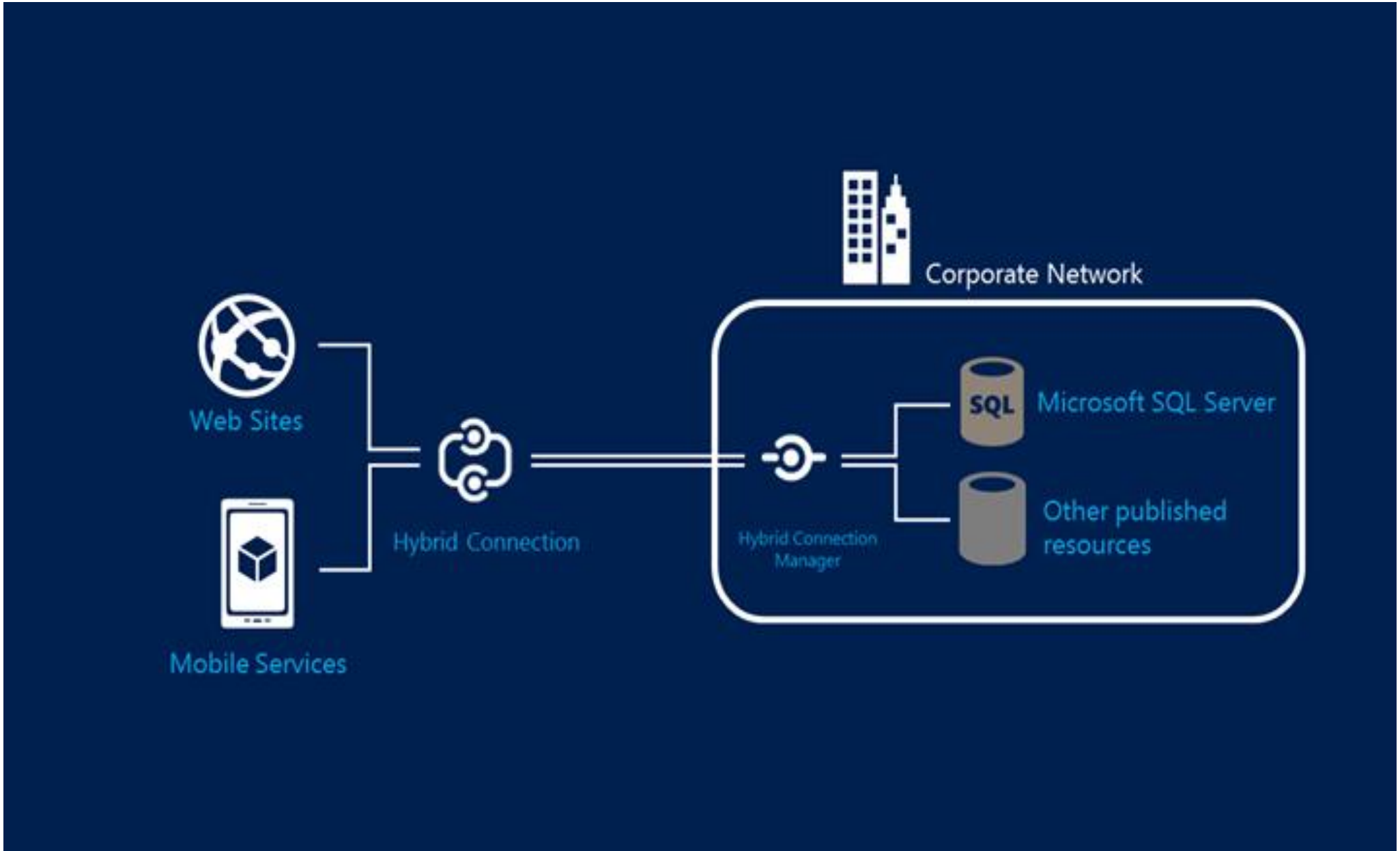


- Ingest messages at scale at high throughput, high volume and low latency
- Typical use cases are IOT and enterprise logging
- Messages are durable for 7 days
- No enterprise messaging features such as dead letter queue

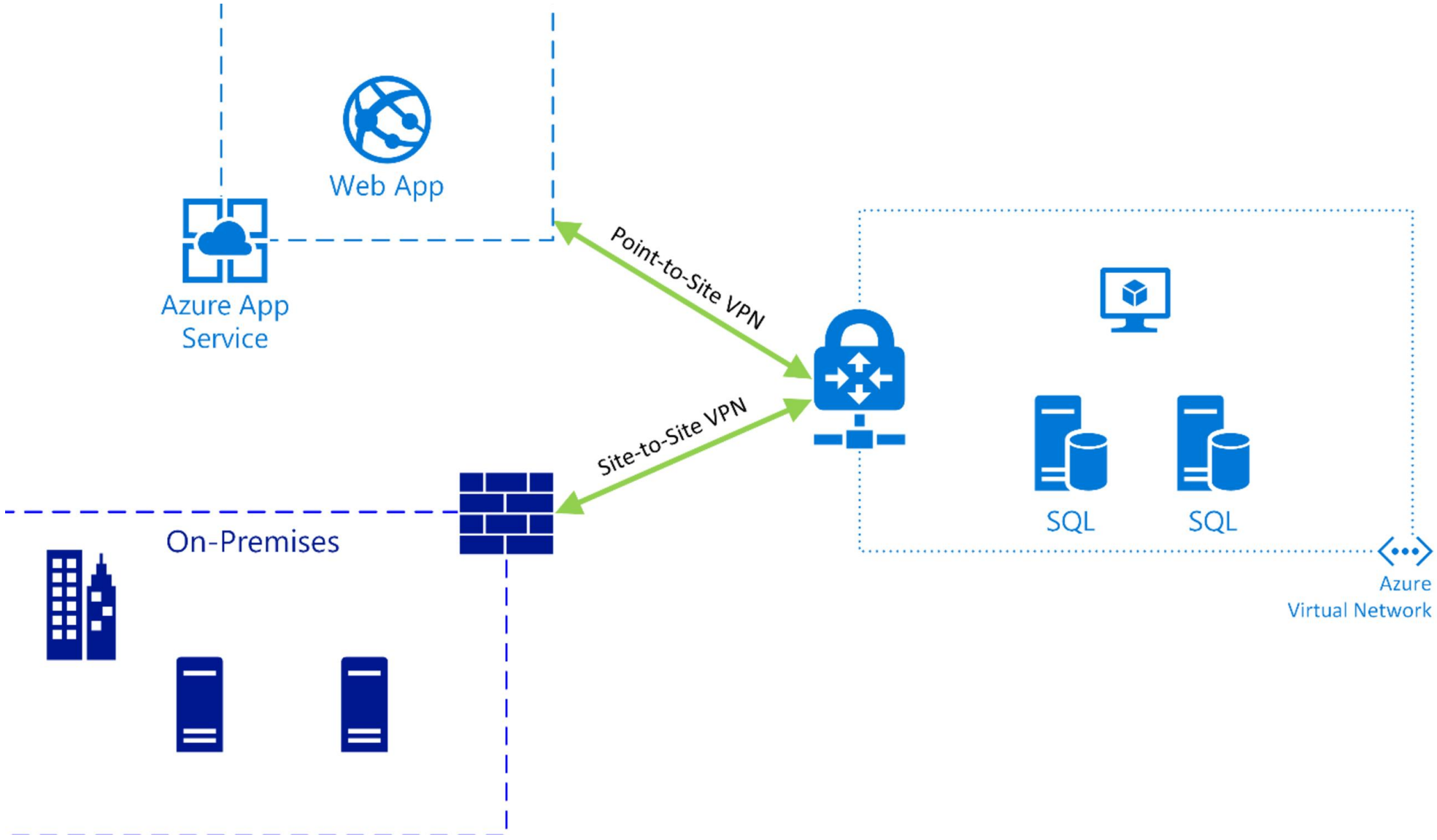
Connectivity for Hybrid Applications

- Azure Relay
  - Hybrid connections and WCF Relay are part of the Azure Relay service
  - Communicate with on-premises resources without opening a firewall port
  - Hybrid Connections support multi-platform scenarios.
  - Hybrid Connections can be used to connect to any TCP port including SQL DB's and Web API's.
  - WCF Relay can communicate with WCF services and .NET Framework only.
- VPN
  - Connect an Azure Web App to on-premises via VPN.
  - VNET integration gives a multi tenant Web App Access to resources accessible by an Azure VNET.
  - App Service Environment (ASE) can be deployed into an Azure VNET for bidirectional access.

Hybrid Connections Architecture



Azure Web App VNET Integration



Question: Your app needs a brokered messaging channel to an on premises line of business application that offers a WCF endpoint to clients. You need to implement connectivity without changing on-premises firewall rules. Implementation needs to have a lower cost compared to other options. Choose an implementation below.

1) Express Route
2) Site to Site VPN
3) Hybrid Connection
4) WCF Relay

Service Bus Tiers

FEATURE	BASIC	STANDARD	PREMIUM
Queues	✔	✔	✔
Scheduled messages	✔	✔	✔
Topics	–	✔	✔
Transactions	–	✔	✔
De-duplication	–	✔	✔
Sessions	–	✔	✔
ForwardTo / SendVia	–	✔	✔
Message Size	256 KB	256 KB	1 MB
Brokered connections included	100	1,000[1]	1,000 per MU
Brokered connections (overage allowed)	–	(billable)	Up to 1,000 per MU
Resource isolation	–	–	✔

Question: You need to process IOT data from approx 700 devices. Data is filtered and moved into Blob Storage. Archival of raw ingress data is required for a week. Choose an implementation below.

1) IOT Hub
2) SQL Database
3) Event Hub Standard Tier
4) Event Hub Basic Tier

Implement background processing

Azure Web Jobs
Azure Functions

Azure Web Jobs

- WebJobs provide an easy way to run scripts or programs as background processes in the context of an App Service, API App or Mobile App
- Web jobs can be scheduled , continuous or on-demand
- You can upload and run an executable file such as as cmd, bat, exe (.NET), ps1, sh, php, py, js, and jar.

```
public const string StartQueueName = "iotoutputqueue";
public const string notifyApplicantQueue = "sendapplicantreminderemailqueue";

 0 references
 public static void SBQueue2SBQueue(
[ServiceBusTrigger(StartQueueName)] string start,
[ServiceBus(notifyApplicantQueue)] out string message,
TextWriter log)
{
    message = start + "-SBQueue2SBQueue";
    log.WriteLine("Logging from SBQueue2SBQueue: " + message);
}
```

Azure Functions

- Server less, highly available and scalable architecture
- Supports programming in Node, Javascript, C#, Python and PHP and various CI options.
- Suitable for trigger based action.
- Web Jobs SDK can be used for local dev and test.

Question: You are trying to implement a background process to send emails on a scheduled interval. Which Azure function triggers would be suitable?

1) Event Hub
2) Blob Storage
3) HTTP
4) Timer

Integrate Azure Services

Azure Search
Media
Advanced Analytics

Azure Search Overview

A fully-managed search solution that allows developers to enable search experiences in applications.

Embed a sophisticated search experience into web and mobile applications without having to worry about the complexities of full-text search and without having to deploy, maintain or manage any infrastructure.

Perfect for enterprise cloud developers, cloud software vendors, cloud architects who need a fully-managed search solution.

Surface Your Data

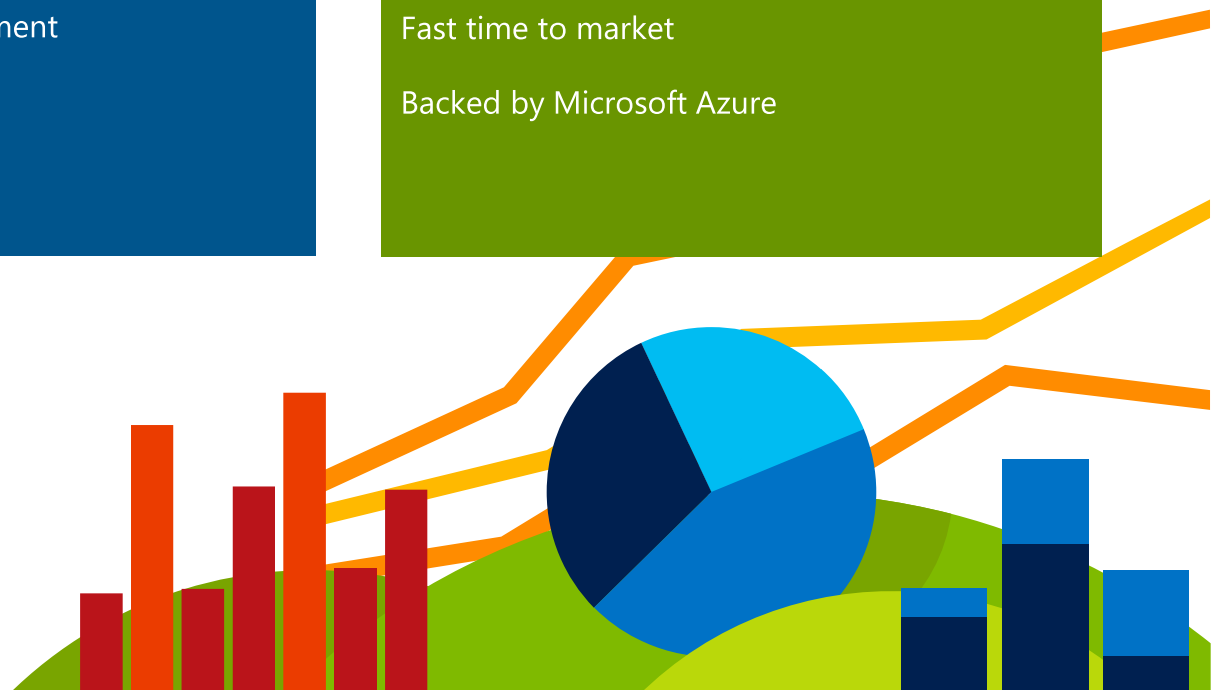
- Powerful, guaranteed performance
- Sophisticated search
- Connects business goals to the application

Reduce Complexity

- Simplify search index management
- Scale-out easily

Move Quickly with Confidence

- Fast time to market
- Backed by Microsoft Azure



Azure Search

- Use Cases
  - Ecommerce - Searching for products
  - News Feed – Newer articles are more relevant
  - Geospatial search – A Search that is aware of your location.
  - Unstructured content – Index and search documents
- Some Features
  - Term Boosting – Quiet clean hotel
  - Synonyms – Motel, Hotel

What you can do with Media Services

Live and on-demand streaming

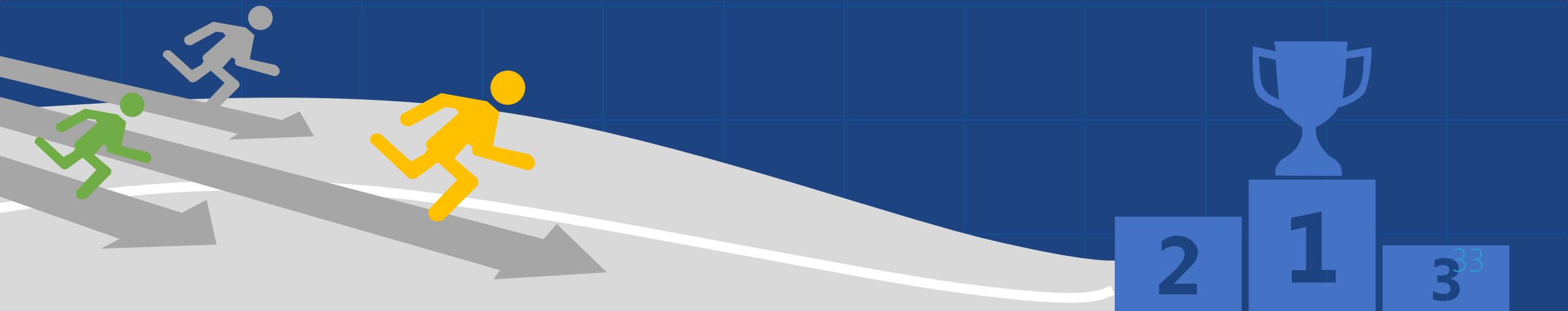
Reach hundreds of millions of device endpoints.

Digital marketing platforms

Services and tools for video preparation, management and publishing.

Enterprise video management

Distribute and manage corporate communications, IT, HR content and training.



Media Services Applications

Live event streaming service with CDN capabilities

Studio grade encoding

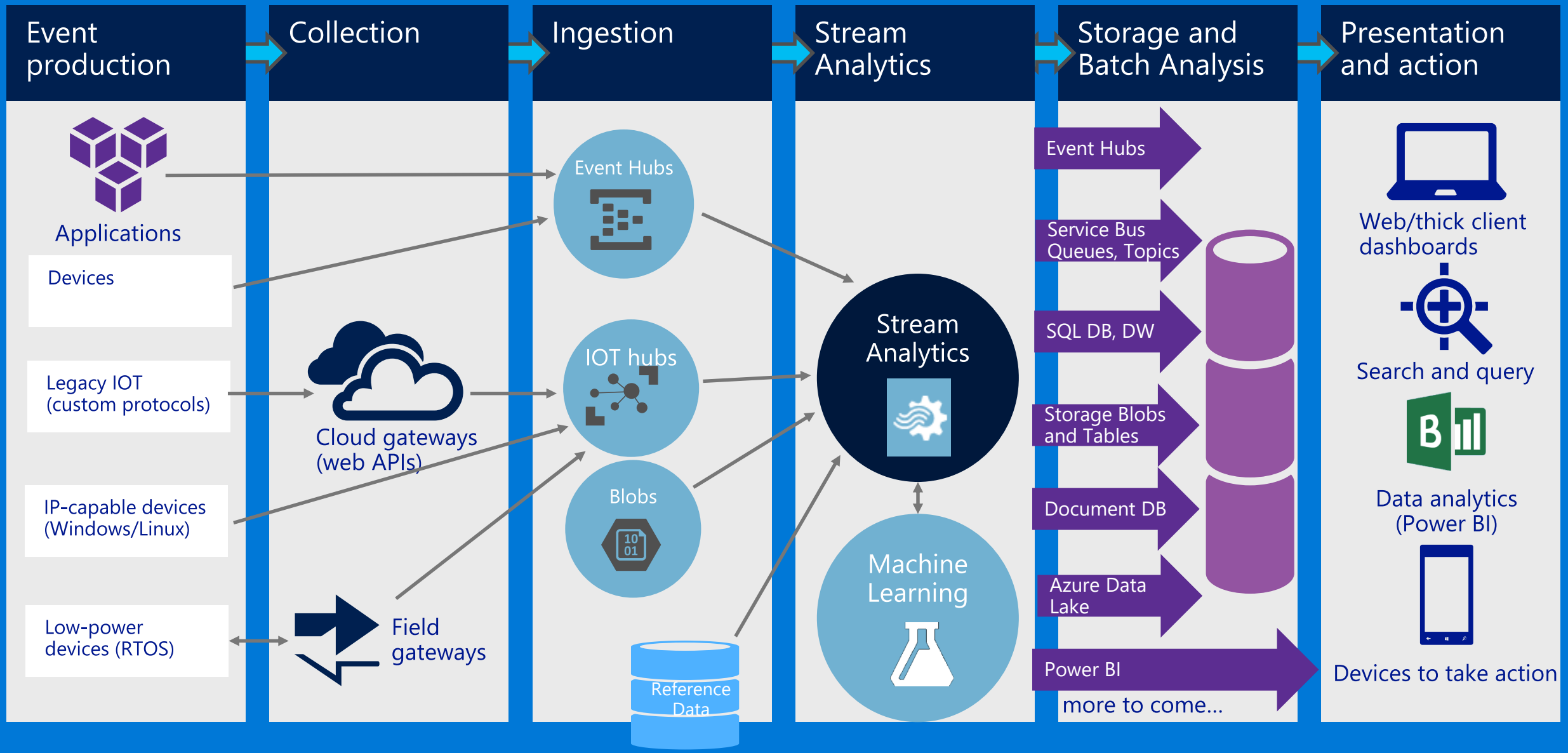
Content protection and encryption

Distribute content across multiple channels and devices

Question: Your company uses Azure media services to supply advertising media to partners. Multiple channels are configured within a single instance of Media services. You need to enforce a rule that only content that contains a signed security token can be uploaded. How can we enforce this rule ?

1) Use a Network Security Group
2) Create an ingest restriction
3) Use an Access Control List
4) Set media services authorization policy to Token

Advanced Analytics



Platform Services

1. Design Web Applications

- Design Azure App Service Web Apps, design custom web API, offload long-running applications using WebJobs, secure Web API using Azure AD, design Web Apps for scalability and performance, deploy Azure Web Apps to multiple regions for high availability, deploy Web Apps, create App Service plans, design Web Apps for business continuity, configure data replication patterns, update Azure Web Apps with minimal downtime, back up and restore data, design for disaster recovery

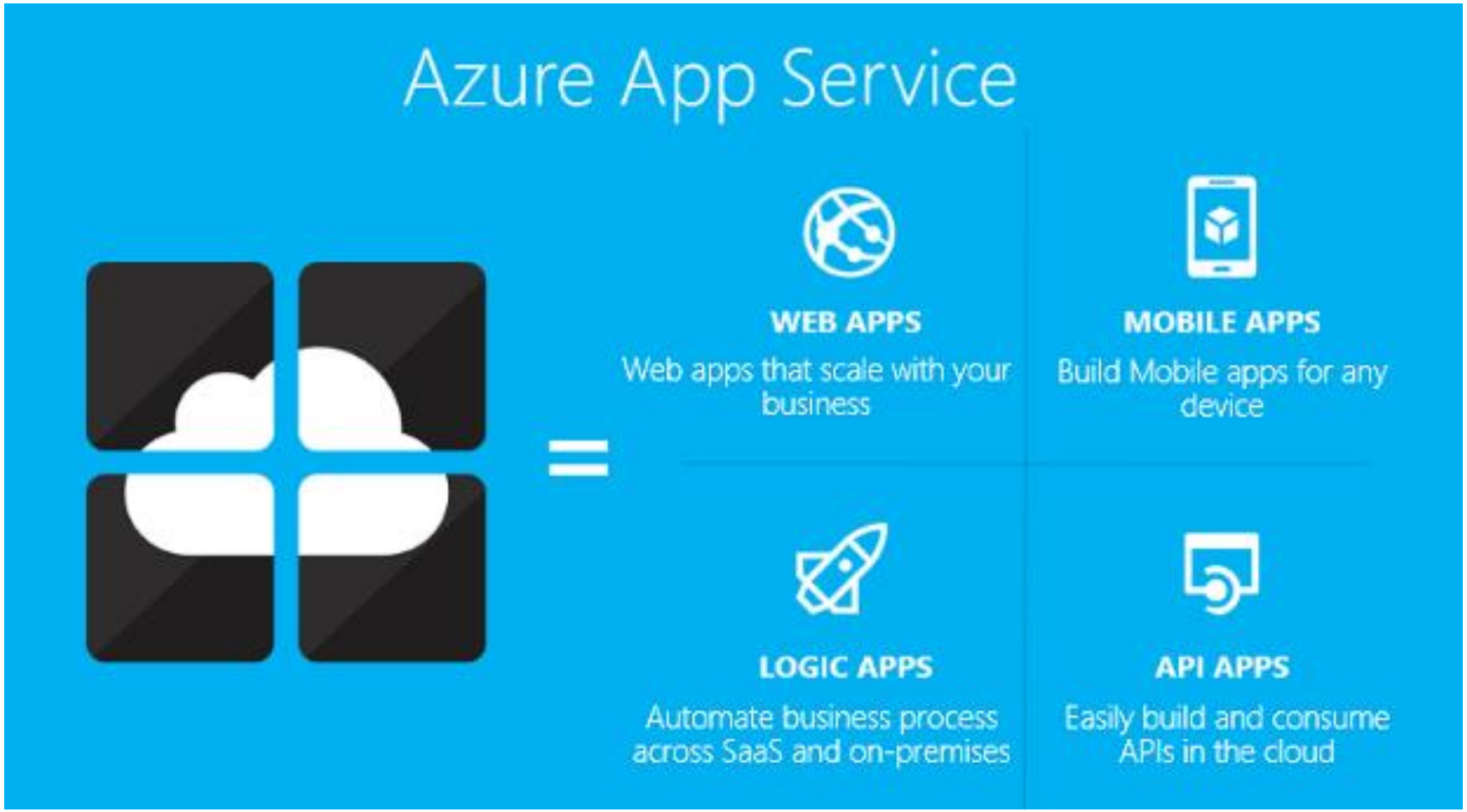
Design Mobile Applications

- Design Azure Mobile Services; consume Mobile Apps from cross-platform clients; integrate offline sync capabilities into an application; extend Mobile Apps using custom code; implement Mobile Apps using Microsoft .NET or Node.js; secure Mobile Apps using Azure AD; implement push notification services in Mobile Apps; send push notifications to all subscribers, specific subscribers, or a segment of subscribers

EXAM TIP!

There are many Azure products and features you need to be familiar with for the exam. In preparing for the exam, you should strive for at least an introductory level of understanding of Azure products that are not specifically called out in the exam skills. This will help you rule out choices when you see them on the exam.

App Service



Authentication

Backup/Restore

Deployment

Networking

Scalability

WebJobs

App Service Plan Tiers

	FREE Try for Free	SHARED Host Basic Apps	BASIC More Features for Dev / Test	STANDARD Go Live with Web and Mobile	PREMIUM Enterprise Scale and Integration
Web, mobile, or API apps	10	100	Unlimited	Unlimited	Unlimited
Disk space	1 GB	1 GB	10 GB	50 GB	250 GB
Logic App Actions (per day) ¹	200	200	200	10,000	50,000
Maximum instances ²	–	–	Up to 3	Up to 10	Up to 50
SLA	–	–	99.95%	99.95%	99.95%
Auto-Scale	–	–	–	Supported	Supported
Geo-distributed deployment	–	–	–	Supported	Supported
VPN hybrid connectivity	–	–	–	Supported	Supported
Staging environments	–	–	–	5	20
Custom domain	–	Supported	Supported	Supported	Supported
SSL certificates	–	–	Unlimited SNI SSL certs	Unlimited SNI SSL certs and 1 IP SSL included[1]	Unlimited SNI SSL certs and 1 IP SSL included[1]
Automated Backups (/day)	–	–	–	2	50

https://azure.microsoft.com/en-us/pricing/details/app-service/plans/

App Service Plan

Represents the collection of physical resources used to host your apps

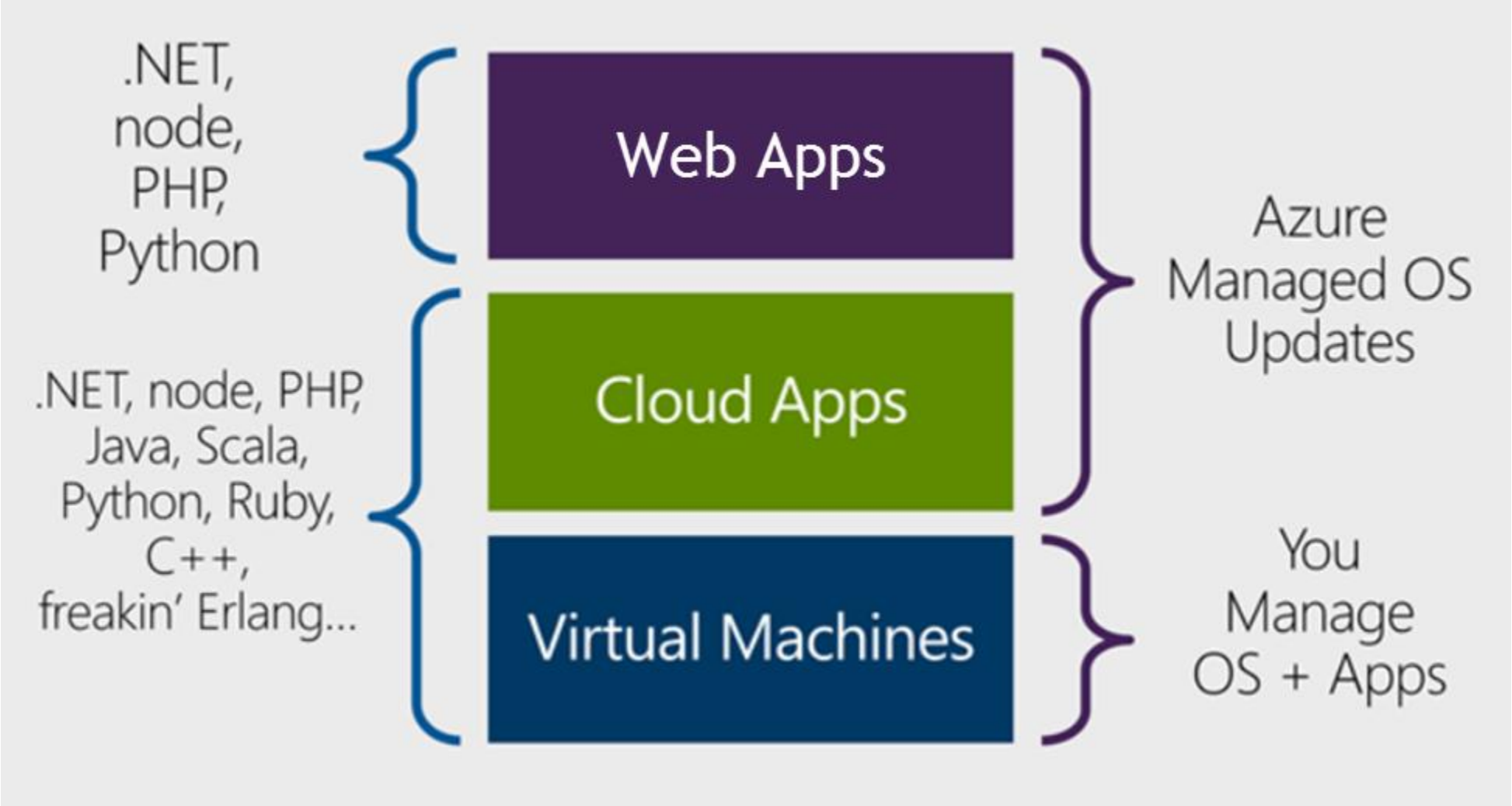
- Region (West US, East US, etc.)
- Scale count (one, two, three instances, etc.)
- Instance size (Small, Medium, Large)
- SKU (Free, Shared, Basic, Standard, Premium)

Web Apps, Mobile Apps, API Apps, Functions run in an App Service Plan

You have an web app that is to be deployed in two data centers (east us and west us) and will use traffic manager, what is the least expensive service plan you can use?

1) Free
4) Standard
2) Shared
3) Basic
4) Standard
5) Premium

Design Azure App Service Web Apps



Design Azure App Service Web Apps

Platform as a Service (PaaS)

Azure Resource Manager (ARM) Technology

Easy to use with existing development skills:

- VSTS/Git/GitHub/etc. for deployment
- Visual Studio integration

Other Azure options for deploying web applications:

- Virtual Machines (IaaS)
- Service Fabric (Microservice architectures)
- Cloud Services (Web Roles and Worker Roles) – Older ASM technology

When creating a website in Azure, which Azure services can you use?

1) Cloud Services
   1) Cloud Services
2) Virtual Machines
   2) Virtual Machines
3) Web Apps
   3) Web Apps
4) Microsoft Flow

EXAM TIP!

Quite a few Azure services provide the same capability. You need to understand the features and common usages in order to pick the best choices on the exam.

Example:

Virtual machines and web apps can be used for websites however you cannot remote desktop to a web app machine.

Design Custom Web API

Web API is a one or more RESTful services (with one or more operations)

- Endpoints expose services to external, partner or internal developers

Can implement in several technologies:

- ASP.Net Web API
- Node.js

App Service options:

- Web App (if you need a web site too)
- Mobile App
- API App

What is the best option to add background processing to your web app?

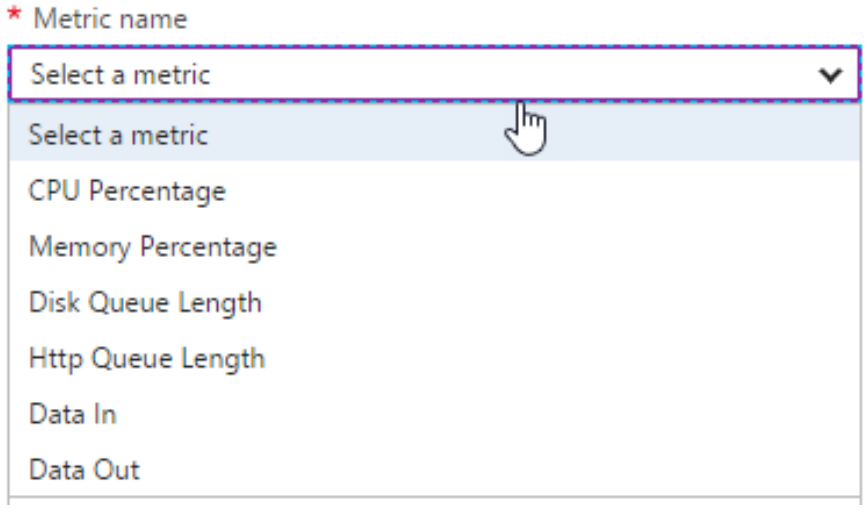
1) Virtual Machines
4) Web Jobs
2) Cloud Services
3) Worker Roles
4) Web Jobs
5) Network Security Groups

Design for Scalability and Performance

Scale Up – Change pricing tiers: Free, Shared, Basic, Standard, Premium

Scale Out – Change instance count: manually, auto

Scaling condition rules: Scheduled or Metric



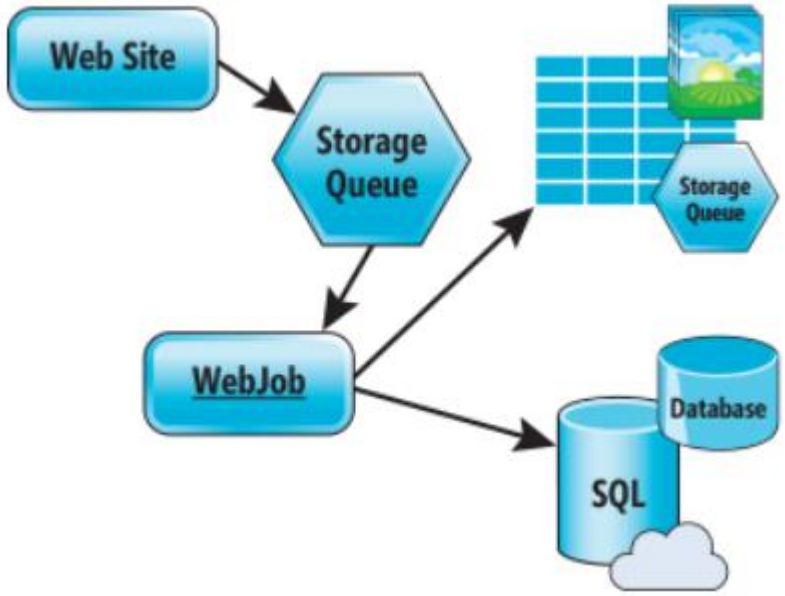
Can have multiple condition rules

Can notify via email or webhook when autoscale events occur

Design for Scalability and Performance

Design for Scale Out

- Move towards stateless or at least distributed session/cache
  - Redis Cache for any Session/Cache needed
- Move towards asynchronous UI
  - Queues for passing work off



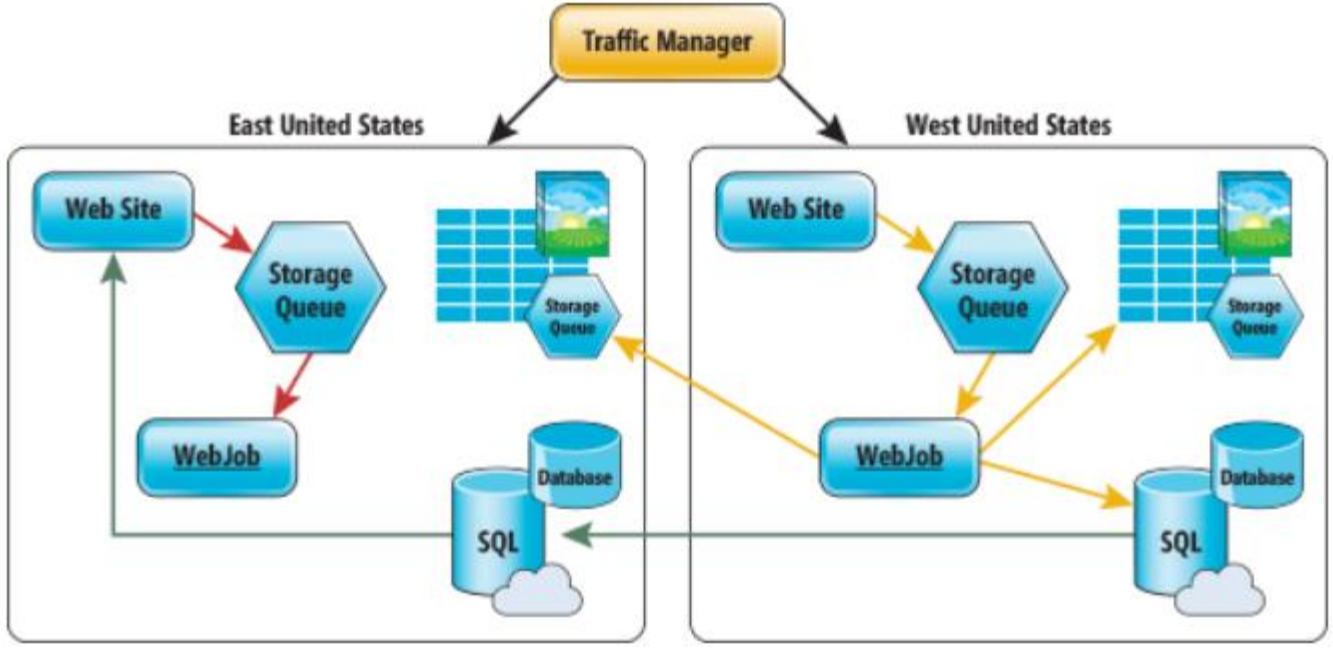
Deploy Azure Web Apps to Multiple Regions

Traffic Manager for routing traffic between regions

- Performance – for directing user to closest region
- Failover – for secondary site
- Round Robin – for balancing traffic

CDN

- Places static content close to user (images, media, etc)



You are going to deploy your web application on the east coast and west coast. You also want to make sure your users are sent to the closest location. What three things do you need to do?

1) Create a Traffic Manager profile
   1) Create a Traffic Manager profile
2) Set the Routing method to priority
   3) Set the Routing method to performance
3) Set the Routing method to performance
   5) Add configure the endpoints in Traffic Manager
4) Create a new Resource Group

5) Add configure the endpoints in Traffic Manager

Deploy

Web Deploy

Kudu (Git/Mercurial/OneDrive/Dropbox)

- VSTS/Github/Bitbucket
- Browser drag and drop (Chrome and Firefox)

FTP/FTPS

- Filezilla, Windows Explorer

App Service infrastructure can be setup using PowerShell, Azure CLI or RM templates

Update Web Apps with Minimal Downtime

Deployment Slots are live apps with their own hostnames

- Only available for Standard or Premium App Service plans

Number of slots available depend on App Service Plan

App content and configurations can be swapped between two deployment slots

- Not all settings and configurations are swapped
- Some settings can be marked to not swap

Testing in Production feature allows you to spread traffic across multiple deployment slots

What gets Swapped with a Deployment Slot?

Swapped	Not Swapped
App Settings – can be configured to not swap	Custom Domain Names
Connection Strings – can be configured to not swap	SSL certificates and bindings
General settings	Scale settings (only production slots are scalable)
Handler mappings	Publishing endpoints
Diagnostic logs settings	

You have a Web App and want to create a staging deployment slot in order to test a release before moving to production. Your app service plan is currently a Shared plan. What two things do you need to do?

1) Call Microsoft support
3) Create a new deployment slot named staging
2) Change your App Service Plan to a Basic plan
4) Change your App Service Plan to a Standard plan
3) Create a new deployment slot named staging
4) Change your App Service Plan to a Standard plan
5) Create a new Resource Group

Design Web Apps for Business Continuity

Web/Mobile/API Apps

- Multiple instances (single data center)
- Multiple data centers with Traffic Manager to balance traffic
- Backup/Restore

Configure Data Replication Patterns

Features Available

- Blob storage: geo-redundant and read-access geo-redundant storage
- SQL Database: geo-restore, geo-replicate
- CosmosDB/DocumentDB: global replication

Custom Code

- Can write WebJob to copy data to other regions or on-premise

You have a Web App that uses SQL Database. You need to make sure your database will not be down any less than a one minute. Which option should you use?

1) Point in Time Restore
2) Active geo-replication
2) Active geo-replication
3) Azure Backup Vault
4) Site Recovery
5) StorSimple

EXAM TIP!

Many Azure services are highly available (HA) by design – such as SQL Database, App Service, Azure Storage and CosmosDB. Others require you to use specific pricing tiers in order to get HA – such as Virtual Machines, Redis Cache and Search. Before taking the exam, you should look through the Service Level Agreements and learn what it takes to get HA for each product that is on the exam.

https://azure.microsoft.com/en-us/support/legal/sla/

App Service Backup

Configure a storage account and container to store backup

- Can store backup in another region

Configure schedule for backup to occur

Can optionally backup database also (as a bacpac file)

Exclude files with a _backup.filter file listing paths to exclude

Limit of 10GB of content for a backup (site files + bacpac)

Stores backup as .zip

App Service Restore

Restore options:

- Replace existing app (backup was taken from)
- Replace another app or create another app based on backup

Design for Disaster Recovery

Backup/Restore - is about data or workloads and getting them back to a known state and running.

Disaster Recovery - is about getting your systems up and running in another location.

Recovery time objective (RTO) – maximum acceptable time before the application fully recovers after the disruption.

Recovery point objective (RPO) – maximum amount of recent data updates (time interval) the application can tolerate losing.

Design for Disaster Recovery

How do you bring up a new site in a new location, if not using Traffic Manager?

1. Database Layer
   Initiate unplanned failovers to bring secondary site up as primary
   or perform geo-restore from replicated backup
2. Storage Layer
   If only have read only access, need process to copy in order to read/write
3. Web Layer
   Restore from backup (stored in storage account for failover site)
   or Redeploy from RM templates and code from Releases repository
4. Fix up connection strings

You are evaluating your Web Apps for disaster recovery. What is the first thing you should look for?

1) Verify Backups are configured
    1) Verify Backups are configured
2) Verify the SSL bindings
3) Check if Traffic Manager is setup
4) Confirm you are using Redis Cache

EXAM TIP!

Take a look at the Azure PowerShell cmdlets and the CLI documentation. The exam will have questions that use either PowerShell or CLI commands.

Just because this is a design level exam, does not mean there won’t be any code level questions.

Design App Service Mobile Apps

Native and Cross Platform

Connect your enterprise

Build offline-ready apps

Scalable Push Notifications

Client SDKs:

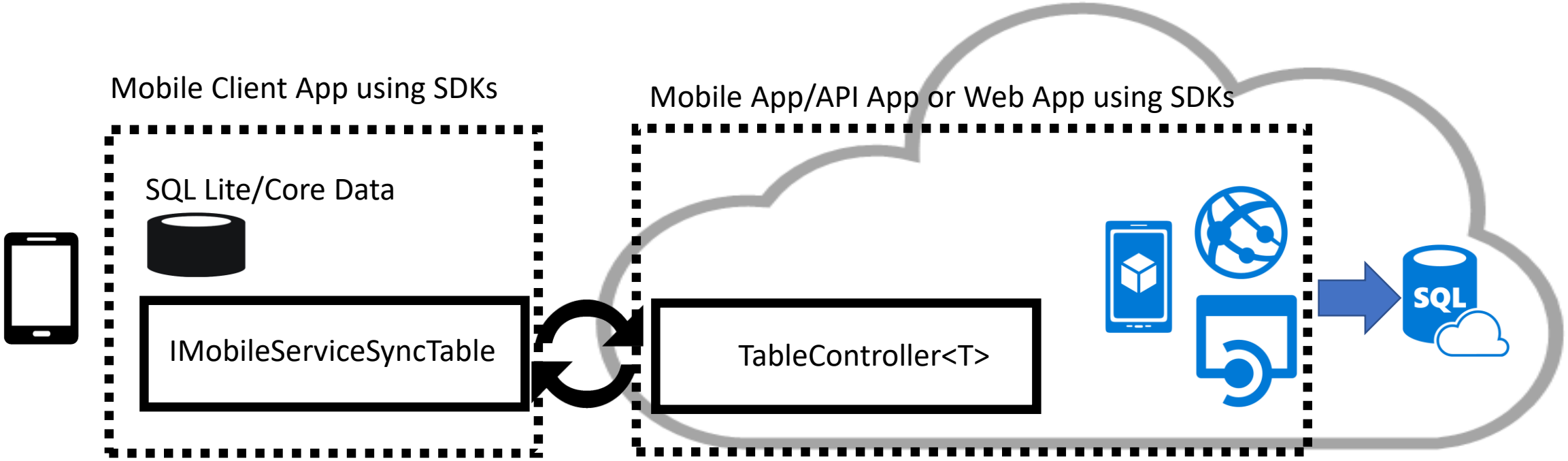
- iOS
- Android
- Windows
- Xamarin
- Cordova

Offline Sync Capabilities

Mobile Client App – use platform specific SDKs and local data stores

SQL Lite or Core Data on iOS

Server endpoint – use SDK TableController base class for table syncing



Users of your mobile application need access to an on-premise database. Which of the following are valid steps for exposing that data?

1) Download and install the Hybrid Connection Manager
1) Download and install the Hybrid Connection Manager
2) Add new hybrid connection
2) Add new hybrid connection
3) Configure Hybrid Connection Manager
3) Configure Hybrid Connection Manager
4) Change connection string in web.config to point at new endpoint
5) Create Service Bus Relay

Extend Mobile Apps using Custom Code

Mobile Client SDKs available for:

- Android
- Apache Cordova
- iOS
- Windows
- Xamarin.Android
- Xamarin.Forms
- Xamarin.iOS

Implement Mobile Apps Using Microsoft .NET or node.js

Mobile App server SDKs available for:

- .NET
- Node.js (has Easy Tables and Easy APIs available in portal)

SDKs provide:

- Table operations for data access
- Custom API operations
- Push Notifications
- Integration with Authentication

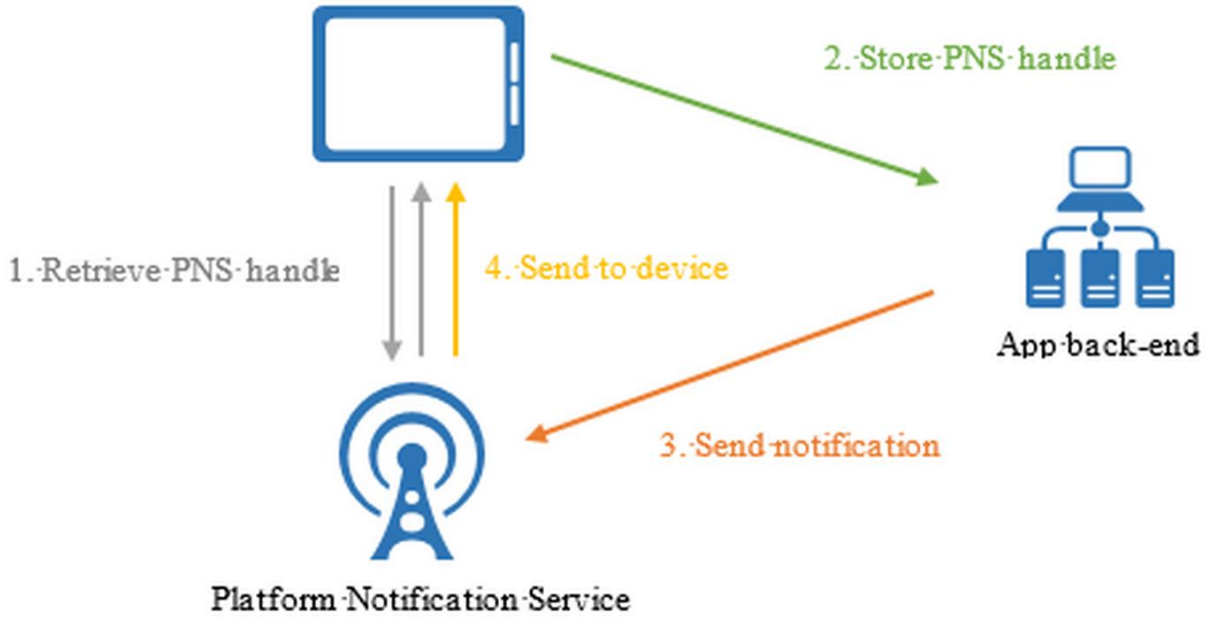
You have an existing Web App and want to add a Mobile App to the site. What do you need to do?

1) Create a new Web App
3) Merge your Web App and Mobile Apps server code base
2) Create an Azure AD Application Proxy
3) Merge your Web App and Mobile App server code base
4) Create a Service Bus Namespace

Implement Push Notification Services in Mobile Apps

Abstracts the choreography to support push notification to mobile clients

- Apple Push Notifications (APNS)
- Google Cloud Messaging (GCM)
- Windows (WNS)
- Windows Phone (MPNS)
- Amazon (ADM)



Send Push Notifications

Push on the App Service menu - Uses Notification Hubs

Broadcast to one or multiple platforms

Push to device or user

Push to segment with dynamic tags

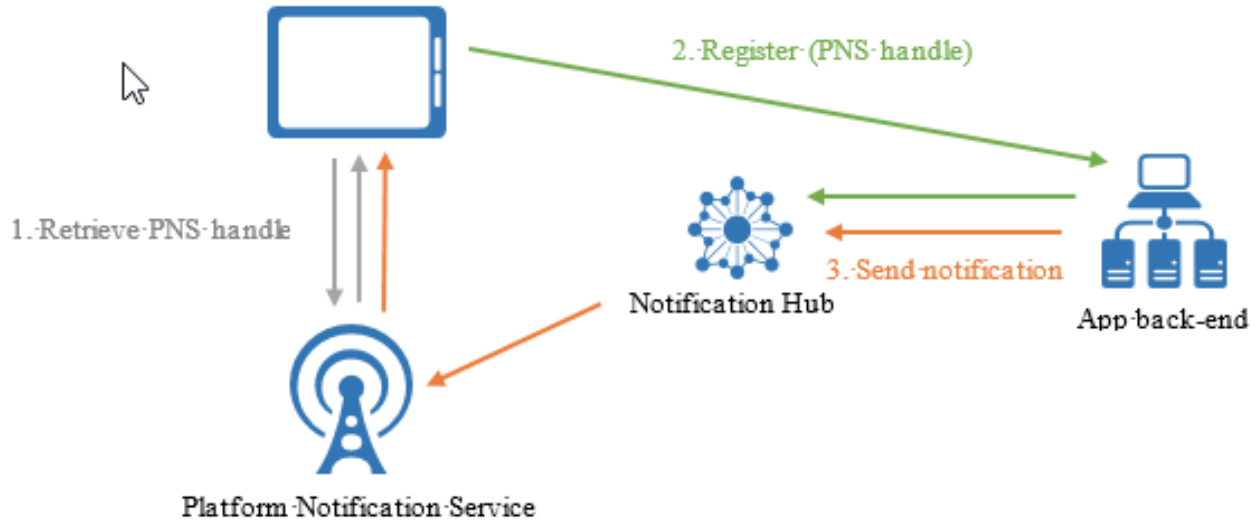
Localized push

Silent push

Scheduled push

Direct push

Personalized push



EXAM TIP!

Mobile Apps are part of App Service, so the Authentication, Networking, Scaling, WebJobs, etc. are also available for Mobile Apps too.

EXAM TIP!

Mobile Apps are mobile client apps and sever backend apps. Be prepared to answer questions on Node.js as well as .NET.

If you have never created a Node.js application, make sure you take the time and do the Mobile Apps tutorials that use Node.js for the backend.

EXAM TIP!

Since there are multiple languages for the Mobile App SDKs, be familiar with the common objects and what they are used for. Both on the client sdk and server sdk.

Which of the following technologies can you build a Web API with?

1) Express
   1) Express
2) Restify
   2) Restify
3) ASP.NET Web API
   3) ASP.NET Web API
4) ADAL
5) Angular

You have an on-premise ASP.NET MVC website that uses windows authentication. Which of the following items are steps you need to take in moving it to Azure?

1) Create an Azure AD
   1) Create an Azure AD
2) Create a SQL Database
   3) Create and deploy as a Web App
3) Create and deploy as a Web App
   5) Add application to Azure AD
4) Create a Redis Cache
   6) Use the Authorize Attribute
5) Add application to Azure AD
   7) Connect and Sync local AD with Azure AD
6) Use the Authorize attribute

7) Connect and Sync local AD with Azure AD

You are concerned about the performance of a new Web App and want to make sure it scales when it starts to get heavy use. Which choice is the best for you to do?

1) Deploy another instance from Github
2) Change the Pricing tier to a larger machine size?
3) Configure auto scale to increase instance count when CPU hits 80%
3) Configure auto scale to increase instance count when CPU hits 80%
4) Stop all WebJobs currently running on the WebApp

You have a website that uses a lot of session state. You need to move the site to a web app in Azure. What two choices should you do?

1) Create a Virtual Machine
2) Create a Redis Cache
3) Download and configure the ASP.NET Session State Provider in your web.config
4) Deploy your web application to the virtual machine

You are having problems with stability of your latest website release. What can you do to minimize downtime?

1) Create multiple instances of your Web App
   1) Create multiple instances of your Web App
2) Change the App Service Plan to Premium
3) Setup VNET Integration
4) Create another deployment slot

You are launching a beta site and have little budget to spend. You need to be ready in case the site or db goes down and are ok with some downtime. What is the best thing to do?

1) Deploy another Web App but don't give anyone the URL
3) Setup Backup for the Web App using a storage account in another region
2) Setup Traffic Manager
3) Setup Backup for the Web App using a storage account in another region
4) Create a WebJob that backs up the database

You have a mobile app and need to allow your users to enter data while they are not online or connected to a network. What do you need to do?

1) Download your Windows Store certification
2) Change the native client app code
3) Expose a new endpoint on your server for data synchronization
4) Create a new Azure AD

You have a Mobile App. Your managers want an alert on their mobile app about sales numbers at the end of day. How can you do that?

1) Set up an Alert for the App Service
4) Use a Push Notification
2) Use Azure Scheduler to send the alert
3) Use a webhook
4) Use a Push Notification

Your Mobile App needs to authenticate users from an on-premise Active Directory. What do you need to do?

1) Connect and Sync AD to Azure AD
    1) Connect and Sync AD to Azure AD
2) Configure Mobile App to use Azure AD
    2) Configure Mobile App to use Azure AD
3) Configure Vnet integration
4) Add a SSL binding

Microsoft