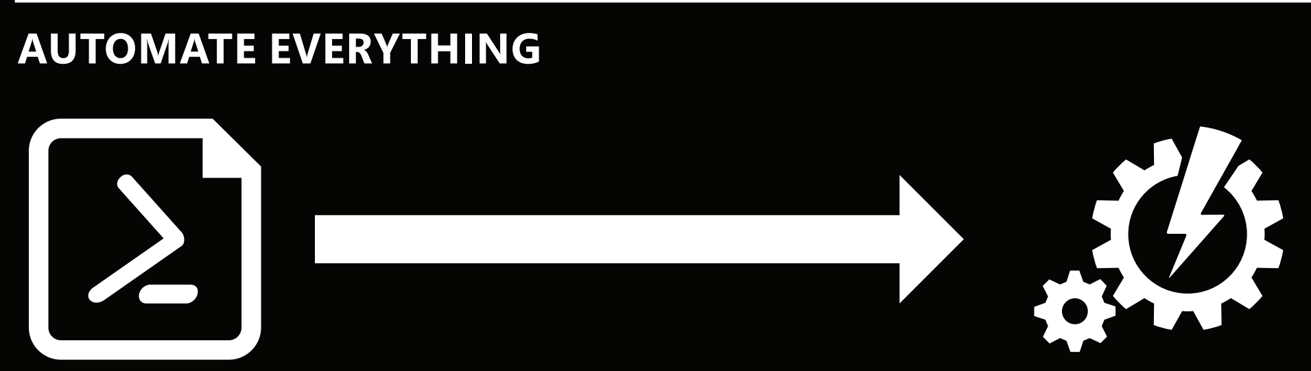
Microsoft Azure

Curious about developing for the cloud, or are you new to developing for the cloud? The concepts and patterns here are proven and practical. Adopt the basic strategies below to ensure long-term success and sustainability. Use the techniques at right as appropriate.

For full text and concrete examples, search Bing for "Building Real-World Cloud Apps."

Search azure.microsoft.com, MSDN, ASP.NET, or TechNet for the keywords referenced in this poster

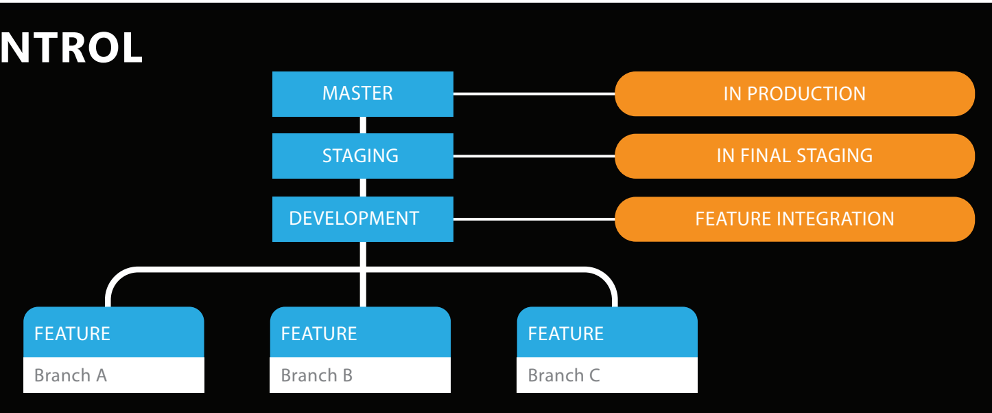
AUTOMATE EVERYTHING



POWERSHELL

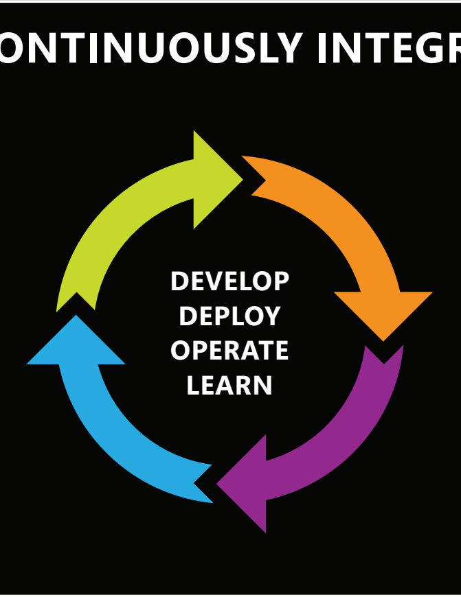
Repeatability is key. Everything in Azure can be automated using REST APIs and the scripting tool or programming language API of your choice.

USE SOURCE CONTROL



Store your source code in an easily accessible but secure repository. Store your automation scripts as well so old versions can be redeployed on command.

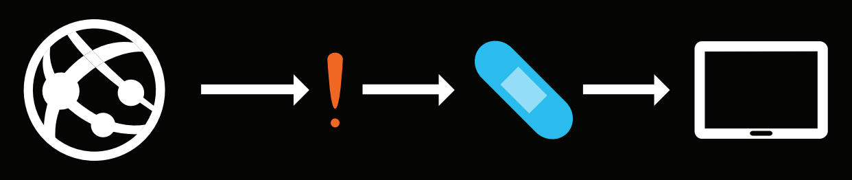
CONTINUOUSLY INTEGRATE AND DELIVER



Continuous integration (CI) means that when a developer checks in code to the source repository, a build is automatically triggered. Continuous delivery (CD) takes this one step further: after a build and automated unit tests are successful, the build is released.

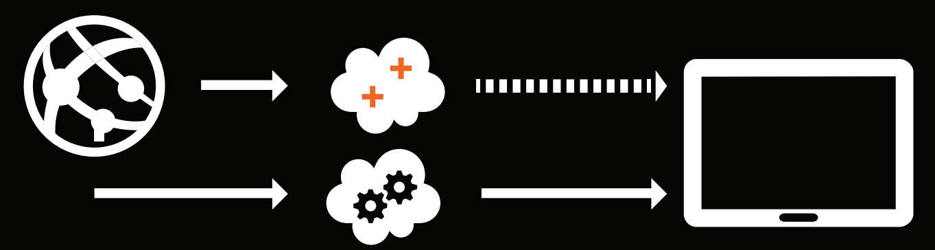
DESIGN FOR FAILURE

A. Transient failures are self-healing, such as intermittent network connection issues



For transient failures, implement a retry policy to ensure that most of the time the app recovers quickly and automatically.

B. Enduring failures require intervention



For enduring failures, implement monitoring and logging that notifies you promptly when issues arise and that facilitates root cause analysis.

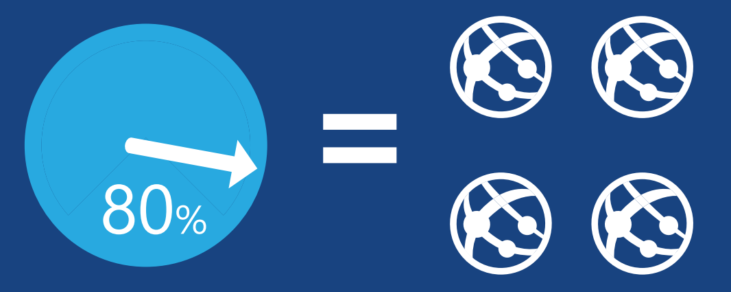
Web Development Best Practices

These practices are valid for all web development, not just for cloud apps. But they're especially important for cloud apps. They work together to help you make optimal use of the highly flexible scaling offered by the cloud environment.

CREATE STATELESS WEB TIERS

A stateless web tier means you don't store any application data in the web server memory or file system. Keeping your web tier stateless enables you to both provide a better customer experience and save money.

With Azure App Service Web Apps, if your web tier is stateless, use the Scale tab in the management portal to easily configure autoscaling. Autoscale by CPU usage or by schedule.



When CPU usage increases above 80%, 4 (maximum) instances are deployed. Set your own maximum.

Instance count governed by CPU usage

During peak hours, schedule 4 instances. Scale down to 1 during off hours.

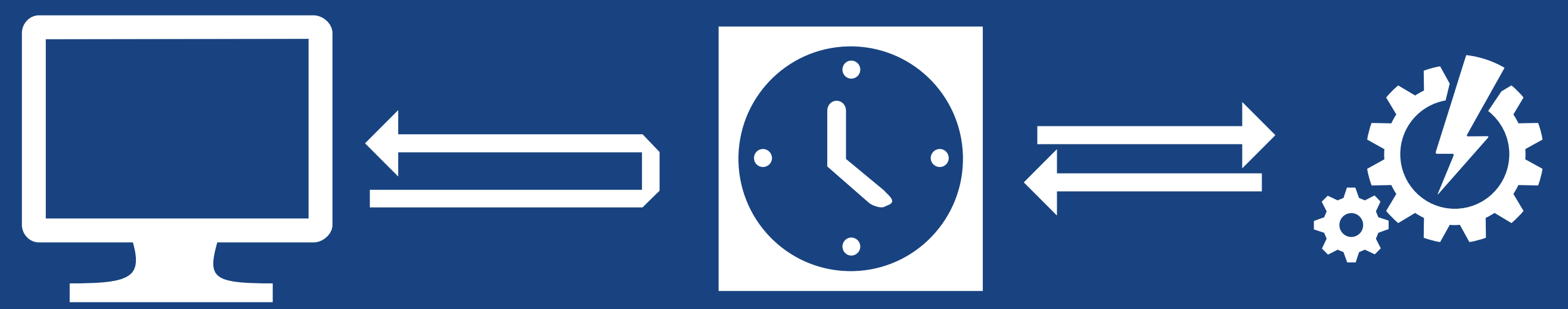
By schedule

USE CDN TO CACHE STATIC FILES

Content Delivery Network (CDN). You provide static file assets such as images and script files to a CDN provider. The provider caches these files in datacenters all over the world so that wherever people access your application, they get quicker response and low latency for the cached assets.

USE .NET ASYNC PROGRAMMING

- Use async programming to avoid blocking on I/O calls
- Async programming also enables more efficient use of web server resources — lower cost and better scalability
- Parallel processing lets you kick off multiple web service calls simultaneously

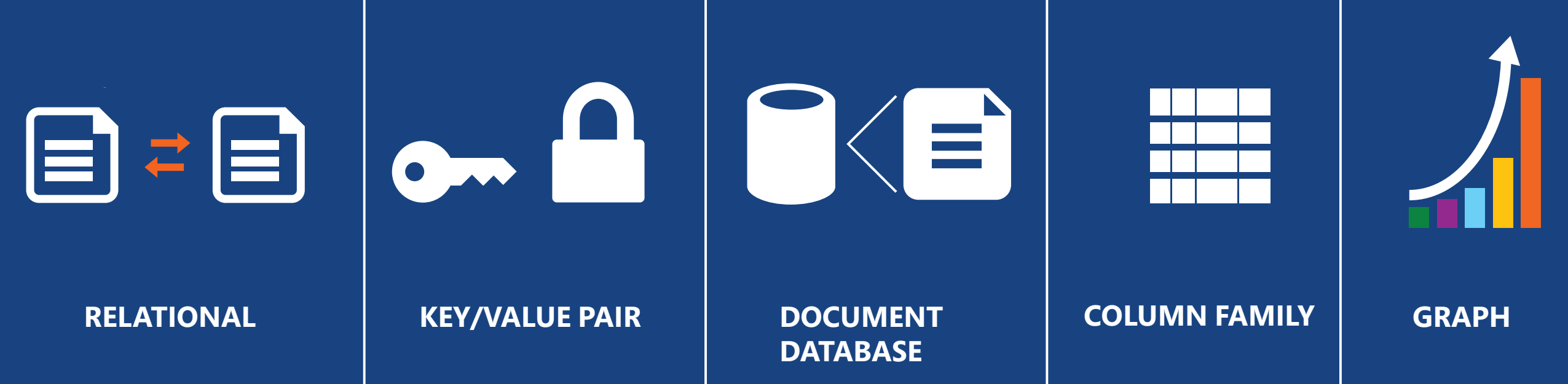


Dealing With Data

Cloud computing makes it practical to mix and match data storage approaches to best fit the needs of your application. If you're building a new application, think carefully about the options in order to pick approaches that will continue to work well when your application grows.

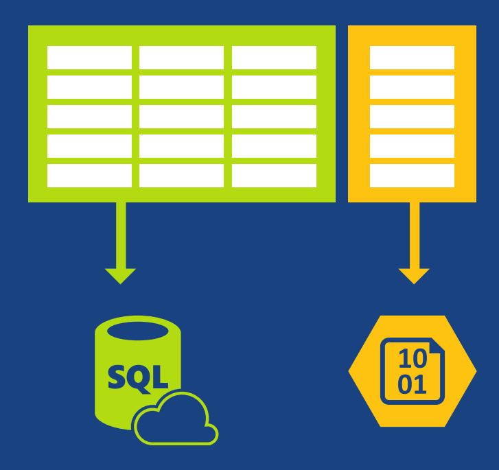
DATA OPTIONS

Most people are used to relational databases, and they tend to overlook other data storage options when they're designing a cloud app.



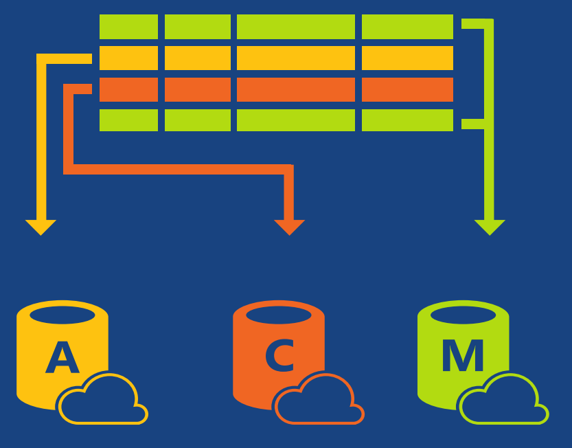
PARTITIONING

VERTICAL PARTITIONING



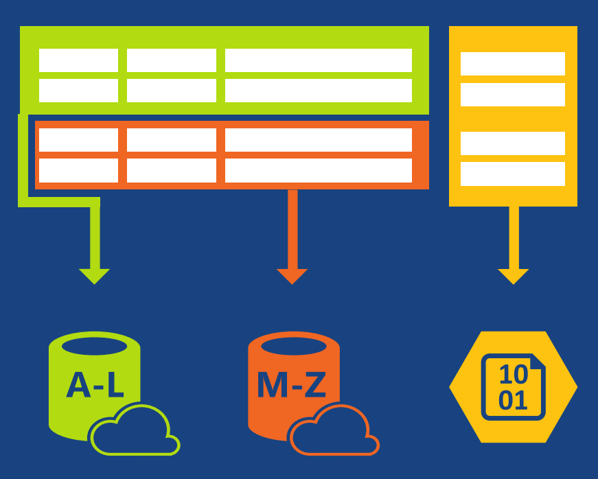
Split up a table by columns: one set goes into one data store, and another set goes into a different data store. In this example, text is stored in Azure SQL Database, and photos in blob storage.

HORIZONTAL PARTITIONING



Split up a table by rows. In this example, rows indexed by the letter "A" go into one store, "C" into a second, and "M" into a third.

HYBRID PARTITIONING



Combine vertical and horizontal partitioning. For example, store the images in blob storage and horizontally partition the string data.

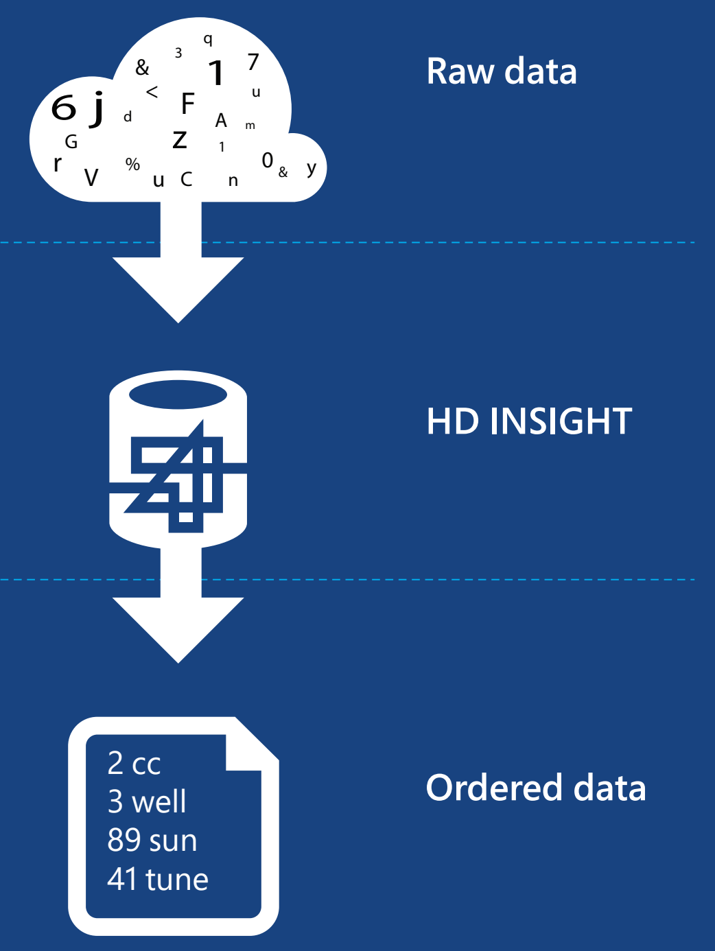
BLOB STORAGE

The Azure Storage Blob service provides a way to store files in the cloud. The Blob service has a number of advantages over storing files in a local network file system:

- Highly scalable — Store 100's of terabytes
- Durable — Automatically backed up
- High availability — 99.9% uptime SLA
- Platform as a Service — pay only for used storage
- REST API — Programmable
- Internet accessible — Available everywhere
- Secure — Limit access to authorized persons
- Low cost — for example, 1 GB costs $.07 a month

HDINSIGHT

The high volumes of data that you can store in NoSQL databases may be difficult to analyze efficiently. To do that you can use a framework like Hadoop which implements MapReduce functionality.



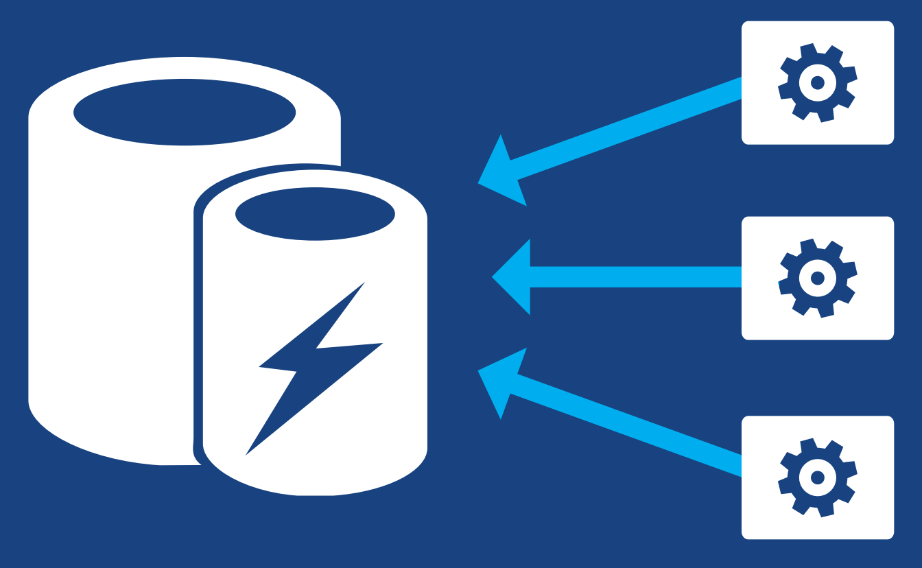
Messaging, Security, and Monitoring

The cloud makes it easier to implement strategies that optimize performance and scalability, that notify you quickly about problems, and that provide troubleshooting information that helps resolve problems.

DISTRIBUTED CACHING

A cache provides low-latency access to application data.

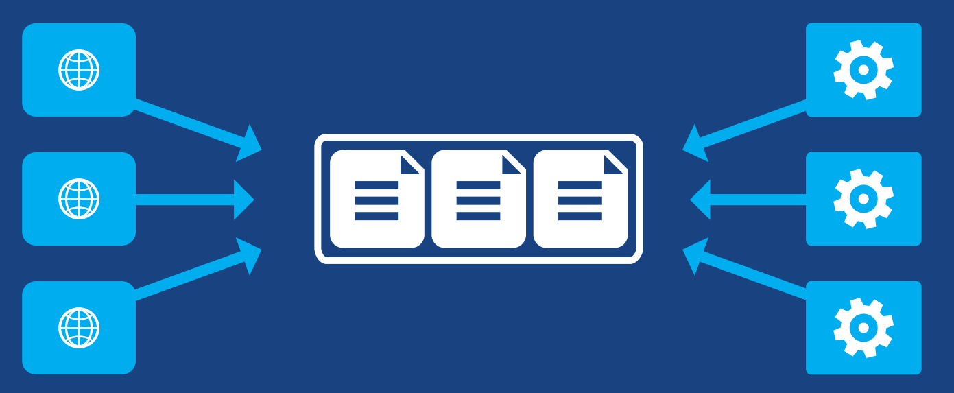
In a distributed cache, data is not stored in the web server's memory but on other cloud resources. This allows all of the application's web servers and VMs to access the data — even while servers are added or removed.



USE QUEUES

When the application gets a request, it puts a work item into a queue and immediately returns a response. Then a separate back-end process pulls work items from the queue and does the work. This allows:

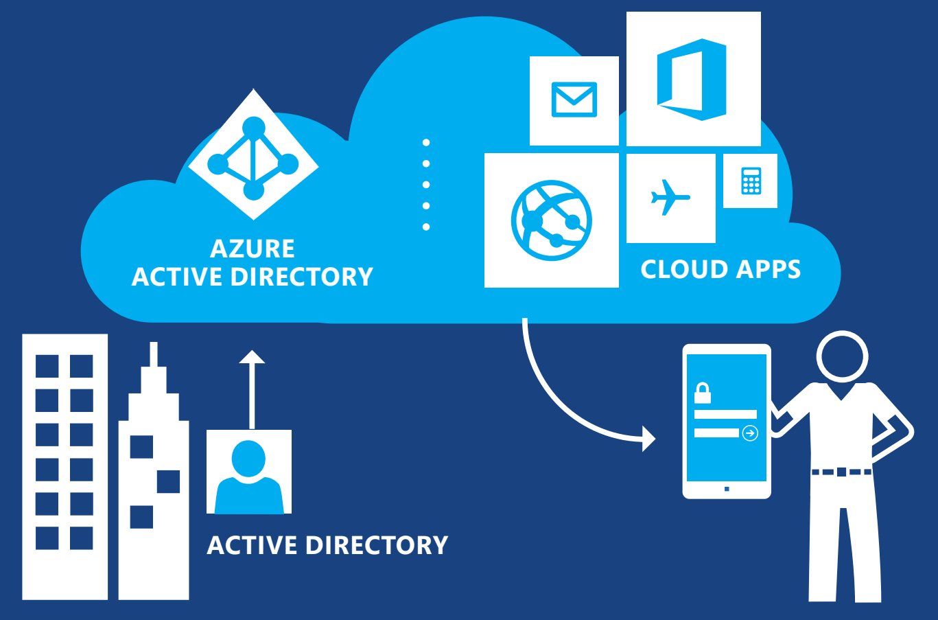
- Increased app responsiveness, reliability, and scalability
- Tiers that can be scaled independently



SINGLE SIGN-ON

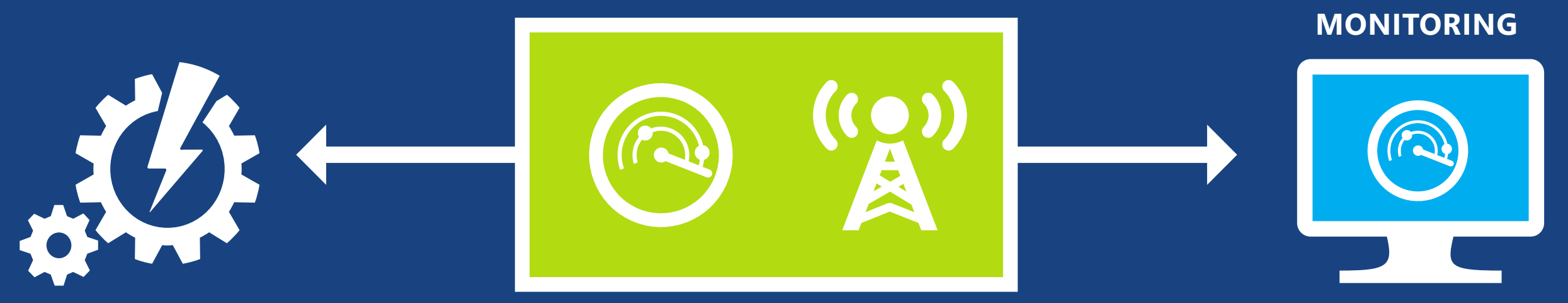
"I'm primarily building apps for the employees of my company; how do I host these apps in the cloud and still enable them to use the same security model that my employees know and use in the on-premises environment when they're running apps that are hosted inside the firewall?"

Azure Active Directory is the answer.



LOGGING AND TELEMETRY

With good telemetry and logging systems, when something does go wrong you find out right away and have helpful troubleshooting information to work with.



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