

# AZ-400.6

## Module 1:

### Implement a Mobile DevOps Strategy



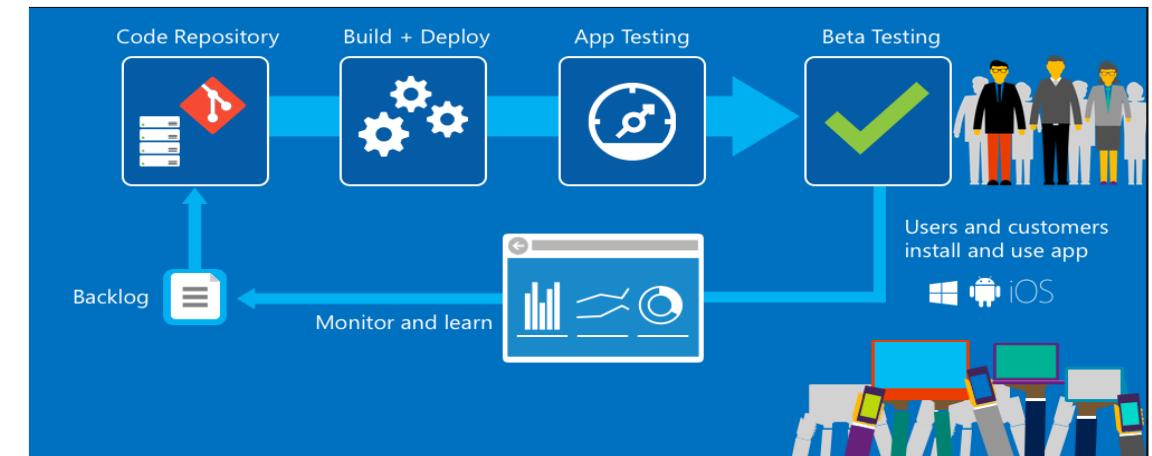
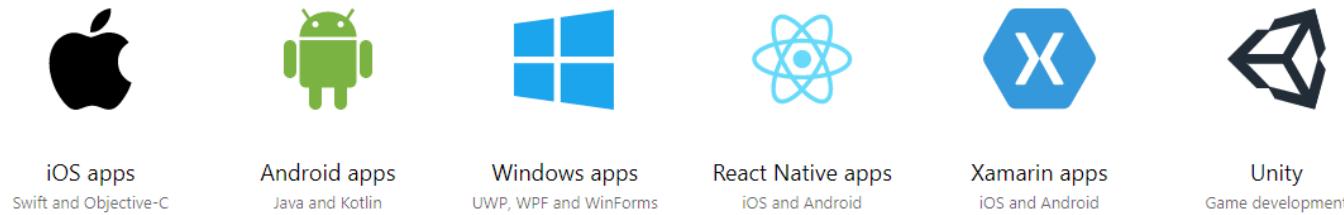
# Lesson 01: Introduction to Mobile DevOps



# Mobile DevOps vs DevOps

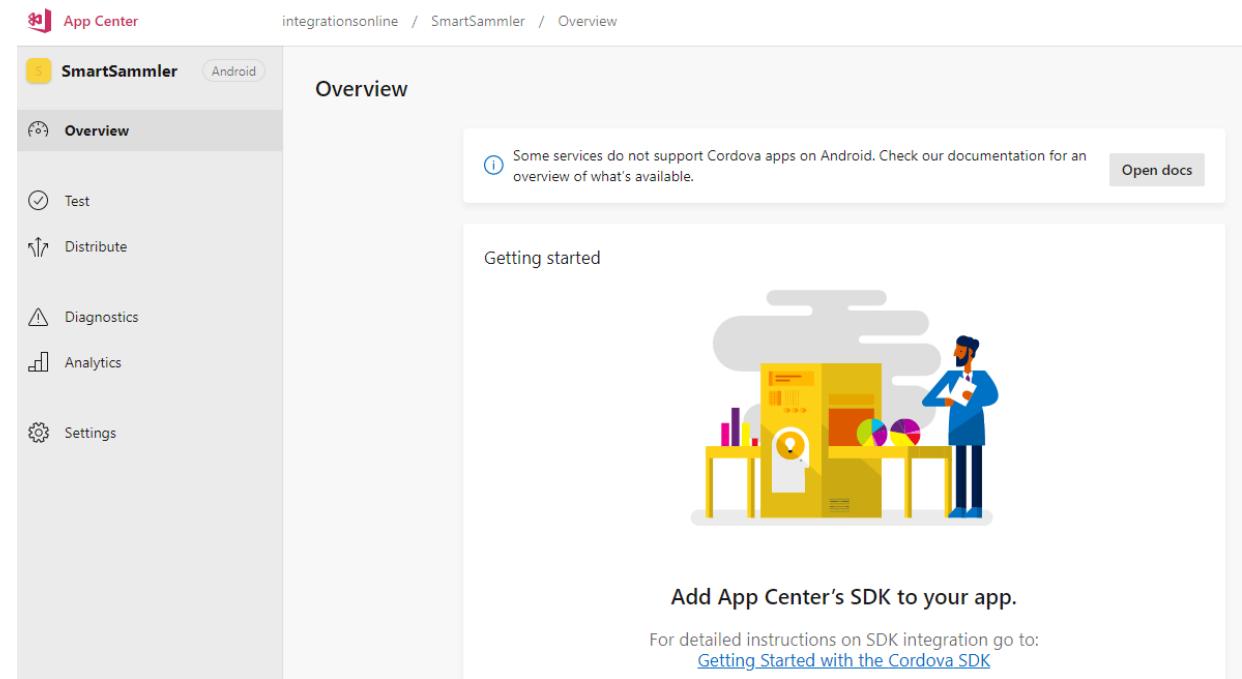
- Mobile DevOps practices and the culture are the same as DevOps, but the tooling is different

App Center is awesome for:



# Visual Studio App Center

- App Center brings together multiple services into an integrated cloud solution
- Developers use App Center to Build, Test, and Distribute applications
- Once the app's deployed, developers can monitor the status and usage of the app



# Continuous Integration in Minutes

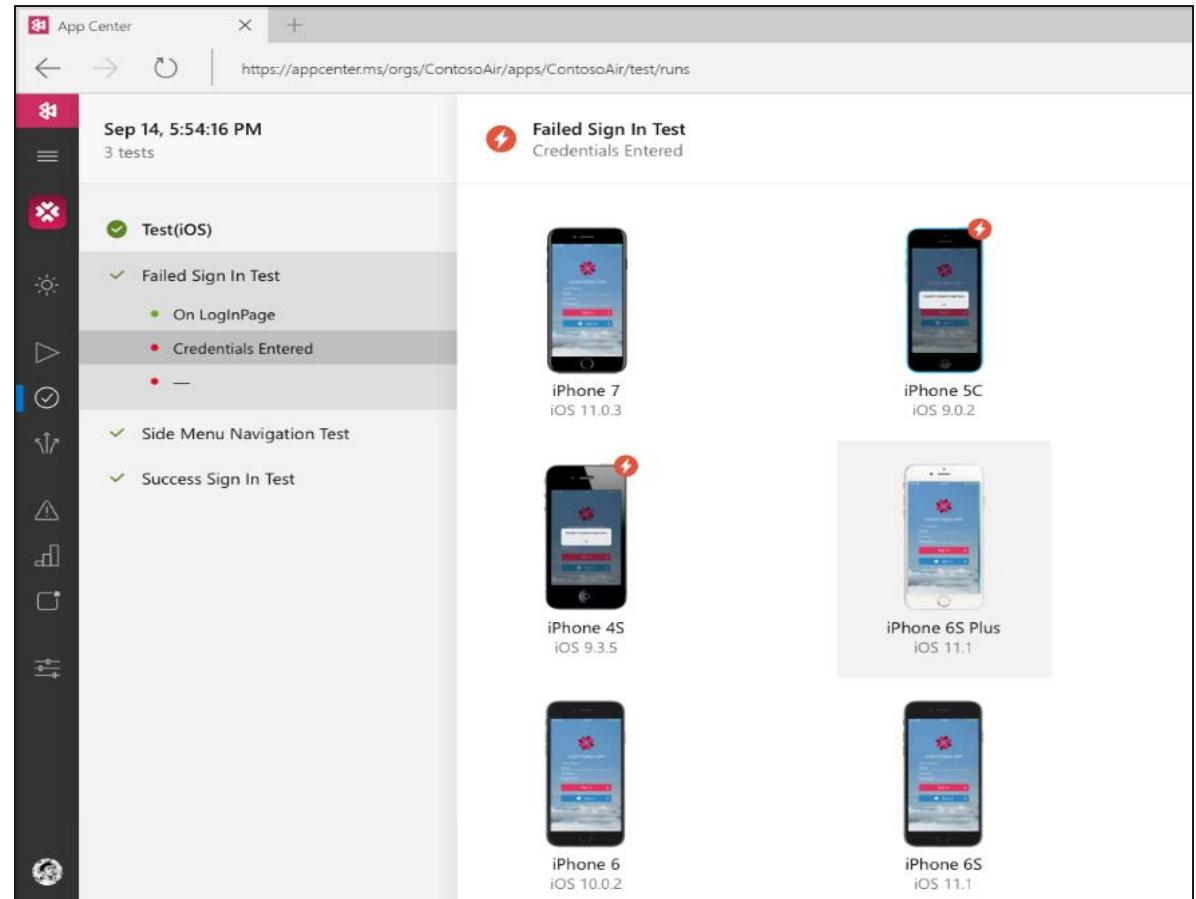
- Build apps more frequently and faster- iOS, Android, Windows, and macOS
- Connect to your GitHub, Bitbucket or Azure repos and build your apps
- Create an installable app package - GitHub, or Git repos on Bitbucket and Azure DevOps

The screenshot shows the Microsoft App Center interface for continuous integration. On the left, a sidebar lists branches: AppInsightBugBranch, AutoFlightRebookBranch, development, master (which is selected and highlighted in red), and mobile-center-xamarin. The main area displays a table of builds:

Last commit	Build	Status
Trying to get entitlements to work with Test... Joshua Pearson	356	FAILED
Simplify header UIViewController Tais Morales	355	BUILT
Consider events soon if they are at most tw... Tais Morales	354	BUILT
Bump version Joshua Brown	353	FAILED
ShouldBeVisible seems broken right now Gerry Donnelly	352	FAILED
Allow provisioning profiles with wildcards... William Barton	351	BUILT
Oops, this actually has to convert Mable Cohen	350	BUILT
Fixed rendering bug Joshua Brown	349	FAILED

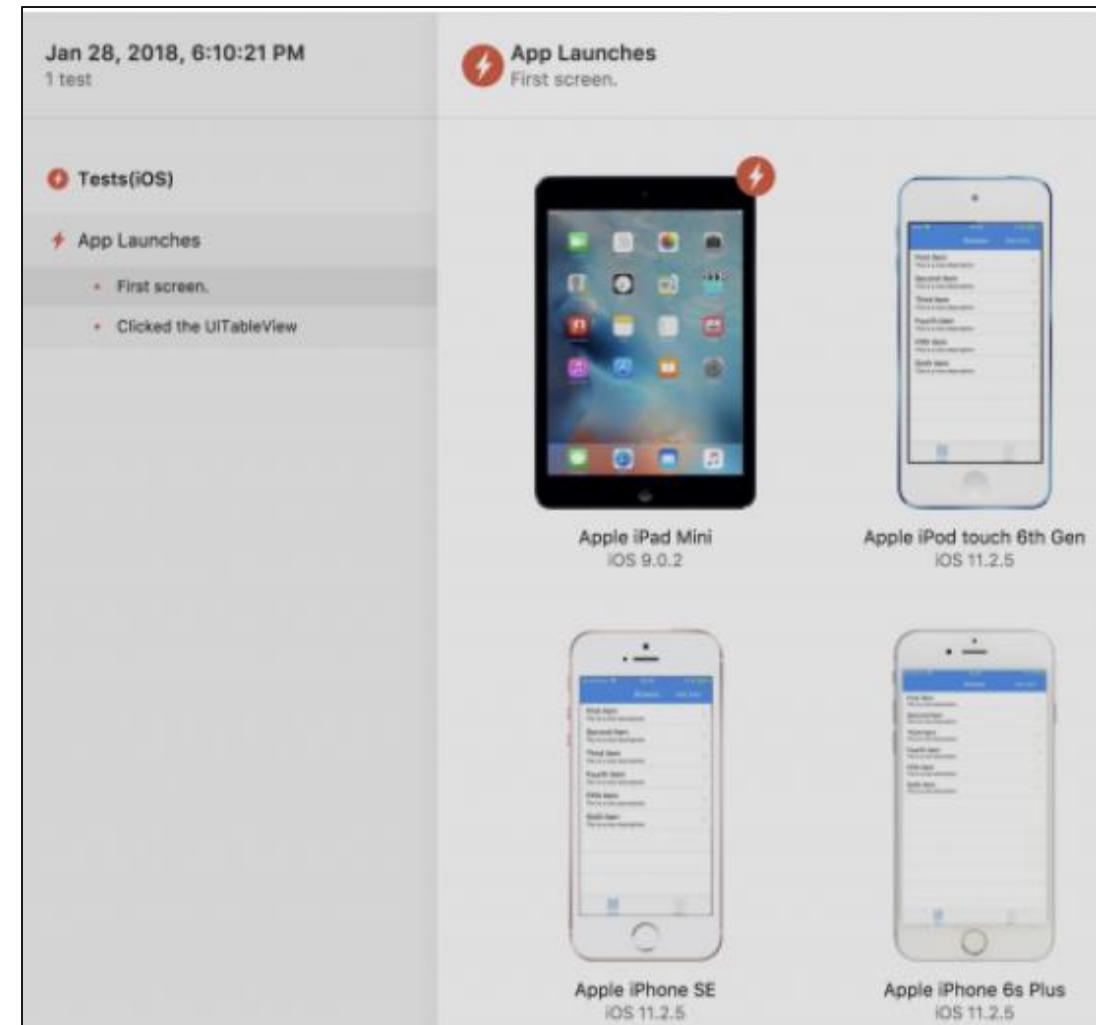
# Continuous Quality on Real Devices

- Automate UI tests with frameworks like Appium, Espresso, and XCUI Test
- Test and diagnose bugs and performance problems
- Run your tests for iOS and Android apps with Xamarin.UITest, Appium, Espresso (Android), and XCUI Test (iOS).



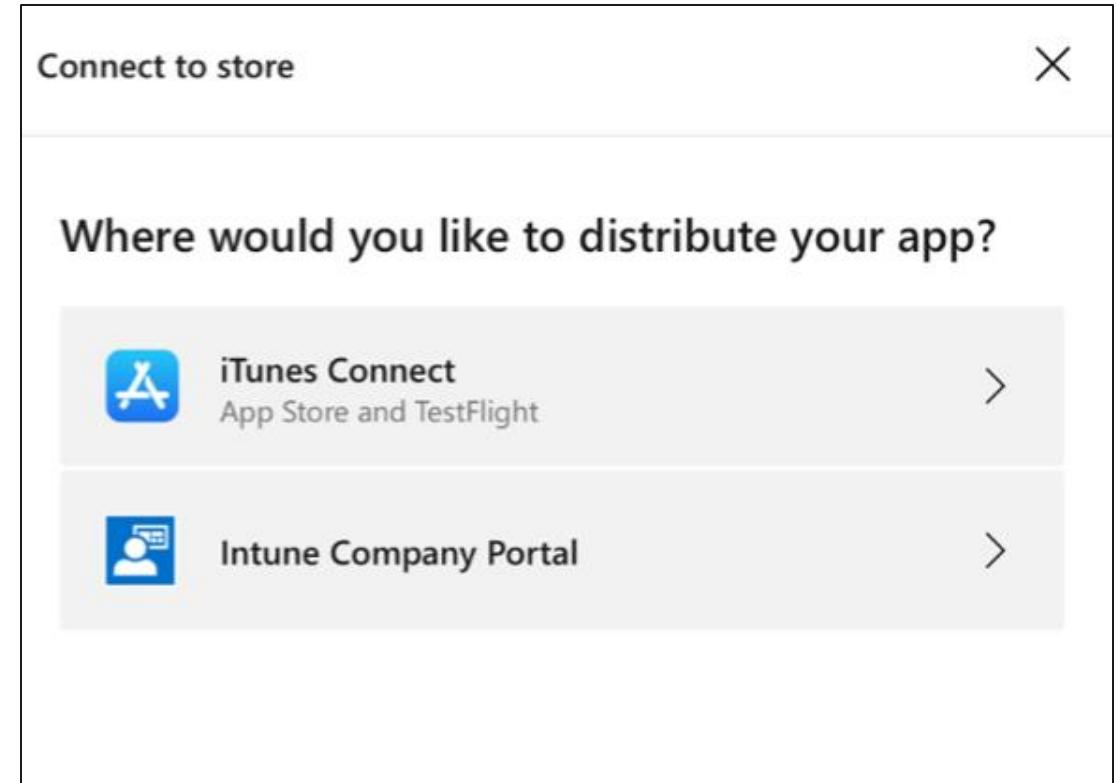
# Run UI Tests

- Upload your test suite after completing a build
- Generate a test upload shell command, add it to your app's repo
- When your test code finishes executing, a detailed report will appear in the App Center Test
- App Center provides device logs, test framework logs, and the line in which the failure occurred



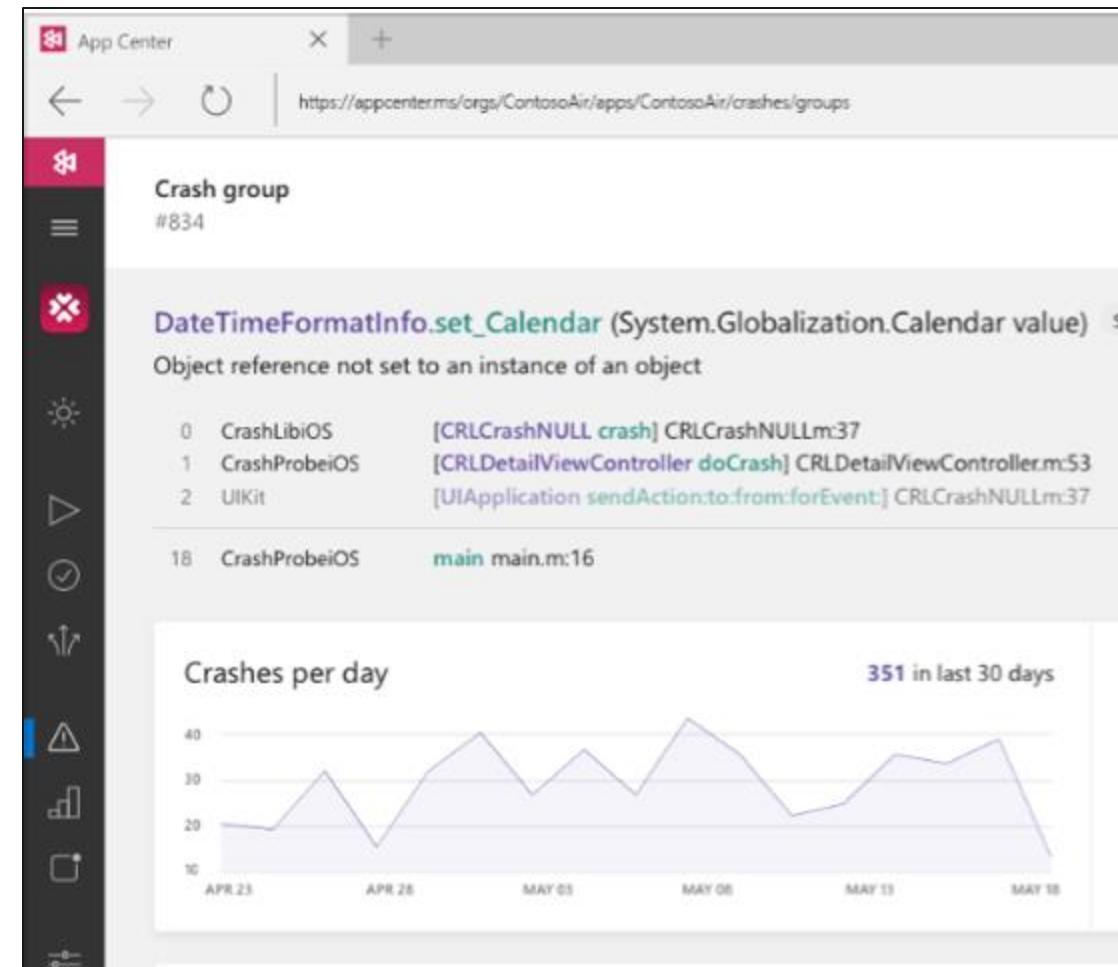
# Continuous Delivery that Works

- Deploy everywhere with ease
- Distribute your app to beta testers and users on Android, iOS, Windows, and
- Send different builds to different groups of testers and notify them via in-app updates
- Release to Apple's App Store & Google Play Store



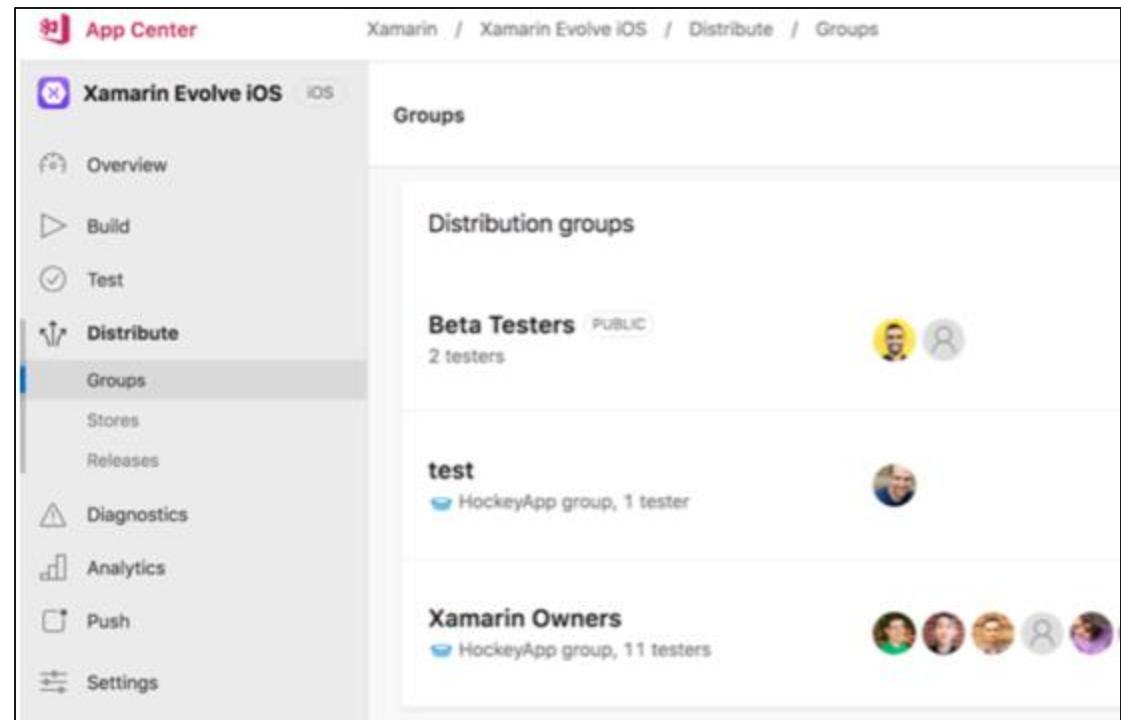
# Continuous Learning for Growth

- Insightful crash reports that monitor the health of your app with faster debugging and detailed crash reports. Get notified and fix issues as they come up.
- Real-time analytics for deep insights about user sessions, top devices, OS versions, behavioral analytics and event trackers for your apps.



# Distribution Groups

- Distribution Groups are used to control access to releases
- Distribution Group represents a set of users that can be managed jointly and can have common access to releases
- You create the groups and can now add AAD groups to the distribution group



# Types of Distribution Groups

- Private Distribution Groups
  - This is the default
  - Only testers invited via email can access the releases available to this group
- Public Distribution Groups
  - Used when you want enable unauthenticated installs from public links
  - Testers will receive an email notifying them that they've been invited to test the app and when a release is available to them
- Shared Distribution Groups
  - Private or public distribution groups that are shared across multiple apps in a single organization
  - Shared distribution groups eliminate the need to replicate distribution groups across multiple apps

# App Center Distribution

- Developer tool to release application binaries to their end user devices
- Distribute packages for iOS, Android, UWP, and macOS

Named Device Sets

Android 8 4 configurations	 
Oldies 4 configurations	 
Top 200 Global 200 configurations	 

**Test on a real device**

Verify that your build works on a real device by running a launch test.

On

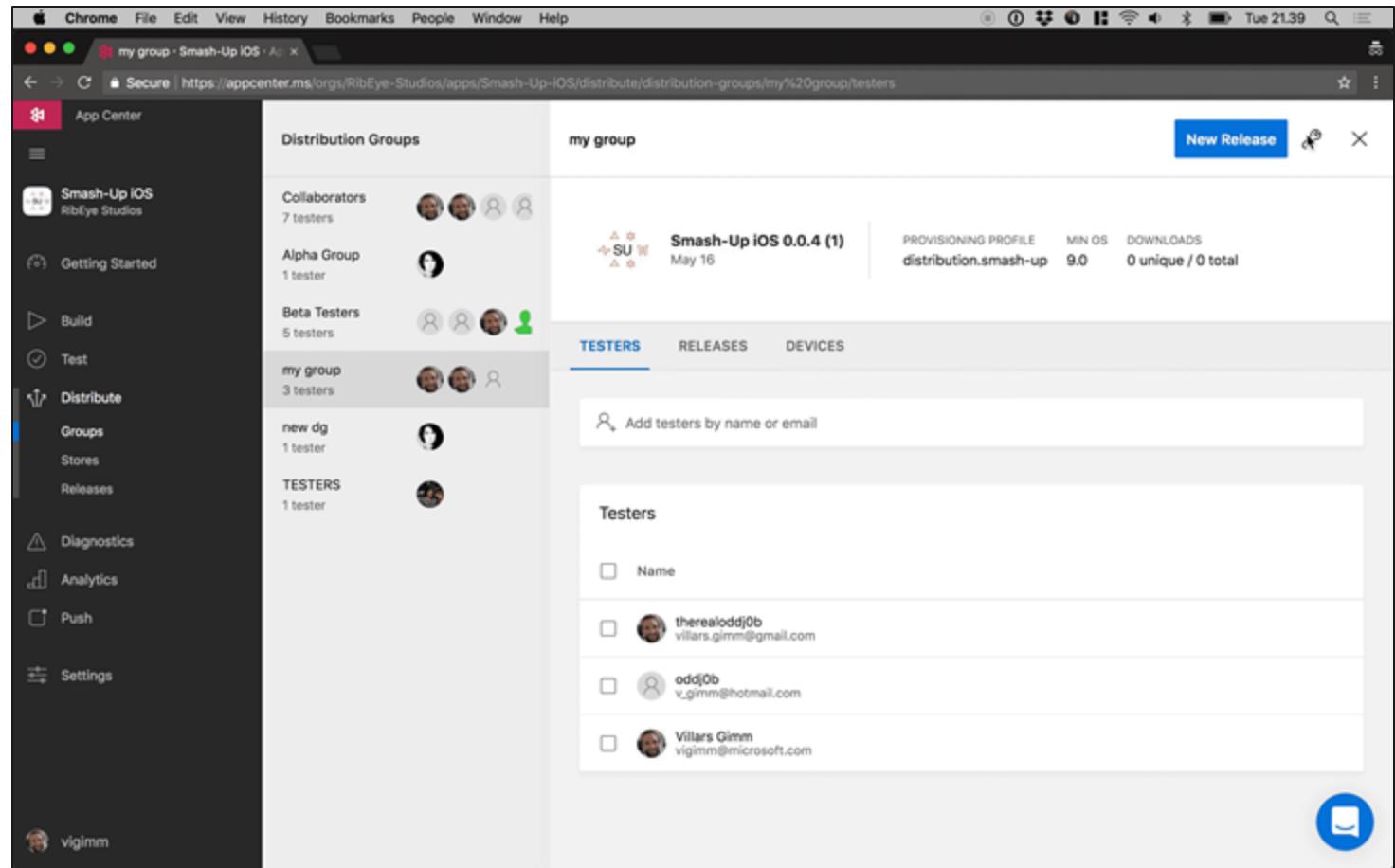
 Do not use personal data in your tests. [Learn more.](#)

**API App Center Tests**

GET	/v0.1/apps/{owner_name}/{app_name}/user/device_sets/{id}
PUT	/v0.1/apps/{owner_name}/{app_name}/user/device_sets/{id}
DELETE	/v0.1/apps/{owner_name}/{app_name}/user/device_sets/{id}
GET	/v0.1/apps/{owner_name}/{app_name}/user/device_sets

# Provision Tester Devices for Deployment

- App Center supports the release of auto-provisioning capabilities
- You can automate the distribution process and enable testers and team members to install your app with one click



# App Center Diagnostics

- App Center Diagnostics is a cloud service that helps developers monitor the health of an application, delivering the data needed to understand what happens when an app fails during testing or in the wild.
- In the App Center Diagnostics UI, you can attach, view and download one binary and one test attachment to your crash reports.
- Track events leading up to a crash to capture useful information about the state of your app.

# Configure alerts

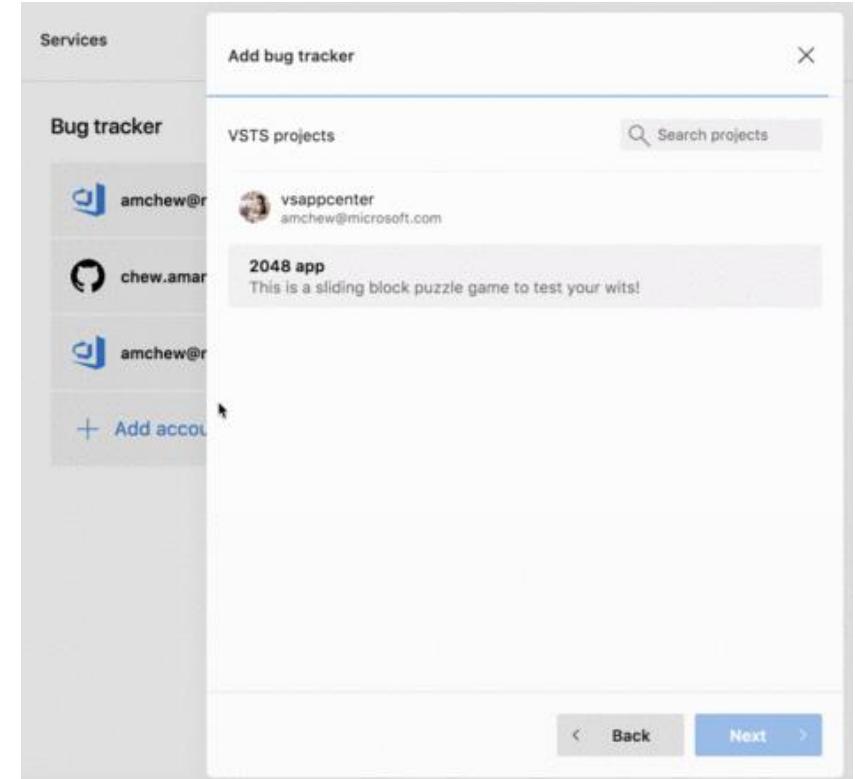
1. Log into App Center and select your app.
2. In the left menu, navigate to Settings.
3. Click on Email notifications.
4. Select the box next to crashes.

The screenshot shows the App Center interface with the following details:

- Crash Group #286** for **iPhone X (A1901)** (iOS 11.3.1 [15E302]).
- VERSION**: 5.0.0 (60) | **OCCURRENCE**: Jun 19, 6:56 AM | **Download** ▾ | **X**
- Crash Details:**
  - iPhone 8 Plus (A1864/A1898/A182w ago)
  - iPhone 8 Plus (A1864/A1898/A181m ago)
  - iPhone 8 Plus (A1864/A1898/A181m ago)
  - iPhone X (A1901) 2w ago
  - iPhone X (A1901) 2w ago
  - iPhone 6s 1m ago
- Event Timeline:** Shows 5 events: "App crashed" (12 sec), "Trigger Crash" (11 sec), "Page Execute a privileged instruction" (10 sec), "Main Page" (5 sec), and "Session started" (0 sec).

# Bug Tracker

- You can integrate third party bug tracker tools with App Center to stay informed and better manage your crashes



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## Module 2:

### Recommend and Design System Feedback Mechanisms

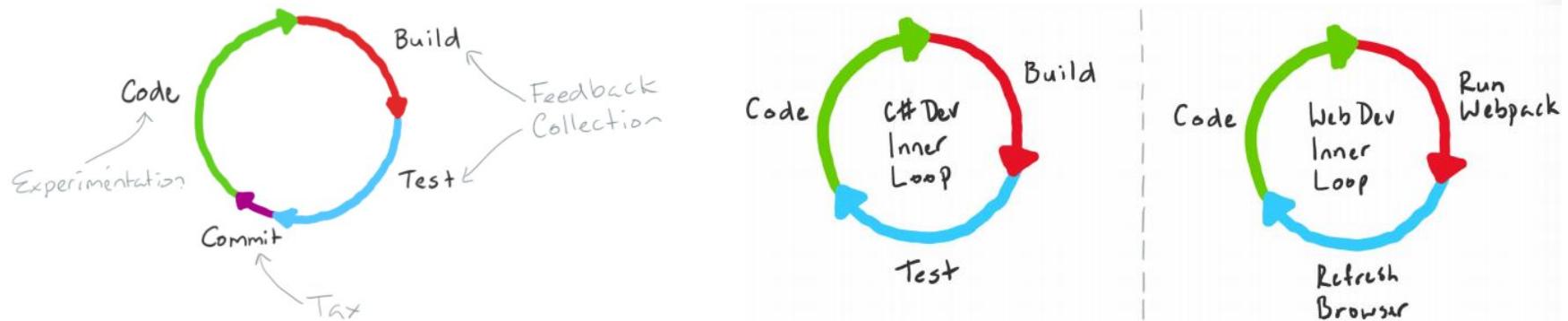


# The inner loop

Inner loop is the iterative process that a developer performs when they write, build, and debug code.

Here are a few things you and your team can do to optimize the inner loop:

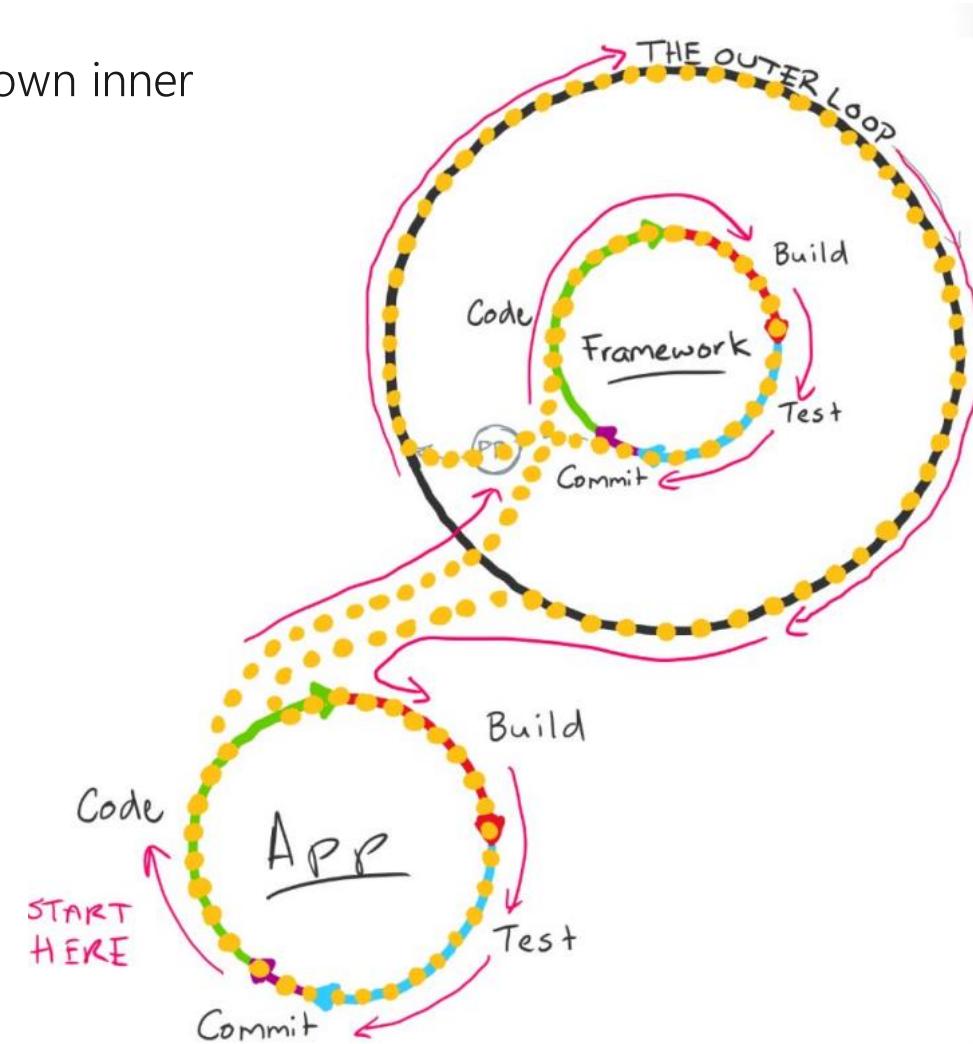
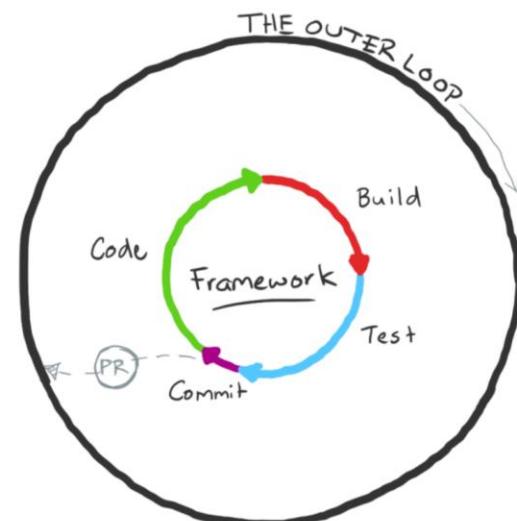
- Only build and test what changed.
- Cache intermediate build results to speed up full builds.
- Break up the codebase into smaller units.



# Tangled Loops

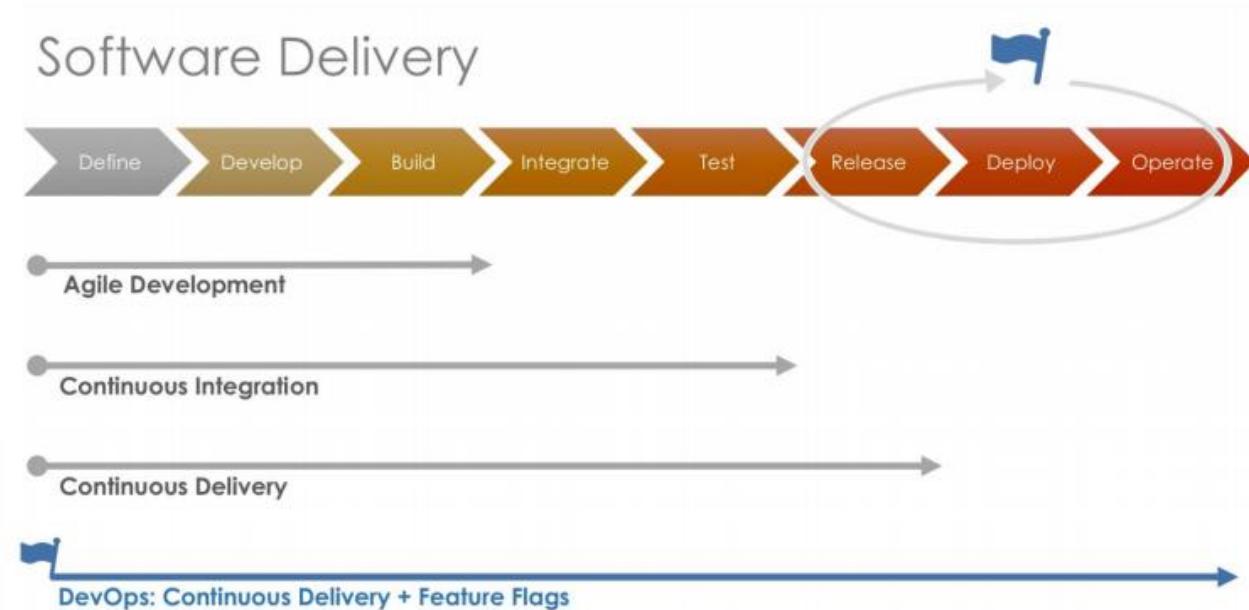
A tangled loop happens when multiple processes, each with its own inner loop, become dependent on one another.

- Extract to Framework
- Use Pull Requests



# Feature Flags

By using feature flags in the continuous delivery process, teams can efficiently integrate release, deployment, and operational management into the software development cycle.



# Continuous Delivery

## Benefits

- Faster software development
- Smaller and more frequent releases
- Automated testing
- Reduced development risk
- Better development coordination
- Quickly adapt to shifting markets

## Benefits with Feature Flags

- Decouple rollout from code deployment
- Releases with substantially mitigated risk
- Customer feedback loop
- Percentage rollouts and targeted releases
- Feature rollbacks without redeploying
- Configuration and long-term management

# Design Practices to Measure End-User Satisfaction



# Design Practices to Measure End-User Satisfaction

The only real measure of software quality that's worth its salt is end-user satisfaction

Five steps to easily measuring customer satisfaction:

1. Outline your goals and plan.
2. Create a customer satisfaction survey.
3. Choose your survey's trigger and timing.
  - Whom you send the survey and when you send it
4. Analyze the survey data.
5. Make adjustments and repeat.

# Customer Satisfaction Survey

When you create a customer satisfaction survey, you have a few options to choose from. A few popular methods are:

- Customer Satisfaction Score (CSAT)
  - Rate their satisfaction on a linear scale
- Customer Effort Score (CES)
  - Ask them to evaluate the ease of their experience
- Net Promoter Score (NPS)
  - How likely is it that you would recommend ...

# Survey Guidelines

- Outline your goals
- Create a customer satisfaction survey
- Choose a time to launch your survey
- Analyze your survey data
- Make adjustments and repeat

# In product feedback

It's very likely that if you visit a web property for a little while, you'll eventually be prompted to provide some feedback or sign up for something

Benefits	Weaknesses
Context-sensitive feedback	Not enough detail
Always on	Always on
High response rates	Too. Much. Feedback
	Limited future follow up

# Feedback on product roadmap

Effective communication on your product roadmap helps keep your customers engaged

Pros	Cons
Customers feel that they're an active part of building your product roadmap.	Likely biased towards your highest-intent customers.
Builds a sense of community and heightened loyalty.	Low volume.
Provides a channel through which you can make users feel appreciated.	

# Feature Request Board

A massive part of build a product is identifying new features customers desire

Should contain:

- Link Azure DevOps work items to Features and Ideas
- Updated Status
- See which work items are linked to UserVoice

# Demo: Query Work Item

Queries > Shared Queries > CriticalBugs

Query returned no results.

Results Editor Charts | Run query New Save query Save as... Rename Revert changes ...

Type of query Flat list of work items | Query across projects

Filters for top level work items

And/Or	Field	Operator	Value
+ X	Work Item Type	=	Bug
+ X	State	=	New
+ X	Priority	=	1
+ X	Severity	=	1 - Critical

Add new clause

Release

Manually triggered by Alexander Pajer on 10.4.2020, 05:02

Artifacts (No artifacts)

Stages

Staging Succeeded on 10.4.2020, 05:17

Staging

Pre-deployment conditions: Succeeded

Gates | View logs

All gates succeeded at 10.4.2020, 05:17

Deployment gates \ samples

05:02 05:17

Query Work Items Execute a work item query and check the num...

# Design Process to Automate Application Analytics



# Site Reliability Engineering

- Site reliability engineering (SRE) empowers software developers to own the ongoing daily operation of their applications in production
- The goal is to bridge the gap between the development team that needs to ship continuously, and the operations team that is responsible for the reliability of the production environment
- A key skill of a software reliability engineer is that they have a deep understanding of the application

# Automate Application Analytics

- In an Agile environment, you may typically find multiple development teams that work simultaneously, introducing new code or code changes on a daily basis, and sometimes several times a day
- Teams must examine the infrastructure and application logs as part of this investigation process
  - > Assisting DevOps with Augmented Search
- Augmented Search will display a layer which highlights critical events that occurred during the specified time period instead of going over thousands of search results
- A key factor to automating feedback is telemetry

# Smart Detection notification

Application Insights sends a notification when it detects that the performance of your application has degraded in one of these ways:

- Response time degradation,
  - Your app has started responding to requests more slowly than it used to. The change might have been sudden, for example if there was a regression in your latest deployment. Or, the degradation might have been gradual, perhaps because there is a memory leak.
- Dependency duration degradation.
  - Your app makes calls to a REST API, database, or other dependency. The dependency is responding more slowly than it used to.
- Slow performance pattern.

The screenshot shows the 'fabrikamprod - Smart Detection settings' page in the Azure Application Insights portal. The left sidebar includes links for Overview, Activity log, Access control (IAM), Getting started, Properties, Alerts (which is selected and highlighted with a blue border), and Smart Detection settings (also highlighted with a blue border). The main content area displays a table of detected issues:

NAME	SEVERITY
Slow page load time	Information
Slow server response time	Information
Long dependency duration	Information
Degradation in server response time	Information
Azure cloud service issues	Information
Degradation in dependency duration	Information
Failure Anomalies - fabrikamprod	Alert

# Benefits of Telemetry

Telemetry enables you to answer questions such as:

- Are your customers using the features you expect? How are they engaging with your product?
- How frequently are users engaging with your app, and for what duration?
- What settings options do users select most? Do they prefer certain display types, input modalities, screen orientation, or other device configurations?
- What happens when crashes occur? Are crashes happening more frequently when certain features or functions are used? What's the context surrounding a crash?

# Monitoring Tools that collect Telemetry

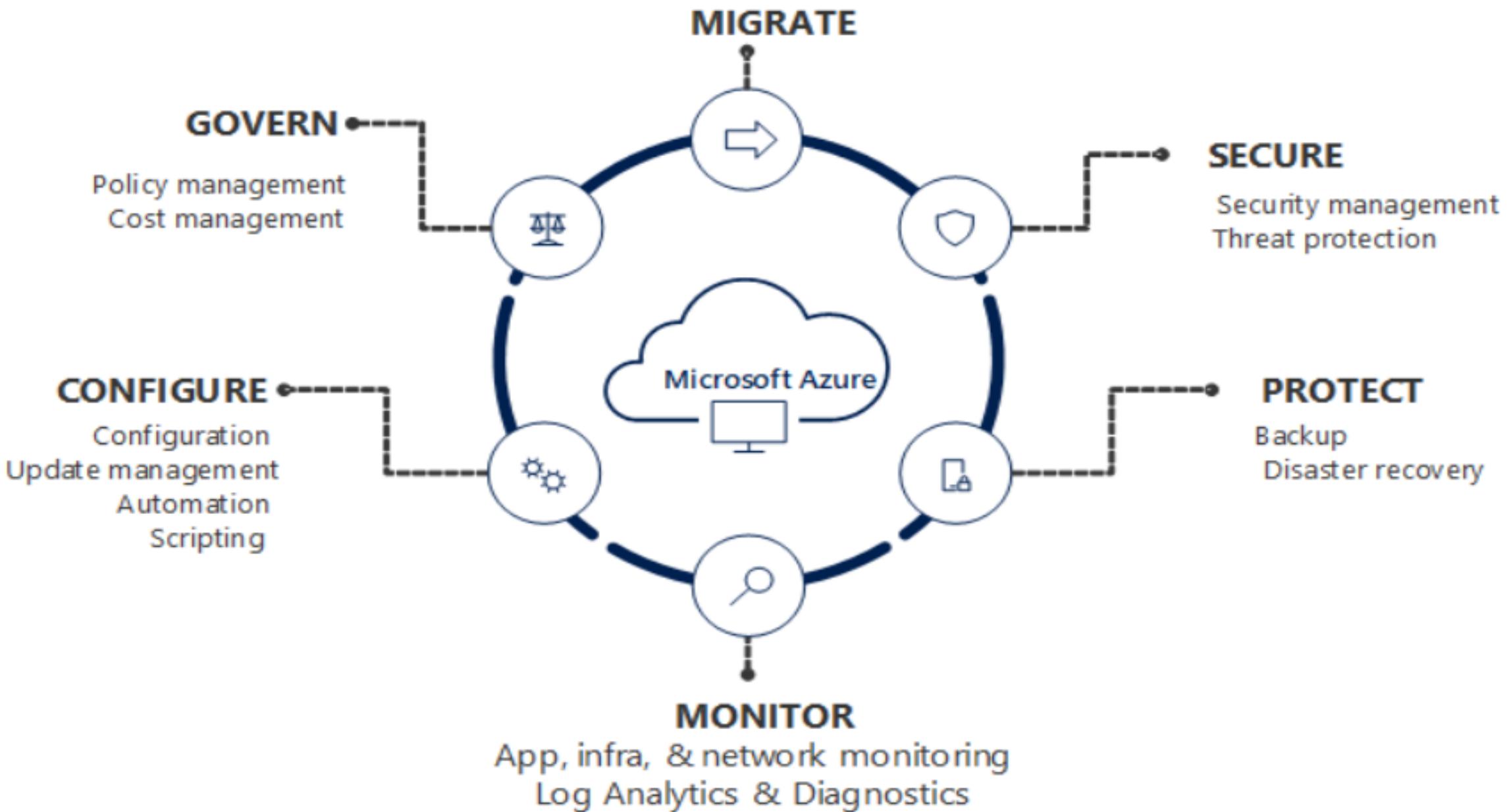
- Synthetic monitoring
  - Monitoring the Applications
- Alert Management
  - Automatic using Mail, Slack, Teams
- Deployment Automation
- Analytics
  - Ability to look for patterns in Logs

# AZ-400.6

## Module 2:

### Implement Process for Routing System Feedback to Development Teams





# Enable monitoring for all your applications

In order to gain observability across your entire environment, you need to enable monitoring on all your web applications and services

- Azure DevOps Projects
- Continuous monitoring in your DevOps release pipeline
- Status Monitor
  - <https://status.azure.com/de-de/status>
- Application Insight

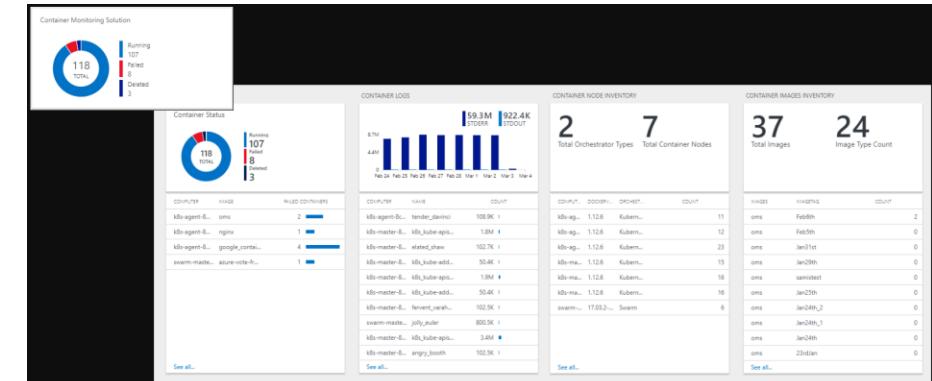
# Enable monitoring for your entire infrastructure

- Make it easier to discover a potential root cause when something fails
- Azure Monitor helps you track the health and performance of your entire hybrid infrastructure
  - Azure Monitor for VMs
  - Azure Monitor for Containers
- Use Azure Policy to enforce different rules over your resources

# Azure Monitor

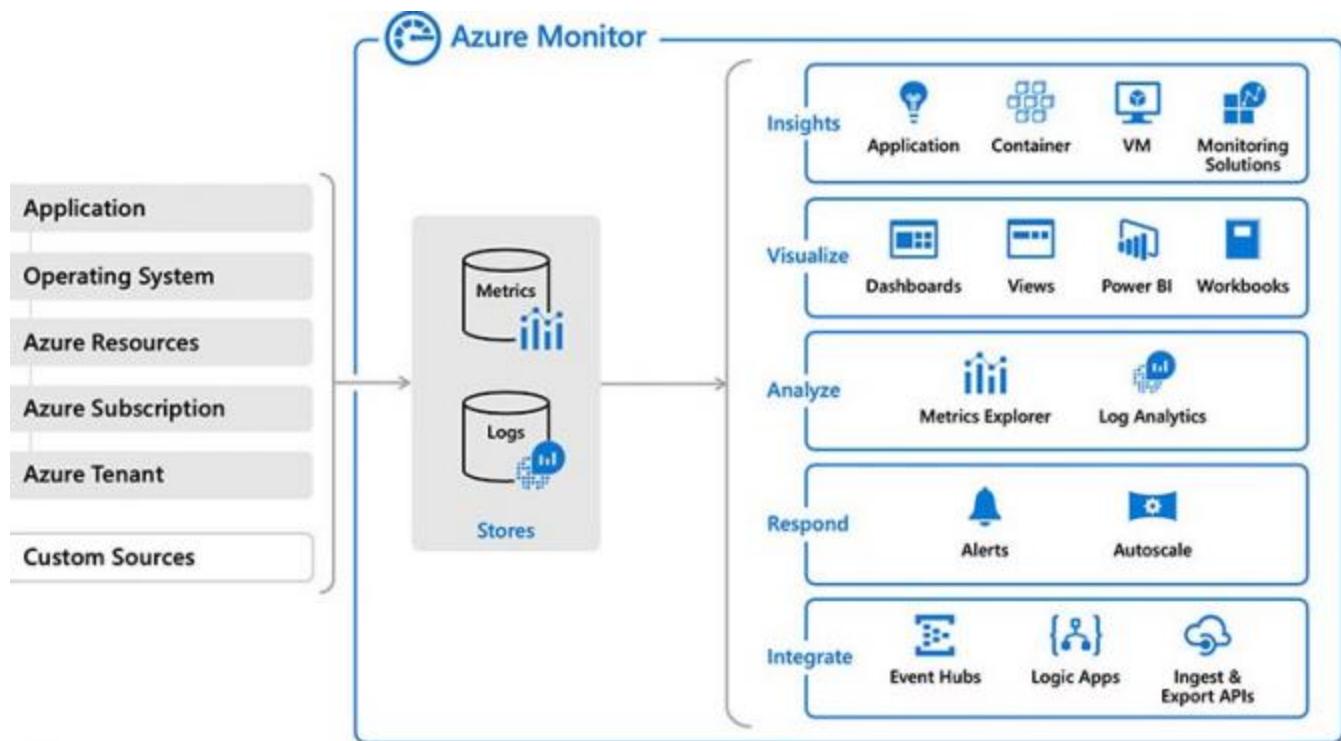
Use Azure Monitor for:

- Detect and diagnose issues across applications and dependencies with [Application Insights](#).
- Correlate infrastructure issues with [Azure Monitor for VMs](#) and [Azure Monitor for Containers](#).
- Drill into your monitoring data with [Log Analytics](#) for troubleshooting and deep diagnostics.
- Support operations at scale with [smart alerts](#) and [automated actions](#).
- Create visualizations with Azure [dashboards](#) and [workbooks](#).

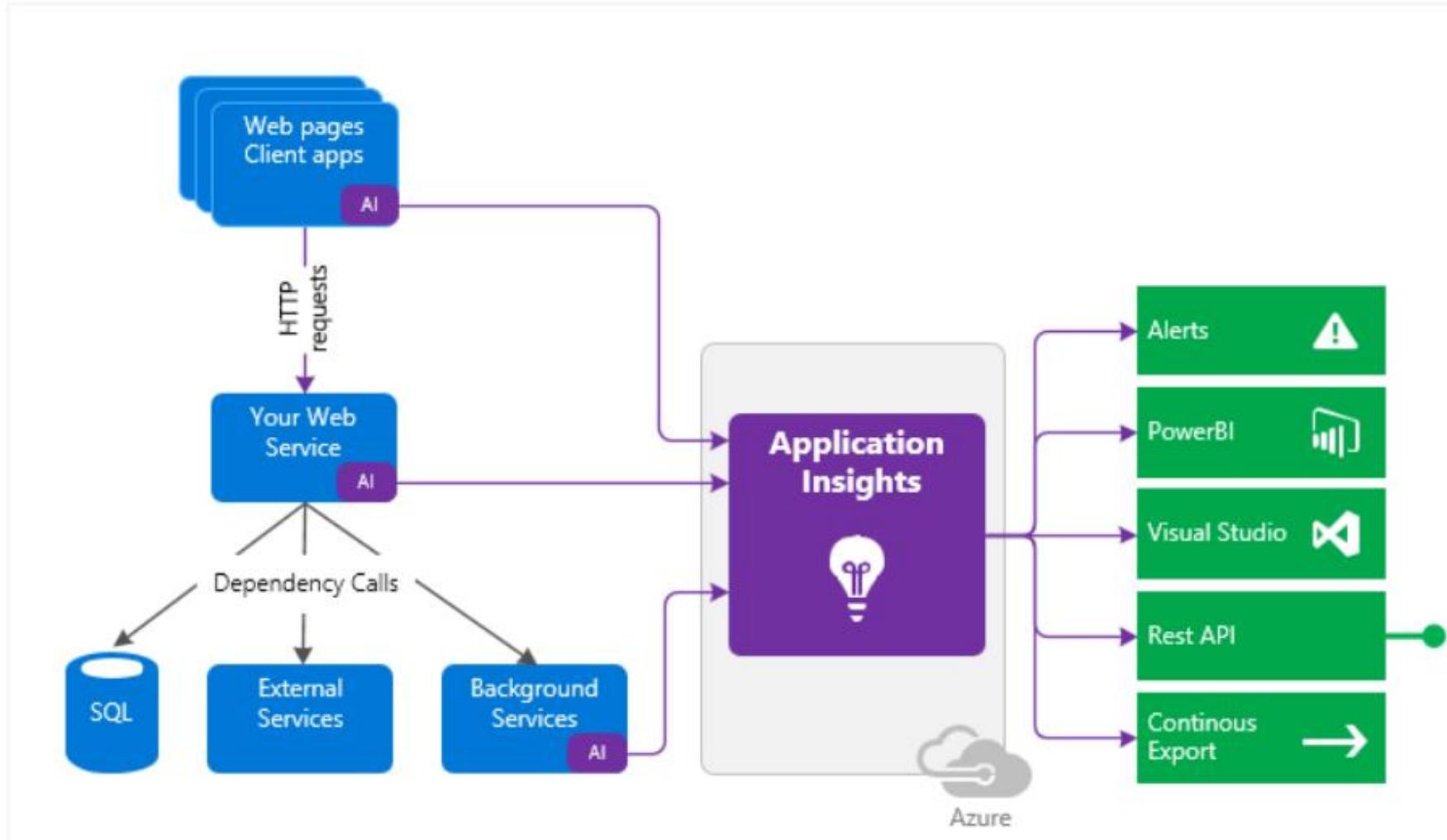


# Azure Log Analytics

With Azure Monitor you can analyse data, set up alerts, get end-to-end views of your applications, and use machine learning-driven insights to quickly identify and resolve problems

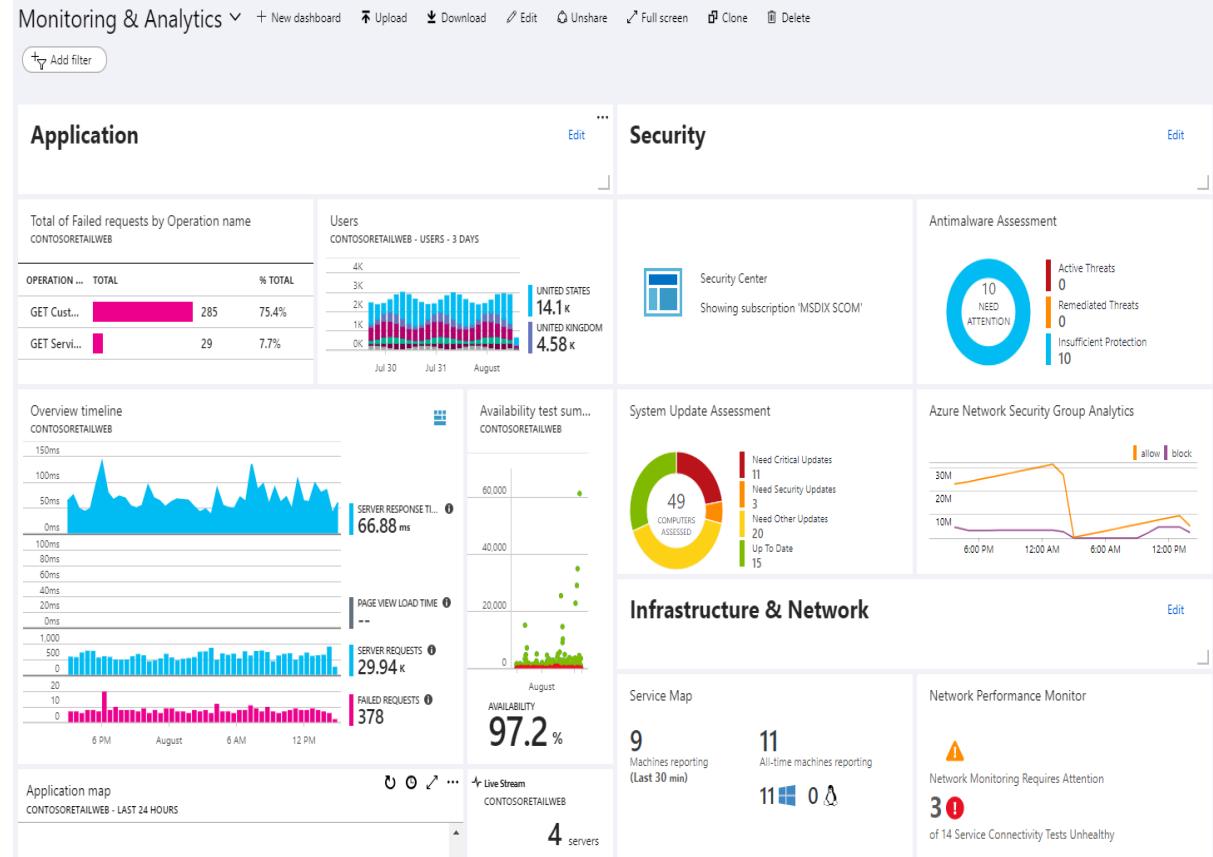


# How Does Application Insights Work



# Azure Dashboards

- Dashboards are a focused and organized view of your cloud resources in the Azure portal
- The Azure portal provides a default dashboard as a starting point. You can edit the default dashboard. Create and customize additional dashboards



# Workbooks

Workbooks combine text, log queries, metrics, and parameters into rich interactive reports

## Analysis of Page Views

Page views correspond to user activity in your app. Understanding how your users interact with your pages will give you good insights into what is working in your app and what aspects need improvements.

This report will help

- Usage
- Time spent on page
- Time to first interaction
- Exit rates

If your telemetry does

Pages: Home Page, Details

OptimizeCalculations

### Usage

This section helps you understand how

Page Name	Unique Users	As % of App Users/Sessions
Overall	8813	
Home P...	8811	
Create	8792	
Details	8780	

- The As % of App Users/Sessions/

### Time Spent on Page

This report helps you understand the time spent by customers in your pages. Longer time spent pages usually indicates good engagement and is generally the desired behavior.

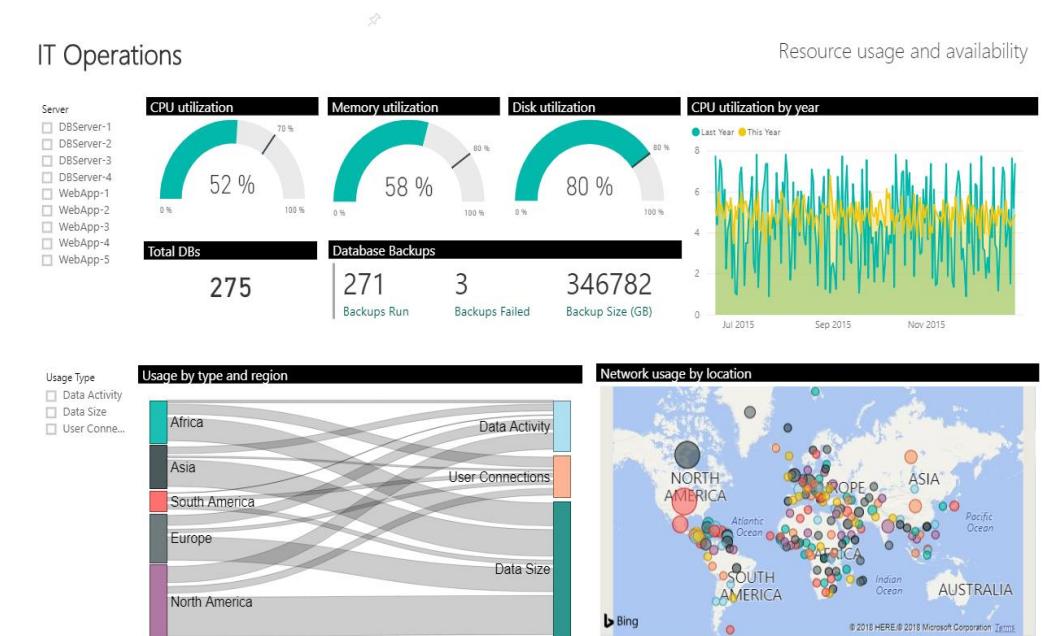
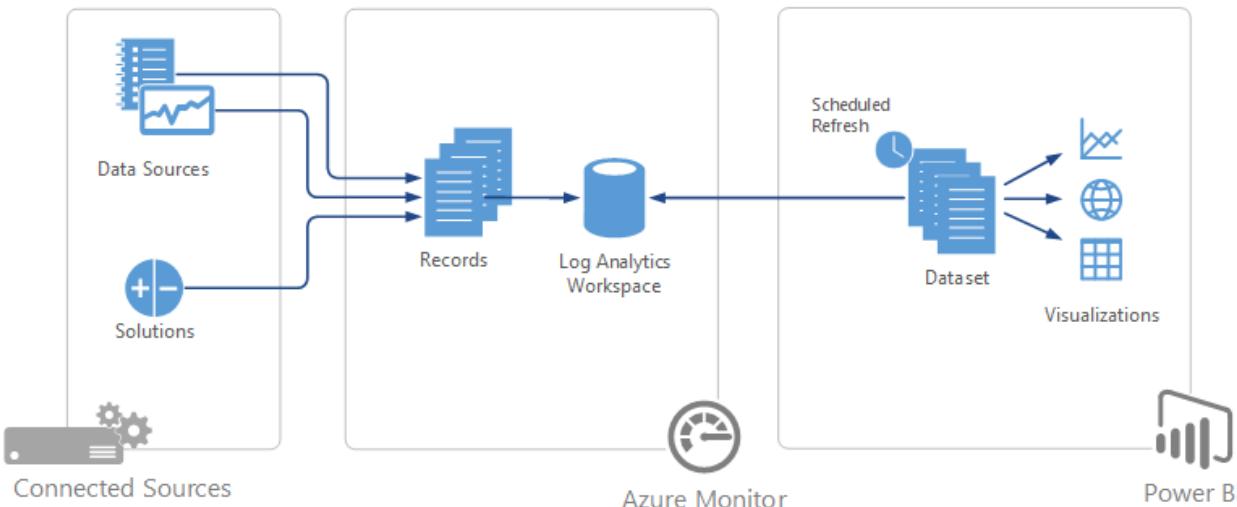
IgnoreDurationsOver: 3600s ▾

Page Name	Sampled Page Views	Median (seconds)	75th Percentile (seconds)	90th Percentile (seconds)	Mean (seconds)
Overall	107150	149.7		375	750.5
Create	29522	174.4		540	896.5
Details	33086	169.2		480	900
Home Page	44542	105.6		300	500

- The calculations may use sampling based on the `OptimizeCalculationsFor` parameter.
- Time Spent on Page does not consider exit pages (last page of the session) in this calculations. The `Sampled Page Views` column may be fewer than the sampling count of 100000 because of this.

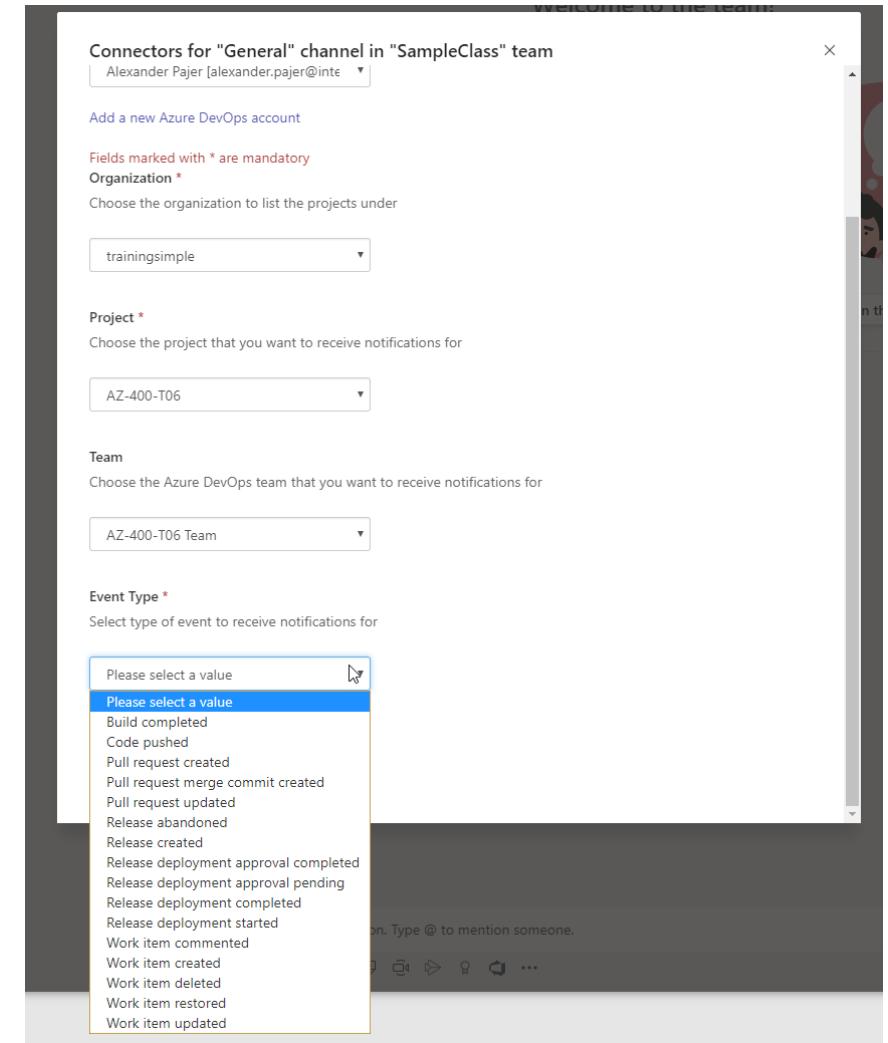
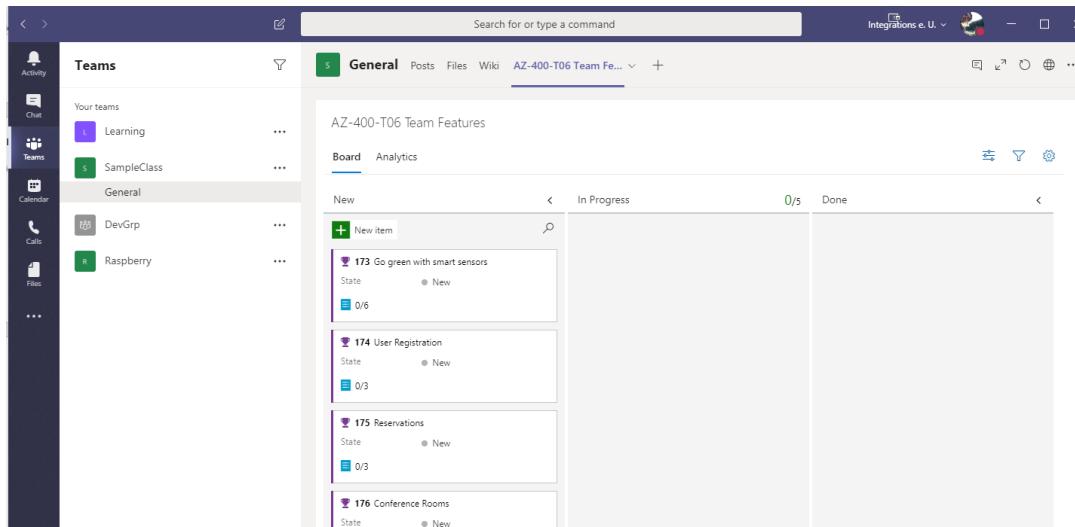
# Power BI

To import data from a Log Analytics workspace in Azure Monitor into Power BI, you create a dataset in Power BI based on a log query in Azure Monitor



# Microsoft Teams

- Microsoft Teams can be used as a Hub for modern Software Development
- DevOps can be integrated using:
  - Connectors
  - Tabs



# Integrate and Configure Ticketing Systems

Azure DevOps supports integration to existing Ticketing Systems such as

- Remedy ITSM
- ServiceNow

Home > Monitor - Action groups > Add action group

### Add action group

* Action group name	MyActionGroup	✓
* Short name	MyAG	✓
* Subscription	My subscription	▼
* Resource group	Default-ActivityLogAlerts	▼

Actions

ACTION NAME	ACTION TYPE	STATUS	DETAILS
CreateIncident	SMS	Active	X
Unique name for the action	Email	In Progress	
Privacy Statement	Webhook	Pending	
Pricing	Azure app	Completed	
	ITSM	Queued	
	Automation Runbook	Not Started	

# AZ-400T06

## Module 3: Implement and Manage Build Infrastructure



# Site Reliability Engineering

- Site reliability engineering (SRE) empowers software developers to own the ongoing daily operation of their applications in production
- Bridge the gap between the development team that wants to ship things as fast as possible and the operations team that doesn't want anything to blow up in production
- 50% caretaking - 50% coding

# Site Reliability Engineering Responsibilities

- Proactively monitor and review application performance
- Handle on-call and emergency support
- Ensure software has good logging and diagnostics
- Create and maintain operational runbooks
- Help triage escalated support tickets
- Work on feature requests, defects and other development tasks
- Contribute to overall product roadmap

# Smart detection notification

[Application Insights](#) automatically analyzes the performance of your web application and can warn you about potential problems like:

- Response time degradation
- Dependency duration degradation
- Slow performance pattern

# Alerting

Alerts proactively notify you when important conditions are found in your monitoring data.

- Metric values
- Log search queries
- Activity Log events
- Health of the underlying Azure platform
- Tests for web site availability

# Configure email notifications

Smart Detection notifications are enabled by default and sent to those who have owners, contributors and readers access to the Application Insights resource

Emails about Smart Detections performance anomalies are limited to one email per day per Application Insights resource

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