SAND2022-13396C

Sandia National Laboratories

Exceptional service in the national interest

Automation made easy with Azure

Presenters

Valerie Silva, *Enterprise Cloud Services* | vrsilva@sandia.gov

Marc Sanchez, *Enterprise Cloud Services* | msanch7@sandia.gov

Gerald Sandoval, *Enterprise Cloud Services* | glsando@sandia.gov

Sandia National Laboratories is a multimission laboratory managed and operated by National Technology and Engineering Solutions of Sandia LLC, a wholly owned subsidiary of Honeywell International Inc. for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-NA0003525.

Sandia National Laboratories is a multimission laboratory managed and operated by National Technology & Engineering Solutions of Sandia, LLC, a wholly owned subsidiary of Honeywell International, Inc., for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-NA0003525.

Agenda

1. Overview
2. Function Apps
3. Azure Container Instances
4. Azure Automation Accounts
5. Azure WebJobs
6. Logic Apps
7. Key Takeaways

Cloud Automation Areas

Automation is needed in three broad areas of cloud operations:

Deploy and Manage

Create and configure programmatically using automation or infrastructure as code tooling to deliver repeatable and consistent deployment and management of cloud resources.

Response

Create event-based automation to diagnose and resolve issues.

Orchestrate

Orchestrate and integrate your automation with other Azure or third party services and products.

Five Automation Options in Azure

Function Apps

Azure WebJobs

Azure Container Instances

Logic Apps

Azure Automation Accounts

⚠ NOTE: This is not a comprehensive list. These are the five selected for this presentation

What are Azure Functions?

Execute event-driven serverless code functions with an end-to-end development experience.

Use Cases

Build a web API	Implement an endpoint for your web applications using the HTTP trigger
Process file uploads	Run code when a file is uploaded or changed in blob storage
Build a serverless workflow	Chain a series of functions together using durable functions
Respond to database changes	Run custom logic when a document is created or updated in Cosmos DB
Run scheduled tasks	Execute code on pre-defined timed intervals
Create reliable message queue systems	Process message queues using Queue Storage, Service Bus, or Event Hubs
Analyze IoT data streams	Collect and process data from IoT devices
Process data in real time	Use Functions and SignalR to respond to data in the moment

Pros and Cons

Pros

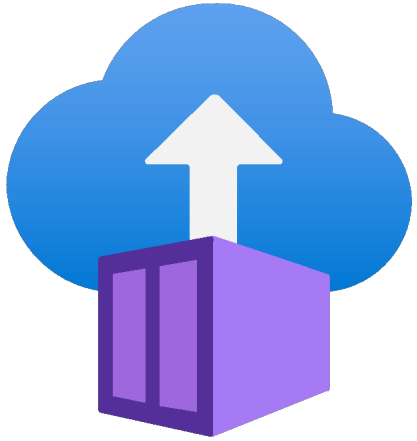
- Automated flexible scaling
- Serverless model
- Integrated programming model
- End-to-end development experience
- Variety of programming languages
- Easy to trigger based on various events

Cons

- Limited default language handlers
  *Custom handlers available
- Library compatibility issues
- Vendor lock-in
  *Can be containerized

What are Azure Container Instances?

- Run Docker containers on-demand in a managed, serverless Azure environment.
- Azure Container Instances is a solution for any scenario that can operate in isolated containers, without orchestration.



Use Cases

Elastic bursting with AKS

Event-driven applications

Data Processing Jobs

Azure DevOps Agents

Pros and Cons

Pros

- Fast and simple
- No managed servers (serverless)
- Fast startup time
- Hypervisor-level security

Cons

- No Orchestration
  - Service discovery
  - Auto scaling
  - Coordinated application upgrades
- Not recommended for end-user applications

What are Azure Automation Accounts?

- Azure Automation gives you complete control during deployment, operations, and decommissioning of enterprise workloads and resources.
- Delivers a cloud-based automation, operating system updates, and configuration.
- Supports consistent management across your Azure and non-Azure environments.

Use Cases

Process Automation

Configuration Management

Update Management

Shared Capabilities

Heterogeneous Features

Pros and Cons

Pros

- Serverless automation of configuration and update management tasks
- PowerShell environment
  - Graphical or textual
- Integration with other cloud services via webhooks
- Change tracking of VM inventory
- Cross-platform

Cons

- Time limits
- Specific management use cases
- Small number of languages supported

What are Azure WebJobs?

WebJobs is a feature of Azure App Service that enables you to run a program or script in the same instance as a web app, API app, or mobile app. WebJobs also give you the ability to run code off of app service file system change trigger.

You can use the Azure WebJobs SDK with WebJobs to simplify many programming tasks.

Use Cases

Running scripts from a wide array of languages

(cmd, bat, exe, ps1, sh, php, py, js, jar)

Running code based on file system changes

Scheduled/Triggered code runs

Pros and Cons

Pros

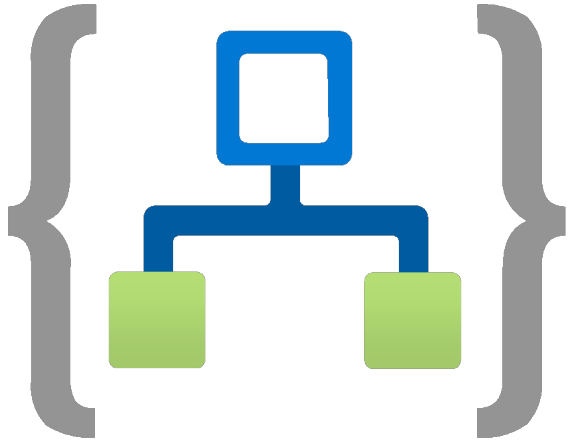
- Multiple supported filetypes
- Lives with the application
  - Easy to configure
  - Managed in same DevOps environment
- Remote debugging
- Filesystem changes trigger
- There is no additional cost to use WebJobs.

Cons

- Windows only
  - WebJobs is not yet supported for App Service on Linux.
- Shares same resources as application
  - Can cause performance issues
- C# SDK only

What are Azure Logic Apps?

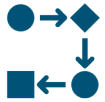
Azure Logic Apps is a cloud-based platform for creating and running automated workflows that integrate your apps, data, services, and systems.



Use Cases

Timer-based or content based triggers

Event processing



Business process/workflows

Integration between other cloud services

Pros and Cons

Pros

- Low to no-code
- Easy to get started
- Quickly create workflows
- Built-in connectors
- Pay per action
- Integrate systems easily
- Many different triggers

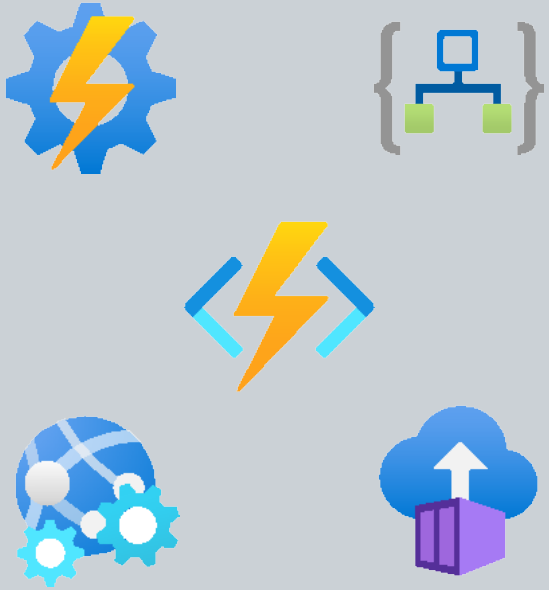
Cons

- Can become complicated quickly
  - Not as robust as code options
- Not for large amounts of data

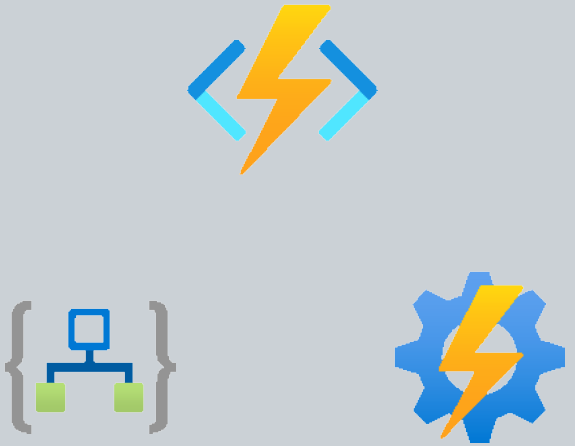
Use Case Summary

Deploy and Manage

Response



Orchestrate



Key Takeaways

- All of these services integrate with each other and other Azure services
  - A solution may require one or more of these automation services
- Services are interchangeable
  - Choose based on skillset and use case
- This is not a comprehensive list of all automation options in Azure

References

- Cloud Automation
  - https://learn.microsoft.com/en-us/azure/automation/automation-services
- Function Apps
  - https://learn.microsoft.com/en-us/azure/azure-functions/functions-overview
  - https://learn.microsoft.com/en-us/azure/azure-functions/functions-overview#scenarios
  - https://azure.microsoft.com/en-us/products/functions/#features
- Azure Container Instances
  - https://learn.microsoft.com/en-us/azure/container-instances/
  - https://learn.microsoft.com/en-us/azure/container-instances/container-instances-overview
  - https://azure.microsoft.com/en-us/products/container-instances/#features
- Azure Automation
  - https://learn.microsoft.com/en-us/azure/automation/overview
- Azure WebJobs
  - https://learn.microsoft.com/en-us/azure/app-service/webjobs-create
- Logic Apps
  - https://learn.microsoft.com/en-us/azure/logic-apps/logic-apps-overview

Questions