

AUTOMATING AZURE INFRASTRUCTURE SOLUTIONS

2021

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Automating Azure Infrastructure Solutions

The Azure Portal is a great management tool for your Azure resources. People like clean, modern-looking, and easy-to-use graphical interface. However, when you start working on more complex IaaS solutions that involves a number of Azure resources, you will quickly realize that GUI wizards don't scale. Automation is a key to fully embrace what Azure IaaS offers in a consistent and optimal manner. It saves time and increases the reliability of regular administrative tasks. In this course, you will learn how to create and scale the most common IaaS services, and how to automate the manual, long-running, error-prone, and frequently-repeated tasks that are commonly performed in a cloud. We will focus on using Azure PowerShell, Azure CLI, Azure Cloud Shell, Azure Automation, Azure Automation State Configuration (DSC), ARM templates, Ansible, Terraform, event-based automation with PowerShell in Azure Functions, and continuous deployment using Azure DevOps and GitHub Actions. The course includes a variety of practical exercises after each presentation.

Course Objectives

After completion of this course, you will have a solid understanding of how to automate provisioning and management of virtual machines, VM scale sets, set up networking, manage virtual machine storage, and related Azure resources using different automation technologies in Azure.

Course Audience

IT Professionals and developers who want to automate provisioning and management of Azure virtual machines and related IaaS resources.

Prerequisites

Basic experience with PowerShell, basic understanding of Azure virtual machines, networking and storage.

Material

Demo and lab scripts, lab manual, and slides.

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Course Outline

Module 1: Using Azure PowerShell / Azure CLI / Azure Cloud Shell

To create and manage Azure infrastructure solutions in a consistent manner at scale, some form of automation is typically desired. There are many tools and solutions that allow you to automate the complete Azure infrastructure deployment and management lifecycle. This module introduces some of the infrastructure automation tools that you can use in Azure.

- Install and configure Azure PowerShell
- Install and configure Azure CLI
- Use Azure Cloud Shell
- Use Visual Studio Code and Windows Terminal

Module 2: Automating Azure Networking

This module introduces the student to automating Azure Networking and its common management tasks.

- Create a virtual network for multi-tier applications
- Implement network security groups (NSG)
- Configure VNet peering

Module 3: Automating Azure Storage

This module introduces the student to automating Azure Storage (Blob and File storage) and its common management tasks.

- Create a storage account and retrieve the access keys
- Perform Azure Blob storage operations
- Migrate Blobs across storage accounts using AzCopy
- Upload a VHD to Azure Storage
- Create, connect, and mount Azure File Share

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Module 4: Automating Azure Virtual Machines and VM Scale Sets

This module introduces the student to creating, configuring, and managing Azure Virtual Machines (VM) using different automation techniques.

- Create an Azure VM
- Create highly available virtual machines
- Manage a VM using VM extensions (Custom Script, DSC...)
- Monitor a VM with Log Analytics
- Create a managed image of a generalized VM
- Create a VM from a managed OS disk
- Create a VM Scale Set
- Create a scale set from a custom VM image
- Install applications to a scale set
- Explore Azure VMs using Resource Graph

Module 5: Azure Automation

This module introduces the student to using the Azure Automation service that works the best when it is linked to the Azure Monitor Logs (Log Analytics). Student will learn how to author, test, and schedule automation runbooks to automate and monitor Azure infrastructure. Azure Automation can run across both Windows and Linux VMs, as well as on-premises virtual or physical machines with a hybrid runbook worker.

- Configure Automation accounts
- Create a Log Analytics workspace
- Create a PowerShell runbook
- Add a module
- Import and schedule a runbook
- Start a runbook

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Module 6: Azure Automation State Configuration (Desired State Configuration) and Azure Policy Guest Configuration

Azure Automation also provides a State Configuration (DSC) service that allows you to create definitions for how a given set of VMs (Windows and Linux) should be configured. This module details how to ensure that the required configuration is applied and the VM stays consistent. It also covers how to audit settings inside a VM using Azure Policy Guest Configuration.

- Desired State Configuration (DSC) Overview
- Onboard machines for management
- Compile DSC configurations
- Configure machines to a desired state and manage drift
- Forward Azure Automation State Configuration reporting data to Azure Monitor Logs
- Assign Azure Policy Guest Configuration

Module 7: Azure Resource Manager and Bicep Templates

This module walks a student through the steps of deploying Azure resources using the Azure Resource Manager (ARM) and Bicep templates. These templates are files that define the resources we need to deploy for our solution. They enable idempotent deployment of Azure infrastructure resources and give us a full declarative solution to build our environment and provision our VMs.

- Visual Studio Code extensions for ARM and Bicep templates
- Understand the structure and syntax of ARM templates
- Create an ARM template
- Simplified template authoring with Bicep
- Deploy the ARM and Bicep templates
- View deployment operations
- Export an ARM template and redeploy

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Module 8: 3rd-party Automation Tools (1): Ansible

Ansible is an automation engine for configuration management, VM creation, or application deployment. Ansible uses an agent-less model, typically with SSH keys, to authenticate and manage target machines. Configuration tasks are defined in playbooks, with a number of Ansible modules available to carry out specific tasks.

- Install and configure Ansible
- Create a basic VM
- Create a complete VM environment including supporting resources

Module 9: 3rd-party Automation Tools (2): Terraform

Terraform is an automation tool that allows you to define and create an entire Azure infrastructure with a single template format language. You define templates that automate the process to create network, storage, and VM resources for a given application solution. Terraform simplifies the infrastructure deployment without needing to convert to an Azure Resource Manager template.

- Install and configure Terraform with Azure
- Create an Azure infrastructure with Terraform

Module 10: Event-based Automation with PowerShell in Azure Functions

Azure Functions enables users to deliver event-based services using serverless architecture. A student will learn how PowerShell works in Azure Functions and the new scenarios it opens up to deliver seamless automation across Azure and on-premises environments. This module will cover the core architecture of how PowerShell works in Azure Functions and the benefits and limitations it has when automating tasks.

- Set up PowerShell in Azure Functions
- Run event-based automation tasks in Azure and on-premises
- Durable Azure Functions with PowerShell

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Module 11: Automate a deployment with Azure DevOps

To automate the build, test, and deployment phases of application development, you can use a continuous integration and deployment (CI/CD) pipeline. In this module, we create a CI/CD pipeline using Azure DevOps Services and an ARM template to deploy a web server

- Set up an Azure DevOps environment

- Deploy Azure resources in Azure Pipelines by using an ARM template

Module 12: Automate a deployment by using GitHub Actions

GitHub Actions enable us to create custom workflows for the software development lifecycle directly in the GitHub repository where our code (for example, ARM template or Azure function) is stored. In this module, you learn how to deploy Azure Functions by using GitHub Actions.

- Describe GitHub Actions and where to find them

- Author a GitHub Actions workflow

- Trigger the deployment of an Azure function