

Microsoft Azure: Infrastructure as a Service (IaaS)

Module 2 - Azure Resource Manager (ARM)

Overview

Why Azure Resource Manager?

Today's challenge – it's difficult to...

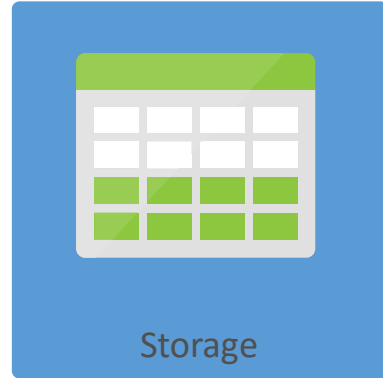
- Set and manage permissions – only co-admin and service admin
- Monitor and have alerting rules – limited to Management Services and basic KPI in portal
- Billing – through the billing portal
- Deployment – complex PowerShell to gather all components for an application
- Visualize a group of resources in a logical view, including monitoring/billing

Current Portal - Resource Centric Views

The screenshot displays the Microsoft Azure portal interface. On the left is a navigation pane with icons and labels for various service categories: WEBSITES, VIRTUAL MACHINES, MOBILE SERVICES, CLOUD SERVICES, SQL DATABASES, STORAGE, HDINSIGHT, MEDIA SERVICES, SERVICE BUS, VISUAL STUDIO ONLINE, CACHE, BIZTALK SERVICES, and RECOVERY SERVICES. The main area is titled 'all items' and contains a table listing resources. The table has columns for NAME, TYPE, STATUS, SUBSCRIPTION, and LOCATION. The first row is highlighted in blue and shows a 'Cloud service' named 'bjm-1f5-1' with a status of 'Stopped'. Other rows include various storage accounts, virtual machines, mobile services, and databases. At the bottom of the screen, there is a dark bar with '+ NEW' and 'NEW' buttons, and a trash icon labeled 'DELETE'.

NAME	TYPE	STATUS	SUBSCRIPTION	LOCATION
bjm-1f5-1	Cloud service	Stopped	LSAzure Internal Subscri...	East US
bmoore-demo	Cloud service	Running	LSAzure Internal Subscri...	West US
devtestvhdsae98966345e0	Storage Account	Online	LSAzure Internal Subscri...	East US
devtestvhdsd6650e159daa	Storage Account	Online	LSAzure Internal Subscri...	West US
lsazure	Storage Account	Online	LSAzure Internal Subscri...	West US
lsazureci	Storage Account	Online	LSAzure Internal Subscri...	West US
lsazuredemo	Storage Account	Online	LSAzure Internal Subscri...	West US
lsazurefiles	Storage Account	Online	LSAzure Internal Subscri...	West US
lsazurevhds	Storage Account	Online	LSAzure Internal Subscri...	West US
portalvhds08h5h5np4nbn	Storage Account	Online	LSAzure Internal Subscri...	West US
bjm-1f5-1	Virtual machine	Stopped (D...	LSAzure Internal Subscri...	East US
bmoore-demo	Virtual machine	Running	LSAzure Internal Subscri...	West US
lsotodo	Mobile Service	Ready	LSAzure Internal Subscri...	West US
Scratch	Virtual Network	Created	LSAzure Internal Subscri...	Scratch (West US)
scratch-vpn	Virtual Network	Created	LSAzure Internal Subscri...	North Central US
lightswitch_db	SQL Database	Online	LSAzure Internal Subscri...	West US
lsspph_db	SQL Database	Online	LSAzure Internal Subscri...	West US
lsciz	SQL Database	Online	LSAzure Internal Subscri...	West US
lsci	SQL Database	Online	LSAzure Internal Subscri...	North Central US
bmoore-msft	Visual Studio Online	Active	LSAzure Internal Subscri...	South Central US

Current Portal - Individual Resources



- Provision resources in isolation
- Deployment becomes more complex
- Management of app is challenging
- Proper use of resources becomes more abstract
- Isolation makes communications a challenge

Benefits of ARM

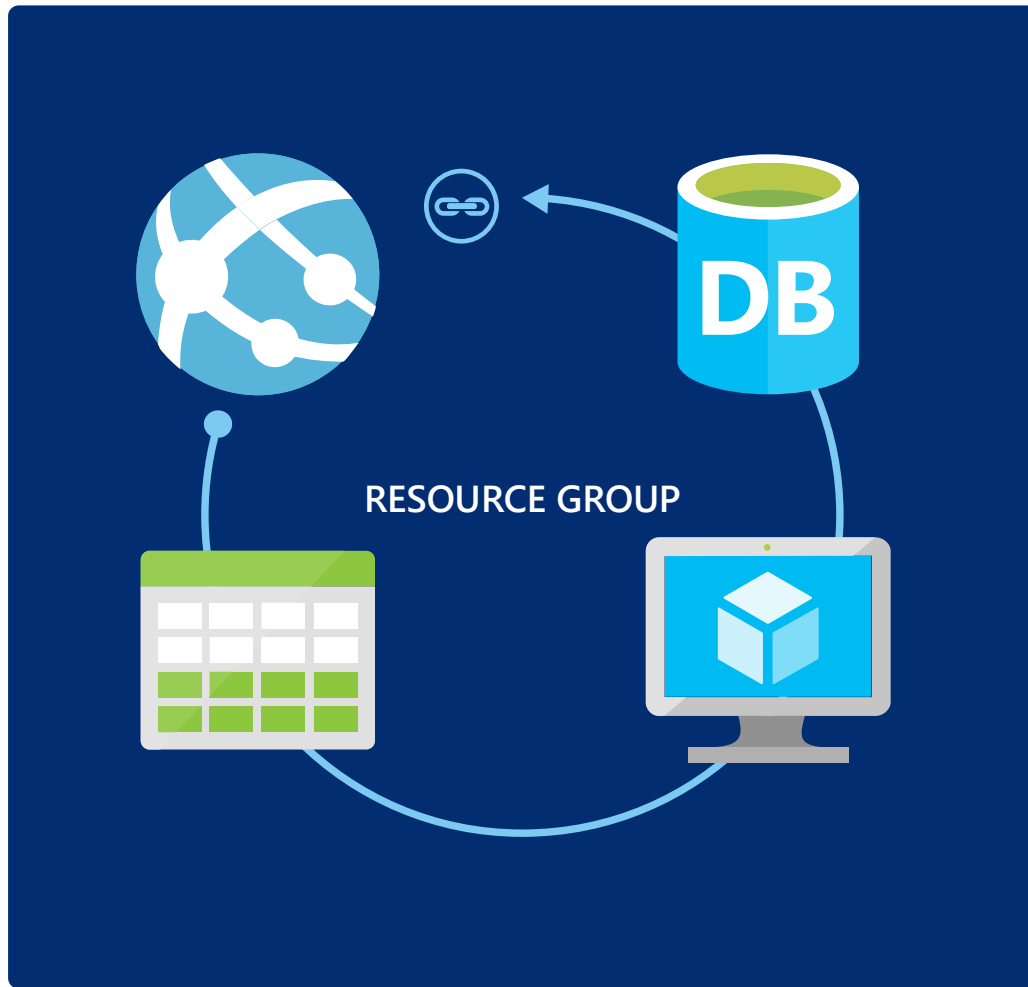
- Desired-state deployment
- Faster deployments
- Role-based access control (RBAC)
- Resource-provider model
- Common interface for Azure and Azure Stack

Resource Groups

A Resource Group is a Unit of Management

- Application Lifecycle Containment – Deployment, update, delete and status
- Declarative solution for Deployment – “Config as Code”
- Grouping – Metering, billing, quote: applied and rolled up to the group
- Consistent Management Layer
- Access Control – Scope for RBAC permissions

Azure Resource Groups



- Tightly coupled containers of multiple resources of similar or different types
- Resource groups can span regions
- Every resource **must** exist in one and only one resource group

Resource Group Lifecycle

Question:

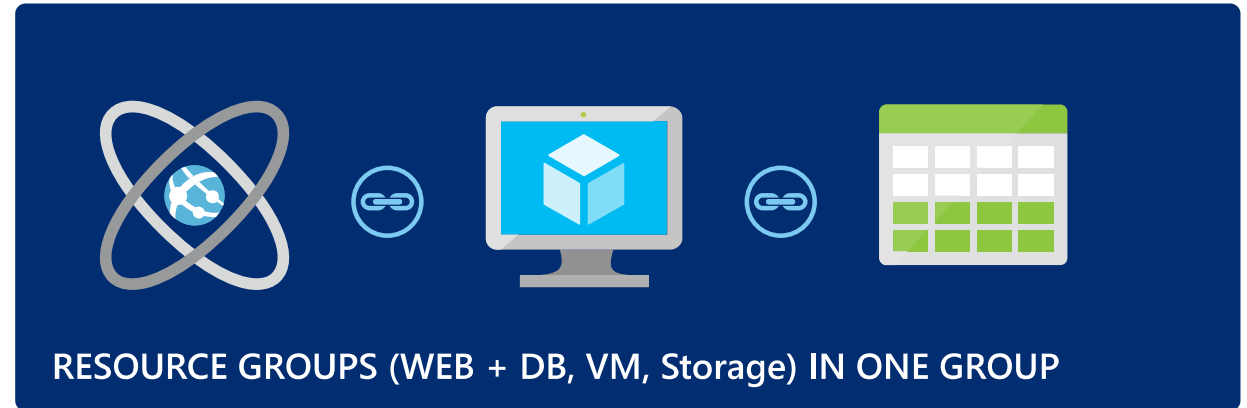
Should these resources be in the same group or a different one?

Hint:

Do they have common lifecycle and management?

Answer:

It's up to you.



OR



Organizational Concepts

Resource groups

- Tightly coupled to a container of resources
- Follows RBAC rules
- 1 resource group at a time

Tags

- Loosely coupled user or system defined categorization
- Arbitrary boundaries
- 15 tags to use as needed

Resource groups and tags are the building blocks from which users define **applications**.

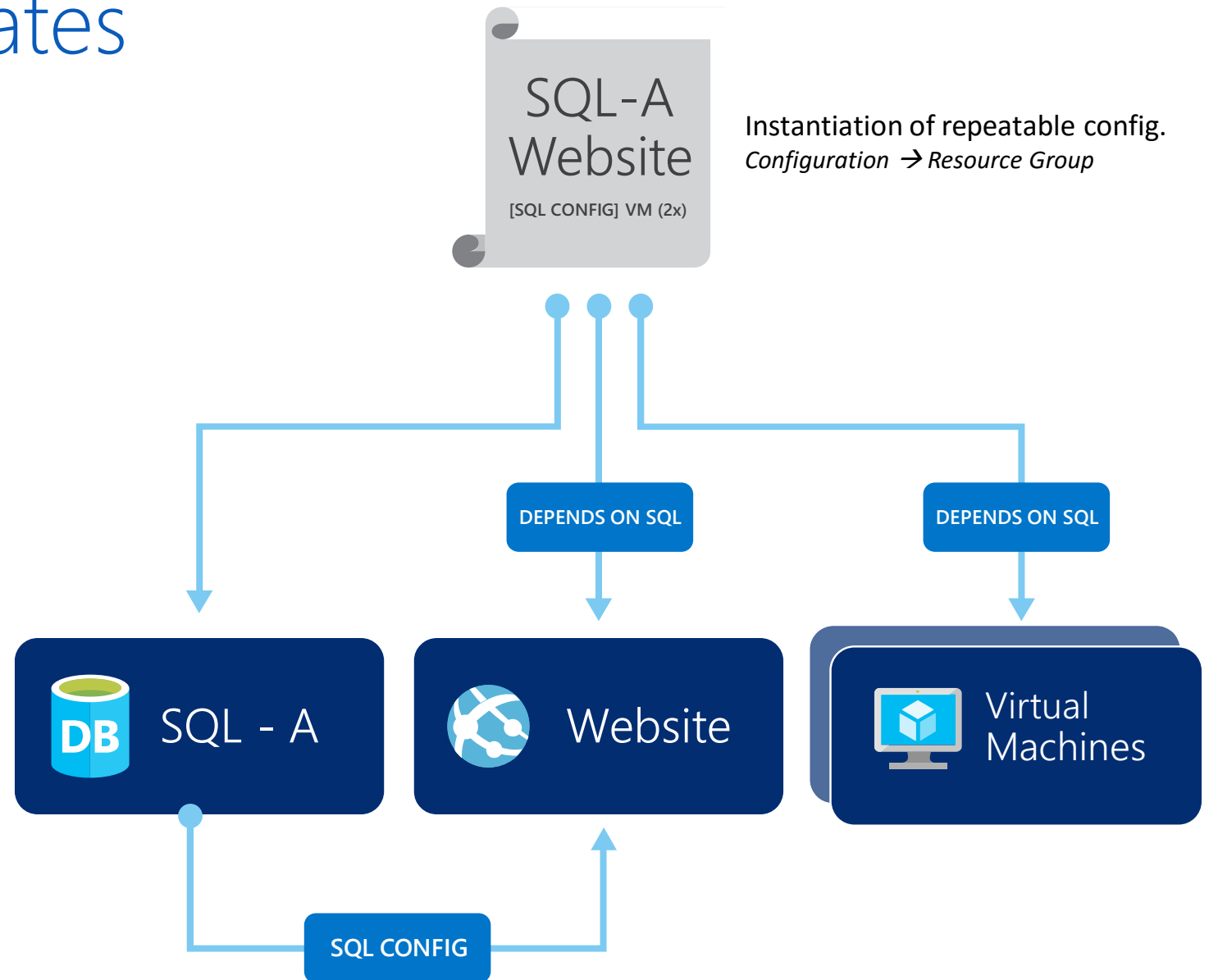
Deployment Templates

What?

- Source file, can be checked-in
- Specifies resources, dependencies and connections
- Parameterized input/output

Why?

- Ensure Idempotency
- Simplify orchestration
- Provide cross-resource configuration and update support



Demo: Resource Groups and Templates

Module 2 - Azure Resource Manager (ARM)

Resource Providers

ARM Definitions

- Resource - Atomic unit of deployment
- Resource group - Collection of resources
- Resource provider - Manages specific kinds of resources
- Resource type - Specifies the type of resource

Resource Providers

- Used to deploy specific types of resources
- Identified by provider namespace
 - e.g., Microsoft.Compute, Microsoft.Storage, Microsoft.Web (~25 Microsoft or Customer namespaces)
- Resource types
 - Each provider namespace manages one or more resource types: e.g., virtualMachines
 - Different regional availability and apiVersions
- PowerShell
 - Get-Azurelocation
 - Get-AzureProvider

Resource Provider Types (examples)

Resource Type	Usage
Microsoft.Compute/virtualMachines	Virtual Machines (VMs) ~ (V2)
Microsoft.Storage/storageAccounts	Storage accounts (V2)
Microsoft.Compute/availabilitySets	
Microsoft.Network/networkInterfaces	Virtual network interface card (NIC)
Microsoft.Network/loadBalancers	Azure Load Balancer or Internal Load Balancer
Microsoft.Network/virtualNetworks	Virtual networks (V2)
Microsoft.ClassicStorage	V1 storage – not managed by ARM
Microsoft.ClassicCompute	V1 VMs – not managed by ARM

Many more!

How do I know what resources providers are available?

Using PowerShell, log in to your Azure account and then run

Get-AzureRmResourceProvider

ProviderNamespace	RegistrationState	ResourceTypes
Microsoft.AppService	Registered	{apiapps, appIdentities, gateways, deploymenttemplates...}
Microsoft.Automation	Registered	{automationAccounts, automationAccounts/runbooks, operations}
Microsoft.Backup	Registered	{BackupVault}
Microsoft.Batch	Registered	{batchAccounts}
Microsoft.Cache	Registered	{Redis, checkNameAvailability, operations, RedisConfigDefinition...}
Microsoft.ClassicCompute	Registered	{domainNames, checkDomainNameAvailability, domainNames/slots, domainNames/slots/...
Microsoft.ClassicNetwork	Registered	{virtualNetworks, reservedIps, quotas, gatewaySupportedDevices...}
Microsoft.ClassicStorage	Registered	{storageAccounts, quotas, checkStorageAccountAvailability, storageAccounts/serv...
Microsoft.Compute	Registered	{availabilitySets, virtualMachines, virtualMachines/extensions, virtualMachines/...
Microsoft.insights	Registered	{components, webtests, queries, alertrules...}
Microsoft.KeyVault	Registered	{vaults, vaults/secrets, operations}
Microsoft.MobileEngagement	Registered	{appcollections, appcollections/apps, checkappcollectionnameavailability, suppor...
Microsoft.Network	Registered	{virtualNetworks, publicIPAddresses, networkInterfaces, loadBalancers...}
Microsoft.OperationalInsights	Registered	{workspaces, storageInsightConfigs, linkTargets, operations}
Microsoft.Sql	Registered	{operations, locations, locations/capabilities, checkNameAvailability...}
Microsoft.Storage	Registered	{storageAccounts, operations, usages, checkNameAvailability...}
microsoft.support	Registered	{operations, supporttickets}
Microsoft.Web	Registered	{sites/extensions, sites/slots/extensions, sites/instances, sites/slots/instanc...
Microsoft.ADHybridHealthService	Registered	{services, addsservices, configuration, operations...}
Microsoft.Authorization	Registered	{roleAssignments, roleDefinitions, classicAdministrators, permissions...}
Microsoft.Features	Registered	{features, providers}
Microsoft.Resources	Registered	{subscriptions, subscriptions/providers, subscriptions/operationresults, resourc...
Microsoft.Scheduler	Registered	{jobcollections, operations}
microsoft.visualstudio	Registered	{account, account/project}

How can I see what Resource Providers are in use in my subscription?

Go to <https://resources.azure.com> and log in using your Azure Credentials

The screenshot displays the Azure Resource Explorer (Preview) interface. The left sidebar shows a tree view of the subscription hierarchy. The 'providers' section is expanded, showing a list of resource providers. The main pane displays the details for the 'CS-PMC-APP-0x' resource group. The 'Allowed Operations' section shows the available actions for this resource group. The JSON snippet below shows the provisioning state of the resource group.

Subscription

Resource Provider

Allowed Operations

```
{
  "id": "/subscriptions/...",
  "name": "CS-PMC-APP-0x",
  "location": "eastus",
  "properties": {
    "provisioningState": "Succeeded"
  }
}
```

Resource Definition

- Name
 - Unique for resource group and resource type (e.g., Microsoft.Compute/virtualMachines)
- Id
 - Unique across Azure
 - /subscriptions/GUID/resourceGroups/myRG/providers/Microsoft.Compute/virtualMachines/vmName
- Location
- ResourceType
- ResourceGroup
- Properties
 - Additional properties specific to the resource provider

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Tools

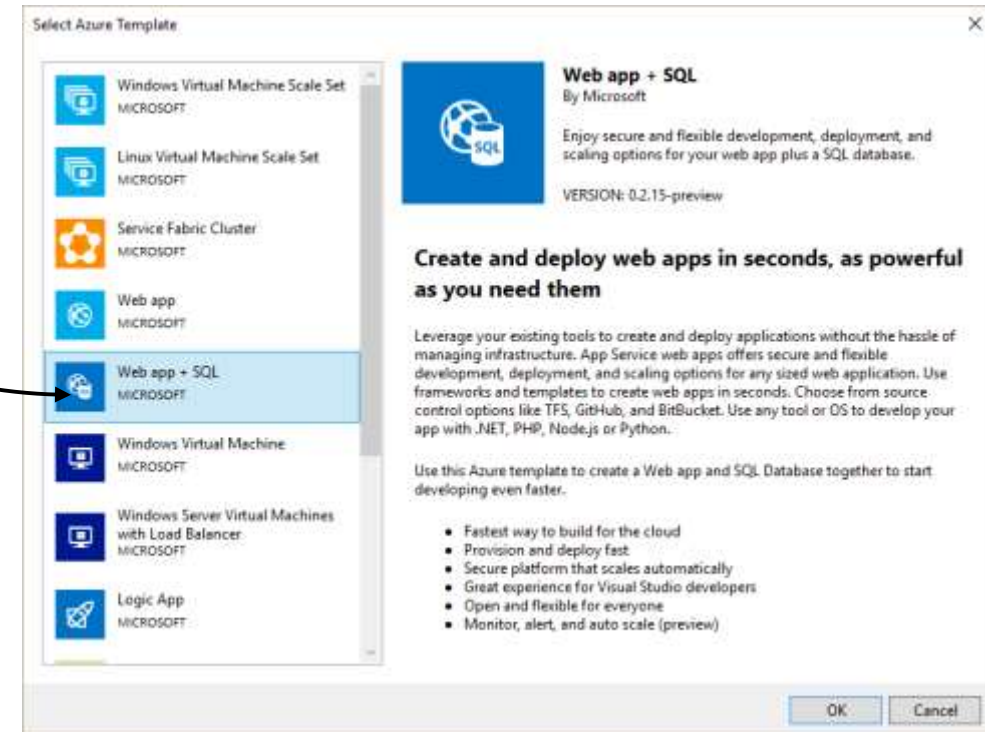
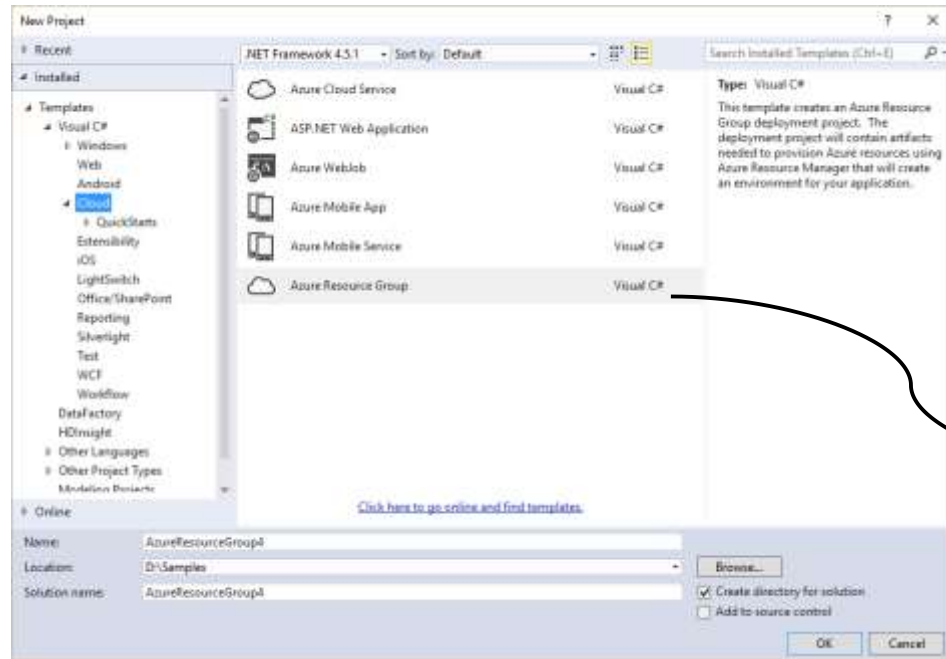
Tools typically used by IT with ARM

- PowerShell
- Troubleshooting in the portal
- Visual Studio

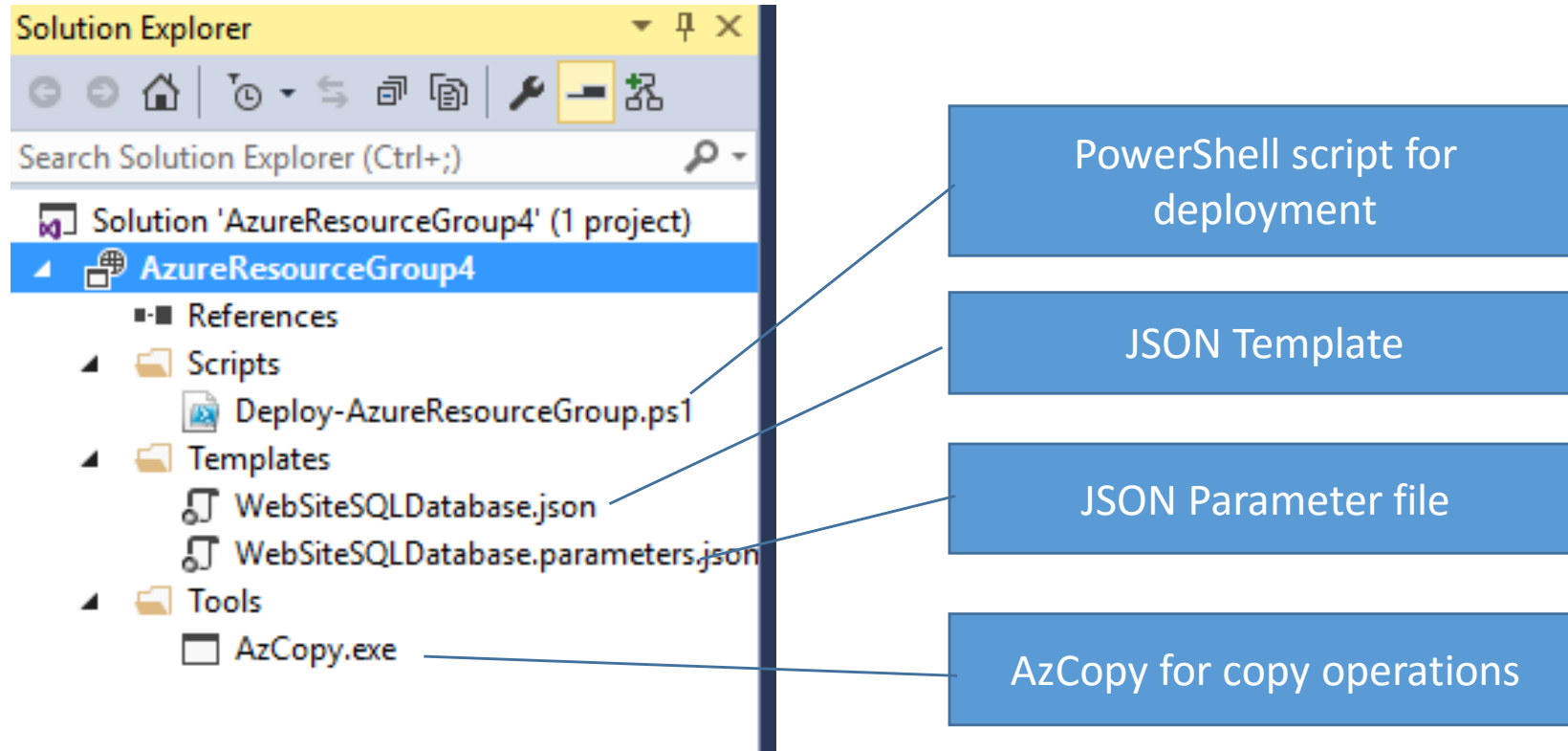
Visual Studio

- Provides a new template from the gallery
- Allows the deployment of a resource group
- Generates scripts to deploy application

Template options

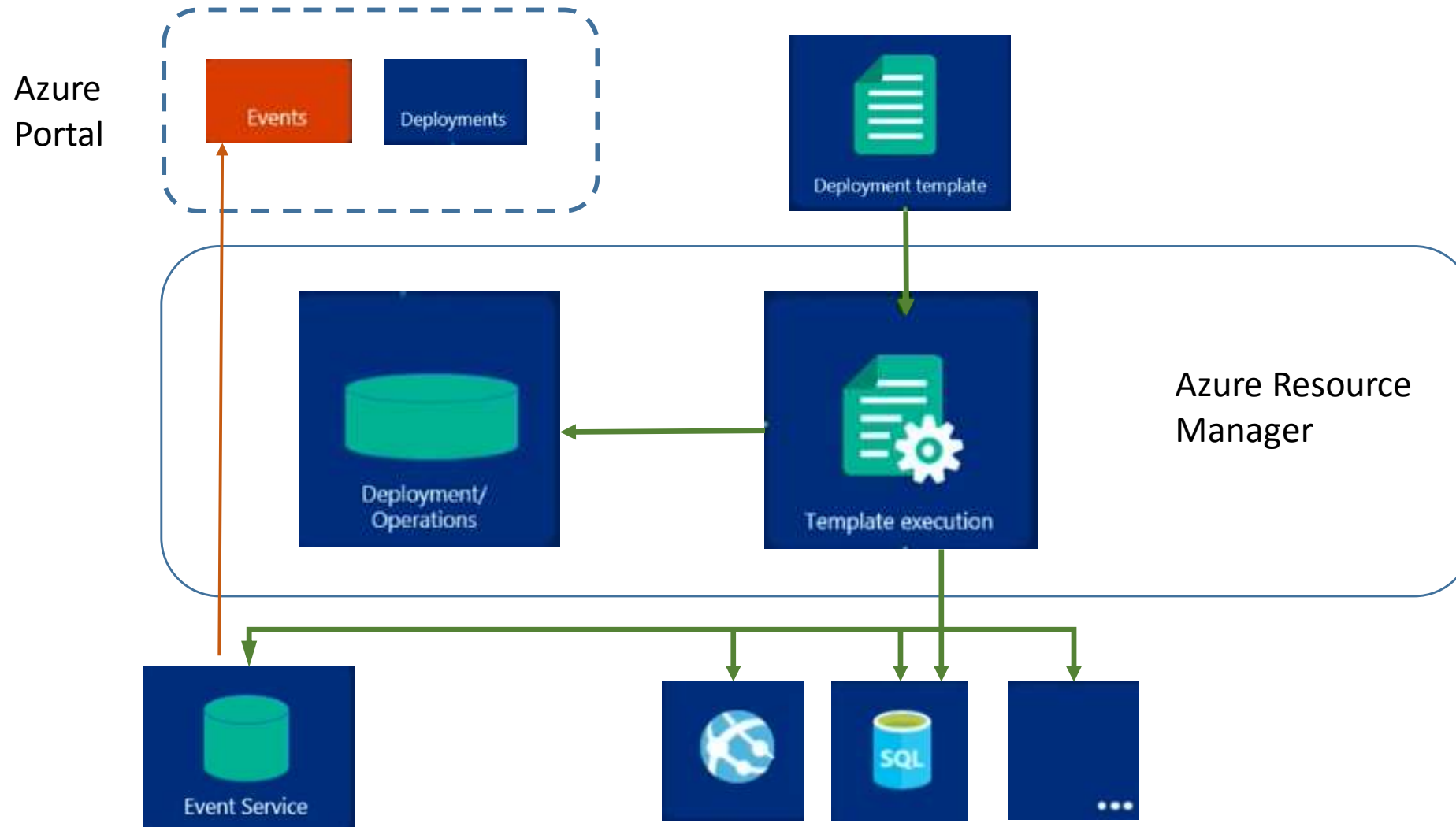


Files Generated by Template



Demo: Visual Studio Deployment

Troubleshooting Deployments



Demo: Troubleshooting

- Event Viewer in the Azure Portal
- Deployment operations in the Azure Portal
- Deployment logs in PowerShell

