Azure security - ultimate security in the cloud era

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Innovative technology consulting for business

About me

Tom Janetscheck

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Microsoft Azure MVP & P-CSA

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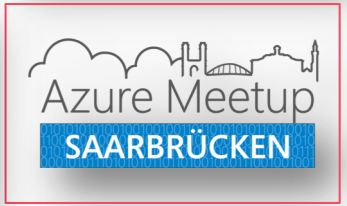


Cloud momentum continues to accelerate

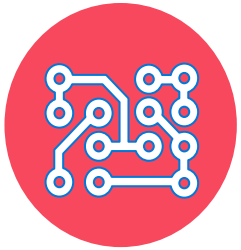
"The question is no longer: 'How do I move to the cloud?' Instead, it's 'Now that I'm in the cloud, how do I make sure I've **optimized my investment and risk exposure**?"[1]

"By 2020 clouds will stop being referred to as 'public' and 'private'. It will simply be **the way business is done** and IT is provisioned."[2]

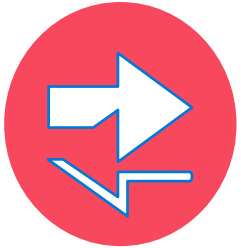
[1]KPMG: 2014 Cloud Survey Report, Elevating business in the cloud, December 10, 2014

[2]IDC: IDC Market Spotlight, Cloud Definitions and Opportunity, April 2015

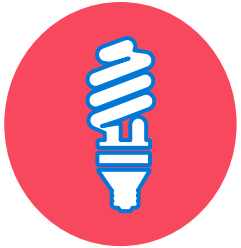
But cloud security concerns persist



Management is increasingly distributed



Cloud environments are more dynamic



Attackers continue to innovate

Cloud Security is a Shared Responsibility

MICROSOFT COMMITMENT

Securing and managing the cloud foundation

Physical assets

Datacenter operations

Cloud infrastructure

JOINT RESPONSIBILITY

Securing and managing your cloud resources

Virtual machines

Applications & workloads

Data

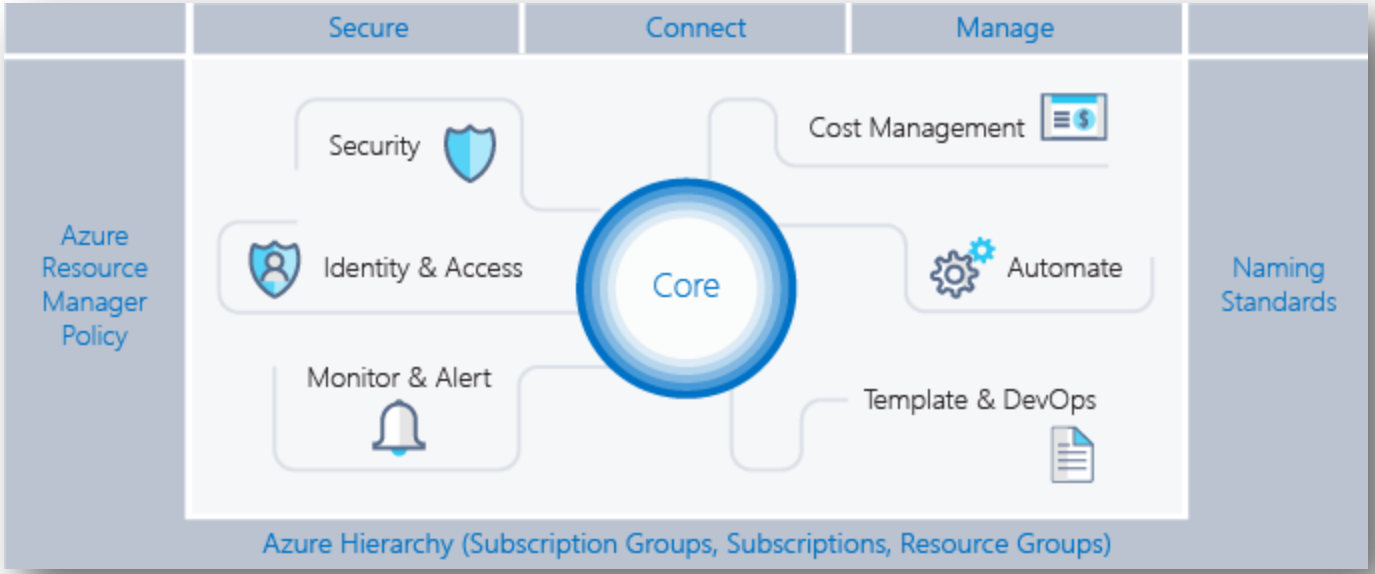
Azure Governance

Governance – a definition

Establishment of **policies**, and continuous **monitoring** of their proper **implementation**, by the members of the governing body of an organization[…][1]

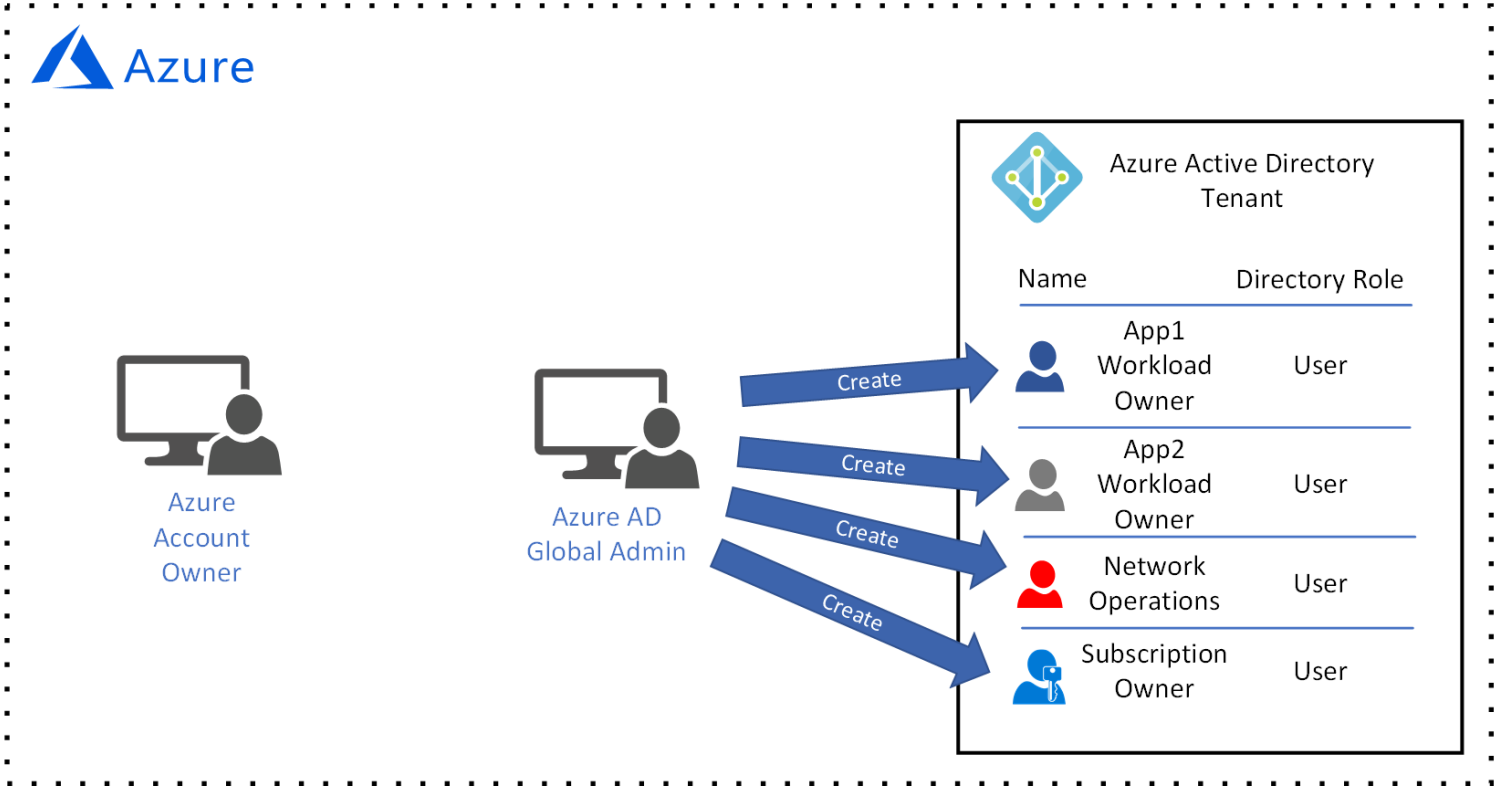
[1]Source: BusinessDictionary

Azure Governance Scaffold

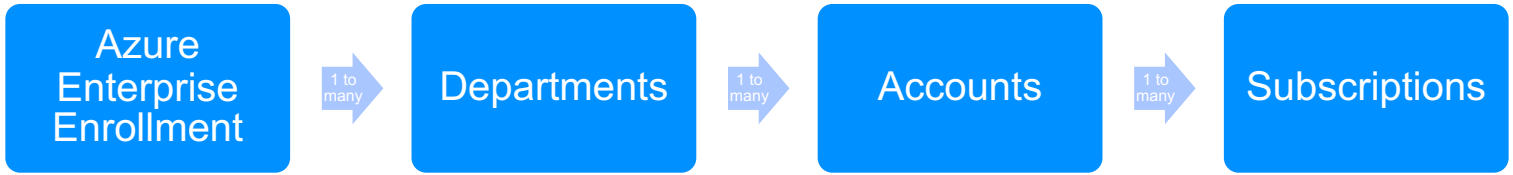


Source: https://docs.microsoft.com/en-us/azure/architecture/cloud-adoption/appendix/azure-scaffold

Azure Account Owner vs. Azure AD Global Admin

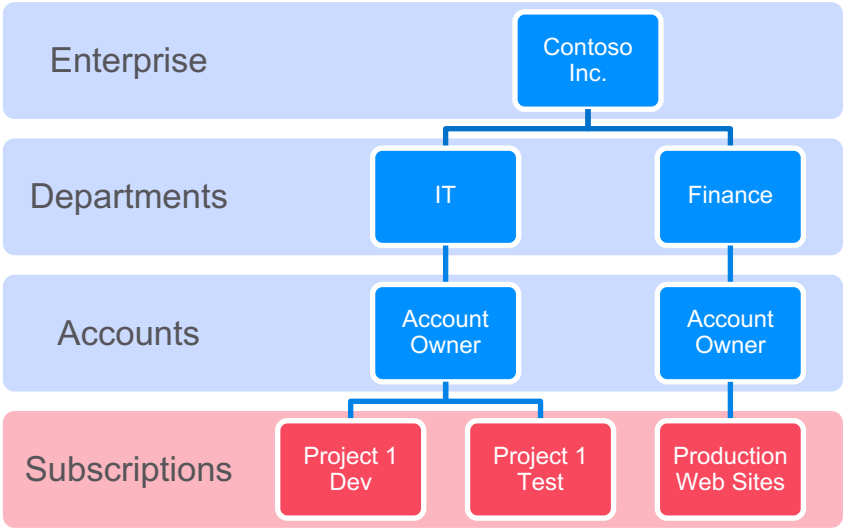


Define your hierarchy

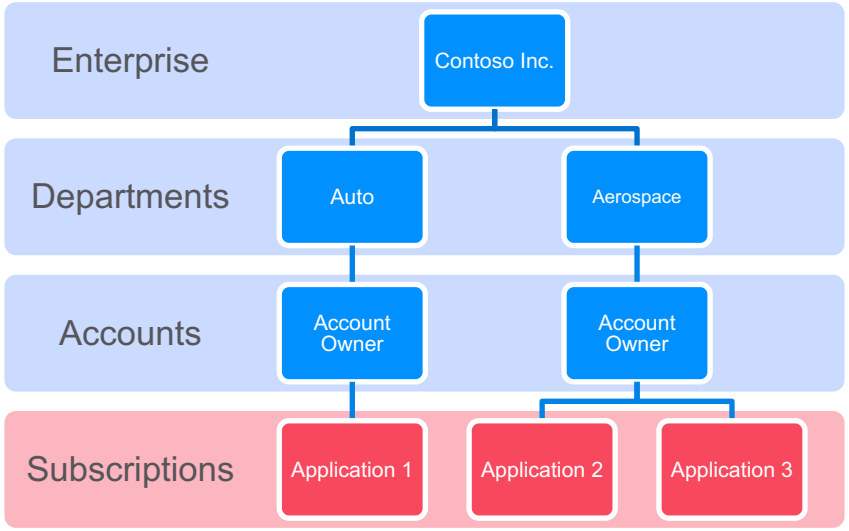


Plan first, act second!

Functional Pattern



Business Unit Pattern



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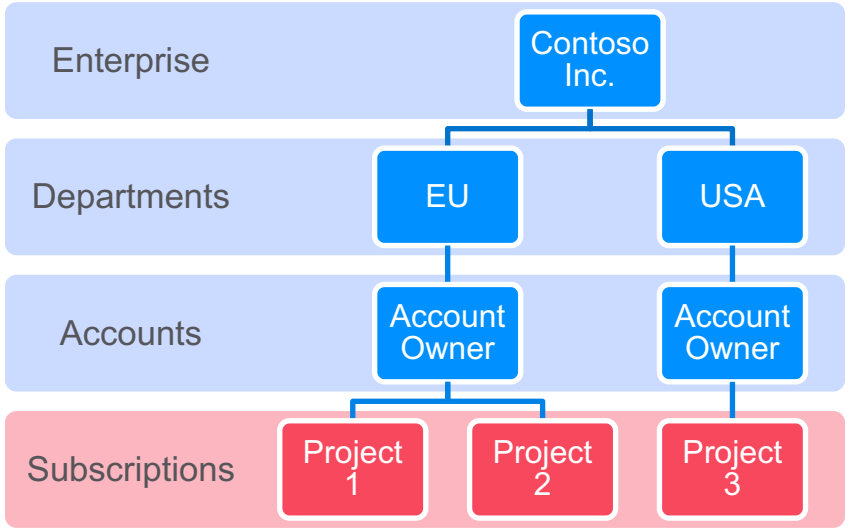
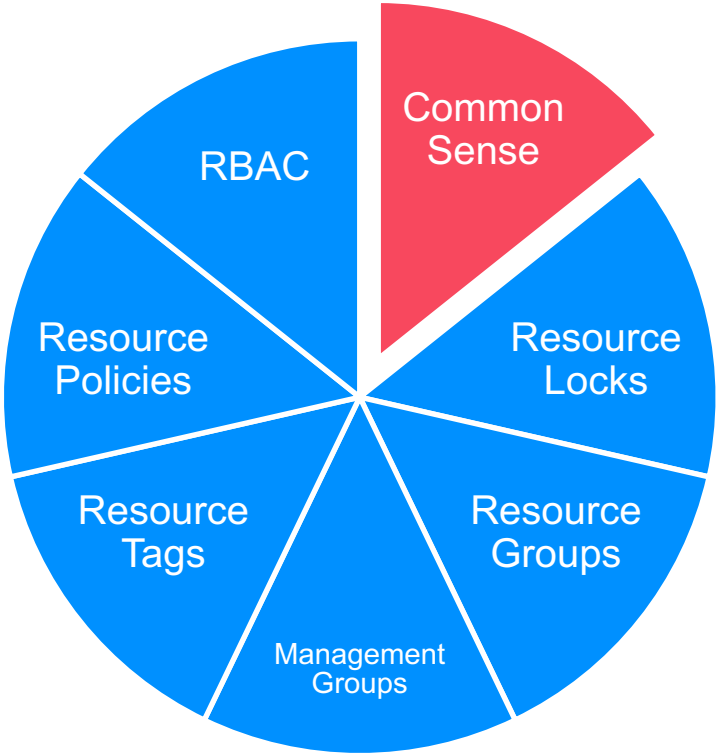
Geographic Pattern



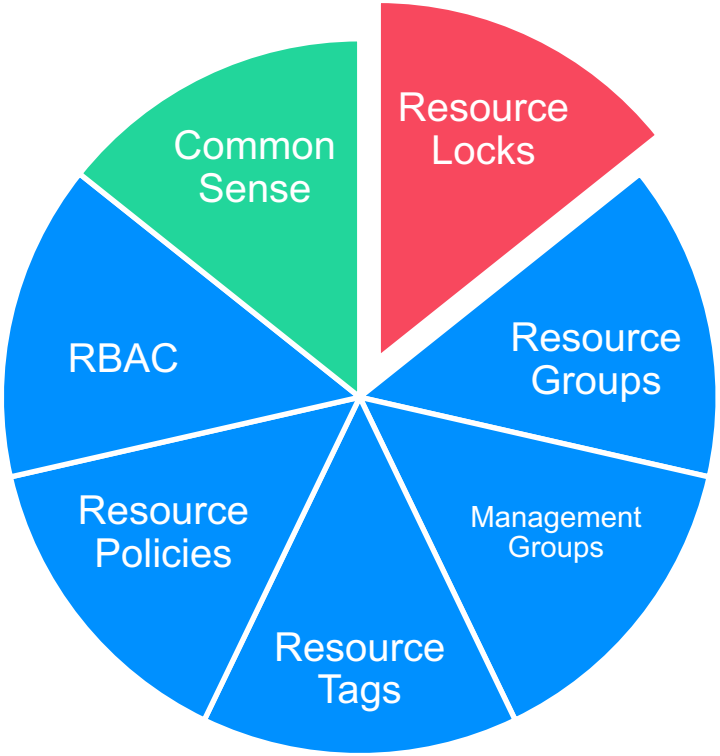
Azure governance features and capabilities



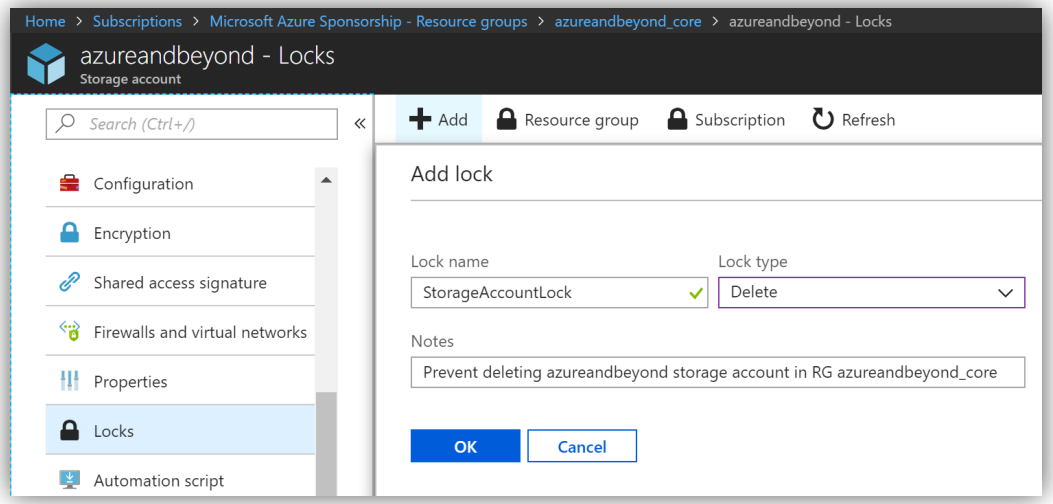
Common sense…

…is not so common
Voltaire

Resource Locks

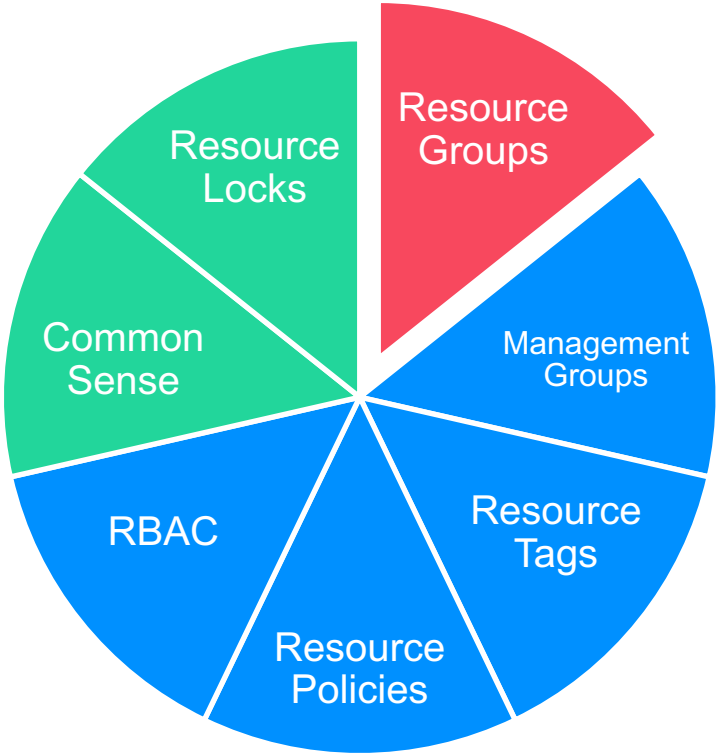


Resource Locks



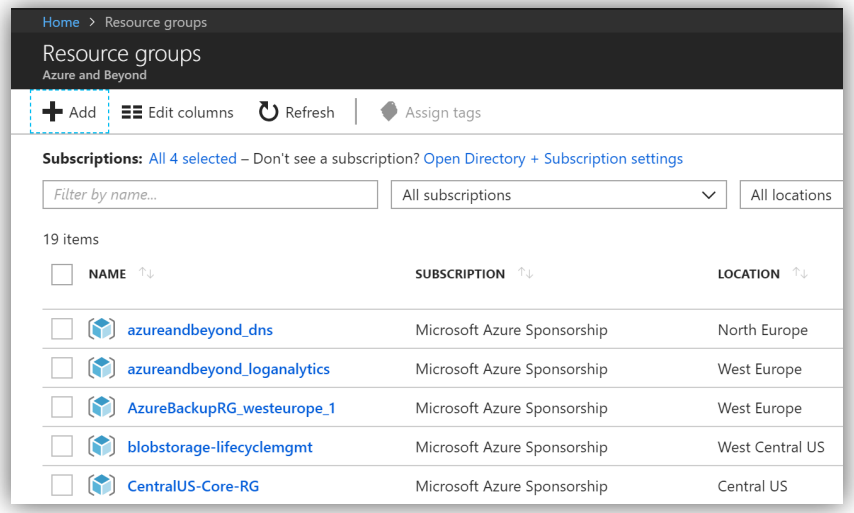
- Locks protect resources
  - Delete locks
  - ReadOnly locks
- Define locks in advance
- Use them in combination with common sense (e.g. read only means read only!)

Resource Groups

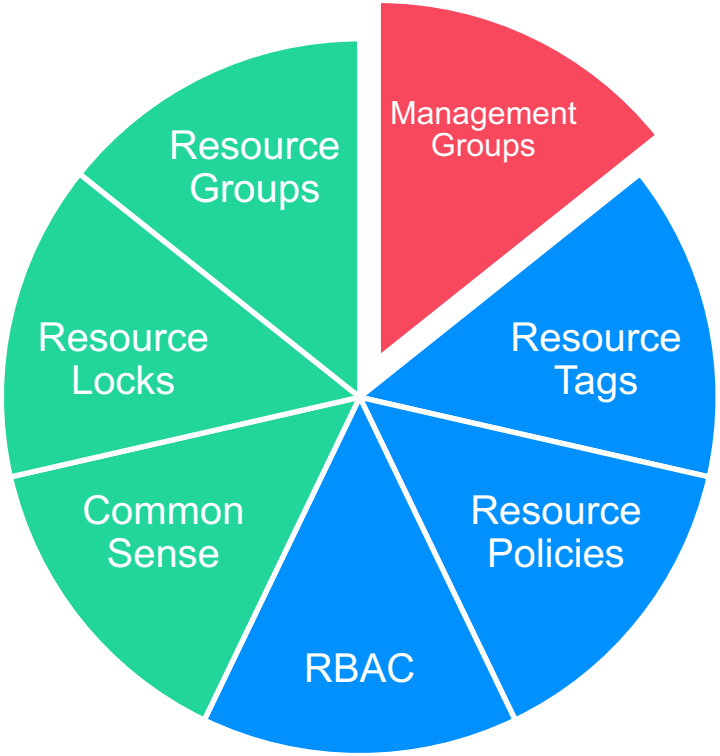


Resource Groups

- Management containers for Azure resources
- RGs contain resources with the same deployment lifecycle
- RGs stick to one region but can contain resources that reside in different regions
- Every resource can only exist in one RG
- Resources can be moved between RGs

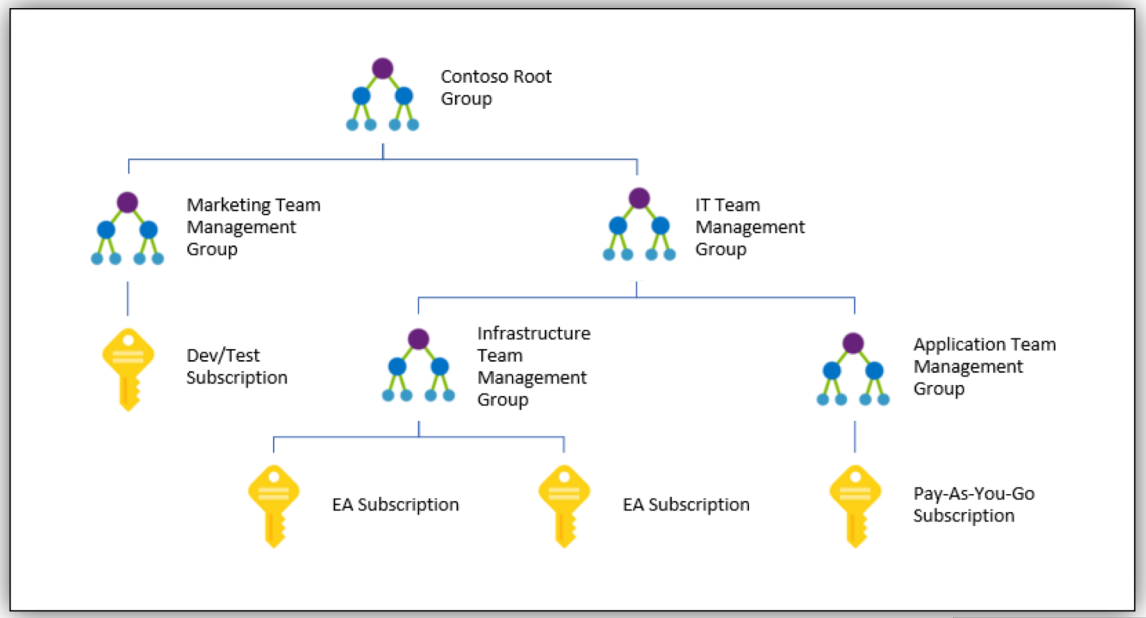


Management Groups

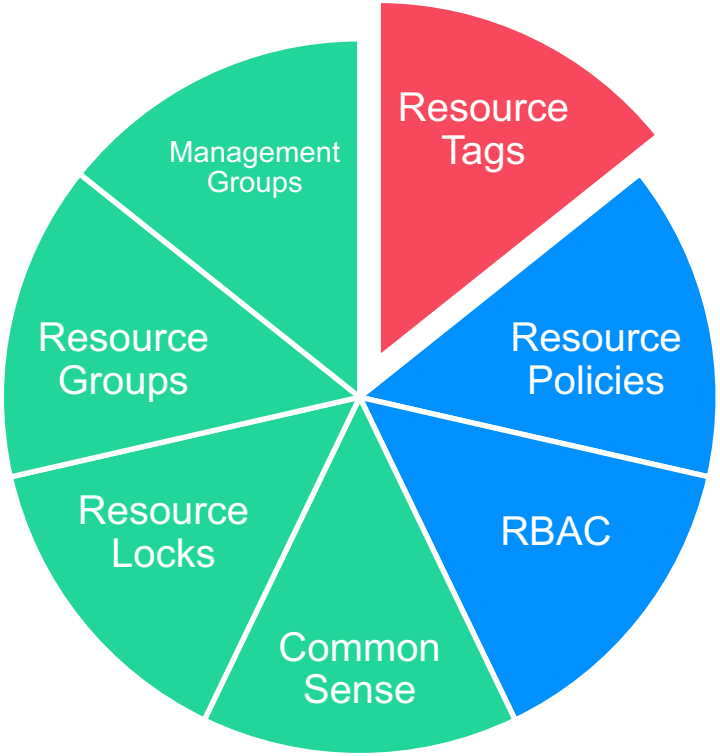


Management Groups

- efficiently manage access, policies, and compliance
- level of scope above subscriptions

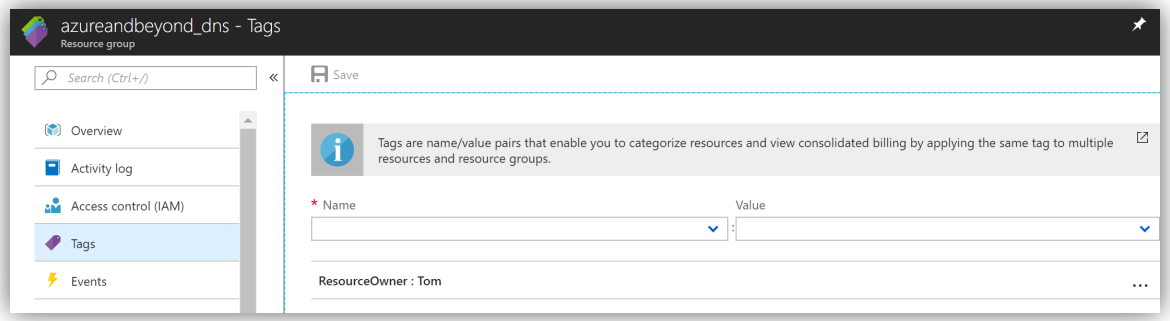


Resource Tags



Resource Tags

- Name:Value, e.g. CostCenter:ProdIT, ResourceOwner:Tom
- Help to define responsibility and view consolidated billing
- Always tag RGs
  - Owner
  - Dept
  - CostCenter
  - […]
- Tag resources as needed
- Define tags in advance



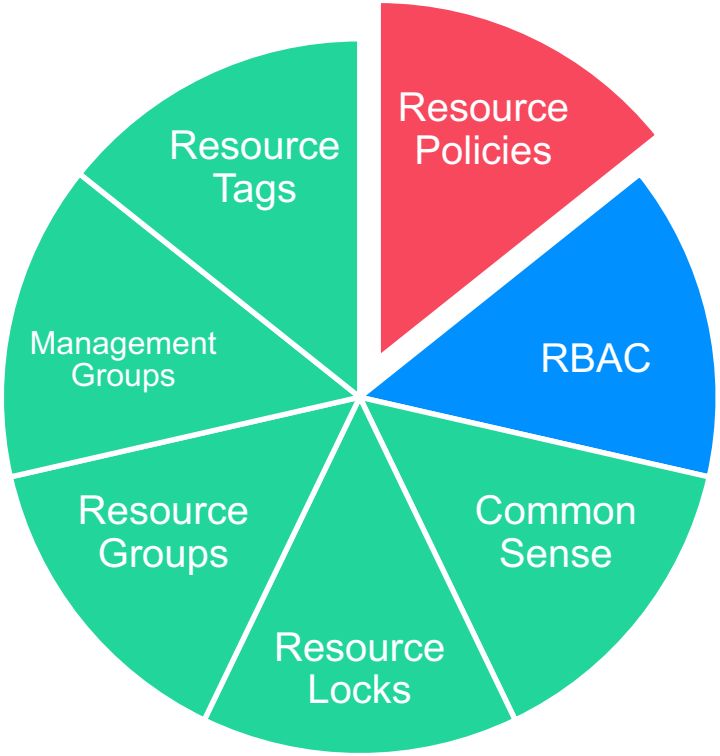

```
PS C:\> Get-AzureRmResource -TagName ResourceOwner -TagValue Tom | ft

Name              ResourceGroupName         ResourceType                    Location
----              -----------------         ------------                    --------
azureandbeyond.eu azureandbeyond_dns        Microsoft.Network/dnszones      global
lifecycletest     blobstorage-lifecyclemgmt Microsoft.Storage/storageAccounts westcentralus
```

Resource Tags

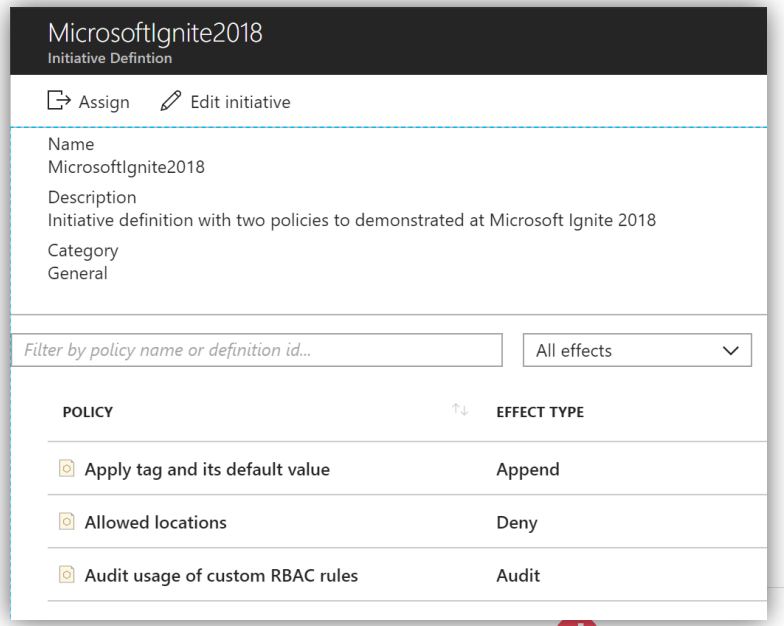
- **Billing**; Grouping resources and associating them with billing or charge back codes.
- **Service Context Identification**; Identify groups of resources across Resource Groups for common operations and grouping
- **Access Control and Security Context**; Administrative role identification based on portfolio, system, service, app, instance, etc.

Resource Policies



Resource Policies

- Rule enforcements on MG, subscription or RG level
- Initiative definitions vs. Policy definitions
- Effect types:
  - Append
  - Deny
  - Audit

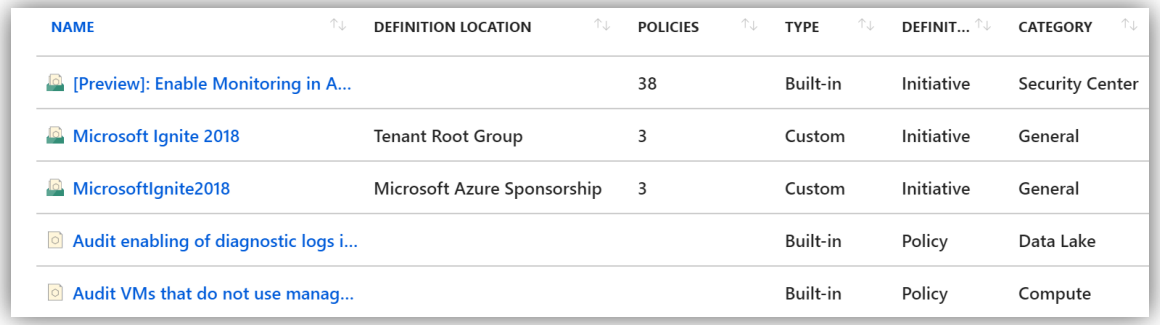


Resource Policies

```
{
    "$schema": "http://schema.management.azure.com/schemas/2015-10-01-preview/policyDefinition.json",
    "if": {
        "not": {
            "field": "location",
            "in" : ["northeurope" , "westeurope"]
        }
    },
    "then": {
     "effect": "deny"
    }
}
```

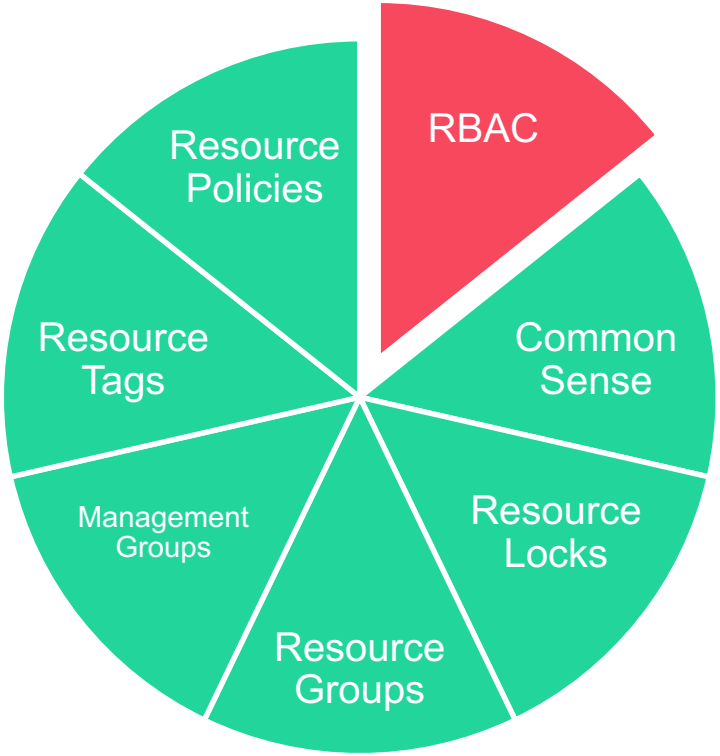
Resource Policies

- Create initiatives on MG level
- Assign initiatives on MG or subscription level
  - Resource ownership
  - Geo-compliance
  - Cost management
- Assign RG initiatives if needed



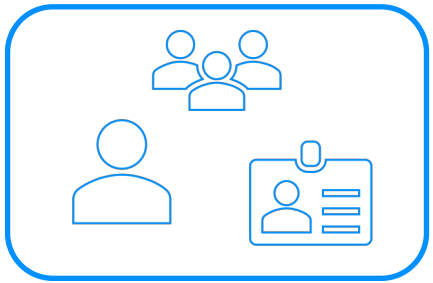
NAME	DEFINITION LOCATION	POLICIES	TYPE	DEFINIT...	CATEGORY
[Preview]: Enable Monitoring in A...		38	Built-in	Initiative	Security Center
Microsoft Ignite 2018	Tenant Root Group	3	Custom	Initiative	General
MicrosoftIgnite2018	Microsoft Azure Sponsorship	3	Custom	Initiative	General
Audit enabling of diagnostic logs i...			Built-in	Policy	Data Lake
Audit VMs that do not use manag...			Built-in	Policy	Compute

Role-based access control



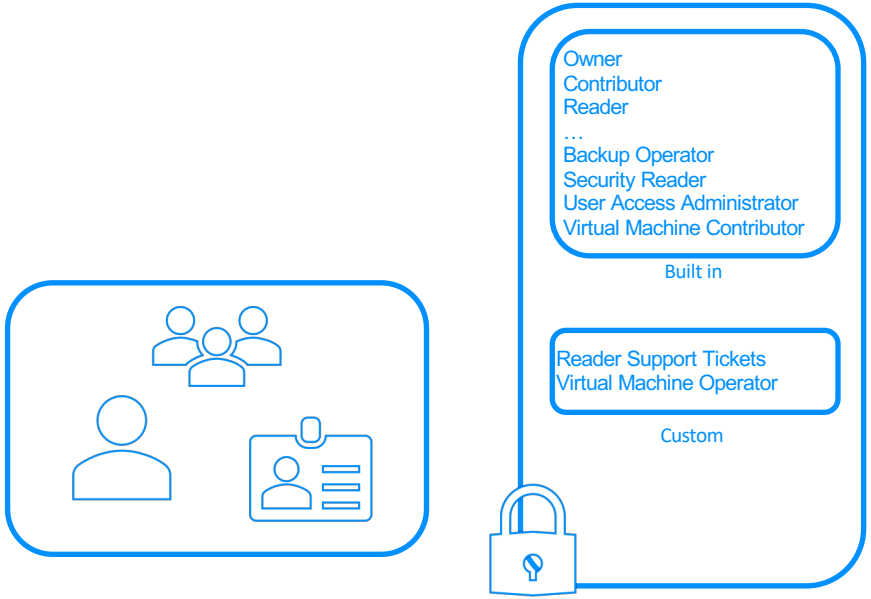
Role-based access control

1. Security principal = user, group, service principal



Role-based access control

1. Security principal = user, group, service principal
2. Role definition = set of management rights



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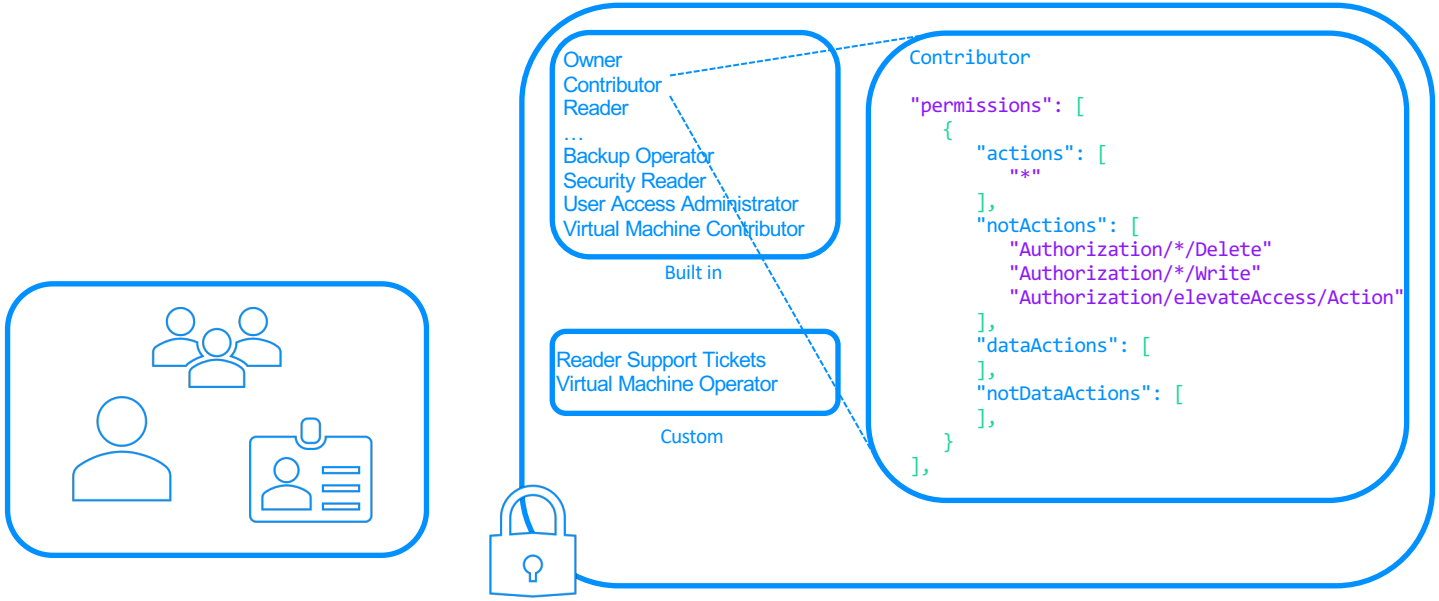
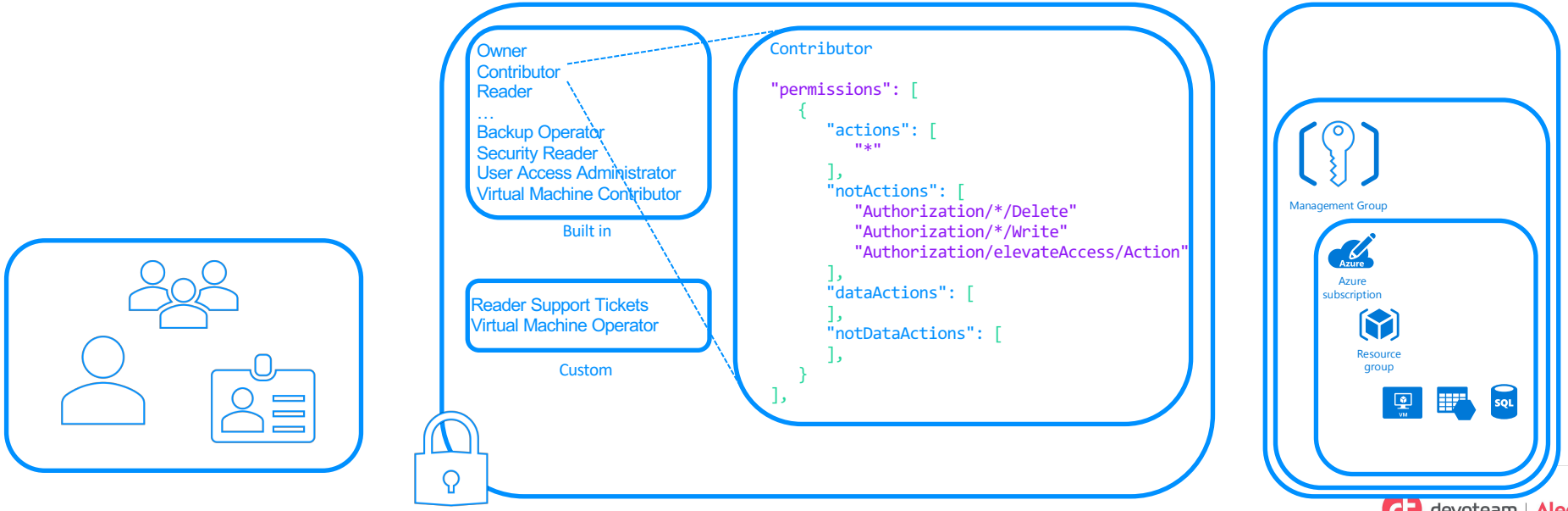
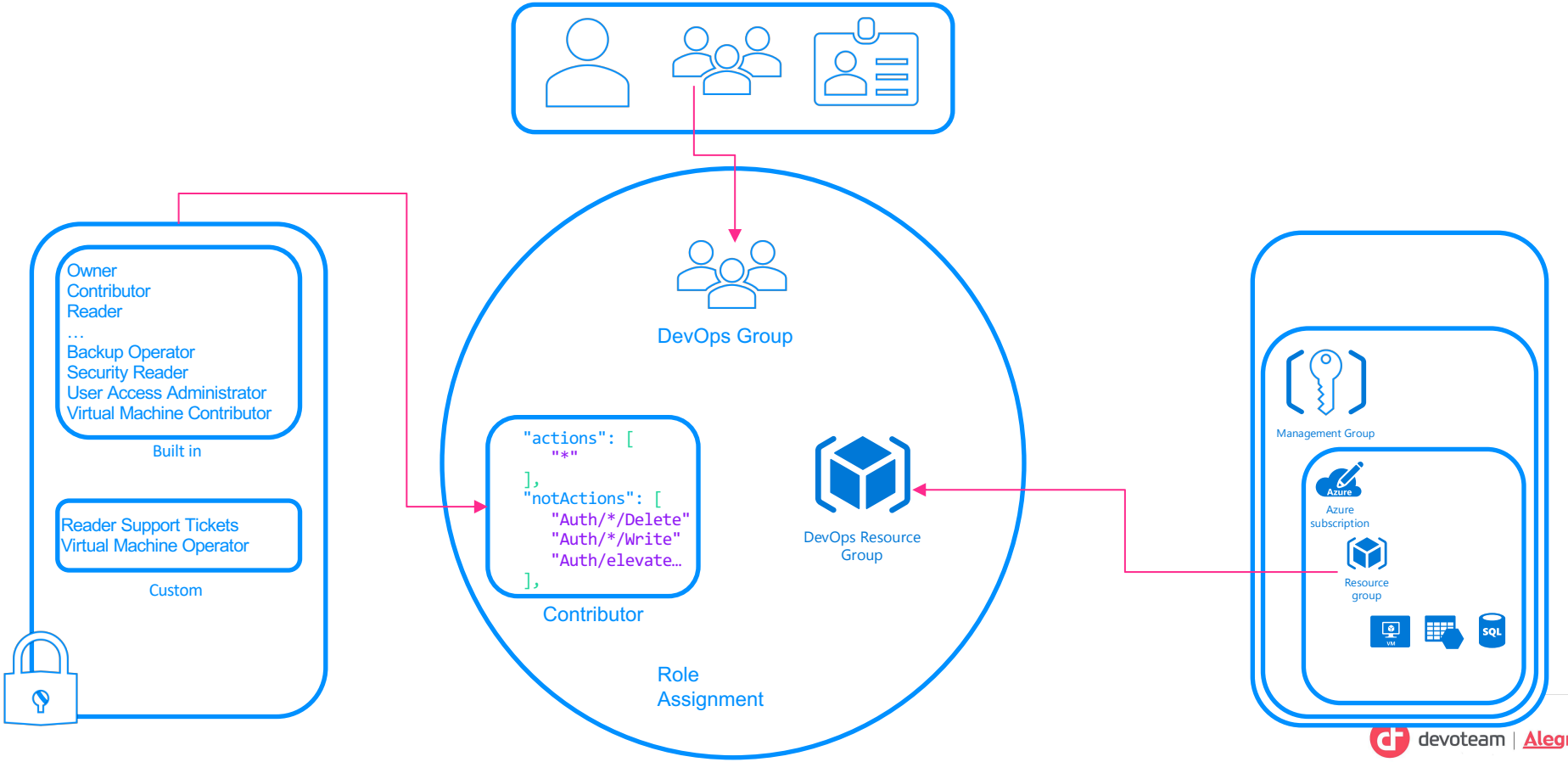


Role-based access control

1. Security principal = user, group, service principal
2. Role definition = set of management rights
3. Scope = MG, subscription, RG, resource



Role-based access control – Role assignment

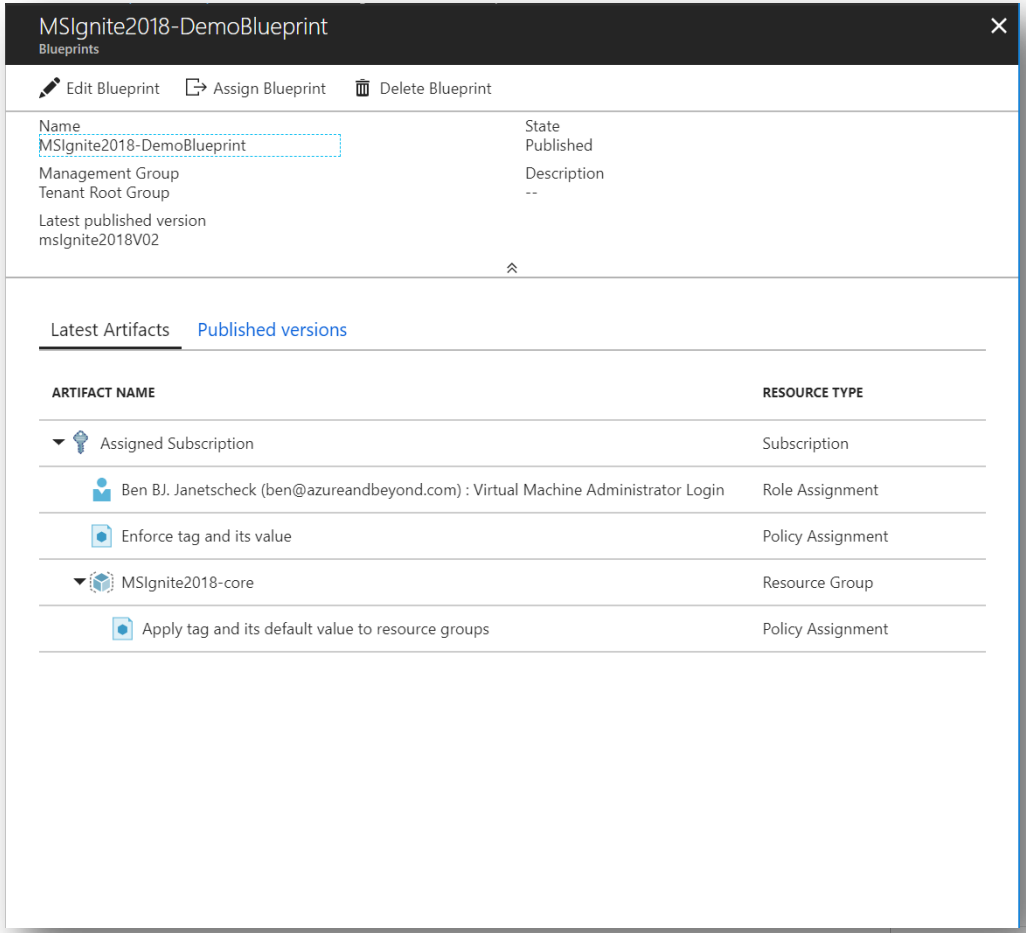


Announced at MS Ignite 2018: Azure Blueprints & Quickstart Center public previews

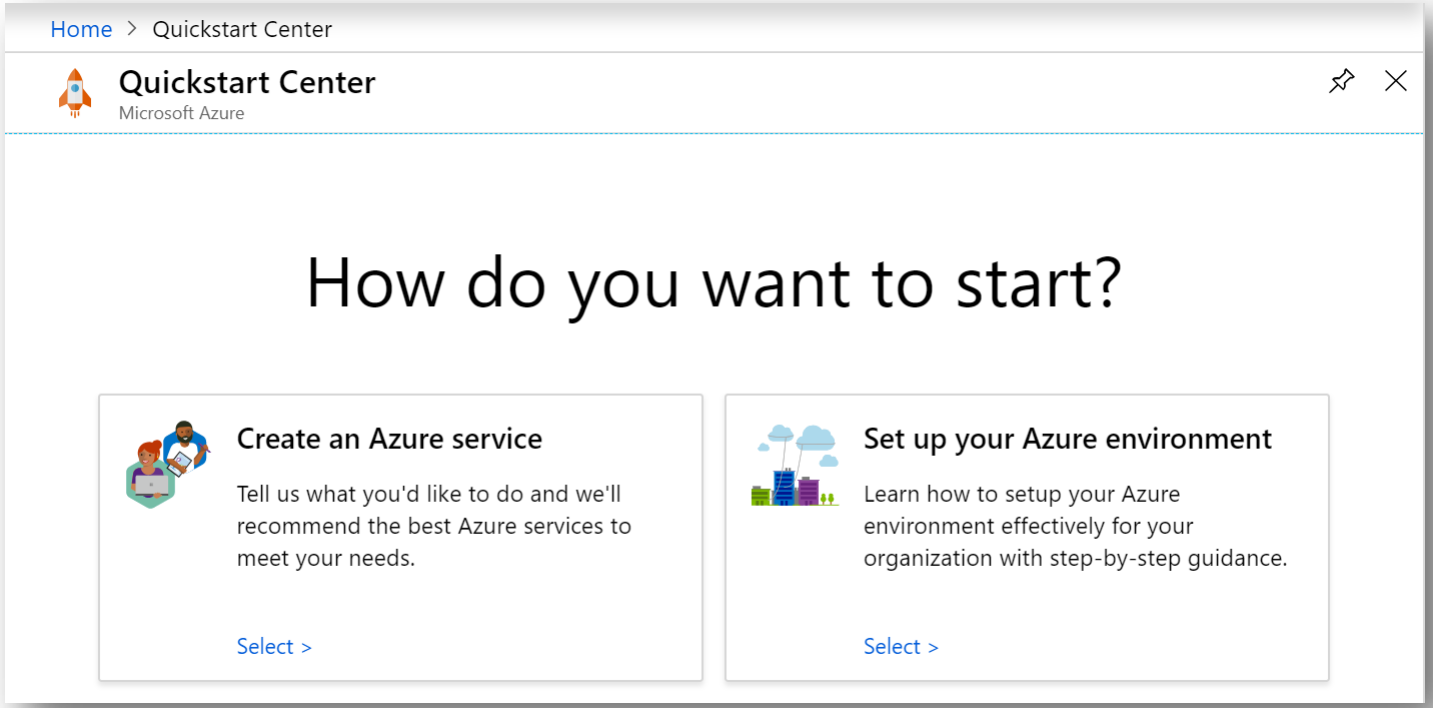
Azure Blueprints

Deployment orchestration of

- ARM templates
- Role assignments
- Policy assignments
- Resource groups
- Resource Locks



Azure Portal Quickstart Center



Azure Security

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Automation

```
#!/bin/bash

# Change these variables according to your needs
    RESOURCE_GROUP_NAME=terraformstate
    STORAGE_ACCOUNT_NAME=tfstate$RANDOM
    CONTAINER_NAME=tfstate
    VAULT_NAME=yourKeyVault$RANDOM
    SECRET_NAME=yourSecret

# Create Resource Group, Storage Account and Container for Terraform backend (

# Create resource group
    az group create --name $RESOURCE_GROUP_NAME --location westeurope

# Create storage account
    az storage account create --resource-group $RESOURCE_GROUP_NAME --name $ST

# Get storage account key
    ACCOUNT_KEY=$(az storage account keys list --resource-group $RESOURCE_GROUP_NAME --account-name $STORAGE_ACCOUNT_NAME --
```

Data sources

With data sources in Terraform we can reference external objects that are needed during deployments. The passage

```
# Azure Key Vault data source to access local admin password
data "azurerm_key_vault_secret" "mySecret" {
  name      = "labuser"
  vault_uri = "https://yourKeyVault.vault.azure.net/"
}

# get my external IP address to enter into NSG rule
data "http" "myExtIp" {
    url = "http://ident.me/"
}
```

creates references to an Azure KeyV
external IP address from the website

```
"resources": [
  {
      "apiVersion": "2017-05-10",
      "name": "linkedTemplate",
      "type": "Microsoft.Resources/deployments",
      "properties": {
          "mode": "Incremental",
          <nested-template-or-external-template>
      }
  }
]
```

```
$outputs = (new-azurermresourcegroupdeployment `
      -Name AzSecLab-Core `
      -ResourceGroupName $resourceGroupName `
      -TemplateUri https://azureseclab.blob.core.windows.net/azureseclab/azuredeploy-core.json
      -VaultName $vaultName `
      -SecretName $secret.Name `
      -VaultResourceGroup $resourceGroupName `
      ).Outputs
```

https://github.com/azureandbeyond/AzureSecurity/Terraform

Azure Security Services and Capabilities

Network Security

- Virtual Network Service Endpoints
- DDoS Protection
- Network Security Groups
- NSG Service Tags
- NSG Application Security Groups
- NSG Augmented Rules
- Global Virtual Network Peering
- Azure DNS Private Zones
- Site-to-Site VPN
- Point-to-Site VPN
- ExpressRoute
- Azure Virtual Networks
- Virtual Network Appliances
- Azure Load Balancer
- Azure Load Balancer HA Ports
- Azure Application Gateway
- Azure Firewall
- Azure Web Application Firewall
- Service Endpoints

Monitoring and Logging

- Azure Log Analytics
- Azure Monitor
- Network Watcher
- VS AppCenter Mobile Analytics

Compliance Program

- Microsoft Trust Center
- Service Trust Platform
- Compliance Manager
- Azure IP Advantage (legal)

Identity and Access Management

- Azure Active Directory
- Azure Active Directory B2C
- Azure Active Directory Domain Services
- Azure Active Directory MFA
- Conditional Access
- Azure Active Directory Identity Protection
- Azure Active Directory Privileged Identity Management
- Azure Active Directory App Proxy
- Azure Active Directory Connect
- Azure RBAC
- Azure Active Directory Access Reviews
- Azure Active Directory Managed Service Identity

Security Docs Site

- Azure Security Information Site on Azure.com

DDoS Mitigation

- Azure DDoS Protection
- Azure Traffic Manager
- Autoscaling
- Azure CDN
- Azure Load Balancers
- Fabric level edge protection

Infrastructure Security

- Comes with Azure Data Centers
- Azure Advanced Threat Protection
- Confidential Computing

Pen Testing

- Per AUP
- Per TOS
- No contact required

Data Loss Prevention

- Cloud App Discovery
- Azure Information Protection

Encryption

- Azure Key Vault
- Azure client-side encryption library
- Azure Storage Service Encryption
- Azure Disk Encryption
- SQL Transparent Data Encryption
- SQL Always Encrypted
- SQL Cell/Column Level Encryption
- Azure CosmosDB encrypt by default
- Azure Data Lake encrypt by default
- VPN protocol encryption (ssl/ipsec)
- SMB 3.0 wire encryption

Configuration and Management

- Azure Security Center
- Azure Resource Manager
- Azure Resource Graph
- ARM Management Groups
- Azure Policy
- Azure Blueprints
- Azure Automation
- Azure Advisor
- Azure API Gateway

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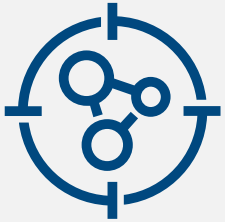
Microsoft Azure Security Center

Unify security management and enable advanced threat protection for hybrid cloud workloads



Unified visibility and control

Dynamically discover and manage the security of your hybrid cloud workloads in a single cloud-based console

Adaptive threat prevention

Enable actionable, adaptive protections that identify and mitigate risk to reduce exposure to attacks

Intelligent detection and response

Use advanced analytics and Microsoft Intelligent Security Graph to rapidly detect and respond to evolving cyber threats

Azure Security Center Pipeline

Data sources:

Computers

Azure Services

Security Data & Alerts

REST APIs

DETECT

Built-in Analytics & Machine Learning

Custom Alert Rules

Enrichment

Threat Intelligence

Prioritization

Fusion

RESPOND

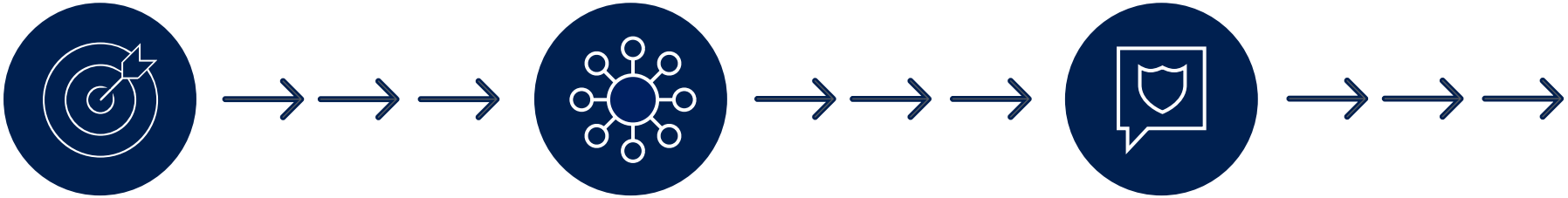
Search

Alert Exploration

Investigation

Automation & Orchestration

Detect threats across the kill chain



TARGET AND ATTACK

Inbound brute force RDP, SSH, SQL attacks and more

Application and DDoS attacks (WAF partners)

Intrusion detection (NG Firewall partners)

INSTALL AND EXPLOIT

In-memory malware and exploit attempts

Suspicious process execution

Lateral movement

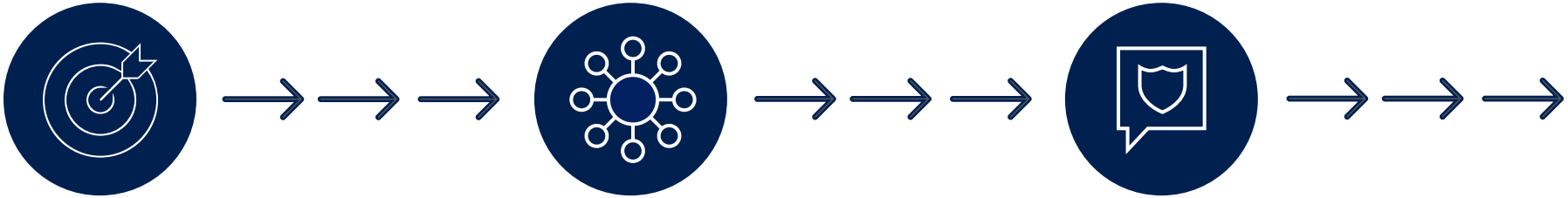
Internal reconnaissance

POST BREACH

Communication to a known malicious IP (data exfiltration or command and control)

Using compromised resources to mount additional attacks (outbound port scanning, brute force RDP/SSH attacks, DDoS, and spam)

Detect threats across the kill chain



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Demo

Thank you!

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