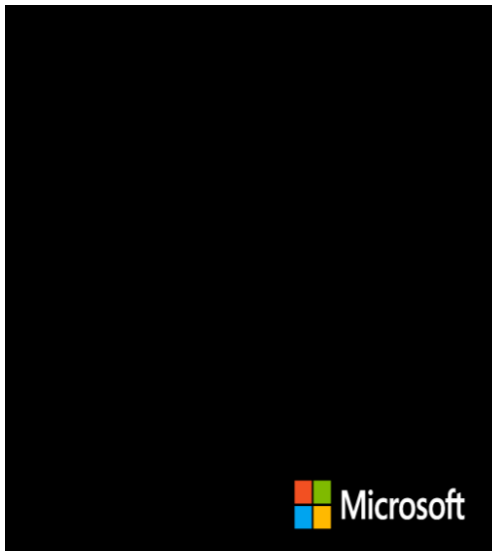
Design for Operations



Dan Rey
Cloud Consultant
Technical Trainer | MCT

Design for Operations (10-15%)

- Design an application monitoring and alerting strategy
  - Determine the appropriate Microsoft products and services for monitoring applications on Azure; define solutions for analyzing logs and enabling alerts using Azure Log Analytics; define solutions for analyzing performance metrics and enabling alerts using Azure Monitor; define a solution for monitoring applications and enabling alerts using Application Insights
- Design a platform monitoring and alerting strategy
  - Determine the appropriate Microsoft products and services for monitoring Azure platform solutions; define a monitoring solution using Azure Health, Azure Advisor, and Activity Log; define a monitoring solution for Azure Networks using Log Analytics and Network Watcher service; monitor security with Azure Security Center
- Design an operations automation strategy
  - Determine when to use Azure Automation, Chef, Puppet, PowerShell, Desired State Configuration (DSC), Event Grid, and Azure Logic Apps; define a strategy for auto-scaling; define a strategy for enabling periodic processes and tasks
  -

Azure is a cloud partnership

Your Organization

Balance of responsibility
Cloud architectures
Design for high-availability
Leverage Microsoft resources

MICROSOFT RESOURCES

Service resiliency guide
Cloud dev patterns & practices
Proactive and reactive support

CLOUD PLATFORM RELIABILITY

Availability, change orchestration, monitoring, communications, recommendations

Monitoring and Alerting

Azure Monitor

Native monitoring and diagnostics for all your Azure resources

Monitor, diagnose, alert, and be notified of events in your cloud infrastructure

https://aka.ms/azmonitor/

Azure Advisor

Personalized recommendation guide helping you follow best practices

Optimize across four areas - high availability, performance, security, and cost

http://aka.ms/azureadvisor/

Azure Resource Health

Diagnose and get support when an Azure issue impacts your resources

Guides you through solutions to mitigate issues with Azure resources

http://aka.ms/azureresourcehealth/

Microsoft Products and Services – Platform Services

Azure Monitor

Enables basic monitoring for Azure service by allowing collection of **Metrics**, **Activity Logs**, and **Diagnostic logs**

Azure Service Health

Identifies any issues with Azure services

Azure Advisor

Recommendations for performance, security, high availability AND reduce your overall Azure spend.

Microsoft Products and Services – Application / Infra

- Application Insights
  - Application Monitoring; Availability plus performance and deep insights; on-premisis and in the cloud.
- Log Analytics
  - Central Role in Azure Monitor: powerful query analytics on logs; complete picture IaaS and PasS
- Service Map
  - Analyze VMs – Integrates events, management solutions, log analytics
- Network Watcher
  - Scenario based: Network Performance Monitoring; DNS Traffic Analysis, more
- Management Solutions
  - Packaged set of logic to monitor different workloads; Microsoft and third party

Microsoft Product and Services - Shared

Shared = Shared by multiple services

- Azure Alerts
  - Proactive Notification; webhooks
- Azure Dashboards
  - Visual representation of data
- Metrics Explorer
  - Visualization of metrics; can send metrics to Log Analytics
- Activity Logs
  - Provides (logs) data on services; including errors

What does visibility mean to you?

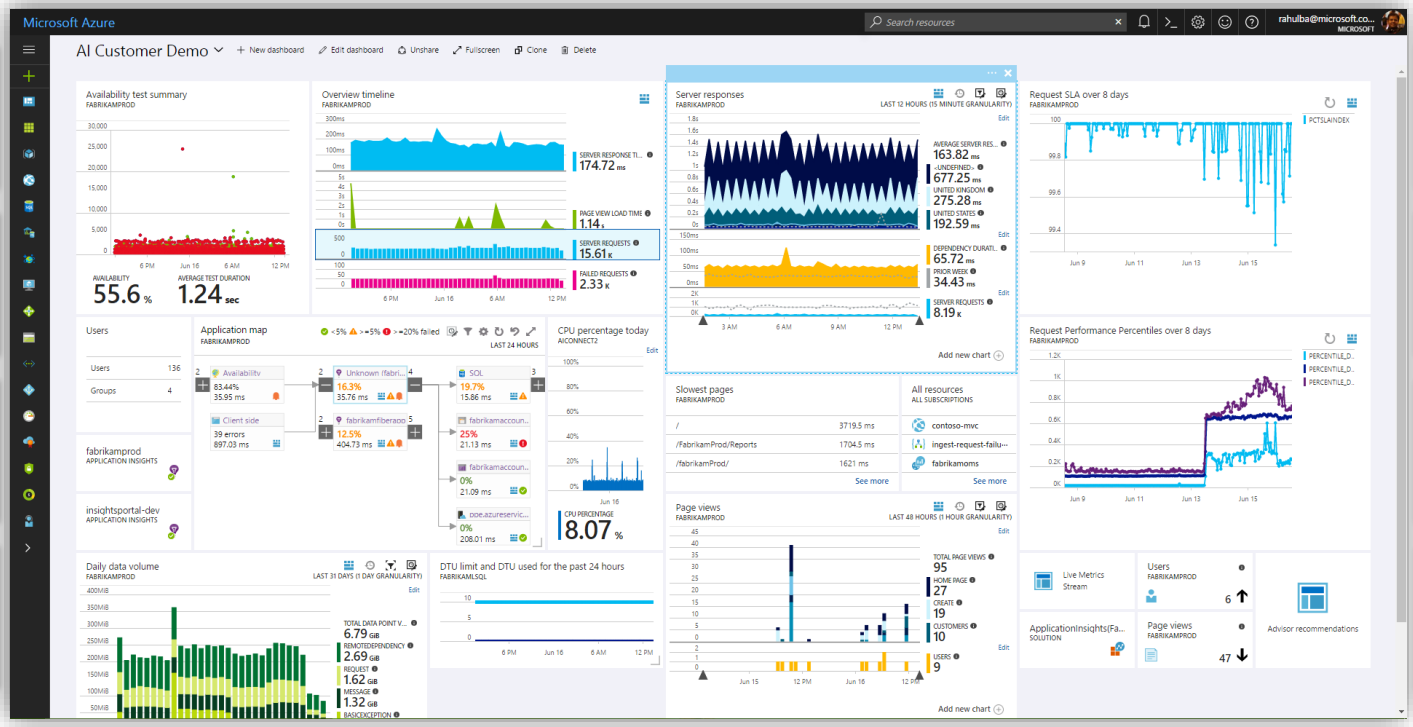
Azure Application Insights

Health Check

Monitor & Optimize

Detect & Debug

Data Analytics



Take Actions

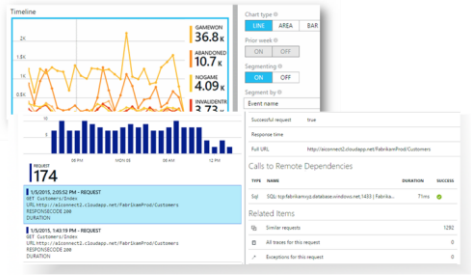
Customer Insight

DevOps Workflow

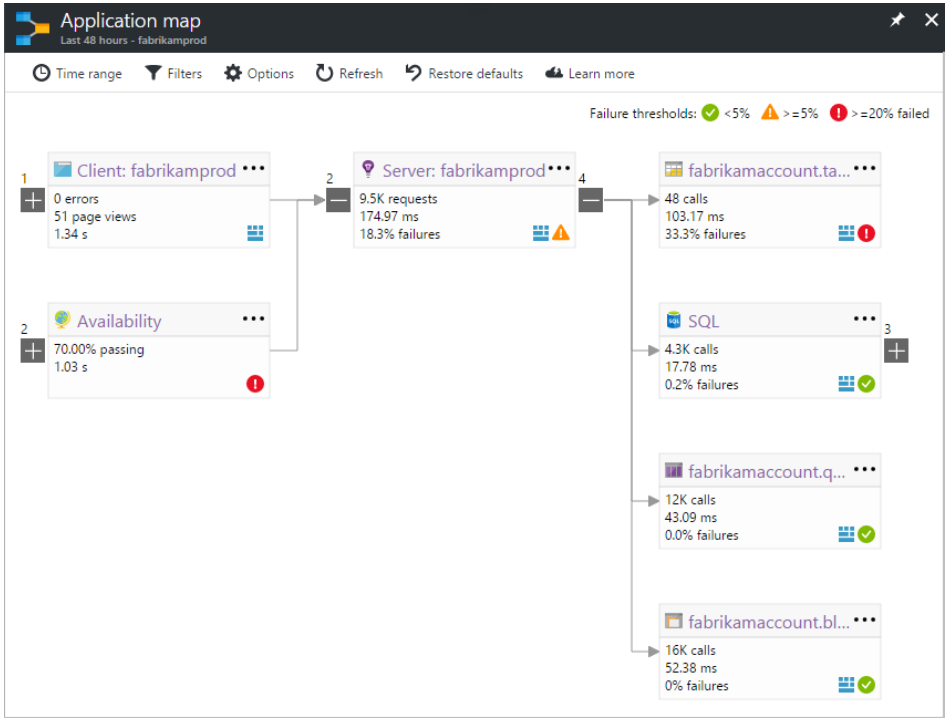
Export & Correlate

Application Insights

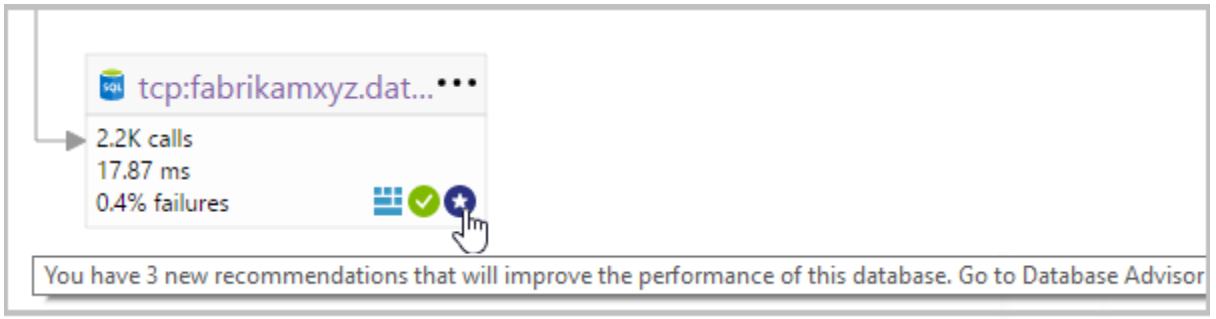
- Detect and diagnose issues in Web apps and services
- Alerts through email or webhooks
- Diagnose exceptions and performance issues
- Perform root cause analysis and initiate azure automation runbook
- Live application monitoring
- HTTP metrics, Dependency (SQL) response times, Log tracing, View and Session counts, Server performance, Availability tests



Application Map (Insights)

- 

Application Map (Insights)



Application Insights Ecosystem

Ingestion

Application Insights
Open Source SDKs
Status Monitor
Azure Extensions

SCOM MP

Open Schema

Exploration

Microsoft Azure Portal
Azure Monitor
Application Map
Live Metrics Stream
Profiler & Debugger

Visual Studio IDE

Analytics Portal

Export & Correlation

OMS Connector

Power BI

Microsoft Azure dashboards

Blob storage

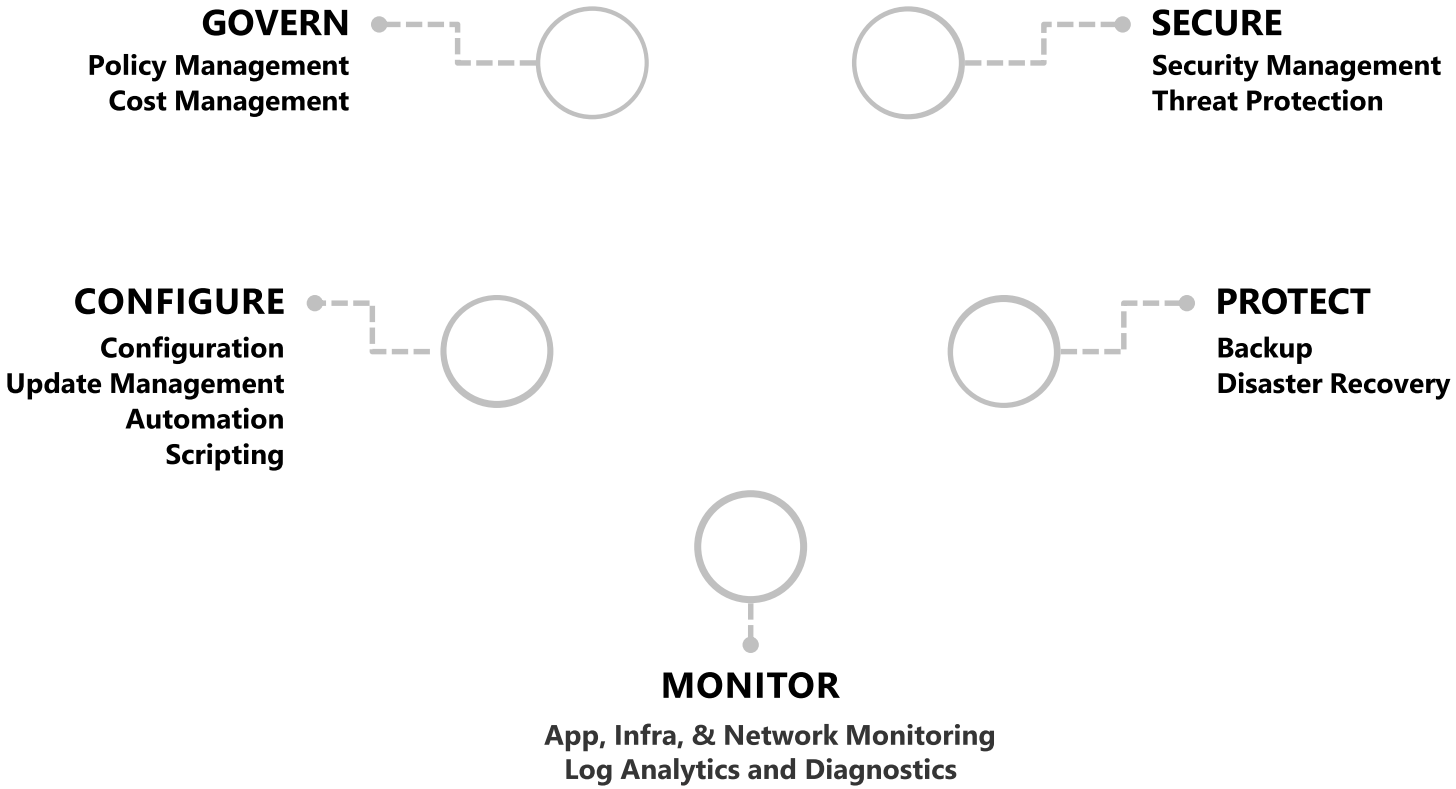
Visual Studio Team Services

Data Access APIs

Support

ASP.NET	PHP	Azure Web Apps	Log4Net/NLog	Concrete
ASP.NET Core	Python	Azure Cloud Services	Log4J/Logback	Drupal
Java - J2EE	Ruby	Azure VMs	System.Diagnostics	Joomla
Windows Desktop	Angular	Azure Functions	Semantic Logging (SLAB)	SharePoint
WCF	Docker	Azure Service Fabric	ETW/EventSource	WordPress
JavaScript	Kubernetes	Glimpse	LogStash	Orchard
Node.JS	Dynamics CRM	Spring	Collectd	OSS/Public Endpoints ...

Full set of cloud management capabilities

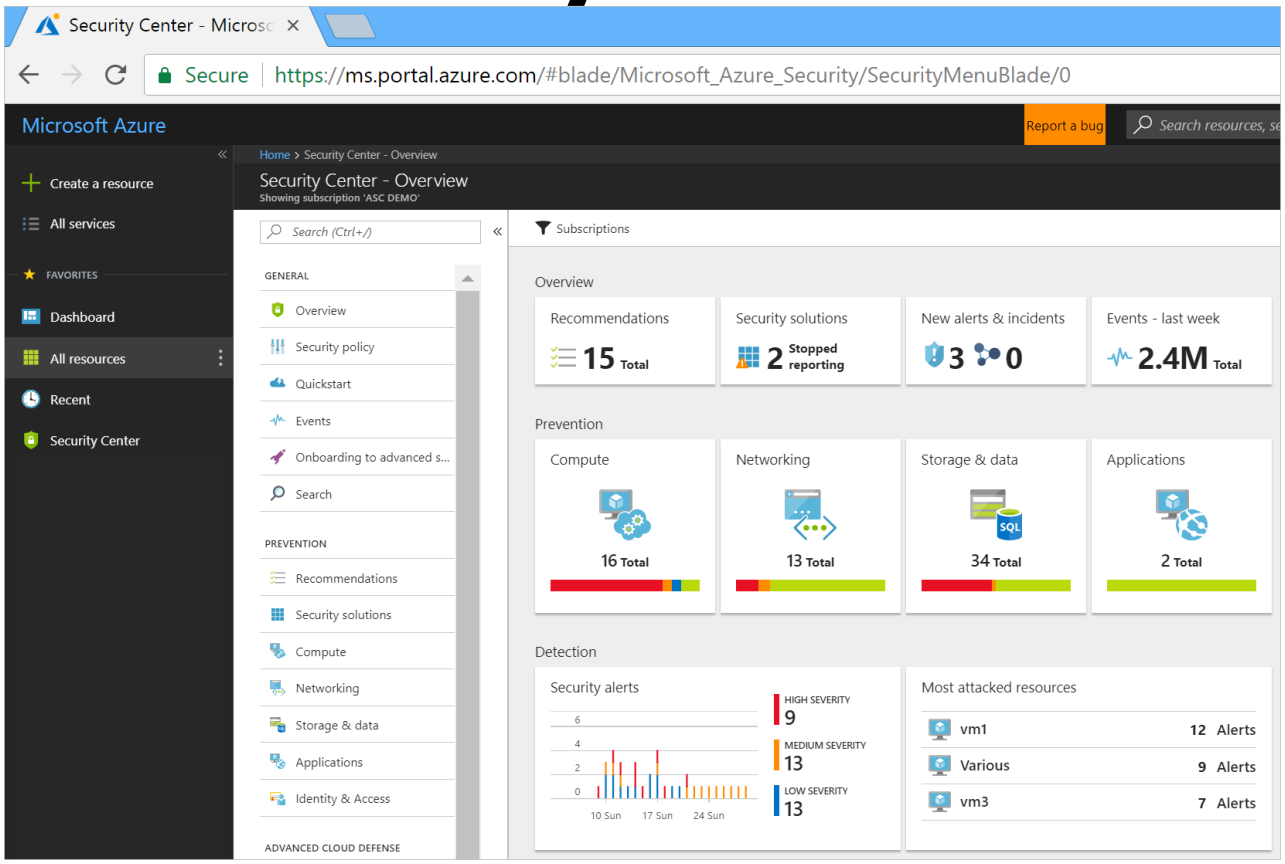


Azure Monitor

- Use the Azure Portal to monitor Web Apps, VMs by default.
- Good Short term solution for point-in-time view
- Monitoring writes data to Azure Storage
  - Can use Visual Studio to view
- Configure Alerts from the portal based on performance metrics
- Know the SLAs

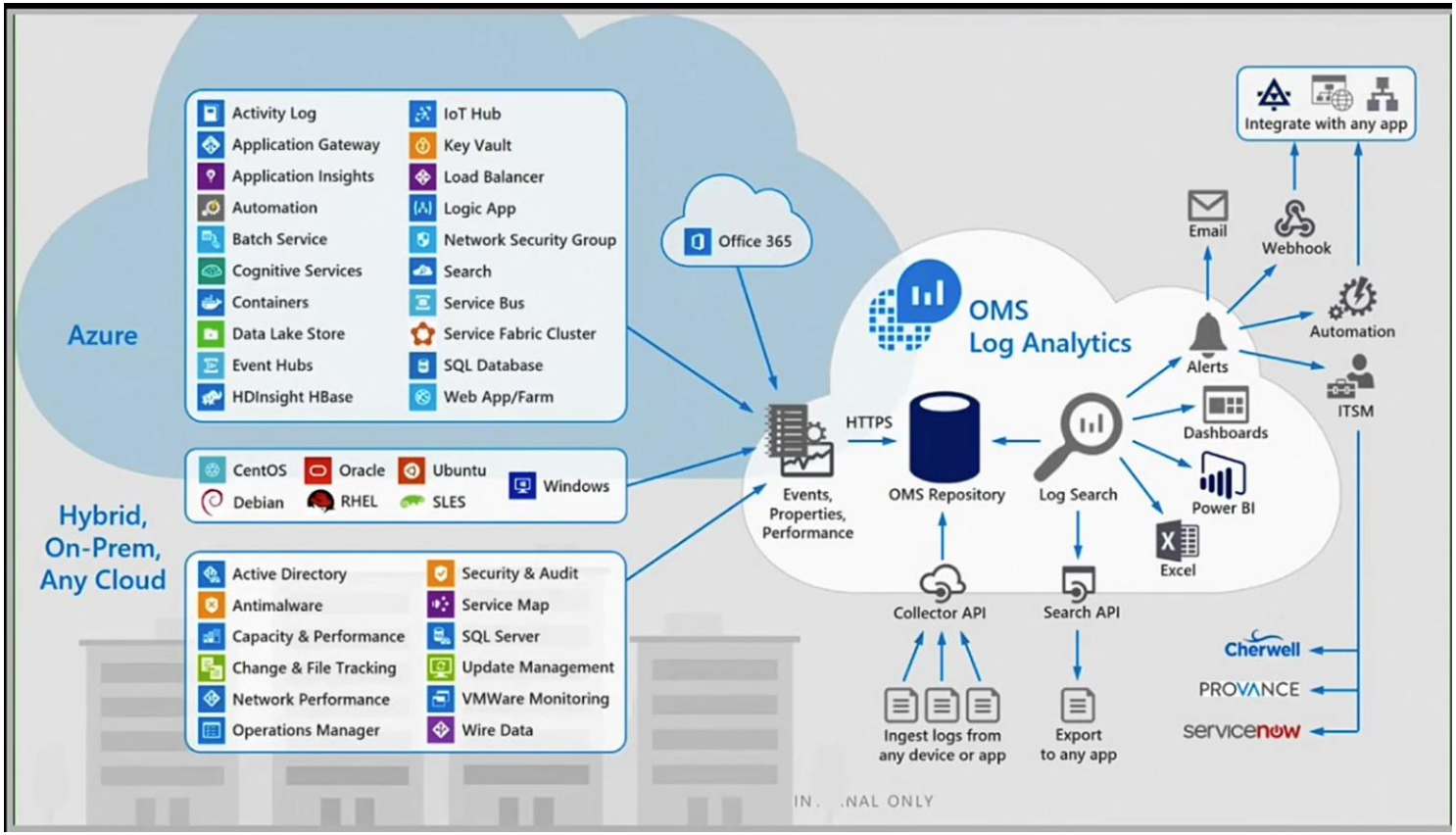
https://azure.microsoft.com/en-us/support/legal/sla/summary/

Azure Security Center

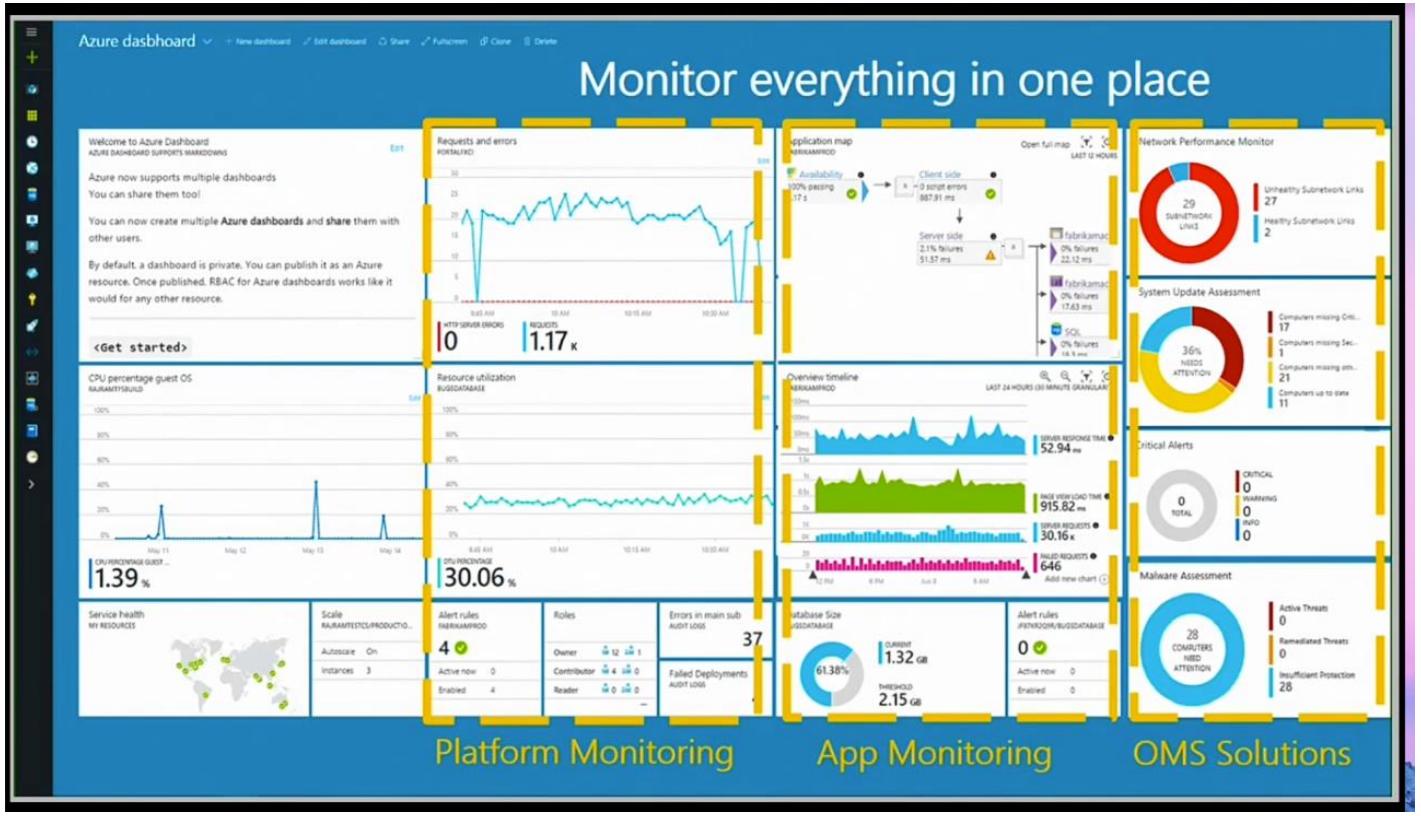


https://docs.microsoft.com/en-us/azure/security-center/security-center-intro

Azure Log Analytics



Log Analytics – Everything in one place



Azure Automation

Runbooks

Chef Configure and Automate. Apply Fine Grained Permissions

https://www.chef.io/solutions/windows/

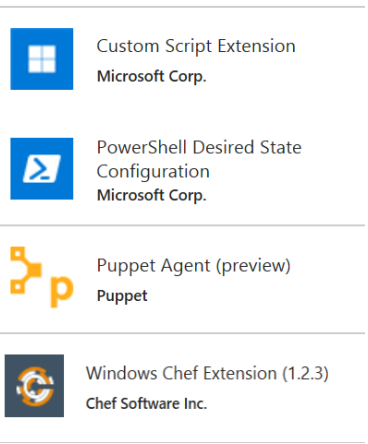
- # Puppet Can Configure and Manage Windows and Azure

http://puppetlabs.com/solutions/microsoft

Desired State Configuration

- Make it So
https://docs.microsoft.com/en-us/azure/automation/automation-dsc-overview

- In the portal + New – Azure Automation



DevOps Enabler

Others, Docker, Ansible, SaltStack, etc.

Which to use?
All can be used with Windows & Linux

- **Chef**
  - If you already have a Chef management infrastructure
  - If your primary expertise is managing Linux machines
- **Puppet**
  - If you already have a Puppet management infrastructure
  - If your primary expertise is managing Linux machines
- **DSC**
  - If you do not already have a Configuration Management Solution
  - If your primary experience is in managing Windows machines
  - Uses vender-neutral configuration files (MOF)
  - If you already have PowerShell expertise
- **Azure Automation**
  - If you do not already have a Configuration Management Solution, or not deeply embedded
  - If you want to significantly expand your configuration management without significant expense
  - If you already own OMS
  - If you already have PowerShell expertise

Chef & Puppet

Chef

- Cross-OS systems management, automation, and analytics output
- Ruby and Git are required + agent is on target machine
- Good for development focused teams (code driven approach to configuration)
- Leverage Chef in Azure when already using it.

Puppet

Stable and mature so good for managing large, heterogeneous enterprise environments

Automate systems configuration & enforce consistency

Large Open Source catalog of modules and runs on nearly every OS (cross platform)

Azure Event Grid

Fully-managed
event routing

Near real-time event
delivery at scale

Broad coverage within
Azure and beyond

https://docs.microsoft.com/en-us/azure/event-grid/

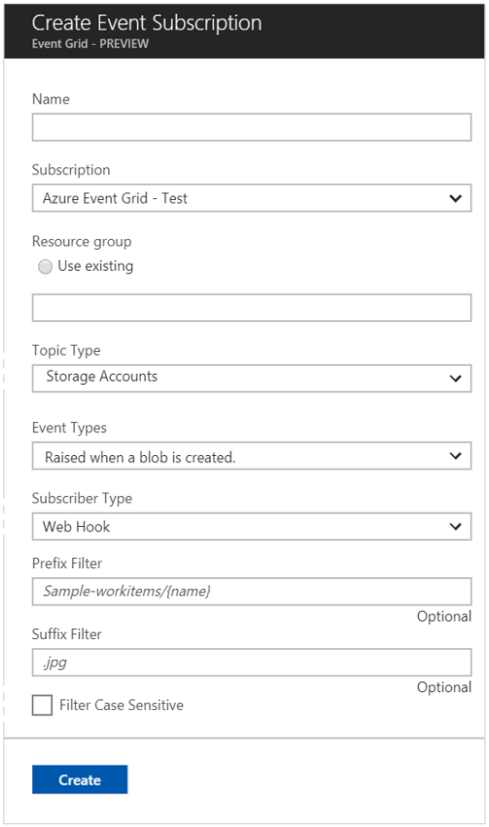
Manage all events in one place

Event publishers

- Blob Storage
- Resource Groups
- Azure Subscriptions
- Event Hubs
- Custom Events

Subscribe to pre-defined system events in Azure or create your own custom topics
Route events to any end-points, Azure or even beyond

Enable filtering and efficient routing of events



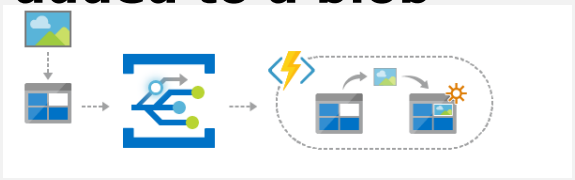
Event handlers

- Azure Functions
- Logic Apps
- Azure Automation
- WebHooks

Scenarios

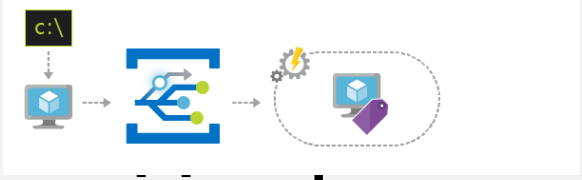
Serverless apps

Instantly trigger a serverless function to run analysis when a new file is added to a blob



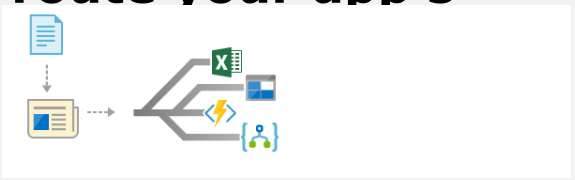
Ops automation

Speed up automation and simplify policy enforcement by notifying Azure provisioned

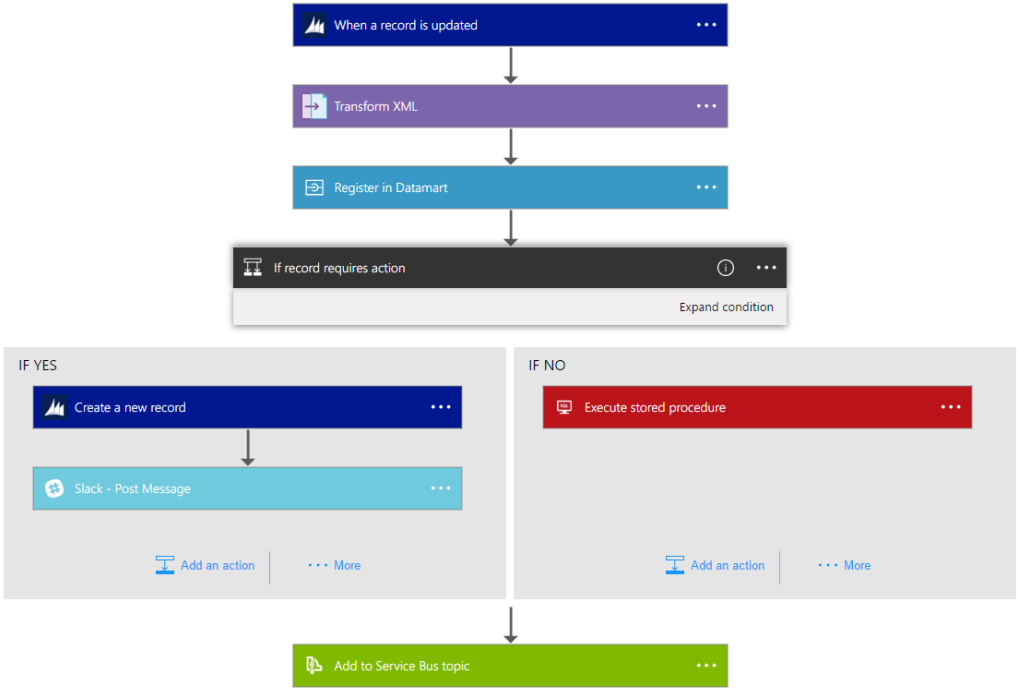


Application integration

Connects your app with other services. Create an application topic to route your app's



Azure Logic Apps



https://docs.microsoft.com/en-us/azure/logic-apps/logic-apps-what-are-logic-apps

Azure Backup Key Workloads

Specialized Workloads File/Folders/Volumes

- **Exchange**
- **SharePoint**
- **SQL Server**

- **Windows Server**
- **Windows**

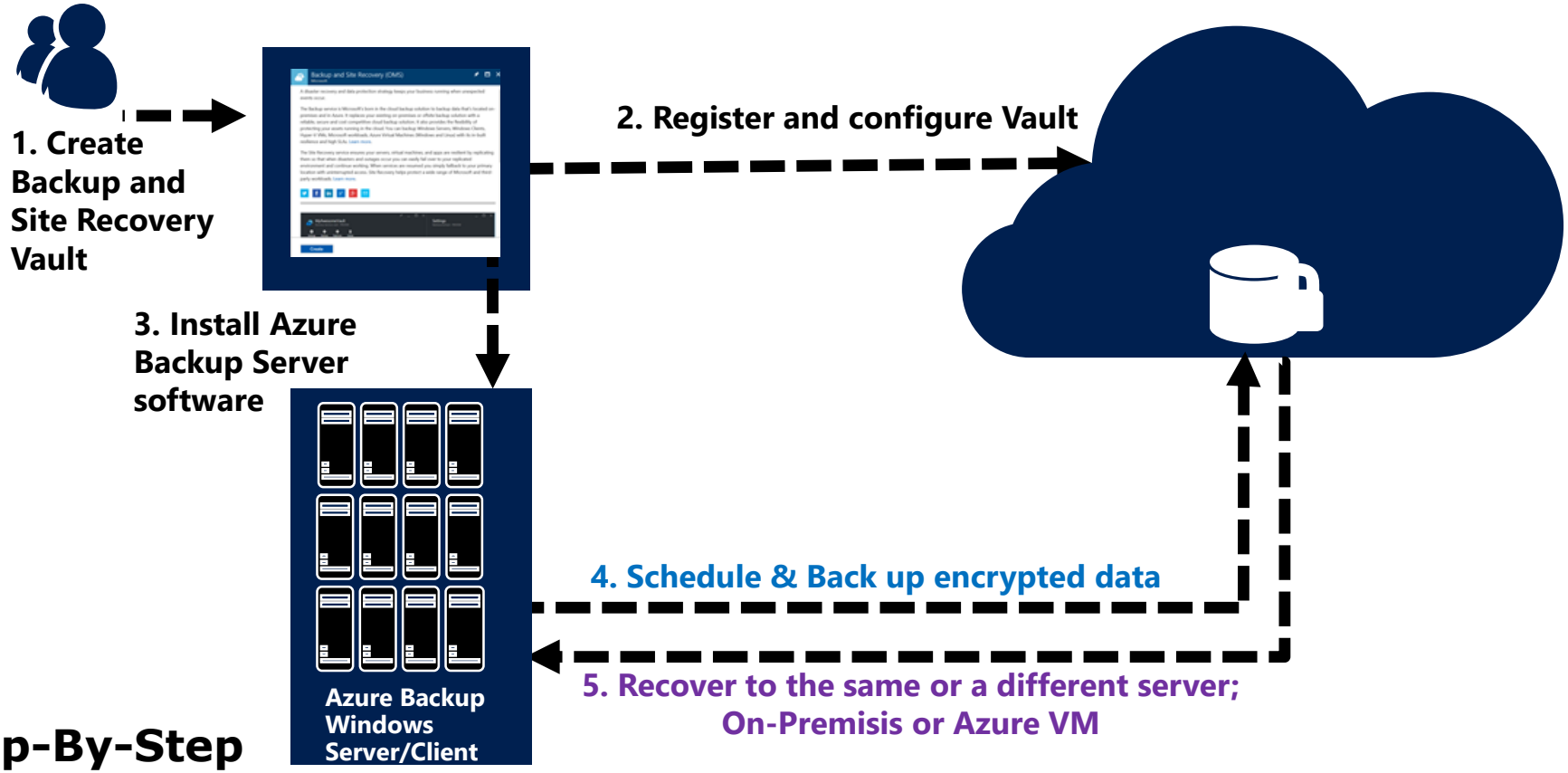
Virtual Machines

- **Windows**
- **Linux**

- **Hyper-V**
- **Windows Server**

- **Microsoft Azure**
- **VMware**

How It Works: Azure Backup Server



Step-By-Step

https://docs.microsoft.com/en-us/azure/backup/backup-try-azure-backup-in-10-mins

EXAM TIP!

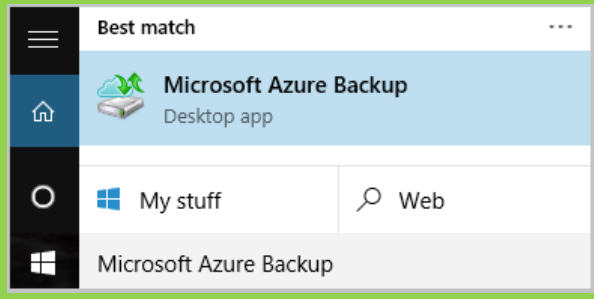
Name of the Backup agent **Installer** is:

MARSagentinstaller.exe

Backup Agent is

Microsoft Azure Backup

"C:\Program Files\Microsoft Azure Recovery Services Agent\bin**wabadmin.msc**"

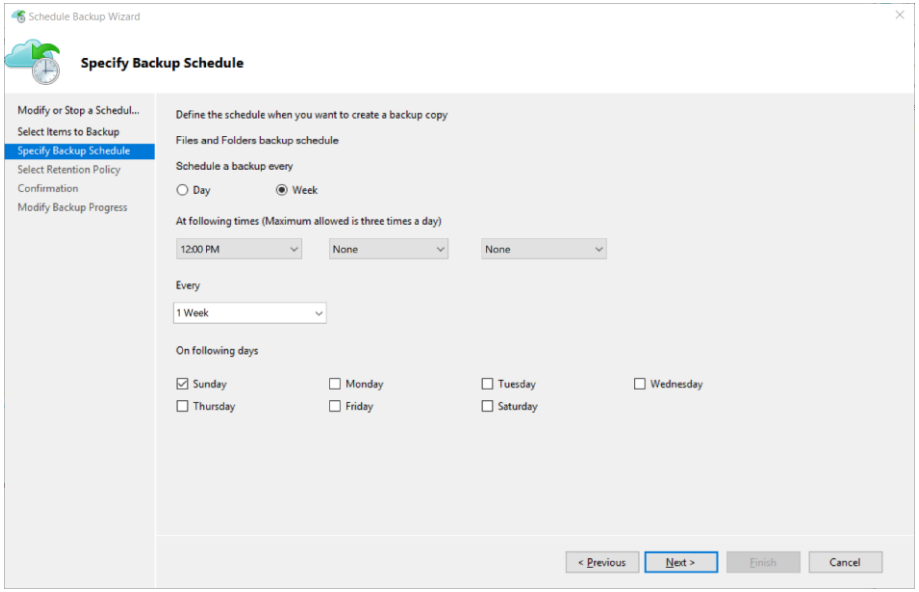


Maximum rate of backups per day?

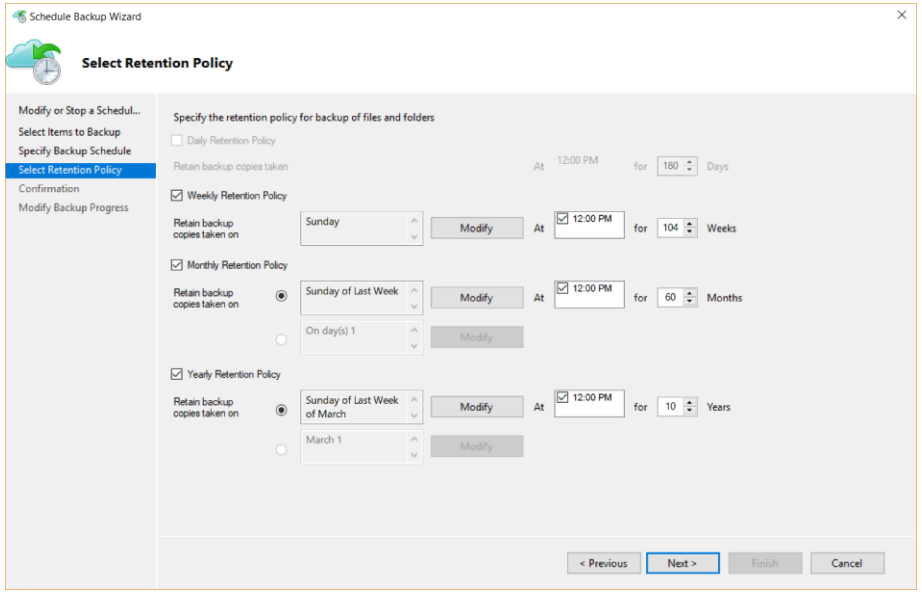
Three (3) times per day!

Backup Schedule & Retention Policy

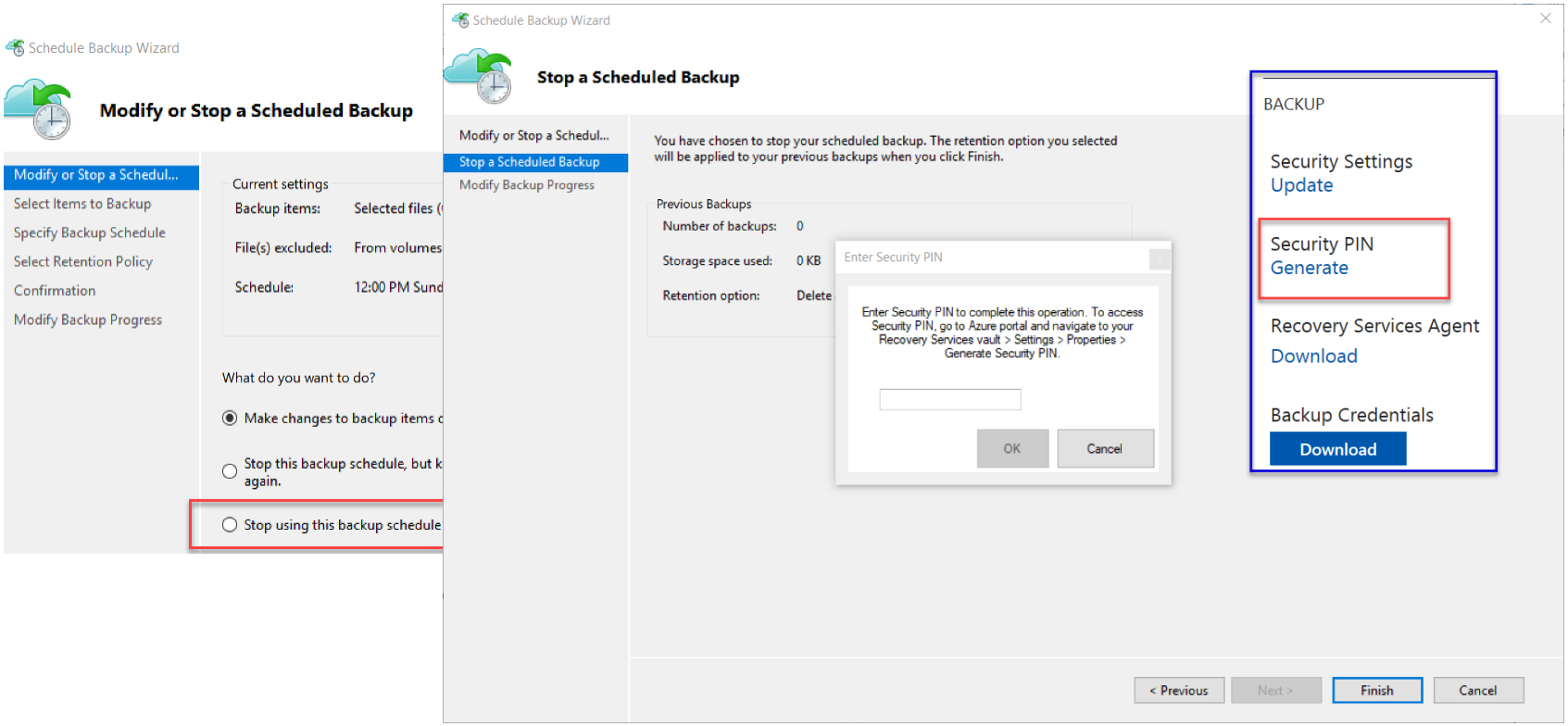
Backup Schedule



Retention Policy



Cancelling Schedule and Removing Backups



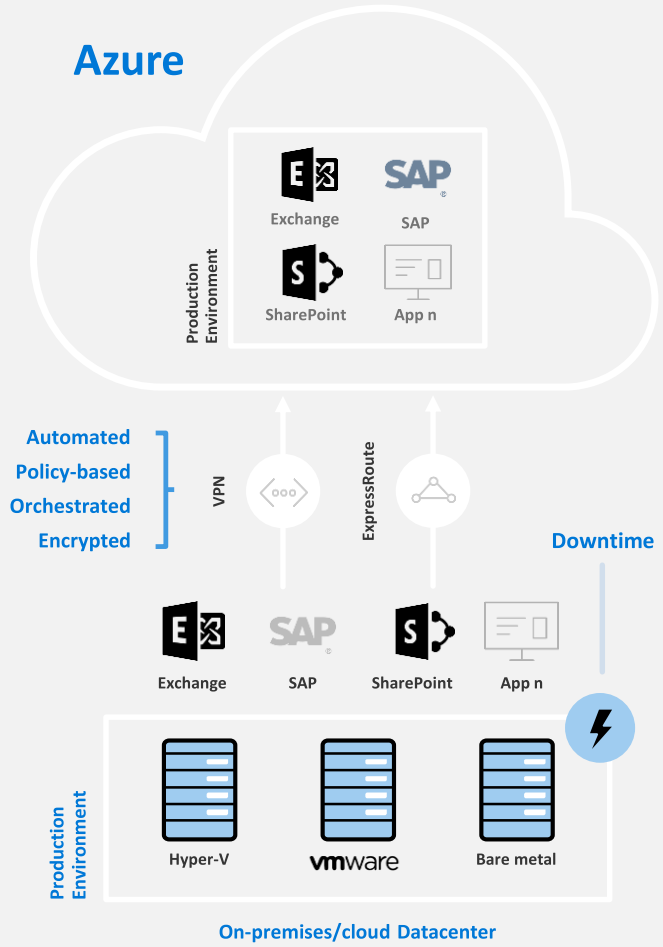
Azure Site Recovery

Automated, seamless disaster recovery from the cloud to protect applications

Provides application-consistent recovery of critical workloads

Leverage current investments

Orchestrate one-click recovery even for complex multi-tier applications



WHEN NOT

Workload requires synchronous replication, data outside of VHD

Azure Site Recovery support matrix *

Source	Target	Availability	Supported Guest OS Types
Hyper-V 2012 R2	Azure	Available	All Guest OS types supported by Azure
Hyper-V 2008 R2 SP1 and 2012	Azure	Available	Windows* and Linux*
VMware vSphere 5.1, 5.5, 6.0 and Physical Servers	Azure	Available	Windows* and Linux*
Amazon Web Services (Windows AMIs)	Azure	Available	Windows Server 2008 R2 SP1+ (HVM only)
Amazon Web Services (Linux AMIs)	Azure	Available	RHEL 6.7 HVM
Hyper-V 2012	Hyper-V 2012R2	Available	All Guest OS types supported by Hyper-V
VMware vSphere 5.1, 5.5, 6.0	Hyper-V 2012R2	Available via Microsoft Services Global Delivery	Windows Server 2008 R2 SP1+

** May be asked on the exam what ASR will support for a certain scenario*

Source: https://docs.microsoft.com/en-us/azure/site-recovery/

Azure BC/DR Capabilities & Use Cases

Hyper-V Replica

- Simple, Affordable Second Site
- "Extended Replication" + 3rd Party Integration
- Hardware Agnostic – either side

Hybrid Cloud

- Seamless Integration:
- Private Cloud or on-premises to…
- Service Provider Cloud
- Microsoft Azure

• Azure Site Recovery (ASR)

WHEN TO USE: 2nd Site / Use SCCM,SCVMM, Unprotected workloads

WHEN NOT TO USE:

- Workload requires synchronous replication, data outside of VHD
- Workload needs to recover physical servers, beyond Hyper-V replica's capabilities

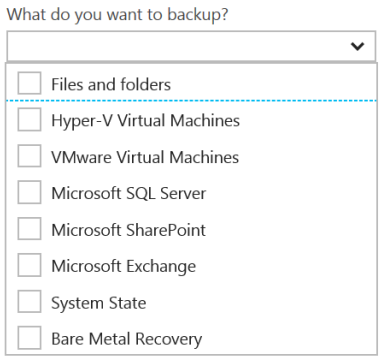
Disaster Recovery Capabilities & Use Cases

Azure Backup

- Reliable, Simple, Efficient backup and restore (agent based)
- Use for Branch Office or Small Business
- Backup and restore files and folders
- No Central Management

Azure Backup Server

- Disk (D2D), giving high RTOs for tier 1 workloads
- Azure (D2D2C) for long term retention
- Modern Backup Storage technolog
- VMware capabilities
- Application Consistency (SQL, Exchange, SharePoint)



- No Tape Backup
- No Integration with System Center
- Requires Azure Subscription

System Center Data Protection Manager (DPM)

- Physical, VM, Azure VM
- Store Locally to Disks (D2D) **and to Tape (D2T)**
- Store in Azure (D2D2C) for long term retention
- Full application consistency across server apps (Exch, SP, SQL…)
- Small backup window
- Bare Metal Recovery / Recovery to Azure
- Full System Center Integration (discovery, reporting, etc)

StorSimple

- Proprietary Device | Multiple Tiers
- Cloud Integrated Storage (CiS)

Seamless view of ALL Enterprise Storage

- Windows and VMWare

Multi-Tiers backup and recovery (Hot/Cold)

Fastest Solution

Long Term Azure storage; scale storage out to Azure

minimize on-premesis disk requirements

Seamless view of ALL Enterprise Storage | Windows and VMWare

EXAM TIP!

Additional Information: SLA for Site Recovery 99.9%

"**Failover**" is the process of transferring control, either simulated or actual, of a Protected Instance from a primary site to a secondary site.

"**On-Premises-to-Azure Failover**" is the Failover of a Protected Instance from a non-Azure primary site to an Azure secondary site. Customer may designate a particular Azure datacenter as a secondary site, provided that if Failover to the designated datacenter is not possible, Microsoft may replicate to a different datacenter in the same region.

"**On-Premises-to-On-Premises Failover**" is the Failover of a Protected Instance from a non-Azure primary site to a non-Azure secondary site.

"**Protected Instance**" refers to a virtual or physical machine configured for replication by the Site Recovery Service from a primary site to a secondary site. Protected Instances are enumerated in the Protected Items tab in the Recovery Services section of the Management Portal.

EXAM TIP!

READ & Practice
https://docs.microsoft.com/pdfstore/en-us/Azure.azure-documents/live/backup.pdf

Link from https://docs.microsoft.com/en-us/azure/backup/backup-try-azure-backup-in-10-mins – Download PDF

6.5 Describe the use cases for Azure Automation configuration

- Evaluate when to use Azure Automation, Chef, Puppet, PowerShell, or Desired State Configuration (DSC)

Microsoft

Azure Automation

PowerShell & PS Workflow Engines
- Use your existing PS scripts
- Checkpoint/Parallel if needed

Runbooks, Modules
- Author PS, PSWF, Graphical runbooks
- Gallery – Runbooks, modules
- Extensibility, integration

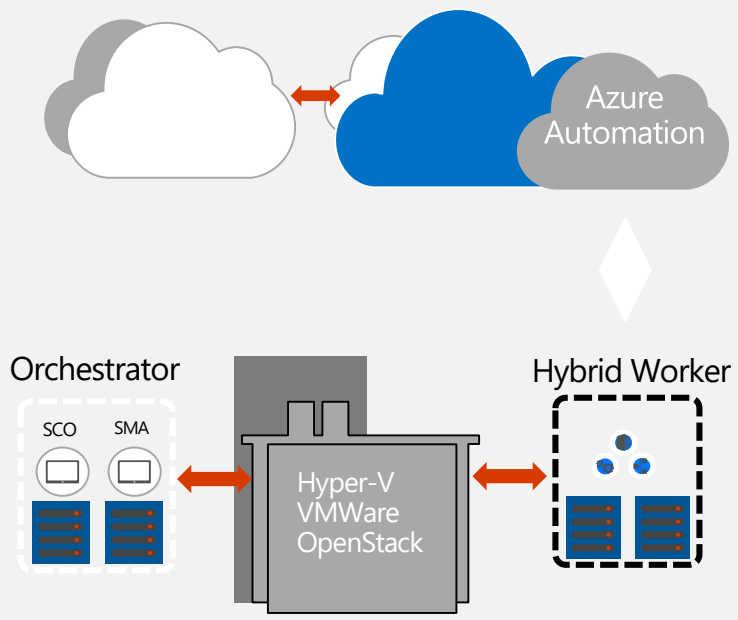
Assets
- Secure, global store for variables, credentials, …
- Schedules

Jobs
- Troubleshoot/audit via job history

PowerShell DSC
- Configurations, Pull service
- Node Management & Reporting

Hybrid Runbook Workers
- Install on any machine
- Secure, only outbound ports

Webhooks
- URL to start runbook remotely
- Integration



PowerShell for automation

- Automating repeatable, identical tasks
- Creating resources such as VMs
- Tasks that are very time consuming or prone to error

Desired State Configuration (DSC)

- Install or remove windows roles and features
- Running Windows PowerShell scripts
- Managing registry settings
- Managing files and directories
- Starting, stopping, and managing processes and services
- Managing groups and user accounts
- Deploying new software
- Managing environment variables
- Discovering the actual confi guration state on a given node
- Fixing a confi guration that has drifted away from the desired state

LAB Create a standalone Azure Automation account

1) **Create a new Automation Account from the Azure portal**

https://docs.microsoft.com/en-us/azure/automation/automation-create-standalone-account

- Monitoring Configurations
- Eliminate Configuration Drift
- Automated Change of Configuration
- Maintain Exact Configuration (override other changes)
- Automated Testing
- Automating Usage – Auto Start – Auto Stop
- Automating Hybrid Scenarios
- Automated Deployment

- Implement DevOps practices

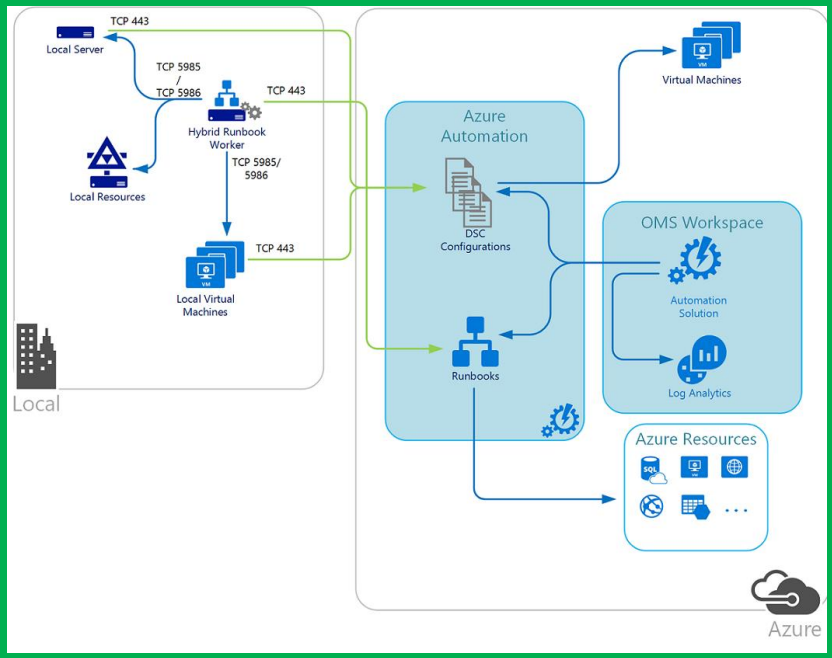
EXAM TIP!

Hybrid Azure Automation - DSC

DSC configurations stored in Azure Automation can be directly applied to Azure virtual machines. Other physical and virtual machines can request configurations from the Azure Automation DSC pull server.

Note

- TCP 443 from local to Azure
- TCP 5985/5986 Hybrid Runbook Worker to local machines and resources
- Hybrid Runbook worker is running locally and managing local resources



https://docs.microsoft.com/en-us/azure/automation/automation-offering-get-started

Thank You

Microsoft