Chapter 1: Implementing Cloud Infrastructure Monitoring
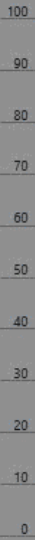
Local Time: Last 24 hours (Automatic - 15 minu...

Time range

( ) Last 30 minutes   ( ) Last 48 hours

( ) Last hour   ( ) Last 3 days

( ) Last 4 hours   ( ) Last 7 days

( ) Last 12 hours   ( ) Last 30 days

(●) Last 24 hours   ( ) Custom

Time granularity

Automatic ⇕

Show time as

( ) UTC/GMT

(●) Local

Apply   **Cancel**

Last 24 hours (Automatic - 5 minutes)

📈 Line chart ⌄   ⊡ New alert rule   📌 Pin to dashboard ⌄   ...

Pin to current dashboard

Select another dashboard

Monitor - Alerts
Microsoft

Search (Ctrl+/)	
Overview	
Activity log	
Alerts	
Metrics	
Logs	
Service Health	
Workbooks	

Insights

Applications	
Virtual Machines (preview)	
Storage Accounts (preview)	
Containers	
Networks (preview)	
Cosmos DB (preview)	
More	

Settings

Diagnostics settings	
Autoscale	

+ New alert rule   🔧 Manage alert rules   Manage actions   🔔 View classic alerts   ↻ Refresh   ☺ Provide feedback

Don't see a subscri...   Open Directory + Subscription settings

Subscription * ⓘ
SZ 1

Resource group ⓘ
Type to start filtering ...

Resource ⓘ
Type to start filtering ...

Pay attention to what matters.

You have not configured any alert rules.

Configure alert rules and attend to fired alerts to efficiently monitor your Azure resources. Learn More ⧉
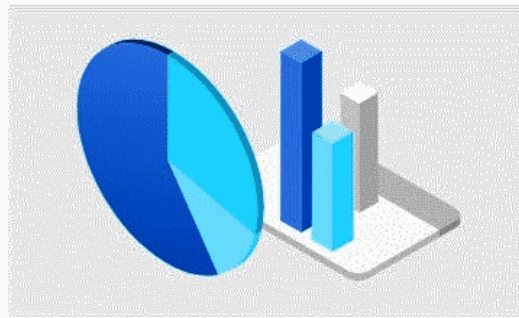
+ New Alert Rule

Create rule
Rules management

* RESOURCE   HIERARCHY

Select the target(s) that you wish to monitor

Select

* CONDITION

No condition defined, click on 'Add condition' to select a signal and define its logic

Add condition

ACTION GROUPS

Notify your team via email and text messages or automate actions using webhooks, runbooks, functions, logic apps or integrating with external ITSM solutions. Learn more here

ACTION GROUP NAME   ACTION GROUP TYPE

No action group selected

Select existing   Create New

ALERT DETAILS

* Alert rule name ⓘ
Specify alert rule name. Sample: 'Percentage CPU greater than 70'

Description
Specify alert description here...

Enable rule upon creation
Yes   No

Select a resource

Select the resource(s) you want to monitor. Available signals for your selection will show up on the bottom right.

* Filter by subscription ⓘ   Filter by resource type ⓘ   Location ⓘ

| SZ 1 ▼ | Type to start filtering ... ︿ | All ▼ |

| 🔍 Search to filter items... | | |

RESOURCE

▼ 🔑 SZ 1

- All
- App Service plans
- App Services
- Application Insights
- Azure Cosmos DB accounts
- Configurations (configurations)
- Deployment (deployments)
- Disks
- GenerateRecommendations (generateRecommendations)
- Management lock (locks)
- Network interfaces
- Network security groups
- Network Watcher (networkWatchers)
- Operations (operations)
- Public IP addresses
- Recommendations (recommendations)
- Resource groups
- Role assignment (roleAssignments)
- schedules (schedules)
- Server Firewall Rule (servers/firewallRules)
- SQL servers
- Storage accounts
- Storage services
- Subscriptions
- Suppressions (recommendations/suppressions)
- Suppressions (suppressions)
- **Virtual machines**
- Virtual networks

Selection preview   Available signal(s) : None

Done

Configure signal logic ✕

Choose a signal below and configure the logic on the next screen to define the alert condition.

Signal type ⓘ   **Monitor service** ⓘ

| All ▼ | All ▼ |

Displaying 1 - 20 signals out of total 47 signals

| 🔍 Search by signal name |
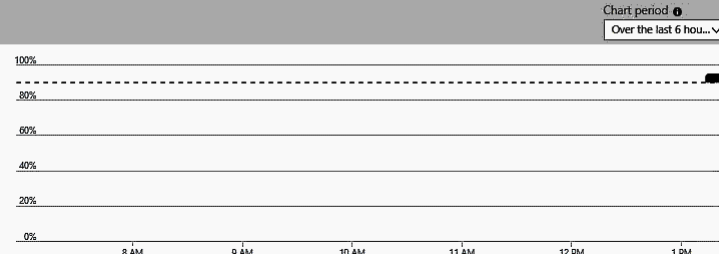
Signal name ↑↓		Signal type ↑↓	Monitor service ↑↓
Percentage CPU	〰	Metric	Platform
Network In Billable (Deprecated)	〰	Metric	Platform
Network Out Billable (Deprecated)	〰	Metric	Platform
Disk Read Bytes	〰	Metric	Platform
Disk Write Bytes	〰	Metric	Platform

Done

Configure signal logic   ✕

<- Back to signal selection

Percentage CPU(Platform)

Chart period ❶
Over the last 6 hou... ⌄

100%
80%
60%
40%
20%
0%
　　　　8 AM　　　9 AM　　　10 AM　　　11 AM　　　12 PM　　　1 PM

Percentage CPU (Avg)
linux
--

New! Dynamic thresholds automatically set the thresholds
for you and adapt to changes.
Click here to explore.

[Got it] How does it work?

Alert logic

Threshold ❶

| Static | Dynamic (preview) |

Operator ❶
[Greater than ⌄]

★ Aggregation type ❶
[Average ⌄]

★ Threshold value ❶
[90 ✓]
%

Condition preview

Whenever the percentage cpu is greater than 90 percent

Evaluated based on

★ Aggregation granularity (Period) ❶
[5 minutes ⌄]

Frequency of evaluation ❶
[Every 1 Minute ⌄]

[Done]

Add action group   ✕

★ Action group name ❶   [Send email ✓]

★ Short name ❶   [email ✓]

★ Subscription ❶   [SZ 1 ⌄]

★ Resource group ❶   [PacktResourcegroup ⌄]

Actions

ACTION NAME	ACTION TYPE	STATUS	DETAILS	ACTIONS
[email ✓]	[Email/SMS/Push/V... ⌄]		Edit details	✕

Please configure the action by clicking the link

| [Unique name for the act...] | [⌄] | | | |

Privacy Statement

Pricing

ℹ Have a consistant format in emails, notifications and other endpoints irrespective of monitoring
source. You can enable per action by editing details. Learn more

[OK]

Email/SMS/Push/Voice   ▢ ✕

Name
[email]

☑ Email
[SZaal@packt.com ✓]

☐ Email Azure Resource Manager Role
[None ⌄]

☐ SMS
Country code   ★ Phone number
[1 ⌄]   [1234567890]

ℹ Carrier charges may apply

☐ Azure app Push Notifications
Learn about the connecting to your Azure
resources using the Azure app.

[email@example.com]
This is the email you use to log into your Azure
account.

☐ Voice
Country code   ★ Phone number
[1 ⌄]   [1234567890]

Enable the common alert schema. Learn more
[Yes] [No]

[OK]

Create rule
Rules management

* RESOURCE	HIERARCHY
🖥 Linux	🔑 SZ 1 > 📦 PacktResourcegroup

Select

* CONDITION	Monthly cost in USD (Estimated) ⓘ
✅ Whenever the Percentage CPU is Greater than 90 %	$ 0.10 🗑

Add condition   Total $ 0.10

* ACTION GROUPS

Notify your team via email and text messages or automate actions using webhooks, runbooks, functions, logic apps or integrating with external ITSM solutions. Learn more here

ACTION GROUP NAME	ACTION GROUP TYPE
Send email	1 Email 🗑

Select existing   Create New

ALERT DETAILS

* Alert rule name ⓘ

CPU over 90   ✓

Description

Specify alert description here...

* Severity ⓘ

Sev 3

Enable rule upon creation

Yes   No

ℹ️ It can take up to 10 minutes for a metric alert rule to become active.

Create alert rule

🔍 Search (Ctrl+/)   💾 Save ✕ Discard

| Overview | Performance counters | Logs | Crash dumps | Sinks | Agent |

- ⏰ Auto-shutdown
- ☁ Backup
- 🌐 Disaster recovery
- 🖥 Update management
- 📋 Inventory
- 📊 Change tracking
- 📑 Configuration management ...
- ⚙ Policies
- 🖳 Run command

Monitoring

- 💡 Insights (preview)
- 🔲 Alerts
- 📊 Metrics
- 📗 **Diagnostic settings**
- 🔷 Advisor recommendations

Azure Monitoring collects host-level metrics – like CPU utilization, disk and network usage – for all virtual machines without any additional software. For more insight into this virtual machine, you can collect guest-level metrics, logs, and other diagnostic data using the Azure Diagnostics agent. You can also send diagnostic data to other services like Application Insights. Learn more

To get started now, click the button below:

Enable guest-level monitoring

Already know what you're doing? You   omize the diagnostic data you want to collect by visiting each of the tabs above. You can add or   ata types to collect at any time.

Logs
packtworkspace

New Query 1

📖 Help ⚙ Settings ≣ Sample queries 🗔 Query explorer

PacktWorkspace

▷ Run   Time range: Last 24 hours   💾 Save ⌗ Copy link ↱ Export ＋ New alert rule 📌 Pin

Schema   Filter (preview) «

Type your query here...

Filter by name or type...

⇟ Collapse all

Active

▼ 🌐 PacktWorkspace ☆

▶ LogManagement

▶ ƒx Functions

Favorite workspaces

Write your query ✕

This is the query editor. To get started – type a table name and click Run, or learn more about writing queries.

‹ PREVIOUS   ▪ ▪ ▪ ▪   NEXT ›

each hour

List heartbeats
List all computer heartbeats from the last hour

Last heartbeat of each computer
Show the last heartbeat sent by each computer

Run

Run

Run

Learn more

📖 Documentation

🎓 Online course

💬 Query language

Unavailable computers
List all known computers that didn't send a heartbeat in the last 5 hours

Availability rate
Calculate the availability rate of each connected computer

🧑 Community

📺 What's new

Run

Run

✦ Start tour

Network Watcher
Microsoft   ✕

🔍 Search (Cmd+/) «

🌐 Overview

Subscriptions: All 2 selected – Don't see a subscription? Open Directory + Subscription settings

Filter by name   All subscriptions   ▼

Monitoring

🖧 Topology

Name	↑↓	Region	Status	↑↓
PacktPub		⌄ 33 regions	Partially enabled	···
		🌐 West US	Disabled	···
		🌐 East US	Enabled	···
		🌐 North Europe		···
		🌐 West Europe	Enable network watcher	···
		🌐 East Asia	Disabled	···
		🌐 Southeast Asia	Disabled	···
		🌐 North Central US	Disabled	···

🖧 Connection monitor

🖧 Connection monitor (Preview)

🔷 Network Performance Monitor

Network diagnostic tools

🖥 IP flow verify

🔵 Next hop

↧ Effective security rules

Network Watcher | Topology

Microsoft

🔍 Search (Cmd+/) «

- 🌐 Overview

Monitoring

- 🔗 Topology
- 🖥 Connection monitor
- 🖥 Connection monitor (Preview)
- 🔵 Network Performance Monitor

Network diagnostic tools

- 🖥 IP flow verify
- 🔵 Next hop
- 🔧 Effective security rules
- 🔷 VPN troubleshoot
- 🔵 Packet capture
- 🖥 Connection troubleshoot

Metrics

- ☰ Usage + quotas

⬇ Download topology

Subscription ⓘ	Resource Group ⓘ	Virtual Network ⓘ
PacktPub ▾	packtvmresourcegroup ▾	Select virtual network ▾

PacktVM-VNET

default

packtvm760

PacktVM   PacktVM-nsg   PacktVM-ip
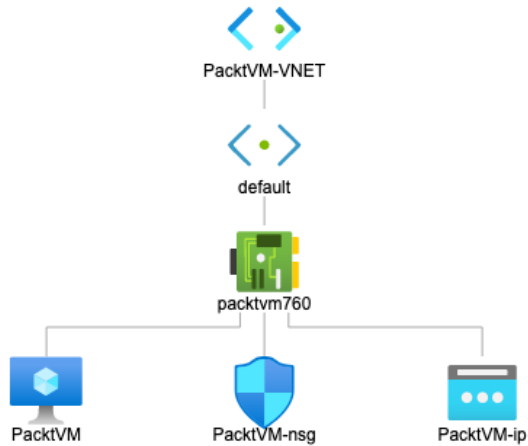
Network Watcher | Connection monitor

Microsoft

🔍 Search (Cmd+/) «   ＋ Add

- 🌐 Overview

Monitoring

- 🔗 Topology
- 🖥 Connection monitor
- 🖥 Connection monitor (Preview)
- 🔵 Network Performance Monitor

Network diagnostic tools

- 🖥 IP flow verify
- 🔵 Next hop
- 🔧 Effective security rules
- 🔷 VPN troubleshoot
- 🔵 Packet capture
- 🖥 Connection troubleshoot

Network Watcher Connection Monitor enables you to configure
changes. If there is an issue, it tells you why it occurred and how
[Learn more.](#)

Name ⓘ	Subscription ⓘ
Filter by name	PacktPub

Virtual Machine ⓘ

All virtual machines ▾

Name	↑↓	Resource Group	↑↓	Source
No results.				

Add connection monitor ✕

Name *
ConnectToInternet ✓

Source

Subscription * ⓘ
PacktPub ▾

Virtual machine *
PacktVM ▾

Destination
○ Select a virtual machine   ● Specify manually

URI, FQDN or IPv4 *
www.packtpub.com ✓

Port * ⓘ
443 ✓

⌄ Advanced settings

Add

Show data for last:

| 1 hour | 6 hours | 12 hours | 1 day | 7 days | 30 days |

Avg. Round-Trip Time and % Probes Failed

```
1ms    ┅┅┅┅┅┅┅┅┅┅┅┅┅┅┅┅┅┅┅┅┅┅┅┅┅┅┅┅┅┅┅┅┅┅┅
0.8ms
0.6ms
0.4ms
0.2ms
0ms    ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━
       7:45 AM        8 AM        8:15 AM       8:30 AM      UTC+01:00
```

Avg. Round-trip Time...	% Probes Failed (Avg)
networkwatcher_eastu...	networkwatcher_eastu...
1ms	**0**%
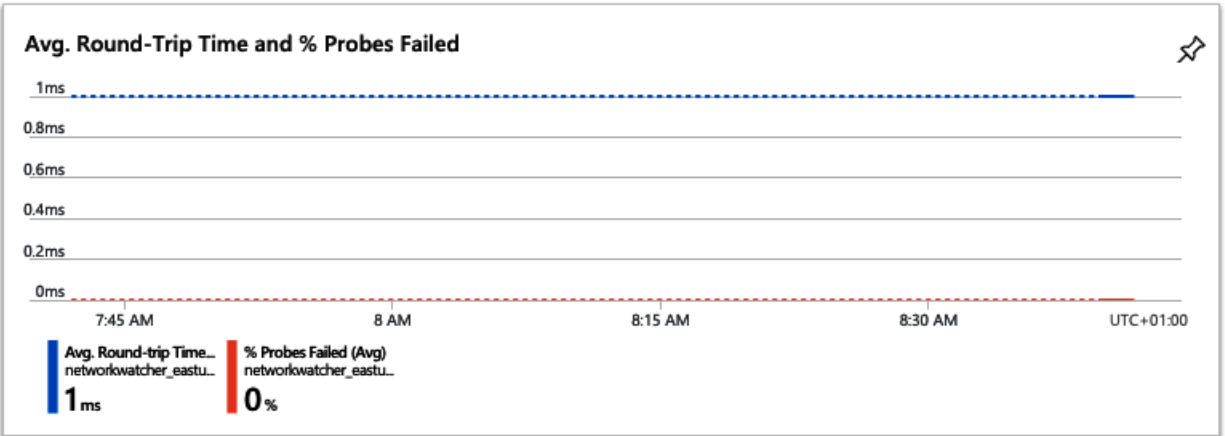
Grid view   Topology view

Hops

Name	IP address	Status	Next hop IP address	RTT from source (ms)
🖥 **PacktVM**	10.0.0.4	✅	172.67.31.83	-
🌐 Destination	172.67.31.83	✅	-	-

Network Watcher | IP flow verify

Microsoft

Search (Cmd+/) «

🌐 Overview

Monitoring

⚙️ Topology

🖥️ Connection monitor

🖥️ Connection monitor (Preview)

◆ Network Performance Monitor

Network diagnostic tools

▦ IP flow verify

🔵 Next hop

⬇️ Effective security rules

◆ VPN troubleshoot

🔵 Packet capture

🖥️ Connection troubleshoot

Metrics

☰ Usage + quotas

Logs

📊 NSG flow logs

📊 Diagnostic logs

☁️ Traffic Analytics

Specify a target virtual machine with associated network security groups, then run an inbound or outbound packet to see if access is allowed or denied.

Subscription * ⓘ

PacktPub ⌄

Resource group * ⓘ

packtvmresourcegroup ⌄

Virtual machine * ⓘ

PacktVM ⌄

Network interface *

packtvm760 ⌄

Packet details

Protocol

◉ TCP ◯ UDP

Direction

◉ Inbound ◯ Outbound

Local IP address * ⓘ   **Local port** * ⓘ

10.0.0.4   ✓   443

Remote IP address * ⓘ   **Remote port** * ⓘ

13.107.21.200   ✓   443

[Check]

❌ Access denied

Security rule
DenyAllInBound

Network Watcher | Next hop

Microsoft

Overview

Monitoring

Topology

Connection monitor

Connection monitor (Preview)

Network Performance Monitor

Network diagnostic tools

IP flow verify

Next hop

Effective security rules

VPN troubleshoot

Packet capture

Connection troubleshoot

Metrics

Usage + quotas

Logs

NSG flow logs

Diagnostic logs

Traffic Analytics

Next Hop provides the next hop from the target virtual machine to the destination IP address.
Learn more.

Specify a target virtual machine and destination IP address to view the next hop.

Subscription * ⓘ

PacktPub

Resource group * ⓘ

packtvmresourcegroup

Virtual machine * ⓘ

PacktVM

Network interface *

packtvm760

Source IP address * ⓘ

10.0.0.4

Destination IP address * ⓘ

13.107.21.200

Next hop

Result

Next hop type
Internet

IP address
-

Route table ID

System Route

Network Watcher | Effective security rules

Microsoft

✕

🔍 Search (Cmd+/)   «

🌐 Overview

Monitoring

🔲 Topology

🖥 Connection monitor

🖥 Connection monitor (Preview)

🔷 Network Performance Monitor

Network diagnostic tools

⬜ IP flow verify

🔷 Next hop

⬇ Effective security rules

🔷 VPN troubleshoot

🔷 Packet capture

⬇ Download   🔄 Refresh

ℹ Showing only top 50 security rules in each grid, click Download above to see all.

Subscription *

PacktPub

Resource group *

packtvmresourcegroup

Virtual machine *

PacktVM

Select a network interface below to see the effective security rules and network security groups associated with it.

Scope   Virtual machine (PacktVM)

Network interface   packtvm760

Associated NSGs: ⓘ   **PacktVM-nsg (Network interface)**

PacktVM-nsg

Inbound rules

Name	Priority	Source	Source Ports	Destination	Destination Ports	Protocol	Access
SSH	300	0.0.0.0/0,0.0.0.0/0	0-65535	0.0.0.0/0,0.0.0.0/0	22-22	TCP	✅ Allow
AllowVnetInBound	65000	Virtual network (2 prefixes)	0-65535	Virtual network (2 prefixes)	0-65535	All	✅ Allow
AllowAzureLoadBalancerInBound	65001	Azure load balancer (2 prefixes)	0-65535	0.0.0.0/0,0.0.0.0/0	0-65535	All	✅ Allow
DenyAllInBound	65500	0.0.0.0/0,0.0.0.0/0	0-65535	0.0.0.0/0,0.0.0.0/0	0-65535	All	❌ Deny

Outbound rules

Name	Priority	Source	Source Ports	Destination	Destination Ports	Protocol	Access
AllowVnetOutBound	65000	Virtual network (2 prefixes)	0-65535	Virtual network (2 prefixes)	0-65535	All	✅ Allow
AllowInternetOutBound	65001	0.0.0.0/0,0.0.0.0/0	0-65535	Internet (236 prefixes)	0-65535	All	✅ Allow
DenyAllOutBound	65500	0.0.0.0/0,0.0.0.0/0	0-65535	0.0.0.0/0,0.0.0.0/0	0-65535	All	❌ Deny

Add packet capture ✕

Subscription *

| PacktPub | ⌄ |

Resource group *

| packtvmresourcegroup | ⌄ |

Target virtual machine *

| PacktVM | ⌄ |

Packet capture name *

| matpacketcapture | ✓ |

Capture configuration

The packet capture output file (.cap) can be stored in a storage account and/or on the target VM.

◉ Storage account   ○ File   ○ Both

Storage accounts *

| packtstorage1 | ⌄ |

Maximum bytes per packet ⓘ

| default: 0 (entire packet) |

Maximum bytes per session ⓘ

| default: 1073741824 |

Time limit (seconds) ⓘ

| default: 18000 |

Filtering (optional)

+ Add filter

Save   Cancel

Filtering (optional)

Protocol *

(●) Any   ( ) TCP   ( ) UDP

Local IP address ⓘ

```
"127.0.0.1", "127.0.0.1-127.0.0.255" or "127.0.0.1;127.0.0.5"
```

Local port ⓘ

```
"80", "30-100" or "80;40"
```

Remote IP address ⓘ

```
"127.0.0.1", "127.0.0.1-127.0.0.255" or "127.0.0.1;127.0.0.5"
```

Remote port ⓘ

```
"80", "30-100" or "80;40"
```

[**+ Add filter**]   [Cancel]

╋ Add   ↻ Refresh

	Subscription ⓘ
Filter by name	All subscriptions ⌄

Name	Target	Storage	Status	Bytes per packet	Bytes per session
matpacketcapture	PacktVM	packtstorage1	ⓘ Running	Entire pack	···

Delete
Stop

Details	⌄

Status   Details

Session status
Running

Storage location
packetcapture_06_09_16_123.cap

Start time
-

Errors
-

No.	Time	Source	Destination	Protocol	Length	Info
18	1.147696	216.58.213.99	192.168.1.4	TCP	66	443 → 51094 [ACK] Seq
19	1.203112	192.168.1.4	168.63.129.16	TCP	354	49719 → 32526 [PSH,
20	1.203920	168.63.129.16	192.168.1.4	HTTP	79	HTTP/1.1 100 Continue
21	1.204002	192.168.1.4	168.63.129.16	HTTP	425	PUT /status HTTP/1.1
22	1.209293	168.63.129.16	192.168.1.4	HTTP	157	HTTP/1.1 200 OK
23	1.209530	192.168.1.4	168.63.129.16	TCP	355	49719 → 32526 [PSH, A
24	1.210218	168.63.129.16	192.168.1.4	HTTP	79	HTTP/1.1 100 Continue
25	1.210296	192.168.1.4	168.63.129.16	HTTP	3173	PUT /status HTTP/1.1
26	1.210454	168.63.129.16	192.168.1.4	TCP	54	32526 → 49719 [ACK] S
27	1.214303	168.63.129.16	192.168.1.4	HTTP	157	HTTP/1.1 200 OK
28	1.255726	192.168.1.4	168.63.129.16	TCP	54	49719 → 32526 [ACK] S
29	1.256672	192.168.1.4	168.63.129.16	HTTP	145	GET /machine/plugins?
30	1.267312	168.63.129.16	192.168.1.4	HTTP	207	HTTP/1.1 200 OK (tex
31	1.287004	192.168.1.4	216.58.213.1	TCP	55	51096 → 443 [ACK] Seq
32	1.288500	216.58.213.1	192.168.1.4	TCP	66	443 → 51096 [ACK] Seq
33	1.318293	192.168.1.4	168.63.129.16	TCP	54	49724 → 80 [ACK] Seq
34	1.425276	170.194.32.60	192.168.1.4	TCP	60	10400 → 3389 [ACK] Se

PacktPub | Activity log 📌

Subscription   ✕

⌕ Search (Cmd+/)	«

⌄ Activity   ≡≡ Edit columns   ↻ Refresh   ⚙ Diagnostics settings   ↓ Download as CSV   🔌 Logs   ⌁ Pin current filters   ⋯

- 🎯 Overview
- 🗔 Activity log
- 👤 Access control (IAM)
- 🏷 Tags
- 🔧 Diagnose and solve problems
- 🛡 Security
- ⚡ Events

Cost Management

- 💰 Cost analysis
- 💲 Cost alerts
- 💲 Budgets
- ☁ Advisor recommendations

⌕ Search		⦿ Quick Insights

Subscription : **PacktPub**   Event severity : **All**   Timespan : **Last 6 hours**   ⊞ Add Filter

22 items.

Click here to expand

Operation name	Status	Time	Time stamp	Subscription	Event initiated by
⌄ ⓘ Stop Packet Capture	Succeeded	17 minutes ...	Sat Sep 12 ...	PacktPub	
ⓘ Stop Packet Capture	Started	17 minutes ...	Sat Sep 12 ...	PacktPub	
ⓘ Stop Packet Capture	Started	17 minutes ...	Sat Sep 12 ...	PacktPub	
ⓘ Stop Packet Capture	Accepted	17 minutes ...	Sat Sep 12 ...	PacktPub	
ⓘ Stop Packet Capture	Accepted	17 minutes ...	Sat Sep 12 ...	PacktPub	
ⓘ Stop Packet Capture	Succeeded	17 minutes ...	Sat Sep 12 ...	PacktPub	
› ⓘ Create Packet Capture	Succeeded	19 minutes ...	Sat Sep 12 ...	PacktPub	
› ⓘ Returns Storage Account	Succeeded	19 minutes ...	Sat Sep 12 ...	PacktPub	Azure Traffic Manager an...

╋ New alert rule

Summary   **JSON**

```
1  {
2      "authorization": {
3          "action": "Microsoft.Network/networkWatchers/packetCaptures/stop/action",
4          "scope": "/subscriptions/_____/resourceGroups/
   NetworkWatcherRG/providers/Microsoft.Network/networkWatchers/NetworkWatcher_eastus/packetCaptures/
   matpacketcapture"
5      },
6      "caller": "_____",
7      "channels": "Operation",
```

Costs by resource ⓘ View details >

cloudguru-web1_osdisk_1_d1a8bcf21bb34fe4985...
0.12 GBP

cloudguru-web2_osdisk_1_d1c113de25fd48ebb5...
0.12 GBP

completegurustorage
0.00 GBP

Others
0.01 GBP
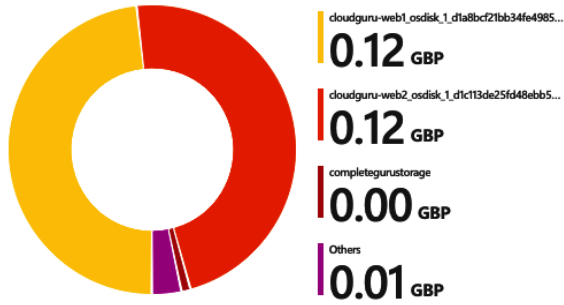
Spending rate and forecast ⓘ View details >

Current cost
0.24 GBP
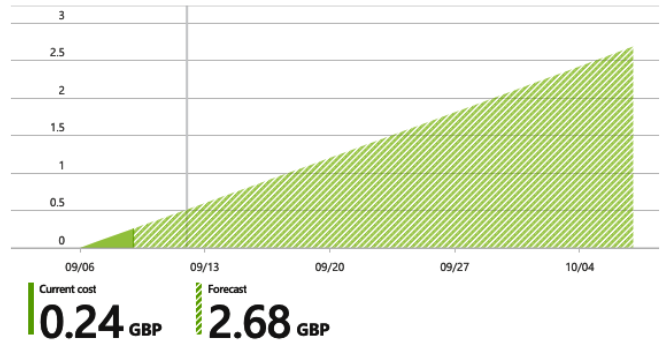
Forecast
2.68 GBP

💾 Save 💾 Save as 🗑 Delete view 🔗 Share 🔄 Refresh ⬇ Download ⚙ Settings 🧪 Try preview ❓ Help ∨

Scope : 🔑 Teaching Subscription

VIEW ⓘ
Accumulated costs ∨

📅 Invoice (Azure) : **Sep 9–Oct 8** ∨

➕🔽 Add filter

ACTUAL COST (GBP ONLY) ⓘ
£0.24 ∨

FORECAST: CHART VIEW ON ⓘ
£2.61 ∨

BUDGET: NONE
-- ∨

Group by: **None** ∨   Granularity: **Accumulated** ∨   📈 Area ∨

● Accumulated cost   ● Forecast cost

Service name ∨

storage
£0.24
bandwidth
£0.00
network watcher
£0.00
virtual machines
£0.00
virtual network
£0.00

Location ∨

uk west
£0.24
uk south
<£0.01
eu west
<£0.01

Resource group name ∨

rsg-linuxvms
£0.24
rsg-storage
<£0.01
cloud-shell-storage-...
<£0.01
networkwatcherrg
£0.00
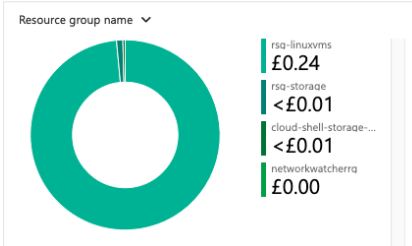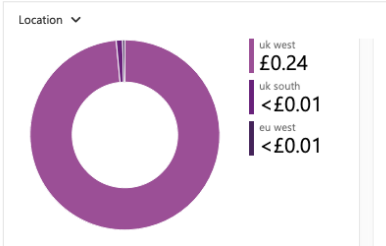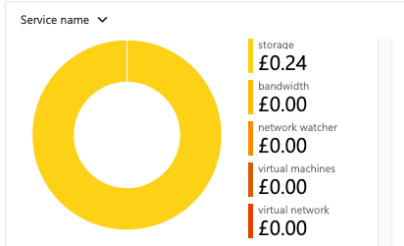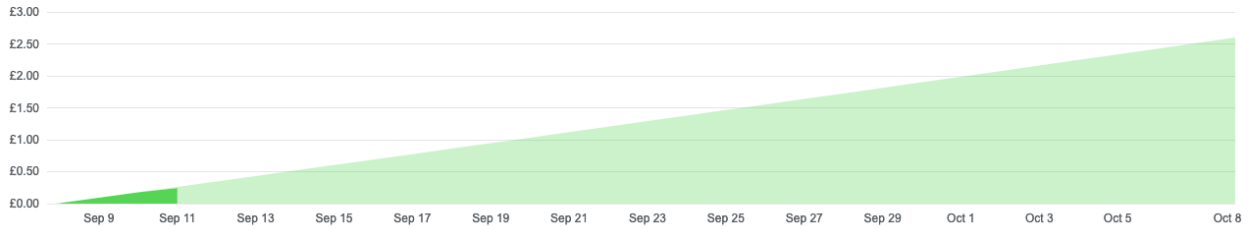
Scope : 🔑 **PacktPub**

VIEW ⓘ
Accumulated costs ⌄

ACTUAL COST (GBP ONLY) ⓘ

£0.16 ⌄

Built-in views

Accumulated costs

Cost by resource

£0.20

Daily costs

Cost by service

Invoice details

Group by: **Resource** ⌄   Granularity: **Monthly** ⌄   ▦ **Table** ⌄

Chapter 2: Creating and Configuring Storage Accounts
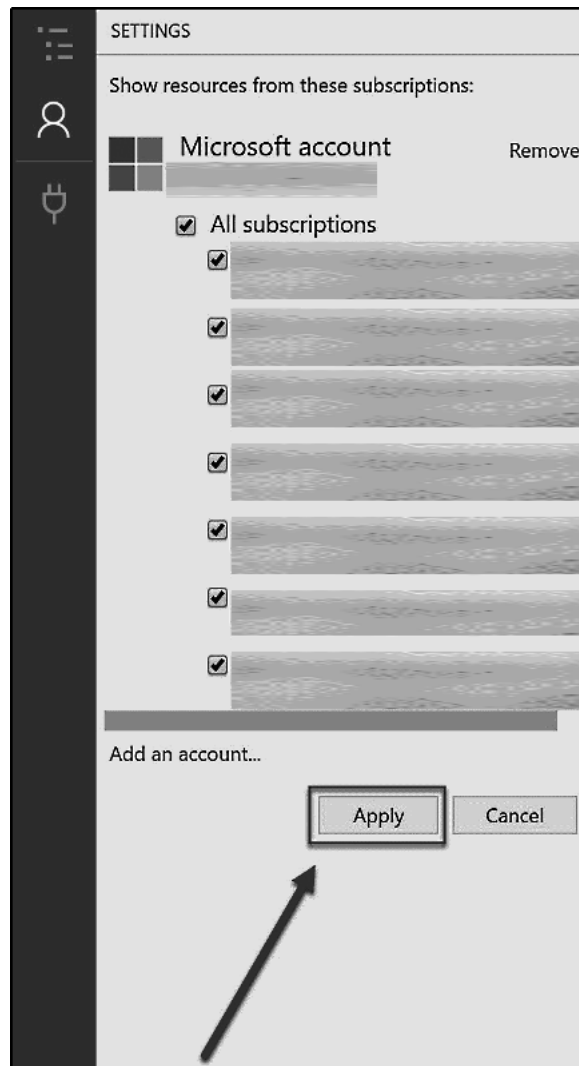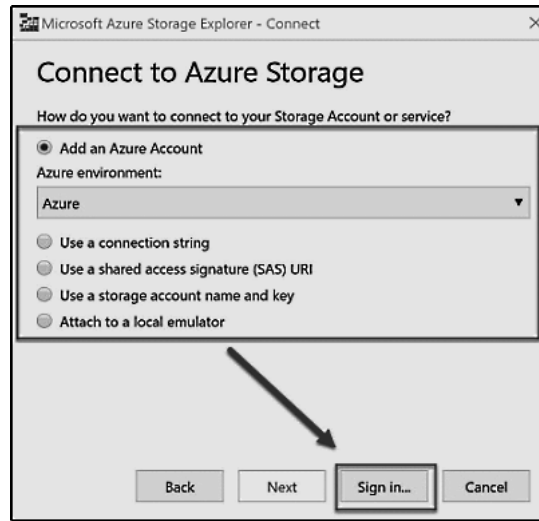
EXPLORER

Search for resources ✕ 🔍

Collapse All   Refresh All

 ⚡ Quick Access
▶ 🔗 Local & Attached

▼
  ▼ ▦ Storage Accounts
    ▶ ▦ csb8f6d04086d33x4e86x81c
    ▶ ▦ devdiag471
    ▼ ▦ packtpubstorage
      ▶ 🖼 Blob Containers
      ▶ 🗄 File Shares
      ▶ ▥ Queues
      ▶ ▦ Tables

▶
▶
▶
▶
▶

Actions	Properties	⌄
Name	packtpubstorage
Type	Microsoft.Storage/s
Subscription	
Resource Group	PacktPubStorageAc
Location	eastus
Account Name	packtpubstorage
Account Kind	Storage

Upload toolbar

Upload	Download	Open	New Folder	Copy URL	Select All	Copy	Paste	Re

← → ∨ ↑ Active blobs (default) ▼ packtblobcontai... Search by prefix (case-sensi

Name^	Access Tier	Access Tier Last Modified	Last Modified	Blob Type	Con

No data available in this blob container

Microsoft Azure Storage Explorer - Upload Files to Blob Container ✕

Upload Files

Files

No files selected	...

Blob type

Block Blob	▼

☑ Upload .vhd/vhdx files as page blobs (recommended)

Upload to folder (optional)

Upload   Cancel

🔍 Search (Ctrl+/) «   💾 Save   ✕ Discard   ↻ Refresh

☰ Overview	ⓘ Firewall settings allowing access to storage services will remain in effect for up to a minute after saving updated settings restricting access.
🗒 Activity log	
🔑 Access control (IAM)	**Allow access from**
🏷 Tags	◯ All networks ◉ Selected networks
🔧 Diagnose and solve problems	Configure network security for your storage accounts. Learn more.
⇄ Data transfer	**Virtual networks**
⚡ Events	Secure your storage account with virtual networks. + Add existing virtual network + Add new virtual network
📊 Storage Explorer (preview)	

Settings

💡 Access keys	**Virtual Network** Subnet Address range Endpoint Status
🔘 Geo-replication	No network selected.
⊘ CORS	
💼 Configuration	**Firewall**
🔒 Encryption	Add IP ranges to allow access from the internet or your on-premises networks. Learn more.
🔑 Shared access signature	☐ Add your client IP address ('213.127.25.24') ⓘ
🛡 Firewalls and virtual networks	**Address range**
‹/› Private endpoint connection...	IP address or CIDR
🛡 Advanced security	**Exceptions**
	☑ Allow trusted Microsoft services to access this storage account ⓘ
	☐ Allow read access to storage logging from any network
	☐ Allow read access to storage metrics from any network

Create virtual network

Name *

PacktStorageNetwork

Address space * ⓘ

10.1.0.0/16

10.1.0.0 - 10.1.255.255 (65536 addresses)

Subscription *

Microsoft Azure Sponsorship

Resource group *

PacktPubStorageAccount

Create new

Location *

(US) East US

Subnet

Name *

default

Address range * ⓘ

10.1.0.0/24

10.1.0.0 - 10.1.0.255 (256 addresses)

DDoS protection ⓘ

● Basic ○ Standard

Service endpoint ⓘ

Microsoft.Storage

Firewall ⓘ

Disabled   Enabled

Create

💾 Save ✕ Discard ↻ Refresh

ⓘ Firewall settings allowing access to storage services will remain in effect for up to a minute after saving updated settings restricting access.

Allow access from

○ All networks ● Selected networks

Configure network security for your storage accounts. Learn more.

Virtual networks

Secure your storage account with virtual networks.   + Add existing virtual network   + Add new virtual network

Virtual Network	Subnet	Address range	Endpoint Status	Resource Group	Subscription	
> PacktStorageNetwork	1			PacktPubStorageAccount	Microsoft Azure Sponso...	•••

Firewall

Add IP ranges to allow access from the internet or your on-premises networks. Learn more.

☐ Add your client IP address ('213.127.25.24') ⓘ ⬅

Address range

IP address or CIDR

Exceptions

☑ Allow trusted Microsoft services to access this storage account ⓘ

☐ Allow read access to storage logging from any network

☐ Allow read access to storage metrics from any network

Use access keys to authenticate your applications when making requests to this Azure storage account. Store your access keys securely - for example, using Azure Key Vault - and don't share them. We recommend regenerating your access keys regularly. You are provided two access keys so that you can maintain connections using one key while regenerating the other.

When you regenerate your access keys, you must update any Azure resources and applications that access this storage account to use the new keys. This action will not interrupt access to disks from your virtual machines. Learn more

Storage account name

packtpubstorage

key1 ↻

Key

FU7XYM3Xo7Zdd8GnVMcYguXcZqsliFhW5OmOCYqUhh2PFQnQI3WUcUlv9inEJFJFqSGVns19g8mpQwpnZi5o6w==

Connection string

DefaultEndpointsProtocol=https;AccountName=packtpubstorage3;AccountKey=FU7XYM3Xo7Zdd8GnVMcYguXcZqsliFhW5OmOCYqUhh2PFQnQI3WUcUlv9inEJFJFqSGV...

key2 ↻

Key

KJyo44hIKIASEG/DT8zAEoulgXWWiw8CzkKevuPGvDWlyTn4JHRNB7A+uQg1JpBjdsVsAXmmfUCs6zDhbfyFHQ==

Connection string

DefaultEndpointsProtocol=https;AccountName=packtpubstorage3;AccountKey=KJyo44hIKIASEG/DT8zAEoulgXWWiw8CzkKevuPGvDWlyTn4JHRNB7A+uQg1JpBjdsVsAX...

A shared access signature (SAS) is a URI that grants restricted access rights to Azure Storage resources. You can provide a shared access signature to clients who should not be trusted with your storage account key but whom you wish to delegate access to certain storage account resources. By distributing a shared access signature URI to these clients, you grant them access to a resource for a specified period of time.

An account-level SAS can delegate access to multiple storage services (i.e. blob, file, queue, table). Note that stored access policies are currently not supported for an account-level SAS.

Learn more

Allowed services ⓘ

☑ Blob ☑ File ☑ Queue ☑ Table

Allowed resource types ⓘ

☑ Service ☑ Container ☑ Object

Allowed permissions ⓘ

☑ Read ☑ Write ☑ Delete ☑ List ☑ Add ☑ Create ☑ Update ☑ Process

Start and expiry date/time ⓘ

Start

| 12/17/2019 | 📅 | 5:21:28 PM |

End

| 12/18/2019 | 📅 | 1:21:28 AM |

(UTC+01:00) Sarajevo, Skopje, Warsaw, Zagreb ⌄

Allowed IP addresses ⓘ

for example, 168.1.5.65 or 168.1.5.65-168.1.5.70

Allowed protocols ⓘ

⦿ HTTPS only ○ HTTPS and HTTP

Signing key ⓘ

key1 ⌄

Generate SAS and connection string

A shared access signature (SAS) is a URI that grants restricted access rights to Azure Storage resources. You can provide a shared access signature to clients who should not be trusted with your storage account key but whom you wish to delegate access to certain storage account resources. By distributing a shared access signature URI to these clients, you grant them access to a resource for a specified period of time.

An account-level SAS can delegate access to multiple storage services (i.e. blob, file, queue, table). Note that stored access policies are currently not supported for an account-level SAS.

Learn more

Allowed services ⓘ
☑ Blob ☑ File ☑ Queue ☑ Table

Allowed resource types ⓘ
☑ Service ☑ Container ☑ Object

Allowed permissions ⓘ
☑ Read ☑ Write ☑ Delete ☑ List ☑ Add ☑ Create ☑ Update ☑ Process

Start and expiry date/time ⓘ

Start

| 12/17/2019 | 🗓 | 5:21:28 PM |

End

| 12/18/2019 | 🗓 | 1:21:28 AM |

| (UTC+01:00) Sarajevo, Skopje, Warsaw, Zagreb | ⌄ |

Allowed IP addresses ⓘ

| for example, 168.1.5.65 or 168.1.5.65-168.1.5.70 |

Allowed protocols ⓘ
◉ HTTPS only ○ HTTPS and HTTP

Signing key ⓘ

| key1 | ⌄ |

| Generate SAS and connection string | ⟵

💾 Save   ✕ Discard   ⟳ Refresh

The cost of your storage account depends on the usage and the options you choose below.
Learn more about storage pricing ⊡

Account kind
StorageV2 (general purpose v2)

Performance ⓘ
◉ Standard   ◯ Premium

ⓘ This setting cannot be changed after the storage account is created.

Secure transfer required ⓘ
◯ Disabled   ◉ Enabled

Allow Blob public access ⓘ
◯ Disabled   ◉ Enabled

Minimum TLS version ⓘ
Version 1.2 ⌄

Blob access tier (default) ⓘ
◯ Cool   ◉ Hot

Replication ⓘ
Geo-redundant storage (GRS) ⌄

Large file shares ⓘ
◉ Disabled   ◯ Enabled

ⓘ The current combination of subscription, storage account kind, performance, replication and
location does not support large file shares.

Identity-based access for file shares

Azure Active Directory Domain Services (Azure AD DS) ⓘ
◉ Disabled   ◯ Enabled

Storage endpoints

View all

♦ Primary location   ♦ Secondary location

Location	Data center type	Status	Failover
♦ East US	Primary	Available	-
♦ West US	Secondary	Available	-

Prepare for failover

Chapter 3: Implementing and Managing Virtual Machines

Fault Domain 0
Rack 1

Fault Domain 1
Rack 2

Fault Domain 2
Rack 3

Virtual machine 0
Update Domain 0

Virtual machine 1
Update Domain 1

Virtual machine 2
Update Domain 2

Virtual machine 3
Update Domain 3

Virtual machine 4
Update Domain 4

Availability Set

Microsoft
Azure
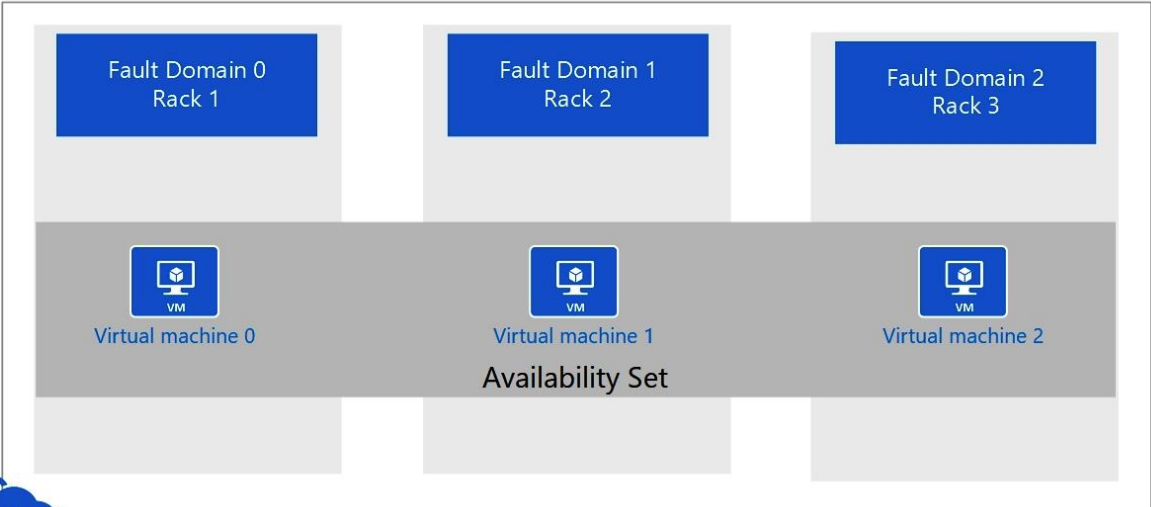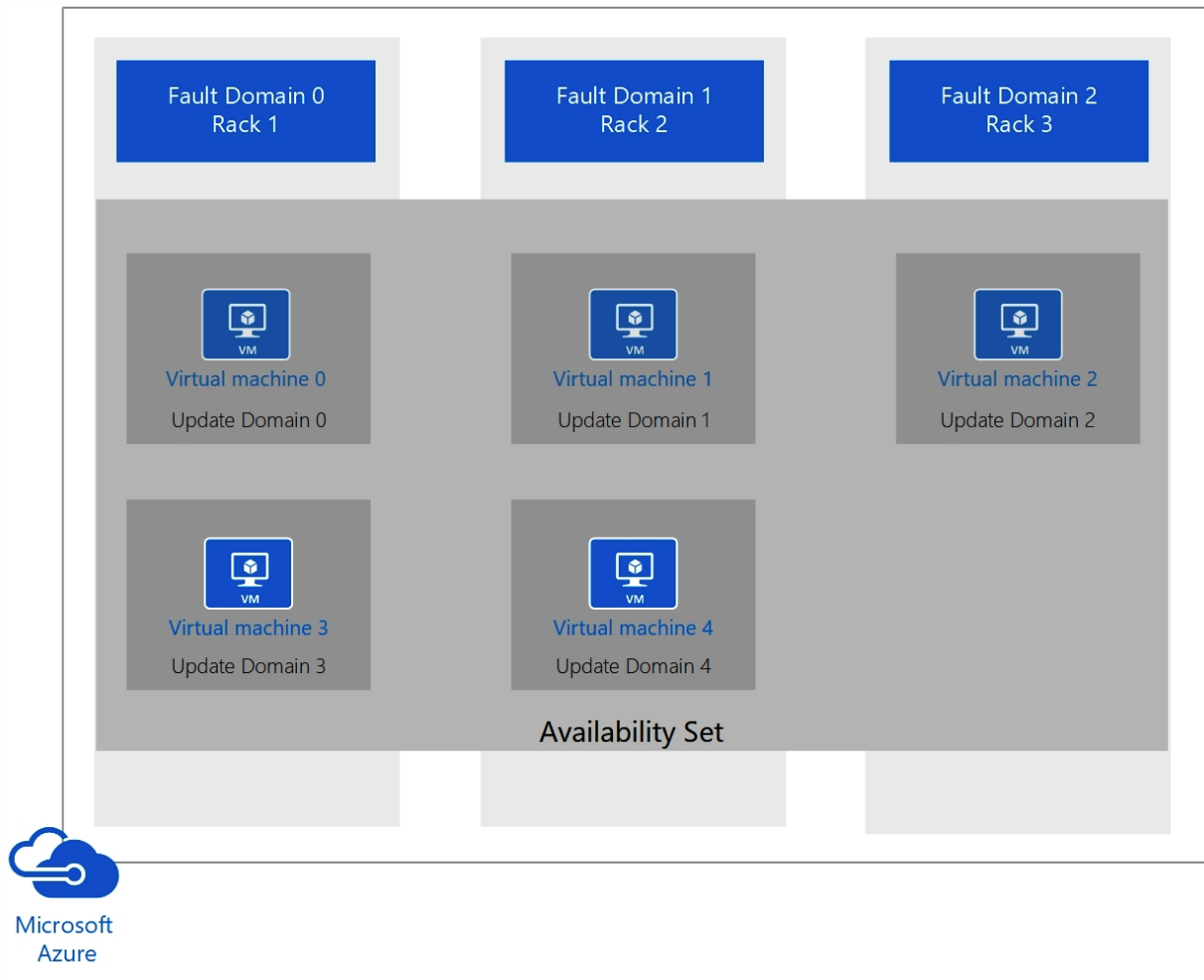
Virtual machines
PuttySoft Inc

+ Add   ⏱ Reservations   ▦ Edit columns   ↻ Refresh | 🏷 Assign tags   ▶ Start   ↻ Restart   ⏹ Stop   🗑 Delete   ⚏ Services

Subscription ___ __4 selected__ — Don't see a subscription? **Open Directory + Subscription settings**

| Filter by name... | 3 subscriptions ⌄ | All resource groups ⌄ | All types ⌄ | All locations ⌄ | All tags ⌄ | No grouping ⌄ |

2 items

	NAME ↑↓	TYPE ↑↓	STATUS	RESOURCE GROUP ↑↓	LOCATION ↑↓	MAINTENANCE STATUS	SUBSCRIPTION ↑↓	
☐	🖥 Linux	Virtual machine	Stopped (deallocated)	**PacktResourcegroup**	West Europe	-	SZ 1	⋯
☐	🖥 PacktFileServer	Virtual machine	Stopped (deallocated)	**PacktFileShareResourceGroup**	East US	-	SZ 1	⋯

Create a virtual machine

Basics   **Disks**   Networking   Management   Advanced   Tags   Review + create

Azure VMs have one operating system disk and a temporary disk for short-term storage. You can attach additional data disks. The size of the VM determines the type of storage you can use and the number of data disks allowed. Learn more

Disk options

OS disk type * ⓘ

Premium SSD	⌄

Enable Ultra Disk compatibility ⓘ   ◯ Yes ⦿ No

Data disks

Ultra Disk compatibility is not available for this VM size and location.

You can add and configure additional data disks for your virtual machine or attach existing disks. This VM also comes with a temporary disk.

LUN	Name	Size (GiB)	Disk type	Host caching

Create and attach a new disk   Attach an existing disk

⌄ **Advanced**

Create a virtual machine

Basics   Disks   Networking   **Management**   Advanced   Tags   Review + create

Configure monitoring and management options for your VM.

Azure Security Center

Azure Security Center provides unified security management and advanced threat protection across hybrid cloud workloads.
Learn more

✅ Your subscription is protected by Azure Security Center basic plan.

Monitoring

Boot diagnostics ⓘ
- ⦿ Enable with managed storage account (recommended)
- ◯ Enable with custom storage account
- ◯ Disable

OS guest diagnostics ⓘ   ◯ On   ⦿ Off

Identity

System assigned managed identity ⓘ   ◯ On   ⦿ Off

Azure Active Directory

Login with AAD credentials (Preview) ⓘ   ◯ On   ⦿ Off

> ⚠ This image does not support Login with AAD.

Auto-shutdown

Enable auto-shutdown ⓘ   ◯ On   ⦿ Off

Backup

Enable backup ⓘ   ◯ On   ⦿ Off

Guest OS updates

Patch installation ⓘ
- ◯ Azure-orchestrated patching (preview): patches will be installed by Azure
- ⦿ OS-orchestrated patching: patches will be installed by OS
- ◯ Manual patching: Install patches yourself or through a different patching solution.

> ⓘ Your subscription is not registered to use Azure-orchestrated patching. Learn more ↗

| Review + create | | < Previous | | Next : Advanced > |

Create a virtual machine

Basics   Disks   **Networking**   Management   Advanced   Tags   Review + create

Define network connectivity for your virtual machine by configuring network interface card (NIC) settings. You can control ports, inbound and outbound connectivity with security group rules, or place behind an existing load balancing solution. Learn more

Network interface

When creating a virtual machine, a network interface will be created for you.

Virtual network * ⓘ	(new) PacktVMGroup-vnet ⌄
	Create new
Subnet * ⓘ	(new) default (10.0.0.0/24) ⌄
Public IP ⓘ	(new) PacktWindowsVM-ip ⌄
	Create new

NIC network security group ⓘ   ○ None   ● Basic   ○ Advanced

Public inbound ports * ⓘ   ○ None   ● Allow selected ports

Select inbound ports * | RDP (3389) ⌄ |
|---|

> ⚠ **This will allow all IP addresses to access your virtual machine.** This is only recommended for testing. Use the Advanced controls in the Networking tab to create rules to limit inbound traffic to known IP addresses.

Accelerated networking ⓘ   ○ On   ● Off

The selected VM size does not support accelerated networking.

Load balancing

You can place this virtual machine in the backend pool of an existing Azure load balancing solution.   Learn more

Place this virtual machine behind an existing load balancing solution?   ○ Yes   ● No

---

[Review + create]   [< Previous]   [Next : Management >]

Create a virtual machine

Basics   Disks   Networking   **Management**   Advanced   Tags   Review + create

Configure monitoring and management options for your VM.

Azure Security Center

Azure Security Center provides unified security management and advanced threat protection across hybrid cloud workloads.
Learn more

✅ Your subscription is protected by Azure Security Center standard plan.

Monitoring

Boot diagnostics ⓘ   ⦿ On ◯ Off

OS guest diagnostics ⓘ   ◯ On ⦿ Off

Diagnostics storage account * ⓘ

| (new) packtvmgroupdiag156 | ⌄ |

Create new

Identity

System assigned managed identity ⓘ   ◯ On ⦿ Off

Azure Active Directory

Login with AAD credentials (Preview) ⓘ   ◯ On ⦿ Off

⚠ This image does not support Login with AAD.

Auto-shutdown

Enable auto-shutdown ⓘ   ⦿ On ◯ Off

Shutdown time ⓘ

| 7:00:00 PM |

Time zone ⓘ

| (UTC) Coordinated Universal Time | ⌄ |

Notification before shutdown ⓘ   ◯ On ⦿ Off

Backup

Enable backup ⓘ   ◯ On ⦿ Off

| Review + create | | < Previous | | Next : Advanced > |
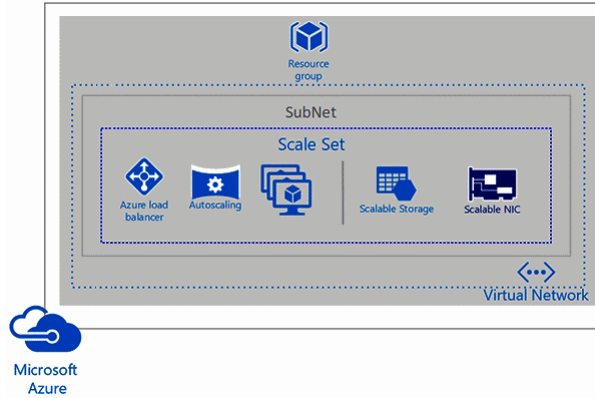
AUTOSCALE

Autoscale ⓘ	○ Disabled ● Enabled
Minimum number of VMs * ⓘ	1
Maximum number of VMs * ⓘ	10

Scale out

CPU threshold (%) * ⓘ	75
Number of VMs to increase by * ⓘ	1

Scale in

CPU threshold (%) * ⓘ	25
Number of VMs to decrease by * ⓘ	1

NETWORKING

Microsoft Azure Application Gateway is a dedicated virtual appliance providing application delivery controller (ADC) as a service.
Azure Load Balancer allows you to scale your applications and create high availability for your services.
Learn more about load balancer differences

Resources	Optimal for	Supported Protocols	SSL offloading	RDP to instance
Application Gateway	Web-based traffic	HTTP/HTTPS/WebSoc...	Supported	Not supported
Load balancer	Stream-based traffic	Any	Not supported	Supported

Choose Load balancing options	○ Application Gateway ○ Load balancer ● None

Configure virtual networks

Virtual network * ⓘ	(new) PacktVMGroup-vnet ⌄
	Create new
Subnet *	(new) default (10.0.0.0/24) ⌄
Public IP address per instance ⓘ	○ On ● Off
Accelerated networking ⓘ	○ On ● Off

Create storage account

✓ Validation passed

Basics   Advanced   Tags   **Review + create**

BASICS

Subscription	SZ 1
Resource group	(new) PacktARMResourceGroup
Location	(US) East US
Storage account name	packtarm
Deployment model	Resource manager
Account kind	StorageV2 (general purpose v2)
Replication	Read-access geo-redundant storage (RA-GRS)
Performance	Standard
Access tier (default)	Hot

ADVANCED

Secure transfer required	Enabled
Allow access from	All networks
Hierarchical namespace	Disabled
Blob soft delete	Disabled

Create	Previous	Next	Download a template for automation

Template

Download Add to library Deploy

ℹ Automate deploying resources with Azure Resource Manager templates in a single, coordinated operation. Define resources and configurable input parameters and deploy with script or code.

Template Parameters Scripts

▶ ✳ Parameters (6)
📄 Variables (0)
▼ ☁ Resources (1)
   📦 [parameters('storageAccountN...

```json
1  {
2      "$schema": "http://schema.management.azure.com/schemas/2015-01-01/deploymentTemplate.json#",
3      "contentVersion": "1.0.0.0",
4      "parameters": {
5          "location": {
6              "type": "string"
7          },
8          "storageAccountName": {
9              "type": "string"
10         },
11         "accountType": {
12             "type": "string"
13         },
14         "kind": {
15             "type": "string"
16         },
17         "accessTier": {
18             "type": "string"
19         },
20         "supportsHttpsTrafficOnly": {
21             "type": "bool"
22         }
23     },
24     "variables": {},
25     "resources": [
26         {
27             "name": "[parameters('storageAccountName')]",
28
29             "apiVersion": "2019-06-01",
30             "location": "[parameters('location')]",
31             "properties": {
32                 "accessTier": "[parameters('accessTier')]",
33                 "supportsHttpsTrafficOnly": "[parameters('supportsHttpsTrafficOnly')]"
34             },
35             "dependsOn": [],
36             "sku": {
37                 "name": "[parameters('accountType')]"
38             },
39             "kind": "[parameters('kind')]",
40             "tags": {}
41         }
42     ],
43     "outputs": {}
44  }
```

Template

⤓ Download   💾 Add to library   ⬆ Deploy

ℹ Automate deploying resources with Azure Resource Manager templates in a single, coordinated operation. Define resources and configurable input par

Template   Parameters   Scripts

```json
1  {
2      "$schema": "https://schema.management.azure.com/schemas/2015-01-01/deploymentParameters.json#",
3      "contentVersion": "1.0.0.0",
4      "parameters": {
5          "location": {
6              "value": "eastus"
7          },
8          "storageAccountName": {
9              "value": "packtarm1"
10         },
11         "accountType": {
12             "value": "Standard_RAGRS"
13         },
14         "kind": {
15             "value": "StorageV2"
16         },
17         "accessTier": {
18             "value": "Hot"
19         },
20         "supportsHttpsTrafficOnly": {
21             "value": true
22         }
23     }
24  }
```

Custom deployment
Deploy from a custom template

Learn about template deployment

ℹ Read the docs ↗

🖉 Build your own template in the editor

Common templates

🖥 Create a Linux virtual machine

🖥 Create a Windows virtual machine

🌐 Create a web app

🗄 Create a SQL database

Load a GitHub quickstart template

Select a template (disclaimer) ℹ

| Type to start filtering... | ⌄ |

Edit template
Edit your Azure Resource Manager template

+ Add resource **↑ Quickstart template** **↑ Load file** **↓ Download**

- ▶ ⚙ Parameters (6)
- 📄 Variables (0)
- ▼ 📦 Resources (1)
  - 🗄 [parameters('storageAccountN...

```
1  {
2      "$schema": "http://schema.management.azure.com/schemas/2015-01-01/deploymentTemplate.json#",
3      "contentVersion": "1.0.0.0",
4      "parameters": {
5          "location": {
6              "type": "string"
7          },
8          "storageAccountName": {
9              "type": "string"
10         },
11         "accountType": {
12             "type": "string"
13         },
14         "kind": {
15             "type": "string"
16         },
17         "accessTier": {
18             "type": "string"
19         },
20         "supportsHttpsTrafficOnly": {
21             "type": "bool"
22         }
23     },
24     "variables": {},
25     "resources": [
26         {
27             "name": "[parameters('storageAccountName')]",
28             "type": "Microsoft.Storage/storageAccounts",
29             "apiVersion": "2018-07-01",
30             "location": "[parameters('location')]",
31             "properties": {
32                 "accessTier": "[parameters('accessTier')]",
33                 "supportsHttpsTrafficOnly": "[parameters('supportsHttpsTrafficOnly')]"
34             },
35             "dependsOn": [],
36             "sku": {
37                 "name": "[parameters('accountType')]"
38             },
39             "kind": "[parameters('kind')]"
40         }
41     ],
42     "outputs": {}
43  }
```

Save **Discard**

📦 **PacktARMResourceGroup**
Resource group

📌 ✕

🔍 Search (Ctrl+/) «

+ Add **⊞ Edit columns** **🗑 Delete resource group** **→ Refresh** **→ Move** **↓ Export to CSV** **🔗 Assign tags** **🗑 Delete** **↓ Export template** **♡ Feedback**

⊡ Overview	Subscription (change) : Microsoft Azure Sponsorship	Deployments : 1 Succeeded
📄 Activity log	Subscription ID : 60ad227c-01b2-4da3-ac97-43e704fdba0c	
🔑 Access control (IAM)	Tags (change) : Click here to add tags	
🏷 Tags		
⚡ Events	

Settings

- 🔍 Quickstart
- ⓞ Resource costs
- ⬆ Deployments

Filter by name...   (Type == all ⊗) (Location == all ⊗) (+▽ Add filter)

Showing 1 to 1 of 1 records. ☐ Show hidden types ⓘ   No grouping ▼

☐ Name ↑↓	Type ↑↓	Location ↑↓	
☐ 🗄 fd3wz52dzswhestorage ←	Storage account	East US	...

ℹ To export relate~~~~~~~~~~ the resources from the Resource Group view then select the "Export template" option from the tool bar.

☑ Include parameters ⓘ

Template   Parameters   Scripts

▶ ✳ Parameters (9)
　📄 Variables (0)
▼ 📦 Resources (12)
　　🛡 [parameters('networkSecurityGr...
　　🖥 [parameters('publicIPAddresses...
　　🖥 [parameters('publicIPAddresses...
　　⟨⟩ [parameters('virtualNetworks_P...
　　☁ [concat(parameters('networkSe...
　　☁ [concat(parameters('networkSe...
　　☁ [concat(parameters('virtualNet...
　　📊 [parameters('availabilitySets_Pa...
　　🖥 [parameters('virtualMachines_P...
　　🖥 [parameters('virtualMachines_P...
　　🟩 [parameters('networkInterfaces...
　　🟩 [parameters('networkInterfaces...

```json
 1  {
 2      "$schema": "https://schema.management.azure.com/schemas/2015-01-01/deploymentTemplate.json#",
 3      "contentVersion": "1.0.0.0",
 4      "parameters": {
 5          "virtualMachines_PacktVM1_name": {
 6              "defaultValue": "PacktVM1",
 7              "type": "String"
 8          },
 9          "virtualMachines_PacktVM2_name": {
10              "defaultValue": "PacktVM2",
11              "type": "String"
12          },
13          "virtualNetworks_PacktVnet_name": {
14              "defaultValue": "PacktVnet",
15              "type": "String"
16          },
17          "networkInterfaces_PacktVM1_name": {
18              "defaultValue": "PacktVM1",
19              "type": "String"
20          },
21          "networkInterfaces_PacktVM2_name": {
22              "defaultValue": "PacktVM2",
23              "type": "String"
24          },
25          "availabilitySets_PacktVMAvailabilitySet_name": {
26              "defaultValue": "PacktVMAvailabilitySet",
27              "type": "String"
28          },
29          "publicIPAddresses_PacktPublicIpAddress1_name": {
30              "defaultValue": "PacktPublicIpAddress1",
31              "type": "String"
32          },
33          "publicIPAddresses_PacktPublicIpAddress2_name": {
34              "defaultValue": "PacktPublicIpAddress2",
35              "type": "String"
36          },
37          "networkSecurityGroups_PacktNetworkSecurityGroup_name": {
38              "defaultValue": "PacktNetworkSecurityGroup",
39              "type": "String"
40          }
```

Azure DevOps

Almost done...

Name your Azure DevOps organization

dev.azure.com/   bh-packtpub

We'll host your projects in

| UK South | ⌄ |

Continue

Create a project to get started

Project name *

```
AZ303Guide
```
✓

Description

```
|
```

Visibility

⊕ ○ **Public**	🔒 ◉ **Private**
Anyone on the internet can view the project. Certain features like TFVC are not supported.	Only people you give access to will be able to view this project.

⌄ **Advanced**

+ Create project

Azure DevOps   bh-packtpub / AZ303Guide / Repos / Files / ◆AZ303Guide ⌄

A AZ303Guide +

- Overview
- Boards
- Repos
- Files
- Commits
- Pushes
- Branches
- Tags
- Pull requests
- Pipelines
- Test Plans
- Artifacts

AZ303Guide is empty. Add some code!

Clone to your computer

| HTTPS | SSH | https://bh-packtpub@dev.azure.com/bh-packtpub/AZ303Guide/ | ⎘ |

Generate Git Credentials

ⓘ Having problems authenticating in Git? Be sure to get the latest version Git for Windows or our plugins for

Push an existing repository from command line

| HTTPS | SSH |

```
git remote add origin https://bh-packtpub@dev.azure.com/bh-packtpub
/AZ303Guide/_git/AZ303Guide
git push -u origin --all
```
⎘

Import a repository

Import

Initialize ⑂master branch with a README or gitignore

☑ Add a README   Add a .gitignore: None ⌄   Initialize

Import a Git repository   ✕

Repository type

| ◆ Git | ⌄ |

Clone URL *

```
'Microsoft-Azure-Architect-Technologies-Exam-Guide-AZ-303.g
```

☐ Requires Authentication

Cancel   **Import**

New Azure service connection

Azure Resource Manager using service principal (automatic)

✕

Scope level

- ⦿ Subscription
- ◯ Management Group
- ◯ Machine Learning Workspace

Subscription

PacktPub (f9483dab-48b4-4a40-9420-8b916e6b33c9)	⌄

Resource group

	⌄

Details

Service connection name

PacktPubServiceConnection

Description (optional)

Security

☑ Grant access permission to all pipelines

Learn more

Troubleshoot

Back   **Save**

bh-packtpub / AZ303Guide / Pipelines

✓ Connect   ✓ Select   Configure   Review

New pipeline
Configure your pipeline

ASP.NET
Build and test ASP.NET projects.

ASP.NET Core (.NET Framework)
Build and test ASP.NET Core projects targeting the full .NET Framework.

.NET Desktop
Build and run tests for .NET Desktop or Windows classic desktop solutions.

Universal Windows Platform
Build a Universal Windows Platform project using Visual Studio.

Xamarin.Android
Build a Xamarin.Android project.

Xamarin.iOS
Build a Xamarin.iOS project.

Starter pipeline
Start with a minimal pipeline that you can customize to build and deploy your code.

Existing Azure Pipelines YAML file
Select an Azure Pipelines YAML file in any branch of the repository.

Show more

Select an existing YAML file ✕

Select an Azure Pipelines YAML file in any branch of the repository.

Branch
ℬ master ▾

Path
/Chapter03/pipeline.yaml ▾

Select a file from the dropdown or type in the path to your file

AZ303Guide ↗

Cancel   Continue

New pipeline
Review your pipeline YAML

Variables   Run ▾

◆ AZ303Guide / Chapter03/**pipeline.yaml** ⊟   ⊞ Show assistant

```
25          vmImage: windows-2019
26        steps:
          Settings
27        - task: DownloadPipelineArtifact@2
28          inputs:
29            buildType: 'current'
30            artifactName: 'VirtualMachines'
31            targetPath: '$(Pipeline.Workspace)'
32
          Settings
33        - task: AzureResourceGroupDeployment@2
34          displayName: 'Azure Deployment: LinuxVM '
35          inputs:
36            azureSubscription: 'PacktPubServiceConnection'
37            resourceGroupName: 'packtpubdevopsdeployresourcegroup'
38            location: eastus
39            csmFile: '$(Pipeline.Workspace)\Chapter03\azuredeploy.json'
40            csmParametersFile: '$(Pipeline.Workspace)\Chapter03\azuredeploy.parameters.json'
41
```

Stages   Jobs

Build and Publish VM		DeployVirtualMachi...	
✅ Build and Publish VM		✅ DeployVirtualMachi...	
1 job completed	1m 59s	1 job completed	1m 16s
🗄 1 artifact			

Create dedicated host

Project details

Select the subscription to manage deployed resources and costs. Use resource groups like folders to organize and manage all your resources.

Subscription * ⓘ

PacktPub ▾

Resource group * ⓘ

(New) dedicatedhostsresourcegroup ▾

Create new

Instance details

Name * ⓘ

PacktPubDedicatedHost ✓

Location * ⓘ

(Europe) UK South ▾

Hardware profile

Host group * ⓘ

PacktPubHostGroup ▾

Create new host group

Size family * ⓘ

Standard DSv3 Family - Type 1 ▾

Fault domain *

1 ▾

Automatically replace host on failure * ⓘ   Enabled | Disabled

Save money

Save money by using licenses you already own. Learn more about Azure Hybrid Benefit

Already have Windows Server licenses? *   ◯ Yes   ⦿ No

Already have SQL Server licenses? *   ◯ Yes   ⦿ No

[Review + create]   [< Previous]   [Next : Tags >]

Create a virtual machine

Basics   Disks   Networking   Management   **Advanced**   Tags   Review + create

Add additional configuration, agents, scripts or applications via virtual machine extensions or cloud-init.

Extensions

Extensions provide post-deployment configuration and automation.

Extensions ⓘ   **Select an extension to install**

Custom data

Pass a script, configuration file, or other data into the virtual machine while it is being provisioned. The data will be saved on the VM in a known location. Learn more about custom data for VMs ⧉

Custom data
┌───┐
│   │
│   │
│   │
│   │
└───┘

> ⓘ Custom data on the selected image will be processed by cloud-init. Learn more about custom data and cloud init ⧉

Host

Azure Dedicated Hosts allow you to provision and manage a physical server within our data centers that are dedicated to your Azure subscription. A dedicated host gives you assurance that only VMs from your subscription are on the host, flexibility to choose VMs from your subscription that will be provisioned on the host, and the control of platform maintenance at the level of the host. Learn more

Host group ⓘ | PacktPubHostGroup | Zone (none) | uksouth   ⌄ |

Host ⓘ | PacktPubDedicatedHost   ⌄ |

Proximity placement group

Proximity placement groups allow you to group Azure resources physically closer together in the same region. Learn more

Proximity placement group ⓘ | No proximity placement groups found   ⌄ |

> ⓘ Proximity placement groups cannot be used with dedicated hosts.

VM generation

Generation 2 VMs support features such as UEFI-based boot architecture, increased memory and OS disk size limits, Intel® Software Guard Extensions (SGX), and virtual persistent memory (vPMEM).

VM generation ⓘ   ◉ Gen 1   ○ Gen 2

> ⓘ Generation 2 VMs do not yet support some Azure platform features, including Azure Disk Encryption.

───

[**Review + create**]   [< Previous]   [Next : Tags >]

Chapter 4: Implementing and Managing Virtual Networking

Add route

PacktRoutingTable

Route name *

DefaultRoute ✓

Address prefix * ⓘ

0.0.0.0/0 ✓

Next hop type ⓘ

Virtual appliance ⌄

Next hop address * ⓘ

10.1.1.10 ✓

ⓘ Ensure you have IP forwarding enabled on your virtual appliance. You can enable this by navigating to the respective network interface's IP address settings.

OK

Chapter 5: Creating Connectivity between Virtual Networks

```
Azure:/
PS Azure:\> Get-AzVirtualNetworkGatewayConnection -Name $Connection02 -ResourceGroupName $RG2
Name                    : VNet2toVNet1
ResourceGroupName       : PacktResourceGroup2
Location                : westus
Id                      : /subscriptions/8f6d0408-6d33-4e86-81c3-c817b3d7e060/resourceGroups/PacktResourceGroup2/
Etag                    : W/"87a21e84-949c-4582-bc1f-2c7c7080377e"
ResourceGuid            : f477c780-111b-4d4d-bb1d-d592df8e8f2f
ProvisioningState       : Succeeded
Tags                    :
AuthorizationKey        :
VirtualNetworkGateway1  : "/subscriptions/8f6d0408-6d33-4e86-81c3-c817b3d7e060/resourceGroups/PacktResourceGroup2/
VirtualNetworkGateway2  : "/subscriptions/8f6d0408-6d33-4e86-81c3-c817b3d7e060/resourceGroups/PacktResourceGroup1/
LocalNetworkGateway2    :
Peer                    :
RoutingWeight           : 0
SharedKey               : AzurePacktGateway
ConnectionStatus        : Connected
EgressBytesTransferred  : 0
IngressBytesTransferred : 0
TunnelConnectionStatus  : []
```

Chapter 6: Managing Azure Active Directory (Azure AD)

Users - All users
PuttySoft Inc - Azure Active Directory

All users	
Deleted users	
Password reset	
User settings	
Activity	
Sign-ins	
Audit logs	
Troubleshooting + Support	
Troubleshoot	
New support request	

+ New user   + New guest user   Reset password   Delete user   Multi-Factor Authentication   Refresh   Columns

Name

Search by name or email

NAME	USER NAME	USER TYPE

New user
PuttySoft Inc

> ⓘ Got a second? We would love your feedback on user creation →

◉ **Create user**

Create a new user in your organization. This user will have a user name like alice@sjoukjezaal.com.
I want to create users in bulk

○ **Invite user**

Invite a new guest user to collaborate with your organization. The user will be emailed an invitation they can accept in order to begin collaborating.
I want to invite guest users in bulk

Help me decide

Identity

User name ⓘ	PacktUser1 ✓ @ sjoukjezaal.com ⌄ 📋
	The domain name I need isn't shown here
Name * ⓘ	PacktUser1 ✓
First name	Packt ✓
Last name	User1 ✓

Password

◉ Auto-generate password
○ Let me create the password

Initial password   ········

☐ Show Password

Groups and roles

Groups	0 groups selected
Roles	User

Settings

Block sign in	Yes **No**
Usage location	Filter usage locations ⌄

Job info

Job title	Azure Administrator ✓
Department	IT ✓

[Create]

Directory roles

Choose admin roles that you want to assign to this user. Learn more

Search

Search by name or description

Type

All ⌄

	Role ↑↓	Description
☐	Application administrator	Can create and manage all aspects of app registrations and enterprise apps.
☐	Application developer	Can create application registrations independent of the 'Users can register applicatio…
☐	Authentication administrator	Has access to view, set, and reset authentication method information for any non-ad…
☐	Azure DevOps administrator	Can manage Azure DevOps organization policy and settings.
☐	Azure Information Protection adm…	Can manage all aspects of the Azure Information Protection product.
☐	B2C IEF Keyset administrator	Can manage secrets for federation and encryption in the Identity Experience Framew…
☐	B2C IEF Policy administrator	Can create and manage trust framework policies in the Identity Experience Framework.
☐	B2C user flow administrator	Can create and manage all aspects of user flows.
☐	B2C user flow attribute administra…	Can create and manage the attribute schema available to all user flows.
☐	Billing administrator	Can perform common billing related tasks like updating payment information.
☐	Cloud application administrator	Can create and manage all aspects of app registrations and enterprise apps except A…
☐	Cloud device administrator	Full access to manage devices in Azure AD.
☐	Compliance administrator	Can read and manage compliance configuration and reports in Azure AD and Office …
☐	Compliance data administrator	Can create and manage compliance content.
☐	Conditional Access administrator	Can manage conditional access capabilities.
☐	Customer LockBox access approver	Can approve Microsoft support requests to access customer organizational data.
☐	Desktop Analytics administrator	Can access and manage Desktop management tools and services.
☑	Directory readers	Can read basic directory information. Commonly used to grant directory read access …
☐	Dynamics 365 administrator	Can manage all aspects of the Dynamics 365 product.
☐	Exchange administrator	Can manage all aspects of the Exchange product.
☐	External Identity Provider administ…	Can configure identity providers for use in direct federation.
☐	Global administrator	Can manage all aspects of Azure AD and Microsoft services that use Azure AD identi…
☐	Global reader	Can read everything that a global administrator can, but not update anything.
☐	Groups administrator	Can manage all aspects of groups and group settings like naming and expiration pol…

Select

New user

PuttySoft Inc

ⓘ Got a second? We would love your feedback on user creation →

○ **Create user**	◉ **Invite user**
Create a new user in your organization. This user will have a user name like alice@sjoukjezaal.com.	Invite a new guest user to collaborate with your organization. The user will be emailed an invitation they can accept in order to begin collaborating.
I want to create users in bulk	I want to invite guest users in bulk

Help me decide

Identity

Name ⓘ	Sjoukje Zaal ✓
Email address * ⓘ	▭gmail.com ✓
First name	Sjoukje ✓
Last name	Zaal ✓

Personal message

Hi,

Welcome to my tenant!

Groups and roles

Groups	0 groups selected
Roles	User

Settings

Block sign in	Yes **No**
Usage location	Filter usage locations ▾

Job info

Job title	
Department	

Invite

Documentation ⧉   ✕

+ New user   + New guest user   🔑 Reset password   🗑 Delete user   ⧉ Multi-Factor Authentication   ↻ Refresh   ▤ Columns

All users	Name	Show
Deleted users	*Search by name or email*	All users ▾
Password reset		
User settings		

NAME		USER NAME	USER TYPE	SOURCE
PA	PacktUser1	PacktUser1@sjoukjezaal.com	Member	Azure Active Directory
PA	PacktUser2	PacktUser2@sjoukjezaal.com	Member	Azure Active Directory
PA	PacktUser3	PacktUser3@sjoukjezaal.com	Member	Azure Active Directory
☑ 🌐			Guest	Invited user
			Guest	
			Member	
			Member	
			Guest	
			Guest	

Activity
- 🔁 Sign-ins
- ▤ Audit logs

Troubleshooting + Support
- ✖ Troubleshoot
- 👤 New support request

+ New user   + New guest user   ↑ Bulk create   ↑ Bulk invite   ↑ Bulk delete   ↓ Download users   ↻ Refresh   🔑 Reset password   ⧉ Multi-Factor Authentication   🗑 Delete user

Search	Search attributes	Show
Name or email	Name, email (begins with) ▾	All users ▾

	Name	User name	User type
☐			
☐			
☐			
☐			
☑ PA	PacktUser1	PacktUser1@sjoukjezaal.com	Member
☑ PA	PacktUser2	PacktUser2@sjoukjezaal.com	Member
☑ PA	PacktUser3	PacktUser3@sjoukjezaal.com	Member

Password reset - Properties

💾 Save   ✕ Discard

✖ Diagnose and solve problems	**Self service password reset enabled** ⓘ
Manage	(None Selected **All**)
▥ Properties	
🛡 Authentication methods	ⓘ These settings only apply to end users in your organization. Admins are always enabled for self-service password reset and are required to use two authentication methods to reset their password. Click here to learn more about administrator password policies.
≡ Registration	
▦ Notifications	
▥ Customization	
⇄ On-premises integration	

Activity
- ▤ Audit logs
- 📊 Usage & insights

Troubleshooting + Support
- 👤 New support request

Password reset - Authentication methods

«

💾 Save ✕ Discard

Diagnose and solve problems

Manage

Ⅲ Properties

🛡 **Authentication methods**

≣ Registration

📗 Notifications

📊 Customization

↕ On-premises integration

Activity

📘 Audit logs

📈 Usage & insights

Troubleshooting + Support

👤 New support request

Number of methods required to reset ⓘ

[**1**   2]

Methods available to users

☐ Mobile app notification

☐ Mobile app code

☑ Email

☑ Mobile phone

☐ Office phone

☐ Security questions

> ⓘ These settings only apply to end users in your organization. Admins are always enabled for self-service password reset and are required to use two authentication methods to reset their password. Click here to learn more about administrator password policies.

⚙ **Devices** | Device settings
Square Connection Ltd - Azure Active Directory   ✕

«

💾 Save ✕ Discard | ♡ Got feedback?

🖥 All devices

⚙ **Device settings**

⚙ Enterprise State Roaming

🔑 BitLocker keys (Preview)

✕ Diagnose and solve problems

Activity

📘 Audit logs

👥 Bulk operation results (Preview)

Troubleshooting + Support

👤 New support request

[**All**   Selected   None]

Selected

No member selected

Users may register their devices with Azure AD ⓘ

[All   None]

ⓘ Learn more on how this setting works

Require Multi-Factor Auth to join devices ⓘ

[Yes   **No**]

Maximum number of devices per user ⓘ

[20   ⌄]

Additional local administrators on all Azure AD joined devices

Manage Additional local administrators on all Azure AD joined devices

Enterprise State Roaming

Manage Enterprise State Roaming settings

Devices - All devices
PuttySoft Inc - Azure Active Directory

Manage
- All devices
- Device settings
- Enterprise State Roaming

Activity
- Audit logs

Troubleshooting + Support
- Troubleshoot
- New support request

✓ Enable   ⊘ Disable   🗑 Delete   ⚙ Manage   ↻ Refresh   ⊞ Columns

ⓘ Learn more about activity timestamp and how to use it to manage stale devices in Azure Active Directory →

Enabled
All

Date Range
All

Apply

Search by name or device ID

Name	Enabled	OS	Version	Join Type	Owner	MDM	Compliant	Registered	Activity
HoloLens-	✓ Yes	Windows	Windows 10	Azure AD joined	Sjoukje Zaal	None	N/A	11/8/2017, 5:45:44 PM	11/8/2017, 5:45:44 PM
DESKTOP-	✓ Yes	Windows	10.0.15063.0	Azure AD joined	Sjoukje Zaal	None	N/A	5/3/2017, 3:31:38 PM	6/12/2019, 6:45:43 PM
DESKTOP-	✓ Yes	Windows	10.0.17763.0	Azure AD joined	Sjoukje Zaal	None	N/A	5/3/2019, 10:56:46 AM	6/1/2019, 8:31:15 PM
SZ-	✓ Yes	Windows	10.0.18362.0	Azure AD joined	Sjoukje Zaal	None	N/A	6/13/2019, 12:45:09 PM	11/7/2019, 4:33:26 AM
LB	✓ Yes	Windows	10.0.17134.0	Azure AD registered	Sjoukje Zaal	None	N/A	9/20/2019, 9:46:50 AM	11/11/2019, 10:49:08 ...
DE	✓ Yes	Windows	10.0.15063.0	Azure AD joined	Sjoukje Zaal	None	N/A	5/16/2017, 4:39:08 PM	5/16/2017, 4:39:08 PM
LB	✓ Yes	Windows	10.0.17134.0	Azure AD registered	Sjoukje Zaal	None	N/A	8/15/2019, 5:33:11 PM	9/16/2019, 9:44:05 AM

Device

⚙ Manage   ✓ Enable   ⊘ Disable   🗑 Delete

Name	DESKTOP-M8TO4M4
ID	
Enabled	Yes
OS	Windows
Version	10.0.15063.0
Join Type	Azure AD joined
Owner	Sjoukje Zaal
User name	
MDM	None
Compliant	N/A
Registered	5/3/2017, 3:31:38 PM
Activity	4/29/2019, 9:09:06 AM

BITLOCKER KEY ID	BITLOCKER RECOVERY KEY	DRIVE TYPE

No BitLocker key found for this device

Devices - Audit logs
PuttySoft Inc - Azure Active Directory

Manage
- All devices
- Device settings
- Enterprise State Roaming

Activity
- Audit logs

Troubleshooting + Support
- Troubleshoot
- New support request

⭳ Download   ↻ Refresh   ⊞ Columns   ♡ Got feedback?

Date : Last 1 month   Show dates as: Local   Service : Core Directory   Category : Device   Activity : All   + Add filters

Date		Service	Category		Activity		Status	Status reason	Target(s)	Initiated by (actor)
11/11/2019, 10:51:25 AM	↑↓	Core Directory	Device	↑↓	Update device	↑↓	Success			Device Registration Service
11/7/2019, 4:36:37 AM		Core Directory	Device		Update device		Success			Device Registration Service
10/23/2019, 6:02:10 AM		Core Directory	Device		Update device		Success			Device Registration Service
10/19/2019, 7:42:37 AM		Core Directory	Device		Update device		Success			Device Registration Service

+ Add custom domain   ↻ Refresh   ✕ Troubleshoot | ☷ Columns

ⓘ Looking to move an on-premises application to the cloud and use Azure Active Directory Domain Services?

🔍 Search domains ✕   ⊹∇ Add filters

Name	Status
▓▓▓▓.onmicrosoft.com	✅ Available
▓▓▓▓.com	✅ Verified

Custom domain name   ✕
PuttySoft Inc

* Custom domain name ⓘ

packtpub.com   ✓

Add domain

packtpub.com
Custom domain name

🗑 Delete

ⓘ To use packtpub.com with your Azure AD, create a new TXT record with your domain name registrar using the info below.

RECORD TYPE	TXT MX
ALIAS OR HOST NAME	@ 📋
DESTINATION OR POINTS TO ADDRESS	MS=ms19059692 📋
TTL	3600 📋

Share these settings via email

Verify domain
Verification will not succeed until you have configured your domain with your registrar as described above.

Verify

Chapter 7: Implementing Multi-Factor Authentication (MFA)

verification options (learn more)

Methods available to users:
- ☑ Call to phone
- ☑ Text message to phone
- ☑ Notification through mobile app
- ☑ Verification code from mobile app or hardware token

trusted ips (learn more)

☑ Skip multi-factor authentication for requests from federated users on my intranet

Skip multi-factor authentication for requests from following range of IP address subnets

192.168.1.0/27

Ⓖ

⚠ Multi-Factor Authentication - Fraud alert

«   💾 Save   🗑 Discard | ♡ Got feedback?

Getting started

✕ Diagnose and solve problems

Settings

🔒 Account lockout

👥 Block/unblock users

⚠ Fraud alert

🔔 Notifications

⚙ OATH tokens

⚙ Phone call settings

👥 Providers

Fraud alert

Allow your users to report fraud if they receive a two-step verification request that they didn't initiate.

Allow users to submit fraud alerts

[**On**   Off]

Automatically block users who report fraud

[**On**   Off]

Code to report fraud during initial greeting

Default fraud code is 0

Multi-Factor Authentication - One-time bypass

✕

🚀 Getting started

✕ Diagnose and solve problems

Settings

🔒 Account lockout

👤 Block/unblock users

⚠ Fraud alert

🔔 Notifications

⚙ OATH tokens

⚙ Phone call settings

👥 Providers

Manage MFA Server

⚙ Server settings

◆ One-time bypass

☰ Caching rules

+ Add   🖫 Save   🗑 Discard | ♡ Got feedback?

One-time bypass

Allow a user to authenticate without performing two-step verification for a limited time.
The bypass goes into effect immediately, and expires after the specified
number of seconds. This feature only applies to MFA Server deployment.

Default one-time bypass seconds

300

Bypassed users

User	Reason	Date	Seconds	Action
No results				

Chapter 8: Implementing and Managing Hybrid Identities

Microsoft Azure Active Directory Connect

Express Settings

Welcome
Express Settings
Connect to Azure AD
Connect to AD DS
Configure

If you have a **single** Windows Server Active Directory forest, we will do the following:

- Configure synchronization of identities in the current AD forest of PACKTPUB
- Configure password hash synchronization from on-premises AD to Azure AD
- Start an initial synchronization
- Synchronize all attributes
- Enable Auto Upgrade

Learn more about express settings

If you would like different settings, click Customize.

[Customize]   [Use express settings]

Microsoft Azure Active Directory Connect

Connect to Azure AD

Welcome
Express Settings
Connect to Azure AD
Connect to AD DS
Configure

Enter your Azure AD global administrator credentials. ?

USERNAME

[████ @ ████.onmicrosoft.com]

PASSWORD

[••••••••••]

[Previous]   [Next]

Microsoft Azure Active Directory Connect

Connect to AD DS

Welcome
Express Settings
Connect to Azure AD
Connect to AD DS
Configure

Enter the Active Directory Domain Services enterprise administrator credentials: ?

USERNAME

[████████]

PASSWORD

[•••••••••••]

[Previous]   [Next]

Microsoft Azure Active Directory Connect

Ready to configure

Once you click Install, we will do the following:

- Install the synchronization engine
- Configure Azure AD Connector
- Configure sjoukjezaal.com Connector
- Enable Password hash synchronization
- Enable Auto Upgrade
- Configure synchronization services on this computer

☑ Start the synchronization process when configuration completes.

Welcome
Express Settings
Connect to Azure AD
Connect to AD DS
Configure

[Previous] [Install]

Microsoft Azure Active Directory Connect

Configuration complete

Azure AD Connect configuration succeeded. The synchronization process has been initiated.

The configuration is complete. You can now log in to the Azure or Office 365 portal to verify that user accounts from your local directory have been created. Then, do a test sign-on to the Azure portal. **Learn more**

The Active Directory Recycle Bin is not enabled for your forest (sjoukjezaal.com) and is strongly recommended. **Learn more**

Azure Active Directory is configured to use AD attribute mS-DS-ConsistencyGuid as the source anchor attribute. **Learn more**

Welcome
Express Settings
Connect to Azure AD
Connect to AD DS
Configure

[Previous] [Exit]

PuttySoft Inc - Azure AD Connect
Azure Active Directory

Search (Ctrl+/)

Troubleshoot **Refresh**

- Overview
- Getting started
- Diagnose and solve problems

Manage

- Users
- Groups
- Organizational relationships
- Roles and administrators
- Enterprise applications
- Devices
- App registrations
- Identity Governance
- Application proxy
- Licenses
- Azure AD Connect
- Custom domain names
- Mobility (MDM and MAM)
- Password reset
- Company branding
- User settings
- Properties
- Notifications settings
- Security

PROVISION FROM ACTIVE DIRECTORY

Azure AD Connect cloud provisioning

This feature allows you to manage provisioning from the cloud.

Manage provisioning (Preview)

Azure AD Connect sync

Sync Status	Enabled
Last Sync	More than 1 day ago
Password Hash Sync	Enabled

USER SIGN-IN

Federation	Disabled	0 domains
Seamless single sign-on	Disabled	0 domains
Pass-through authentication	Disabled	0 agents

STAGED ROLLOUT OF CLOUD AUTHENTICATION

This feature allows you to test cloud authentication and migrate gradually from federated authentication.

Enable staged rollout for managed user sign-in (Preview)

ON-PREMISES APPLICATIONS

Looking to configure remote access for on-premises applications? Head to Application Proxy

HEALTH AND ANALYTICS

Monitor your on-premises identity infrastructure and synchronization services in the cloud. Azure AD Connect Health

---

+ New user   + New guest user   ↑ Bulk create   ↑ Bulk invite   ↑ Bulk delete   ↓ Download users   ○ Refresh   🔑 Reset password   ☐ Multi-Factor Authentication   🗑 Delete user

Search
Name or email

Search attributes
Name, email (begins with)

Show
All users

Name	User name	User type	Source
On-Premises Directory Synchronization Servi	Sync_PacktDC_e5d912db3606@puttysoft.onmicroso...	Member	Windows Server AD
On-premises User	on-premises@sjoukjezaal.com	Member	Windows Server AD
PacktUser1	PacktUser1@sjoukjezaal.com	Member	Azure Active Directory
PacktUser2	PacktUser2@sjoukjezaal.com	Member	Azure Active Directory
PacktUser3	PacktUser3@sjoukjezaal.com	Member	Azure Active Directory

Welcome to Azure AD Connect

⚠ **The synchronization service scheduler is suspended until this setup wizard is closed.**
Learn more

Configure   Exit

Additional tasks

Welcome
Tasks

The required tasks for the scenario have been completed. Choose from the list below to perform additional tasks.

Privacy settings

View current configuration

Customize synchronization options

Configure device options ❓

Refresh directory schema

Configure staging mode

Change user sign-in

Manage federation ❓

Troubleshoot

Previous   Next

Connect to Azure AD

Welcome
Tasks
Connect to Azure AD
Sync
  Connect Directories
  Domain/OU Filtering
  Optional Features
Configure

Enter your Azure AD global administrator credentials for puttysoft.onmicrosoft.com - AAD. ❓

USERNAME
█████ @ █████ com

PASSWORD
●●●●●●●●●

Previous   Next

Microsoft Azure Active Directory Connect

Connect your directories

Enter connection information for your on-premises directories or forests. ❓

DIRECTORY TYPE

Active Directory ▾

FOREST ❓

sjoukjezaal.com ▾   Add Directory

CONFIGURED DIRECTORIES

sjoukjezaal.com (Active Directory)

Previous   Next

Microsoft Azure Active Directory Connect

Domain and OU filtering

If you change the OU-filtering configuration for a given directory, the next sync cycle will automatically perform full import on the directory.

Directory: sjoukjezaal.com ▾   Refresh Domains ❓

◉ Sync all domains and OUs
○ Sync selected domains and OUs

▷ ☑ sjoukjezaal.com

Previous   Next

Microsoft Azure Active Directory Connect

_ ✕

Welcome

Tasks

Connect to Azure AD

Sync

    Connect Directories

    Domain/OU Filtering

    Optional Features

Configure

Optional features

Select enhanced functionality if required by your organization.

☐ Exchange hybrid deployment ❓

☐ Exchange Mail Public Folders ❓

☐ Azure AD app and attribute filtering ❓

☑ Password hash synchronization ❓

☑ Password writeback ❓

☐ Group writeback ❓

☐ Device writeback ❓

☐ Directory extension attribute sync ❓

Learn more about optional features.

Previous   Next

Password reset - On-premises integration
PuttySoft Inc - Azure Active Directory

💾 Save ✕ Discard

Manage

||| Properties

🛡 Authentication methods

☰ Registration

📋 Notifications

📊 Customization

↕ On-premises integration

Activity

🖼 Audit logs

Troubleshooting + Support

✖ Troubleshoot

👤 New support request

✔ Your on-premises writeback client is up and running.

Write back passwords to your on-premises directory? ⓘ
Yes   No

Allow users to unlock accounts without resetting their password? ⓘ
Yes   No

completecloud.guru

{💠} Settings   🔄 Refresh   🗑 Delete

Essentials ∧

Forest name	Functional Level
completecloud.guru	Windows2016Forest
Domain naming master FSMO role	Schema master FSMO role
completecloud-d.completecloud.guru	completecloud-d.completecloud.guru

Domain Controllers, Domains and Sites

completecloud.guru
(1 of 1 DCs monitored)   ...

🌐 **Domains**
1 DOMAINS

🌐 **Sites**
1 SITES

Replication Status
completecloud.guru

0

DCs with errors

LDAP Successful Binds/sec from last 24 hours
(RIGHT-CLICK FOR MORE INFORMATION)
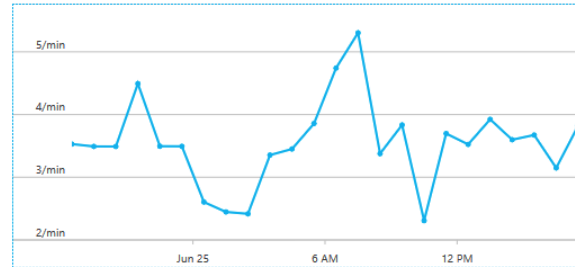
FABVM03.FABTOSO.COM
3.54 /min

Operations

Alerts
completecloud.guru

✅ **0** active

Active	0
Resolved from last 24 hours	0

MACHINE NAME	MIN	MAX	AVG
completecloud.guru	.04/s	0.09/s	0.06/s

Monitoring

Chapter 9: Managing Workloads in Azure

Data Box

Get your data to the cloud

Azure Migrate - Servers
Microsoft

Search (Ctrl+/)

- Overview

Migration goals

- Servers
- Databases
- VDI
- Web Apps
- Data Box

Manage

- Discovered items

Support + troubleshooting
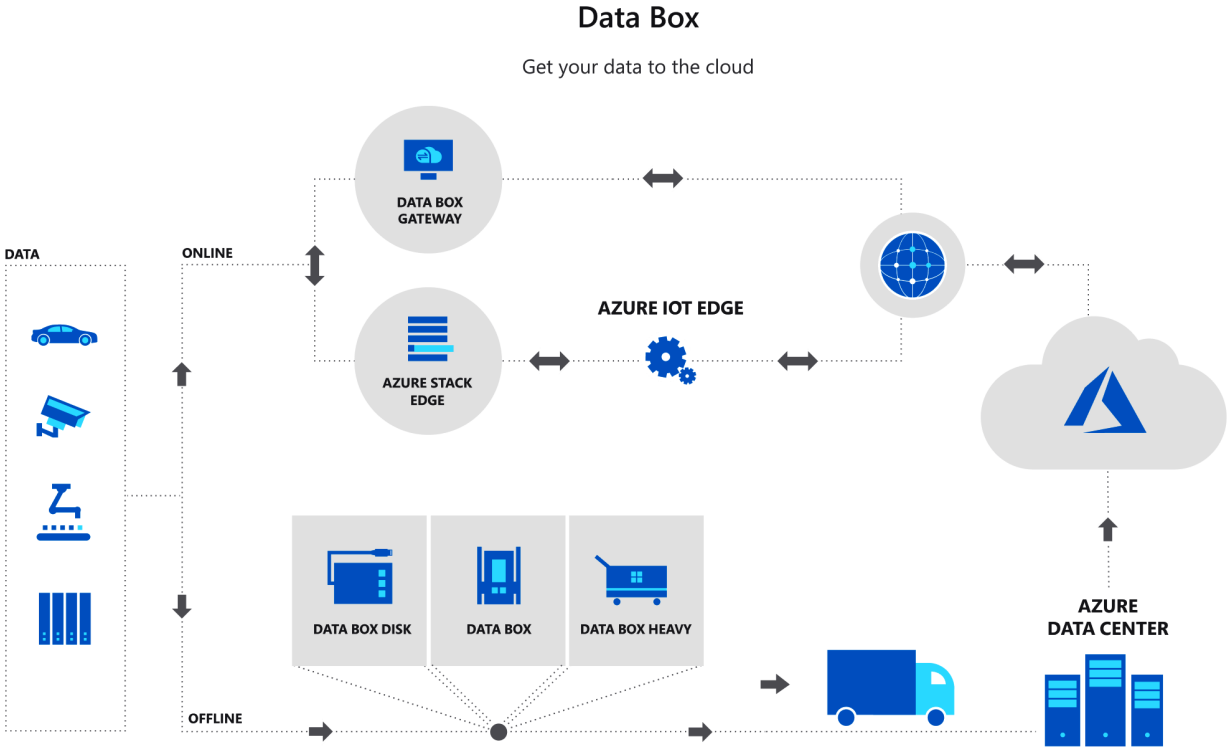
- New support request

Refresh

Last refreshed at: 11/19/2019, 8:16:21 AM (Click on "Refresh" to update the page)

Assessment tools

Azure Migrate: Server Assessment

Discover   Assess   Overview

Quick start

1: Discover
Discover your on-premises machines by using an appliance or importing in a CSV format. Click 'Discover' to get started.

2: Assess
Click 'Assess' to assess the discovered machines.

Add more assessment tools? Click here.

Migration tools

Azure Migrate: Server Migration

Discover   Replicate   Migrate   Overview

Quick start

1: Discover
Click "Discover" to start discovering your on-premises machines.

2: Replicate
Once your on-premises machines are discovered, click "Replicate" to start replicating the discovered machines.

3: Migrate
Once your machines have replicated, click "Migrate" to migrate your machines.

Add more migration tools? Click here.

Discover machines ✕

Are your machines virtualized?

Yes, with Hyper-V ⌄

To discover your on-premises or cloud environment, you will need to deploy the Azure Migrate appliance. Follow the steps below to set up and configure the appliance. Once set up, this appliance remains connected to Azure Migrate, and performs continuous discovery of your environment.

The discovery requires access credentials to the hosts and clusters that run the machines you want to discover. The discovery will also collect performance counters that can be used for performance based-assessments.

➕ **1: Generate Azure Migrate project key**

The Azure Migrate appliance enables you to discover your machines running on-premises or virtual machines running on-premises or on any cloud. Before downloading the appliance, you need to provide the appliance name and generate the Azure Migrate project key that must be copied to the appliance to complete its registration. During this step, some Azure resources will be created. Ensure you have the required permissions for the creation of these resources. Learn more

Name your appliance	PacktMigrate ✓	**Generate key**	Manage existing appliances

✅ All resources have been created successfully. Please find below the Azure Migrate project key to register the appliance for discovery of Hyper-V virtual machines.

Azure Migrate project key	PacktMigrate;PROD;eb77f960-8276-427e-a08e-b2ed3b6fd97a;/subscriptions/f9483dab-48b4-4a40-9420-8b916e6 ... 📋

Copy the key to the appliance configuration manager after setting up the appliance using the .VHD file or PowerShell script from the step below.

⬇ **2: Download Azure Migrate appliance**

After you have generated the Azure Migrate project key, you can either download the virtual machine image (.VHD) to set up the appliance or download the zip file (.zip) with the PowerShell script to install the appliance on an existing physical or virtual machine.

◉ .VHD file. 12GB   ○ .zip file. 50MB   **Download**   💡 Help me choose

▣ **3: Set up the appliance**

Before you start, ensure these prerequisites are met. To set up the appliance, either create a virtual machine on a host from the downloaded .VHD file or execute the PowerShell script from the downloaded .zip file on an existing physical or virtual machine (running Windows Server 2016, with 16 GB of memory, 8 vCPUs, around 80 GB of disk storage).
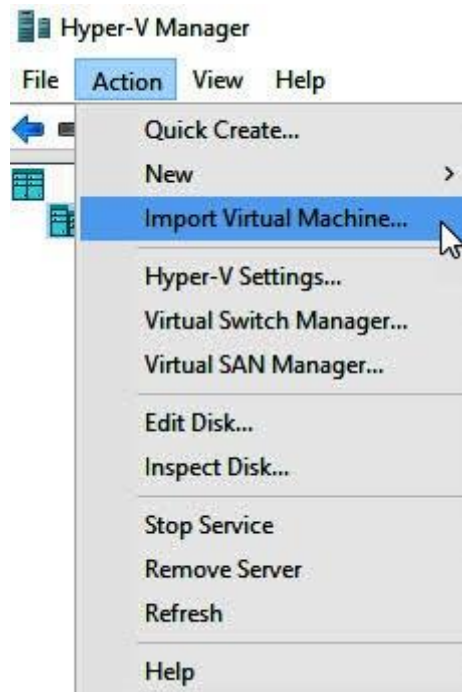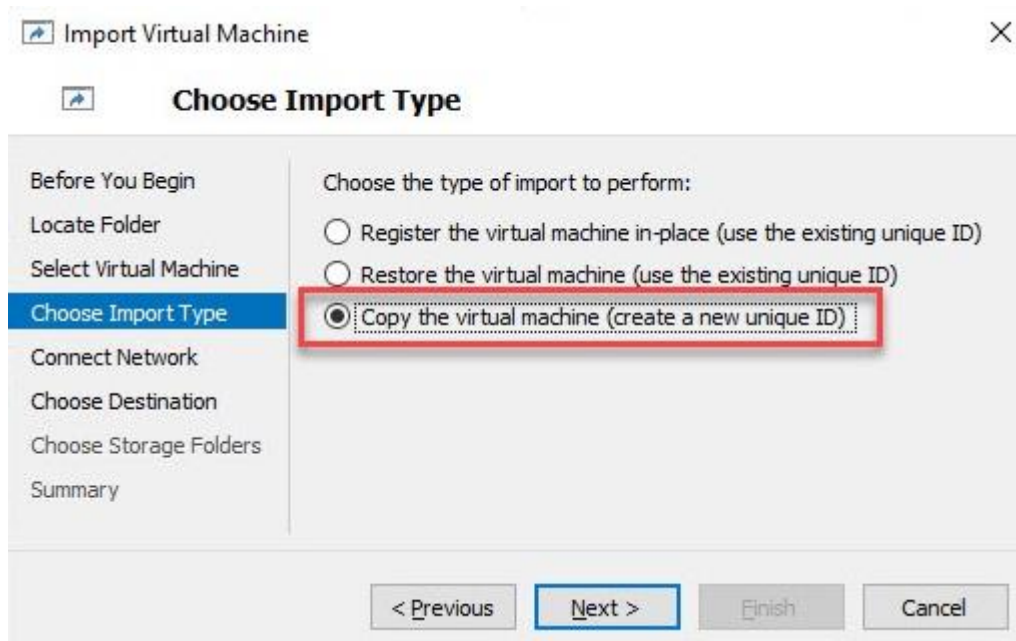
Set up discovery for Azure Migrate

Azure Migrate appliance helps you discover and assess your Hyper-V virtual machines. Complete the following steps to start discovery. Learn more about Azure Migrate discovery capabilities.

📋 Set up prerequisites
Verify and set up appliance prerequisites   ⌄

✅ Accepted license terms   View terms of use

☑ Use of the Azure Migrate Appliance (the "software") is licensed to you as
    part of your or your company's subscription for the Azure Migrate Service
    (the "service"). Your use of the software is governed by the agreement
    under which you or your company obtained the service (see Azure Legal
    Information). Microsoft assumes no responsibility or liability whatsoever
    for any non-Microsoft product made available to you through your use of
    the service or software. Customer is solely responsible for any non-
    Microsoft product that it installs or uses with the service or software and
    acknowledges that use shall be governed by the separate agreement(s)
    between Customer and the publisher of the non-Microsoft product. See
    TPN for third-party components included in the software.

✅ You are connected to the Internet   Set up proxy

✅ Time in sync with the Internet time server

✅ Latest Azure Migrate updates are installed

Continue

Register with Azure Migrate ⌄
Specify your Microsoft Azure account details

Login to Azure to proceed

Login

Continue

Azure Migrate Appliance

Set up discovery for Azure Migrate

Azure Migrate appliance helps you discover and assess your Hyper-V virtual machines. Complete the following steps to start discovery. Learn more about Azure Migrate discovery capabilities.

Set up prerequisites
Verify and set up appliance prerequisites

Register with Azure Migrate
Specify your Microsoft Azure account details

Choose the subscription and resource group that you used to set up Azure Migrate. The discovery and assessment metadata will be stored in the geography you selected while setting up Azure Migrate on the Azure portal. Learn more

Logged in ▮▮▮▮▮▮▮▮▮   Logout

Subscription
SZ 1

Migrate project
PacktMigrateProject(PacktMigrateProj

Enter Appliance Name
win-cddolih1vb ✕ ⑦

Register

Provide Hyper-V hosts details

Provide Hyper-V host and credential details to discover machines

⌄

Specify credentials to connect to Hyper-V hosts and clusters

These credentials are used to connect to the Hyper-V hosts and clusters being discovered. Learn more about permissions.

User name

[▓▓▓▓▓▓▓ ▓▓]

Password

[•••••••••]

Friendly name for credentials

[AssessmentAccount   ✕]

[Save details]

Provide list of Hyper-V hosts and clusters

You can provide the FQDN or the IP address of the host/cluster. Provide one entry per line

```
DEMOSERVER01
```

ⓘ You cannot remove entries after you start discovery.

[Validate]

Azure Migrate - Discovered items
Microsoft

ℹ️ Agentless dependency analysis is now available in preview. Click here to request access. →

Subscription : | Microsoft Azure Sponsorship   ⌄ | Migrate project | PacktMigrateProject (PacktAzureMigrateR... ⌄ |

Microsoft tools   Other tools

To view the machines discovered by the Azure Migrate appliance, click on the 'Azure Migrate appliance' tab. For all others machines, click 'Other'.

Azure Migrate appliance   Import based (Preview)   Other

Appliance name | ▓▓▓▓▓▓ (Hyper-V)   ⌄ |

| Search to filter rows | | | | | < Previous | Page 1 of 1 | Next > |

Name	IP address	Applications Discovered	Cores	Memory (MB)	Disks	Storage (GB)	Operating System
Azure-Migrate-Appliance	-	Not supported	1	2048	1	40.00	-
VM-APP03	192.168.178.33	Not supported	1	2048	1	50.00	Windows Server 2019 Data...
VM-APP01	192.168.178.34	Not supported	1	2048	1	50.00	Windows Server 2019 Data...
AzureMigrateAppliance_v2....	192.168.178.36,fe80::b1ec:1...	Not supported	2	4096	1	40.00	Windows Server 2016 Data...
Azure-Migrate-Appliance-S...	-	Not supported	1	4048	1	40.00	-
VM-APP02	-	Not supported	1	2024	1	50.00	-

Assess servers

An assessment is created on a group of machines that you migrate together. Assessment helps you determine Azure readiness of your on-premises machines.

Discovery source | Machines discovered from Azure Migrate applian... ⌄ |

Assessment name *
| PacktAssessment1   ✓ |

Assessment properties   (Showing 3 of 13)   View all
Migration target location   : West US 2
Sizing criterion   : Performance-based
Reserved instances   : 3 years reserved

Select or create a group
⦿ Create New   ◯ Use Existing

| PacktVMGroup   ✓ |

Add machines to the group   💡

Appliance name | win-saulp9h9nq (Hyper-V)   ⌄ |

Select all Clear selection | Search to filter machines |

	Name	IP address	Operating System	Machine Type
☐	Azure-Migrate-Appliance			Hyper-V
☑	VM-APP03	192.168.178.33	Windows Server 2019 Datacenter	Hyper-V
☑	VM-APP01	192.168.178.34	Windows Server 2019 Datacenter	Hyper-V
☐	AzureMigrateAppliance_v2.19.07.30	192.168.178.36,fe80::b1ec:1b7:66d3:d50f	Windows Server 2016 Datacenter Evaluation	Hyper-V
☐	Azure-Migrate-Appliance-Sjoukje			Hyper-V
☑	VM-APP02			Hyper-V

Create assessment

Assessment tools

Azure Migrate: Server Assessment

🔍 Discover   ⋲≡ Assess   ⊞ Overview

📱	Discovered servers	6
🖧	Groups	1
⋲≡	**Assessments**	**1**
🔔	Notifications	0

⚡ **Next step:** Start migrating your servers or optionally you can refine your application grouping with dependency analysis

Add more assessment tools? Click here.

🖊 Edit properties   ↓ Export assessment   ↻ Recalculate   🗑 Delete assessment

⚠ The confidence rating of the assessment is low, ensure that you wait for at least a day after starting discovery, before creating performance-based assessments. Learn more. →

Essentials   ⌄

Azure readiness

3

Ready for Azure	2
Ready with conditions	1
Not ready for Azure	0
Readiness unknown	0

Monthly cost estimate (USD)

51.5

Compute	42.5
Storage	9.02

Storage - Monthly cost estimate (USD)

9

Standard HDD managed disks	9.02
Standard SSD managed disks	0
Premium managed disks	0

Azure Migrate - Servers
Microsoft

Search (Ctrl+/)

Overview

Migration goals

Servers

Databases

VDI

Web Apps

Data Box

Manage

Discovered items

Support + troubleshooting

New support request

⟳ Refresh

Last refreshed at: 11/22/2019, 3:59:53 PM (Click on "Refresh" to update

Assessment tools

Azure Migrate: Server Assessment

🔍 Discover   ☰ Assess   ⊞ Overview

Discovered servers	6
Groups	1
Assessments	1
Notifications	0

⚡ **Next step:** Start migrating your servers or optionally you can refine your application grouping with dependency analysis

Add more assessment tools? Click here.

Migration tools

Azure Migrate: Server Migration

🔍 Discover   ⧉ Replicate   ↗ Migrate

🔧 Click "Discover" to get started.

Add more migration tools? Click here.

Discover machines

Are your machines virtualized? ⓘ

Yes, with Hyper-V	⌄

Target region ⓘ

West US	⌄

> ⓘ The target region for migration, once confirmed, cannot be changed for the project. After confirmation, the Server Migration tool (in this project) will allow replication and migration only to the selected target region.

☑ **Confirm that the target region for migration is "West US"**

Create resources

Discover machines

Are your machines virtualized? ⓘ

Yes, with Hyper-V	⌄

Target region ⓘ

West US	⌄

Prepare for replication by downloading and installing the replication provider software on your Hyper-V hosts. Follow the steps below to setup and configure Hyper-V host servers.

1. Prepare Hyper-V host servers.
Download the Hyper-V replication provider(AzureSiteRecoveryProvider.exe) software installer. Use the installer to install the replication provider on the Hyper-V servers.

Download the registration key file and use it to register the Hyper-V host to this Azure Migrate project.

Download

2. Finalize registration.
Prepare for replication by finalizing registration for the Hyper-V hosts.

Registered Hyper-V hosts   **0 (Connected)** Why do I not see any Hyper-V host?

> ⚠ At least one Hyper-V host must be registered to proceed with this step. Complete step 1 to proceed.

Finalize registration

Microsoft Azure Site Recovery Registration Wizard ✕

Vault Settings...

Vault Settings	Select the registration key file you downloaded from the Azure Site Recovery portal and specify vault settings. Learn More
Proxy Settings	
Registration	

Key file   PacktMigrateProject-MigrateVault-k3abqftn_PacktMigrateProject-Hype   [Browse]

Subscription   60ad227c-01b2-4da3-ac97-43e704fdba0c

Vault name   PacktMigrateProject-MigrateVault-k3abqftn

Hyper-V site name   PacktMigrateProject-HyperVSite

[Next]   [Cancel]

Microsoft Azure Site Recovery Registration Wizard ✕

Proxy Settings...

Vault Settings	Specify how the Provider running on the server connect to Azure Site Recovery. Connectivity will be verified when you click Next.
Proxy Settings	
Registration	**Click next to check connectivity with Azure Site Recovery Service.**

◉ Connect directly to Azure Site Recovery without a proxy server

◯ Connect to Azure Site Recovery using a proxy server

[Previous]   [Next]   [Cancel]

Discover machines

Are your machines virtualized? ⓘ

Yes, with Hyper-V ⌄

Target region ⓘ

West US ⌄

Prepare for replication by downloading and installing the replication provider software on your Hyper-V hosts. Follow the steps below to setup and configure Hyper-V host servers.

1. Prepare Hyper-V host servers.

Download the Hyper-V replication provider(AzureSiteRecoveryProvider.exe) software installer. Use the installer to install the replication provider on the Hyper-V servers.

Download the registration key file and use it to register the Hyper-V host to this Azure Migrate project.

Download

2. Finalize registration.

Prepare for replication by finalizing registration for the Hyper-V hosts.

Registered Hyper-V hosts   **1 (Connected)**

Why do I not see any Hyper-V host?

Finalize registration

Azure Migrate - Servers
Microsoft

Search (Ctrl+/) «

☁ Overview

Migration goals

🗄 Servers

🗄 Databases

🖥 VDI

☁ Web Apps

◆ Data Box

Manage

🔎 Discovered items

Support + troubleshooting

👤 New support request

Assessment tools

⊞ Azure Migrate: Server Assessment

🔍 Discover   ⅏ Assess   ⊞ Overview

🗄 Discovered servers		6
🔲 Groups		1
✅ Assessments		1
🔔 Notifications		0

⚡ **Next step:** Start migrating your servers or optionally you can refine your application grouping with dependency analysis

Add more assessment tools? Click here.

Migration tools

⊞ Azure Migrate: Server Migration

🔍 Discover   ⧉ Replicate   ↗ Migrate   ⊞ Overview

🗄 Discovered servers		6
🗄 Replicating servers		0
⚗ Test migrated servers		0
▧ Migrated servers		0

⚡ **Next step:** Start replicating your servers to Azure

Replicate

Source settings | **Virtual machines** | Target settings | Compute | Disks | Review + Start replication

Select the virtual machines to be migrated.

Import migration settings from an assessment? * ⓘ

Yes, apply migration settings from an Azure Migrate assessment	⌄

ⓘ Only VMs that can be replicated through the specified appliance (selected in the source settings step) and having a Azure Migrate assessment are shown. We will automatically populate compute and disk information from the latest Azure Migrate assessment published to this project. You have the option of overriding the selections.

Select group * ⓘ

PacktVMGroup	⌄

Select assessment * ⓘ

PacktAssessment1	⌄

* Virtual machines ⓘ

Search to filter machines	< Previous	Page 1	Next >

	Name	Azure VM Readi...	Host Name
☑	VM-APP03	⚠	DEMOSERVER01
☑	VM-APP01	✔	DEMOSERVER01
☑	VM-APP02	⚠	DEMOSERVER01

Selected items : 3

« Previous: Source settings | Next: Target settings

Replicate

Source settings   Virtual machines   **Target settings**   Compute   Disks   Review + Start replication

Select target properties for migration. Migrated machines will be created with the specified properties.

> ⚠ The region (West US) selected for the migration is different from the region (West US 2) specified in the selected assessment (PacktAssessment1). Costs may vary based on the selected region.

Region * ⓘ	West US ⌄
Subscription * ⓘ	Microsoft Azure Sponsorship ⌄
└─── Resource group * ⓘ	AzureMigratedVMsResourceGroup ⌄
* Replication Storage Account ⓘ	azuremigratestorage1 (Standard) ⌄
Virtual Network * ⓘ	MigrateVNet ⌄
Subnet * ⓘ	default ⌄

Azure Hybrid Benefit

Apply Azure Hybrid Benefit and save up to 49% vs. pay-as-you-go virtual machine costs with an eligible Windows Server license.

Already have an eligible Windows Server License? * ⓘ

Yes   No

[« Previous: Virtual machines]   [Next: Compute]

Replicate   ✕

Source settings   Virtual machines   Target settings   **Compute**   Disks   Review + Start replication

Select the Azure VM size and OS disk for the machines that are being migrated. Additionally, select an Availability Set if the migrated machine should be part of one. The OS disk is the disk that contains the operating system.

> ⓘ Target Azure VM sizes were automatically populated with the recommended sizes from the assessment PacktAssessment1.
> You can override the selected size by clicking the dropdown and selecting a different size.

Name	Source VM Size	Azure VM Size	OS Type	OS Disk	Availability Set
VM-APP03	1 Cores, 2048 MB RAM	Standard_F1 (1 Cores, 2 GB...⌄	Windows ⌄	APP03 ⌄	No availability set with the ...⌄
VM-APP01	1 Cores, 2048 MB RAM	Standard_F1 (1 Cores, 2 GB...⌄	Windows ⌄	APP01 ⌄	No availability set with the ...⌄
VM-APP02	1 Cores, 2024 MB RAM	Standard_F1 (1 Cores, 2 GB...⌄	Windows ⌄	APP02 ⌄	No availability set with the ...⌄

Replicate

Select the managed disk type to use for the disks of the migrated machine.

Optionally, you may also choose to exclude certain disks from replication by unselecting those disks from the list of disks to replicate.

Name	Disks To Replicate	Disk Size(GB)
VM-APP03	All selected ⌄	50
	░░░░PP03	50
VM-APP01	All selected ⌄	50
	░░░░PP01	50
VM-APP02	All selected ⌄	50
	░░░░PP02	50

[« Previous: Compute]   [Next: Review + Start replication]

○ Refresh   ↗ Migrate   ≡≡ Columns

Other

Last refreshed at: 11/23/2019, 6:25:13 AM

🔍 Filter items...

Name	Status	Health	Migration phase	Test migration status	
VM-APP03	Protected	✅ Healthy	-	Never performed	•••
VM-APP02	Protected	✅ Healthy	-	Never performed	•••
VM-APP01	Protected	✅ Healthy	-	Never performed	•••

Migration tools

Azure Migrate: Server Migration

🔍 Discover   🗗 Replicate   ↗ Migrate   **⊞ Overview**

🖥	Discovered servers	6
🗄	Replicating servers	3
⚗	Test migrated servers	0
🔲	Migrated servers	0

⚡ **Next step:** You can start migrating the replicating servers to Azure

Add more migration tools? Click here.

🔄 Refresh   🗗 Replicate   ↗ Migrate

Last refreshed at: 11/23/2019, 6:28:54 AM

Step 1: Replicate Start replicating machines	**Step 2: Test migration** Perform test migrations	**Step 3: Migrate** Migrate to Azure
Replicating machines	⚡	⚡
3 Healthy **3** / Warning **0** / Critical **0**	You have not performed any test migrations yet. Perform test migrations on the servers which are replicating to Azure	Replicate your machines to Azure first. Performing test migrations on replicated machines is recommended before you start with actual migration.
Replicate more machines	Test migration	Migrate

Jobs View all

Failed   4 ❌

In progress   0 🔄

Attention required

✅ No issues found.

Test migration | Clean up test migration | Migrate | Resynchronize | Error Details | Stop replication

Migration status

Status	Protected
Health	✓ Healthy
Test migration status	⚠ Never performed
Configuration issues	✓ No issues
Last synchronized	11/23/2019, 6:25:47 AM
Last app-consistent sync	-

Server details

VM ID	dbcc5c90-a5ae-48e9-87e5-ffb6f6a982d1
Operating System	Windows

Replication settings and target configuration

Cache storage account(s)	azuremigratestorage1
Target subscription	Microsoft Azure Sponsorship
Target location	West US
Target resource group	AzureMigratedVMsResourceGroup
Target VM size	Standard_F1
Target storage account	azuremigratestorage1
Target virtual network	MigrateVNet

Events (last 72 hours) Open in new page

11/22/2019, 10:18:20 PM   Replication health chan... ⓘ Information

Virtual machines
SZaal

+ Add | ⟳ Reservations | ≡≡ Edit columns | ⟳ Refresh | ⊘ Assign tags | ▷ Start | ⟳ Restart | ☐ Stop | 🗑 Delete | ≣ Services

Subscriptions: All 4 selected – Don't see a subscription? Open Directory + Subscription settings

| Filter by name... | All subscriptions ⌄ | All resource groups ⌄ | All types ⌄ | All locations ⌄ | All tags |

3 items

	Name ↑↓	Type ↑↓	Status	Resource group ↑↓	Location ↑↓	Source
☐	🖥 Dev	Virtual machine	Stopped (deallocated)	Dev	West Europe	Marketplace
☐	🖥 PacktVM	Virtual machine	Stopped (deallocated)	PacktVMResourceGro...	East US	Marketplace
☐	🖥 VM-APP01-test	Virtual machine	Running	AzureMigratedVMsRe...	West US	Disk

Migrate

PacktAzureMigrateResourceGroup

Shutdown machines before migration to minimize data loss? * ⓘ

Yes	⌄

ⓘ Replication is unhealthy for the virtual machines: VM-APP01. There is a high probability that the migrate operation may fail if the issues impacting replication health aren't addressed. It is recommended that you fix any issues impacting replication and wait for replication to turn healthy before attempting the migration of these virtual machines.

Other

* Virtual machines

🔍 Filter items...

	Name	Health	Test migration status	Target configurations
☐	VM-APP03	✓ Healthy	Never performed	-
☐	VM-APP02	✓ Healthy	Never performed	-
☑	VM-APP01	✓ Healthy	Test done (11/23/2019)	-

Selected items : 1

Migrate

Virtual machines

SZaal

\+ Add   ⟳ Reservations   ≡≡ Edit columns   ⟳ Refresh | ⌗ Assign tags   ▷ Start   ↻ Restart   ☐ Stop   🗑 Delete   ≣ Services

Subscriptions: All 4 selected – Don't see a subscription? Open Directory + Subscription settings

Filter by name...	All subscriptions ⌄	All resource groups ⌄	All types ⌄	All locations ⌄	All tags

3 items

	Name ↑↓	Type ↑↓	Status	Resource group ↑↓	Location ↑↓	Source
☐	🖥 Dev	Virtual machine	Stopped (deallocated)	Dev	West Europe	Marketplace
☐	🖥 PacktVM	Virtual machine	Stopped (deallocated)	PacktVMResourceGro...	East US	Marketplace
☐	🖥 VM-APP01	Virtual machine	Running	AzureMigratedVMsRe...	West US	Disk

PacktAutomation | Update management
Automation Account

🔍 Search (Cmd+/) «

⚙️ Overview

🗔 Activity log

🔐 Access control (IAM)

🏷️ Tags

🔧 Diagnose and solve problems

Configuration Management

📦 Inventory

🗐 Change tracking

✅ State configuration (DSC)

Update management

🗔 Update management

Process Automation

🔀 Runbooks

🔢 Jobs

📸 Runbooks gallery

🔄 Hybrid worker groups

🔍 Watcher tasks

Update Management

Enable consistent control and compliance of your VMs with Update Management.

This service is included with Azure virtual machines and Azure Arc machines. You only pay for logs stored in Log Analytics.

This service requires a Log Analytics workspace and this Automation account.

Log Analytics workspace location ⓘ

East US ⌄

Log Analytics workspace subscription ⓘ

PacktPub ⌄

*Log Analytics workspace ⓘ

PacktWorkspace| ⌄

Automation account ⓘ

PacktAutomation ⌄

Enable

🗓️ Schedule update deployment   ＋ Add Azure VMs   🗗 Add non-Azure machine   🔗 Manage machines

Non-compliant machines ⓘ	Machines need attention (0) ⓘ		Missing updates (0)		Failed update deployments ⓘ	Learn more
0 ✅	**Critical and security**	0	**Critical**	0	**0** ✅	Update Management
out of 0	**Other**	0	**Security**	0	out of 0 in the past thirty days	Provide feedback
	Not assessed	0	**Others**	0		

Machines (0)   Missing updates (0)   Deployment schedules   History

Filter by name   Compliance: All ⌄   Platform: All ⌄   Operating System: All ⌄

Machine name	Compliance	Platform	Operating system	Critical missing upda...	Security missing upd...	Other missing updat...	Update agent readine...

No machines currently appear assessed. For the machines connected just recently it might take a few minutes to start reporting first data.
Turned-off machines do not report any data.

Update Management

Enable consistent control and compliance of these virtual machines with Update Management.

Subscription

PacktPub (virtual machines: 1) ⌄

Location

East US (virtual machines: 1) ⌄

Configuration (used when enabling new VMs) ⓘ

○ AUTO: Auto-configure Log Analytics workspace and Automation account based on VMs subscription and location

◉ CUSTOM: Choose existing Log Analytics workspace and Automation account

Log Analytics workspace: packtworkspaceeus
Automation account: PacktAutomation

Summary

Ready to enable ⓘ	Already enabled ⓘ	Cannot enable ⓘ
1 →	0 ✓	0 ⛔

☐ Name	↑↓	Update Managem... ↑↓	Details
☑ 🖥 packtvm		→ Ready to enable	

Enable   **Cancel**   Number of virtual machines to enable Update Management: 1

🗓 Schedule update deployment   ➕ Add Azure VMs   ⬈ Add non-Azure machine   ⚙ Manage machines

Non-compliant machines ⓘ	Machines need attention (1) ⓘ		Missing updates (2)		Failed update deployments ⓘ	Learn more
0 ✓ out of 1	Critical and security	0	Critical	0	0 ✓	Update Management
	Other	1 ▬	Security	0	out of 0 in the past thirty days	Provide feedback
	Not assessed	0	Others	2 ▬		

Machines (1)   Missing updates (2)   Deployment schedules   History

Filter by name	Compliance: All ⌄	Platform: All ⌄	Operating System: All ⌄

Machine name	Compliance	Platform	Operating system	Critical missing up...	Security missing up...	Other missing upd...	Update agent readi...
PacktVM Azure: PacktVMResourceGro	✓ Compliant as of ▮	Azure	Windows	0	0	2	✓ Ready (view)

Backup jobs   ✕

⊟ Choose columns   ▽ Filter   ⬆ Export jobs   ↻ Refresh   ☰ View jobs in secondary region

Filtered by: Item Type - All item types, Operation - All Operations, Status - All Status, Start Time - ▮

ⓘ   Completed fetching data from the service.

🔍 Filter items...

Workload name ↑↓	Operation ↑↓	Status ↑↓	Type ↑↓	Start time ↑↓	Duration ↑↓	
packtvm	Backup	🔄 In progress	Azure virtual machine	▮	00:05:28	...
packtvm	Configure backup	✓ Completed	Azure virtual machine	▮	00:00:30	...

Restore points (1)

This list is filtered for last 30 days of restore points. To recover from restore point older than 30 days, click here.

	CRASH CONSISTENT		APPLICATION CONSISTENT		FILE-SYSTEM CONSISTENT
	0		1		0

Time	↑↓	Consistency	↑↓	Recovery Type	↑↓
		Application Consistent		Snapshot and Vault	⋯

Restore VM

File Recovery

Restore Configuration

○ Create new   ● Replace existing

ℹ The disk(s) from the selected restore point will replace the disk(s) in your exisiting VM. Learn more about In-Place Restore.

Restore Type ⓘ

Replace Disk(s)	⌄

Staging Location * ⓘ

packtstorage (StandardLRS)	⌄

Can't find your storage account ?

Restore

🔍 Search (Cmd+/)   «   + Recovery plan

🔲 Site Recovery

Protected items

🔲 Backup items

🔲 Replicated items

Manage

🔲 Backup policies

🔲 Backup Infrastructure

🔲 Site Recovery infrastructure

🔲 Recovery Plans (Site Recovery)

🔲 Backup Reports

🔍 Filter items...

Name	↑↓	Source	↑↓	Target	↑↓	Current job	↑↓	Successful test failover ↑↓	Successful failover	↑↓
PacktRecovertPlan		East US		West US		-		-		⋯

Customize

Test failover

Cleanup test failover

Failover

Re-protect

Commit

Delete

	Name ↑↓	Type ↑↓	Status	Resource group ↑↓	Public IP address	Private IP address	Location ↑↓
☐	🖥 PacktVM	Virtual machine	Running	packtvmresourcegroup	52.152.226.77	10.0.0.4	East US
☐	🖥 PacktVM-test	Virtual machine	Running	PacktVMResourceGro...	-	10.0.0.4	West US

+ Recovery plan

🔍 Filter items...

Name	↑↓	Source	↑↓	Target	↑↓	Current job	↑↓	Successful test fail...↑↓	Successful failover ↑↓
PacktRecovertPlan		East US		West US		⚠️ Cleanup test failov...		10/30/2020,			

Customize
Test failover
Cleanup test failover
Failover
Re-protect
Commit
Delete

Chapter 10: Implementing Load Balancing and Networking Security

Add virtual machines to backend pool

ℹ You can only attach virtual machines that are in the same location and on the same virtual network as the loadbalancer. Virtual machines must have a basic SKU public IP or no public IP. All virtual machines must be in the same availability set.

| Filter by name... | | Location == **eastus** | Virtual network == **PacktLBVNet** |

☑	Virtual machine ↑↓	Resource group ↑↓	IP Configuration ↑↓	Availability set ↑↓	Tags
☑	PacktVM1	PacktLBResourceGroup	ipconfig1 (10.0.0.4)	AVS	-
☑	PacktVM2	PacktLBResourceGroup	ipconfig1 (10.0.0.5)	AVS	-

Add   Cancel
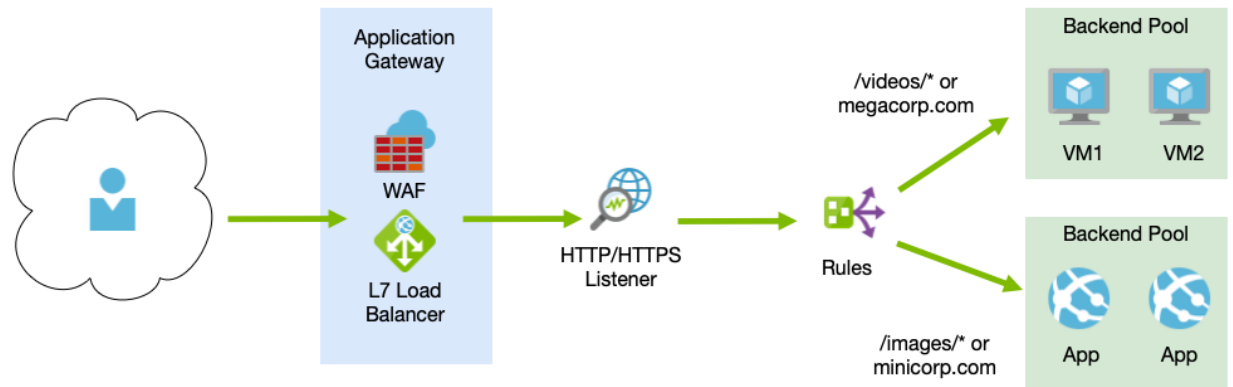
PacktLBVNet | Subnets
Virtual network

Search (Cmd+/)   «   + Subnet   + Gateway subnet   ↻ Refresh   👥 Manage users   🗑 Delete

↔ Overview

📋 Activity log   Search subnets

👥 Access control (IAM)

🔶 Tags

Name ↑↓	IPv4 ↑↓	IPv6 (many availa... ↑↓	Delegated to ↑↓	Security group ↑↓
default	10.0.0.0/24 (249 availa...	-	-	-
ApplicationGateway	10.0.1.0/24 (251 availa...	-	-	-

🔧 Diagnose and solve problems

Settings

Create application gateway

✓ Basics ✓ Frontends ③ Backends ④ Configuration ⑤ Tags ⑥ Review + create

A backend pool is a collection of resources to which your application gateway can send traffic.
A backend pool can virtual machines, virtual machine scale sets, app services, IP addresses,
or fully qualified domain names (FQDN).

Add a backend pool

Backend pool	Targets
No results	

[Previous] [Next : Configuration >]

Add a backend pool.   ✕

A backend pool is a collection of resources to which your application gateway can send
traffic. A backend pool can contain virtual machines, virtual machines scale sets, IP
addresses, domain names, or an App Service.

Name * | PacktAGWPool1   ✓ |

Add backend pool without   [Yes   **No**]
targets

Backend targets

1 item

Target type		Target	
Virtual machine ⌄		packtvm1269 (10.0.0.4) ⌄	🗑 ⋯
IP address or FQDN ⌄			

[Add] [Cancel]

Create application gateway

✓ Basics ✓ Frontends ③ Backends ④ Configuration ⑤ Tags ⑥ Review + create

A backend pool is a collection of resources to which your application gateway can send traffic. A backend pool can contain
virtual machines, virtual machine scale sets, app services, IP addresses, or fully qualified domain names (FQDN).

Add a backend pool

Backend pool	Targets	
PacktAGWPool1	⌄ 1 target	⋯
	packtvm1269	⋯
PacktAGWPool2	⌄ 1 target	⋯
	packtvm2126	⋯

[Previous] [Next : Configuration >]

Create application gateway

✓ Basics ✓ Frontends ✓ Backends ④ Configuration ⑤ Tags ⑥ Review + create

Create routing rules that link your frontend(s) and backend(s). You can also add more backend pools, add a second frontend IP configuration if you haven't already, or edit previous configurations.

Frontends	Routing rules	Backend pools
+ Add a frontend IP	+ Add a routing rule	+ Add a backend pool
Public: PacktAGW-pip 🗑 ⋯	PacktSGWRule1 🗑 ⋯	PacktAGWPool1 🗑 ⋯
	PacktAGWRule2 🗑 ⋯	PacktAGWPool2 🗑 ⋯
	Manage HTTP settings	

Previous   Next : Tags >

∧ Essentials

Resource group (change)
PacktLBResourceGroup

Location
East US

Subscription (change)
PacktPub

Subscription ID
f9483dab-48b4-4a40-9420-8b916e6b33c9

Tags (change)
Click here to add tags

Virtual network/subnet
PacktLBVNet/ApplicationGateway

Frontend public IP address
52.191.95.54 (PacktAGW-pip)

Frontend private IP address
-

Tier
Standard V2

← → ⟳ ⌂ 🛡 52.191.95.54 ⋯ » ≡
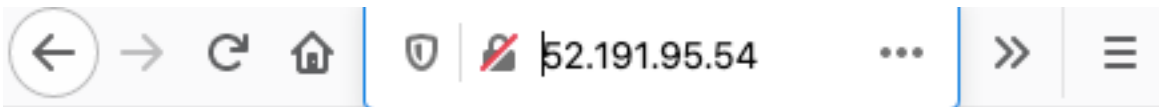
PacktVM1

← → ⟳ ⌂ 🛡 52.191.95.54:81 ⋯ » ≡

PacktVM2

PacktAGW | Web application firewall

Application gateway

⊗

Search (Cmd+/) «

- ◆ Overview
- ▦ Activity log
- ஃ Access control (IAM)
- 🏷 Tags
- 🔧 Diagnose and solve problems

Settings

- 🗄 Configuration
- 🛡 Web application firewall
- ▦ Backend pools
- ☰ HTTP settings
- ▭ Frontend IP configurations
- ⇄ Listeners
- ☰ Rules
- ⇄ Rewrites
- 🔘 Health probes

💾 Save   ✕ Discard   🔄 Refresh

Configure   Rules

Tier ⓘ   (Standard V2 **WAF V2**)

* Firewall status   🟣⬤ Enabled

Firewall mode *   (Detection **Prevention**)

Exclusions

PacktAGW will evaluate everything in the request except for the items included in this list.

Field	**Operator**	**Selector**
▾	▾	

Global parameters

Inspect request body   🔵⬤ On

Max request body size (KB) ⓘ   [   ]

File upload limit (MB)   [   ]

```
                    ┌─────────┐
                    │  Start  │
                    └────┬────┘
                         │
                         ▼
┌──────────────────┐  No   ┌──────────────────┐  No                          ┌──────────────────────┐
│ Web application? ├──────▶│ Internet Facing? ├──────────────────────────────▶│  Azure Load Balancer │
│  (HTTP/HTTPS)    │       │                  │                               └──────────────────────┘
└────────┬─────────┘       └────────┬─────────┘                    ▲ No
         │                          │ Yes                          │
         │ Yes             ┌────────────────────┐  Yes  ┌──────────────────────┐
         │                 │ Deployed in Multiple├──────▶│ Traffic Manager + Load│
         ▼                 │     Regions?       │       │      Balancer        │
┌──────────────────┐  No   └────────────────────┘       └──────────────────────┘
│ Internet Facing? ├──────────────────────────────────────▶┌──────────────────────┐
│                  │                                        │ Application Gateway  │
└────────┬─────────┘                                        └──────────────────────┘
         │ Yes
         ▼
┌──────────────────┐  Yes   ┌────────────────────┐  Yes   ┌──────────────────────┐
│ Deployed in      ├───────▶│ SSL Offloading, or ├───────▶│ Azure Front Door +   │
│ Multiple Regions?│        │ app later processing│       │ Application Gateway  │
└────────┬─────────┘        │     required?      │        └──────────────────────┘
         │ No               └────────┬───────────┘
         │                           │ No
         │                  ┌────────────────────┐  PaaS   ┌──────────────────────┐
         │                  │ Hosting - PaaS,    ├────────▶│ Azure Front Door     │
         │                  │ IaaS, AKS          │ (App Service, └──────────────────┘
         │                  └────────┬───────────┘ Functions)
         │                           │
         │                           │          AKS     ┌──────────────────────────┐
         │                           ├─────────────────▶│ Azure Front Door +       │
         │                           │                  │ Application Gateway      │
         │                           │                  │ ingress controller       │
         │                           │                  └──────────────────────────┘
         │                           │
         │                           │       IaaS (VMs)  ┌──────────────────────┐
         │                           └──────────────────▶│ Azure Front Door +   │
         │                                               │ Load Balancer        │
         │                                               └──────────────────────┘
         │              Yes   ┌────────────────────┐  No   ┌──────────────────────┐
         └───────────────────▶│ Performance        ├──────▶│ Application Gateway  │
                              │ Acceleration required?│    └──────────────────────┘
                              └────────────────────┘
```

Resource group (change) : PacktLBResourceGroup   Custom security rules : 2 inbound, 0 outbound

Location : East US   Associated with : 0 subnets, 1 network interfaces

Subscription (change) : PacktPub

Subscription ID :

Tags (change) : Click here to add tags

Inbound security rules

Priority	Name	Port	Protocol	Source	Destination	Action	
300	⚠ RDP	3389	TCP	Any	Any	✔ Allow	•••
310	HTTP	80	TCP	Any	Any	✔ Allow	•••
65000	AllowVnetInBound	Any	Any	VirtualNetwork	VirtualNetwork	✔ Allow	•••
65001	AllowAzureLoadBalancerInBound	Any	Any	AzureLoadBalancer	Any	✔ Allow	•••
65500	DenyAllInBound	Any	Any	Any	Any	✖ Deny	•••

Outbound security rules

Priority	Name	Port	Protocol	Source	Destination	Action	
65000	AllowVnetOutBound	Any	Any	VirtualNetwork	VirtualNetwork	✔ Allow	•••
65001	AllowInternetOutBound	Any	Any	Any	Internet	✔ Allow	•••
65500	DenyAllOutBound	Any	Any	Any	Any	✖ Deny	•••

Internet

Allow Specific Services

All Traffic denied By default

Azure Firewall

Firewall Rules
100 Allow exception
999 DENY All

Subscription 1

Subscription 2

NSG
Allow RDP (3389) /
SSH (22)

Private IP

Azure VM

Azure VM

Azure VM

NSG
Allow HTTPS (443)

Internet

Public IP

Azure Bastion

AzureBastionSubnet /27

Target Subnet

Virtual Network
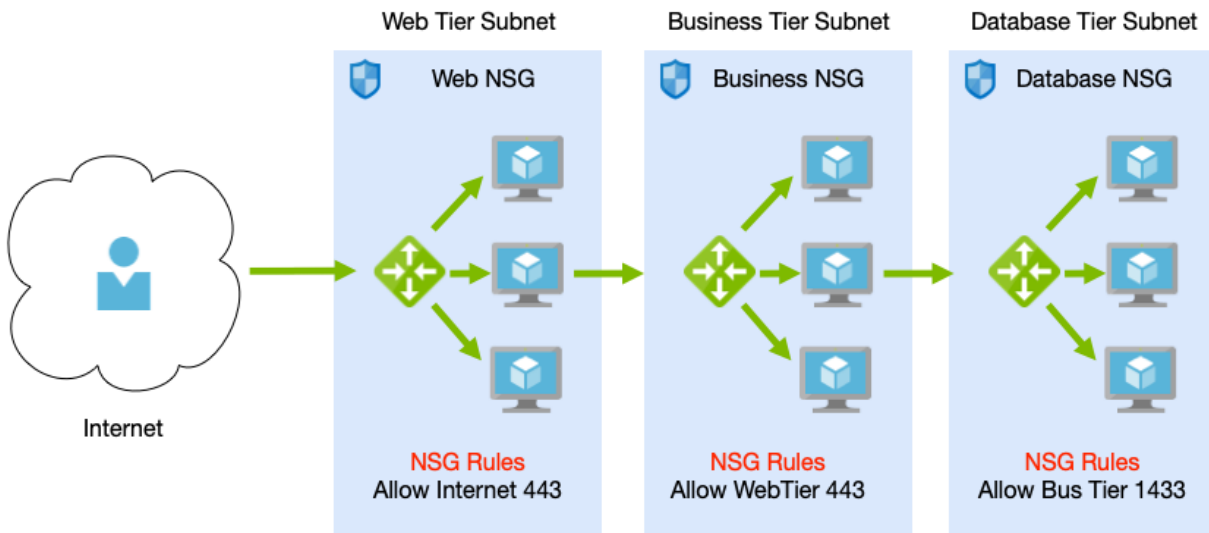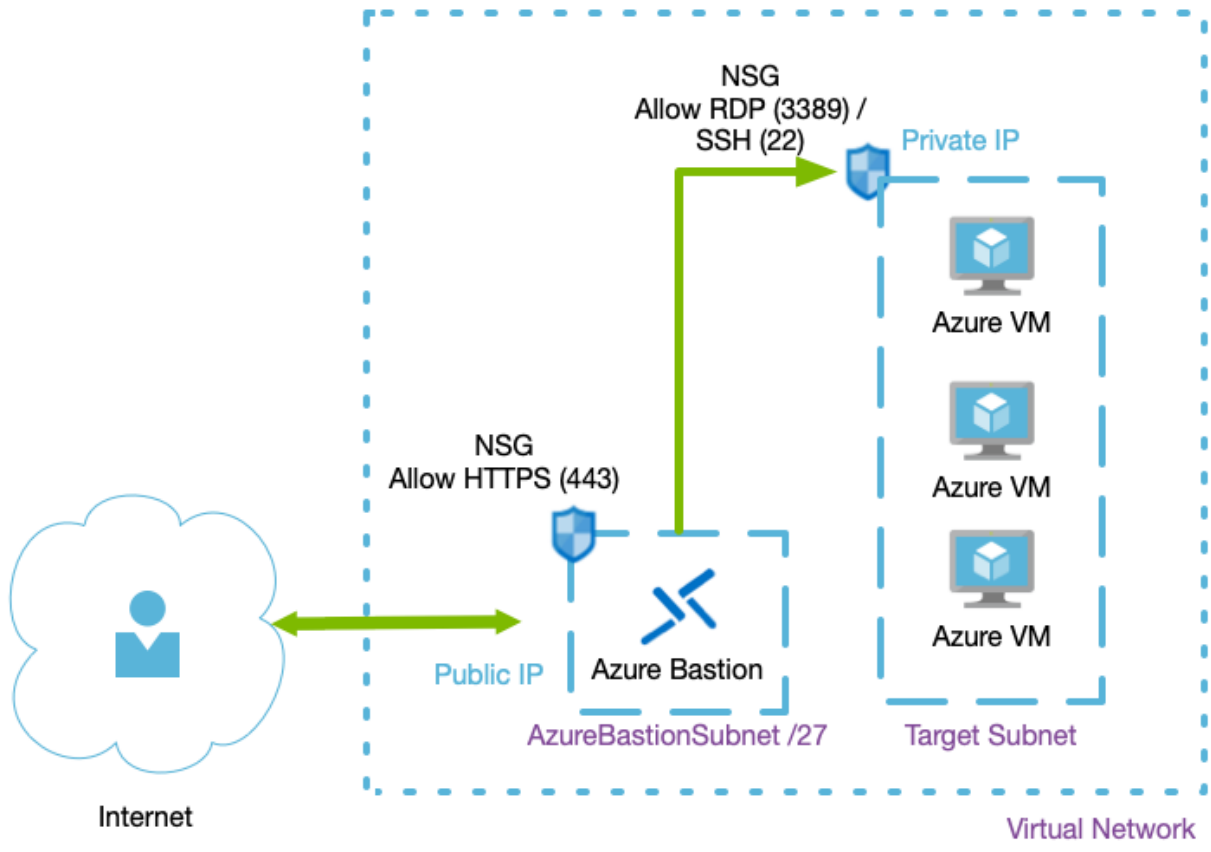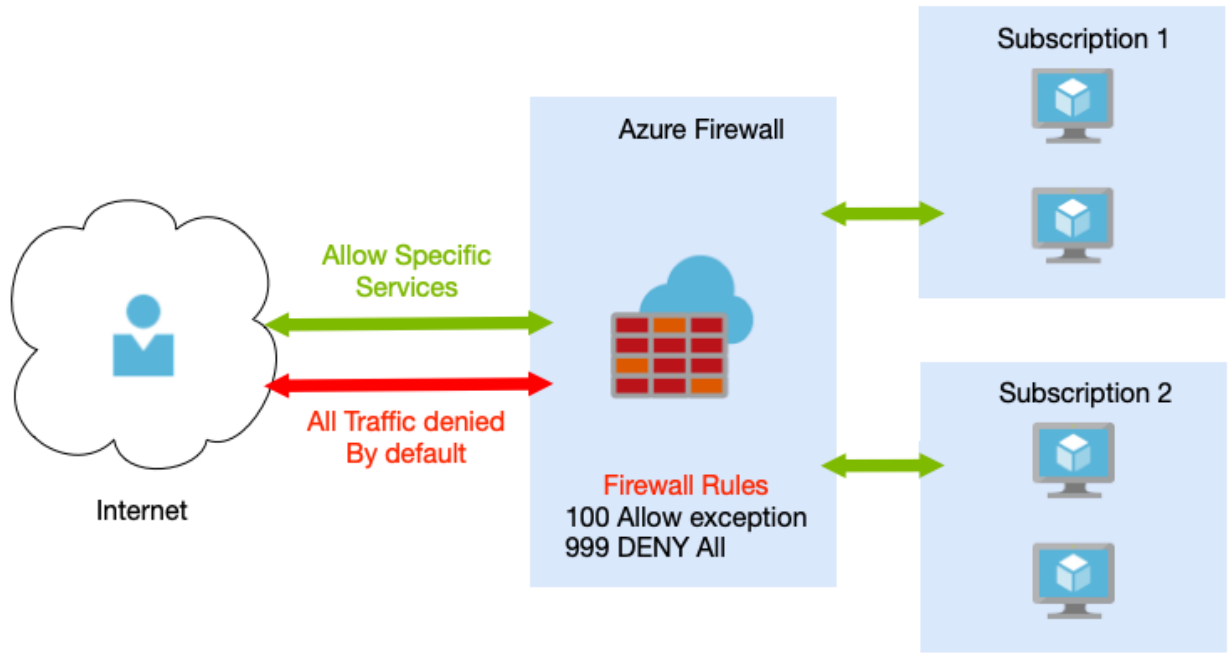
Chapter 11: Implementing Azure Governance Solutions

+ Add   ≡≡ Edit columns   ◯ Refresh | 🗑 Remove | ♡ Got feedback?

Add role assignment

Add co-administrator   ⬅

Deny assignments   Classic administrators   Roles

Check access
Review the level of access a user, group, service principal, or
managed identity has to this resource. Learn more 🗗

Find ⓘ

Azure AD user, group, or service principal   ⌄

Search by sign-in name

Add a role assignment

Grant access to resources at this scope by
assigning a role to a user, group, service
principal, or managed identity.

Add   Learn more 🗗

View role assignments

View the users, groups, service principals
and managed identities that have role
assignments granting them access at this
scope.

View   Learn more 🗗

View deny assignments

View the users, groups, service principals
and managed identities that have been
denied access to specific actions at this
scope.

View   Learn more 🗗

Add co-administrator   ✕

Select user ⓘ

sjouk

SZ   Sjoukje Zaal

Selected users:

SZ   Sjoukje Zaal   Remove

Add   **Cancel**

Policy - Getting started

- Overview
- Getting started
- Join Preview
- Compliance
- Remediation

Authoring

- Assignments
- Definitions

Related Services

- Blueprints (preview)
- Resource Graph
- User privacy

Real-time control and compliance assessment at scale

With Azure Policy, implement proper guardrails and assess compliance accross the organization. Learn more

Assign policies

Browse built-in policies and assign policies at scale.

[View definitions]

Assess compliance

Get a compliance overview of all your assignments.

[Go to compliance]

Author definitions

Create custom policy definitions tailored to your environment.

Learn more

Recommended policy assignments

Select one to learn more and assign the policy to your environment.

Inherit tags from Resource Group Automated inheritance of tags from Resource Group to resources.	**Require tag on Resource Group** Enforce existence of a tag on Resource Group.	**Not allowed resource types** Block the creation of specified resource types.
Audit Windows VMs for security Deploy security baselines for Windows VMs.	**Enable Azure Monitor for VMs** Install monitoring and dependency agents on VMs.	**Enable Azure Security Center** Monitor security recommendations by Azure Security Center.

Explore policy by category

Policies and initiatives can govern a wide range of resources and attributes. Select a category to view the definitions.

- General
- Kubernetes
- Regulatory Compliance
- Tags
- Guest Configuration
- Key Vault
- Network
- Compute
- Monitoring

Policy - Definitions

- Overview
- Getting started
- Join Preview
- Compliance
- Remediation

Authoring

- Assignments
- Definitions

+ Initiative definition   + Policy definition   ↻ Refresh

Scope	Definition type	Type	Category	Search
Microsoft Azure Spon... ...	All definition types ▼	All types ▼	All categories ▼	Locations

Name	↑↓	Definition location	↑↓	Policies ↑↓	Type	↑↓	Definition t...↑↓	Category	↑↓	
Allowed locations					Built-in		Policy	General		...
Allowed locations for resource groups					Built-in		Policy	General		...

Allowed locations
Policy definition

⟶ Assign   ✎ Edit definition   ⧉ Duplicate definition   🗑 Delete definition

Name   : Allowed locations

Description   : This policy enables you to restrict the locations your organization can specify when deploying resources. Use to enforce your geo-com

Available Effects : Deny

Category   : General

Definition   Assignments (0)   Parameters

```
 9        },
10        "parameters": {
11          "listOfAllowedLocations": {
12            "type": "Array",
13            "metadata": {
14              "description": "The list of locations that can be specified when deploying resources.",
15              "strongType": "location",
16              "displayName": "Allowed locations"
17            }
18          }
19        },
20        "policyRule": {
21          "if": {
22            "allOf": [
23              {
24                "field": "location",
25                "notIn": "[parameters('listOfAllowedLocations')]"
26              },
27              {
28                "field": "location",
29                "notEquals": "global"
30              },
31              {
32                "field": "type",
33                "notEquals": "Microsoft.AzureActiveDirectory/b2cDirectories"
34              }
35            ]
36          },
37          "then": {
38            "effect": "deny"
39          }
40        }
41      },
42      "id": "/providers/Microsoft.Authorization/policyDefinitions/e56962a6-4747-49cd-b67b-bf8b01975c4c",
43      "type": "Microsoft.Authorization/policyDefinitions",
44      "name": "e56962a6-4747-49cd-b67b-bf8b01975c4c"
45    }
```

Allowed locations

Assign policy

Basics   Parameters   Remediation   Review + create

Scope

Scope (**Learn more about setting the scope**) *

| Microsoft Azure Sponsorship/PacktVMResourceGroup ✓ | ... |

Exclusions

| Optionally select resources to exempt from the policy assignment | ... |

Basics

Policy definition

| Allowed locations |

Assignment name * ⓘ

| Allowed locations |

Description

| |

Policy enforcement ⓘ

(**Enabled**   Disabled)

Assigned by

| Sjoukje.Zaal |

[**Review + create**]   [Cancel]   [Previous]   [Next]

Allowed locations

Assign policy

Basics   **Parameters**   Remediation   Review + create

Specify parameters for this policy assignment.

Allowed locations * ⓘ

| East US ∨ |

[**Review + create**]   [Cancel]   [Previous]   [Next]

Create a virtual machine

⊘ Validation failed. Click here to view details. →

Basics Disks Networking Management Advanced Tags Review + create

PRODUCT DETAILS

Standard DS1 v2
by Microsoft
Terms of use | Privacy policy

Subscription credits apply ⓘ
0.0573 EUR/hr
Pricing for other VM sizes

TERMS

By clicking "Create", I (a) agree to the legal terms and privacy statement(s) associated with the Ma
above; (b) authorize Microsoft to bill my current payment method for the fees associated with the
billing frequency as my Azure subscription; and (c) agree that Microsoft may share my contact,
information with the provider(s) of the offering(s) for support, billing and other transactional activi
provide rights for third-party offerings. See the Azure Marketplace Terms for additional details.

⚠ **You have set RDP port(s) open to the internet.** This is only recommended for testing. If you
back to Basics tab.

Basics

Subscription   Microsoft Azure Sponsorship

Resource group   PacktVMResourceGroup

Create   < Previous   Next >   Download a template for

Summary   Raw Error

ERROR DETAILS   🗐

Resource 'vm12471' was disallowed by policy. (Code:
RequestDisallowedByPolicy)

Policy: Allowed locations

WAS THIS HELPFUL? 👍 👎

Troubleshooting Options

Check Usage + Quota ↗
New Support Request ↗

Create blueprint

Basics   **Artifacts**

Add artifacts to the blueprint. Add resource groups to organize where

Name	Artifact type
∨ 🔑 Subscription	
＋ Add artifact...	
∨ 🔷 VNET Resource Group	Resource group
📄 NSG for new VNET	Azure Resource Manager
📄 VNET and one subnet	Azure Resource Manager
＋ Add artifact...	

Save Draft   **Discard**   « Previous : Basics

Edit artifact   ✕

Template   Parameters

Import template

Select a file   🗀

```
 1  {
 2    "$schema": "https://schema.management.azure.com/schemas/2015-
 3    "contentVersion": "1.0.0.0",
 4    "parameters": {
 5      "localPrefix": {
 6        "type": "string",
 7        "metadata": {
 8          "displayName": "Prefix for the resource names deployed
 9        }
10      }
11    },
12    "variables": {
13      "subnetId": "[resourceId(resourceGroup().name, 'Microsoft.Ne
14      "location": "[resourceGroup().location]",
15      "existingVirtualNetworkResourceGroupName": "[resourceGroup()
16      "existingVirtualNetworkName": "[concat(parameters('localPref
17      "existingSubnetName": "[concat(parameters('localPrefix'), 's
18      "newNsgName": "[concat(parameters('localPrefix'), 'nsg-bluep
```

Save   Cancel

Blueprint parameters

Resource name prefix * ⓘ

| BP- | ✓ |

Artifact parameters

Artifact / Parameter	Parameter Value
🔑 **Subscription**	
⌄ 🔲 **VNET Resource Group**	
Resource Group: Name	[concat(parameters('resourceNamePrefix'),'-RG')]
Resource Group: Location	East US ⌄
📄 **NSG for new VNET**	
⌄ 📄 **VNET and one subnet**	
Address space for vnet	10.0.0.0/16
Address space for subnet	10.0.0.0/24

Assign Cancel

Root Management Group

US — EMEA
- Subscription

Non Production — Production
- Subscription

HR — Marketing
- Subscription
- Subscription
- Resource group

RBAC Role 1 — Assigned
RBAC Role 2 — Assigned
RBAC Role 1 / RBAC Role 2 — Applied
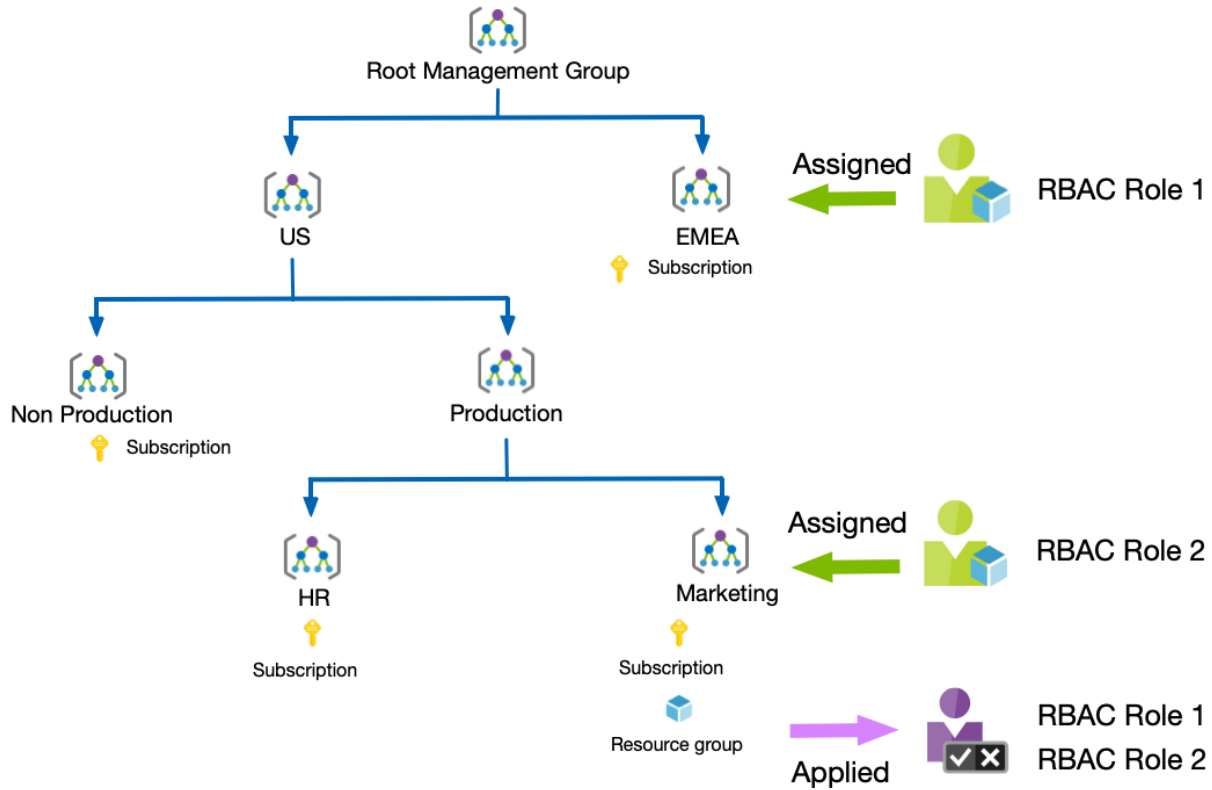
Tenant Root Group (details)

Name	ID	Type	My Role	
Packt-US	Packt-US	Management Group	Owner	...
PacktPub		Subscription	Owner	...

Tenant Root Group > Packt-US

Search by name or ID

Using management groups helps you manage access, policy, and compliance by grouping multiple subscriptions together. Learn more.

Packt-US (details)

Name	ID	Type	My Role	
PacktPub		Subscription	Owner	...

Chapter 12: Creating Web Apps Using PaaS and Serverless


```
["value1","value2"]
```

Swagger

Select a definition My To Do API v1 ▼

To Do API v1 OAS3

/swagger/v1/swagger.json

Todo ▼

GET	/api/Todo

Parameters

Try it out

No parameters

Responses

Code	Description	Links
200	*Success*	*No links*

text/plain ▼

Controls Accept header.

Example Value | Schema

```
[
  {
    "id": 0,
    "name": "string",
    "isComplete": true
  }
]
```

POST	/api/Todo

GET	/api/Todo/{id}

PUT	/api/Todo/{id}

DELETE	/api/Todo/{id}

Build

Rebuild

Clean

View   ▶

Analyze and Code Cleanup   ▶

Pack

Publish...

Configure Application Insights...

Overview

Scope to This

New Solution Explorer View

File Nesting   ▶

Edit Project File

Add   ▶

Manage NuGet Packages...

Manage Client-Side Libraries...

Manage User Secrets

Set as Startup Project

Debug   ▶

Cut   Ctrl+X

Remove   Del

Rename   F2

Unload Project

Load Direct Dependencies of Project

Load Entire Dependency Tree of Project

Copy Full Path

Open Folder in File Explorer

Properties   Alt+Enter

Publish
Select existing or create a new Azure App Service

Square Connection Ltd
brett@squareconnection.co.uk

Target

Specific target

App Service

API Management

Subscription

PacktPub

View

Resource group

Search

▲ 📁 **PacktWebAppRSG**
    ▷ 🌐 packtpubwebapi

➕ Create a new Azure App Service...

Refresh

Back   Next   Finish   Cancel

Overview

Connected Services

Publish

Publish

Deploy your app to a folder, IIS, Azure, or another destination. More info

🔲 packtpubwebapi - Web Deploy

Publish

New   Edit   Rename   Delete   Restore

Summary

Site URL	http://packtpubwebapi.azurewebsites.net 📋
Resource group	PacktWebAppRSG
Configuration	Release ✏
Target framework	netcoreapp3.1 ✏
Deployment mode	Framework-dependent ✏
Target runtime	Portable ✏

Actions

Preview changes

Manage in Cloud Explorer

Manage Azure App Service settings

Manage in Azure portal

View streaming logs

Open troubleshooting guide

×

Save   Discard   + Add Slot   Swap   Logs   Refresh

🚀 You haven't added any deployment slots. Click here to get started. →

Tags
Diagnose and solve problems
Security
Events (preview)

Deployment

Quickstart
Deployment slots
Deployment Center
Deployment Center (Preview)

Deployment Slots

Deployment slots are live apps with their own hostnames. App content and configurations elements can be swapped between two deployment slots, including the production slot.

NAME	STATUS	APP SERVICE PLAN	TRAFFIC %
packtpubwebapi **PRODUCTION**	Running	packtpubwebapi	100

cess keys ×

Use access keys to authenticate your applications when making requests to this Azure storage account. Store your access keys securely - for example, using Azure Key Vault - and don't share them. We recommend regenerating your access keys regularly. You are provided two access keys so that you can maintain connections using one key while regenerating the other.

When you regenerate your access keys, you must update any Azure resources and applications that access this storage account to use the new keys. This action will not interrupt access to disks from your virtual machines. Learn more

Storage account name
packtwebjobstorage

key1 ⟳
Key

Connection string
DefaultEndpointsProtocol=https;Acc

key2 ⟳
Key

Connection string
DefaultEndpointsProtocol=https;AccountName=

orage Explorer (preview)

Search

→ View Message   + Add Message   — Dequeue Message   ☒ Clear Queue   ⟳ Refresh

ID	MESSAGE TEXT	INSERTION TIME

No data available in table

▶ 🗀 BLOB CONTAINERS
▶ 🗐 FILE SHARES
▲ 🗄 QUEUES
    🗄 webjob
▶ 🗄 TABLES

Publish

Deploy your app to a folder, IIS, Azure, or another destination. More info

FolderProfile   Publish

New Edit Rename Delete

Summary

Target Location	bin\Release\netcoreapp2.2\publish\
Configuration	Release
Target Framework	netcoreapp2.2
Target Runtime	Portable

Profile Settings

Profile Name:	FolderProfile
Configuration:	Release	Any CPU
Target Framework:	netcoreapp2.2
Deployment Mode:	Framework Dependent
Target Runtime:	win-x64
Target Location:	bin\Release\netcoreapp2.2\publish\	...

Save   Cancel

Add WebJob

packtpubtodoapi

* Name ⓘ

HelloWorldWebJob ✓

* File Upload

"HelloWorldWebJob.exe" 📁

Type ⓘ

Triggered ⌄

ⓘ   Calling the webhook will trigger a job execution. Use ⧉
webhook triggers to integrate with Azure scheduler.

Triggers ⓘ

Manual ⌄

💾 Save ✕ Discard

Application Logging (Filesystem) ⓘ

[**Off** | On]

Application Logging (Blob) ⓘ

[**Off** | On]

Web server logging ⓘ

[**Off** | Storage | File System]

Detailed error messages ⓘ

[**Off** | On]

Failed request tracing ⓘ

[**Off** | On]

Download logs

FTP/deployment username   No FTP/deployment user set

FTP   ftp://waws-prod-blu-159.ftp.azurewebsites.windows.net

FTPS   ftps://waws-prod-blu-159.ftp.azurewebsites.windows.net

---

PacktFunctionApp
Function Apps   📌

🔍 "PacktFunctionApp " ✕

Microsoft Azure Sponsorship ⌄

▤ Function Apps

▼ ⚡ PacktFunctionApp ⟳ »

  ▼ ▤ Functions   ➕

  ▶ ▤ Proxies

  ▶ ▤ Slots

| Overview | Platform features | ☁ Quickstart ✕ | 📌 |

☁ Azure Functions for .NET - getting started

Follow our Quickstart guidance to author and publish a function Learn more

①   ②
CHOOSE A DEVELOPMENT ENVIRONMENT   CREATE A FUNCTION

▣ Visual Studio	▣ VS Code	▣ Any editor + Core Tools	▣ In-portal
Use Visual Studio to author, build, and run .NET functions	Use Visual Studio Code to author your functions	Write functions using your favorite editor and the Azure Functions Core Tools	Author functions quickly in the portal

Continue

```
run.csx        Save          ▶ Run     </> Get function URL

  1 #r "Newtonsoft.Json"
  2
  3 using System.Net;
  4 using Microsoft.AspNetCore.Mvc;
  5 using Microsoft.Extensions.Primitives;
  6 using Newtonsoft.Json;
  7
  8 public static async Task<IActionResult> Run(HttpRequest req, ILogger log)
  9 {
 10     log.LogInformation("C# HTTP trigger function processed a request.");
 11
 12     string name = req.Query["name"];
 13
 14     string requestBody = await new StreamReader(req.Body).ReadToEndAsync();
 15     dynamic data = JsonConvert.DeserializeObject(requestBody);
 16     name = name ?? data?.name;
 17
 18     return name != null
 19         ? (ActionResult)new OkObjectResult($"Hello, {name}")
 20         : new BadRequestObjectResult("Please pass a name on the query string or in the request body");
 21 }
 22
```

View files Test   ❯

HTTP method
POST ▾

Query
There are no query parameters
✚ Add parameter

Headers
There are no headers
✚ Add header

Request body
```
1 {
2     "name": "Azure"
3 }
```

Output   ✓ Status: 200 OK

Hello, Azure

▶ Run

Logs   Console   ✎ Reconnect ▢ Copy logs ‖ Pause ⌫ Clear ↗ Expand

```
2018-12-25T10:26:49  Welcome, you are now connected to log-streaming service.
2018-12-25T10:27:49  No new trace in the past 1 min(s).
2018-12-25T10:28:49  No new trace in the past 2 min(s).
2018-12-25T10:29:49  No new trace in the past 3 min(s).
2018-12-25T10:30:49  No new trace in the past 4 min(s).
2018-12-25T10:31:49  No new trace in the past 5 min(s).
2018-12-25T10:32:49  No new trace in the past 6 min(s).
2018-12-25T10:33:49  No new trace in the past 7 min(s).
2018-12-25T10:34:49  No new trace in the past 8 min(s).
```


⊞ Connectors ❓ Help

When a feed item is published   ⋯

For each   ⋯

*Select an output from
previous steps   Feed links ✕

                          ⊕

Connections   ⚠ ⋯

ⓘ Invalid connection.

Select an existing connection or create a new one:
✓   (office365) ❗
   Invalid connection
   + Add new connection

                  ⊤ Add an action

              + New step

When a feed item is published   0s

↓

For each   1s

‹ Previous   ‹ Previous failed   Show   [1]   of 1   Next failed ›   Next ›

Send an email   0s

INPUTS   Show raw inputs ›

To

Subject

New RSS Feed

Body

Title: 'Invulnerable' nuclear missile ready to deploy, Putin says

Published: 06:32:45Z

Link: http://rss.cnn.com/~r/rss/cnn_topstories/~3/azeeL7CyPeo/index.html

OUTPUTS   Show raw outputs ›

Status code

200

Headers

Key	Value
Pragma	no-cache
x-ms-request-id	e03e260d-3723-4806-8c0...
Strict-Transport-Security	max-age=31536000; inclu...

History   ✕
0858655714166539350876420263CU02

SUMMARY

FIRED

True

RUN IDENTIFIER

0858655714166539350876420263CU02

START DATE

END DATE

SCHEDULED DATE

Inputs   ▢ ✕
0858655714166539350876420263CU02

```
{
    "host": {
        "connection": {
            "name":
        }
    },
    "method": "get",
    "path": "/OnNewFeed",
    "queries": {
        "feedUrl": "http://rss.cnn.com/rss/cnn_topstories.rss"
    }
}
```

Create rule

Rules management

Choose a signal below and configure the logic on the next screen to define the alert condition.

Signal type ⓘ

All

Monitor service ⓘ

All

* **RESOURCE**   **HIERARCHY**

🖧 PacktLogicApp   🔑 Microsoft Azure Sponsorship > 🌐 PacktLogicApp

Select

Displaying 1 - 20 signals out of total 46 signals

🔍 Search by signal name

Signal name ↑↓	Signal type ↑↓	Monitor service ↑↓
Runs Started	∿ Metric	Platform
Runs Completed	∿ Metric	Platform
Runs Succeeded	∿ Metric	Platform
Runs Failed	∿ Metric	Platform
Runs Cancelled	∿ Metric	Platform
Run Latency	∿ Metric	Platform
Run Success Latency	∿ Metric	Platform
Run Throttled Events	∿ Metric	Platform
Run Start Throttled Events	∿ Metric	Platform

* **CONDITION**

No condition defined, click on 'Add condition' to select a signal and define its logic

Add

ACTIONS

Action group name   Contain actions

No action group selected

Select action group   Create action group

Add action group   ☐ ✕

Action group name * ⓘ   PacktLogicAppAlertGroup ✓

Short name * ⓘ   PacktAlert ✓

Subscription * ⓘ   Microsoft Azure Sponsorship ⌄

Resource group * ⓘ   Default-ActivityLogAlerts (to be created) ⌄

Actions

Action group name *	Action Type *	Status	Configure	Actions
Alert1 ✓	Select an action type ⌃			✕

Unique name for the action

Automation Runbook

Azure Function

Email Azure Resource Manager Role

Email/SMS/Push/Voice

ITSM

LogicApp

Secure Webhook

Webhook

Privacy Statement

Pricing

ⓘ Have a consistent format in   of monitoring source. You can enable per action by editing
details. Learn more

OK

Chapter 13: Designing and Developing Apps for Containers

Virtual Machines

Containerization

Virtual Machine	Virtual Machine
App A	App A
Guest OS	Guest OS

Hypervisor

Infrastructure

App A App B App C App D App E

Docker

Guest OS

Infrastructure

Home page - PacktACIApp   ✕   +

← → C ⌂   🔒 localhost:44332
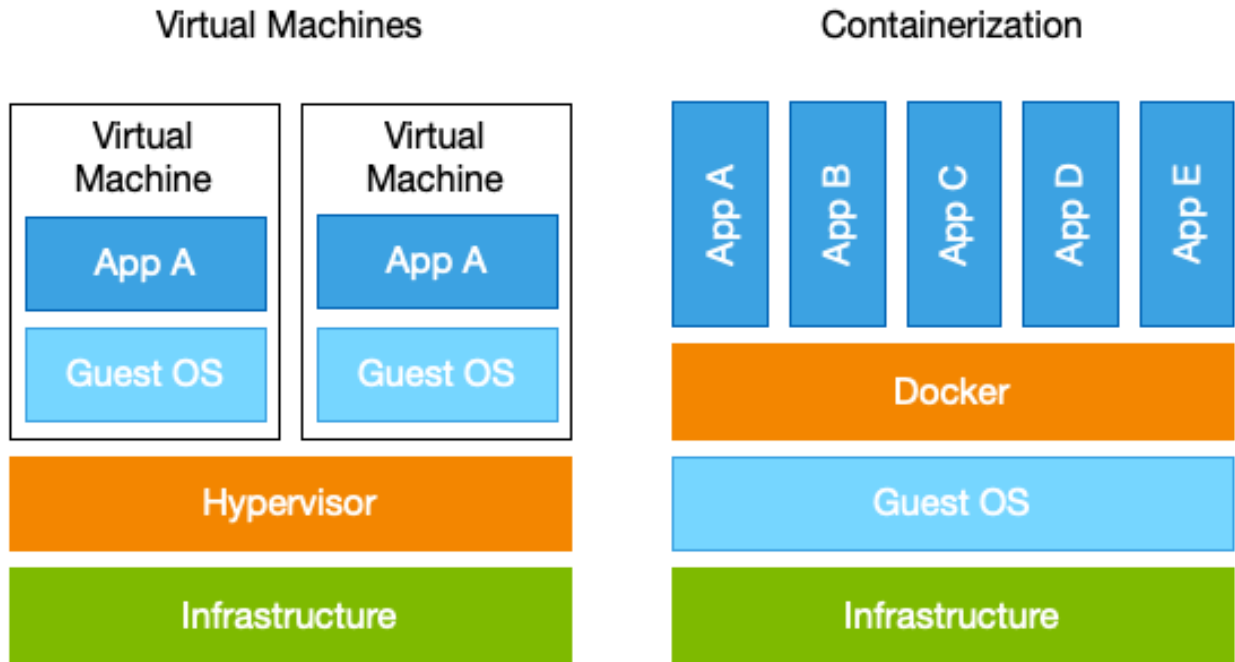
PacktACIApp   Home   Privacy

Welcome

Learn about building Web apps with ASP.NET Core.
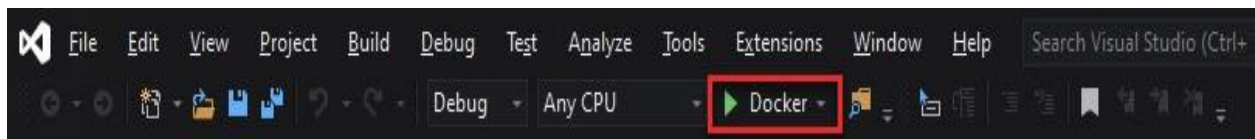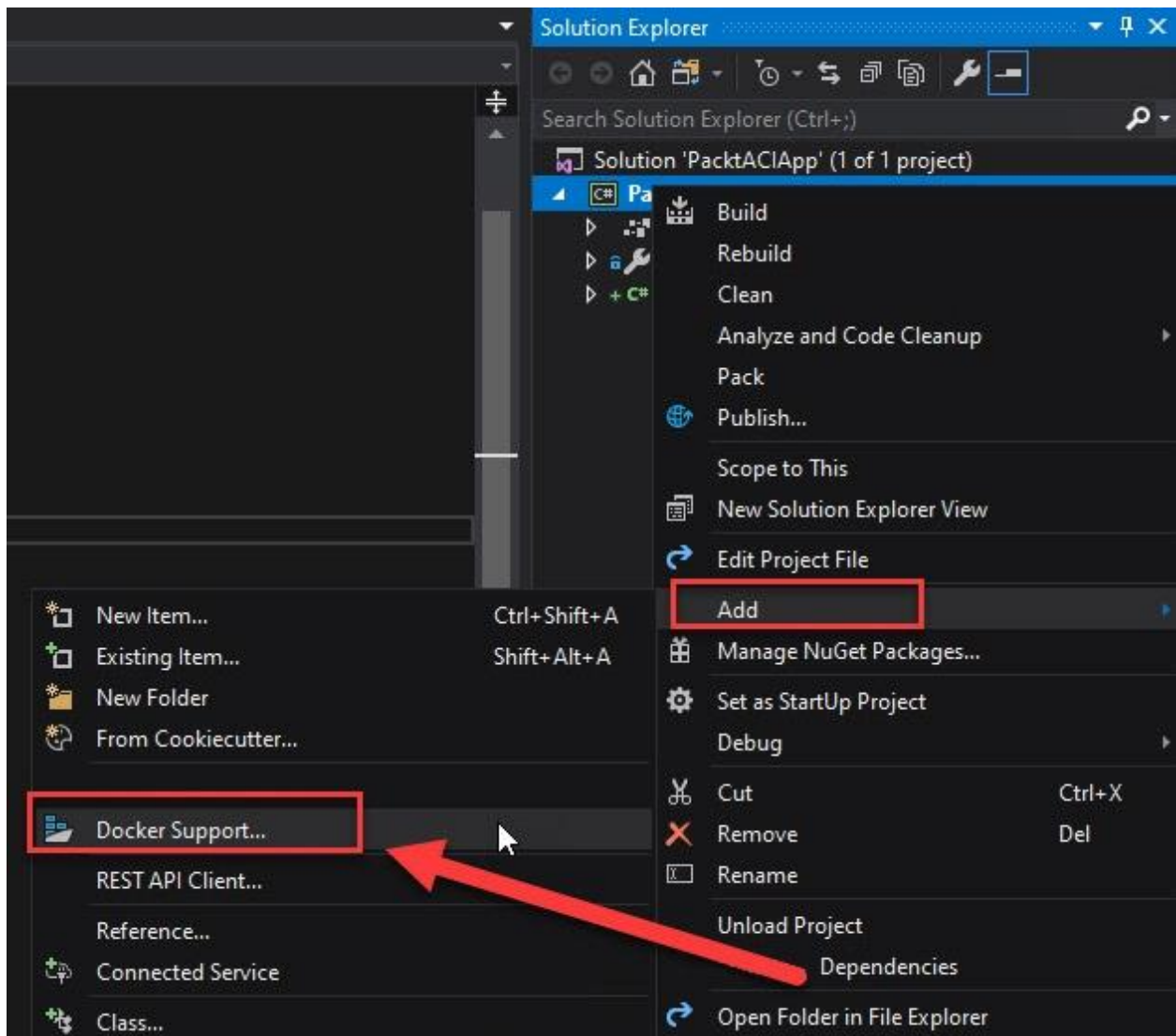
Azure Container Registry
Create new

DNS prefix

PacktACIApp20201103125700

Subscription

PacktPub

Resource group

PacktStorageResourceGroup (East US)   New...

SKU

Standard

Registry location

East US

Export...   Create   Cancel

Overview

Connected Services

Publish

Publish

Deploy your app to a folder, IIS, Azure, or another destination. More info

🐳 PacktACIApp20201103125700   ∨   Publish

New Edit Rename Delete

Summary

Image Tag	latest 🗎
Repository	https://packtaciapp20201103125700.azurecr.io 🗎
Subscription	PacktPub 🗎
Configuration	Release ✏️

Actions

Edit Image Tag

Manage in Azure portal

Repository	: packtaciapp		Digest
Tag	: latest		Manifest creation date
Tag creation date	: 11/3/2020, 2:19 PM GMT		Platform
Tag last updated date	: 11/3/2020, 2:19 PM GMT		

Docker pull command   docker pull packtaciapp20201103125700.azurecr.io/packtaciapp:latest

041 - Access keys

Registry name

PacktACIApp20190917053041

Login server

packtaciapp20190917053041.azurecr.io

Admin user ⓘ

[**Enable**] Disable

Username

PacktACIApp20190917053041

NAME	PASSWORD		
password	tcOcMMKLmQwXc7U0MCvMw4xhLUxCg+iZ		
password2	jns+1UTrSKp6sOG1M2J3ZgLVtS5odmSc		

▶ Start   ↻ Restart   ■ Stop   🗑 Delete   ↻ Refresh

Resource group (change)	: PacktACIResourceGroup	OS type	: Linux
Status	: Running	IP address	: 52.188.143.110
Location	: East US	FQDN	: ---
Subscription (change)	: MSDN	Container count	: 1
Subscription ID	: 8f6d0408-6d33-4e86-81c3-c817b3d7e060		
Tags (change)	: Click here to add tags		

≪

PacktACIApp   Home   Privacy
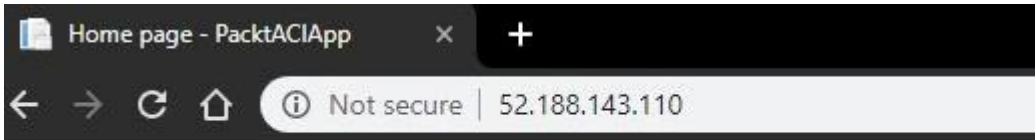
Welcome

Learn about building Web apps with ASP.NET Core.

Create Web App

all your resources.

Subscription * ⓘ	PacktPub ⌄
Resource Group * ⓘ	(New) PacktContainerResourceGroup ⌄
	Create new

Instance Details

Name *	PacktContainerApp ✓
	.azurewebsites.net
Publish *	◯ Code ⦿ Docker Container
Operating System	⦿ Linux ◯ Windows
Region *	East US ⌄
	ⓘ Not finding your App Service Plan? Try a different region.

App Service Plan

App Service plan pricing tier determines the location, features, cost and compute resources associated with your app.
Learn more ↗

Linux Plan (East US) * ⓘ	(New) ASP-PacktContainerResourceGroup-b527 ⌄
	Create new
Sku and size *	**Free F1** 1 GB memory Change size

[Review + create]   [< Previous]   [Next : Docker >]

Create Web App

Basics   **Docker**   **Monitoring**   **Tags**   **Review + create**

Pull container images from Azure Container Registry, Docker Hub or a private Docker repository. App Service will deploy the containerized app with your preferred dependencies to production in seconds.

Options	Single Container ⌄
Image Source	Azure Container Registry ⌄

Azure container registry options

Registry *	PacktACIApp20201103125700 ⌄
Image *	packtaciapp ⌄
Tag *	latest ⌄
Startup Command ⓘ	

Review + create   **< Previous**   **Next : Monitoring >**

⧉ Browse   ⬜ Stop   ⇄ Swap   ↻ Restart   🗑 Delete | ↻ Refresh   ⬇ Get publish profile   ↻ Reset publish profile   ♡ Send us your feedback

⌃ Essentials

Resource group (change)	: PacktContainerResourceGroup	URL	: https://packtcontainerapp.azurewebsites.net
Status	: Running	App Service Plan	: ASP-PacktContainerResourceGroup-b527 (F1: Free)
Location	: East US	FTP/deployment username	:
Subscription (change)	: PacktPub	FTP hostname	: ftp://waws-prod-blu-191.ftp.azurewebsites.windows.net...
Subscription ID	:	FTPS hostname	: ftps://waws-prod-blu-191.ftp.azurewebsites.windows.ne...
Tags (change)	: Click here to add tags		

← → C ⌂   🔒 packtcontainerapp.azurewebsites.net
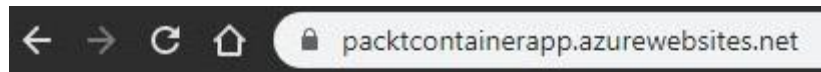
Hello App Service!

This is being served from a **docker container** running Nginx.

Create Kubernetes cluster

Project details

Select a subscription to manage deployed resources and costs. Use resource groups like folders to organize and manage all your resources.

Subscription * ⓘ	PacktPub ▾
Resource group * ⓘ	(New) PacktAKSResourceGroup ▾
	Create new

Cluster details

Kubernetes cluster name * ⓘ	PacktAKSCluster ✓
Region * ⓘ	(US) East US ▾
Availability zones ⓘ	Zones 1,2 ▾
Kubernetes version * ⓘ	1.17.11 (default) ▾

Primary node pool

The number and size of nodes in the primary node pool in your cluster. For production workloads, at least 3 nodes are recommended for resiliency. For development or test workloads, only one node is required. If you would like to add additional node pools or to see additional configuration options for this node pool, go to the 'Node pools' tab above. You will be able to add additional node pools after creating your cluster. Learn more about node pools in Azure Kubernetes Service

Node size * ⓘ	**Standard DS2 v2** Change size
Node count * ⓘ	●━━━━━━━━━━━━━━━━━━━ 3

Create Kubernetes cluster

Basics Node pools **Authentication** Networking Integrations Tags Review + create

Cluster infrastructure

The cluster infrastructure authentication specified is used by Azure Kubernetes Service to manage cloud resources attached to the cluster. This can be either a service principal ⧉ or a system-assigned managed identity ⧉.

Authentication method   ◉ Service principal ○ System-assigned managed identity

Service principal * ⓘ
┌───┐
│ (new) default service principal   │
└───┘
Configure service principal

Kubernetes authentication and authorization

Authentication and authorization are used by the Kubernetes cluster to control user access to the cluster as well as what the user may do once authenticated. Learn more about Kubernetes authentication ⧉

Role-based access control (RBAC) ⓘ   ◉ Enabled ○ Disabled

AKS-managed Azure Active Directory ⓘ   ○ Enabled ◉ Disabled

Node pool OS disk encryption

By default, all disks in AKS are encrypted at rest with Microsoft-managed keys. For additional control over encryption, you can supply your own keys using a disk encryption set backed by an Azure Key Vault. The disk encryption set will be used to encrypt the OS disks for all node pools in the cluster. Learn more ⧉

Encryption type
┌───┐
│ (Default) Encryption at-rest with a platform-managed key   ⌄ │
└───┘

[**Review + create**]   [< Previous]   [Next : Networking >]
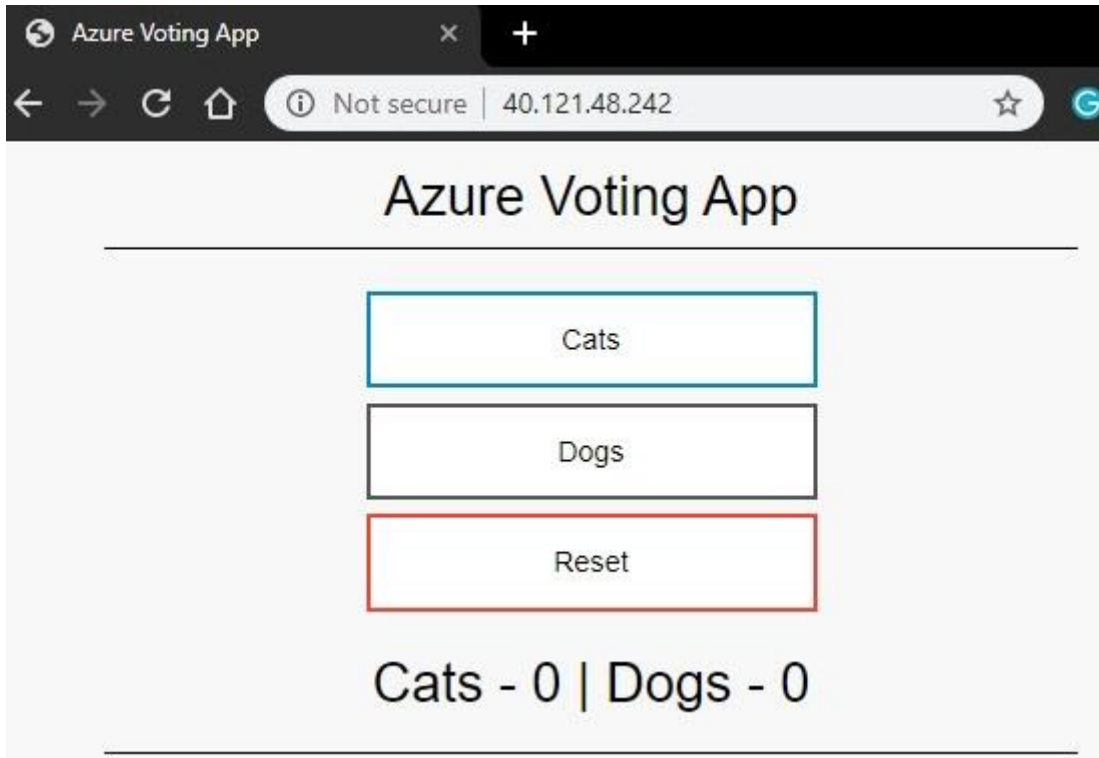
```
sjoukje@Azure:~$ kubectl get nodes
NAME                        STATUS    ROLES    AGE    VERSION
aks-agentpool-18232472-0    Ready     agent    48m    v1.13.10
aks-agentpool-18232472-1    Ready     agent    48m    v1.13.10
aks-agentpool-18232472-2    Ready     agent    48m    v1.13.10
sjoukje@Azure:~$
```

```
sjoukje@Azure:~$ nano
sjoukje@Azure:~$ kubectl apply -f azure-vote.yaml
deployment.apps/azure-vote-back created
service/azure-vote-back created
deployment.apps/azure-vote-front created
service/azure-vote-front created
sjoukje@Azure:~$
```

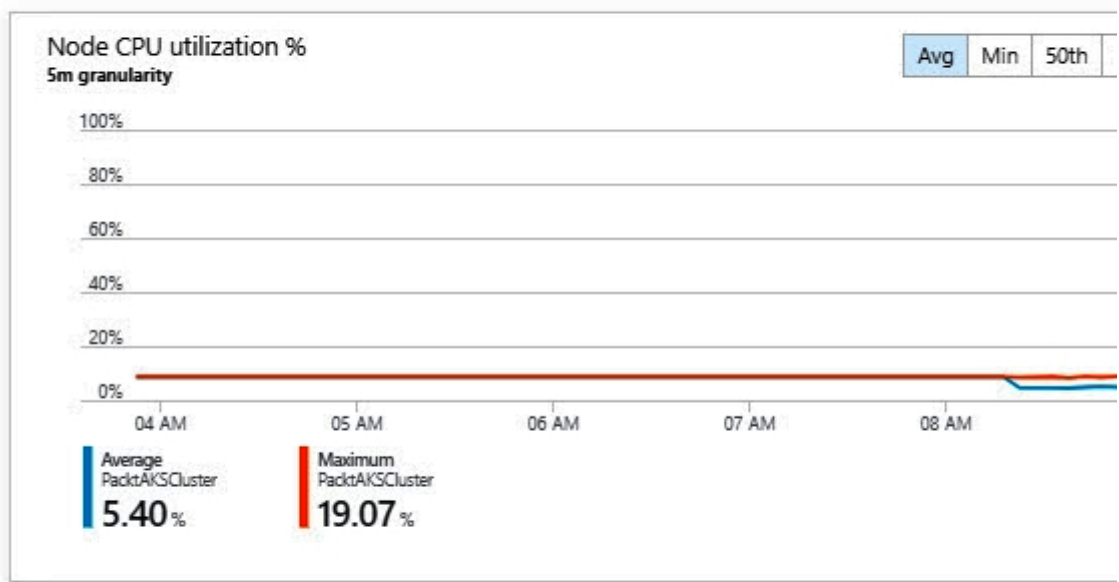```
sjoukje@Azure:~$ kubectl get service azure-vote-front --watch
NAME   TYPE   CLUSTER-IP   EXTERNAL-IP   PORT(S)   AGE
azure-vote-front   LoadBalancer   10.0.66.19   40.121.48.242   80:31847/TCP   4m
```



Azure Voting App

Not secure | 40.121.48.242

# Azure Voting App

Cats

Dogs

Reset

Cats - 0 | Dogs - 0

Refresh | View All Clusters | Monitor resource group | Feedback ⌄

Time range = Last 6 hours    ⁺▼ Add Filter

**Cluster**    Nodes    Controllers    Containers

Node CPU utilization %
5m granularity

| | Avg | Min | 50th |

100%

80%

60%

40%

20%

0%

04 AM          05 AM          06 AM          07 AM          08 AM

Average
PacktAKSCluster
**5.40** %

Maximum
PacktAKSCluster
**19.07** %

Node count
5m granularity

| | Total |

3

2.50



Refresh | View All Clusters | Monitor resource group | Feedback ⌄

Time range = Last 6 hours    Names... = <All but kube-... ⊗    ⁺▼ Add Filter          View Workbooks ⌄

Cluster    Nodes    Controllers    **Containers**                                   Forums ↗  Learn more ↗

Search by name...      Metric: CPU Usage (millicores) ▼    Min  Avg  50th  90th  95th  Max

2 items

| NAME | STATUS | 95TH % ↑↓ | 95TH | POD | NODE | RESTARTS | UPTIME | TREND 95TH % (1 BAR = 15M) |
|------|--------|-----------|------|-----|------|----------|--------|----------------------------|
| ▦ azure-vote-back | ✔ Ok | 0.6% | 2 mc | azure-vote-back-7ff... | aks-agentpool-182... | 0 | 29 mins | |
| ▦ azure-vote-front | ✔ Ok | 0.2% | 0.5 mc | azure-vote-front-74... | aks-agentpool-182... | 0 | 23 mins | |

»

### azure-vote-front
Container

**View live data(preview)**

⧉   View in analytics         ∨
View container logs

azure-vote-front

Container ID
c4dd1b2e6bdb3eaf10daa66d23017c20c5697031b99bc0939
66078bbaa02e41d

Container Status
running

Container Status Reason
-

Image
azure-vote-front

Image Tag
v1

Container Creation Time Stamp
9/18/2019, 9:34:45 AM

Start Time
9/18/2019, 9:34:45 AM

Finish Time
-

CPU Limit
250 mc

CPU Request
100 mc

Memory Limit
256 MB

Memory Request
128 MB

```
let startDateTime = datetime('2019-09-18T01:45:00.000Z');
let endDateTime = datetime('2019-09-18T08:00:00.000Z');
let ContainerIdList = KubePodInventory
| where TimeGenerated >= startDateTime and TimeGenerated < endDateTime
| where ContainerName =~ 'f94a88c4-d9e5-11e9-a01b-4aa19e07b734/azure-vote-front'
| where ClusterId =~ '/subscriptions/60ad227c-01b2-4da3-ac97-43e704fdba0c/resourceGroups/PacktAKSResourceGroup/providers/Microsoft.ContainerService/managedClusters/PacktAKSCluster'
| distinct ContainerID;
ContainerLog
| where TimeGenerated >= startDateTime and TimeGenerated < endDateTime
| where ContainerID in (ContainerIdList)
| project LogEntrySource, LogEntry, TimeGenerated, Computer, Image, Name, ContainerID
| order by TimeGenerated desc
| render table
```

Completed        ⏱ 00:00:03.342   🗑 64 records 🗑

▦ TABLE   ▥ CHART   |   Columns ⌄        Display time (UTC+00:00) ⌄

Drag a column header and drop it here to group by that column

| TimeGenerated [UTC] | LogEntrySource | LogEntry | Computer | Image | Name | ContainerID |
|---|---|---|---|---|---|---|
| > 9/18/2019, 7:48:25.528 AM | stderr | [pid: 15|app: 0|req: 2/5] 10.244.2.1 () {34 vars in 467 bytes} [Wed Sep 1... | aks-agentpool-18232472-1 | microsoft/azure-vote-front:v1 | f94a88c4-d9e5-11e9-a01b-4aa19e07b734/azure-vote-front | c4dd1b2e6bdb3eaf10daa66d23017c20 |
| > 9/18/2019, 7:48:25.528 AM | stdout | 10.244.2.1 - - [18/Sep/2019:07:48:25 +0000] "GET / HTTP/1.1" 200 950... | aks-agentpool-18232472-1 | microsoft/azure-vote-front:v1 | f94a88c4-d9e5-11e9-a01b-4aa19e07b734/azure-vote-front | c4dd1b2e6bdb3eaf10daa66d23017c20 |
| > 9/18/2019, 7:36:43.682 AM | stderr | [pid: 15|app: 0|req: 1/4] 10.240.0.4 () {38 vars in 504 bytes} [Wed Sep 1... | aks-agentpool-18232472-1 | microsoft/azure-vote-front:v1 | f94a88c4-d9e5-11e9-a01b-4aa19e07b734/azure-vote-front | c4dd1b2e6bdb3eaf10daa66d23017c20 |
| > 9/18/2019, 7:36:43.682 AM | stdout | 10.240.0.4 - - [18/Sep/2019:07:36:43 +0000] "GET /favicon.ico HTTP/1... | aks-agentpool-18232472-1 | microsoft/azure-vote-front:v1 | f94a88c4-d9e5-11e9-a01b-4aa19e07b734/azure-vote-front | c4dd1b2e6bdb3eaf10daa66d23017c20 |
| > 9/18/2019, 7:36:12.493 AM | stderr | [pid: 14|app: 0|req: 3/3] 10.240.0.4 () {38 vars in 504 bytes} [Wed Sep ... | aks-agentpool-18232472-1 | microsoft/azure-vote-front:v1 | f94a88c4-d9e5-11e9-a01b-4aa19e07b734/azure-vote-front | c4dd1b2e6bdb3eaf10daa66d23017c20 |
| > 9/18/2019, 7:36:12.493 AM | stdout | 10.240.0.4 - - [18/Sep/2019:07:36:12 +0000] "GET /favicon.ico HTTP/1... | aks-agentpool-18232472-1 | microsoft/azure-vote-front:v1 | f94a88c4-d9e5-11e9-a01b-4aa19e07b734/azure-vote-front | c4dd1b2e6bdb3eaf10daa66d23017c20 |
| > 9/18/2019, 7:35:54.121 AM | stdout | 10.240.0.5 - - [18/Sep/2019:07:35:54 +0000] "GET /favicon.ico HTTP/1... | aks-agentpool-18232472-1 | microsoft/azure-vote-front:v1 | f94a88c4-d9e5-11e9-a01b-4aa19e07b734/azure-vote-front | c4dd1b2e6bdb3eaf10daa66d23017c20 |
| > 9/18/2019, 7:35:54.121 AM | stderr | [pid: 14|app: 0|req: 2/2] 10.240.0.5 () {40 vars in 657 bytes} [Wed Sep ... | aks-agentpool-18232472-1 | microsoft/azure-vote-front:v1 | f94a88c4-d9e5-11e9-a01b-4aa19e07b734/azure-vote-front | c4dd1b2e6bdb3eaf10daa66d23017c20 |
| > 9/18/2019, 7:35:53.897 AM | stdout | 10.240.0.5 - - [18/Sep/2019:07:35:53 +0000] "GET /static/default.css H... | aks-agentpool-18232472-1 | microsoft/azure-vote-front:v1 | f94a88c4-d9e5-11e9-a01b-4aa19e07b734/azure-vote-front | c4dd1b2e6bdb3eaf10daa66d23017c20 |
| > 9/18/2019, 7:35:53.774 AM | stdout | 10.240.0.5 - - [18/Sep/2019:07:35:53 +0000] "GET / HTTP/1.1" 200 950... | aks-agentpool-18232472-1 | microsoft/azure-vote-front:v1 | f94a88c4-d9e5-11e9-a01b-4aa19e07b734/azure-vote-front | c4dd1b2e6bdb3eaf10daa66d23017c20 |

# Chapter 14: Implementing Authentication
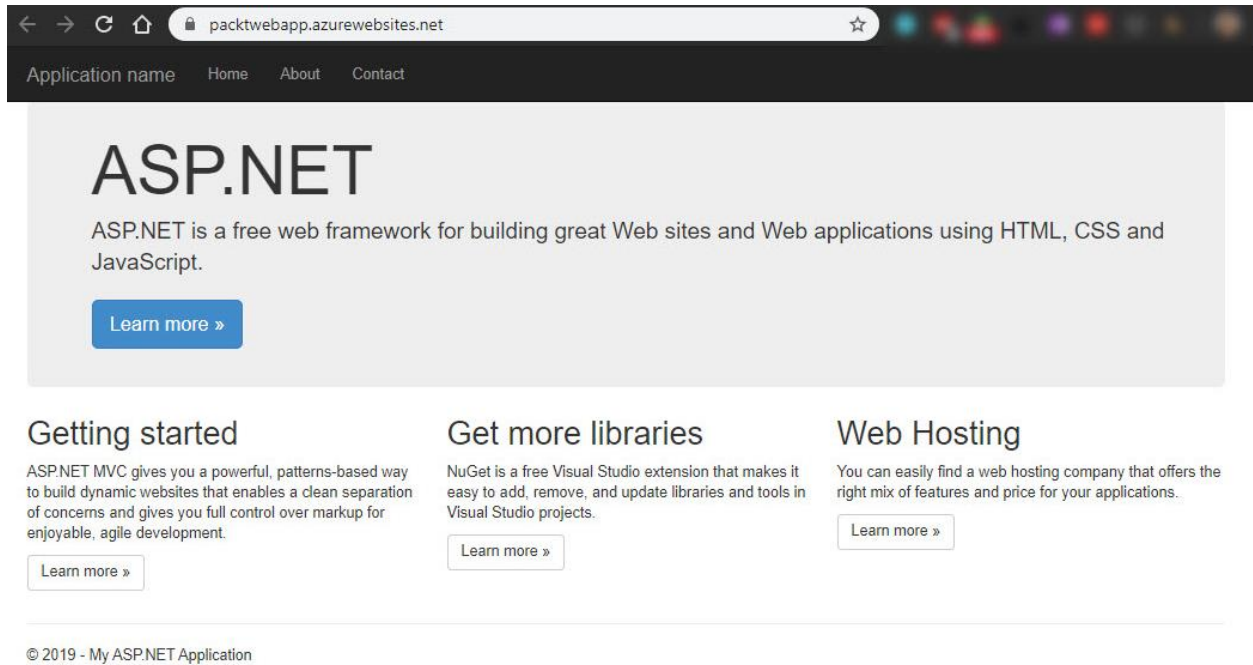
💾 Save    ✕ Discard

⚠ Anonymous access is enabled on the App Service app. Users will not be prompted for login.

App Service Authentication

Off **On**

Action to take when request is not authenticated

Allow Anonymous requests (no action)    ⌄

Authentication Providers

◆ Azure Active Directory                                    ›
Not Configured

■ Microsoft                                                 ›
Not Configured

f Facebook                                                  ›
Not Configured

8+ Google                                                   ›
Not Configured

🐦 Twitter                                                  ›
Not Configured

Advanced Settings

Token Store

Off    **On**

**Allowed External Redirect URLs**

[                                                    ] ⋯

Save    ✕ Discard

⚠ Anonymous access is enabled on the App Service app. Users will not be prompted for login.

App Service Authentication

Off    **On**

Action to take when request is not authenticated

Allow Anonymous requests (no action)    ⌄

Authentication Providers

◆ Azure Active Directory
Not Configured                                          ›

■ Microsoft
Not Configured                                          ›

f Facebook
Not Configured                                          ›

8+ Google
Not Configured                                          ›

🐦 Twitter
Not Configured                                          ›

Advanced Settings

Token Store

Off    **On**

Allowed External Redirect URLs

[                                              ]  ···

**Azure Active Directory Settings** ☐ ✕

**Active Directory Authentication**

These settings allow users to sign in with Azure Active Directory. Click here to learn more. Learn more

**Management mode** ⓘ

| Off | **Express** | Advanced |

ⓘ Express mode allows user to create an AD Application or select an existing AD application in your current Active Directory.

**Current Active Directory**

SZaal

**Management mode**

| **Create New AD App** | Select Existing AD App |

**Create App** *

PacktWebApp ✓

**Grant Common Data Services Permissions**

| On | **Off** |

**OK**

**Microsoft**

# Permissions requested

**PacktWebApp**

**This application is not published by Microsoft.**

This app would like to:

∨ Sign you in and read your profile

☐ Consent on behalf of your organisation

Accepting these permissions means that you allow this app to use your data as specified in their Terms of Service and Privacy Statement. You can change these permissions at https://myapps.microsoft.com. Show details

Does this app look suspicious? Report it here

Cancel     Accept

Index.cshtml Views/Home

```
1  @{
2      ViewBag.Title = "Home Page";
3  }
4
5  <div class="jumbotron">
6      <h1>ASP.NET</h1>
7      <p class="lead">ASP.NET is a free web framework for buildin
8      <p><a href="http://asp.net" class="btn btn-primary btn-lg"
9  </div>
10
11 <div class="row">
12     <div class="col-md-4">
13         <h2>Getting started</h2>
14         <p>
15             ASP.NET MVC gives you a powerful, patterns-based
16             enables a clean separation of concerns and gives
17             for enjoyable, agile development.
18         </p>
19         <p><a class="btn btn-default" href="http://go.microsoft
20     </div>
21     <div class="col-md-4">
22         <h2>Get more libraries</h2>
23         <p>NuGet is a free Visual Studio extension that makes
24         <p><a class="btn btn-default" href="http://go.microsoft
25     </div>
26     <div class="col-md-4">
27         <h2>Web Hosting</h2>
28         <p>You can easily find a web hosting company that offer
29         <p><a class="btn btn-default" href="http://go.microsoft
30     </div>
31 </div>
```

Index.cshtml Views/Home

```
1  @{
2      ViewBag.Title = "Home Page";
3  }
4
5  @using System.Security.Claims
6  @using System.Threading
7
8  <div class="jumbotron">
9      @{
10         var claimsPrincipal = Thread.CurrentPrincipal as ClaimsPrincipal;
11         if (claimsPrincipal != null && claimsPrincipal.Identity.IsAuthenticated)
12         {
13             <h2 style="color:red">Authentication Succeeded!</h2>
14             <div><span><strong>Principal Name:</strong><br />@claimsPrincipal.Identity.Name</span></div>
15             <br />
16         }
17         else
18         {
19             <div style="color:blue">Current request is unauthenticated!</div>
20         }
21     }
22 </div>
```

Application name   Home   About   Contact

Authentication Succeeded!

Principal Name:

brett@squareconnection.co.uk

↻ Refresh   🗑 Delete bindings | 🖥 Buy Certificate   ❓ FAQs

| Bindings | **Private Key Certificates (.pfx)** | Public Key Certificates (.cer) |

⚙ **Protocol Settings**

Protocol settings are global and apply to all bindings defined by your app.

HTTPS Only: ⓘ   [Off | On]

Minimum TLS Version ⓘ   [1.0 | 1.1 | **1.2**]

Incoming client certificates ⓘ   [Off | On]

🛡 **TLS/SSL bindings**

Bindings let you specify which certificate to use when responding to requests to a specific hostname over HTTPS. TLS/SSL Binding requires valid private certificate (.pfx) issued for the specific hostname. Learn more

➕   Add TLS/SSL Binding

☐	HOST NAME	PRIVATE CERTIFICATE THUMBPRINT	TLS/SSL TYPE

No TLS/SSL bindings configured for the app.

↻ Refresh   🗑 Delete bindings | 🟦 Buy Certificate   ❓ FAQs

Bindings   **Private Key Certificates (.pfx)**   Public Key Certificates (.cer)

PFX   **Private Key Certificate**

Private key certificates (.pfx) can be used for TLS/SSL bindings and can be loaded to the certificate store for your app to consume. To understand how to load the certificates for your app to consume click on the learn more link. Uploaded certificates are not available for manual download from the Azure Management Portal, they can only be used by your app hosted on App Service after the required App Settings are set properly or used for TLS/SSL. Learn more

+ Import App Service Certificate   + Upload Certificate   + Import Key Vault Certificate

Private Key Certificates

Status Filter (All) Healthy   Warning   Expired

HEALTH STATUS	HOSTNAME			EXPIRATION	THUMBPRINT

No private key certificates available for app.

Add Private Certificate (.pfx)   ✕

PFX   **Upload Private Certificate**

Upload a private certificate (.pfx) file with a valid password to be used for SSL bindings and runtime consumption.
Learn more

* PFX Certificate File

"13d1bcb0dc41addc258c676a32a12434.pfx"   📁

* Certificate password

••••••••   🔳 ✓

Upload

Bindings   Private Key Certificates (.pfx)   Public Key Certificates (.cer)

⚙ **Protocol Settings**

Protocol settings are global and apply to all bindings defined by your app.

HTTPS Only: ⓘ   ⬤ Off   On

Minimum TLS Version ⓘ   1.0   1.1   **1.2**

Incoming client certificates ⓘ   ⬤ Off   On

🛡 **TLS/SSL bindings**

Bindings let you specify which certificate to use when responding to requests to a specific hostname over HTTPS. TLS/SSL Binding requires valid private certificate (.pfx) issued for the specific hostname. Learn more

➕   Add TLS/SSL Binding   ⬅

☐   HOST NAME   PRIVATE CERTIFICATE THUMBPRINT   TLS/SSL TYPE

No TLS/SSL bindings configured for the app.

SSL Binding   ✕

🛡 **SSL bindings**

Use the dropdowns to select the Hostname to secure with SSL, and the certificate to use. You may also select whether to use Server Name Indication (SNI) or IP based SSL. Learn more

* Hostname

| sjoukjezaal.nl   ⌄ |

* Private Certificate Thumbprint

| www.sjoukjezaal.nl,sjoukjezaal.nl (553133FAF5F9C65CFE52E2EDA... ⌄ |

* SSL Type:

| SNI SSL   ⌄ |

Add Binding

Bindings	Private Key Certificates (.pfx)	Public Key Certificates (.cer)

⚙️ **Protocol Settings**

Protocol settings are global and apply to all bindings defined by your app.

HTTPS Only: ⓘ   [**Off** | On]

Minimum TLS Version ⓘ   (1.0   1.1   **1.2**)

Incoming client certificates ⓘ   [**Off** | On]

🛡️ **TLS/SSL bindings**

Bindings let you specify which certificate to use when responding to requests to a specific hostname over HTTPS. TLS/SSL Binding requires valid private certificate (.pfx) issued for the specific hostname. Learn more

➕ Add TLS/SSL Binding

☐ HOST NAME	PRIVATE CERTIFICATE THUMBPRINT	TLS/SSL TYPE
sjoukjezaal.nl	553133FAF5F9C65CFE52E2EDAD87D2CB8AE0C6BB	SNI Based
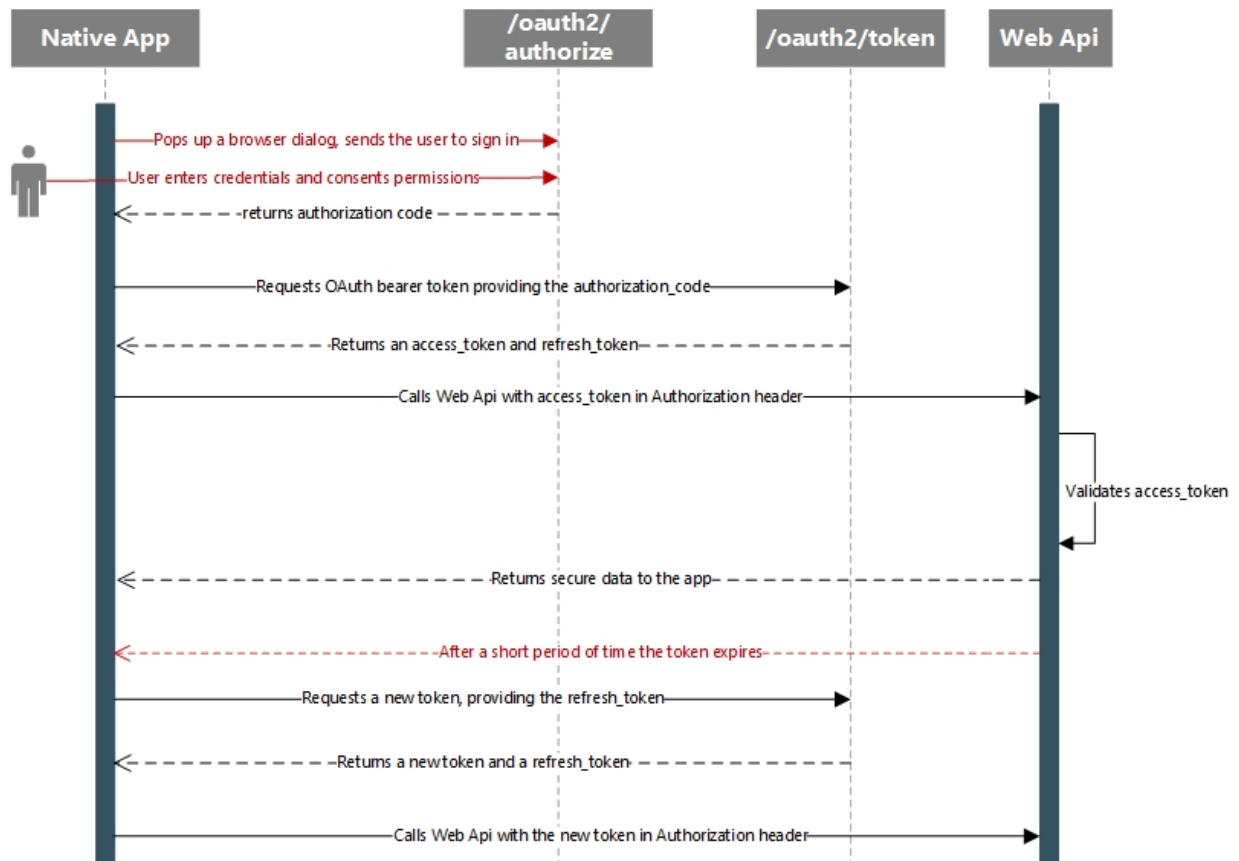
ℹ️   Welcome to the new and Improved App   (now Generally Available). See what's new and learn more on how it's changed. →

All applications | Owned applications

🔍 Start typing a name or Application ID to filter these results

Display name	Application (client) ID	Created On	Certificates & secrets

Register an application

* Name

The user-facing display name for this application (this can be changed later).

PacktADApp	✓

Supported account types

Who can use this application or access this API?

- ⦿ Accounts in this organizational directory only [   ] - Single tenant)
- ○ Accounts in any organizational directory (Any Azure AD directory - Multitenant)
- ○ Accounts in any organizational directory (Any Azure AD directory - Multitenant) and personal Microsoft accounts (e.g. Skype, Xbox)

Help me choose...

Redirect URI (optional)

We'll return the authentication response to this URI after successfully authenticating the user. Providing this now is optional and it can be changed later, but a value is required for most authentication scenarios.

Web ⌄	https://localhost	✓

By proceeding, you agree to the Microsoft Platform Policies ⧉

Register

Credentials enable applications to identify themselves to the authentication service when receiving tokens at a web addressable location (using an HTTPS scheme). For a higher level of assurance, we recommend using a certificate (instead of a client secret) as a credential.

Certificates

Certificates can be used as secrets to prove the application's identity when requesting a token. Also can be referred to as public keys.

⬆ Upload certificate

No certificates have been added for this application.

THUMBPRINT	START DATE	EXPIRES

Client secrets

A secret string that the application uses to prove its identity when requesting a token. Also can be referred to as application password.

\+ New client secret ⬅

DESCRIPTION	EXPIRES	VALUE

No client secrets have been created for this application.

Credentials enable applications to identify themselves to the authentication service when receiving tokens at a web addressable location (using an HTTPS scheme). For a higher level of assurance, we recommend using a certificate (instead of a client secret) as a credential.

Certificates

Certificates can be used as secrets to prove the application's identity when requesting a token. Also can be referred to as public keys.

⬆ Upload certificate

No certificates have been added for this application.

THUMBPRINT	START DATE	EXPIRES

Client secrets

A secret string that the application uses to prove its identity when requesting a token. Also can be referred to as application password.

\+ New client secret

DESCRIPTION	EXPIRES	VALUE	
Key1	10/9/2020	qka0NDH6yUBTqay3@9SqkCbBCUBjw:]. 📋	🗑

Configured permissions

Applications are authorized to call APIs when they are granted permissions by users/admins as part of the consent process. The list of configured permissions should include all the permissions the application needs. Learn more about permissions and consent

\+ Add a permission   Grant admin consent for ▓▓▓▓▓▓

API / Permissions name	Type	Description	Admin Consent Req...	Status	
∨ Microsoft Graph (1)					•••
User.Read	Delegated	Sign in and read user profile	-		•••

Request API permissions

< All APIs

▶ ChannelMessage

▶ Chat

▶ Contacts

▶ DelegatedPermissionGrant

▶ Device

▶ DeviceManagementApps

▶ DeviceManagementConfiguration

▶ DeviceManagementManagedDevices

▶ DeviceManagementRBAC

▶ DeviceManagementServiceConfig

▼ Directory (1)

☐ **Directory.Read.All**
Read directory data ⓘ

> Allows the app to read and write data in your organization's directory, such as users, and groups, without a signed-in user. Does not allow user or group deletion.

☑ **Directory.ReadWrite.All**
Read and write directory data ⓘ   Yes

▶ Domain

▶ EduAdministration

▶ EduAssignments

▶ EduRoster

▶ ExternalItem

Add permissions   **Discard**

⚠ Permissions have been changed, but there is a delay between permissions being configured and when they appear on the consent prompt. Please wait a few minutes before granting admin consent. Users and/or admins will have to consent even if they have already done so previously.

Configured permissions

Applications are authorized to call APIs when they are granted permissions by users/admins as part of the consent process. The list of configured permissions should include all the permissions the application needs. Learn more about permissions and consent

+ Add a permission | Grant admin consent for [redacted] |

API / Permissions name	Type	Description	Admin Consent Req...	Status	
∨ Microsoft Graph (2)					⋯
Directory.ReadWrite.All	Application	Read and write directory data	Yes	⚠ Not granted for [redacted]	⋯
User.Read	Delegated	Sign in and read user profile	-		⋯

Configured permissions

Applications are authorized to call APIs when they are granted permissions by users/admins as part of the consent process.
The list of configured permissions
should include all the permissions the application needs. Learn more about permissions and consent

+ Add a permission   Grant admin consent for SZ Solutions

API / Permissions name	Type	Description	Admin Consent Req...	Status		
∨ Microsoft Graph (2)						...
Directory.ReadWrite.All	Application	Read and write directory data	Yes	✅ Granted for		...
User.Read	Delegated	Sign in and read user profile	-	✅ Granted for		...

---

https://login.microsof 🔴	https://graph.microso 🔴	+ ...		No Environment ∨	👁 ⚙

POST ∨	https://graph.microsoft.com/v1.0/users	Params	Send ∨	Save ∨

Authorization   Headers (1)   Body 🔵   Pre-request Script   Tests   Code

	Key	Value	Description	...	Bulk Edit	Presets ▼
☑	Authorization	Bearer eyJ0eXAiOiJKV1QiLCJub25jZSI6ImxlZHJ1VzFxTlJnamIUe...				
	New key	Value	Description			

POST ∨	https://graph.microsoft.com/v1.0/users

Authorization	Headers (2)	Body ●	Pre-request Script	Tests

⬤ form-data ⬤ x-www-form-urlencoded 🔴 raw ⬤ binary **JSON (application/json)** ∨

```
1 ▾ {
2      "accountEnabled": true,
3      "displayName": "PacktUser",
4      "mailNickname": "PacktUser",
5      "userPrincipalName": "PacktUser@sjoukjelive.onmicrosoft.com",
6 ▾   "passwordProfile" : {
7        "forceChangePasswordNextSignIn": true,
8        "password": "P@ss@Word"
9      }
10 }
```

Body	Cookies	Headers (12)	Test Results

Pretty	Raw	Preview	JSON ∨	⇄

```
1 ▾ {
2      "@odata.context": "https://graph.microsoft.com/v1.0/$metadata#users/$entity",
3      "id": "82decd46-8f51-4b01-8824-ac24e0cf9fa4",
4      "businessPhones": [],
5      "displayName": "PacktUser",
6      "givenName": null,
7      "jobTitle": null,
8      "mail": null,
9      "mobilePhone": null,
10     "officeLocation": null,
11     "preferredLanguage": null,
12     "surname": null,
13     "userPrincipalName": "PacktUser@sjoukjelive.onmicrosoft.com"
14 }
```

System assigned   User assigned

A system assigned managed identity enables Azure resources to authenticate to cloud services (e.g. Azure Key Vault) without storing credentials in code. Once enabled, all necessary permissions can be granted via Azure role-based-access-control. The lifecycle of this type of managed identity is tied to the lifecycle of this resource. Additionally, each resource (e.g. Virtual Machine) can only have one system assigned managed identity. Learn more about Managed identities.

🖫 Save   ✕ Discard   ↻ Refresh | ♥ Got feedback?

Status ⓘ

Off	On

+ Add   ≡≡ Edit columns   ↻ Refresh | 🗑 Remove | ♥ Got feedback?

Check access   Role assignments   Deny assignments   Classic administrators   Roles

Check access

Review the level of access a user, group, service principal, or managed identity has to this resource. Learn more ↗

Find ❶

| Azure AD user, group, or service principal | ∨ |

| Search by name or email address | ✓ |

Add a role assignment

Grant access to resources at this scope by assigning a role to a user, group, service principal, or managed identity.

Add   Learn more ↗

View role assignments

View the users, groups, service principals and managed identities that have role assignments granting them access at this scope.

View   Learn more ↗

View deny assignments

View the users, groups, service principals and managed identities that have been denied access to specific actions at this scope.

View   Learn more ↗

Add role assignment ✕

Role ⓘ

Key Vault Contributor ⌄

Assign access to ⓘ

App Service ⌄

* Subscription

MSDN ⌄

Select ⓘ

Search by name

PacktWebApp
/subscriptions/8f6d0408-6d33-4e86-81c3-c817b3d...

Selected members:
No members selected. Search for and add one or more members
you want to assign to the role for this resource.

Learn more about RBAC

Save   Discard

Chapter 15: Developing Solutions that Use Cosmos DB Storage

Address

AddressId
Address
Street
City
ZipCode

Person

PersonId
CategoryId
AddressId
FirstName
Surname

Category

CategoryId
CategoryName
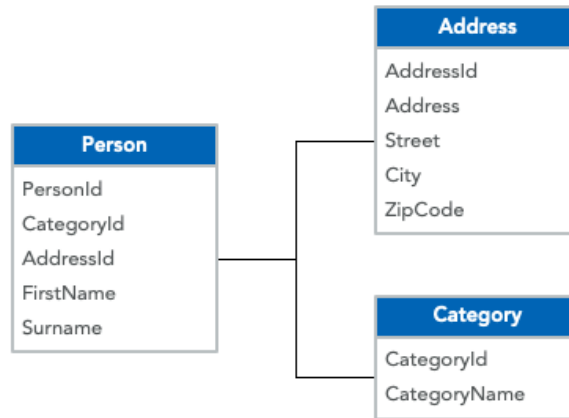
Example Combined Query

Person.PersonId	Person.FirstName	Person.Surname	Category.Name	Address.Street	Address.City
100	Brett	Hargreaves	Active	999 Letsbe Avenue	London

Congratulations! Your Azure Cosmos DB account was created.

Now, let's connect to it using a sample app:

Choose a platform

.NET   .NET Core   Xamarin   Java   Node.js   Python

1 Add a container

In Azure Cosmos DB, data is stored in containers.

Create 'Items' container

Create 'Items' container with 10GB storage capacity and 400 Request Units per second (RU/s) throughput capacity, for up to 400 reads/sec. Estimated hourly bill: $0.033 USD

2 Download and run your .NET app

Once container is created, download a sample .NET app connected to it, extract, build and run.

Download

Read-write Keys | Read-only Keys

URI

https://packtsqlapi.documents.azure.com:443/

PRIMARY KEY

bwUCrEGuPd9XCWzPmDr2A8oyRS7ELGQMDAqAUUfAlUAElhkOzO3vPxR23j6ixSjUCWjt87lh7fVAPBdwKWZejg==   · · ·

SECONDARY KEY

UTOLuQgHlvcX3NaS0UGflS6Py7NyHeAJKWAKqGUuzblcRTbpstCUaGcF7WgflrJBQ809TuckVKBkyKib0eNOhw==   · · ·

PRIMARY CONNECTION STRING

AccountEndpoint=https://packtsqlapi.documents.azure.com:443/;AccountKey=bwUCrEGuPd9XCWzPmDr2A==;

SECONDARY CONNECTION STRING

AccountEndpoint=https://packtsqlapi.documents.azure.com:443/;AccountKey=UTOLuQgHlvcX3NaS0UGflS==;

Save | Discard | Manual Failover | Automatic Failover

⚠ When you add a region to your account, you will be billed for the additional RU/s and storage copied to the region.
To keep your account completely free, stay in 1 region with 400 RU/s and 5GB of storage. Click here to learn more. →

Click on a location to add or remove regions from your Azure Cosmos DB account.

* Each region is billable based on the throughput and storage for the account. Learn more

Configure regions
Multi-region writes ⓘ

Disable | Enable

Configure the regions for reads, writes and availability zone (supported in selected regions and can only be configured when a new region is added). **+ Add region**

Regions	Reads Enabled	Writes Enabled	Availability Zone	Action
East US	✓	✓		🗑

Save | Discard

STRONG | BOUNDED STALENESS | SESSION | CONSISTENT PREFIX | EVENTUAL

ⓘ Eventual consistency is the weakest form of consistency wherein a client may get the values which are older than the ones it had seen before, over time.

Understand Eventual consistency

In the absence of any further writes, the replicas within the group will eventually converge. Eventual consistency is ideal where the application does not require any ordering guarantees. Examples include count of Retweets, Likes or non-threaded comments.
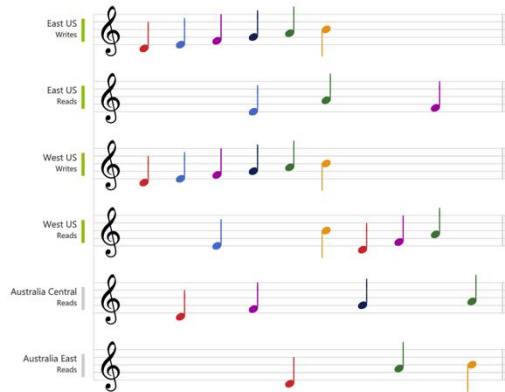
Chapter 16: Developing Solutions that Use a Relational Database

A Login   + New Query   ↑ Open query   ♥ Feedback

PacktSql (PacktAdmin)   ↻

ℹ Showing limited object explorer here.
For full capability please open SSDT.

▸ ☐ Tables
▸ ☐ Views
▸ ☐ Stored Procedures

Query 1 ✕

▶ Run   ■ Cancel query   ↓ Save query   ↓ Export data as .json   ↓ Export data as .csv   ↓ Export data as .xml

```
1  CREATE TABLE Employee (
2      Employeeid int IDENTITY(1,1) PRIMARY KEY,
3      FirstName varchar(255) NOT NULL,
4      LastName varchar(255) NOT NULL,
5      Title varchar(255) NOT NULL,
6      BirthDate date,
7      HireDate date
8  );
```

Results   Messages

ADO.NET   JDBC   ODBC   PHP   Go

ADO.NET (SQL authentication)

Server=tcp:packsqlserver.database.windows.net,1433;Initial Catalog=PacktSql;Persist Security Info=False;User ID={your_username};Password={your_password};MultipleActiveResultSets=False;Encrypt=True;TrustServerCertificate=False;Connection Timeout=30;

Download ADO.NET driver for SQL server

📋 Copy   ↻ Restore   ↑ Export   🛡 Set server firewall   🗑 Delete   ✕ Connect with...   ♥ Feedback

Resource group (change) : PackSQLResourceGroup   Server name   : packsqlserver.database.windows.net
Status   : Online   Elastic pool   : No elastic pool
Location   : East US   Connection strings   : Show database connection strings
Subscription (change)   : Microsoft Azure Sponsorship   Pricing tier   : General Purpose: Gen5, 2 vCores
Subscription ID   : 60ad227c-01b2-4da3-ac97-43e704fdba0c   Oldest restore point : 2019-10-13 09:39 UTC
Tags (change)   : Click here to add tags

+ New database   + New pool   + New data warehouse   ↓ Import database   ✏ Reset password   → Move   🗑 Delete   ♥ Feedback

Resource group (change) : PackSQLReso...   Server admin   : PacktAdmin
Status   : Available   Firewalls and virtual net... : Show firewall settings
Location   : East US   Active Directory admin : Not configured
Subscription (change)   : Microsoft Azure Sponsorship   Server name   : packsqlserver.database.windows.net
Subscription ID   : 60ad227c-01b2-4da3-ac97-43e704fdba0c
Tags (change)   : Click here to add tags

Create SQL Elastic pool

Microsoft

Basics   Tags   Review + create

Create a SQL Elastic pool with your preferred configurations. Elastic pools provide a simple and cost effective solution for managing the performance of multiple databases within a fixed budget. Complete the Basic tab, then go to Review + Create to provision with smart defaults, or visit each tab to customize. Learn more ⧉

Project details

Select the subscription to manage deployed resources and costs. Use resource groups like folders to organize and manage all your resources.

Subscription ⓘ

PacktPub	⌄

Resource group ⓘ

PacktSQLResourceGroup	⌄

Elastic pool details

Enter required settings for this pool, including picking a logical server and configuring the compute and storage resources.

Elastic Pool Name *

PacktElasticPool	✓

Server ⓘ

packtsqlserver (East US)	⌄

Compute + storage * ⓘ

GeneralPurpose
Gen5, 2 vCores, 32 GB, 0 databases
Configure elastic pool

Review + create	Next : Tags >

Create secondary

> ℹ️ Create geo-replicated secondaries to protect

Region

West US 🔒

Database name

PacktSql

*Secondary type

Readable 🔒

*Target server

packtsqlserver-westus (West US) >

Elastic pool

None 🔒

*Pricing tier

Standard S0: 10 DTUs, 250 GB stor... >

OK

packtsqlfailover
packtsqlserver

💾 Save   ✕ Discard   🗄 Add databases   Edit configuration   🗄 Remove databases   ⇄ Failover   ⚠ Forced Failover   🗑 Delete

Configuration details   Databases within group   Databases selected to be added (0)   Databases selected for removal (0)

	Server	Role	Read/Write failover policy
✓	packtsqlserver (East US)	Primary	Automatic
✓	packtsqlserver-westus (West US)	Secondary	

Read/write listener endpoint

packtsqlfailover.database.windows.net

Read-only listener endpoint

packtsqlfailover.secondary.database.windows.net

💾 Save   ✕ Discard   🗄 Add databases   Edit configuration   🗄 Remove databases   ⇄ Failover   ⚠ Forced Failover   🗑 Delete

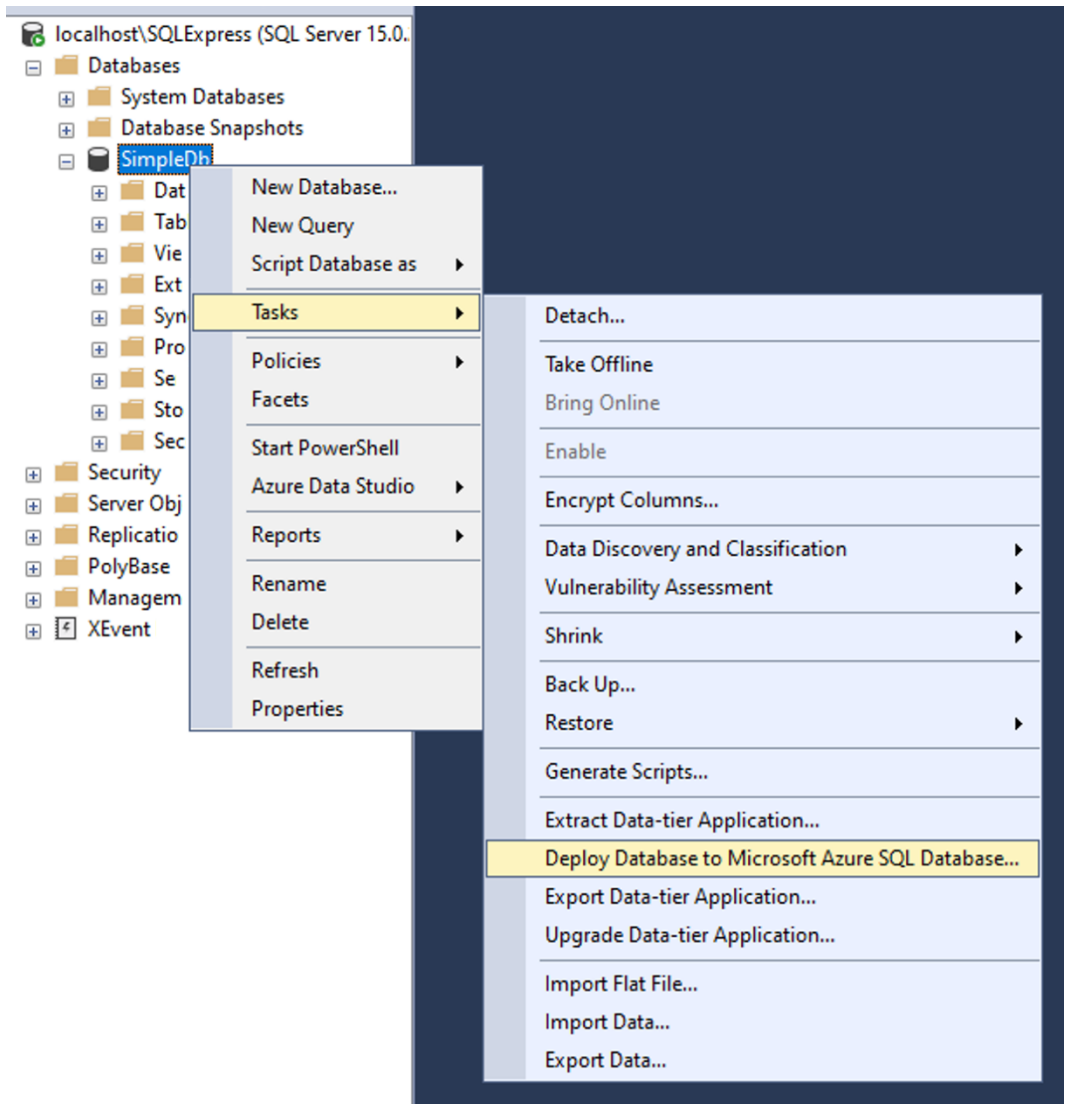localhost\SQLExpress (SQL Server 15.0.
- Databases
  - System Databases
  - Database Snapshots
  - SimpleDb
    - Dat
    - Tab
    - Vie
    - Ext
    - Syn
    - Pro
    - Se
    - Sto
    - Sec
- Security
- Server Obj
- Replicatio
- PolyBase
- Managem
- XEvent

| New Database... |
| New Query |
| Script Database as ▶ |
| Tasks ▶ |
| Policies ▶ |
| Facets |
| Start PowerShell |
| Azure Data Studio ▶ |
| Reports ▶ |
| Rename |
| Delete |
| Refresh |
| Properties |

| Detach... |
| Take Offline |
| Bring Online |
| Enable |
| Encrypt Columns... |
| Data Discovery and Classification ▶ |
| Vulnerability Assessment ▶ |
| Shrink ▶ |
| Back Up... |
| Restore ▶ |
| Generate Scripts... |
| Extract Data-tier Application... |
| Deploy Database to Microsoft Azure SQL Database... |
| Export Data-tier Application... |
| Upgrade Data-tier Application... |
| Import Flat File... |
| Import Data... |
| Export Data... |

Deploy Database 'SimpleDb'

Deployment Settings

Help

Specify Target Connection

Specify the name of the instance of SQL Server or the Microsoft Azure SQL Database server that will host the deployed database, name the new database, and then click Connect to login to the target server.

Server connection:

packtsqlserver (PacktAdmin)   [Connect...]

New database name:

SimpleDb

Microsoft Azure SQL Database settings

Edition of Microsoft Azure SQL Database:	Basic
Maximum database size (GB):	2
Service Objective :	Basic

Other settings

Temporary file name:

C:\Users\brett\AppData\Local\Temp\SimpleDb-20201108193900.bacpac   [Browse...]

[< Previous] [Next >] [Cancel]

SQL databases

Square Connection Ltd

+ Add   🕐 Reservations   ≡≡ Edit columns   🔄 Refresh | 🏷 Assign tags   🗑 Delete

ⓘ Try our new Azure SQL resource browser! This experience offers a unified view of all your SQL Server resources in Azure as well as improved sorting and filtering. Click here to go to the new experience.

Subscriptions: 1 of 2 selected – Don't see a subscription? Open Directory + Subscription settings

Filter by name...	PacktPub	All resource groups	All locations	All tags

2 items

Name ↑↓	Status	Replication role	Server	Pricing tier	Location ↑↓
PacktSql (packtsqlserver/PacktSql)	Online	None	packtsqlserver	Standard S0: 10 DTUs	East US
SimpleDb (packtsqlserver/SimpleDb)	Online	None	packtsqlserver	Basic	East US

Chapter 17: Mock Exam Questions

No Images

Chapter 18: Mock Exam Answers

No Images