

# Azure Runbooks

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# How to Runbook

This guide is a quick manual for an Azure Runbook. Here is a brief description of the prerequisites and definitions that must be met in order to create an automation via Azure Runbooks.

## Prerequisites

### Defined goal

A defined goal is necessary that we can check if our end product is doing what we are expecting. This can be as simple as one phrase.

#### Example:

My Azure Runbook should start by a manual trigger and create a new enrollment service profile via Graph API in Intune. As a result, it should return a success-code and the name and id of the new enrollment service profile.

### Defined input

To know how to start the code, we first need to define the input(s) we need to get with the trigger to reach our goal. This must be a static text input.

#### Example:

Variable 1: \$ServiceProfileName = <textinput>

Variable 2: \$GroupId = <idinput>

Variable 3: \$CompanyName = <companyname>

### Defined output

The output should include the name and the id of the created enrollment service profile and if the script was run successful.

#### Example:

```
ESP-WIN-LNC-DEVICE-CompanyEnrollment-PROD // 396e26cb-d657-4a4e-8beb-105ba1984c63
```

```
Script finished successfully
```

# Trigger method

The method is important that we know what order which object(s) are triggering this runbook. This could be a manual user via the Azure Portal or via the Azure Management API. Furthermore, it could be a third-party system, like ServiceNow or a schedule.

## Example:

This Azure Runbook should get triggered manually via the Azure Portal.

# Logic model

The logic model defines the logic of the code in a very high-level draft.

## Example:

1. Get Input
2. Check input values
3. Create JSON body for Graph API
4. Post JSON body to Graph API
5. Get response from Graph API
6. Write response in output

# Decisions

## Coding language

Azure Runbooks can execute different code with different languages. This is defined per Azure Runbook. To change the Runbooks coding language, you can create a new Runbook in the Automation Account. Azure Runbooks offers these languages for code execution:

- PowerShell
- Python

## Runtime

On which environment should the Runbook run on? You can choose between Azure managed hosts or hybrid worker. Hybrid worker brings the advantage that you can connect to on premise resources and bypass some restrictions which can occur if Azure is selected as runtime.


# Procedure

## Create Automation Account

Automation Accounts are the container which contains all the information, secret, Runbook and more. You can create one Automation Account for all your Runbooks. However, it is a good idea if the automation accounts are subdivided according to the technologies that will be automated.

## Create runbook

The runbook contains the code which will be executed. On creation you have to select which type it should create. This is a selection of the mentioned coding languages.

 **Create a runbook** ...

Name \* ⓘ

Enter the runbook name...

Runbook type \* ⓘ

Select the runbook type

Select the type of runbook you want to create:

- **PowerShell runbooks** are text runbooks based on PowerShell.
- **Graphical runbooks** are based on Windows PowerShell and are created and edited completely in the Automation graphical editor.
- **Python runbooks** are text runbooks based on Python scripts targeting the Python interpreter.
- **PowerShell Workflow runbooks** are text runbooks based on Windows PowerShell Workflow.
- **Graphical PowerShell Workflow runbooks** are based on Windows PowerShell Workflow and are created and edited completely in the Automation graphical editor. Runbooks of this type can be migrated to Graphical runbooks.

## Code

When created you can copy your code into the web editor of the Function or start to develop the code directly in the Azure Portal.

## Testing

For testing you don't have to leave the Azure Portal. While developing you are able to activate the "Test pane". There you can enter the variables if parameters are defined on the top level in the code.

Save Publish Revert to published **Test pane** Feedback

> CMDLETS

> RUNBOOKS

> ASSETS

```
1 $CredentialObject=Get-AutomationPSCredential -Name 'CRED-RB-ALL-CRED-DCDiag-PROD-WE'
2 # $Password = $CredentialObject.GetNetworkcredential().password
3 $Username = $CredentialObject.GetNetworkcredential().username
4
5 $Username
```

param (

[Parameter (Mandatory = \$true)]

```
[object] $Email,  
[Parameter (Mandatory = $true)]  
[object] $deviceName  
)
```

Start Stop Suspend Resume View last test Refresh job streams

Parameters

EMAIL \* ⓘ  
Enter a value

Mandatory: Object

DEVICENAME \* ⓘ  
Enter a value

Mandatory: Object

Run Settings

Run on ⓘ  
Azure Hybrid Worker

Activity-level tracing  
This configuration is available only for graphical runbooks.

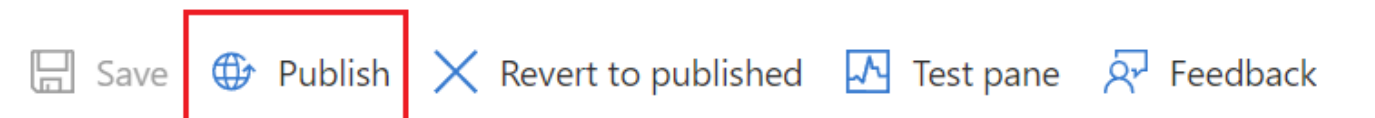
Trace level  
None Basic Detailed

Click 'Start' to begin the test run.  
Streams will display when the test completes.

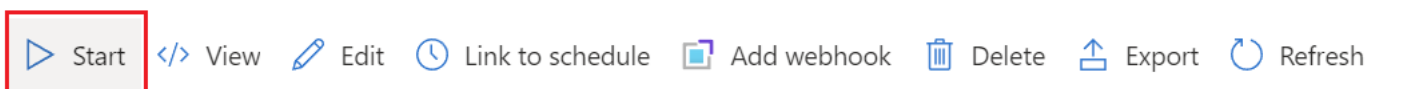
This is the result view in the Azure Portal if parameters are defined in the code.

## Deploy

To deploy the code you have to publish the code in the editor view.



After that you are able to start the Runbook via the normal Azure Runbook GUI. This will then use the latest published version of the code.



## Things to consider

### Hybrid worker

To use a hybrid worker, you have to deploy an Azure VM, or an Azure Arc enabled VM which is always online. This means that the costs are not very low to use on prem scripts via Azure Runbooks.

### Stacking of requests

Azure Runbook stacks the requests. So, if 100 requests are made, the code execution is asynchronous, and you have to wait until all jobs (requests) were processed.

# Runbook concept with PowerShell

Here I describe how to create automations using runbooks. The PowerShell scripts can either run in the Azure environment or on the hybrid workers, which are joined in a domain and can thus access internal resources. The file structure and all resources are displayed and edited via the Azure portal.

Runbooks are executed asynchronously. This means that the first execution is completely finished until the next request is processed (big difference to Azure Functions!). This also means that several executions are stacked (queued) and only one execution is possible in parallel at a time.

## Runbooks

In Azure Automation Accounts, runbooks are the PowerShell scripts that are executed regularly, on user action or via third party applications. These are created in the corresponding automation account according to the technology. These runbooks can then be equipped with other resources such as schedules or credentials.

The runbooks should be named according to the abbreviation corresponding to the environment (AD, MEID, CPC, MW, SPO, EXO, TEA, etc.) and the abbreviation "RB". In addition, a short name that is as meaningful as possible should be used for the action of the script.

Example:

- RB-EXO-PRD-PS1-CreateDomainByCompany-PROD-WE
- RB-MEID-ALL-PS1-CleanUpMEIDDevices-PROD-WE

## Automation Credentials

App Registrations and Service Accounts Credentials can be stored in the Automation Credentials. These are to be stored according to the following concept. Usernames and passwords, but also Secret ID and Client Secrets can be stored here. It is also important here that the corresponding resource names (account name, app registration name) are contained one-to-one.

Example:

- CRED-RB-PRD-CRED-CleanUpMEIDDevices-PROD-WE
- CRED-RB-ALL-CRED-CleanUpMEIDDevices-PROD-WE

## Access in the PowerShell script to the corresponding variables

```
$CredentialObject=Get-AutomationPSCredential -Name 'CRED-RB-ALL-CRED-CleanUpMEIDDevices-PROD-WE'  
$Password = $CredentialObject.GetNetworkcredential().password  
  
$Username = $CredentialObject.GetNetworkcredential().username
```

## Certificates

The certificate storage of Azure Runbooks can be used so that authentication can also be performed using certificates.

Example:

- CERT-RB-PRD-CERT-CleanUpMEIDDevices-PROD-WE
- CERT-RB-ALL-CERT-CleanUpMEIDDevices-PROD-WE

## Variables

Under variables, contents and strings can be stored that simply have to be adapted or should not be hardcoded in the script.

Example:

- VAR-RB-PRD-CLIENTID-CleanUpMEIDDevices-PROD-WE
- VAR-RB-ALL-CLIENTID-CleanUpMEIDDevices-PROD-WE

## Access in the PowerShell script to the corresponding variables

```
$ClientId=Get-AutomationVariable -Name "VAR-RB-PRD-CLIENTID-CleanUpMEIDDevices-PROD-WE"
```

## PowerShell Modules

In order to use PowerShell modules, they must first be added to the Azure Automation account. This can be achieved in the Automation Account via "Modules" → "Add a Module" → "Browse from Gallery".

## Import module into PowerShell script



# Schedules

The schedules are finally mapped to the runbook. These can be set granularly on a weekly, daily or hourly basis. The following concept is also used in the schedule name. In addition to the action name, the abbreviation "RB" for runbook is added here. In addition, there is one of the following regularity descriptions:

- Hourly
- Daily
- Weekly
- Monthly
- Yearly
- 12Hourly

Example:

- SCED-RB-PRD-DAILY-CheckLicenseCount-PROD-WE
- SCED-RB-PRD-WEEKLY-CleanUpMEIDDevices-PROD-WE

# Triggers

Triggers mean types to call the Azure Runbooks and execute the code.

## Manual

Azure Runbooks can be conveniently executed via the GUI. The required parameters can also be entered in the GUI Form.

## Schedules

Schedules can be defined in the Automation Account. This allows scripts to be run on a regular basis. These schedules can then be assigned to the runbooks. To remain transparent, only one schedule per runbook and one runbook per schedule may be used.

## PowerShell

A runbook can also be executed via PowerShell. However, a webhook must be created for this, via which a runbook job can be created. Since runbooks do not automatically return the response and can take several hours to execute, the PowerShell script must also wait for the output. Here we see an example where a PowerShell script waits 165 seconds for the job output and terminates otherwise.

```
# Create AzRUN Job
$url = "<yourrunbookwebhookurl>"
$Body = @"
{
  "email": "$Email"
}
"@
$JobId = Invoke-RestMethod -Method POST -Uri $url -Body $Body
$JobId = $JobId.JobIds

$whilecounter = 1
```

```
# Get AzRUN Job Output

$url =
"https://management.azure.com/subscriptions/<subscriptionid>/resourceGroups/<resourcegroupname>/providers/Microsoft.Automation/automationAccounts/<automationaccountname> >/jobs/$JobId/?api-version=2019-06-01"

$Response = Invoke-Restmethod -uri $url -Method GET -Headers $Headers
$response.properties.provisioningstate
while($response.properties.provisioningstate -ne "Succeeded"){
    Start-Sleep 15
    $Response = Invoke-Restmethod -uri $url -Method GET -Headers $Headers
    $response.properties.provisioningstate
    if($whilecounter -le 10){
        $whilecounter ++
    }
    else{
        Write-Error "Get JobOutput from Runbook failed. Exiting Script."
        Exit 1
    }
}

$outputurl =
"https://management.azure.com/subscriptions/<subscriptionid>/resourceGroups/<resourcegroupname>/providers/Microsoft.Automation/automationAccounts/<automationaccountname> >/jobs/$JobId/output?api-version=2019-06-01"

$Language = Invoke-Restmethod -uri $outputurl -Method GET -Headers $Headers
```

## ServiceNow

ServiceNow has a spoke for interaction with Azure Automation accounts and can use it to execute runbooks and read out their feedback. SNOW receives authorisation for access via a service account. This account must be able to read all resource groups on the subscription and have the rights to execute runbooks on the automation account.

## Authentication to Azure Automation Account

Authentication to the Azure Automation Account happens in exactly the same way in the frontend as well as via code. Here, the app registration must have the permission "user\_impersonation" on the Azure API. Then all requests go via the API <https://management.azure.com>. Accordingly, the app registration must also be authorised in the IAM of the Azure Automation Account by means of Managed Identity.

# Create Runbook Job via Webhook and Azure Management API

To create a Runbook Job you can use the Azure Management API in combination with the webhook feature from Azure Runbooks. This makes sure that you can execute a script with given parameters in a safe location (credential handling, reliability, on premise access and more).

## Use case

To use the runbook to execute PowerShell code on a backend, you can create a Job from the client code with corresponding input values. Even if you want to get some information back from the Runbook, you can wait on the client side code for the response of the Runbook Job.

**Example:** Based on a UPN of a logged in user the language of his device should be set. In order to match the UPN in the database and get a predefined language, an Azure Runbook should be called by the client and return the language. This ensures that the credentials and network access to the database are stored securely.

## Create webhook URL

To create a webhook you have to open the Runbook and go to "Webhooks":

RB-TST-LNC-PS1-DocsTests-NONPROD-WE | Runbook

Search « Start </> View Edit Link

Overview

Activity log

Tags

Diagnose and solve problems

Resources

Jobs

Schedules

Webhooks

Runbook settings

Properties

Description

Logging and tracing

Settings

Locks

Automation

Tasks (preview)

Export template

Support + troubleshooting

New Support Request

Essentials

Resource group : rg-bkw-intune-prod-we

Account : intune-automation

Location : West Europe

Subscription : sub-bkw-shared-prod-w

Tags (edit) : CostCenter : 4-10-0008

Recent Jobs

Status

No jobs found.

There you can create a new webhook and enter the name of the webhook, expiration date and you can view the URL. In addition, you can specify here where the runbook should be executed, whether in Azure itself or on a Hybrid Worker.

**Attention:** The URL is shown only once and should therefore be copied out.

# Authentication to Azure Management API

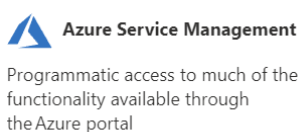
The authorization against the Azure Management API can be solved via an app registration. For this you have to create an App Registration with the following permission:

Delegated: user\_impersonation

+ Add a permission ✓ Grant admin consent for [User Icon]

API / Permissions name	Type	Description	Admin consent requ...	Status
▼ Azure Service Management (1)				
user_impersonation	Delegated	Access Azure Service Management as organization users	No	✓ Granted for [User Icon]

This permission can be added through the "Azure Service Management":



After that you have to use the access control blade of your Automation Account. There you have to grant the "Automation Job Operator" role to the App Registration. This process needs at least the "Application Administrator" role.

Then you can use the same header as for the Graph API as documented here: [Create access token](#)  
[| LNC Docs \(lucanoahcaprez.ch\)](#)

## Get Webhook data from request body

To get the data of the requests body you first have to define a new parameter at the beginning of the Runbook script. Below you can filter out the body from the request and convert it from JSON to a PowerShell object. This can then be stored in normal variables or simply used for the further course of the script.

```
Param(
    [parameter (Mandatory=$false)]
    [object]$WebhookData
)
$WebhookBody = $WebHookData.RequestBody
$InputData = (ConvertFrom-Json -InputObject $WebhookBody)

$LanguageCode = $InputData.LanguageCode
$DomainName = $InputData.DomainName
```

## Create Runbook Job via PowerShell

To create a Runbook Job you have to first use the Webhook feature. Then for getting the Jobs output, you have to wait until the Runbook is with the state "Succeeded".

```
# Create Runbook Job
$webhookurl = "<yourwebhookurl>"
$Body = @"
{
    "email":"$Email"
}
"@
$JobId = Invoke-RestMethod -Method POST -Uri $webhookurl -Body $Body
$JobId = $JobId.JobIds
```

# Create loop from csv content

With the following script you can loop over content inside a csv and create a new Runbook job for every entry.

```
$Imports = Import-Csv -Path "<pathtocsv>" -Delimiter ";"
$webhookurl = "<yourwebhookurl>"

foreach($Import in $Imports){
    # Create Runbook Job
    $Body = @"
    {
        "languagecode":"$($Import.LanguageCode)",
        "domainname":"$($Import.DomainName)",
    }
"@

    Invoke-RestMethod -Method POST -Uri $webhookurl -Body $Body
}
```

# Get Runbook job output via PowerShell

Here you can get the Runbook job output by a job id:

```
$subscriptionid = "<yoursubscriptionid>"
$resourcegroupname = "<yourresourcegroupname>"
$automationaccountname = "<yourautomationaccountname>"

$jobId = "<yourrunbookjobid>"

$whilecounter = 1

# Get Runbook job output
$url =
"https://management.azure.com/subscriptions/$Subscriptionid/resourceGroups/$resourcegroupname/providers/
Microsoft.Automation/automationAccounts/$automationaccountname/jobs/$jobId?api-version=2019-06-01"
$Response = Invoke-Restmethod -uri $url -Method GET -Headers $Headers
```

```
# print out current state of Runbook Job
$response.properties.provisioningstate
while($response.properties.provisioningstate -ne "Succeeded"){
    Start-Sleep 15
    $Response = Invoke-Restmethod -uri $url -Method GET -Headers $Headers
    $response.properties.provisioningstate
    if($whilecounter -le 10){
        $whilecounter ++
    }
    else{
        Write-Error "Get job output from Runbook failed. Exiting Script."
        Exit 1
    }
}

$RunbookJobOutput = Invoke-Restmethod -uri $url -Method GET -Headers $Headers
```