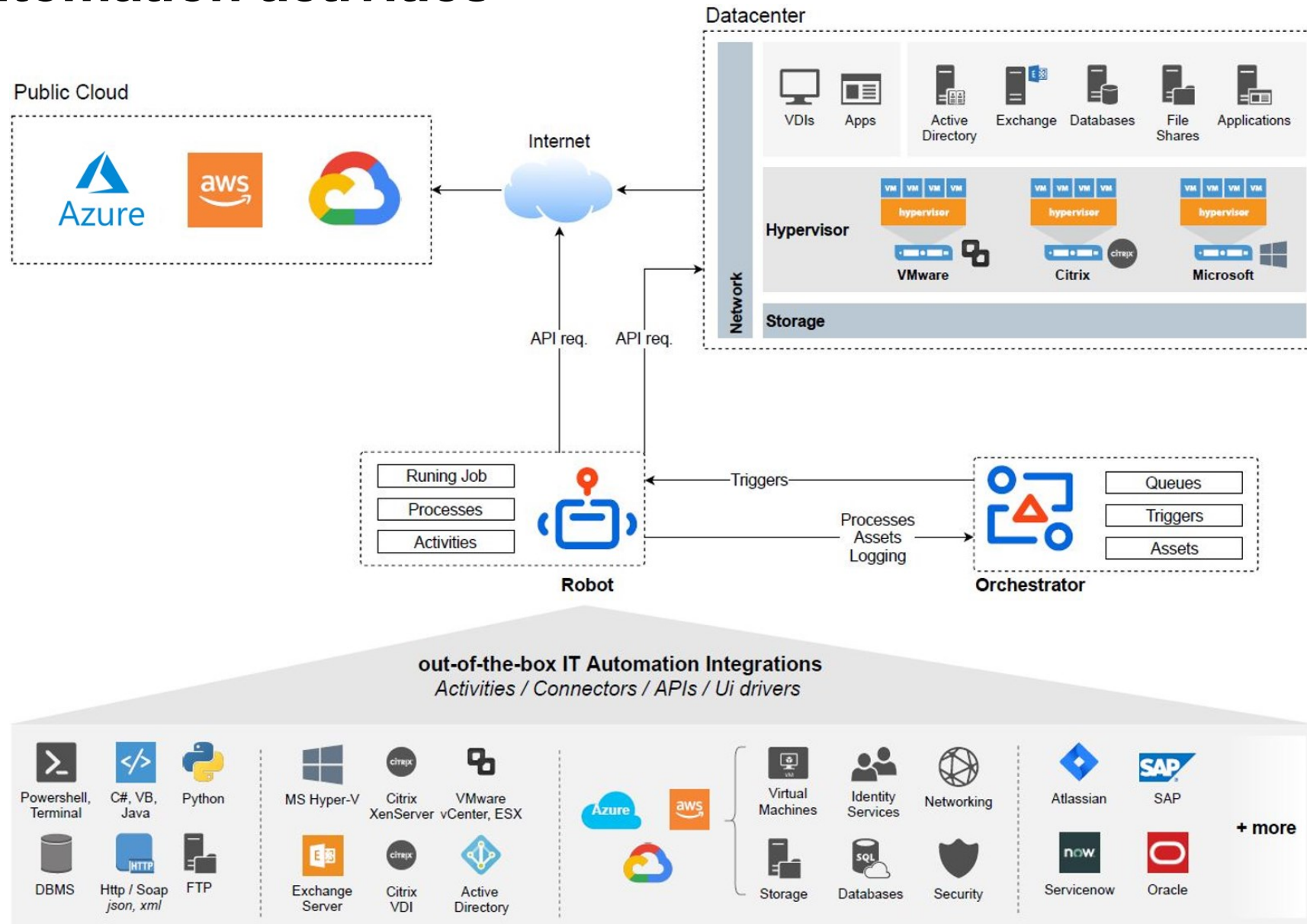
A woman with curly hair and a man in a plaid shirt are looking at a computer monitor in a modern office setting. The monitor displays code. The woman is pointing at the screen with her right hand. The man is looking at the screen with a focused expression. The background is a blurred office environment with other people and computer monitors.

# Robots Autoscaling IT Automation

Andrei Oros

# Empower RPA Workflows with IT Automation activities



# Empower RPA Workflows with IT Automation activities



## Implementation

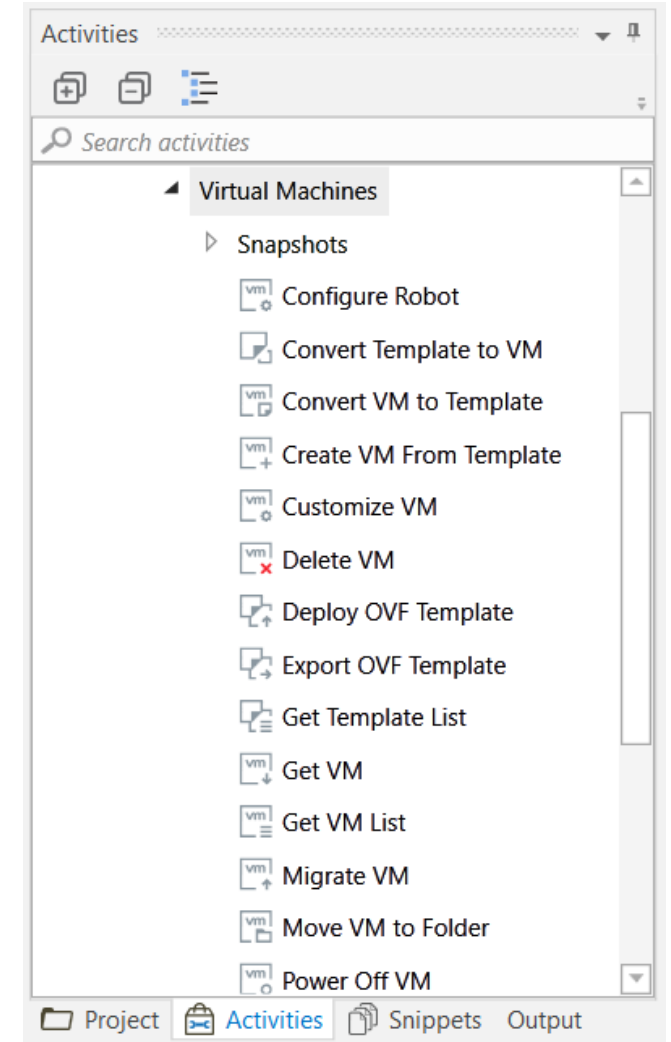
Background running activities built on top of the official SDKs from *Microsoft, Amazon, Citrix, VMware, ..*



## Security and Compliance

Developed by UiPath

Published on the official feed (LTS)



# Robots Autoscaling

## Tech & components

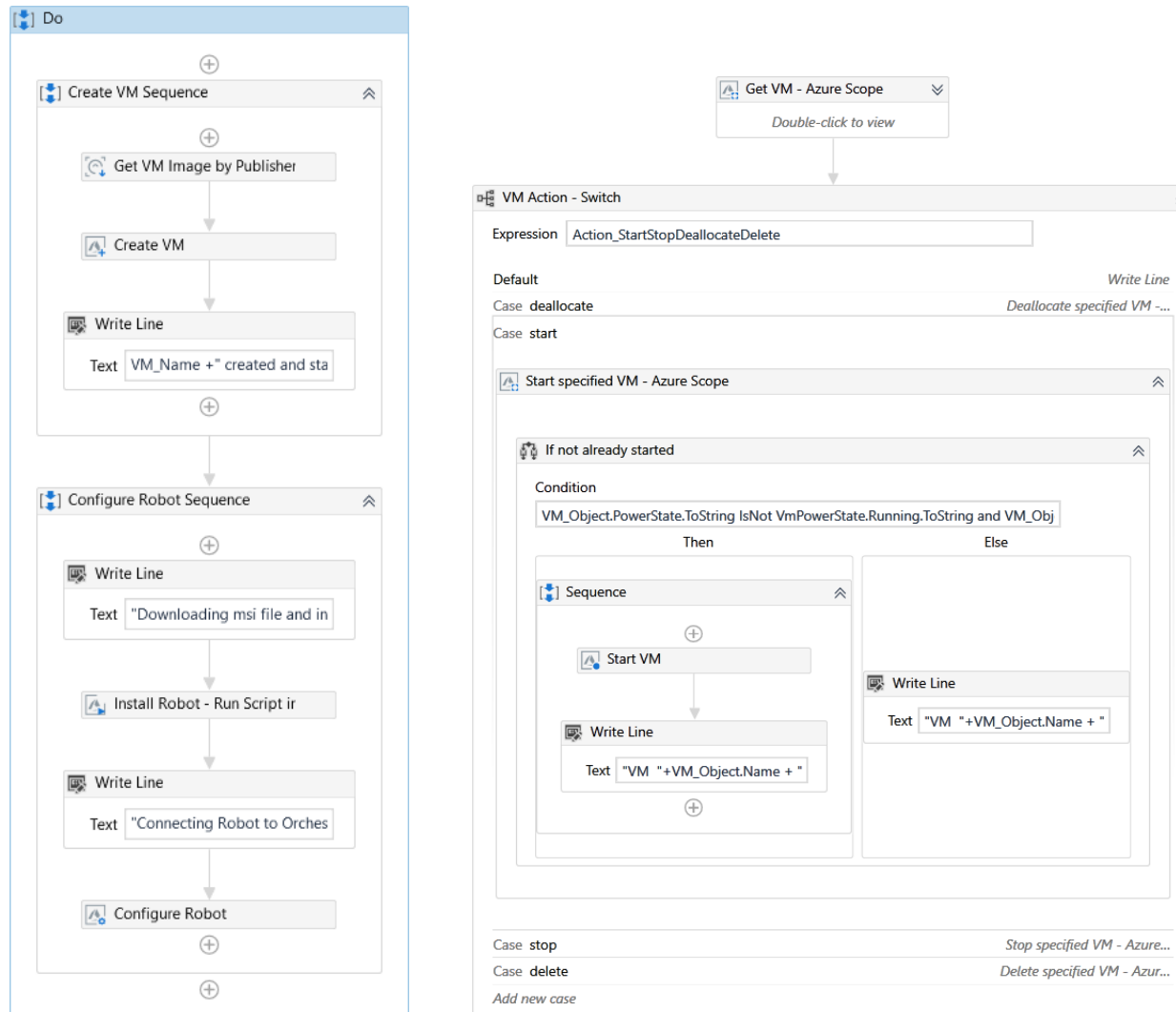




# Works everywhere



# Powered by UiPath IT Automation workflows



## Transparent

easy to understand & inspect  
workflow business logic

## Flexible

easy to update scaling logic with  
out-of-the-box drag & drop  
UiPath IT Automation activities
















## Vendor agnostic

Azure, AWS, VMware, Citrix  
and more.



# IT Automations workflows **Trusted by UiPath**

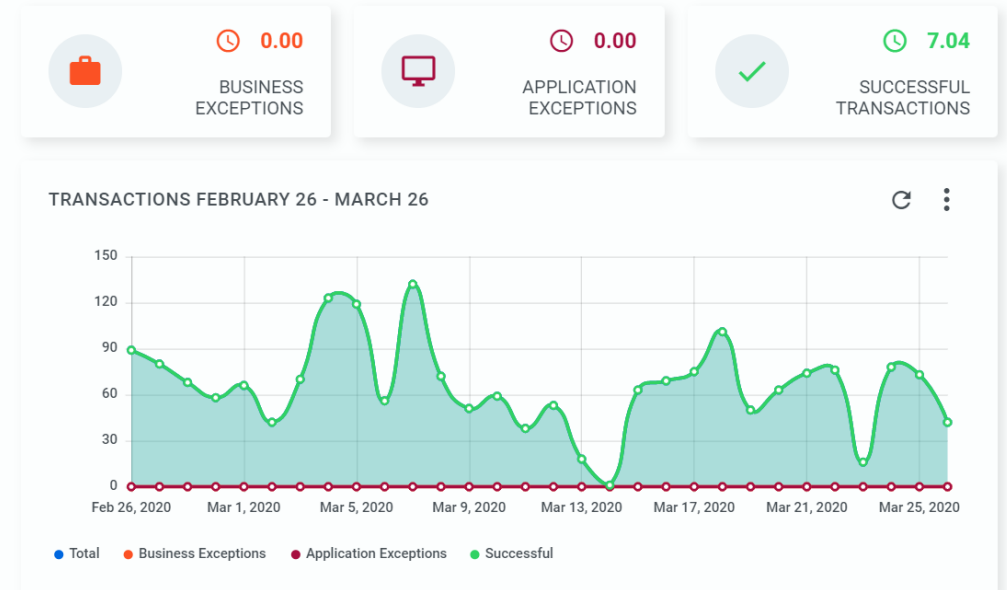
## Cost Control

<input type="checkbox"/> NAME ^	PROCESS ⇅
<input type="checkbox"/>  Azure (POC rg sergiu) policy based VMs start/deallocate	AzureVMsOnDemandAvailability_IT-Ops-Cloud
<input type="checkbox"/>  Azure (QA QA-Orchestrator-Cluj-RG) policy based VMs start/...	AzureVMsOnDemandAvailability_IT-Ops-Cloud
<input type="checkbox"/>  Azure (UTC +2) VMs Daily PowerOn	AzureVMsPowerOff_IT-Ops-Cloud
<input type="checkbox"/>  Azure (UTC +2) VMs Nightly PowerOff	AzureVMsPowerOff_IT-Ops-Cloud
<input type="checkbox"/>  Azure (UTC +5:30) VMs Daily PowerOn	AzureVMsPowerOff_IT-Ops-Cloud
<input type="checkbox"/>  Azure (UTC +5:30) VMs Nightly PowerOff	AzureVMsPowerOff_IT-Ops-Cloud
<input type="checkbox"/>  Azure (UTC +9) VMs Daily PowerOn	AzureVMsPowerOff_IT-Ops-Cloud
<input type="checkbox"/>  Azure (UTC +9) VMs Nightly PowerOff	AzureVMsPowerOff_IT-Ops-Cloud
<input type="checkbox"/>  Azure (UTC -5) VMs Daily PowerOn	AzureVMsPowerOff_IT-Ops-Cloud
<input type="checkbox"/>  Azure (UTC -5) VMs Nightly PowerOff	AzureVMsPowerOff_IT-Ops-Cloud
<input type="checkbox"/>  Azure (UTC -8) VMs Daily PowerOn	AzureVMsPowerOff_IT-Ops-Cloud
<input type="checkbox"/>  Azure (UTC -8) VMs Nightly PowerOff	AzureVMsPowerOff_IT-Ops-Cloud
<input type="checkbox"/>  Azure Security Alerts - add rule to block queued attacker IP	AzureVMsAttackersBlock_AddSecurityRuleTo...
<input type="checkbox"/>  Azure Security Alerts - NICs NSG policy - create NSG for NIC i...	AzureCreateNSGforNIC_IT-Ops-Cloud
<input type="checkbox"/>  Azure Security Alerts - queue VM Attackers for blocking in V...	AzureVMsAttackersBlock_IT-Ops-Cloud

## Azure Security (brute force attacks on VMs)

**15000+ attacks**  
processed automatically in the last 6 months

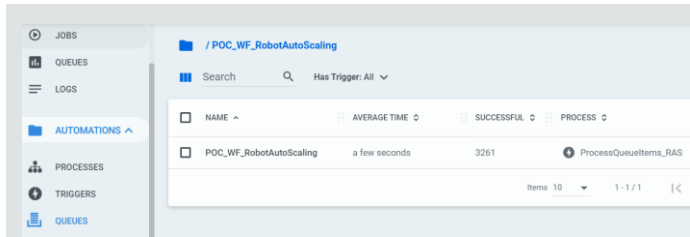
Azure\_SecurityCenterAlerts\_VMAccounts Chart



<https://connect.uipath.com/marketplace/components/it-automation-for-public-private-and-hybrid-clouds>

# Robot Autoscaling - Solution Components

## Management Orchestrator



1+ Robots (for HA)

Assets // db conn, infra auth, ..

Queue // webhook events

Autoscale Process Package

Trigger // on new queue item added

## Webhook Receiver

```
namespace UiPath.WorkflowSolutions.RobotAutoScaling.Function
{
    0 references
    public static class ReceiveWebhooks
    {
        [FunctionName("ReceiveWebhooks")]
        0 references
        public static async Task<ActionResult> Run([HttpTrigger(AuthorizationLevel.

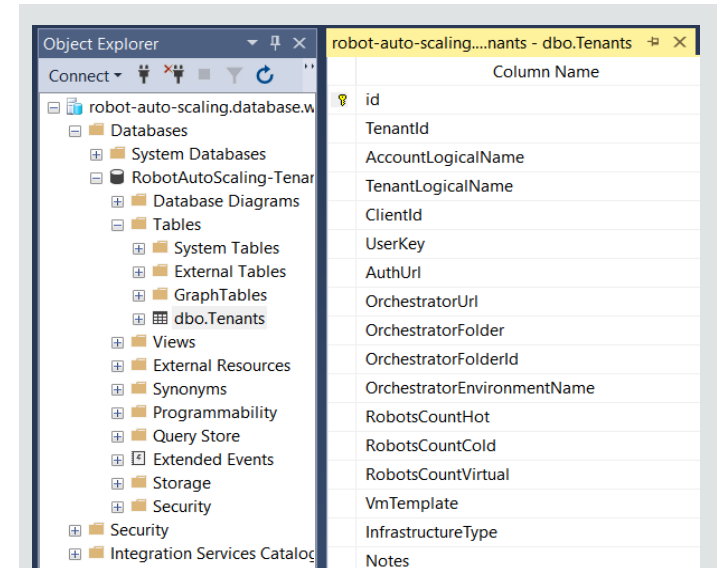
// admin tenant info
18 references
    public static class Constants...

1 reference
    public static class OrchestratorHelper
    {
        1 reference
        public static async Task<string> Authenticate()...

1 reference
        public static async Task<IRestResponse> AddNewQueueItem(string requestBody)
    }
}
```

Events sent via webhooks by the managed clients are added in the *Management OR. Queue*

## Clients Database



Orchestrator API: key, secret, tid, fid, ..  
Infra type: Azure / AWS / VMware / ..  
Scaling rules: cold / hot Robot no.

## Client Tenants

Orchestrator API

Folders (classic) &  
Environments

Robots (unattended)

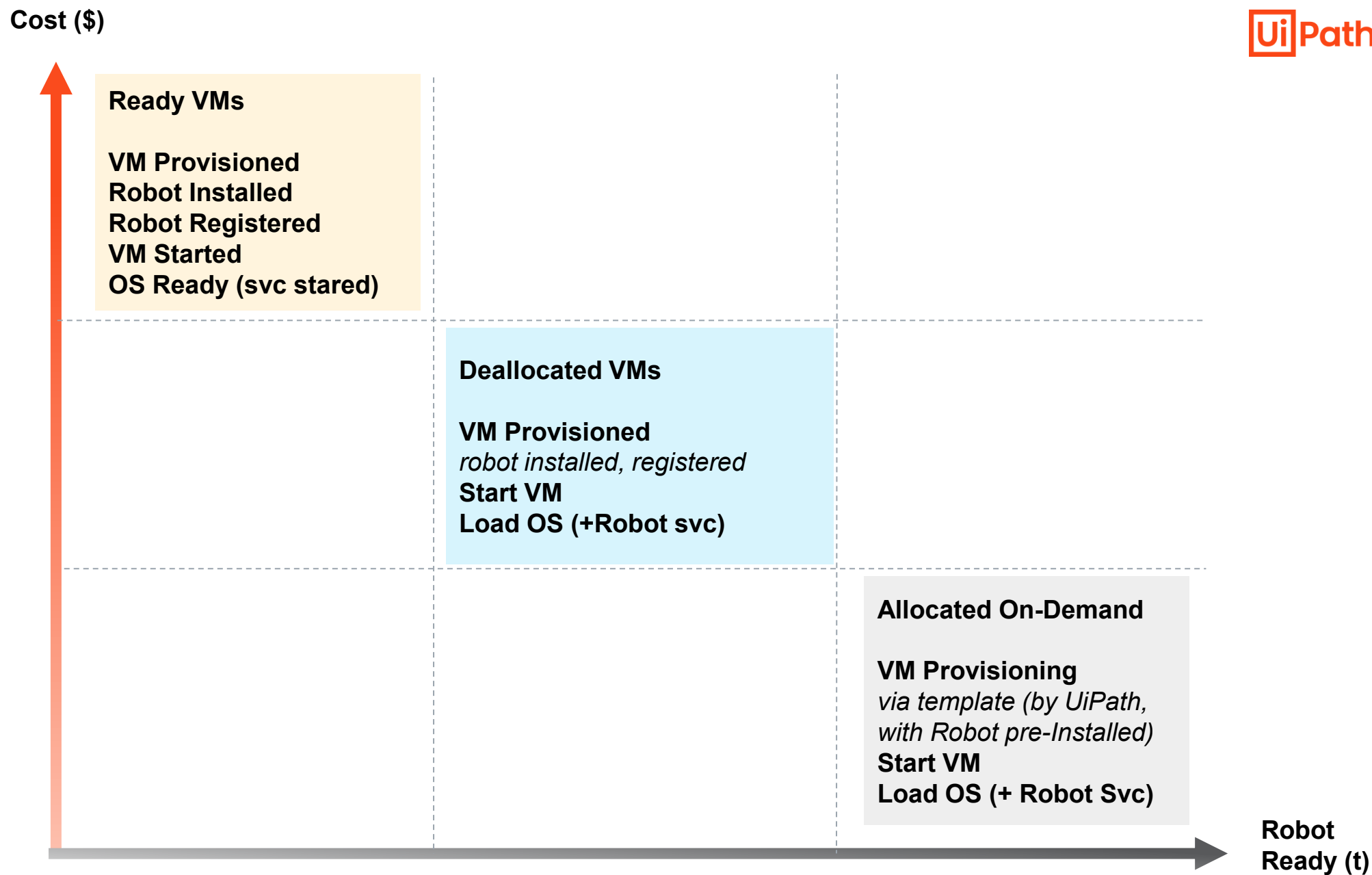
Webhooks



# Robots Autoscaling

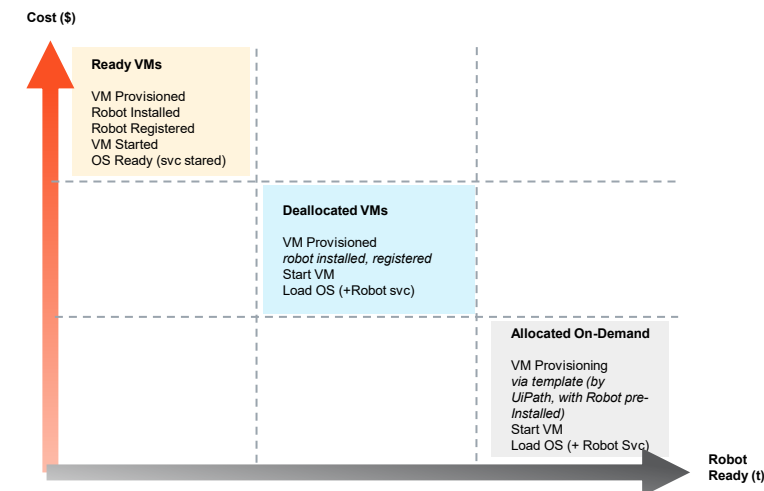
## Scaling Strategies





# Autoscaling. Cost vs Availability

Robot Type	VM / Server state	T(min) to Ready	Cost (\$) VM / month
 Hot	<b>Ready VMs</b> VM is provisioned and running, robot configured and available for Jobs	0	<b>High \$160+</b> compute allocation
 Cold	<b>Deallocated VMs</b> VM is created / exists + robot configured, but it is deallocated (only storage costs)	~2-3	<b>Low \$1.54</b> HDD standard S4  <b>Medium \$2.4</b> SSD standard E4
 Virtual	<b>Allocated On-Demand VMs</b> VM will be created on-demand from specified image + robot configuration	~10	\$0



**Scaling Strategy = F(x,y,..)**

Pending Jobs

Robots Available  
Robots Disconnected  
Robots Busy

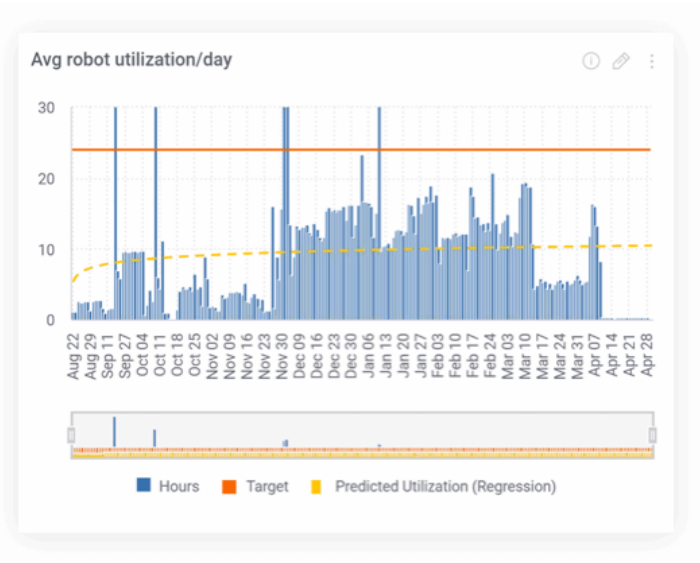
Hot Robots  
Cold Robots  
Virtual Robots

\* Azure (pay-as-you-go) ref. VM: D2v3 + 32Gb Standard S4 hdd / E4 ssd

# Easy Customization - dynamic scaling strategies

**Couple with Robots usage**  
eg. Insights / analyze Job requests

Adjust **hot** / **cold** Robots variables for  
the identified intervals.



Cost (\$)

**Ready VMs**

VM Provisioned  
Robot Installed  
Robot Registered  
VM Started  
OS Ready (svc started)

**Deallocated VMs**

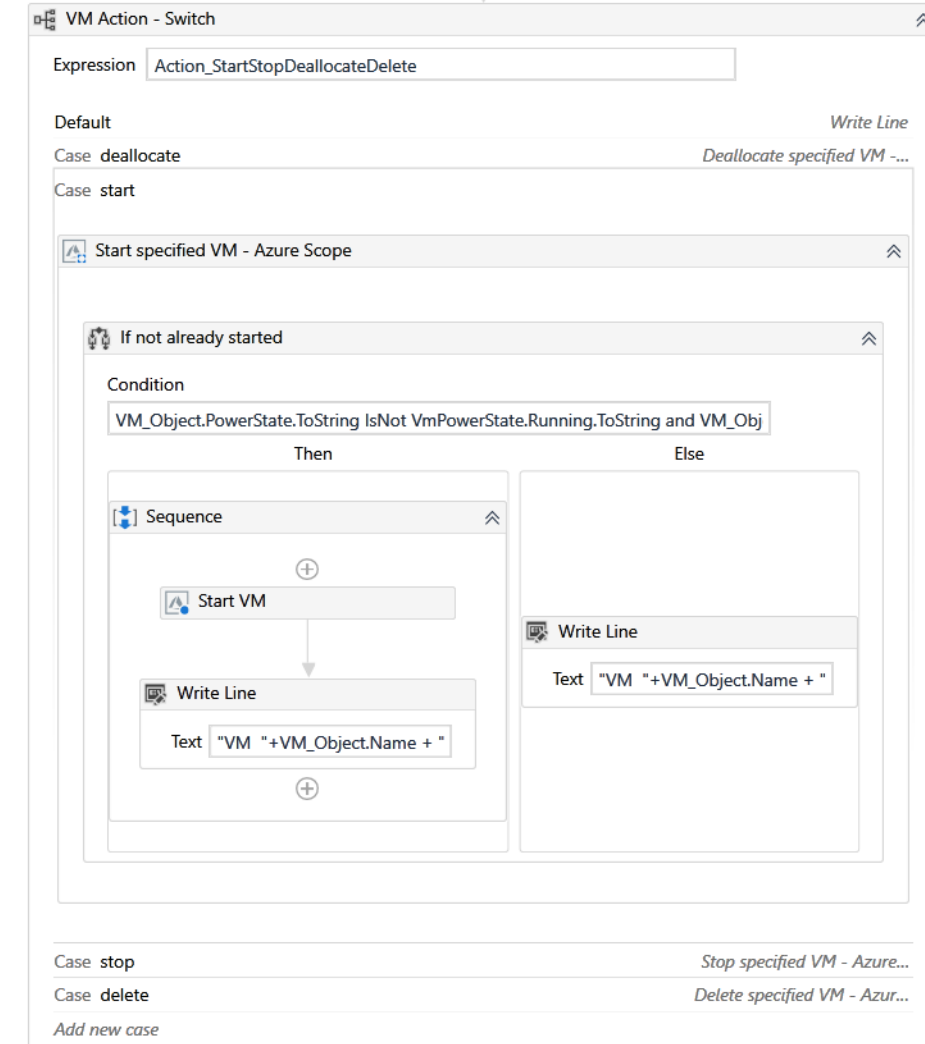
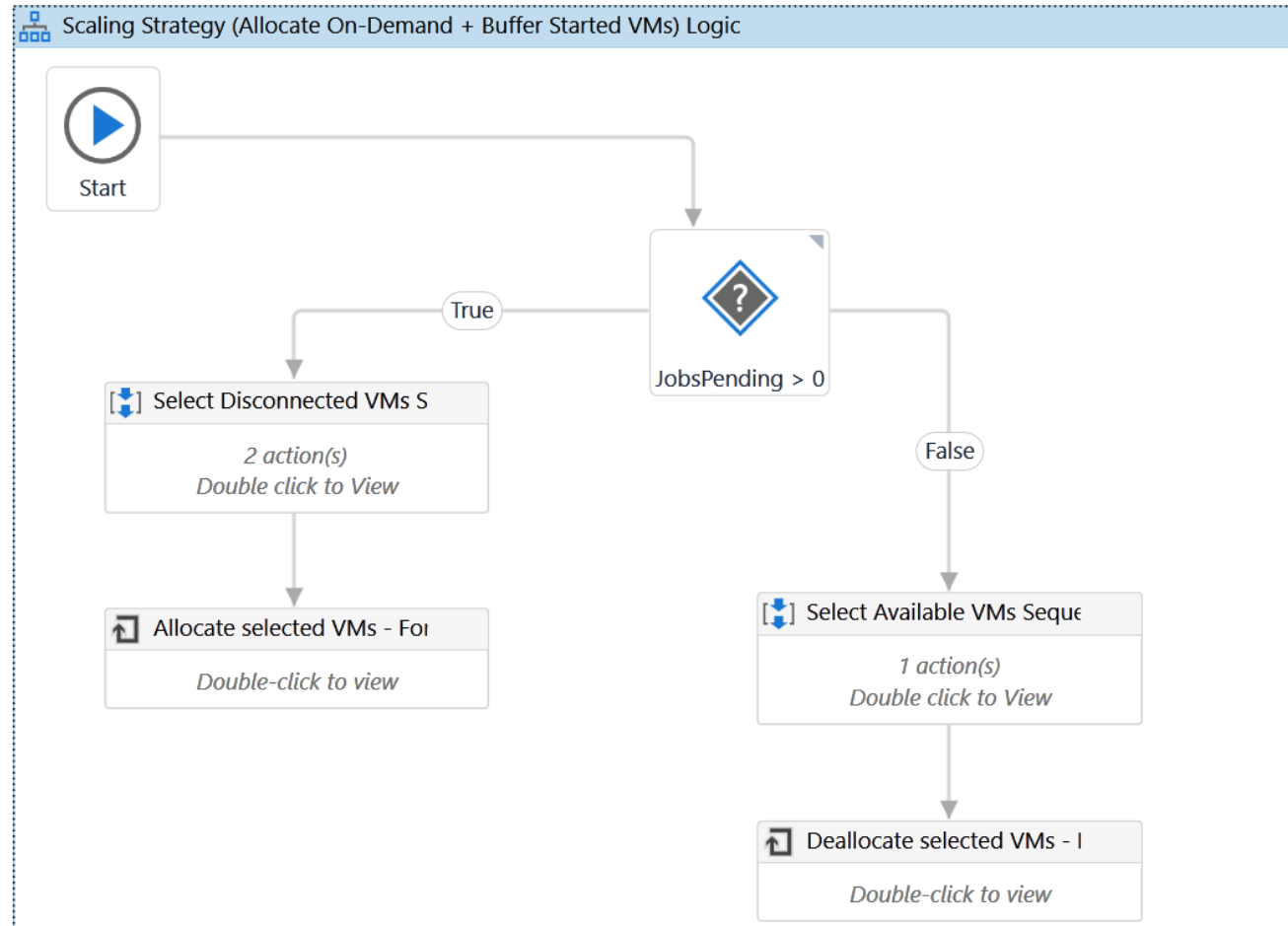
VM Provisioned  
*robot installed, registered*  
Start VM  
Load OS (+Robot svc)

**Allocated On-Demand**

VM Provisioning  
*via template (by UiPath,  
with Robot pre-Installed)*  
Start VM  
Load OS (+ Robot Svc)

Robot  
Ready (t)

# Easy Customization change the process workflows







# Robots Autoscaling


## Process flow



# DB Clients Configs

RobotsCold	50
RobotsHot	10
Infrastructure	
Environment	RAS
Folder	Default
client_(x)	

RobotsCold	10
RobotsHot	2
Infrastructure	
Environment	E2
Folder	F2
client_1	

RobotsCold	80
RobotsHot	5
Infrastructure	
Environment	E1
Folder	F1
client_1	

## Management Orchestrator

Queue. New Webhook Events

AUTOMATIONS	STATUS	REFERENCE	STARTED	ENDED
PROCESSES				
TRIGGERS				
QUEUES				
ASSETS				
STORAGE BUCKETS				
ACTIONS				
0 rows selected				
	Successful	job.completed_204_19619154	11 minutes ago	11 minutes ago
	Successful	job.created_204_19618580	11 minutes ago	11 minutes ago
	Successful	job.created_9351_94536657	13 minutes ago	13 minutes ago
	Successful	job.completed_204_19616011	40 minutes ago	40 minutes ago
	Successful	job.created_204_19615964	40 minutes ago	40 minutes ago

Jobs triggered by New Items

- 4.1 get event data for 1<sup>st</sup> new q. item
- 4.2 update all associated q. items
- 4.3 get the client info from the database
- 4.4 get the client state: jobs, robots, ..
- 4.5 select machines to start/stop & apply

MONITORING	PROCESS	ROBOT	ENVIRONM.	STATE	STA...	ENDED
ROBOTS						
JOB						
	ProcessQueueItems_RAS	AdminRobot1	RAS	Successful	a minute ago	a few seconds ago
	ProcessQueueItems_RAS	AdminRobot1	RAS	Successful	3 minutes a...	3 minutes ago

## Webhook Events Receiver Service

Add Event to Queue

tenant Id





folder Id

[ ... ]

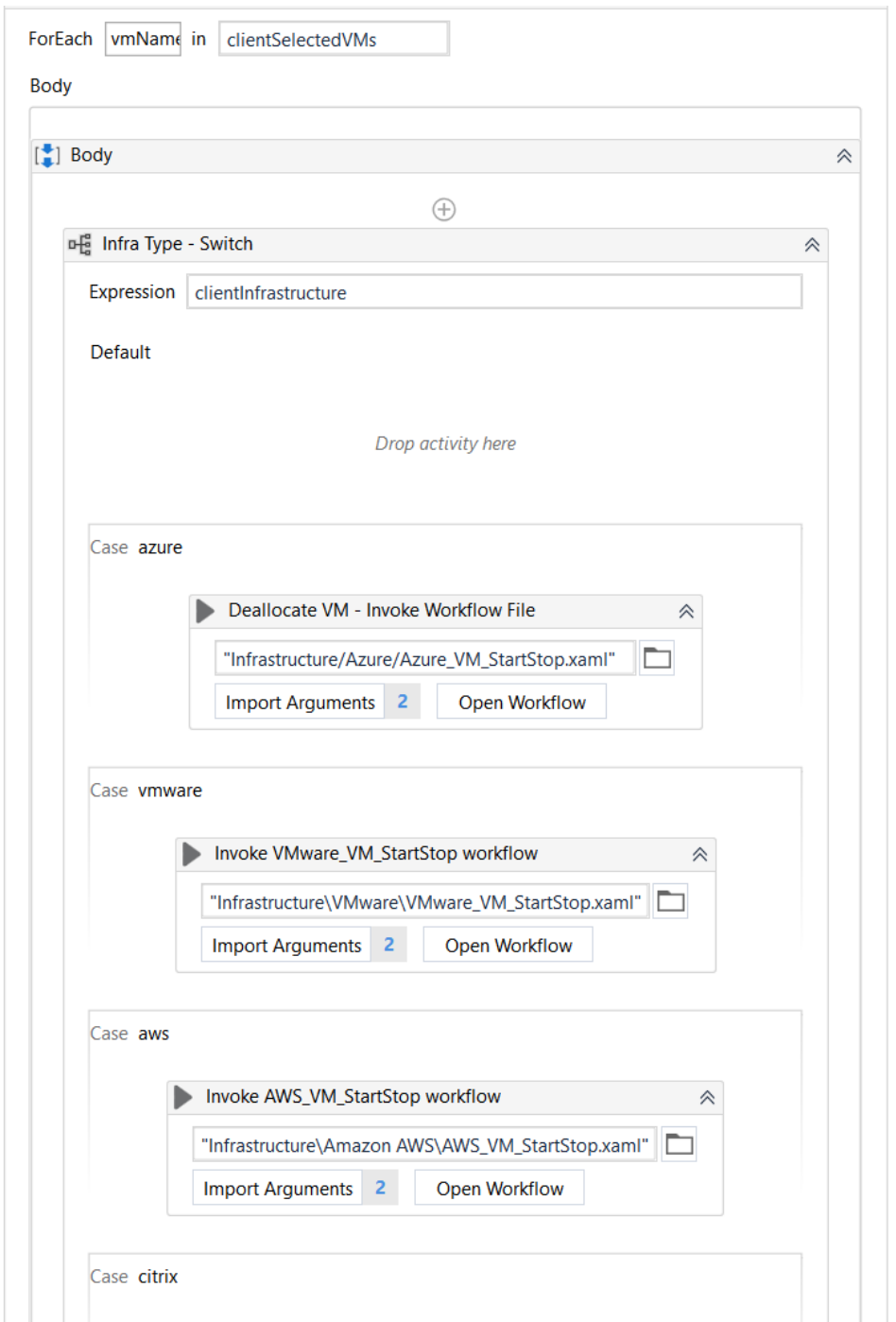
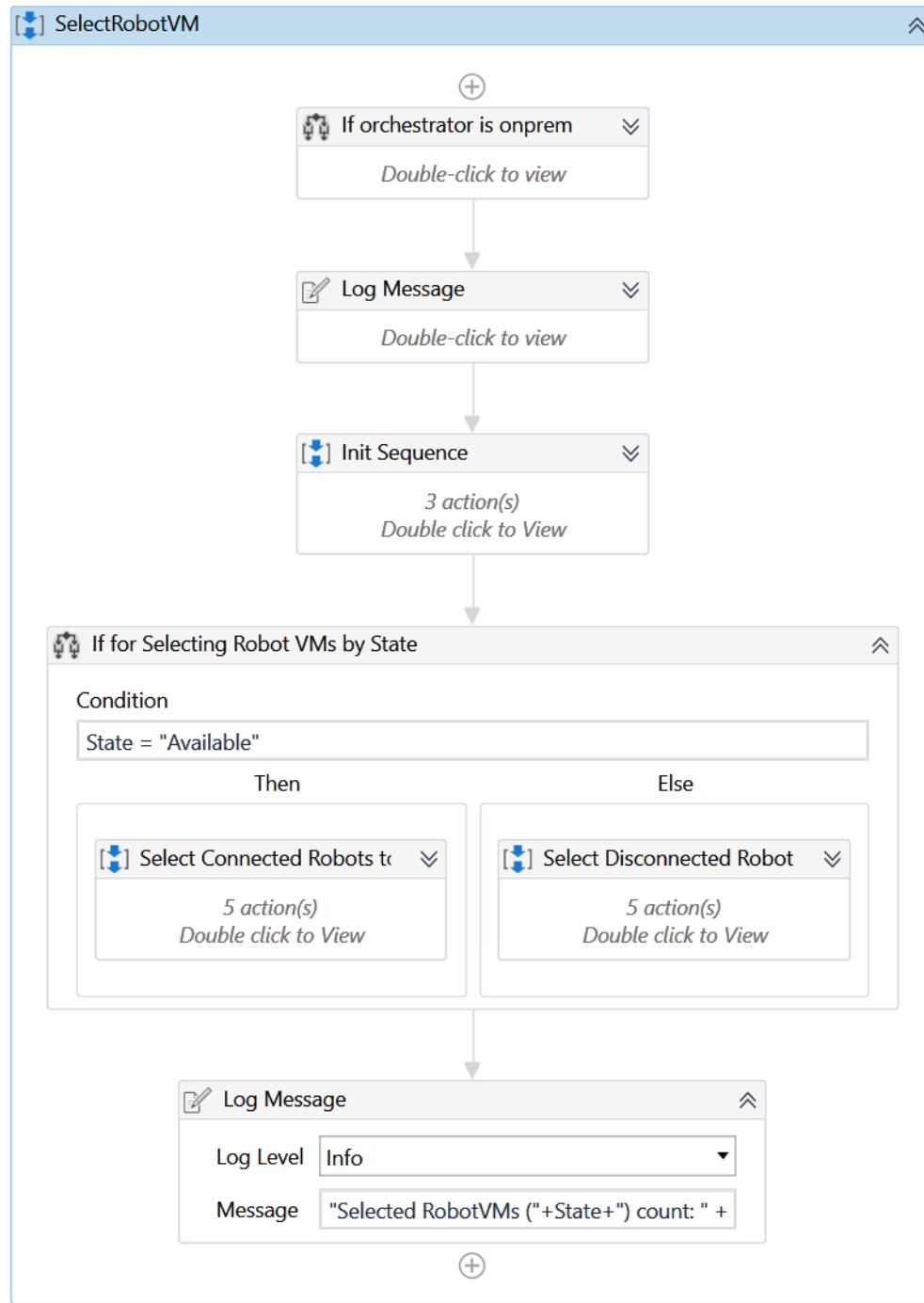
job.created

MONITORING	/ POC_DemoAWS_WF_RobotAutoScaling
ROBOTS	Search User: All State: All Priority: All Source: All
JOB	
QUEUES	
LOGS	
AUTOMATIONS	
PROCESSES	
TRIGGERS	
	PROCESS ROBOT MACHINE ENVIRONMENT STATE
	Fake Work T204F5031-R2 T204F5031-R2 RAS Pending
	Fake Work T204F5031-R3 T204F5031-R3 RAS Pending
	Fake Work Pending allocation RAS Pending

client\_1 machines

			...	
M1	M2	M3		M(n)

client\_1 jobs



# Robots Autoscaling

## Easy to get started



## Robot Autoscaling



SOLUTION



Project source files



Step by step configuration guide



Autoscaling recommendations



Free to download and customize



### Management Orchestrator Config

Processes, Assets, Robot,  
Queue + Trigger



### Webhooks Receiver Service Setup

E.g. function in Azure / AWS



### Deploy Database & Add Clients

DB create, Clients config



# Robot Autoscaling e.g. for 3 client tenants (+ folders)

The image displays a multi-monitor setup used for managing robot autoscaling across different cloud providers and the UiPath Orchestrator.

**Top Left Monitor (XenCenter):** Shows a list of VMs under the 'robot' pool. The 'robot autoscaling in 'Pool'' folder is selected, showing sub-folders for 'CoE - Robot 01' and 'CoE - Robot 02'.

**Bottom Left Monitor (AWS Console):** Displays the 'Instances | EC2 Management Console' for the 'eu-central-1' region. A table lists three instances:

Name	Instance ID	Instance Type	Availability Zone	Instance State
T204F5031-R2	i-093cfa10cadb49ca9	t2.small	eu-central-1b	stopped
T204F5031-R3	i-0b5fe6745611984fa	t2.small	eu-central-1b	stopped
T204F5031-R1	i-0bc18ae77416c8966	t2.small	eu-central-1b	stopped

**Bottom Left Monitor (Azure Portal):** Shows the 'Virtual machines - Microsoft Azure' page. A table lists three VMs:

Name	Status	Resource group	Location
T204F4576-R1	Stopped (deallocated)	DevTest_WF_RobotAut...	West Europe
T204F4576-R2	Stopped (deallocated)	DevTest_WF_RobotAut...	West Europe
T204F4576-R3	Stopped (deallocated)	DevTest_WF_RobotAut...	West Europe

**Right Monitor (UiPath Orchestrator):** Displays the 'Jobs - Folder Overview' for the folder '/ POC\_Demo\_WF\_RobotAutoScaling'. It shows a table of jobs with columns for PROCESS, ROBOT, USER, MACHINE, ENVIRONMENT, STATE, PRIORITY, STARTED, ENDED, and SO...

PROCESS	ROBOT	USER	MACHINE	ENVIRONMENT	STATE	PRIORITY	STARTED	ENDED	SO...
Fake Work	Pending allocat...	Pending allocat...	RAS	...	Pending	Norr			Manual
Fake Work	Pending allocat...	Pending allocat...	RAS	...	Pending	Norr			Manual
Fake Work	Pending allocat...	Pending allocat...	RAS	...	Pending	Norr			Manual

The bottom right monitor shows the 'Jobs - Folder Overview' for the folder '/ POC\_WF\_RobotAutoScaling'. It shows a table of jobs with columns for PROCESS, ROBOT, USER, MACHINE, ENVIRONMENT, STATE, PRIORITY, STARTED, ENDED, and SO...

PROCESS	ROBOT	USER	MACHINE	ENVIRONMENT	STATE	PRIORITY	STARTED	ENDED	SO...
ProcessQ...	AdminRobotOn...	unicom\andrei...	COE-ROB...	RAS	Running	Norr a few second...			ProcessQ...
ProcessQ...	AdminRobotOn...	unicom\andrei...	COE-ROB...	RAS	Succ...	Norr a few second...	a few second...		ProcessQ...
ProcessQ...	AdminRobotOn...	unicom\andrei...	COE-ROB...	RAS	Succ...	Norr 11 minutes ago	10 minutes ago		ProcessQ...
ProcessQ...	AdminRobotOn...	unicom\andrei...	COE-ROB...	RAS	Succ...	Norr 10 minutes ago	10 minutes ago		ProcessQ...
ProcessQ...	AdminRobotOn...	unicom\andrei...	COE-ROB...	RAS	Succ...	Norr 12 minutes ago	12 minutes ago		ProcessQ...

# About UiPath



# A Leader in the 2020 Gartner Magic Quadrant for Robotic Process Automation

For the second consecutive year, UiPath is placed highest for its ability to execute

*“In the second year of this Magic Quadrant, the bar has been raised for market viability, relevance, growth, revenue and how vendors set the vision for their RPA offerings in a fluid market.”\**

\* Source: Gartner, “Magic Quadrant for Robotic Process Automation,” Saikat Ray, Arthur Villa, Cathy Tornbohm, Naved Rashid, Melanie Alexander, July 27, 2020

Magic Quadrant for Robotic Process Automation



Source: Gartner (July 2020)

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# A Forrester Wave Leader

Highest Scores in Current Offering, and Highest Possible Scores in Strategy and Market Presence

*“References report that UiPath will go the extra mile to meet a client's need and cite the transparent and innovation culture as a plus.*

*They also applaud the low cost of getting started, the well-organized partner channel, overall product stability, and strong security.”*

Source: ForresterWave™:RoboticProcessAutomation,Q42019

FIGURE 1 Forrester Wave™: Robotic Process Automation, Q4 2019

## THE FORRESTER WAVE™

Robotic Process Automation

Q4 2019



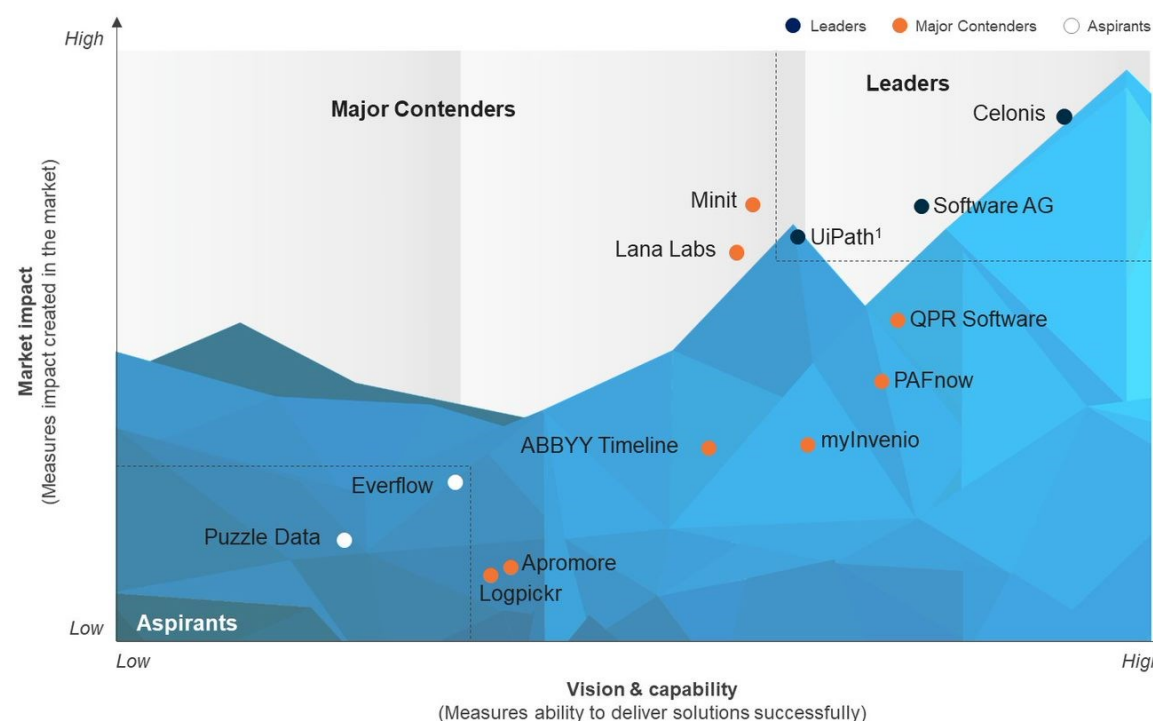
# A Process Mining Leader

Everest Group PEAK Matrix® for  
Process Mining Technology  
Vendors 2020



*"[...] its product development strategy is now more focused toward helping enterprises discover automation use cases and accelerate their automation journeys."*

Everest Group® PEAK MATRIX™ Everest Group Process Mining Products PEAK Matrix® Assessment 2020



<sup>1</sup> UiPath Process Mining (formerly ProcessGold)



# Business Partner Ecosystem Spans Globally and Locally

Global	Americas	Japan	EMEA	India	Asia Pacific
      	    	    	    	    	    

**600+ business partners** that help with the implementation of RPA

# Thank you

[andrei.oros@uipath.com](mailto:andrei.oros@uipath.com)

