Robots Autoscaling IT Automation

Andrei Oros

Ui Path Reboot™ Work.

Empower RPA Workflows with IT Automation activities

Public Cloud
- Azure
- aws
- Google Cloud

Internet

Datacenter

VDIs | Apps | Active Directory | Exchange | Databases | File Shares | Applications

Hypervisor
- VMware
- Citrix
- Microsoft

Storage

Network

API req. | API req.

Robot
- Runing Job
- Processes
- Activities

Triggers

Processes
Assets
Logging

Orchestrator
- Queues
- Triggers
- Assets

out-of-the-box IT Automation Integrations
Activities / Connectors / APIs / Ui drivers

Powershell, Terminal | C#, VB, Java | Python | MS Hyper-V | Citrix XenServer | VMware vCenter, ESX | Azure | aws | Virtual Machines | Identity Services | Networking | Atlassian | SAP

DBMS | Http / Soap json, xml | FTP | Exchange Server | Citrix VDI | Active Directory | Storage | Databases | Security | Servicenow | Oracle

+ more

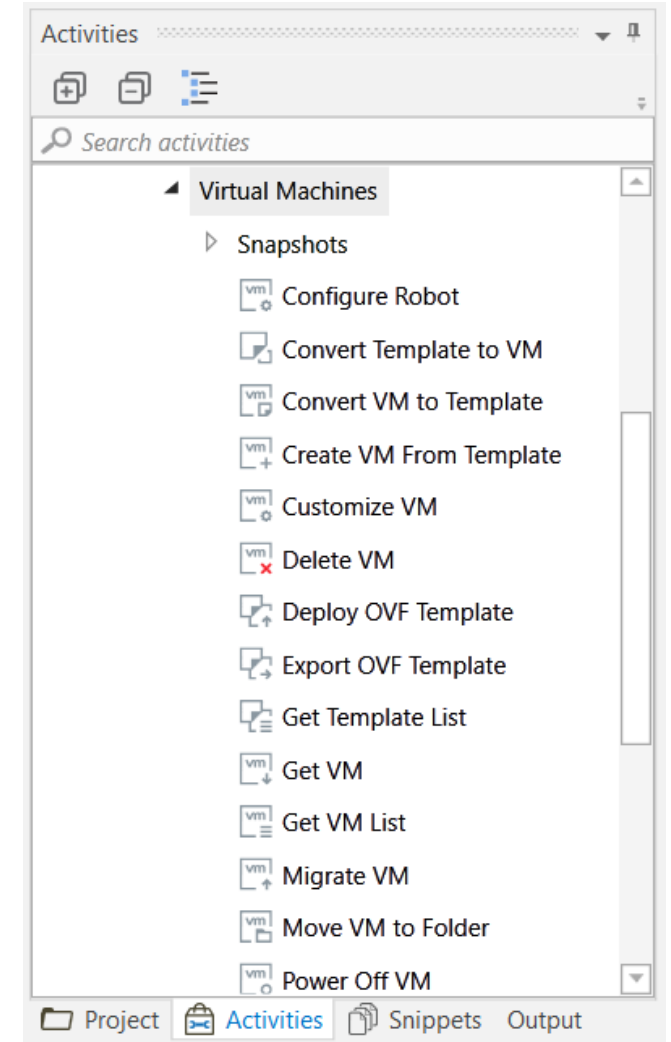# Empower RPA Workflows with IT Automation activities

Implementation

Background running activities built on top of the official

SDKs from *Microsoft, Amazon, Citrix, VMware, ..*

Security and Compliance

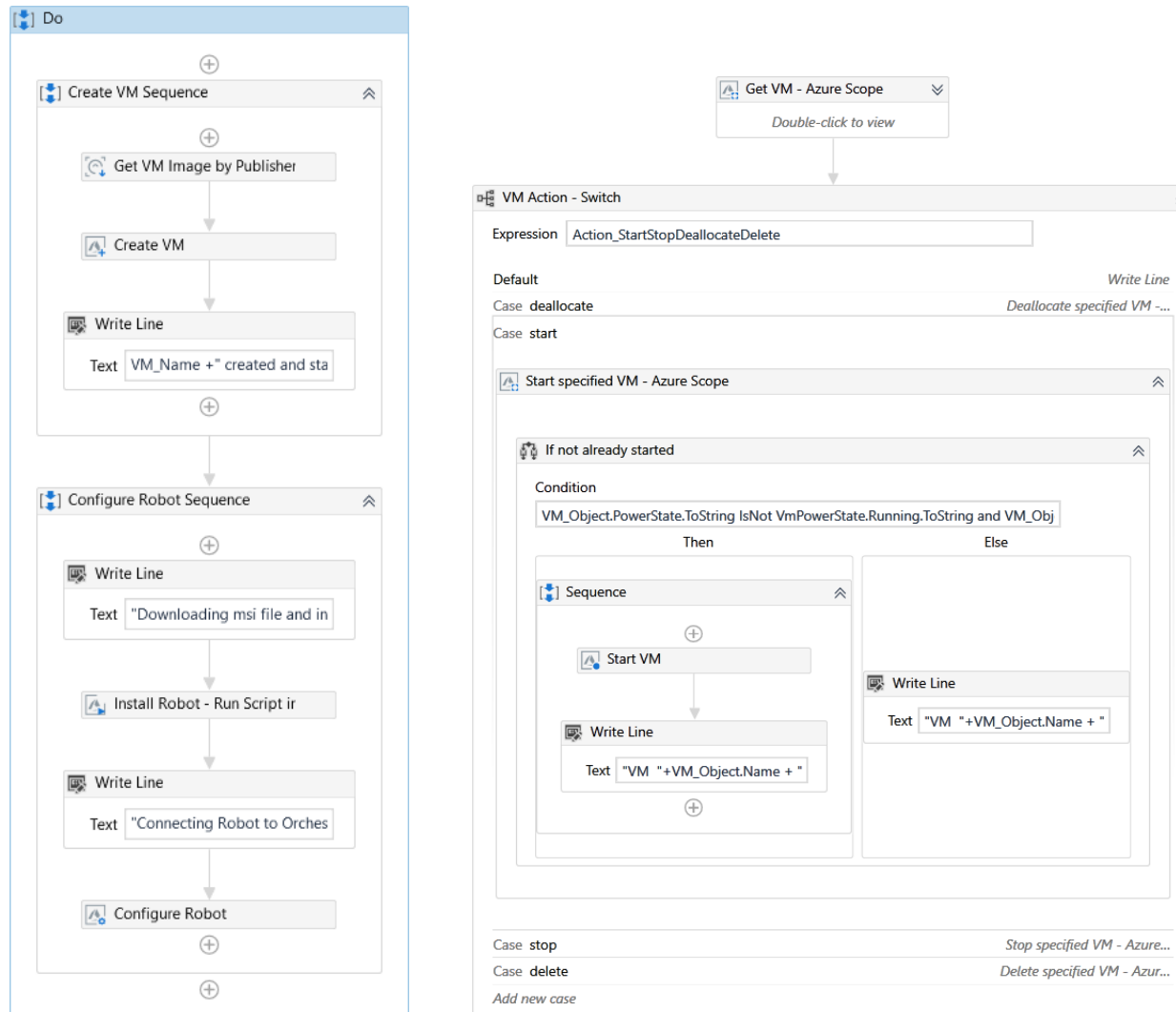Developed by UiPath

Published on the official feed (LTS)

VERACODE
VERIFIED CONTINUOUS

UiPath Reboot™ Work.

Activities

Search activities

◢ Virtual Machines
  ▷ Snapshots
    Configure Robot
    Convert Template to VM
    Convert VM to Template
    Create VM From Template
    Customize VM
    Delete VM
    Deploy OVF Template
    Export OVF Template
    Get Template List
    Get VM
    Get VM List
    Migrate VM
    Move VM to Folder
    Power Off VM

Project Activities Snippets Output

Robots Autoscaling
Tech & components

Works everywhere

All our product's components can run on **both physical or virtual machines.**

Your entire robotic workforce is managed, controlled and monitored by **UiPath Orchestrator,** the browser-based server application that centralizes in one secure place your entire enterprise operation.

DEPLOY

UiPath ORCHESTRATOR

3RD PARTY APP

API

MONITOR EXECUTE

AUTOMATE
</mainframe>
</web>
</Citrix>
</SAP>
</desktop apps>

ATTENDED UNATTENDED

ROBOT

ON-PREMISES   **PRIVATE CLOUD**   **PUBLIC CLOUD**   **UIPATH CLOUD**

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
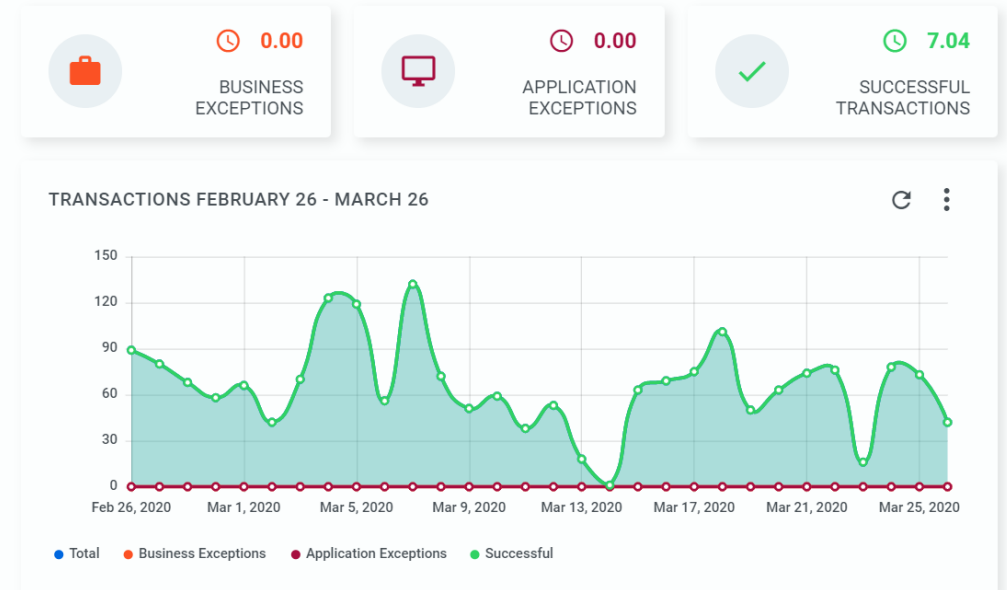
Cost Control

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

Azure Security (brute force attacks on VMs)

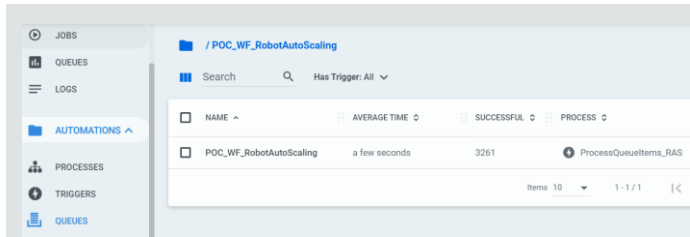# 15000+ attacks
processed automatically in the last 6 months

Azure_SecurityCenterAlerts_VMAttacks Chart

🕐 0.00 BUSINESS EXCEPTIONS	🕐 0.00 APPLICATION EXCEPTIONS	🕐 7.04 SUCCESSFUL TRANSACTIONS

TRANSACTIONS FEBRUARY 26 - MARCH 26

● Total ● Business Exceptions ● Application Exceptions ● Successful

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

Robot Autoscaling - Solution Components

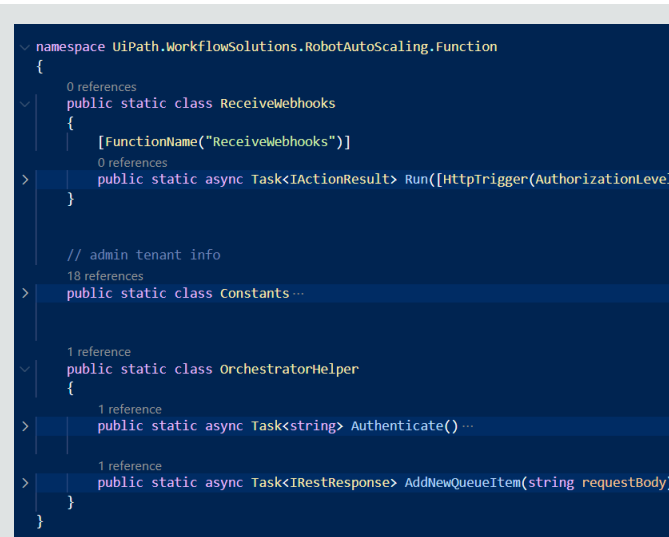## Management Orchestrator

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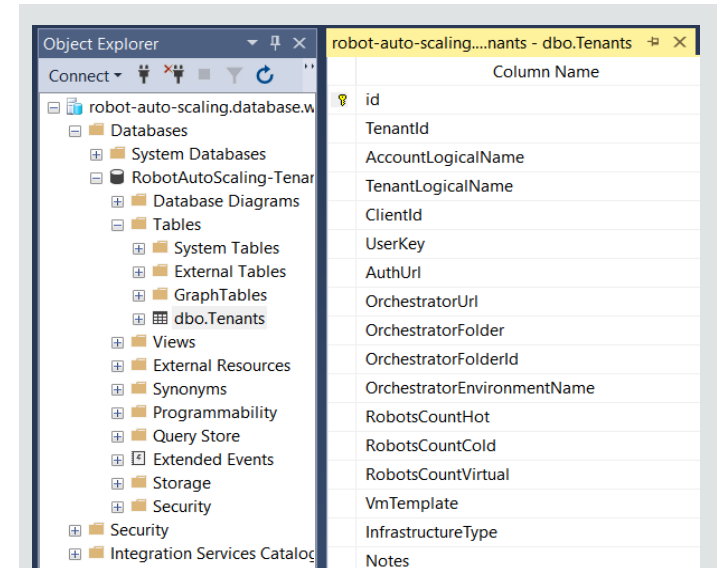
Orchestrator API: key, secret, tid, fid, ..
Infra type: Azure / AWS / VMware / ..
Scaling rules: cold / hot Robot no.

Client Tenants

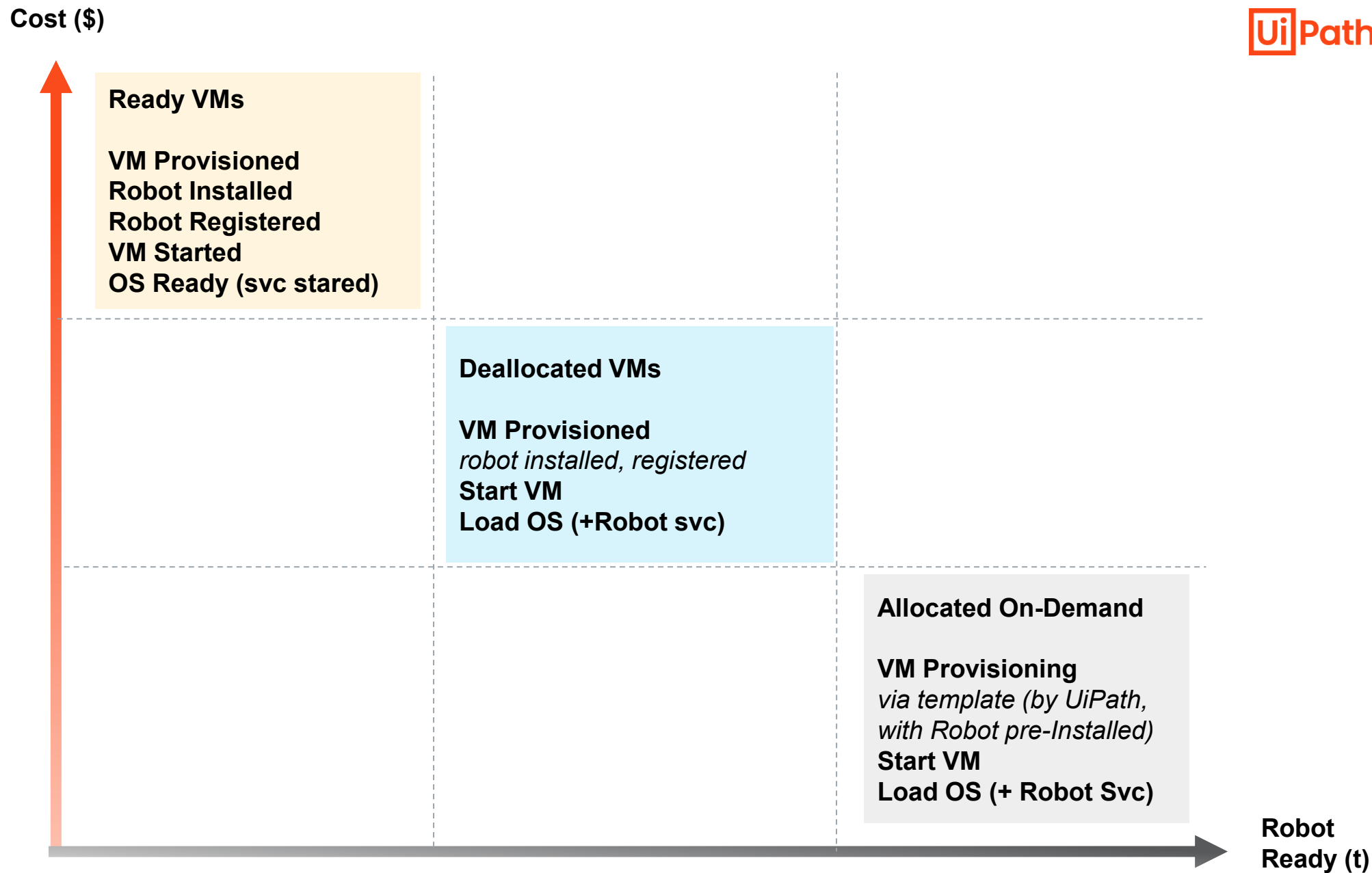| Orchestrator API	Folders (classic) & Environments	Robots (unattended)	Webhooks

Robots Autoscaling
Scaling Strategies

UiPath Reboot™ Work.

Cost ($)

UiPath Reboot™ Work.

Ready VMs

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

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)

Autoscaling. Cost vs Availability

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

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

Cost ($)

Ready VMs
VM Provisioned
Robot Installed
Robot Registered
VM Started
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Deallocated VMs
VM Provisioned
robot installed, registered
Start VM
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Robot Ready (t)
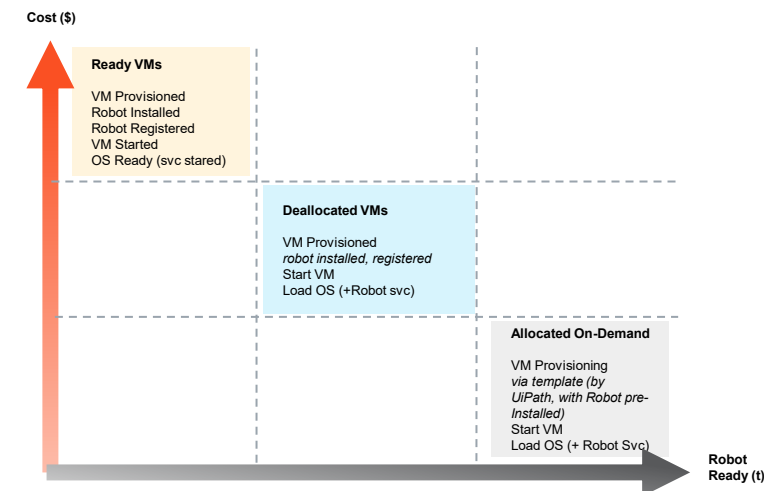
Scaling Strategy = F(x,y,..)

Pending Jobs

Robots Available
Robots Disconnected
Robots Busy

Hot Robots
Cold Robots
Virtual Robots

Easy Customization - dynamic scaling strategies

Couple with Robots usage
eg. Insights / analyze Job requests

Adjust hot / cold Robots variables for
the identified intervals.
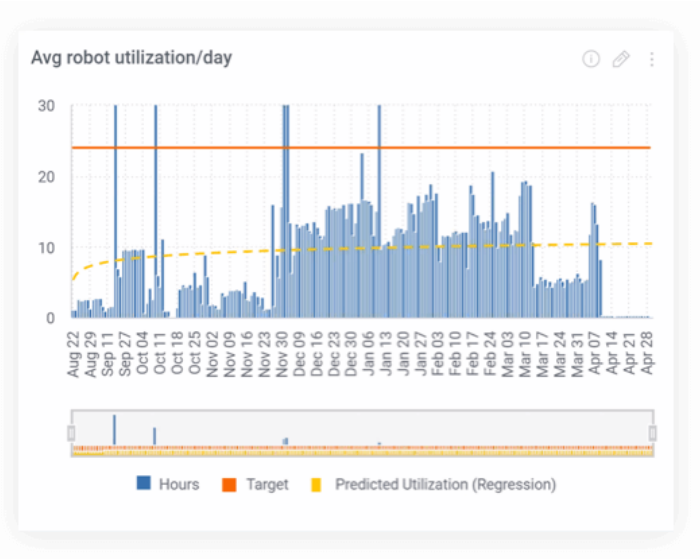
Avg robot utilization/day

Cost ($)

Ready VMs

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

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
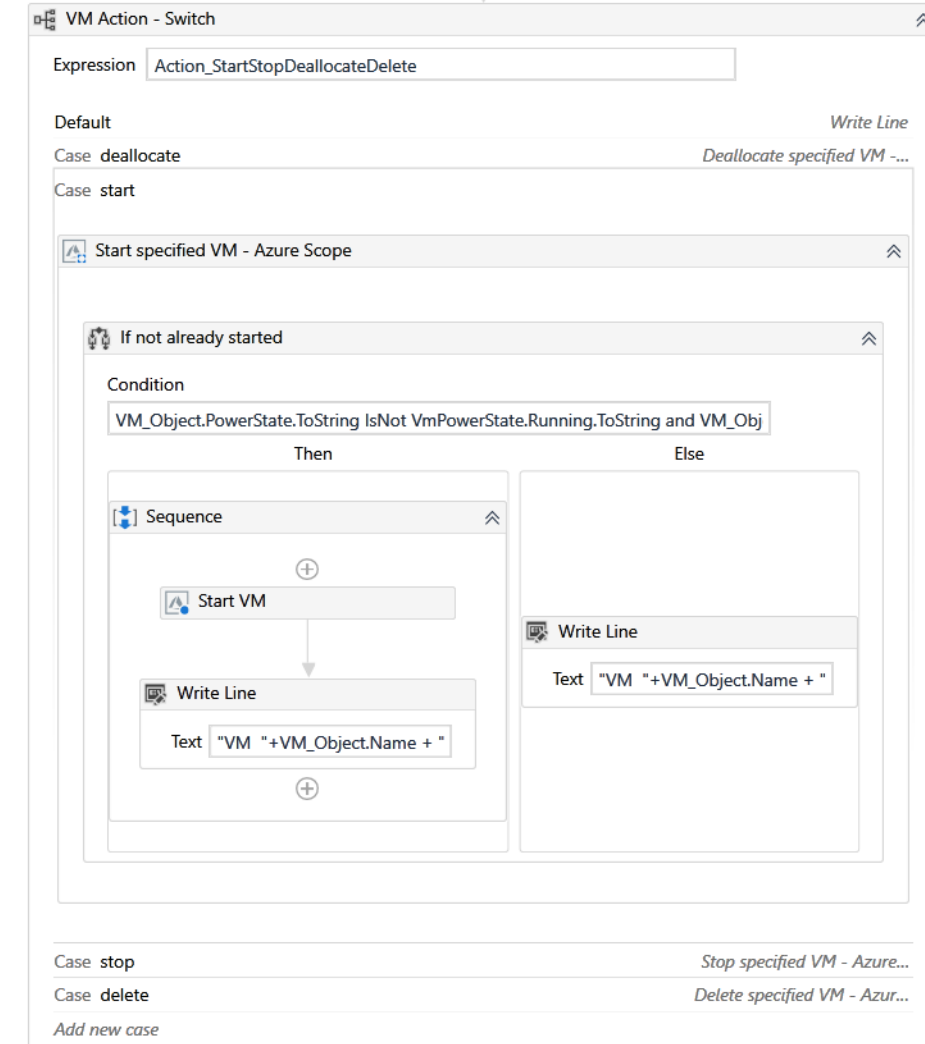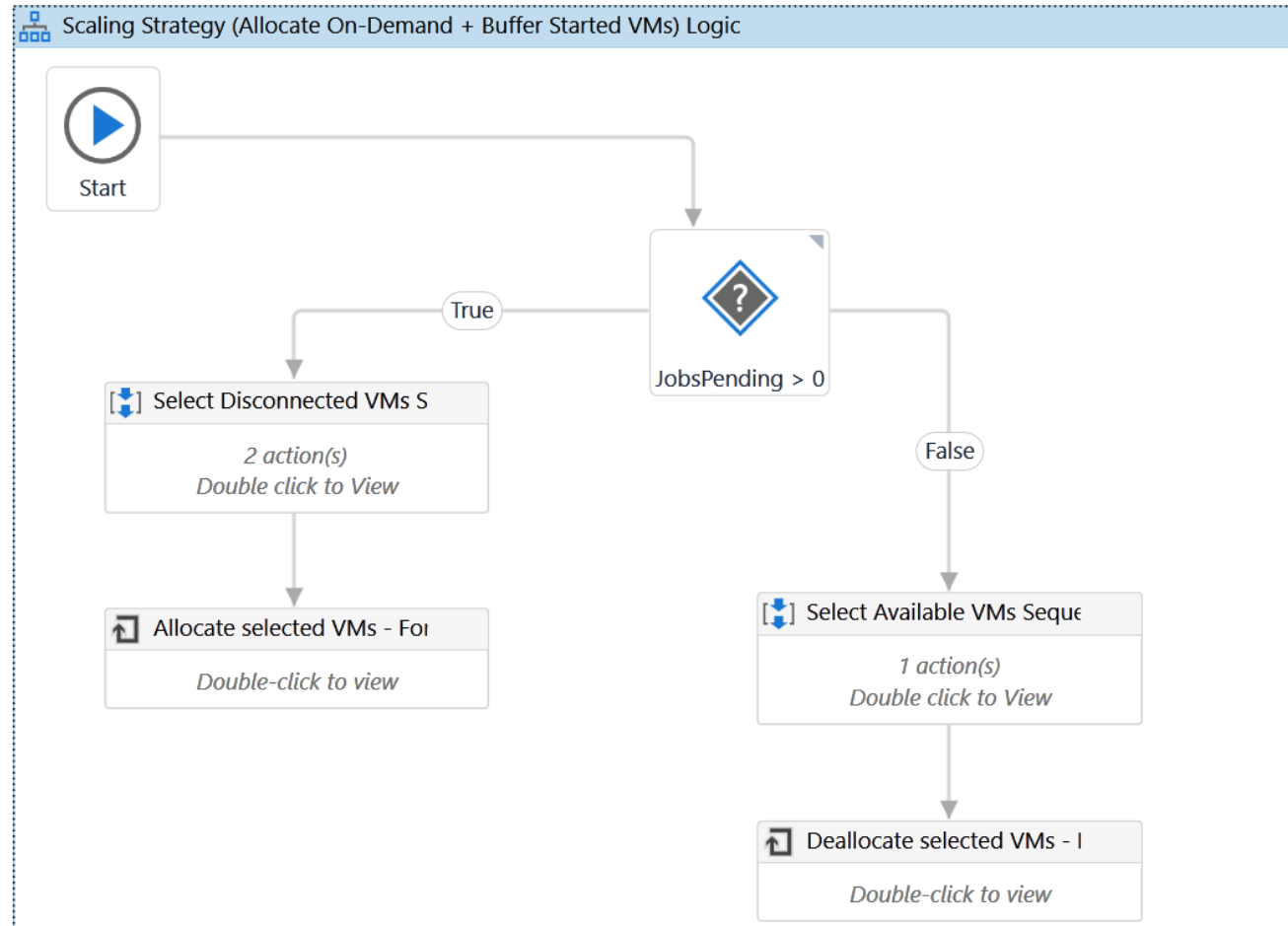
Robots Autoscaling
Process flow

DB Clients Configs

RobotsCold	50
RobotsHot	10
Infrastructure	aws
Environment	RAS
Folder	Default

client_(x)

...

RobotsCold	10
RobotsHot	2
Infrastructure	citrix
Environment	E2
Folder	F2

client_1

RobotsCold	80
RobotsHot	5
Infrastructure	Azure
Environment	E1
Folder	F1

client_1

Management Orchestrator

Queue. New Webhook Events

	STATUS	REFERENCE	STARTED	ENDED
		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

AUTOMATIONS
- PROCESSES
- TRIGGERS
- QUEUES
- ASSETS
- STORAGE BUCKETS

ACTIONS

3

Jobs triggered by New Items

4.1 get event data for 1ˢᵗ new q. item

4.2 update all associated q. items

4.3 get the client info from the database

get the client state: jobs, robots, .. **4.4**

select machines to start/stop & apply **4.5**

MONITORING
- ROBOTS
- JOBS

	PROCESS	ROBOT	ENVIRONM...	STATE	STA...	ENDED
	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

2

1

/ POC_DemoAWS_WF_RobotAutoScaling

MONITORING
- ROBOTS
- JOBS
- QUEUES
- LOGS

AUTOMATIONS
- PROCESSES
- TRIGGERS

Search   User: All   State: All   Priority: All   Source: All

	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

Items 10

client_1 jobs

client_1 machines

M1   M2   M3   ...   M(n)

SelectRobotVM

If orchestrator is onprem

Double-click to view

↓

Log Message

Double-click to view

↓

Init Sequence

3 action(s)
Double click to View

↓

If for Selecting Robot VMs by State

Condition

State = "Available"

Then	Else
Select Connected Robots to	**Select Disconnected Robot**
5 action(s) Double click to View	5 action(s) Double click to View

↓

Log Message

Log Level   Info ▼

Message   "Selected RobotVMs ("+State+") count: " +

ForEach vmName in clientSelectedVMs

Body

Body

⊕

Infra Type - Switch

Expression   clientInfrastructure

Default

Drop activity here

Case azure

▶ **Deallocate VM - Invoke Workflow File**

"Infrastructure/Azure/Azure_VM_StartStop.xaml" 📁

Import Arguments 2   Open Workflow

Case vmware

▶ **Invoke VMware_VM_StartStop workflow**

"Infrastructure\VMware\VMware_VM_StartStop.xaml" 📁

Import Arguments 2   Open Workflow

Case aws

▶ **Invoke AWS_VM_StartStop workflow**

"Infrastructure\Amazon AWS\AWS_VM_StartStop.xaml" 📁

Import Arguments 2   Open Workflow

Case citrix

Robots Autoscaling
Easy to get started

UiPath Reboot™ Work.

Robot Autoscaling

Get it from **Connect**

✅ Trusted Source

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)

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)

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

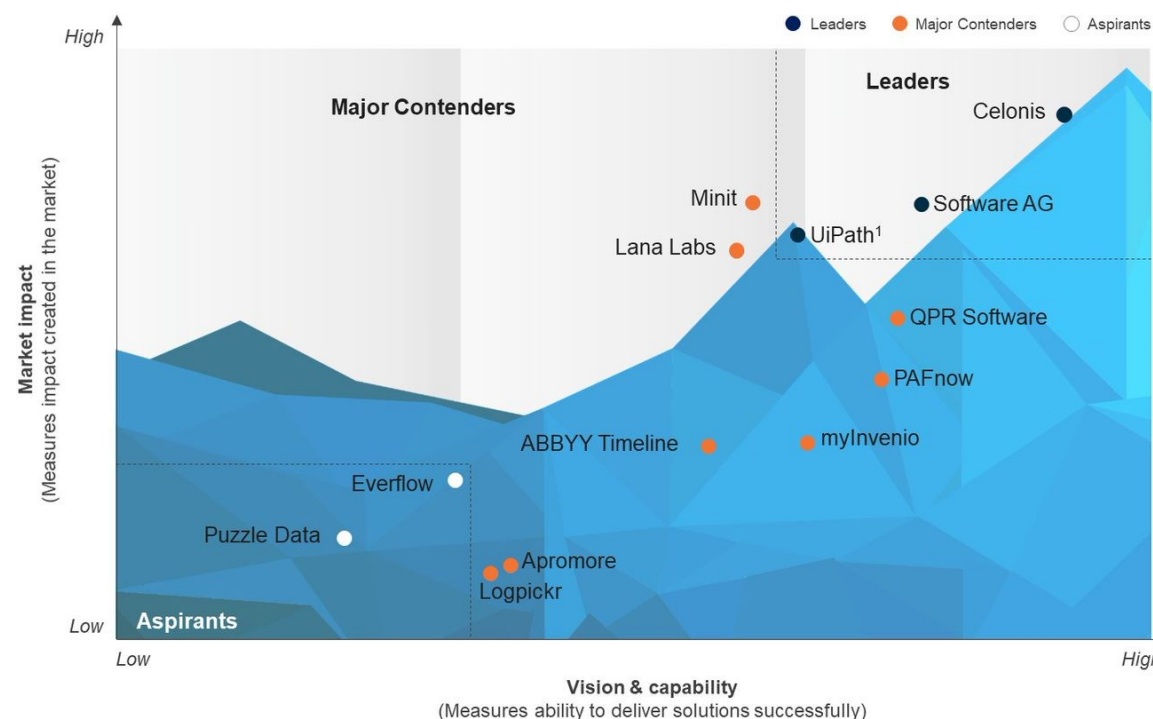# A Process Mining Leader

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 Process Mining Products PEAK Matrix® Assessment 2020

1   UiPath Process Mining (formerly ProcessGold)

Business Partner Ecosystem Spans Globally and Locally

Global	Americas	Japan	EMEA	India	Asia Pacific
accenture	Atos	CTC Challenging Tomorrow's Changes	Capgemini	Cognizant	Bb Blackbook.ai
EY	HURON	PERSOL パーソル プロセス&テクノロジー	CGI	KGiSL	INNOVIOR
Cognizant	perspecta	accenture	sopra steria	NIIT	KDDI KDDI China
IBM	TATA CONSULTANCY SERVICES	iSiD IT Solution Innovator	itelligence NTT DATA Business Solutions	RPATech —automating intelligence—	posco
Deloitte.	Infosys	TIS TIS INTEC Group	TATA CONSULTANCY SERVICES	Tech Mahindra	ncs making IT happen
pwc					
KPMG					

600+ business partners that help with the implementation of RPA

Thank you

andrei.oros@uipath.com

Ui|Path Reboot™ Work.