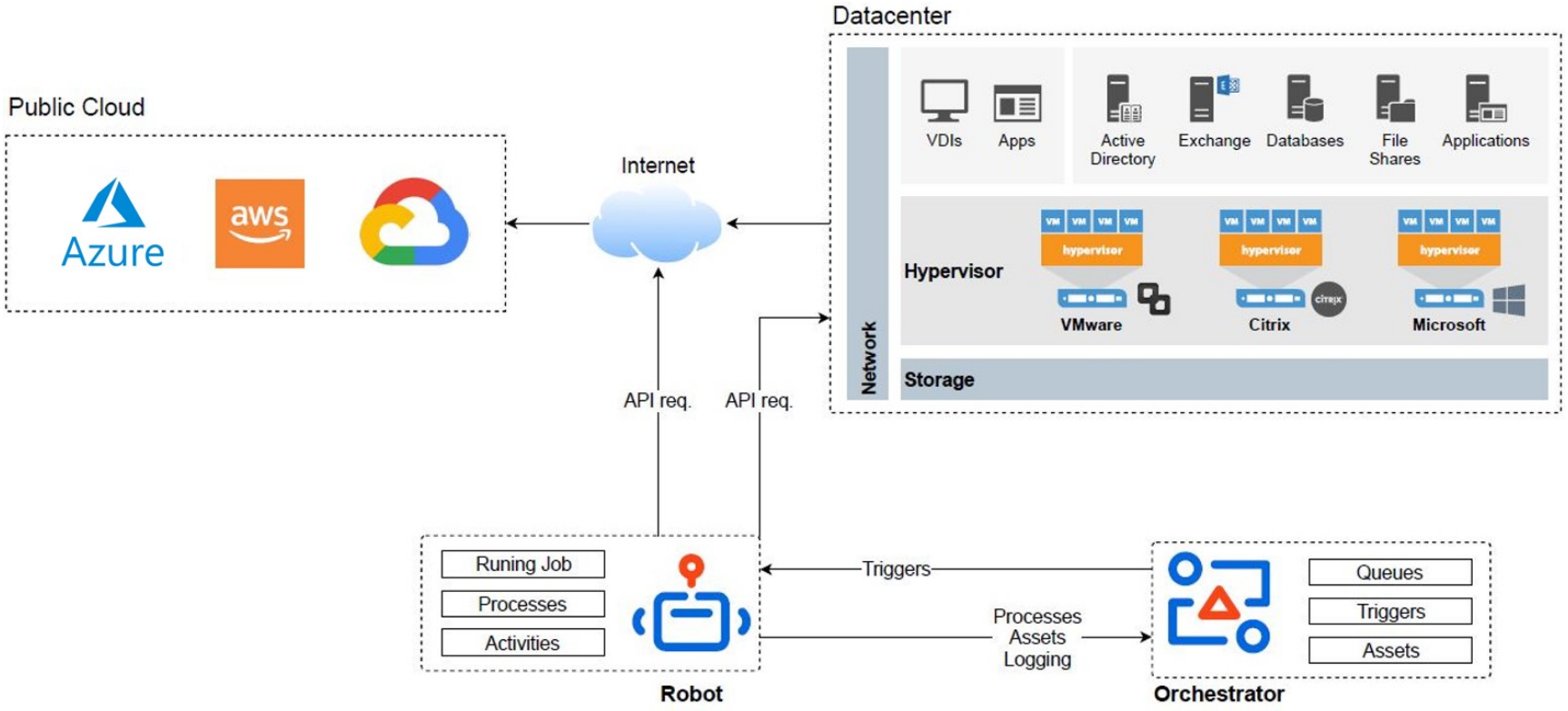
Robots Autoscaling IT Automation

Andrei Oros

UiPath Reboot™ Work.

Empower RPA Workflows with IT Automation activities



out-of-the-box IT Automation Integrations

Activities / Connectors / APIs / Ui drivers

Empower RPA Workflows with IT Automation activities

Implementation

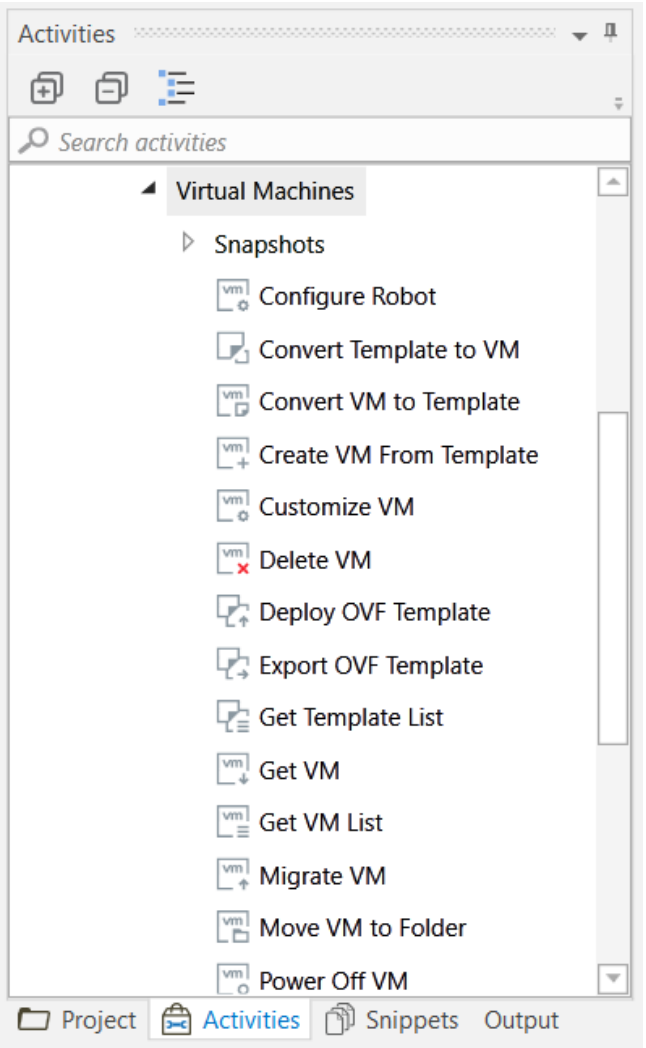
Background running activities built on top of the official SDKs from *Microsoft, Amazon, Citrix, VMware, ..*

Security and Compliance

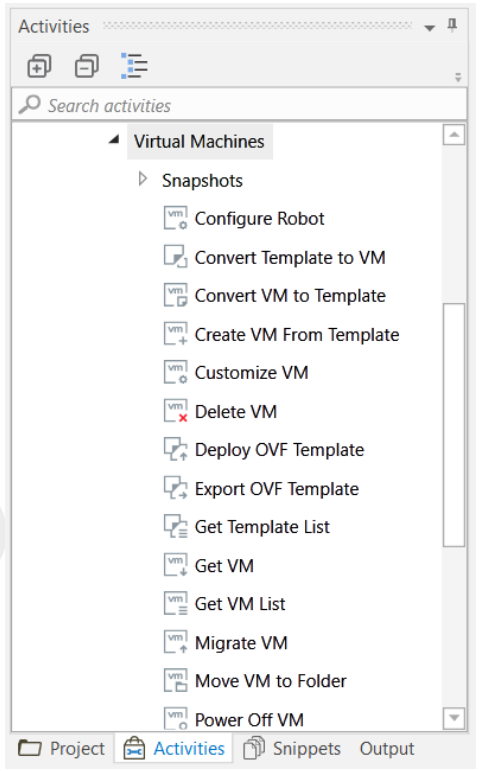
Developed by UiPath

Published on the official feed (LTS)

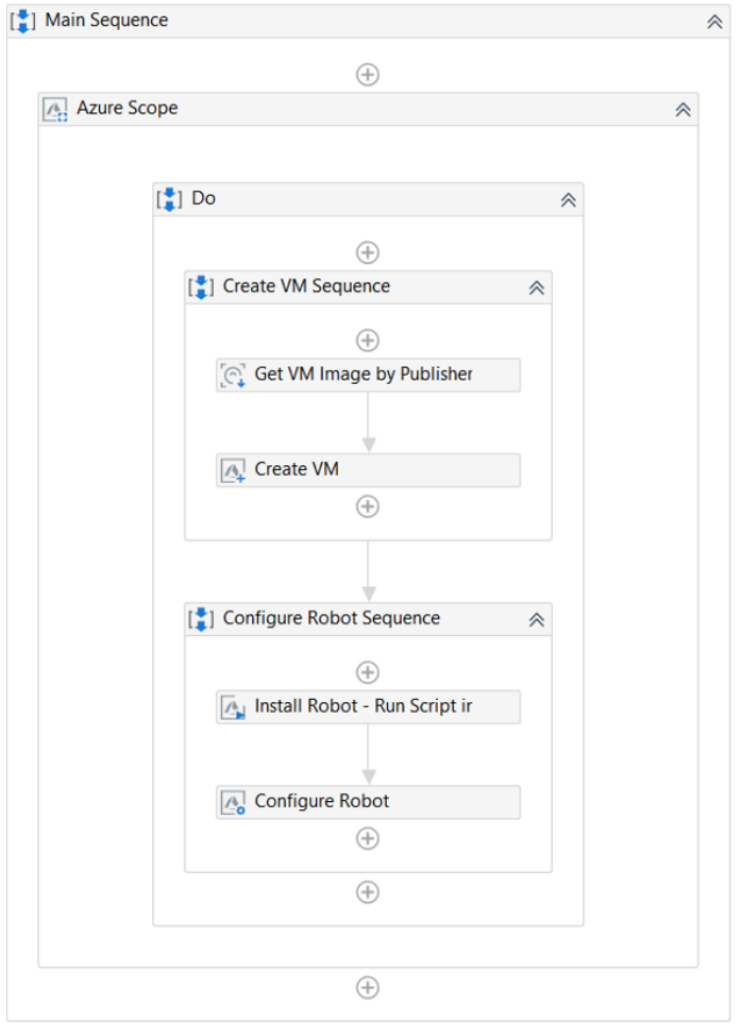
VERACODE
VERIFIED CONTINUOUS



DevOps. Infrastructure as Workflow / Diagram



Free from Official Feed (LTS)
Background Running (via SDKs)



Easy
create automations with out-of-the-box drag & drop official UiPath IT Automation activities

Vendor agnostic
Azure, AWS, Google Cloud
VMware, Citrix, Hyper-V

Transparent
easy to understand & inspect business logic

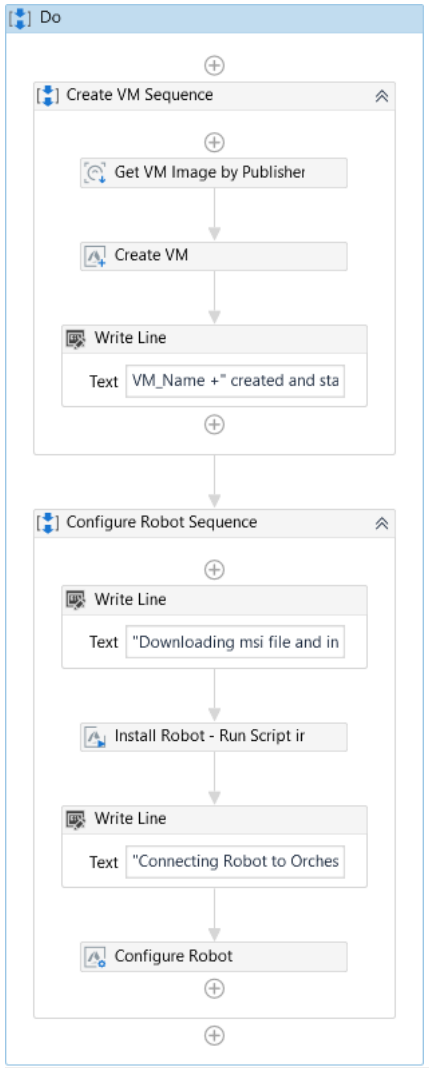
Robots Autoscaling

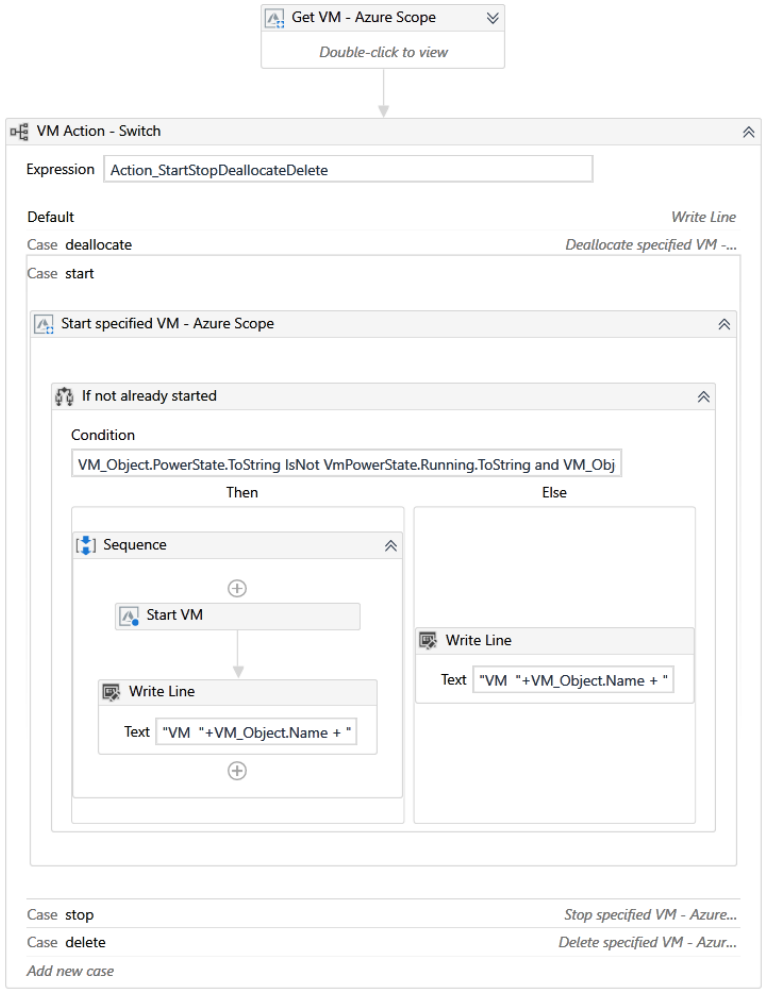
Tech & components

UiPath Reboot Work.™

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

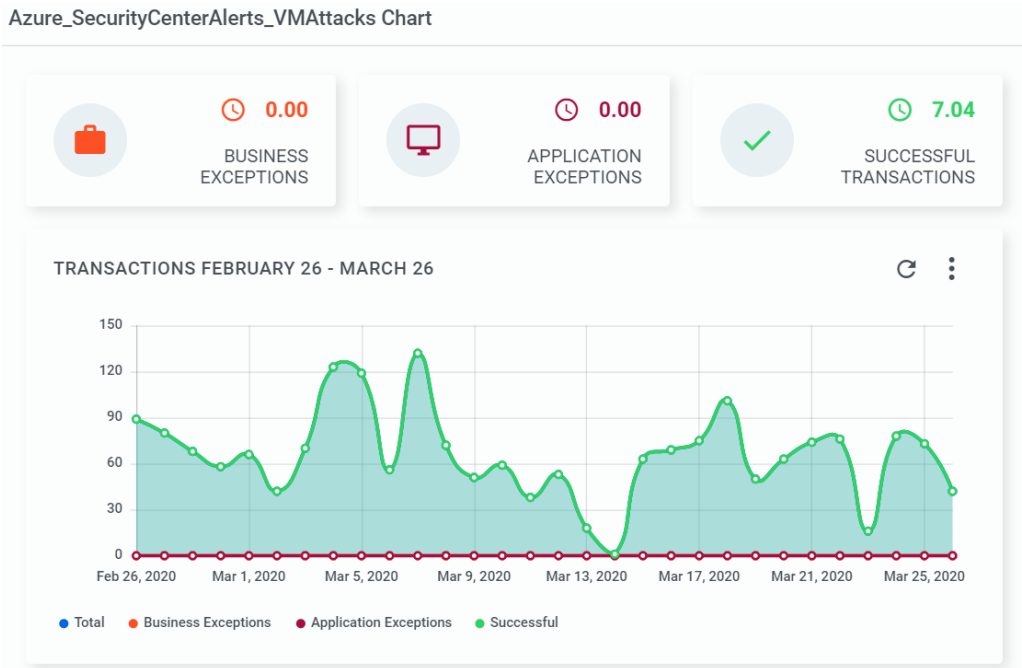
Cost Control

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

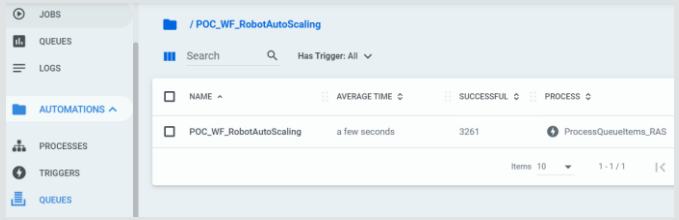
processed automatically in the last 6 months



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

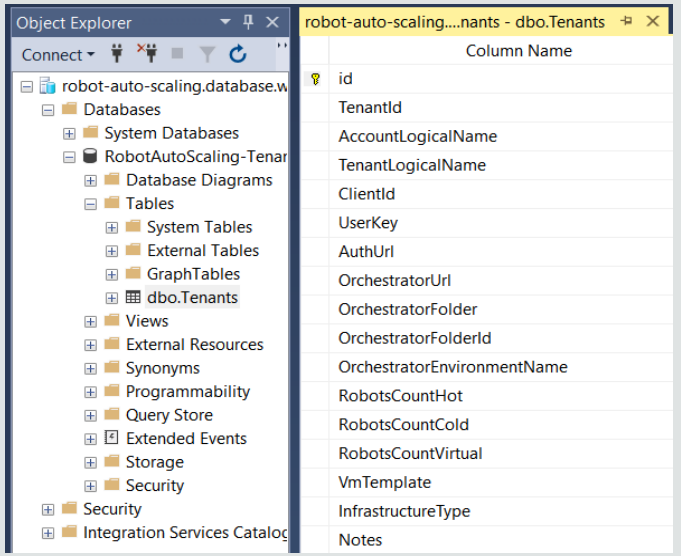
Trigger *// on new queue item added*

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.

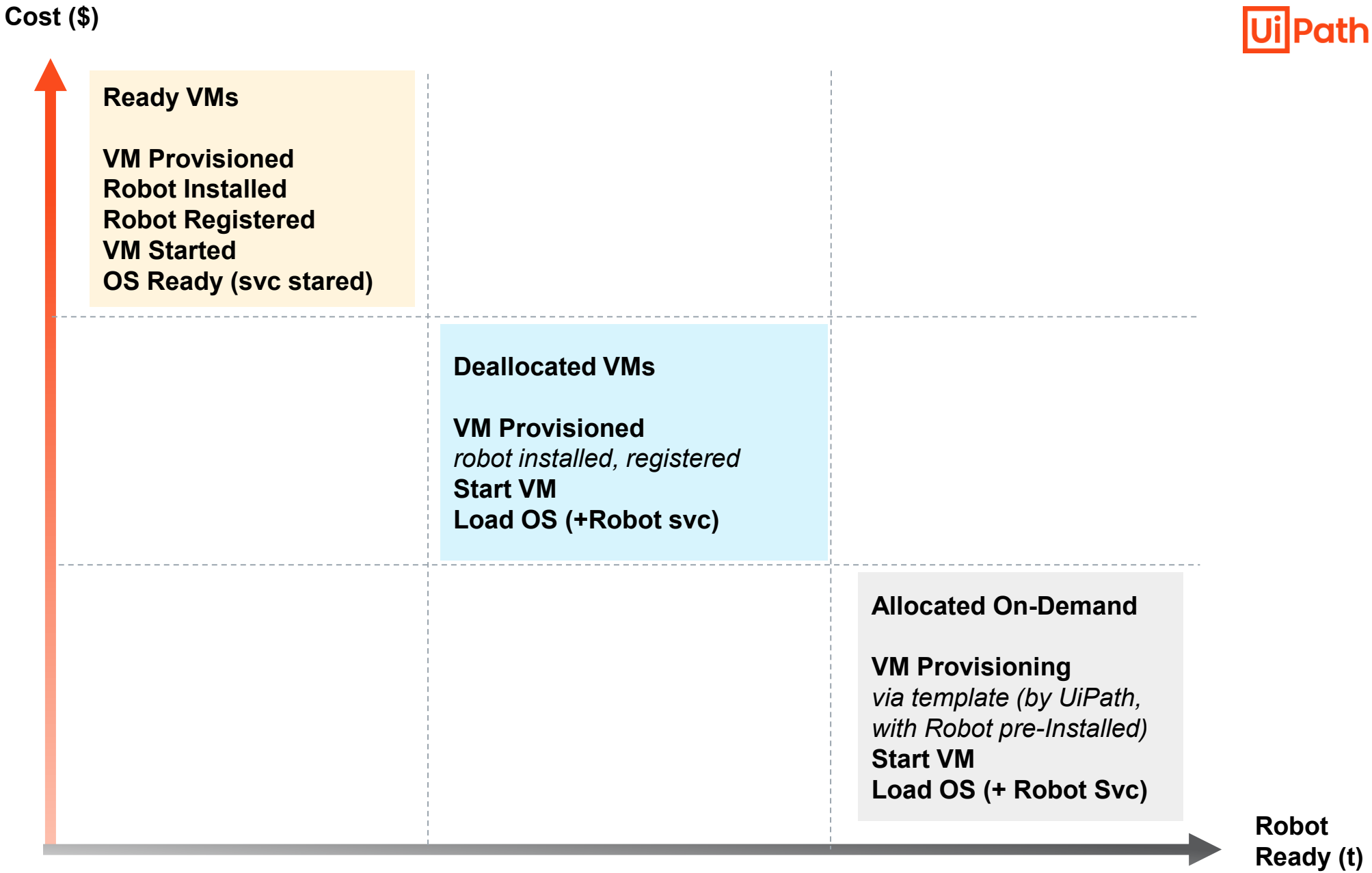
Client Tenants

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

Robots Autoscaling

Scaling Strategies

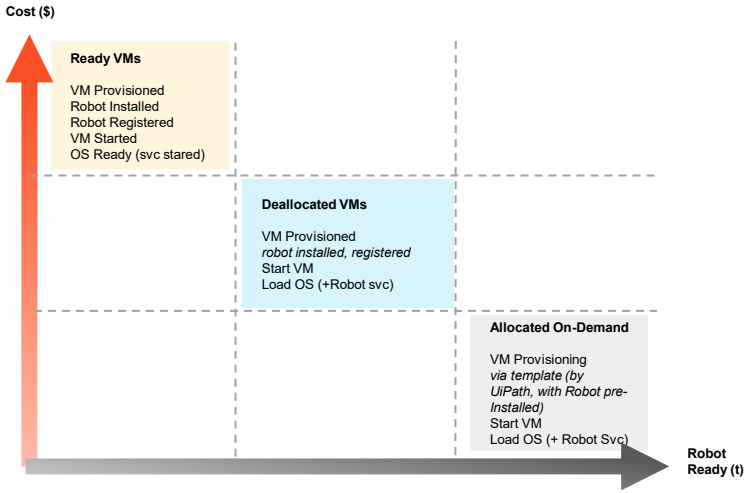
UiPath Reboot Work.™


Cost ($)
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



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

Pending Jobs

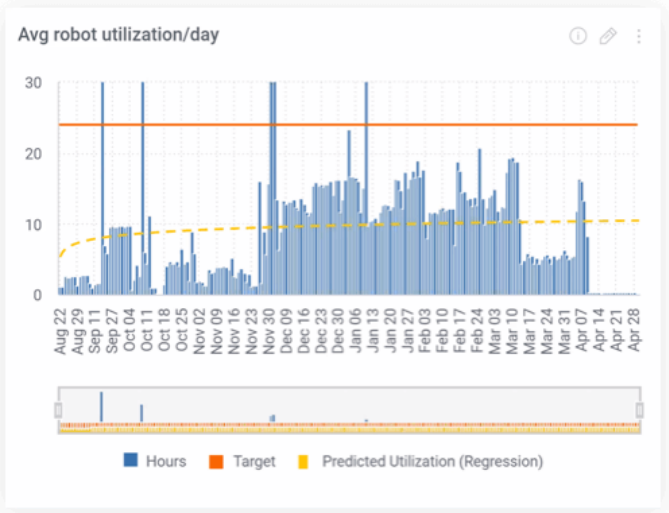
Robots Available
Robots Disconnected
Robots Busy

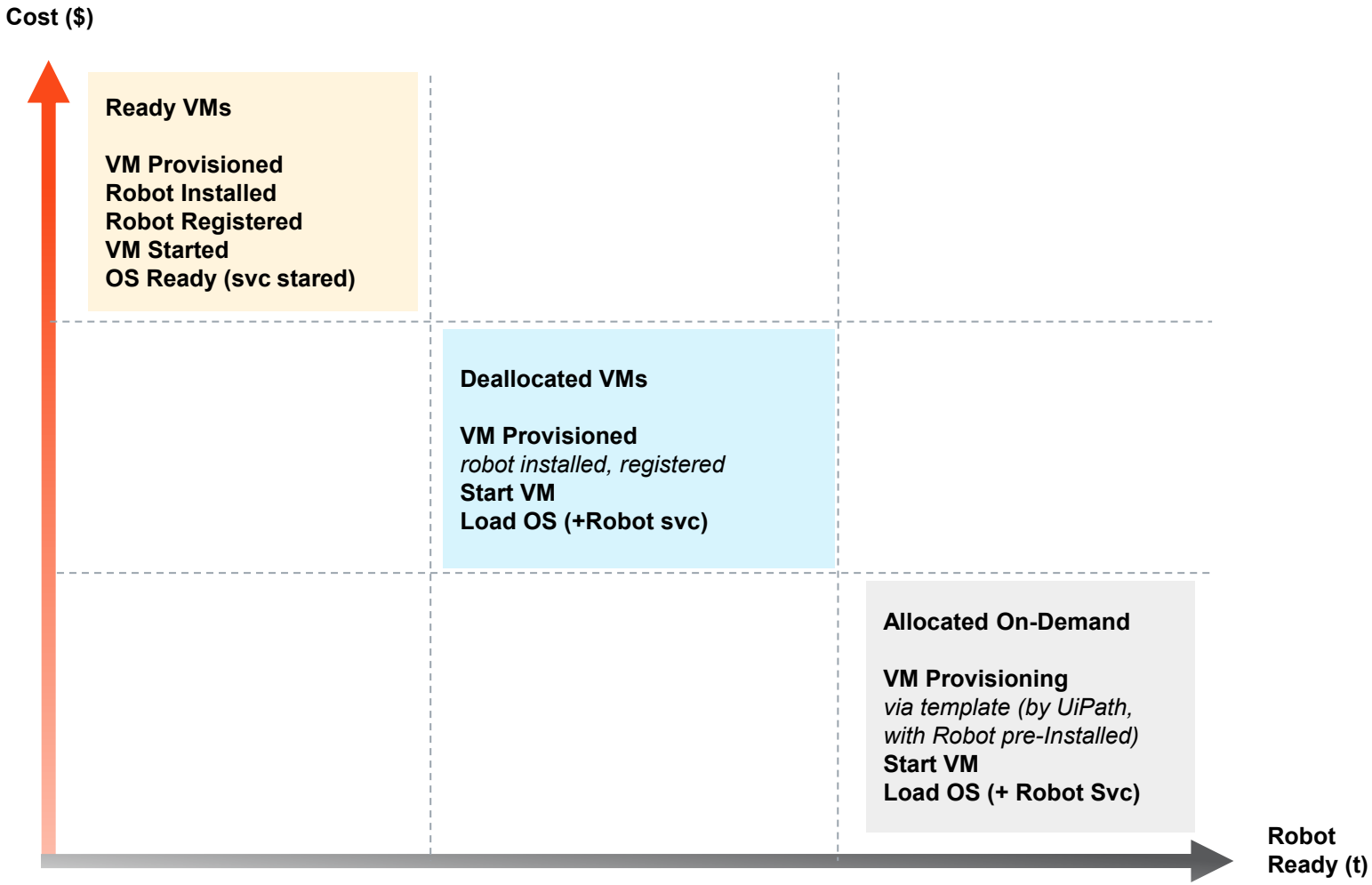
Hot Robots
Cold Robots
Virtual Robots

Easy Customization - dynamic scaling strategies

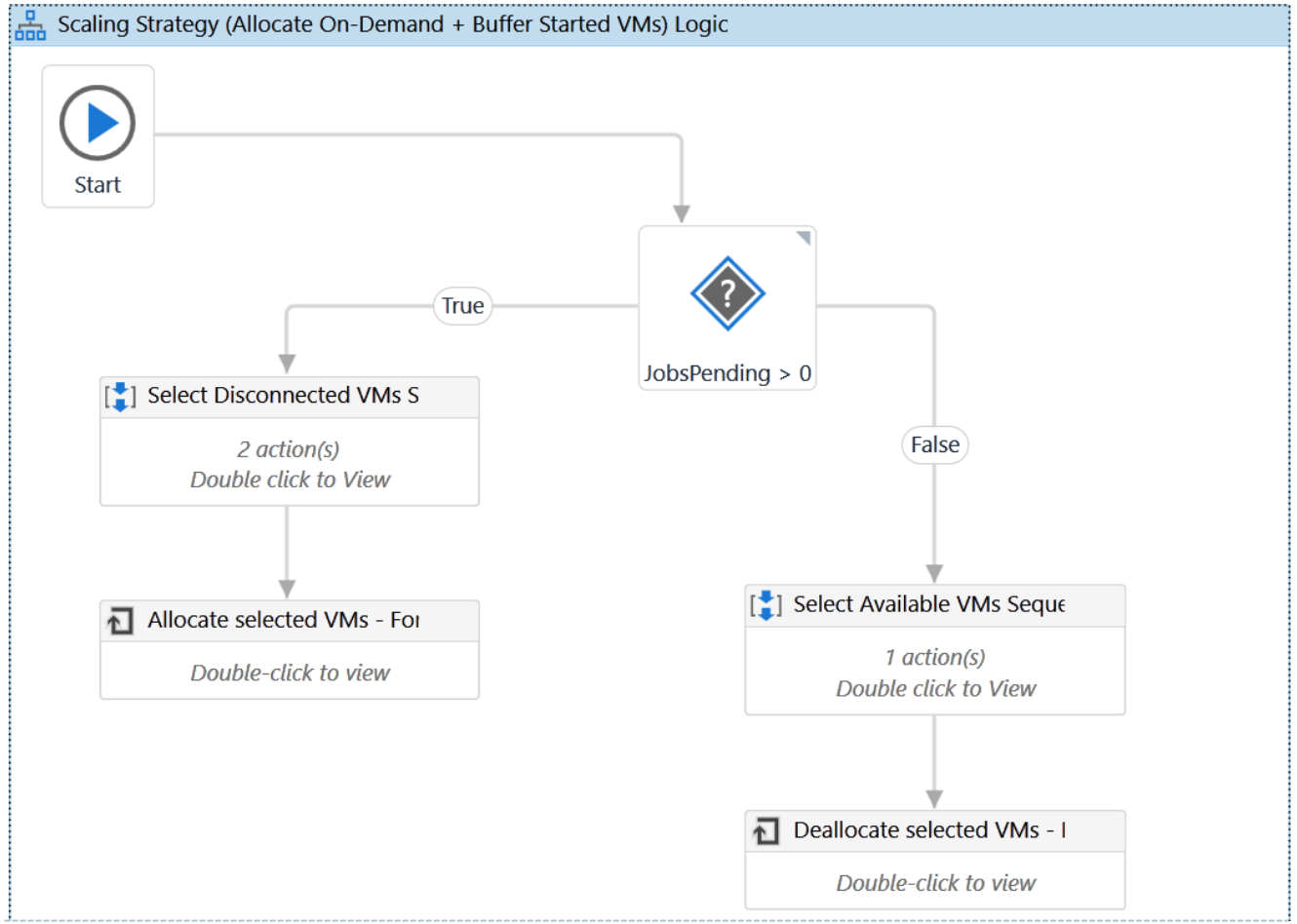
Couple with Robots usage
eg. Insights / analyze Job requests

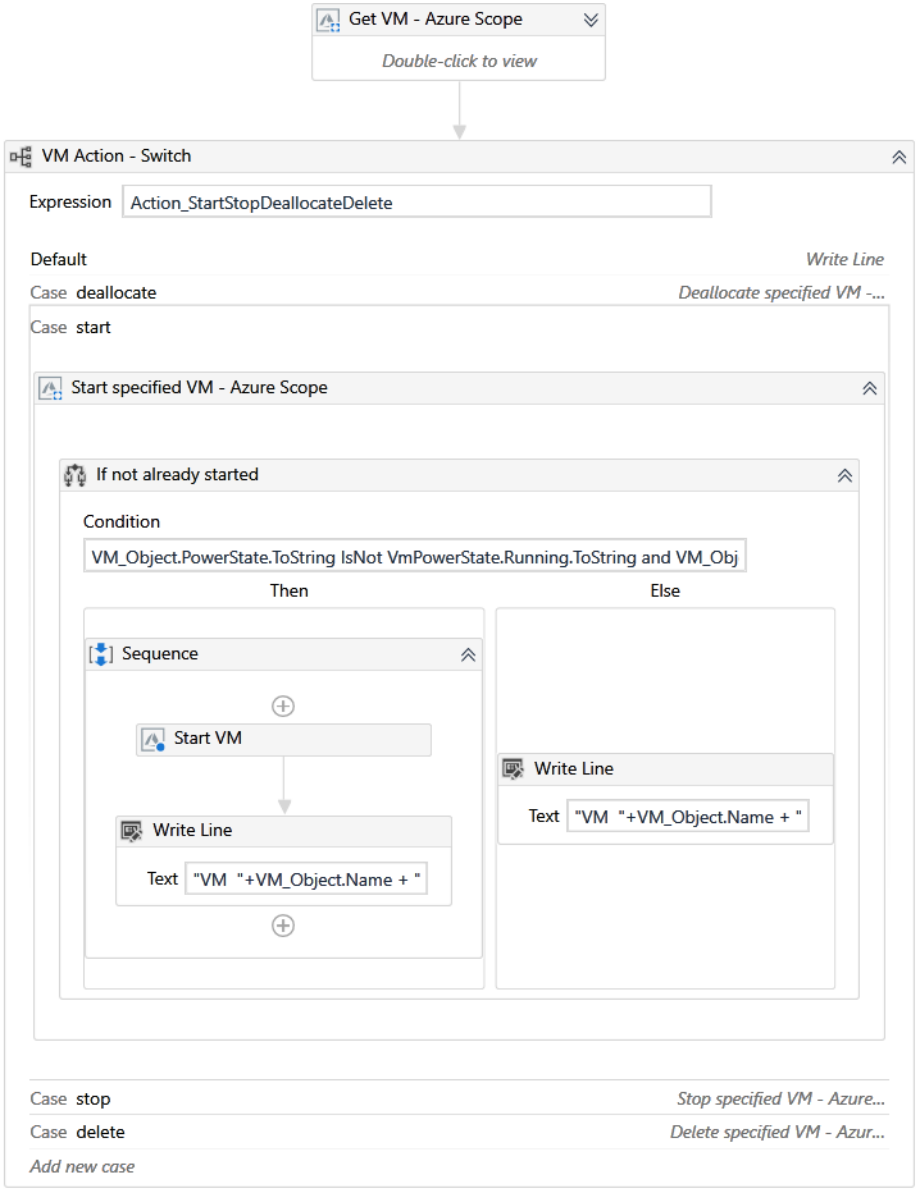
Adjust hot / cold Robots variables for the identified intervals.





Easy Customization
change the process workflows

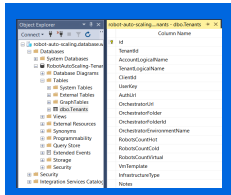




Robots Autoscaling

Process flow

UiPath Reboot Work.™



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

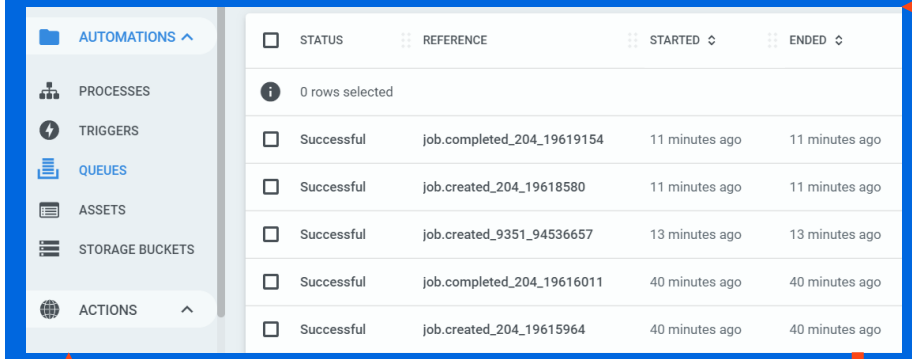
client_1

RobotsCold	80
RobotsHot	5
Infrastructure	azure
Environment	E1
Folder	F1

client_1

Management Orchestrator

Queue. New Webhook Events



Jobs triggered by New Items

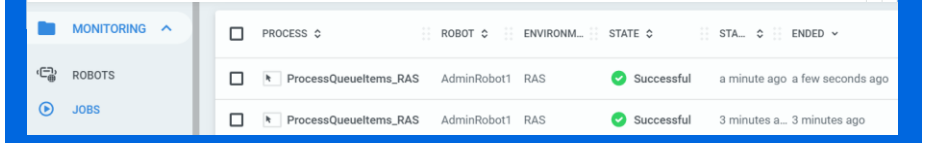
4.1 get event data for 1st new q. item

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



Webhook Events Receiver Service

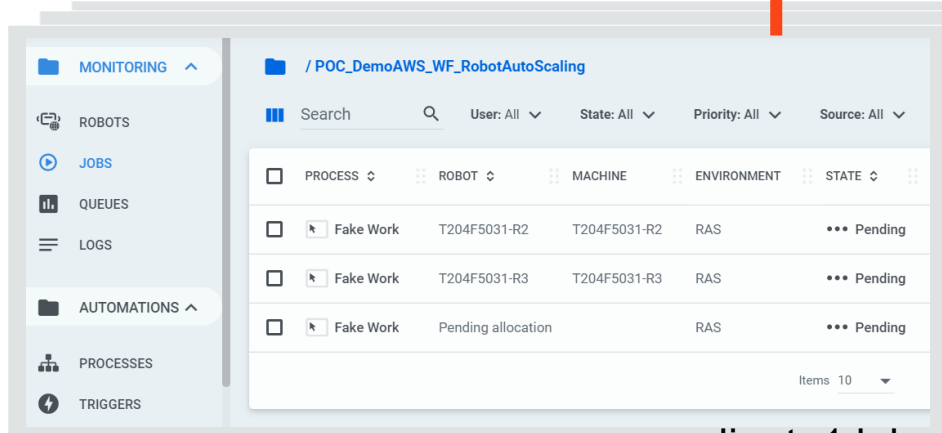
Add Event to Queue

tenant Id	folder Id
[...]	job.created

1

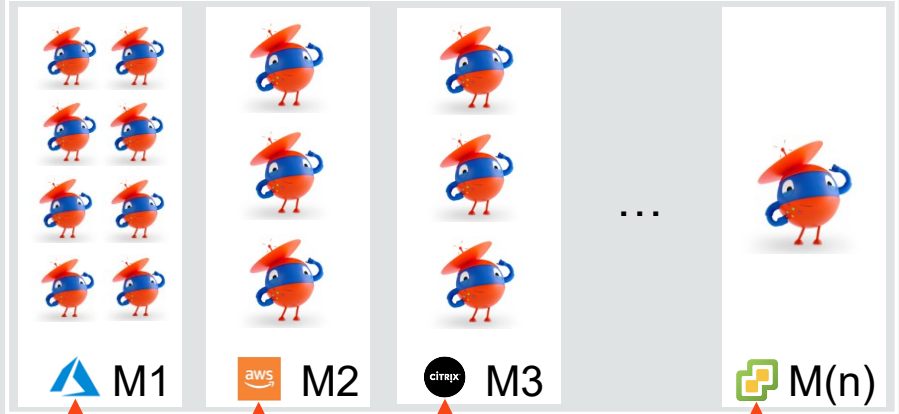
2

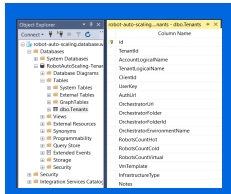
3



client_1 jobs

client_1 machines





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client_(x)

...

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RobotsHot	2
Infrastructure	citrix
Environment	E2
Folder	F2

client_1

RobotsCold	80
RobotsHot	5
Infrastructure	azure
Environment	E1
Folder	F1

client_1

Management Orchestrator

NAME	PROCESS	ENVIRONMENT
ProcessQueueItems	ProcessQueueItems_RAS	RAS

1 Jobs started by scheduled trigger

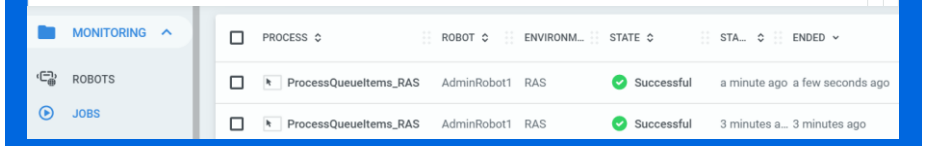
2 get the client info from the database

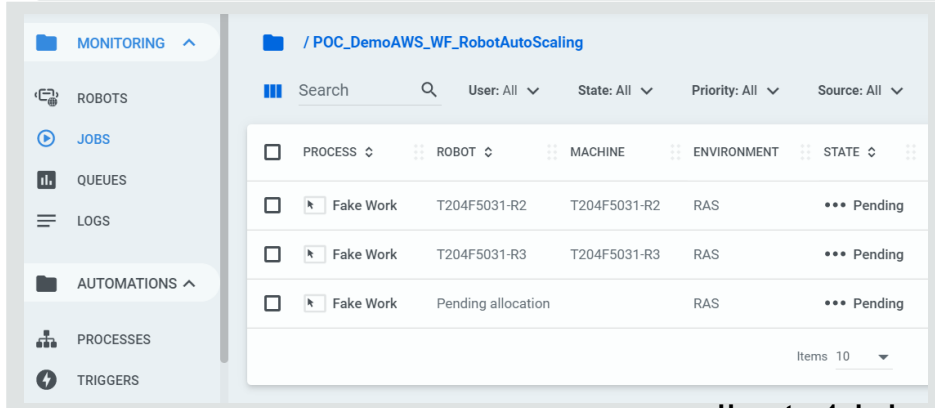
get the client state: jobs, robots, ..

3

select machines to start/stop & apply

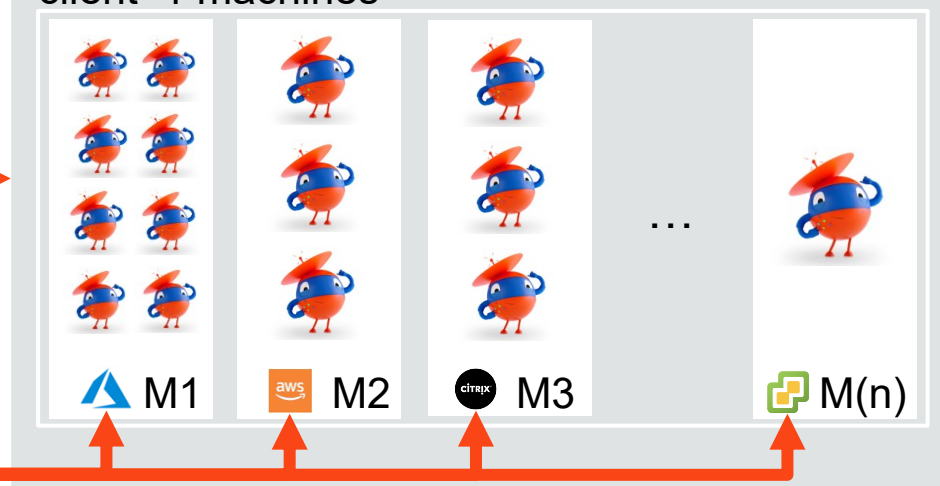
4

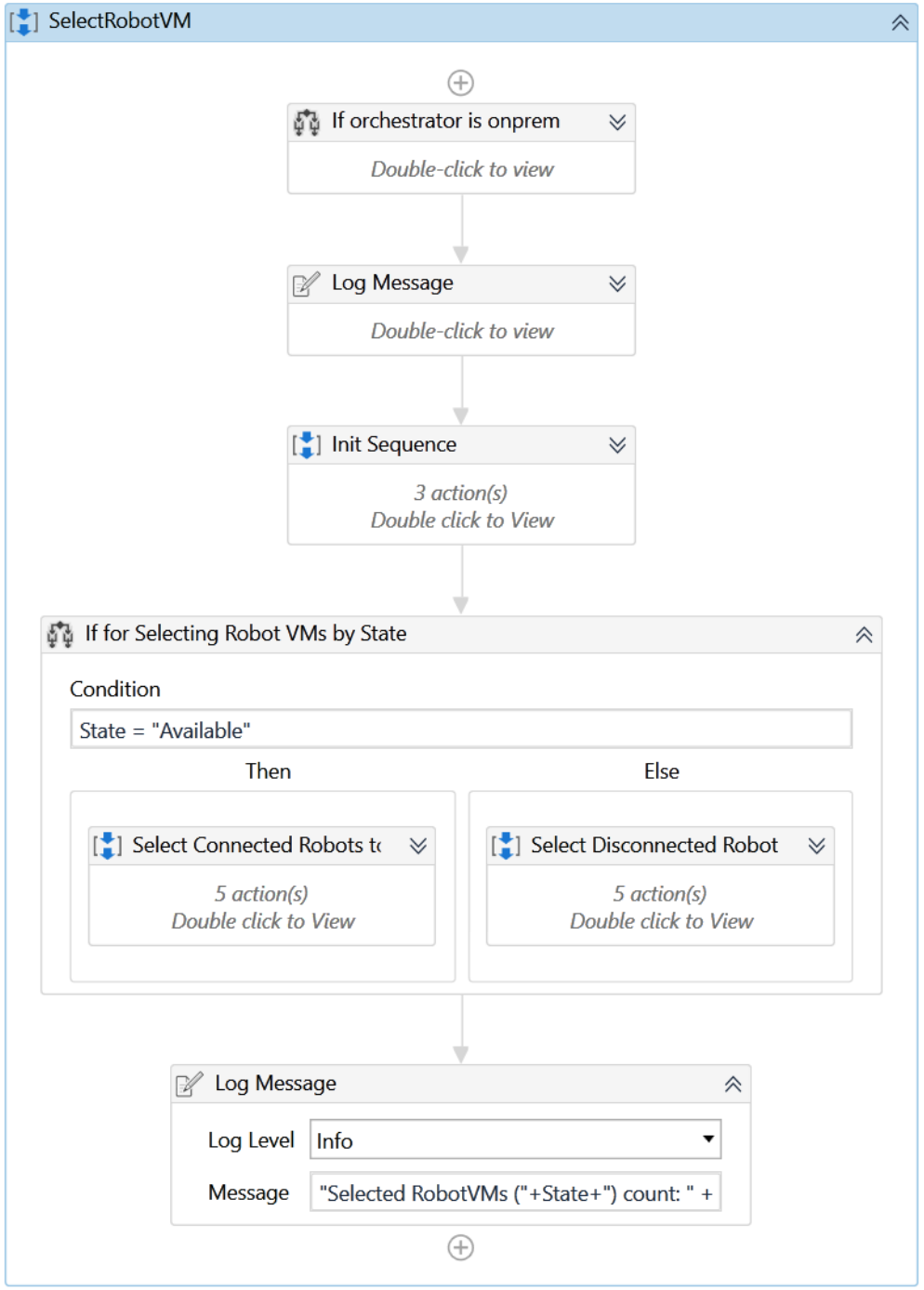


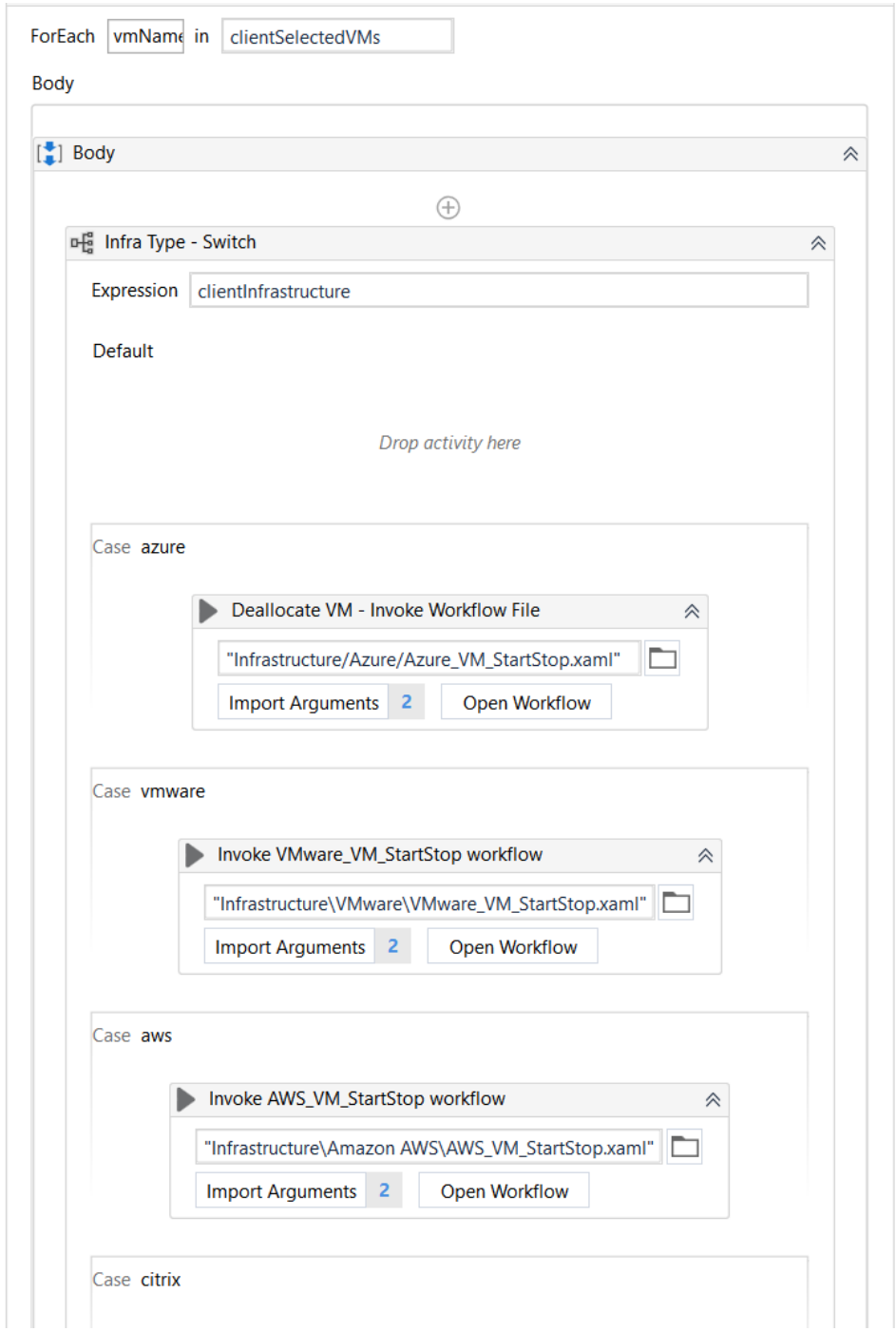


client_1 jobs

client_1 machines




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 t
5 action(s)
Double click to View
Select Disconnected Robot
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

RPA Autoscaling Customer Story

Business Problem. Client is a leading Tax provider that faces dynamic workload related to customer workload during busy tax seasons. This resulted in excess spending on infrastructure and personnel.

Challenge

- Deadline events cause 500-1000% workload demand increases on a daily cycle
- Tax busy seasons, specifically tax end requests, caused spikes in RPA Jobs (dynamic workload)
- Very inefficient while done manually: increased costs with IT Infrastructure and administration
- Scaling needs increase from 10 machines to 300 machines dynamically, each with 10-20 high density robots (avg 1500 robots during the day and 150 robots at night) running 24 / 7
- Incurred high maintenance costs, high administration costs to accommodate dynamic workload in real-time
- Higher Risk from missed SLAs - client potential liability for millions of dollars towards customers and legal commitments

Solution

UiPath provided an autoscaling solution that ..

- Responds in real-time to dynamic workloads by allocating / deallocating robot machines to meet the incoming RPA Jobs requests
- Works with all types of infrastructures (cloud, on-premises, hybrid)
- Empowers the client to easily and on the fly adjust the autoscaling strategy to balance *Cost Savings* vs *Highly-Available Job Execution*

Expected Outcomes

Optimized RPA & Business Operations
reduced costs with IT Infrastructure & labor

Flexible deployment
support for custom RPA setup (high density robots, environments, Azure cloud + VMware on-premises)

Green Computing
energy savings with compute from running a more efficient RPA operation

SLAs risk management
help meet customer & contractual SLAs in a highly regulated tax environment

Anticipated Savings

62% average expected reduction in annual infrastructure costs

73% average expected reduction in annual labor costs

64% average expected overall reduction in total costs

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

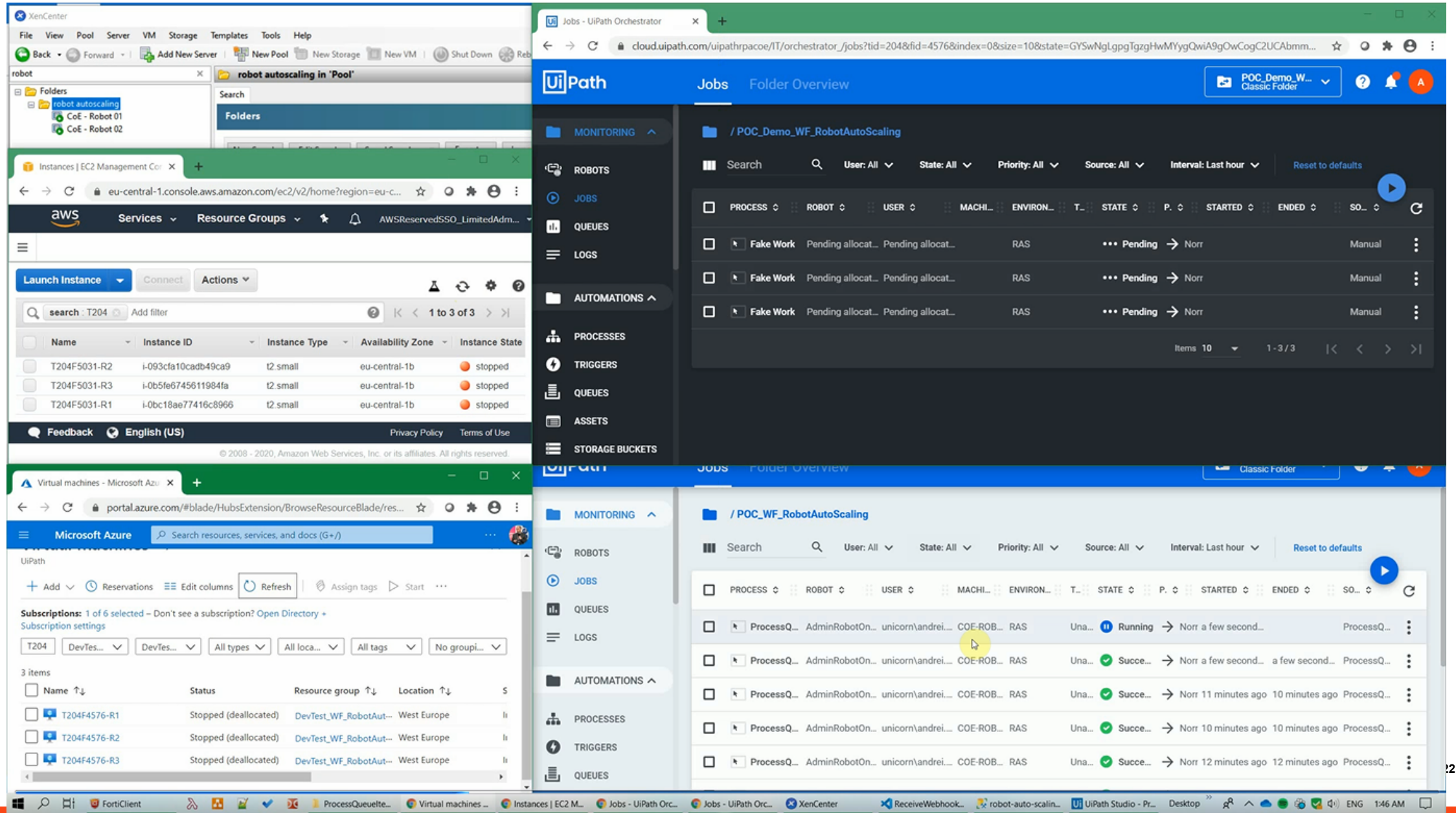
Webhooks Receiver Service Setup

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

UiPath Reboot Work.™

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*

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

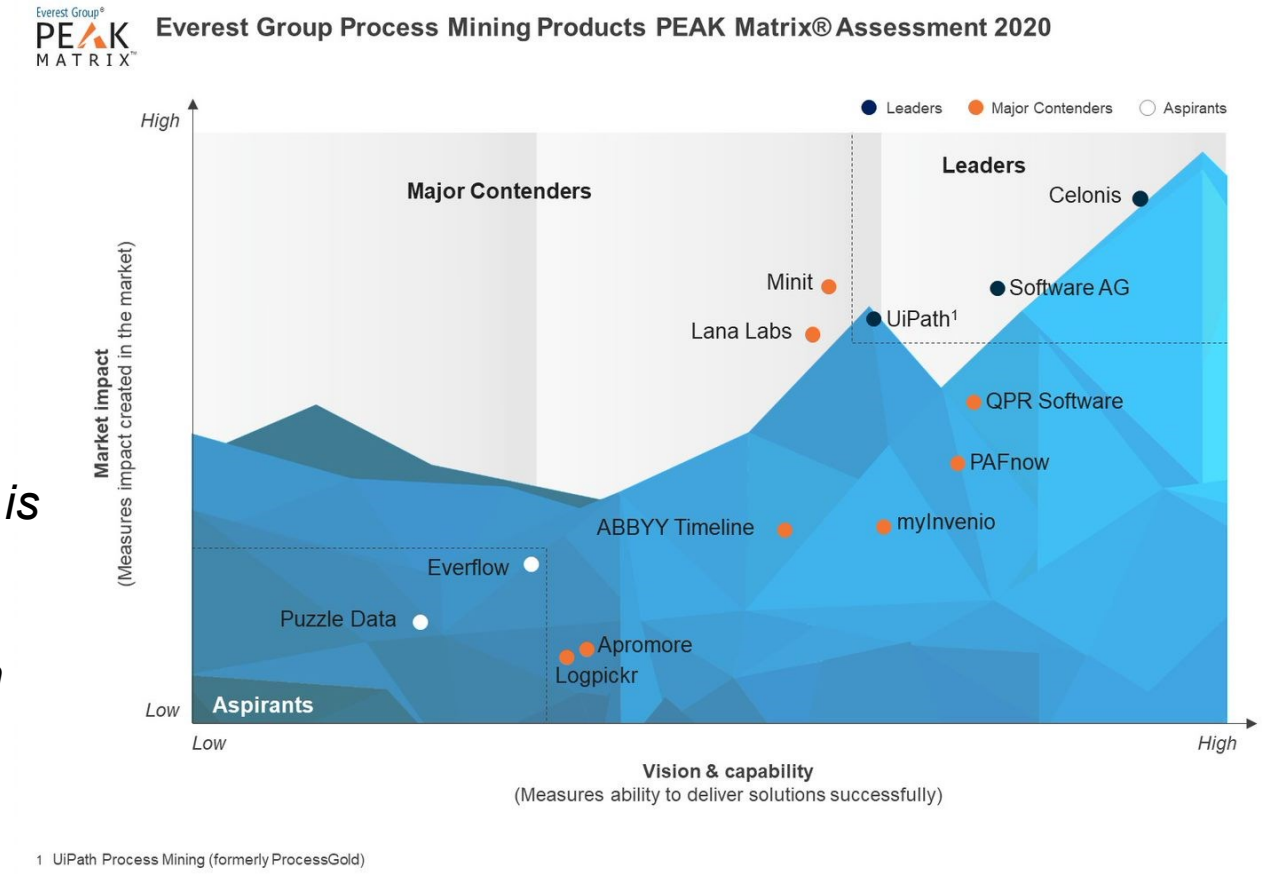
FIGURE 1 Forrester Wave™: Robotic Process Automation, Q4 2019

A Process Mining Leader

Everest Group PEAK Matrix® for Process Mining Technology Vendors 2020

Everest Group PEAK MATRIX® LEADER 2020
PROCESS MINING PRODUCTS

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



Full report: https://www.uipath.com/hubfs/Reports/Everest_Group_PEAK_Matrix_for_Process_Mining_Products_2020_Focus_on_UiPath.pdf

Business Partner Ecosystem Spans Globally and Locally

Global	Americas	Japan	EMEA	India	Asia Pacific
accenture	Atos	CTC	Capgemini	Cognizant	Blackbook.ai
EY	HURON	PERSOL	CGI	KGiSL	INNOVIOR
Cognizant	perspecta	accenture	sopra steria	NIIT	KDDI China
IBM	TATA CONSULTANCY SERVICES	iSiD	itelligence	RPATech	posco
Deloitte.	Infosys	TIS	TATA CONSULTANCY SERVICES	Tech Mahindra	ncs
pwc					
KPMG					

600+ business partners that help with the implementation of RPA

Thank you

andrei.oros@uipath.com

UiPath Reboot™ Work.