

Application resource management

300-level live demo script



Introduction

In this growing digital economy, the application is the business. Application performance, therefore, is one of the highest CIO priorities.

Home Robots Inc. is a fully digital company selling innovative “household chores” robots globally via its RobotShop online marketplace. Clients browse and purchase through RobotShop’s microservices-based cloud native app. Promotions and other marketing events, however, generate unpredictable load patterns. This often results in poor application performance and bad customer experiences. Without full stack visibility, IT Ops teams tend to either over or under-provision resources based on best guesses - which is highly inefficient, costly and risky.

In this demo, I’ll show you how IBM Turbonomic, a solution based on the principles of Application Resource Management (ARM), helps SREs and IT Ops teams proactively assure application performance and operational efficiency across their mission critical deployments.

We will:

- See how Turbonomic stitches together a full-stack view from business applications down to the supporting infrastructure
- Examine the resource optimization recommendations generated by analytics
- Demonstrate how to automate the execution of platform-derived “actions”

Note: This demo will be focused on application resource management in private clouds.

1 - Getting a global view of the applications and their infrastructure dependencies

1.1 - Examine the global supply chain

Narration

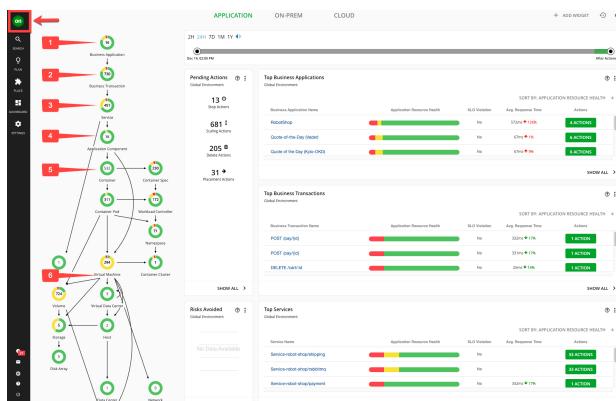
Turbonomic requires configuration and operational performance data to make resource optimization recommendations. The more data the better.

The RobotShop application is being observed by Instana. Turbonomic ingests data from Instana and builds a common data model to stitch together a graphical view of the application and its resource dependencies. In the Turbonomic nomenclature, this is called the “supply chain.”

The global supply chain models the dynamic relationship of the managed application and its dependent infrastructure layers.

Action 1.1.0

- Log in to the Turbonomic instance and click the **On** button in the upper left corner.
- Note:** The next six steps will refer to the graphic below.



Action 1.1.1

- Hover the cursor over the **Business Application** entity (1), which shows the business applications of which Turbonomic is aware.

Action 1.1.2

- Hover the cursor over the **Business Transaction** entity (2), which shows logical business functions that an end-user would execute (such as a purchase or add-to-cart). Business applications are composed of these business transactions.

Action 1.1.3

- Hover the cursor over the **Service** entity (3). A service is basically a REST endpoint. Transactions use the services.

Action 1.1.4

- Hover the cursor over the **Application Component** entity (4). Services are hosted and executed in an application component, such as a Java virtual machine (JVM).

Action 1.1.5

- Hover the cursor over the **Container** entity (5). Application components run on a container platform like Kubernetes.

Action 1.1.6

- Hover the cursor over the **Virtual Machine** entity (6). Application platforms are hosted in virtualized environments like vSphere.

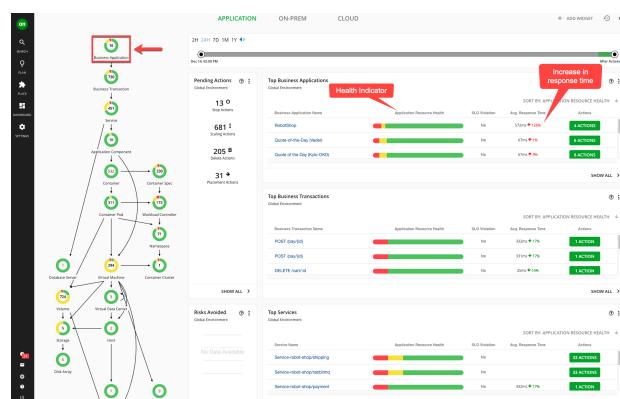
1.2 - Explore the top business applications view

Narration

Turbonomic displays the applications in order of risk.

Action 1.2.1

- Click the **Business Application** entity.



Narration

We see that there's an increase in the average response time.

In the Application Resource Health bar, the color of each circle reflects the current health of the entities: “red” represents performance recommendations, “yellow” represents efficiency recommendations, and “green” is healthy. The current status indicates that there are some critical performance issues as well as some areas to improve efficiency.

The Actions button enables you to take the recommended actions directly from Turbonomic. **Note:** We won't click the Actions button at this time.

2 - Drilling into the RobotShop application

2.1 - Examine RobotShop resource dependencies

Narration

Now that we have a broad understanding of the global view, let's examine the health of the RobotShop application. This is called "scoping."

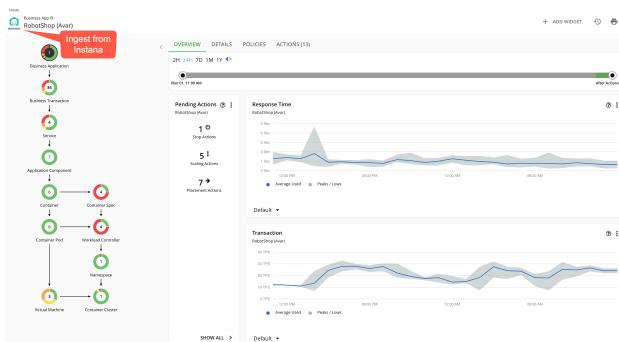
Action 2.1.1

- Click the **RobotShop** link to scope to RobotShop.



Action 2.1.2

- Notice that we are scoped to RobotShop, with data coming from Instana.



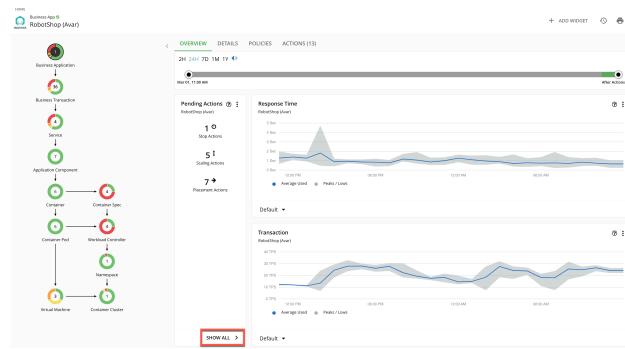
Narration

The supply chain is scoped to RobotShop, and the charts provide a quick view of RobotShop's overall operating health.

Since RobotShop is a Kubernetes-based cloud native application, all the entities in the supply chain are specific to a container infrastructure.

Action 2.1.3

- On the Pending Actions chart, click **SHOW ALL**.



Narration

The Turbonomic engine performs an ongoing (real-time) holistic analysis of the environment, generating resource optimization recommendations (and associated actions) that you can follow to resolve and avoid emerging problems.

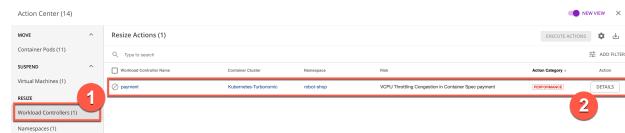
Here we see container resize actions, categorized as ‘performance’ and ‘efficiency’ actions. These are displayed for you to either investigate further or execute manually.

Container resize *UP* actions are typically performance-centric actions that are driven to resolve an underlying resource congestion issue.

Container resize *DOWN* actions are typically efficiency-centric actions that are pointing to a resource optimization opportunity, likely a consequence of resource over-provisioning.

Action 2.1.4

- On the **Action Center** panel, under **RESIZE**, select **Workload Controllers** (1). Then, click **DETAILS** (2) in the **payment** row.
- Note:** If the view does not match the screenshot below, click **NEW VIEW** at the upper right corner to enable the new view.



3 - Understanding the resource optimization recommendations

3.1 - Analyze a container right-sizing performance recommendation

Narration

Let's explore one of the performance recommendations in more detail.

Action 3.1.1

- On the **Action Details** page, click **Expand Details** to inspect the rationale behind the recommendations.

The screenshot shows the Action Center interface with a single action listed:

MOVE
Container Pods (11)

SUSPEND
Virtual Machines (1)

RESIZE
Workload Controllers (1)

Namespaces (1)

Action Details

Resize VCPU Limit for Workload Controller payment
VCPU Throttling Congestion in Container Spec payment

IMPACTED CONTAINER SPEC

EXPAND DETAILS (button highlighted with a red box)

WORKLOAD CONTROLLER DETAILS

NAME	NAMESPACE	CONTAINER CLUSTER
payment	robot-shop	Kubernetes-Turbonomic

TAGS

app.kubernetes.io/managed-by: Helm stage: prod service: payment

STATE

Action execution is blocked by related actions.

RELATED ACTIONS

BLOCKED BY

Resize up VCPU Limit Quota for Namespace robot-shop from 4,000 mCores to 6,000 mCores

Action 3.1.2

- Review the performance action details. Notice the recommendation to upsize the virtual CPU limit from 200 mCores to 500 mCores.
- Note:** Since this is a dynamic system, the metrics displayed on your screen may not necessarily reflect the exact numbers in the screenshot.



Narration

CPU throttling directly impacts the response time of a service and therefore user experience. Turbonomic observes and tracks CPU throttling. In the case of RobotShop, the response time latency of the payment service can adversely impact the ecommerce checkout experience. Given the rate of throttling being observed, Turbonomic recommends increasing the CPU limit from 200 mCores to 500 mCores, thereby reducing the CPU throttling from 19.2% to 3.1%. Proactively alleviating CPU congestion pressures by providing these analytics-driven recommendations helps keep the application in the desired state where it meets its defined service-level objectives (SLOs).

Action 3.1.3

- Click the **X** in the upper right corner to close the **Action Details** page.



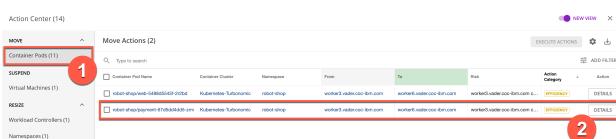
3.2 - Analyze a proactive workload redistribution recommendation

Narration

The underlying cloud native environment to which the RobotShop microservices are deployed is highly dynamic. The initial node to which a pod was placed may not always remain the most optimal place to continue executing this workload. An unhealthy application can cause cascading issues, potentially impacting healthy neighboring pods. Additional node capacity may present alternative optimal placement options that were not available at the time when this pod was initially placed. Continuously and proactively redistributing workloads, in line with shifting load patterns and available capacity, helps assure application performance and infrastructure operational efficiency.

Action 3.2.1

- On the **Action Center** panel, under **MOVE**, select **Container Pods** (1). Then, click **DETAILS** (2) in the **robot-shop/payment** row.



Action 3.2.2

- Review the efficiency action details. Notice the recommendation to relocate the payment pod from where it is currently running on worker node 3 to worker node 6.
- Note:** Since this is a dynamic system, the metrics displayed on your screen may not necessarily reflect the exact numbers in the screenshot.

The screenshot shows the 'Action Details' page for a 'Move Container Pod' action. The top bar indicates '2 of 2'. The main content area displays the following information:

- CONTAINER POD DETAILS:** Name: payment, Workload Controller: payment, Namespace: robot-shop, Consumer Cluster: Kubernetes-Turbonomic.
- INFO:** [Jobs tolerance] NoExecute: node.kubernetes.io/nodename=... [Jobs tolerance] NoSchedule: node.kubernetes.io/nodename=... [Jobs label] stage: prod [Jobs label] pod-template-hash: 67f5dd405
- CONTAINER POD:** robot-shop/payment:67f5dd405:immwep
- CURRENT VIRTUAL MACHINE - IMPACT FROM ALL ACTIONS:** worker.vader.coc.ibm.com
- SMOOTHED VIRTUAL MEMORY:** 19.5 % → 10 % (from 62.9 GB to 62.9 GB)
- SMOOTHED VIRTUAL CPU:** 7.1 % → 10 % (from 39.5 GHz to 39.5 GHz)
- SMOOTHED VIRTUAL MEMORY:** 9.6 % → 5.1 % (from 59.9 GHz to 59.9 GHz)
- SMOOTHED VIRTUAL STORAGE:** 64.5 % → 64.4 % (from 199.5 GB to 199.5 GB)
- DESTINATION VIRTUAL MACHINE - IMPACT FROM ALL ACTIONS:** worker.vader.coc.ibm.com
- SMOOTHED VIRTUAL CPU:** 15.5 % → 20.8 % (from 62.9 GHz to 62.9 GHz)
- SMOOTHED VIRTUAL MEMORY:** 62.9 GB → 62.9 GB

At the bottom, there is a note: "Action can be accepted and executed immediately." A red box highlights the 'SMOOTHED VIRTUAL CPU' section under 'DESTINATION VIRTUAL MACHINE - IMPACT FROM ALL ACTIONS'.

Narration

If the underlying node is getting congested, it will attempt to identify an alternate node with more capacity. If, on the other hand, as is the case here, the underlying node is underutilized, it makes sense to proactively redistribute the workload to other appropriate nodes to improve operational efficiency.

The Turbonomic analysis engine computes the current and possible future state of the cluster if the Move action is accepted for execution. As we can observe here, the migration of workloads from worker node 3 to worker node 6 will result in a marginal increase of virtual CPU utilization from 7.1% to 10% and an increase of virtual memory consumption from 15.5% to 20.8% of worker node 6.

Continuous redistribution of workloads helps better optimize overall cluster resources in terms of performance and cost of ownership.

Action 3.2.3

- Click the X in the upper right corner to close the **Action Details** page.

The screenshot shows the 'Action Details' page for a 'Move Container Pod' action. The top bar indicates '2 of 2'. The main content area displays the following information:

- CONTAINER POD DETAILS:** Name: payment, Workload Controller: payment, Namespace: robot-shop, Consumer Cluster: Kubernetes-Turbonomic.
- INFO:** [Jobs tolerance] NoExecute: node.kubernetes.io/nodename=... [Jobs tolerance] NoSchedule: node.kubernetes.io/nodename=... [Jobs label] stage: prod [Jobs label] pod-template-hash: 67f5dd405
- CONTAINER POD:** robot-shop/payment:67f5dd405:immwep
- CURRENT VIRTUAL MACHINE - IMPACT FROM ALL ACTIONS:** worker.vader.coc.ibm.com

A red box highlights the 'X' button in the top right corner of the browser window.

3.3 - Analyze an intelligent cluster scaling recommendation

Narration

The Turbonomic analysis engine is continuously exploring opportunities to optimize overall cluster efficiency, essentially balancing cluster capacity with workload demand.

Pods consume resources from the underlying nodes on which they are placed. Nodes are represented as virtual machines (VMs) in the supply chain. When pods begin experiencing performance issues due to diminishing resources at the underlying node level, Turbonomic will provide early recommendations to provision additional cluster capacity.

On the other hand, it will seek out opportunities to consolidate workloads on a fewer number of nodes, thereby driving down operational costs.

Action 3.3.1

- On the **Action Center** panel, under **SUSPEND**, select **Virtual Machines** (1). Then, click **DETAILS** (2) in the **worker3.vader.coc-ibm.com** row.

Action Center (11)

SUSPEND

Virtual Machines (1)

1

2

Virtual Machine Name	VCore Capacity	VDPX Capacity	VStorage Capacity	Action Category	Action
worker3.vader.coc-ibm.com	62.8 GB	59.99 GHz	199.47 GB	DIMINISHING	DETAILS

Action 3.3.2

- Review the action details.

Action Details

Suspend Virtual Machine worker3.vader.coc-ibm.com

Improved infrastructure efficiency

VIRTUAL MACHINE DETAILS

CLOUD PROVIDER: Kubernetes Turbonomic

NAME: [idle label] subnamespaces.kubernetes.worker3.vader.coc-ibm.com

NUMBER OF CONSUMERS: 250

STATE: Action acceptance is blocked by policy or system. Acceptance mode is recommended.

RELATED ACTIONS

Actions:

- Suspend Container Pod openlithf/cluster-node-running-operator-huawei-fxr2
- Suspend Container Pod openlithf/image-registrant-node-cx-sj7fb
- Suspend Container Pod instana-agent/instana-agent-4597x
- Suspend Container Pod openlithf/storage-backplane-0000000000000000
- Suspend Container Pod openlithf/etcd/etcd-0000000000000000
- Suspend Container Pod openlithf/machine-config-operator-machine-config-daemon-pdw6
- Suspend Container Pod openlithf/metricsnetwork-metrics-daemon-h5q9
- Suspend Container Pod openlithf/odt0dn3ywg
- Suspend Container Pod openlithf/dnives-default-dlpzf
- Suspend Container Pod openlithf/mutau/mutau-02w2
- Suspend Container Pod openlithf/odt0dn3ywg

Narration

Executing the Suspend action will result in reclaiming and possibly repurposing the compute resources of worker node 3.

These actions enhance overall cluster operational efficiency and naturally yield significant costs savings, while not compromising application performance and availability.

Action 3.3.3

- Click the X in the upper right corner to close the **Action Details** page.

The screenshot shows the 'Action Details' page for a virtual machine named 'worker3.vader.coc-ibm.com'. The top navigation bar includes 'Action Details', 'Suspend Virtual Machine worker3.vader.coc-ibm.com', 'Improve Infrastructure Efficiency', and a red-bordered 'X' button. Below the navigation is a section titled 'VIRTUAL MACHINE DETAILS' with tabs for 'CONTAINERS CLUSTER' and 'Kubernetes Turbines'. The 'CONTAINERS CLUSTER' tab is selected, showing a table with two rows: 'YAML' and 'Logs'. The 'YAML' row contains several Kubernetes labels. At the bottom, there are sections for 'VIRTUAL CPU', 'VIRTUAL MEMORY', and 'NUMBER OF CONSUMERS', with values 59.9 GHz, 62.9 GB, and 250 respectively. The entire page has a light gray background with dark blue header elements.

4 - Automating actions

NOTE: If you want to demonstrate how to create and configure an automation policy, you will need additional credentials. To do so, log out and log back in using the **cocadmin** username. The password remains the same: **CoC#Rulz!**.

4.1 - Automate the execution of actions and eliminate manual intervention

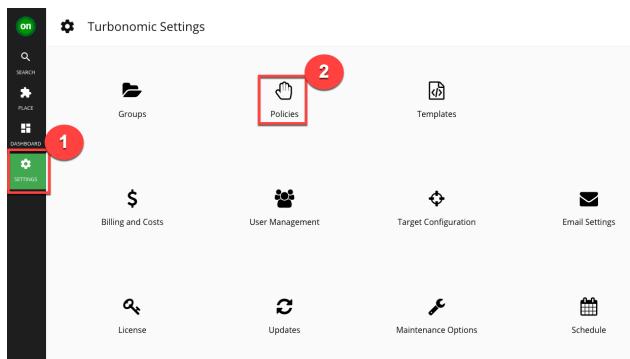
Narration

Though Turbonomic allows you to initiate an action natively from the platform with the click of a button, it is a best practice to automate the execution of these actions.

We will now define a policy that enables you to automate the platform-derived actions without having to jump into multiple tools. This significantly enhances operator productivity.

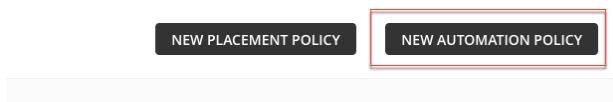
Action 4.1.1

- Click **SETTINGS** (1) and select **Policies** (2).



Action 4.1.2

- Click **NEW AUTOMATION POLICY**.



Action 4.1.3

- Select **Container Pod**.

Select policy type

Application Component

Business Application

Business Transaction

Container

Container Pod

Container Spec

Database Server

Disk Array

Host

Service

Storage

Virtual Machine

Volume

Workload Controller

Action 4.1.4

- Give the policy a custom **NAME**. Then, expand **AUTOMATION AND ORCHESTRATION** (2) and click **ADD ACTION** (3) to define how an action is accepted.

< Configure Container Pod Policy

The screenshot shows the 'Configure Container Pod Policy' interface. Step 1 is the 'NAME' field, which contains 'RobotShop Container Pod Automation Policy'. Step 2 is the 'AUTOMATION AND ORCHESTRATION' section, which is expanded and described as 'Defines how actions are accepted.'. Step 3 is the '+ ADD ACTION' button, which is highlighted with a red circle.

NAME
RobotShop Container Pod Automation Policy

- SCOPE

+ ADD CONTAINER POD GROUPS

+ POLICY SCHEDULE

- AUTOMATION AND ORCHESTRATION

Defines how actions are accepted.

+ ADD ACTION

Action 4.1.5

- Fill out the **Automation and Orchestration** panel:
 - Set the **ACTION TYPE** to **Move** (1).
 - Set **ACTION GENERATION** to **Generate Actions** (2).
 - Set **ACTION ACCEPTANCE** to **Automatic** (3).
- IMPORTANT NOTE:** Do **NOT** click **Submit**, as this is a read-only environment.

Automation and Orchestration

ACTION TYPE Move > Add a tag 1

ACTION GENERATION 2

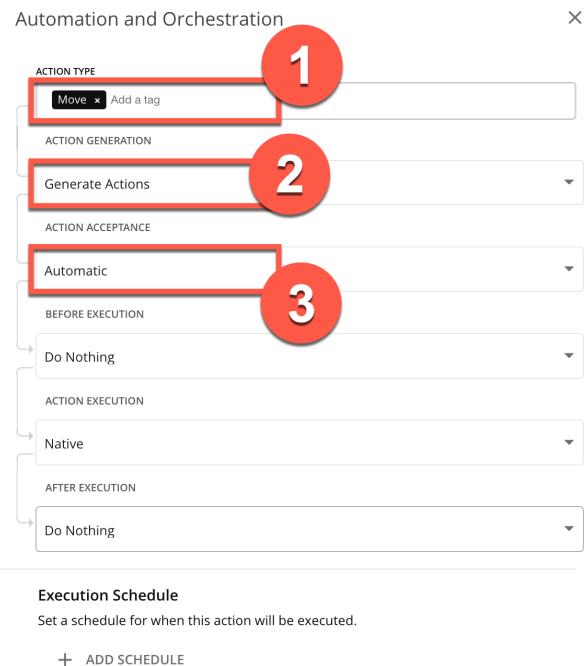
ACTION ACCEPTANCE 3

BEFORE EXECUTION Do Nothing

ACTION EXECUTION Native

AFTER EXECUTION Do Nothing

Execution Schedule
Set a schedule for when this action will be executed.
+ ADD SCHEDULE



Narration

Once the automation policy is saved, it will go into effect. All configured actions will now be executed automatically.

The main benefit and best practice of Turbonomic is to execute the platform-derived actions automatically. The underlying goal is to reduce or remove human intervention and leverage automation to maintain application performance and improve operational efficiency.

Although we have demonstrated how actions can be taken automatically from Turbonomic, it is typical that IT organizations first build a level of trust where actions are initially executed manually by a human operator. And as the organization's level of comfort matures over time, we evolve into a semi-automatic and then a relatively fully automatic mode, where an increasing number of actions is being driven by automation.

Summary

In this demo, we showed how Home Robots Inc. leveraged Turbonomic to assure application performance and improve the operational efficiency of the supporting infrastructure. We demonstrated how Turbonomic can augment the well-known benefits of a container platform to provide additional and high-value capabilities, ranging from full-stack visibility and analytics-driven resource optimization recommendations (e.g., vertical scaling, container right-sizing, and proactive workload redistribution) to intelligent platform-derived automatable actions.