

# Proactive outage avoidance

300-level live demo script



## Introduction

In this demo, I'll show you how Cloud Pak for Watson AIOps helps SREs and IT Ops teams proactively identify, diagnose, and resolve incidents across mission-critical workloads.

You'll see how Watson AIOps:

- Intelligently correlates multiple disparate sources of information, such as logs, metrics, events, tickets, and topology
- Condenses and presents all of this information in actionable alerts instead of large quantities of unrelated alerts
- Resolves problems within seconds to minutes of being notified using Watson AIOps' automation capabilities

We will be using an application called Quote of the Day, which is a content delivery app that serves up random quotations. This will serve as a proxy for any type of application. The application is built on a microservices architecture, and the services are running on Kubernetes.

## 1 - Simulating a failure

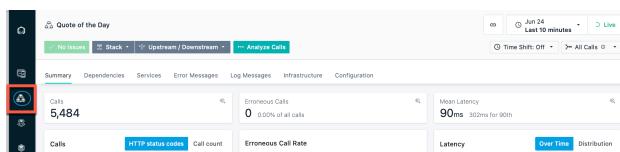
### 1.1 - Review the golden signals of the Quote of the Day (QotD) application

#### Narration

Let's examine the current health of the Quote of the Day application.

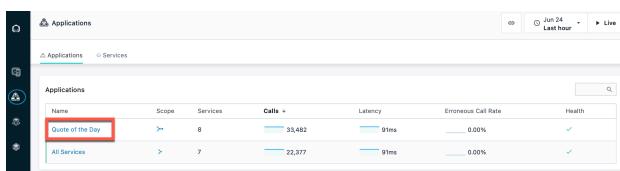
#### Action 1.1.1

- Navigate to **Instana**, and click the **Applications** icon.



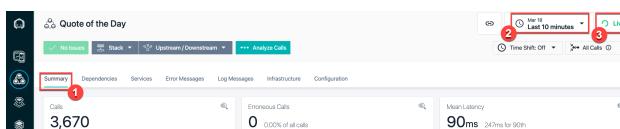
#### Action 1.1.2

- Click the **Quote of the Day** application.



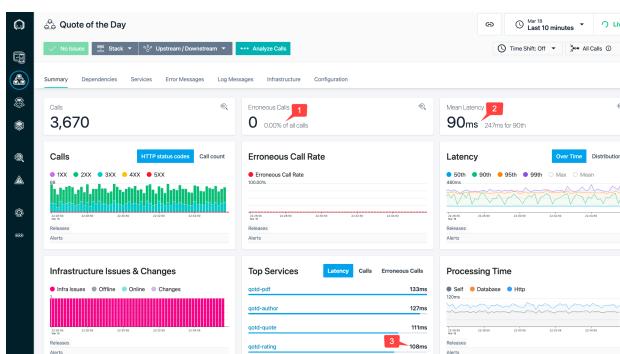
#### Action 1.1.3

- Click the **Summary** tab (1). Set the time period to **Last 10 minutes** (2), and click **Live** (3).



#### Action 1.1.4

- Show the application is healthy by pointing out the erroneous call rate is 0 (1), the mean service latency is 90 ms (2), and the average latency of the Rating (**qotd-rating**) service is 108 ms (3).
- **NOTE:** The numbers on your screen may vary slightly.

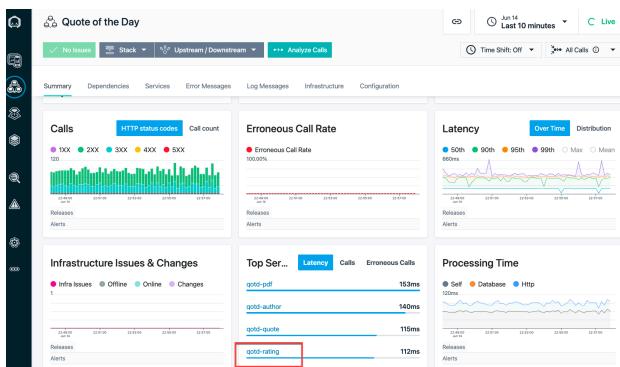


## Narration

Let's take a closer look at the qotd-rating service.

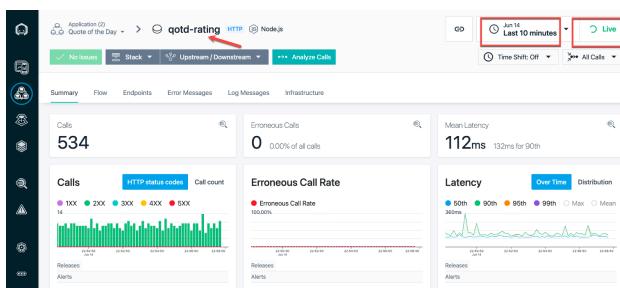
### Action 1.1.5

- Click the **qotd-rating** service.



### Action 1.1.6

- Examine the golden signals of the **qotd-rating** service. Ensure that the time window is set to **Last 10 mins** and that the refresh is set to **Live**.



## Narration

The qotd-rating service is healthy. The erroneous call rate is 0, and the mean service latency is sub-second.

We are now ready to inject a few failures and observe how AIOps detects and helps quickly resolve incidents.

## 1.2 - Navigate to the anomaly generator and inject failures

### Narration

To see how this all works, I'm going to generate a few real failures in our application.

#### Action 1.2.1

- Select the **Quote of the Day Anomaly Generator** tab. Click **Ratings service failures**.

The screenshot shows the 'Quote of the Day App Anomaly Generator' interface. At the top, there is a red button labeled 'Reset All Services to Factory Settings'. Below it, several failure scenarios are listed:

- Image service cert expires, Author service unable to connect to ratings.** The ratings service is unaccessible because cert expired.
- Image service logs indicate certificate is expired. Cascading failures follow.** The certificate for the image service has expired, and there is no replacement available. This triggers a cascading set of failures.
- Elite Team - Image service logs indicate certificate is expired. Cascading failures follow.** The certificate for the image service has expired, and there is no replacement available. This triggers a cascading set of failures.
- Quote, PDF, Web, Rating service cascade failure** This use case simulates a failure beginning in the quote service. Later the failures cascade to pdf, ratings and web services.
- Image and Quote Service Issues** The image and quote services start experiencing cpu and latency issues. New logs start appearing in both.
- Ratings service failures** The rating service experiences major problems across the board (log anomalies, latency, cpu, memory and increase of error status codes). This section is highlighted with a red border.

At the bottom, there is another red button labeled 'Quote and PDF Service Issues'.

### Narration

The anomaly generator web application is designed to simulate a variety of failures.

#### Action 1.2.2

- Click **Start**.

[Home](#) | [Services](#) | [Script Manager](#)

### Quote of the Day App Anomaly Generator Ratings service failures

The screenshot shows the 'Quote of the Day App Anomaly Generator' interface. At the top, there is a red button labeled 'Reset All Services to Factory Settings (i.e. Stop anomalous behavior)'. Below it, a message states: 'The rating service experiences major problems across the board (log anomalies, latency, cpu, memory and increase of error status codes.)'. In the center, there is a large blue button labeled 'Start'.

Below the 'Start' button, there is a table listing three failure types:

Service	Description
ratings	Rating service failing with 500/404 errors half of the time.
ratings	Increase memory usage
ratings	Increase cpu usage

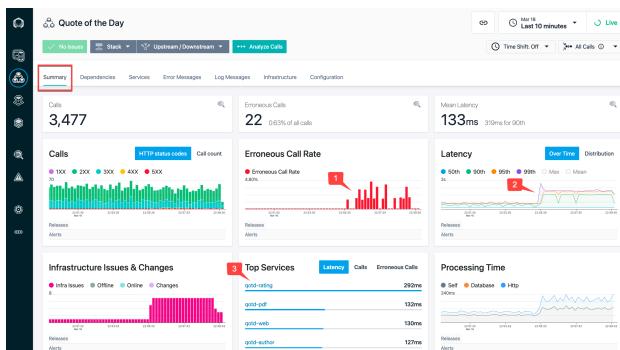
## Narration

The green check marks indicate that the various failures are now underway. The various anomalies represent real-world performance issues that applications typically face, such as high CPU usage, memory leaks, or network congestion.

Now, let's examine the current state of the Quote of the Day application and understand the impact of the failures. Observe the increase in the number of calls, the error rate, latency, and CPU processing time.

### Action 1.2.3

- Navigate back to the **Instana** tab. Click the **Summary** tab and point out the trends in the primary golden signals.
- Point out the increases in both the erroneous call rate (1) and the mean service latency (2). Also, notice that in the Top Services chart, the **qotd-rating** service is now at the top of the list (3).



## Narration

Without Watson AIOps, we would get all sorts of alerts and notifications from multiple sources when a problem occurs.

As we'll see in a moment, with Watson AIOps, all of this information gets correlated and presented in one place. Watson AIOps also includes recommendations for how to resolve the incident. We can take action directly from the notification and resolve the incident quickly.

## 2 - Getting notified of an emerging problem

### 2.1 - AIOps packages the notification along with relevant details as a story

#### Narration

Notifications are now appearing in Slack. We're using Slack in this demo, but Watson AIOps also integrates with Microsoft Teams.

Watson AIOps formats the notifications into a “story” using AI to correlate events, metrics, alerts, and logs. Each story brings together the various notifications for all the affected services by the same underlying issue. Imagine if each piece of data presented in the story was a separate notification – we'd quickly be inundated with alerts.

The story is like a home base for action when a problem arises. Instead of manually correlating things across multiple different tools, it's all right here immediately when the notification is received.

In addition to providing a highly contextualized view of the incident, it enables us to jump to other tools to explore further details. This eliminates tool silos and helps us restore service faster.

#### Action 2.1.1

- Navigate to the tab running **Slack** and examine the incoming story.
- **NOTE:** You may need to wait a few minutes for the Slack messages to appear.

A screenshot of a Slack message from the 'Ezra AIOps' channel. The message displays a summary of a story titled 'Log Anomaly found 11 logs containing errors for component: qtd-rating'. It includes sections for impacted applications, status (Unassigned), creation details (Today 19:47 by IBM Cloud Pak for Watson AIOps), and top alerts. The top alerts section lists three items: 'Log Anomaly found 11 logs containing errors for component: qtd-rating', 'blkio.blk\_read is 7700.4800, which is outside its predominant range of values: 0.0000 to 0.0000', and 'blkio.blk\_read is 163.8400, which is outside its predominant range of values: 0.0000 to 0.0000'. A 'Show more' button is visible at the bottom.

Ezra AIOps APP 19:47  
Priority 1

This is a summary of your story details.

**Story title:**  
Log Anomaly found 11 logs containing errors for component: qtd-rating

**Impacted applications (1):**  
Quote of the Day

**Status:**  
Unassigned

**Created:**  
Today 19:47  
by IBM Cloud Pak for Watson AIOps

**Top Alerts**  
We've identified the top 3 alerts for this story by severity then first occurrence.

- Log Anomaly found 11 logs containing errors for component: qtd-rating
- blkio.blk\_read is 7700.4800, which is outside its predominant range of values: 0.0000 to 0.0000
- blkio.blk\_read is 163.8400, which is outside its predominant range of values: 0.0000 to 0.0000

+Show more

## **Narration**

This story is telling us there's an emerging problem with the Rating service, which is one of the microservices in our Quote of the Day application.

In the background, the AI and ML algorithms of Watson AIOps have done the work for us. It shows which services are affected and presents us with a curated view of relevant information: the events and alerts that are indicative of the symptoms of this problem, anomalies that Watson AIOps has found in the log files, and similar incidents that have occurred in the past. This way, we can see how they were successfully resolved. We'll explore each of these components in more detail.

## 3 - Determining which services caused the problem

### 3.1 - Analyze the story

#### Narration

Based on its intelligent correlation of logs, metrics, and traces, Watson AIOps derives probable causes of the failure.

As we can see in the ChatOps notification here, there is a high-priority issue emerging in the QotD application.

Watson AIOps presents a list of top three probable causes of this incident: a log anomaly in the qotd-rating service, an excessive CPU usage condition, and increasing service call response times.

As more information comes in, Watson AIOps correlates related events and updates the existing story in real time.

Let's dive deeper into the story to examine the supporting details.

#### Action 3.1.1

- Click **Show more**.

 **Boba** APP 20:28  
🔥 Priority 1

This is a summary of your story details.

**Story title:**  
 Abnormal behavior in the logs for component: qotd-rating. Evidence includes: embeddings (statistical baseline), error entities, patterns + embeddings (natural language)

**Impacted applications (1):**  
 Quote of the Day

**Status:**  
Unassigned

**Created:**  
Today 20:28  
by IBM Cloud Pak for Watson AIOps

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 **Probable cause**

We've identified the top 3 probable cause alerts for this story.

-  node - Excessive CPU usage
-  qotd-rating (qotd/qotd-rating-94b45546-vxr27) - User memory usage high
-  cpu.user\_usage is Higher than expected. Actual: 0.0330 Expected: 0.0051

[+Show more](#)

## Narration

Let's unpack the details behind the developing story. We need to find out where the issue began, so we can prevent it from causing cascading failures across the components of the application.

Instead of having to hop between tools to look for alerts, we can see them right here from the notification. Watson AIOps has determined that these events are related, and it provides an explanation for how it determined the relationships. We can see that there are two groups of events based on related resources and the timing of the events.

### Action 3.1.2

- Click **View alerts** to examine the details behind these alerts.

!! Alerts

We found 12 alerts associated with this story.

 [View in Alert Viewer](#)

Critical alerts:	Major alerts:
6	2
Minor alerts:	Warning alerts:
4	0
Information alerts:	Indeterminate alerts:
0	0

Click "View alerts" to review details, confirm relevance, or view template logs.

 [View alerts](#)

## Narration

We can inspect the grouped events right here without searching for them in another tool.

It looks like the memory and CPU on the Rating service increased significantly. This is causing a significant slowdown in the response times on both the Rating and Web services.

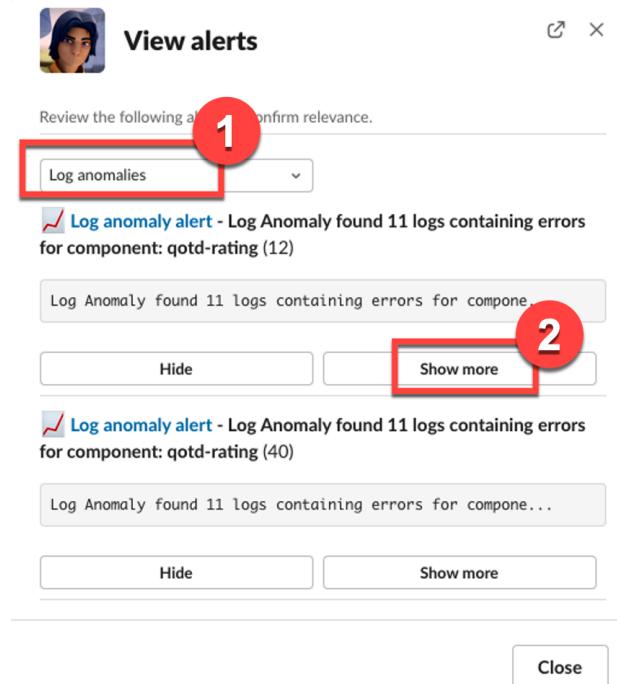
Based on this information, it seems that the Rating service is the source of the issue. Let's get a bit more detail – this time from the log files.

Instead of needing to go to Kibana and manually sort through the hundreds or thousands of log entries that come in every minute, Watson AIOps has found several anomalies in the log files and presented them here.

During normal operations, Watson AIOps continually trains on the log files of the application and monitors for deviations from that baseline. We can see that the anomalies are occurring on the Rating service, which fits with what we saw in the alerts.

### Action 3.1.3

- In the **View alerts** pop-up window, select **Log anomalies** (1) and then **Show more** (2).



### Narration

Watson AIOps gives us additional context on the anomaly. In this case, the 'error\_log' anomaly is telling us that Watson AIOps has never seen this type of log entry before (hence the 'unknown') and that the log message indicates there is some type of error. Watson AIOps is not only looking at the statistical frequency of the type of log, but it is also using Natural Language Processing (NLP) to analyze the content of the log message to give additional context (in this case that there's likely an error).

Watson AIOps also explains why the anomaly was flagged. It expected to see zero of this type of log, but it actually saw four.

Now we know that there is an unfamiliar log coming from the Rating service, and it's indicating an error.

This further reinforces what we saw with the alerts - it looks like the Rating service is likely the root cause of this problem.

#### Action 3.1.4

- Click **Preview Logs of Pattern 1**.
- **NOTE:** Pattern 1 displays 'Unknown pattern. Error message in the pattern.'

The screenshot shows a 'View alerts' window with the following details:

- Alert Summary:** 3 Log anomaly alert - Abnormal behavior in the logs for component: qotd-rating. Evidence includes: embeddings (statistical baseline), error entities, patterns + embeddings ... (83)
- Ranking:** 3
- Severity:** Major
- Status:** Open | Today 20:41
- Resource:** qotd-rating
- First occurrence:** Today 20:27
- Last occurrence:** Today 20:41
- Source:** Log Anomaly

3 anomalous log message pattern(s) were detected. Showing top 3.

Buttons: Attach log message patterns, Preview Logs (highlighted with a red box), Close.

#### Action 3.1.5

- Click **Back** in the **Log Preview** window.

The screenshot shows a 'Log Preview' window with the following details:

Template: Unknown pattern. Error message in the pattern

```
ERROR - unknown code et found in bucket.  
Unexpected internal error: Bobo is having a moment.  
ERROR - unknown code quidem found in bucket.  
ERROR - unknown ip 247.255.165.151 request.
```

Buttons: Back (highlighted with a red box).

### Action 3.1.6

- In the **View alerts** pop-up window, select **Alerts** from the drop-down menu options.
- NOTE:** You may need to wait a few minutes for **Alerts** to appear.

The screenshot shows a 'View alerts' window with a title bar featuring a Boba Fett icon and the text 'View alerts'. Below the title bar is a message: 'Review the following alerts to confirm relevance.' There are two dropdown menus: 'Alerts' (which is highlighted with a red box) and 'Ranking'. The main content area displays three alerts:

- 1** ● ⚡ Alert - node - Excessive CPU usage (48)  
node - Excessive CPU usage  
Hide Show more
- 2** ● ⚡ Alert - qotd-rating (qotd/qotd-rating-94b45546-vxr27) - User memory usage high (48)  
qotd-rating (qotd/qotd-rating-94b45546-vxr27) - User memory usage high  
Hide Show more
- 2** ◆ Alert - memory.used\_percentage is 0.1163, which is outside its predominant range of values: 0.0479 to 0.0584 (4)

Close

### Action 3.1.7

- Click **Show more** under the first alert.

The screenshot shows the same 'View alerts' window as the previous one, but the 'Show more' button for the first alert is highlighted with a red box. The alert details are identical to the ones in the previous screenshot.

## Narration

Watson AIOps has detected that the qotd-rating service is consuming an excessive amount of CPU and memory resources.

Under the covers, Watson AIOps is comparing the CPU and memory utilization to the known and learned behaviors of the application. Since it is seemingly straying from the expected behavior, Watson AIOps is flagging the anomaly and correlating it to the current story.

## Action 3.1.8

- Click **Close** to exit the **View alerts** pop-up window.

The screenshot shows a 'View alerts' window with a title bar featuring a Boba Fett icon and the text 'View alerts'. Below the title bar are two dropdown menus: 'Alerts' and 'Ranking'. The main content area displays three alerts:

- 1** ⚡ Alert - node - Excessive CPU usage (48)  
node - Excessive CPU usage  
[Hide] [Show more]
- 2** ⚡ Alert - qotd-rating (qotd/qotd-rating-94b45546-vxr27) - User memory usage high (48)  
qotd-rating (qotd/qotd-rating-94b45546-vxr27) - User memory usage high  
[Hide] [Show more]
- 2** ⚠ Alert - memory.used\_percentage is 0.1163, which is outside its predominant range of values: 0.0479 to 0.0584 (4)

A red box highlights the 'Close' button at the bottom center of the window.

## Narration

We have reviewed the log and metric anomalies that have been correlated as part of this story by Watson AIOps.

Now that we have a high-level understanding of the emerging incident and the probable causes, we need to focus on resolving the issue as quickly as possible.

### Action 3.1.9

- Click the **Abnormal behavior in the logs for component: qotd-rating. Evidence includes: embeddings (statistical baseline), error entities, patterns + embeddings (natural language)** story title to navigate to the Watson AIOps console.

 **Boba** APP 20:28  
 **Priority 1**

This is an overview of your story details.

<b>Story title:</b>  Abnormal behavior in the logs for component: qotd-rating. Evidence includes: embeddings (statistical baseline), error entities, patterns + embeddings (natural language)	<b>Story:</b> bahz-awfb
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**Impacted applications (1):**  
 [Quote of the Day](#)

<b>Status:</b> Unassigned	<b>Priority:</b> 1
<b>Owner:</b> Unassigned	<b>User group:</b> Unassigned

**Created:**  
Today 20:28  
by IBM Cloud Pak for Watson AIOps

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 **Story resources**  
We've created a topological view of the resources affected by this story.  
[View story resource topology](#)

<b>Created:</b> Today 20:28	<b>Updated:</b> Today 20:42
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 **Probable cause**  
We've identified the top 3 probable cause alerts for this story.

 <b>node - Excessive CPU usage</b>	<b>Ranking:</b>	<b>First occurrence:</b>
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## 4 - Fixing the problem and restoring the service

### 4.1 - Take ownership of the incident

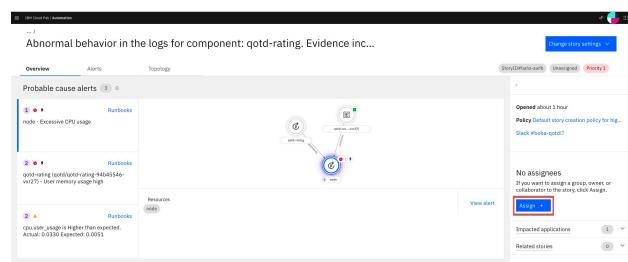
#### Narration

The Watson AIOps console enables us to get to the details underlying the story. It allows us to examine the specific alerts and understand the topological relationships between the impacted application components. It also helps accelerate incident resolution by recommending specific runbooks that could potentially resolve the current incident.

Before we progress with the incident resolution process, it is important to take ownership of the story. This ensures accountability and enables the collaboration and communication necessary to accelerate the resolution of the incident.

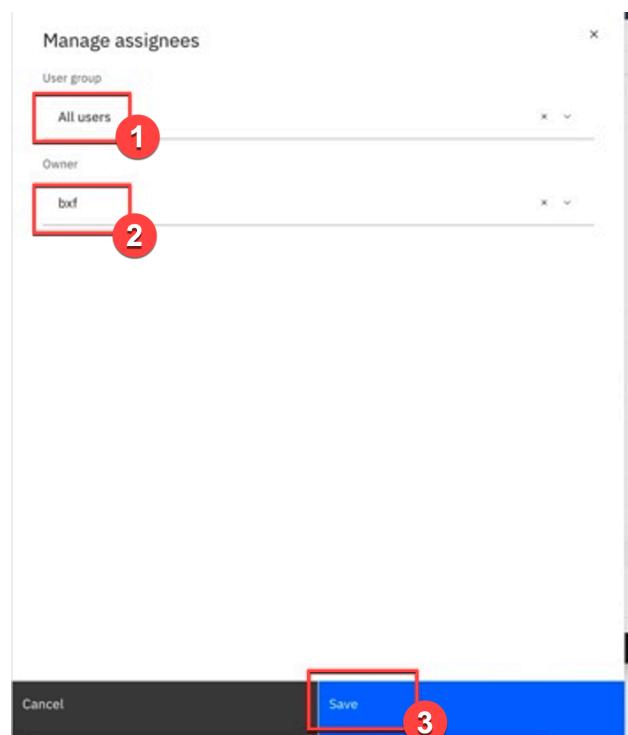
#### Action 4.1.1

- To take ownership of the incident, click **Assign**.



#### Action 4.1.2

- Set the **User group** to **All users** (1), and set the **Owner** to your CoC ID (2). Click **Save** (3).



### Action 4.1.3

- Validate that you are now the owner of the incident.

### Narration

Let's proceed to fix the problem and restore the service.

Now that we have a high-level understanding of the incident, let's take a quick look at the topology of the application to understand which components are impacted and their relationships with other services in the application. The component dependencies will help us better understand and assess the potential impact of cascading failures.

### Action 4.1.4

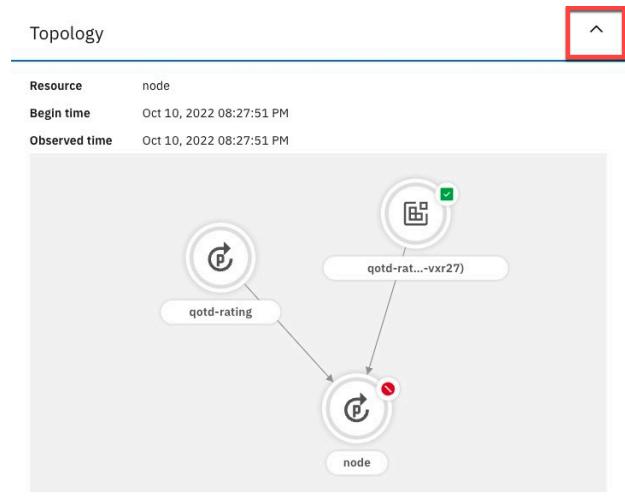
- In the **Alerts** tab, select the first alert in the list that confirms a critical alert in the **qotd-rating** service.
- NOTE:** Make sure to pick the first alert that is **NOT** in the **Closed** state.

The screenshot shows the 'Alerts' tab of a monitoring interface. A message at the top states: 'Abnormal behavior in the logs for component: qotd-rating. Evidence incl...'. Below is a table titled 'Se-Stat Ranking Summary' with columns: Type, Sender, Resource, First occurrence, Last occurrence, Runset, Topology, and Trigger alert. The first row, which corresponds to the highlighted alert, has a red border around it. The alert details are as follows:

Type	Sender	Resource	First occurrence	Last occurrence	Runset	Topology	Trigger alert
Info	System Health	qotd-rating	2022-08-10T08:27:51Z	2022-08-10T08:27:51Z	1	•	•

### Action 4.1.5

- Expand **Topology** by clicking the arrow.

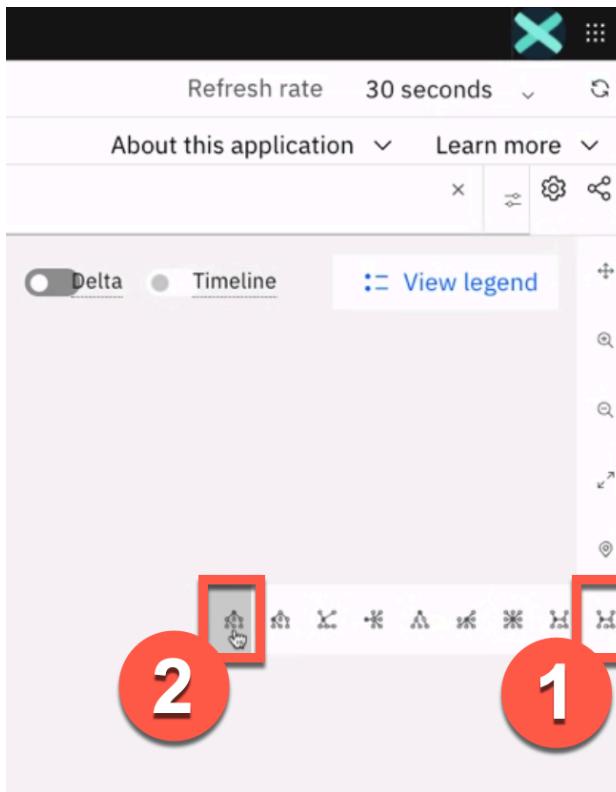


### Narration

Resources are related to each other, and these relationships are represented in the graph as a typed arc.

### Action 4.1.6

- Click the **Hierarchy** icon (1), located on the right side, to change the topology orientation to an **Inverted tree** (2).



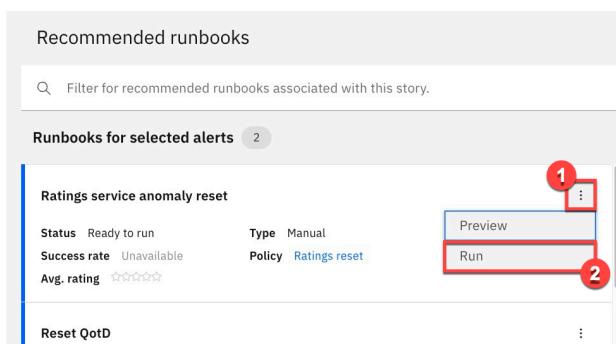
### Narration

These discovered topological relationships are used when grouping alerts. If two resources are directly or closely related and they are exhibiting an alert, they get grouped together in the same story.

The qotd-rating service is implemented with two pods. Therefore, there are two separate resources for pods, containers, processes and Node.js runtimes.

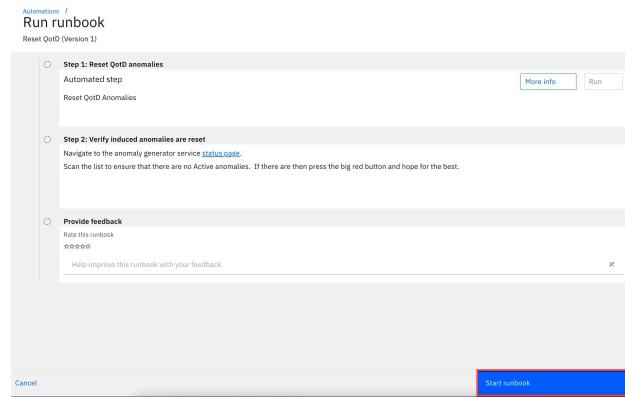
### Action 4.1.7

- Navigate back to the **Overview** tab to execute the recommended runbook. In the **Recommended runbooks** section, click the **pop-up menu** (1) and then **Run** (2).



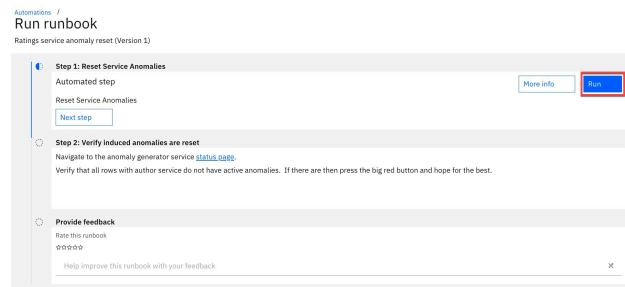
## Action 4.1.8

- Click **Start runbook**.



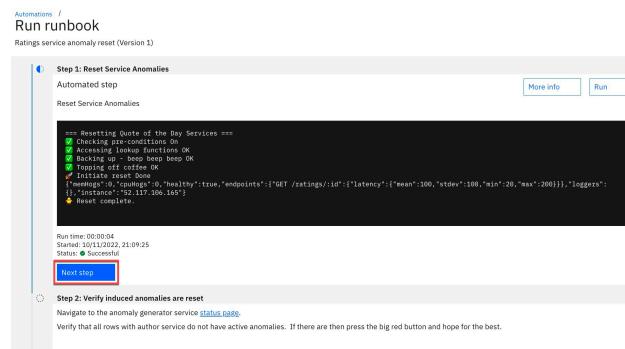
## Action 4.1.9

- Click **Run** to start the execution of the runbook.



## Action 4.1.10

- Click **Next Step**.

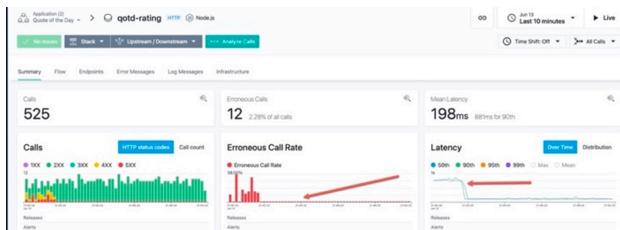


## Narration

Before we mark the runbook as complete, let's confirm that the erroneous call rate is decreasing and that the service latency is improving.

### Action 4.1.11

- Navigate to the **Instana** tab. Validate that there are improvements in the erroneous call rate and latency.

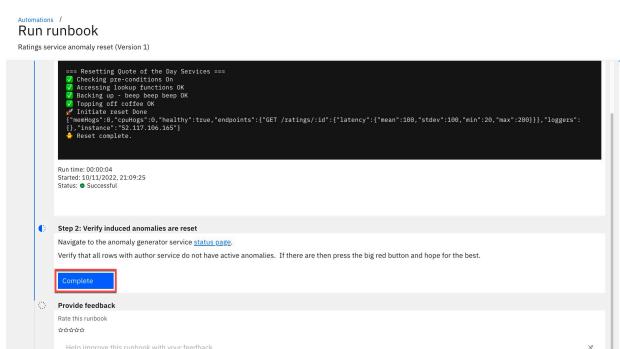


### Narration

Over time, the golden signals of the qtd-rating service will indicate a 100% success rate and a sub-second service latency.

### Action 4.1.12

- Click **Complete** to mark the successful execution of the runbook.



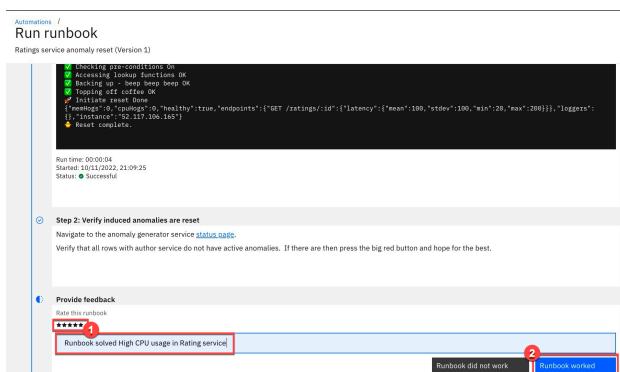
### Narration

We can rate the runbook to document the fact that it was successful. This will be helpful for the next person who uses the runbook, as well as for providing feedback to the author of the runbook.

This enables a collaborative approach to organically improve incident resolution over time.

### Action 4.1.13

- Provide feedback and rate the runbook (1). Then, click **Runbook worked** (2).



## 5 - Closing the incident

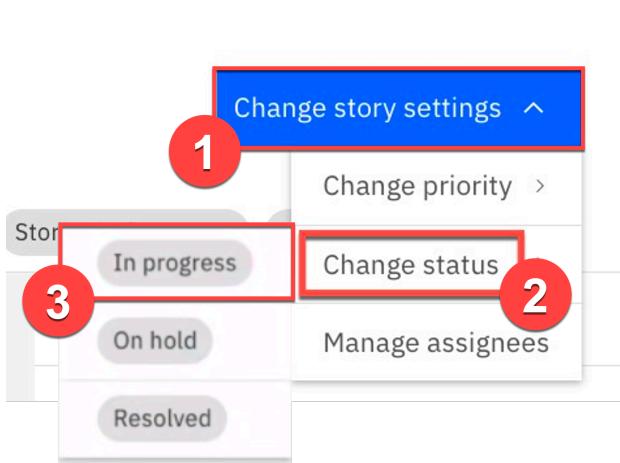
### 5.1 - Mark the story as resolved

#### Narration

Now that the incident is resolved and the service is restored, let's update the status of the incident.

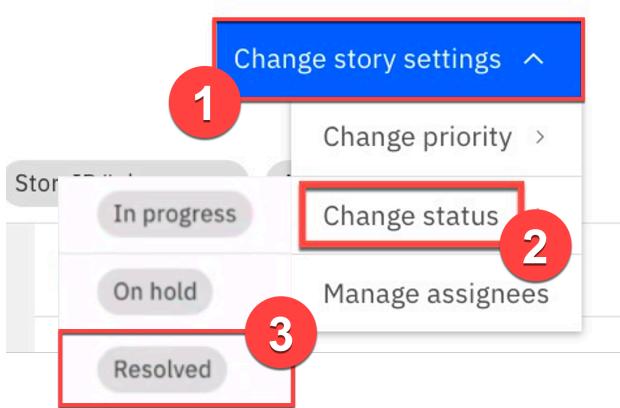
#### Action 5.1.1

- Expand **Change story settings** (1) and click **Change status** (2). Mark the status of the incident as **In progress** (3).



#### Action 5.1.2

- Expand **Change story settings** (1) and click **Change status** (2). Mark the status of the incident as **Resolved** (3).



## Narration

Watson AIOps will mark the incident as resolved and then change the status to ‘Closed’ automatically.

After Watson AIOps has marked the incident as ‘Closed,’ let’s navigate to Slack to communicate the successful resolution of this incident to the broader team.

### Action 5.1.3

- Navigate to **Slack**.

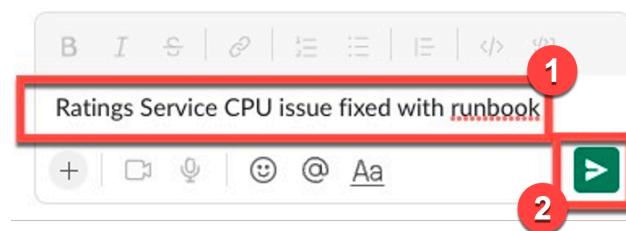
## Narration

Watson AIOps adds a reply to the relevant Slack thread, indicating the formal closure of the story.

### Action 5.1.4

- Optionally add any relevant comments to communicate with the broader team regarding this incident (1). Then, click the green **Send** icon (2).

 Story was automatically closed, no further updates can be made.



## Summary

In this demo, we have demonstrated how Watson AIOps enables you to avoid business-impacting outages by applying AI to data gathered from your existing disparate tools. It helps you quickly determine the probable causes of a failure and proactively alleviate outages, therefore minimizing the business impact of these IT issues on revenue or client experiences.

The anomaly detection capabilities alert you early to potential issues, enabling the SREs to quickly take remedial actions. The intelligent event analytics examine logs, metrics, tickets, and topology and provide a useful correlation that would otherwise be very challenging. Lastly, the AI-driven remediation accelerates problem resolution and significantly reduces the mean time to repair.

Thank you for attending today’s presentation.