

Technical Validation

Optimizing Hybrid Cloud Visibility with Oracle Cloud Observability and Management Platform

Unified Management for Oracle Cloud Infrastructure, Multi-cloud, and On-premises Environments

By Alex Arcilla, Validation Analyst

April 2021

This ESG Technical Validation was commissioned by Oracle and is distributed under license from ESG.



Contents

- Introduction 3
 - Background 3
 - Oracle Cloud Observability and Management Platform 4
- ESG Technical Validation..... 5
 - Identifying Root Causes of IT Issues with Logging and Logging Analytics..... 5
 - Troubleshooting IT Performance Issues with Application Performance Monitoring, Database Management, and Operations Insights Services 9
 - Sharing Data with Third-party Tools Using Service Connector Hub 11
 - Achieving Overall Costs Savings in IT Observability and Management 12
 - A Note on Oracle’s Competitive Strengths 13
- The Bigger Truth..... 15

ESG Technical Validations

The goal of ESG Technical Validations is to educate IT professionals about information technology solutions for companies of all types and sizes. ESG Technical Validations are not meant to replace the evaluation process that should be conducted before making purchasing decisions, but rather to provide insight into these emerging technologies. Our objectives are to explore some of the more valuable features and functions of IT solutions, show how they can be used to solve real customer problems, and identify any areas needing improvement. The ESG Validation Team’s expert third-party perspective is based on our own hands-on testing as well as on interviews with customers who use these products in production environments.

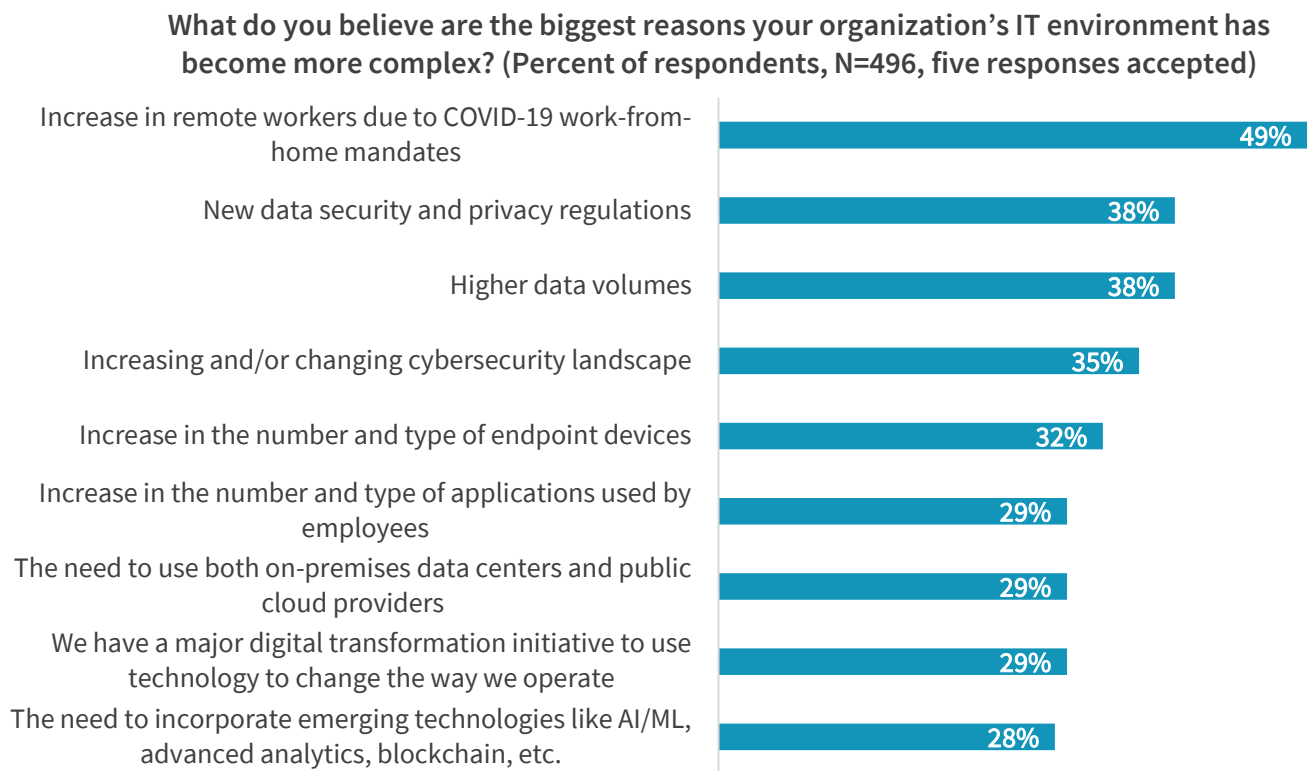
Introduction

This ESG Technical Validation documents testing of the Oracle Cloud Observability and Management Platform, with a goal of assessing its capabilities for applications deployed on-premises or in the cloud. Testing focused on the new services integrated into the existing platform and how the combination of such services simplifies the identification and resolution of IT-related issues.

Background

As organizations continue to upgrade and augment their IT infrastructures to support mission-critical workloads, they find that they have become more complex to manage and operate. In fact, ESG research has found that 75% of organizations view their IT environments as more or significantly more complex than two years ago, up from 64% when the same question was asked in 2020.¹ Amongst the top reasons that IT environments have become more complex are an increase in the number and types of applications used (29%), the need to use both on-premises data centers and public cloud providers (29%), and the need to incorporate emerging technologies like modern architectures that support containers (28%) (See Figure 1).²

Figure 1. Top Reasons for Increased Complexity in IT Environments



Source: Enterprise Strategy Group

Increasingly complex IT environments challenge organizations to maintain comprehensive end-to-end visibility, particularly in hybrid cloud environments. Organizations typically settle for multiple point tools that provide monitoring into specific parts of their IT environment, yet the tools, and the corresponding data collected, remain in separate silos and thus cannot provide insights into issues crossing multiple areas or provide a unified view. Further exacerbating the problem, current tools are limited to monitoring either an on-premises or cloud environments. Organizations typically settle for manually

¹ Source: ESG Research Report, [2021 Technology Spending Intentions Survey](#), January 2021.

² Ibid.

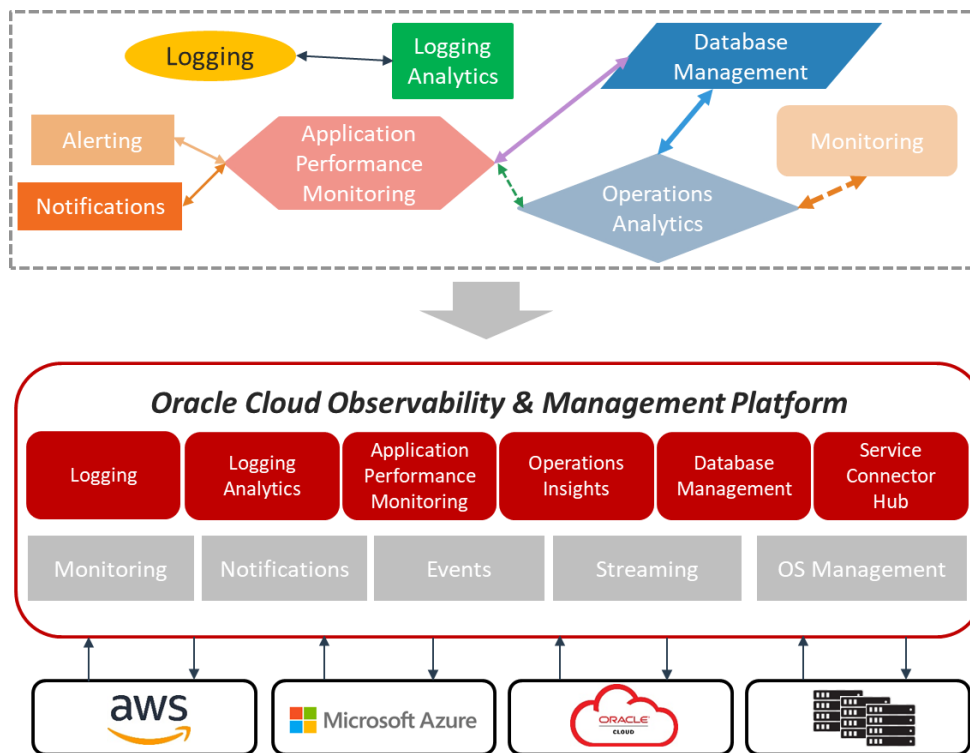
integrating tools in-house, consuming time and resources that otherwise could be spent actually monitoring their IT environments. Lacking such an integrated view across on-premises and cloud environments results in inefficient detection and resolution of issues that affect IT performance and availability.

Oracle Cloud Observability and Management Platform

The Oracle Cloud Observability and Management Platform helps organizations by providing a full-stack view of their IT estate with tools to address a wide range of IT issues affecting performance and availability at the application, database, and infrastructure layers. The platform provides end-to-end visibility of an IT environment deployed on any combination of Oracle Cloud Infrastructure (OCI), third-party clouds, and on-premises data centers. Unlike point products from multiple vendors designed to address specific problems within different layers of an IT environment, Oracle’s platform integrates multiple capabilities to provide a holistic view of overall IT performance and availability.

Along with its existing services—monitoring, notifications, events, and operating system (OS) management—the Oracle Cloud Observability and Management Platform has been expanded to include six new services (See Figure 2):

Figure 2. Oracle Cloud Observability and Management Platform



Source: Enterprise Strategy Group

- **Logging:** Ingests and manages multiple log types—audit, infrastructure, database, and application—from a centralized interface so that organizations can begin to diagnose issues.
- **Logging Analytics:** Provides advanced capabilities for fast problem detection and resolution for all log data from customers’ on-premises and multi-cloud environments. As a result, data silos no longer exist (as with using multiple point tools) to complicate issue analysis and delay resolution. With integrated machine learning, Logging Analytics can also predict and forecast anomalies in the IT environment with the integrated data.

- **Application Performance Monitoring:** Facilitates end-to-end visibility with out-of-the-box cross-tier views from a single interface. The platform ties in users' experience at the application (traditional and cloud-native) level with the underlying databases and infrastructure to pinpoint where issues are occurring for faster diagnosis and resolution.
- **Operations Insights:** Analyzes performance patterns over time in order to optimize utilization and overall IT performance.
- **Database Management:** Monitors and manages the entire lifecycle of database fleets from a unified console for on-premises and cloud databases, offering a broad range of features from deep performance diagnostics and tuning to security and compliance, thereby maximizing database performance and availability.
- **Service Connector Hub:** Facilitates sharing of data between OCI services and third-party tools, and monitors data movements.
- Previously announced services in this category:
 - Monitoring.
 - Notifications.
 - OS Management.

Oracle's platform also enables visibility within IT environments built on numerous technology stacks, including containers (Docker and Kubernetes), cloud-native microservices, infrastructure-as-code, and Oracle-based technologies. The breadth and depth of visibility provided by the Oracle Cloud Observability and Management Platform can decrease overall troubleshooting time without the need to access and coordinate findings from multiple interfaces.

Oracle has also developed a partner ecosystem so that organizations can integrate tools already used in their IT environments with the Oracle Cloud Observability and Management Platform. Customers can benefit from out-of-the box integrations with partner tools such as Grafana, PagerDuty, Slack, and Twilio (for dashboards and event notifications), as well as the Cloud Native Computing Foundation (CNCF), an open source software foundation focused on container technology and related tools. CNCF projects in the partner ecosystem include CloudEvents, Fluentd, and OpenTracing.

ESG Technical Validation

ESG performed evaluation and testing of the Oracle Cloud Observability and Management Platform using a remote test bed located in Redwood City, CA. Testing was designed to demonstrate how the platform can help organizations to identify the root cause of network issues with Logging and Logging Analytics services; troubleshoot a multi-tier application performance issue with a combination of application performance monitoring, database management, and operations insights services; and extract additional value from Oracle's platform via integration of third-party and open source tools.

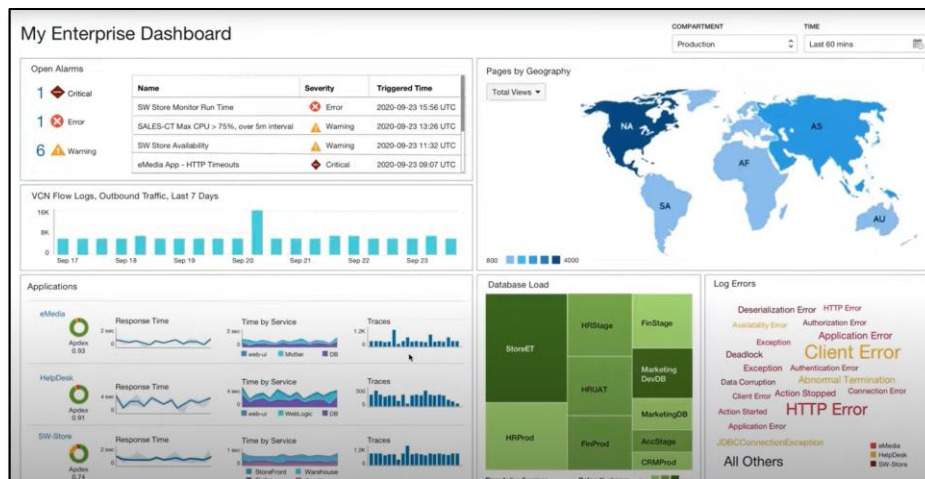
Identifying Root Causes of IT Issues with Logging and Logging Analytics

With the Logging and Logging Analytics services of the Oracle Cloud Observability and Management Platform, organizations can search through and analyze log data across multiple tiers within the IT environment via a single interface. Service Connector Hub facilitates movement of logs from a variety of sources to Logging and Logging Analytics services. Instead of collecting, integrating, and analyzing data from separate point tools, tasks for identifying the root cause can be completed in a logical and organized fashion to minimize mean time to innocence (MTTI) and mean time to repair (MTTR).

ESG Testing

ESG began by navigating to the Enterprise dashboard that provides a single pane for viewing the most critical information about the enterprise’s applications, workloads, and errors encountered (See Figure 3). We observed the listing of current open alarms and clicked on the one labeled “Critical” and named “eMedia App - HTTP timeouts” (See Figure 3). We were automatically redirected to the **Logging Search** page of the platform’s **Logging Service** with the appropriate fields prepopulated to identify exactly what caused the alarm. We learned that the “Critical” alarm was raised due to a request timeout (or HTTP 408) error. Clicking on the issue description brought up JSON code revealing error details, including the front-end host where the request originated, request IP address, latency (in milliseconds), and the generated error message.

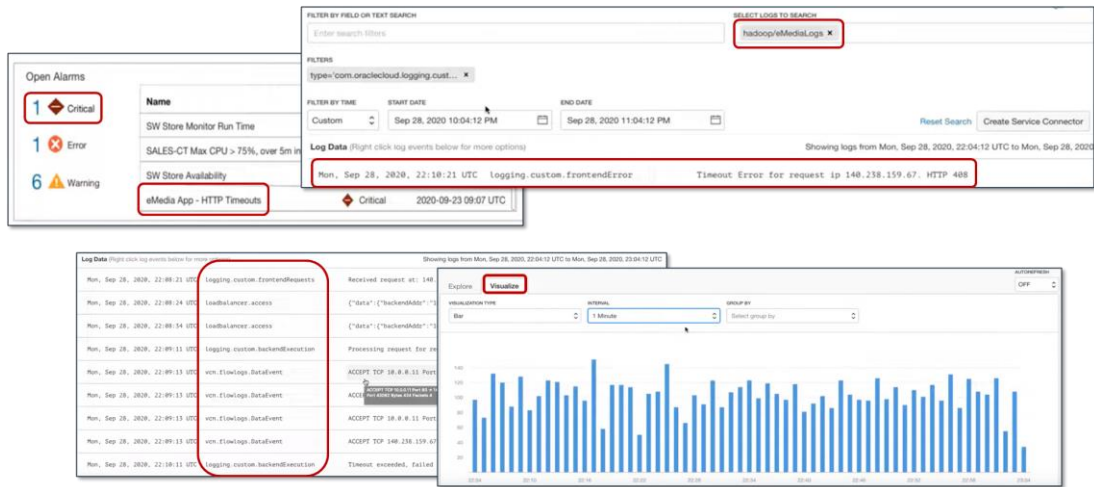
Figure 3. Oracle Cloud Observability and Management Platform Enterprise Dashboard



To further pinpoint how the error arose, ESG brought up log data to trace exactly how the original request was processed throughout all architecture tiers (from the front-end server, through load balancers and the network, to the back-end server). In the log data displayed in Figure 4, we observed unusual network traffic going through the front-end application, denoted by “vcn-flowlogs.DataEvent.”³

³ An Oracle virtual cloud network (VCN) flow log retains detailed metadata records of a network traffic flow passing through a VCN and presents this data for analysis in the Oracle Observability and Management Platform Logging service. Metadata includes source and destination of the traffic, traffic volume, and the accept or reject policy action taken, based on network security rules

Figure 4. Tracing Where ‘Critical’ Alarm was Triggered with Logging Search Page



ESG proceeded to investigate the prevalence of the unusual network traffic by generating another search on the **Logging Search** screen filtering on “vcn-flowlogs.DataEvent.” After we clicked on the **Visualize** tab, the search generated a bar chart illustrating an aggregated count of all inbound and outbound requests across this network (See Figure 4). Because the bar chart revealed that network traffic was abnormally high, we proceeded to investigate if this was the issue’s root cause.

ESG then navigated to the **Logging Analytics** service to analyze all VCN flow logs. With the built-in machine learning capabilities and visualizations, we explored one-time network anomalies among the log data and prompted the platform to create a cluster chart (See Figure 5). Each bubble in the chart represents the total bytes transferred from specific sources. Each line item listed below the chart aggregates key details of individual network traffic flow logs into one place, such as source and destination IP address, traffic type, and total bytes transferred.

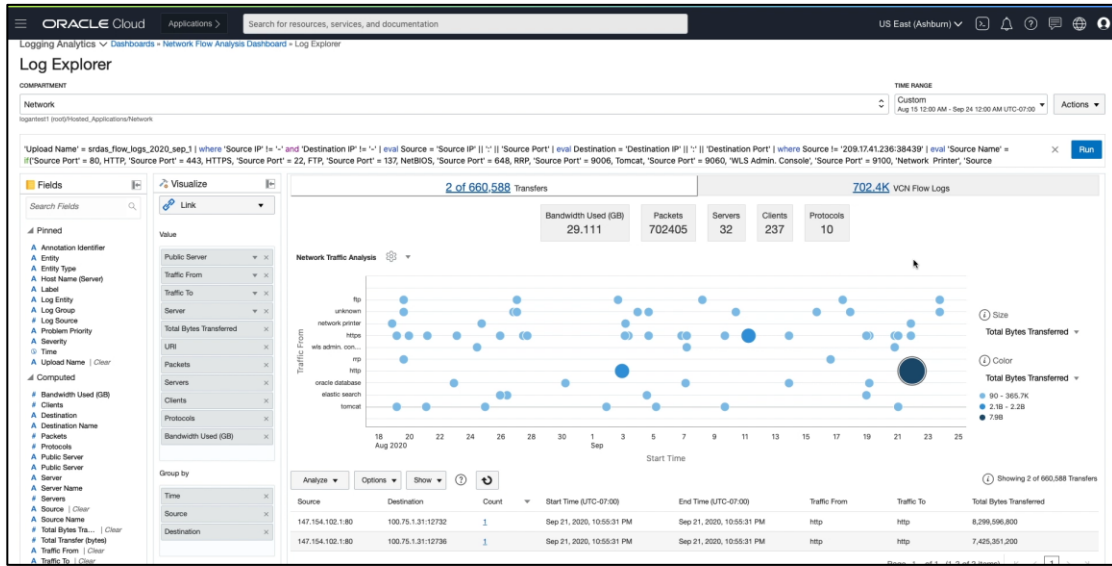
To narrow our search from the hundreds of thousands of logs listed, ESG focused on viewing those logs associated with larger numbers of bytes transferred and uncovered one bubble fitting that criteria. Hovering the mouse over the single bubble revealed that large data transfers associated with an MP4 file from a web server named “collabserver1” was the root cause of the timeout error initially identified.

Figure 5. Determining Root Cause of ‘Critical’ Alarm Via Logging Analytics



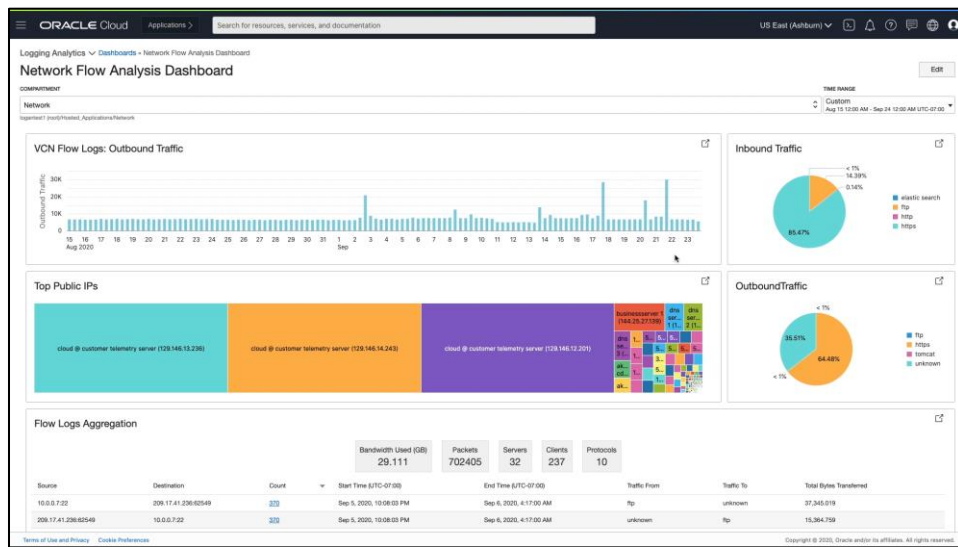
The chart was followed by a detailed report for each source-destination server combination covering the number of connections and network communication details needed to take action (See Figure 6).

Figure 6. Interactive Drill-Down and Detailed Reporting in Logging Analytics



In order to prevent such incidents from happening in the future ESG then created a Network Flow Analysis dashboard in Logging Analytics. It provides all of the information about health and performance of the entire network in a single view (See Figure 7).

Figure 7. Network Monitoring Dashboard Created in Logging Analytics



Why This Matters

Aggregating, tracing, and analyzing log data is a challenging exercise when determining the root cause of an IT issue. This is especially true when the nature and location of the root cause cannot be easily identified. While multiple log data types—audit, infrastructure, database, and application—can be collected and analyzed individually, stitching the data together to gain a comprehensive and logical view of why the issue has occurred is difficult when such data exists in varied silos. MTTI and MTRR subsequently increase, ultimately preventing organizations from achieving business objectives.

ESG validated that the Oracle Cloud Observability and Management Platform integrated all log data from different architecture tiers and associated the relevant logs for a given issue alarm from one interface. By eliminating data silos, IT administrators can understand the complexity of an issue quickly and leverage the built-in machine learning and visualizations to examine possible root causes.

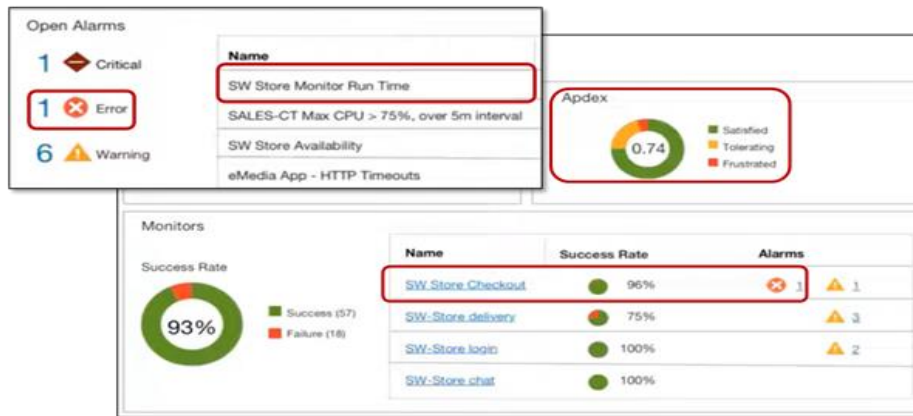
Troubleshooting IT Performance Issues with Application Performance Monitoring, Database Management, and Operations Insights Services

The combination of the Application Performance Monitoring, Database Management, and Operations Insights services of the Oracle Cloud Observability and Management Platform can ease the task of resolving application performance issues, especially when those issues do not lie within the application itself. Instead of accessing multiple point tools and manually correlating data to detect and diagnose the problem, Oracle’s integrated services speed up MTTR, decreasing the impact such issues can have on business operations.

ESG Testing

ESG navigated back to our dashboard and focused on the alarm labeled “Software Store Monitor Run Time” (See Figure 8). We clicked on the alarm to investigate what had caused this error and were redirected to a screen specifically monitoring the performance of the application “SW-store” using various metrics. We also examined the **Monitors** panel and saw that the alarm was tied to an error occurring with the “SW-Store Checkout” microservice. The **Monitors** panel tracks synthetic monitors, developed by Oracle to measure application performance by simulating user transactions on scripted user paths and calculating average response times. We also noted that the application performance index (Apdex)⁴ was low (0.74).

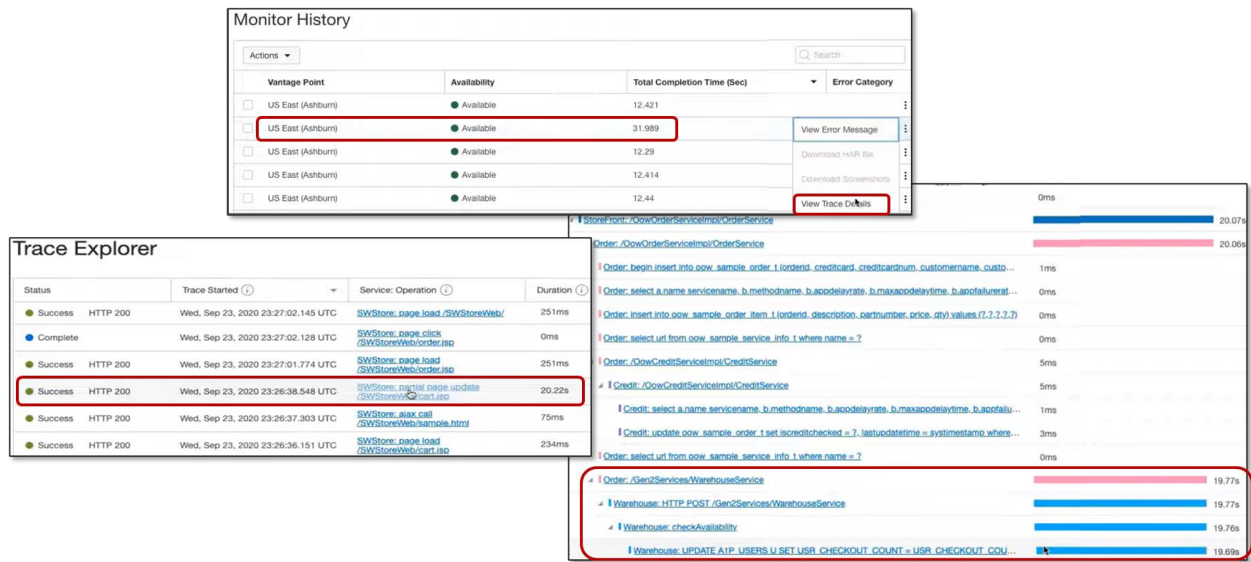
Figure 8. Assessing an Error Caused by Degraded Performance



Within the **Application Performance Monitoring** service, ESG clicked on the “SW-Store Checkout” link to view details about simulation transactions completed to date and noticed some higher completion times (See Figure 9). We focused on one run to trace executed steps of the application by right clicking on that line item and selecting **View Trace Details**. We were directed to the **Trace Explorer** module of the Application Performance Monitoring service. While the majority of transactions were completed in milliseconds, one step took 20.22 seconds. We clicked on the corresponding hyperlink to reveal each action executed, from the end-user’s browser request to the database request. As ESG reviewed each action, we identified that a database call—a SQL update statement—was involved in the delay in the overall runtime of the simulated run.

⁴ The application performance index (Apdex) is a standard measure of user satisfaction with application performance. Higher scores are better.

Figure 9. Investigating Error with ‘SW-Store’ Using the Application Performance Monitoring Service



To determine why the update statement was slowing down completion time of the application run, ESG navigated to the Performance Hub screen of the Database Management service (See Figure 10). Performance Hub uses the same best practices found in Oracle Enterprise Manager that most Oracle Database administrators are familiar with. We prompted the service to perform a multidimensional analysis of the average time of user sessions sorted by wait events.

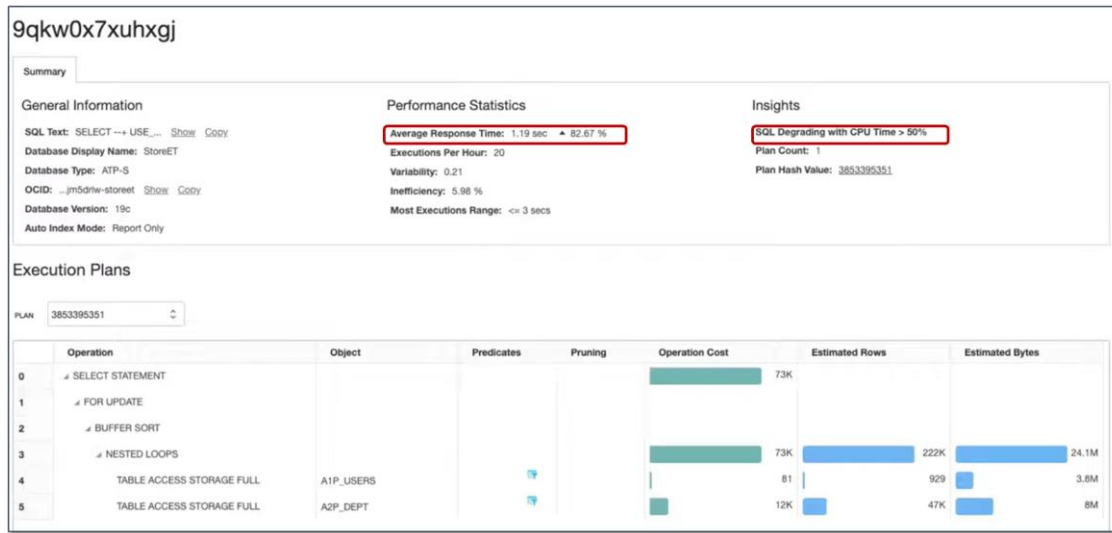
Figure 10. Pinpointing Root Cause of Alarm with Database Management Service



As ESG observed in the cluster bar chart, SQL UPDATE statements (shown in blue) consumed CPU time, delaying the execution of SQL SELECT statements (shown in green). In other words, since SQL SELECT locked database rows, any attempt to perform a SQL UPDATE would take longer to execute, as both actions occur on the same database.

We then proceeded to view a history of these actions and found that past SQL updates in this specific application faced the same issue. We concluded that the processing of SQL UPDATE statements was the root cause of the “Software Store Monitor Run Time” alarm originally flagged.

To resolve the run time issue, ESG first navigated to the Operations Insights service. We selected the Oracle SQL Warehouse module, which stores long term performance and trend analyses of SQL statements executed (See Figure 11).

Figure 11. Determining Resolution for Root Cause of Error

We examined the performance statistics related to the previously identified SQL SELECT statement and noted that execution time had increased by approximate 83%, while SQL performance had degraded over 50%.

The execution plan for this SQL statement was straightforward. However, we noted that it would not scale should the data in the underlying database table grow. We ultimately determined that resolving this issue would require adding an index to decrease SQL SELECT execution time. Oracle provides the SQL Tuning Advisor to help administrators simplify index selection and creation. However, since this example used an Oracle Autonomous Database, we simply enabled the auto-indexing feature to fix the issue.



Why This Matters

Examining the interactions between the application and database over time can help to resolve application performance issues. Yet, tracking and displaying these interactions is difficult to achieve when separate point tools monitor application and database performance. Attempts to correlate data from these tools consume time and resources unnecessarily, while the issue continues to impact the business.

ESG validated that the combination of the Application Performance Monitoring, Database Management, and Operations Insights services of the Oracle Cloud Observability and Management Platform can help in improving the time to resolve application performance issues, even if those issues do not lie within the application layer. We observed how these three services provided end-to-end visibility, tracing the steps executed within an application and identifying those that were ultimately the root cause. ESG observed that we could also view performance history of executed steps, such as database calls and updates, to determine whether further corrective action was required to prevent future occurrences.

Sharing Data with Third-party Tools Using Service Connector Hub

Using the Oracle Cloud Observability and Management Platform does not require any “rip-and-replace” of existing IT tools. With the Service Connector Hub, organizations can create custom connections between the platform and Apache Kafka⁵-compatible tools used in their current IT environments. Organizations can then minimize the time and resources spent on

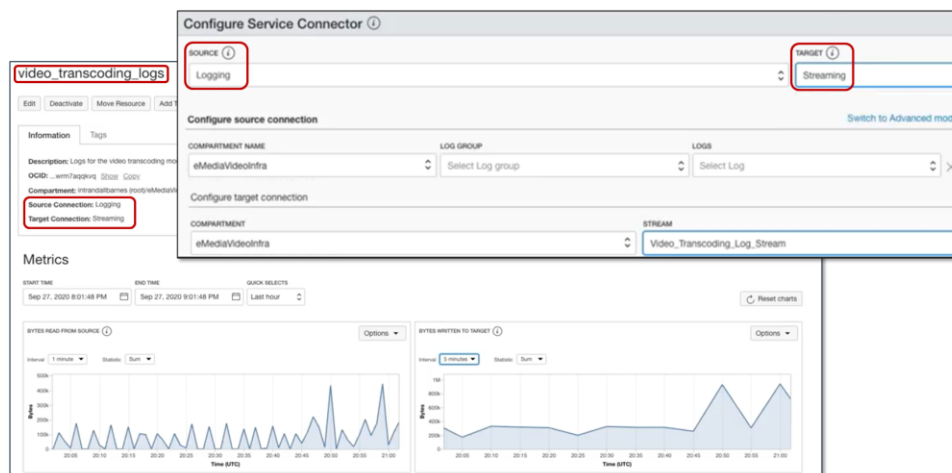
⁵ Apache Kafka is an open source stream-processing software platform for handling real-time data feeds while maximizing throughput and minimizing latency.

manually extracting, moving, and integrating data across Oracle and third-party platforms, while enhancing their monitoring and visibility capabilities.

ESG Testing

ESG proceeded to create a custom log metric for an eMedia transcoding application. We wanted to use the Logging service as a source for the data. We clicked on the button **Create Service Connector** located above the list of other custom logs. On the next screen, we indicated that the Logging service would be the source of the streaming data used to calculate real-time log metrics (See Figure 12). Once we submitted the request to create this service connector, we immediately saw new metrics tracking the performance of the video transcoding application.

Figure 12. Connecting Third-party Data Analysis Tool with Service Connector Hub



i Why This Matters

Organizations that can move and share data among multiple management tools and services can only help to increase understanding of the IT environment’s health at any given time. However, using multiple tools creates data silos that prevent easy and quick data sharing.

ESG verified that the Oracle Cloud Observability and Management Platform facilitates quick and easy data movement and sharing, specifically between the platform and Apache Kafka-compatible tools. With Oracle’s platform, organizations don’t have to invest time and resources on developing the required feeds between tools and services. Instead, they can focus more time on maintaining the overall health and performance of the IT environment.

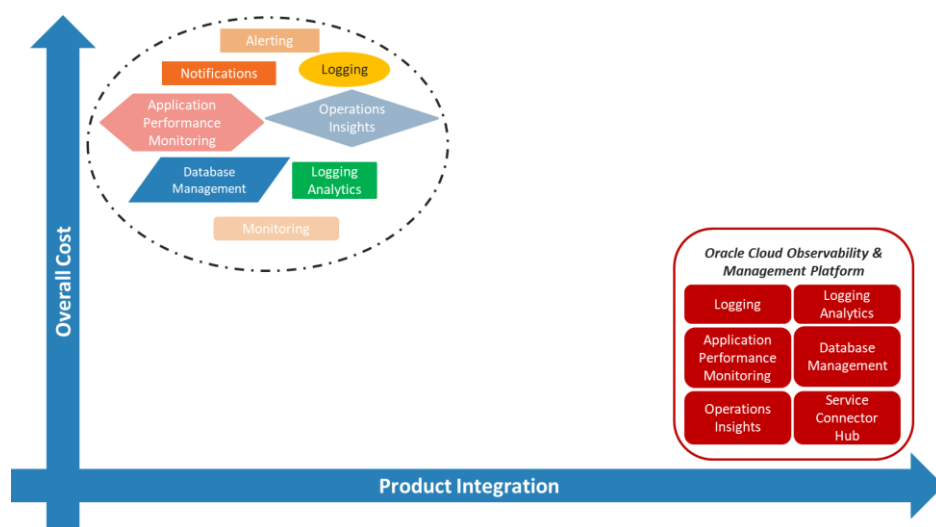
Achieving Overall Costs Savings in IT Observability and Management

Finally, we considered the potential time and cost savings when using the Oracle Cloud Observability and Management Platform. Not only must the initial purchase costs be considered, but also those costs incurred to ensure that all IT management tools work together to provide a level of visibility into the entire environment, regardless of the infrastructure and technology stack leveraged.

Figure 13 below shows that the Oracle Cloud Observability and Management Platform offers many cost advantages over the purchase of multiple point tools. Among those advantages are:

- The built-in integration of Oracle’s data collection, tracking, analysis, and management removes the time and resources required for IT staff to develop custom integrations between multiple tools to obtain a similar level of visibility.
- The ability to trace issues from the application to the underlying infrastructure and determine exactly where in the environment the root cause exists saves time and resources in extracting and correlating data from multiple tools to arrive at a similar conclusion, accelerating problem resolution.
- The ease of integrating third-party tools that already exist in the current IT environment further improves overall visibility and monitoring, without the need to modify existing IT operational processes. Ultimately, ESG sees that the level of integration can decrease IT expenses related to identifying and resolving IT issues.

Figure 13. How Native Product Integration Affects Overall Capital and Operational Expenses



Another source of savings but perhaps more difficult to measure, is how the breadth and depth of visibility that Oracle’s platform can prevent any negative impact to business operations by decreasing the overall time to solve problems.

A Note on Oracle’s Competitive Strengths

With all the talk of observability in this report, it would be an extremely myopic IT professional that had not observed the fact that there are a number of competitive observability offerings. The choices include some well-known public providers, such as Amazon AWS, Microsoft Azure, as well as Splunk and open source solutions (e.g., ELK). While this ESG Validation Report is focused on the depth of the Oracle Observability and Management Platform, it is important to give a general idea of how Oracle stacks up against these competitive offerings. A mix of Oracle capabilities and the value they deliver listed below applies to each of the competitive offerings mentioned above, and thus each should be evaluated in light of your specific needs and what Oracle can bring to the observability and management party. Oracle offers:

- **A comprehensive solution:** Oracle provides a comprehensive solution for multi-platform, multi-cloud, and on-premises deployments. This extends beyond the product capabilities themselves into deployment choices; the Oracle platform is available for deployment on cloud (OCI) and on-premises (Exadata Cloud@Customer or Dedicated Region Cloud@Customer). Moreover, Oracle’s platform does not depend on legacy or on-premises tools, which means that organizations can move their entire monitoring platform to Oracle Cloud Infrastructure to gain the cost savings and integrated functionality needed to optimally manage and operate their IT environment.

- **No requirement to add third-party tools:** Oracle provides coverage for all layers of the stack *natively* from the cloud with no requirement for third-party tools to achieve equivalent functionality. Should third-party tools be necessary—say for dashboarding, alerting, or analytics—they add not just cost but also complexity.
- **A rich and integrated suite of functions:** Oracle provides coverage for all layers of the stack, including a strong APM capability, Logfile Analytics, database management, and standards-based interoperability. This is offered in concert with a unified data platform and zero-touch Machine Learning Analytics. It's important to note that this isn't an all or nothing proposition. Each service can be adopted individually and can be integrated with existing tooling using interoperability standards mentioned earlier in this report.
- **Clear and attractive TCO:** Of course, all vendors attest to the cost simplicity and competitiveness of both deploying and maintaining their solutions...and, equally obviously, what is charged to any given user can vary situationally. *However*, there are some other specific and tangible advantages to Oracle's pricing structure:
 - Oracle's consumption charges are metered hourly, so users only pay for what they use.
 - Oracle does not charge network traffic or data egress fees. These can get substantial as users ramp-up their application deployments and need commensurately increasing long-term storage of logging and monitoring data. While not a major consideration for small cloud users this can be a major—even prohibitive—cost in large-scale deployments. Savvy users will employ cost estimators to evaluate their future cloud-based monitoring cost before taking the leap...and to avoid unpleasant surprises.
 - To further preclude surprises the Oracle solution (a) does not require third-party tools for full functionality; and (b) offers a free tier, allowing users to get acquainted with its services without incurring any costs.

The Bigger Truth

Complexity in IT environments persists, as organizations continue to migrate applications and workloads to the public cloud while still maintaining an on-premises environment. The increased usage of alternative technology stacks, such as containers and microservices, further adds to overall complexity. Organizations have responded by adopting multiple point tools to increase their visibility and management capabilities. However, the resulting ad-hoc mix, lack of integration, and data silos of such tools will most likely not achieve the breadth and depth of end-to-end visibility that organizations clearly need to optimize overall IT performance and availability.

The Oracle Cloud Observability and Management Platform overcomes these barriers by offering a highly integrated set of tools and services to achieve the end-to-end visibility required to identify, locate, and resolve IT issues quickly and easily without having to manually collect, correlate, and analyze data from multiple point tools. By navigating through the various services within Oracle's platform, ESG validated that the platform enables organizations to pinpoint exactly how an IT issue emerged by tracing how it appeared at every layer of technology and infrastructure within the environment. We also saw how Oracle's platform can enable organizations to integrate and analyze data to provide different views of the same issue. We can see how Oracle's integrated platform can help organizations to decrease MTTI and MTTR, thus saving on IT operational expenses and reducing the business impact by quickly finding and addressing root causes of IT issues.

There's a certain irony to the fact that choosing the best observability platform requires some serious observation of, and visibility into, the intricacies of the seemingly similar offerings on the market. But it is worth the time to check your needs and the choices. After all, to use an analogy, you wouldn't want to buy a point A-to-B first-class air ticket only to find that some legs of your journey are in economy (missing functionality), or require an airport transfer (not comprehensive and integrated), or have a to-be-decided-later unlimited fuel surcharge (network and egress fees)! And yet, as the parenthetical comments in our analogy indicate, it's all too easy to end up with a sub-optimal "IT travel" experience. So, what should you do? Clearly, if it were travel being evaluated you might look at your required routing, desired in-flight experience, availability of same-terminal connections, baggage allowance, convenient flight times, on-time and reliability records, etc....whatever matters to you. The same applies for observability and management solutions.

It is important for organizations to consider the extent to which Oracle's platform can provide coverage for the types of IT issues typically faced in their specific environments. As with any new set of tools and services, it is also critical to assess the time and effort that can be saved by using such a platform over the foreseeable future. And finally, we recommend that organizations use cost estimators to compare overall cloud costs.

If your organization is looking to improve the breadth and depth of end-to-end visibility in your current IT environment, with the goal of turbocharging IT performance and availability while decreasing overall operational expenses, ESG recommends taking a close look at the Oracle Cloud Observability and Management Platform.

All trademark names are property of their respective companies. Information contained in this publication has been obtained by sources The Enterprise Strategy Group (ESG) considers to be reliable but is not warranted by ESG. This publication may contain opinions of ESG, which are subject to change from time to time. This publication is copyrighted by The Enterprise Strategy Group, Inc. Any reproduction or redistribution of this publication, in whole or in part, whether in hard-copy format, electronically, or otherwise to persons not authorized to receive it, without the express consent of The Enterprise Strategy Group, Inc., is in violation of U.S. copyright law and will be subject to an action for civil damages and, if applicable, criminal prosecution. Should you have any questions, please contact ESG Client Relations at 508.482.0188.



Enterprise Strategy Group is an IT analyst, research, validation, and strategy firm that provides market intelligence and actionable insight to the global IT community.

© 2021 by The Enterprise Strategy Group, Inc. All Rights Reserved.

