eG Innovations

eG Enterprise v7.2

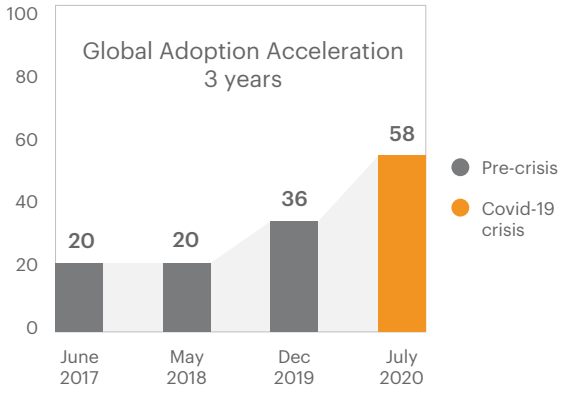
Observability for Modern IT

www.eginnovations.com

1 Introduction

The last couple of years have witnessed dramatic changes in the IT landscape. Due to the Covid pandemic, businesses have had to accelerate the digitization of their customer services, supply chain interactions and internal operations.

- A McKinsey & Company survey determined that digitization accelerated by three to four years due to the pandemic.
- This study also determined that companies are three times more likely to have more than 80% of their customer interactions digitally, and that the share of digital products has accelerated by over seven years.
- This has meant that organizations across verticals and across different stages of evolution have begun to rely on IT even more than before.



Average share of customer interactions that are digital %

As IT has become fundamental to the business, customer needs and expectations have changed. Businesses and their executives are realizing that every minute of IT slow-time or downtime is resulting in loss of productivity for internal operations and millions of dollars in lost revenue for customer facing operations. The increasing use of remote work and collaboration tools is putting a greater burden on IT operations teams who are responsible for keeping the remote access infrastructure and tools operational. Faced with increasing need to respond quickly to business needs, many IT teams are deploying more workloads on public clouds than ever before and reliance on SaaS services has also increased. The changing ownership of the last mile is something IT teams are worried about. Users working from home often complain about slow access to their work environments, when the real issue is a poor home network connection, and corporate IT is not directly responsible for this. Clearly, the security challenges of distributed hybrid work environments and cloud-based deployments have become a critical focus area for IT teams as well.

How COVID-19 has pushed companies over the technology tipping point and transformed business forever.

https://www.mckinsey.com/capabilities/strategy-and-corporate-finance/our-insights/how-covid-19-has-pushed-companies-over-the-technology-tipping-point-and-transformed-business-forever

McKinsey & Company

2 The Modern IT Landscape

One of the important characteristics of a modern IT infrastructure is that it must support workers connecting securely from their homes or remote locations. To enable work from home, **organizations have had to deploy or grow different types of digital workspaces,** using technologies like Citrix Virtual Apps and Desktops, Omnissa Horizon or cloud alternatives like Amazon WorkSpaces and AppStream 2.0, or Microsoft Azure Virtual Desktop (AVD). A recent survey by eG Innovations and xenappblog found that 1 in 6 organizations had deployed digital workspaces for the first time during the Covid pandemic, and over 80% of organizations grew their deployment of digital workspaces during the pandemic to handle new business requirements.

Since users may connect to their digital workspaces from personal devices, using their home network, IT teams have been forced to look at ways of troubleshooting user complaints quickly and determining if any slowdowns have been due to the user's home network or device, or whether it relates to a problem in the corporate network or data center. 86% of organizations who responded to the eG Innovations xenappblog digital workspace survey indicated that they had faced challenges supporting a digital workspace.

In the modern IT landscape, face-to-face meetings have been replaced by virtual meetings using SaaS services such as Microsoft Teams and Zoom. IT teams have had to look for tools and techniques to proactively monitor, audit and troubleshoot problems with these new technologies.

The shift to cloud technologies has been hastened in the last couple of years. An eG Innovations/DevOps Institute survey of APM

and Cloud technologies found that 88% of organizations are using cloud technologies in one form or the other. While cloud technologies make it easy to deploy new workloads, monitoring and diagnosing the performance of applications is more challenging because of the multi-domain nature of these environments. Cloud service provider SLAs mainly offer uptime guarantees for their services (e.g., EC2, S3. RDS, etc.). When an organization deploys an application that uses multiple services, the overall SLA guarantee is much lower. Furthermore, if and when slowdowns occur in the application, the cloud service provider tools are often not sufficient for diagnosing the reason for slowness. 27% of respondents to the eG Innovations DevOps Institute survey felt that the **native service provider monitoring tools such as AWS CloudWatch and Azure Monitor provided only basic functionality and were insufficient** for their needs.

Traditional monitoring tools designed for on-premises infrastructures and applications usually cannot be directly deployed for monitoring and troubleshooting many of these modern IT technologies.

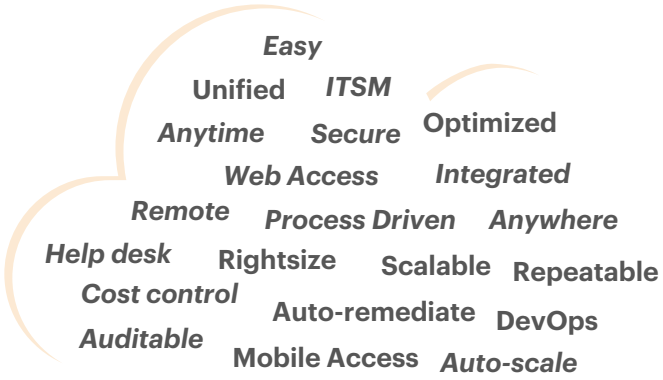
3 Modern IT Operations

Just as IT technologies being deployed have changed over the years, the Covid pandemic has also caused organizations to relook at the ways in which IT environments are operated and managed. Some of the key changes that IT organizations are making include:

- **Focus on processes, not individuals:** In the past, many IT organizations have relied on the expertise of a few individuals. With the limited availability of expertise and needing to have an operational strategy that is not dependent on a few individuals, IT teams are focusing on putting in place processes that can be followed across the team, so they are not dependent on a few team members. As non-experts begin to play a greater role in IT monitoring and management, it is essential that tools they use be easier to install and operate. Ideally, the monitoring tool should be integrated into existing IT operations workflows – e.g., incident management, unified dashboarding, etc.

- **Accessible from anywhere, at any time:** Since IT operations teams themselves may have to operate remotely at times, the tools they use must be securely accessible from anywhere, at any time, so remote monitoring and diagnosis is facilitated.

- **Emphasis on automation:** There is also a growing push for automation of technologies, to ensure that more can be done with fewer staff. Monitoring tools are no exception to this trend. Automation also becomes essential as organizations start to adopt DevOps technologies.



- **Security monitoring is growing in importance:** The distributed nature of modern IT means that IT teams have to focus on the security of their environment more than ever before.

- **Cost control especially in the cloud is becoming essential:** In the cloud, it is easy to spend a lot more money than necessary. A misconfigured system, an application left running for long, files that grow in an unbounded manner, can all result in increased cost for the organization. IT teams are being tasked to control their spend on the cloud.

- **Support for dynamic IT environments with auto-scaling:** Auto-scaling is a cloud-native capability that is widely used to handle dynamic workloads. Even in on-premises environments, the use of microservices and containers has added a level of dynamicity that IT has not handle to deal with in the past. IT teams need tools that provide insights and visibility to tackle dynamic IT infrastructures.

4 eG Enterprise: Observability for Modern IT

Given the diverse nature of modern IT applications and infrastructure, a lot of time and effort is focused on what to monitor and how to monitor. Monitoring is the task of collecting metrics from the target infrastructure. The term "observability" has been used recently to refer to "modern monitoring". Observability adds different ways to analyze and interpret the monitoring data. Anomaly detection, dependency mapping and root-cause analysis, forecasting and prediction are some of the capabilities in this area. To be effective, observability solutions should not just focus on availability and performance monitoring. Changes to application and infrastructure configuration can impact performance and tracking such changes and correlating them with performance anomalies should be an integral part of an observability strategy. Analysis of metrics to ensure greater security of the target infrastructure also falls under the purview of observability. Cost control, right-sizing and optimization are also key functions and to minimize routine work, observability solutions also incorporate automation in some form.

Figure 1: The main components of an observability solution for modern IT

The latest release of eG Enterprise – v7.2 – focuses on observability for modern IT. It aims to help IT teams tackle the new challenges they face as they deploy a modern IT infrastructure – one that includes a combination of public and private infrastructures, that supports a hybrid workforce, and supports collaborative work.

- With overall support for close to 600 different application and infrastructure components, 6,000 unique checks it performs to assess application and infrastructure health and its ability to track over 50,000 unique metrics, eG Enterprise v7.2 offers great breadth and depth of monitoring capabilities.

- Feedback from our user community has always played a critical role in the evolution of eG Enterprise and this new release is no exception. Many of the new capabilities this release have already been provided to some customers and their feedback used to fine-tune these capabilities.

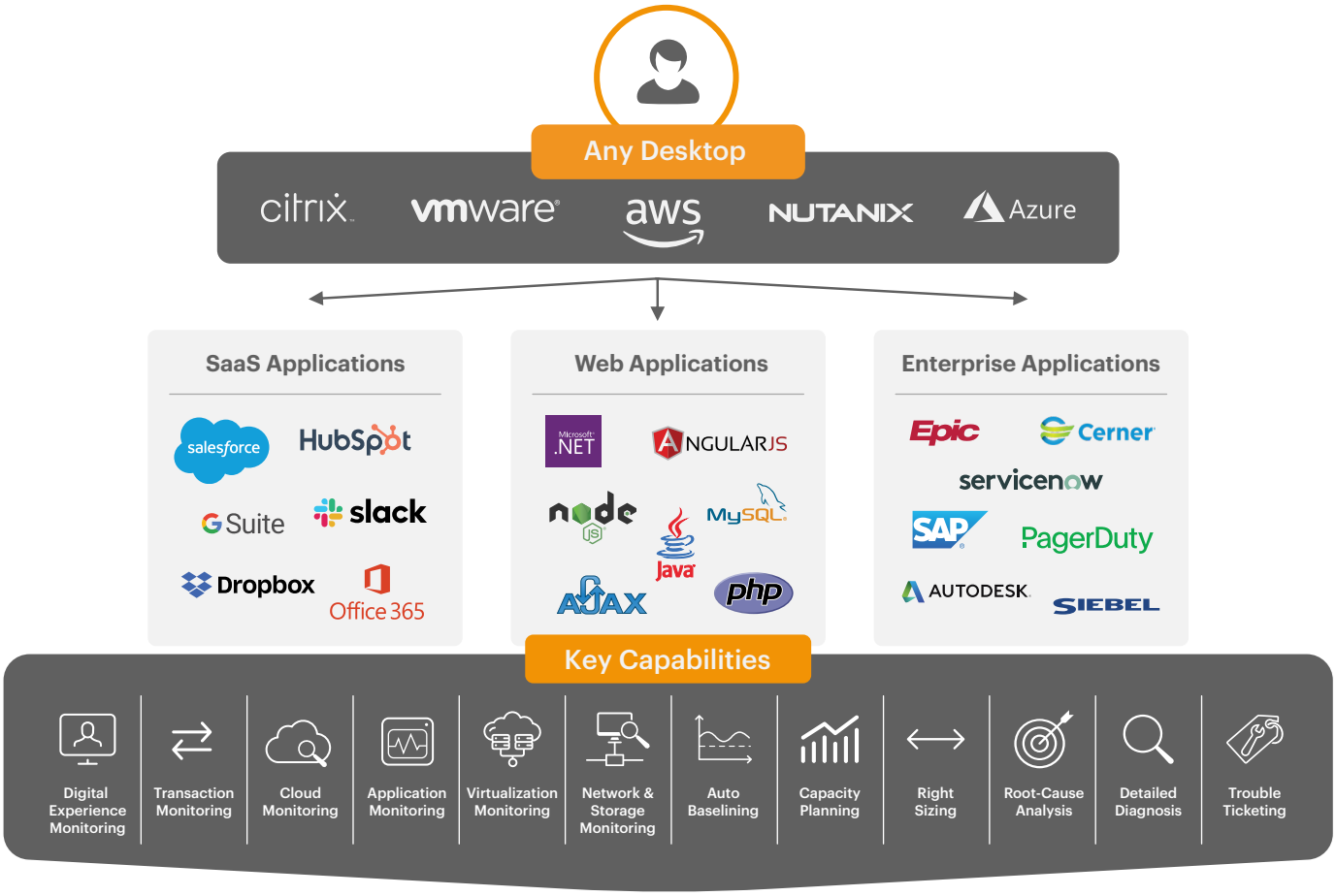


Figure 2: What eG Enterprise supports and its key capabilities

In keeping with the requirement of modern IT operations, we have made eG Enterprise v7.2 easier to deploy with many options for automated deployment and configuration – for physical, virtual, cloud and container environments.

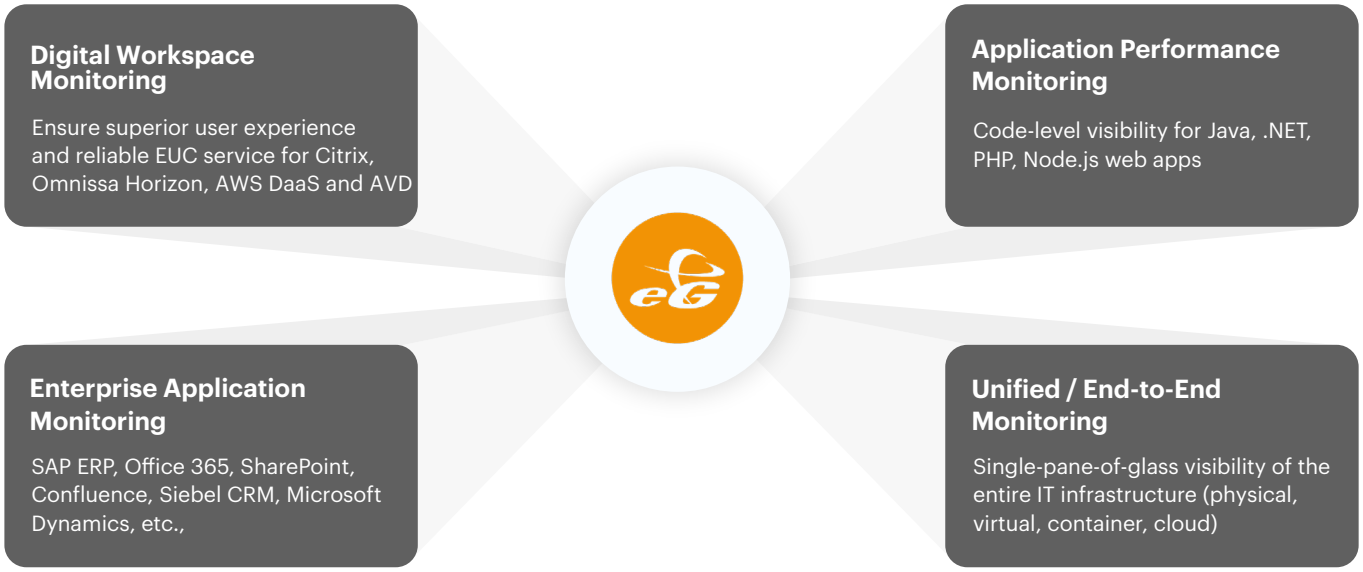


Figure 3: Enhancements in eG Enterprise v7.2 cover all four core areas of focus for modern IT operations

Scalability of the solution has been greatly enhanced. With the right resource configuration, a single eG Manager instance can handle over ten million unique metrics. A number of new monitoring capabilities particularly relating to modern application components have been added. Analytics and reporting capabilities have been improved to provide better and more insights. Enhancements in this release cover all four of eG Enterprise's core focus areas - digital workspace monitoring, APM (Application Performance Monitoring), enterprise app monitoring and unified monitoring.

5 Digital Workspace Monitoring Enhancements

5.1 Monitoring, Diagnosis and Reporting for Microsoft Azure Virtual Desktop (AVD)

Microsoft Azure now allows organizations to install multi-session hosts offering Windows 10 and Windows 11 desktops to users. Since its launch two years ago, multi-session Azure virtual desktop (AVD) technology has been gaining in popularity. According to an eG Innovations AVD TechFest survey, 26% of organizations already have Microsoft AVD deployed and this number is expected to grow to 58% in just two years.

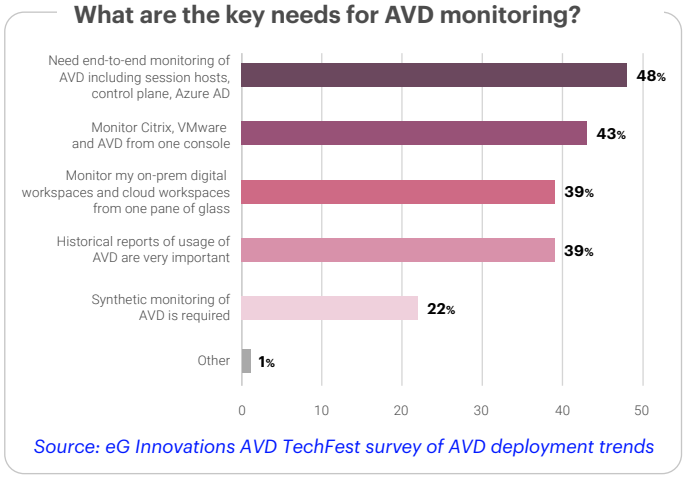


Figure 4: The key monitoring needs for AVD monitoring

As with other digital workspace technologies, performance is critical to the success of Microsoft AVD. AVD is a highly interactive service and hence, very performance sensitive. Even a slight glitch in a user's network connectivity or a resource bottleneck on the AVD session host can result in screen freezes and session disconnects for users.

Azure's built-in tool, Azure Monitor, provides a few out-of-the-box metrics for AVD analytics. However, to get a completely usable and effective solution using Azure Monitor requires a lot of effort and cost. Pricing is based on number of metrics collected (the higher the concurrent user count, higher the cost). Pricing also depends on the type of threshold configured - whether static

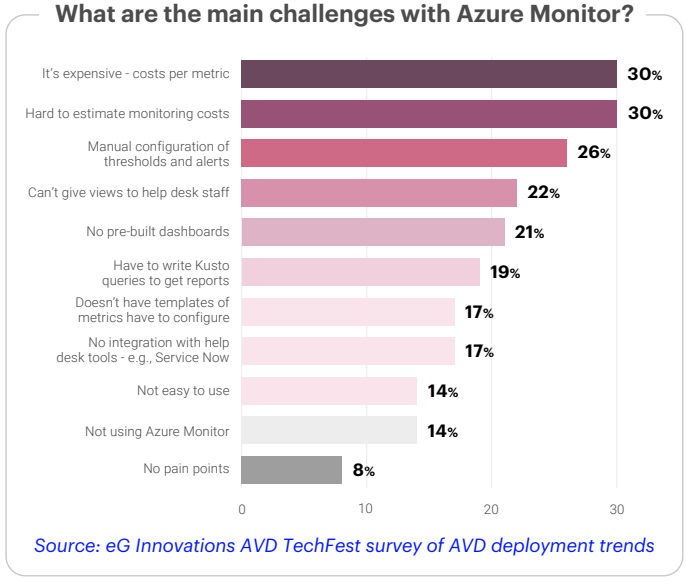


Figure 5: The main challenges when using Azure Monitor for AVD

or automatic. To get the key audit, compliance and performance reports needed, IT admins have to write elaborate queries using the Kusto Query Language (KQL). Therefore, it is not a surprise that organizations adopting AVD are seeking complete, easy-to-use and cost-effective solutions for monitoring, diagnosing and reporting on AVD performance.

eG Enterprise v7.2 offers organizations a fully featured, cost-effective monitoring, alerting and reporting platform for Microsoft AVD. With eG Monitor for AVD, you can:

- Auto-discover key elements of the AVD infrastructure including, AVD session hosts, host pools, connection broker, Azure AD, etc.
- Monitor every layer of every tier of the Azure Virtual Desktop service delivery chain, from host pools, session hosts, Azure Active Directory, Azure Virtual Desktop Connection Broker, Azure Subscription, FSLogix and more!
- Receive in-depth insights into the performance of the AVD connection broker and promptly capture host pool errors, connection failures, unhealthy session hosts, and users experiencing logon slowness promptly capture host pool errors, connection failures, unhealthy session hosts, and users experiencing logon slowness.
- Monitor Azure Active Directory and be alerted to redundant/dormant accounts, inactive users, unassigned directory roles, suspicious account usage patterns, sudden configuration changes to user accounts, and more.
- Monitor the health of key services of an Azure Subscription such as, the Azure Billing service, VPN gateways, Azure storage, Database services, Azure Backup service, etc., and capture anomalies on-the-fly.
- Periodically check session hosts for sizing inadequacies, processing latencies, session disconnects, critical error events, abnormal browser activity etc., and promptly initiate pre-emptive measures.

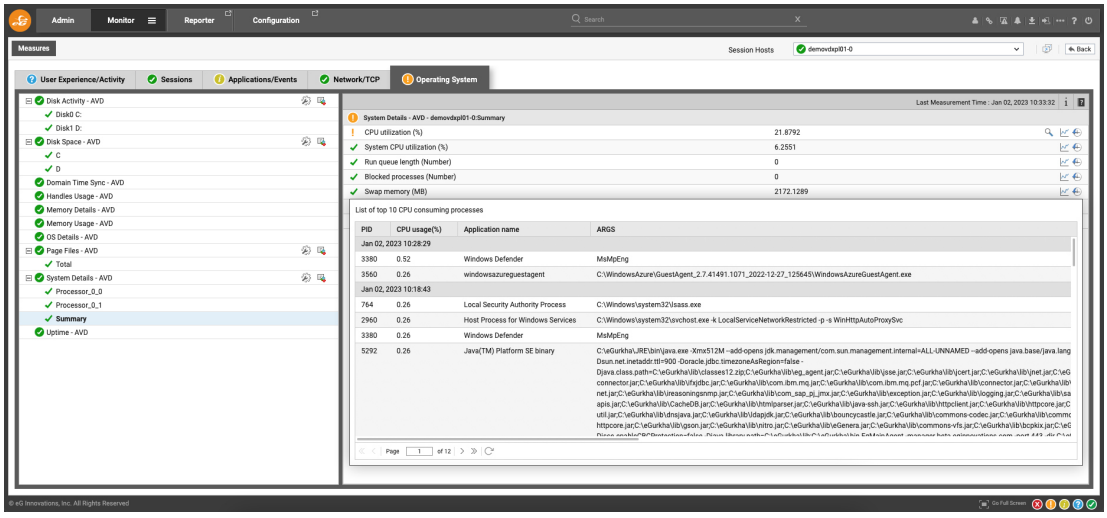


Figure 6: eG Enterprise capturing a CPU contention on a session host, and leading you to the process causing it

- Measure the logon performance of synthetic and real users to the AVD service, and accurately diagnose the root-cause of a sub-par logon experience.
- Emulate a complete user session to the AVD service – from login, application launch, to working with the application – and isolate bottlenecks.
- Measure overall end-user experience with the AVD service in real-time, and precisely pinpoint why service quality is poor for which users.
- Auto-correlate performance across AVD tiers, auto-triage issues, and accurately isolate the source of service slowdowns/outages.
- Instantly invoke comprehensive, ready-to-use AVD dashboards, or build custom dashboards from scratch to suit your purpose, to visually assess AVD performance, identify problem areas at a glance, and quickly drill down to the source of those problems.

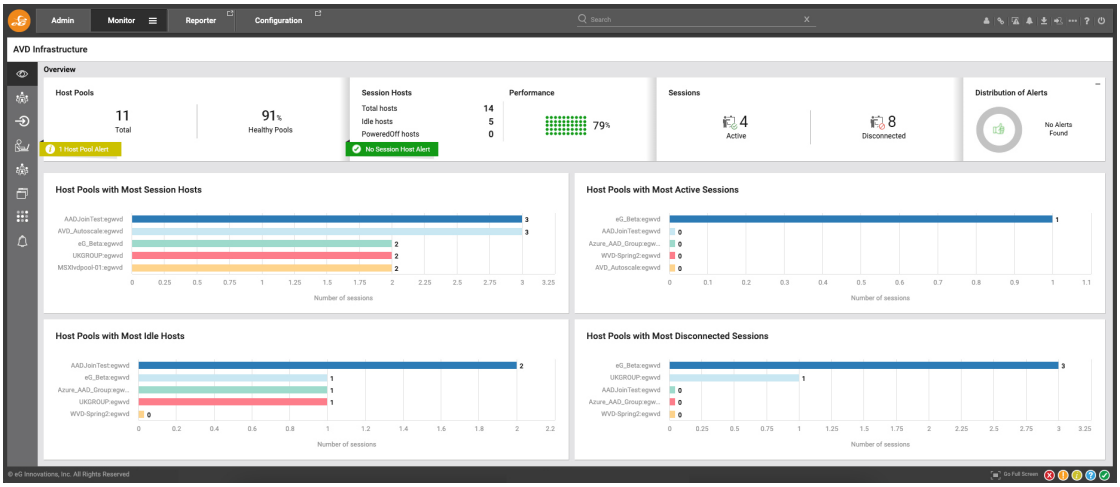


Figure 7: An AVD infrastructure dashboard providing at a glance view of the entire deployment

- Use a wide variety of purpose-built AVD reports to historically analyze the resource demand on, consumption of, and overall quality of the AVD service, forecast future trends in load and usage, predict contentions, and plan the future capacity of the AVD infrastructure, so as to avoid resource contentions and improve service quality.

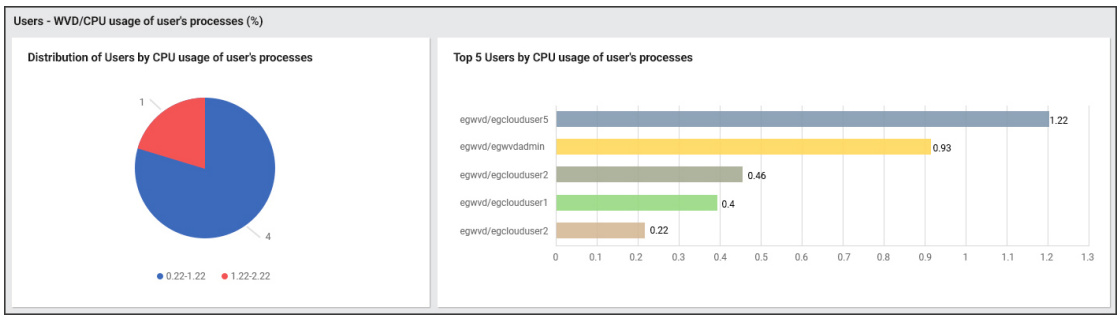


Figure 8: Built-in reports that help analyze resource usage of session hosts over time, and better plan future capacity of the hosts

5.2 Performance Assurance for Amazon WorkSpaces and AppStream 2.0

AWS WorkSpaces and Amazon Appstream 2.0 are two of the key cloud-based workspace technology alternatives for Citrix, Omnissa Horizon and Microsoft AVD. While Amazon WorkSpaces supports virtual desktops in the cloud, AppStream 2.0 support virtual applications. Previous versions of eG Enterprise supported monitoring of Amazon Workspaces v1. The main enhancements in this release include:

- Monitoring of GPO processing and logon performance during user logons to WorkSpaces v2 and AppStream 2.0.
- Monitoring all important KPIs to track resource usage of the virtual desktops and applications.
- Monitoring of active/idle time of users and in-depth insights into browser activity.

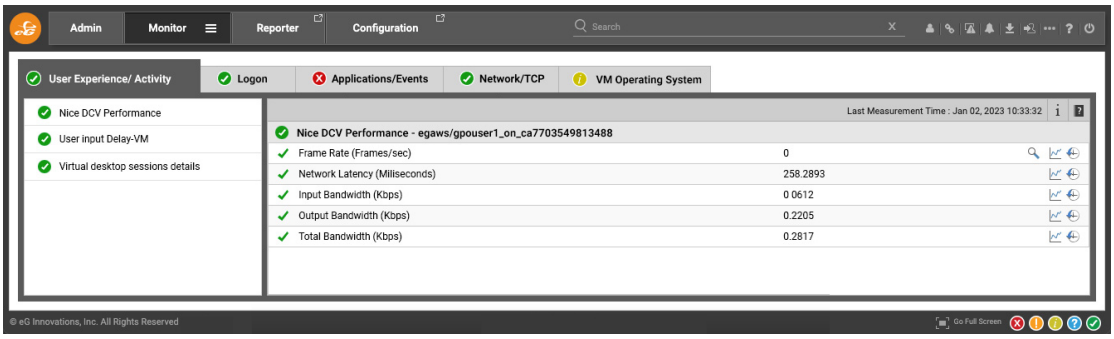


Figure 9: NICE DCV protocol metrics for an AWS AppStream virtual user session

- Extending the AWS logon simulator to support Amazon WorkSpaces v2 and AppStream 2.0, thereby providing logon insights from multiple distributed locations.
- VM agents deployed on Amazon WorkSpaces and AppStream 2.0 desktops can monitor digital workspace protocol performance. Both Amazon WorkSpaces v2 and AppStream 2.0 are based on NICE DCV. VM agents monitor key metrics for every user session including frame rate, network latency, bandwidth used, etc.
- Extension of eG Enterprise monitoring for AWS accounts to report AppStream Fleet configuration and usage, including alerts on insufficient capacity.
- Extension of eG Enterprise reports and dashboards for AWS WorkSpaces and AppStream. Many of the capabilities that are supported for on-premises Citrix and Omnissa Horizon deployments are available for AWS WorkSpaces and AppStream 2.0 as well.

5.3 Enhanced Monitoring Support for Citrix Environments

Citrix deployments on-premises and on the cloud continue to be widely used across different verticals for providing secure, remote access to remote workers. eG Enterprise v7.2 extends our leadership in this focus area with several key enhancements:

- The Citrix logon simulator provides additional details of the logon process than previously. ICA file download time is monitored separately. A launch timeout can be configured for the simulation to provision for inherent delays at any stage of the simulation. While previous versions required a static token to support 2FA access during simulation, **eG Enterprise v7.2 now supports 2FA-enabled Citrix logons using Time-based One Time Password (TOTP) integration.** A dynamically generated token is programmatically discovered by eG Enterprise and input during the simulation.

- Integration with the Citrix Cloud control plane of Citrix Cloud has been enhanced. While previous versions required the remote agent monitoring the cloud control plane to be deployed on a Citrix cloud connector, **eG Enterprise v7.2 allows the remote agent to be deployed on any system with connectivity to the cloud.** This has several benefits including lower overhead on the Citrix cloud connector, ability to deploy the remote agent on a Microsoft Windows cluster for HA support, support for Citrix cloud connector appliances running Linux, etc. The Citrix cloud control plane monitoring has been enhanced so IT admins can see resource usage of the Citrix cloud connectors without needing to deploy agents on the cloud connectors.

- Over the last few years, Microsoft Teams has become the most used application on virtual desktops. The Citrix HDX Optimization for Microsoft Teams, if deployed, offers a richer experience for users while taking up less resources and bandwidth. **eG Enterprise agents for virtual apps and desktops can now highlight if the optimization pack for Microsoft Teams is not deployed/enabled.**

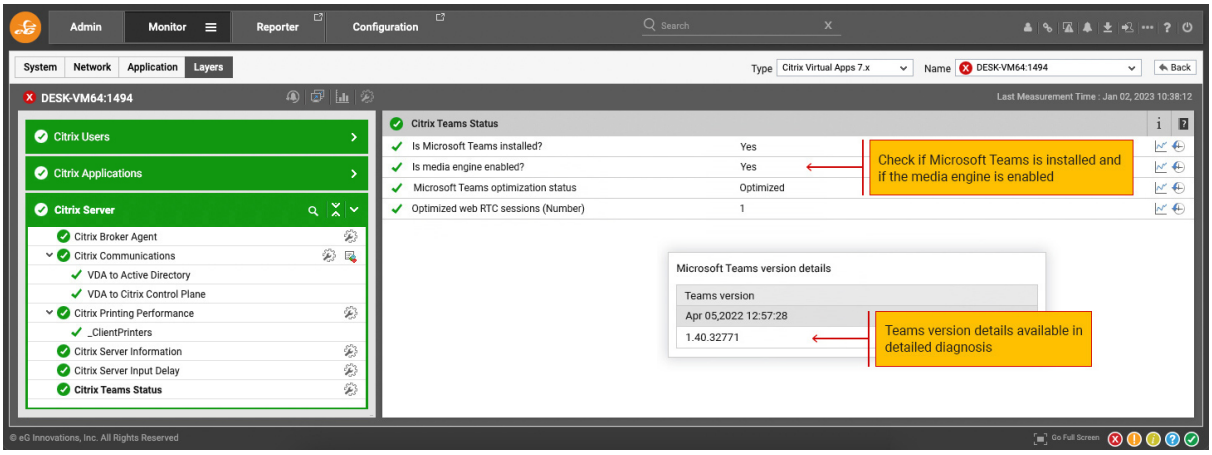


Figure 10: Monitoring of Teams Optimization Status on a Citrix virtual desktop

- Latencies between Citrix components in a private or cloud data center can affect user experience and scalability. eG Enterprise now integrates with Microsoft Windows Resource Monitor to **track latency between different Citrix tiers.** Latencies between Citrix VDA and AD, Citrix VDA and Citrix Control plane, Citrix Delivery Controller and License server, AD and data store, Citrix Cloud connector (Windows) and Cloud gateway and Citrix control plane, and between a PVS server and a license server and database are all passively tracked using this approach. Proactive alerts can be generated if there are any significant changes in latency patterns.

- **Monitoring of Linux VDAs and VDIs has been improved.** A VM agent is now available for Linux VMs, providing similar capabilities as that provided for Microsoft Windows VMs, without needing to enable SSH access, provide user credentials, etc. For both Linux VDAs and VDIs, eG Enterprise v 7.2 now reports virtual channel performance metrics (frame rate, input/output bandwidth, screen refresh latency, etc.), in a manner similar to metrics reported for Microsoft Windows VMs.

- FSLogix profiles management is a popular choice for Citrix environments. eG Enterprise v7.2 includes **monitoring support for FSLogix Profile Container and FSLogix Office Container.**

- A number of new reports have been added in version 7.2 to address different needs that Citrix admins may have:

  - User experience can now be analyzed by geography, and those geographies where user experience has been consistently sub-par can be identified. You can even zoom into a specific geography to closely assess performance in that geography, and isolate unhealthy KPIs.

  - Session workload can now be analyzed by department. The Citrix Sessions by Users report can now be generated for a particular delivery group – i.e., department. Such a report provides you with detailed insights into session duration, logon times, and unique users in a delivery group, thus highlighting session-related irregularities within that group.

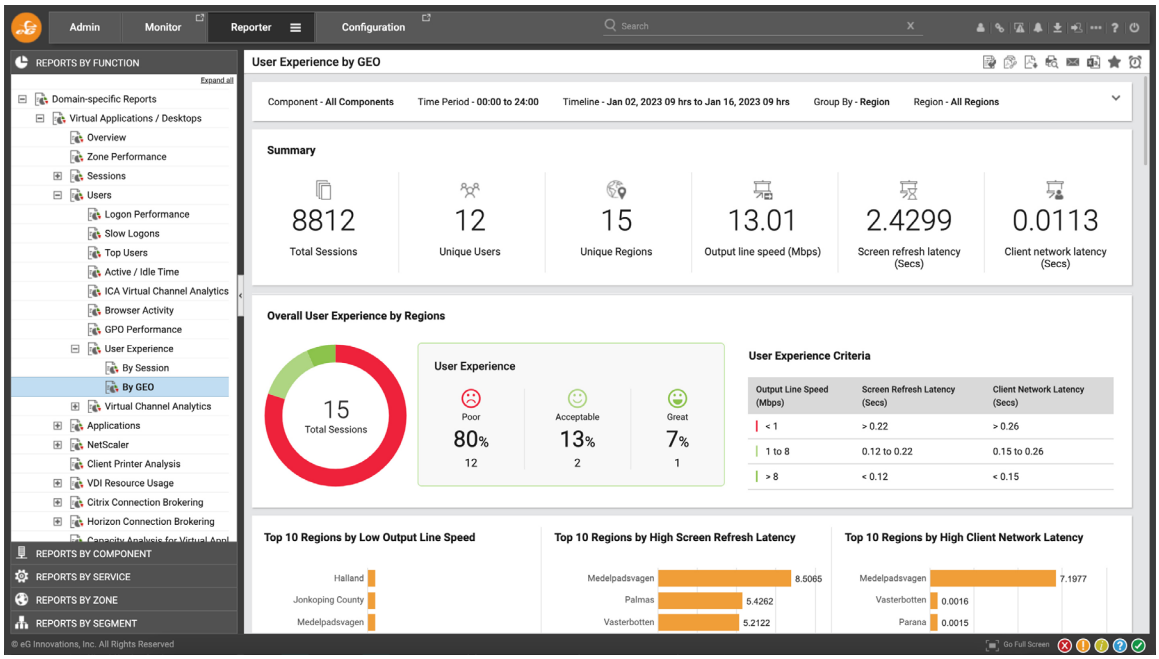
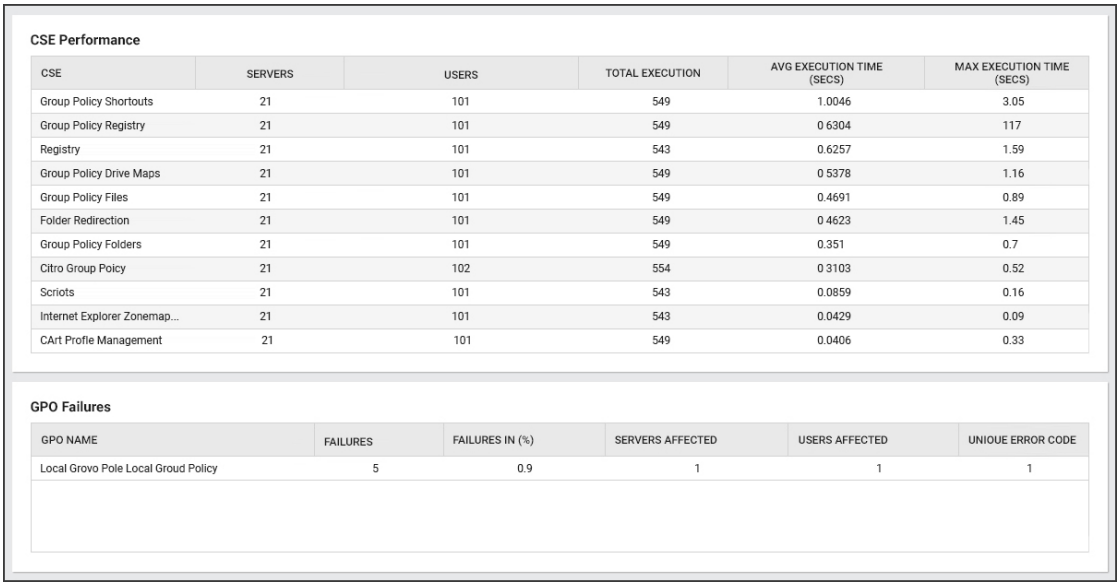


Figure 11: Analyzing the experience of Citrix users by geography

- The new GPO Performance Report can help you historically analyze user logons, and determine which GPOs are often used, which ones are taking time, and which GPOs have most errors.



CSE Performance

CSE	SERVERS	USERS	TOTAL EXECUTION	AVG EXECUTION TIME (SECS)	MAX EXECUTION TIME (SECS)
Group Policy Shortouts	21	101	549	1.0046	3.05
Group Policy Registry	21	101	549	0.6304	117
Registry	21	101	543	0.6257	1.59
Group Policy Drive Maps	21	101	549	0.5378	1.16
Group Policy Files	21	101	549	0.4691	0.89
Folder Redirection	21	101	549	0.4623	1.45
Group Policy Folders	21	101	549	0.351	0.7
Citro Group Poicy	21	102	554	0.3103	0.52
Scriots	21	101	543	0.0859	0.16
Internet Explorer Zonemap...	21	101	543	0.0429	0.09
CArt Profle Management	21	101	549	0.0406	0.33

GPO Failures

GPO NAME	FAILURES	FAILURES IN (%)	SERVERS AFFECTED	USERS AFFECTED	UNIOUE ERROR CODE
Local Grovo Pole Local Groud Policy	5	0.9	1	1	1

Figure 12: GPO performance report helps identify the slowest GPOs by execution time

- The Browser Activity report reveals web sites that are popular on a Citrix Virtual Apps and Desktops server. You can also drill down further to view which users accessed which web site.

5.4 Enhancements for Omnissa Horizon Monitoring

Omnissa Horizon has emerged as an alternative on-premises digital work-space technology for Citrix Virtual Apps and Desktops.

The primary built-in monitoring tool for Omnissa Horizon is vRealize Operations (vROps). While vROps provides insights into the Omnissa Horizon brokering and supporting tiers, VMware recommends that additional tools like ControlUp are used to get a complete view of activities within virtual desktops and applications. With its wide-ranging capabilities to monitor every layer and every Omnissa Horizon tier and its in-depth inside views of virtual desktops, eG Enterprise is well suited to provide a single pane of glass for Omnissa Horizon monitoring.

eG Enterprise v7.2 includes support for Omnissa Horizon 8.5. The wide-ranging capabilities added in this capabilities are intended to enhance our monitoring, diagnosis and reporting for Omnissa Horizon environments, but they are also intended to make sure that our Omnissa Horizon monitoring capabilities are on-par with those offered for Citrix digital workspaces. eG Enterprise v7.2 adds several capabilities in this regard.

- Previous versions of eG Enterprise used Omnissa Horizon's PowerCLI interface for monitoring. From Omnissa Horizon 7.10, a RESTful API has been introduced as an alternative for data collection. eG Enterprise v7.2 now uses the VMware RESTful API for monitoring.

This makes the monitoring more scalable and also reduces the complexity and manual work associated with configuring Omnissa Horizon monitoring.

- Horizon Pod/Cluster monitoring has been improved. From the centralized eG web console, you can now monitor key aspects of the Omnissa Horizon control plane:

  - Connectivity and client details
  - The state of user sessions on application pools
  - Connection server performance
  - Datastore health and usage
  - Overall health of pods/clusters
  - Horizon license usage

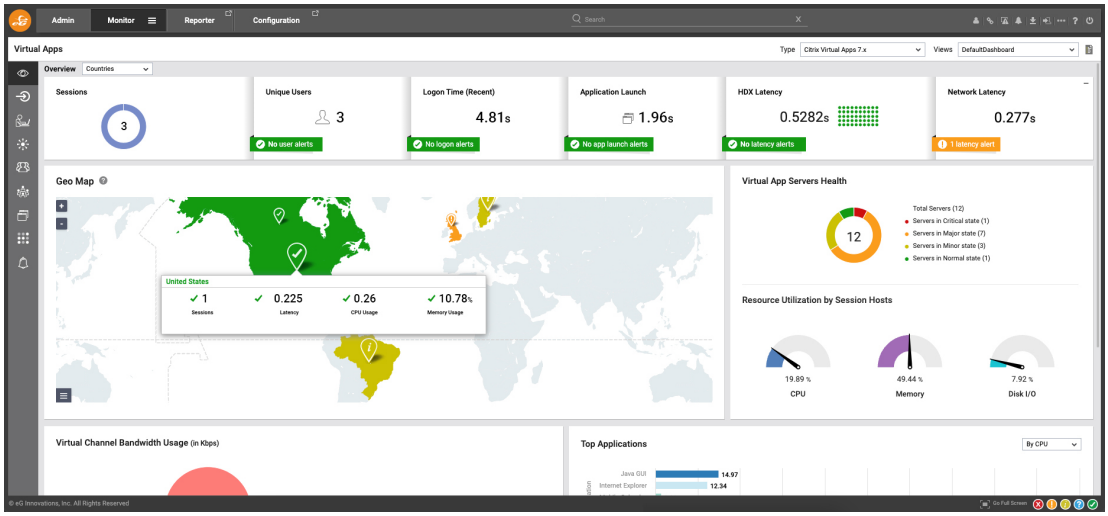


Figure 13: Omnissa Horizon Virtual Apps dashboard provides an overview of workload and performance

- eG Enterprise now tracks **configuration changes** on VMware Pod/Clusters, Connection Servers and RDSH servers.

- Virtual applications and virtual desktops dashboards are now available for Omnissa Horizon environments and users. eG Enterprise agents discover the remote IP addresses of user terminals and this information is then used to detect a user's geo location. Metrics are collected in real-time by aggregating data reported for each user session and this is then used to present a geographic dashboard showing the countries/states/cities that users are connecting from and their respective health.

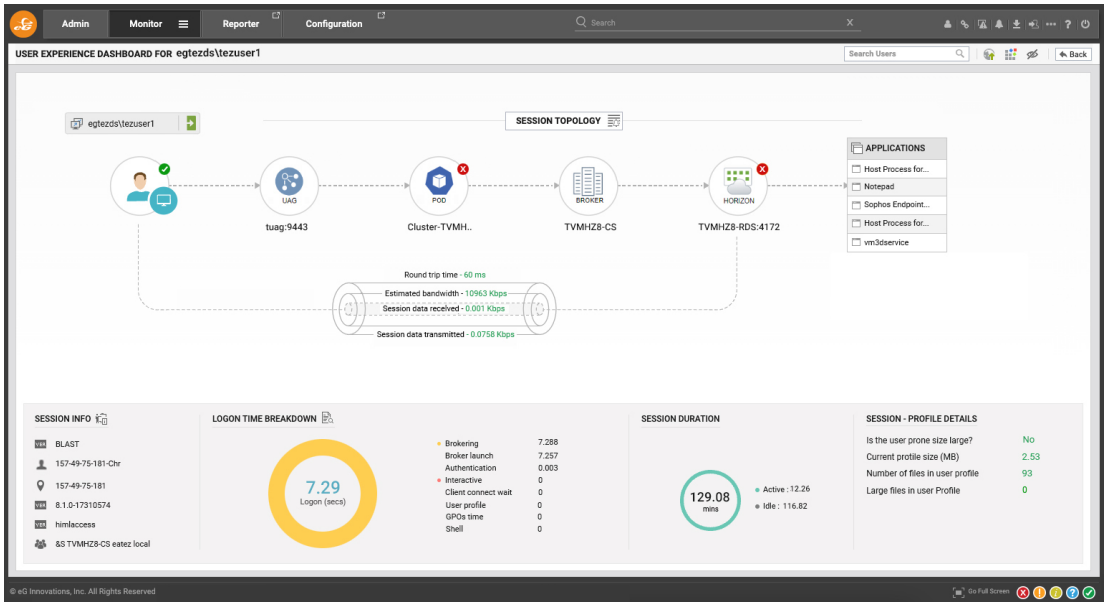


Figure 14: Topology of a Omnissa Horizon session showing all the tiers involved in service delivery for a specific user session

- For each user session, eG Enterprise presents a session topology highlighting just the servers/components that the user session is connected via. This drilldown which is available from the user experience dashboard makes it easy for Omnissa Horizon admins to quickly determine how a user is connected and to drilldown to the relevant components in the session topology to troubleshoot an issue.

- A number of new reports have been added for Omnissa Horizon environments:
  - The overview report provides a centralized view of the health of key Horizon performance indicators such as user experience, application performance, resource usage, and license usage, to promptly identify problem areas in the Omnissa Horizon infrastructure.

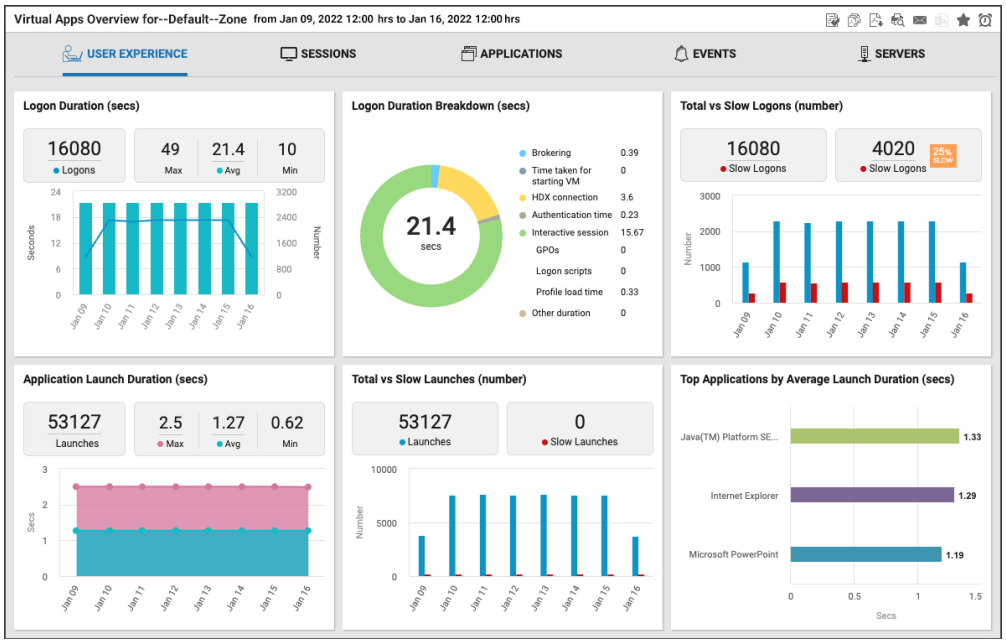


Figure 15: Virtual Apps Dashboard for Omnissa Horizon

- The top applications report helps identify the most resource consuming applications.
- Analyze history of Horizon events to isolate recurring problem patterns on specific Horizon nodes.
- Track license usage over time and determine if the Horizon environment will soon be running out of licenses.
- Report on Horizon client versions in use and highlight if specific users are using outdated versions of client applications.

5.5 Monitoring IGEL Environments

One of the key components of a digital workspace is the endpoint. If an endpoint is slow, user experience will suffer. IGEL endpoints are widely used by many organizations deploying digital workspaces and eG Enterprise v7.2 adds comprehensive monitoring and reporting for IGEL products.

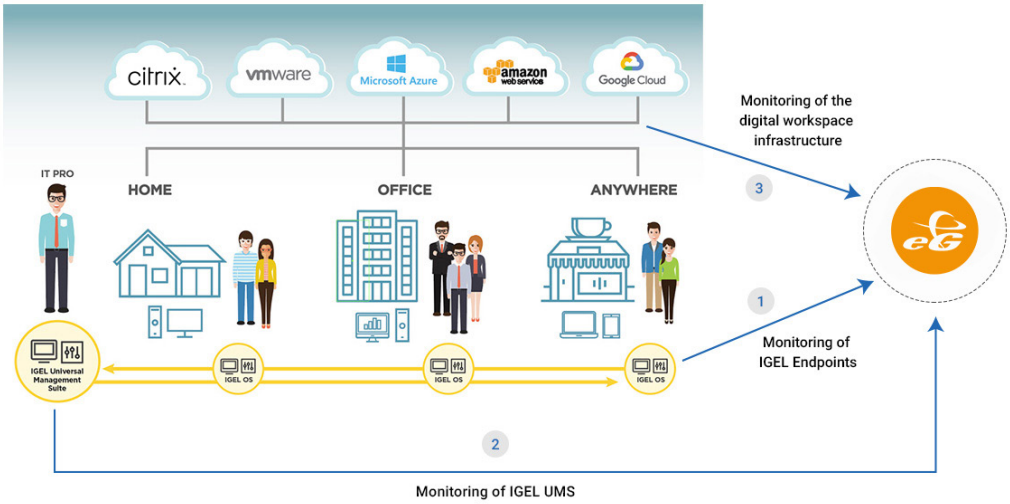


Figure 16: Integrating IGEL monitoring with that of your digital workspace service provides true end-to-end visibility

The different monitoring capabilities supported for IGEL products include:

- **Monitoring IGEL Endpoints:** eG Enterprise includes a new light-weight agent that can be deployed using custom partitions on the IGEL endpoints. Unlike the standard VM agent, the IGEL agent does not include a separate Java runtime environment (JRE). Instead, it leverages the JRE already available in the IGEL OS. This makes the endpoint agent even lighter than a VM agent.

  All the capabilities of a VM agent are available in the IGEL agent – monitoring CPU, memory, disk, top processes, TCP connections, system uptime, etc. In addition, these agents also report on the quality of their WiFi connection (if relevant) and the network latency.

  The IGEL agents push metrics to a pre-configured TCP port to an eG Enterprise remote agent. The remote agent to report to can be configured at the time of installation of the agent (ideal for a deployment at home), or

it can be configured when the IGEL agent first contacts an eG manager it is assigned to (ideal for a corporate network deployment).

For Citrix deployments, it is possible to map a specific endpoint based on its ID to a user session and for this to be displayed in the user session topology. This capability is not yet supported for other digital workspaces.

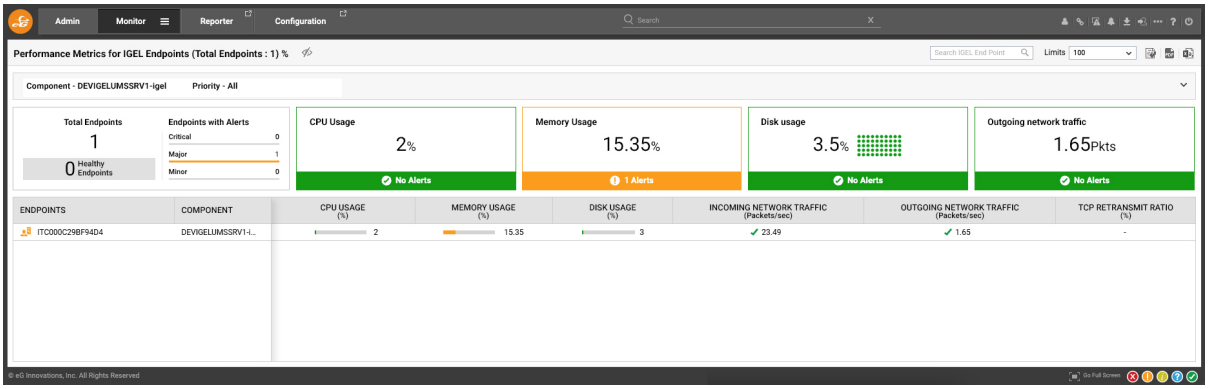


Figure 17: The IGEL Endpoints dashboard

- **Monitoring IGEL UMS:** The IGEL UMS controls the functioning of all IGEL endpoints and hence, is a core component of an IGEL architecture. IGEL UMS is built on top of Apache Tomcat and runs on a Java virtual machine. eG Enterprise's Java APM capabilities allow it to monitor IGEL UMS comprehensively. Administrators can answer several key questions about IGEL UMS using eG Enterprise:

  - Are the IGEL UMS servers available and responding well?
  - Do they have sufficient resources to handle the workload?
  - Is the UMS application configured correctly – does it have enough Java heap space?
  - Are any threads in the JVM blocking others or taking excessive CPU?
  - Are the key UMS processes operational?
  - Are the SSL certificates configured on UMS working and are they nearing expiry?

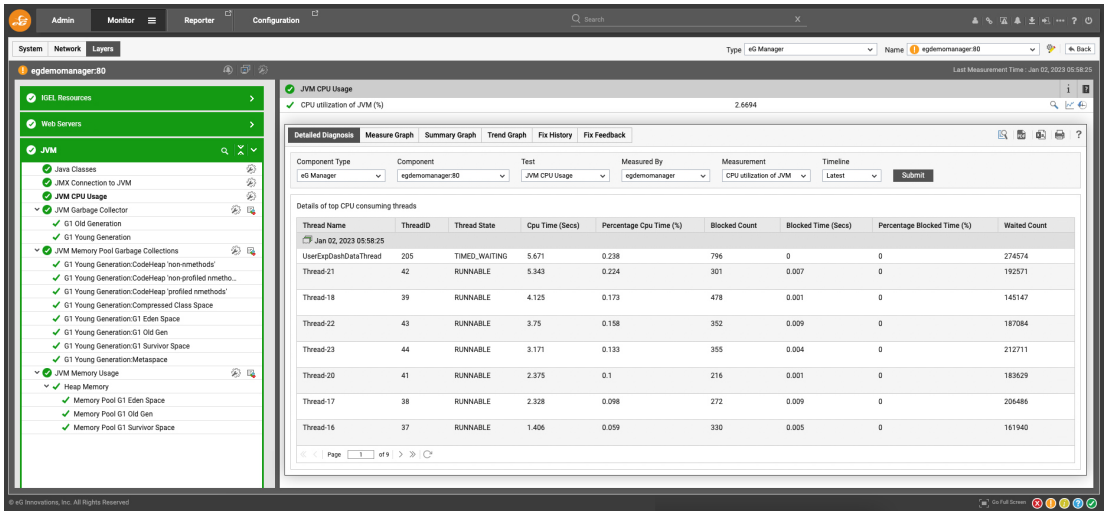


Figure 18: The eG Monitor for IGEL UMS reporting the CPU usage of JVM and the JVM threads causing the CPU contention

Many dashboards and reports specific to IGEL components are available in eG Enterprise as well.

5.6 Monitoring Physical Desktops

With users increasingly being remote, IT teams are finding it difficult to troubleshoot problems. After all, a slowness reported by a user may arise from a poor network connection, or a problem with the physical desktop that the user is accessing the infrastructure from. Monitoring of physical desktops is essential to understanding if there are any bottlenecks at the user end. Starting with eG Enterprise v7.2, you can monitor physical desktops using light-weight VM agents. The metrics collected on physical and virtual desktops are broadly similar. On physical desktops, it is important to monitor WiFi strength of the wireless connection. Latency to the local router, the 1st Internet router and to a known end point are also monitored on an on-going basis from each physical desktop.

	Virtual Desktop	Physical Desktop
CPU utilization monitoring	✓	✓
Memory utilization monitoring	✓	✓
Page file utilization monitoring	✓	✓
OS handle usage monitoring	✓	✓
Disk space and activity monitoring	✓	✓
Network traffic monitoring	✓	✓
TCP connection activity monitoring	✓	✓
Windows services monitoring	✓	✓

Logon monitoring	✓	✓
User input delay monitoring	✓	✓
User profile size monitoring	✓	✓
Application launch time monitoring	✓	✓
Browser activity monitoring	✓	✓
Active/Idle time monitoring	✓	✓
WiFi/Internet connectivity monitoring		✓
EUC Protocol performance monitoring	✓	

Figure 19: eG Enterprise monitoring capabilities for physical and virtual desktops

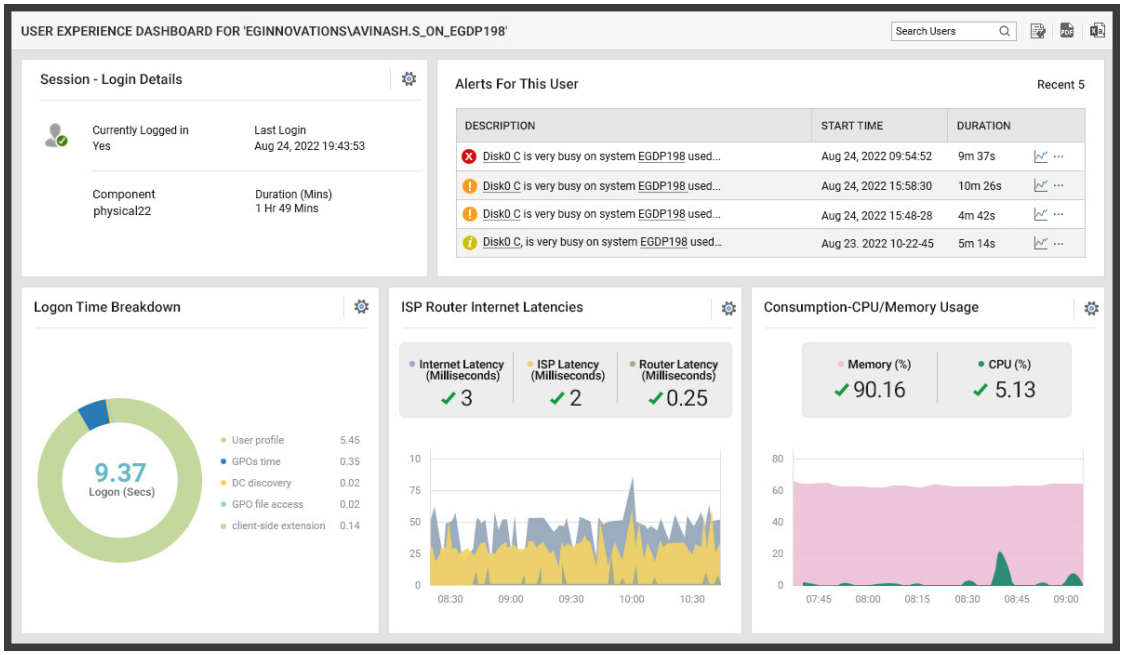


Figure 20: User experience dashboard for a user on a physical desktop

Most of the dashboards and reports for virtual desktops are also supported for physical desktops. This ensures that you get a consistent view of performance irrespective of the type of desktop in use.

5.7 New Features Applicable to All Digital Workspace Technologies

eG Enterprise v7.2 also includes a number of features that may be applicable to all digital workspace technologies supported:

- Previously, remote control was supported only for eG agents. VM agents could not be used to remotely execute commands on the target systems. With eG Enterprise v7.2, remote control of VM agents deployed on hypervisors (i.e., in a pull model from the remote agent to the VM agent) is now possible.

- The version of VM agents reporting to a remote agent in a pull model are now reported in the eG Enterprise admin console. This makes tracking of VM agent versions easier.

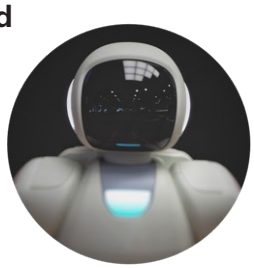
- GPU monitoring capabilities have been enhanced to include support for AMD and Intel GPUs. Monitoring of NVIDIA vGPUs has been updated to support the latest NVIDIA graphics cards.

6 Application Performance Monitoring (APM)

eG Enterprise's APM capabilities mainly fall into three main areas. Monitoring of user experience using synthetic and real user monitoring, transaction tracing and code level insights into application performance, and monitoring of the application server and application infrastructure platform (JVM, .NET CLR, etc.). eG Enterprise v7.2 includes enhancements in all of these areas.

6.1 Web Application Simulation Improvements

- **Support for TOTP-based 2FA support:** Two factor authentication (2FA) is becoming mandatory for many corporate applications. Time-Based One-Time Password (TOTP) is one of the most used 2FA authentication methodologies. TOTP generates a random 6-digit code that changes every 30 seconds by default and users have to key in the random code within the stipulated time to be able to login.



  To enable the eG Web App Simulator to securely simulate web application access, you can now configure the Web App Simulation Recorder with the secret key obtained from the target application and the variable used to store the TOTP passcode. During playback, the Web App Simulation then automatically generates the TOTP using the secret key and current time and provides this along with user credentials for user authentication.

- **Enhanced Usability of the Web App Simulation Recorder:** The Web App Simulation Recorder now offers greater flexibility in editing scripts. The key edit options are discussed below:

  - Cut/Copy/Paste options, using which you can easily modify the sequence of the simulated steps. You no longer have to remove and recreate an entire simulation, just to move around a few steps.

  - Option to enable/disable user activities as and when needed.

  - Breakpoint option, which helps you pause the simulation at any point to trouble-shoot issues in the script flow.

  - Wait time, which enables you to provision for inherent delays in loading of elements or page navigation during simulation.

  - Bypass option for SSL certificate errors, so that such errors are ignored and the simulation proceeds seamlessly during playback.

- Ability to automatically input dynamically-created text-based captcha values during playback, for authenticating logins to web applications.

6.2 Real User Monitoring Improvements

The focus on enhancements to Real User Monitoring (RUM) in eG Enterprise v7.2 is to support a broader range of applications and to provide additional insights into user experience.

- **Additional support for Single-Page Applications:** A Single-Page Application (SPA) is a web technology and design paradigm that reduces browser-level page loads by using JavaScript to fetch resources and build pages. This creates a smoother, faster user experience more like a desktop or mobile application than a traditional web page (without reloading the entire page). Single page applications have become very popular, with a number of different frameworks being used to support them. While earlier versions of eG Enterprise supported Angular and Angular JS frameworks only, eG Enterprise v7.2 has broader support. Applications using ReactJS, EmberJS, Vue.js, Meteor and Backbone.js are not supported. Furthermore, the process of instrumenting SPA for RUM has now been automated. This automation does not involve any application code change. This saves the time and trouble involved in this exercise, and minimizes the incidence of errors.

- **Detailed Metrics on Browser Rendering and Page Loading:** Using the Paint Timing API supported by modern browsers, eG Enterprise now reports the First Paint Time and First Contentful Paint Time measures. These measures cover the duration between when pixels are first drawn and when the first piece of DOM is rendered by the browser. If first paint is slow, the user will not be able to perceive the visual change during the loading of the web page. A slow first contentful paint will cause users to think that the web page is slow, even if it loads in a short time thereafter.

  The time taken for on-loading and unloading pages is also reported in this version. Any slowness in these operations can be attributed to events that may be triggered at the time of on-loading/unloading.

- **Optimizations to eG RUM Collector and eG Agent:** The following optimizations have been included to reduce overheads, latency, and traffic between the eG RUM Collector and eG agent.

  - The eG RUM Collector no longer stores the data it receives from the browser; instead, it processes the beacons in memory. This greatly reduces disk I/O.

  - Starting with this version, the eG RUM Collector processes the beacons it receives from the browser, asynchronously. This minimizes processes latencies.

  - Also, the eG RUM Collector does not ship all the raw data it receives to the eG agent anymore; instead, it sends only aggregated metrics to the agent. This reduces data traffic between the agent and collector.

6.3 Java Application Monitoring Enhancements

Java technologies continue to evolve at a fast pace. There are JVM versions released every 6 months. eG Enterprise v7.2 supports monitoring for all versions of JVM from 5.x to 19.x.

A new component model for the Jetty application server has been added in this version.

To simplify administration, a common component model for JBoss and Wildfly application servers has been adopted starting with this version of eG Enterprise.

Auto-discovery has been improved. The eG BTM jar file which is used to implement Java transaction tracing now has the capability to auto-discover and auto-manage common Java web application servers. So if Java transaction tracing is enabled along with VM or application provisioning, the corresponding applications will be automatically monitored by eG Enterprise.

Improvements to eG Enterprise's Java transaction tracing capability focus on improved security, more insights into the performance of third-party APIs used, and increased support for new JVM features. Key capabilities introduced are mentioned below:

- URL parameters in Java exceptions and error reporting are **masked for security.** Masking of cookie and header information is also supported.
- An Exceptions Trend Analysis report highlights the **top types of exceptions** being seen during runtime, the tiers and applications that are seeing the most exceptions, and the times when exceptions happen the most.
- A new SQL performance report that highlights the **URLs spending the most time on SQL queries** and therefore, the ones that are the best candidates for optimization. This report also provides a list **queries** and therefore, the ones that are the best candidates for optimization. This report also provides a list of top queries executed by the application with execution count and average time per execution. The top queries in this report are the ones that a developer needs to work on optimizing for enhanced application performance.
- Transaction tracing **support for most popular Java messaging service providers** including Jakarta messaging, Rabbit MQ and Spring JMS.
- Support for tracking time spent and execution of the **Java ExecutorService Framework has been added.**
- Applications using Java Servlet specifications 4.x and 5.x are now supported.
- **A new composite metric "satisfaction score"** is reported for each URL. This metric provides a value between 0 and 100 (100 being the highest satisfaction) and is computed as a percentage taking into account slow, stalled and error prone requests for a URL.
- The process for capturing Username and Business Context as part of transaction tracing has been greatly simplified. A special user interface is available in the eG administrative console, using which you can easily build rules for capturing the username and business context for Java transaction URLs as part of the detailed diagnosis of the Java Business Transactions test. This interface helps administrators save time, effort, and minimize errors that can happen when configuring rules manually.

- From the monitoring interface, administrators can not only see which queries are slow, but they can also quickly from the same context see if there are any associated alerts on the underlying database server, at the same time. This greatly simplifies troubleshooting of database related problems with Java applications.

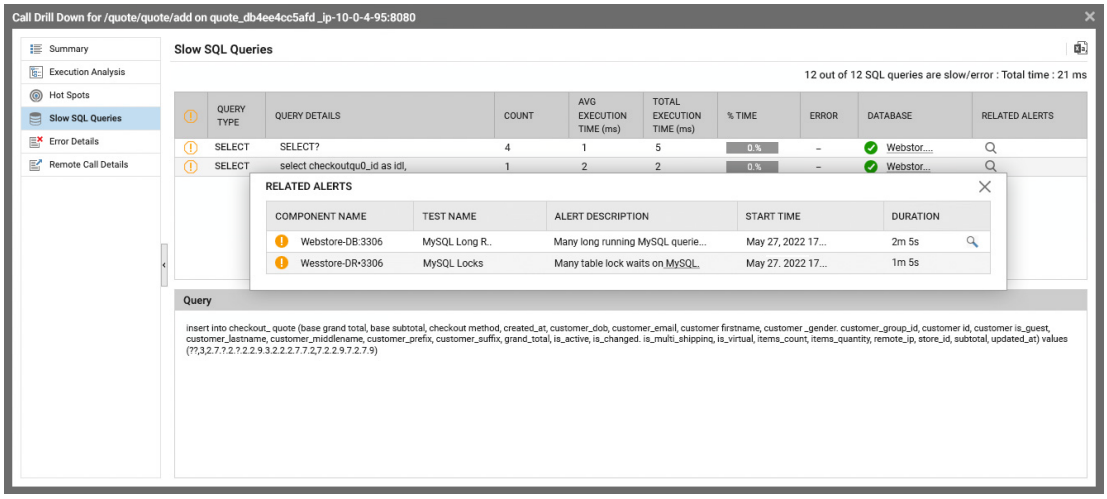


Figure 21: Displaying alerts for the database on which a query issued by slow transaction was executed

This capability is available for Java. .NET, PHP, and .NET Core transactions.

6.4 Enhancements to PHP Transaction Tracing

Transaction tracing for PHP applications provides insights into time spent processing requests and provides insights into slow method calls, loops and external database or web service bottlenecks. With eG Enterprise v7.2, PHP versions 8.0 and 8.1 are now supported.

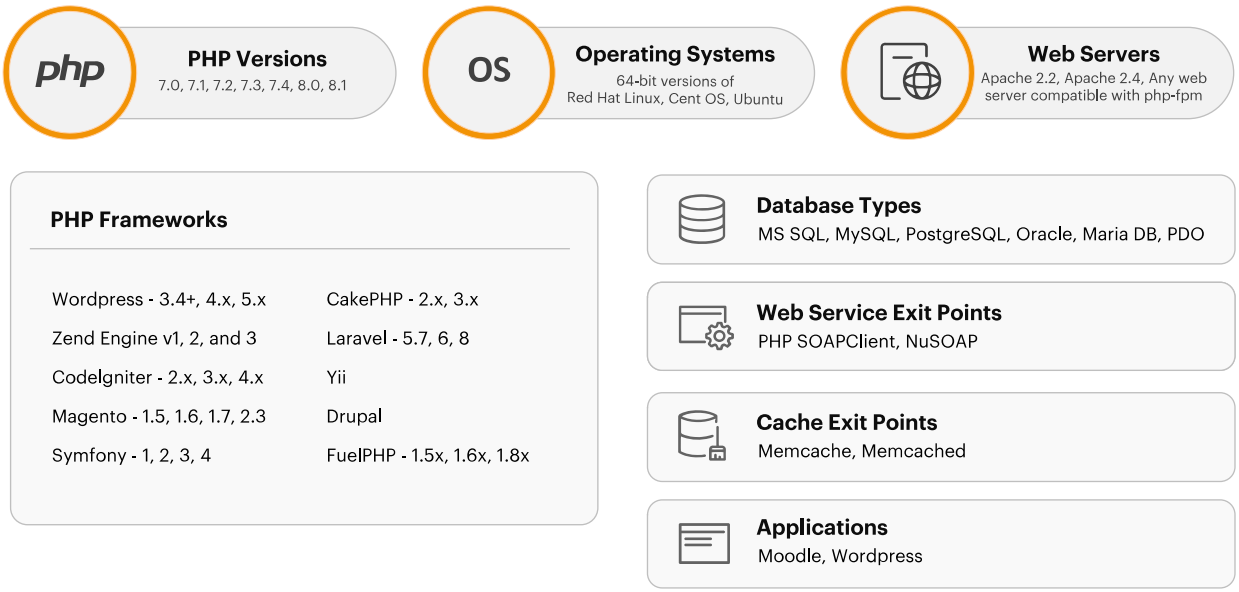


Figure 22: Support matrix for PHP transaction tracing

- Web service exit calls that use PHP SOAPClient and NuSOAP (v 0.9.5) can now be traced.
- Memcache, the caching daemon, is supported.
- The RUM-BTM integration capability can be enabled/disabled as required; this allows you the flexibility to switch off this capability if it increases processing overheads.
- Name-based virtual hosting for transaction tracing is now supported; this means that eG Enterprise can monitor transactions to all those web sites/domains/applications that share the same IP address.

6.5 Monitoring of Node.js Engine and Applications is Supported Now

eG Enterprise v7.2 adds support to monitor Node.js applications running on Windows, Linux, Kubernetes, and Docker containers. Node.js versions 10.0.0 to 19.1 are supported. Both agent-based and agentless monitoring can be used.

continual monitoring of the health of the V8 JavaScript engine integrated with built-in out-of-the-box alerting.

- For key resource usage metrics such as CPU usage and memory usage, drilldowns help identify the problematic JavaScript (JS) function(s).

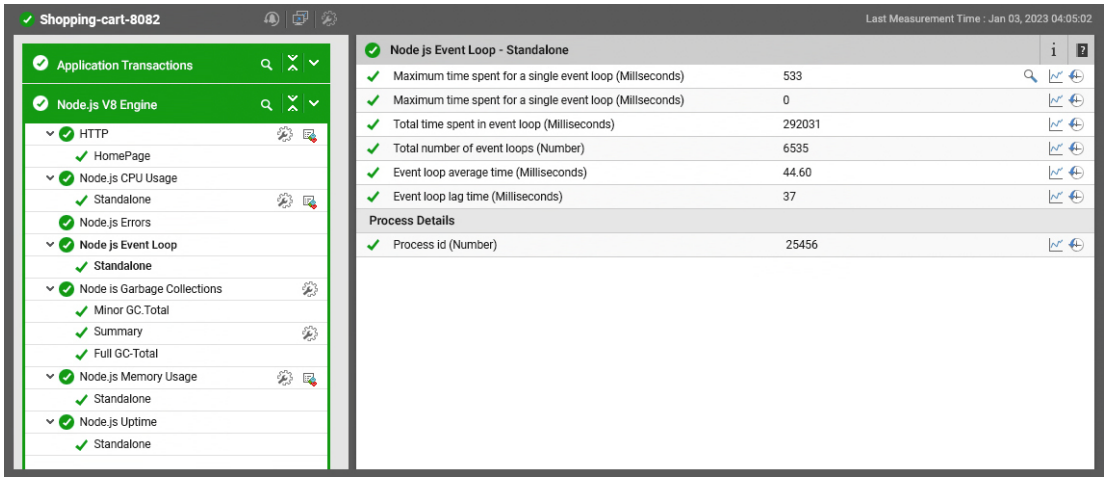


Figure 23: Node.js v8 engine monitoring

Just as Java application monitoring must include monitoring of the JVM/JRE and the application code, Node.js monitoring must include monitoring for the V8 engine and the JavaScript application code. eG Enterprise monitoring of the V8 JavaScript engines tracks heap memory, garbage collection, event loop processing and suspension metrics.

With eG Enterprise, you get proactive and

- Closely track the performance of the event loop and get alerts when the event loop lag is high.
- Easily identify the application that takes time to return control to the event loop.
- Track V8 engine uptime and report on any unusual restarts.

- Track Node.js worker threads and report CPU used, GCs executed and memory used by each thread.
- Monitor Node.js clusters and see resource usage for each worker node.

Node.js application monitoring allows deep insight into application transactions and identifies code level bottlenecks.

- Get application-level transaction details including per URL drilldowns and transaction details for each and every access to web and e-Commerce sites.
- Distributed transaction flow analysis leverages a tag-and-follow technique to trace transactions across multiple tiers – Node.js and other (Java, PHP, .NET) APM tiers.
- Additional contextual information is also captured. For example, when monitoring an e-Commerce website, details of what products are viewed and what are the most searched products, etc. are captured.
- Code level exceptions are tracked and captured including comprehensive exception reporting.

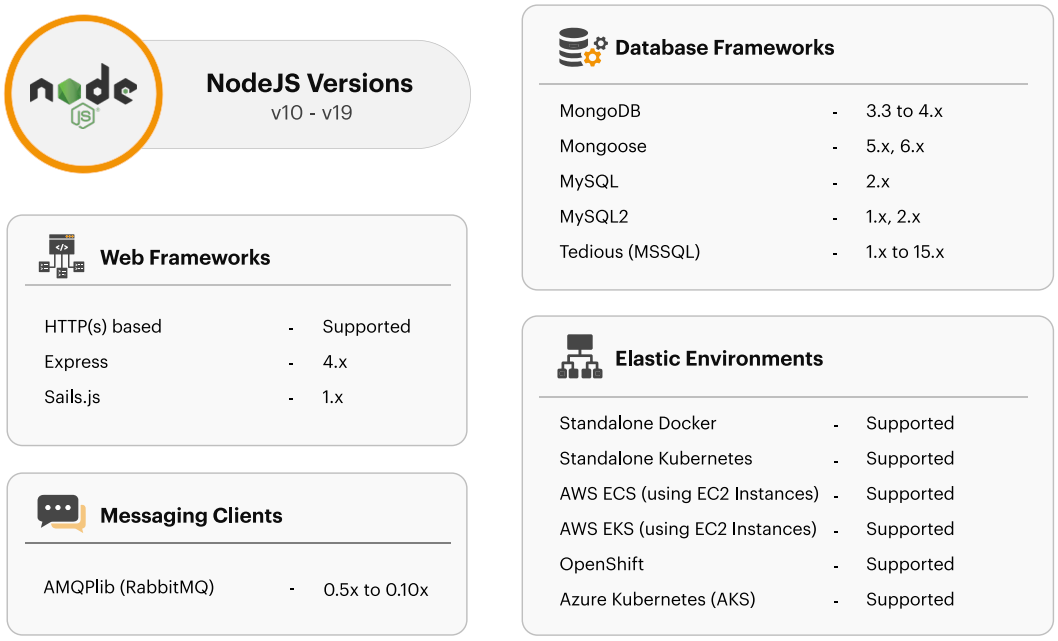


Figure 24: Support matrix for Node.js monitoring

- Automatic inspection and continual monitoring of database queries and database performance. Use the Slow SQL Queries feature to identify queries that are taking excessive or abnormal time to execute. All major database technologies including MongoDB, MySQL, PostgreSQL and more supported.
- Most of the reports supported for Java transaction tracing are also supported for Node.js applications.

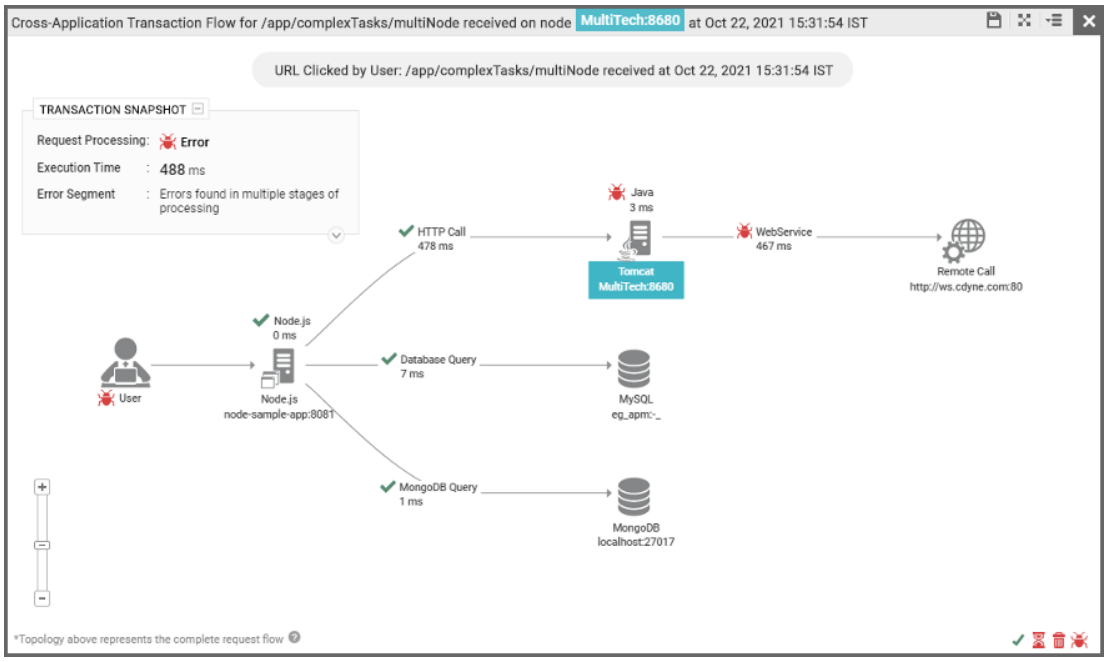


Figure 25: Distributed transaction flow of transactions in a Node.js application

6.6 Enhancements for .Net Transaction Tracing

- **Installation and operation** of the eG Enterprise Microsoft .NET Profiler which is the module that enables .NET transaction monitoring **has been simplified**. While previously .NET framework 3.5 was a requirement, now the .NET profile is compatible with .NET framework 3.5 and higher.

- eG Enterprise v7.2 is now able to trace .NET applications that make use of TIBCO enterprise messaging service, NLog service for logging, and PostGre SQL backend database access.

- Many applications use stored procedures to perform repetitive tasks on the database, quickly. For such applications, the **eG Enterprise .NET profiler is now able to report the time that a .NET transaction spent executing a stored procedure.** If a stored procedure is slowing down transaction execution, then drilling down from that transaction will now reveal the name of the procedure that was invoked along with its arguments.

- Many applications use asynchronous approaches to speed up processing and perform tasks in parallel. The **eG .NET profile can now track the the execution time of asynchronous calls made by a .NET transaction**. You can now quickly drill down from the cross-application topology of an unhealthy transaction to quickly see what asynchronous calls were initiated and how long they took.

- **Long running transactions are now captured and reported as stalled transactions** (based on the pre-configured stalled time limit). Detailed diagnostics for these transactions help you quickly diagnose the root-cause of the transaction stalls.

6.7 Support for Monitoring .NET Core Applications is Available

.NET Core is a general-purpose framework that may be used to build software applications for Windows, Linux, and MacOS. eG Enterprise v7.2 **now supports monitoring and profiling of applications using .NET Core v2.0 to v6.0,** on the following platforms:

- Windows Server 2012 (and above).
- 64-bit CentOS and Ubuntu.
- Kestrel web servers running in one of the following modes:
  - Kestrel as service.
  - Kestrel as standalone.
  - Apache web server running as reverse proxy to kestrel web server.

The eG .NET Core Profiler operates in the same manner as the eG .NET Profiler. Transaction tracing is performed using a tag-and-follow technique. The traced transaction path is captured into an auto-constructed transaction flow topology. This topology representation reveals where in the transaction path the bottleneck lies. Smart drill downs lead you to a method-wise breakdown of the transaction responsiveness, thus enabling you to accurately identify the method/query/call that is adversely impacting transaction performance.

eG Enterprise can also now monitor .NET Core applications running as an Azure App service. Additionally, .NET and .NET Core applications that are not web-based and run as Microsoft Windows services can also be monitored with eG Enterprise.

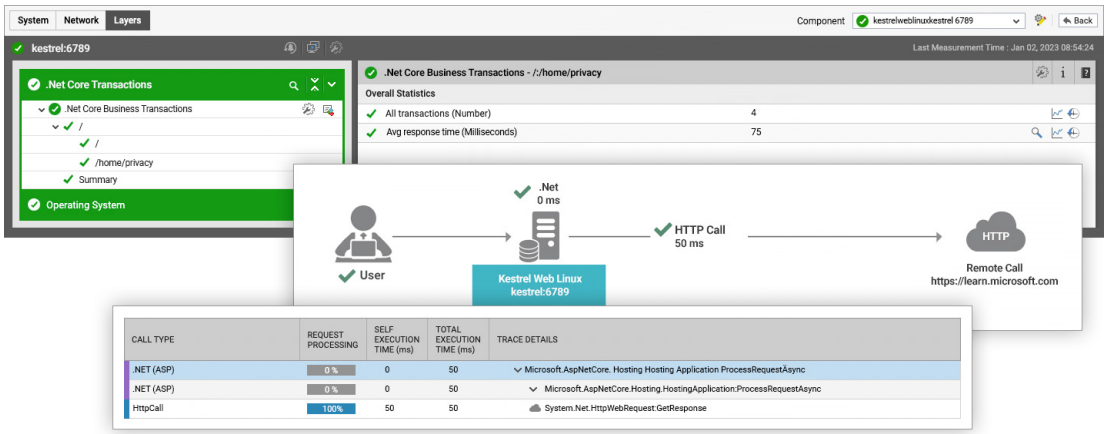


Figure 26: Use a simple sequence of mouse clicks to diagnose the root-cause of poor transaction performance for .NET Core applications running on a web server

7 Enterprise Application Monitoring

Enhancements in this area have focused on new capabilities and dashboards for Microsoft Office 365 monitoring, additional metrics for Zoom monitoring and new capabilities for monitoring the SAP application stack.

7.1 Enhancements for Microsoft Office 365 Monitoring

Microsoft has been adding new APIs to allow third-party tools like eG Enterprise glean more insights into Office 365 performance. eG Enterprise v7.2 includes many key capabilities for Microsoft O365 monitoring:

- **Webhooks for Real-Time Call Records in Teams:** Previously, Teams call records were published only once every 4 hours by Microsoft for API-based access from monitoring tools. The new Microsoft Graph API's Webhook mechanism provides near real-time measures of call quality. This technology delivers change notifications to clients within minutes of call completion. This helps with more timely and quick issue resolutions. eG Enterprise v7.2 has webhooks support to enable this capability.

- **Email Path Simulation:** Email is a key IT service these days. A delay anywhere in the mail path can slow down business operations and cause an enterprise to incur huge losses in terms of revenue and reputation. To proactively identify, investigate, and resolve mail routing issues, administrators should monitor the mail flow path.

With the new Email Path Flow simulation in eG Enterprise v7.2, you can continuously monitor the mail sent and receive status as well as time taken for email delivery across multiple domains – e.g., from your internal network to gmail, from one location to another, etc. This information can be used by helpdesk teams to quickly identify mail delays/failures, and precisely pinpoint where the bottleneck is – is it because the sender failed to / was slow in sending emails? Is it because the receiver failed to / was slow in receiving the emails? Or is it because of an issue at a specific hop en-route?

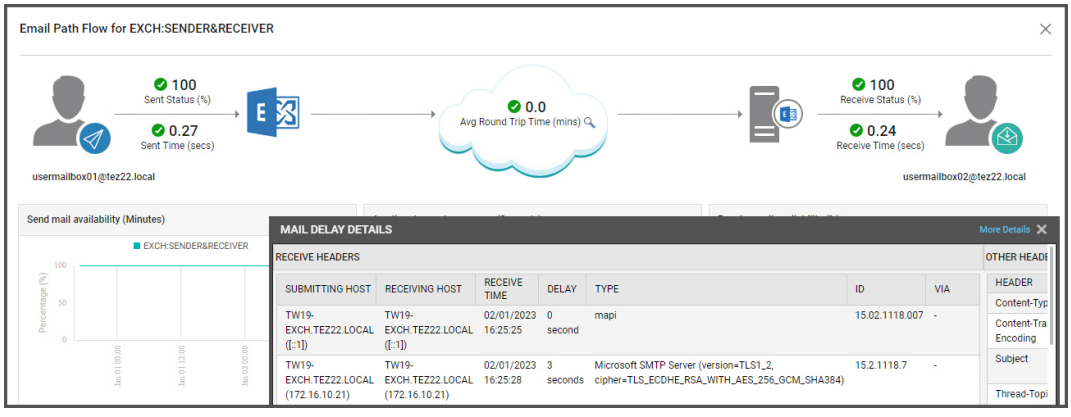


Figure 27: Email path flow representation with detailed metrics revealing the exact hop at which a delay occurred

- **O365 User Dashboard:** With the new user dashboard, admins can get a quick view of top users performing mail activities, using the largest amount of storage, etc. They can drill down from this dashboard to into usage details of specific users. A search option is also provided, so an admin can search a user and immediately access their Office 365 usage and call statistics.

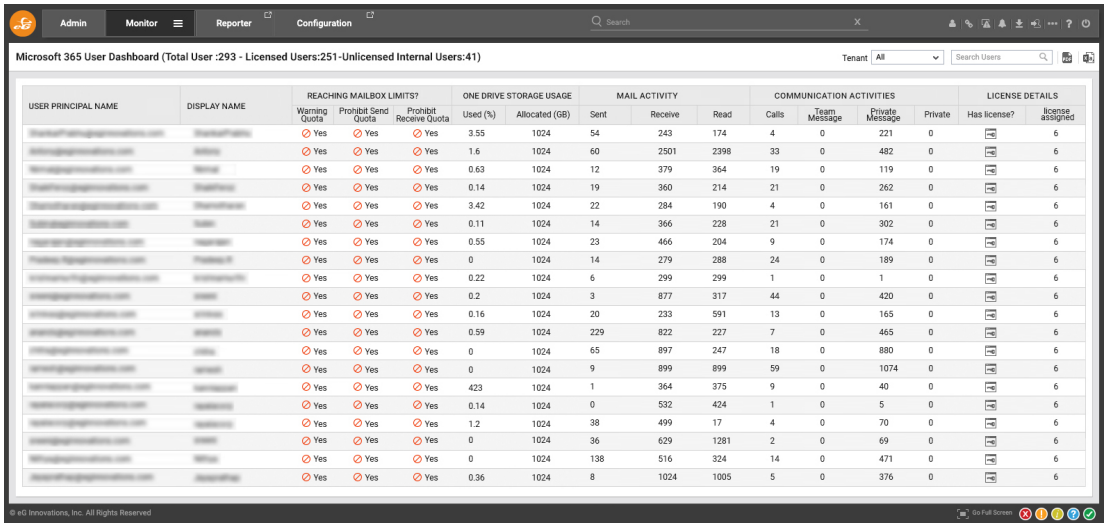


Figure 28: Office 365 User dashboard

- **Support for Modern Authentication:** eG Enterprise supports Certificate Based Authentication (CBA) or app-only authentication now which enables modern authentication in unattended scripts/automation scenarios by using Azure AD apps and self-signed certificates. This means that a certificate and a tenant name can be supplied instead of O365 admin credentials to collect performance metrics via O365 APIs.

- **Yammer Monitoring:** eG Enterprise 7.2 introduces built-in monitoring and reporting capabilities for Yammer, the collaboration service that is part of O365.

- **Additional reports** have been added for reporting on O365 usage. These include reporting on least active users, all user logins, call quality reports on Teams calls and an overview of OneDrive performance.

7.2 SAP Monitoring Enhancements

For customers using eG Enterprise to monitor SAP applications, we have added several new capabilities:

- **SAP Business Technology Platform (Neo Environment).** Neo is a feature-rich and easy-to-use development environment, allowing you to develop Java, SAP HANA XS, and HTML5 applications. eG Enterprise v7.2 provides a specialized monitoring model for SAP Neo, using which administrators can keep close tabs on the availability, overall health, resource usage, and status of the Java and SAP HANA XS applications deployed on the Neo platform. Applications experiencing performing degradations, resource contentions, and upload failures are highlighted in the process.

eG Enterprise v7.2 also offers a One-click SAP Neo Dashboard. This dashboard helps administrators assess the performance and resource utilization of the applications and identify those applications that are experiencing slowdowns at a single glance.

- **SAProuter** is a standalone program that protects your SAP network against unauthorized access. Since issues in the availability and overall performance of the SAProuter can threaten the safety and security of the SAP network, eG Enterprise v7.2 offers comprehensive monitoring support to the SAP router. This eG Monitor promptly captures issues in router operations, brings them to the notice of administrators, and enables them to take action before network security is compromised. You can also use the SAProuter dashboard to rapidly spot connection failures, error conditions, and SSL certificate expiry.

- **SAP HANA Extended Application Services** are now monitored. With eG Enterprise v7.2, you can now track the status of every HANA XS application instance, and identify those instances that have suddenly stopped or have crashed.

- Monitoring support is now available for **SAP Lumira.** Alerts are sent out if the Lumira server process is not sized with adequate JVM memory, if JVM lock contentions are noticed, or if error conditions are logged in the server logs.

- **New SAP Dashboards:** One-click dashboards are available in v7.2 for SAP ABAP, SAP Java, SAP Web Application, SAP BOBI, and SAP Dispatcher. Improved visual representation of performance data eases analysis, facilitates prompt problem detection, and enables quick and accurate root-cause diagnosis.

8 Unified, End-to-End Monitoring

Many customers rely on eG Enterprise to provide them a single pane of glass across all the technology stacks they use, including network, server, virtualization, cloud, containers, etc. eG Enterprise v7.2 includes several new capabilities to broaden its reach.

8.1 Container Monitoring Enhancements

8.1.1 RedHat OpenShift Monitoring

Augmenting eG Enterprise's existing support for micros-ervices, containerization and orchestration framework technologies such as Docker and Kubernetes, v7.2 introduces enhancements for the monitoring of Red Hat OpenShift.

Red Hat OpenShift offers a secure enterprise-grade container application framework based on Kubernetes for both traditional and cloud-native applications. eG Enterprise supports the monitoring of the whole OpenShift stack architecture including:

- **Monitoring Kubernetes that is used for Orchestration:** Auto-discovery of the OpenShift deployment through integration with Kubernetes APIs is now possible. To handle containers that can be ephemeral, eG Enterprise reporting has been enhanced so IT admins can view metrics from currently executing containers, but they also have the option to report on containers that may have existed in the past. This capability is also useful in cloud environments where auto-scaling is configured.

- **Monitoring the RHEL Core OS/CRI-Engine on worker nodes and their containers:** CRI-O monitoring is agent-based. A separate container agent has to be deployed on each CRI-O node. The agent can be deployed as a DaemonSet, or a Red Hat certified Kubernetes Operator can be used for this purpose.

- **Monitoring applications running on containers:** The container agent on a CRI-O node discovers all the containers on that node and the applications running in each container. Agentless monitoring techniques are used by the container agent to collect performance metrics from all the containers and their applications. Applications running on containers can be configured to be auto-discovered when a container starts, and to be deleted from the monitoring automatically, when the container stops or is removed.

8.1.2 Podman Monitoring

Podman is a daemonless container engine for developing, managing, and running OCI Containers on your Linux System. Podman manages the entire container ecosystem which includes pods, containers, container images, and container volumes. eG Enterprise v7.2 provides indepth insights into the Podman container engine. Administrators are alerted if the Podman service is down, or if any container has stopped running or has been removed/paused. Images that are not mapped to containers are also brought to the notice of administrators. The resource utilization of each container is tracked periodically, and the resource hungry containers are identified.

8.2 Public Cloud Monitoring Enhancements

Version 7.2 includes enhancements to support new services and increase the visibility for services already supported with Amazon AWS and Microsoft Azure.

8.2.1 AWS Monitoring Enhancements

- **AWS Roles for Monitoring:** Previously, AWS Access key and Secret key had to be provided for monitoring an AWS account. AWS best practice recommends that keys be changed often. Following this could result in a lot of effort for reconfiguring AWS monitoring. eG Enterprise v7.2 now integrates more securely with AWS CloudWatch. Pre-defined roles are used for authentication, rather than using access and secret keys. The new approach reduces the manual intervention needed to update keys, improving security as a result.

- **AWS Trusted Advisor Integration:** This service identifies ways to optimize your AWS infrastructure, improve security and performance, reduce costs, and monitor service quotas. You can now view the optimization

recommendations of Advisor in the eG monitoring console itself. This way, you are quickly directed to problems and the means to mitigate them. This enables you to rapidly implement the recommendations and improve the overall performance of the AWS infrastructure.

- **AWS Billing Integration:** AWS Services are pay-as-you-go. By monitoring the billing service, you can track your bill in near real-time and get alerted when your bill grows beyond the expected limit.

- **AWS API Gateway Monitoring:** Amazon API Gateway is a fully managed service that makes it easy for developers to create, publish, maintain, monitor, and secure APIs at any scale. Version 7.2 measures the efficiency of this service by reporting:

  - Whether/not the API cache is used effectively to serve requests.

  - How quickly the API gateway receives and responds to requests from/to clients/backends.

- **Monitoring Amazon Connect:** Amazon Connect is an AWS public cloud customer contact center service that enables customer service representatives to respond to phone calls or chat inquiries from end customers just as if the contact center infrastructure were set up and managed on premises. To help administrators diagnose the root-cause of poor help desk quality, resolve it, and restore end customer faith in the support services and the Amazon cloud platform as a whole, administrators should continuously monitor Amazon Connect.

eG Enterprise v7.2 deep insights into the health and operations of Amazon Connect. Using this Monitor, administrators can find quick and accurate answers to the following questions:

- Is the Amazon Connect instance unavailable?

- Are inbound and outbound calls enabled in the target instance?

- Is the contact center unable to service requests quickly? If so, why? - Is it due to too many agents in error state? Or is due to too many agents being non-productive? or is it due to too many contacts contacting the contact center? or is it due to unavailability of slots?

- How well the contacts are handled by the agents? Are the number of abandoned and missed contacts high? Is the time that a contact spends in a queue and the call abandon time high?

- Is there any anomalous behaviour detected in the Amazon Connect Instance? Is this due to high number of missed voice calls, throttled calls, error in uploading call recording due to lack of space in Amazon S3, or call failure due to misconfigured phone number, etc.?

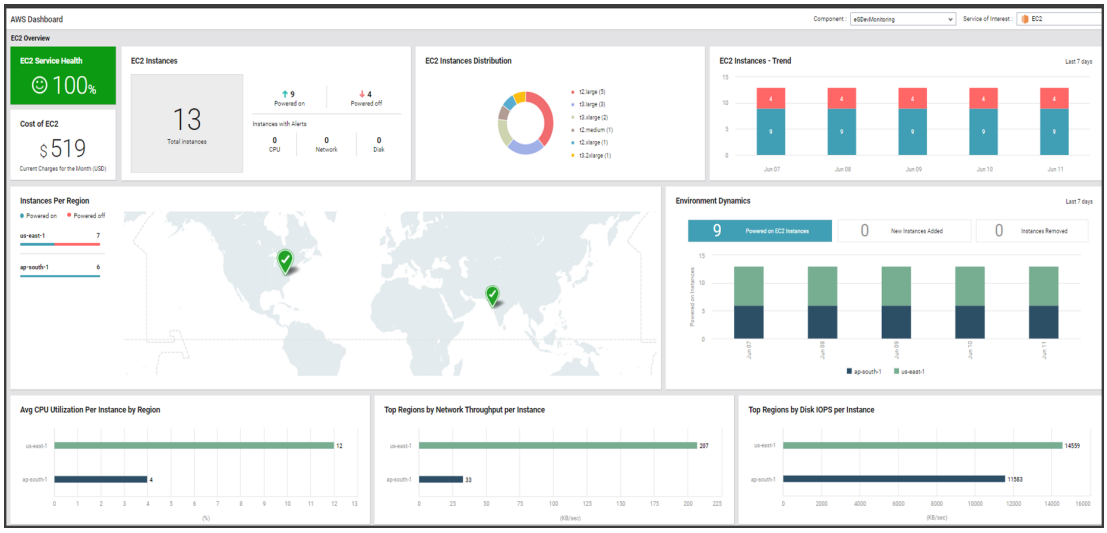


Figure 29: New AWS monitoring dashboard in eG Enterprise

- **New dashboards:** New dashboards are available out of the box to visualize key Amazon AWS metrics. Pre-built dashboards are available for EC2, S3, RDS and EBS.

8.2.2 Microsoft Azure Monitoring Enhancements

- Monitoring is now done **subscription by subscription,** allowing simpler visualizations and better user workflows.

- **Monitoring support is now available for many new Azure services.** Popular services now supported include:

  - **Azure App Services:** With Azure App Service, you can build and host web apps, mobile back ends, and RESTful APIs without managing infrastructure. eG Enterprise v7.2 auto-discovers the web apps hosted by the Azure App Service, and tracks the status, CPU usage, memory usage, network traffic, request workload, response time, etc. of each web app. Resource-hungry, overloaded, latent web apps can be accurately isolated in the process.

  - **Azure Firewall and VPN Gateway Monitoring:** eG Enterprise v7.2 provides monitoring support to Azure Firewall and VPN gateway by the Azure App Service.

  - **Azure Quota Usage Details:** Each Azure subscription comes with a default limit for every resource in Azure for a particular region. With eG Enterprise v7.2, you can be proactively alerted if any resource is about to exhaust its quota limit.

  - **Azure Log Analytics:** Log Analytics is a tool in the Azure portal to edit and run log queries from data collected by Azure Monitor logs and interactively analyze their results. You can now use eG Enterprise to monitor each log analytics workspace, identify the workspace that has many log entries, and rapidly isolate the logs that are occupying too much space.

- **Azure Backup Service:** Starting with v7.2, you can be promptly alerted whenever the Azure Backup Service fails to run a backup job.

- **Azure Advisor:** Azure Advisor is a Microsoft Azure service that provides recommendations based on your deployed Azure services. eG Enterprise now captures and reports the cost, availability, and performance-related recommendations offered by Azure Advisor.

- **Azure Billing:** Azure Billing helps you view aggregated costs to understand where costs occur over time and identify spending trends. Using eG Enterprise v7.2, you can easily determine the total billing cost across all resources for the current month, and be alerted if the billing cost for the month exceeds a certain limit. You can also precisely pinpoint the resource type that is the costliest, and can further drill down into that resource type to identify the exact resource of that type that costs the maximum.

Additionally, without needing to write Kusto queries, you can now identify unused disks, network interfaces, public IPs, resource groups, and more, and save on Azure costs.

8.3 Other Infrastructure Monitoring Enhancements

A host of other monitoring capabilities have been added in v7.2. Modern applications make use of several Apache applications and middleware components. Monitoring support for many of these has been added in eG Enterprise v7.2. The supported technologies page provides details of these components.

Figure 30: New technologies supported in eG Enterprise v7.2.

Support for new versions of technologies already monitored by eG Enterprise has also been added.

v21c	v6.5	v19	v2022
v8.5	v2022	v10	v8
v9	v14	v12	v7.3

Figure 31: eG Enterprise also supports new versions of several technologies

Enhancements in this release cover the complete spectrum of infrastructure technologies including virtualization, server, storage and networking.

9 Architectural Improvements in eG Enterprise

A number of architectural improvements have been introduced in this version.

9.1 Installation Improvements

- Admins now have the ability to remotely push and install eG agents from the eG Enterprise manager console itself. This capability is ideal for an on-premises deployment of eG Enterprise.

- For a SaaS/multi-tenant environment, eG Enterprise now includes an agent installer – a standalone Windows tool that can be used to deploy and control agents at scale from a central location.

- Single line command-based installation of eG agents is now supported as well for Windows and Linux platforms. This is ideal for integration with orchestration tools where scripts drive the complete infrastructure and application deployments.

- Compression is used during communication of configuration details from the manager to agents, reducing the bandwidth consumed significantly. This capability will be useful for distributed deployments where the agents and manager are separated by a WAN.

9.2 Remote Control Enhancements

- Many new remote control commands have been added, offering more granular control and a wider range of operations.
- Remote control of VM agents deployed to support metrics pull by the remote agent is now possible.
- Enhanced auditing capabilities ensure that the actions of users executing remote control commands on remote systems are recordable and auditable to ensure administrator actions are accountable, compliant and best practice.
- Enhanced RCA access controls now allow granular control over which commands each user can execute allowing rigorous security policies to ensure powerful and invasive commands are restricted strictly to those both qualified and security vetted to execute them.

9.3 ITSM Integrations

New integrations with SalesForce, BMC Remedy, TOPdesk, Freshdesk and ServiceNow ITOM are now supported for automatic incident management. Moreover, the eG manager can be integrated with more than one ITSM tool. This is ideal for SaaS environments, where each customer (tenant) may be using a different tool.

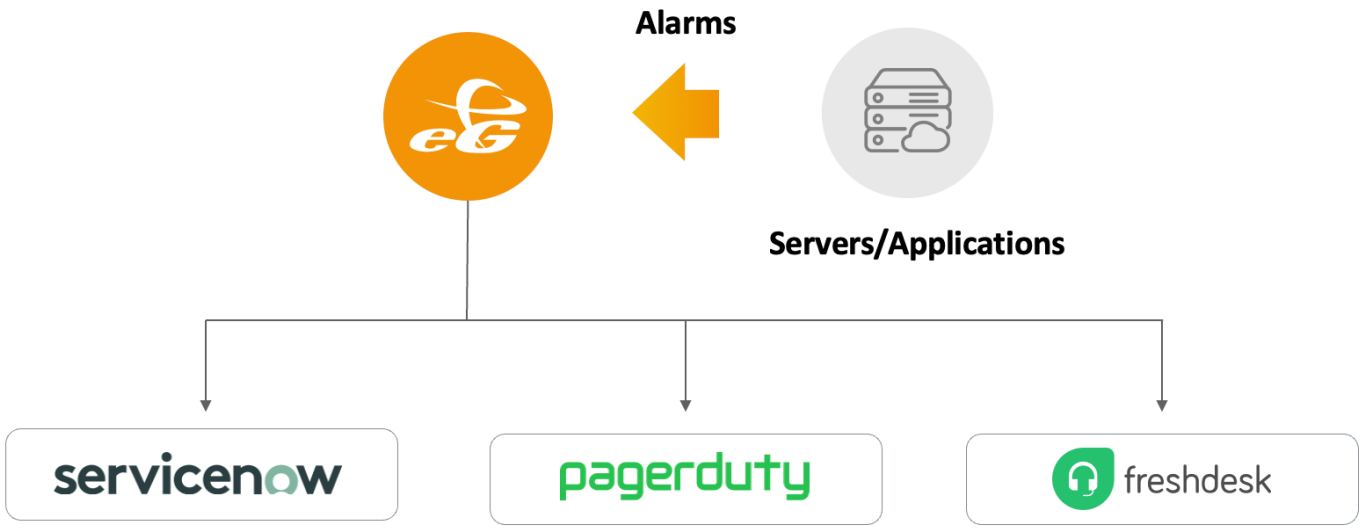


Figure 32: Multiple ITSM tools can now be integrated with an eG Enterprise manager

9.4 New Incident Management Panel with Improved Root-Cause Diagnosis Display

A new incident management panel allows IT admins to easily view, acknowledge, sort, search and delete alarms or events. Importantly, a view to display cause/effect relations between alarms has been introduced. This makes it easy for IT managers to see where the real problems lie and quickly understand which alarm reduced the priority of another alert.

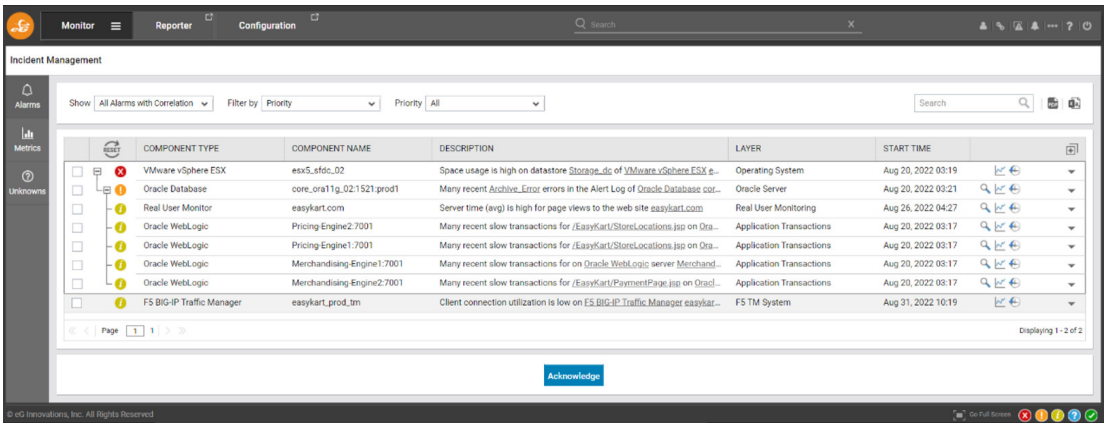
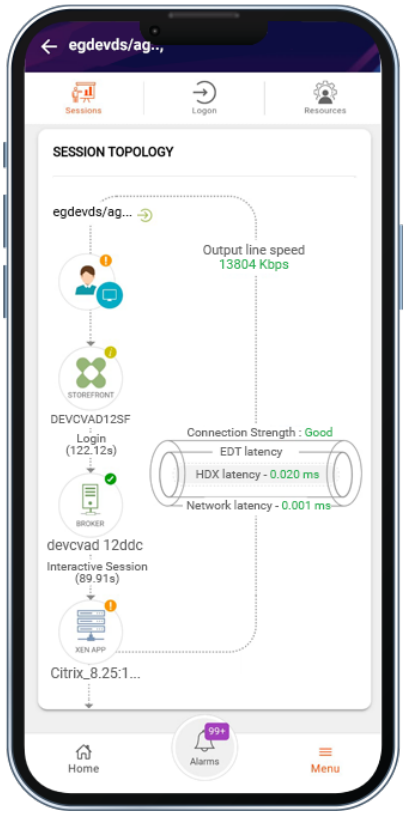


Figure 33. New incident management panel clearly highlights how alarms have been correlated and which alarm is the root-cause and which ones are the effects.

9.5 Mobile App Enhancements

Several new additions to the eG Monitor Mobile App have been made to make it more functional. The additions are intended to bring many of the capabilities available in the eG Enterprise web console to the mobile app:

- New and enhanced screens have been added including Monitoring Dashboard, User Profile Screen, Real User Monitoring (RUM) Dashboard Alarms Screen.
- New mobile-optimized UI (User Interface) components, gestures, and tools have been used to make the mobile app fast and more interactive.
- Alerts can be sent to the mobile device via SMS or email. eG Mobile App has transitioned from Urban Airship to OneSignal Gateway.
- Single sign-on using SAML is also supported now for user authentication.



9.6 Optimizations for eG Manager Performance/Scalability

- Bandwidth usage during agent-manager communication has been optimized by enabling the agent to download only those configuration changes that apply to it.
- Configuration changes are now updated to the eG manager faster by processing these changes in the background.
- The eG agent and manager now communicate asynchronously, so that slowness in database inserts does not impact scalability or increase storage overheads of the eG agents.
- The eG Manager – Active Directory communication (for monitoring or SSO) is now encrypted by channel binding and digital signing.
- In this version, you can choose between the JTDS JDBC driver and the Microsoft SQL JDBC driver for Microsoft SQL database access from the eG manager.
- Now, the eG manager performs automatic reindexing for default tables (e.g., tables used to maintain alert information, meta information about components being monitored, etc.) as well. This minimizes admin involvement in manual maintenance of the eG Enterprise system.
- The older, slower single threaded model, which was used for sending email alerts, has now been replaced by a modern, more efficient multi-threaded model. In the new approach, a thread pool is used for sending email alerts.
- Email alerts are now cached, thus optimizing the processing of the same email to multiple users.

9.7 Automation and Security Monitoring Enhancements

In this version, automation capabilities have been added in a domain-specific manner. Previously, IT admins could add their own scripts for automatic correction of anomalies. Rather than leave the corrective action entirely up to the admin to create, eG Enterprise agents now include specific automation capabilities. For instance, if an RDP or ICA session is in a disconnected state for a long time, it keeps using server/desktop resources unnecessarily. Instead of this, an IT admin can configure eG Enterprise to automatically logoff a disconnected session after a configured time delay. In the same manner, if a system is running low on disk space availability, eG Enterprise agents can be configured to cleanup specific files/folders in different pre-specified locations. This could help in a scenario where an OS upgrade in a scenario where an OS upgrade has aborted mid-way and is still using up a lot of disk space.

eG agents for Microsoft Windows OS have also been enhanced to perform security checks on the systems they are installed on. New files created/updated on root drives or system folders, services configured/running with vulnerable privileges, etc. can be detected and alerted to admins.

10 Conclusion

As you can see, eG Enterprise v7.2 includes a wealth of new capabilities and improvements to existing monitoring capabilities. The goal of these enhancements is to provide customers with all the key capabilities they need as they look to modernize their IT infrastructures and IT operations.

It is easier than ever before to test drive eG Enterprise. To start a no hassle, quick trial, just connect to https://www.eginnovations.com/it-monitoring/free-trial.

About eG Innovations

eG Innovations provides the world's leading enterprise-class performance management solution that enables organizations to reliably deliver mission-critical business services across complex cloud, virtual, and physical IT environments. Where traditional monitoring tools often fail to provide insight into the performance drivers of business services and user experience, eG Innovations provides total performance visibility across every layer and every tier of the IT infrastructure that supports the business service chain. From desktops to applications, from servers to network and storage, eG Innovations helps companies proactively discover, instantly diagnose, and rapidly resolve even the most challenging performance and user experience issues.

eG Innovations' award-winning solutions are trusted by the world's most demanding companies to ensure end user productivity, deliver return on transformational IT investments, and keep business services up and running. Customers include Anthem, Humana, Staples, T-Mobile, Cox Communications, eBay, Denver Health, AXA, Aviva, Southern California Edison, Samsung, and many more.

To learn more visit www.eginnovations.com