

# EPIC SOLUTION OVERVIEW

“ Goliath was able to identify several issues within my infrastructure and we were quickly able to resolve the issues. Within one month we saw a drop in the number of tier 1 support tickets by 25%. ”

- **Chad Brisendine, CIO, St Luke's University Health Network**

By The Goliath Technologies Technical Team



**Goliath Technologies** is an approved application available in the **Epic App Orchard**

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## Introduction

Focused on the end-user experience, Goliath links Epic with the entire virtual desktop infrastructure used to deliver mission-critical applications including Epic. With our industry-only purpose-built Epic module containing embedded intelligence and automation, health systems using Epic can anticipate, troubleshoot and prevent end-user experience issues before they are impacted to improve the clinician and patient experience.

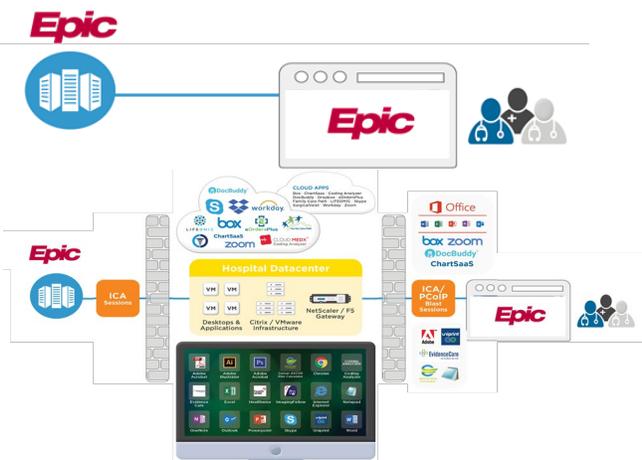
Health IT professionals can now:

- ▶ Have an end-to-end view of Epic, end-user experience, and VMware Horizon/Citrix metrics
- ▶ Isolate root cause and troubleshoot performance issues reducing remediation time
- ▶ Collaborate with Epic with actionable intelligence for data-driven conversations
- ▶ Proactively monitor to detect and resolve issues before end users are impacted
- ▶ Prevent issues with historical reporting for trending and analysis
- ▶ Purchase Goliath software directly from Epic AppOrchard

## End-to-End Visibility Requires 3<sup>rd</sup> Party Tools

While Healthcare IT leaders take great care in choosing the right Electronic Health Records system, many underestimate the complexity of the virtualized desktop delivery infrastructure like Citrix and VMware Horizon and the critical role it plays in providing access to Epic and other mission-critical applications. Desktop delivery infrastructure requires specific attention and tools to properly support it.

The reality is that an organization's desktop delivery infrastructure, and performance requirements for delivery of other applications, may negatively impact end-user experience with Epic. Understanding how the performance of the delivery infrastructure impacts the end-user experience requires powerful, purpose-built tools that allow Health IT to proactively anticipate, troubleshoot, and prevent access and performance issues. Without these tools, the true root cause of performance issues cannot be established and corrected. Furthermore, the hospital IT department will not have the performance metrics to have data driven conversations with management, counterparts in other departments, Epic and or other vendors so they can collaborate to determine root cause, document and fix issues permanently.



### Fig. 1 Perception:

Epic is sole root cause of any performance issues.

### Fig. 2 Reality:

There are many failure points. First, the connection goes through the hospital data center. Then, other applications are delivered with Epic further complicating the process.

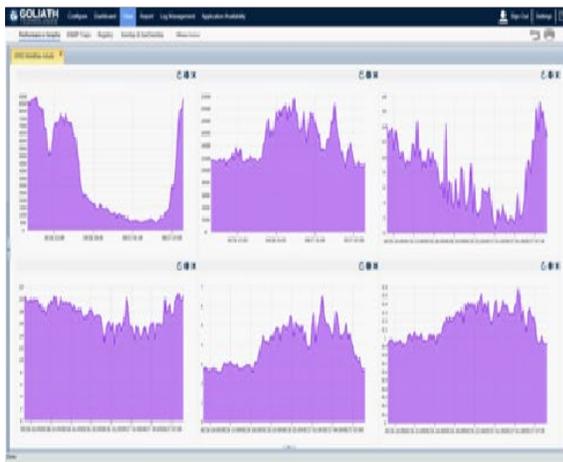
## Epic System Pulse Integration

Goliath Performance Monitor's module for hospitals using Epic provides a unified view combining performance metrics for Epic System Pulse, the end-user experience, and the underlying Citrix or VMware Horizon virtualization delivery infrastructure. This is the only IT operations software with purpose-built technology to integrate these three data sources to help Healthcare IT proactively anticipate, troubleshoot and prevent end-user experience issues.

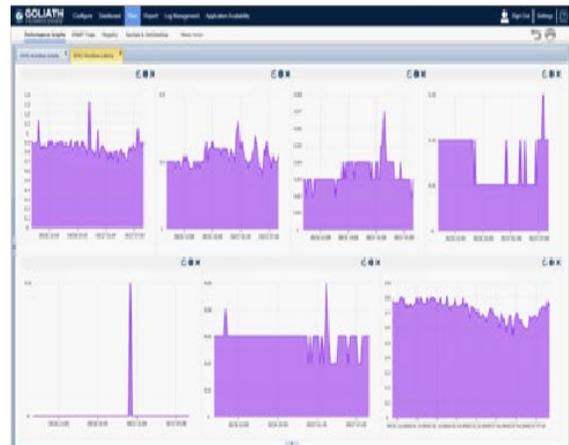
There are many factors external to Epic's core systems that can affect application access, user logon speed, network latency, and system latency. These areas are key to the end-user experience and are often root causes of end-user frustration and support requests. With integrated metrics from these three areas, system administrators can easily isolate root cause anywhere in this complex environment. Additionally, the software's embedded intelligence and automation provides performance thresholds to proactively monitor events and conditions that precede end-user experience issues and resolve them before users are impacted. This combination of a proactive solution with broad and deep visibility alleviates frustration for end users and system administrators alike.

For hospitals using Epic, Goliath brings together the Epic System Pulse metrics, such as Workflow Activity, Workflow Latency and Environment Response Time, with end-user experience metrics and Citrix or VMware Horizon performance metrics. This unique integration and end-to-end visibility enable corrective action before end users are impacted.

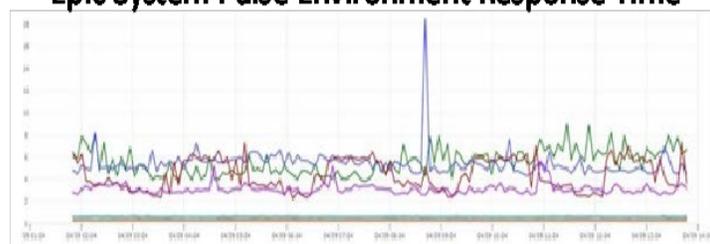
### Epic System Pulse Workflow Activity



### Epic System Pulse Workflow Latency



### Epic System Pulse Environment Response Time



# Automated Logons Confirm Epic Availability

Goliath is the industry’s only proactive, production-ready end-user experience software that validates availability of the entire Citrix or VMware Horizon delivery infrastructure. It ensures availability by executing real Citrix or VMware Horizon sessions that exercise the exact same steps a user takes during the Epic logon process. Regardless of whether a user is remote or local, Goliath’s virtual user is deployed at the remote health systems giving administrators an “early warning system” that allows them to know exactly what the Epic end-user experience will be like for their clinicians – in advance.

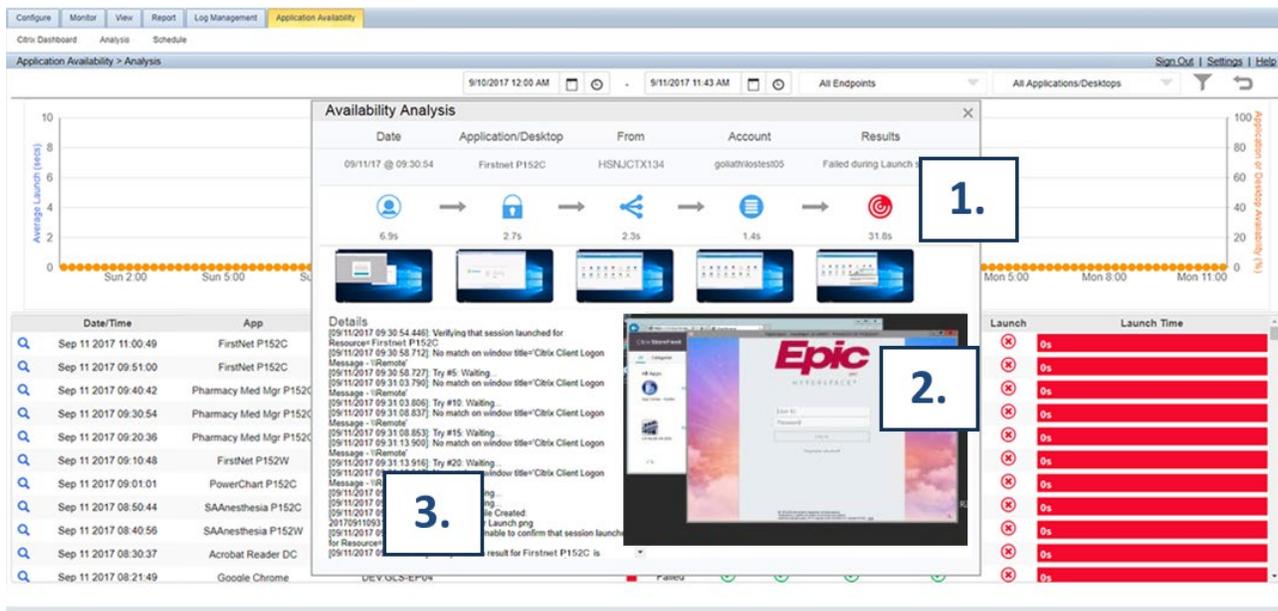


*The image above is leveraged to show confirmation of access for groups of users – they can be remote offices, other data centers, or vendor sites with critical connections. Managing and scheduling tests from each location is centrally managed and automated.*

1. Dashboard display of real-time assessment of Citrix or VMware Horizon availability.
2. Launch times broken down by stages.

When there is a logon failure, an administrator will be alerted immediately using the real-time analytics to isolate where the failure occurred and the root cause.

The Goliath Application Availability Monitor identified a failure launching the application caused by licensing issues, as evidenced in the captured screenshot, and, therefore, sent an alert to the Health IT team indicating a failure and providing specific details. This provides Health IT with both the details and time required to resolve issues quickly – often before actual clinicians or patient care is impacted.



The image above shows the snapshot evidence provided highlighting exactly what the end-user experiences when logging on and launching applications like Epic. In the image you see:

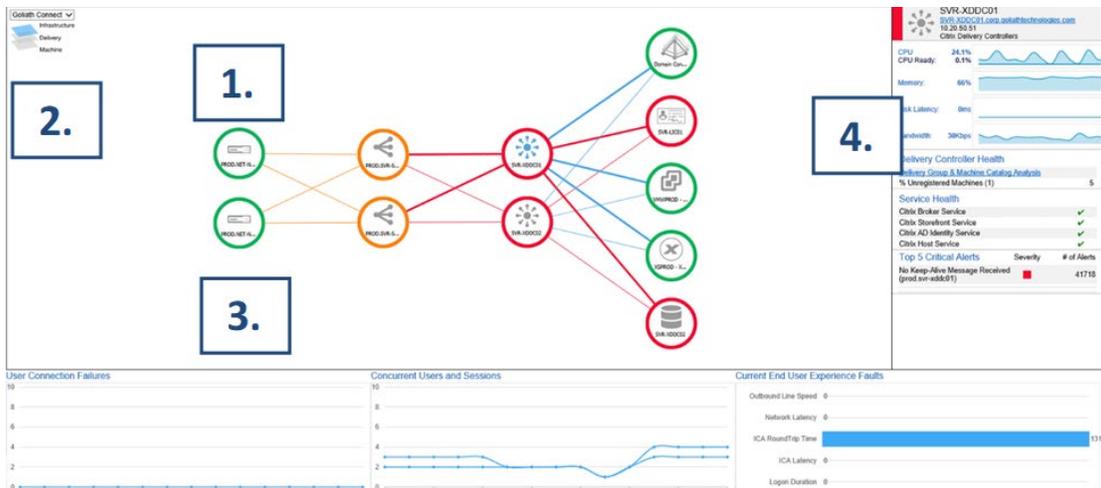
1. Highlight of where the issue occurred during logon.
2. Visual proof that an issue did occur.
3. Isolation of the failure point in the specific details captured.

## The Automatic Citrix Discovery and Dependency Map

The Goliath Automatic Citrix Discovery and Dependency Map intelligently builds out a dependency map of your Citrix infrastructure. It requires no manual setup or scripting and adapts to new components as they are added. This eliminates the time it takes to correlate relationships between elements. Through color-coded connection line and specific metrics, it shows which elements are affecting other elements and how. Then, as issues occur in your infrastructure, alerts will 'bubble up' allowing IT professionals to see the impacted elements at a glance. This single, macro view of your Citrix environment allows administrators to switch between different data centers and farms, breaking down traditional siloed architecture and allowing effective management and troubleshooting of your environment.

### Highlights

- ▶ Automatically discovers and intelligently draws a dependency map of the Citrix delivery infrastructure.
- ▶ Eliminates the time it takes to correlate root cause to elements in your environment by graphically representing all the connections between components in your Citrix infrastructure.
- ▶ Easily switches between data centers and farms to eliminate siloed architectures.
- ▶ Drills down to the host level and views specific metrics for each element in your environment.
- ▶ Views end-user experience metrics for different layers in your environment at a glance.



The image above shows the Citrix Automatic Discovery Map and Highlights critical components:

1. Automatic mapping your entire Citrix infrastructure to visualize connections, relationships, and health of components.
2. Ability to easily switch views to different data centers or locations.
3. Correlation of end-user experience issues to delivery infrastructure components and health.
4. Context-sensitive report metrics and alerts for selected components.

## Correlate End-User Experience Performance Metrics

Goliath provides granular real-time and historic data for Epic and all other virtual applications. When there are issues, IT professionals drill into a user session to gain deeper visibility and identify the root cause.

User	XA Server No.	Session	State	Client Name	Client Address	Version	Login	ICA Latency	Avg. ICA Lat.	Delivery Group	Connected	App Name
CAPRICM\wafat...	CITRIX038	HDX - Desktop	Active	DESKTOP-HOSHILLS	192.168.1.78	14.7.0.13011	49.7s	0ms	0ms	Interior Office 2016	2019-12-16 08:03:13	Epic Hyperspace
CAPRICM\wafat...	CITRIX023		Active			19.6.0.60	106s	62ms	62ms		2019-12-16 09:01:11	Epic Hyperspace
CAPRICM\wafat...	CITRIX026		Active			18.10.0.11	166s	0ms	0ms		2019-12-16 08:59:18	Epic Hyperspace
CAPRICM\wafat...	4426		Active			13.4.300.10	135s	24ms	24ms		2019-12-16 08:47:33	Epic Hyperspace
CAPRICM\wafat...	4401		Active			14.12.0.18020	168s	0ms	0ms		2019-12-16 08:45:20	Epic Hyperspace
CAPRICM\wafat...	CITRIX043		Active			19.6.0.60	147s	67ms	46ms		2019-12-16 08:33:01	Epic Hyperspace
CAPRICM\wafat...	CITRIX1010		LoggedOff			14.12.0.18020	7s	93ms	259ms		2019-12-16 04:41:16	Epic Hyperspace
CAPRICM\wafat...	CITRIX1032		LoggedOff			14.12.0.18020	7s	23ms	23ms		2019-12-15 15:59:44	Epic Hyperspace
CAPRICM\wafat...	CITRIX125		LoggedOff			14.8.0.1010	111.2s	244ms	127ms		2019-12-15 14:21:05	Epic Hyperspace
CAPRICM\wafat...	CITRIX032		LoggedOff			14.4.0.8014	25.5s	190ms	197ms		2019-12-15 13:50:09	Epic Hyperspace
CAPRICM\wafat...	CITRIX034		LoggedOff			14.4.0.8014	24s	189ms	192ms		2019-12-15 13:33:41	Epic Hyperspace
CAPRICM\wafat...	CITRIX0404		LoggedOff			12.1.0.30	64.9s	16ms	27ms		2019-12-15 13:01:49	Epic Hyperspace
CAPRICM\wafat...	CITRIX1010		LoggedOff			19.5.0.26	160s	29ms	30ms		2019-12-15 12:26:07	Epic Hyperspace
CAPRICM\wafat...	CITRIX036		LoggedOff			14.8.0.1010	114s	27ms	35ms		2019-12-15 11:42:51	Epic Hyperspace
CAPRICM\wafat...	CITRIX1032		LoggedOff			14.4.1000.16	73.2s	26ms	20ms		2019-12-15 11:02:41	Epic Hyperspace
CAPRICM\wafat...	CITRIX103		LoggedOff			14.12.0.18020	27.4s	195ms	195ms		2019-12-15 10:18:27	Epic Hyperspace
CAPRICM\wafat...	CITRIX1032		LoggedOff			14.12.0.18020	71s	19ms	17ms		2019-12-15 09:39:41	Epic Hyperspace
CAPRICM\wafat...	CITRIX1032		LoggedOff			14.12.0.18020	71s	50ms	48ms		2019-12-15 07:33:21	Epic Hyperspace
CAPRICM\wafat...	CITRIX1029		Disconnected				0s	0ms	0ms		2019-12-09 11:57:18	
CAPRICM\wafat...	CITRIX1029		Disconnected				0s	0ms	0ms		2019-12-06 14:27:50	

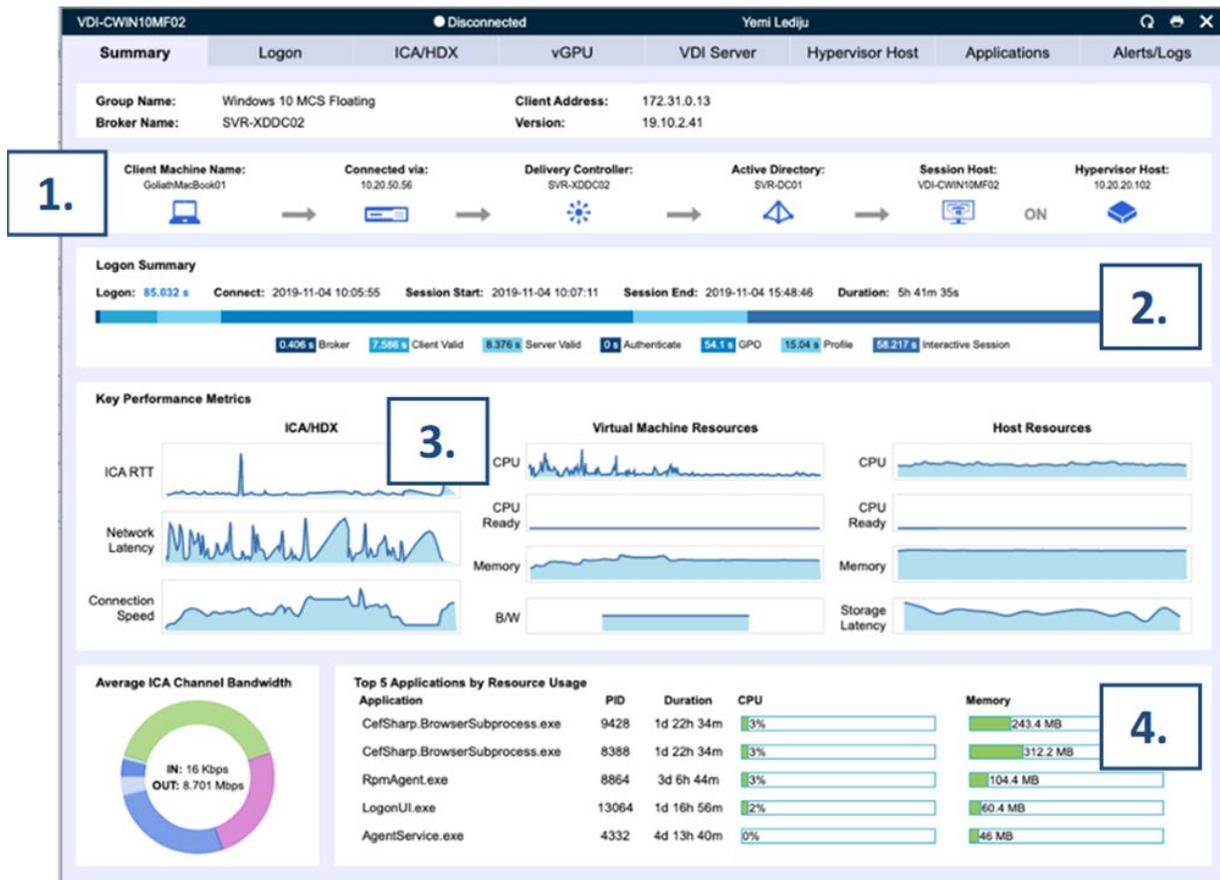
The image is of the Published Apps and Desktop tab that displays user sessions with published apps and published shared desktops. It gives a high-level overview of the user's server, application, and the session performance details.:

1. Click into an individual user session to drill into additional session details.
2. Real-time alerts can be set up on breached Epic thresholds for logon times or ICA/PCoIP latency.
3. Highlights if Epic is running in that user session.

# Automated Intelligence Isolates Clinician Performance Issues

Goliath provides the ability to drill down into a single end user's session and, at a glance, reviews key analytics around that session performance: logon duration summary, key performance metrics from ICA/HDX, VM resources, host resources, along with application resource usage data. All of these elements can impact the performance of Epic and, with this insight, an administrator can quickly drill into a root cause of an "Epic is slow" complaint and determine if it is Epic or something within the Citrix/VMware delivery infrastructure.

This quick summary enables an administrator to quickly view correlated performance metrics and rule out what isn't causing the performance bottleneck and focus on the metrics that appear to indicate root cause.



The image above shows Goliath's summary for a single session. At-a-glance administrators can quickly get an overview of a single session's performance.

1. Dependency map offers a quick overview of all components involved in establishing and hosting the selected Citrix/VMware session.
2. Quick visual breakdown of all stages of the logon process.
3. Key performance metrics enable an administrator to quickly view answers about the performance of a Citrix/VMware session and if slowness is caused by the network or other resources.
4. A detailed breakdown of the application usage reveals root cause of a performance issue within an end user's virtual machine.

As seen in the image above for #3, Goliath provides industry-leading visibility into Citrix or VMware session performance by breaking down the ICA/HDX or PCoIP/BLAST protocol and returning precise metrics around individual channel performance.

Detailed ICA/HDX Channel Metrics include, but not limited to:

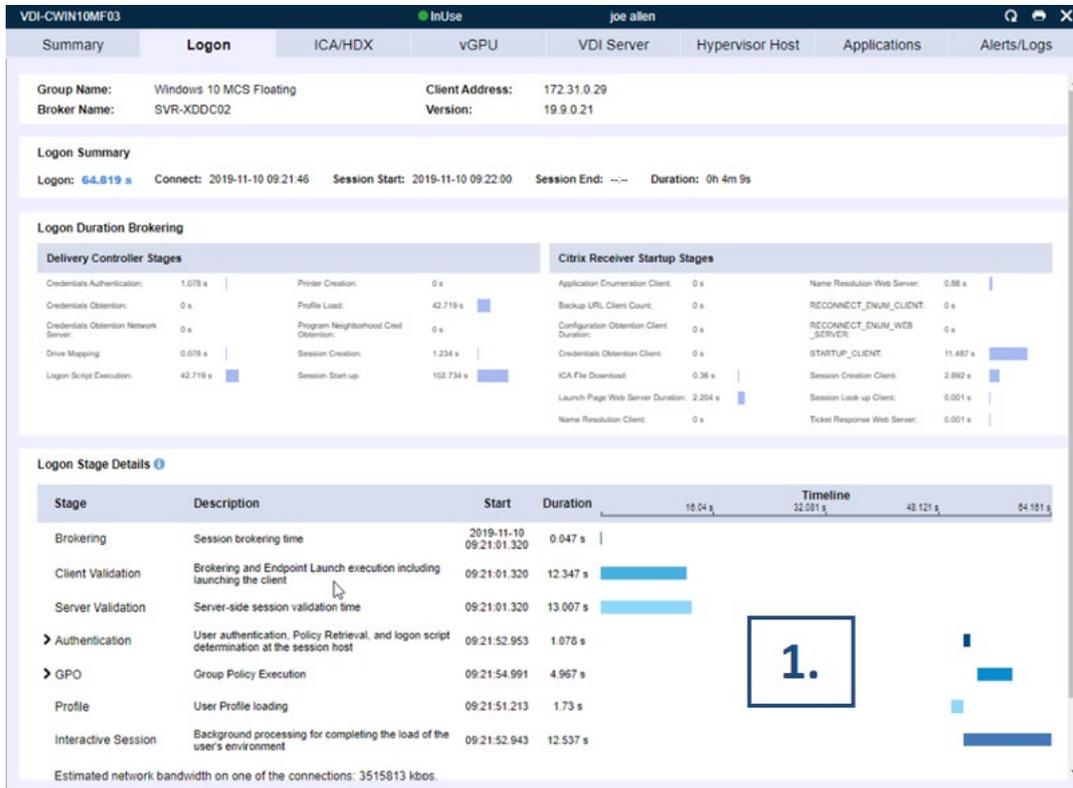
- ▶ User Connection Performance
- ▶ Printing Bandwidth
- ▶ Audio Bandwidth
- ▶ Clipboard Bandwidth
- ▶ Keyboard and Mouse Bandwidth
- ▶ Thinwire Bandwidth
- ▶ DCR Bandwidth
- ▶ Multimedia Bandwidth

Goliath has the ability to trend ICA Latency for a user session, as well as ICA/HDX channels, which can help identify performance bottlenecks. IT admins can view this data in context of other session metrics or drill down into more detail under the ICA/HDX tab. Similarly, Goliath Performance Monitor will provide detailed protocol and channel metrics for PCoIP/BLAST for VMware Horizon deployments.

## Real-Time Logon Duration Drilldown

If you can't drill down into all 33+ stages of the Citrix or VMware Horizon logon process, then you can't isolate and fix root cause of logon slowness. With the Citrix/VMware logon duration monitoring and troubleshooting functionality of Goliath Performance Monitor, you can now capture real-time logon duration times and get alerted to end-user logon slowness on any of the 33+ logon duration stages.

The real-time Citrix/VMware Logon Duration Drilldown breaks down a user's logon process into each of the stages to help understand what needs to be optimized to improve logon times. This report can also be used to identify and troubleshoot session load problems by identifying what may be getting stuck or taking too long to process. Threshold-based alerting on user logon times is also possible.



The image above shows the combination of in-depth Citrix data along with Windows OS logging data to break down the user's login from start to finish giving the administrator usable metrics to reduce troubleshooting times.

1. The logon duration view above not only details out the performance of each logon stage, but also highlights the unique value delivered by Goliath which combines the logon duration metrics with information included in the Goliath logs.

The logon duration drilldown allows an administrator to parse logon times into each of the stages and substages. This includes the details of the brokering process that the Citrix Delivery Controller and Receiver is responsible for and the breakdown of the session launch from mouse click to being delivered onto the XenApp/XenDesktop Server or VDI, including, but not limited to:

- ▶ End User Mouse Click to Launch Application or Desktop to Session Host
- ▶ ICA/HDX File Download
- ▶ XML Service Name Resolution of an App or Desktop to a Session Host
- ▶ User Authentication
- ▶ Time to Request Session Creation
- ▶ Determine the Session Host
- ▶ STA Ticket Retrieval
- ▶ Logon Script Execution
- ▶ Profile Load and Drive Mapping
- ▶ Session Creation
- ▶ Desktop Load

When the Session is established on the XenApp/XenDesktop Server or VDI, Goliath Performance Monitor further breaks down the policy and profile load stages to determine the root cause of which script or stage caused the logon delay. This is accomplished by providing the details of how long each process took and iterating each execution stage and how that occurs including:

- ▶ Identifying and establishing connection to the Domain Controller for authentication
- ▶ LDAP calls to copy over policies
- ▶ Copying over each script file

Execution of each group policy and script to determine the execution time of:

- ▶ Registry Extensions
- ▶ Citrix Group Policy
- ▶ Folder Redirection
- ▶ Citrix Profile Management
- ▶ Drive Mapping
- ▶ Printer Mapping
- ▶ OU Policy Execution

The same metrics are available when diagnosing VMware Horizon logon durations.

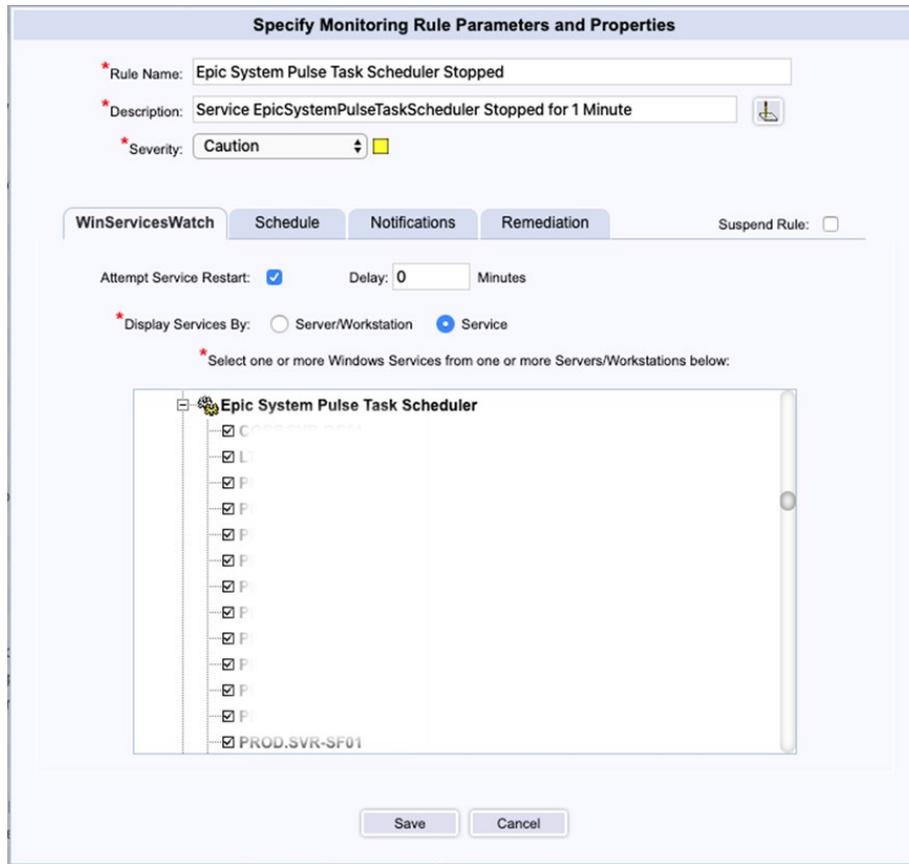
## **Embedded Intelligence and Automation**

Goliath's monitoring and troubleshooting software with embedded intelligence and automation guides users on what to monitor and how to monitor it. It includes specific metrics and analytics that empower Health IT Professionals to proactively anticipate issues before they happen, troubleshoot them when they do occur and prevent them from happening in the future.

Our out-of-the-box software will:

- ▶ Automatically deploy to your IT infrastructure
- ▶ Automatically monitor over 250 known failure points & conditions
- ▶ Alert on performance threshold events, conditions & failures
- ▶ Automatically 24/7/365 ensure applications and infrastructure are operational
- ▶ Remediate issues on demand
- ▶ Resolve issues at the help desk level that would historically be escalated
- ▶ Schedule reports for insights and long-term planning

With its embedded intelligence, Goliath vastly improves the time to resolution with auto-detection and self-healing capabilities. End-user experience is often impacted by issues related to application components such as processes or services failing. The self-healing capability enables the IT administrator to resolve issues immediately when they are discovered.



*This image above shows an example of the self-healing functionality applied to an alert notification. Out-of-the- box, IT staff can monitor their Windows services and direct them to stop instantly, or for a period of time, Goliath will attempt to restart the service and notify the end user.*

## Example User Story: Top 10 U.S. Health System Prevented Epic Hyperspace Outage for 25,000 Users

A top 10 U.S. Health System with over 100 hospitals and millions of patients nationwide turned to Goliath to help troubleshoot and monitor their VMware, Citrix XenApp, and Epic Hyperspace environment. They were often receiving complaints related to Citrix XenApp and XenDesktop availability from their clinicians. A top complaint was the inability to launch Epic Hyperspace which was negatively impacting their ability to care for patients.

To respond, the Citrix team at this health system deployed Goliath’s early warning system which features the “Goliath Virtual User” – a low footprint agent that is managed from a central console and logs onto Citrix XenApp and XenDesktop and Epic just like a real user. This ensures that the Epic Hyperspace and Citrix applications are available and that the Citrix delivery infrastructure and workflow are functioning as they should.

In one example, the Epic Hyperspace application had recently been upgraded. When the upgrade was complete, the app was tested and made available for consumption by end users. However,

during the upgrade, there was a misconfiguration of the application that Citrix admins were not aware of at the time.

The Citrix team had configured the Goliath for Epic to alert them if there was an issue with a Citrix-delivered application, as part of the early warning system designed to troubleshoot Citrix in advance of end users experiencing performance issues. The Goliath Application Availability Monitor, and “Goliath Virtual User,” was scheduled to run and test all critical applications every 15 minutes daily, including the Epic application that was just upgraded.

On this day, the Citrix XenApp and Citrix XenDesktop team were sent a real-time alert at 4:30 a.m. ET that Epic Hyperspace was not available at several hospitals. From the real-time dashboard, it was apparent that failures were occurring from many sites with multiple different Goliath User admin accounts. This allowed IT to know in an instant that there was a global outage of the Epic application that was just updated. From the application availability detail of each failed simulation, the failure point was identified. In every failed instance, an enumeration issue was discovered as the root cause and there was a picture to prove what the issue was in the “screenshot” analysis.

Now, the IT team receives an advance warning if Epic Hyperspace and Citrix will not launch, or is slow, *before* physicians and other healthcare workers log into Citrix XenApp or Citrix XenDesktop for the day. The advance warning, via real-time alerts, gives the IT team peace of mind because they know the early warning system will give them time to troubleshoot Citrix and resolve the performance issue before users are impacted. They now use the new “screenshot” analysis to document, via pictures and metrics, the “true” root cause and put fix actions in place so the issue can be permanently resolved.

## Available from Epic AppOrchard

Goliath Technologies empowers health IT to be proactive and prevent end-user experience issues before clinicians and patients are impacted. **Goliath is trusted by healthcare organizations using Epic, including Atlantic Health Systems, Catholic Health Initiatives, Children’s Hospital of Colorado, University of Mississippi Medical Center, Texas Tech University HC Center, Monroe Clinic, Lehigh Valley Health Network, UC San Francisco Medical Center and many others to improve patient care.**



Goliath Technologies is an approved application available in the [Epic App Orchard](#). Users may use the Goliath page to nominate the application to their App Orchard Point Person, or that point person can use the contact author button to contact Goliath directly.

If you would like to learn more about how Goliath can provide value to your organization, email us at [techinfo@goliathtechnologies.com](mailto:techinfo@goliathtechnologies.com).