

# Oracle Cerner Solution Overview

The only solution permitted to deploy in both the Cerner RHO and the health system to provide complete visibility of the Cerner delivery infrastructure.

Contents

Introduction ..... 3

End-to-End Visibility Requires 3rd Party Tools ..... 3

    Solution: ..... 4

Goliath Proactive End-User Troubleshooting Architecture ..... 5

Benchmark Clinician Experience ..... 6

AI-Powered Troubleshooting ..... 7

Automated Logons Confirm Cerner Availability ..... 8

    The Automatic Citrix Discovery and Dependency Map ..... 10

Real-Time Citrix Performance Graphs..... 11

Correlate End-User Experience Performance Metrics ..... 11

Automated Intelligence Isolates Clinician Performance Issues ..... 11

Real-Time ICA Channel Drill Down from Session Display..... 12

Real-Time Logon Duration Drilldown..... 14

Embedded Intelligence and Automation ..... 16

Working with Cerner to Improve End-User Experience ..... 17

Sample Deployment: Universal Health Services ..... 18

The Standard in Health IT ..... 19

## Introduction

Goliath's monitoring, troubleshooting & analytics solution focuses on analyzing end user experience, from the users perspective, and uses embedded intelligence and automation to enable IT to identify the underlying IT elements that impact it. Goliath is uniquely purpose-built for Cerner healthcare clients because it links Cerner RHO with the on-premise environment for a complete end-to-end view. With our industry-only purpose-built Cerner module with embedded intelligence and automation, health systems using Cerner can anticipate, troubleshoot, and document 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 Cerner, end-user experience, and VMware Horizon/Citrix metrics
- Collaborate with Cerner with actionable intelligence for data-driven conversations
- Proactively monitor to detect and resolve issues before end users are impacted
- Isolate root cause and troubleshoot performance issues reducing remediation time
- Prevent issues with historical reporting for trending and analysis
- Purchase Goliath software directly from Cerner

## End-to-End Visibility Requires 3rd Party Tools

Health IT professionals know that an end-to-end view of the entire clinician experience is critical to visualize because if there are gaps in visibility there are gaps in monitoring and these invisible elements may be the root cause of performance issues. The challenge for IT Pros is that the perception by management (Fig. 1) is there is a simple, direct connect between clinicians and Cerner Millennium in the hosted facility. This is not reality (Fig. 2) because the connection relies on many other IT elements to deliver a positive end-user experience. In addition, other applications are delivered to the end user with the same connection to the same device.



### Perception:

Cerner RHO is the sole root cause of performance issues.

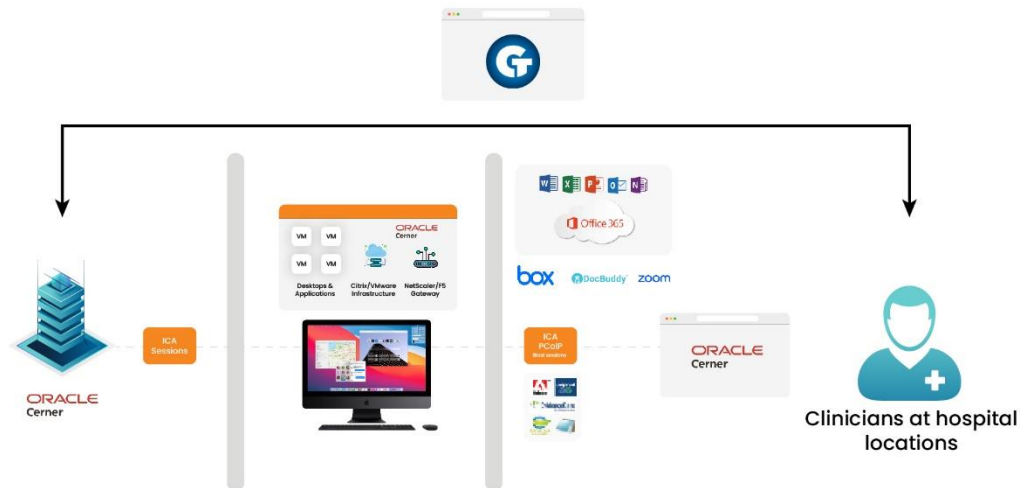


### Reality:

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

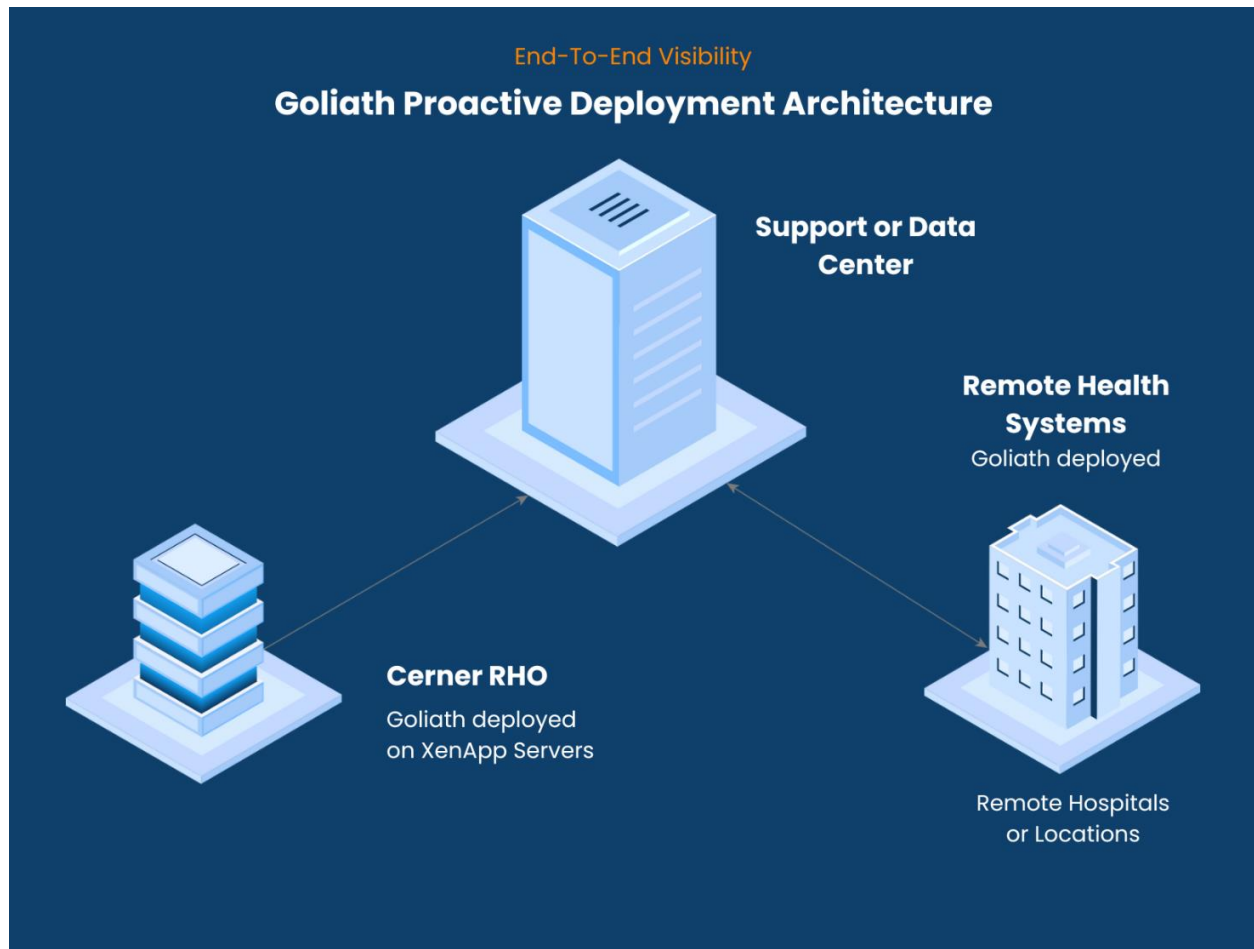
### Solution:

Troubleshoot by isolating the Cerner clinician experience and on-premises delivery infrastructure. To effectively monitor and troubleshoot the clinician experience requires purpose-built on-premises tools with RHO visibility for the desktop delivery infrastructure. Goliath Technologies is the only solution deployed in Cerner RHO and across all system locations.



## Goliath Proactive End-User Troubleshooting Architecture

The deployment architecture includes technology across all hospital locations and, optionally, at the Cerner-hosted facility. In the data center hosting the electronic health record application, intelligent agents are deployed on Citrix and/or VMware servers running Cerner applications. Onsite at the hospital, Goliath Performance Monitor is deployed on virtual servers, desktops, tablets, Citrix, VMware Horizon and other general IT infrastructure.



Hospitals rely on a complex architecture to deliver not just Cerner, but many other critical business applications to their facilities and users. It is imperative that they invest in the tools required to anticipate, troubleshoot, and document clinician experience issues across this virtual desktop delivery infrastructure.

## Benchmark Clinician Experience

Establish an objective baseline of the health of your IT delivery and quantifiably measure improvement over time.

The Citrix End User Experience report utilizes embedded intelligence to provide a distilled objective view of user experience. Goliath automatically analyzes complex connectivity and performance metrics from the user's perspective and calculates a top-line user experience score. The report then enables easy filtering to analyze subsets of the environment for focused analysis, even down to individual users. Not only is IT able to easily see what the objective user experience is, but it also explains why by breaking out the primary elements responsible for the user experience score (ICA Latency, Network, Local Connection). This capability expedites cross-departmental analysis and streamlines both IT operations and IT management's ability to act confidently on objective data.

Use this report to provide a benchmark for new pilots or deployments, provide management with objective reporting that is easy to consume, proactively identify trouble spots and focus resources on areas of need, and much more.

Clinician Experience									
Citrix XenApp End User Experience Scorecard									
Reporting Period: Sun Jan 14 2024 10:31:59 – Thu Mar 14 2024 11:31:59					Sort By: Avg Conn Speed (Mbps)		Report Run: Thu Mar 15 2024 11:31:59		
Total Users: 14									
86 Overall EUE Score		70 Connection Speed Score		96 Network Latency Score		98 ICA RTT Score		96 ICA Latency Score	
		36.05 Avg Connection Speed (Mbps)		18.75 Avg Network Latency (ms)		15.93 Avg ICA RTT (ms)		22.54 Avg ICA Latency (ms)	
User Name	Dept	Client IP Address	Client Device	Workspace Version	EUE Score	Avg Conn Speed	Avg Network Latency	Avg ICA RTT (ms)	Avg ICA Latency
jan joplin	Radiology	10.10.0.92	ASUS Zenbook	24.3.0.93	85	12.00	5.11	8.15	5.00
george anders	Radiology	10.10.0.56	Lenovo Thinkpad	24.3.0.93	84	17.38	24.78	30.82	23.80
aschroeder	Radiology	10.10.32.55	Lenovo Thinkpad	24.3.0.93	64	20.32	164.40	146.66	193.50
theodore nugent	Radiology	10.10.46.67	Lenovo Thinkpad	24.3.0.93	68	23.00	149.00	102.00	172.50
john hiltz	Emergency	10.18.34.00	ASUS Zenbook	24.3.0.93	84	24.15	33.08	37.33	56.72
floyd roberts	Oncology	100.10.5.92	Lenovo Thinkpad	24.3.0.93	91	35.29	12.09	6.79	8.63
avi lipp	Emergency	10.18.0.46	ASUS Zenbook	24.3.0.93	89	52.78	91.30	39.41	39.72
heather mcleod	Pediatrics	100.15.6.76	Lenovo Thinkpad	24.3.0.93	95	62.12	34.21	33.85	33.03
cgiardinelli	Emergency	10.18.25.34	ASUS Zenbook	24.3.0.93	93	63.60	64.36	86.73	28.91
keary pence	Oncology	100.10.2.01	Lenovo Thinkpad	24.3.0.93	78	74.45	72.45	156.83	374.33
martin quinan	Emergency	10.18.74.00	Lenovo Thinkpad	24.3.0.93	93	77.61	72.64	32.54	42.76
mnagel	Pediatrics	100.15.5.77	Lenovo Thinkpad	24.3.0.93	94	91.46	64.87	28.35	41.75
brian may	Emergency	10.18.92.56	ASUS Zenbook	24.3.0.93	95	84.00	34.50	34.30	40.14
jgeorge	Oncology	100.10.5.00	Lenovo Thinkpad	24.3.0.93	93	116.14	27.20	35.18	85.45

## AI-Powered Troubleshooting

Goliath introduced the first AI Citrix troubleshooting assistant, KIP. By leveraging AI in the troubleshooting workflow, IT teams can:

- Quickly troubleshoot Citrix issues without Citrix-specific expertise
- Make up for limited resources such as IT budget and headcount
- Empower all levels of the IT Support team to troubleshoot ultimately reducing escalations
- Reduce remediation times

The screenshot displays the Goliath AI Assistant interface within a Google Chrome browser window. The interface is titled "GOLIATH John Hiltz" and shows the user is "Logged Off". The main navigation bar includes tabs for Summary, Logon, ICA/HDX, App Server, Chrome OS, Hypervisor Host, Processes, and Alerts/Logs. The "Logon" tab is active, showing a summary of the logon process for a session with ID 74.124 s. The summary includes the XA Server Name (PRD-SV2XA03), Client Name (CorpAI/Goliath), Version (23.12.0.29), and Hypervisor Host (10.20.20.115). The Logon Summary table shows the following stages and durations:

Stage	Description	Start	Duration
Brokering	Time taken to assign resources to the user.	2024-01-23 14:52:55.693	0.357 s
Server Validation	Server-side session validation time. This phase begins at log on time and ends when validation is more...	14:52:55.693	68.144 s
Authentication	Time taken to complete the authentication to the remote session. Click to expand this phase more...	14:54:07.820	0.334 s
GPO	Time taken to apply Group Policy objects during logon, if required. Click to expand this phase for more...	14:54:09.446	1.454 s
Profile	Time taken to load the user profile, if required. This time is increased when Citrix Profile more...	---	0.145 s
Interactive Session	The total time required to hand off keyboard and mouse control to the user. This is normally the more...	---	10.72 s

Estimated network bandwidth on one of the connections: 2780315 kbps. A fast link was detected. The Estimated bandwidth is 22242 kbps. The slow link threshold is 500 kbps.

The "Session Brokering" section shows the following details:

Stage	Duration
Credentials Authentication	0.109 s
Credentials Obtainment	2.953 s
Drive Mapping	0.016 s
Logon Script Execution	11.906 s
Profile Load	11.906 s
Session Creation	0.781 s
Session Start-up	18.408 s

The "Citrix WDD" section shows the following details:

Stage	Duration
ICA File Download	0.253 s
Launch Page Web Server Duration	0.359 s
Name Resolution Web Server	0.234 s
STARTUP_CLIENT	1.6 s
Session Creation Client	0.825 s
Session Look-up Client	0.001 s

The Goliath AI Assistant (KIP) is shown in a chat window, providing a detailed analysis of the logon process. It identifies the "Server Validation" stage as the primary cause of the slow logon and lists several potential causes, including:

- Improper site configuration: If the user is logging into a datacenter in one location but being authenticated by a domain controller in another physical location, it could indicate a misconfiguration in Active Directory Sites and Services. This can result in delays during the authentication process.
- Site DNS issue: A problem with the Domain Name System (DNS) can also contribute to slow server validation. If there are issues with DNS resolution or if the DNS server is overloaded, it can cause delays in the authentication process.
- Overloaded Domain Controllers: If the domain controllers responsible for authenticating user credentials are overloaded with requests, it can lead to longer server validation times. This can happen if there is a high volume of authentication requests or if the domain controllers are not properly optimized for performance.

The assistant also provides steps to resolve the slow logon during the server validation stage, including:

- Check the server's performance: Ensure that the server hosting the user profiles and policies is not experiencing any resource constraints or performance issues. Monitor CPU, memory, and disk usage to identify any bottlenecks.
- Review group policies: Analyze the group policies applied during the server validation stage. Check for any unnecessary or conflicting policies that may be causing delays. Consider optimizing or removing policies that are not required.
- Examine logon scripts: Review the logon scripts being executed during the server validation stage. Update or remove any broken or unnecessary scripts that may be causing delays.
- Validate drive mappings: Verify that the drive mappings configured for the user profiles are correct and functioning properly. Incorrect or broken drive mappings can significantly impact logon duration.
- Network connectivity: Ensure that the server hosting the user profiles and policies has a stable and reliable network connection. Latency or network issues can cause delays during the server validation stage.
- Monitor event logs: Check the event logs on the server for any errors or warnings related to the logon process. These logs can provide valuable insights into potential issues causing slow logon.
- Test with a different user profile: Create a test user profile and observe if the slow logon issue persists. This can help determine if the problem is specific to a particular user profile or if it is a more widespread issue.

By following these steps, you should be able to identify and resolve the root cause of the slow logon during the server validation stage.

## Automated Logons Confirm Cerner Availability

Goliath is the industry's leading 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 Cerner login 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 Cerner end-user experience will be like for their clinicians – in advance.

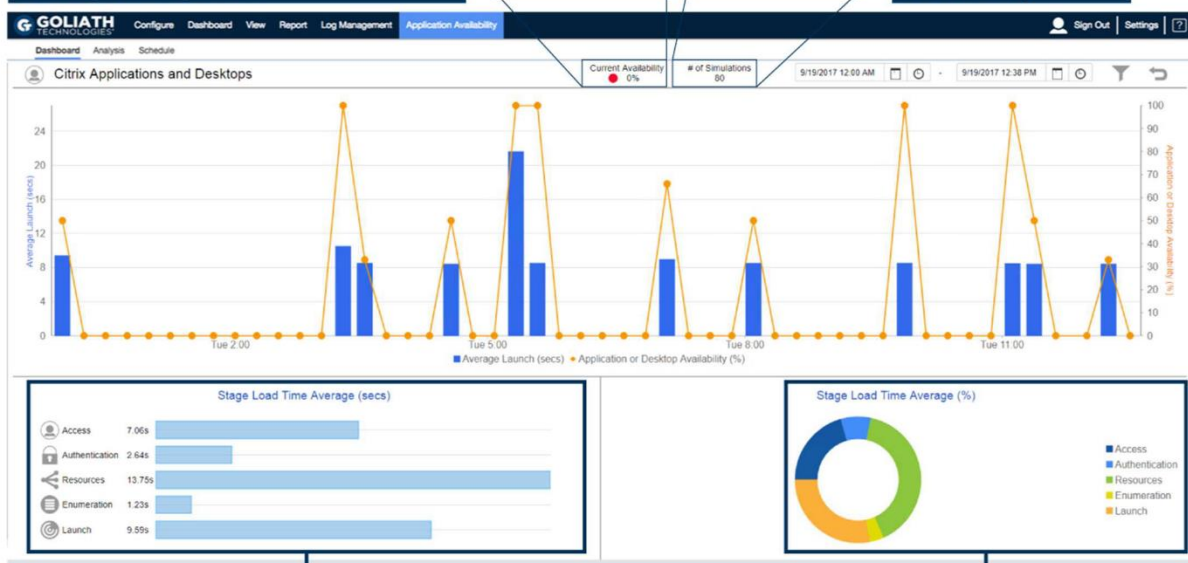
1

Immediate Citrix availability assessment, taking into consideration NetScaler, Storefront, Delivery Controller, SQL and Session Host availability, including XA configuration.

Current Availability  
0%

# of Simulations  
80

Automatically schedule launches to continuously test availability.



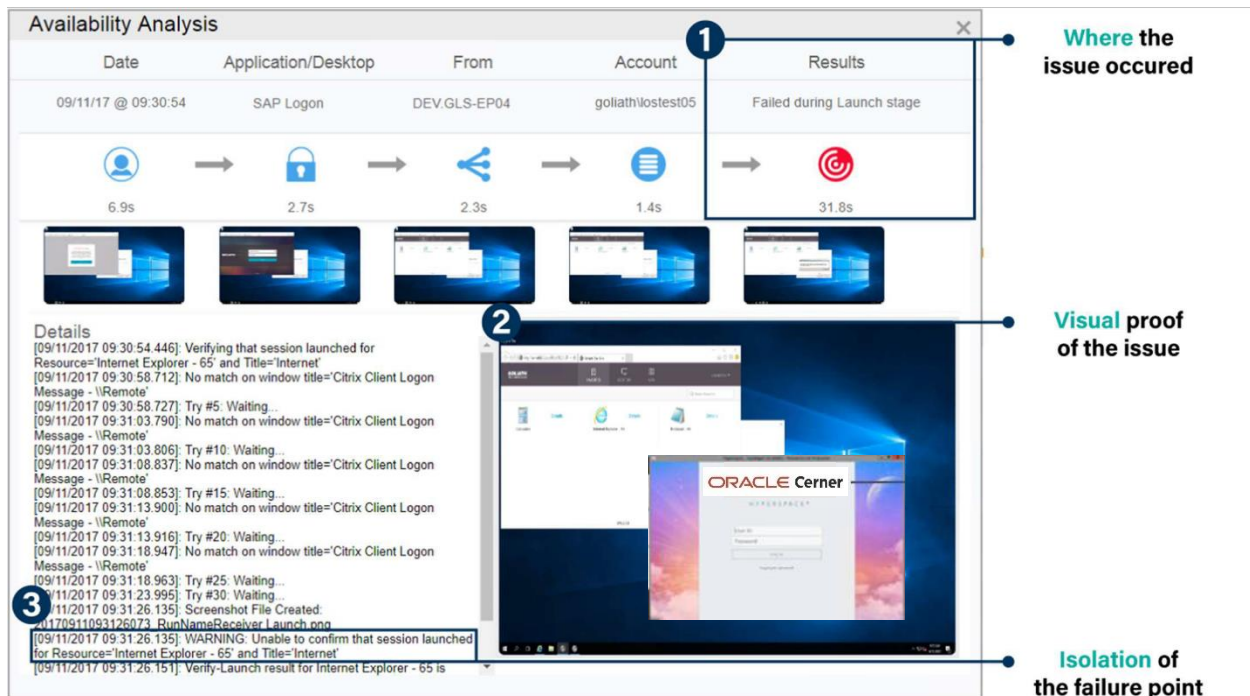
2

Breakdown failures by stage to determine if problems are related to overall environment health or one part of the delivery workflow.

Breakdown launch times by stage to identify which stage should be optimized to yield the best results, and how they are performing.



When there is a logon failure, an administrator will be alerted immediately using 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.



1. In this case, failure occurred at the launch stage (marked by the '1')
2. The screenshot (2) proves that the application failed to launch and shows the root cause of the Citrix workflow and application launch failure as being the result of a licensing problem
3. By navigating to the "Details" or "Analytics" section (3), we can see that the launch failed at the point of verifying that Internet Explorer launched

## The Automatic Citrix Discovery and Dependency Map

Goliath's Automatic Citrix Discovery and Dependency Map intelligently creates a dependency map of your entire Citrix infrastructure with true end-to-end visibility of the health of your Citrix infrastructure. This single, macro view used as a real-time NOC display of your Citrix environment gives administrators the ability to monitor, manage and troubleshoot issues with Citrix, whether the root cause is the Citrix infrastructure or the supporting IT elements. It shows the overall health of your environment at-a-glance and provides context-sensitive supporting metrics and details as you select each element. You can drill down and dynamically examine your environment and troubleshoot issues more easily since everything is broken down logistically.

### Highlights:

- Automatically deploys to your environment, with no manual set-up.
- 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 switch between data centers and farms to eliminate siloed architectures.
- Drill down to the host level and view specific metrics for each element in your environment.
- View end user experience metrics for different layers in your environment at-a-glance.



### Critical Components Highlighted in the above image:

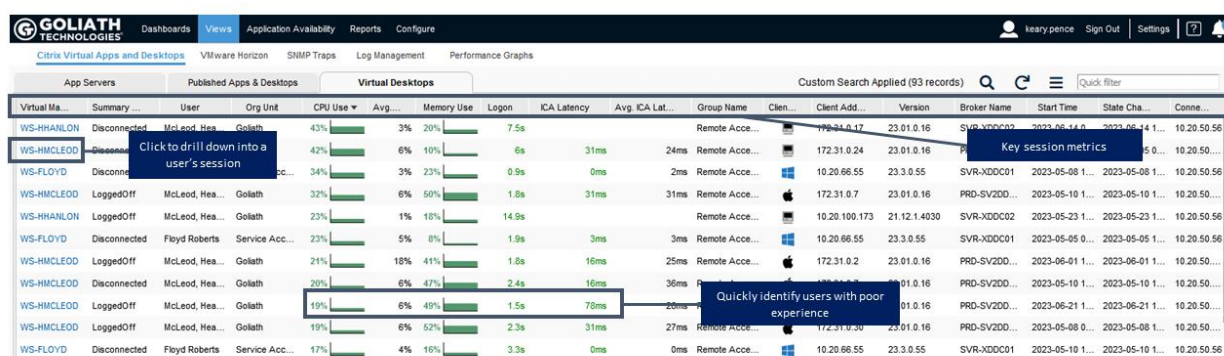
1. Automatically map your entire Citrix infrastructure to visualize connections, relationships, and health of components.
2. Easily switch views to different data centers or locations.
3. Correlate end user experience issues to delivery infrastructure components and health.
4. See context-sensitive metrics and alerts for selected components.

## Real-Time Citrix Performance Graphs

Goliath provides five layers of visibility in one console: hardware, host, VM, OS, and application. The performance graphs allow administrators to trend Citrix ICA/HDX Latency and Logon Duration as well as resource utilization of each server.

## Correlate End-User Experience Performance Metrics

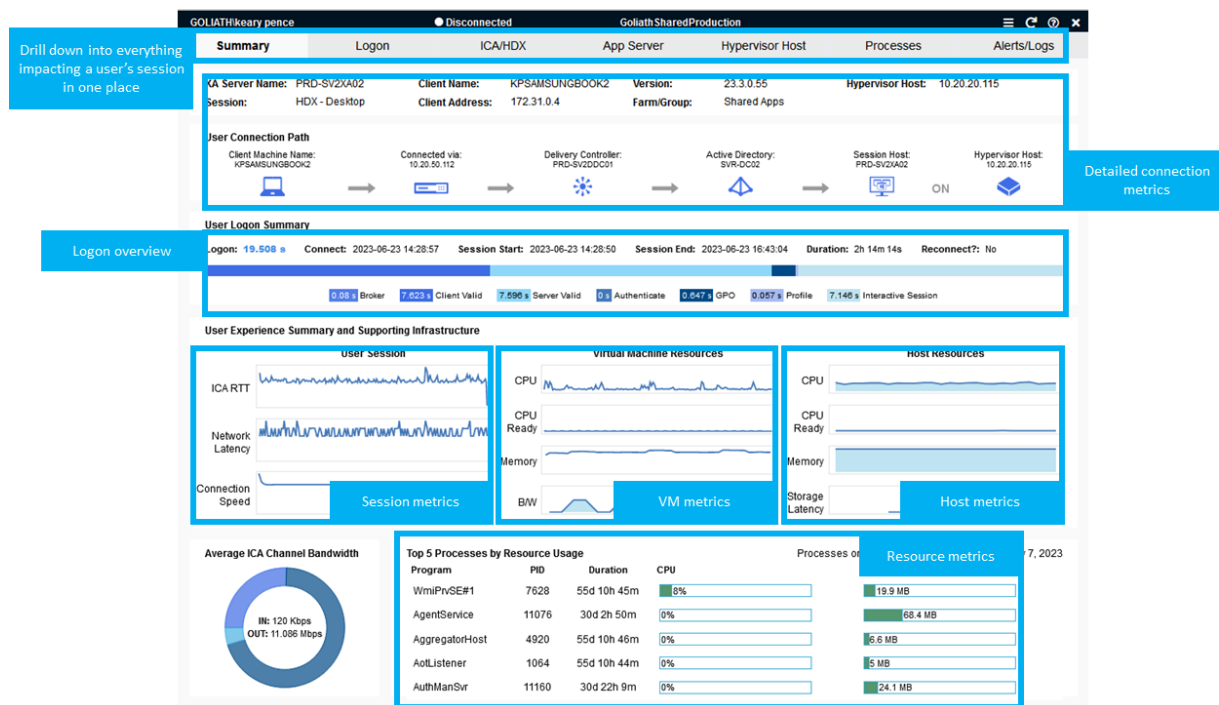
Goliath provides granular real-time and historic data for all Citrix Sessions. When there are end user experience issues, administrators can drill into an individual user session to gain deeper visibility and identify the root cause.



## Automated Intelligence Isolates Clinician Performance Issues

Goliath provides the ability to drill down into a single end user's session and, at a glance, review 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.

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.



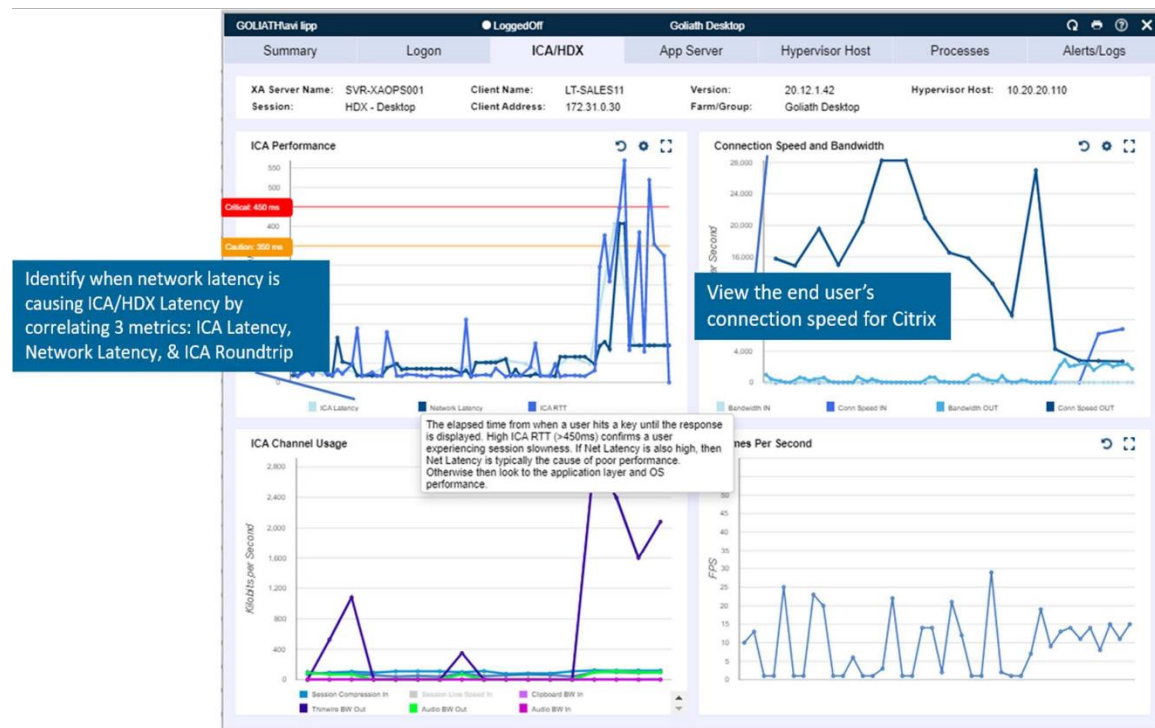
## Real-Time ICA Channel Drill Down from Session Display

Goliath provides industry-leading visibility into Citrix session performance by breaking down the ICA/HDX protocol and returning precise metrics around individual ICA/HDX channel performance.

### Detailed ICA/HDX Channel Metrics Include:

- User Connection Performance
- Printing Bandwidth
- Audio Bandwidth
- Clipboard Bandwidth
- And more!
- Keyboard and Mouse Bandwidth
- Thinwire Bandwidth
- DCR Bandwidth
- Multimedia Bandwidth

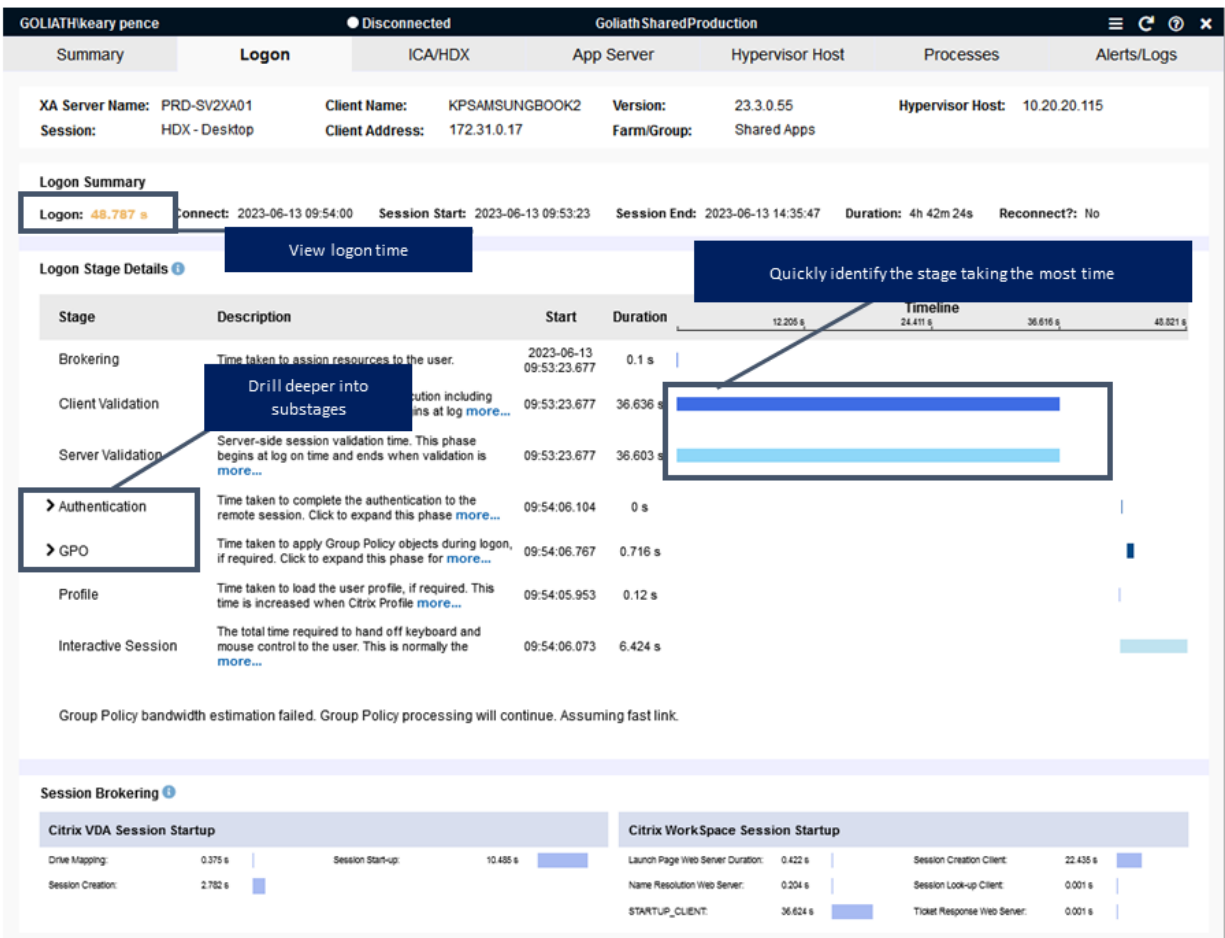
Goliath's industry-leading visibility Goliath trends ICA Latency for a user session, as well as ICA/HDX channels, which can help identify performance bottlenecks. IT admins can view this data in context of other session metrics or drill down into more detail under the ICA/HDX tab. Similarly, Goliath 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 logon process, then you can't isolate and fix root cause of logon slowness. With the Citrix Logon Duration monitoring and troubleshooting functionality you can 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 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 logon duration drilldown allows an administrator to parse logon times into each of the stages and sub-stages. 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 CVAD 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
- Desktop Load

When the session is established on the CVAD Server or VDI, GPM 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
- OU Policy Execution
- Citrix Profile Management
- Drive Mapping
- Printer Mapping

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



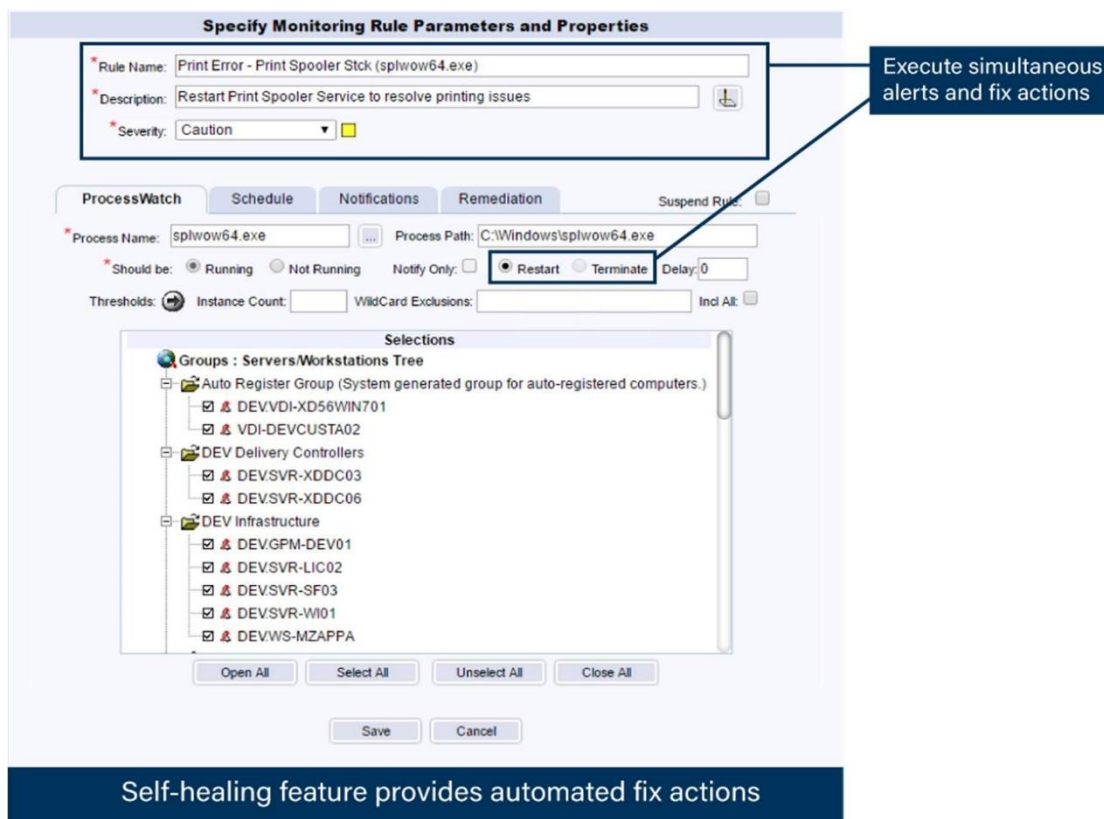
## Embedded Intelligence and Automation

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.





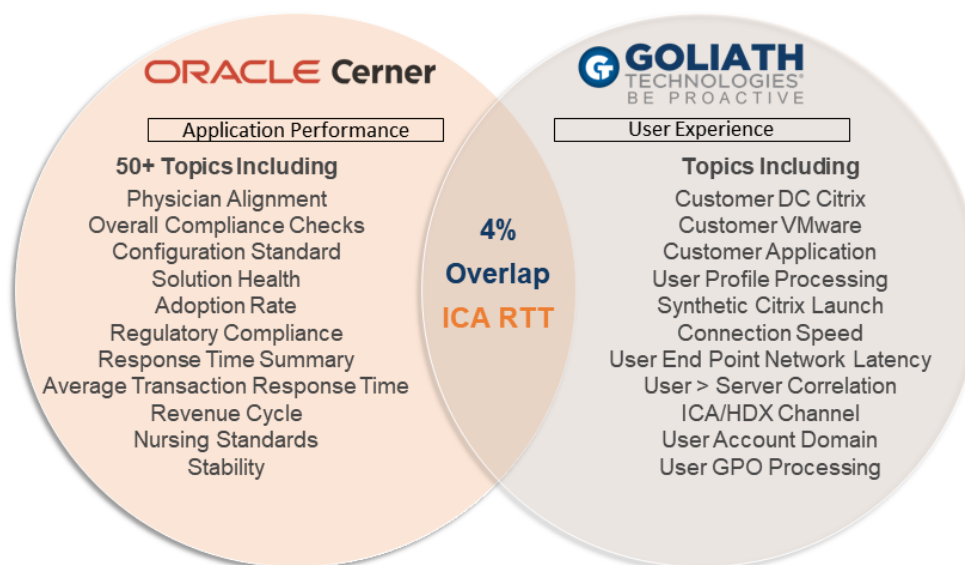
## Working with Cerner to Improve End-User Experience

Cerner Lights On Network® and Goliath Technologies offer a powerful and complementary feature set that together deliver significant value to our mutual customers. Cerner Lights On Network is the best technology available to support Cerner and Cerner hospitals with the complex needs and requirements of multiple stakeholders throughout the hospital. It provides a robust, comprehensive set of features that covers many critical areas including Compliance, Security, Adoption, Configuration Standards, Performance, Users, Outcomes and much more.

Goliath Technologies focuses instead on the Citrix / VMware environment on-premises at the hospital locations. Goliath's software is specifically used by the systems engineers in hospital IT organizations that support both users accessing Cerner over Citrix and VMware, and other corporate staff at the hospital. Goliath focuses on reducing end-user experience issues on-premises when users are interacting with any Citrix or VMware Horizon delivered applications. Most Cerner hospitals are using Citrix and/or VMware Horizon to deliver access to multiple corporate applications, not just access to Cerner RHO.

The different roles and users for our products present additional value for both Cerner and Cerner hospitals.

- The combined metrics available from both Cerner Lights On Network and Goliath Technologies allow hospitals to analyze a holistic view of their environments.
- This holistic view allows hospitals to pinpoint the specific root cause of performance issues – which are likely to exist in the on-premises delivery infrastructure, not Cerner itself.
- Goliath's proactive approach to Citrix performance issues leads to less criticism for Cerner and reduces support calls to CernerWorks.

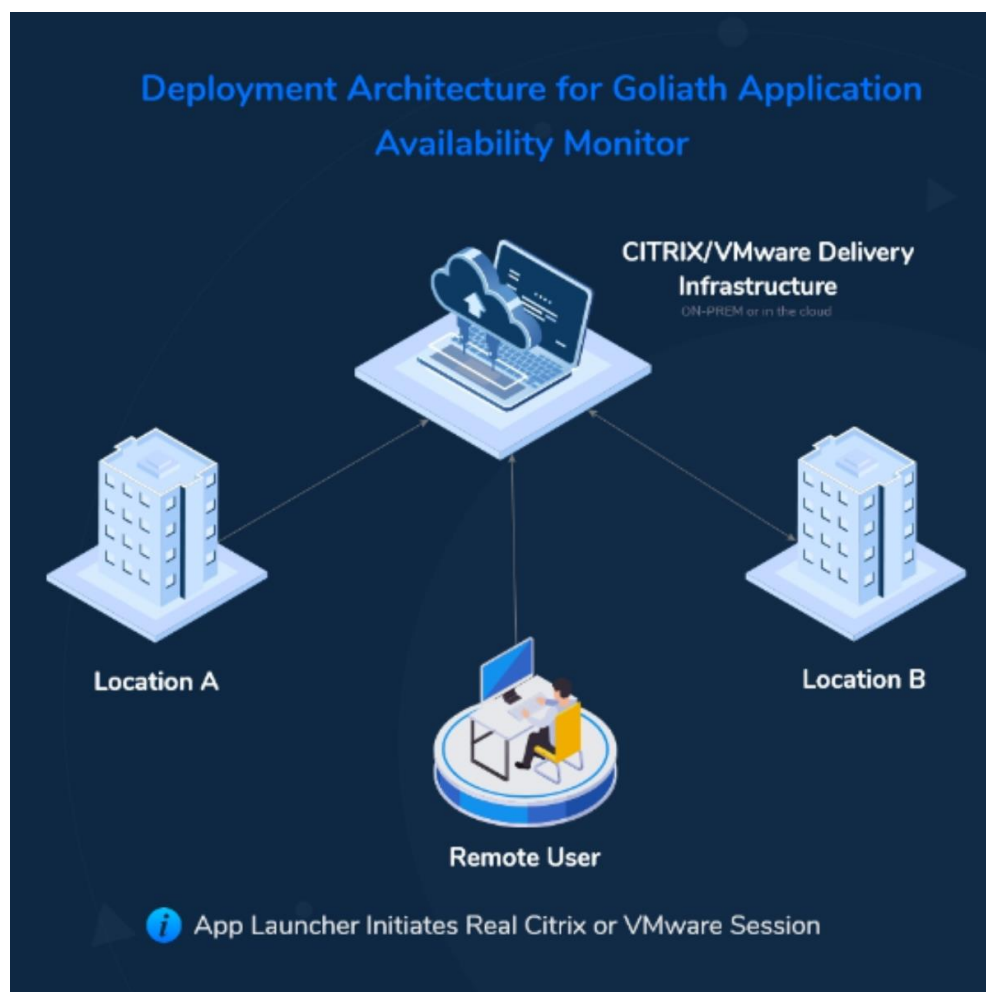


## Sample Deployment: Universal Health Services

UHS is one of the 10 largest for-profit healthcare organizations in the United States. Today, UHS has Goliath Performance Monitor and Goliath Application Availability Monitor deployed at their corporate office, 30 acute care hospitals, and within the Cerner datacenter on Citrix servers running Cerner applications.

UHS has configured and scheduled the availability monitors to launch tests to confirm applications are available 24/7/365. Currently, approximately 15,000 application test launches occur daily with a real-time alert being triggered if a logon fails or exceeds a logon time threshold. This alerts administrators before the logon difficulty manifests to end users, so they have the ability to remediate the issue before clinicians or healthcare workers are impacted.

In one example, a number of the clinical staff were having difficulty accessing the Cerner applications, getting frequent disconnects, unable to load the application at all, and while connected, horrible slowness. By using Goliath Performance Monitor, the IT staff at the hospital was able to determine that the issue had nothing do with Cerner, saving hours and days in the troubleshooting process, but rather that the users were all connecting through the same Wi-Fi access point at the hospital.



## The Standard in Health IT

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 Cerner, including Universal Health Services, Ascension, Children's National, NorthBay Healthcare, AtlantiCare, Westchester Medical Center, Intermountain Healthcare, CommonSpirit, and many others to improve patient care.**

*Goliath Technologies can be purchased directly through Cerner. If you would like to learn more about how we can provide value to your organization, email us at [techinfo@goliathtechnologies.com](mailto:techinfo@goliathtechnologies.com)*

Get started today with a free  
[demo](#) or a [trial](#) of Goliath  
Performance Monitor



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