GOLIATH TECHNOLOGIES®

THE HEALTH IT STANDARD

MEDITECH Module

A Technical Overview

By The Goliath Technologies Technical Team

"In approximatelty one week, support tickets dropped by 25%"

–Chad Brisendine
CIO of St. Luke's University Health Network

CITRIX® Ready

Contents

Summary

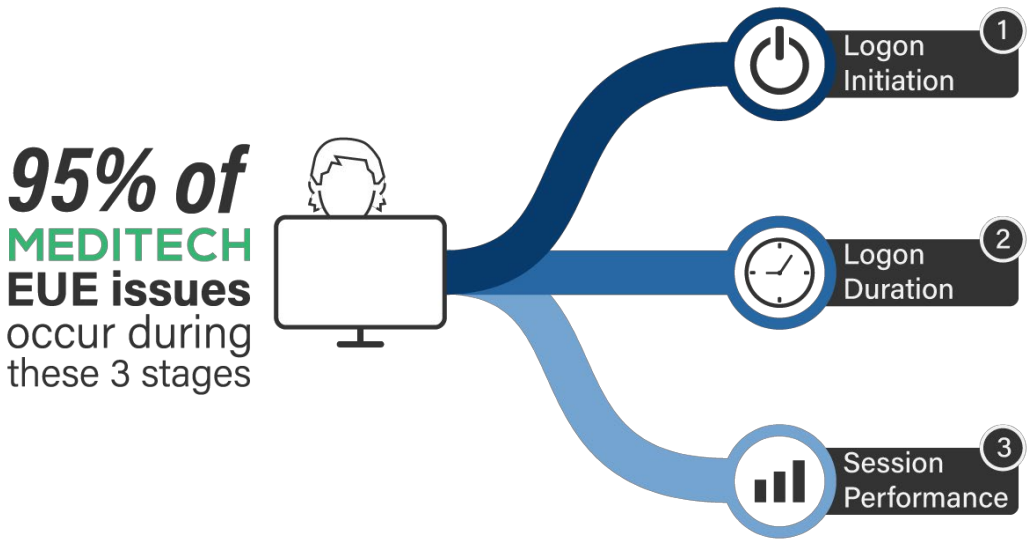
While healthcare IT leaders take great care in choosing the right Electronic Health Records system, the underlying virtualized desktop delivery infrastructure, like Citrix and VMware Horizon, is key to delivering MEDITECH and all your applications.

An organization's desktop virtualization infrastructure, and its systems for delivering applications, are complex and can have numerous hang-ups that will impact end user experience. In this technical overview you will see how Goliath Performance Monitor and Goliath Application Availability Monitor are used to support Citrix, VMware Horizon, MEDITECH and other business applications on-premises in a healthcare setting. You will see the healthcare IT specific functionality of the two products and how to leverage those features to anticipate, troubleshoot, and prevent end user experience issues.

Purpose-built for Citrix and MEDITECH

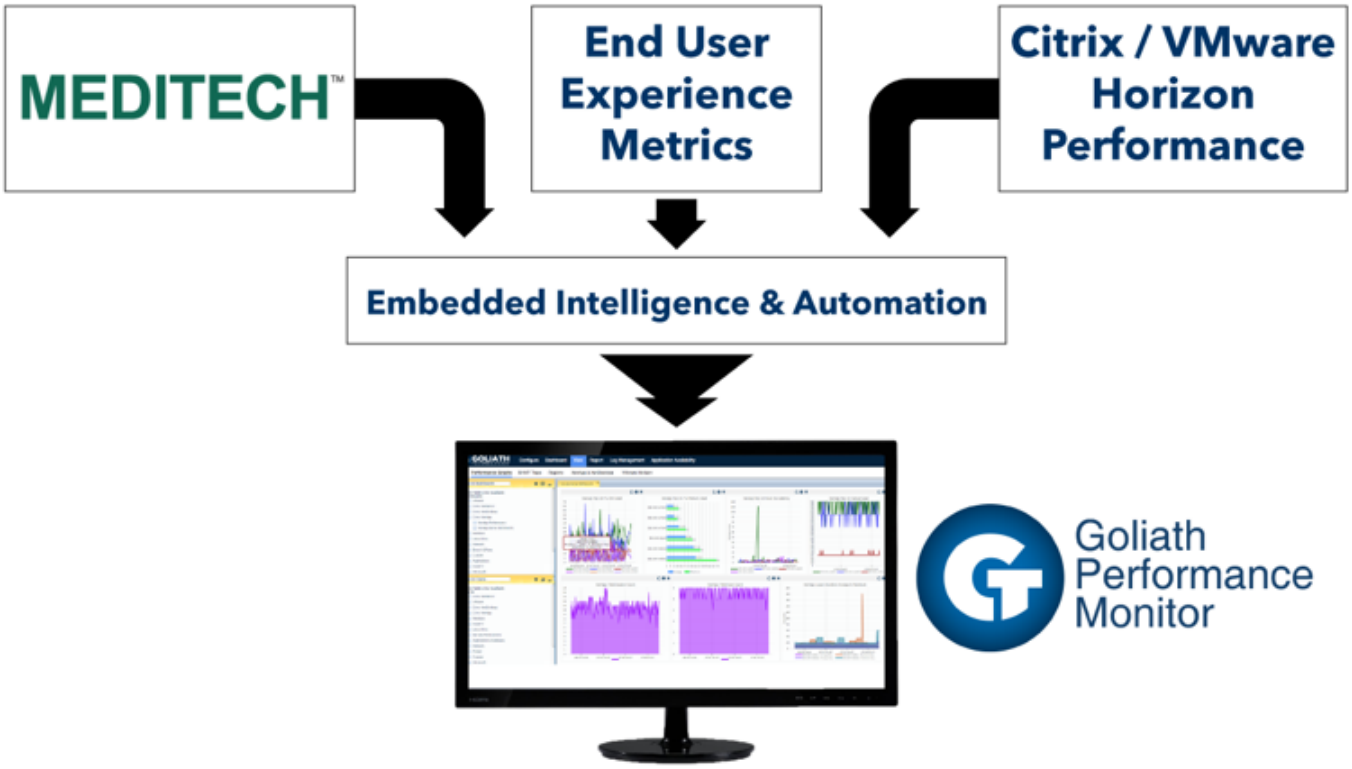
Goliath Performance Monitor for hospitals using MEDITECH is built with input from Healthcare IT teams who deployed Magic, Client Server and MEDITECH 6.x in their Citrix environment in order to troubleshoot and fix end user experience issues that affect physicians and healthcare workers.

Goliath focuses on providing granular visibility & advanced proactive operational functionality into three key areas of the Citrix end user experience: **Logon Initiation, Logon Duration, and Session Performance.**



MEDITECH Integration

Goliath Performance Monitor's module for MEDITECH provides a unified view combining performance metrics for MEDITECH, End User Experience, and the underlying Citrix or VMware Horizon virtualization delivery infrastructure. This enables Healthcare IT professionals to view data and metrics pertaining to the different elements of their environment in one single console and gives them the power to anticipate, troubleshoot and prevent end user experience issues.



Factors external to MEDITECH's core system can affect application access such as **user logon speed, network latency, and system latency**. These areas are key to the end user experience and need to be carefully monitored with specific thresholds, alerts and remediation actions. With deep Citrix API integration, you get detailed metrics from these three areas, so 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.

Solutions

Goliath Technologies provides comprehensive end user experience monitoring, troubleshooting and management consisting of two primary solutions. These technologies allow administrators to monitor, identify, and troubleshoot issues in better than real-time.

GOLIATH APPLICATION AVAILABILITY MONITOR

Confirm Citrix is available for local or remote end users.

This is a complete early warning system that lets you know in advance if an end user is going to have a problem when they try to access an application, so you can fix it before they are negatively impacted. The technology is designed to:

- Confirm that applications and the IT delivery infrastructure are available and working.
- Send alerts if they fail or are slow for troubleshooting.
- Provide reports as objective evidence of success, slowness or failure so permanent fix actions can be put in place to prevent issues in the future.

GOLIATH PERFORMANCE MONITOR with MEDITECH Module

Proactive IT Performance Monitoring for Virtual Server, Virtual Desktop, Hybrid Cloud, and Mobile Environments.

Goliath Performance Monitor for Hospitals using MEDITECH provides complete support for monitoring virtual servers, virtual desktops and hybrid cloud environments, in addition to MEDITECH applications. The technology has been designed from the ground up to help IT administrators anticipate issues before they become problems. If problems do appear, it gives you the data and tools to troubleshoot and resolve them with minimal end user impact. The software also enables IT to put permanent fix actions in place to prevent issues from occurring in the future.

Goliath Topology View for Citrix

The Goliath Topology view provides a visual guide to the logical relationships and connections of your entire Citrix infrastructure and shows the health of each individual component at a glance. It provides detailed information on the status of your delivery groups, machine catalogs, images, clusters and hosts that allows you to quickly identify and troubleshoot macro-level events affecting locations, regions, and other large groups of users.

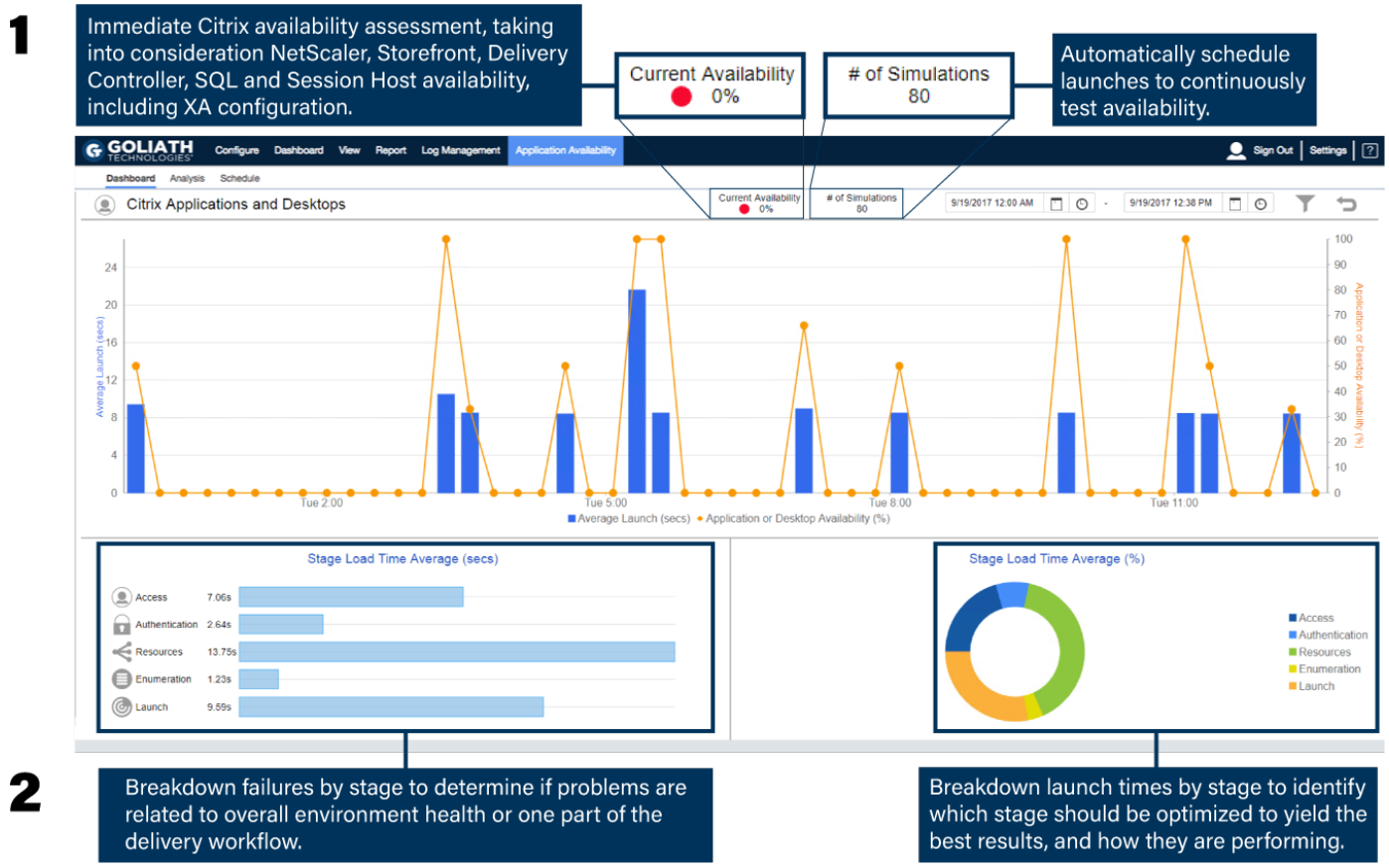
Goliath Application Availability Monitor

An Early Warning System

GAAM is a production-ready end-user experience software that validates availability of the Citrix delivery infrastructure (including the NetScaler). It ensures MEDITECH and other applications are available by executing real Citrix sessions that exercise the exact same steps a user takes during the Citrix logon process. Regardless of whether a user is remote or local, the Goliath Application Availability Monitor gives administrators an "early warning system" that allows them to know exactly what the Citrix end user experience will be like for their users in advance. This guarantees the availability of the entire Citrix delivery infrastructure and MEDITECH.

- Automatically tests the logon and application launch process across your entire infrastructure 24/7/365 and alerts you anytime anywhere of issues.
- Detailed reporting with screenshot evidence tells you exactly what stage your process failed and isolates the specific failure point.
- Deploy anywhere, on premises or in the cloud, to identify individual, site or geographical application availability issues.
- Automatic remediation actions built-in.

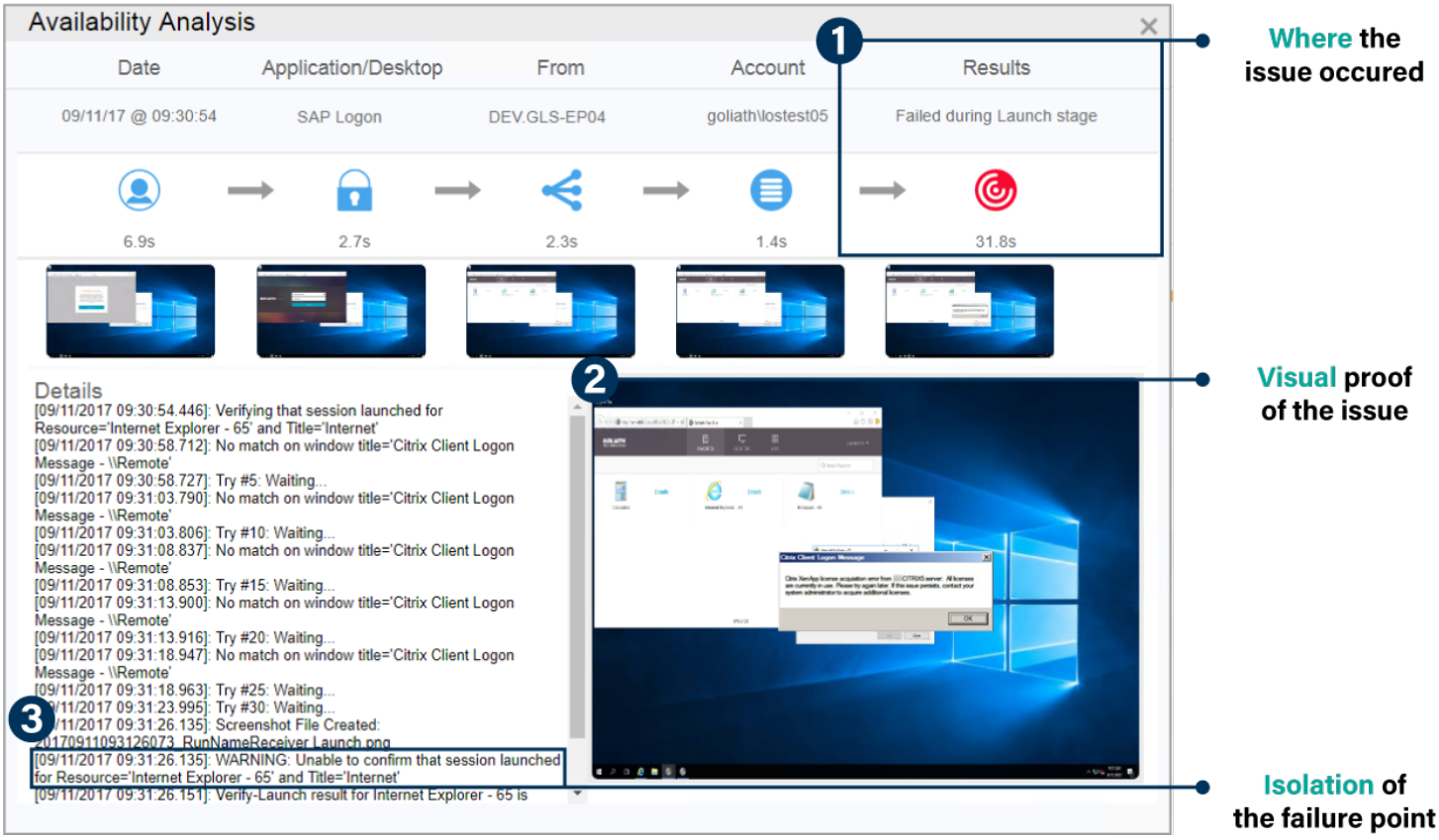
Pictured Below: (1) The Application Availability Monitor Dashboard displaying a real-time assessment of Citrix Availability. (2) The breakdown of launch times by stage.



End User Screenshot Analytics

When there is a logon failure, an administrator will be alerted immediately. Using the provided details, healthcare IT professionals can pinpoint where the failure occurred and the root cause.

Illustrated Below: Quickly drill down to investigate failures right from the application availability dashboard by clicking on the magnifying glass. In just three steps, you can then see *where* the logon issues occurred during the logon process and *what* the issue was:



1. In this case, failure occurred at the launch stage (**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.

GOLIATH PERFORMANCE MONITOR

Topology View

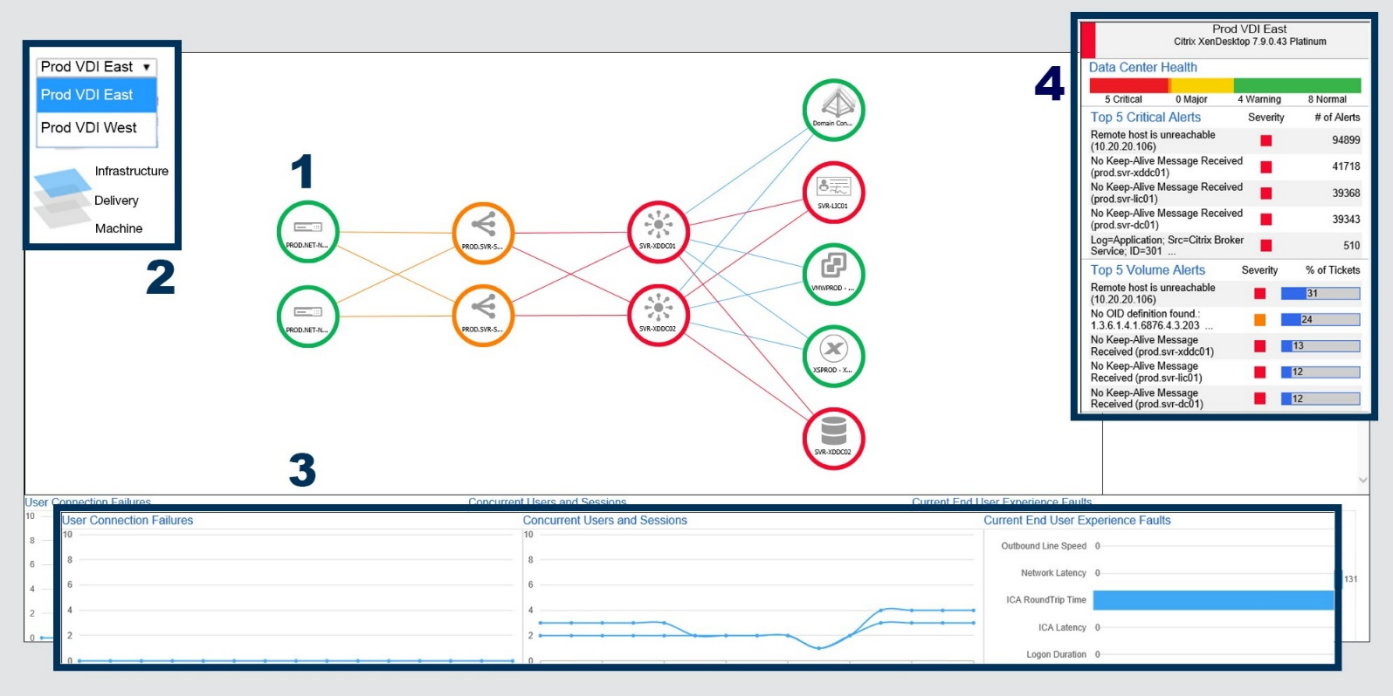
Topology View automatically builds out a dependency map of your Citrix infrastructure. It requires no manual set-up or scripting and adapts to new components as they are added. This eliminates the time it takes to correlate relationships between elements. It shows which elements are affecting other elements and how through color-coded connection lines and specific metrics. 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 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 connection between component 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.

Physical Layer

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.

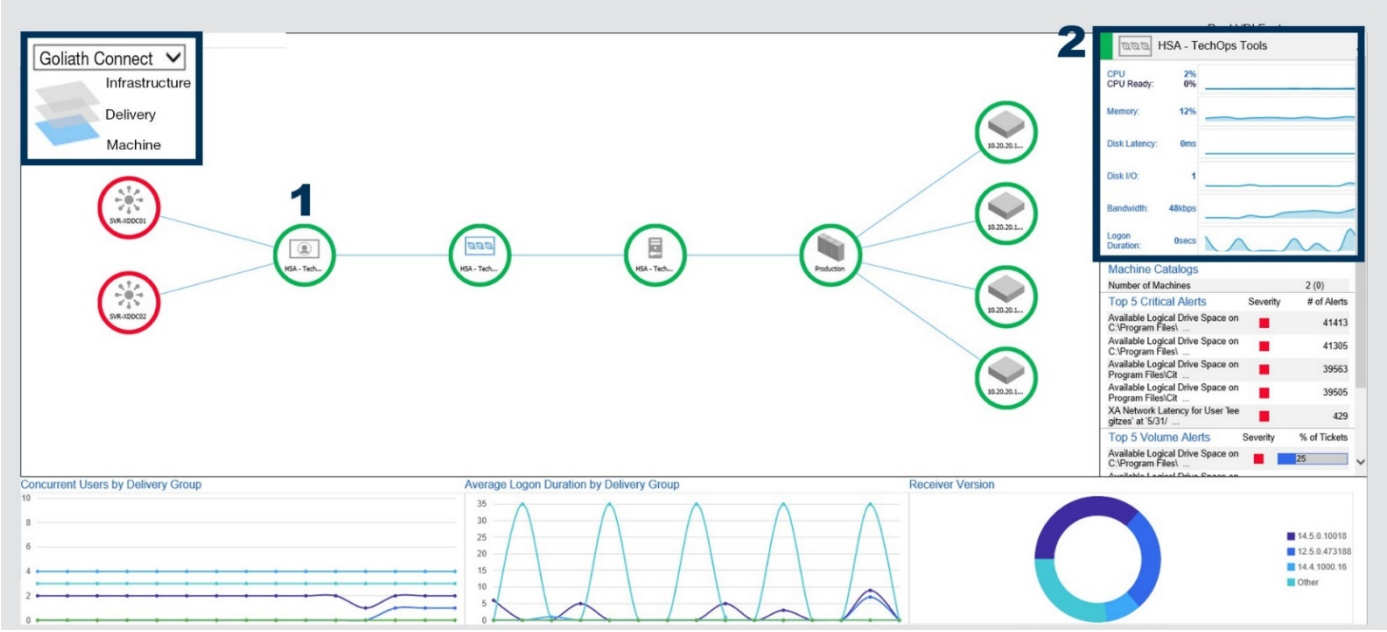


Delivery layer

1) Shows the logical connections and dependencies of your Citrix environment by delivery group, machine catalog, and down to the specific image.
2) Correlates end user experience metrics for the selected delivery groups.
3) Delivers context sensitive metrics for any selected component.

Machine Layer

1) In addition to the delivery group elements, the machine layer displays Citrix PVS and/or MCS as well as the hypervisor resources and hosts.
2) The details on the right pane will update according to the selected node.



MEDITECH Monitoring Module

Goliath Performance Monitor for MEDITECH integrates directly with the MEDITECH EHR system giving administrators MEDITECH specific data at their fingertips.

Highlights:

- MEDITECH specific monitoring rules
- Five layers of visibility into the MEDITECH delivery infrastructure
- View MEDITECH specific performance graphs to identify errors and fault points in your environment
- Run reports on all the faults and errors in your MEDITECH environment
- Threshold based alerting

MEDITECH Monitoring Intelligence for Common Failure Points

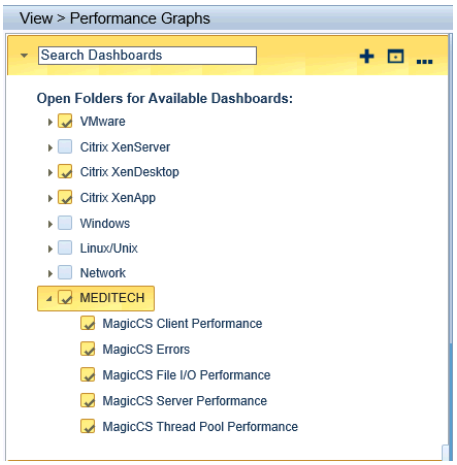
Goliath comes with "embedded intelligence" consisting of hundreds of pre-configured monitoring rules and alerts based upon best practices. With the MEDITECH module our customers also receive MEDITECH specific monitoring rules which allows for administrators to immediately begin focusing on improving environmental bottlenecks or failure points.

Rule Name	Type	Severity	Description
MEDITECH - ANPServer Service Failure	WinServicesWatch	Critical	Handles all M-AT Read/Writes between the File Server and the clients
MEDITECH - Application Manager Service Failure	WinServicesWatch	High	MTAppManager
MEDITECH - Application Server Service Failure	WinServicesWatch	High	MEDITECH Application Server
MEDITECH - Archive Server Low Resources	ServerWatch	Critical	Alert for Low Memory, disk, and high CPU Utilization
MEDITECH - BG Servers Sustained 100 percent Utilization	CounterWatch	Critical	Alert when CPU Total stays persistently at 100 percent
MEDITECH - CS Background Jobs Service Failure	WinServicesWatch	High	MEDITECH CS Bkg Jobs
MEDITECH - CS File Server Service Failure	WinServicesWatch	High	Handles all NPR Read/Writes between the File Server and the Clients
MEDITECH - CSProxy Server Service Failure	WinServicesWatch	Critical	Allows access to NPR routines via client
MEDITECH - Disk Read Latency Spike on File and Transaction Servers	CounterWatch	H	
MEDITECH - Disk Read Latency Sustained on File and Transaction Servers	CounterWatch	C	
MEDITECH - Disk Read Queue Length Spiked on File and Transaction Servers	CounterWatch	H	
MEDITECH - Disk Read Queue Length Systained on File and Transaction Servers	CounterWatch	C	
MEDITECH - Disk Write Latency Spike on File and Transaction Servers	CounterWatch	H	
MEDITECH - Disk Write Latency Sustained on File and Transaction Servers	CounterWatch	Critical	
MEDITECH - Disk Write Queue Length Spiked on File and Transaction Servers	CounterWatch	High	
MEDITECH - Disk Write Queue Length Sustained on File and Transaction Servers	CounterWatch	Critical	

MEDITECH alerts include notification, alert resolution and remediation capabilities

Deep Visibility

Goliath provides five layers of visibility into one console: Hardware, Host, VM, OS, and Application.

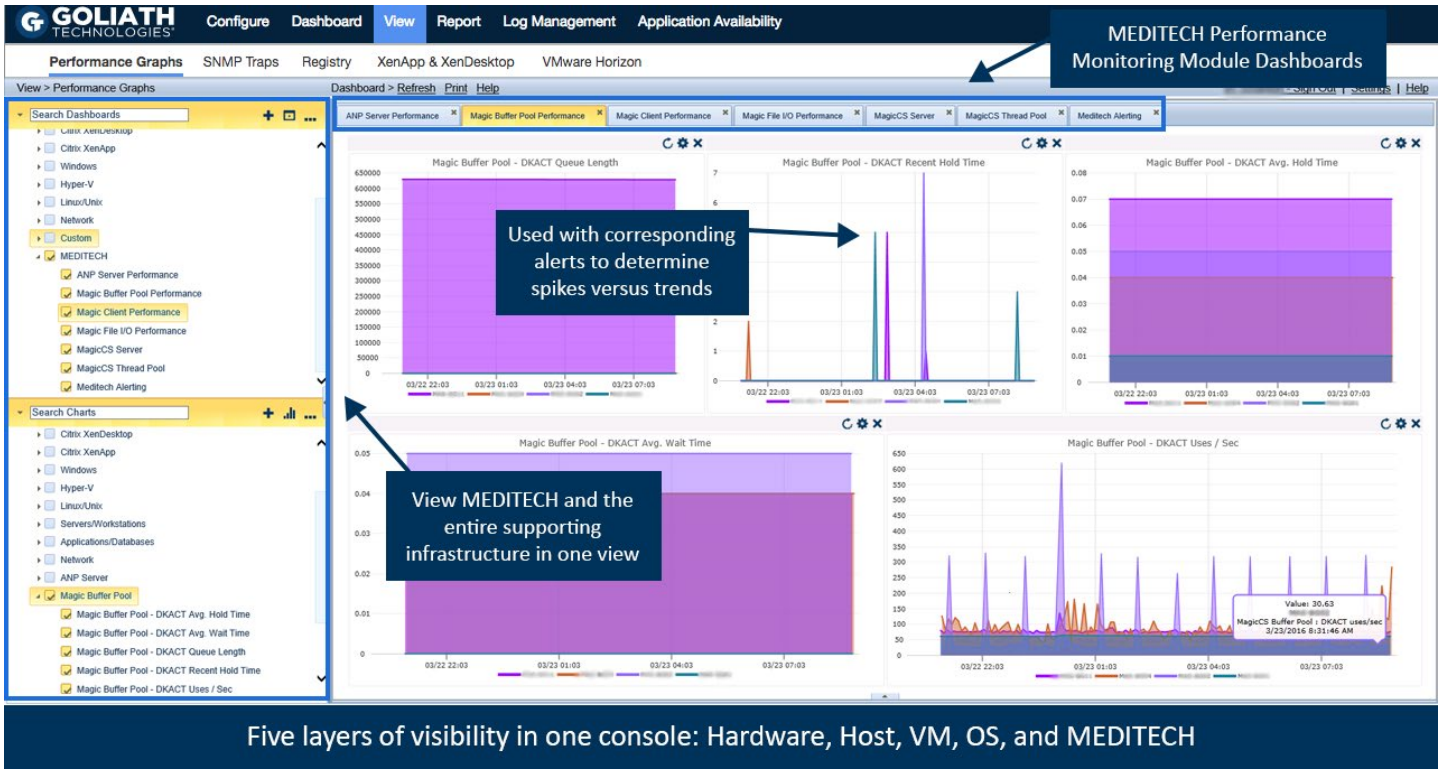


Performance Graphs

This allows you to view performance graphs in order to trend MEDITECH specific counters as well as resource utilization for each server to identify faults and errors.

Select the elements/layers you want to view performance graphs for, and they will populate on the screen so you can view related metrics and correlate data to discover causation.

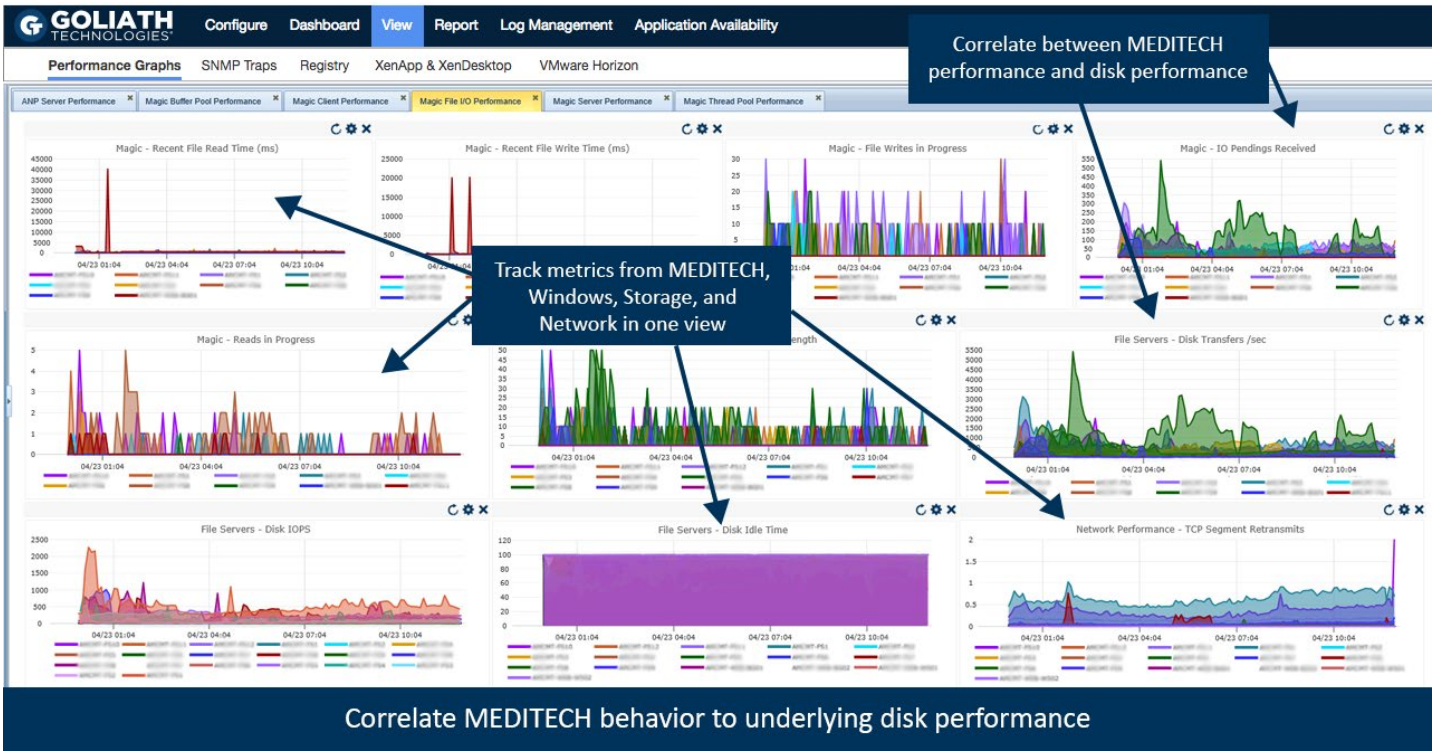
MEDITECH Magic Buffer Pool Performance Dashboard



Five layers of visibility in one console: Hardware, Host, VM, OS, and MEDITECH

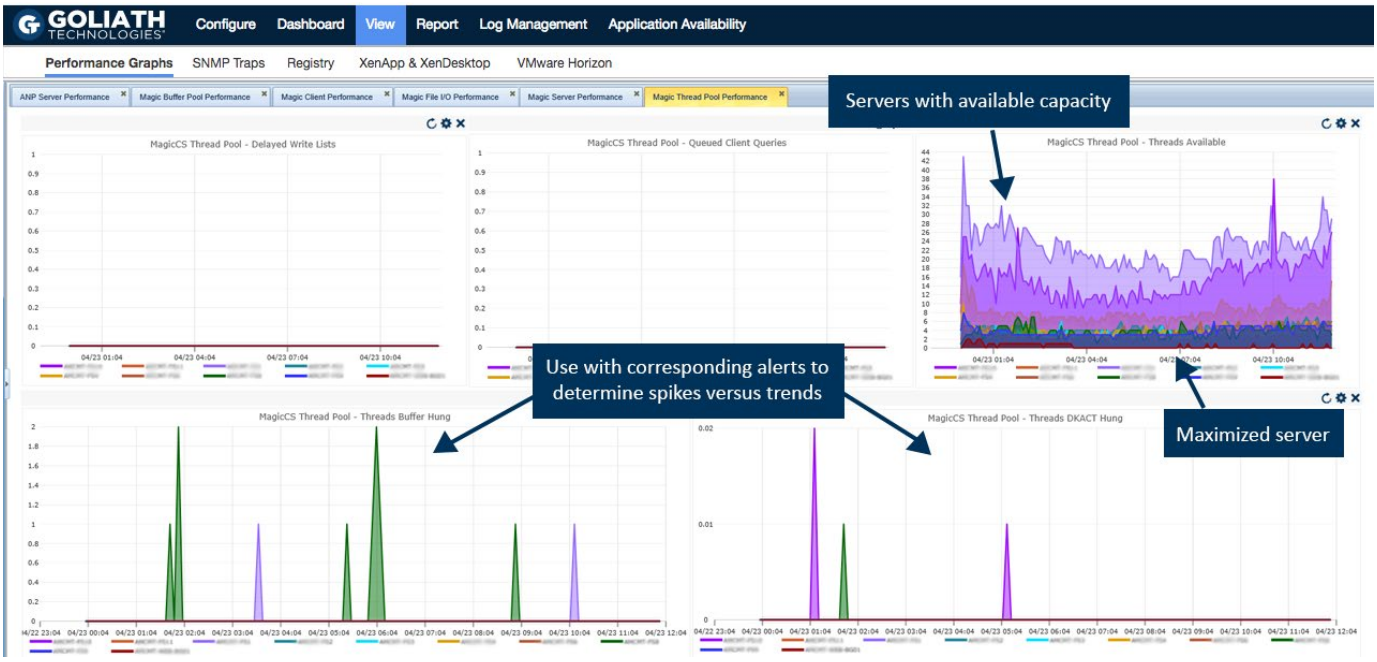
MEDITECH Magic File I/O Performance Dashboard

Track metrics from MEDITECH, Windows, Storage, and Networks in one view.



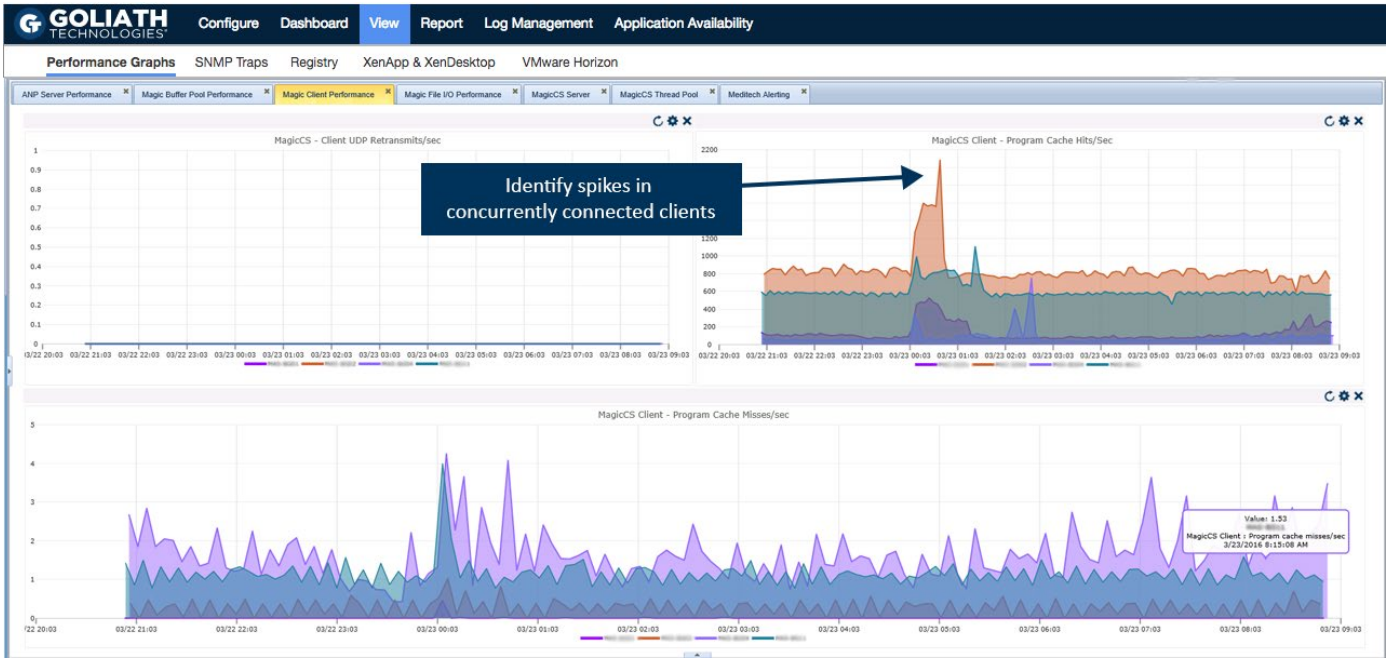
MEDITECH Magic Thread Pool Performance Dashboard

Track the availability of the environment to support additional growth by tracking the number of threads available for capacity planning.



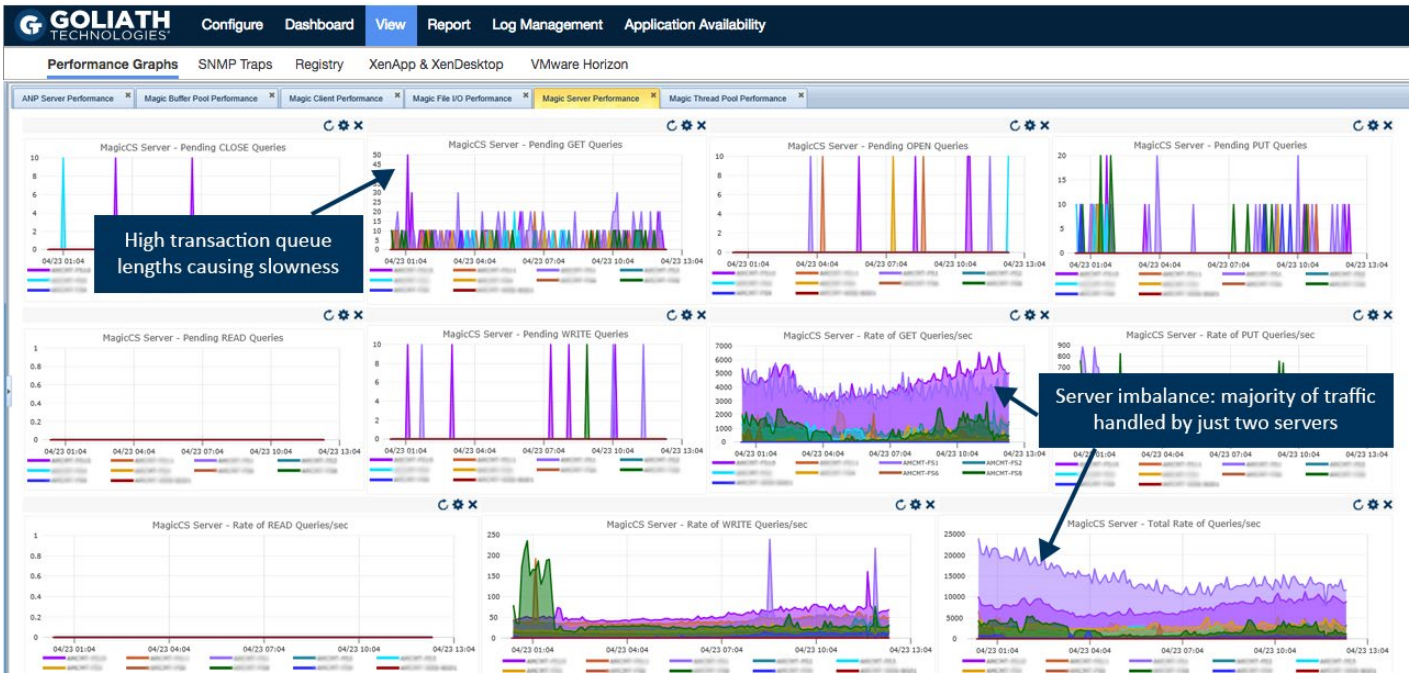
MEDITECH Magic Client Performance Dashboard

Correlate client slowness and connection problems to client activity and the server to identify bottlenecks.



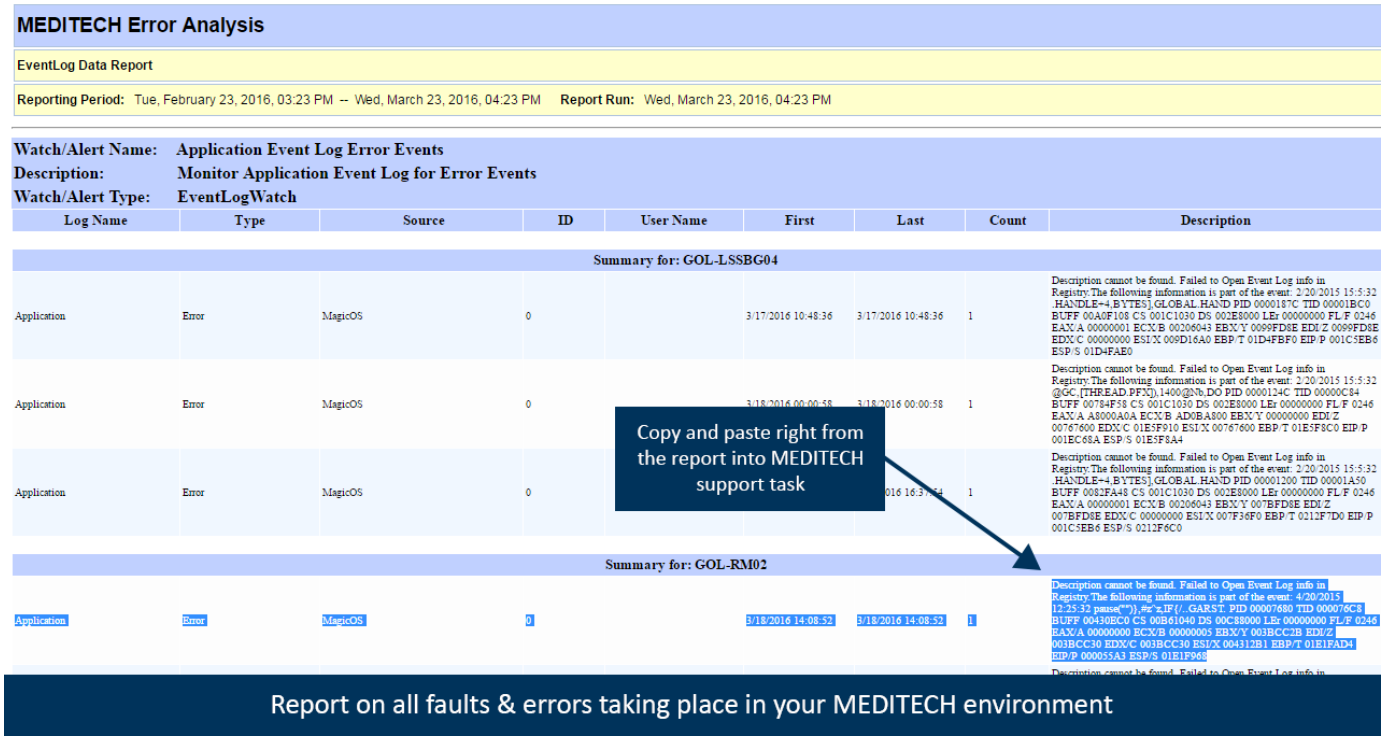
MEDITECH Magic Server Performance Dashboard

Identify spikes in transaction requests and trend transaction volume



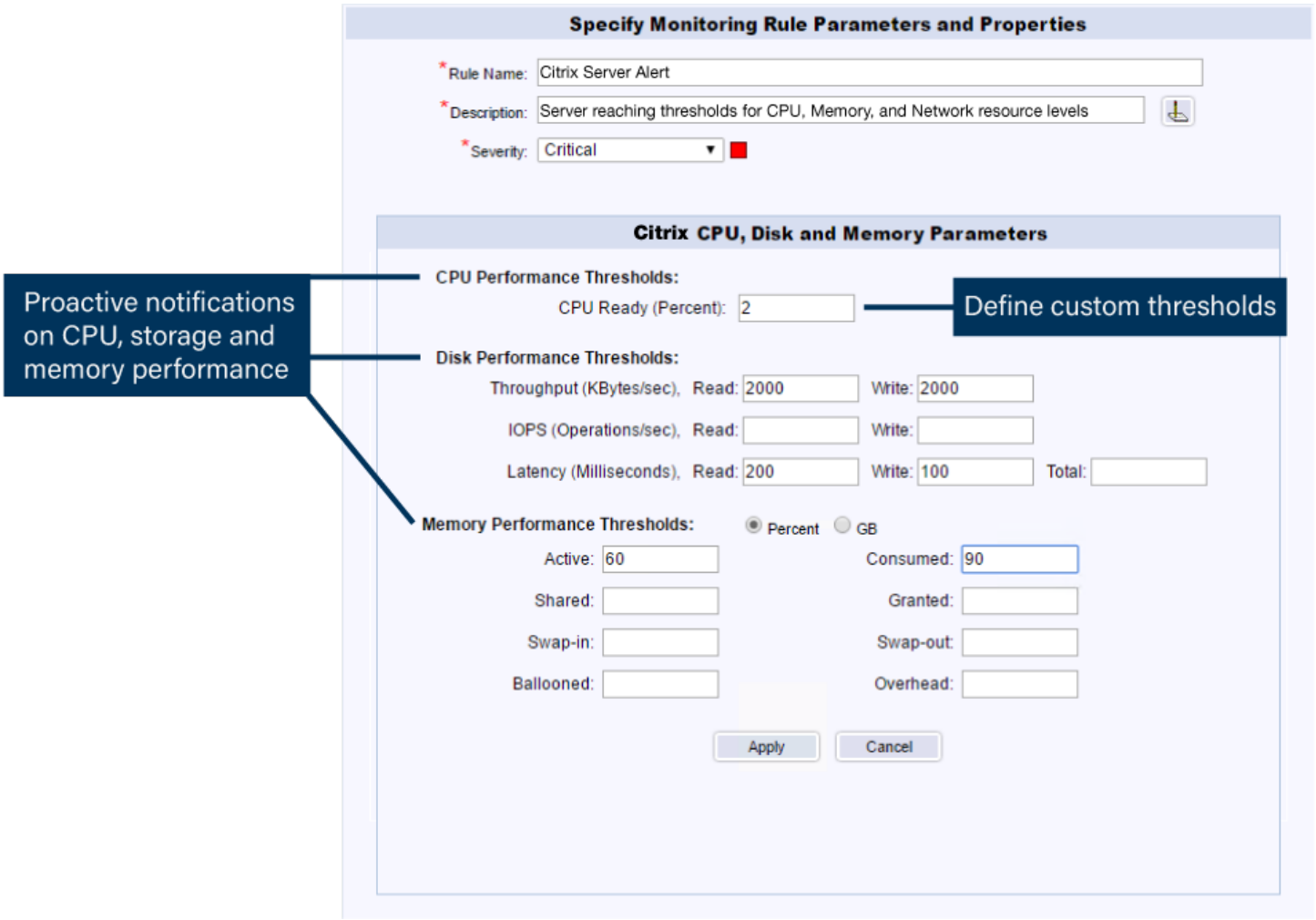
MEDITECH Faults & Errors Report

Report on all faults & errors taking place in your MEDITECH environment in order to set automated fix actions and threshold-based alerts (covered in the next section).



Threshold-Based Alerting

Define custom thresholds and receive proactive notifications based on faults, errors, and conditions so administrators can resolve issues before end users complain. Configuring alerts and tuning them to the specifications of each department requires no scripting or customizations because there are pre-built templates for each type of alert.



Purpose-built for XenApp & XenDesktop

Goliath Performance Monitor is the only IT performance monitoring solution that brings together granular Citrix XenApp and XenDesktop data and metrics from the underlying delivery infrastructure in a single console. Goliath Performance Monitor is preconfigured to proactively find and monitor common Citrix XenApp and XenDesktop, infrastructure, and role server failure points. This allows you to proactively anticipate, troubleshoot, resolve, and prevent performance issues in the most complex Citrix XenApp and XenDesktop environments.

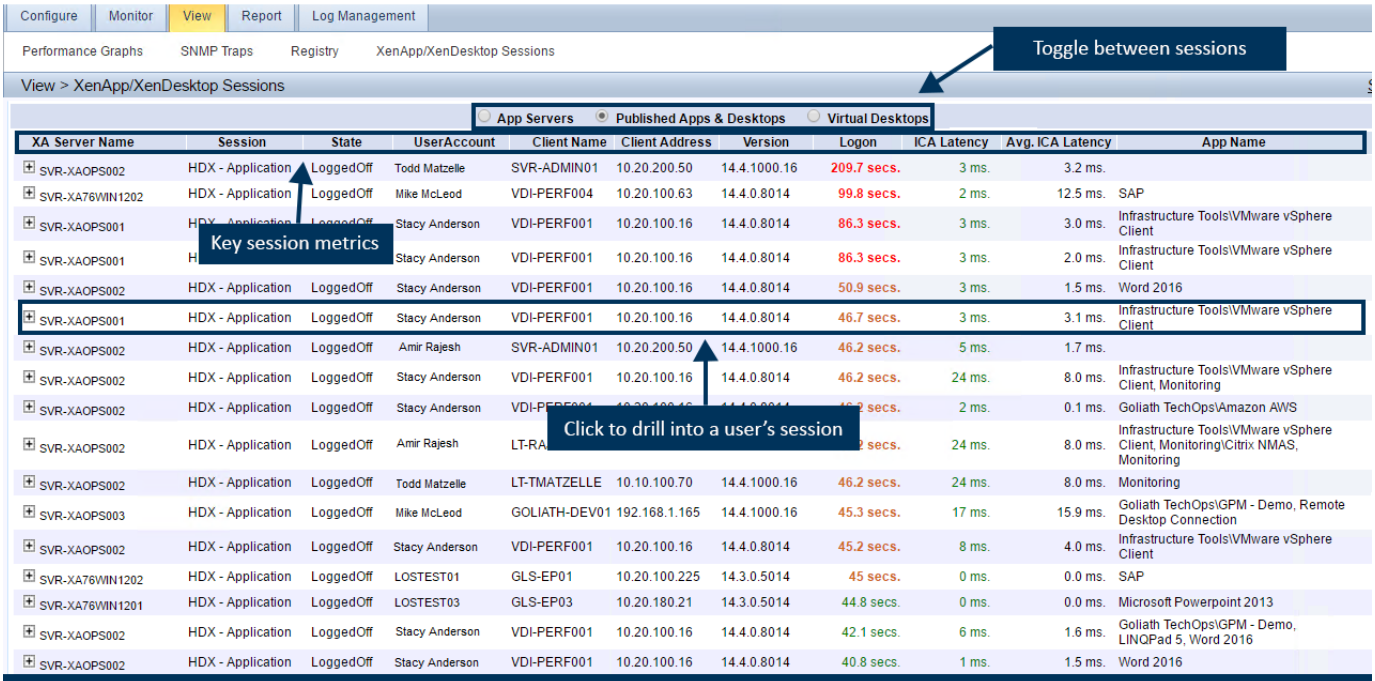
Highlights:

- Citrix 5 layers of visibility
- XenApp & XenDesktop Session Display
- Real time ICA/HDX channel drill down
- Logon duration

Real-Time Citrix Performance Graphs

View Citrix XenApp & XenDesktop along with the entire supporting infrastructure in one console

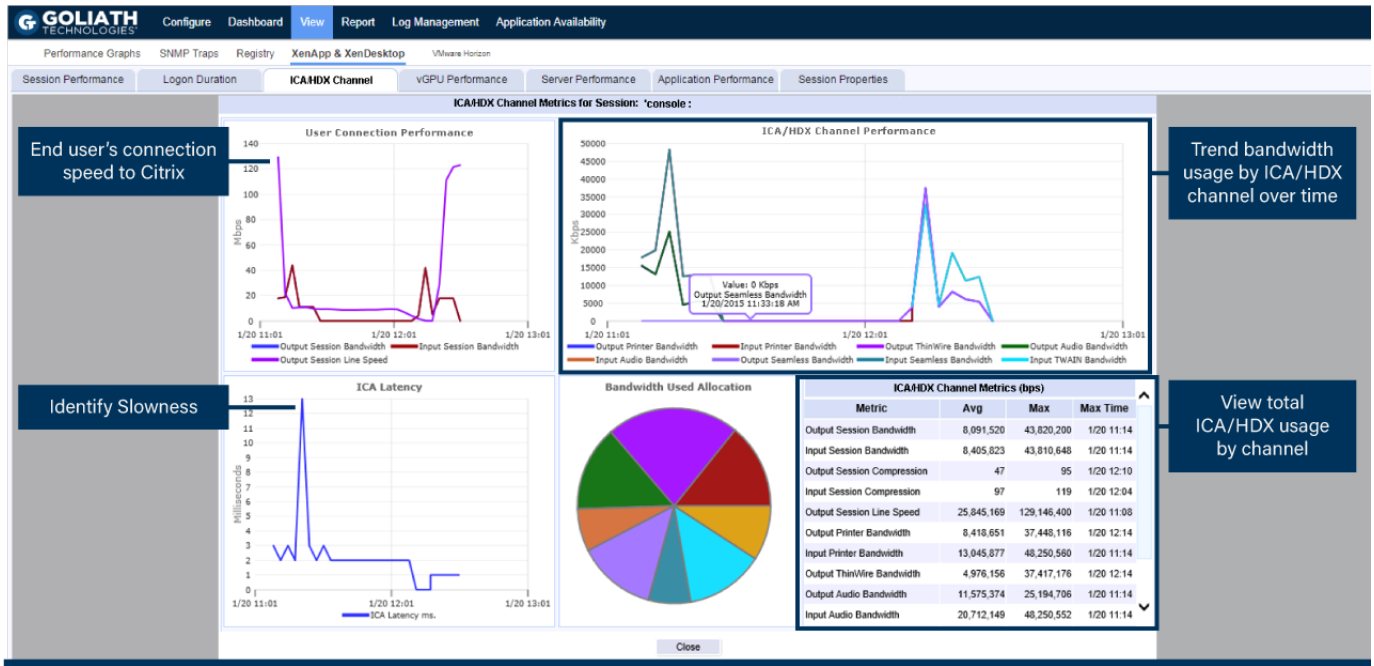
Real-Time XenApp & XenDesktop Session Display



Troubleshoot real or simulated end user sessions historically or in real-time

Real-Time ICA/HDX Channel Drill Down From Session Display

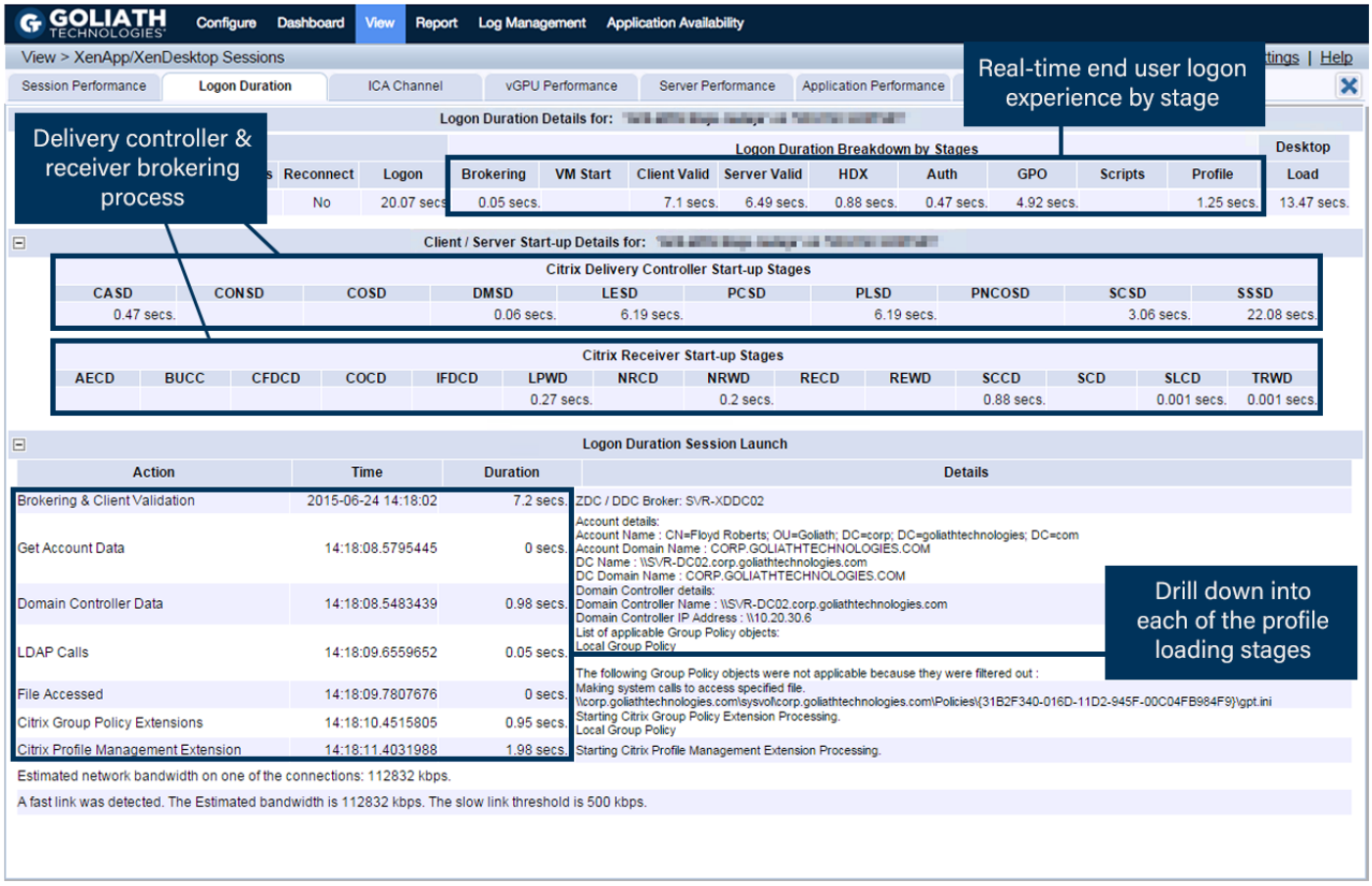
Goliath provides industry-leading visibility into Citrix session performance by breaking down the ICA protocol and returning precise metrics around individual ICA channel performance.



Citrix XenApp & XenDesktop Deep ICA Channel Analysis for Troubleshooting

Real-Time Session Logon Time Drill Down From Session Display

Goliath provides granular detail around logon duration times, including the exact environment elements used by an individual user's logon to ensure efficient root cause analysis and expedite troubleshooting should a fault or delay take place.

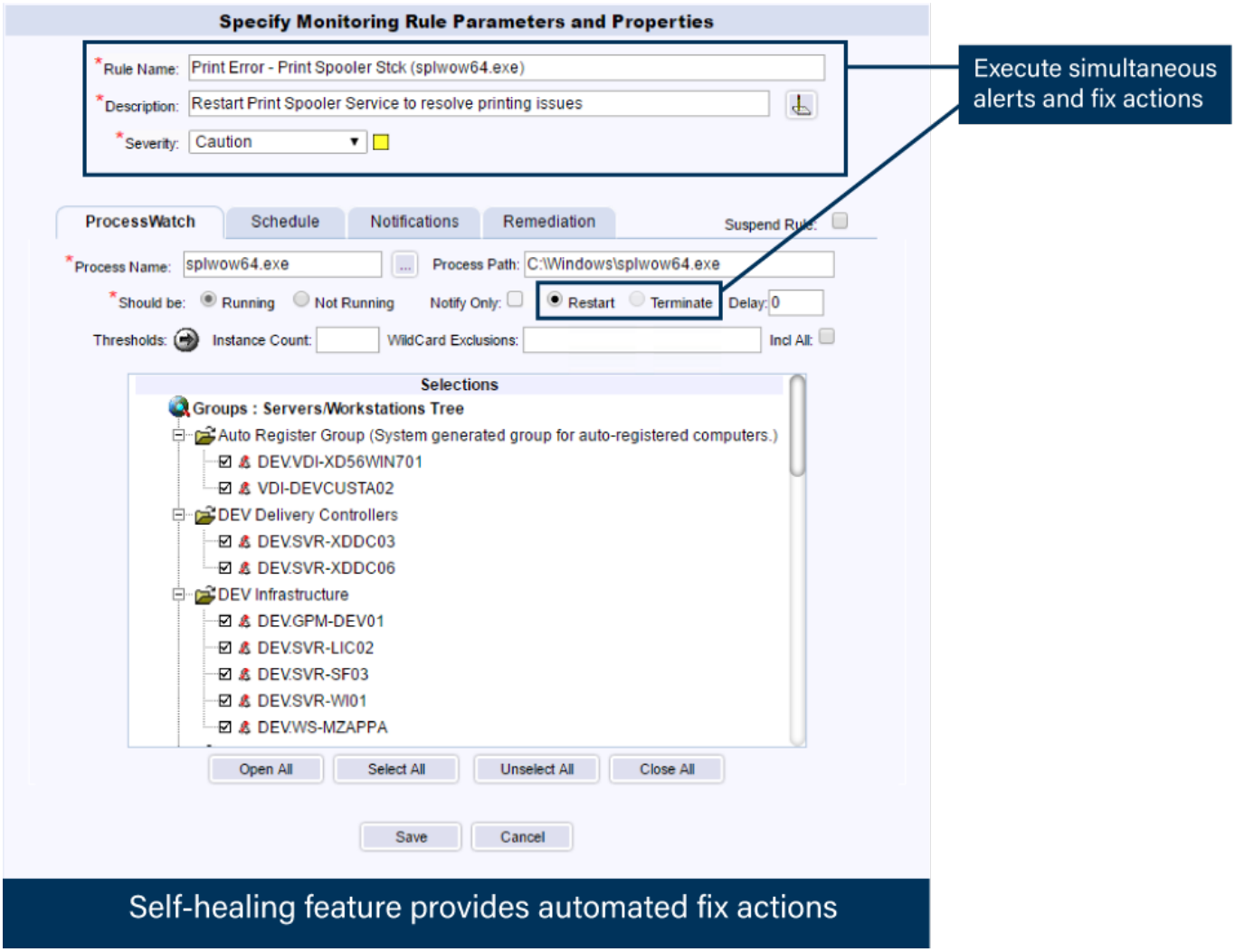


Advanced Remediation Capabilities

Goliath goes beyond providing differentiating Citrix visibility and granular metrics by also delivering unique operational features that allow organizations to take the next step in improving operational IT troubleshooting and Help Desk workflows.

Automated Remediation Actions

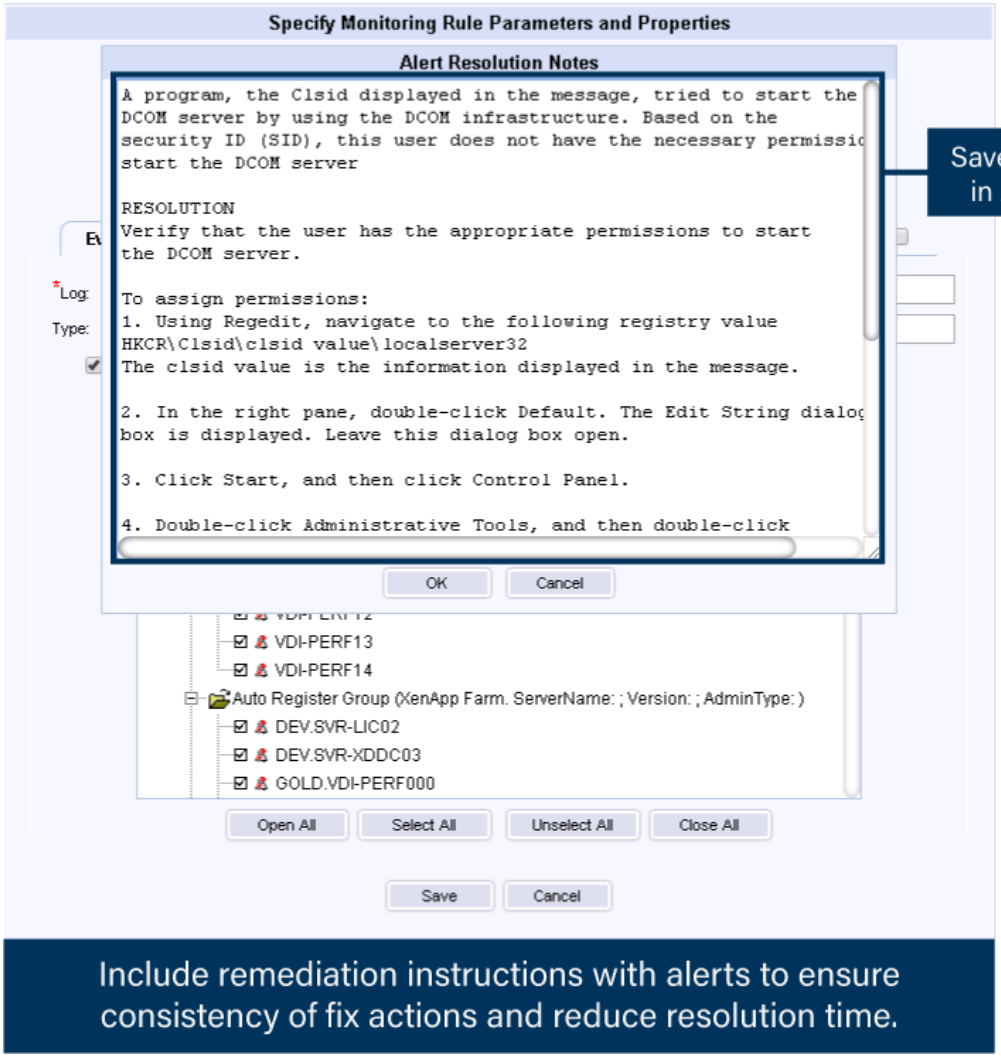
Configure automatic remediation fixes to take place when certain alerts are triggered. Whether it be restarting a service, or running a PowerShell script, Goliath supports a number of “self-healing” workflows to allow IT organizations to dramatically increase Help Desk response times and implement truly proactive IT processes.



Self-healing feature provides automated fix actions

Alert Resolution / Escalation Knowledgebase

For workflows that cannot be automated, Goliath allows administrators to automatically pass on troubleshooting instructions to the appropriate administrators when certain alerts are triggered.



Sample Reports

Citrix XenApp - ICA Latency Report

Citrix XenApp - ICA Latency for Specified Report Period - Show Top 20 Average

Reporting Period: Fri, January 01, 2016, 07:00 AM -- Fri, January 08, 2016, 07:00 AM **Report Run:** Tue, February 02, 2016, 12:19 PM **Sort By:** ICA Latency

User Account	Client Name	Client Address	Session Name	ICA Latency	Network Latency	ICA RTT	App Name	Date/Time	Server Name
Kelsey Hoff	SVR-TS02	10.20.30.102	ica-cgp 108	245.7 ms.	266.4 ms.	144.7 ms.	Internet Explorer, YouTube - Chrome	1/7/2016 14:45:45	SVR-XA76WIN1201
Adam Kelly	SVR-TS02	10.20.30.102	ica-cgp 129	171.0 ms.	171.0 ms.	606.7 ms.	Internet Explorer, YouTube - Chrome	1/7/2016 11:10:49	SVR-XA76WIN1201
lostest01	GLS-EP01	10.20.100.225	ica-cgp 29	19.0 ms.	0 ms.	3.0 ms.	Acrobat Reader DC	1/7/2016 12:09:33	SVR-XA76WIN1202
lostest01	GLS-EP01	10.20.100.225	ica-cgp 64	7.0 ms.	0 ms.	5.0 ms.	Acrobat Reader DC	1/7/2016 15:24:50	SVR-XA76WIN1202
lostest01	GLS-EP01	10.20.100.225	ica-cgp 61	0.0 ms.	0 ms.	0.0 ms.	Acrobat Reader DC	1/7/2016 11:54:49	SVR-XA76WIN1202
Mike McLeod	SVR-TS02	10.20.30.102	ica-cgp 128	82.3 ms.	3 ms.	82.3 ms.	Internet Explorer, YouTube - Chrome	1/6/2016 07:34:47	SVR-XA76WIN1201
lostest01	GLS-EP01	10.20.100.225	ica-cgp 30	0.0 ms.	0 ms.	0.0 ms.	Acrobat Reader DC	1/7/2016 14:40:27	SVR-XA76WIN1202
lostest01	GLS-EP01	10.20.100.225	ica-cgp 35	4.0 ms.	0 ms.	0.0 ms.	Acrobat Reader DC	1/7/2016 12:40:14	SVR-XA76WIN1202
Stacy Brown	SVR-TS03	10.20.30.103	ica-cgp 76	26.0 ms.	0 ms.	26.0 ms.	Server Manager	1/7/2016 08:49:21	SVR-XA76WIN1202
John Marshall	SVR-TS03	10.20.30.103	ica-cgp 131	62.0 ms.	0 ms.	62.0 ms.	Server Manager	1/4/2016 08:50:44	SVR-XA76WIN1201
lostest01	GLS-EP01	10.20.100.225	ica-cgp 15	31.0 ms.	0 ms.	31.0 ms.	Acrobat Reader DC	1/7/2016 03:54:54	SVR-XA76WIN1202
lostest01	GLS-EP01	10.20.100.225	ica-cgp 106	0.0 ms.	0 ms.	0.0 ms.	Acrobat Reader DC	1/6/2016 13:20:24	SVR-XA76WIN1202
lostest01	GLS-EP01	10.20.100.225	ica-cgp 16	32.0 ms.	0 ms.	32.0 ms.	Acrobat Reader DC	1/5/2016 19:09:58	SVR-XA76WIN1202
lostest01	GLS-EP01	10.20.100.225	ica-cgp 100	2.0 ms.	0 ms.	2.0 ms.	Acrobat Reader DC	1/5/2016 09:19:31	SVR-XA76WIN1202
lostest01	GLS-EP01	10.20.100.225	ica-cgp 92	1.0 ms.	0.0 ms.	31.0 ms.	Acrobat Reader DC	1/5/2016 07:35:22	SVR-XA76WIN1202
lostest01	GLS-EP01	10.20.100.225	ica-cgp 82	1.0 ms.	0 ms.	0.0 ms.	Acrobat Reader DC	1/5/2016 05:39:58	SVR-XA76WIN1202
Greg Jackson	SVR-TS03	10.20.30.103	ica-cgp 70	1.0 ms.	0 ms.	0.0 ms.	Server Manager	1/7/2016 16:11:54	SVR-XA76WIN1202
Thomas Fitzgerald	SVR-TS03	10.20.30.103	ica-cgp 6	1.0 ms.	0 ms.	0.0 ms.	Server Manager	1/4/2016 10:30:45	SVR-XA76WIN1202
Kelsey Hoff	GLS-EP03	10.20.100.22	ica-cgp 94	0.0 ms.	0 ms.	0.0 ms.	YouTube - Chrome	1/7/2016 11:10:49	SVR-XA76WIN1201
lostest01	GLS-EP01	10.20.100.225	ica-cgp 27	0.7 ms.	0.0 ms.	4.0 ms.	Acrobat Reader DC	1/7/2016 11:15:47	SVR-XA76WIN1202

View user sessions with high ICA latency.

Identify high network latency that could be affecting a user's session.

ICA/HDX latency and RTT in one view.

Report on Citrix XenApp & XenDesktop ICA/HDX latency for real or simulated end users.

Citrix XenDesktop Session Logon Duration Report - Session Logon Duration (in Seconds) Report for Specified Period

Reporting Period: Fri, January 01, 2016, 12:41 PM -- Sun, January 31, 2016, 12:41 PM **Report Run:** Tue, February 02, 2016, 12:48 PM **Sort By:** Machine Name

View users experiencing slow logons and identify where logon duration times occurred within the logon process.

Machine Name	User Account Name	User Display Name	Connect D/T	Reconnect	Logon Duration Breakdown							
					Logon	Client Valid	Auth	GPO	Scripts	Profile	Interactive	Group Name
⊞ VDI-DEVCUSTA03	GOLIATH\Stacy Anderson	Stacy Anderson	2016-01-15 15:52:18.000	Yes	32.9	6.58	0.25			0.59	3.89	VDI - WIN7-CUSTA
⊞ VDI-DEVCUSTA03	GOLIATH\ Greg Jackson	Greg Jackson	2016-01-15 11:10:33.000	Yes	35.4	3.39	0.23	6.06	0.25	0.25	3.95	VDI - WIN7-CUSTA
⊟ VDI-DEVCUSTA03	GOLIATH\Todd Matzelle	Todd Matzelle	2016-01-12 08:01:50.000	No	349.0	156.10	0.70	3.92		0.92	13.06	VDI - WIN7-CUSTA

Addtional Logon Duration Details

Action	Time	Duration	Details
Brokering	08:01:50.000	0.14 secs.	ZDC / DDC Broker: SVR-XDDC03
Get Account Data	07:58:35.936725600	0.02 secs.	Account details: Account Name : CN=Todd Matzelle,OU=Goliath,DC=corp,DC=goliathtechnologies,DC=com Account Domain Name : CORP.GOLIATHTECHNOLOGIES.COM DC Name : \\SVR-DC02.corp.goliathtechnologies.com DC Domain Name : CORP.GOLIATHTECHNOLOGIES.COM
Domain Controller Data	07:58:35.936725600	0.97 secs.	Domain Controller details: Domain Controller Name : \\SVR-DC02.corp.goliathtechnologies.com Domain Controller IP Address : \\10.20.30.6
LDAP Calls	07:58:37.699582100	0.02 secs.	List of applicable Group Policy objects: Local Group Policy
File Accessed	07:58:37.730783100	0.31 secs.	Making system calls to access specified file. \\corp.goliathtechnologies.com\sysvol\corp.goliathtechnologies.com\Policies\{31B2F340-016D-11D2-945F-00C04FB984F9}\gpt.ini
Citrix Group Policy Extensions	07:58:39.353235100	0.22 secs.	Starting Citrix Group Policy Extension Processing. Local Group Policy
Citrix Profile Management Extension	07:58:39.587242600	0.17 secs.	Starting Citrix Profile Management Extension Processing.
Estimated network bandwidth on one of the connections: 1000000 kbps.			
A fast link was detected. The Estimated bandwidth is 1000000 kbps. The slow link threshold is 500 kbps.			

Identify scripts or group policy extensions with higher than normal load times.

Report on Citrix XenApp & XenDesktop Logon Duration and view the logon duration breakdown for real and simulated users.

To see how Goliath can help you improve MEDITECH end user experience:

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