MEDITECH SOLUTION OVERVIEW

" With Goliath, we can identify the 'who, what and where' of performance issues. We even use the data in the product to open up support tasks with MEDITECH and they, in turn, are able to work with the support staff to determine root cause. "

- Derek Seiber, Systems Administrator, *Memorial Health System*

By The Goliath Technologies Technical Team

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Introduction

Focused on the end-user experience, Goliath links MEDITECH with the entire virtual desktop infrastructure used to deliver mission-critical applications including MEDITECH. With our industry-only purpose-built MEDITECH module containing embedded intelligence and automation, health systems using MEDITECH 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 MEDITECH, end-user experience, and VMware Horizon/Citrix metrics in one screen
- Isolate root cause and troubleshoot performance issues reducing remediation time
- Collaborate with MEDITECH 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

End-to-End Visibility Requires 3rd 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 MEDITECH** 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 MEDITECH. 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, MEDITECH and/or other vendors so they can collaborate to determine root cause, document and fix issues permanently.

Fig. 1 Perception:
MEDITECH 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 MEDITECH further complicating the process.

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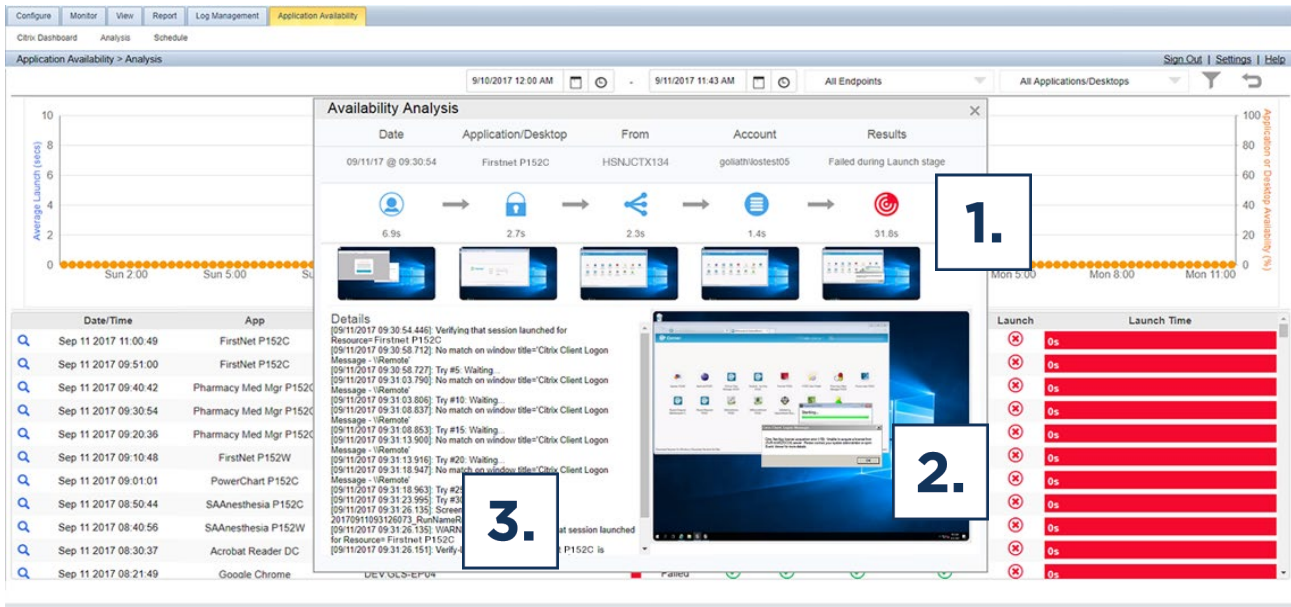
The image above shows the snapshot evidence provided highlighting exactly what the end-user experiences when logging on and launching applications like MEDITECH. In the image you see:

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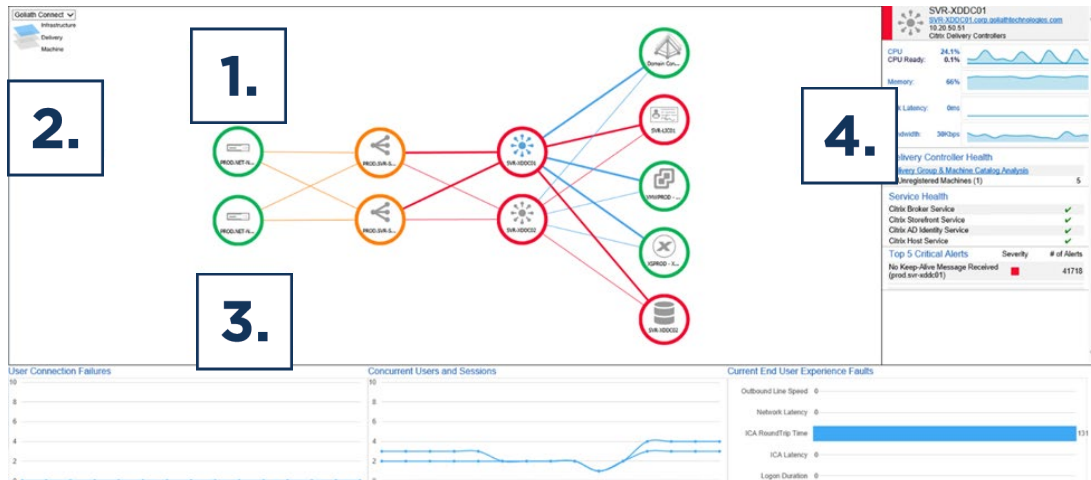
The image above shows the Citrix Automatic Discovery Map and Highlights critical components:

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 metrics and alerts for selected components.*

MEDITECH Performance Graphs

Goliath's MEDITECH module includes specific performance graphs to trend MEDITECH specific counters as well as resource utilization for each server to identify faults and errors. The MEDITECH module includes specific dashboards for Pool performance, ANP Server performance, I/O Performance, Server Performance and more.
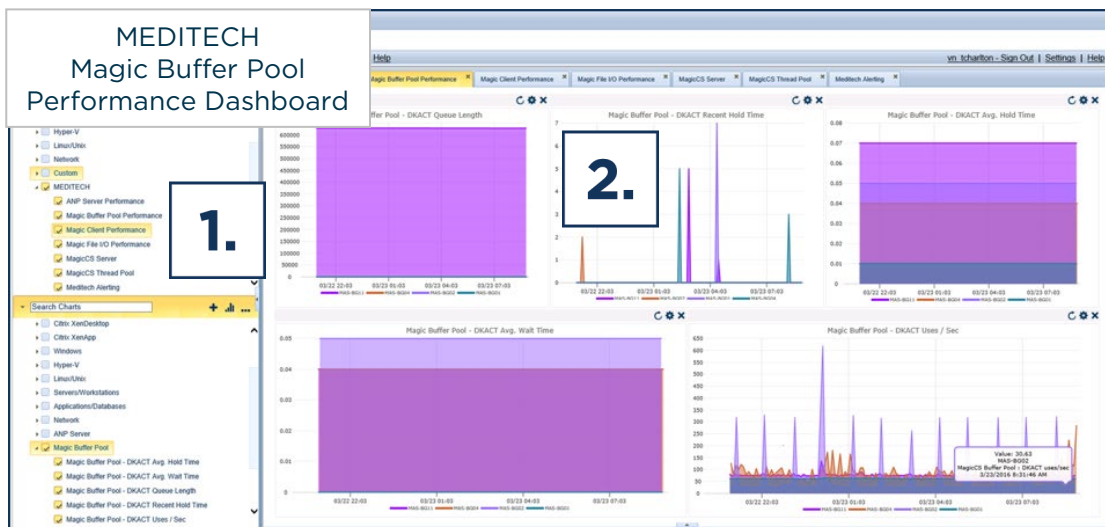

The image above is the MEDITECH Magic Buffer Pool performance dashboard offers five layers of visibility in one console to view Hardware, HOST, VM, OS and MEDITECH performance data.

1. *View MEDITECH and the entire supporting infrastructure in one view.*
2. *Use dashboard with corresponding alerts to determine spikes versus trends.*
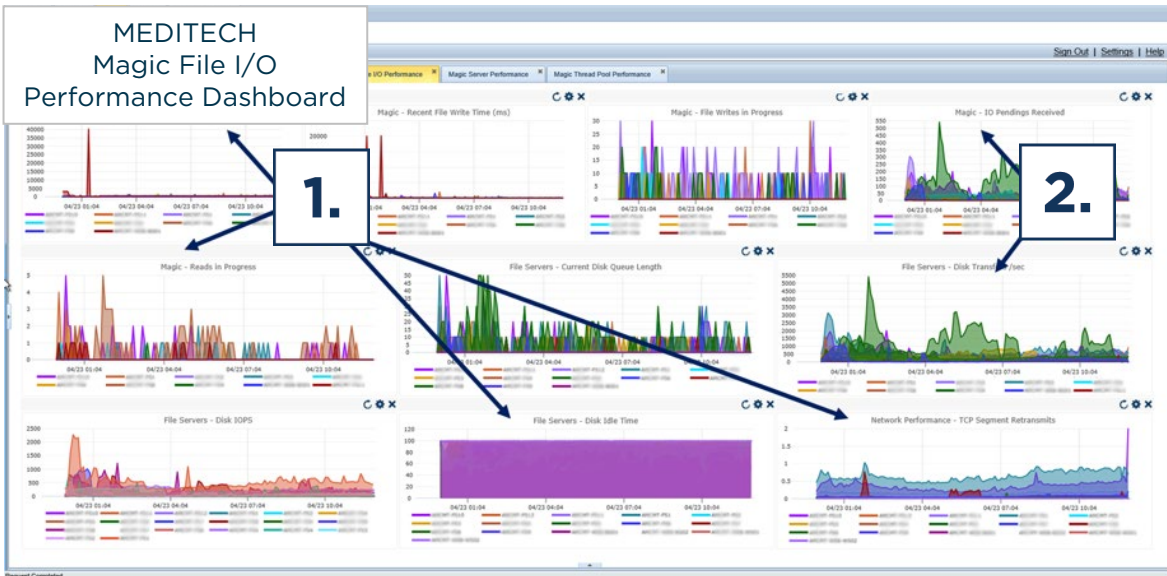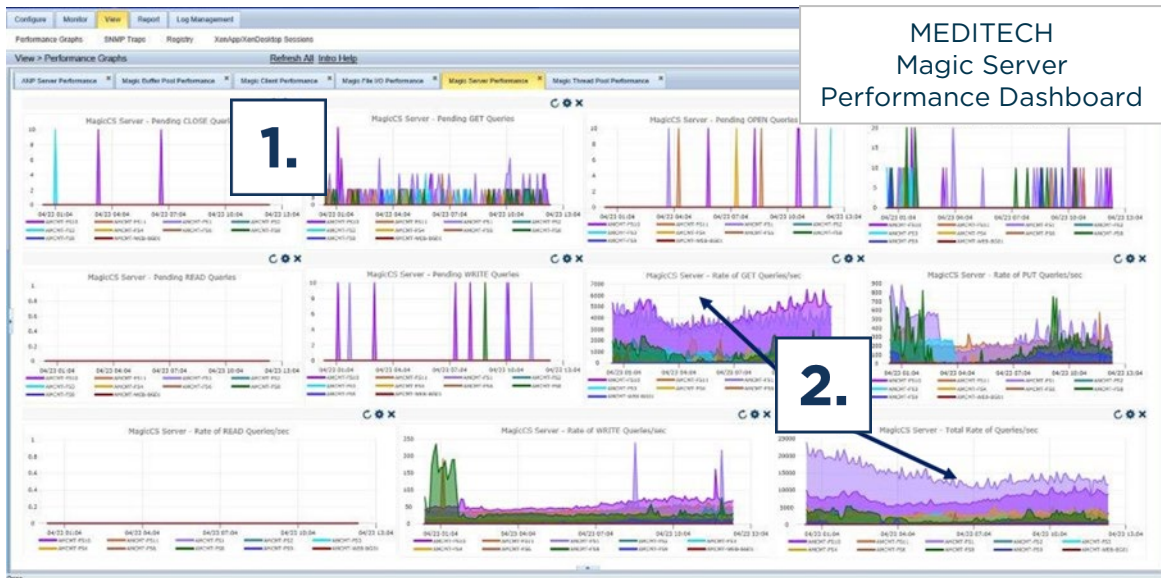
The image above is the MEDITECH Magic File I/O performance dashboard that tracks MEDITECH, Windows, and Storage data all in one view.

1. *Single view to trending metrics around MEDITECH, Windows, Storage, and Network performance all in one console.*
2. *Correlate data between MEDITECH performance and disk performance.*
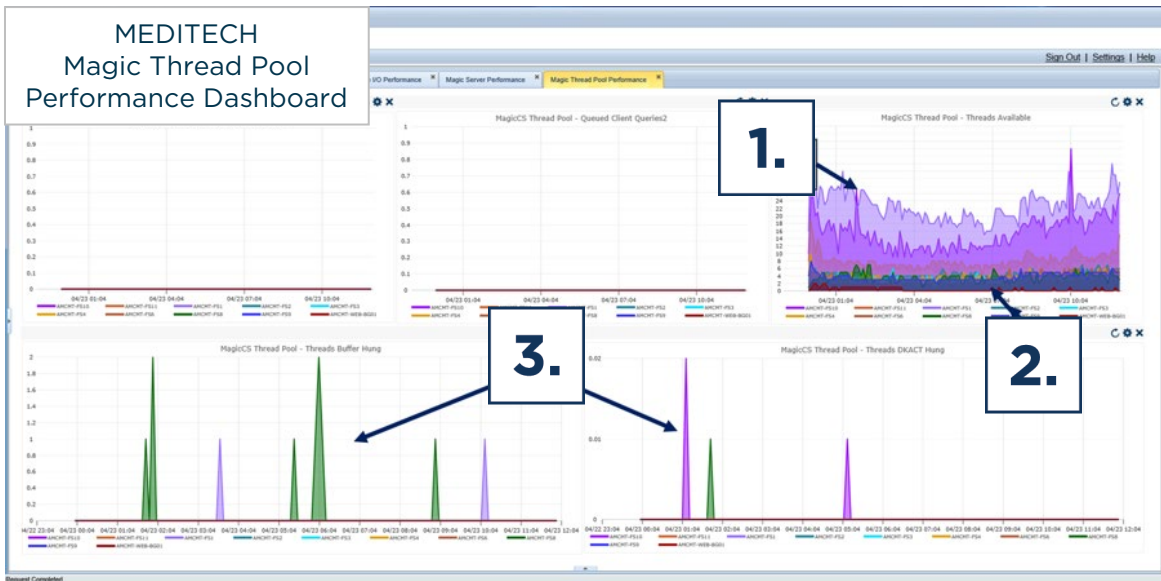
The image above tracks the availability of the environment to support additional growth by tracking the number of threads available for capacity planning

1. *Servers with available capacity.*
2. *Maximized servers with no additional capacity.*
3. *Use with corresponding alerts to determine spikes vs. trends.*

The image above is the MEDITECH Magic Server performance dashboard that identifies spikes in transaction request and trends transaction volume.

1. *High transaction queue lengths causing slowness.*

2. *Server imbalance: majority of traffic handled by just two servers.*

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. The Goliath MEDITECH Module includes specific parameters for monitoring just Meditech.

Rule Name	Type	Severity	Notify	Description
MEDITECH - Archive Server H Drive	CounterWatch	High	✔	H Drive Nearing Capacity
MEDITECH - Archive Server Low Resources	ServerWatch	Critical		Alert for Low Memory, disk, and high CPU Utilization
MEDITECH - Authorization Service Failure	WinServicesWatch	High		MTAuthManager
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 - CSMagic using over 1.25 GB of Memory	ProcessWatch	High		Monitor Running Processes for Excessive WorkingSet or Page File Memory
MEDITECH - CSMagic.exe using over 75 percent of a CPU Core	ProcessWatch	High		Monitor Running Processes for Excessive WorkingSet or Page File Memory
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	High		
MEDITECH - Disk Read Queue Length Spiked on File and Transaction Servers	CounterWatch	High		
MEDITECH - Disk Read Queue Length Systained on File and Transaction Servers	CounterWatch	Critical		
MEDITECH - Disk Write Latency Spike on File and Transaction Servers	CounterWatch	High		
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 - DKACT Avg. Wait Time over 1	CounterWatch	High		lindicates that is is taking a long time for the CSMAGIC.exe server to file data to disk
MEDITECH - DKACT Hold Time Spiked	CounterWatch	High		lindicates that is is taking a long time for the CSMAGIC.exe server to file data to disk
MEDITECH - DKACT Queue Length is over 5	CounterWatch	High		lindicates that is is taking a long time for the CSMAGIC.exe server to file data to disk
MEDITECH - DKACT Sustained Avg. Wait Time over 0.2	CounterWatch	Critical		lindicates that is is taking a long time for the CSMAGIC.exe server to file data to disk
MEDITECH - DKACT Sustained Hold Time over 0.2	CounterWatch	Critical		lindicates that is is taking a long time for the CSMAGIC.exe server to file data to disk
MEDITECH - DKACT Sustained Queue Length is High	CounterWatch	Critical		lindicates that is is taking a long time for the CSMAGIC.exe server to file data to disk
MEDITECH - DKACT Uses Lower Than Minimum	CounterWatch	High		lindicates that is is taking a long time for the CSMAGIC.exe server to file data to disk

The image above shows MEDITECH alerts that include notification, alert resolution, and remediation capabilities.

Correlate End-User Experience Performance Metrics

Goliath provides granular real-time and historic data for MEDITECH 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.

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 MEDITECH thresholds for logon times or ICA/PCoIP latency.*
3. *Highlights if MEDITECH 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, 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. All of these elements can impact the performance of MEDITECH and, with this insight, an administrator can quickly drill into a root cause of a "MEDITECH is slow" complaint and determine if it is MEDITECH 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.
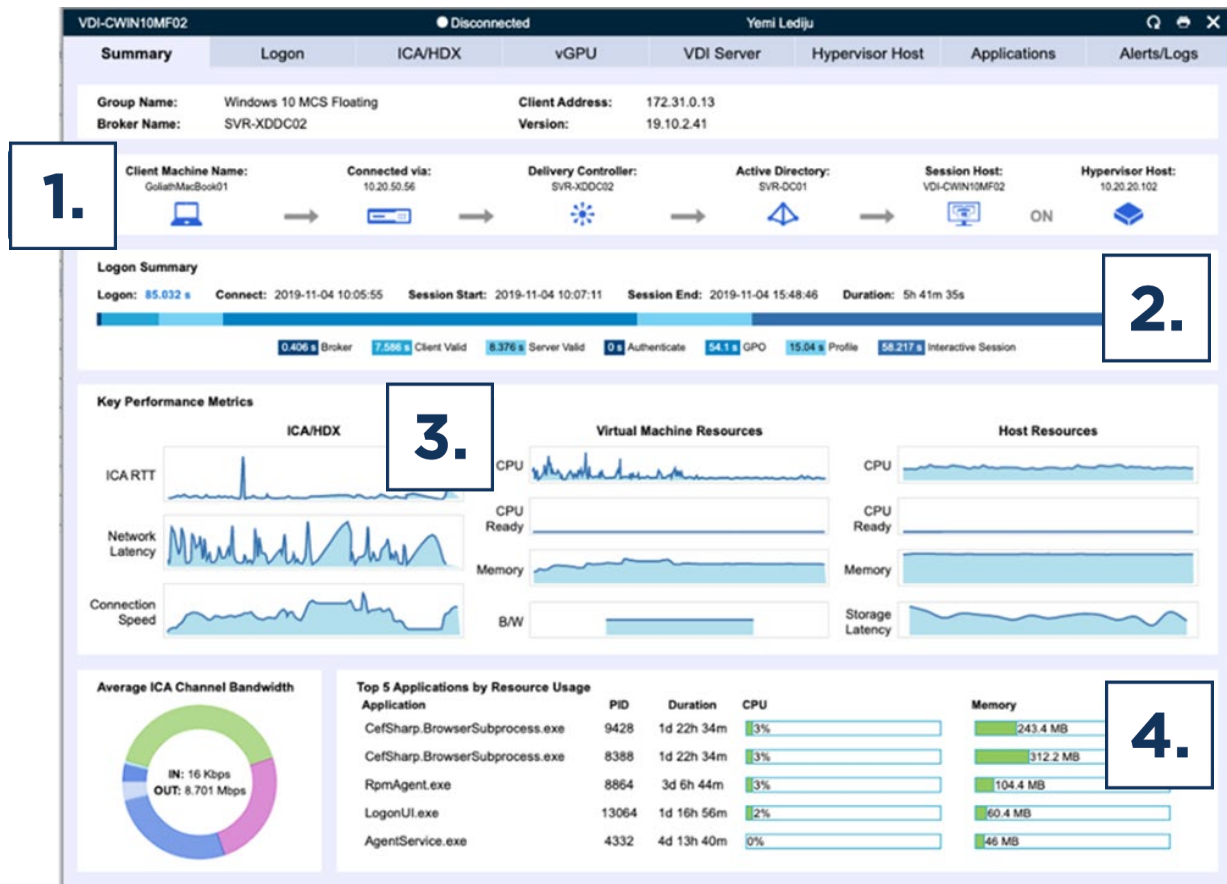
The image above shows Goliath's summary for a single session. At-a-glance administrators can quickly get an overview of a single session's performance.

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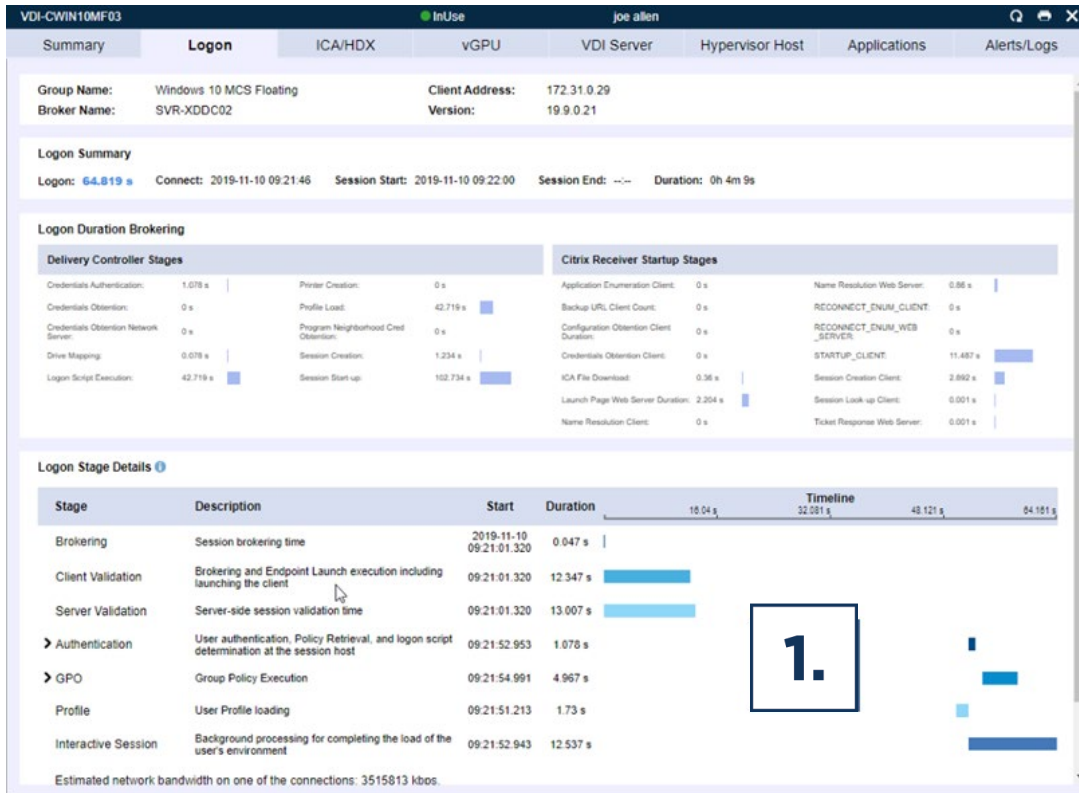
The image above shows the combination of in-depth Citrix data along with Windows OS logging data to break down the user's login from start to finish giving the administrator usable metrics to reduce troubleshooting times.

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.

Example User Story: Augusta Health IT Resolves MEDITECH and Citrix End-User Issues and Improves Patient Care

Augusta Health is a community hospital with 4,000 MEDITECH end users and 255 physicians. The challenge was that the hospital lacked a purpose-built technology that brought together the three key components of their IT infrastructure that impact the end-user experience with the EHR application: MEDITECH, Citrix XenApp, and VMware.

Not having a single software solution that gave Augusta Health visibility and performance data from MEDITECH, Citrix XenApp, and VMware caused significant issues when we attempted to resolve complaints or support tickets that claimed MEDITECH was slow.

Historically, the IT team deployed multiple products and utilities to manually disqualify each potential failure point until they determined the root cause. The other problem was that we spent more time figuring out what wasn't causing the end-user performance issues than what was.

Becoming Proactive with Simplified Solution

While Augusta Health was working to find fixes for performance issues, they began defining specific IT requirements for a technology that would solve their problems based on the gaps in visibility, such as:

- MEDITECH servers and how they were performing
- Deep performance metrics on Citrix XenApp and all of their VMware virtual machines, and
- End-user experience, such as Citrix logon duration and Citrix ICA/HDX latency.

As they searched for the type of solution that could meet their needs, they realized it would require a tremendous investment in licensing, consulting, customization, or deployment of

multiple products. And although VMware offers vCenter Operations Manager, it didn't give them visibility into any data outside of VMware, like MEDITECH and Citrix, so it required Augusta Health to consider additional products to find and fix the root cause of end-user performance issues.

The Solution

August Health selected Goliath Technologies because it brings together, in one console, the performance metrics for MEDITECH, Citrix XenApp, and VMware along with actual end-user behavior details. Once deployed, August Health used Goliath to:

▸ Reduce troubleshooting times by being able to immediately see their entire MEDITECH and VMware server infrastructure to quickly rule things out as potential root cause issues. For instance, they could quickly rule out host, storage latency, memory, and CPU on all their MEDITECH and VMware servers.

▸ Improve end-user performance and putting a stop to the blame game. If Augusta Health has a clinician complaining that MEDITECH is slow, they now have actual data on whether it is MEDITECH and why or why not. The IT team is armed with real-time details of each logon stage and Citrix ICA channel utilization to more effectively determine the root cause of "slow." The blame game has stopped cold with objective evidence as to the root cause of the issue. And, often, it isn't the MEDITECH application.

▸ Proactively manage Citrix using performance metrics pertaining to a clinician's Citrix session (both logon times and performance in session) enabling the IT team to compare reported slowness to actual values and trends over time.

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