AppDynamics Application Intelligence

Transform the way modern applications are built, maintained and operated

Optimize user experience with continuous, mission-focused application performance monitoring

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Abstract

As the U.S. Army has adapted to an increasingly digital age, the investment in and reliance on critical mission applications has substantially expanded. Subsequently, users relying on these business and mission applications regularly experience degraded performance. This results in frustration, productivity loss, potential risk to the mission, and diminished mission effectiveness. Troubleshooting routinely takes days, weeks, and even months, and cross-functional organizations criticize each other, often anecdotally and without metrics. Throughout the Army, network performance has become an easy scapegoat, where blame defaults to teams responsible for this area and often without consideration for all the complexity that IT brings.

The US Army's 101st Airborne Division has been experiencing many of these daily, weekly, and monthly challenges when it comes to deploying and operating tactical mission applications. The 101st Airborne invited the Cisco AppDynamics team to participate in a recent exercise in January 2020 to evaluate Mission Command Information Systems (MCIS) performance. Our findings are based on what we observed using machining learning inherent in our solution, and what we shared with the 101st. Leveraging this information and solution, the US Army can have greater mission awareness, be more responsive to the needs of the warfighter in real time, and improve the effectiveness of the IT organizations responsible for said systems for greater mission success.

For reasons documented in this paper, your Cisco AppDynamics team formally requests sponsorship and engagement for joint development between Cisco AppDynamics, PEO-C3T, PM Mission Command, and the Network Cross Functional Team (NCFT). Working together, we can enable key mission capabilities for greater application success for the US Army. These new capabilities will reduce development and operating costs for the Army, drive efficiencies for all parties, and lead to improved mission effectiveness for the 101st Airborne Division and other combatant commands that employ MCIS applications. Our approach leverages commercial-off-the-shelf capabilities to create a scalable and extensible platform currently in use across DoD and the Intelligence Community (IC) agencies. The platform provides the IT enterprise and application/MCIS developers the ability to gain situational awareness and gather real time actionable information that can be quickly and easily shared with all stakeholders for significantly reduced mean time to resolution.

The goal of this paper is to highlight the offering by AppDynamics, the work done, and benefits found in a field mission with the 101st, and to obtain sponsorship and engagement for a joint development between Cisco AppDynamics, PEO-C3T, PM Mission Command and the NCFT. We would like to work together to enable these mission capabilities for greater application mission success for the US Army.

Introduction

The 101st Airborne Division requested our assistance to help identify and troubleshoot frequent deployment challenges with their Mission Command Information Systems (MCIS). Currently, the 101st uses basic troubleshooting techniques on the systems, applications, and networks that support their tactical applications. The systems are not as stable, robust or reliable as desired. Hours and days of time are spent resetting, reconfiguring, reimaging, and replacing the components of the MCIS. This occurs over and over again during exercises and real-world operations. More often than not, the root cause of the issues often experienced when operating MCIS go undiscovered. The result is a lack of reliability and stability in the MCIS producing a mission outcome that is less than desired for the command.

> *"We spend 90% of our time in the field fixing glitchy systems issues that bring down the mission applications, any help here would be truly valuable to us."*
> **LTC Mason Wilson, CIO/G6, 101st**

Of the many capabilities for application performance that AppDynamics can deliver, these were the three areas of focus with the 101st during our recent exercise:

1) Can the 101st get the much needed but missing visibility into mission and command wide applications, which are not as reliable or stable as desired, creating negative impacts on the mission readiness of the command.

2) What can be done to reduce the repetitive time and effort spent troubleshooting mission applications, where getting to the root cause is rare.

3) What can be done to help baseline the mission applications when performing normally, so when performance deviates over time the 101st can know with certainty the reasons why.

See figure 1 below.

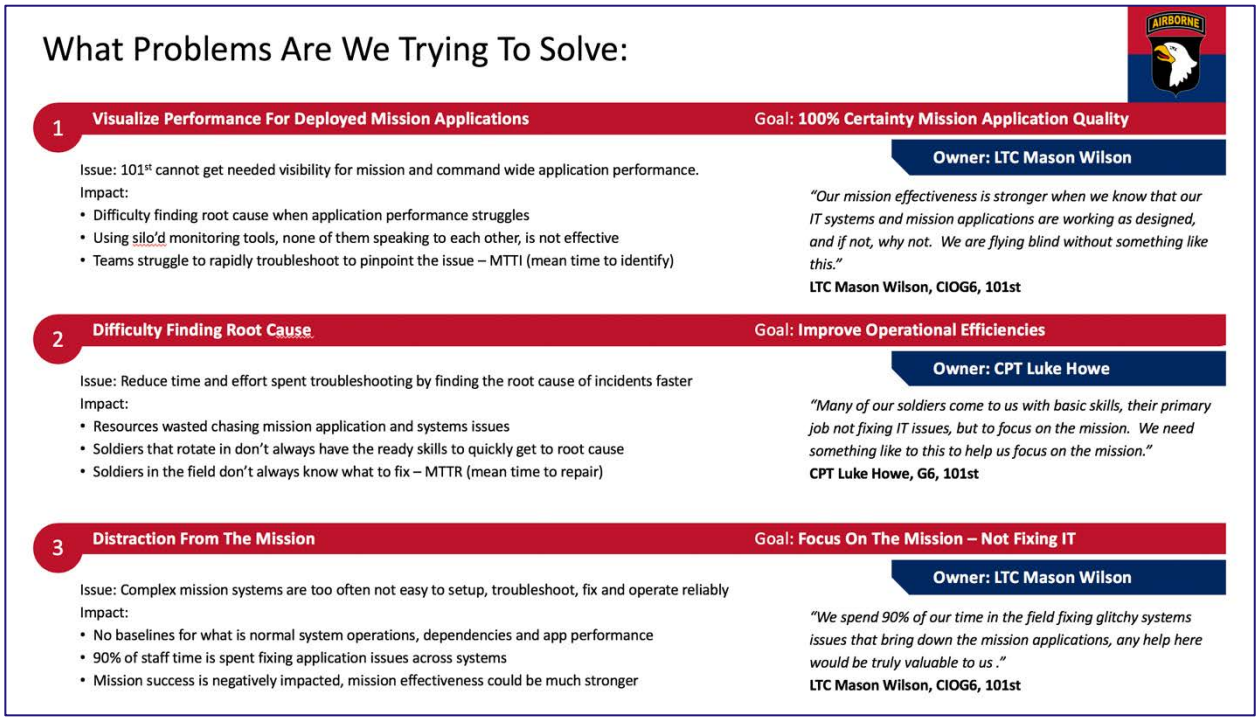


Figure 1 – Application and system health challenges and associated goals at the 101st Airborne

The remainder of the paper will provide an overview of AppDynamics, share key findings from our work with the 101st, and request a plan of action to help resolve key pain points.

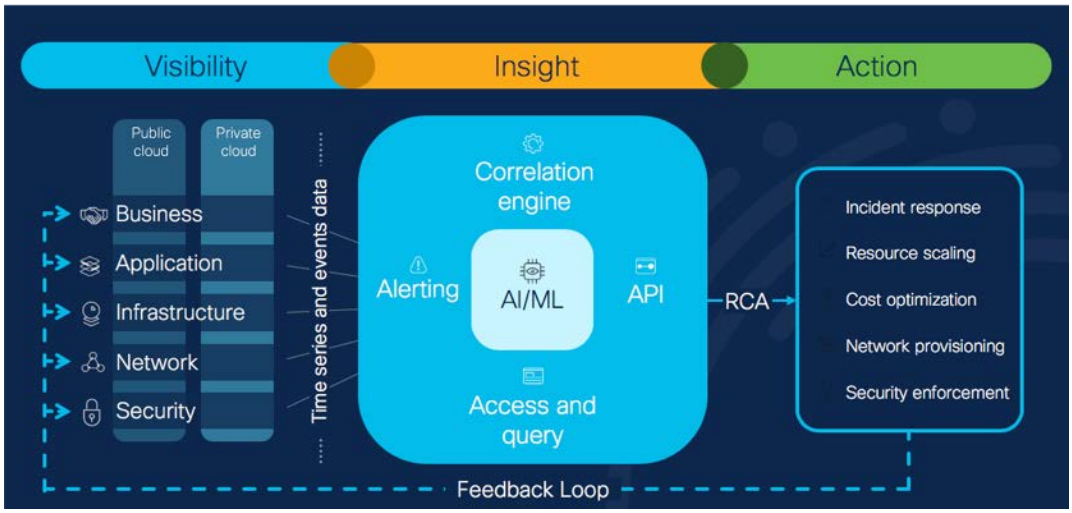
Overview

Cisco's AppDynamics allows organizations to provide optimal mission outcomes by improving application performance and user experience. It does this by providing a platform designed to follow the users or soldier's interaction with the application from beginning to end.

AppDynamics allows real-time analysis and visualization of collected and correlated data to get insights into IT operations, user experience and mission outcomes**.** Using machine learning AppDynamics automatically discovers all the business transactions that comprise the application and baselines (understands what normal is for) all metrics collected, so when a system has a slow or problematic application experience, developers can see exactly what caused the bottleneck and identify the issue quickly. This reduces the mean time to respond to issues, on average a 70%-90% improvement. AppDynamics addresses the challenges brought by the traditional approach of monitoring, where disparate teams try to solve application problems by using siloed IT infrastructure data to narrow down the root cause of a problem, lacking a holistic view.

AppDynamics Application Intelligence provides the Visibility to see, the Insight to know and the recommending Action to take. Specifically, that means:

- **Visibility**: Ability to see the entire application (or set of applications) in real-time as to individual end user experience, including the supportive IT infrastructure;
- **Insight**: Ability to know trends in the application over time, as well as its contribution to overall mission effectiveness; and
- **Action**: so, you can quickly fix problems or fine-tune an application in development based on data, reflecting deep visibility into how the app is relating with its surrounding infrastructure.



AppDynamics adopts a top down approach to performance monitoring by uniquely focusing on the end user's experience with something we call the ***Business Transactions*** of the application. A Business Transaction traces the entire transaction path, from the end-user device or browser, through the application code, databases, third-party API calls, servers and other infrastructure. This is a more accurate way of understanding the health of applications than traditional bottom-

up approaches that rely on silo-based monitoring solutions. Our approach is more valuable because it provides answers when traditional troubleshooting breaks down with siloed tools and finger pointing, AppDynamics brings everyone together from all applications, systems and components, to one holistic solution highlighting where the problem is. Greater teamwork is enabled, thus greater efficiencies. This capability dynamically captures changes in the architecture and continues providing visibility even during periods of diminished capability.

As AppDynamics is 100% software based, it can run in a lightweight virtual machine, wherever your applications are running. The AppDynamics agents are typically deployed to the application without any code changes and communicate back to the controller platform that can reside on premise or in a private or public cloud environment, such as AWS or Azure DOD clouds. Our solution exploits the latest machine learning capabilities and has minimal overhead (1%-2%) to the application. Once deployed AppDynamics will discover, tag, trace, correlate and visualize all elements of your mission application system (See Figure 2). We do this without any code changes, and with nearly zero performance impact on your systems.

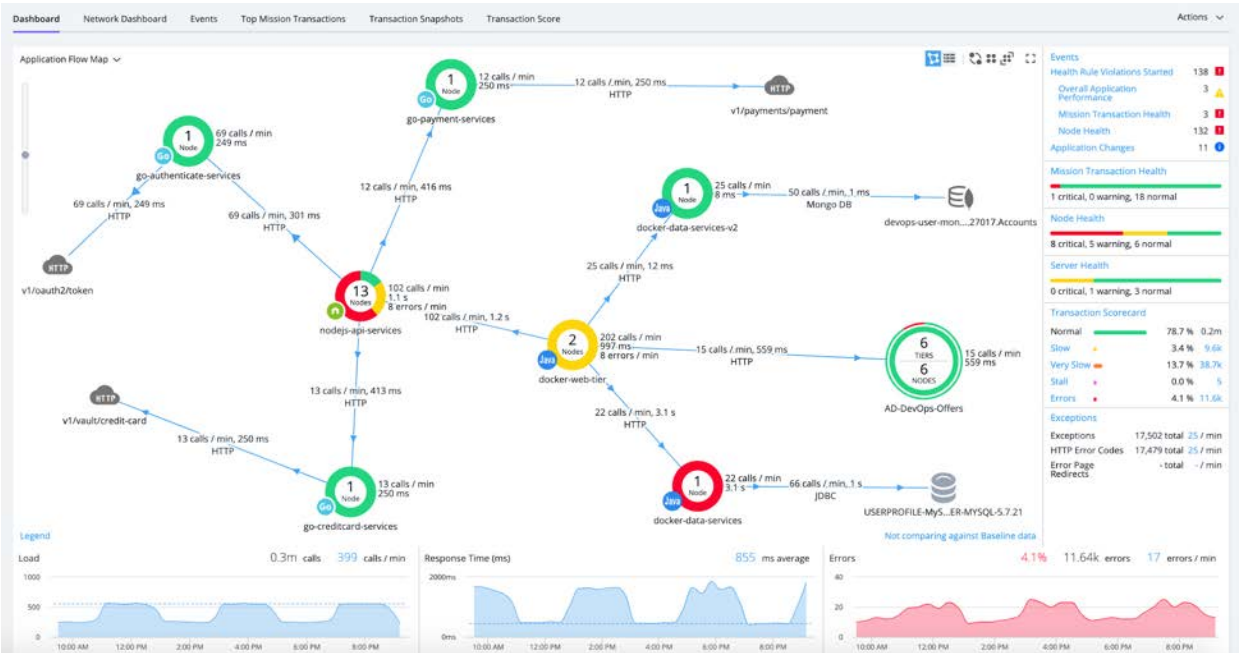


Figure 2 - Example diagram of AppDynamics Flow-map showing application health and baselines

> *"Many of our soldiers come to us with basic skills, their primary job not fixing IT issues, but to focus on the mission. We need something like this implemented at the development level."*
> **CPT Luke Howe, G6, 101st**

The AppDynamics user interface offers global views, application level views, intra-application views and leadership dashboard views out of the box to include a wide variety of data, such as:

- Global Applications View
- Application Flow Map
- Business Transactions
- Tiers and Nodes
- Service Endpoints
- Database
- Java and .NET Infrastructure metrics
- Java and .NET transaction metrics

An example of such an "executive" dashboard is captured below in Figure 3.

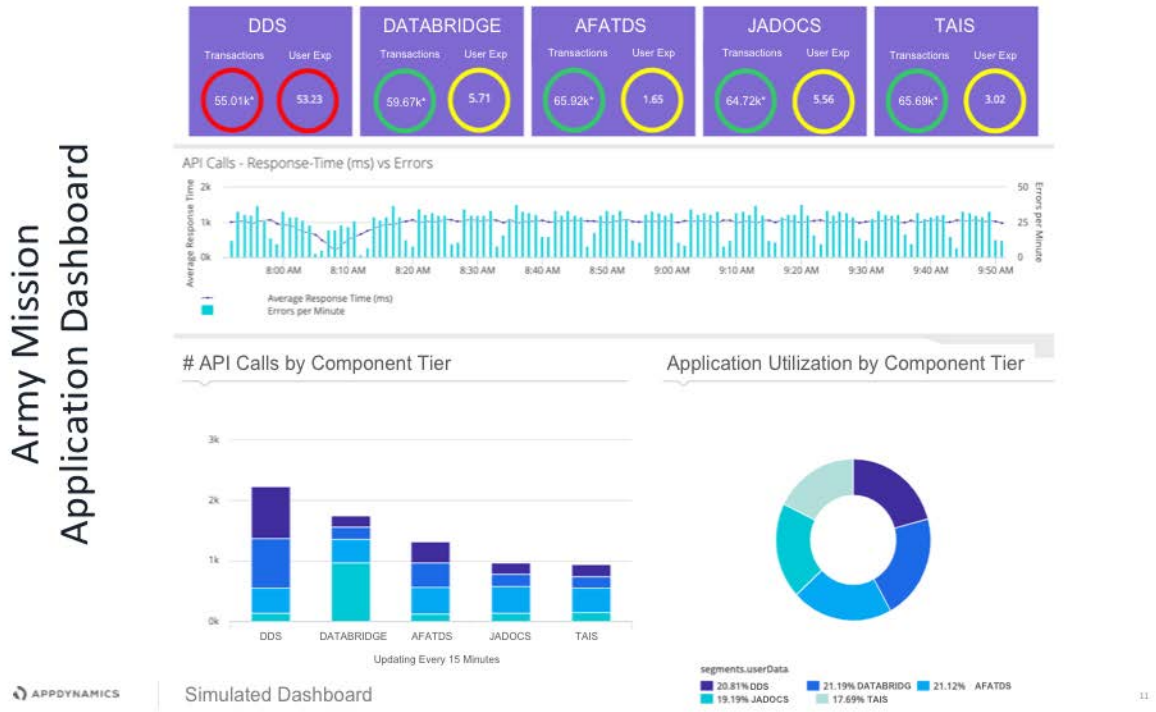


Figure 3 – Simulated dashboard, specific KPI's and formatting are 100% customizable for a wide variety of US Army mission and technical leadership use cases

Initial Findings

- *Representative screenshots are used for unclassified use. Actual screenshots from mission systems are captured via CPT Howe's SIPR laptop onto SIPR drive share. Like-for-like features and findings have been validated with CPT Howe and team at the 101st.*

The AppDynamics platform was installed at the 101st Airborne and was ready to go within a day. AppDynamics agents took longer to instrument the applications due to a number of factors beyond immediate control, caused by incompatibility of MCIS with the program unless integrated at the development level. Once agents were temporarily hosted on three initial systems (See Figure 4), using AppDynamics, we immediately began collecting all observable metrics of the application code and the systems they were on. Within a few minutes we had some initial findings.

Figure 4

Within a few hours we started to see (see Figure 5) data related to application operation.

We found on one server there was a health alert, so we drilled down into the alert to find that CPU was at 100% for several periodic intervals. We used AppDynamics to see all metrics from the virtual machine supporting the application. We can narrow the view for a certain time range to see if this KPI health alert is relevant to anything else observed.

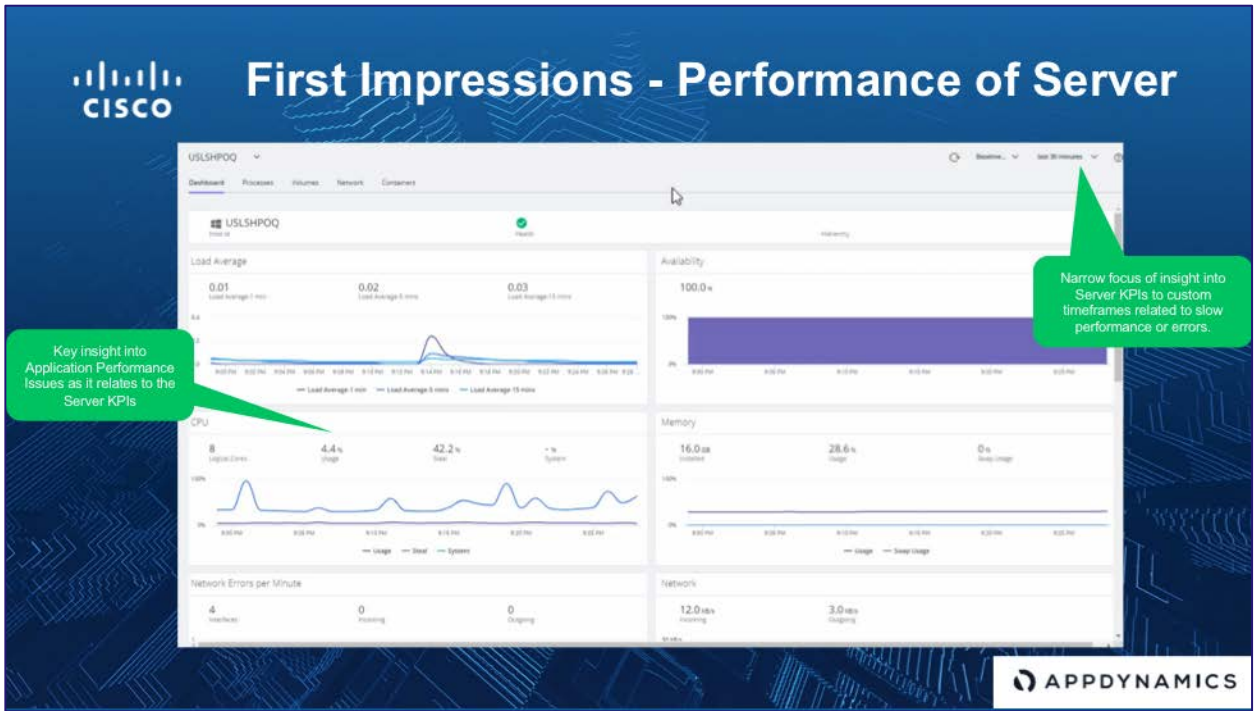


Figure 5

We also observed a node health alert, a memory race condition with one of the JVM's, (see figure 6). In this case the memory/HEAP usage alert lasted for hours, contributing to systems losing or dropping connection to each other, which had nothing to do with the network or the virtual machine. With our automated baselining, the system dynamically sets health rules to learn what is normal, and only alerts based on deviations from normal. The value is that we eliminate false positives such that IT operations can be focused on what matters, and not be distracted wading through a mountain of white noise false positive alerts. We also eliminate significant project costs because implementation teams do not require weeks or months of onsite consulting time to be setting and resetting thresholds to attempt to avoid this mountain of false positive alerts.

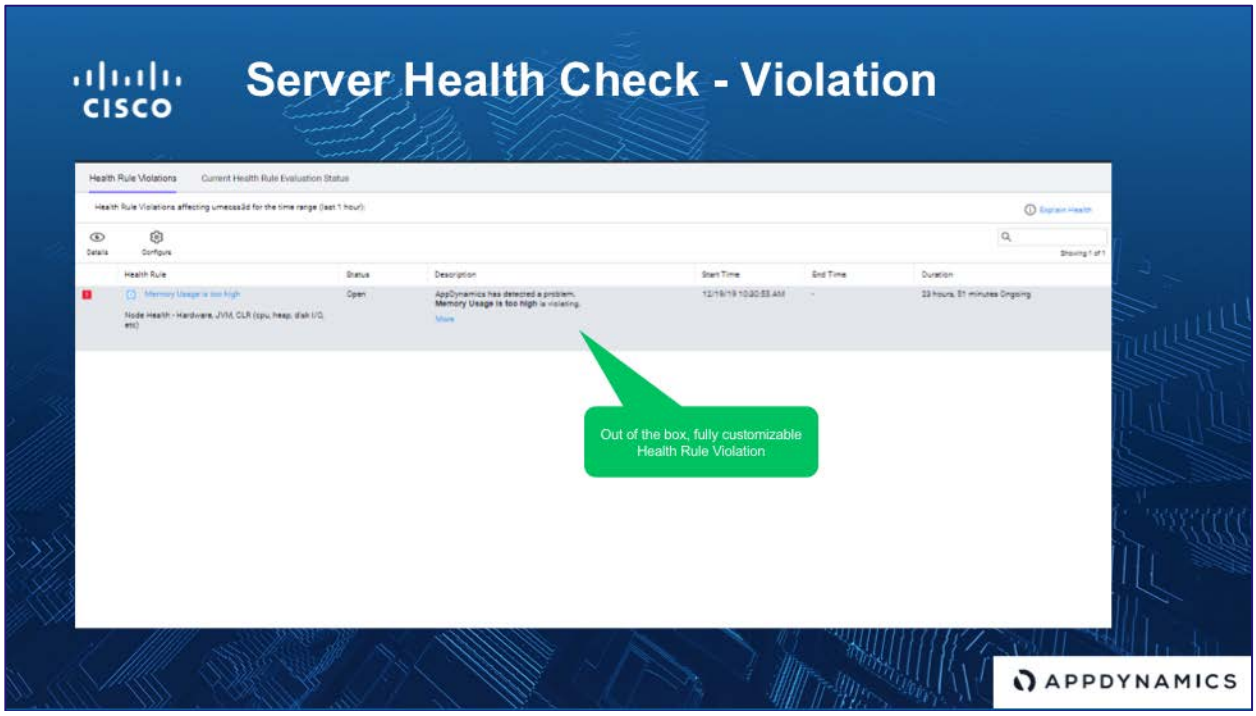


Figure 6

During this time frame we also collected and observed metrics on the database. We see all database KPI's; functions, time spent, memory used, disk IO, network IO, and related performance metrics (see figure 7). A message from another system is being received but it is taking a long time. Again, this is unrelated to the network or the physical system running the application, but we are monitoring everything, tagging, tracing and correlating events. With Project Manager (PM) integration before system fielding, Soldiers can be provided pre-configured "watch-lists" to identify proper/improper functioning.

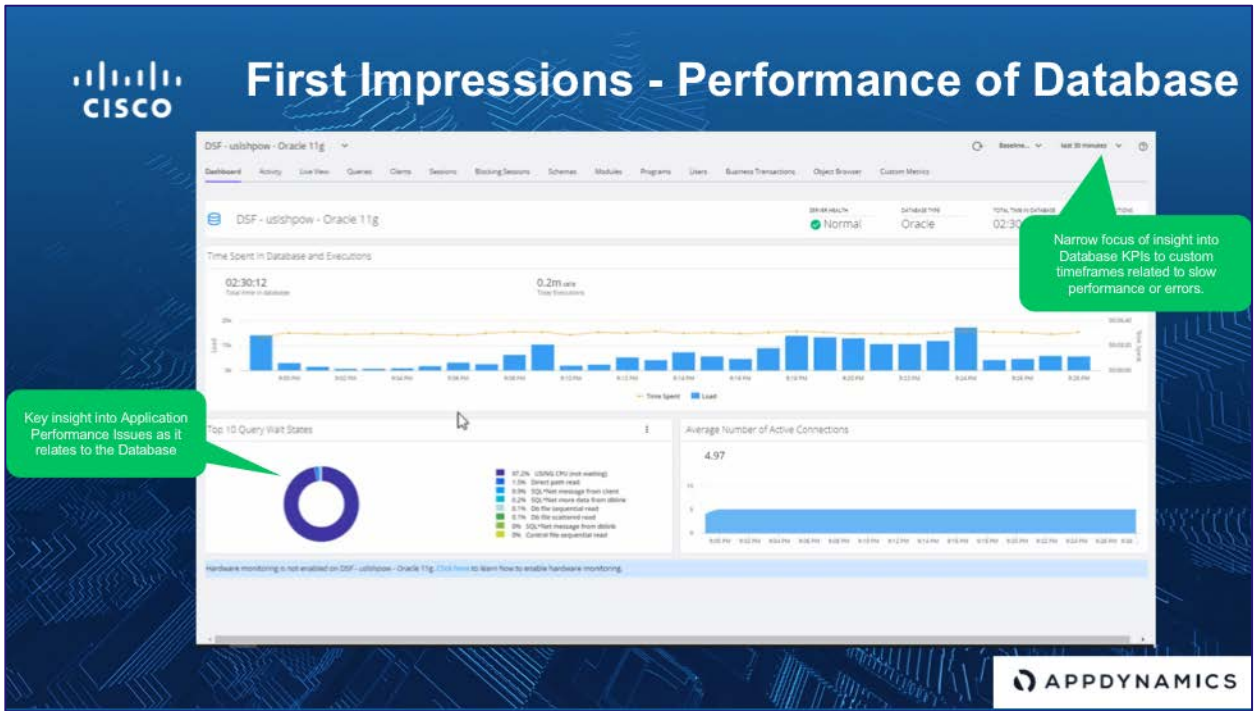


Figure 7

Using the AppDynamics dashboard, we click into the slow database method call to gain further detail (see figure 8). Here we are presented the machine learned data as to the nature of the JDBC call, the call statement itself, and related parameters that contributed to the slow message exchange, part of the slow business transaction that was measured. This level of detail is valuable for developers so that these findings can be used immediately in an AGILE DevSecOps cycle, so that next releases of the application improve application performance and quality, which leads to the mission effectiveness goals that LTC Wilson and team are looking for at the 101st Airborne and across the Army.

Figure 8

All mission application transactions were measured from end to end, and the data can be sorted a number of ways, useful to trending and troubleshooting. We stack rank transactions based on which ones are slowest and Java exceptions causing the condition. We help see top transactions and load on the systems. We see all the systems that participated in each transaction, which ones were slow, and the root cause of why the transaction was slow (see figure 9). Just like the slow database interaction in figure 8, with the code level visibility we gather users have supreme operational dominance for your tactical applications, which ones are having issues, and the root cause as to why. This level of forensic detail is critical for helping to operate the most effectively, and jointly to develop cleaner, better performing and more robust mission applications. This leads to greater operational efficiencies and drives greater mission effectiveness for the 101st Airborne and other forward deployed commands.

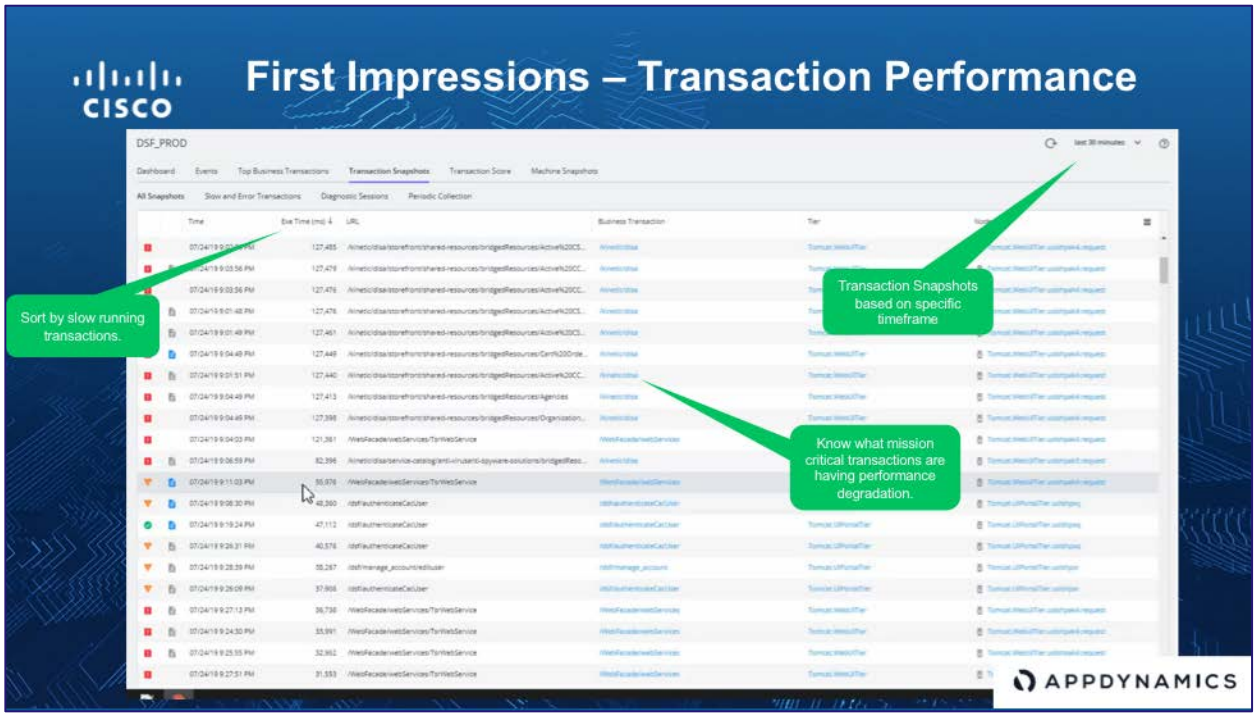


Figure 9

Within a few seconds we find the slow transaction mentioned previously, based on how we stack ranked it in the previous view (see figure 9). We click into the transaction and find the code level detail of the application, and how the JDBC database call was initiated, (see figure 10). We show why, where, and how a mission application transaction was stalled that led to failed system performance. IT specialists from the 101st now DO NOT have to spend hours and days troubleshooting, reconnecting, rebooting, and reimaging systems. They know exactly why the application stalled and why the systems disconnected. They can work with mission application experts, providing them code level details as to why systems are not stable and not reliable, so that correct and immediate remedies can be applied, such that future releases of software images will be more robust, more reliable, leading to greatly improved mission outcomes. This achieves LTC Wilson's overarching objective - better lethal mission effectiveness.

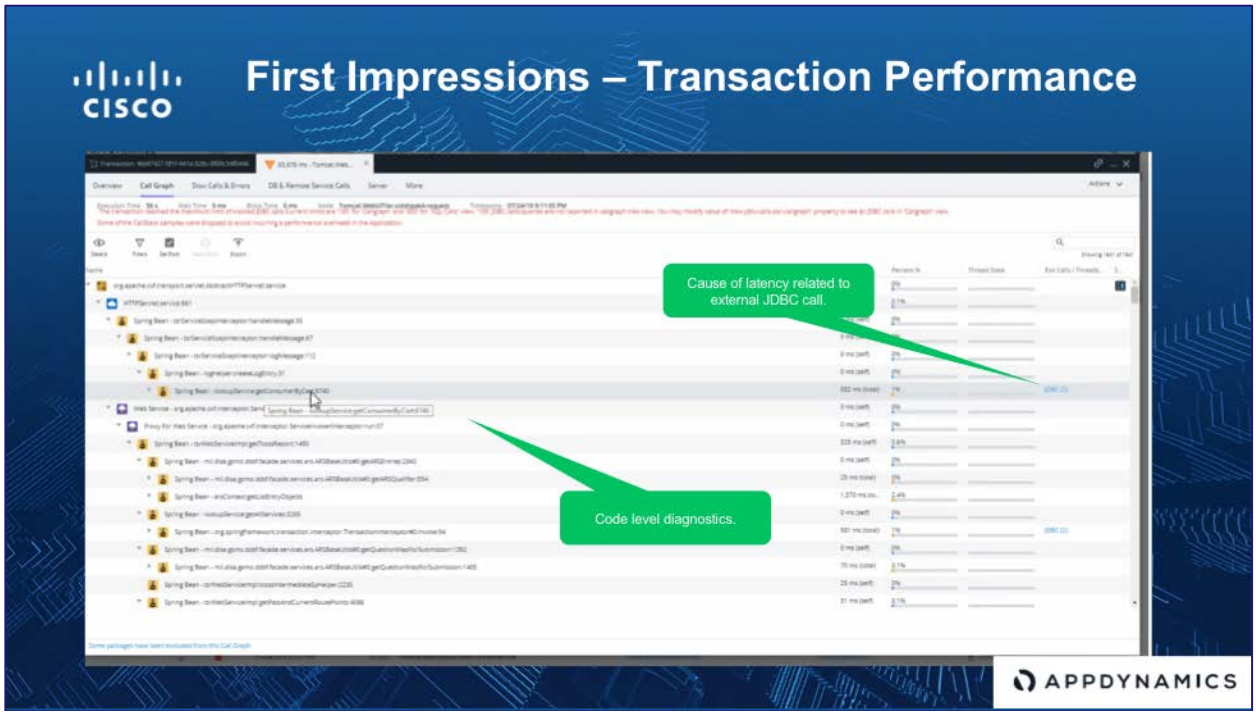


Figure 10

"Our mission effectiveness is stronger when we know that our IT systems and mission applications are working as designed, and if not, why not. We are flying blind without something like this."

LTC Mason Wilson, CIO/G6, 101st

Capabilities

With AppDynamics, application owners and program managers have real-time validation of production code releases based on correlated application performance, end user soldier experiences, and mission KPIs. Code level metrics learned at machine speed with AppDynamics, have a direct positive impact on US Army AGILE DevSecOps cycles for mission application owners, to be able to develop better and faster applications at significantly lower cost. Application developers can then analyze new releases of their applications against baselined metrics from before, which is mission critical as applications evolve, to know for sure that KPI's are improving and better supporting the mission. PM's can better focus and prioritize application development investments. User and soldier expectations can be better managed at scale and the entire production / operation / sustainment cycle for the US Army will benefit from the machine learned granular analytics from front end to back end systems and all the real world visibility metrics we provide. Having a solution like AppDynamics provides MCIS development teams the ability to precisely pinpoint issues, allowing them to either fix or alert the teams responsible for remediation.

- End-to-end performance instead of stove piping MCIS development
- Understand the effect on key mission drivers, as well as impact to end user / soldier experience

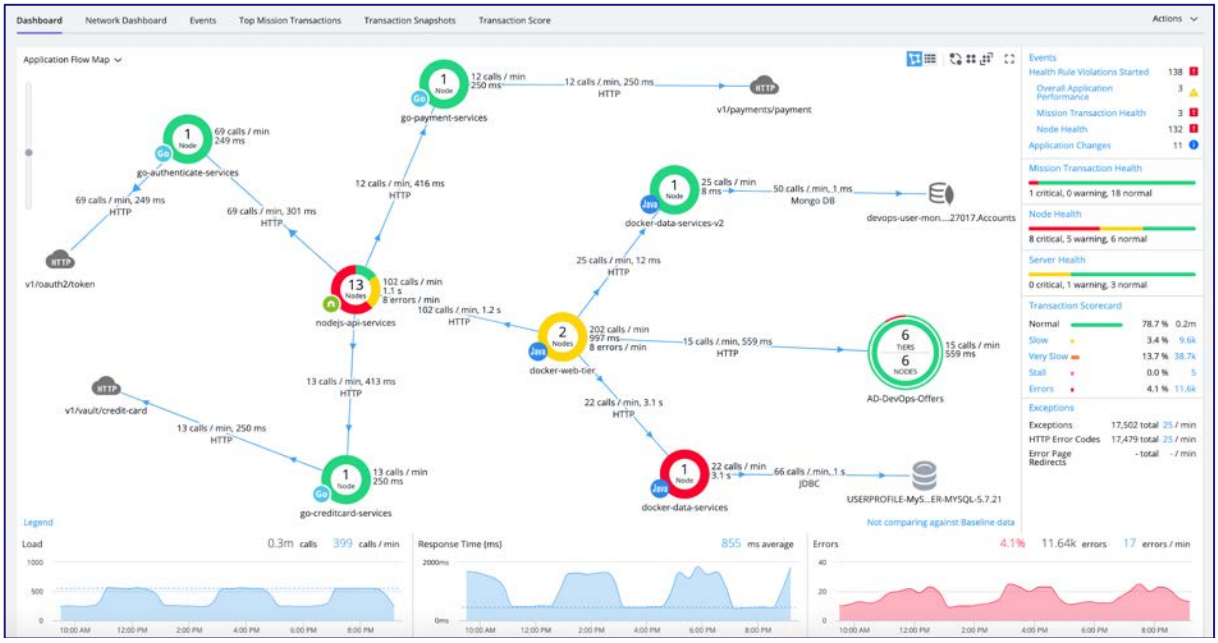


Figure 11 - Example diagram of AppDynamics Application Flow-map showing application health and baselines

With AppDynamics, MCIS development teams can see whether or not application performance is being impacted by the network during system development.

- Auto-discover application and network topology and interdependencies, including reverse proxy load balancers

- Enable IT operations to triage and escalate issues to the right network team
- Pinpoint increased network latency, congestion, or micro-bursts
- Eliminate expensive packet capture/analysis appliances and associated SPAN/TAP hardware
- Track network KPIs including throughput, packet loss, and RT rates

Figure 12 - Example flow-map of AppDynamics network dashboard

Operational Impact

BLUF:

This program while valuable, isn't viable at the tactical or strategic level and I don't recommend purchase or use at the strategic or below level at this time. It is my hope that after integration at MCIS development offices, AppDynamics can be further developed to become a program fielded with unit level server stacks and training integrated into TRADOC course material for Warrant Officers and Functional Area Officers.

What Does AppDynamics Do?

AppDynamics is a powerful tool for computer programmers who develop MCIS. This program monitors computer code execution and provides real-time metrics on hardware and software health. AppDynamics provides feedback on the code level operation of a program and how it integrates with other system's and program's code. AppDynamics is a product development tool that the Army or DOD program management and MCIS development offices should use to assess software prior to use in a tactical, operational or strategic environment.

What Doesn't AppDynamics Do?

AppDynamics doesn't solve any connection or configuration problems at the WarFighter level nor does it tell the WarFighter how to fix them. Based on the proof of value conducted between the 101st and AppDynamics team, the information produced by AppDynamics in its current iteration isn't interpretable or usable at the tactical, operational or strategic level. Additionally, since it isn't integrated by PM into current MCIS images, this program must be re-installed on every system after every time they reboot, jump, shutdown or experience a power loss event. Additionally, without PM support this program may also hinder Field Service Representative support when needed since it is a deviation from system baseline.

- CPT Howe, Luke 101st ABN DIV (AASLT) ACofS G6

"AppD as applied at the program level would reduce operational and tactical level inefficiencies in troubleshooting MCIS integration, leading to a more efficient capability of G6 and S6's to enable mission command and overall decision making for commanders and staffs."

LTC Mason Wilson, CIO/G6, 101st

Conclusion & Request

Your US Army Cisco AppDynamics team greatly appreciates the opportunity to team with the 101st Airborne on improving the visibility and efficiency of your operations. For each of the stated use cases for our joint exercise, see figure 13, we highlight the positive impacts we can deliver with these exciting new application analytics capabilities if implemented by Project Managers before MCIS development and fielding.

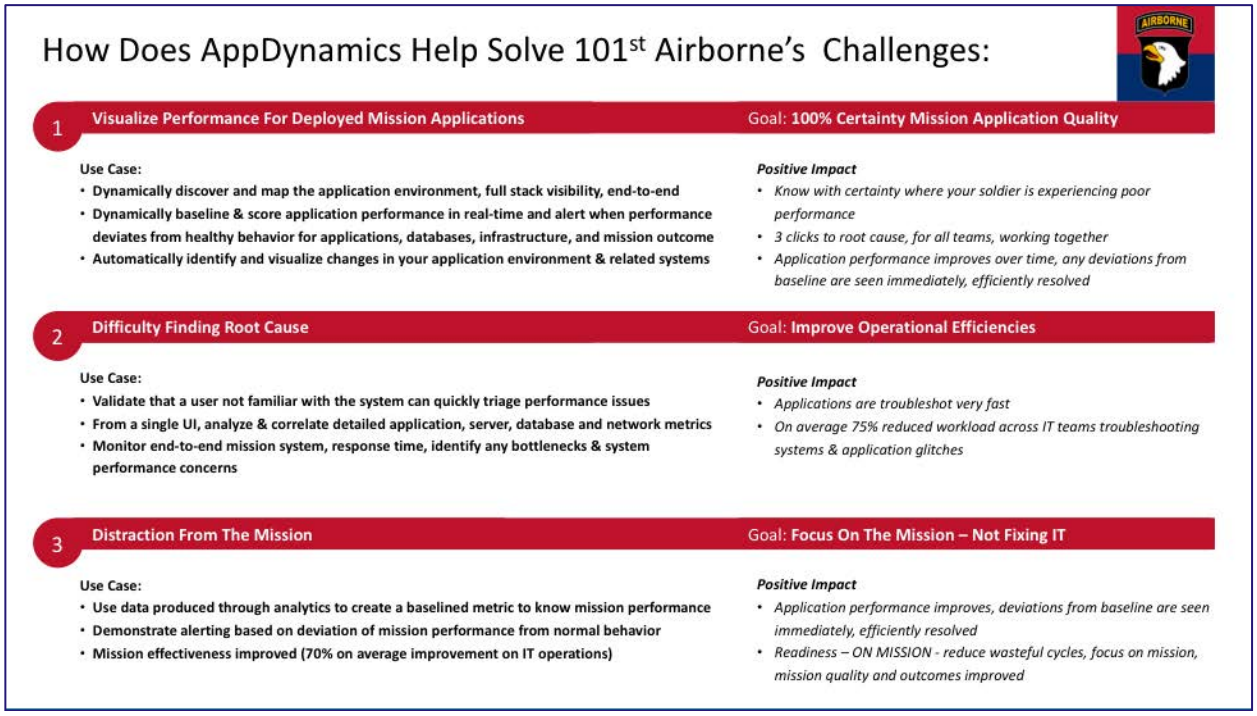


Figure 13

In this white paper, we have shown just the initial findings of what is possible. The more visibility we can gather from a larger set of developer applications, the greater insights we can deliver and the more powerful these exciting capabilities can be realized for most efficient actions and troubleshooting across the US Army for any demanding mission application. Were AppDynamics allowed this approach across of all your tactical mission applications, in a more native, well supported, developed and partnered endeavor, the US Army would be able to compliment the DevSecOps cycle that enables a center of excellence level capability broadly within USArmy and beyond for DoD.

The US Army is increasingly reliant on digitization, so the importance of understanding the connection between critical application performance and the user experience of a digital workforce, the mission outcomes associated with those applications has never been greater. Leveraging a world-class platform that provides holistic visibility, the Army will be equipped to more efficiently build and operate mission critical applications. Utilizing this platform for real-time analysis and continuous development, Cisco AppDynamics can aid the Army with the focus required to maintain, train and equip combat-ready Army forces capable of winning wars, deterring aggression and maintaining our cherished freedoms.

Rick Noonan – Cisco AppDynamics Specialist – US Army
Brian Green – Cisco AppDynamics Consulting Engineer – DOD
Jeff Cahill – Cisco AppDynamics Consulting Engineer – DOD
Amanda Pelletier – Cisco Account Manager – US Army Enterprise
Anthony Swanson – Cisco Systems Engineer – US Army Enterprise
Aaron Warner – Cisco Systems Architect – US Army
Mike McGrath – Cisco AppDynamics – DOD Manager
Jason Port – Cisco Regional Manager – US Army Enterprise
Laurent Knafo – Cisco Regional Manager – US Army Joint Mission

Appendix A: DOD Federal

Industry, Federal and Department of Defense:

Cisco AppDynamics has ATO, RMF and CON in every branch of service (Army, Navy, Air Force, Marine Corps). We do not alter an existing ATO. We do not alter a system STIG. ATO's produced through the RMF process apply to specific units and applications. There currently is no ATO that covers AppDynamics in a tactical or operational environment.

Cisco AppDynamics has ATO with every intelligence agency and we can help with ATO reciprocity introductions as needed, for government to government validations.

Cisco AppDynamics is in production at nearly all Federal civilian agencies with heavy deployments across the Intelligence Community, the Department of Homeland Security and their demanding operational application objectives.

Cisco AppDynamics is the #1 application performance platform available. Consistently recognized as "Leader" in Gartner's "Magic Quadrant for APM" report, we debuted in the "leader" quadrant in 2010 when Gartner created the APM technology category, and we have remained in a leader position ever since. In the recently released Gartner 2019 APM Magic Quadrant report, AppDynamics again was ranked a leader, nine years in a row.

Appendix B: Case Studies

AppDynamics is used globally across every major industry. Below are two unclassified industry case studies of successful implementations, and the value provided. More information can be provided upon request.

Case Study #1 - Cisco

Challenges

Cisco Security Cloud Operations blocks over 250 million threats per day. The team's main challenge was actioning the 88,000 alerts generated annually by their existing monitoring tools. Valuable time and resources were being wasted, as 96% of these were false positives.

The sheer volume of data processed across Cisco's 23 global data centers raised obvious management challenges for the team. With 2,000 physical servers and 5,000 VMs serving more than 200 applications in total, Cisco required a scalable APM solution able to support its complex environment.

At the same time, the organization has witnessed a 12% increase in users over the past year, with average daily transactions growing from 5.5 billion to 6.37 billion. Constantly upscaling compute power in order to meet this demand was not sustainable. Cisco needed a way to scale effectively and manage traffic, while ensuring flawless execution.

Solution

Cisco Security Cloud Operations required a robust, next-generation APM solution able to cope with the scale of its infrastructure and high volumes of daily traffic.

The organization first engaged AppDynamics in May 2013, deciding to run a proof-of-concept across its main security scanners, using AppDynamics in a performance environment to spot issues.

Nitin Thakur, technical operations manager, Cisco Security Technology Group, said, "From our initial evaluation, it was clear AppDynamics was able to provide the functionality we required to cope with the sheer volume of transactions we handle on a daily basis. We evaluated other products on the market, but for us, AppDynamics provided true end-to-end visibility, and we were impressed with the ease of deployment. Crucially, its future roadmap meant the company was best placed to help us scale for future growth."

After a successful proof-of-concept, AppDynamics was rolled out globally across the organization's 23 data centers — deploying a total of 15,000 agents — in just one week, and all reporting into a single AppDynamics controller.

Benefits: Increased performance, collaboration, and visibility

Previously, Cisco received 88,000 alerts a year from standard monitoring tools, of which only 3,000 were genuine alerts requiring remedial action. Through implementing AppDynamics, Cisco has been able to dramatically reduce false positives over the past twelve months.

“Prior to AppDynamics, our network operations center team was working overtime looking in the wrong places, at the wrong problems. Even if the NOC team only spent an average of five minutes looking at each erroneous alert, that amounts to over 7,000-man hours per year of effort that could be better spent either working on critical issues, or helping to drive innovation forward. Since introducing the AppDynamics platform, we have been able to identify problems we weren’t even looking for. AppDynamics has enabled us to move towards data-driven troubleshooting rather than ‘gut-feels.’ The solution gives us visibility when we need it and the application intelligence to know when things aren’t functioning optimally,” said Thakur.

Since introducing AppDynamics, Cisco has identified unique slow business transactions affecting services, as well as addressing multiple configuration errors. For example, Thakur explained, “We spotted a configuration issue which meant 17 million requests were being sent back to our central hub unnecessarily. With AppDynamics, it took just five minutes to find and fix this issue. We were not even looking for this problem and only identified it when it was presented to us.” Among other benefits, this has resulted in a four-to-five percent increase in memory utilization across the entire platform.

AppDynamics provides a common language between operations, development, and test. Introducing the platform has helped enable us to move towards a DevOps model, which in turn had a positive impact on employee collaboration,” said Thakur. “The visibility gleaned from AppDynamics has made employees feel more empowered to reach problem resolution and able to influence business outcomes.

“Because we make application releases so frequently, for us, it was critical to have APM in production. AppDynamics gives us great visibility into what is happening on the estate, helping us to dramatically reduce the number of escalations and continue delivering a seamless service to our customers.”

Case Study #2 – Nasdaq

Challenges

It’s a name that’s heard every day as one of the key indicators of economic activity: The “Nasdaq” is either up or down, tracking the fortunes of growing enterprises and the investors who fund them and hope to prosper with them. Nasdaq is the single largest U.S. stock exchange by volume. That’s how most people know it. But there’s a lot more to Nasdaq than the exchange whose numbers are reported on the nightly business report.

Nasdaq’s Corporate Solutions Technology group manages a sizable portfolio of applications used by companies on and off its exchange, as well as its private markets technology and its corporate web properties.

Such a multitude of software created over time, plus new innovations Nasdaq is continuously introducing, results in a diverse and complex ecosystem of technologies and infrastructure. Understanding the application environment holistically is a challenge, and pinpointing issues impacting performance and availability can be difficult given the level of interconnectivity and breadth of the platforms.

Traditionally, Nasdaq has monitored and managed its applications using a variety of somewhat disparate monitoring, alerting and log aggregation tools. This broad ecosystem creates inefficiencies in tracing a problem to their root cause.

"It's the classic challenge of having to piece together monitoring and logging data across separate systems, tools, and layers in the architecture, and even if the data is there, in many cases it is difficult to directly connect the chain of events and cause and effect," says Heather Abbott, Senior Vice President of Corporate Solutions Technology. "It can be hard, if not impossible, to put the puzzle together. There's frustration, especially at the management level, since we are held accountable for application stability, performance, and the ability to get to root causes and resolution quickly."

Doing the analysis could take lots of person-hours, sidetracking development and operations team members from more important projects, according to Eric Poon, Director of Operations Analytics. "AppDynamics enables an innovative approach to how we monitor a modern application stack. Using AppDynamics allows us to harvest the valuable business data that only application metrics could provide," says Poon.

Solution

When Nasdaq decided to go outside for an application performance management (APM) solution, it was looking for something that offered high value right out of the box. The team scrutinized how the solution was architected to gather data, and what kind of usability and traceability it offered right out of the box.

"It can be gathering all this great data, but if it can't trace transactions (that may be failing) through the system to the potential issue, then it's probably not going to be too heavily used," Abbott says. "At least not widely across all our constituents from engineering to operations, QA business stakeholders, and management."

After looking at several of the leading APM solutions, AppDynamics quickly rose to the top. The AppDynamics Application Intelligence Platform immediately demonstrated its ability to deliver value right out of the box.

"It worked as it was advertised and it worked very easily," Poon says. "It was simple to deploy. It took minutes, literally. On our first proof-of-concept, we saw results within an hour."

Comparing it to the other tools in the market, Poon says, "It really stood very well within a DevOps model, in this day and age where there is a lot of complexity within a given application architecture. The flow map that came out of the box just really sold the product during the POC. By seeing how an application interacts with the different components inside or outside of the

environment helps our new application development, and it helps in working with legacy code that a developer may not be the original designer for."

Today, the AppDynamics platform gives Nasdaq visibility across its highly complex and extended application environment, both locally in its data centers and in the cloud, predominantly for Java and .NET applications.

Nasdaq uses the platform to see and understand application health, to quickly trace transactions and diagnose issues, and to provide performance insights in pre-production scenarios.

Benefits

Visibility and rapid time to resolution are the primary benefits AppDynamics brings to Nasdaq, along with the potential to access a whole new level of actionable data.

Teams have been freed from the onerous task of scouring logs to pinpoint issues, and time to resolution has been dramatically slashed — from hours or days, down to minutes. The platform quickly points to the offending issues, whether in the code, with remote services, or a database.

Abbott cites "the ability to trace a transaction visually and intuitively through the interface" as a major benefit that AppDynamics delivers. That visibility was especially valuable when Nasdaq was migrating a platform from its internal infrastructure to Amazon.

"We used AppDynamics extensively to understand how the platform was functioning on Amazon," Abbott said. "Measuring its performance and understanding how the system was behaving on a completely new infrastructure platform."

The team and users at Nasdaq speak highly of the AppDynamics platform. Poon reports that the developers who were involved in the proof-of-concept said, "flat out, it's one of the best tools we've deployed here to maximize our application performance." Abbott says, "It's a tool that offers seamless traceability and a view that bridge both the APM and the Business product usage effectively."

Going forward, Nasdaq sees strong alignment between the direction AppDynamics is going and the direction Nasdaq wants its technology to go.

"We continue to work with innovative companies such as AppDynamics to support the Business and leverage DevOps, Poon Says.