AIOPS AND AUTOMATION: KEYS TO INTELLIGENT MANAGED SERVICE DELIVERY

Cloudticity reinvents the MSP operating model

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Table of Contents

Sea Change in Healthcare

You only have to look as far as the COVID-19 pandemic to see how quickly the healthcare world can turn on a dime. For example, one telehealth service routinely averaged about 14K sessions a day before the pandemic. In barely a month, that number exploded to more than 1 million – two orders of magnitude – and is projected to ultimately reach 2.5 million. No one expects another market disruption of this magnitude any time soon – but nobody expected COVID-19 either.

Even before COVID-19, the healthcare industry was in flux thanks to two other variables, cybersecurity and compliance. Consider the following:

- RANSOMWARE AND OTHER RELATIVELY NEW CYBERTHREATS ARE INCREASING ORGANIZATIONAL RISK. To take one example, Colorado-based Parkview Medical Center's technology infrastructure was hit with a ransomware attack on April 21, 2020, which caused IT network outages – right in the middle of treating COVID-19 infections. While patient care was not affected, the organization is likely to incur substantial remediation costs and brand damage as a result of the attack[1].
- REGULATORY CHANGES CONTINUE AT AN ACCELERATING PACE, INCREASING THE LOAD ON COMPLIANCE OFFICERS AS WELL AS IT STAFF WHO SUPPLY INFORMATION NEEDED FOR REPORTING. For example, the trend to value-based care is running up against laws designed in a fee-for-service era. In response, the Department of Health and Human Services (HHS) has proposed changes to modernize the Physician Self-Referral Law (Stark Law) and the federal Anti-Kickback Statute (AKS) – changes that will ripple down to risk and compliance departments[2].

Faced with these and other pressures, more and more healthcare organizations are turning to managed service providers (MSPs) to provide IT infrastructure resources and offload the increased burdens of cybersecurity and compliance. MSPs are seizing the day: a recent survey found that 34% of MSPs target the healthcare industry, more than any other vertical[3].

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1 https://healthitsecurity.com/news/ransomware-shuts-down-colorado-hospital-it-network-amid-covid-19

2 https://www.reliasmedia.com/articles/144036-evolution-of-healthcare-industry-poses-new-and-ongoing-compliance-risks-in-2019

3 Datto's 2019 State of the MSP Report

Clouds in the Forecast

The rise of public clouds has transformed the healthcare industry as well as MSPs that serve the healthcare industry. Technology giants Alibaba, Amazon, Google, Microsoft, and Oracle dominate the public cloud market, competing for customers with aggressive pricing and continual releases of new features. Virtually every MSP is using public cloud services for delivering value to their customers.

By now, everyone is familiar with the benefits of cloud com uting, including reduced capital investment, easy access to information, baseline security, service-level agreements, and radical scalability. However, the CSP business model poses challenges for companies in the healthcare industry in three primary areas: control and visibility, availability, and data security.

CONTROL AND VISIBILITY

Compared to an on-premises data center, a public cloud deployment is a black box that delivers the services you need but doesn't let you see what's really happening inside. Of course, that's part of the appeal of CSPs, to let someone else worry about the infrastructure so you can concentrate on your business. But in a highly regulated industry such as healthcare, the buck stops with the organization, not the CSP. The opacity of the CSP environment can be problematic for compliance and troubleshooting.

AVAILABILITY

In terms of uptime, what seems sufficiently relia le in one industry can be completely unacceptable in another. CSPs work under the assumption that a sufficien number of nines of availability will meet the needs of their customers. But healthcare doesn't understand nines. For example, 99.99% availability means that the system is down more than four minutes a month – an eternity in an emergency.

DATA SECURITY

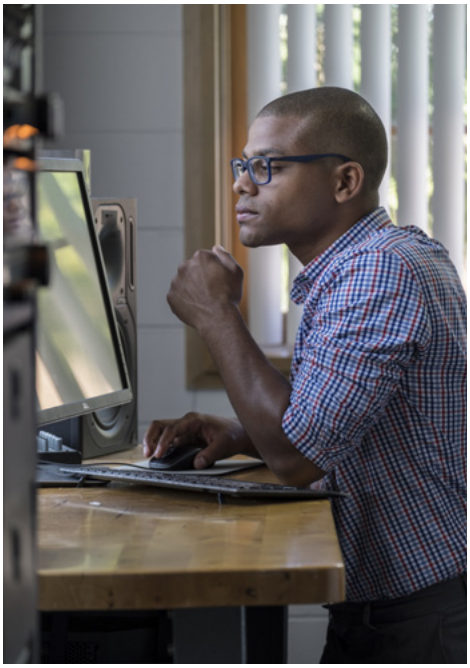
CSPs provide baseline security for the data that resides in their environment. But just as in the case of reliability, healthcare marches to a different security drum than other industries, thanks to an alphabet soup of regulations and legislation such as HIPAA, HITECH, HITRUST, and GDPR. For that reason, the baseline security provided by the CSP simply isn't enough to ensure the security of protected health information (PHI).

Application Development in Public Clouds

The CSP business model can sometimes pose problems for healthcare applications because of shared responsibility, a core tenet of the CSP business model. Here's how AWS puts it:

> **"Security and compliance is a shared responsibility between AWS and the customer... AWS operates, manages and controls the components from the host operating system and virtualization layer down to the physical security of the facilities…The customer assumes responsibility and management of the guest operating system [and] application software."**[4]

Unfortunately, the healthcare world doesn't divide up so neatly. Part of the difficulty s rings from the wide range of sophistication of the applications themselves. Newer startups roll out cloud-native applications based on microservices and containers pushing out releases continuously using DevOps principles. These early adopters know how to integrate their applications smoothly with the premium security and availability services offered by CSPs.



It's a different story for larger, more established companies. They often rely on monolithic applications with millions of lines of code written in decades-old programming languages and update them with major releases a few times a year. Many of them are turning to cloud-native methodologies for new development but can't justify the time and money that would be needed to re-architect existing applications. With no way to adapt their applications to the cloud, they are at the mercy of the CSP for security and availability.

4 https://aws.amazon.com/compliance/shared-responsibility-model/

A Breath of Fresh Air

Cloudticity is the (relatively) new kid on the healthcare MSP block, founded less than ten years ago. In that time, we've grown our team to 30, worked with over 50 clients, and even built the first atient portal and Health Information Exchange (HIE) on AWS. Not bad for a band of healthcare wonks and computer geeks located in Seattle (and Detroit and Kansas City and Grand Rapids and San Francisco and…).

By virtue of being a startup, Cloudticity was not handcuffed by millions of existing lines of monolithic code or legacy service delivery workflows – instead, we started with a clean sheet of paper. That reality gave us a once-in-a-lifetime opportunity to define a new cate ory – and we took advantage of that opportunity.

THINK OF OUR APPROACH AS INTELLIGENT SERVICE DELIVERY FOR THE HEALTHCARE INDUSTRY.

Cloudticity Oxygen™: New Platform For The Cloud Era

Cloudticity Oxygen is our proprietary managed services delivery platform that leverages groundbreaking automation to oversee all aspects of operations for healthcare systems and applications. Oxygen acts as a broker that allows applications, whether legacy or modern, to take full advantage of cloud capabilities such as high availability and autoscaling. Cloudticity uses Oxygen to deliver healthcare applications intelligently while achieving maximum security, availability, and compliance.

To understand why Oxygen is such a revolutionary platform, you need to look under the hood. What you will fin there are two key ingredients: automation and AIOps. Put them in a blender and you have the secret sauce that makes Oxygen unique in the industry, and uniquely suited to navigate the challenges facing healthcare today.

Ingredient 1: Automation

From the very start, Cloudticity has lived by one motto: Automate first

To understand why, take an imaginary walk through a typical network operations center (NOC). What you will likely see there is a group of people sitting in swivel chairs watching dashboards all day, scribbling Post-IT notes, and responding to incidents based on a runbook or other source. This tried-and true way of managing the network has served the industry well, but unfortunately is running out of gas, for three main reasons:

1. The massive amounts of data in the modern IT infrastructure stretch the analytical capabilities of humans using database queries to the breaking point – and beyond.

2. Human response time is far too slow for today's cyberthreats, for example, the average time it takes for ransomware to encrypt your files after execution is only three seconds.

3. NOCs do not scale well. Adding staff with the right skill sets requires time-consuming and challenging hiring cycles – plus, people are expensive.

We somewhat playfully refer to this situation as the silicon-carbon dichotomy. Silicon-based intelligence (aka computers) does some things better, while carbon-based intelligence (aka humans) is better at others. That's why Cloudticity continues to focus on automation as a way to free talented staff for innovation and strategic initiatives. This principle guides our entire business, from strategic planning and product development to service delivery and customer care (Figure 1).

Figure 1. Si versus C, strengths

Ingredient 2: AIOps

Virtually every MSP claims to use AI – but as always, the devil is in the details. Suppose you're an MSP and you build a platform that uses a third-party malware application with AI inside. Technically, your platform uses AI – but it's really AI by proxy. To take full advantage of the potential of AI, you need to build your own customized models to drive machine learning – the branch of AI that we're talking about in this document.

By contrast, Cloudticity doesn't just nibble around the edges of AI – we're all in. One main reason is that machine learning is particularly adept at findin patterns hidden in mountains of data that humans couldn't possibly work with. Spotting one server out of hundreds that hits 95% utilization at 3am every weekday night (but not on the weekends). Identifying weirdly inconsis-tent traffic atterns involving a suspicious IP address. Flagging applications trying to access information that makes no sense – why does an accounting package need to download binaries from the development server?

A few years ago, our strong commitment to AI led us to embrace an emerg-ing technology known as AIOps. AIOps combines big data and machine learning to automate IT operations processes, including event correlation, anomaly detection, and causality determination[5]. The basic operating model for AIOps is Observe-Engage-Act (Figure 2).

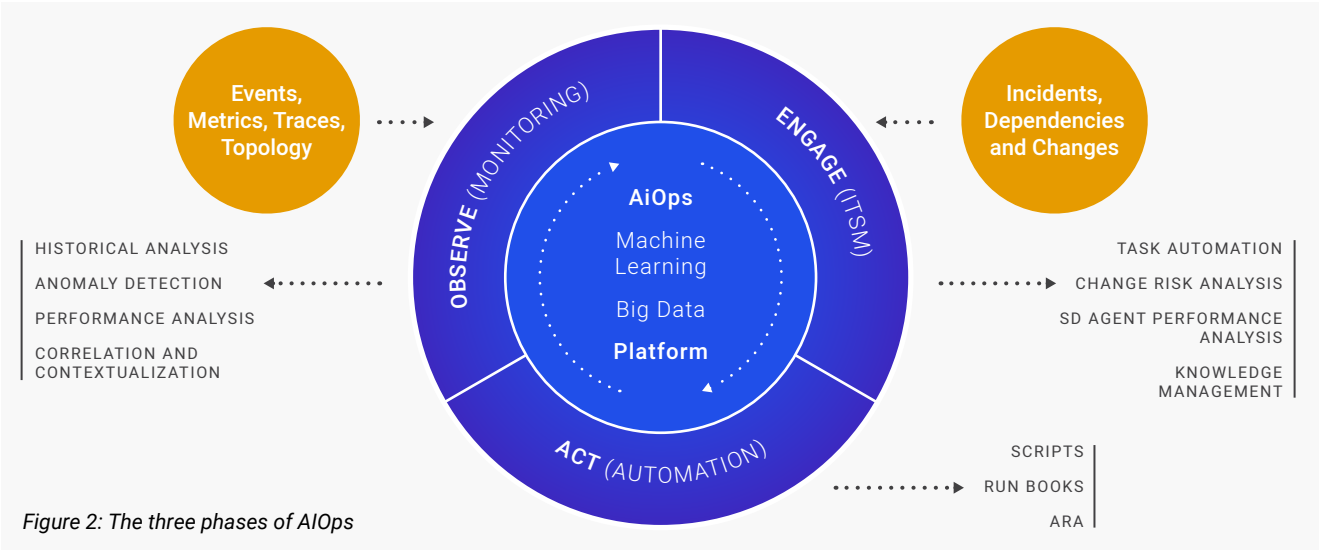


Figure 2: The three phases of AIOps

5 https://www.gartner.com/en/information-technology/glossary/aiops-artificial intelligence-operations

Inside Oxygen

While the overall workflow is complex, this summary will give you a sense of how Oxygen uses AI and operational intelligence to automate remediation when possible and present clear choices to operations staff for the 2% of cases that cannot be resolved automatically (see Figure 3).

AI Workflow

A. Ingest vast quantities of data, including PHI and healthcare messages.

B. Perform real-time analytics on the streaming data using machine-learning models

C. Report anomalies to the recommendation engine.

D. Stores streaming data in a data lake.

E. Analyze historical data sets using machine-learning models.

F. Feed insights back to the real-time models to fine-tune accuracy

G. Provide context information to the recommendation engine.

Operations Workflow

H. (98% of cases) Automatically remediate the anomaly immediately.

I. (2% of cases) Send ticket to customer with three options: Do Nothing, Fix Now, Schedule

- DO NOTHING: Take no action, delete ticket after 7 days.
- FIX NOW: Implement the recommended actions immediately.
- SCHEDULE: Perform the recommended actions during the next maintenance window.

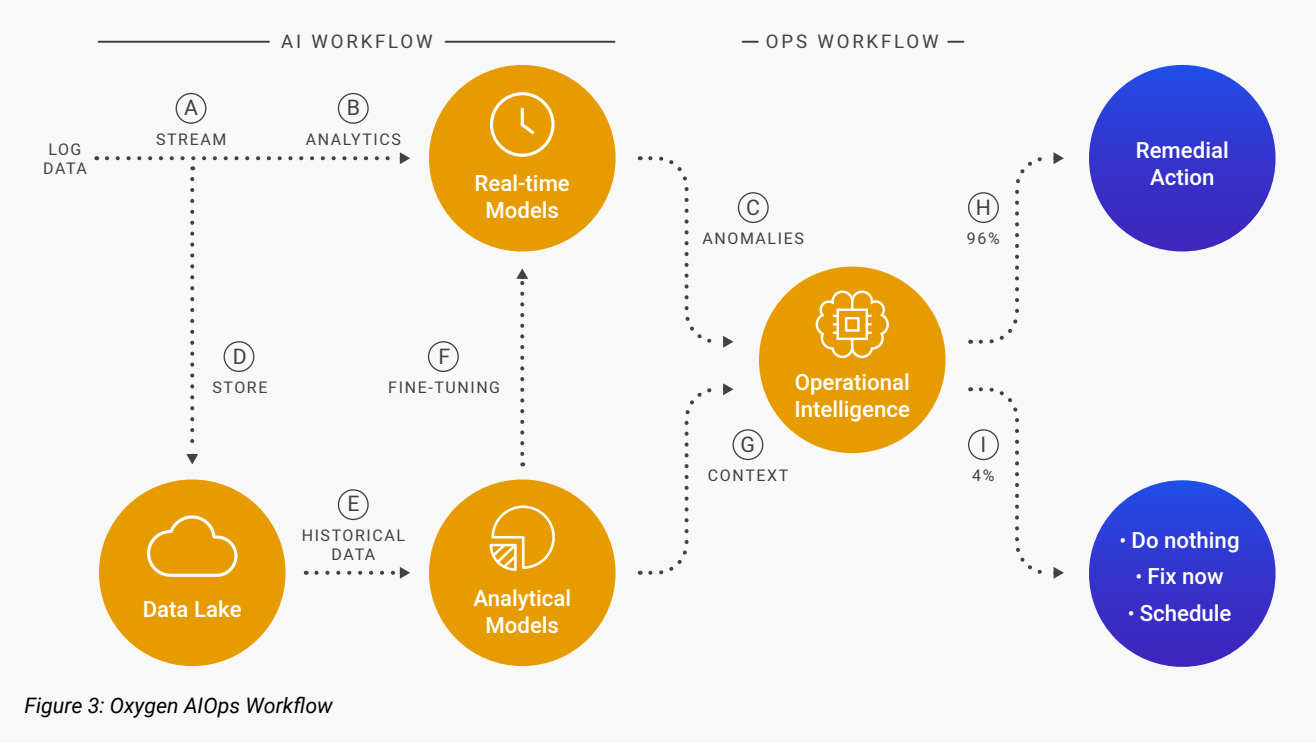


Figure 3: Oxygen AIOps Workflow

What Oxygen Can Do for You

Cloudticity is changing the way people think about managed services. In the past, many organizations turned to MSPs to offload the burdensome and complex tasks of managing infrastructure – outsourcing a problem, as it were. With Oxygen, managed services become a strategic resource that contributes to the organization's success. Our clients are more agile, able to respond to changing circumstances faster than competitors. They are confident that their a plications and data are secure and available, and have the performance and cost management capabilities to drive their success (see Figure 4).

Figure 4: Five Pillars of Oxygen

Innovating at the Speed of Life

Since moving to Cloudticity, a healthcare SaaS provider has accelerated its pace of innovation and dramatically improved its agility. Though manually configurin an environment previously took up to three weeks, it can now be done in seconds. The company can instantly create environments to develop and test new applications and get them to market quickly, in response to business changes.

Cloudticity has also given the SaaS provider the freedom to engage in low-cost, low-risk experiments. Now when the team has a theory about something that might improve security, they can quickly spin up a pseudo-environment and test it. Prior to migrating to AWS, that would have been unthinkable.

Agility

COVID-19 has shown the healthcare industry the need for an agile infrastructure. Some healthcare companies have seen their network traffic s iking at 30 or 40 times the normal level, while others have had to shift their business models from storefront to online fulfillment virtually overni ht. Accommodating such rapid shifts requires the ability to turn on a dime, which stretches the capabilities of many healthcare systems and the staff who maintain them to the breaking point – and sometimes beyond.

Oxygen helps organizations respond agily in three ways. First, Oxygen automates previously manual monitoring and remediation activities, freeing IT staff from burdensome and repetitive tasks such as monitoring backups, tracking CPU utilization, and managing firewall rules. Now those resource can be redeployed to initiatives that directly contribute to the organization's core mission. In addition, AIOps gives Oxygen unprecedented flexibility to adapt to changing requirements with a minimum of human intervention. Machine learning continually provides insights to drive automated configuratio changes and remediation activities. Finally, Oxygen allows developers to experiment in ways they couldn't do before.

Weekend Failure? No Worries.

On a recent weekend, a node on a client's MongoDB cluster went down. In the old days, several IT staffers would have had to put their personal lives on hold and scramble to get the system back up. Today, thanks to Cloudticity's automation, a new node quickly spun itself up and the client's availability did not suffer.

Reliability

Healthcare systems are mission-critical – they simply cannot go down. Imagine what could happen if an infected patient came in for a COVID-19 test and the testing system were unavailable. Instead of an immediate quarantine, the person would walk out of the clinic unaware of the danger and potentially infect dozens of people.

Oxygen is designed around the premise of 100% availability – something that many of our clients have achieved. Oxygen uses machine learning to constantly monitor the system for component failures. When they occur, auto-remediation ensures that the system continues to operate with no perceptible degradation in performance. Also, we work closely with our clients to eliminate single points of failure, which further improves availability.

HITRUST Certification

To maintain HITRUST certific - tion – a key business differentia- tor – healthcare communications firm Revel Health turned t Cloudticity. Oxygen provides over 200 inheritable and partially inheritable HITRUST controls. As a result, Revel has shortened their recertification timeline an simplified yearly reassessments

Security and Compliance

For Cloudticity, compliance is not a periodic check-the-box activity – rather, we see compliance as a measurable, repeat- able set of policies and procedures that are proven to reduce risk and improve security. The Oxygen platform uses machine learning to identify drifts in confi uration and deviations from baseline performance that represent potential compliance violations, then remediates those situations automatically and accurately. Not only does this approach keep the system continually in compliance, it avoids the inevitable human errors that occur when security staff has to initiate manual remediation tasks.

Furthermore, Oxygen is exceptionally fast: 98% of our service tickets are resolved through automation, with 70% resolved within the first hour. In most cases, the only way the clien knows that something has occurred is when they receive an email from us letting them know that the problem has already been solved. For IT professionals who are used to getting awakened in the middle of the night by security alerts, that’s a huge advantage.

From 60% Failures to Zero

As the COVID-19 pandemic took hold and office visits wer curtailed, a telehealth company suddenly found its traffic level increasing overnight more than thirty-fold. As demand skyrocketed, performance plummeted: six in ten calls dropped out before the session was completed. After they migrated to Oxygen, the failure rate was zero, that is, the patient and the care provider were able to complete their interaction in every case. This case shows a striking example of how infrastructure health can directly impact patient care, and ultimately, outcomes.

Performance

When users complain about performance problems, troubleshooting within public clouds can be a challenge. Many traditional troubleshooting methods and tools are ineffective in the cloud due to lack of visibility into the provider's networking environment. In addition, most cloud deployments include a number of third-party solutions, which further complicates the problem.

The Cloudticity Oxygen platform features deep integration with native AWS services like AWS CloudFormation, Amazon API Gateway, and AWS Confi , along with third-party solutions such as Trend Micro Deep Security and CloudHealth, to deliver a fully automated end-to-end managed services platform for healthcare. One of the byproducts of this deep level of automation is more predictable and reliable performance of the platform.

Reduce Cloud Spend By 30% in 3 Months

Cloudticity engineers are experts at optimizing AWS costs and have instantiated that knowledge into the Oxygen platform. Oxygen relies on machine learning to identify anomalous spending patterns, then uses automation to remediate the situation before it results in a significan cost problem. Cloudticity staff meets regularly with clients to understand upcoming events that could influence usage, for example, a major product launch that will drive millions to the application. Oxygen helps our clients avoid both underprovi-sioning and overprovisioning while maintaining the required levels of performance and availability.

Cost Optimization

The AWS pricing model provides options for significant cos optimization – if you fully understand both the model and your organization's dynamic resource requirements. However, many AWS customers are surprised by unexpectedly high costs for resources due to problems such as oversizing, inefficient a plications, and sub-optimal architectures that result from lift-and-shift migrations.

Oxygen in a Nutshell

The public cloud and AIOps are either game-changers or existential threats, depending on whether MSPs embrace or resist these and other emerging technologies. Combining AIOps with our “automate first” philoso hy, Cloudticity created Oxygen, the next generation of managed cloud services. Oxygen delivers five key enefits – a ility, security and compliance, reliability, performance, and cost optimization – at levels that are unprecedented in the industry today. The results speak for themselves: 98% of incidents are remediated automatically, with 70% closed within the first our. One client summed it up perfectly: “With Cloudticity, things that used to take months, now take moments.”

LEARN MORE ABOUT HOW OXYGEN AND CLOUDTICITY CAN HELP YOUR BUSINESS GO FROM MONTHS TO MOMENTS HERE.

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