The Essential Guide to AIOps

Overcome data chaos and get continuous insight into your IT Operations

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What Is AIOps?

AIOps is the practice of applying analytics and machine learning to big data to automate and improve IT operations. These new learning systems can analyze massive amounts of network and machine data to find patterns not always identified by human operators. These patterns can both identify the cause of existing problems and predict future impacts. The ultimate goal of AIOps is to automate routine practices in order to increase accuracy and speed of issue recognition, enabling IT staff to more effectively meet increasing demands.

History and Beginnings

The term AIOps was coined by Gartner in 2016. In the **Market Guide for AIOps Platforms**, Gartner describes AIOps platforms as "software systems that combine big data and artificial intelligence (AI) or machine learning functionality to enhance and partially replace a broad range of IT operations processes and tasks, including availability and performance monitoring, event correlation and analysis, IT service management and automation."

AIOps Today

Ops teams are being asked to do more than ever before. In a common practice that can sometimes even feel laughable, old tools and systems never seem to die. Yet the same ops teams are under constant pressure to support more new projects and technologies, very often with flat or declining staffing. To top it off, increased change frequencies and higher throughput in systems often means the data these monitoring tools produce is almost impossible to digest.

To combat these challenges, AIOps:

- **Brings together data from multiple sources:** Conventional IT operations methods, tools and solutions aggregate and average data in simplistic ways that compromise data fidelity (as an example, consider the aggregation technique known as "averages of averages"). They weren't designed for the volume, variety and velocity of data generated by today's complex and connected IT environments. A fundamental tenet of an AIOps platform is its ability to capture large data sets of any type while maintaining full data fidelity for comprehensive analysis. An analyst should always be able to drill down to the source data that feeds any aggregated conclusions.
- **Simplifies data analysis:** One of the big differentiators for AIOps platforms is their ability to correlate these massive, diverse data sets. The best analysis is only possible with all of the best data. The platform then applies automated analysis on that data to identify the cause(s) of existing issues and predict future issues by examining intersections between seemingly disparate streams from many sources.
- **Automates response:** Identifying and predicting issues is important, but AIOps platforms have the most impact when they also notify the correct personnel, automatically remediate the issue once identified or, ideally, execute commands to prevent the issue altogether. Common remedies such as restarting a component or cleaning up a full disk can be handled automatically so that staff are only involved once typical solutions have been exhausted.

Key Business Benefits of AIOps

By automating IT operations functions to enhance and improve system performance, AIOps can provide significant business benefits to an organization. For example:

- Avoiding downtime improves both customer and employee satisfaction and confidence.
- Bringing together data sources that had previously been siloed allows more complete analysis and insight.
- Accelerating root-cause analysis and remediation saves time, money and resources.
- Increasing the speed and consistency of incident response improves service delivery.
- Finding and fixing complicated issues more quickly improves IT's capacity to support growth.
- Proactively identifying and preventing errors empowers IT teams to focus on higher-value analysis and optimization.
- Proactive response improves forecasting for system and application growth to meet future demand.
- Adding "slack" to an overwhelmed system by handling mundane work, allowing humans to focus on higher-order problems, yielding higher productivity and better morale.

Data Is Vital for AIOps

Data is the foundation for any successful automated solution. You need both historical and real-time data to understand the past and predict what's most likely to happen in the future. To achieve a broad picture of events, organizations must access a range of historical and streaming data types of both human- and machine-generated data.

Better data from more sources will yield analytics algorithms better able to find correlations too difficult for humans to isolate, allowing the resulting automation tasks to be better curated. For example, it's not hard in most semi-modern monitoring systems to automate some sort of response. However, if response times slow down an application, AIOps would help ensure the correct automated response and not just the "knee-jerk" response that's statically connected. Adding more capacity to a service may in fact make a slowdown worse if the bottleneck isn't related to capacity. And it certainly can result in unintended and unnecessary costs in cloud environments. Thus, having the right data to make more-complete decisions results in better outcomes.

For total visibility, it's necessary to access data in one place across all of your IT silos. It's important to understand the underlying data supporting your services and applications — defining KPIs that determine health and performance status. As you move beyond data aggregation, search and visualizations to monitor and troubleshoot your IT, machine learning becomes key to achieving predictive analysis and automation.

Key AIOps Use Cases

According to Gartner, there are five primary use cases for AIOps:

1. Performance analysis

2. Anomaly detection

3. Event correlation and analysis

4. IT service management

5. Automation

1. **Performance analysis:**

It has become increasingly difficult for IT professionals to analyze their data using traditional IT methods, even as those methods have incorporated machine learning technology. The volume and variety of data is just too large. AIOps helps address the problem of increasing volume and complexity of data by applying more sophisticated techniques to analyze bigger data sets to identify accurate service levels, often preventing performance problems before they happen.

2. **Anomaly detection:**

Machine learning is especially efficient at identifying data outliers — that is, events and activities in a data set that stand out enough from historical data to suggest a potential problem. These outliers are called anomalous events. Anomaly detection can identify problems even when they haven't been seen before, and without explicit alert configuration for every condition.

Anomaly detection relies on algorithms. A trending algorithm monitors a single key performance indicator (KPI) by comparing its current behavior to its past. If the score grows anomalously large, the algorithm raises an alert. A cohesive algorithm looks at a group of KPIs expected to behave similarly and raises alerts if the behavior of one or more changes. This approach provides more insight than simply monitoring raw metrics and can act as a bellwether for the health of components and services.

AIOps makes anomaly detection faster and more effective. Once a behavior has been identified, AIOps can monitor and detect significant deviations between the actual value of the KPI of interest versus what the machine learning model predicts.

Accurate anomaly detection is vital in complex systems as failures often exist in ways that are not always immediately clear to the IT professionals supporting them.

3. **Event correlation and analysis:**

The ability to see through an "event storm" of multiple, related warnings to identify the underlying cause of events. The reality of most complex systems is that something is always "red" or alerting. It's inevitable. The problem with traditional IT tools, however, is that they don't provide insights into the problem, just a storm of warnings. This creates a phenomenon known as "alert fatigue"; teams see a particular alert that turns out to be trivial so often that they ignore the alert even on the occasions when it's important.

AIOps automatically groups notable events based on their similarity. Think of this as drawing a circle around events that belong together, regardless of their source or format. This grouping of similar events reduces the burden on IT teams and reduces unnecessary event traffic and noise. AIOps focuses on key event groups and performs rule-based actions such as consolidating duplicate events, suppressing alerts or closing notable events. This enables teams to compare information more effectively to identify the cause of the issue.

4. **IT service management (ITSM):** A general term for everything involved in designing, building, delivering, supporting and managing IT services within an organization. ITSM encompasses the policies, processes and procedures of delivering IT services to end users within an organization.

AIOps provides benefits to ITSM by letting IT professionals manage their services as a whole rather than as individual components. They can then use those whole units to define the system thresholds and automated responses to align with their ITSM framework, helping IT departments run more efficiently.

AIOps for ITSM can help IT departments to manage the whole service from a business perspective rather than managing components individually. For example, if one server in a pool of three machines encounters problems during a normal-load period, the risk to the overall service may be considered low, and the server can be taken offline without any user-facing impact. Conversely, if the same thing were to happen during a high-load period, an automated decision could be taken to add new capacity before taking any poor-performing systems offline.

In addition, AIOps for ITSM can help:

- Manage infrastructure performance in a multicloud environment more consistently
- Make more accurate predictions for capacity planning
- Maximize storage resource availability by automatically adjusting capacity based on forecasting need
- Improve resource utilization based on historical data and predictions
- Manage connected devices across a complex network

5. **Automation:** Legacy tools often require manually cobbling information together from multiple sources before it's possible to understand, troubleshoot and resolve incidents. AIOps provides a significant advantage — automatically collecting and correlating data from multiple sources into complete services, increasing the speed and accuracy of identifying necessary relationships. Once an organization has a good handle on correlating and anazlyzing data streams, the next step is to automate responses to abnormal conditions.

An AIOps approach automates these functions across an organization's IT operations, taking simple actions that responders would otherwise be forced to take themselves. Take for example a server that tends to run out of disk space every few weeks during high-volume periods due to known-issue logging. In a typical situation, a responder would be tasked with logging in, checking for normal behavior, cleaning up the excessive logs, freeing up disk space and confirming nominal performance has resumed. These steps could be automated so that an incident is created and responders are notified only if normal responses have already been tried and have not remedied the situation. These actions can range from the simple, like restarting a server or taking a server out of load-balancer pools, to more sophisticated, like backing out a recent change or rebuilding a server (container or otherwise).

AIOps automation can also be applied to:

- Servers, OS and networks: Collect all logs, metrics, configurations and messages to search, correlate, alert and report across multiple servers.
- Containers: Collect, search and correlate container data with other infrastructure data for better service context, monitoring and reporting.
- Cloud monitoring: Monitor performance, usage and availability of cloud infrastructure.
- Virtualization monitoring: Gain visibility across the virtual stack, make faster event correlations, and search transactions spanning virtual and physical components.
- Storage monitoring: Understand storage systems in context with corresponding app performance, server response times and virtualization overhead.
- Application monitoring: Identify application service levels and suggest or automate response to maintain defined service level objectives.

AIOps and the Shift to Proactive IT

One of the primary benefits of AIOps is its ability to help IT departments predict and prevent incidents before they happen, rather than waiting to fix them after they do. AIOps, specifically the application of machine learning to all of the data monitored by an IT organization, is designed to help you make that shift today.

By reducing the manual tasks associated with detecting, troubleshooting and resolving incidents, your team not only saves time but adds critical “slack” to the system. This slack allows you to spend time on higher-value tasks focused on increasing the quality of customer service. Your customer experience is maintained and improved by consistently maintaining uptime.

AIOps can have a significant impact in improving key IT KPIs, including:

- Increasing mean time between failures (MTBF)
- Decreasing mean time to detect (MTTD)
- Decreasing mean time to investigate (MTTI)
- Decreasing mean time to resolution (MTTR)

IT organizations who have implemented a proactive monitoring approach with AIOps have seen significant improvement in a variety of IT metrics, including:

How to Get Started With AIOps

The best way to get started with AIOps is an incremental approach. As with most new technology initiatives, a plan is key. Here are some important considerations to get you started.

Choose Inspiring Examples

If you're evaluating AIOps solutions, platforms and vendors for your organization, you've got a big task ahead of you. The most challenging aspect may not be the evaluation process itself, but gaining the support and executive buy-in you need to conduct the evaluation. If you choose inspiring examples of other, similar organizations that have benefited from AIOps — and have metrics to prove it — you'll have a much easier time getting the go-ahead. A good partner can help you do that. (See *Select the Right Partner* below.)

Consider People and Process

It's obvious that technology plays an important role in AIOps, but it's just as important to make a plan to address people and process. For example, if an AIOps solution identifies a problem that's about to happen and pages a support team to intervene, a responder might ignore the warning because nothing has actually happened yet. This can undermine trust in the AIOps solution before it has a chance to be proven in operation.

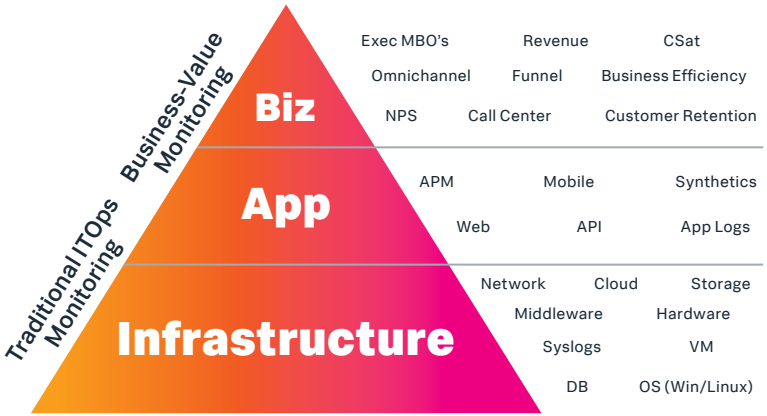
It's also important to give IT teams the time to work on building, maintaining and improving systems. This vital work can't be assigned as a side project or entry-level job if you expect meaningful change. Put your best people on it. Make it a high priority so other work can't infringe on it. AIOps practices are iterative and must be refined over time; this can only be done with mature and consistent focus on improvement.

You'll also need to re-examine and adjust previously manual processes that had multiple levels of manager approval, like restarting a server. This requires trust in both technology and team practices. Building trust takes time. Start with simple wins to build cultural acceptance of automation. For example, be prepared to build historical reports that show previous incidents were correctly handled by a consistent, simple activity (such as a restart or disk cleanup) and offer to automate those tasks on similar future issues. Choose a solution that allows for "automation compromise" by inserting approval gates for certain activities. Over time, those gates should be removed to improve speed as analytics proves its value in selecting correct automation tasks.

Finally, include in your plans a campaign to reassure staff that AIOps is not intended to replace people with robots. Show them how AIOps can free up key resources to work on higher-value activities — limiting the unplanned work your teams have to endure each day.

Unlock Your Data

Enabling AIOps requires access to all types of data: unstructured machine data and structured metrics, as well as relational data for enrichment. Consider data not only by its type but also by its position in "the stack," starting with infrastructure and moving upward to the application and finally the business application. You want data from each layer.



These different data types allow you to construct a holistic perspective across all silos and take actions meaningful to the situation and data type. Your goal is to identify data sources at each layer of the service beginning with infrastructure (cloud or traditional) and moving up to application performance, finally tying identifiable business outcomes (such as customer satisfaction, revenue, number of orders, wait times and so on). Pick a very small number of sources (one or two) at each level and begin by correlating those.

Ingesting and analyzing all of the data effectively and quickly can be daunting. Instead, start by accessing and analyzing raw historical machine and metric data to establish a base understanding, and use clustering algorithms and analytics to identify trends and patterns. Raw data is best for real-time detection. Then, you can begin to analyze streaming data to see how it fits those patterns, applying artificial intelligence that's powered by machine learning to introduce automation and, eventually, predictive analytics.

Historical data is extremely valuable as you get started with AIOps. If you start by analyzing and understanding past states of your systems, you will be able to correlate what you learn with the present to develop meaningful service level thresholds.

To achieve this, organizations must ingest and provide access to a vast range of historical and streaming data types. The data type that you select — which could be anything from logs, metrics and text to wire and social media data — depends on the problem you're solving. For example, you can use metric data from your infrastructure to monitor capacity, or application logs to ensure that you are providing an outstanding experience to your customers.

Many AIOps platforms have historically focused on a single data source. Restriction to a single data type limits your insights into system behavior — regardless of whether those insights come from an IT admin or an algorithm. Hence, enterprises should select platforms that are capable of ingesting and analyzing data from multiple sources.

Select the Right Partner

As interest in AIOps has grown, some vendors are packaging traditional IT operations tools together, adding basic AI features and calling the result an AIOps "platform." A true AIOps platform isn't just a collection of tools. This is important to understand as you get started, because the platform you choose will determine your success. Gartner recommends that enterprises "prioritize those vendors that allow for the deployment of data ingestion, storage and access, independent from the remaining AIOps components." You need a platform that can gather all the necessary data at full fidelity, not just aggregations or rollups. You need a platform that can then enrich, analyze and crunch that data to meaningful conclusions and insights (and without requiring heavy amounts of custom work to configure or maintain). And you need a platform that integrates proper automation to take the right action at the right time as a tight ecosystem.

Look at feature sets, and also review customer case studies and AIOps use cases. The easiest way to know if an AIOps platform could meet your needs is to find customer case studies that show how a company similar to yours addressed their business challenges with AIOps. Look for vendors who showcase their customers online and ask for customer references. If an AIOps tool or platform promises great results but the company can't provide evidence, that should be a clue to look elsewhere.

Why Splunk for AIOps Is Different

Splunk makes it easy to ingest almost any kind of data from almost any source, real-time or historical, and then apply advanced analytics — predictive analytics, prediction and forecasting, event management and analytics, clustering, adaptive and statistical thresholding, anomaly detection, root cause determination and more. This unique approach helps enhance a broad range of IT operations and tasks and allows companies to get value not possible with human analysis alone.

A Differentiated Approach to Data — Data-to-Everything

Splunk's AIOps platform is the only one built with the power of Splunk, the Data-to-Everything Platform — empowering customers to use the data explosion as an opportunity to drive effectiveness, productivity, insights and automation — to turn data into action, anywhere in the organization.

Even the best machine learning capabilities become powerless without the right data to support them. The rise in complexity, caused by the rapid growth in data volumes generated by IT infrastructure and applications, the increasing variety of data types, and the increasing velocity at which data is generated, is met with opposing forces of cost reduction — making it challenging for IT operations to adequately get their jobs done, let alone leverage the best analytics for transformation.

A differentiated approach to data can make all the difference between dabbling with features and achieving true success and transformation. As the Data-to-Everything Platform, on-prem or in the cloud, Splunk can ingest nearly any kind of data, like logs, metrics, text, wire, API, and even social-media derived, from nearly any tool and system. Splunk can ingest this data as structured, semi-structured or unstructured, and do all this either historically or in real time.

Imagine a single platform that unifies all your disparate data across all of your silos — and then imagine what AI and ML could do. Imagine teams no longer burdened with too many alerts, complex tools or siloed views, and imagine teams that get ahead of problems before they happen.

The Data-to-Everything Platform gives you the ability to supply your AIOps platform with all the data it needs to solve an enormous variety of IT challenges. Any other AIOps offering can only provide a partial solution.

Differentiators

- Flexible and scalable solution with AI and ML at its core
  - Result: predict service degradation up to 30 minutes in advance
- Simplified event management and incident response with AIOps capabilities like dynamic thresholding and anomaly detection
  - Result: decrease event noise by 95%
- Monitoring and insights across infrastructure, apps and services
  - Result: monitoring and service performance health views for IT and business services

Key Capabilities

- Event Management and Analysis
  - Instantly group and correlate events to quiet the noise
- Thresholding
  - Account for and adapt to regular patterns in business activity and data
- Root Cause Determination
  - Mirror IT and business environments for faster investigation and identify top contributing KPIs
- Anomaly Detection
  - Pinpoint deviations from past behaviors to identify unusual events
- Predictive Analytics
  - Predict health scores and forecast trends to prevent incidents

Benefits of Splunk

- Reduce noise and complexity
  - Simplify incident detection with automated alerts and mobilization
  - Apply artificial intelligence, and machine learning capabilities across all ITOps functions, for flexible and scalable solutions that grow with your organization
- Predict outages before they impact customers
  - Use predictive cause analysis on data across services, apps, and infrastructure
  - Predict service degradation 30-40 minutes in advance through adaptive thresholds, anomaly detection and service health prediction algorithms
- 360° visibility
  - Complete visibility across app, system and infrastructure health
  - Bring together any type of data and performance metrics into one consumable place

The Bottom Line: Now Is the Time for AIOps

If you're an IT and networking professional, you've been told over and over that data is your company's most important asset, and that big data will transform your world forever. Machine learning and artificial intelligence will be transformative and AIOps provides a concrete way to leverage its potential for IT. From improving responsiveness to streamlining complex operations to increasing productivity of your entire IT staff, AIOps is a practical, readily available way to help you grow and scale your IT operations to meet future challenges. Perhaps most important, AIOps can solidify IT's role as a strategic enabler of business growth.

Learn **More.**

For more information on AIOps:

- **Artificial Intelligence for IT Operations (AIOps)**
- **Market Guide for AIOps Platforms**

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