ARTIFICIAL INTELLIGENCE FOR IT OPERATIONS (AIOPS)

Abstract

Artificial Intelligence for IT Operations (AIOps) is an emerging interdisciplinary field arising in the intersection between the research areas of big data , machine learning, streaming analytics, and the management of IT operations. The benefits of AIOps for operational transformation are improved time management and event prioritization, increased business innovation, enhanced automation and accelerated digital transformation. In short AIOps uses artificial intelligence to discover any underlying issues in ITSM and helps to fix them quickly, thereby improving the efficiency everywhere.

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I. INTRODUCTION

Business Transformation, Digital Economy, and Agility are all "buzz" words in today's era. The pace at which business is evolving and new offerings are rolling out has been at its peak. Digitization has emerged and has positively impacted most activities impacting human life, from food delivery to digital wallets to self-driven cars and even flying cars. One of the fundamental backbones for the pace of this business transformation and agility is the power of underlying infrastructure. Enterprises no longer rely on one platform. Hybrid Cloud infrastructure comprising of On-Prem, Private Cloud, and Multi Clouds is what businesses rely on for ensuring availability, reliability, performance, and auto-scaling. This has resulted in the increasing complexity of modern application architectures—which have made the role of IT operations more challenging. In response, AI and machine learning have emerged to relieve some of the manual intervention required.

II. WHAT EXACTLY IS AIOPS?

Gartner coined the term AIOps in 2016 with the intent to identify machine learning analytics technology that improves IT and operations analytics. The term "Artificial Intelligence IT Operations" is abbreviated as AIOps. AIOps enables end-to-end operations and development teams to work more efficiently and quickly to predict issues with digital services earlier and address them before adversely affecting business operations and customers. This is accomplished through algorithmic analysis of IT data and observability telemetry. Ops teams can prevent failures, preserve uptime, and achieve continuous service assurance by using AIOps to manage the enormous complexity and volume of data created by their modern IT environments. AIOps has accelerated the fusion of machine learning and cloud research due to the fundamental nature of IT operations, which is strongly related to cloud development and the management of dispersed applications.

III. AIOPS IN ACTION

Setting up an effective AIOps solution needs to be carefully planned and executed. Selecting all data feeds, correlating the data, and setting up a big-data platform for learning need to be planned methodically. The critical stages for setting up an AIOps solution stack is as listed below:

1. **Data selection:** Due to the highly complex nature of application architecture and Hybrid Cloud Operations, an enormously large amount of redundant and noisy IT data is being generated. Statistics show that $80 - 90\%$ of alerts are noise, and algorithmic filtering is often required to identify actionable insights. The availability of 100% of business & IT Ops critical data is necessary for the success of AIOps solution implementation.

2. **Pattern Discovery:** To perform more complex analytics, correlation is used to identify connections between the relevant data items and aggregate them. Leveraging learnings from historical data, consuming real-time relationships from an accurate CMDB (Configuration Management Database), and identifying seasonality behavior; are to be catered as critical requirements for the AIOps solution stack. This enables you to identify outliers and anomalies that need to focus on.

3. **Inference & Anomaly detection:** Identifying the underlying causes of difficulties and recurrent problems so that you can act on what has been revealed. AIOps uses multiple AI and ML technologies to arrive at accelerated root cause analysis. One of the critical benefits of AIOps is predicting the issues in advance of occurrence, thereby minimizing the outage. Yet another focus of an AIOps solution is its ability to perform accurate root cause analysis and noise reductions.

4. **Collaboration:** Assigning issues to the right SMEs and notifying the required teams and operators via automation is one of the critical requirements of Hybrid Cloud Ops, especially in incidents that impact the business. Issue detection and assignment of the right team is often manual, which delays the whole resolution cycle. By leveraging learning from prior incidents and having the assignment groups well mapped out, the power of AI can be effectively used for faster issue resolution.

5. **Automation:** To increase the precision and speed of resolution, automate as many incidents as possible. Usage of self-healing or zero-touch automation in conjunction with AIOps methodologies for faster detection of root cause will ensure resolution within the committed Service Level Agreements.

IV. LEADING AIOPS SOLUTIONS

AIOps is a crowded marketplace. Leading technology solutions and brand-new products have filled this space beyond imagination. This is in no way an identification of the top 5 solutions but calls out vendors that appear consistently across analyst reviews and assessments.

AIOps solutions are often classified into two categories. It can either be domain-centric or domain-agnostic. In domain-centric solutions, AIOps is used for a specific domain, such as network monitoring, log monitoring, application monitoring, or log collection. You will frequently see monitoring companies make claims of AIOps, but their focus is on a single domain, giving those domains the power of AI.

Solutions that are domain-agnostic function more generally and are compatible with monitoring, logging, cloud, infrastructure, ITSM (IT service management), etc. These technologies operate on enormous amounts of IT data ingested across the ITOps spectrum and tools to provide more precise inferences and decisions.

Within the two categories, domain- agnostic solutions are recommended for complex Hybrid Cloud operations considering the usage of a "large amount of data" that is getting ingested and the pace at which data need to be processed across various groups.

Few of the industry-leading AIOps solutions are consistently featured in analyst reviews that include:

1. Splunk
2. Moogsoft
3. Datadog
4. Dynatrace
5. AppDynamics
6. PagerDuty

1. **Splunk:** Splunk is well known in the industry for its analytics and infrastructure monitoring. They have made a name for themselves as industry leaders in infrastructure monitoring, AIOps, Security Analytics, Compliance, and Log monitoring. Being a leading AIOps platform Splunk provides complete platform visibility, powerful analytics, end-to-end service management, outlier detection, and predictive management.

2. **Moogsoft:** AIOps solutions from Moogsoft are renowned for enabling teams to incident detection, availability commitment, and faster issue resolution, leading to enhanced agility, and decreased operational risks. Real-time AI algorithms of Moogsoft AIOps help IT operations and developers focus on actionable insights rather than noisy alerts. It enables centralized collaboration by allowing you to build a virtual Network Operations Center (NOC). It correlates significant warnings and combines them into scenarios that can be self-healed.

3. **Datadog:** Datadog provides end-to-end traces and monitoring of servers, databases, tools, and services and is a SaaS-based AIOps platform. Highlights of this solution include user experience, 360-degree observability, and reliability of the infrastructure it manages. It is mainly used by businesses of all sizes to automate log management, infrastructure monitoring, and application performance monitoring.

4. **Dynatrace:** Dynatrace is a leader in Application Performance Management and Cloud Monitoring. Dynatrace offers AI-based solutions to monitor and improve applications' operations, infrastructure, and user experience. The strength of the solution includes AI-based analytics. Observability and o digital performance management

5. **App Dynamics:** App Dynamics is a well-liked APM tool for managing application performance and availability in hybrid cloud computing environments. It provides complete transparency and real-time monitoring, which aid in prioritizing what's crucial so that decisions and actions may be made immediately.

6. **Pager Duty:** Pager Duty has a SaaS incident response platform focusing on automation and machine learning. In addition to the ML and AI algorithms, PagerDuty is known for ease of integration with other leading ITSM and ITOM solutions.

V. KEY BENEFITS OF AIOPS

The benefits of AIOps can be summarized across a few key points as listed below:

1. Faster detection of issues by identifying anomalies and outliers that cannot be detected by an enterprise monitoring or aggregator solution
2. Forecast key metric(s) to avoid interruptions and enhance operations effectiveness.
3. Event correlation to filter actionable insights from the super large volume of data noise
4. Accurate assessment of application health and performance using telemetry data
5. Leverage time series metrics for quicker root cause inference.
6. Predicting incident assignment group based on alert attributes and historical learning

The adoption of AIOps has accelerated among all large enterprises, and very often, these are the organizations that create an impact in the digitized economy. These organizations, in turn, drive business transformation by creating a new user experience across verticals. AIOps is one of the key drivers behind the stabilized management of Hybrid Cloud operations which in turn is resulting in the business transformation we all are experiencing.