



Driving Synergy

Unleashing the Power of
Integration Ops with AI



```
if (this.useGlobal) {  
  context = globalThis;  
} else {  
  sendInspectorCommand (session) => {  
    session.post ('/start-ins-enable');  
    session.once ('/start-ins-enable');  
    this (contextId) => {  
      context = createContext (session, contextId, {  
        post: 'create-context',  
        params: {  
          createContext:  
            createContext;  
          }  
        });  
      Array.prototype.forEach (Object.getOwnPropertyNames (globalThis), (name) => {  
        Object.defineProperty (globalThis, name, {  
          value: Object.getPrototypeOf (globalThis).prototype;  
        });  
      });  
    };  
  }  
}
```

Work Item 024
09:51:28 / 06:30:00

A progress bar with three horizontal lines, indicating a task's progress.

100%
80%
60%



Today's dynamic business landscape demands seamless integration of diverse systems and processes to ensure organizational success. The advent of Integration Ops with Artificial Intelligence (AI) has ushered in a transformative synergy that can propel businesses toward unprecedented efficiency and innovation. As ChatGPT and Bard continue to gain popularity and media attention, the general sentiment around it has been mixed with curiosity, caution, and fear. It may remind us of the fear, uncertainty, and doubt (FUD) days. However, as the algorithm improves and robust regulations and frameworks govern its usage to ensure ethical deployment, it is evident that this technology is here to stay!

This paper delves into an interesting, seemingly straightforward, and simple-to-achieve use case for Integration Services operations using AI. This study is highly relevant and significant, as it provides a practical application of AI to augment human expertise and capabilities, leading to significant efficiency and productivity gains.

The Foundation of Integration Ops

Integration Ops serves as the backbone of organizations, ensuring seamless communication and collaboration between different systems and processes. It integrates and automates the work of software development and IT operations and helps improve and shorten the operational response life cycle.

In a typical global enterprise IT world, integration services being deployed across multiple regions across the world. Often, they are deployed as containers orchestrated by Kubernetes. These Kubernetes clusters are spread around the region and further compartmentalized by the underlying namespaces as a logical grouping of the services.

From an IT Ops perspective, we often get queries, escalations around the health of a service, potential issues with a service, and disruption RCAs. These services also need to be monitored 24x7 and alerted in case of faults in real-time.

However, the response to such requests is neither proactive nor developer-friendly. Manual approaches can often be challenging due to their complexity, lack of agility, and difficulty in adapting to evolving scalability needs. For instance, if you are a developer or an L1/L2 operator responsible for the integration services in a large enterprise, accessing systems and logs can be a time-consuming process, including:



Service Request Ticket



Approvals



Email

Essentially, several productive hours are wasted!



AI as the Catalyst for Transformation



AI can act as a transformative force in Integration Ops by automating routine tasks and processes. This not only reduces manual effort but also enhances the speed and accuracy of operations. Real-world examples, such as AI-powered chatbots handling customer queries or intelligent document processing, can illustrate the tangible impact of AI in Enterprise Integration.

Here are some examples of how AI can play a pivotal role in Integration Ops:

Continuous analysis of integration service metrics in real-time

This enables the automatic detection of anomalies or deviations from normal behavior, leading to prompt identification and resolution of potential issues that could potentially impact system performance.

Facilitate root cause analysis by correlating data from various integration points

This helps in identifying the primary source of issues, facilitating the resolution process and minimizing the impact on overall performance.

Improve the accuracy of alerts by distinguishing between critical issues and routine fluctuations

This reduces the number of false alarms, helping IT teams focus on resolving genuine high-priority incidents promptly.

Predict potential failures or performance bottlenecks within integration service components

This approach enables organizations to schedule proactive interventions, reducing downtime and ensuring seamless operation of integration services.

Enhance the security of integration services by continuously learning and adapting to emerging threats

This includes identifying patterns that could indicate potential security breaches and implementing measures to mitigate risks automatically.

Empower decision-makers with an extensive understanding of integration service performance based on AI-powered insights

This helps in appropriate planning, resource allocation, and continuous improvement of integration operations.

Monitor the end-user experience across integrated systems

By analyzing user behavior and feedback, organizations can identify areas for improvement, ensuring a seamless and user-friendly experience.

Analyze historical data with ML to predict future demand patterns

This information can be used to dynamically scale integration resources, ensuring optimal performance during peak periods and cost-effective resource allocation during non-peak hours.

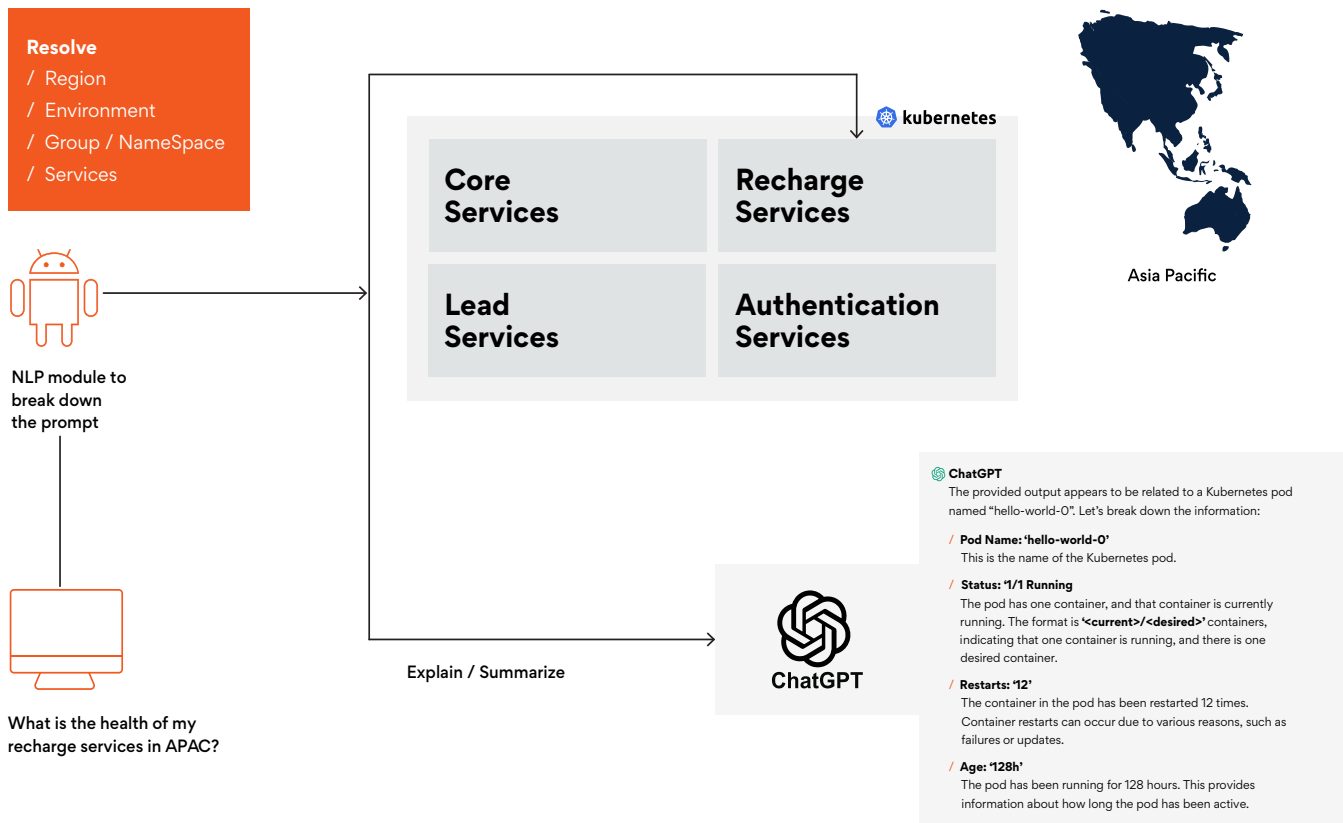
Let's now explore a practical example to demonstrate the implementation of AI for Integration Ops in action.

By utilizing API provided by AI engines such as ChatGPT and using NLP modules such as python NLTK (Natural Language Tool Kit) to break down prompts, we could easily answer questions like the following:

- / How is the health of my recharge services in APAC?
- / What are the issues in core services in North America?
- / Status of all my services in EMEA?

Here's a pictorial representation of the answer to a prompt:

What is the health of my recharge services in APAC?



The NLP module can break down the prompt and resolve it to the actual endpoint services that you are interested in knowing the health of or troubleshooting. Thus by resolving the query to the Kubernetes cluster and namespace, this custom NLTK service can now query the namespace by `kubectl` queries or `kusto` queries in the Azure AKS world, such as:

- / `kubectl config set-context int-apac-clus-prod-01`
- / `kubectl -n int-recharge-prod get pods`
- / `kubectl -n int-recharge-prod get events`
- / `kubectl -n int-recharge-prod describe pod <faulted pod>`

The output from the above queries are sent as a prompt to ChatGPT for further summarization, explanation, and detailing. ChatGPT is an expert in understanding Kubernetes output and correlating to a potential issue along with possible mitigation.

Below is an example of a failed POD and its explanations from ChatGPT.

```
$ kubectl get pods
NAME                                READY   STATUS              RESTARTS   AGE
grafana-d78b7b7bc-clbcf             1/1    Running             0          16h
loki-0                               1/1    Running             0          15h
loki-canary-6sz11                   1/1    Running             0          15h
loki-grafana-agent-operator-d7c684bf9-jt7d6  1/1    Running             0          15h
loki-logs-84htc                     2/2    Running             0          15h
promtail-798qg                      0/1    ImagePullBackOff   0          9m6s
$ █
```

When prompted ChatGPT with a question “Identify issues in following kubectl output”, followed by above output, we get the following response.


The issues in the provided Kubernetes output are:

- 1. promtail-798qg:** This pod is facing an issue (‘ErrImagePull’), indicating a problem pulling its container image. It hasn’t restarted yet and has been running for 40 seconds. The primary concern is the failure to pull the container image for the ‘promtail’ pod. Investigating and resolving the image pull issue would be necessary to bring this pod to a running state.

An AI engine like ChatGPT can help with the following aspects of intelligent operations:

Identifying issues with integration microservices deployments across enterprises	Highlighting potential problems and areas of concern
Summarizing the overall health and status of integration microservices deployments	Triaging issues to determine their severity and priority
Troubleshooting problems to identify their root causes	Mitigating issues to minimize their impact and prevent them from recurring
Monitoring integration microservices deployments proactively to detect and resolve issues quickly	

Summing it up



Leveraging AI for proactive monitoring and swift mitigation of issues in microservices deployments across the enterprise can significantly reduce the time and effort required to troubleshoot problems. This, in turn, leads to improved service quality and reduced downtime. Furthermore, implementing automation on top of this process will help escalate issues through incidents or IT requests, provide daily / weekly health-check reports, issue email alerts, and send messages using Teams or Slack channels, etc. Overall, by implementing these measures, organizations can ensure that their microservices deployments are more stable, reliable and resilient.

See Beyond, Rise Above

About Persistent

With over 23,000 employees located in 21 countries, Persistent Systems (BSE & NSE: PERSISTENT) is a global services and solutions company delivering Digital Engineering and Enterprise Modernization. As a participant of the United Nations Global Compact, Persistent is committed to aligning strategies and operations with universal principles on human rights, labor, environment, and anti-corruption, as well as take actions that advance societal goals. With 268% growth since 2020, Persistent is the fastest-growing Indian IT Services brand according to Brand Finance.

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