FORM 2

THE PATENT ACT, 1970

(39 of 1970)

AND

THE PATENTS RULES, 2003

COMPLETE SPECIFICATION

(Section 10; rule 13)

TITLE OF THE INVENTION:

Comprehensive SaaS Platform for Post-Purchase Service Management

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PREABMBLE TO THE DESCRIPTION

The following specification particularly describes the invention and the way it is to be performed.

DESCRIPTION OF INVENTION

FIELD OF INVENTION

The present invention relates to the field of Software as a Service (SaaS) platforms, specifically designed for managing post-purchase services. This encompasses the orchestration of last-mile delivery, product installations, and ongoing service management.

BACKGROUND OF THE INVENTION

In the modern marketplace, the dynamics of customer expectations and the complexity of supply chains have significantly evolved. Manufacturers, online marketplaces, and third-party sellers are continually seeking ways to enhance the post-purchase experience for their customers. However, managing post-purchase services such as last-mile delivery, product installation, and ongoing maintenance presents several challenges.

Many companies rely on disparate systems to handle different aspects of post-purchase services. Separate platforms for delivery, installation, and service management create silos of information. This fragmentation leads to inefficiencies as data must be manually transferred between systems, increasing the likelihood of errors and delays. Ineffective communication between stakeholders—manufacturers, online marketplaces, third-party sellers, service providers, and customers—can lead to significant delays and misunderstandings. For instance, a lack of real-time updates on delivery and installation status can frustrate customers and impact their satisfaction levels.

Many post-purchase service operations still rely on semi-digital or decentralized processes. Order details or ASN (Advanced Shipping Notice) details are received from manufacturers, third-party websites, or marketplaces and passed on to file/last mile vendors. These vendors manage order management, warehouse management, routing, rating engines, settlement, dispatch, tracking, invoicing, document management, claims, and event exceptions, either through different modules in one app or various custom applications. However, providing a single source of truth for data to the end customer or client in the final mile business remains a challenge. This SaaS platform will act as a bridge between clients and final mile vendors. Regardless of the

applications used by final mile vendors, they will receive order and ASN details through this SaaS portal and update all milestones to clients and customers, incoming details, and settlement details to their respective carriers via this SaaS portal, serving as a single source of truth for all parties.

The traditional approach to work order creation for any repair or service works is often manual, involving significant time and effort. This process is not only time-consuming but also prone to human errors, leading to incorrect assignments and further inefficiencies. Integrating order details, service requests, and technician dispatching into a cohesive workflow is a major hurdle. The lack of seamless integration results in disjointed operations, where information does not flow smoothly from one stage to the next, affecting overall service quality.

Many post-purchase service operations still rely heavily on paper-based or semi-digital or decentralized processes. This lack of comprehensive digitalization or decentralized systems hinders the ability to scale operations efficiently and adapt to increasing customer demands. Assigning the right technician to the right job at the right time is critical for service efficiency. Manual dispatching methods often fail to consider the specific skills required for a task, the technician's location, and their availability, leading to suboptimal service delivery. Without a unified tracking system, it is challenging to maintain a single source of truth for all service milestones. Customers and service providers alike suffer from the lack of visibility into the status of deliveries, installations, and ongoing maintenance tasks.

There is a pressing need for systems that can handle the growing volume and complexity of post-purchase services efficiently. Customers demand real-time updates and transparency throughout the post-purchase journey. Meeting these expectations is crucial for maintaining customer loyalty and satisfaction. The market requires solutions that can seamlessly integrate various aspects of post-purchase service management, reducing the operational burden on companies. Leveraging advanced technologies such as AI to automate routine tasks can significantly enhance service efficiency and accuracy.

OBJECT OF THE INVENTION

The primary object of the present invention is to provide a comprehensive SaaS platform that integrates order details and ASN (Advance Shipping Notice) details from Manufacturers, online marketplaces, and third-party sellers for last-mile delivery, product installation, and ongoing service management (based on the service request raised by customer thru Manufacturers, online marketplaces, and third-party sellers) into a single , unified system, thereby eliminating the need for multiple disparate systems.

Further the objective of the present invention is to provide a comprehensive solution for all third-party service providers involved in last-mile delivery, installations, and ongoing maintenance services. This one-stop SaaS platform offers access to detailed information from manufacturers, online marketplaces, third-party sellers, and customers, facilitating efficient management of delivery, installations, repair, and maintenance tasks. It serves all stakeholders—service providers, customers, and others—enabling seamless product lifecycle management from post-purchase through to the end of the product's life.

Further object of the present invention is to leverage generative AI for automating the creation and assignment of work orders, optimizing technician dispatch based on specific defects and requirements, and reducing manual effort and errors.

Further object of the present invention is to ensure real-time tracking and updates for all service milestones, utilizing an event-driven architecture to enhance coordination and transparency among all stakeholders.

Further object of the present invention is to integrate a generative AI chatbot with natural language processing (NLP) capabilities for capturing customer service requests and generating field service requests, thereby improving customer interaction and service accuracy.

BRIEF DESCRIPTION OF DRAWINGS

The accompanying drawings constitute a part of this specification and illustrate one or more embodiments of the invention. Preferred embodiments of the invention are described in the following with reference to the drawings, which are for the purpose of

illustrating the present preferred embodiments of the invention and not for the purpose of limiting the same.

For simplicity and clarity of illustration, the drawing figures illustrate the general manner of construction, and descriptions and details of well-known features and techniques may be omitted to avoid unnecessarily obscuring the invention. Additionally, elements in the drawing figures are not necessarily drawn to scale. For example, the dimensions of some of the elements in the figures may be exaggerated relative to other elements to help improve understanding of embodiments of the present invention. The same reference numerals in different figures denotes the same elements.

In the drawings:

Figure 1 illustrates a workflow and technical architecture of the comprehensive SaaS platform for post-purchase service management.

SUMMARY OF THE INVENTION

Embodiments of the present disclosure present technological improvements as solution to one or more of the above-mentioned technical problems recognized by the inventor in conventional practices and existing state of the art.

The present disclosure seeks to provide a comprehensive SaaS Platform for Post-Purchase Service Management.

In accordance with an aspect of the present invention, the platform integrates key aspects of post-purchase services, including last-mile delivery, product installation, and ongoing maintenance, into a unified and efficient system.

In accordance with another aspect, the present invention involves obtaining orders and ASN details from manufacturers and third-party sellers for final/last mile vendors and uses generative AI, which automates the creation and assignment of work orders for ongoing service management (repairs and services), optimizing the dispatch of technicians based on specific defects and requirements. This reduces manual effort and minimizes errors, ensuring timely and accurate service delivery.

The platform's architecture includes an API gateway that supports RESTful and GraphQL APIs, facilitating seamless data integration and real-time updates. It employs a microservices architecture, using containerization technologies like Docker and

orchestrated by Kubernetes, to manage various service aspects such as order details, ASN details, status updates, invoicing, and milestone tracking. An event-driven architecture, supported by messaging systems like Apache Kafka or RabbitMQ, ensures real-time notifications and coordination across stakeholders.

Centralized data management is achieved using relational databases such as PostgreSQL or MySQL for structured data, and NoSQL databases like MongoDB or Cassandra for unstructured data, providing a scalable and unified data repository. A generative AI chatbot with natural language processing (NLP) capabilities captures customer service requests and generates field service requests, enhancing customer interaction and service accuracy.

The platform includes robust monitoring and logging infrastructure using Prometheus, Grafana, and the ELK Stack for system monitoring, metrics visualization, and centralized logging. Mobile and web applications, developed using frameworks like React, Angular, React Native, and Flutter, ensure cross-platform compatibility and a seamless user experience.

Security is a paramount concern, with measures including OAuth 2.0, OpenID Connect for secure authentication and authorization, TLS/SSL for data encryption, and regular security audits. The platform also features advanced analytics and reporting tools, utilizing machine learning algorithms to provide insights into service performance, customer satisfaction, and operational efficiency.

The present invention supports integration with IoT devices for real-time monitoring and predictive maintenance, and includes additional features like role-based access control (RBAC), automated backup and disaster recovery, offline support for mobile applications, multilingual support, and API rate limiting. By addressing critical industry challenges, the present invention revolutionizes post-purchase service management, enhancing operational efficiency, customer satisfaction, and overall service quality.

While the invention has been described with reference to specific embodiments, various modifications and alterations can be made without departing from the scope of the invention, as defined by the appended claims.

The objects and the advantages of the invention are achieved by the process elaborated in the present disclosure.

DETAILED DESCRIPTION OF THE INVENTION

The following detailed description illustrates embodiments of the present disclosure and ways in which the disclosed embodiments can be implemented. Although some modes of carrying out the present disclosure have been disclosed, those skilled in the art would recognize that other embodiments for carrying out or practicing the present disclosure are also possible.

Order and ASN (Advanced Shipping Notice) details from manufacturers, third-party websites, or marketplaces are passed on to last-mile vendors. These vendors handle various tasks such as order management, warehouse management, routing, dispatch, tracking, invoicing, and claims through different modules or custom applications. However, providing a single source of truth for data to the end customer or client remains a challenge. The present invention acts as a bridge between clients and last-mile vendors. Regardless of the applications used by the vendors, they will receive order and ASN details through this portal and vendors (Last mile, carriers, repair, and field service vendors) will update all milestones and processed details into the SaaS platform, this ensures a single source of truth for all parties involved.

The present invention describes a comprehensive Software as a Service (SaaS) platform designed to integrate and streamline post-purchase service management. The platform also aims to integrate ongoing service management (repairs and services) into a single, unified system. When the end customer raises an issue requiring repair or service for a specific product, a field ticket is created. The assignment of technicians, management of technicians, and inventory management related to repair or service parts can be handled by any internal service management platform. However, vendors will receive service or field orders from this SaaS platform and will update the status of events within this platform. The manufacturer of the product will be connected to this SaaS platform to monitor the status of all events.

The present invention describes a comprehensive Software as a Service (SaaS) platform designed to integrate and streamline post-purchase service management. The platform aims to transform the current fragmented and inefficient processes into a cohesive and efficient workflow. The present invention integrates last-mile delivery, product installation, and ongoing service management (repairs & services) into a single, unified

platform. This integration eliminates the need for multiple systems, ensuring a seamless flow of information and reducing the complexity of managing post-purchase services.

The platform leverages generative AI to automate the creation and assignment of work orders. This automation reduces manual effort, minimizes errors, and ensures that the right tasks are assigned to the right technicians based on specific defects and requirements. By integrating order details from manufacturers and third-party sellers in real-time, the present invention provides a single source of truth for all stakeholders. Real-time data flow ensures timely updates and coordination, enhancing transparency and customer trust. The AI models are deployed on advanced frameworks such as TensorFlow or PyTorch, trained on extensive historical service data to predict optimal work order assignments. This automation significantly reduces manual effort, minimizes errors, and ensures that the right tasks are assigned to the right technicians based on specific defects and requirements.

The present invention tracks all service milestones and provides real-time updates. The platform digitalizes vendor operations, transforming manual processes into efficient digital workflows. This digitalization improves operational efficiency and scalability. The platform's AI-driven dispatch system ensures that technicians are assigned tasks based on their skills, location, and availability, optimizing service delivery and reducing response times.

In the description, Figure 1 describes the workflow and technical architecture of the present invention, detailing the interactions and data flows between different components involved in managing post-purchase services. This comprehensive SaaS platform integrates various processes, such as order management, delivery tracking, service request handling, and technician dispatch, into a unified system. The following detailed description outlines each key component of the system, highlighting the technological architecture and functionalities that ensure a seamless, efficient, and scalable service management platform.

Order Details (101 and 201)

The process begins with order details being received from manufacturers, e-commerce sites, or third-party sellers. These details are managed by specific microservices within the present system, ensuring scalability and easy maintenance. The API Gateway

facilitates incoming requests and routes them to appropriate microservices, while RESTful and GraphQL APIs enable efficient data retrieval and updates. An event-driven architecture ensures real-time updates and notifications, enhancing data flow and real-time communication between the manufacturer, InstaService Hub, and the last-mile vendor. Real-time data streaming technologies like Apache Kafka or RabbitMQ are utilized to support these data flows, with centralized data management ensuring consistent and accurate data handling.

ASN Details (102 and 202)

Advanced Shipping Notice (ASN) details are managed similarly to order details, with microservices handling each detail to ensure scalability and maintainability. The API Gateway manages incoming ASN details, and RESTful and GraphQL APIs facilitate efficient data interactions. The event-driven architecture and real-time data streaming support timely updates and status notifications between all stakeholders. The present invention serves as a central repository for ASN details, ensuring accuracy and consistency.

Final Last-Mile Milestone (103 and 203)

This component tracks the milestones of the final mile delivery, providing real-time updates from the final mile vendor. Using event-driven architecture and real-time data streaming, the present invention ensures accurate status information and timely updates. Centralized data management consolidates milestone data, enhancing the tracking of delivery progress and improving transparency and coordination among all parties involved.

Invoice Details (104 and 204)

Invoicing details are managed by dedicated microservices, ensuring scalability and easy maintenance. The API Gateway manages incoming requests for invoicing details, while RESTful and GraphQL APIs provide efficient data interactions. The event-driven architecture supports real-time updates and notifications, facilitating smooth data flow between e-commerce platforms, third-party sellers, manufacturers, and claimed platform. Centralized data management ensures consistent and accurate handling of invoicing details.

Field Service Request (105 and 205)

Customer service requests are captured by a generative AI chatbot, which generates field service requests in real-time. The event-driven architecture triggers the creation of service requests upon issue reporting by customers. The API Gateway manages incoming service requests and routes them to appropriate services for processing, ensuring efficient handling and quick response times.

Generative AI for Work Order Creation (106 and 206)

Generative AI, utilizing frameworks like TensorFlow or PyTorch, creates work orders based on customer requests. The AI chatbot interacts with customers to generate work orders efficiently, and RESTful and GraphQL APIs facilitate communication between the AI models and other services within claimed platform.

Work Order Assignment (107 and 207)

AI and machine learning algorithms assign work orders to appropriate technicians based on specific requirements and defect reports. The microservices architecture ensures that each work order assignment process is handled independently, with the API Gateway routing assignment requests to the appropriate microservice.

Technician Dispatch (108 and 208)

The dispatching of technicians to customer locations is managed by a dedicated microservice. Real-time data streaming provides updates on technician status and location, while mobile and web applications offer real-time updates to technicians and dispatchers, ensuring efficient coordination and timely service.

Service Execution (109 and 209)

Technicians use mobile and web applications to follow specified workflows and utilize the required materials for service execution. The microservices architecture manages these processes independently, with the API Gateway ensuring seamless interaction between the mobile applications and backend services.

Service Completion (110 and 210)

Upon completion of the service, technicians update the status through user-friendly mobile and web applications. RESTful and GraphQL APIs ensure that these updates are accessible to all relevant parties, with each completion update managed independently by the microservices architecture for scalability.

Customer Feedback (111 and 211)

Customer feedback is collected efficiently by a generative AI chatbot. The feedback collection and processing are managed by specific microservices, with the API Gateway routing feedback data to the appropriate service for processing, ensuring continuous improvement of service quality.

Final Invoice and Reporting (112 and 212)

The generation of final invoices and service reports is handled by dedicated microservices. RESTful and GraphQL APIs ensure that final invoices and reports are shared with manufacturers, third-party sellers, or e-commerce platforms. Cloud services provide a scalable infrastructure for handling invoicing and reporting processes.

Ongoing Maintenance and Support (113 and 213)

IoT integration enables real-time monitoring and diagnostics for ongoing maintenance. The event-driven architecture facilitates proactive maintenance and support through real-time data collection and updates. Real-time data streaming ensures continuous monitoring and immediate alerts for maintenance needs, enhancing the efficiency and reliability of post-purchase service management.

Data Analytics and Improvement (114 and 214)

AI and machine learning analyze data from the entire service process to identify areas for continuous improvement. Monitoring and logging tools like Prometheus, Grafana, and the ELK Stack are used to monitor system performance and gather insights. Database management systems store and manage the data required for analytics and reporting, ensuring informed decision-making and ongoing service optimization.

The platform's architecture features an API gateway that manages incoming requests and routes them to appropriate microservices within the system. The API gateway supports both RESTful and GraphQL APIs, facilitating efficient data retrieval and updates. This architecture decomposes data management into specific microservices responsible for handling order details, advanced shipment notice (ASN) details, status updates, invoicing details, and milestone tracking. Each microservice is deployed using

containerization technologies such as Docker and orchestrated using Kubernetes, ensuring scalability and resilience.

The present invention employs an event-driven architecture, utilizing messaging systems to ensure real-time updates and notifications across all stakeholders. This setup guarantees timely coordination and enhances transparency throughout the service lifecycle. Centralized data management is implemented using relational databases like PostgreSQL or MySQL for structured data, and NoSQL databases like MongoDB or Cassandra for unstructured data, providing a unified and scalable data repository.

A standout feature of the platform is its generative AI chatbot, integrated with natural language processing (NLP) capabilities. This chatbot captures customer service requests and generates field service requests, streamlining the interaction process and ensuring accurate service delivery. Additionally, the present invention includes robust monitoring and logging infrastructure. Tools like Prometheus for system monitoring, Grafana for visualization of metrics, and the ELK Stack (Elasticsearch, Logstash, Kibana) for centralized logging and analysis are used to maintain operational integrity and performance.

To enhance user experience, the platform offers mobile and web applications developed using modern frameworks such as React or Angular for web applications and React Native or Flutter for mobile applications. These applications ensure cross-platform compatibility and provide a seamless user experience. The platform implements OAuth 2.0 and OpenID Connect for secure authentication and authorization, data encryption using TLS/SSL for secure data transmission, and conducts regular security audits and vulnerability assessments to ensure platform integrity and security.

The generative AI system for work order automation includes a scheduler module that optimizes work order assignments by considering technician availability, skill sets, geographic location, and current workload. This intelligent dispatch system enhances service efficiency and reduces response times. Real-time tracking and updates for delivery and service milestones are achieved using WebSockets or Server-Sent Events (SSE), ensuring that all stakeholders receive timely and accurate status information.

The present invention also focuses on the digitalization of vendor operations through the use of containerization and microservices, enabling efficient digital workflows and improving operational efficiency and scalability. The platform's architecture supports integration with Internet of Things (IoT) devices for real-time monitoring and predictive maintenance of products, further enhancing its capabilities.

Advanced analytics and reporting tools are integrated into the platform, utilizing machine learning algorithms to provide insights into service performance, customer satisfaction, and operational efficiency. These tools enable data-driven decision-making and continuous improvement of service quality.

Additional features of the platform include API rate limiting and request throttling to ensure optimal performance and reliability, event sourcing to maintain a detailed history of all events and changes within the system, fault tolerance mechanisms such as circuit breakers and retries to enhance system resilience, and role-based access control (RBAC) for managing user permissions securely.

Moreover, the monitoring and logging infrastructure includes automated alerting and incident response capabilities to ensure prompt resolution of system issues. The mobile and web applications feature offline support and data synchronization to ensure usability in environments with limited or intermittent internet connectivity. The centralized data management system incorporates data partitioning and sharding techniques to enhance performance and scalability. The generative AI chatbot includes multilingual support to cater to a diverse user base. Lastly, the platform encompasses an automated backup and disaster recovery system to ensure data integrity and business continuity.

By integrating these advanced technical specifications, the present invention provides a revolutionary solution for post-purchase service management. It enhances operational efficiency, customer satisfaction, and overall service quality, setting a new standard in the industry.

CLAIMS:

We Claim:

1. A comprehensive SaaS platform for post-purchase service management, comprising:
   - a unified platform integrating last-mile delivery, product installations, and ongoing service management;
   - a generative AI system utilizing AI models deployed on frameworks such as TensorFlow or PyTorch for automatically creating and assigning work orders based on specific defects and requirements;
   - an API gateway that manages incoming requests and routes them to appropriate microservices within the platform, supporting both RESTful and GraphQL APIs for efficient data retrieval and updates;
   - a microservices architecture decomposing data management into specific services for handling order details, advanced shipment notice (ASN) details, status updates, invoicing details, and milestone tracking, each microservice being deployed using containerization technologies such as Docker and orchestrated using Kubernetes;
   - an event-driven architecture utilizing messaging systems such as Apache Kafka or RabbitMQ to ensure real-time updates and notifications across all stakeholders;
   - centralized data management implemented using PostgreSQL or MySQL for relational data and MongoDB or Cassandra for NoSQL data, providing a unified and scalable data repository;
   - a generative AI chatbot integrated with natural language processing (NLP) capabilities for capturing customer service requests and generating field service requests;
   - monitoring and logging infrastructure including Prometheus for system monitoring, Grafana for visualization of metrics, and the ELK Stack (Elasticsearch, Logstash, Kibana) for centralized logging and analysis;
   - mobile and web applications developed using frameworks such as React or Angular for web applications and React Native or Flutter for mobile

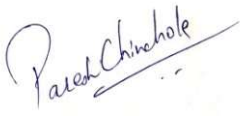
applications, ensuring cross-platform compatibility and a seamless user experience;

- security measures including implementing OAuth 2.0 and OpenID Connect for secure authentication and authorization, data encryption using TLS/SSL for secure data transmission, and conducting regular security audits and vulnerability assessments to ensure platform integrity and security;
- real-time data streaming utilizing Apache Kafka or RabbitMQ to facilitate real-time data flow between InstaService Hub and the final mile vendor;
- AI and machine learning models for analyzing data from the entire process to ensure continuous improvement and proactive maintenance.

2. The platform as claimed in Claim 1, wherein the generative AI system for work order automation includes a scheduler module that considers technician availability, skill sets, geographic location, and current workload to optimize work order assignments.
3. The platform as claimed in Claim 1, further comprising real-time tracking and updates for delivery and service milestones using WebSockets or Server-Sent Events (SSE) to ensure that all stakeholders receive timely and accurate status information.
4. The platform as claimed in Claim 1, wherein vendor operations are digitalized through the use of containerization and microservices, enabling efficient digital workflows and improving operational efficiency and scalability.
5. The platform as claimed in Claim 1, wherein the platform's architecture includes support for integration with Internet of Things (IoT) devices for real-time monitoring and predictive maintenance of products.
6. The platform as claimed in Claim 1, further comprising advanced analytics and reporting tools that utilize machine learning algorithms to provide insights into service performance, customer satisfaction, and operational efficiency.
7. The platform as claimed in Claim 1, wherein the API gateway supports API rate limiting and request throttling to ensure optimal performance and reliability.
8. The platform as claimed in Claim 1, wherein the event-driven architecture supports event sourcing to maintain a detailed history of all events and changes within the system.

9. The platform as claimed in Claim 1, wherein the microservices architecture includes fault tolerance mechanisms such as circuit breakers and retries to enhance system resilience and reliability.
10. The platform as claimed in Claim 1, further comprising a role-based access control (RBAC) system for managing user permissions and ensuring secure access to platform features and data.
11. The platform as claimed in Claim 1, wherein the monitoring and logging infrastructure includes automated alerting and incident response capabilities to ensure prompt resolution of system issues.
12. The platform as claimed in Claim 1, wherein the mobile and web applications include offline support and data synchronization features to ensure usability in environments with limited or intermittent internet connectivity.
13. The platform as claimed in Claim 1, wherein the centralized data management system includes data partitioning and sharding techniques to enhance performance and scalability.
14. The platform as claimed in Claim 1, wherein the generative AI chatbot includes multilingual support to cater to a diverse user base.
15. The platform as claimed in Claim 1, further comprising an automated backup and disaster recovery system to ensure data integrity and business continuity.

Dated this: 14th June, 2024



Sign:

Name of the Signatory: Mr. Paresh Ravindra Chinchole

Patent Agent Code: IN/PA-3052

ABSTRACT:

Title of the Invention:

Comprehensive SaaS Platform for Post-Purchase Service Management

The present invention discloses a comprehensive SaaS Platform for Post-Purchase Service Management designed to streamline post-purchase service management for manufacturers and third-party sellers. It integrates last-mile delivery, product installations, and ongoing service management into a unified system. It involves obtaining orders and ASN details from manufacturers and third-party sellers for final/last mile vendors and leveraging generative AI, the platform automates the creation and assignment of work orders for ongoing service management, optimizing technician dispatch based on specific defects and requirements. The architecture includes an API gateway, microservices, event-driven systems, and centralized data management for efficient and scalable operations. Real-time tracking, advanced analytics, and robust security measures ensure transparency, reliability, and data integrity. Additionally, the platform features a generative AI chatbot, mobile and web applications, and supports integration with IoT devices for real-time monitoring and predictive maintenance.

Figure of Abstract:

Figure 1