Managing work orders for automotive maintenance activities

Sparks AS is a company providing automotive maintenance activities.

Entities

Within Sparks, the order management system maintains information related to maintenance activities. The *order management system* interacts with the following parties:

- *The customer:* customers may interact directly with the order management system for the purpose of tracking a maintenance activity (also called a "work order").
- *Clerks* in the customer service department as well as team leaders in the repairs department have access to the order management system for the purpose of creating, viewing and updating work orders.
- *The warehouse management system:* the order management system may interact with the warehouse management system to check for the availability of parts that are needed in a work order and to order such parts. Employees in the warehouse also interact with this system to check stock levels and order new parts (especially for commonly-used parts). The system also maintains information about the prices of the parts available in the warehouse.
- *The reseller's catalogue:* the order management system may interact with a catalogue provided by a certified reseller to order parts that are required in a work order and not available in the warehouse. The catalogues of the certified resellers are available online, some as web applications (with HTML front-end) others as Web services (XML).
- *The garage booking system:* the order management system interacts with the garage booking system to book a service bay and a mechanic to perform the required work. Mechanics have access to the garage booking system.
- *Insurance information system:* a customer's vehicle may be insured in which case repairs need to be billed to the insurer. The insurance information system maintains information of insurance details of customers.

Business Process

The ordering business process starts with the receipt of a request for work order from a customer. It finishes when either the order management system schedules an appointment with the customer or the customer rejects the quote for work order.

Upon the receipt of a request for work order, the order management system estimates the requirements for supplies, parts and labour and prepares a quote with the estimated total cost for the maintenance activity. If the customer's vehicle is insured, the order management system communicates with the insurance information system to retrieve the details of the customer's insurance plan. Depending on the plan, the customer's insurance may cover for the full maintenance costs or a contribution may be required from the customer and this needs to be taken into account to prepare a quote.

The order management system then sends the quote to the customer, who can either accept or reject the quote by notifying the order management system. If the customer accepts the quote, the order management system contacts the warehouse management system to check if the required parts are in stock before scheduling an appointment with the customer. If some parts are not in stock, the order management system notifies the customer who can decide whether to obtain the parts by themselves, or to order them through Sparks. In both cases, the customer communicates their decision to the customer service department. If the customer decides that Sparks has to provide for the required parts, the customer service department orders the required parts by interacting with the catalogue of a certified reseller.

Once all required parts are in stock or have been ordered, the order management system schedules an appointment with the customer to bring their vehicle in and interacts with the garage booking system to book a suitably-equipped service bay and a suitably-qualified mechanic to perform the work. Finally, a confirmation of the appointment is sent to the customer directly from the garage booking system.

Technical details

- Customers can place orders either via Java EE web application deployed on IBM WebSphere or via phone call to a back-office clerk who uses a C++ desktop application to lodge the order. Clients can then track the progress of the order through the Java EE web application. Clerks can also track order through their C++ desktop application or through the Web application. Clerks can also to update existing orders through their desktop application, but there is no way of modifying orders through the Web application.
- Warehouse management system is a product bough from an external vendor who is now bankrupt. System has got only DCOM interface for different operations. IT-department claims that the system is written in C++, but as they seem to be missing the source code you are not sure about it.
- The insurance department is using an application built on top of the MS Access database to maintain information about customer's insurance policy. This application can be integrated with CSV import/export only. Also, when a new customer is registered, his/her insurance policy details need to be entered into the insurance information system and verified with the corresponding insurer. Usually this verification is done by phone, but two of the major insurers provide a system to check the insurances online.
- The garage booking system is built in-house as a Python application using Oracle 10g Enterprise Edition RDBMS.
- Communication with external systems (insurer's policy verification system, reseller's catalogue) is implemented via HTTPS connections. Each external system has its own data format specified.
- Reseller catalogue information is downloaded once a week from the reseller's site and copied into a local MSSQL database for searching
- All systems have implemented their own concept of a user and authentication
- Garage booking system and insurance department share the concept of a customer, all other systems have implemented their own concept. When a customer is missing from a system it is created manually for each system.