# *The Statement of a Movie/Game DVD Rental System*

A new video store offers rentals of movie/game DVDs to the wider public. Its suppliers provide DVD ordering web services so that the store can use the web services to search and order movie/game DVDs online via internet. In order to run the business more efficiently, the store lets a software company develop a new movie/game DVD rental system for the store with integration with suppliers’ web services.

The new system is to store 1,500 movie/game DVDs initially and then will be extended with additional DVDs in future. The DVD inventory has already been ordered from suppliers who are generally able to supply movie/game DVDs within one week from the order date. But the price is changed day by day. Each supplier provides its own DVD ordering web service that receives requests (e.g. get current price of DVDs) from clients and then returns data values as requested (e.g. current price of DVDs) to the clients. Such web services normally provide a list of service endpoints (methods/API) that clients can find from the web service inventory on internet. “GetNewDVDCatelogue()”, “GetDVDPrice(DVDCode,DVDTitle)” and “ ” are three popular service methods of such web services. Once a request (method call) is received from the movie/game DVD rental system, “GetNewCatelogue()” returns a copy of current DVD catalogue and “GetDVDPrice(DVDCode, DVDTitle)” returns the current price of a DVD to the system as the response to the request. “OrderDVD(OrderForm)” processes the received order form and then returns the result of the order to the system as the response to the ordering DVD request. Therefore, the new system has to interact with suppliers’ DVD orderting web services dynamically via internet as shown in the following diagram:

Suppliers’ DVD ordering web services on the suppliers’web server

movie/game DVD Rental System on the video store’s machine

internet

The movie/game DVD Rental system itself will store all DVD order forms that have been sent out so that the store manager can check the result of orders.

The system will store suppliers’ contact information including their name, address, phone number, and email address. It will support the store manager to use suppliers’ DVD ordering web service to fill and submit DVD order forms online with an order number, order date, store name, store address and store email address.

Ordering web services allow the video store to order multiple DVDs as well as multiple copies of one DVD using an online DVD order form. Each ordered DVD is added on the order form as one order line that shows the title of the DVD, the number of copies ordered, the selling price of the DVD and the line subtotal. As long as a DVD order form is received by the ordering web service, “OrderDVD(OrderForm)” starts to process the order and returns the result to the movie/game DVD rental system. Then the system will add the result on the stored order form.

The store wants the new system to be connected with a scanning machine as an integrated system. So that the store clerk can use the machine to scan DVDs for processing DVD rentals and returns with the system. To support this facility, new arrived DVDs will be barcoded firstly before being put on the store shelves. The information of all DVDs will be stored in the system including their barcode, title, producer, selling price, rental price and the number of copies for each DVD. A DVD can have multiple copies in the store so that different cutomers can rent the same DVD in the same period. Each copy is recorded in the system with its copy number and current status value that is either ‘out’ or ‘in’.

The system will record the customer contact including customer name, home address, telephone number and email address. The store will notify customers new arrived DVDs or remind to return overdue DVDs via this contact.

When a customer comes in the store, the customer either picks up DVDs from the store shelves and take them to a store clerk, or get reserved DVDs from a clerk. The clerk uses the system to issue them by clicking the RENTAL button on the computer screen to get an online blank rental form opened on the screen. Then the clerk fills the form with a form number, issue date and return date (30 days from the issue date), customer name, home address, phone number and email address. Then the clerk uses the scanning machine to scan DVDs one by one. For each scan, the system validates the scanned barcode with stored barcodes. If a scanned barcode does not match any of stored barcodes, the system rejects the DVD. Otherwise, the system will add a rental line on the rental form that shows the barcode, title and rental price of the scanned DVD. Also the system adds the rental price of the scanned DVD to the total rental cost on the rental form. If the customer rents multiple DVDs, this scanning process is repeated till all of DVDs have been scanned. Then the clerk tells the customer the total rental cost to be paid.

The customer can pay the total rental cost by either cash or a bank card. If the bank card is used first time, the clerk clicks the Bank Card button to record the bank card with the card number, bank name and expire date in the system. This helps the customer to use the same bank card for future rentals. The clerk processes the payment manually without using the system. If the payment is invalid, the clerk rejects the rental and clicks the Cancel Button to cancel the rental form. Otherwise, the clerk clicks the COMPLETE button so that the system can update the status value of each of rented DVDs with “out”. Then the system will show the message “this rental is completed successfully” on the screen. In addition, the system adds the clerk’s staff number to the rental form record for an auditing purpose.

Rented DVDs are normally returned to the store by the return date. The system will provide a RETURN button for processing DVD returns. When a clerk receives returned DVDs from a customer, the clerk clicks the RETURN button to start scanning returned DVDs one by one. For each scan, the system needs to check the scanned barcode against stored barcodes. If scanned barcode does not match any of stored barcodes, the system will reject the DVD. Otherwise, the system will update the status value of the DVD with “in”. The system also searches overdue DVDs every day and notifies the store to contact the customers who should return DVDs immediately.

The store allows customers to reserve a DVD that either has not been returned or are on order. Customers need to pay a deposit for each reservation. But they are allowed to cancel the reservation and get the refund of the deposit. When a reserved DVD is returned by a customer or delivered by a supplier, the store will contact the customer on the top of the reservation list.

The store expects a lot of enquiries from customers as well as staff, e.g. availability of a DVD (in stock or on order) and how many copies of a DVD are available for rental currently. The system needs to response to such enquiries immediately.

1. A UML state diagram showing the business context for the major parties of the video store and documents that the parties exchange. (10)
2. A UML activity diagram with horizontal swimlanes showing the high-level business process model of the video store. (10)
3. A UML use case diagram showing the functionality of the Movie/Game DVD rental system. (10)
4. A UML activity diagram with vertical swimlanes showing the scenario of the use case “Rent DVDs” included in the created use case diagram in 3. (10)
5. A UML class diagram showing the information model of the Movie/Game DVD rental system. (10)
6. A service interaction diagram (drawn in a UML class diagram) showing service interactions meant by the UML activity diagram created for 4. (10)
7. A service interface diagram (drawn in a UML class diagram) showing the service” definition meant by the UML activity diagram created for 4. (10)