OBJECT ORIENTATED CONSTRUCTS AND SYSTEM ANALYSIS & DESIGN

Planning and Implementing an Object-Oriented Software System

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How we divided the tasks...

We attempted to divide each task into halves, but in actuality every task completed was a collaboration. For example, the initial division of the UML Use Cases divided it into roughly two diagrams each, however after the first rough draft, we reviewed with each other and made changes based on how we believed they could improve until we were satisfied. This was the same for the requirements list where we both came up with our list individually, then came together to merge our lists and polish it. The class diagram was drawn by Andressa through both of our input.

SAAD

Problem Definition

<div align="center">Client: Extra-vision Vending Limited</div>

Our Extra-vision system is designed to simplify the movie rental process by eliminating the need for onsite employees and a large, expensive building. By stationing kiosks in convenient locations such as grocery stores, shopping centres and other high-traffic locations, the user-friendly system puts the responsibility on the customer for the rent and return process.

Objectives of new system

- To provide a convenient movie rental system in grocery stores and shopping centres
- To provide an efficient and speedy rent and return movie process
- To simplify the movie selection process by having all available titles on a digital display
- To safely and confidentially record credit/debit card details according to data protection policies

Scope of new system

- The project will encompass the following areas of the business:
- The rent procedures
- Return procedures
- Validating movies available
- Payment procedures
- Optional marketing via email to customers
- This project will not cover printable receipts, restocking movies or adding new movies.

Requirement List

1. Offer two options on the home screen to rent a movie or movies and to return a movie or movies.
2. Store movies available with their serial codes, names, descriptions, length, rating, genre, and their quantities in the database.
3. Display verification prompt after 30 seconds of inactivity to verify customer is still present, and end transaction if verification isn't provided.

Renting a Movie

4. Display to the user the movies available for rent, but not the ones unavailable or at least show that they aren't selectable
5. Allow a first customer to select up to 2 movies for first rental, but no more while allowing a recurring customer to select up to 4 movies, but no more.
6. Only allow a user to select one movie from each title available.
7. Display information about the movie when selected.
8. Allow the user to add selection to cart or to cancel, then return to available movie selection.
9. Store movie(s) selected in a cart, calculate the total cost for movies and store value in cart.
10. Proceed to shopping cart when option is selected to view list of movies selected and the total as well as offer a textbox for the user to insert promotional codes.
11. Verify promotional code added is valid and inform user if successful or not.
12. Calculate new total with promotional code applied if added and adjust total on display.
13. Allow user to remove items from cart, return to shopping or to proceed with checkout.
14. Display Terms & Conditions Agreement form and prevent user from proceeding until agreed option is selected.
15. Display prompt for user to insert debit/credit card to initialise checkout.
16. Do not allow other cards to be processed and reject immediately.
17. Process users card information, checking details with database to verify if user is a first customer or recurring.
18. Display prompt for user to enter card pin number if debit card is inserted.
19. Encrypt card number and pin (if used) to ensure privacy and security of personal information.
20. Store only the encrypted card number and pin (if used) in database.
21. Inform user no physical receipt will print and offer email input to send a digital one to their email if requested.

22. Offer marketing option to be linked with email to send future promotions and updates.
23. Store email in separate table in database from card details.
24. End transaction, empty cart and return to home screen.

Returning Movie

25. Display instructions for proper insertion of disc with customer service details if needed.
26. Check magnetic strip (serial #) on disc to verify disc is one rented from this system by verifying it is in the database.
27. Reject movie if not one from system.
28. If movie is from the system, check the return date and compare with the last rental date. If it is within the 10-day maximum period, calculate total cost by day rate and store in final charges. If it past the 10-day period, reject the disc and inform user they have already been charged the maximum 15 Euro and get to keep the movie.
29. Accept and store movie once verified was rented and within rentable period and adjust database count.
30. Allow another disc to be inserted, until user selects finish option to proceed to billing.
31. Calculate the total cost of rental for all inserted discs minus the initial day rate charge.
32. Display information of successful return and total cost along with each line-item charge including a text box for the user to optionally add their email address for a digital copy of the final bill.

Additional Requirements (Non-Functional, Data, etc)

33. Each movie costs 2.99 Euro for first day (Processed when rented).
34. Movie must be returned before 8 PM next day, otherwise considered late.
35. Late Charge of 1.50 Euro per day (with a maximum of 10 days = 15 Euro) applied and processed at return of disc.
36. If later than 10 days, disc is no longer returnable and final charge of 15 Euro is processed.
37. First Transaction has rental limit of 2 discs.
    a. Limit of 4 discs applies after that
38. No Login/Membership, but email is optional for receiving receipts and/or marketing/promotions.
    a. Email stored only for marketing/promotional purposes
    b. Email can be entered at rental/return confirmation screen
39. If user enters FREE123 Promotional Code at Checkout of first transaction, the value of one disc will be deducted from initial charge.

      a. Pop up message alerting user if code is not applicable after inserting card details and giving option to continue without promotional discount or cancel transaction

40. Credit Card details are encrypted and stored in database.

The system must:

41. be user-friendly and self-explanatory.
42. display text so it is easily readable for accessibility.
43. keep movies offered consistent amongst kiosks.
44. transition from one window to another quickly with a maximum lag of 5 seconds.
45. operate 24/7 with high availability of 99%.
46. store the card number in an INTEGER with a set parameter of 16 digits.
47. store the pin for the card if it is a debit card in an INTEGER with a set parameter of 4 digits.
48. hash and salt the card number and pin if used with MD5.
49. store movie information such as title & description as a String /VARCHAR with a limit of 60 and 500 characters.
50. store the movie's release year and runtime as an INTEGER.
51. store emails provided if marketing was requested as a STRING/VARCHAR with a max of 30 characters.
52. store the unique ID of each disc as an INTEGER for the purpose of tracking movies rented and preventing unrented movies from being inserted into the machines.
53. store a movie title's availability as a BOOLEAN.
54. store date of rental as an INTEGER/DATE.
55. Store charge of rental as a DOUBLE.
56. Store days rented as an INTEGER with a maximum value of 7.

Use Case 1 – Rents 2 movies and uses coupon code
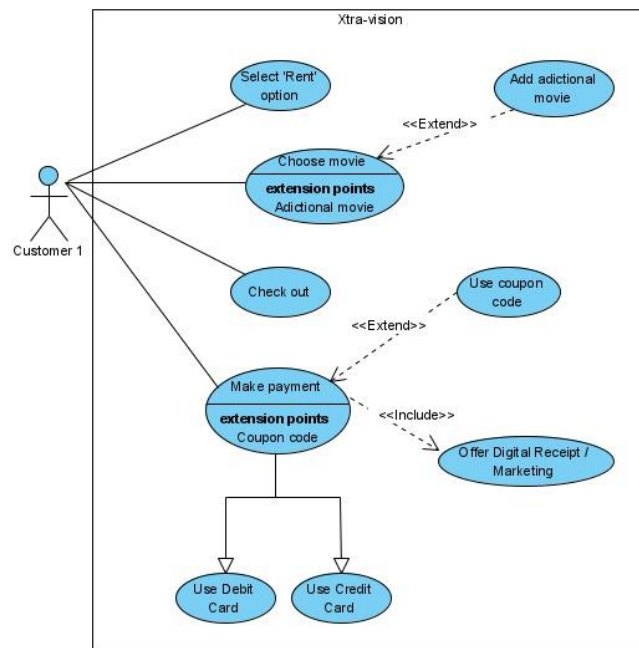
- Customer 1 is a new customer. They approach the kiosk and select the 'Rent' option on the home-screen menu.
- The kiosk displays the movie selection available.
- Customer 1 selects "The Princess Bride".
- The kiosk displays the information about the movie.
- Customer 1 adds to cart.
- The kiosk gives the option to continue shopping or checkout.
- Customer 1 select continue shopping.
- The kiosk displays the movie selection available again.
- Customer 1 selects "The Joker".
- The kiosk displays the information about the movie.
- Customer 1 adds to cart.
- The kiosk gives the option to continue shopping or checkout.
- Customer 1 selects checkout.
- The kiosk displays the movies selected and the price for the day rental for each (2.99), the total (5.98), and includes an optional coupon code entry box. At the bottom the Terms & Conditions is listed.
- Customer 1 inserts new user coupon code "FREE123".
- The discounted amount is shown (2.99) and the total price adjusted (2.99).
- Customer 1 selects checkout.
- The kiosk prompt customer to insert credit/debit card and customer 2 inserts their credit card.
- The system verifies the card being used is new to the system and finds this to be true.
- Payment is processed successfully.

- The kiosk displays a confirmation and includes an option to insert an email address to receive a digital receipt is given along with the option to receive promotional offers from Extra-vision.
- Customer 1 doesn't input or choose either and instead selects Finish.
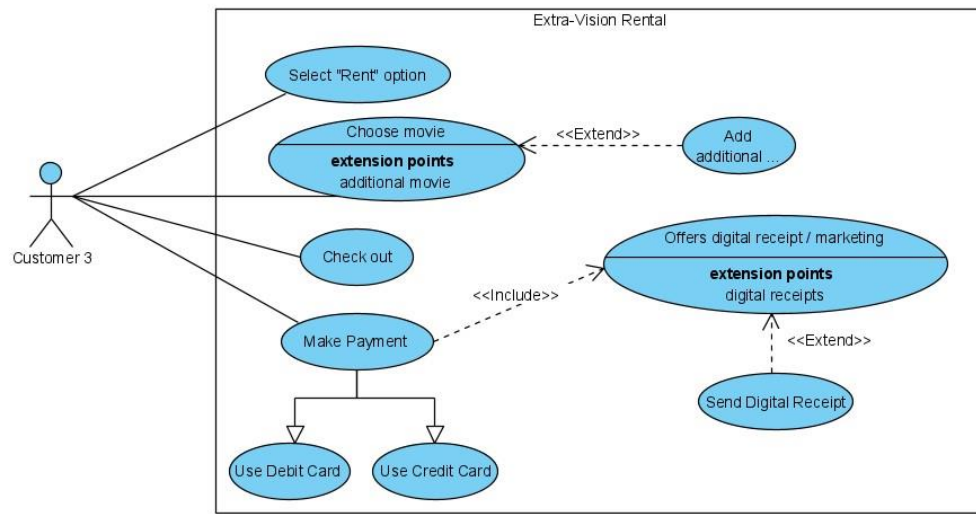- Transaction ends.

Use Case 2 – Rents 1 movie
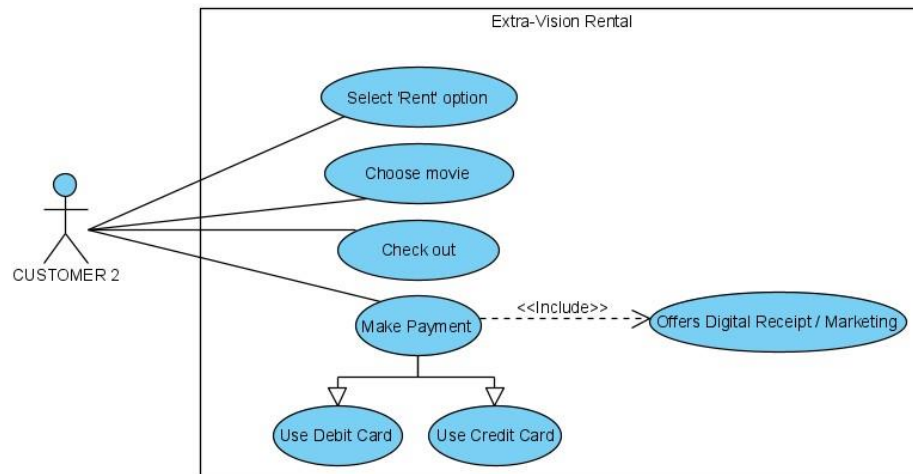
- Customer 2 is a returning customer. They approach the kiosk and select the 'Rent' option on the home-screen menu.
- The kiosk displays the movie selection available.
- Customer 2 selects "Iron Man 2".
- The kiosk displays the information about the movie.
- Customer 2 adds to cart.
- Customer 2 is then given the option to continue shopping or checkout.
- They select checkout.
- The kiosk displays the movie selected and the price for the day rental (2.99) and includes an optional coupon code entry box. At the bottom the Terms & Conditions is listed.
- Customer 2 selects checkout button again without inputting coupon code.
- The kiosk prompt customer to insert credit/debit card.
- Customer 2 inserts their debit card.
- The kiosk prompts customer input pin.
- Customer 2 inserts their pin.
- Payment is processed successfully.
- The kiosk displays a confirmation and includes an option to insert an email address to receive a digital receipt is given along with the option to receive promotional offers from Extra-vision.
- Customer 2 doesn't input or choose either and instead selects Finish.
- Transaction ends.

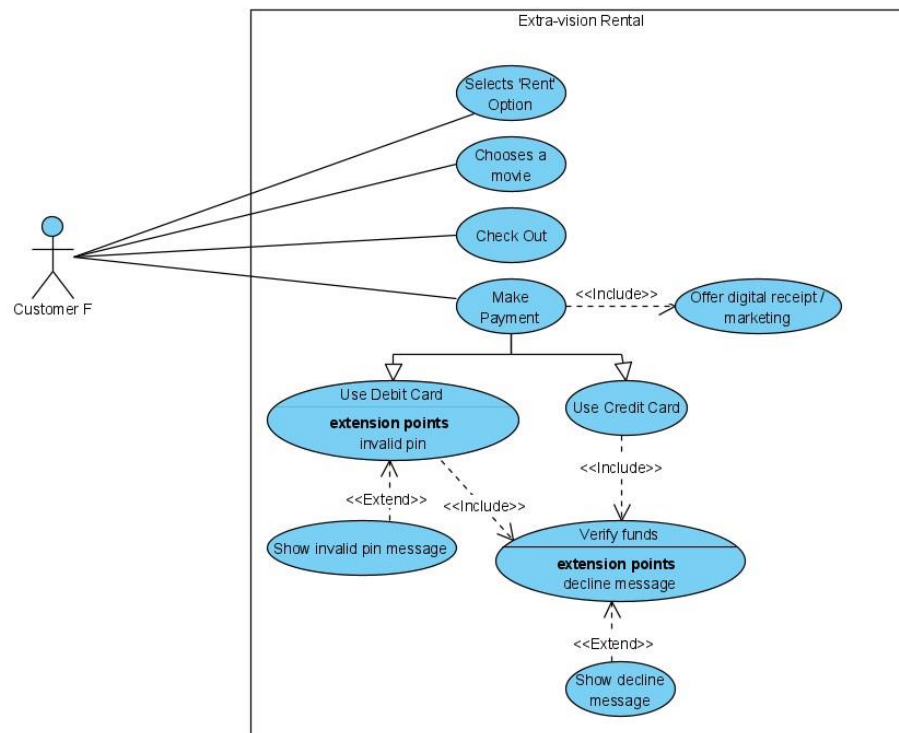*Use Case 3 - Rents 2 movies and request digital receipt & marketing*

- Customer 3 is a new customer. They approach the kiosk and select the 'Rent' option on the home-screen menu.
- The kiosk displays the movie selection available.
- Customer 3 selects "Insidious".
- The kiosk displays the information about the movie.
- Customer 3 adds to cart.
- The kiosk gives the option to continue shopping or checkout.
- Customer 3 select continue shopping.
- The kiosk displays the movie selection available again.
- Customer 3 selects "The Woman in Black".
- The kiosk displays the information about the movie.
- Customer 3 adds to cart.
- The kiosk gives the option to continue shopping or checkout.
- Customer 3 selects checkout.
- The kiosk displays the movies selected and the price for the day rental for each (2.99), the total (5.98), and includes an optional coupon code entry box. At the bottom the Terms & Conditions is listed.
- Customer 3 selects checkout without inputting coupon code.
- The kiosk prompt customer to insert credit/debit card and customer 2 inserts their credit card.
- Payment is processed successfully.
- The kiosk displays a confirmation and includes an option to insert an email address to receive a digital receipt is given along with the option to receive promotional offers from Extra-vision.
- Customer 3 inputs email and chooses to receive promotional offers and selects Finish.
- A digital receipt is sent to the email given and the email is stored for marketing purposes.
- Transaction ends.

Use Case 4 – Returns one movie
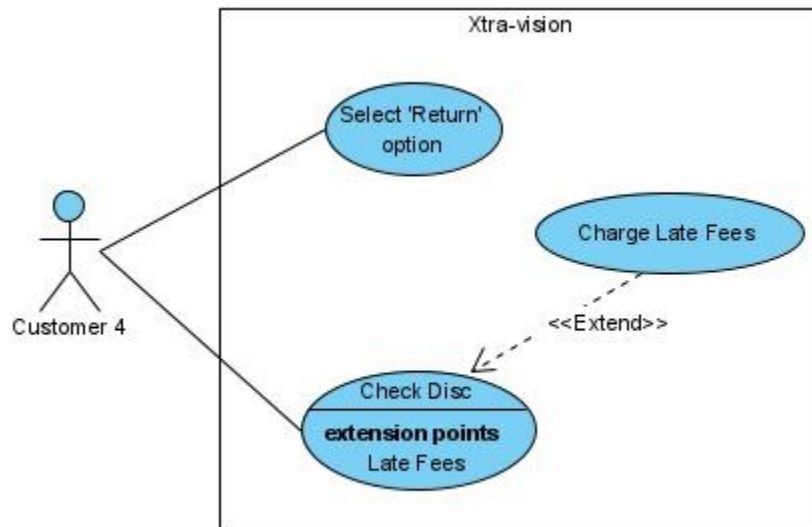
- Customer 4 approach the kiosk and select the 'Return' option on the home-screen menu.
- The kiosk displays instructions for proper insertion of disc with customer service details if needed.
- Customer 4 inserts their disc.
- The system checks serial number on disc to verify disc was rented.
- The disc is accepted.
- The system checks the return date and compares with the last rental date.
- The kiosk displays that the return is 2 days late and 3.00 euros will be charged to their card
- Customer 4 selects 'Ok'.
- The kiosk displays a confirmation and includes an option to insert an email address to receive a digital receipt is given along with the option to receive promotional offers from Extra-vision.
- Costumer 4 refuses the digital receipt and marketing and selects Finish.
- Transaction ends.

Use Case F (Failure) – User cannot finish payment

- Customer F is a returning customer. They approach the kiosk and select the 'Rent' option on the home-screen menu.
- The kiosk displays the movie selection available.
- Customer F selects "Grown Ups".
- The kiosk displays the information about the movie.
- Customer F adds to cart.
- Customer F is then given the option to continue shopping or checkout.
- They select checkout.
- The kiosk displays the movie selected and the price for the day rental (2.99) and includes an optional coupon code entry box. At the bottom the Terms & Conditions is listed.
- Customer F selects checkout button again without inputting coupon code.
- The kiosk prompt customer to insert credit/debit card.
- Customer F inserts their debit card.
- The kiosk prompts customer input pin.
- Customer F inputs pin incorrectly.
- The kiosk prompts customer to retry.
- Customer F cannot enter pin correctly.
- Customer F selects cancel transaction.
- Transaction ends.

Class Diagram

Rental

-cardNum : int
-discCode : int
-rentalDate : int
-returnDate : int
-duration : int
-totalCharge : double
-promoCode : string
-promoDiscount : double
-movie[ ]

+getSerialNum()
+showReturnInfo()
+validateSerialNum()
+isLate()
+calAddCharges()
+chargeMax()
+showSuccessReturnMess()
+getUserPromo()
+validatePromo()
+applyPromo()

Movie

-title : string
-description : string
-runTime : int
-rating : int
-genre : string
-quantities : int
-availability : boolean
-discCode : int

+getTitle()
+getDescription()
+getRunTime()
+getRating()
+getGenre()
+getQuantities()
+showAvailableMovies()
+showMovieDet()
+addToCart()

Card

-cardNum : int
-cardPin : int
-customerEmail : string

+toString()
+validateCard()
+isNewCustomer()
+hashCardNum()
+validatePin()
+hashPin()
+getEmail()
+validateEmail()
+isEmpty()
+sendDigReceipt()

Cart

-dayCharge : double
-totalCharge : double
-movie[ ]

+calcTotal()
+showCartItems()
+removeItem()