**SG Technologies**

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**Inception Phase**

**Group Submission #1**

**Positioning**

**Business Opportunity**

The business opportunity met by this project is providing a POS service to those retail business providers need better transaction and management system that is adaptable to their business. By creating a well documented and cleanly structured product we’ll be able to make small changes to adapt to specific customers allowing us to market/sell our product to multiple customers at once. By incorporating features such as an emergency off-line mode, administrative inventory control and well-structured logging we’ll have a final product that perfectly fits our customers’ needs.

**Problem Statement**

|  |  |
| --- | --- |
| The problem of | poorly structured and functioning POS systems |
| affects | Retail Stores and the managers, cashiers and customers that interact with these systems. |
| the impact of which is | Retail inefficiency through wasted time and dissatisfied staff/customers |
| a successful solution would be | a simple to use, computer application that will allow the Retail location to handle/record sales, rentals and returns as well as including useful service applications and features such as fault-tolerance and administrative functionality. |

**Product Position Statement**

|  |  |
| --- | --- |
| For | Retail Stores |
| Who | Need software to handle customer transactions and log data |
| The POS System | Is a software application |
| That | Processes/records sales and rentals, also handles returns and refunds. |
| Unlike | Current POS/other POS systems which aren’t as efficient, easy to use, incorporate useful service applications or have ample fault-tolerance |
| Our product | Is simple and practical to operate, but filled with useful features. |

**Stakeholder Descriptions**

|  |  |  |
| --- | --- | --- |
| **Name** | **Description** | **Responsibilities** |
| Developers | Implements and codes software requirements into an application | Ensures system functionality, usability, and aesthetics |
| Requirements Engineers | Specifies the requirements of the application | Ensures that the system meets requirements that specify what is needed to solve the problem |
| Cashiers  (System User) | Surface-level users of the POS system | Correct and accurate use/understanding of the surface level POS system including interacting with the customers and entering sales/rentals/returns |
| Managers  (System User) | Admin-level users of the POS system | A more complex use/understanding of the POS system, including administrative duties, inventory control and data analysis |
| Retail Customers | Customers of our customer, these people should only experience indirect interactions with the POS system | Communicate to the cashier the transaction type,items involved and payment. Communicate the customer id to the cashier in case of rental. |

**Product Overview**

SGT POS will be a computerized application used in different retail stores that will record sales and handle payments (process sale), process rentals and handle payments (process rental), and handle returns and refund credit (handle return). The POS will be efficient, elegant and easy to use on surface level (cashiers) as well as administrative level (managers) but also include services such as an off-line mode, a third-party tax calculator and inventory control that will make it top of the line.

**Summary Of System Features**

-Record sale and handle payment (Proces Sale)

-Process rental and handle payment (Process Rental)

-Handle return and refund credit (Handle Return)

-Payment authorization

-Support manual inputs of item ID or barcode

-Interfaces to various service applications (3rd party tax calculator and inventory control)

-Off-line mode (capable of capturing sales and handling cash payment when offline)

-Administrative functionality including startup/shutdown and user management

**Use Cases**

**Use Case Name: Process Sales**

**Primary Actor:** Cashier

**Stakeholders and Interests:**

1. Cashier: Wants accurate, fast entry, and correct payment, as cash drawer shortages are deducted from his/her salary.

2. Salesperson: Wants all sales commissions to be recorded.

3. Customer: Wants to put minimal effort to purchase the goods as fast as possible and has the proof of return.

4. Company: Wants to please customers and record the transactions correctly.

Wants to account for every transaction accurately. Wants updates on those account records including inventory and sales in time and some mistakes are allowed

5. Government Tax Agencies: Want to collect tax from every sale

6. Payment Authorization Service: Wants to receive digital authorization requests in the correct format and protocol. Wants to accurately record all payables to the store.

**Preconditions:** Cashier is authorized.

**Success Guarantee (Post conditions):** Sale is saved. Tax is correctly calculated.

Accounting and Inventory are updated. Commissions recorded. Invoice is generated.

Payment authorization approvals are recorded.

**Main Success Scenario (or Basic Flow):**

1. Customer gets to POS checkout with goods and/or services to purchase.

2. Cashier starts a new sale.

3. Cashier enters item identifier.

4. System records sale line item and displays item description, price, and subtotal on the screen. Keeping doing step 3-4 till there is no item left.

5. System displays total price with taxes calculated.

6. Cashier tells Customer the total, and asks for payment.

7. Customer pays (if cash, adds deposit) and System handles payment.

8. System logs completed sale and sends sale and payment information to the external accounting system (for accounting and commissions) and Inventory system (to update inventory).

9. System presents receipt.

10. Customer leaves with receipt and goods.

**Extensions (or Alternative Flows):**

a. System crushes at any time:

1. Cashier restarts the system, and the system recovers the prior transaction.

2. System reconstructs itself

2a. system detects errors in recovery

1. system reports error to cashier, records the error, and restart to clean state

2. Cashier starts a new transaction.

3a. invalid identifier:

1. System signals error and rejects entry

2. Cashier enters the entry manually

3-6a. customer asks for removing some item

1. Cashier removes the item by identifier

2. System recalculates the total amount

3-6b. customer asks for cancelling the sale

1. Cashier cancels the sale

4a. the price of item shown on the system is not consistent with shown on the item

1. Cashier asks manager

2. Manager confirms the price and corrects the price

3. System or the item presents a new price

5a. system is not able to calculate the tax

1. System signals error

2. Cashier calculates tax manually or cancel the sale

5b. customer claims that they are eligible for a discount

1. Cashier enters the customer id

2. System displays the discount amount under rules

5c. customer claims that they have credit in their account, to apply to the sale:

1. Cashier enter the customer id

2. System calculates the total after credit applied and present the new total and credit balance

6a. customer intends to pay by cash but does not have enough cash

1. Customer uses an alternate payment method.

2. Customer wants to cancel the sale and cashier does so

7a. Customer pay by cash:

1. Cashier enters the cash amount

2. System presents the total amount and releases the cash drawer

3. Cashier deposits the cash tendered and return the balance to customer

4. System records the transaction.

7b. Customer pay by credit:

1. Customer swipes the credit card

2. System send the authorization request to remote service system

2a. system fails to send the request

1. Cashier asks for alternate payment method.

3. The system receives the approval of the request and presents it to the cashier

3a. the system receives the denial of the request

1. Cashier asks for alternative payment method.

4. System presents the credit payment and the signature box

5. Cashier asks customer for signature.

7c. customer pay by check

1. Customer presents the check

2. Cashier takes the check, put it in the drawer and the system records the transaction

2a. check is invalid

1. Cashier asks for alternate payment method.

7d. customer pay by debit

1. Customer swipes the debit card

2. System send the authorization request to remote service system

2a. system fails to send the request

1. Cashier asks for alternate payment method.

3. The system receives the approval of the request and presents it to the cashier

3a. the system receives the denial of the request

1. Cashier asks for alternative payment method.

4. System presents the credit payment and the signature box

5. Cashier asks customer for signature.

7e. Customer presents coupons

1. Before payment, Cashier scans each coupon and System adjusts total balance as appropriate. System also records the used coupons

1a. Coupon is not for any purchased item

1. System signals error to Cashier

1b. Coupon is invalid

1. System signals error to Cashier

2. Cashier tells Customer and throws coupon away

9a. there are product rebates:

1. System presents the rebate form and receipt

9b. customer requests gift receipt

1. Cashier requests gift receipt and system presents it

9c. printer runs out of paper

1. System detects the fault and signals the problem

2. Cashier replaces paper

3. Printer prints another receipt

9d. printer runs out of ink

1. System detects the fault and signals the problem

2. Cashier replaces ink box

3. Printer prints another receipt

**Special Requirements:**

1. Touch screen Ul on a large flat panel monitor. Text must be visible from 1 meter.

2. Credit authorization response under 30 secs.

3. Fast recovery from remote system failing.

4. Language internationalization on the text displayed.

**Technology and Data Variations List:**

1. Item identifier entered by bar code laser scanner or keyboard.

2. Item identifier may be any UPC, EAN, JAN, or SKU coding scheme.

3. Credit account information entered by card reader or keyboard.

4. Credit payment signature captured on paper receipt and will soon captured digitally.

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**Use Case Name: Process Rental**

**Primary Actor:** Cashier

**Stakeholders and Interests:**

1. Cashier: Wants accurate, fast entry, and correct payment.

2. Salesperson: Wants all sales recorded for commission.

3. Customer: Wants to put minimal effort to rent goods quickly, receive receipt for return.

4. Company: Wants to please customers and record the transactions correctly. Wants updates on those account records including inventory and sales in time and some mistakes are allowed

5. Government: Want to collect tax from every sale

6. Payment Authorization Service: Wants to receive digital authorization requests in the correct format and protocol. Wants to accurately record all payables to the store.

**Preconditions:** Cashier is authorized.

**Success Guarantee (Postconditions):** Rental is logged and saved correctly. Inventory updated and timetable for rentals updated. Commissions for salespeople recorded. Invoice is generated.

Payment authorization approvals are recorded.

**Main Success Scenario (or Basic Flow):**

1. Customer gets to POS checkout with goods/service to rent.

2. Cashier starts a new rental.

3. Cashier enters item identifier.

4. Customer specifies length of time for rental.

5. System records rental line item and time and displays item description, price, and subtotal on the screen. Repeat 3-4 until no item left.

6. System displays total price with taxes calculated.

7. Cashier tells Customer the total, and asks for payment.

8. Customer pays and System handles payment.

9. System logs completed rental and sends inventory, payment, and time information to the external accounting system (for accounting and commissions) and Inventory system (to update inventory).

10. System presents receipt with return date listed.

11. Customer leaves with receipt and goods.

**Extensions (or Alternative Flows):**

a. System crashes:

1. Cashier restarts the system, and the system recovers the prior transaction.

2. System reconstructs itself

2a. system detects errors in recovery

1. system reports error to cashier, records the error, and restart to clean state

2. Cashier starts a new transaction.

3a. invalid identifier:

1. System signals error and rejects entry

2. Cashier enters the entry manually

3-6a. customer requests item removed some item

1. Cashier removes the item by identifier

2. System recalculates the total amount

3-6b. customer asks for cancelling the sale

1. Cashier cancels the sale

4a. the price of item shown on the system is not consistent with shown on the item

1. Cashier asks manager

2. Manager confirms the price and corrects the price

3. System or the item presents a new price

5a. system is not able to calculate the tax

1. System signals error

2. Cashier calculates tax manually or cancel the sale

5b. customer claims that they are eligible for a discount

1. Cashier enters the customer id

2. System displays the discount amount under rules

5c. customer claims that they have credit in their account, to apply to the sale:

1. Cashier enter the customer id

2. System calculates the total after credit applied and present the new total and credit balance

6a. customer intends to pay by cash but does not have enough cash

1. Customer uses an alternate payment method.

2. Customer wants to cancel the sale and cashier does so

7a. Customer pay by cash:

1. Cashier enters the cash amount

2. System presents the total amount and releases the cash drawer

3. Cashier deposits the cash tendered and return the balance to customer

4. System records the transaction.

7b. Customer pay by credit:

1. Customer swipes the credit card

2. System send the authorization request to remote service system

2a. system fails to send the request

1. Cashier asks for alternate payment method.

3. The system receives the approval of the request and presents it to the cashier

3a. the system receives the denial of the request

1. Cashier asks for alternative payment method.

4. System presents the credit payment and the signature box

5. Cashier asks customer for signature.

7c. customer pay by check

1. Customer presents the check

2. Cashier takes the check, put it in the drawer and the system records the transaction

2a. check is invalid

1. Cashier asks for alternate payment method.

7d. customer pay by debit

1. Customer swipes the debit card

2. System send the authorization request to remote service system

2a. system fails to send the request

1. Cashier asks for alternate payment method.

3. The system receives the approval of the request and presents it to the cashier

3a. the system receives the denial of the request

1. Cashier asks for alternative payment method.

4. System presents the credit payment and the signature box

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7e. Customer presents coupons

1. Before payment, Cashier scans each coupon and System adjusts total balance as appropriate. System also records the used coupons

1a. Coupon is not for any purchased item

1. System signals error to Cashier

1b. Coupon is invalid

1. System signals error to Cashier

2. Cashier tells Customer and throws coupon away

8a. Customer does not return rental

1. System charges Customer if paid by credit
2. System updates accounting with cash deposit from Customer

9a. there are product rebates:

1. System presents the rebate form and receipt

9b. customer requests gift receipt

1. Cashier requests gift receipt and system presents it

9c. printer runs out of paper

1. System detects the fault and signals the problem

2. Cashier replaces paper

3. Printer prints another receipt

9d. printer runs out of ink

1. System detects the fault and signals the problem

2. Cashier replaces ink box

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**Special Requirements:**

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**Brief Use Cases:**

**System startup and down**

Cashier startup the system at the beginning of their shift, log in to their account by entering their ID and password. System connects to the database for inventory checking. When cashier finishes their shift, system performs all outstanding actions, creates a log of sales report and count cash in the machine. Cashier logs out of the system, and shuts down the computer.

**Process Return**

A customer arrives with items to return. The cashier, using the Point of Sale system, records each returned item by their identifier. After all the items have been returned and recorded, the system presents a confirmation receipt to the customer. Customer leaves with the receipt.

**User Management**

System administrator logs in to the system by user id and password. If there is information about existing users to be modified, system administrator finds the user by entering user id and processes changes. If there are new user profiles to be added, system administrator creates new profile, enters information, and saves the profile. If there is profile to be deleted, system administrator finds the user by entering user id and deletes the profile. After modification, system administrator saves all the changes and logs out of the system.

**Customer Says They Have Credit in Their Account (extra)**

Customer arrives at point of sale checkout with goods and/or services to purchase. Cashier starts a new sale. Cashier records every purchased item and afterwards presents a running total to the Customer. Customer informs the Cashier that he has credit in his account, to apply to the sale. Cashier signals credit request. Cashier enters Customer identification. System applies credits up to running total equals to 0, and reduces the remaining credit in the Customer’s account. If necessary, the Customer pays the rest with one of the choices of payment available. Customer leaves with receipt and goods (if any).

**Supplementary specification**

**Revision history**

|  |  |  |  |
| --- | --- | --- | --- |
| Version | Date | Description | Author |
| Inception phase | Sept. 8, 2015 | First draft of six use cases. Two are fully-dressed and the other four are brief. | SG Technologies |

**Functionality**

* Error handling

all errors occurring log to stable storage

* Security

all user information requires user authentication

**Usability**

* Human factors
* The text on POS screen should large enough to be seen from 1 meter
* The POS system should be easy to use for cashiers
* The checkout process should be precise, and quick for customer’s convenience
* The management system should clearly list information, and be easy for manager to search and update

**Reliability**

* Recoverability
  + If one register POS system crashes, other registers can finish the checkout process
  + If store has a power failure, there is backup electrical system for the store to continue operating
  + All information stored in the management system has backup on the cloud

**Performance**

Our goal is to make the checkout process easy and quick to meet customer’s expectation. The only bottleneck we have is that we cannot control the time for requesting credit authorization, but we would try to make it responds under 30 seconds.

**Supportability**

* Adaptability: when process sale with different customers, it should be able to plug new business rules under customer’s requirements. The system can be easily updated without rework other parts of the system.
* Configurability: The system needs to be configurable and flexible for its business and performance needs.

**Hardware constraint**

* Touch screen monitor
* Barcode scanner
* Keyboard for entering barcode and price
* Receipt printer
* Credit/debit card reader
* Signature reader
* Computers for management system

**Software constraint**

* Interface for management system
* Inventory record system to keep track of inventory
* other external system

**Other design and implementation constraints**

Most of the time, we try to maximize the utility of Java to make the POS system easy to implement.

**Legal concerns**

* Each product sold or rent by POS system should be in good quality.
* All tax rules must under law restraint.
* We allow the resale of products if the products have license on resale.

**Physical environment concerns**

The store’s temperature should always be suitable for human. In summer, the store should provide airconditioner, and in winter, it should provide heat.

**Internationalization concerns**

* The language shown on screen should be in local language.
* For measurement, the system should always use international unit.
* Management system can change to at least eight languages under user’s need.

**Information in domains of interest**

* Pricing: every product has one original price, and with price rules in the business rules, tax rules and other external effects, the product also has one permanent markdown price. Product will be sold at permanent markdown price.
* Sales Tax: A sales tax is a tax paid to a governing body for the sales of certain goods and services. Usually laws allow the seller to collect funds for the tax from the consumer at the point of purchase. It is very complicated to compute the tax to be paid, we requires outside tax calculation system to calculate it.
* Credit and debit Payment: When customer makes payment with credit/debit card, the payment authorization service will receive the request and approve it. After approvement, the amount customer needs to pay will be recorded by the service system in the account needed to be paid to seller. The authorization service will transfer the money to seller’s account in the end of every day. The authorization service will also charge a service fee for each transaction.

**Glossary**

|  |  |  |
| --- | --- | --- |
| Term | Definition and information | Aliases |
| Item | A product or service for sale |  |
| Payment  authorization | Validation by an external payment authorization service that they will make or guarantee the payment to the seller. |  |
| Payment  authorization  request | A composite of elements electronically sent to an authorization service, usually as a char array. Elements include: store ID, customer account number, amount, and timestamp. |  |
| UPC | 12 digit code that identifies a product. Usually symbolized with a bar code placed on products. | Universal  Product Code |
| Sales | completed transactions with one or more items. |  |
| Discount | A reduction in the normal cost of an item |  |
| Account | An account that is established to allow for regular business dealings or services. It is used to keep track of sales transactions in a point-of-sale system. |  |
| Barcode | A special code that consists of printed, randomly patterned spaces and bars. Numerals are sometimes included as well. The code can be scanned and fed into a computer program in order to transmit important information about an item. It is typically used to scan the price of an item in a retail setting. |  |
| Inventory | Products that are actually on the shelves and available for purchase by customers. It also refers to the value of the products that are currently on hand. |  |
| Database | The collection of data which can be accessed and manipulated remotely. |  |
| Point of Sale | The particular area in a retail store, restaurant or other establishment where the company's product are sold, usually at some form of cash register, computer terminal or cash box. The point of sale is usually run by an employee of the company, but there are some that are automated, or "self-checkout". Typically a dated and numbered receipt is printed for the customer, although some are produced electronically. |  |
| Tender | A term synonymous with payment or type of payment. |  |
| Receipt | A printed piece of paper showing the details of a particular sale. |  |

**Business Rules**

|  |  |  |  |
| --- | --- | --- | --- |
| Rule ID | Rule | Changeability | Source |
| 01 | Purchaser discounts are set by the retailer’s policy. | Very low since every retailer’s policies are usually different from one another. | Retailer policy. |
| 02 | All credit payments require a signature from the buyer. | Some sort of “signature” from the buyer will always be required. But in the future, customers will demand newer technology to be available such as digital capture devices. | Common credit authorization company policy. |
| 03 | All sales require added taxes. More information on taxes can be found on the government statutes. | Very high since tax laws change frequently. | Law. |
| 04 | Product discounts and sales are also set by the retailer’s policy. | Very low since every retailer’s policies are usually different from one another. | Retailer policy. |
| 05 | Company policy dictates that credit payment reversals may only be paid as a credit to the buyer’s credit account. | Very low. | Company policy,  credit authorization. |
| 06 | The moment that an electronic debit or credit payment is approved, the payment authorization service is responsible for paying the seller, not the buyer or the company. | Very low. | Company policy |