Invenstock

A GAP Inventory System

Requirements Specification Document

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PROJECT DRIVERS

1. The Purpose of the Project

The clothing industry has product that changes with the seasons. The product usually comes in regular price, goes through several promotions, finally landing on the clearance rack. Despite the advancements in technology, many companies continue to use older inventory hardware and software. Often, older hardware/software can be expensive to maintain and inaccurate.

The Gap Flagship on Michigan Ave, uses a software that updates their product count every 72-hours. In those 3 days, it is possible that:
1) An item was bought.
2) An item was put on hold on one of the Gap's 3 floors.
3) It was placed randomly by a customer on the sales floor.
4) It was placed randomly by an employee anywhere within the store (including employee areas).

It is very easy to cause chaos with misplaced products, and 3 days gives the product a big head start to get lost. The "LRT guns", used by the Gap as inventory software, require nightly updates that cause many to crash. It is common for Gap managers to have to send these guns for service repair because of the age of the technology, meaning their employees are either forced to share or work without one, which can amount to a certain level of frustration. With these LRT guns, employees are able to keep track of product (within a 72-hour grace period), transfer product into or out of the store's system to another store within the company, create shipping labels, etc. Just about anything that has to do with product inventory management, is done on these LRT guns.

The goal of our project is to create an app that facilitates all of that. We aim to create an inventory app that connects to a local server for more accurate, faster counts of product. A secondary purpose is to help the company better organize and map out their product within their respective stockrooms, in efforts to keep better track of each item.

2. The Stakeholders

The actors in the business use case for the GAP Inventory system are the logistic staff (who are responsible for the management of the inventory system), customer care staff (who make use of the inventory system), manager (who looks over the inventory system) and driver (who brings the product from the warehouse).

Logistic staff performs the following actions:

1. Product testing: maintain the stockroom that contains the product, keep accurate counts of the product, keep track of promotions and product expiration dates.
2. Product separation and maintenance: Segregation of the seasonal products from the all year products and maintenance of each of these products in the stockroom.
3. Mapping of products: Mapping the products in the stockroom based on inventory count and space, and storing details of the product locations within the system.

Customer Care staff performs the following actions:

1. Check Product Availability: Checks if the product is available for sale through the inventory system.

Manager is responsible for following actions:

1. Product Transfer: Transfer of product from one store location to another, if the demand and sale of the product is greater in another store location.
2. Employee Management: Management of employees in the local store bars on the needs of the store.

PROJECT CONSTRAINTS

3. Mandated Constraints

3.a.1. Solution Constraints

1.
Description: The web browser must have JavaScript enabled.
Rationale: The users will need to log on to the application on the browser that requires JavaScript to support the application.
Fit Criterion: The user will be able to use the application on a web browser.

2.
Description: If using IOS, the version must be at least 8.4.1 and above.
Rationale: The user will be needed to log on to the application on IOS.
Fit Criterion: The users would able to log in to the application on iPod or iPad,

3.
Description: If the user is Internet Explorer, the version must be at least 9 and above
Rationale: The users will need to log on to the application on the browser that requires JavaScript to support the application.
Fit Criterion: The user will be able to use the application on a web browser.
4.
Description: The application system must accommodate a maximum of 50 users logged in at once in local store and 50000 users nationally.
Rationale: The users will need open application, log in on a web browser, which requires JavaScript to support application.
Fit Criterion: Users would be able to log in to application, access the inventory system and search for items locally in stores.

5.
Description: The application system must have access to the Internet
Rationale: Users will need to log in to the application, verify their log in credentials via the Internet
Fit Criterion: The user will be able to use the application on a web browser.

3.a.2 Project Constraints

1.
Description: The entire application development team must use Eclipse IDE team server for collaboration.

Rationale: Setting up a uniform working environment, the development process of the application will be error free.
Fit Criterion: All developers on the team will be supervised in order to ensure compliance with set standard.

2.
Description: The development team must use scrum, a form of agile development methodology.
Rationale: Using Agile methodology will ensure the development will happen in incrementally, the right timetable and prone to change as needed.
Fit Criterion: Use Agile software like ice scrum.

3.
Description: The budget for the project will be $4 million.
Rationale: The budget will ensure that there is sufficient capital to meet the expenditure generated in the development process of the application
Fit Criterion: Expenses will be carefully documented to keep within the constraint of the budget

4.
Description: The application should be developed within nine months
Rationale: If the developing process of the application is slow, we will stand the chances of not meeting the deadline, which is aimed at the busiest shopping session of the year.
Fit Criterion: The planned development schedule in accordance with the deadline must be maintained and adhered to.

3.b. Implementation Environment of the Current System

The application will would mainly consist of two sections which are the Front-End part of the application that deals with the user interface of the application; and the Back-End part of the application that deals mainly with the database where the inventory information is been stored.

- Front-End: HTML5/CSS3, AJAX, Java Server Pages, AngularJS
- Back-End: Apache Tomcat/MySQL
- Framework: Spring, REST angular, RESTful web-services

The application dashboard accessible by all the employees which they can check of items, ring out a customer, call other stores. Managers and Storages have access to other level of the application where they can offer discounts, price change override and so on.

3.c. Partner or Collaborative Applications

1.
Description: The application shall be able to have all employees' credentials stored in the database on the server
Rationale: Since all users, which are all employees and their credentials, users can logon from multiple locations.
Fit Criterion: The users will be able to login upon entering valid credentials.

2.
Description: The application shall users log on to multiple devices at the same time.
Rationale: User can log on to the desktop, iPad or iPod at the same time with valid credentials.
Fit Criterion: The users will be able to login upon entering valid credentials.

3.
Description: The application shall update the inventory of the store's items every second and the nationwide inventory will be updated every 48 hours.
Rationale: Users will be able to know what item is in stock and in what quantity.
Fit Criterion: User will be able to order or sell items to customers.

4.
Description: The application shall be able to location items in the stockroom of every store.
Rationale: Since application have every location of each items on each shelves in the stock room of store
Fit Criterion: User should be able to locate every item in the store.

3.d. Off-the-Shelf Software

N/A

3.e. Anticipated Workplace Environment

Since the users will be only current employees that have valid usernames and password, they will be able to log on to the application on the desktop, iPad and iPod. The Store will be where the application is being used, employees can log in successfully, start a transection of a customer, check availability of items. Only the Store manager and other managers in the store can give discount, price override, give employee discount, classify an item Damaged and adjust pricing

for a defected item. The application shall be able to save every transection in the system.

3.f. Schedule Constraints

1.
Description: The application shall be developed, tested and operational by November 2nd, 2016.
Rationale: The stores shall be able to replace existing retail system with the current one in order to prepared for busy thanks giving and Christmas shopping.
Fit Criterion: Users should be to log-in at that time.

2.
Description: The Beta version of the application shall be designed and developed I four months after the requirement is been gathered.
Rationale: Once the beta version is developed, client can look at the application and confirm if the application meets the scope of the requirement.
Fit Criterion: Clients at the point can test the application and give inputs.

3.
Description: The development team shall dedicate six weeks for testing the application.
Rationale: There shall be a usability testing to check where the application is easy to use and if a user can use it with out training.
Fit Criterion: The goal is to have users with little knowledge or the are not technologically savvy use the application.

4.
Description: The potential user of the application shall be provided training in order to use the application
Rationale: Employees must know how to navigate the application. Search for items, start a transection and so on
Fit Criterion: Users should be able to use that application training

3.g. Budget Constraints

1.
Description: The amount of money used to develop the application shall not exceed $4,000,000
Rationale: This amount is funded by The GAP clothing company and will cover the cost of maintenance, salaries of the software developers, business analysts and testers working on the application.

Fit Criterion: Funds by the GAP clothing company do not exceed $4,000,000.

2.
Description: The budget allocated for the application does not include the maintenance budget for the application.
Rationale: Maintenance budget will come from the company's profits generated from the usage of the application due to projected increase in sales.
Fit Criterion: Other updates shall be added during maintenance.

3.h. Enterprise Constraints

1.
Description: The application shall make all permission and privileges to Store Managers.
Rationale: The Store Managers shall be able to to view the profile of all the students and see the usage.
Fit Criterion: The store manager shall be able to view information and statistics of usage of all the employees.

2.
Description: The application shall be able to automatically switch the price of the items as they transition from full priced items to discounted sale priced items nationwide.
Rationale: Users don't have to adjust the price of the items at the point the of sale.
Fit Criterion: Employees can be efficient and timely when closing a transection.

3.
Description: The system shall prompt for a manager in case of any price override or discounts that is to make to a customer.
Rationale: Only managers are allowed to make exceptional judgment in terms of customer discount.
Fit Criterion: Non-management employees are not allowed to give discount.

4.
Description: Application shall be able to show where each employee is being zoned in the store for the duration of his or her shift.
Rationale: User should the area where they are zone in order to help customers
Fit Criterion: Users will be proactive helping customers.

5.
Description: Application shall have a planogram of the store so that users can pin any part of the store that things need to be fixed or repair.
Rationale: Creates any atmosphere of efficiency and quick response to any hazardous situation.
Fit Criterion: Making the working environment server.

4. Naming Conventions and Terminology

5. Relevant Facts and Assumptions

There are certain assumptions that are made in this project as follows:

- The LRT guns used by the employees have regularly updated information; say 1hr in each store using a local server instead of using the company server that updates information every 72hrs.

- Everything in the store is placed according to its location i.e. what shelf and what position for easy mapping when a customer requests for a certain product to try on.

- Once the new stock arrives, it should remain in the store for a particular amount of time say for a specific season for seasonal clothes and maybe around 6 months for other products before it is set in the sale section then sent out to the outlet malls.

- If a customer wants to know whether a certain product is available in another GAP store in the same town, then every store must have information regarding the other stores i.e. what stock is available at a particular time.

- Shipping of goods must be done according to the demands of the store.

- A different section of items are placed in the store, which are used for testing purpose. Based on which product is sold more frequently, that particular store can order more of those products next time.

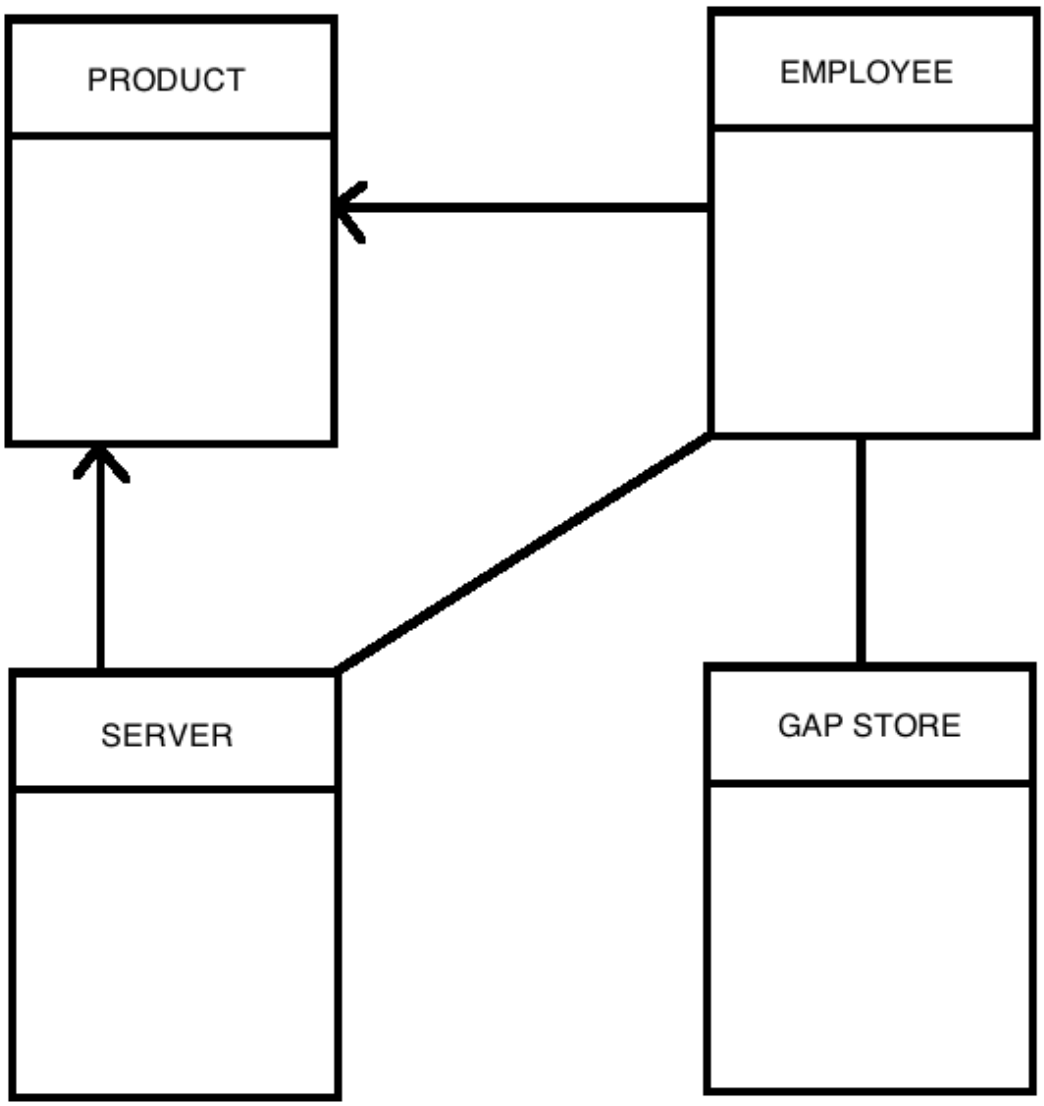
- All information stored in this application i.e. customer credit card details, personal information, product related information is confidential and not accessible to unauthorized personnel.

FUNCTIONAL REQUIREMENTS

6. The Scope of The Work

7. Business Data Model and Data Dictionary

7.a. Business Data Model



7.b. Data Dictionary

?????-Table of data

8. The Scope of The Product

9. Functional Requirements

FR1:
Description: The system must be able to let the GAP staff login.
Rationale: So that the GAP staff can access the inventory system and make decisions as per the supply and demand.

Fit Criterion: Try to login the application wrong credentials and make sure that it doesn't login and then try it with right credentials and make sure that it logs in with user's level of privileges.

FR2:
Description: The system must display legitimate items expiry date for Product testing.
Rationale: So that GAP staff can keep track of the product expiry.
Fit Criterion: Enter an existing product ID to check if its expiry date has been displayed correctly. Enter a non-existing product ID to check if an appropriate message is displayed.

FR3:
Description: The system must clearly display all the expired products in the inventory.
Rationale: So that GAP staff can keep track of expired products.
Fit Criterion: Click on the "Expired Products" button and enter date to make sure that only a list of expired products is displayed.

FR4:
Description: The system must be able to show the product's validity correctly.
Rationale: So that the staff can keep a separate the seasonal products from those products that can be sold all year round.
Fit Criterion: Enter an existing product ID to check if it correctly displays the product's validity correctly. Enter a non-existing product ID to make sure that the appropriate message is displayed.

FR5:
Description: The system must be able to display product's location correctly.
Rationale: So that the staff can map the products to its location in the store.
Fit Criterion: Enter an existing product ID in the "Search" textbox and cross verify if the location showed is correctly displayed. Enter a non-valid product ID to make sure that an appropriate message is displayed.

FR6:
Description: The system must be able to display product's availability.
Rationale: So that the staff checks for the number of a particular product is available in the store.
Fit Criterion: Enter an existing product ID in the "Search" textbox to check if the product's availability correctly matches the currently available products in the store. Enter a non-valid product ID to make sure that an appropriate message is displayed.

FR7:
Description: The system must display all the nearby GAP stores where the product is available.
Rationale: So that staff can check for the product's availability in the nearby stores and convey to the customers, if required.
Fit Criterion: Click on the "Check Nearby" button situated on right of the product information. Check if the product availability in the nearby stores is correctly displayed after regular updates. Check if the updates are happening regularly or not.

FR8:
Description: The system must allow employee records to be displayed.
Rationale: So that the GAP manager can check for employee records if it is required.
Fit Criterion: Enter the employee name or id to check sure that the correct employee record is displayed.

FR9:
Description: The system must allow the employee records to be edited by the GAP manager.
Rationale: So that the GAP store manager can make updates from the store, if necessary.
Fit Criterion: Edit an employee record and check if it has been updated or not.

NON-FUNCTIONAL REQUIREMENTS

10. Look and Feel Requirements

11. Usability and Humanity Requirements

12. Performance Requirements

13. Operational and Environmental Requirements

14. Maintainability and Support Requirements

14.a. Maintenance Requirement

NF-MA.1
Description: The application shall start installing updates twice every month on Mondays.
Rationale: In order make sure that the business is disrupted due to updates and affect users, the maintenance of the application will on a less busy day like Monday.
Fit Criterion: Updating the application system must start at 12:00am Monday and must end at 8:00am Tuesday morning.

NF-MA.2
Description: The application shall prompt for an update when one is out and the store Manager will be notified
Rationale: This is to ensure that the application system is not down during a busy or critical time.
Fit Criterion: Email notification message will be sent to the store managers regarding the updates.

14.b Supportability Requirement

NF-SU.1
Description: The application shall need IT support.
Rationale: This is to ensure that developer's resources are engaged frequently to support the application.
Fit Criterion: The application must require IT support more than 10 times every month.

NF-SU.2
Description: The application shall have documentation available in a PDF file format inside the help menu.
Rationale: To aide new employees or users to help them familiarize themselves with the application.
Fit Criterion: The PDF document must be available inside the help menu at all times.

14.c. Adaptability Requirement

NF-AD.1
Description: The application front's end system or user interface must run all web browsers.
Rationale: Regardless of whichever browser is installed on the desktop of the GAP clothing company, the user must be able to use the application.
Fit Criterion: Application must run 100% on all browsers.

NF-AD.2
Description: The application shall store data in a MySQL database.
Rationale: This has been determining to be one of the most secure databases.
Fit Criterion: MySQL must be used 100% of the time in the application and all its future releases.

15. Security Requirements

15.a. Access Requirements

NF-ACC.1
Description: Application shall allow only IT team to make modification in the dashboard.
Rationale: The dashboard contains different user interface based on the theme of the season the clothing is using.
Fit Criterion: The application must block all employees access, expected that of the IT team.

NF-ACC.2
Description: The application shall allow only the store manager to have access to all employee information.
Rationale: This is private information that should not be available to all employees
Fit Criterion: The application must block all employees access, expected that of the store manager.

NF-ACC.3
Description: The application shall only allow manager to give discount to customer.
Rationale: The managers should only make this decision.
Fit Criterion: The application must block all employees access, expected that of the store manager.

NF-ACC.4
Description: The application shall allow user to edit the user profile of each employees when they are signed into the system, which is the editing privileges.
Rationale: The accurate information has to be logged in the system
Fit Criterion: User editing profile privileges shall be granted to all correct employees.

15.b Integrity Requirements

NF-IN.1
Description: Application data shall be stored in two different locations.
Rationale: Storing data in two different locations will help guard against losses due to failure at a particular site.
Fit Criterion: Application data must be stored at the store's server and a different location at 75 miles apart.

15.c Privacy Requirements

NF-PRE.1
Description: Application shall display the employee's profiles along with their username and employee ID number.
Rationale: This shall be the minimum amount of data needed to identify each user.
Fit Criterion: Profile creation must not be complete without entering the username and employee ID number 100% of the time.

NF-PRE.2
Description: The application shall comply with the GAP clothing company privacy policy.
Rationale: Since the GAP clothing company will use application; it has to adhere to their privacy policy.
Fit Criterion: Application must pass the inspection conducted by the company's human resources team to ensure strict compliance.

15.d Audit Requirements

NF-AU.1
Description: Application shall keep records of all profile creations
Rationale: In order to ensure that users of the application can look back at past profile creations and view the details of the user belonging to that profile.
Fit Criterion: Old profile must be retrieved within 5 seconds of clicking on the retrieve button.

NF-AU.2
Description: Application shall keep records of all purchase made by customer based on receipt and credit card information.
Rationale: Customer can reprint receipt if lost
Fit Criterion: All receipt must be retrieved with 2 seconds of clicking the retrieved button.

NF-AU.3
Description: The application shall keep records of all former employees.
Rationale: To ensure that new employees can view.
Fit Criterion: Records of former employee must be displayed within 2 seconds on submitting the request.

15.e Immunity Requirements

NF-IM.1
Description: The application shall be compatible with all browser plugins.
Rationale: To ensure malicious software is detected at an early stage.
Fit Criterion: The application must run smoothly after installing security plugins in the browser 100% of the time.

NF-IM.2
Description: The application's server shall have current version of the anti virus software.
Rationale: This will protect the data against any malicious software.
Fit Criterion: The application must check for current updated version of anti-virus software and must update it along with its weekly updates.

16. Cultural Requirements

16.a Cultural Requirements

NF-CUR.1
Description: Application shall comply with company's multi cultural policies.
Rationale: The application must adhere strictly to this policy.

Fit Criterion: Application must comply with cultural guidelines of the GAP clothing company.

17. Legal Requirements

17.a Compliance Requirements

NF-COM.1
Description: Application shall keep User information confidential.
Rationale: Information is private property and must be safeguarded.
Fit Criterion: Information leaks must be detected and treated at every phase of testing the application.

NF-COM.2
Description: The application shall comply with the company's human resources ethics.
Rationale: HR ethics must be complied to strictly.
Fit Criterion: The must be a review to see in this compliance policy are been implemented.

17.b. Standard Requirements

N.A.

PROJECT ISSUES

18. Open Issues

There is still some uncertainty on how often the store database should be updated. To make sure that the GAP inventory system is efficient, it has to be update as often as possible. But updating an inventory system from the remote server is an expensive operation and can be done less frequently. We need to further discuss with our client to see how to best approach the subject.

19. Off-The-Shelf Solution

19a. Update every hour

The remove server can be updated every hour to make sure that GAP inventory system at every location has the latest information only. But this can prove to be very expensive as updating remote server is expensive.

19b. Update every 12 hours

The remote server can be updated every 12 hours rather than updating it every hour. This can be less costly as compared to the previous solution, but it is not as efficient as we intend it to be.

19c. Update locally every hour, remote server every 12 hours

The server at stores at each location can be updated every hour, so that the information the staff accesses are more accurate. The remote server can be updated every 12 hours, which will be less expensive and make sure that information supplied not very old.

20. New Problems

20a. Effects on the Current Environment

The currently present GAP inventory system is obsolete and inefficient. The remote server is updated after every 24 hours and the information that is accessed is not accurate. Also there is no way to map the products to its locations in the current inventory system. With our new GAP inventory system, the availability and the location of the products can be checked in the stores.

The data would be updated as often as possible (and least expensive possible) so that the data accessed by the staff is accurate.

20b. Effects on the Installed Systems

Currently, the GAP inventory system is not efficient. When a GAP employee checks for the availability for a product, often the data is old and inaccurate. Also, in the current systems there is no way to segregate the seasonal products from the all-year round products, so that both can be sold separately, as per the demand. With our new GAP inventory system, the GAP staff shall no more face these problems. Our system will be more efficient than the existing GAP inventory software.

20c. Potential User Problems

There should not be any adverse reaction suffered by the users because the app is specifically crafted and developed to be suitable for the staff. Any potential reaction will be tested beforehand to remedy its effects.

20d. Limitations in the Anticipated Implementation Environment that May Inhibit the New Product

As this software is custom made and designed specifically for the systems at the GAP stores, there should not be any limitations in the product.

21. Tasks

21a. Project Planning

- Database Design
- Development of Server
- Application Development
- Unit Testing
- Integration Testing
- Alpha Testing
- Beta Testing
- Begin Migration

21b. Planning of the Development Phases

Database Design: This is the first phase. In this phase of the development, we will design the database to store all of the necessary information of the product. With this, we will be able to keep track of the products in the stores, their data, location, availability and other related information.

Development of Server: In this phase, we will incorporate the existing GAP remote server into our project (for cost effectiveness). The local servers will be different from the remote server as it will be update more often so that the data accessed at the local store is more accurate.

Application Development: In this phase, we will follow the database design to develop the desktop application to interface with the database. This will be the User Interface of the product.

Unit Testing: In this phase, we will be testing each part of the application independently to check if each of the functionality is working properly or not.

Integration Testing: After we check each of the unit individually, we will make sure that the entire application works correctly using Integration Testing.

Alpha Testing: In this phase, we will test the product in a local GAP store and test the app with them and attempt to use the product in real life situations.

Beta Testing: After being successful with the alpha testing, we will select more classes to test and get feedback.

If during the testing phases we encounter an issue, then we will return to the development phase to fix it and repeat the phases from the unit testing phase. We will also perform **Regression Testing** to ensure that changes during the development phase didn't have any other side effects on the system.

22. Migration To The New Product

22a. Requirements for Migration to the New Product

Database Design – 4 weeks
Development of the Product (app creation, mapping of products, setting up the local server) – 15 weeks
Testing Phase – 4 weeks
Full Migration to New System

The database design including all the product information such as product type, quantity, location in store, price will be completed in 4 weeks. After this, the

application will be fully developed along with a user-friendly interface that will give us timely updates as it will be connected to a server located in the store itself making retrieval of information quicker and easier. This entire phase will consume 15 weeks of time. We can begin the testing phase after this, which should take approximately one month. During the testing phase, this application will be utilized to check the availability and mapping of products in the store. The time for this approximated, may take longer or shorter than what it did previously. The client will assess it and switch if he is satisfied with the new product.

22b. Data that has to be modified or translated for the new system

A local server will be set up making retrieval of data faster and more efficient unlike the current situation where updates take place every 72hrs. Every product will have its location stored in the database so when a product is scanned using the LRT gun or requested for in the store, it will be easy to locate it.

23. Risks

23a. Theft

Theft is one of the greatest risks especially with high-value inventory. Companies spend a lot of money to create policies and procedures to prevent theft, but they still occur on a day-to-day basis. Theft can occur in a number of ways. A thief may just walk out of the store with a box of clothes pretending to be a salesperson. All employees at the store must maintain an ID that will be scanned when they enter or leave the store.

23b. Lost Inventory

Any lost items must be updated to the system as soon as they are found out about. This can be done as employees maintain an asset list, which they check everyday. When they find out about any lost items in the store, they will update the asset list and the new inventory application being developed.

23c. Damage

Some products may get damaged if not placed properly in the store or not packaged properly. So, it should be made mandatory to place only up to four or five clothes in shelves on top of each other.

23d. LRT guns not working

It may happen that while the customer requests for a certain product in the store to one of the employees', suddenly the LRT gun is not working and needs replacement or has lost connection to the local server. So, a backup plan must be kept ready in the hand where a new gun can replace the faulty one or connection to server can be restored within seconds without making the customer wait for a long time.

24. Costs

- Number of data tables to store data: 4
- Number of Business events: 7
- Number of Business use cases: 7
- Number of product use cases: 16
- Number of functional requirements:
- Number of non-functional requirements:
- Number of requirement constraints:

25. User Documentation and Training

25a. User Documentation Requirements

The application will scan the employee's ID when they enter and leave the store to ensure security. It will then serve its main purpose, which is mapping of products in the store and giving updated product information instantly. The employees of the GAP store will use it. Any new information that needs to be added or removed will be done instantly as this system will be connected to the local server.

25b. Training Requirements

The employees will be trained by the developers to use this application more easily before handing it over to them to use in the store.

26. Waiting Room

Invenstock 2.0
This is the second version of the application that may or may not be released for usage by the GAP employees depending on the feedback it gives. This version shall have the following features:

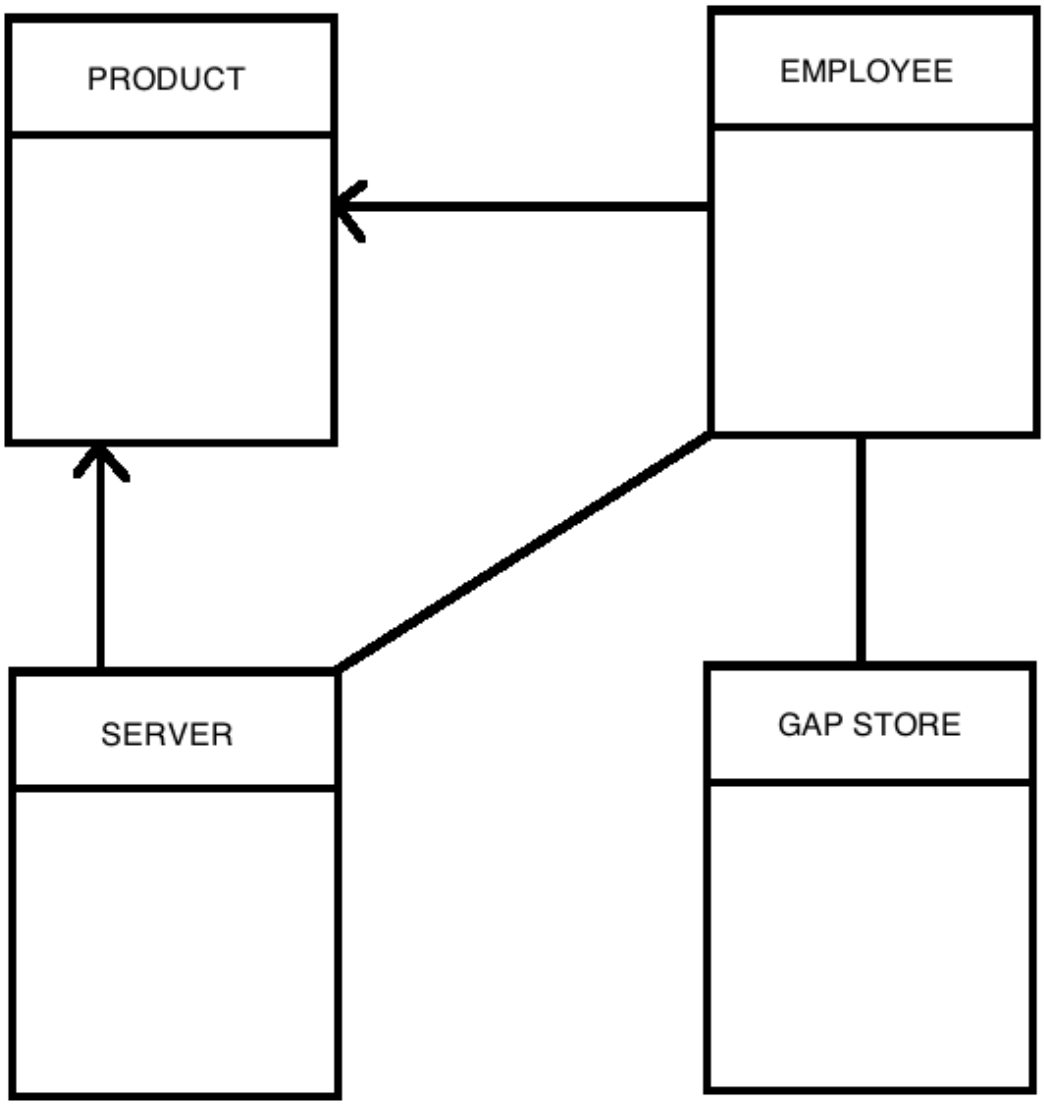
1. The application can keep track of how many items the user has taken into the changing room and how many has he returned to the shelves. This method will

prevent any kind of thefts that could occur in the store. Even a limit can be set to the number of clothes that the user can take at a time.

2. The application can also keep a track as to which customer went into which changing room.

27. Ideas For Solutions

Our idea for a solution is a class diagram of the overall application. The class diagram is as follows:



The structure of the architecture will have the employee responsible with the entire inventory of the GAP store. He will scan the product, retrieve the information instantly and report it to the customer. So, we will have a GAP store class, employee class, product class and server class. Store class contains

all the store information like its location in the city. The employee class contains employee ID and personal information. The product class contains product ID, name, location in store, price, and type. The server retrieves all this information instantly on the LRT guns to the employees.