INVENTORY MANAGEMENT SYSTEM FOR RETAILERS

Team ID	PNT2022TMID15205
Project Name	INVENTORY MANAGEMENT SYSTEM FOR RETAILERS

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1. INTRODUCTION :

1.1 Project Overview :

Retail inventory management is the process of ensuring you carry merchandise that shoppers want, with neither too little nor too much on hand. By managing inventory, retailers meet customer demand without running out of stock or carrying excess supply.

In practice, effective retail inventory management results in lower costs and a better understanding of sales patterns. Retail inventory management tools and methods give retailers more information on which to run their businesses. Applications have been developed to help retailers track and manage stocks related to their own products. The System will ask retailers to create their accounts by providing essential details. Retailers can access their accounts by logging into the application.

Once retailers successfully log in to the application they can update their inventory details, also users will be able to add new stock by submitting essential details related to the stock. They can view details of the current inventory. The System will automatically send an email alert to the retailers if there is no stock found in their accounts. So that they can order new stock.

1.2 Purpose :

The emergence of the internet has been the greatest technological advancement after the industrial age. From the recent studies on internet penetration and usage in India it has been concluded that many Indians are using the internet to pay bills, purchase products online apart from regular surfing, checking e-mail and socialising on multiple social networks. The number is expected to grow from time as the internet becomes more pervasive and secure. The rise of the internet has created opportunities for entrepreneurs, and has changed the business landscape of e-commerce.

Managing inventory to create higher inventory turnover and just in time delivery practices is one of the most important processes for online retailers. Flexible systems that respond to customer demand and inventory uncertainties are most important in e-commerce.

2. LITERATURE SURVEY

2.1 Existing problem :

- Lack of Inventory Visibility. ...
- Inefficient Inventory Management Process or Software. ...
- Tracking Obsolete Material. ...
- Identifying Incorrectly Located Materials. ...
- Keeping up with Overstocks. ...
- Managing Inventory Waste & Defects. ...
- Lack of Centralized Inventory Hub. ...
- Changing Demand.

2.2 References :

[1] Patil, Harish, and Brig Rajiv Divekar. "Inventory management challenges for B2C e-commerce retailers." *Procedia Economics and Finance* 11 (2014): 561-571.

[2] Eckert, Scott Grant. "Inventory management and its effects on customer satisfaction." *Journal of Business and public Policy* 1.3 (2007): 1-13.

[3] Madadi, Alireza, Mary E. Kurz, and Jalal Ashayeri. "Multi-level inventory management decisions with transportation cost consideration." *Transportation Research Part E: Logistics and Transportation Review* 46.5 (2010): 719-734.

[4] Zhang, Mingyang, et al. "Inventory Management of Perishable Goods with Overconfident Retailers." *Mathematics* 10.10 (2022): 1716.

[5] Li, S. G., and X. Kuo. "The inventory management system for automobile spare parts in a central warehouse." *Expert Systems with Applications* 34.2 (2008): 1144-1153.

[6] Ehrenthal, J. C. F., Dorothée Honhon, and Tom Van Woensel. "Demand seasonality in retail inventory management." *European Journal of Operational Research* 238.2 (2014): 527-539.

[7] Bose, R., Mondal, H., Sarkar, I., & Roy, S. (2022). Design of smart inventory management system for construction sector based on IoT and cloud computing. *e-Prime-Advances in Electrical Engineering, Electronics and Energy*, *2*, 100051.

[8] Beheshti, Hooshang M. "A decision support system for improving performance of inventory management in a supply chain network." *International Journal of Productivity and Performance Management* (2010).

[9] Taleizadeh, Ata Allah, et al. "Stock replenishment policies for a vendor-managed inventory in a retailing system." *Journal of Retailing and Consumer Services* 55 (2020): 102137.

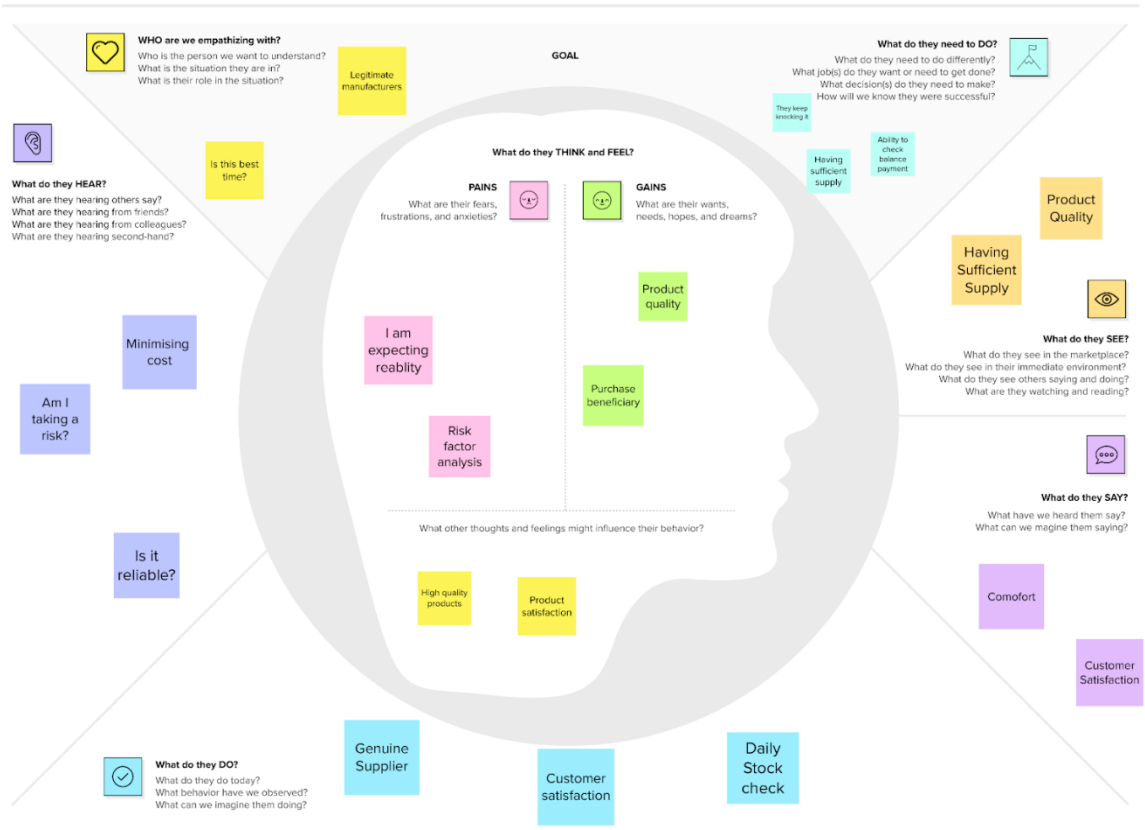
[10] Ji, Jindi, et al. "Distribution network planning and inventory management in a multi-retailing supply chain." *Journal of Physics: Conference Series*. Vol. 1903. No. 1. IOP Publishing, 2021.

2.3 Problem Statement Definition :

The problem faced by the company is they do not have any systematic system to record and keep their inventory data. It is difficult for the admin to record the inventory data quickly and safely because they only keep it in the logbook and not properly organized. Good planning and sales forecast before setting optimal inventory levels, appropriate inventory management requires close coordination between the areas of sales, purchasing and finance.

3. IDEATION & PROPOSED SOLUTION :

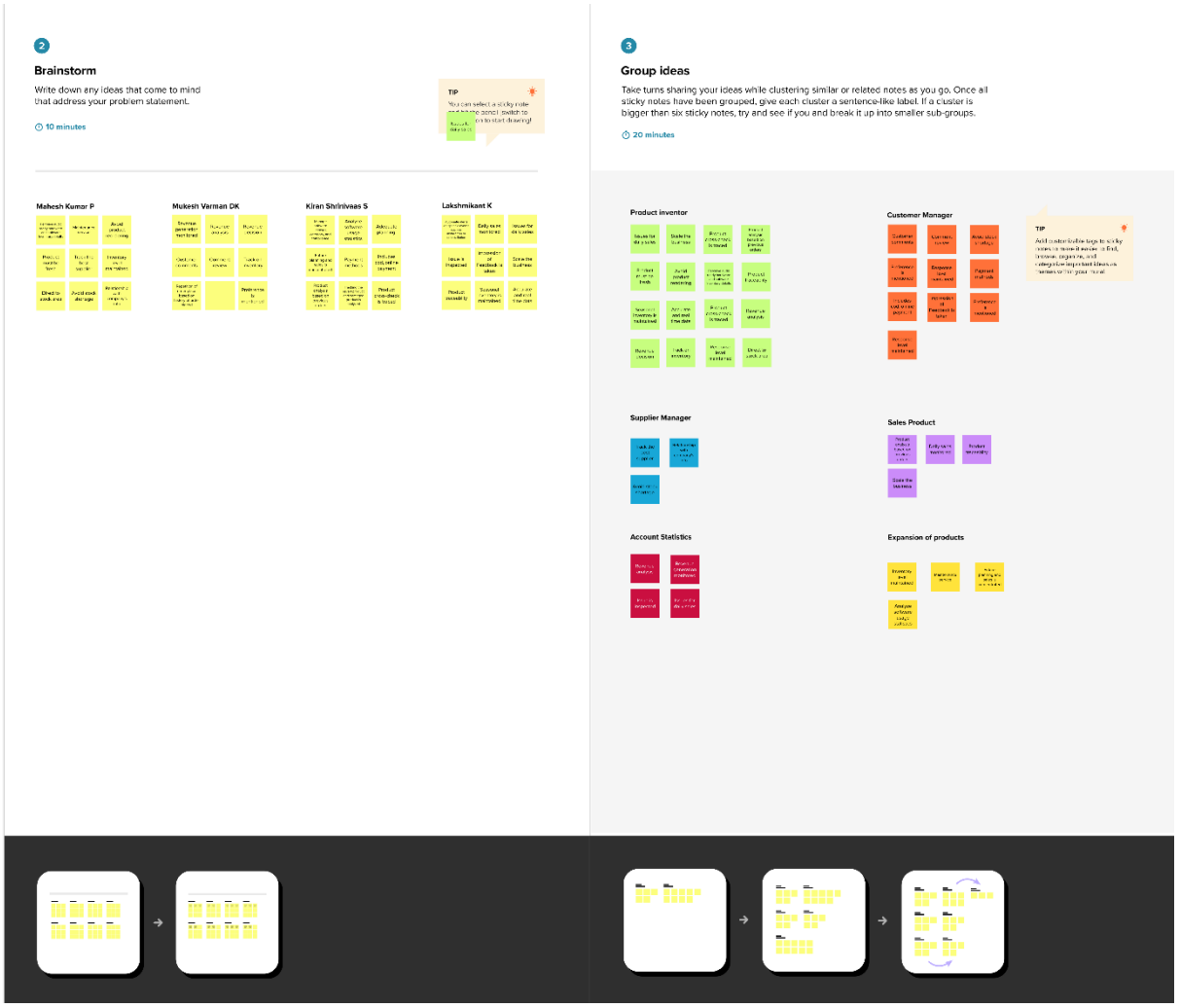
3.1 Empathy Map Canvas :



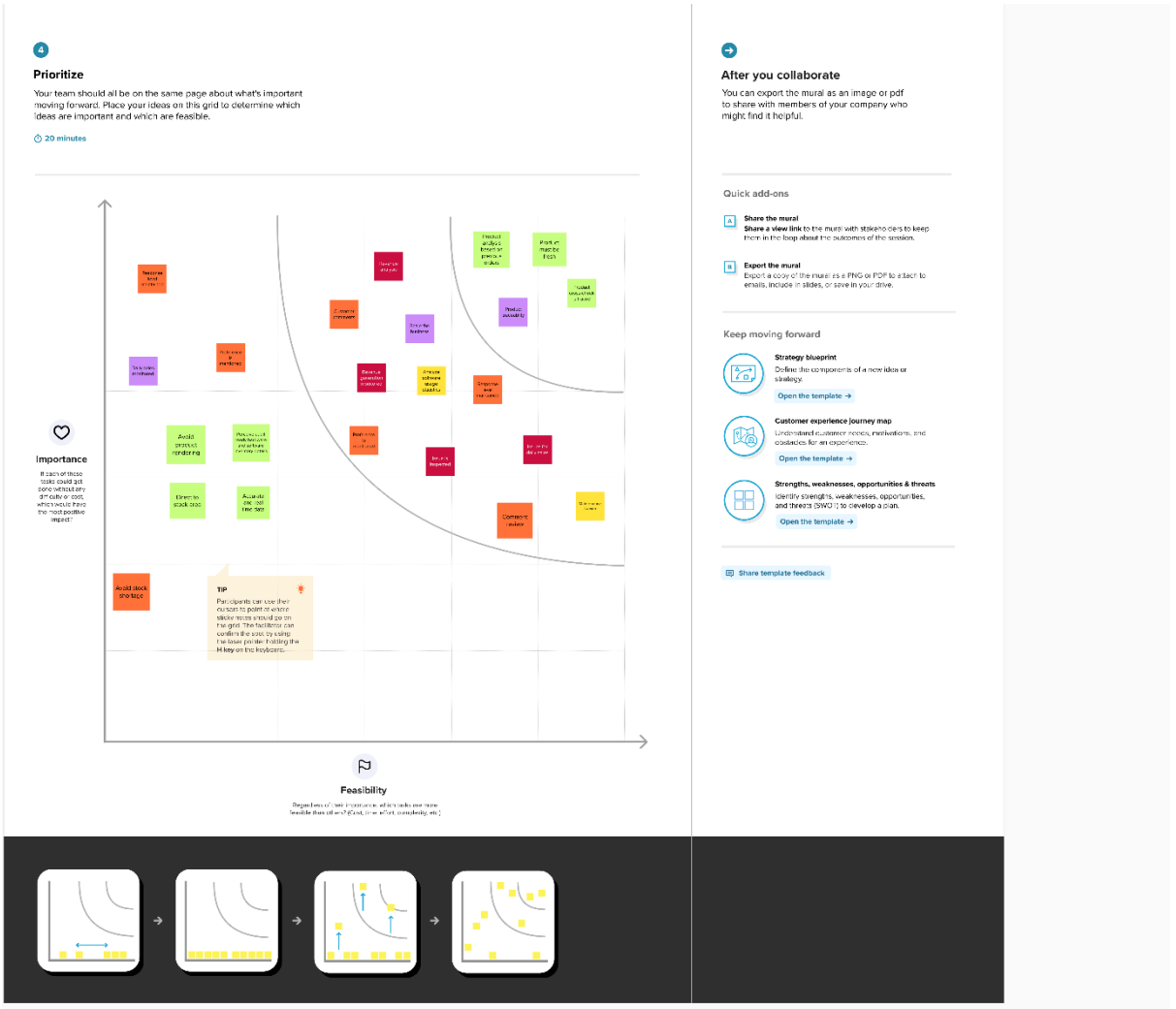
3.2 Ideation & Brainstorming

Step-1: Team Gathering, Collaboration and Select the Problem Statement :

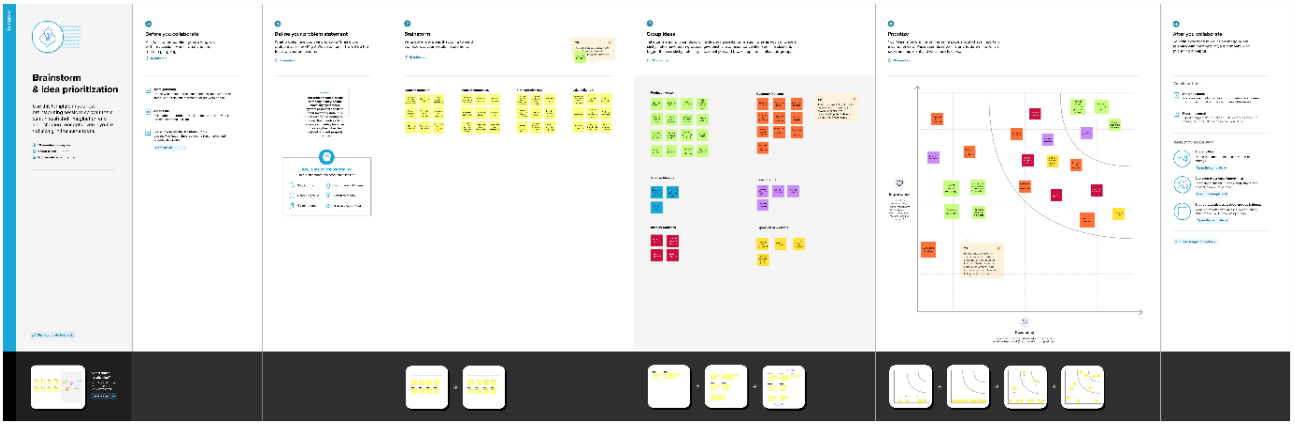
Step-2: Brainstorm, Idea Listing and Grouping :



Step-3: Idea Prioritization :



Entire pitch :

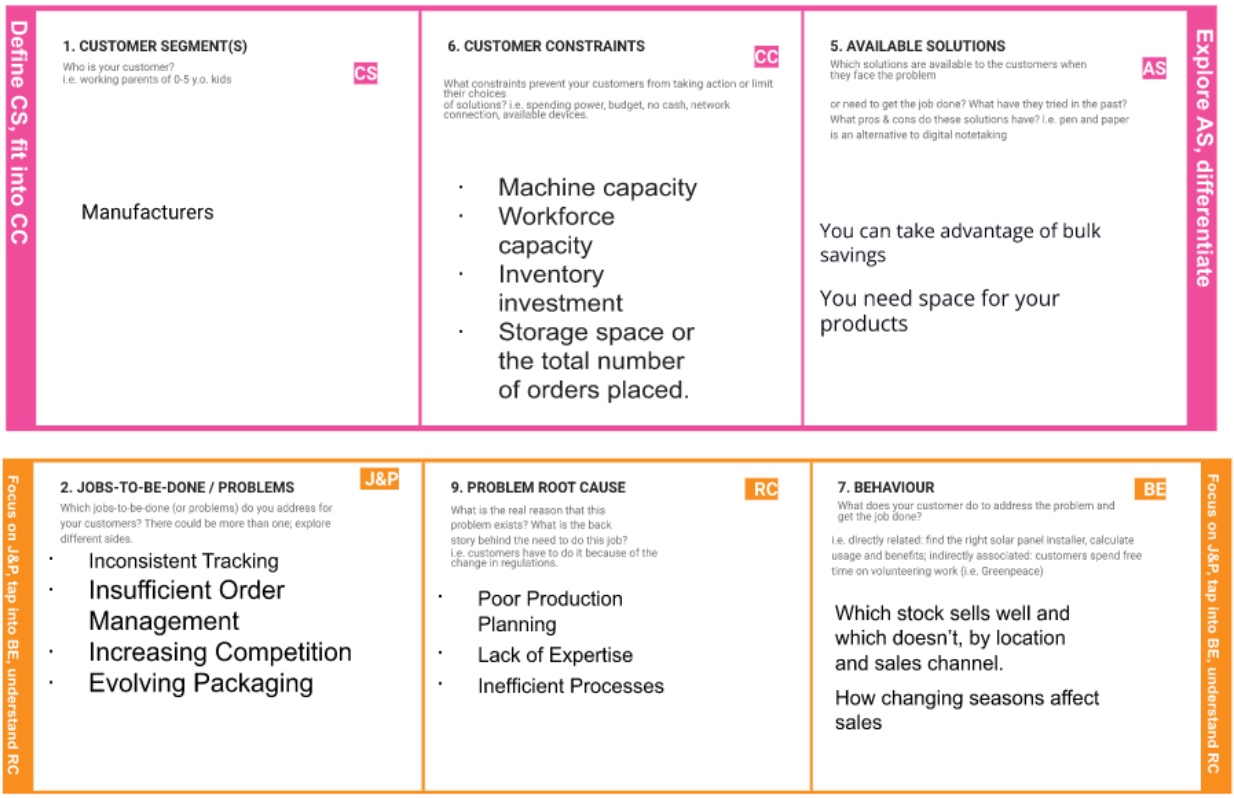


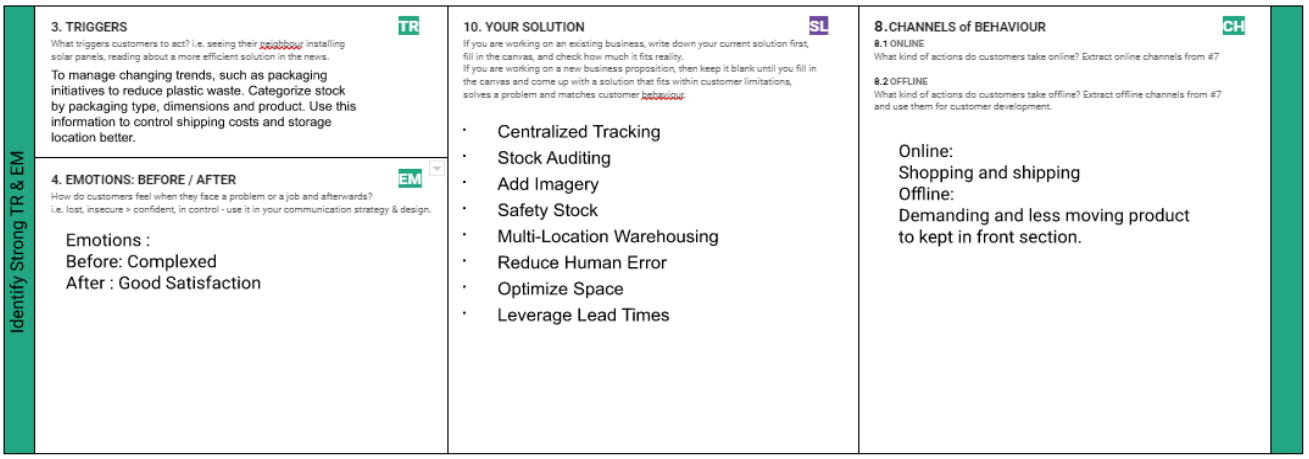
3.3 Proposed Solution :

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	The problem faced by the company is they do not have any systematic system to record and keep their inventory data. It is difficult for the admin to record the inventory data quickly and safely because they only keep it in the logbook and not properly organized. Good planning and sales forecast before setting optimal inventory levels, appropriate inventory management requires close coordination between the areas of sales, purchasing and finance.
	Idea / Solution description	No matter the size of your business, employing some of these common inventory management techniques can be a great way to take control of your stock. Here are a few to consider: 1. Just-in-time (JIT) inventory. 2. ABC inventory analysis. 3. Dropshipping. 4. Bulk shipments 5. Consignment 6. Cross-docking 7. Cycle counting.
	Novelty / Uniqueness	One of the biggest features of an inventory management system for small businesses is the ability to tell you how much you have left of each product. However, some systems can also help you predict future inventory needs. Data analysis uses information from your inventory cycle to help you make better business decisions. For example, it can track your historic sales to predict when you will get a surge of purchases, so you can buy extra inventory and prepare better for your peak season.
0.	Social Impact / Customer Satisfaction	• Delivering great customer service and a positive customer experience every time begins long before a sales transaction takes place. By developing smarter practices and procedures to increase inventory accuracy you can improve lead times, save money and ensure greater satisfaction and consumer loyalty. • Optimal inventory management is all about having what the customer wants, when and where they want it, while exceptional customer service is about meeting and exceeding consumer expectations. Having the right inventory control system will enable you to deliver on both.
0.	Business Model (Revenue Model)	.Point of sale integration I.Inventory catalog I.Automated reordering I.E-commerce integrations /.Product cost analysis /.Barcoding

		I.Forecasting
0.	Scalability of the Solution	Inventory management platforms include demand forecasting tools. This feature integrates with accounting and sales data to help you predict demand and schedule orders based on shifting customer preferences, material availability or seasonal trends.

3.4 Problem Solution fit :





4. **REQUIREMENT ANALYSIS :**

4.1 Functional requirement :

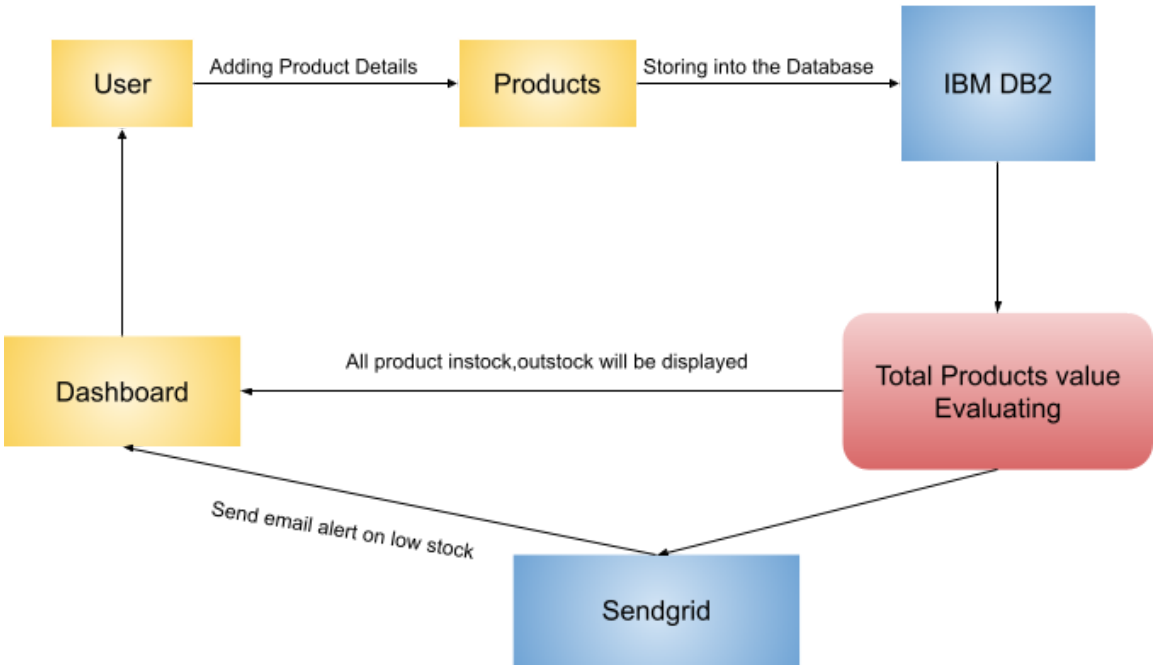
FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	Registration through Form Registration through Gmail Registration through LinkedIN
FR-2	User Confirmation	Confirmation via Email,OTP,Mobile-number
FR-3	Add,delete and update the stocks	Add or delete or update the stocks using the functions available in the inventory
FR-4	Indication	Receive an indication when an item I'm trying to buy is too much than the stock available
FR-5	Location	Able to make purchase from a particular location
FR-6	Re-order	Able to order the products after a certain period of time

4.2 Non-Functional requirements :

FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	Stocks/products are easily able to track and manage
NFR-2	**Security**	By providing one-time-password and 2-step authentication
NFR-3	**Reliability**	More number of stocks can be easily managed and retrieved
NFR-4	**Performance**	Website navigating and loading the content in few seconds.
NFR-5	**Availability**	Retailers, business and traders of all kind can make use of inventory management
NFR-6	**Scalability**	From low-scale retailer to high-scale retailer can very well make use of inventory management

5. PROJECT DESIGN :

5.1 Data Flow Diagrams :



5.2 Solution & Technical Architecture :

Proposed Solutions :

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	The problem faced by the company is they do not have any systematic system to record and keep their inventory data. It is difficult for the admin to record the inventory data quickly and safely because they only keep it in the logbook and not properly organized. Good planning and sales forecast before setting optimal inventory levels, appropriate inventory management requires close coordination between the areas of sales, purchasing and finance.
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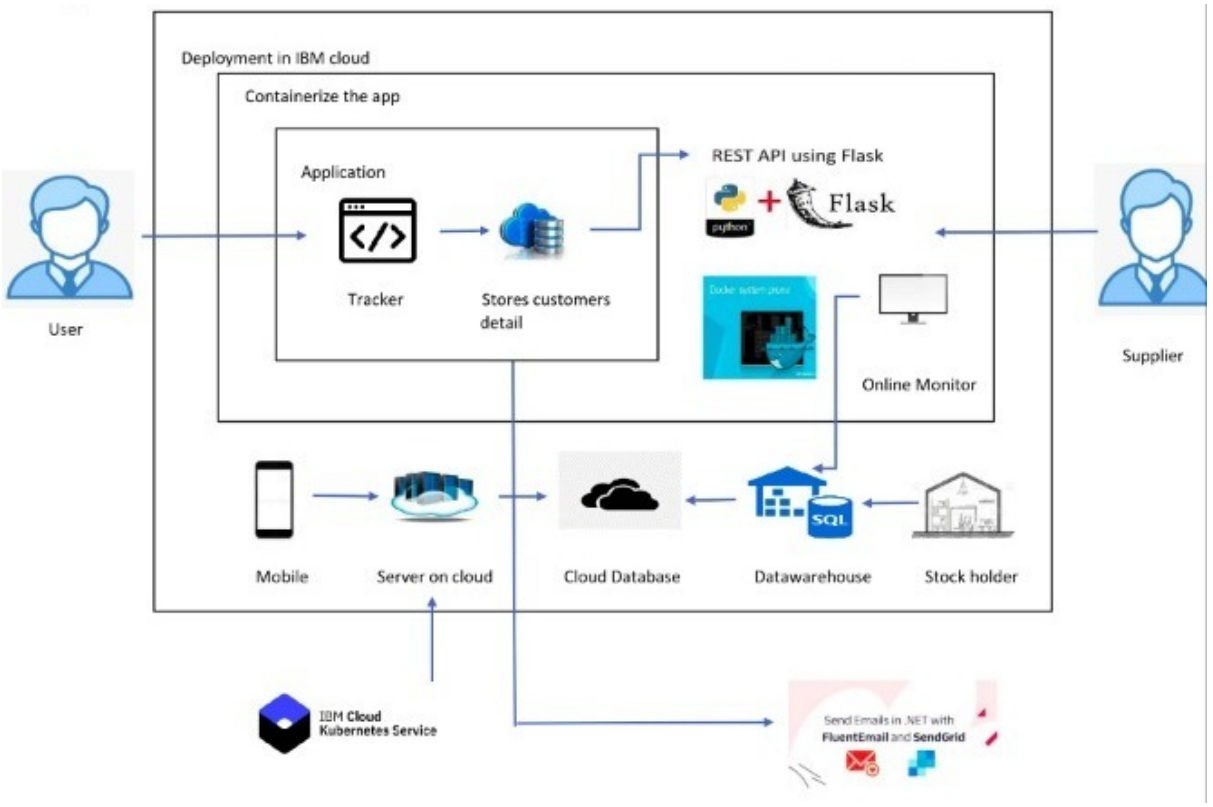
	Novelty / Uniqueness	One of the biggest features of an inventory management system for small businesses is the ability to tell you how much you have left of each product. However, some systems can also help you predict future inventory needs. Data analysis uses information from your inventory cycle to help you make better business decisions. For example, it can track your historic sales to predict when you will get a surge of purchases, so you can buy extra inventory and prepare better for your peak season.
0.	Social Impact / Customer Satisfaction	• Delivering great customer service and a positive customer experience every time begins long before a sales transaction takes place. By developing smarter practices and procedures to increase inventory accuracy you can improve lead times, save money and ensure greater satisfaction and consumer loyalty. • Optimal inventory management is all about having what the customer wants, when and where they want it, while exceptional customer service is about meeting and exceeding consumer expectations. Having the right inventory control system will enable you to deliver on both.
0.	Business Model (Revenue Model)	.Point of sale integration I.Inventory catalog I.Automated reordering I.E-commerce integrations /.Product cost analysis /.Barcoding I.Forecasting
0.	Scalability of the Solution	Inventory management platforms include demand forecasting tools. This feature integrates with accounting and sales data to help you predict demand and schedule orders based on shifting customer preferences, material availability or seasonal trends.

Technical Architecture :



5.3 User Stories :

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Retailer	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.	I can access my account / dashboard	High	Sprint-1
		USN-2	As a user, I will receive confirmation email once I have registered for the application	I can receive confirmation email & click confirm	Medium	Sprint-1
	Login	USN-3	As a user, I can log into the application by entering email & password	I can access my account / dashboard	High	Sprint-1
	Items	USN-5	As a user, I can add the items.	I can create a new type of item	High	Sprint-2
		USN-6	As a user, I can see the items	I can be able to see the items that can be	Low	Sprint-2

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
				added to the inventory		
	Inventory	USN-7	As a user, I can add the items to inventory.	I can add items to the inventory with quantity	High	Sprint-2
		USN-8	As a user, I can see the items in the inventory.	I can see the inventory items with quantity	Low	Sprint-2
	Indication	USN-9	As a user, I can be able to receive indication	I receive a notification when the stock running low	High	Sprint-3
	Location	USN-10	As a user, I can be able to see items from a particular store location	I can be able to make purchase from a particular location	Medium	Sprint-3
		USN-11	As a user, I can add a new location of my store	I can be able to add new store locations	Medium	Sprint - 3
Customer	Purchase	USN -12	As a customer, I can be able to purchase good from the particular location of the store	I can able to purchase from the store	High	Sprint - 4
Retailer & Customer	Deployment	USN-13	As a user, I can access the software in the web	I can access the software in web	High	Sprint -4

6. PROJECT PLANNING & SCHEDULING

6.1 Sprint Planning & Estimation

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Priority	Team Members
Sprint 1	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.	High	Split between all 4
Sprint 1		USN-2	As a user, I will receive confirmation email once I have registered for the application	Medium	Split between all 4
Sprint 1	Login	USN-3	As a user, I can log into the application by entering email & password	High	Lakshmikant & Kiran Shrinivaas
Sprint 2	Items	USN-5	As a user, I can add the items.	High	Mukesh Varman
Sprint 2		USN-6	As a user, I can see the items	Low	Lakshmikant

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Priority	Team Members
Sprint 2	Inventory	USN-7	As a user, I can add the items to inventory.	High	Maheshkumar
Sprint 2		USN-8	As a user, I can see the items in the inventory.	Low	Kiran Shrinivaas
Sprint 3	Indication	USN-9	As a user, I can be able to receive indication	High	Maheshkumar
Sprint 3	Location	USN-10	As a user, I can be able to see items from a particular store location	Medium	Mukesh Varman
Sprint 3		USN-11	As a user, I can add a new location of my store	Medium	Lakshmikant
Sprint 4	Purchase	USN -12	As a customer, I can be able to purchase good from the particular location of the store	High	Kiran Shrinivaas
Sprint 4	Deployment	USN-13	As a user, I can access the software in the web	High	Maheshkumar

Estimation :

Sprint	Total Story Points	Duration	Average Velocity
Sprint 1	**20**	**7 Days**	**20 / 7 = 2.85**
Sprint 2	**20**	**7 Days**	**20 / 7 = 2.85**
Sprint 3	**20**	**7 Days**	**20 / 7 = 2.85**
Sprint 4	**20**	**7 Days**	**20 / 7 = 2.85**
Total	**80**	**28**	**80 / 28 = 2.85**

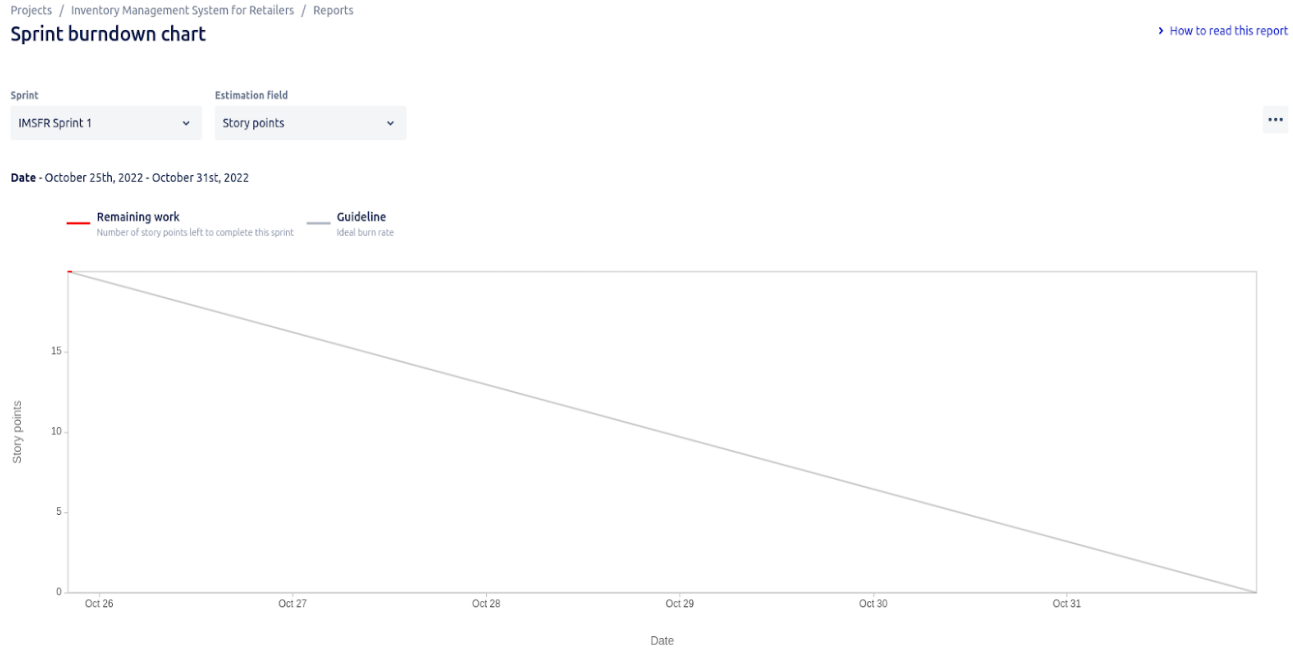
6.2 Sprint Delivery Schedule :

Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)
Sprint-1	20	7 Days	24 Oct 2022	30 Oct 2022	20	30 Oct 2022
Sprint-2	20	7 Days	31 Oct 2022	06 Nov 2022	20	07 Nov 2022
Sprint-3	20	7 Days	07 Nov 2022	14 Nov 2022	20	14 Nov 2022
Sprint-4	20	7 Days	14 Nov 2022	21 Nov 2022	20	21 ov 2022

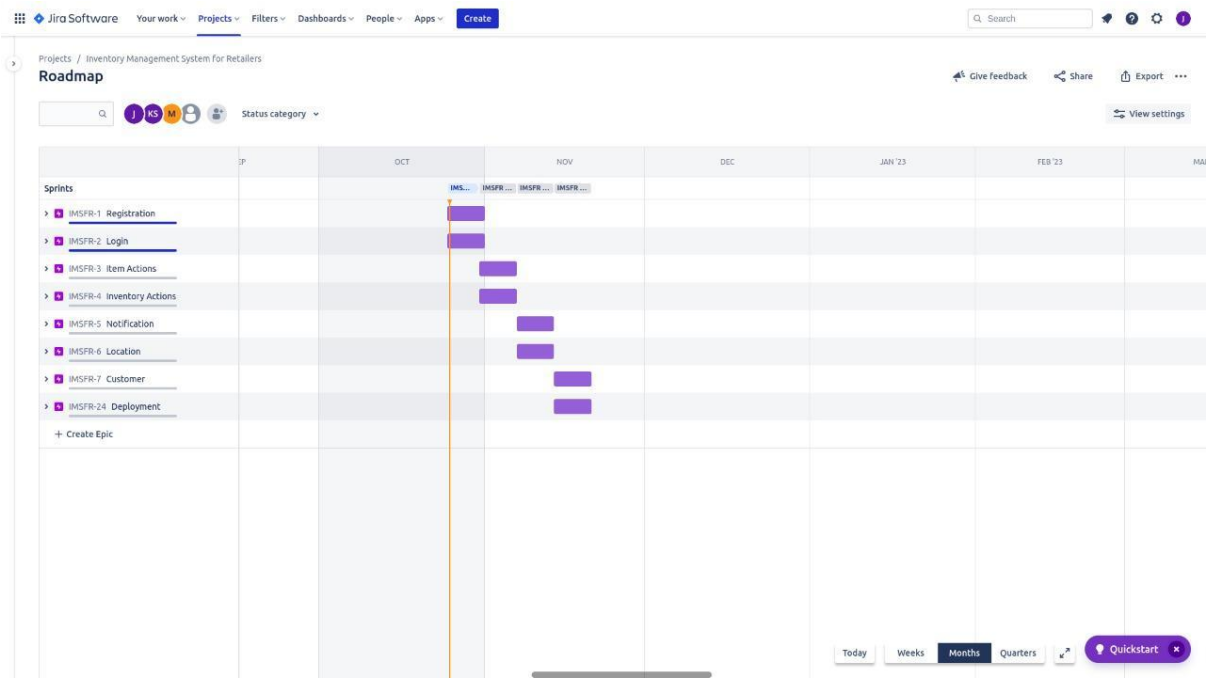
6.3 Reports from JIRA :

Project Planning :

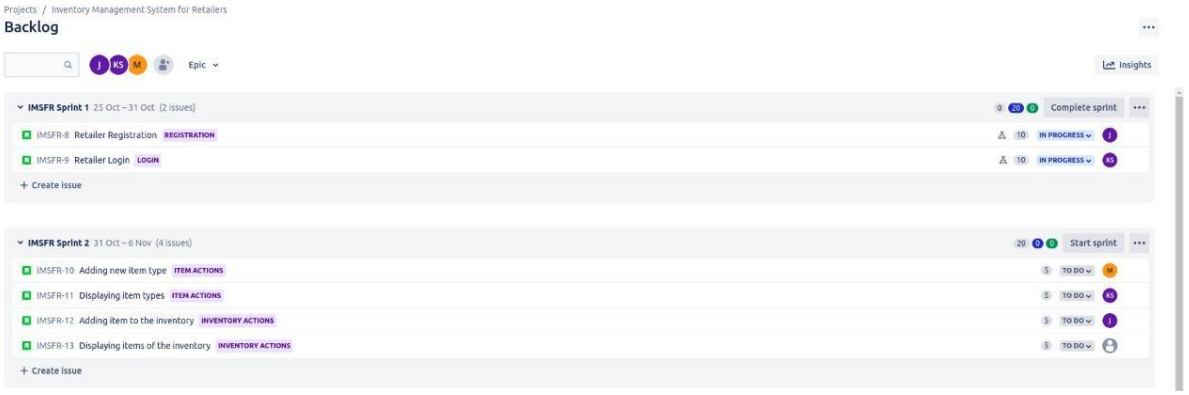
Burndown Chart:

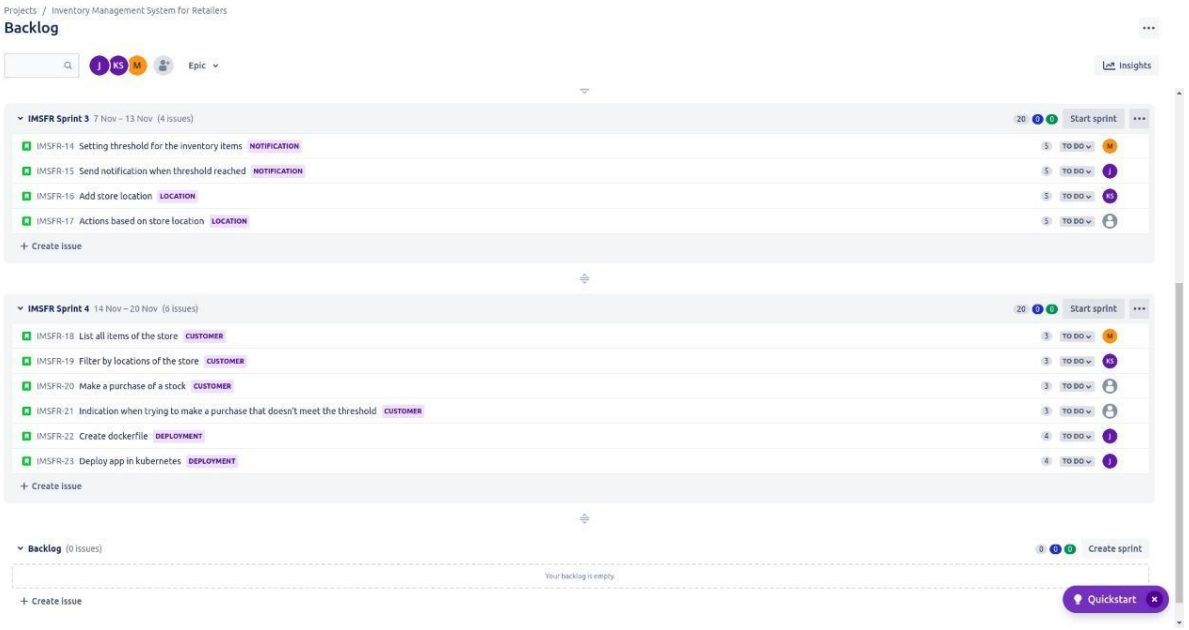


Roadmap:



Backlog :





7. CODING & SOLUTIONING

7.1 Registration & Login

```
def register():
    form = RegistrationForm()

    if form.validate():
        retailer_data = {
            'name': form.name.data,
            'email': form.email.data,
            'address': form.address.data,
            'is_active': False
        }
```

```
        retailer = Retailer(**retailer_data)
        retailer.set_password(form.password.data)

        send_confirmation_email(retailer)

        db.session.add(retailer)
        db.session.commit()
        response_data = {'id': retailer.id}
        return response.success(status_code=RESOURCE_CREATED,
data=response_data, message=REGISTRATION_SUCCESS)

    return response.error(status_code=UNPROCESSABLE_ENTITY,
data=form.errors, message=INVALID_DATA)


def login():
    form = LoginForm()

    if form.validate():
        retailer =
Retailer.query.filter_by(email=form.email.data).scalar()

        if retailer is None or (not
retailer.check_password(form.password.data)):
            return response.error(status_code=UNAUTHORIZED_ACCESS,
message=INVALID_DATA)
        elif not retailer.is_active:
            return response.error(status_code=UNAUTHORIZED_ACCESS,
message=NOT_ACTIVE)

        access_token = create_access_token(retailer)
        response_data = {
            'jwt_token': access_token
        }
        return response.success(status_code=REQUEST_COMPLETED,
data=response_data, message=LOGIN_SUCCESS)

    return response.error(status_code=UNPROCESSABLE_ENTITY,
data=form.errors, message=INVALID_DATA)
```

7.2 Sending Mails

```
def send_mail(subject, to_emails, plain_text_content=None,
html_content=None,
from_email=current_app.config['EMAIL_CONFIRMATION_SENDER_EMAIL']):
   message = Mail(
       from_email=from_email,
       to_emails=to_emails,
       subject=subject,
       plain_text_content=plain_text_content,
       html_content=html_content)

SendGridAPIClient(current_app.config['SENDGRID_API_KEY']).send(message)


def send_confirmation_email(user):
   try:
       to_emails = [user.email]
       confirmation_token = user.get_confirmation_token()
       confirmation_link = url_for(
           'auth.confirm_email', token=confirmation_token,
_external=True)
       subject = 'Inventory: Confirm Your Mail Now!'
       plain_text_content = 'Please confirm your account by clicking
the confirmation link below.'
       html_content = f'''
                       <a href='{confirmation_link}'
target='_blank'>Click Here to Confirm Your Account!</a>
                   '''
       send_mail(subject=subject, to_emails=to_emails,
                 plain_text_content=plain_text_content,
html_content=html_content)
   except Exception as e:
       current_app.log_exception(e)


def send_restock_mail(user, product_name):
   try:
       to_emails = [user.email]
       subject = 'Inventory: Product reached the Threshold.'
       plain_text_content = f'Please start think about restocking the
product {product_name}'
```

```
        send_mail(subject=subject, to_emails=to_emails,
                  plain_text_content=plain_text_content)
    except Exception as e:
        current_app.log_exception(e)
```

7.3 Products

```
@jwt_required()
def create():
    form = ProductForm()

    if form.validate():
        product_data = {
            'name': form.name.data,
            'description': form.description.data,
            'retailer_id': current_user.id
        }
        product = Product(**product_data)

        db.session.add(product)
        db.session.commit()
        response_data = {'id': product.id}
        return response.success(status_code=RESOURCE_CREATED,
data=response_data, message=PRODUCT_CREATED)

    return response.error(status_code=UNPROCESSABLE_ENTITY,
data=form.errors, message=INVALID_DATA)


@jwt_required()
def get_all():
    products = [product.to_dict() for product in current_user.products]

    return response.success(status_code=REQUEST_COMPLETED,
data=products, message=ALL_PRODUCTS)


@jwt_required()
@load_product_by_id
def get_by_id(product):
    return response.success(status_code=REQUEST_COMPLETED,
data=product.to_dict(), message=PRODUCT)
```

```
@jwt_required()
@load_product_by_id
def update_by_id(product):
    form = ProductEditForm()

    if form.validate():
        form_description = form.description.data
        if form_description != product.description:
            product.description = form_description

            db.session.add(product)
            db.session.commit()
        response_data = {'description': form_description}
        return response.success(status_code=REQUEST_COMPLETED,
data=response_data, message=PRODUCT_UPDATED)

    return response.error(status_code=UNPROCESSABLE_ENTITY,
data=form.errors, message=INVALID_DATA)


@jwt_required()
@load_product_by_id
def delete_by_id(product):
    db.session.delete(product)
    db.session.commit()
    return response.success(status_code=REQUEST_COMPLETED,
data=product.to_dict(), message=PRODUCT_DELETED)
```

7.4 Locations

```
@jwt_required()
def create():
    form = LocationForm()

    if form.validate():
        location_data = {
            'name': form.name.data,
            'address': form.address.data,
            'retailer_id': current_user.id
        }
        location = Location(**location_data)
```

```
        db.session.add(location)
        db.session.commit()
        response_data = {'id': location.id}
        return response.success(status_code=RESOURCE_CREATED,
data=response_data, message=LOCATION_CREATED)

    return response.error(status_code=UNPROCESSABLE_ENTITY,
data=form.errors, message=INVALID_DATA)


@jwt_required()
def get_all():
    locations = [location.to_dict() for location in
current_user.locations]

    return response.success(status_code=REQUEST_COMPLETED,
data=locations, message=ALL_LOCATIONS)


@jwt_required()
@load_location_by_id
def get_by_id(location):
    return response.success(status_code=REQUEST_COMPLETED,
data=location.to_dict(), message=LOCATION)


@jwt_required()
@load_location_by_id
def update_by_id(location):
    form = LocationEditForm()

    if form.validate():
        form_address = form.address.data
        if form_address != location.address:
            location.description = form_address

            db.session.add(location)
            db.session.commit()
        response_data = {'address': form_address}
        return response.success(status_code=REQUEST_COMPLETED,
data=response_data, message=LOCATION_UPDATED)
```

```
    return response.error(status_code=UNPROCESSABLE_ENTITY,
data=form.errors, message=INVALID_DATA)


@jwt_required()
@load_location_by_id
def delete_by_id(location):
    db.session.delete(location)
    db.session.commit()
    return response.success(status_code=REQUEST_COMPLETED,
data=location.to_dict(), message=LOCATION_DELETED)
```

7.5 Inventory

```
@jwt_required()
def create():
    form = InventoryForm()

    if form.validate():
        product_id = Product.query.with_entities(Product.id).filter_by(
            name=form.product_name.data,
retailer_id=current_user.id).scalar()
        location_id =
Location.query.with_entities(Location.id).filter_by(
            name=form.location_name.data,
retailer_id=current_user.id).scalar()

        already_exists = Inventory.query.filter_by(
            product_id=product_id, location_id=location_id).scalar()

        if already_exists:
            return response.error(status_code=UNPROCESSABLE_ENTITY,
message=ALREADY_EXISTS)

        inventory_data = {
            'product_id': product_id,
            'location_id': location_id,
            'quantity': form.quantity.data,
            'threshold': form.threshold.data
        }

        inventory = Inventory(**inventory_data)
```

```
        db.session.add(inventory)
        db.session.commit()
        response_data = {'id': inventory.id}
        return response.success(status_code=RESOURCE_CREATED,
data=response_data, message=INVENTORY_RECORD_CREATED)

    return response.error(status_code=UNPROCESSABLE_ENTITY,
data=form.errors, message=INVALID_DATA)


@jwt_required()
def get_all():
    product_ids = {product.id for product in current_user.products}
    inventory_items = Inventory.query.filter(
        Inventory.product_id.in_(product_ids)).all()
    inventory_items = [inventory_item.to_dict()
                       for inventory_item in inventory_items]

    return response.success(status_code=REQUEST_COMPLETED,
data=inventory_items, message=ALL_INVENTORY_ITEMS)


@jwt_required()
@load_inventory_item_by_id
def get_by_id(inventory_item):
    return response.success(status_code=REQUEST_COMPLETED,
data=inventory_item.to_dict(), message=INVENTORY_ITEM)


@jwt_required()
@load_inventory_item_by_id
def update_by_id(inventory_item):
    form = InventoryEditForm()

    if form.validate():
        form_quantity = form.quantity.data
        if form_quantity != inventory_item.quantity:
            inventory_item.quantity = form_quantity

        form_threshold = form.threshold.data
        if form_threshold != inventory_item.threshold:
            inventory_item.threshold = form_threshold
```

```
        db.session.add(inventory_item)
        db.session.commit()
        response_data = {'quantity': form_quantity,
                         'threshold': form_threshold}
        return response.success(status_code=REQUEST_COMPLETED,
data=response_data, message=INVENTORY_ITEM_UPDATED)

    return response.error(status_code=UNPROCESSABLE_ENTITY,
data=form.errors, message=INVALID_DATA)


@jwt_required()
@load_inventory_item_by_id
def delete_by_id(inventory_item):
    db.session.delete(inventory_item)
    db.session.commit()
    response_data = {'id': inventory_item.id}
    return response.success(status_code=REQUEST_COMPLETED,
data=response_data, message=INVENTORY_ITEM_DELETED)
```

7.6 Marketplace

```
def get_all_retailers():
    retailers = [{'id': retailer.id, 'name': retailer.name}
                 for retailer in
Retailer.query.with_entities(Retailer.id, Retailer.name).all()]
    return response.success(status_code=REQUEST_COMPLETED,
data=retailers, message=ALL_RETAILERS)


def get_all_locations_for_a_retailer(retailer_id):
    locations_for_a_retailer = Location.query.with_entities(Location.id,
Location.name).filter_by(
        retailer_id=retailer_id).all()
    locations_for_a_retailer = [{'id': location.id, 'name':
location.name}
                                for location in
locations_for_a_retailer]
    return response.success(status_code=REQUEST_COMPLETED,
data=locations_for_a_retailer, message=LOCATIONS_FOR_A_RETAILER)
```

```
def get_all_products_for_a_location(location_id):
   products_for_a_location =
Product.query.with_entities(Product.name).where(

Product.id.in_(Inventory.query.with_entities(Inventory.product_id).filt
er_by(location_id=location_id))).all()
   products_for_a_location = [{'name': product.name}
                              for product in products_for_a_location]
   return response.success(status_code=REQUEST_COMPLETED,
data=products_for_a_location, message=PRODUCTS_FOR_A_LOCATION)


def complete_purchase_order(retailer_id):
   form = PurchaseOrderForm()

   if form.validate():
       form_product_name = form.product_name.data
       product_id = Product.query.with_entities(
           Product.id).filter_by(name=form_product_name,
retailer_id=retailer_id).scalar()
       location_id = Location.query.with_entities(
           Location.id).filter_by(name=form.location_name.data,
retailer_id=retailer_id).scalar()

       existing_product_record = Inventory.query.filter_by(
           product_id=product_id, location_id=location_id).scalar()

       if not existing_product_record:
           return response.error(status_code=UNPROCESSABLE_ENTITY,
message=PRODUCT_NOT_EXIST_IN_THE_LOCATION)

       form_quantity = form.quantity.data
       if form_quantity > existing_product_record.quantity:
           return response.error(status_code=UNPROCESSABLE_ENTITY,
message=TOO_MUCH_QUANTITY)

       existing_product_record.quantity -= form_quantity

       if existing_product_record.quantity <=
existing_product_record.threshold:
           retailer =
Retailer.query.filter_by(id=Product.query.with_entities(
```

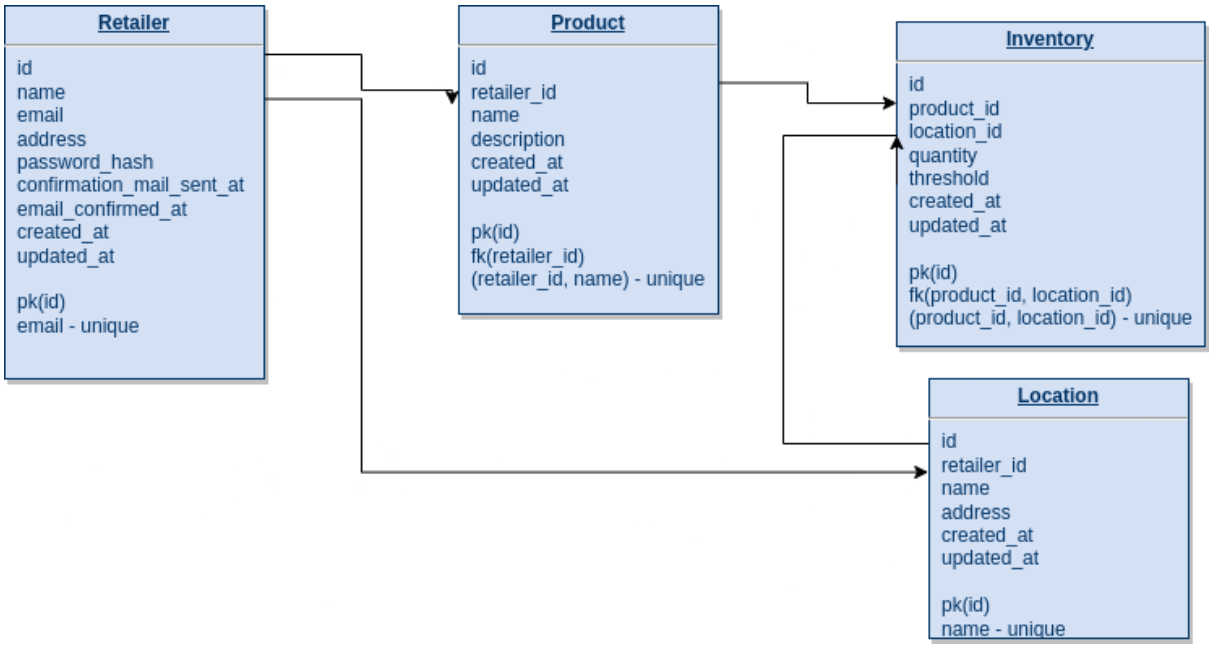
```
Product.retailer_id).filter_by(id=existing_product_record.product_id).s
calar()).scalar()
            send_restock_mail(retailer, form_product_name)

        db.session.add(existing_product_record)
        db.session.commit()

        respose_data = {'bought': form_product_name, 'quantity':
form_quantity}
        return response.success(status_code=REQUEST_COMPLETED,
                                data=respose_data,
message=PURCHASE_SUCCESSFUL)

    return response.error(status_code=UNPROCESSABLE_ENTITY,
                          data=form.errors, message=INVALID_DATA)
```

7.7 DB Models



8. Testing

8.1 Test Cases

https://github.com/IBM-EPBL/IBM-Project-10417-1659179409/tree/main/Project%20Development%20Phase/User%20Acceptance%20Testing

Test case ID	Feature Type	Component	Test Scenario	Pre-Requisite	Steps To Execute	Test Data	Expected Result	Actual Result	Status	Comments	TC for Automation(Y/N)	BUG ID	Executed By
LoginPage_TC_OO1	Functional	Home Page	Verify user is able to see the Login/Signup popup when user land on the page		1.Enter URL and click go 2.Verify login/Singup popup displayed or not		Login/Signup popup should display	Working as expected	Pass		N		
LoginPage_TC_OO2	UI	Home Page	Verify the UI elements in Login/Signup popup		1.Enter URL and click go 2.Click on respective button 3.Verify login/Singup popup with below UI elements: a.email text box b.password text box c.Login button d.New customer? Create account link e.Last password? Recovery password link		Application should show below UI elements: a.email text box b.password text box c.Login button with orange colour d.New customer? Create account link e.Last password? Recovery password link	Working as expected	Pass		N		
LoginPage_TC_OO3	Functional	Home page	Verify user is able to log into application with Valid credentials		1.Enter URL and click go 2.Click on My Account dropdown button 3.Enter Valid username/email in Email text box 4.Enter valid password in password text box 5.Click on login button	Username: test@gmail.com password: Testing123	User should navigate to user account homepage	Working as expected	Pass		N		
LoginPage_TC_OO4	Functional	Login page	Verify user is able to log into application with InValid credentials		1.Enter URL and click go 2.Click on button 3.Enter Valid username/email in Email text box 4.Enter invalid password in password text box 5.Click on login button	Username: test@gmail.com password: Testing6	Application should show 'Incorrect email or password ' validation message.	Working as expected	Pass		N		
ProductPage_TC_001	Fuctional	Product page	Verify user is able to see the products page		1. Go to the site 2. Click on products button		Application should show the products page	Working as expected	Pass		N		
ProductPage_TC_002	Functional	Product page	Verify user is able to add a product		1. Go to the site 2. Click on products button 3. Click on add 4. Fill necessary details		Application should create a product	Working as e	Pass		N		
ProductPage_TC_003	Functional	Product page	Verify user is able to delete a product		1. Go to the site 2. Click on products button 3. Click on delete		Application should delete a product	Working as e	Pass		N		

Test case ID	Feature Type	Component	Test Scenario	Pre-Requisite	Steps To Execute	Test Data	Expected Result	Actual Result	Status	Comments	TC for Automation(Y/N)	BUG ID	Executed By
ProductPage_TC_002	Functional	Product page	Verify user is able to add a product		1. Go to the site 2. Click on products button 3. Click on add 4. Fill necessary details		Application should create a product	Working as e	Pass		N		
ProductPage_TC_003	Functional	Product page	Verify user is able to delete a product		1. Go to the site 2. Click on products button 3. Click on delete		Application should delete a product	Working as e	Pass		N		
ProductPage_TC_004	Functional	Product page	Verify user is able to update a product		1. Go to the site 2. Click on products button 3. Click on update 4. Fill necessary details		Application should update a product	Working as e	Pass		N		
LocationPage_TC_001	Functional	Location page	Verify user is able to create a location		1. Go to the site 2. Click on locations button 3. Click on add 4. Fill necessary details		Application should add a location	Working as e	Pass		N		
LocationPage_TC_002	Functional	Location page	Verify user is able to delete a location		1. Go to the site 2. Click on locations button 3. Click on delete		Application should delete a location	Working as e	Pass		N		
LocationPage_TC_003	Functional	Location page	Verify user is able to update a location		1. Go to the site 2. Click on locations button 3. Click on update 4. Fill necessary details		Application should update a location	Working as e	Pass		N		
InventoryPage_TC_001	Functional	Inventory page	Verify user is able to create a Inventory record		1. Go to the site 2. Click on inventory button 3. Click on add 4. Fill necessary details		Application should create an inventor	Working as e	Pass		N		
InventoryPage_TC_002	Functional	Inventory page	Verify user is able to delete a Inventory record		1. Go to the site 2. Click on inventory button 3. Click on delete		Application should delete an inventor	Working as e	Pass		N		
InventoryPage_TC_003	Functional	Inventory page	Verify user is able to update a Inventory record		1. Go to the site 2. Click on inventory button 3. Click on update 4. Fill necessary details		Applicatoin should update an invento	Working as e	Pass		N		
							Application should fulfill the order						

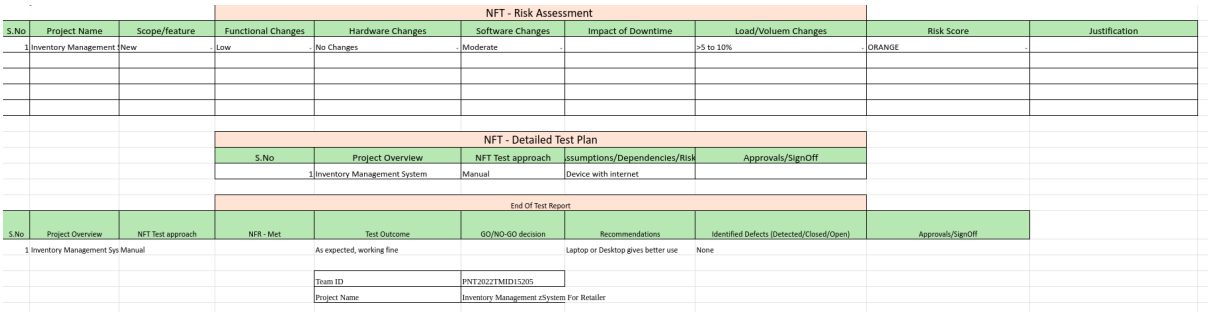
8.2 Defect Analysis

Resolution	Severity 1	Severity 2	Severity 3	Severity 4	Subtotal
By Design	0	0	0	0	0
Duplicate	0	0	2	0	2
External	0	0	0	0	0
Fixed	0	0	0	3	0
Not Reproduced	0	0	0	1	1
Skipped	0	0	0	0	0
Won't Fix	0	0	3	0	3
Totals	0	0	5	4	6

8.3 Test Case Analysis

Section	Total Cases	Not Tested	Fail	Pass
Login	4	0	0	4
Product	4	0	0	4
Location	3	0	0	3
Inventory	3	0	0	3
Marketplace	1	0	0	1

9. Performance Metrics



NFT - Risk Assessment

S.No	Project Name	Scope/feature	Functional Changes	Hardware Changes	Software Changes	Impact of Downtime	Load/Voluem Changes	Risk Score	Justification
1	Inventory Management S	New	Low	No Changes	Moderate		>5 to 10%	ORANGE	

NFT - Detailed Test Plan

S.No	Project Overview	NFT Test approach	ssumptions/Dependencies/Risk	Approvals/SignOff
1	Inventory Management System	Manual	Device with internet	

End Of Test Report

S.No	Project Overview	NFT Test approach	NFR - Met	Test Outcome	GO/NO-GO decision	Recommendations	Identified Defects (Detected/Closed/Open)	Approvals/SignOff
1	Inventory Management Sys	Manual		As expected, working fine		Laptop or Desktop gives better use	None	

Team ID	PNT2022TMID15205
Project Name	Inventory Management zSystem For Retailer

10. Advantages & Disadvantages

- **Allows to monitor product trends**
- **Allows to restock quickly**
- **Allows to understand user needs**
- **Allows to understand demographics of location**

11. Conclusion

So we've created an application that helps retailers to manage their inventories in various locations. They can also receive email whenever the stock count meets the threshold.

12. Future Scope

This is currently implemented as a web application. But a mobile app was also needed in order to connect and make the retailer's life easier. Future scope is to add mobile app support. Listing the purchases happened for each retailer. Showing graphs for the trends.

13. Appendix

- **Github - https://github.com/IBM-EPBL/IBM-Project-10417-1659179409**
- **Application - http://159.122.178.236:31098/register.html**
- **Video link - https://www.loom.com/share/117c36a1fa1344828258e0187eccea95**