

Analysis

Project: SmartInventory

Client: Villiers Hardware & Supplies (fictitious company)

1. Actors

- Admin
- Staff
- Email Service (for notification)

2. Use Cases

2.1 User Management:

- Existing/Pre-created admin creates admin user.
- Admin creates staff user.
- Admin logs in.
- Staff logs in.
- Deactivate admin.
- Deactivate staff.
- Admin/Staff logs out.
- View admin/staff.

2.2 Product Management

- Admin adds product.
- Admin edits product.
- Admin deactivates product.
- Admin views product details and history.

2.3 Supplier Management

- Admin adds supplier.
- Admin edits supplier.
- Admin deactivates supplier.
- View supplier.

2.4 Stock Management

- Admin records incoming stock.
- Senior Staff record incoming stock.
- Staff record outgoing stock.
- Admin records adjustments.
- Admin views stock movement history.

2.5 Forecasting

- Admin/Staff view forecasts.
- Admin triggers manual forecast refresh (if needed).

2.6 Procurement Management

- Admin/Senior staff creates purchase order.
- Admin/Senior staff adds product line item.
- Admin/Senior staff removes product line item.
- Admin/Senior staff view purchase order.
- Admin/Senior staff edits purchase order.
- Admin/Senior staff exports purchase order to PDF.

2.7 Reporting

- Admin/Staff view stock valuation report.
- Admin/Staff view fastest-moving items report.
- Admin/Staff view slow-moving items report.
- Admin/Staff view forecast report.
- Admin/Staff view monthly usage report.
- Admin/Staff view shrinkage/adjustment report.
- Admin/Staff export reports to CSV/PDF.

2.8 Dashboard

- Admin/Staff view low stock.
- Admin/Staff view predicted stockouts.

3. Entities

3.1 Admin

- Id → A unique ID for the admin.
- FirstName → The first name of the admin.
- LastName → The last name of the staff.
- Email → The admin's email.
- Username → The admin's personal username or login username.
- PasswordHash → The admin's hashed password.
- RoleId → Indicates the role of the admin (Admin).
- Status → Indicates if the admin is still active in the company or is deactivated.
- DateCreated → The date on which the admin was added to the system.
- LastLoginDate → The date on which the admin last logged in.
- Permissions → The privileges that the admin is given in the system.

3.2 Staff

- Id → A unique ID for the staff.
- FirstName → The first name of the staff.
- LastName → The last name of the staff.
- Email → The email of the staff.
- Username → The personal username of the staff, for login purposes.
- PasswordHash → The password of the staff, hashed.
- RoleId → Specifies the role of the staff in the company. (Staff or Senior Staff)
- Status → Indicates if the staff is still active in the company or deactivated.
- DateCreated → The date on which the staff was added to the system.
- LastLoginDate → The date on which the staff last logged in.
- Permissions → The privileges that the staff is given in the system.

3.3 Supplier

- Id → A unique ID for the supplier.
- SupplierName → The name of the supplier.
- ContactPersonName → The name of the person they interact with.
- ContactPersonEmail → The email of the person they interact with.
- ContactPersonPhone → The phone number of the person they interact with.
- ContactPersonRole → The role of the person they interact with.
- Address → The physical address of the supplier.
- Phone → The phone number of the supplier.
- Email → The email of the supplier.
- Website → The URL of the supplier's website.
- IsActive → Indicates whether the supplier is still active or deactivated.
- DateCreated → The date on which the supplier was added to the system.

3.4 StockTransaction

- TransactionId → A unique ID for each stock transaction.
- ProductId → Identifies which product the stock change applies to.
- UserId → Identifies the admin or staff who performed the action.
- Date → The exact timestamp the transaction occurred.
- QuantityChange → The amount by which stock changed.
- ReasonTypeId → Provides clarity on the nature of the transaction.
- PreviousStock → The stock quantity before this transaction was applied.
- NewStock → The stock quantity after the transaction was applied.

3.5 PurchaseOrder

- PurchaseOrderId → Unique ID for each purchase order.
- SupplierId → Identifies the supplier to which the PO is sent.
- OrderDate → Date the PO was created.
- ExpectedDeliveryDate → Estimated date the supplier will deliver the goods.

- Status → Tracks where the PO is in the process (Pending/Approved/Sent/Partially Received/Completed/Canceled).
- Notes → Internal comments or instructions.
- AutoGenerated → It helps analytics and traceability (true, if PO was generated by the forecast engine or false, if created manually by the admin).

3.6 PurchaseOrderItem

- PurchaseOrderItemId → Unique ID for the PO line item.
- ProductId → Identifies which purchase order this item belongs to.
- QuantityOrdered → Quantity requested from the supplier.
- UnitCost → Cost of a single unit at the time the PO was created.
- TotalCost → $\text{StoredValue} = \text{QuantityOrdered} * \text{UnitCost}$.
- QuantityReceived → Tracks how much of this item has actually been delivered by the supplier.
- ReceivedDate → The date on which the item was fully received.
- PurchaseOrderId → Links the item to the purchase order.

3.7 Forecast (generated on demand)

- ForecastId → Identifies the forecast.
- ProductId → The product the forecast is for.
- ForecastDate → Date for which the prediction applies.
- ForecastedQuantity → How many units are expected to be needed/sold/used on that date.
- GeneratedOn → Timestamp when the forecast was calculated.
- MethodUsed → Indicates the forecasting algorithm used.

3.8 Report (generated on demand)

- ReportId → An identifier for the report.
- ReportType → StockValuation/Shrinkage/Forecast/FastMoving/MonthlyUsage.
- GeneratedOn → Timestamp when the report was generated.
- GeneratedByUserId → The ID of the user who generated the report.
- PeriodStart → The start of the period for which the report was generated.

- PeriodEnd → The end of the period for which the report was generated.
- Data (JSON) → The report result stored as JSON.

3.9 Product

- SKU → A unique ID for the product.
- Name → The name of the product.
- Description → A text describing the product.
- SupplierId → Links the product to its default supplier.
- Unit Price → The selling price of the product.
- Cost Price → The price the business pays the supplier for one unit.
- Minimum Stock Level → The threshold below which the product becomes “low stock”.
- Current Stock → The real time quantity available.
- Reorder Quantity → The default quantity to order when stock is low.
- Category → Allows grouping of products.
- UnitMeasurement → The size of the product.
- IsActive → Indicates if the product is available, to avoid deleting stock history.
- DateCreated → For audits and tracking when the product was added.
- LastUpdated → Tracks when product details were last changed.
- Barcode → A numeric or alphanumeric code printed under the barcode symbol.

3.10 Permission

- Id → A unique ID for the permission.
- Name → The name of the permission.
- Description → A text describing the permission.

3.11 Role

- Id → An identifier for the role.
- Name → The name of the role.

3.12 RolePermission

- RoleId → Links the entity to a role.
- PermissionId → Links the entity to a permission.

3.13 ReasonType

- Id → A unique ID for the reason type.
- Reason → (Received/Issued/Adjusted/Damaged/Returned)

4. Permission Types

4.1 User Management

- CreateUser
- EditUser
- DeactivateUser
- ViewUsers

4.2 Product Management

- AddProduct
- EditProduct
- DeactivateProduct
- ViewProductDetails
- ViewProductHistory

4.3 Supplier Management

- AddSupplier
- EditSupplier
- DeactivateSupplier
- ViewSupplierDetails

4.4 Stock Management

- RecordIncomingStock
- RecordOutgoingStock
- RecordAdjustment
- ViewStockLevels

4.5 Forecasting

- ViewForecast
- ViewForecastAlerts
- RefreshForecasts

4.6 Procurement Management

- CreatePurchaseOrder
- EditPurchaseOrder
- ViewPurchaseOrder
- ExportPurchaseOrderToPdf
- UpdatePurchaseOrderStatus

4.7 Reports

- ViewReports
- ExportReports

4.8 Notifications

- ViewLowStockAlerts
- ViewStockoutPredictionAlerts
- ViewSlowMovingAlerts

5. Entity Relationships

5.1 **User** may perform one or more **StockTransactions**, but a StockTransaction is performed by one User. [1:M]

5.2 **User** may create one or more **PurchaseOrder(s)**, but a PurchaseOrder is created by one User. [1:M]

5.3 **Supplier** may supply one or more **Product(s)**, but a Product is supplied by only one Supplier. [1:M]

5.4 **Supplier** may receive one or more **PurchaseOrder**(s), but a PurchaseOrder may be sent to only one Supplier. [1:M]

5.5 **Product** may appear in one or more **StockTransaction**(s), but a StockTransaction belongs to one Product. [1:M]

5.6 **Product** may appear in one or more **PurchaseOrderItem**(s), but a PurchaseOrderItem belongs to one Product. [1:M]

5.7 **PurchaseOrder** may contain one or more **PurchaseOrderItem**(s), but a PurchaseOrderItem belongs to one PurchaseOrder. [1:M]

5.8 **User** may have one or more **Permission**(s), and a Permission may be granted to one or more User(s). [M:N]

6. Permission Assignments

6.1 Admin

- All permissions

6.2 Senior Staff

- Stock Permissions
- Forecast Permissions
- Procurement Permissions
- Notification Permissions
- Reports Permissions
- ViewProductDetails

6.3 Standard Staff

- RecordOutgoingStock Permission
 - ViewStockLevels Permission
 - ViewForecast Permission
 - ViewProductDetails Permission
-