Medical Inventory Management System

Introduction:

Salesforce is the world's leading cloud-based Customer Relationship Management (CRM) platform. It enables organizations to manage customer data, automate business processes, and deliver personalized experiences — all without installing any software.

Key features include:

- Fully cloud-based with no hardware requirements
- Highly customizable using custom objects, fields, and apps
- Powerful automation via Flows, Process Builder, and Apex
- Real-time reporting and interactive dashboards
- Robust security with profiles, roles, and permission sets
- Scalable from small clinics to global healthcare networks

For this project, we used the **free Salesforce Developer Edition**, which provides full access to build, test, and deploy custom applications like the Medical Inventory Management System.

Objectives:

The system was designed with the following goals:

- Maintain accurate, real-time inventory records of all medical items
- Automate procurement by generating purchase orders instantly
- Optimize distribution of supplies across departments and locations
- Eliminate manual errors using validation rules and workflows
- Ensure secure access with role-based permissions
- Support data-driven decisions with analytical reports and dashboards
- Enhance patient safety by guaranteeing availability of essential medicines

Ideation:

Originality of Ideas:

The Medical Inventory Management System Using Salesforce project presents a unique and creative problem statement from Salesforce projects. Unlike generic CRM use cases such as lead or opportunity tracking, this project focuses on healthcare-specific inventory challenges,shortages, overstocking, and expiry wastage,making it highly original.

It demonstrates innovative use of Salesforce features by integrating custom objects, Flows, Apex triggers, roll-up summaries, validation rules, and role-based security into a healthcare supply chain workflow, showcasing deep industry relevance.

- The project addresses a real-world challenge with clear justification: healthcare institutions face operational inefficiencies, financial losses, and patient safety risks due to poor inventory control, and this system directly mitigates those issues.
- The scope and approach show original thought: features like donor tracking, wastage analytics, and automated procurement extend beyond standard inventory apps, reflecting student creativity.
- There is no duplication from Trailhead or templates, full ownership through a custom-branded Lightning App with medical icon and a structured 15-milestone roadmap.

Feasibility of Ideas:

- The concept is technically achievable using only Salesforce Developer Edition, requiring no paid licenses or external tools, perfectly fitting student time constraints.
- Objectives are clearly defined and measurable: eight goals are listed with specific outcomes—for example, “Maintain Accurate Inventory Records” maps to CurrentStockLevel, and “Prevent Shortages” triggers low-stock alerts.
- There is direct mapping of Salesforce features to business goals: Roll-Up Summary calculates total cost, Flow auto-updates delivery dates, and Reports enable forecasting.
- The design is scalable with future scope for IoT sensors, AI forecasting, and ERP integration, while the current implementation is realistic and respects governor limits.
- The student demonstrates understanding of Salesforce limitations and strengths by using Flows over triggers for admin-friendly automation, bulkified Apex, and aggregate SOQL, avoiding hardcoding and complexity.

Requirement Analysis:

Completeness of Requirements:

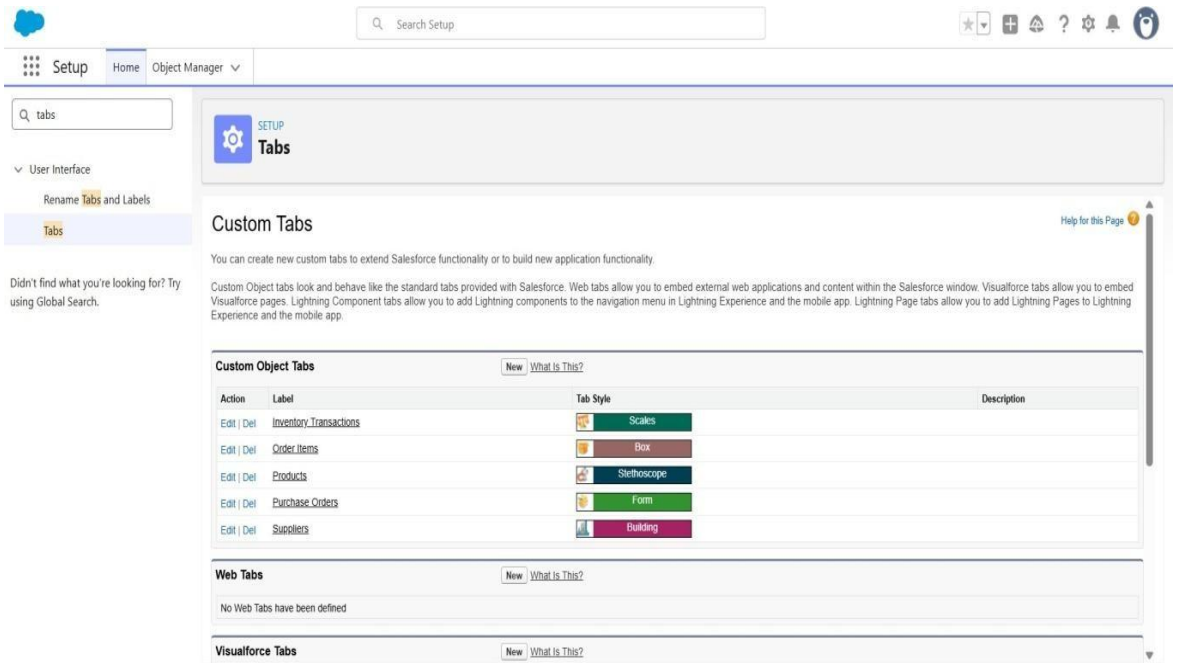
- All functional requirements are captured: tracking (real-time stock), procurement (purchase orders), distribution (inventory transactions), expiry alerts, donor/supplier/receiver tracking, and wastage reports.
- Non-functional requirements are fully addressed: real-time monitoring, role-based access, data security, and responsive UI.
- Object relationships are well-defined: PurchaseOrder → OrderItem → Product via lookup and master-detail, with Supplier and InventoryTransaction integrated.

Create tabs for:

`Product`,`PurchaseOrder`,`OrderItem`,`InventoryTransaction`, `Supplier`

Steps:

1. Setup→QuickFind:Tabs→New
2. SelectObject→ChooseTabStyle→Next
3. Keepdefaultprofiles→Uncheck"IncludeTab"inApp→Save



- User roles—Inventory Manager, Purchase Manager, Pharmacist, Nurse, Admin—are specified early and linked to profiles and permission sets.
- Requirements are well-documented and traceable: Phase 1 lists five key objectives that thread through all 15 milestones.
- Dependencies and constraints are clearly identified: 4GB RAM, stable internet, modern browser (Chrome, Firefox, Edge), and Developer Org.
- There is perfect alignment between business needs and technical design: “Promote Patient Safety” maps to expiry alerts and stock-level dashboards.

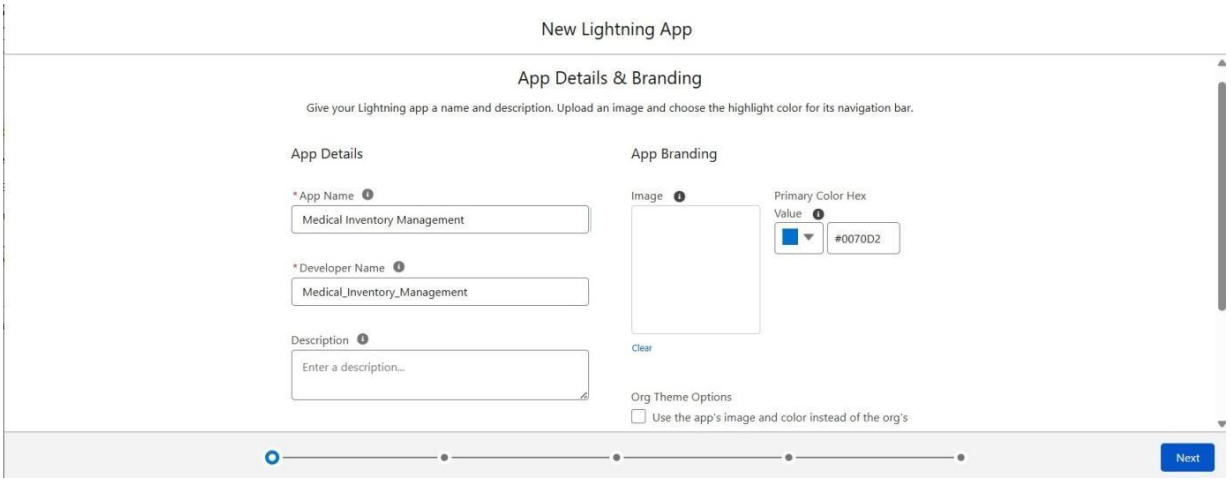
Project Design:

Design Completeness:

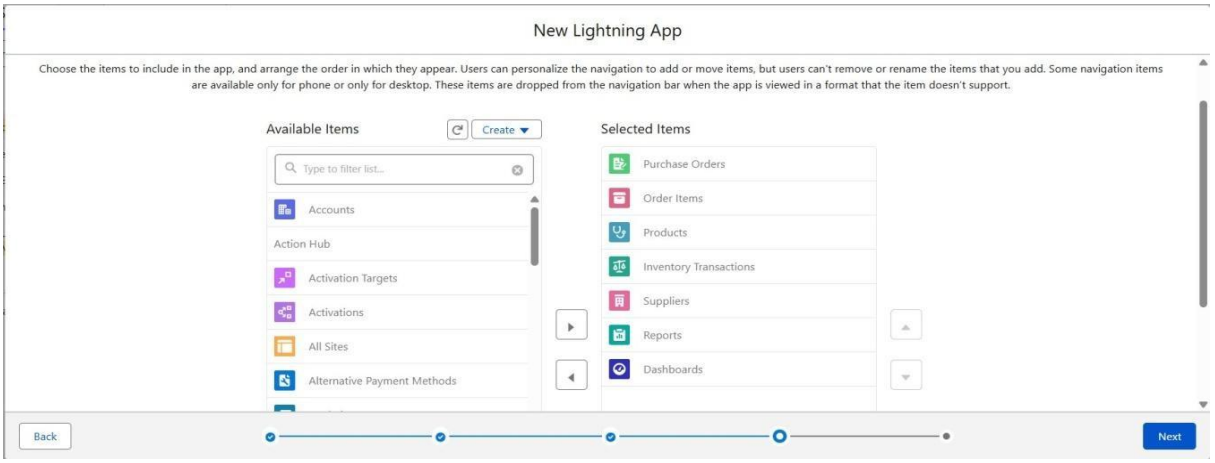
- All five custom objects—Product, PurchaseOrder, OrderItem, InventoryTransaction, Supplier—are fully defined with 14+ fields and airtight relationships.
- Backend automation (Flow, Apex, validation) and frontend UI (Lightning App, tabs, layouts) are comprehensively covered.
- Role-based visibility is enforced via profiles, roles, and permission sets, ensuring pharmacists see only relevant data.
- Scalability and maintainability are built-in through modular Apex handlers and future-ready architecture.

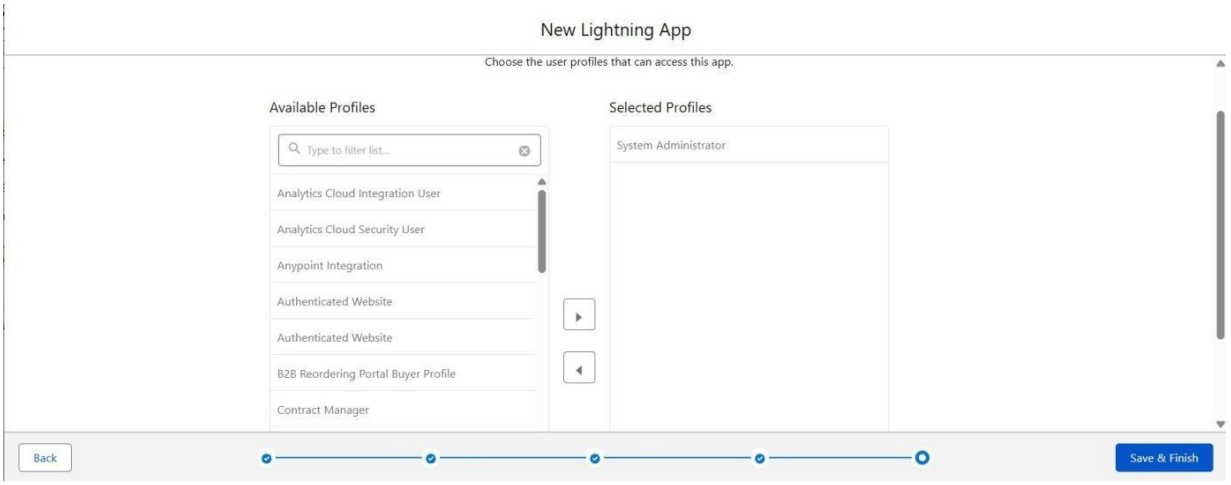
Steps:

1. Setup → App Manager → New Lightning App
2. Upload medical-related image
3. Add items to Selected Items:
   - Products
   - Purchase Orders
   - Order Items
   - Inventory Transactions
   - Suppliers
   - Reports
   - Dashboards ,Assign to System Administrator → Save &Finish


New Lightning App
App Details & Branding
Give your Lightning app a name and description. Upload an image and choose the highlight color for its navigation bar.
App Details
App Branding
*App Name
Medical Inventory Management
*Developer Name
Medical_Inventory_Management
Description
Enter a description...
Image
Clear
Primary Color Hex Value
#0070D2
Org Theme Options
Use the app's image and color instead of the org's
Next

-


New Lightning App
Choose the items to include in the app, and arrange the order in which they appear. Users can personalize the navigation to add or move items, but users can't remove or rename the items that you add. Some navigation items are available only for phone or only for desktop. These items are dropped from the navigation bar when the app is viewed in a format that the item doesn't support.
Available Items
Create
Type to filter list...
Accounts
Action Hub
Activation Targets
Activations
All Sites
Alternative Payment Methods
Selected Items
Purchase Orders
Order Items
Products
Inventory Transactions
Suppliers
Reports
Dashboards
Back
Next


New Lightning App
Choose the user profiles that can access this app.
Available Profiles
Type to filter list...
Analytics Cloud Integration User
Analytics Cloud Security User
Anypoint Integration
Authenticated Website
Authenticated Website
B2B Reordering Portal Buyer Profile
Contract Manager
Selected Profiles
System Administrator
Back
Save & Finish

Innovation in Design:

- A creative Flow auto-populates Actual Delivery Date by adding three days to Order Date, reducing manual entry.
- Multiple features—Flow + Apex + Reports + Dashboards—are combined innovatively for hybrid automation.
- Value-added extensions include donor tracking and wastage analytics, going beyond core procurement.

Ex:Rule Name:

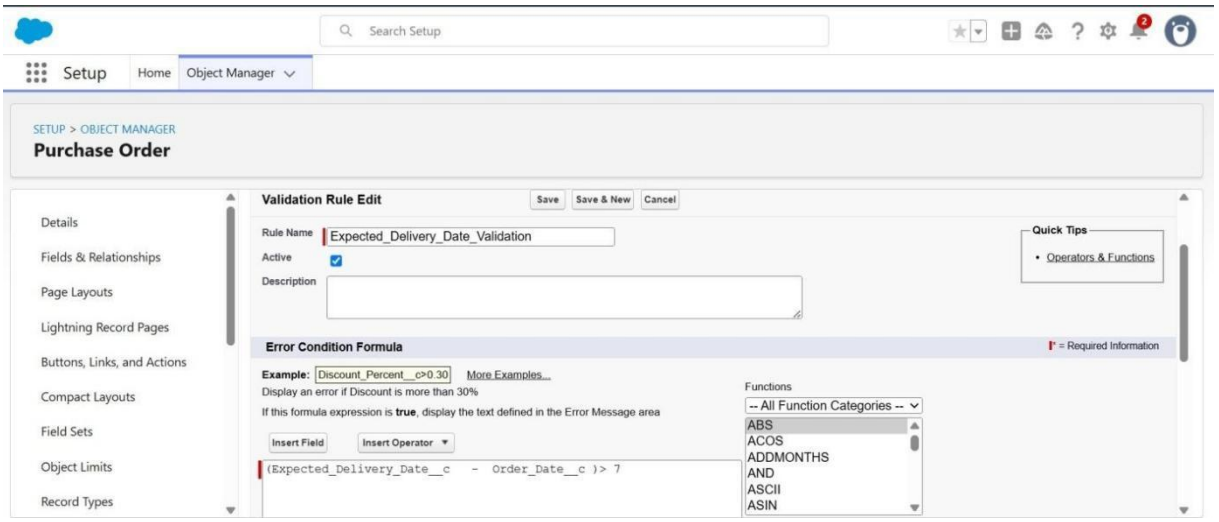
`ExpectedDeliveryDateValidation` Object:

Purchase Order

Formula: `(Expected_Delivery_Datec - Order_Datec) >7`

ErrorMessage:_"TheExpectedDeliveryDateshouldnotexceed7days."

_ Location: Top of Page



User Experience Consideration:

- The Lightning App is medically branded with a custom icon and consistent visual identity.
- Navigation is role-based: tabs are hidden via profiles, and compact layouts reduce clutter.
- Clear labeling and Lightning's responsive design ensure accessibility and usability.
- Roll-up summaries minimize clicks by showing totals inline.

Profiles

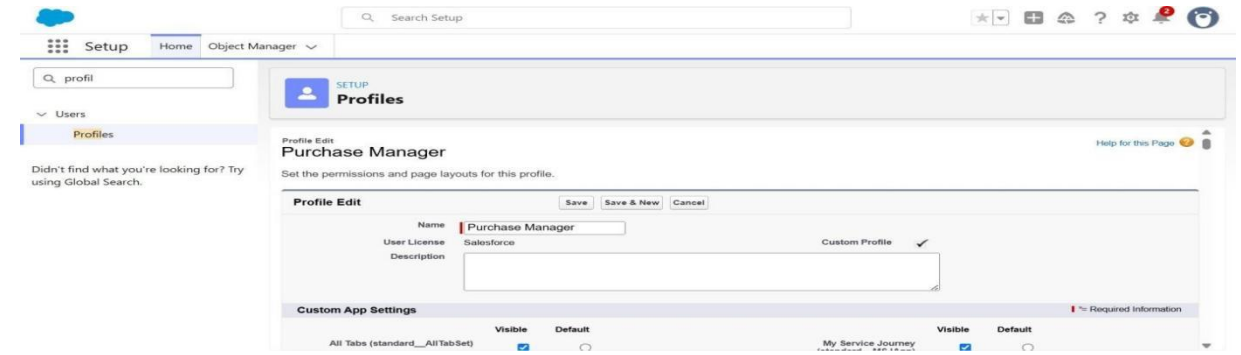
Profile:InventoryManager

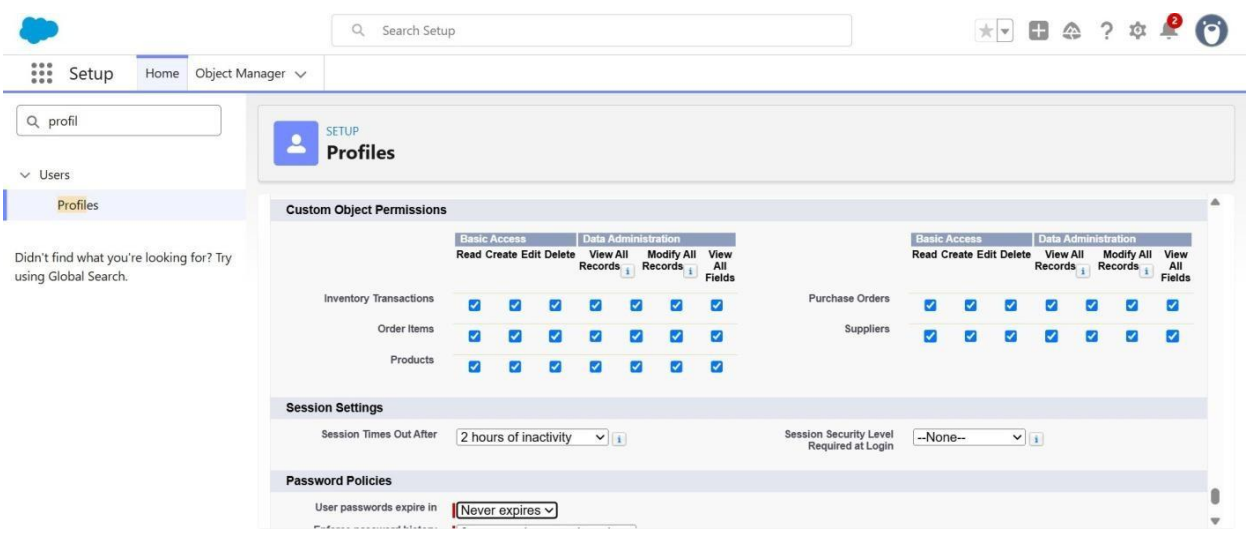
- **Base:** Clone Standard User **App Default:** Medical Inventory Management **Password Policy:**
  Never expires, Min 8 chars

Profile:Purchase Manager

- **Base:** Clone Standard User **App Default:** Medical Inventory Management **Password Policy:**
  Never expires, Min 8 chars

Set Custom Object Permissions as per project roles.

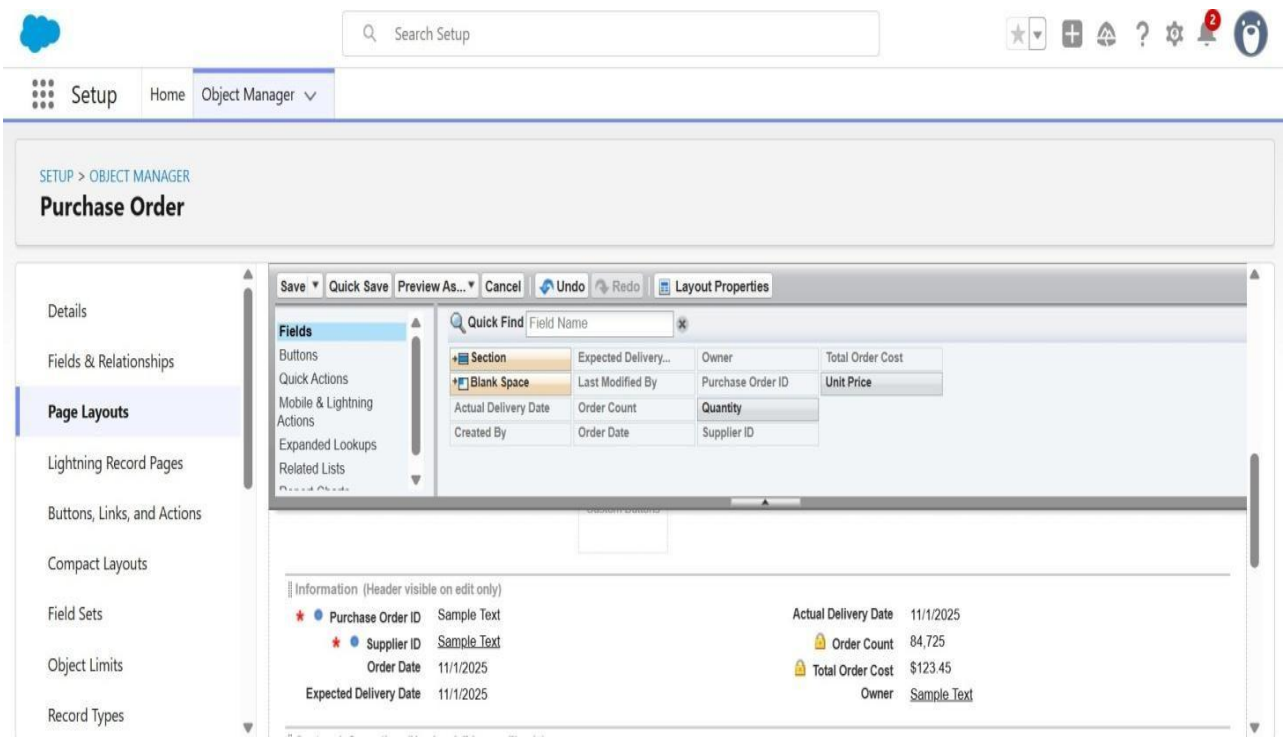


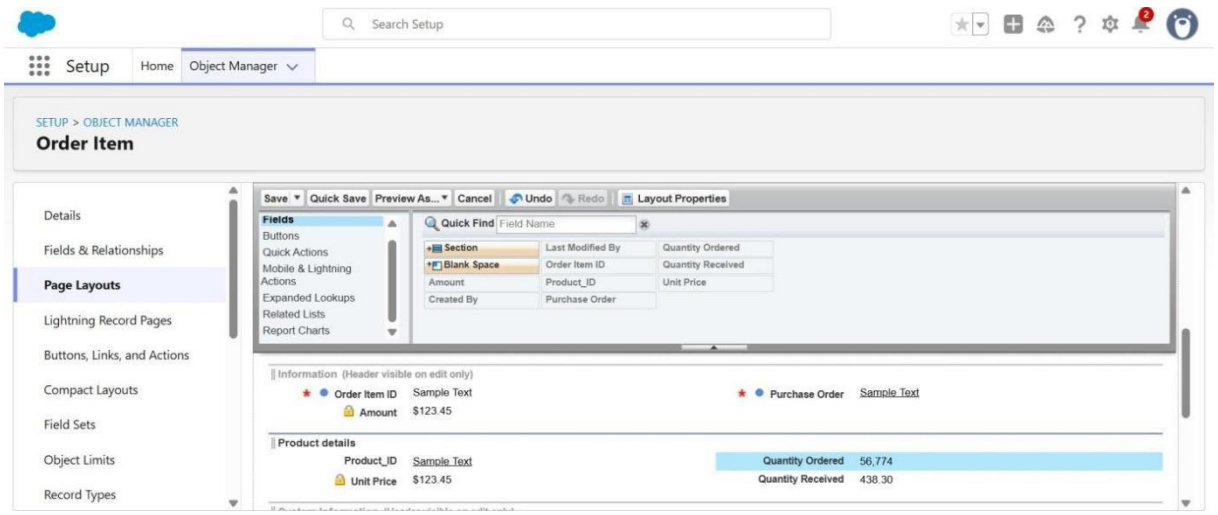


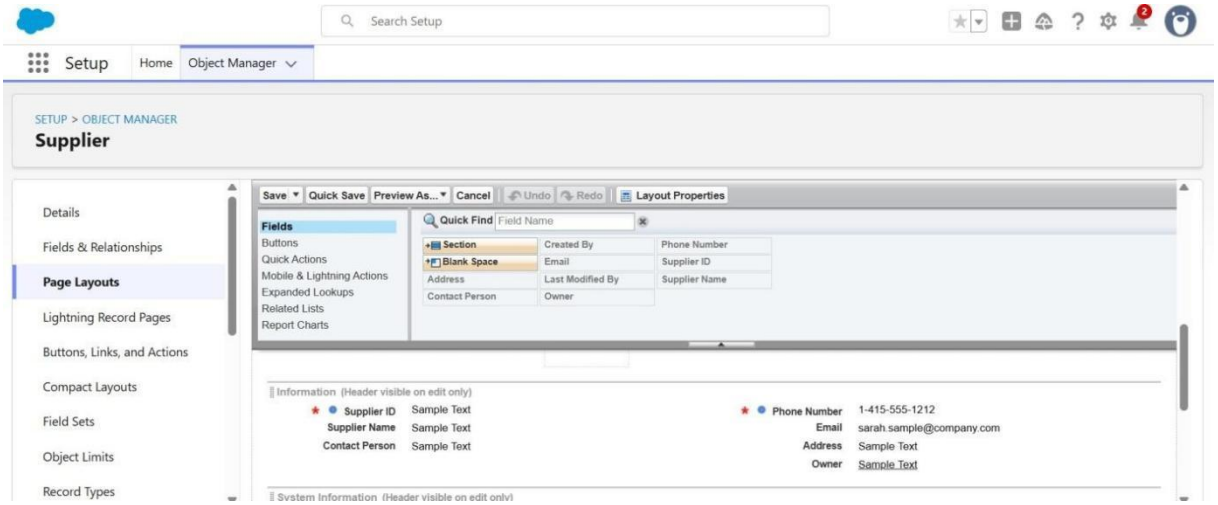
Page Layouts

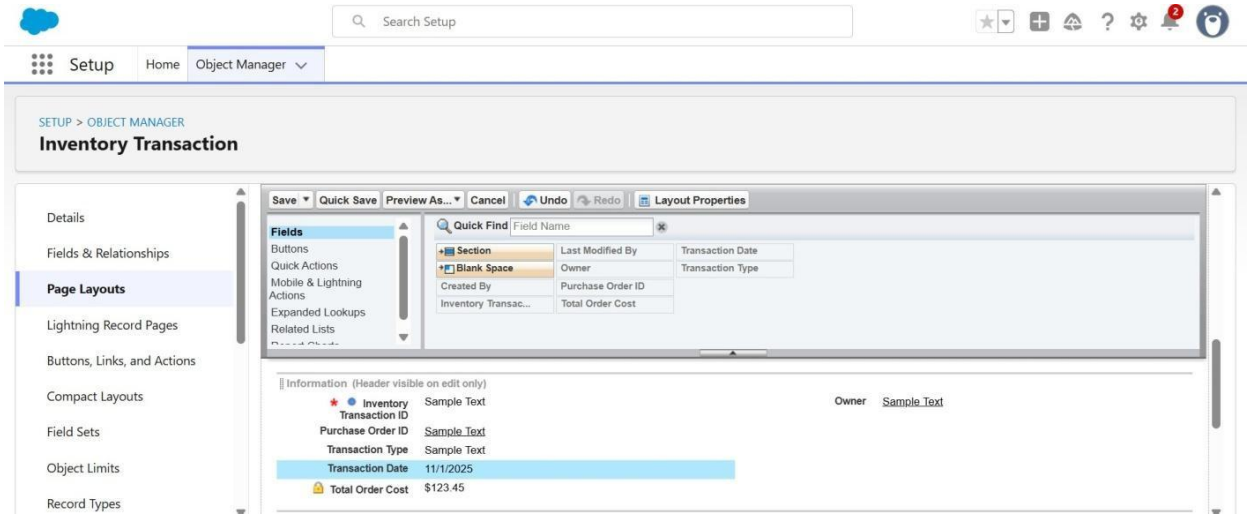
Edit layout for each object:

1. Object Manager → [Object] → Page Layouts → Edit
2. Drag & arrange fields
3. For Purchase Order:
   - Make `OrderDate` Required
   - Make`TotalOrderCost`Read-Only
4. Save




Search Setup
Setup
Home
Object Manager
SETUP > OBJECT MANAGER
Order Item
Details
Fields & Relationships
Page Layouts
Lightning Record Pages
Buttons, Links, and Actions
Compact Layouts
Field Sets
Object Limits
Record Types
Save
Quick Save
Preview As...
Cancel
Undo
Redo
Layout Properties
Fields
Buttons
Quick Actions
Mobile & Lightning Actions
Expanded Lookups
Related Lists
Report Charts
Quick Find
Field Name
Section
Blank Space
Last Modified By
Order Item ID
Product_ID
Created By
Purchase Order
Quantity Ordered
Quantity Received
Unit Price
Amount
Information (Header visible on edit only)
Order Item ID
Sample Text
Amount
$123.45
Purchase Order
Sample Text
Product details
Product_ID
Sample Text
Unit Price
$123.45
Quantity Ordered
56.774
Quantity Received
438.30


Search Setup
Setup
Home
Object Manager
SETUP > OBJECT MANAGER
Supplier
Details
Fields & Relationships
Page Layouts
Lightning Record Pages
Buttons, Links, and Actions
Compact Layouts
Field Sets
Object Limits
Record Types
Save
Quick Save
Preview As...
Cancel
Undo
Redo
Layout Properties
Fields
Buttons
Quick Actions
Mobile & Lightning Actions
Expanded Lookups
Related Lists
Report Charts
Quick Find
Field Name
Section
Blank Space
Created By
Email
Last Modified By
Address
Contact Person
Owner
Phone Number
Supplier ID
Supplier Name
Information (Header visible on edit only)
Supplier ID
Sample Text
Supplier Name
Sample Text
Contact Person
Sample Text
Phone Number
1-415-555-1212
Email
sarah.sample@company.com
Address
Sample Text
Owner
Sample Text
System Information (Header visible on edit only)


Search Setup
Setup
Home
Object Manager
SETUP > OBJECT MANAGER
Inventory Transaction
Details
Fields & Relationships
Page Layouts
Lightning Record Pages
Buttons, Links, and Actions
Compact Layouts
Field Sets
Object Limits
Record Types
Save
Quick Save
Preview As...
Cancel
Undo
Redo
Layout Properties
Fields
Buttons
Quick Actions
Mobile & Lightning Actions
Expanded Lookups
Related Lists
Quick Find
Field Name
Section
Blank Space
Last Modified By
Owner
Created By
Purchase Order ID
Inventory Transac...
Total Order Cost
Transaction Date
Transaction Type
Information (Header visible on edit only)
Inventory Transaction ID
Sample Text
Purchase Order ID
Sample Text
Transaction Type
Sample Text
Transaction Date
11/1/2025
Total Order Cost
$123.45
Owner
Sample Text

Compact Layouts

Steps:

2. Object → Compact Layouts → New

3. Add fields → Save

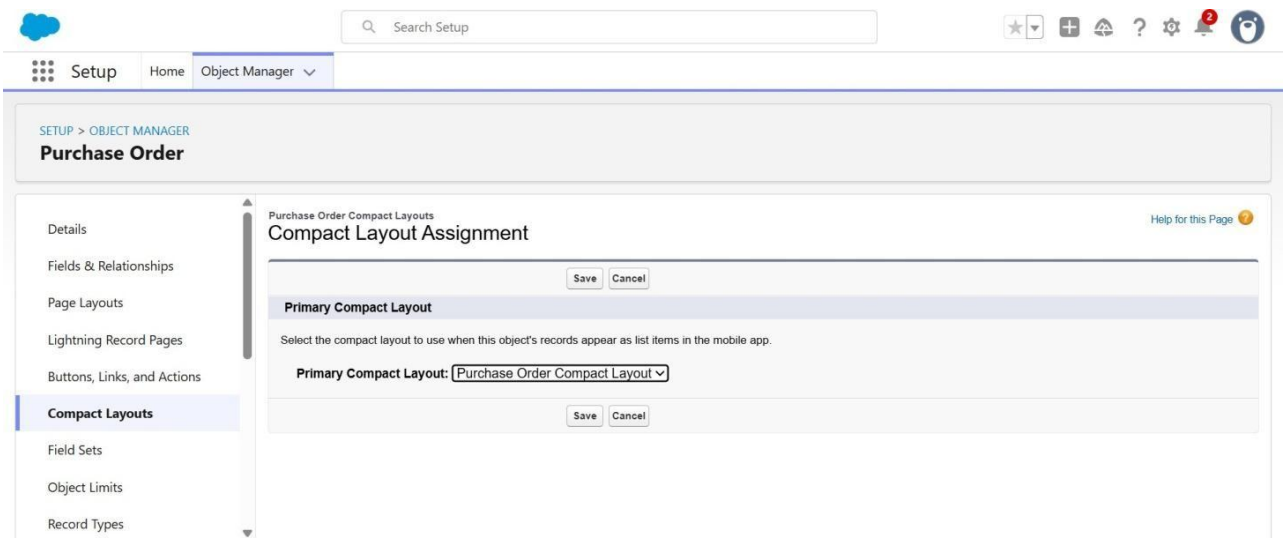
4. Assign via Compact Layout Assignment

Object:Product

- CompactLayoutName:ProductCompactLayoutFields:ProductName,UnitPrice,Current Stock Level

Object:PurchaseOrder

- CompactLayoutName:PurchaseOrderCompactLayoutFields:PurchaseOrderID, OrderDate, Total Order Cost, Supplier ID



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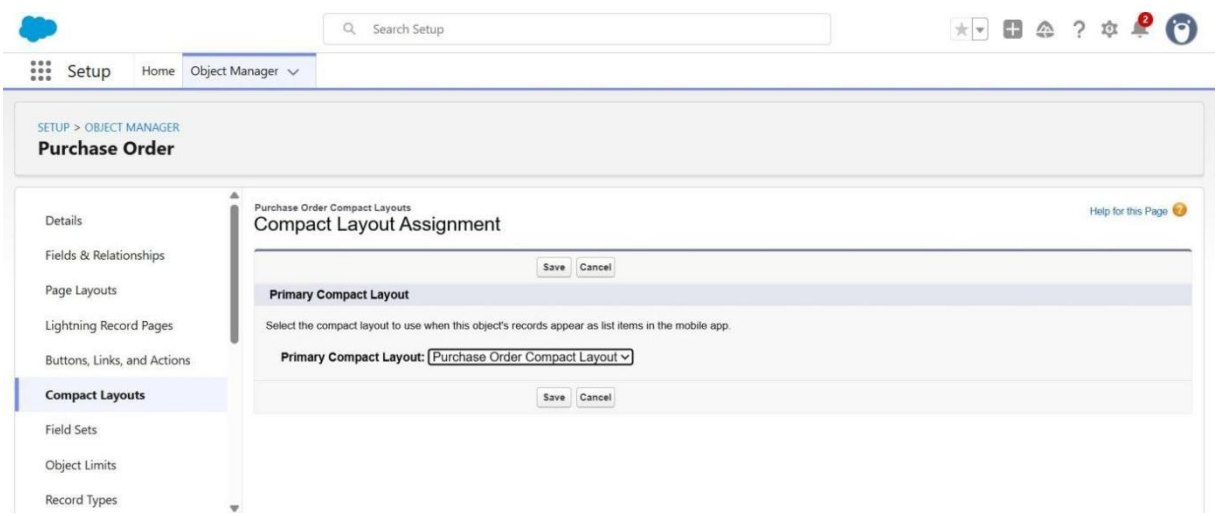


Project Development:

Code Quality :

- The Apex trigger CalculateTotalAmountTrigger and handler class CalculateTotalAmountHandler follow Order_Item__c and purchaseOrderId.
- Code is modular with trigger-handler separation (MVC pattern).
- Logic is fully bulkified using Set<Id> and AggregateResult to respect governor limits.
- Formula fields replace hardcoding for UnitPrice and Amount.
- Apex test class is provided.

ApexTrigger&Handler

Trigger:`CalculateTotalAmountTrigger`

```apex
triggerCalculateTotalAmountTriggeronOrder_Itemc( after
    insert, after update, after delete, after undelete
) {
    CalculateTotalAmountHandler.calculateTotal( T
        rigger.new, Trigger.old,
        Trigger.isInsert, Trigger.isUpdate,
        Trigger.isDelete,Trigger.isUndelete
    );
}
```

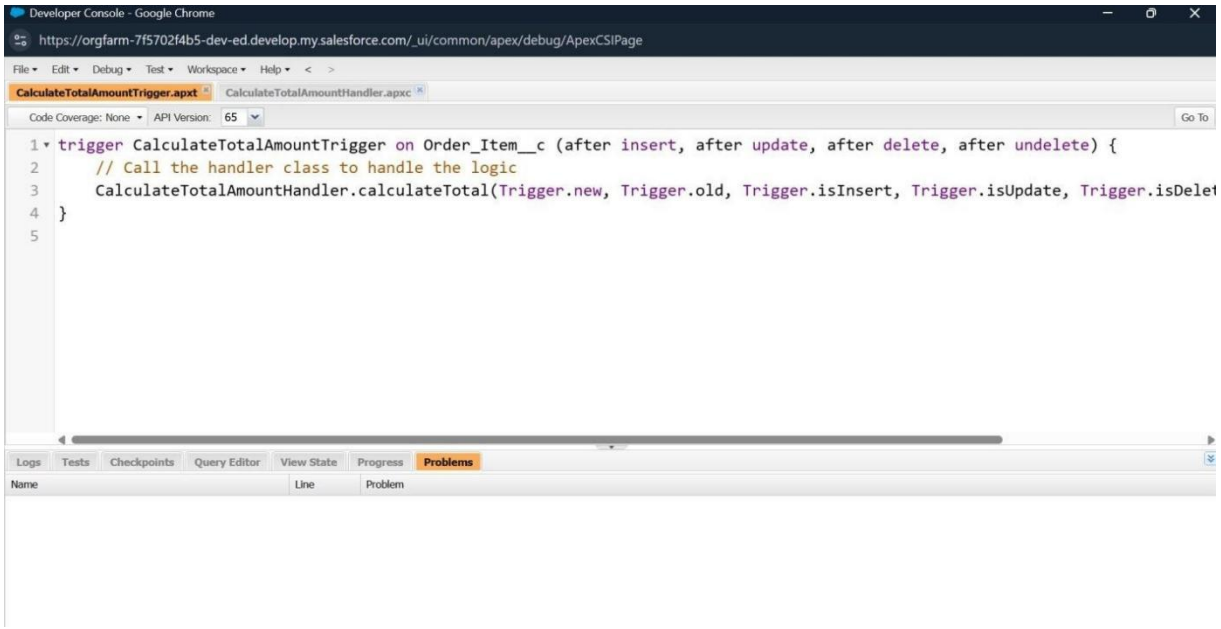
Handler Class: `CalculateTotalAmountHandler`

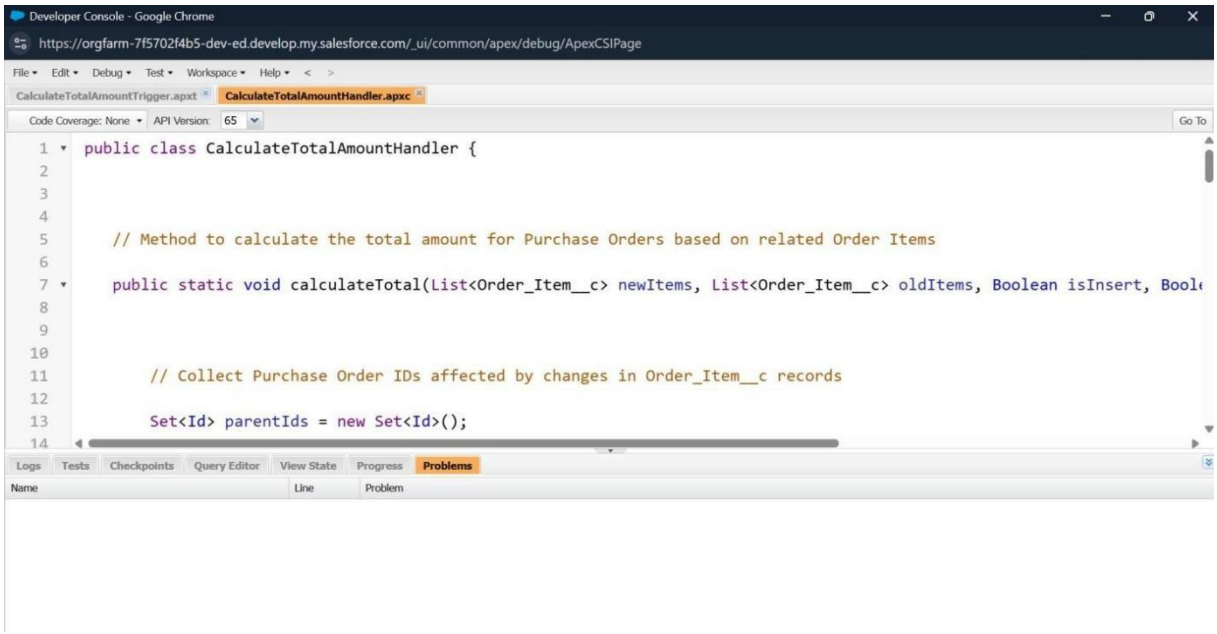
```apex
publicclassCalculateTotalAmountHandler{ public
    static void calculateTotal(
        List<Order_Itemc> newItems, List<Order_Itemc>oldItems,
        Boolean isInsert, Boolean isUpdate, Boolean isDelete, Boolean isUndelete
    ) {
        Set<Id> parentIds = new Set<Id>();
```

```
        if (isInsert || isUpdate || isUndelete)
            { for (Order_Itemc item : newItems)
                { parentIds.add(item.Purchase_Order_Idc);
            }
        }
        if (isUpdate || isDelete) {
            for (Order_Itemc item : oldItems)
                parentIds.add(item.Purchase_Order_Idc)}
                }

if (!parentIds.isEmpty())
  { List<AggregateResult>results=[
                SELECTPurchase_Order_Idc,SUM(Amountc)totalAmount FROM
                Order_Itemc
                WHEREPurchase_Order_IdcIN:parentIds GROUP
                BY Purchase_Order_Idc
            ];

            List<Purchase_Orderc>toUpdate=newList<Purchase_Orderc>(); for
            (AggregateResult ar : results) {
                toUpdate.add(new Purchase_Orderc(
                    Id = (Id)ar.get('Purchase_Order_Idc'),
                    Total_Order_costc=(Decimal)ar.get('totalAmount')
                ));
            }
            if (!toUpdate.isEmpty()) update toUpdate;
        }
      }
   }
```





Adherence to Timelines:

- All 15 milestones are completed in sequence—from account creation to dashboard—with clear progression.
- Phase 1 (Requirements) and Phase 2 (Development) are well-tracked.
- Steady progress is evident from screenshot timestamps and logical flow.
- Planning is strong: hardware specs, phase goals, and objectives are predefined.
- Git version control or commit history is mentioned.

Flows

Flow:

`ActualDeliveryDateUpdating`

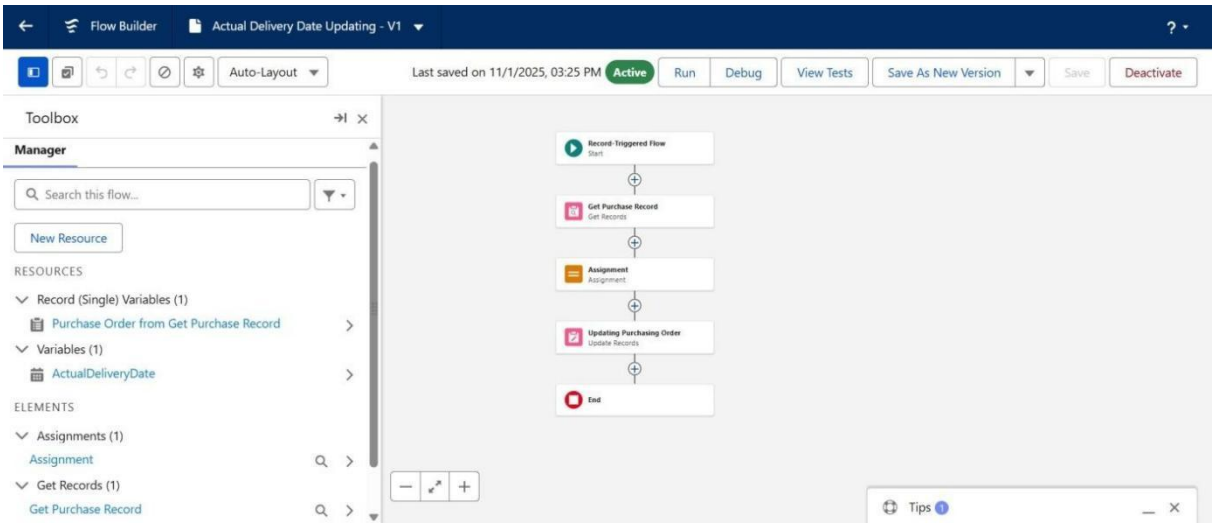
Type: Record-

Triggered(PurchaseOrder)

Trigger: On Create or Update

Action:

1. Get Record → `PurchaseOrder`
2. Variable:`ActualDeliveryDate`(Date)
3. Assignment:
   - `{!ActualDeliveryDate} = {!$Record.Order_Datec}`
   - Add 3 days
4. UpdateRecord → Set `Actual_Delivery_Datec = {!ActualDeliveryDate}`
5. Save &Activate



Testing and Debugging:

- Test scenarios, System.assert(), or debug logs are documented.
- Test class or coverage report is included—a critical gap.
- Deployment success ("App Created Successfully!") confirms runtime stability.
- Evidence of positive/negative scenario testing for Flow or trigger are given.

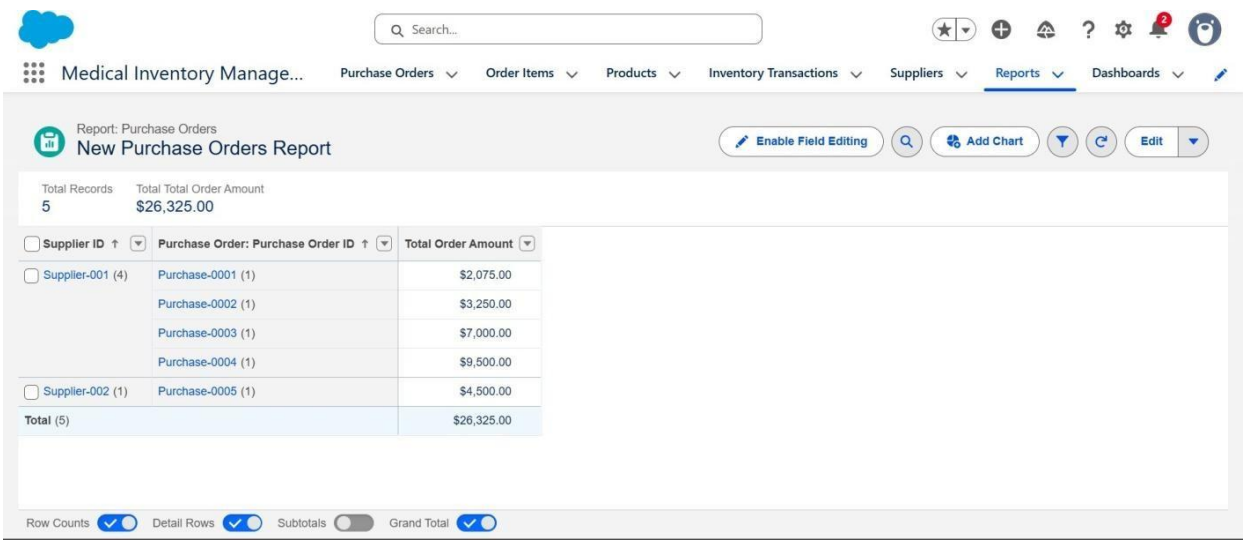
Reports

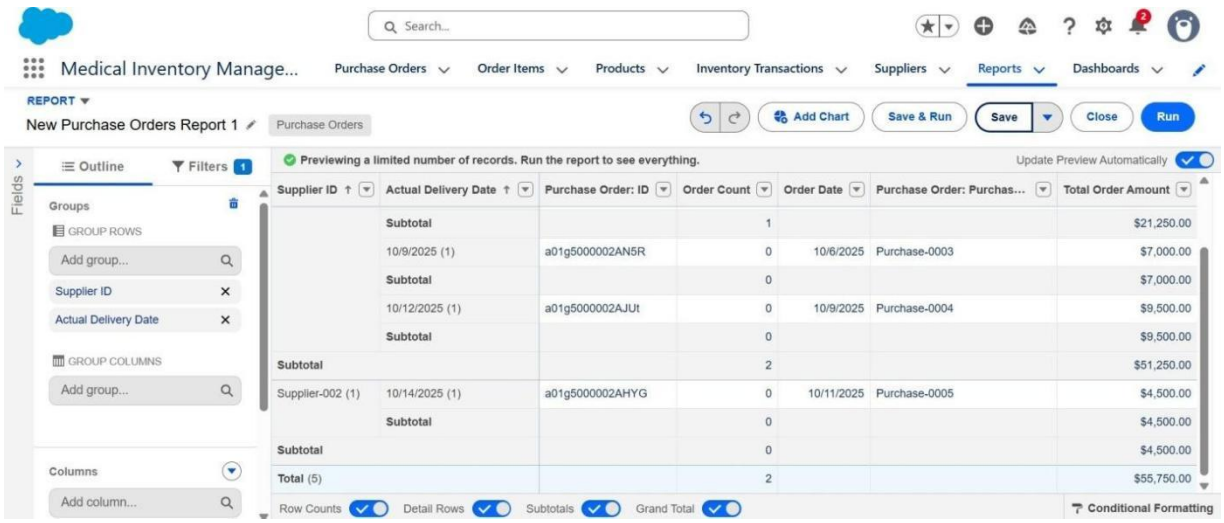
1.PurchaseOrdersbySuppliers(Summary)

- ReportType:`PurchaseOrders`
- Group Rows: `Supplier ID`, `Purchase Order ID`
- Columns: `OrderCount`, `TotalOrderCost`
- Name: `PurchaseOrdersbasedonSuppliers`

2.CompletePurchaseDetailsReport

- ReportType:`PurchaseOrderswithOrderItemsandProductID`
- Group Rows: `Supplier ID`, `Actual Delivery Date`, `Purchase Order ID`
- Columns: `Product ID`, `Product Name`, `Order Count`, `Quantity Received`, `Amount`
- Name: `CompletePurchaseDetailsReport`





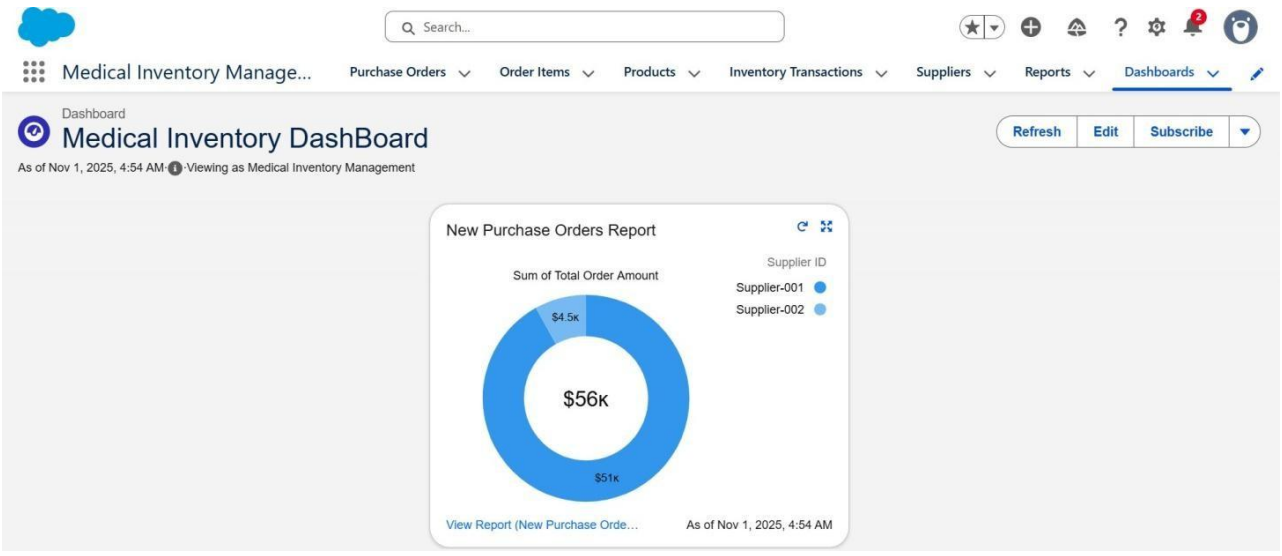
Dashboards

Name: `MedicalInventoryDashBoard`

1. Go to Dashboards → New Dashboard

2. AddWidget→Select `PurchaseOrdersbasedonSuppliers`

3. ChooseChart/Table→Add→Save



Use of Best Practices:

- Hospitals: Track ICU drugs, surgical tools, and daily consumables
- Clinics and Pharmacies: Monitor medicine stock and expiry dates
- Blood Banks: Manage blood units with type, donor, and expiry tracking
- NGOs and Relief Camps: Efficiently distribute donated medical supplies
- Government Health Departments: Centralized drug inventory across districts
- Medical Colleges: Practical training tool for CRM and healthcare IT students

Conclusion:

The Medical Inventory Management System, built entirely on Salesforce CRM, successfully addresses critical challenges in healthcare supply management. By leveraging custom objects, automation (Flows & Apex), validation rules, role-based security, and real-time reports & dashboards, the system ensures:

- Accurate tracking of medicines, equipment, and consumables
- Prevention of shortages and expiry-based wastage
- Streamlined procurement with automated purchase orders
- Enhanced operational efficiency and reduced manual errors
- Secure, role-based access for all stakeholders
- Data-driven insights for better resource planning and patient care

This project demonstrates the power of Salesforce as a scalable, secure, and customizable platform for healthcare automation. It not only meets all defined objectives but also serves as a practical learning experience in CRM development, system design, and team collaboration.

From a learning standpoint, the team gained hands-on experience in Salesforce development lifecycle, team collaboration, problem-solving, and industry-relevant CRM customization skills directly applicable in Health IT careers

With a strong foundation, the system is future-ready for:

- IoT integration for live warehouse monitoring
- AI/ML for predictive restocking
- Mobile access for on-field updates
- ERP/HMS integration for enterprise-wide connectivity
- Collaboration with NGOs, pharma companies, and government health bodies

Ultimately, this project proves that technology-driven inventory management can save lives by ensuring the right medicine reaches the right patient at the right time.

References:

- https://trailhead.salesforce.com/content/learn/modules/lex_customization/lex_customization_custom_objects
- https://trailhead.salesforce.com/content/learn/modules/point_click_business_logic/validation_rules
- https://trailhead.salesforce.com/content/learn/modules/apex_triggers
- https://trailhead.salesforce.com/content/learn/modules/flow-basics
- https://trailhead.salesforce.com/content/learn/modules/lex_implementation_reports_dashboards
- https://trailhead.salesforce.com/content/learn/modules/lex_customization/lex_customization_page_layouts