Phase 5: Apex Programming (Developer)

Project: ***Sports Equipment Rental Management System***

🧩 Objective

In this phase, we implemented **Apex programming** to automate backend logic for managing equipment availability, rental validation, and integration between related objects using **triggers, handlers, and best practices**.

We also connected our **VS Code project** with the **Salesforce Developer Org** to write, test, and deploy Apex classes and triggers efficiently.

🧱 Implementation Steps

STEP 1: Apex Class — EquipmentHandler

Purpose: Automatically update equipment availability status based on available quantity.

Procedure:

1. Go to **Setup → Developer Console**
2. Click **File → New → Apex Class**
3. Enter name: EquipmentHandler
4. Paste the following code:

```
public class EquipmentHandler {
   public static void updateAvailabilityStatus(List<Equipment__c> equipmentList) {
      for(Equipment__c eq : equipmentList) {
         if(eq.Available_Quantity__c != null) {
            if(eq.Available_Quantity__c == 0) {
               eq.Availability_Status__c = 'Rented';
            } else if(eq.Available_Quantity__c > 0) {
               eq.Availability_Status__c = 'Available';
            }
         }
      }
   }
}
```

5. **File → Save All**

✅ This class ensures every equipment's **Availability_Status__c** updates automatically when its quantity changes.

STEP 2: Apex Trigger — EquipmentTrigger

Purpose: Call the handler when Equipment records are inserted or updated.

Procedure:

1. In Developer Console → **File → New → Apex Trigger**
2. Trigger Name: EquipmentTrigger
   sObject: Equipment__c
3. Paste:

```
trigger EquipmentTrigger on Equipment__c (before insert, before update) {
  if(Trigger.isBefore && (Trigger.isInsert || Trigger.isUpdate)){
    EquipmentHandler.updateAvailabilityStatus(Trigger.new);
  }
}
```

4. **Save All**

✅ Keeps equipment status in sync automatically.

STEP 3: Apex Class — RentalAgreementHandler

Purpose: Validate that rented quantity does not exceed available equipment.

Procedure:

1. Developer Console → New Apex Class → Name: RentalAgreementHandler
2. Paste:

```
public class RentalAgreementHandler {

  public static void validateEquipmentAvailability(List<Rental_Agreement__c> newAgreements) {
    Set<Id> equipmentIds = new Set<Id>();
    for (Rental_Agreement__c ra : newAgreements) {
      if (ra.Equipment__c != null) {
        equipmentIds.add(ra.Equipment__c);
      }
    }
```

```
    Map<Id, Equipment__c> equipmentMap = new Map<Id, Equipment__c>(
        [SELECT Id, Name, Available_Quantity__c
         FROM Equipment__c
         WHERE Id IN :equipmentIds]
    );

    for (Rental_Agreement__c ra : newAgreements) {
        if (ra.Equipment__c != null && ra.Quantity_Rented__c != null) {
            Equipment__c eq = equipmentMap.get(ra.Equipment__c);

            if (eq != null) {
                if (eq.Available_Quantity__c <= 0) {
                    ra.addError('Equipment "' + eq.Name + '" is currently unavailable for rent.');
                } else if (ra.Quantity_Rented__c > eq.Available_Quantity__c) {
                    ra.addError(
                        'Only ' + eq.Available_Quantity__c +
                        ' units of "' + eq.Name + '" are available. You requested ' +
                        ra.Quantity_Rented__c + '.'
                    );
                }
            }
        }
    }
}
```

✅ Prevents overbooking or renting unavailable equipment.

STEP 4: Apex Trigger — RentalAgreementTrigger

Purpose: Run the validation before saving Rental Agreement records.

```
trigger RentalAgreementTrigger on Rental_Agreement__c (before insert, before update) {
```

```
    if (Trigger.isBefore && (Trigger.isInsert || Trigger.isUpdate)) {
        RentalAgreementHandler.validateEquipmentAvailability(Trigger.new);
    }
}
```

✅ Adds real-time validation when saving Rental Agreements.

STEP 5: Setup Salesforce Project in VS Code

Procedure:

1. **Install Prerequisites**
    - Visual Studio Code
    - Salesforce CLI (sfdx)
    - Salesforce Extension Pack
2. **Create Project**
3. sfdx force:project:create -n SportsRentalProject
4. cd SportsRentalProject
5. code .
6. **Authorize Salesforce Org**
7. sfdx force:auth:web:login -a MyOrgAlias

Login to Salesforce → Org connected.

8. **Retrieve Metadata**
9. sf project retrieve start --metadata ApexClass --metadata ApexTrigger --target-org MyOrgAlias
10. **Deploy Local Code to Org**
11. sfdx force:source:deploy -p force-app

✅ Your local VS Code project is now connected to Salesforce for seamless development.

🧪 **Testing Procedure**

Test Case	Input	Expected Result
Case 1	Equipment with Available_Quantity__c = 0, Rent 1	❌ Error → “Equipment unavailable for rent.”

Test Case	Input	Expected Result
Case 2	Equipment with Available_Quantity__c = 3, Rent 5	❌ Error → “Only 3 units available…”
Case 3	Equipment with Available_Quantity__c = 3, Rent 2	✅ Record saves successfully
Case 4	Equipment updated to Available_Quantity__c = 0	✅ Status automatically changes to “Rented”

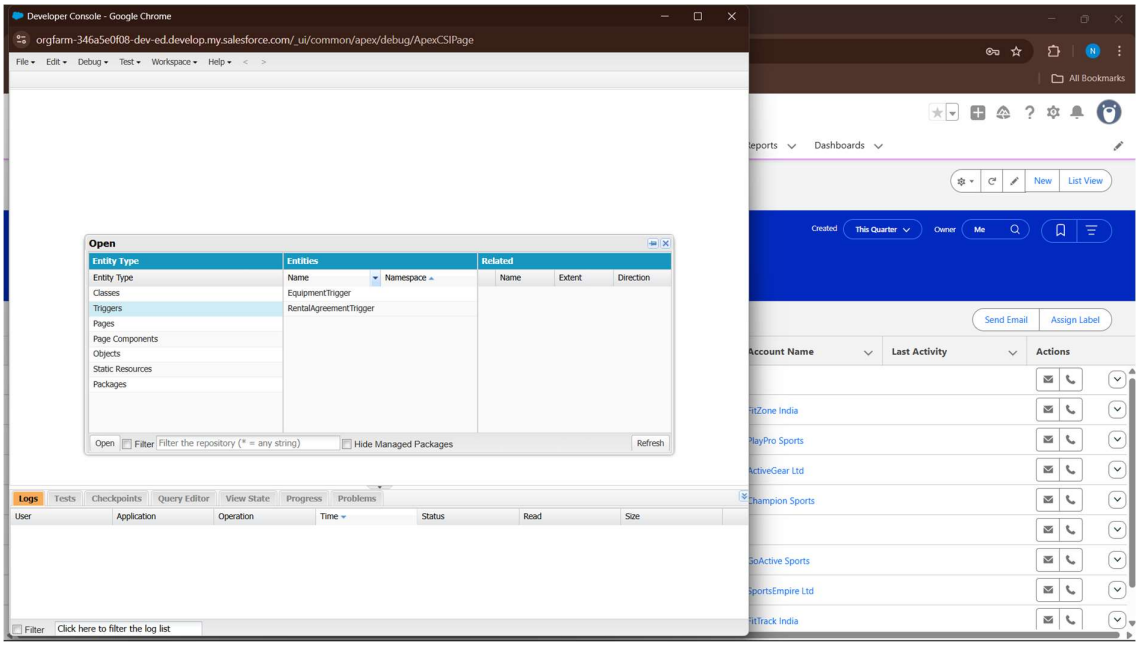
🧠 **Learning Outcomes**

- Understood **Apex Class-Trigger pattern** for clean, modular logic.
- Practiced **SOQL queries** and **collections** to handle related data efficiently.
- Learned to connect Salesforce with **VS Code** using **Salesforce CLI**.
- Applied **real-time validation** and **error handling**.
- Automated data flow between **Equipment** and **Rental Agreement** objects.

✅ **Result**

Successfully implemented a **backend automation system** using **Apex Classes and Triggers** that:

- Prevents renting unavailable equipment.
- Updates equipment status dynamically.
- Enhances system accuracy and efficiency.
- Demonstrates **developer-level Apex concepts** for Salesforce project execution.


Developer Console - Google Chrome
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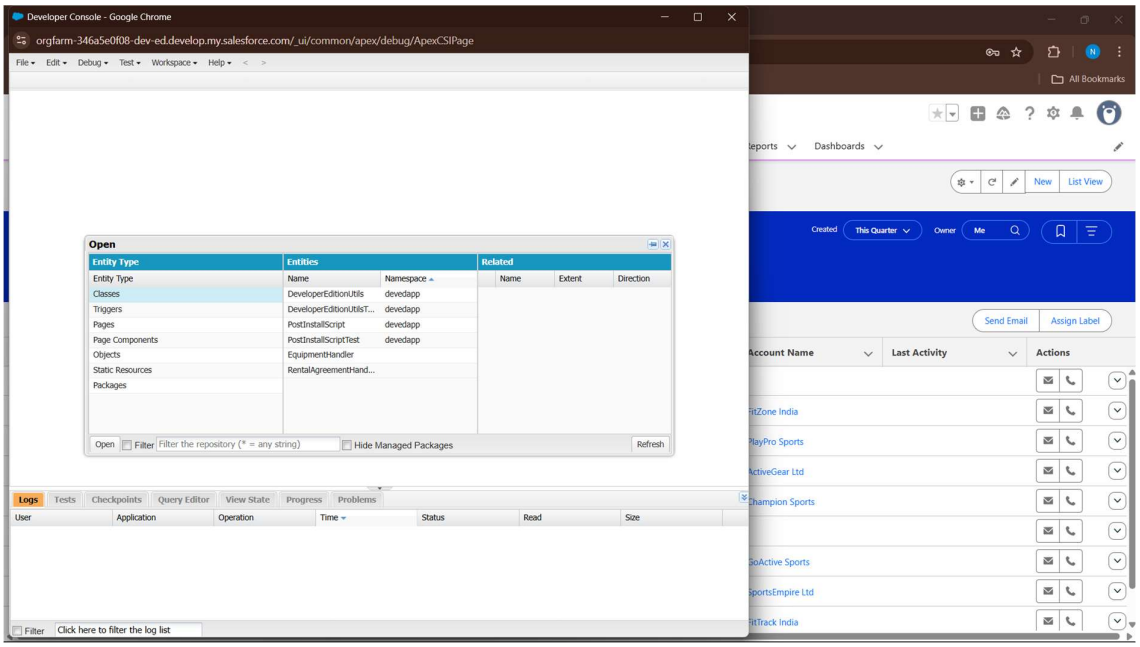
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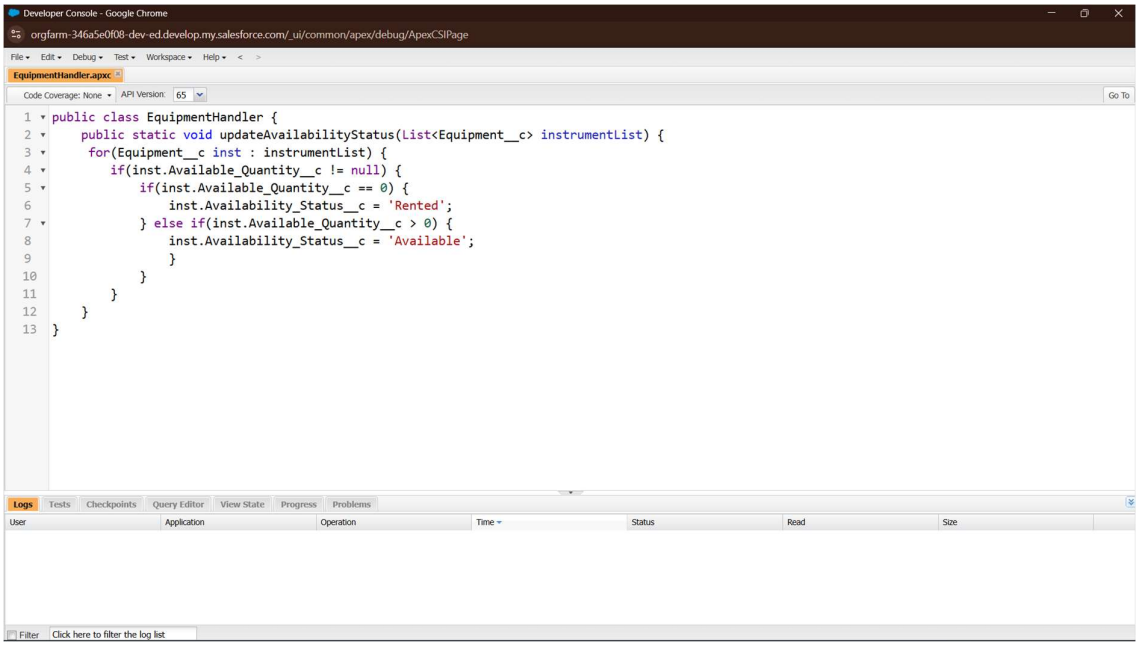
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EquipmentHandler.apxc
Code Coverage: None
API Version: 65
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inst.Availability_Status__c = 'Rented';
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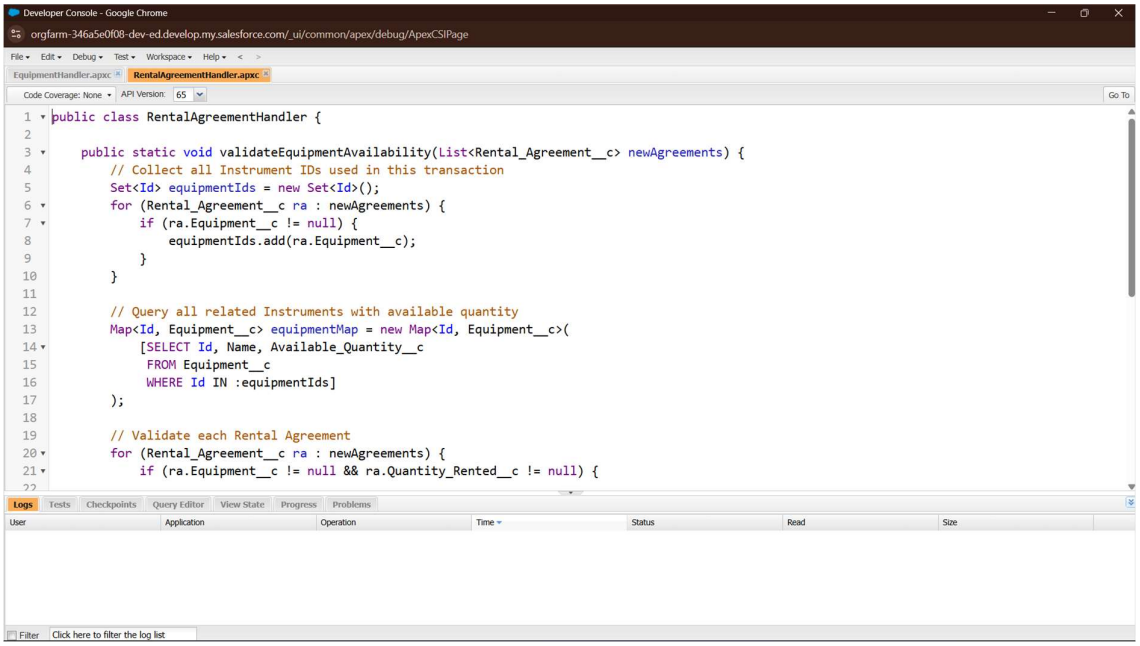
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public static void validateEquipmentAvailability(List<Rental_Agreement__c> newAgreements) {
// Collect all Instrument IDs used in this transaction
Set<Id> equipmentIds = new Set<Id>();
for (Rental_Agreement__c ra : newAgreements) {
if (ra.Equipment__c != null) {
equipmentIds.add(ra.Equipment__c);
}
}
// Query all related Instruments with available quantity
Map<Id, Equipment__c> equipmentMap = new Map<Id, Equipment__c>(
[SELECT Id, Name, Available_Quantity__c
FROM Equipment__c
WHERE Id IN :equipmentIds]
);
// Validate each Rental Agreement
for (Rental_Agreement__c ra : newAgreements) {
if (ra.Equipment__c != null && ra.Quantity_Rented__c != null) {
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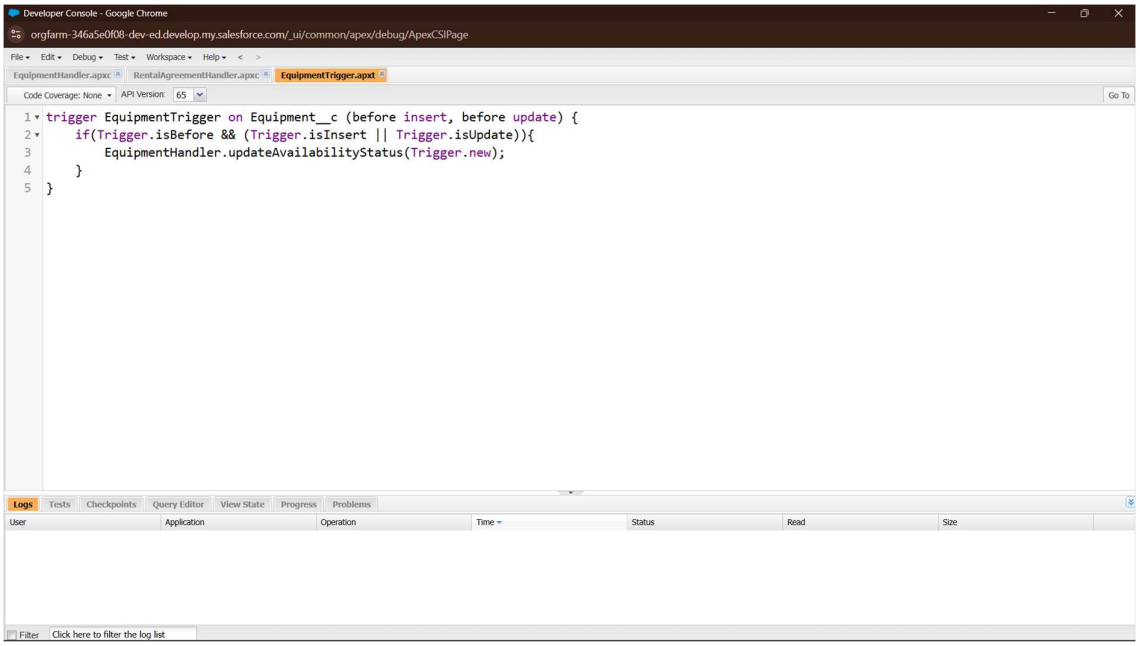
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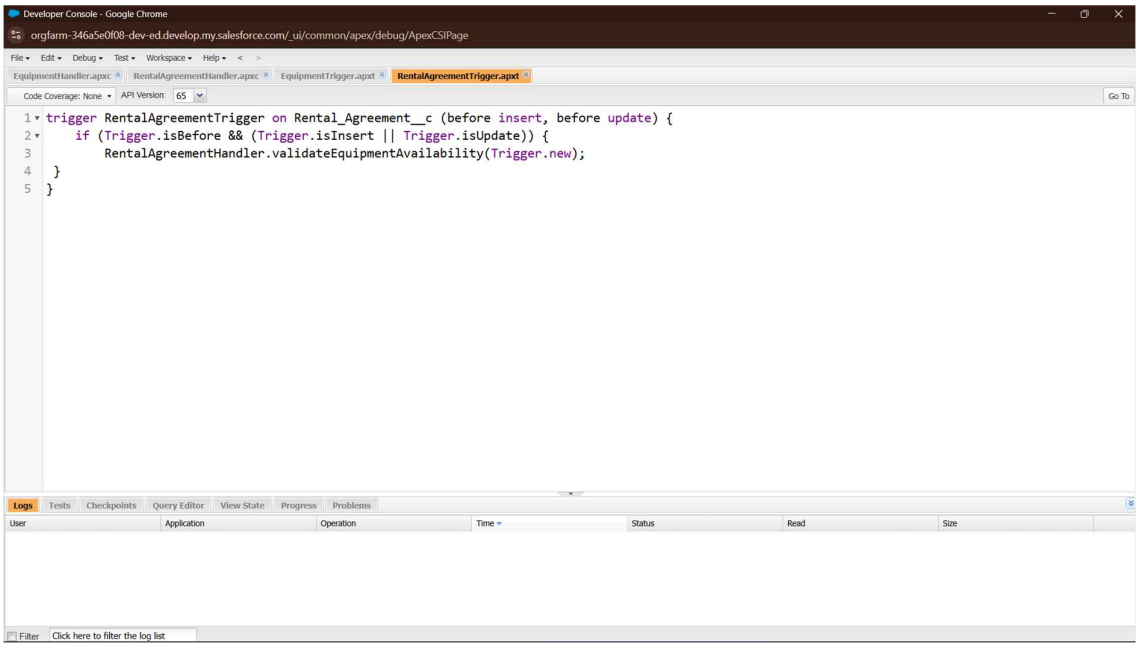
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