# Salesforce Developer Catalyst Self-Learning & Super Badges

## Apex triggers

In this Module the apex trigger created that sets an account’s Shipping Postal Code to match the Billing Postal Code if the Match Billing Address option is selected and bulkified Apex trigger that adds a follow-up task to an opportunity if its stage is Closed Won.

- Get Started With Apex Triggers:

AccountAddressTrigger.apxt:

```
trigger AccountAddressTrigger on Account (before insert, before update) {

    for(Account account:Trigger.New){
        if(account.Match_Billing_Address__c == True){
            account.ShippingPostalCode = account.BillingPostalCode;
        }
        }
}
```

- Bulk Apex Triggers:

ClosedOpportunityTrigger.apxt;

```
trigger ClosedOpportunityTrigger on Opportunity (after insert, after update) {
    List<Task> tasklist = new List<Task>();

    for(Opportunity opp : Trigger.New){
        if(opp.StageName == 'Closed Won'){
            tasklist.add(new Task(Subject= 'Follow Up Test Task', WhatId = opp.Id));
        }
    }

    if(tasklist.size()>0){
        insert tasklist;
    }
}
```

## Apex Testing

In this Module studied about Apex testing framework that enables to write and execute tests for Apex classes and triggers on the Lightning Platform and created test data for testing classes and achieved 100% test coverage.

- Get Started With Apex Unit Tests:

VerifyDate.apxc:

```
public class VerifyDate {

	//method to handle potential checks against two dates
	public static Date CheckDates(Date date1, Date date2) {
		//if date2 is within the next 30 days of date1, use date2.  Otherwise use the end of the month
		if(DateWithin30Days(date1,date2)) {
			return date2;
		} else {
			return SetEndOfMonthDate(date1);
		}
	}

	//method to check if date2 is within the next 30 days of date1
	private static Boolean DateWithin30Days(Date date1, Date date2) {
		//check for date2 being in the past
	if( date2 < date1) { return false; }

	//check that date2 is within (>=) 30 days of date1
	Date date30Days = date1.addDays(30); //create a date 30 days away from date1
		if( date2 >= date30Days ) { return false; }
		else { return true; }
	}

	//method to return the end of the month of a given date
	private static Date SetEndOfMonthDate(Date date1) {
		Integer totalDays = Date.daysInMonth(date1.year(), date1.month());
		Date lastDay = Date.newInstance(date1.year(), date1.month(), totalDays);
		return lastDay;
```

```
        }

}
```

TestVerifyDate.apxc:

```
@isTest
private class TestVerifyDate {

    //testing that if date2 is within 30 days of date1, should return date 2
    @isTest static void testDate2within30daysofDate1() {
        Date date1 = date.newInstance(2018, 03, 20);
        Date date2 = date.newInstance(2018, 04, 11);
        Date result = VerifyDate.CheckDates(date1,date2);
        Date testDate = Date.newInstance(2018, 04, 11);
        System.assertEquals(testDate,result);
    }

    //testing that date2 is before date1. Should return "false"
    @isTest static void testDate2beforeDate1() {
        Date date1 = date.newInstance(2018, 03, 20);
        Date date2 = date.newInstance(2018, 02, 11);
        Date resultDate = VerifyDate.CheckDates(date1,date2);
        Date testDate = Date.newInstance(2018, 02, 11);
        System.assertNotEquals(testDate, resultDate);
    }

    //Test date2 is outside 30 days of date1. Should return end of month.
    @isTest static void testDate2outside30daysofDate1() {
        Date date1 = date.newInstance(2018, 03, 20);
        Date date2 = date.newInstance(2018, 04, 25);
        Date resultDate = VerifyDate.CheckDates(date1,date2);
        Date testDate = Date.newInstance(2018, 03, 31);
        System.assertEquals(testDate,resultDate);
    }

}
```

- Test Apex Triggers:

RestrictContactByName.apxt:

```
trigger RestrictContactByName on Contact (before insert, before update) {

        //check contacts prior to insert or update for invalid data
        For (Contact c : Trigger.New) {
                if(c.LastName == 'INVALIDNAME') { //invalidname is invalid
                        c.AddError('The Last Name "'+c.LastName+'" is not allowed for DML');
                }

        }
}
```

TestRestrictContactByName.apxc:

```
@isTest
private class TestRestrictContactByName {

    @isTest static void testInvalidName() {
        //try inserting a Contact with INVALIDNAME
        Contact myConact = new Contact(LastName='INVALIDNAME');
        insert myConact;

        // Perform test
        Test.startTest();
        Database.SaveResult result = Database.insert(myConact, false);
        Test.stopTest();
        // Verify
        // In this case the creation should have been stopped by the trigger,
        // so verify that we got back an error.
        System.assert(!result.isSuccess());
        System.assert(result.getErrors().size() > 0);
        System.assertEquals('Cannot create contact with invalid last name.',
                             result.getErrors()[0].getMessage());

    }
}
```

- Create Test Data for Apex Tests:

RandomContactFactory.apxc:

```
public class RandomContactFactory {
    public static List<Contact> generateRandomContacts(Integer numContactsToGenerate,
String FName) {
        List<Contact> contactList = new List<Contact>();

        for(Integer i=0;i<numContactsToGenerate;i++) {
            Contact c = new Contact(FirstName=FName + ' ' + i, LastName = 'Contact '+i);
            contactList.add(c);
            System.debug(c);
        }
        //insert contactList;
        System.debug(contactList.size());
        return contactList;
    }

}
```

## Asynchronous Apex

In this Module studied about Asynchronous Apex and its types and used future methods, Batch apex in apex classes and Controlled process with Queuable apex and scheduled jobs using apex scheduler.

- Use Future Methods:

AccountProcessor.apxc:

```
public class AccountProcessor {

    @future
    public static void countContacts(List<Id> accountId_lst) {

        Map<Id,Integer> account_cno = new Map<Id,Integer>();
        List<account> account_lst_all = new List<account>([select id, (select id from contacts) from
account]);
        for(account a:account_lst_all) {
            account_cno.put(a.id,a.contacts.size()); //populate the map

        }

        List<account> account_lst = new List<account>(); // list of account that we will upsert

        for(Id accountId : accountId_lst) {
            if(account_cno.containsKey(accountId)) {
                account acc = new account();
                acc.Id = accountId;
                acc.Number_of_Contacts__c = account_cno.get(accountId);
                account_lst.add(acc);
            }

        }
        upsert account_lst;
    }
}
```

AccountProcessorTest.apxt:

```
@isTest
public class AccountProcessorTest {

    @isTest
    public static void testFunc() {
        account acc = new account();
        acc.name = 'MATW INC';
        insert acc;

        contact con = new contact();
        con.lastname = 'Mann1';
        con.AccountId = acc.Id;
        insert con;
        contact con1 = new contact();
        con1.lastname = 'Mann2';
        con1.AccountId = acc.Id;
        insert con1;


        List<Id> acc_list = new List<Id>();
        acc_list.add(acc.Id);
        Test.startTest();
            AccountProcessor.countContacts(acc_list);
        Test.stopTest();
        List<account> acc1 = new List<account>([select Number_of_Contacts__c from account
where id = :acc.id]);
        system.assertEquals(2,acc1[0].Number_of_Contacts__c);
    }

}
```

- Use Batch Apex:

LeadProcessor.apxc:

```
global class LeadProcessor implements Database.Batchable<sObject> {
    global Integer count = 0;
```

```
    global Database.QueryLocator start (Database.BatchableContext bc) {
        return Database.getQueryLocator('Select Id, LeadSource from lead');
    }

    global void execute (Database.BatchableContext bc,List<Lead> l_lst) {
        List<lead> l_lst_new = new List<lead>();
        for(lead l : l_lst) {
            l.leadsource = 'Dreamforce';
            l_lst_new.add(l);
            count+=1;
        }
        update l_lst_new;
    }

    global void finish (Database.BatchableContext bc) {
        system.debug('count = '+count);
    }
}
```

LeadProcessorTest.apxc:

```
@isTest
public class LeadProcessorTest {

    @isTest
    public static void testit() {
        List<lead> l_lst = new List<lead>();
        for (Integer i = 0; i<200; i++) {
            Lead l = new lead();
            l.LastName = 'name'+i;
            l.company = 'company';
            l.Status =  'somestatus';
            l_lst.add(l);
        }
        insert l_lst;

        test.startTest();
```

```
        Leadprocessor lp = new Leadprocessor();
        Id batchId = Database.executeBatch(lp);
        Test.stopTest();

    }
}
```

- Control Processes with Queueable Apex:

AddPrimaryContact.apxc:

```
public class AddPrimaryContact implements Queueable {
    public contact c;
    public String state;

    public AddPrimaryContact(Contact c, String state) {
        this.c = c;
        this.state = state;
    }

    public void execute(QueueableContext qc) {
        system.debug('this.c = '+this.c+' this.state = '+this.state);
        List<Account> acc_lst = new List<account>([select id, name, BillingState from account
where account.BillingState = :this.state limit 200]);
        List<contact> c_lst = new List<contact>();
        for(account a: acc_lst) {
            contact c = new contact();
            c = this.c.clone(false, false, false, false);
            c.AccountId = a.Id;
            c_lst.add(c);
        }
        insert c_lst;
    }
}
```

AddPrimaryContactTest.apxc:

```
@IsTest
public class AddPrimaryContactTest {

    @IsTest
    public static void testing() {
        List<account> acc_lst = new List<account>();
        for (Integer i=0; i<50;i++) {
            account a = new account(name=string.valueOf(i),billingstate='NY');
            system.debug('account a = '+a);
            acc_lst.add(a);
        }
        for (Integer i=0; i<50;i++) {
            account a = new account(name=string.valueOf(50+i),billingstate='CA');
            system.debug('account a = '+a);
            acc_lst.add(a);
        }
        insert acc_lst;
        Test.startTest();
        contact c = new contact(lastname='alex');
        AddPrimaryContact apc = new AddPrimaryContact(c,'CA');
        system.debug('apc = '+apc);
        System.enqueueJob(apc);
        Test.stopTest();
        List<contact> c_lst = new List<contact>([select id from contact]);
        Integer size = c_lst.size();
        system.assertEquals(50, size);
    }
}
```

- Schedule Jobs Using the Apex Scheduler:

DailyLeadProcessor.apxc:

```
public class DailyLeadProcessor implements schedulable{

    public void execute(schedulableContext sc) {
        List<lead> l_lst_new = new List<lead>();
```

```
        List<lead> l_lst = new List<lead>([select id, leadsource from lead where leadsource =
null]);
        for(lead l : l_lst) {
            l.leadsource = 'Dreamforce';
            l_lst_new.add(l);
        }
        update l_lst_new;
    }
}
```

DailyLeadProcessorTest.apxc:

```
@isTest
public class DailyLeadProcessorTest {

@isTest
    public static void testing() {

        List<lead> l_lst = new List<lead>();
        for(Integer i=0;i<200;i++) {
            lead l = new lead();
            l.lastname = 'lastname'+i;
            l.Company = 'company'+i;
            l_lst.add(l);
        }
        insert l_lst;

        Test.startTest();
        DailyLeadProcessor dlp = new DailyLeadProcessor ();
        String jobId = System.Schedule('dailyleadprocessing','0 0 0 1 12 ? 2022',dlp);
        Test.stopTest();

        List<lead> l_lst_chk = new List<lead>([select id,leadsource from lead where leadsource !=
'Dreamforce']);
        System.assertequals(0,l_lst_chk.size());
    }

}
```

## Apex Integration Services

In Rest Callouts created apex class that calls a REST endpoint to return the name of an animal and written unit tests that achieve 100% code coverage for the class using a mock response.
In SOAP Callouts generated Apex classes using WSDL2Apex, performed a callout to send data to an external service using SOAP and tested callouts by using mock callouts.
In Apex Web Services created an Apex REST class and the service will return the account's ID and name plus the ID and name of all contacts associated with the account. Written unit tests that achieve 100% code coverage for the class.

- Apex REST Callouts:

AnimalLocator.apxc:

```
public class AnimalLocator {
        public class cls_animal {
                public Integer id;
                public String name;
                public String eats;
                public String says;
        }
public class JSONOutput{
        public cls_animal animal;

 }

   public static String getAnimalNameById (Integer id) {
      Http http = new Http();
      HttpRequest request = new HttpRequest();
      request.setEndpoint('https://th-apex-http-callout.herokuapp.com/animals/' + id);

      request.setMethod('GET');
      HttpResponse response = http.send(request);
      system.debug('response: ' + response.getBody());

      jsonOutput results = (jsonOutput) JSON.deserialize(response.getBody(), jsonOutput.class);
```

```
                system.debug('results= ' + results.animal.name);
        return(results.animal.name);
    }
}
```

AnimalLocatorMock.apxc:

```
@IsTest
global class AnimalLocatorMock implements HttpCalloutMock {

    global HTTPresponse respond(HTTPrequest request) {
        Httpresponse response = new Httpresponse();
        response.setStatusCode(200);
        response.setBody('{"animal":{"id":1,"name":"chicken","eats":"chicken food","says":"cluck
cluck"}}');
        return response;
    }

}
```

AnimalLocatorTest.apxc:

```
@IsTest
public class AnimalLocatorTest {
    @isTest
    public static void testAnimalLocator() {
        Test.setMock(HttpCalloutMock.class, new AnimalLocatorMock());
        //Httpresponse response = AnimalLocator.getAnimalNameById(1);
        String s =  AnimalLocator.getAnimalNameById(1);
        system.debug('string returned: ' + s);
    }
}
```

- Apex SOAP Callouts:

ParkService.apxc:

```
public class ParkService {
    public class byCountryResponse {
        public String[] return_x;
        private String[] return_x_type_info = new String[]{'return','http://parks.services/',null,'0','-
1','false'};
        private String[] apex_schema_type_info = new String[]{'http://parks.services/','false','false'};
        private String[] field_order_type_info = new String[]{'return_x'};
    }
    public class byCountry {
        public String arg0;
        private String[] arg0_type_info = new String[]{'arg0','http://parks.services/',null,'0','1','false'};
        private String[] apex_schema_type_info = new String[]{'http://parks.services/','false','false'};
        private String[] field_order_type_info = new String[]{'arg0'};
    }
    public class ParksImplPort {
        public String endpoint_x = 'https://th-apex-soap-service.herokuapp.com/service/parks';
        public Map<String,String> inputHttpHeaders_x;
        public Map<String,String> outputHttpHeaders_x;
        public String clientCertName_x;
        public String clientCert_x;
        public String clientCertPasswd_x;
        public Integer timeout_x;
        private String[] ns_map_type_info = new String[]{'http://parks.services/', 'ParkService'};
        public String[] byCountry(String arg0) {
            ParkService.byCountry request_x = new ParkService.byCountry();
            request_x.arg0 = arg0;
            ParkService.byCountryResponse response_x;
            Map<String, ParkService.byCountryResponse> response_map_x = new Map<String,
ParkService.byCountryResponse>();
            response_map_x.put('response_x', response_x);
            WebServiceCallout.invoke(
              this,
              request_x,
              response_map_x,
              new String[]{endpoint_x,
              '',
```

```
            'http://parks.services/',
            'byCountry',
            'http://parks.services/',
            'byCountryResponse',
            'ParkService.byCountryResponse'}
          );
          response_x = response_map_x.get('response_x');
          return response_x.return_x;
      }
   }
}
```

ParkLocator.apxc:

```
public class ParkLocator {
    public static String[] country(String country){
        ParkService.ParksImplPort parks = new ParkService.ParksImplPort();
        String[] parksname = parks.byCountry(country);
        return parksname;
    }
}
```

ParkLocatorTest.apxc:

```
@isTest
private class ParkLocatorTest{
    @isTest
    static void testParkLocator() {
        Test.setMock(WebServiceMock.class, new ParkServiceMock());
        String[] arrayOfParks = ParkLocator.country('India');

        System.assertEquals('Park1', arrayOfParks[0]);

 }

}
```

ParkServiceMock.apxc:

```
@isTest
global class ParkServiceMock implements WebServiceMock {
    global void doInvoke(
            Object stub,
            Object request,
            Map<String, Object> response,
            String endpoint,
            String soapAction,
            String requestName,
            String responseNS,
            String responseName,
            String responseType) {
        ParkService.byCountryResponse response_x = new ParkService.byCountryResponse();
        List<String> lstOfDummyParks = new List<String> {'Park1','Park2','Park3'};
        response_x.return_x = lstOfDummyParks;

        response.put('response_x', response_x);
    }
}
```

- Apex Web Services:

AccountManager.apxc:

```
@RestResource(urlMapping='/Accounts/*/contacts')
global with sharing class AccountManager{
    @HttpGet
    global static Account getAccount(){
        RestRequest req = RestContext.request;
        String accId = req.requestURI.substringBetween('Accounts/', '/contacts');
        Account acc = [SELECT Id, Name, (SELECT Id, Name FROM Contacts)
                       FROM Account WHERE Id = :accId];

        return acc;
```

```
    }
}
```

AccountManagerTest.apxc:

```
@IsTest
private class AccountManagerTest{
    @isTest static void testAccountManager(){
        Id recordId = getTestAccountId();
        // Set up a test request
        RestRequest request = new RestRequest();
        request.requestUri =
            'https://ap5.salesforce.com/services/apexrest/Accounts/'+ recordId +'/contacts';
        request.httpMethod = 'GET';
        RestContext.request = request;
        Account  acc = AccountManager.getAccount();
        System.assert(acc != null);
    }

    private static Id getTestAccountId(){
        Account acc = new Account(Name = 'TestAcc2');
        Insert acc;

        Contact con = new Contact(LastName = 'TestCont2', AccountId = acc.Id);
        Insert con;
   return acc.Id;
    }
}
```

## Apex Specialist Superbadge

## Challenge 1:  Automated Record Creation-

MaintenanceRequestHelper.apxc:

```
public with sharing class MaintenanceRequestHelper {
   public static void updateworkOrders(List<Case> updWorkOrders, Map<Id,Case>
nonUpdCaseMap) {
      Set<Id> validIds = new Set<Id>();

      For (Case c : updWorkOrders){
         if (nonUpdCaseMap.get(c.Id).Status != 'Closed' && c.Status == 'Closed'){
            if (c.Type == 'Repair' || c.Type == 'Routine Maintenance'){
               validIds.add(c.Id);



            }
         }
      }

      if (!validIds.isEmpty()){
         List<Case> newCases = new List<Case>();
         Map<Id,Case> closedCasesM = new Map<Id,Case>([SELECT Id, Vehicle__c,
Equipment__c, Equipment__r.Maintenance_Cycle__c,(SELECT Id,Equipment__c,Quantity__c
FROM Equipment_Maintenance_Items__r)
                                                FROM Case WHERE Id IN :validIds]);
         Map<Id,Decimal> maintenanceCycles = new Map<ID,Decimal>();
         AggregateResult[] results = [SELECT Maintenance_Request__c,
MIN(Equipment__r.Maintenance_Cycle__c)cycle FROM Equipment_Maintenance_Item__c
WHERE Maintenance_Request__c IN :ValidIds GROUP BY Maintenance_Request__c];

      for (AggregateResult ar : results){
         maintenanceCycles.put((Id) ar.get('Maintenance_Request__c'), (Decimal) ar.get('cycle'));
      }

         for(Case cc : closedCasesM.values()){
            Case nc = new Case (
```

```
                ParentId = cc.Id,
            Status = 'New',
                Subject = 'Routine Maintenance',
                Type = 'Routine Maintenance',
                Vehicle__c = cc.Vehicle__c,
                Equipment__c =cc.Equipment__c,
                Origin = 'Web',
                Date_Reported__c = Date.Today()

            );

            If (maintenanceCycles.containskey(cc.Id)){
                nc.Date_Due__c = Date.today().addDays((Integer) maintenanceCycles.get(cc.Id));
            }

            newCases.add(nc);
        }

        insert newCases;

        List<Equipment_Maintenance_Item__c> clonedWPs = new
List<Equipment_Maintenance_Item__c>();
        for (Case nc : newCases){
            for (Equipment_Maintenance_Item__c wp :
closedCasesM.get(nc.ParentId).Equipment_Maintenance_Items__r){
                Equipment_Maintenance_Item__c wpClone = wp.clone();
                wpClone.Maintenance_Request__c = nc.Id;
                ClonedWPs.add(wpClone);

            }
        }

  insert ClonedWPs;
      }

 }

}
```

MaintenanceRequest.apxt:

```
trigger MaintenanceRequest on Case (before update, after update) {
    if(Trigger.isUpdate && Trigger.isAfter){
        MaintenanceRequestHelper.updateWorkOrders(Trigger.New, Trigger.OldMap);
    }
}
```

## Challenge 2: Synchronize Salesforce data with an external system-

WarehouseCalloutService.apxc:

```
public with sharing class WarehouseCalloutService {

    private static final String WAREHOUSE_URL = 'https://th-superbadge-
apex.herokuapp.com/equipment';

    // complete this method to make the callout (using @future) to the
    // REST endpoint and update equipment on hand.
    @future(callout=true)
    public static void runWarehouseEquipmentSync(){
        Http http = new Http();
        HttpRequest request = new HttpRequest();
        request.setEndpoint(WAREHOUSE_URL);
        request.setMethod('GET');
        HttpResponse response = http.send(request);

        if (response.getStatusCode() == 200) {
            List<Object> results = (List<Object>) JSON.deserializeUntyped(response.getBody());
            List<Product2> equipmentList = new List<Product2>();

            for (Object record: results) {
                Map<String, Object> recordMap = (Map<String, Object>)record;
                Product2 equipment = new Product2();

                equipment.Name = (String)recordMap.get('name');
                equipment.Cost__c = (Decimal)recordMap.get('cost');
                equipment.ProductCode = (String)recordMap.get('_id');
                equipment.Current_Inventory__c = (Integer)recordMap.get('quantity');
                equipment.Maintenance_Cycle__c = (Integer)recordMap.get('maintenanceperiod');
```

```
            equipment.Replacement_Part__c = (Boolean)recordMap.get('replacement');
            equipment.Lifespan_Months__c = (Integer)recordMap.get('lifespan');
            equipment.Warehouse_SKU__c = (String)recordMap.get('sku');

            equipmentList.add(equipment);
        }

        if(equipmentList.size() > 0){
            upsert equipmentList;
        }
    }

  }

}
```

## Challenge 3: Schedule Synchronization Using Apex Code-

WarehouseSyncSchedule.apxc:

```
global with sharing class WarehouseSyncSchedule implements Schedulable{
    global void execute(SchedulableContext ctx){
        System.enqueueJob(new WarehouseCalloutService());
    }
}
```

## Challenge 4: Test Automation Logic-

MaintainanceRequestHelperTest.apxc:

```
@istest
public with sharing class MaintenanceRequestHelperTest {

    private static final string STATUS_NEW = 'New';
    private static final string WORKING = 'Working';
```

```
    private static final string CLOSED = 'Closed';
    private static final string REPAIR = 'Repair';
    private static final string REQUEST_ORIGIN = 'Web';
    private static final string REQUEST_TYPE = 'Routine Maintenance';
    private static final string REQUEST_SUBJECT = 'Testing subject';

    PRIVATE STATIC Vehicle__c createVehicle(){
        Vehicle__c Vehicle = new Vehicle__C(name = 'SuperTruck');
        return Vehicle;
    }

    PRIVATE STATIC Product2 createEq(){
        product2 equipment = new product2(name = 'SuperEquipment',
                                    lifespan_months__C = 10,
                                    maintenance_cycle__C = 10,
                                    replacement_part__c = true);
        return equipment;
    }

    PRIVATE STATIC Case createMaintenanceRequest(id vehicleId, id equipmentId){
        case cs = new case(Type=REPAIR,
                        Status=STATUS_NEW,
                        Origin=REQUEST_ORIGIN,
                        Subject=REQUEST_SUBJECT,
                        Equipment__c=equipmentId,
                        Vehicle__c=vehicleId);
        return cs;
    }

    PRIVATE STATIC Equipment_Maintenance_Item__c createWorkPart(id equipmentId,id
requestId){
        Equipment_Maintenance_Item__c wp = new
Equipment_Maintenance_Item__c(Equipment__c = equipmentId,
                                                    Maintenance_Request__c = requestId);
        return wp;
    }

    @istest
    private static void testMaintenanceRequestPositive(){
        Vehicle__c vehicle = createVehicle();
        insert vehicle;
```

```
        id vehicleId = vehicle.Id;

        Product2 equipment = createEq();
        insert equipment;
        id equipmentId = equipment.Id;

        case somethingToUpdate = createMaintenanceRequest(vehicleId,equipmentId);
        insert somethingToUpdate;

        Equipment_Maintenance_Item__c workP =
createWorkPart(equipmentId,somethingToUpdate.id);
        insert workP;

        test.startTest();
        somethingToUpdate.status = CLOSED;
        update somethingToUpdate;
        test.stopTest();

        Case newReq = [Select id, subject, type, Equipment__c, Date_Reported__c,
Vehicle__c, Date_Due__c
                    from case
                    where status =:STATUS_NEW];

        Equipment_Maintenance_Item__c workPart = [select id
                                    from Equipment_Maintenance_Item__c
                                    where Maintenance_Request__c =:newReq.Id];

        system.assert(workPart != null);
        system.assert(newReq.Subject != null);
        system.assertEquals(newReq.Type, REQUEST_TYPE);
        SYSTEM.assertEquals(newReq.Equipment__c, equipmentId);
        SYSTEM.assertEquals(newReq.Vehicle__c, vehicleId);
        SYSTEM.assertEquals(newReq.Date_Reported__c, system.today());
    }

    @istest
    private static void testMaintenanceRequestNegative(){
        Vehicle__C vehicle = createVehicle();
        insert vehicle;
        id vehicleId = vehicle.Id;
```

```
        product2 equipment = createEq();
        insert equipment;
        id equipmentId = equipment.Id;

        case emptyReq = createMaintenanceRequest(vehicleId,equipmentId);
        insert emptyReq;

        Equipment_Maintenance_Item__c workP = createWorkPart(equipmentId, emptyReq.Id);
        insert workP;

        test.startTest();
        emptyReq.Status = WORKING;
        update emptyReq;
        test.stopTest();

        list<case> allRequest = [select id
                                 from case];

        Equipment_Maintenance_Item__c workPart = [select id
                                                  from Equipment_Maintenance_Item__c
                                                  where Maintenance_Request__c = :emptyReq.Id];

        system.assert(workPart != null);
        system.assert(allRequest.size() == 1);
    }

    @istest
    private static void testMaintenanceRequestBulk(){
        list<Vehicle__C> vehicleList = new list<Vehicle__C>();
        list<Product2> equipmentList = new list<Product2>();
        list<Equipment_Maintenance_Item__c> workPartList = new
list<Equipment_Maintenance_Item__c>();
        list<case> requestList = new list<case>();
        list<id> oldRequestIds = new list<id>();

        for(integer i = 0; i < 300; i++){
           vehicleList.add(createVehicle());
            equipmentList.add(createEq());
        }
        insert vehicleList;
        insert equipmentList;
```

```
        for(integer i = 0; i < 300; i++){
            requestList.add(createMaintenanceRequest(vehicleList.get(i).id,
equipmentList.get(i).id));
        }
        insert requestList;

        for(integer i = 0; i < 300; i++){
            workPartList.add(createWorkPart(equipmentList.get(i).id, requestList.get(i).id));
        }
        insert workPartList;

        test.startTest();
        for(case req : requestList){
            req.Status = CLOSED;
            oldRequestIds.add(req.Id);
        }
        update requestList;
        test.stopTest();

        list<case> allRequests = [select id
                                  from case
                                  where status =: STATUS_NEW];

        list<Equipment_Maintenance_Item__c> workParts = [select id
                                                         from Equipment_Maintenance_Item__c
                                                         where Maintenance_Request__c in: oldRequestIds];

        system.assert(allRequests.size() == 300);
    }
}
```

MaintenanceRequest.apxt:

```
trigger MaintenanceRequest on Case (before update, after update) {
    if(Trigger.isUpdate && Trigger.isAfter){
        MaintenanceRequestHelper.updateWorkOrders(Trigger.New, Trigger.OldMap);
    }
}
```

## Challenge 5: Test Callout Logic-

WarehouseCalloutServiceMock.apxc:

```
public class WarehouseCalloutServiceMock implements HttpCalloutMock {
    private String responseJson = '[' +

'{"_id":"55d66226726b611100aaf741","replacement":false,"quantity":5,"name":"Generator
1000 kW","maintenanceperiod":365,"lifespan":120,"cost":5000,"sku":"100003"},' +

'{"_id":"55d66226726b611100aaf742","replacement":true,"quantity":183,"name":"Cooling
Fan","maintenanceperiod":0,"lifespan":0,"cost":300,"sku":"100004"},' +

'{"_id":"55d66226726b611100aaf743","replacement":true,"quantity":143,"name":"Fuse
20A","maintenanceperiod":0,"lifespan":0,"cost":22,"sku":"100005"}' +
                        ']';

    // Implement this interface method
    public HTTPResponse respond(HTTPRequest request) {

        HttpResponse response = new HttpResponse();
        response.setHeader('Content-Type', 'application/json');
        response.setBody(responseJson);
        response.setStatusCode(200);
        return response;
    }
}
```

WarehouseCalloutServiceTest.apxc:

```
@isTest
private class WarehouseCalloutServiceTest {

    @isTest
    static void testRunWarehouseEquipmentSync(){
        Test.setMock(HttpCalloutMock.class, new WarehouseCalloutServiceMock());

        Test.startTest();
        WarehouseCalloutService.runWarehouseEquipmentSync();
```

```
        Test.stopTest();

        System.assertEquals(3, [select count() from Product2]);
    }
}
```

## Challenge 6: Test Scheduling Logic-

WarehouseSyncSchedule.apxc:

```
global with sharing class WarehouseSyncSchedule implements Schedulable{
    global void execute(SchedulableContext ctx){
        System.enqueueJob(new WarehouseCalloutService());
    }
}
```

WarehouseSyncScheduleTest.apxc:

```
@isTest
public class WarehouseSyncScheduleTest {

    @isTest static void WarehousescheduleTest(){
        String scheduleTime = '00 00 01 * * ?';
        Test.startTest();
        Test.setMock(HttpCalloutMock.class, new WarehouseCalloutServiceMock());
        String jobID=System.schedule('Warehouse Time To Schedule to Test', scheduleTime,
new WarehouseSyncSchedule());
        Test.stopTest();
        //Contains schedule information for a scheduled job. CronTrigger is similar to a cron job
on UNIX systems.
        // This object is available in API version 17.0 and later.
        CronTrigger a=[SELECT Id FROM CronTrigger where NextFireTime > today];
        System.assertEquals(jobID, a.Id,'Schedule ');


    }
}
```

## Lightning Web Components:

Salesforce DX and Visual Studio Code setup is done. Then created and deployed lightning web Components.

- Deploying Lightning Web Component Files:

BikeCard.html:

```
<template>
    <div>
        <div>Name: {name}</div>
        <div>Description: {description}</div>
        <lightning-badge label={material}></lightning-badge>
        <lightning-badge label={category}></lightning-badge>
        <div>Price: {price}</div>
        <div><img src={pictureUrl}/></div>
    </div>
</template>
```

BikeCard.js:

```
import { LightningElement } from 'lwc';
export default class BikeCard extends LightningElement {
    name = 'Electra X4';
    description = 'A sweet bike built for comfort.';
    category = 'Mountain';
    material = 'Steel';
    price = '$2,700';
    pictureUrl = 'https://s3-us-west-1.amazonaws.com/sfdc-demo/ebikes/electrax4.jpg';
}
```

BikeCard.js-meta.xml:

```
<?xml version="1.0" encoding="UTF-8"?>
<LightningComponentBundle xmlns="http://soap.sforce.com/2006/04/metadata">
    <!-- The apiVersion may need to be increased for the current release -
->
    <apiVersion>52.0</apiVersion>
    <isExposed>true</isExposed>
    <masterLabel>Product Card</masterLabel>
    <targets>
        <target>lightning__AppPage</target>
        <target>lightning__RecordPage</target>
        <target>lightning__HomePage</target>
    </targets>
</LightningComponentBundle>
```

- Add Styles and Data to a Lightning Web Component

selector.html:

```
<template>
  <div class="wrapper">
  <header class="header">Available Bikes for {name}</header>
  <section class="content">
    <div class="columns">
    <main class="main" >
        <c-list onproductselected={handleProductSelected}></c-list>
    </main>
    <aside class="sidebar-second">
        <c-detail product-id={selectedProductId}></c-detail>
    </aside>
    </div>
  </section>
  </div>
```

```
</template>
```

selector.js:

```
import { LightningElement, wire } from 'lwc';
import { getRecord, getFieldValue } from 'lightning/uiRecordApi';
import Id from '@salesforce/user/Id';
import NAME_FIELD from '@salesforce/schema/User.Name';
const fields = [NAME_FIELD];
export default class Selector extends LightningElement {
    selectedProductId;
    handleProductSelected(evt) {
        this.selectedProductId = evt.detail;
    }
    userId = Id;
    @wire(getRecord, { recordId: '$userId', fields })
    user;
    get name() {
        return getFieldValue(this.user.data, NAME_FIELD);
    }
}
```

selector.css:

```
body {
  margin: 0;
}
.wrapper{
  min-height: 100vh;
  background: #ccc;
  display: flex;
  flex-direction: column;
}
.header, .footer{
```

```
  height: 50px;
  background: rgb(255, 255, 255);
  color: rgb(46, 46, 46);
  font-size: x-large;
  padding: 10px;
}
.content {
  display: flex;
  flex: 1;
  background: #999;
  color: #000;
}
.columns{
  display: flex;
  flex:1;
}
.main{
  flex: 1;
  order: 2;
  background: #eee;
}
.sidebar-first{
  width: 20%;
  background: #ccc;
  order: 1;
}
.sidebar-second{
  width: 30%;
  order: 3;
  background: #ddd;
}
```

selector.js-meta.xml:

```
<?xml version="1.0" encoding="UTF-8"?>
<LightningComponentBundle xmlns="http://soap.sforce.com/2006/04/metadata">
    <apiVersion>48.0</apiVersion>
    <isExposed>true</isExposed>
    <targets>
        <target>lightning__AppPage</target>
        <target>lightning__RecordPage</target>
        <target>lightning__HomePage</target>
    </targets>
</LightningComponentBundle>
```