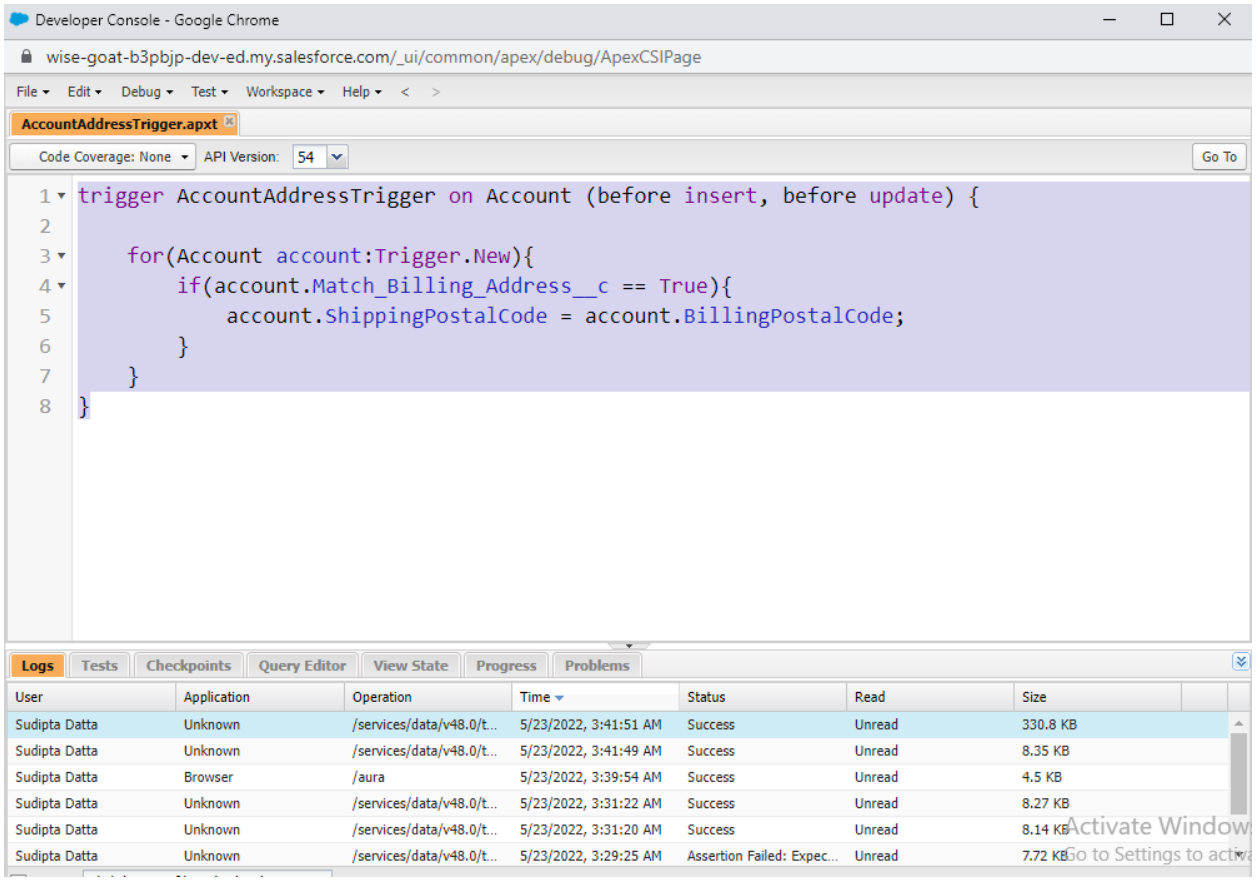
Module: Get Started With Apex triggers

AccountAddressTrigger.apxt

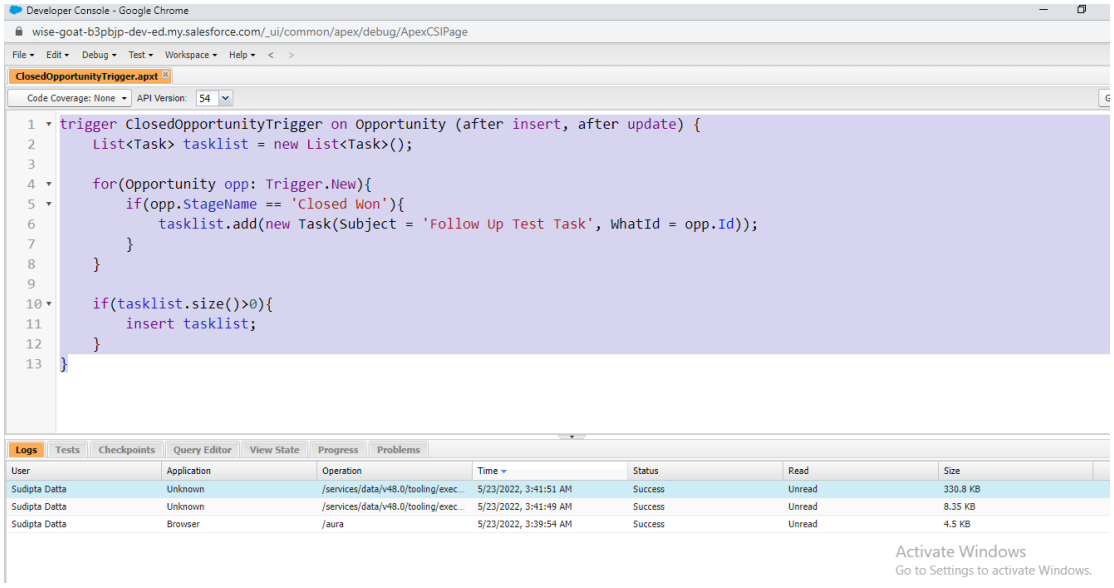
```
trigger AccountAddressTrigger on Account (before insert, before update) {


   for(Account account:Trigger.New){

      if(account.Match_Billing_Address__c == True){

         account.ShippingPostalCode = account.BillingPostalCode;

      }

   }

}
```



Module:Apex Testing: 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;
    }
}
```



Module:Get Started With Apex Unit Tests

VerifyDate.apxc

```
public class VerifyDate {
```

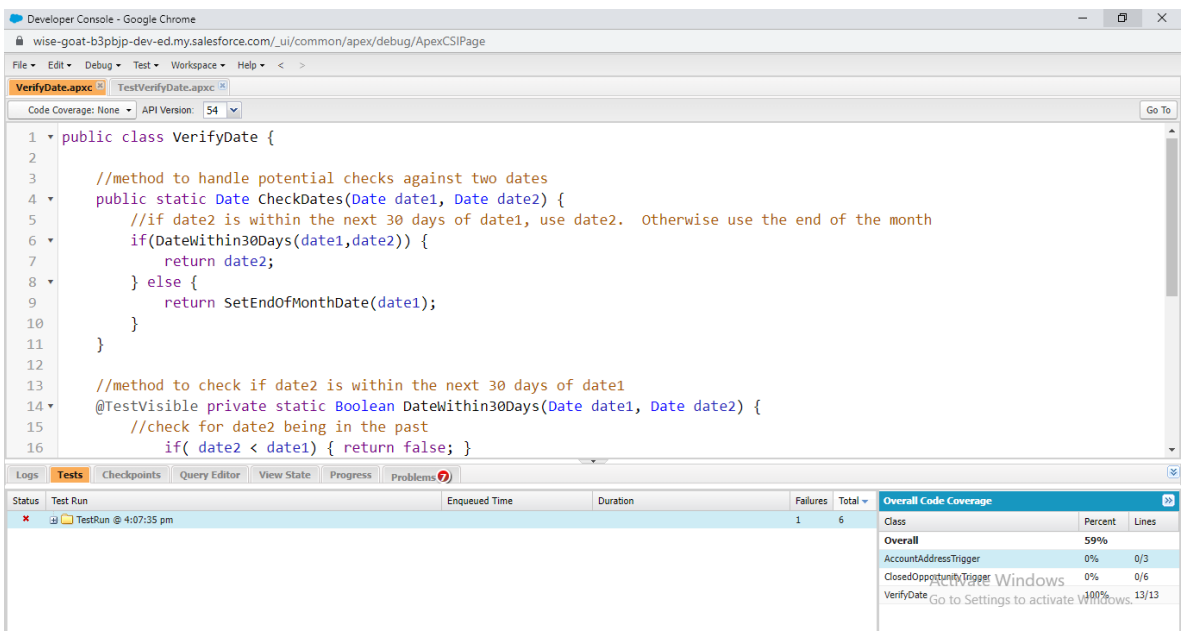
```
//method to handle potential checks against two dates
public static Date CheckDates(Date date1, Date date2) {
	//if date2 is within the next 30 days of date1, use date2.  Otherwise use the end of the month
	if(DateWithin30Days(date1,date2)) {
		return date2;
	} else {
		return SetEndOfMonthDate(date1);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

//method to check if date2 is within the next 30 days of date1
@TestVisible 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
@TestVisible private static Date SetEndOfMonthDate(Date date1) {
	Integer totalDays = Date.daysInMonth(date1.year(), date1.month());
```

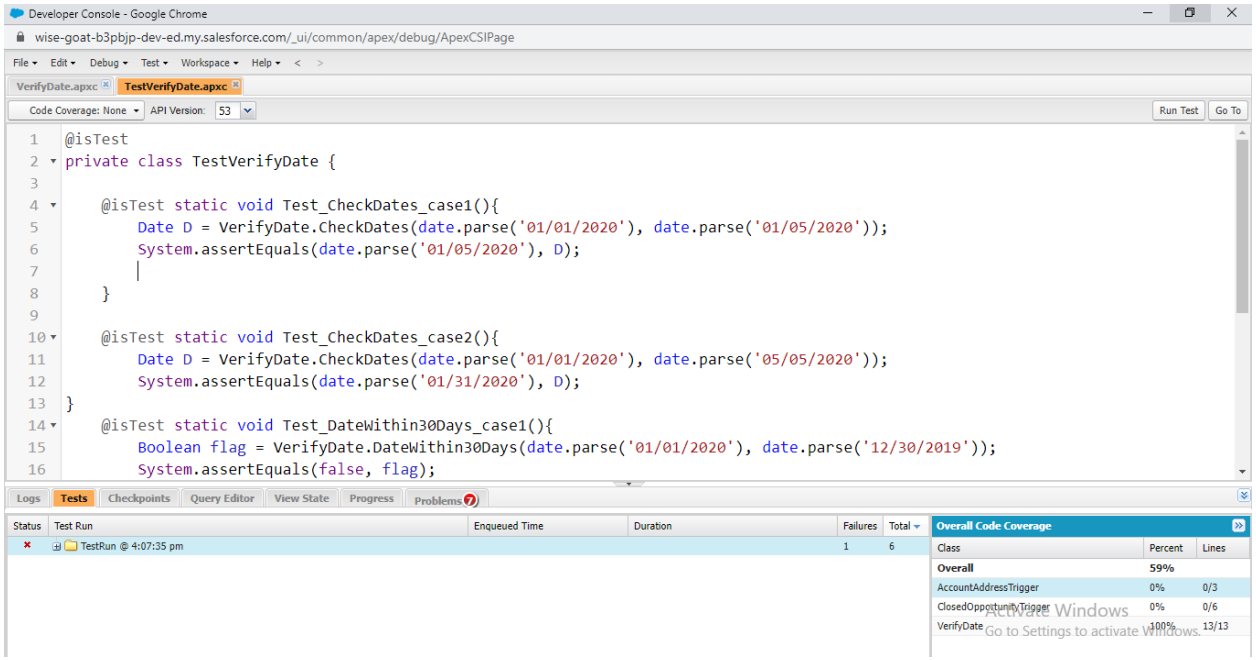
```
            Date lastDay = Date.newInstance(date1.year(), date1.month(), totalDays);
            return lastDay;
        }

}
```

TestVerifyDate.apxc

```
@isTest
private class TestVerifyDate {

    @isTest static void Test_CheckDates_case1(){
        Date D = VerifyDate.CheckDates(date.parse('01/01/2020'), date.parse('01/05/2020'));
        System.assertEquals(date.parse('01/05/2020'), D);

    }

    @isTest static void Test_CheckDates_case2(){
        Date D = VerifyDate.CheckDates(date.parse('01/01/2020'), date.parse('05/05/2020'));
        System.assertEquals(date.parse('01/31/2020'), D);
}
    @isTest static void Test_DateWithin30Days_case1(){
        Boolean flag = VerifyDate.DateWithin30Days(date.parse('01/01/2020'), date.parse('12/30/2019'));
        System.assertEquals(false, flag);
    }
    @isTest static void Test_DateWithin30Days_case2(){
        Boolean flag = VerifyDate.DateWithin30Days(date.parse('01/01/2020'), date.parse('02/02/2020'));
```

```
        System.assertEquals(false, flag);
    }
    @isTest static void Test_DateWithin30Days_case3(){
        Boolean flag = VerifyDate.DateWithin30Days(date.parse('01/01/2020'), date.parse('01/15/2020'));
        System.assertEquals(false, flag);
    }
    @isTest static void Test_SetEndOfMonthDate(){
        Date returndate = VerifyDate.SetEndOfMonthDate(date.parse('01/01/2020'));
    }
}
```





Module: 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
public class TestRestrictContactByName {

    @isTest static void Test_insertupdateContact(){
        Contact cnt = new Contact();
        cnt.LastName = 'INVALIDNAME';

        Test.startTest();
        Database.SaveResult result = Database.insert(cnt, false);
        Test.stopTest();

        System.assert(!result.isSuccess());
        System.assert(result.getErrors().size() > 0);
        System.assertEquals('The Last Name "INVALIDNAME" is not allowded for
DML',result.getErrors()[0].getmessage());

    }
}
```

Developer Console - Google Chrome

wise-goat-b3pbjp-dev-ed.my.salesforce.com/_ui/common/apex/debug/ApexCSIPage

File Edit Debug Test Workspace Help

RestrictContactByName.apxt * | TestRestrictContactByName.apxc

Code Coverage: None API Version: 53 Go To

```
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');
        }

    }



}
```

Logs | Tests | Checkpoints | Query Editor | View State | Progress | Problems

Status	Test Run	Enqueued Time	Duration	Failures	Total
✖	TestRun @ 4:24:31 pm			1	1
✖	TestRun @ 4:24:39 pm			1	1

Overall Code Coverage

Class	Percent	Lines
Overall	**64%**	
AccountAddressTrigger	0%	0/3
ClosedOpportunityTrigger	0%	0/6
RestrictContactByName	100%	3/3
VerifyDate	100%	13/13

Developer Console - Google Chrome

wise-goat-b3pbjp-dev-ed.my.salesforce.com/_ui/common/apex/debug/ApexCSIPage

File Edit Debug Test Workspace Help

RestrictContactByName.apxt * | TestRestrictContactByName.apxc

Code Coverage: None API Version: 54 Run Test Go To

```
public class TestRestrictContactByName {

    @isTest static void Test_insertupdateContact(){
        Contact cnt = new Contact();
        cnt.LastName = 'INVALIDNAME';

        Test.startTest();
        Database.SaveResult result = Database.insert(cnt, false);
        Test.stopTest();

        System.assert(!result.isSuccess());
        System.assert(result.getErrors().size() > 0);
        System.assertEquals('The Last Name "INVALIDNAME" is not allowded for DML',result.getErrors()[0].getmessage());

    }
}
```

Logs | Tests | Checkpoints | Query Editor | View State | Progress | Problems

Status	Test Run	Enqueued Time	Duration	Failures	Total
✖	TestRun @ 4:24:31 pm			1	1
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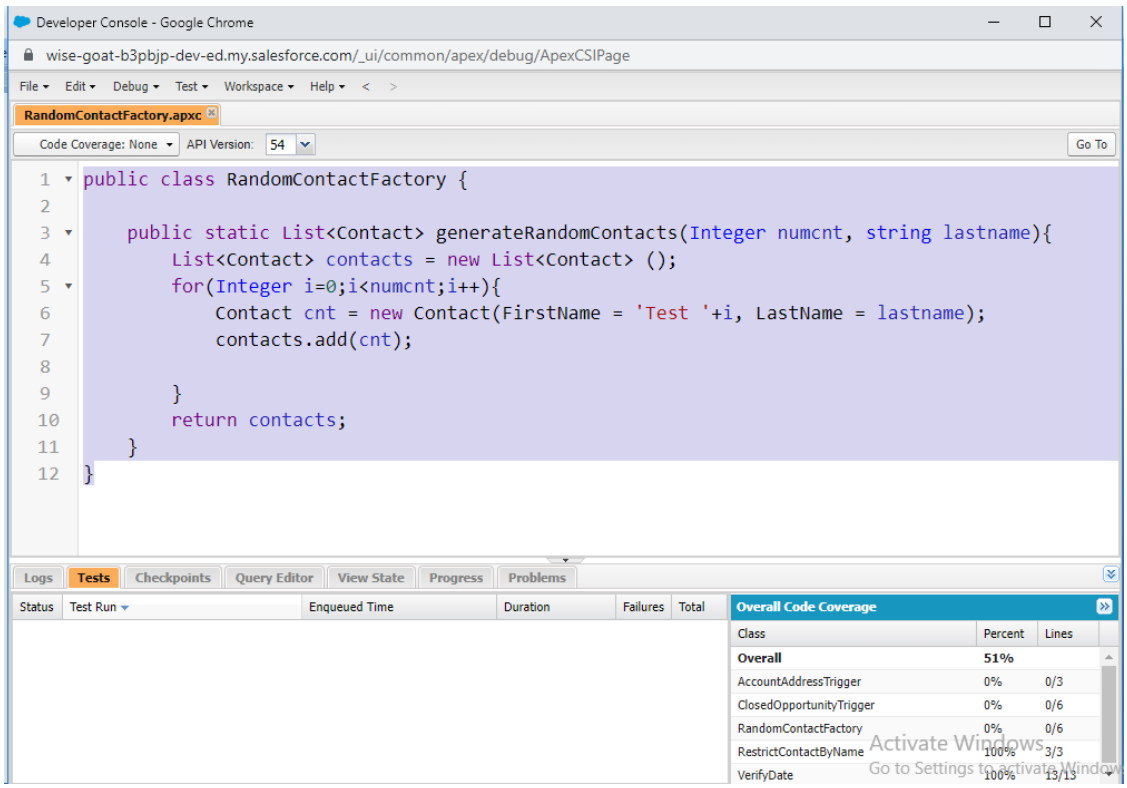
Overall Code Coverage

Class	Percent	Lines
Overall	**64%**	
AccountAddressTrigger	0%	0/3
ClosedOpportunityTrigger	0%	0/6
RestrictContactByName	100%	3/3
VerifyDate	100%	13/13

Module: Create Test Data for Apex Tests

```
public class RandomContactFactory {


    public static List<Contact> generateRandomContacts(Integer numcnt, string lastname){

        List<Contact> contacts = new List<Contact> ();
```

```
    for(Integer i=0;i<numcnt;i++){
        Contact cnt = new Contact(FirstName = 'Test '+i, LastName = lastname);
        contacts.add(cnt);


    }
    return contacts;
  }
}
```

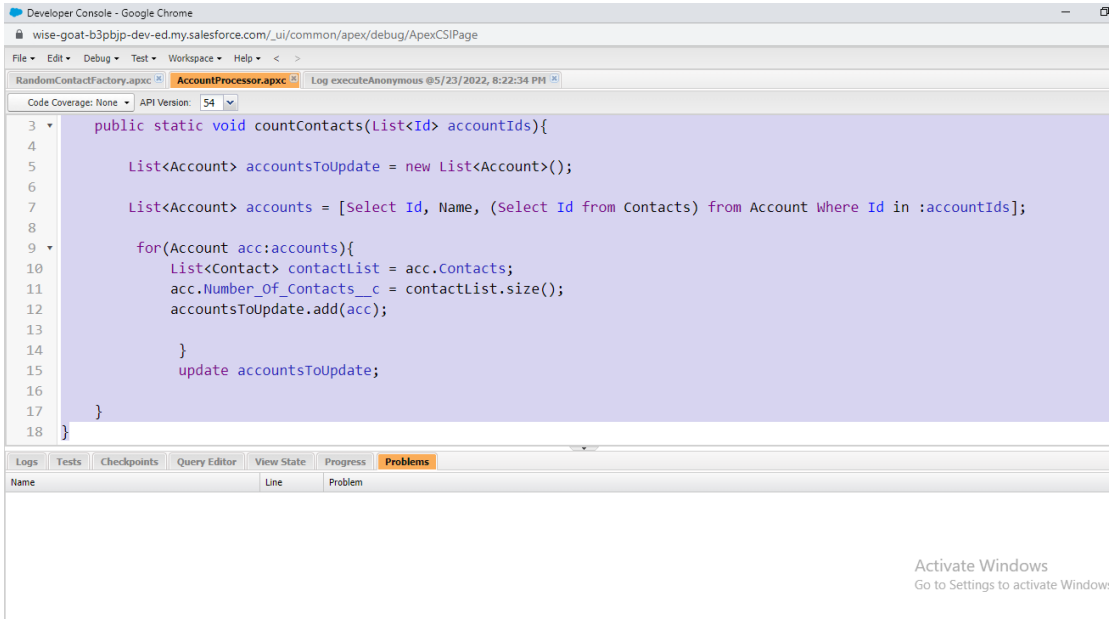


Asynchronous Apex >Use Future Methods

AccountProcessor.apxc

```
public class AccountProcessor {
        @future
  public static void countContacts(List<Id> accountIds){
```

```
        List<Account> accountsToUpdate = new List<Account>();


        List<Account> accounts = [Select Id, Name, (Select Id from Contacts) from Account Where Id in :accountIds];


         for(Account acc:accounts){

            List<Contact> contactList = acc.Contacts;

            acc.Number_Of_Contacts__c = contactList.size();

            accountsToUpdate.add(acc);


             }

             update accountsToUpdate;


    }

}
```



Developer Console - Google Chrome

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File Edit Debug Test Workspace Help < >

RandomContactFactory.apxc | AccountProcessor.apxc | Log executeAnonymous @5/23/2022, 8:22:34 PM

Execution Log

Timestamp	Event	Details
20:22:34:002	USER_INFO	[EXTERNAL]|0051w000000WIa1|goldfishpubg2@wise-goat-b3pbjp.com|(GMT-07:00) Pacific Daylight Time (America/Los_Angeles)|GMT-07:00
20:22:34:002	EXECUTION_ST...	
20:22:34:002	CODE_UNIT_ST...	[EXTERNAL]|execute_anonymous_apex
20:22:34:002	VARIABLE_SCO...	[1]|accountIds|List<Id>|true|false
20:22:34:002	HEAP_ALLOCATE	[79]|Bytes:3
20:22:34:002	HEAP_ALLOCATE	[84]|Bytes:152
20:22:34:002	HEAP_ALLOCATE	[399]|Bytes:408
20:22:34:002	HEAP_ALLOCATE	[412]|Bytes:408
20:22:34:002	HEAP_ALLOCATE	[520]|Bytes:48
20:22:34:002	HEAP_ALLOCATE	[139]|Bytes:6
20:22:34:002	HEAP_ALLOCATE	[EXTERNAL]|Bytes:5
20:22:34:003	STATEMENT_EX...	[1]|
20:22:34:003	STATEMENT_EX...	[1]|
20:22:34:003	HEAP_ALLOCATE	[1]|Bytes:4
20:22:34:003	HEAP_ALLOCATE	[EXTERNAL]|Bytes:4
20:22:34:003	VARIABLE_ASSI...	[1]|accountIds|[]|0x1f1d6c21

This Frame | Executable | Debug Only | Filter | Click here to filter the log

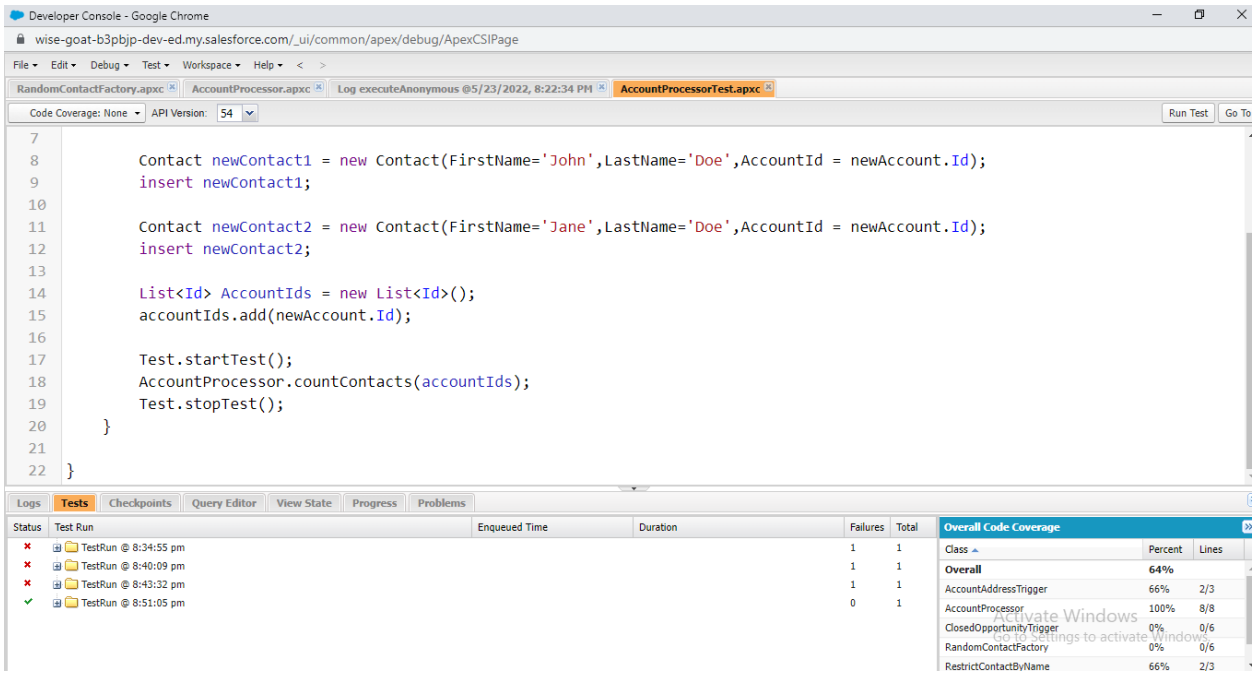
Logs | Tests | Checkpoints | Query Editor | View State | Progress | Problems

Name	Line	Problem

AccountProcessorTest.apxc

```
@IsTest

    private static void testCountContacts(){

        Account newAccount = new Account(Name='Test Account');

        insert newAccount;



        Contact newContact1 = new Contact(FirstName='John',LastName='Doe',AccountId = newAccount.Id);

        insert newContact1;



        Contact newContact2 = new Contact(FirstName='Jane',LastName='Doe',AccountId = newAccount.Id);

        insert newContact2;



        List<Id> AccountIds = new List<Id>();

        accountIds.add(newAccount.Id);



        Test.startTest();

        AccountProcessor.countContacts(accountIds);
```

```
        Test.stopTest();

    }



}
```



Module:Use Batch Apex

LeadProcessor.apxc

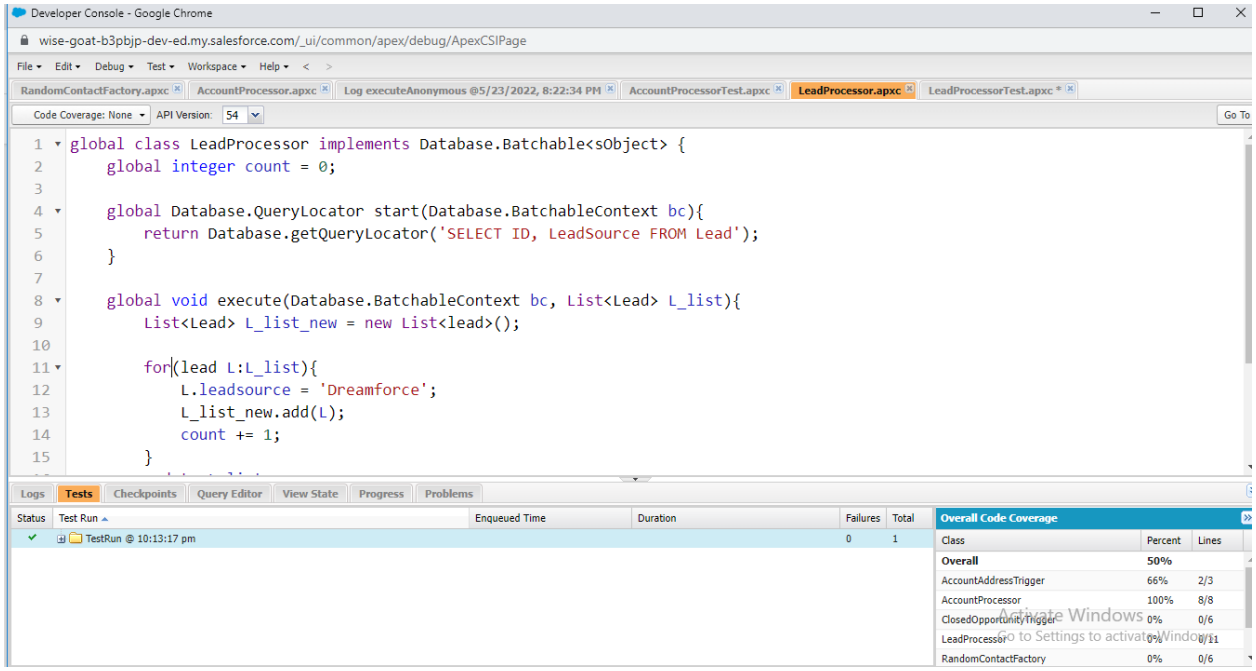
```
global class LeadProcessor implements Database.Batchable<sObject> {

    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_list){

        List<Lead> L_list_new = new List<lead>();
```

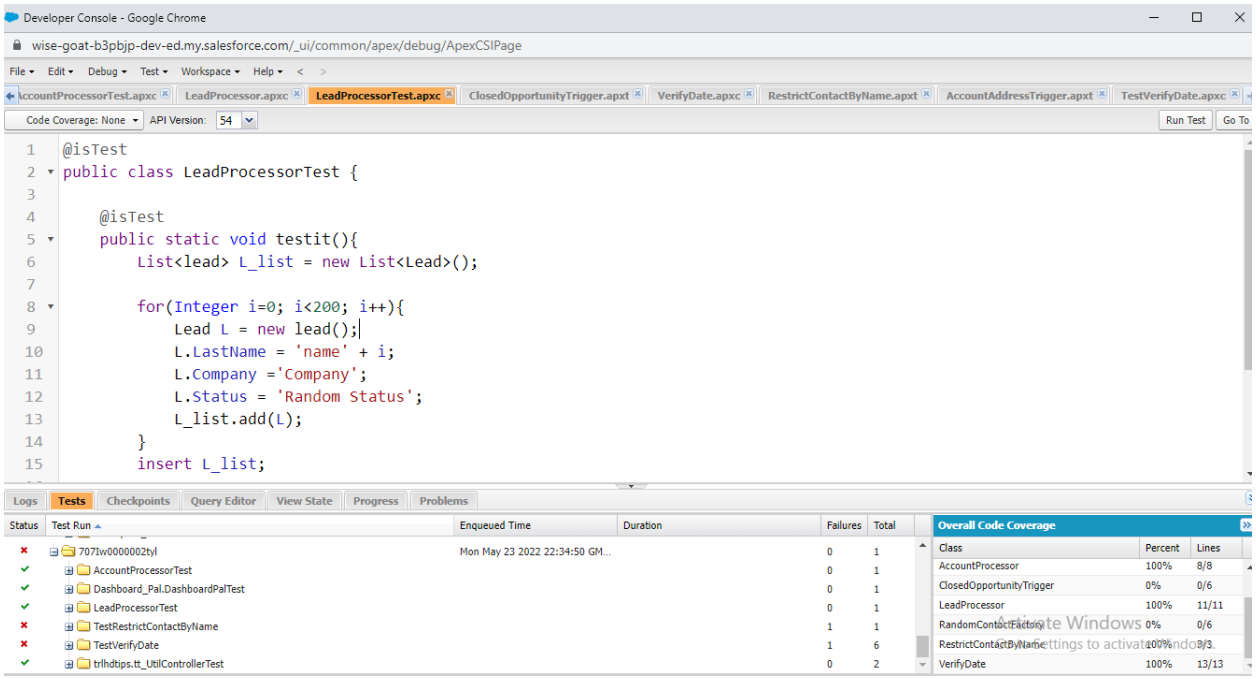
```
        for(lead L:L_list){
            L.leadsource = 'Dreamforce';
            L_list_new.add(L);
            count += 1;
        }
        update L_list_new;
    }

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

LeadProcessorTest.apxc

```
@isTest
public class LeadProcessorTest {

    @isTest
    public static void testit(){
        List<lead> L_list = new List<Lead>();

        for(Integer i=0; i<200; i++){
            Lead L = new lead();
            L.LastName = 'name' + i;
            L.Company ='Company';
```

```
            L.Status = 'Random Status';

            L_list.add(L);

        }

        insert L_list;



        Test.startTest();

        LeadProcessor lp = new LeadProcessor();

        Id batchId = Database.executeBatch(lp);

        Test.stopTest();

    }

}
```





Module: Control Processes with Queueable Apex

AddPrimaryContact.apxc

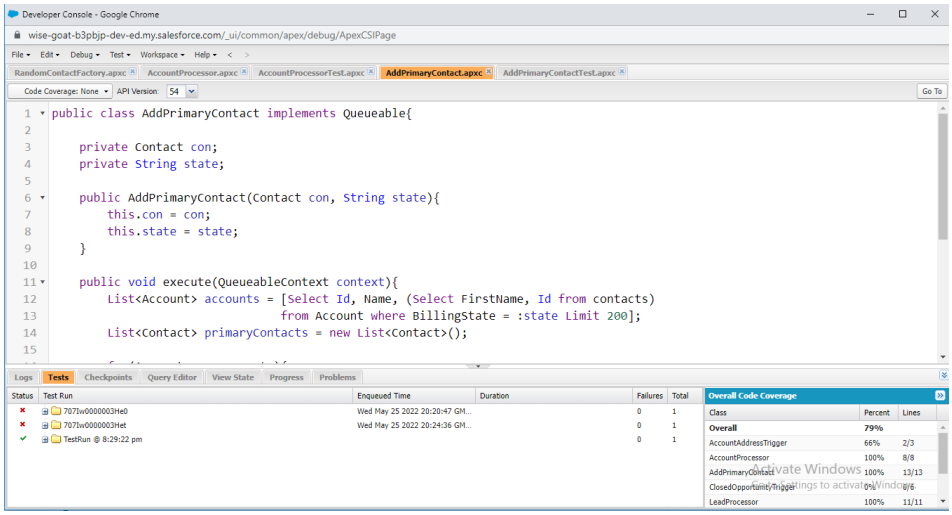
```
public class AddPrimaryContact implements Queueable{


    private Contact con;

    private String state;


    public AddPrimaryContact(Contact con, String state){

        this.con = con;

        this.state = state;

    }


    public void execute(QueueableContext context){

        List<Account> accounts = [Select Id, Name, (Select FirstName, Id from contacts)
```

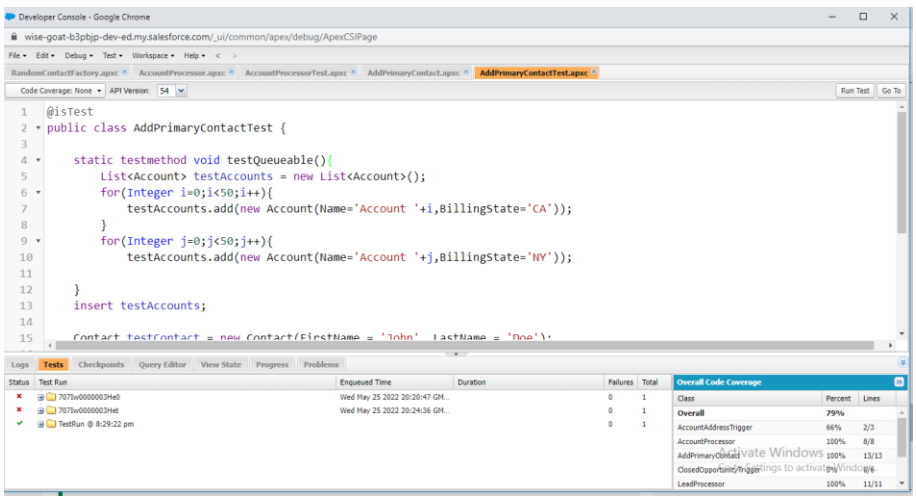
```
                    from Account where BillingState = :state Limit 200];
        List<Contact> primaryContacts = new List<Contact>();

        for(Account acc:accounts){
            contact c = con.clone();
            c.AccountId = acc.Id;
            primaryContacts.add(c);

        }

        if(primaryContacts.size() > 0){
            insert primaryContacts;
        }
    }

}
```

AddPrimaryContactTest.apxc

```
@isTest
public class AddPrimaryContactTest {

    static testmethod void testQueueable(){
        List<Account> testAccounts = new List<Account>();
        for(Integer i=0;i<50;i++){
            testAccounts.add(new Account(Name='Account '+i,BillingState='CA'));
        }
```

```
        for(Integer j=0;j<50;j++){

            testAccounts.add(new Account(Name='Account '+j,BillingState='NY'));



    }

    insert testAccounts;



    Contact testContact = new Contact(FirstName = 'John', LastName = 'Doe');

    insert testContact;



    AddPrimaryContact addit = new addPrimaryContact(testContact, 'CA');



    Test.startTest();

    system.enqueueJob(addit);

    Test.stopTest();



    System.assertEquals(50,[Select count() from Contact where accountId in (Select Id from Account where
BillingState='CA')]);

    }

}
```





Module: Apex Integration Services

Apex Integration Overview

DailyLeadProcessor.apxc

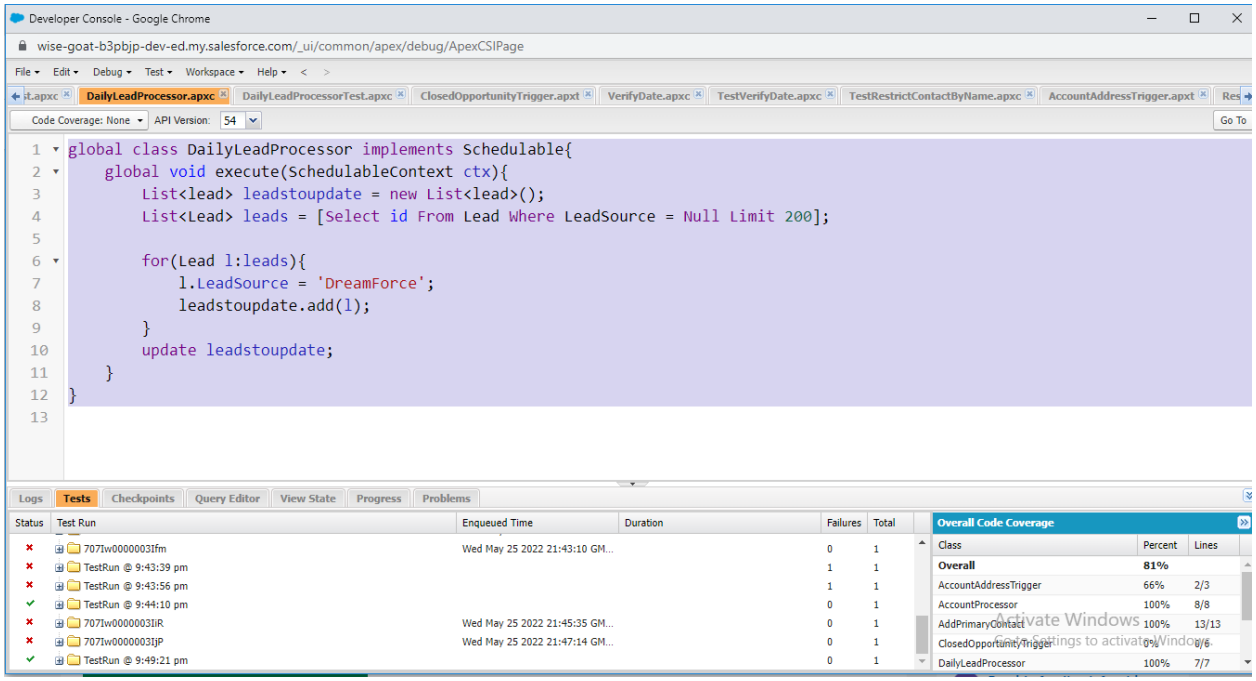
```
global class DailyLeadProcessor implements Schedulable{

    global void execute(SchedulableContext ctx){

        List<lead> leadstoupdate = new List<lead>();

        List<Lead> leads = [Select id From Lead Where LeadSource = Null Limit 200];
```

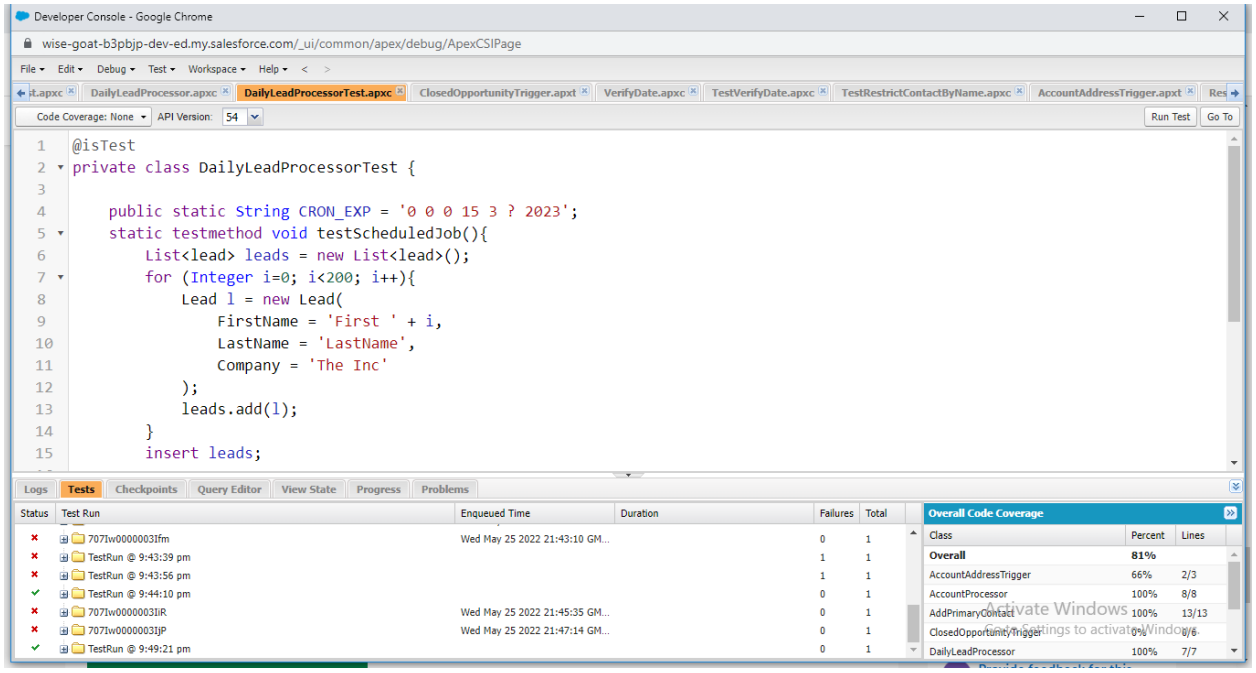
```
        for(Lead l:leads){
            l.LeadSource = 'DreamForce';
            leadstoupdate.add(l);
        }
        update leadstoupdate;
    }
}
```

DailyLeadProcessorTest.apxc

```
@isTest
private class DailyLeadProcessorTest {

    public static String CRON_EXP = '0 0 0 15 3 ? 2023';
    static testmethod void testScheduledJob(){
        List<lead> leads = new List<lead>();
        for (Integer i=0; i<200; i++){
            Lead l = new Lead(
                FirstName = 'First ' + i,
                LastName = 'LastName',
                Company = 'The Inc'
            );
            leads.add(l);
        }
        insert leads;

        Test.startTest();
```

```
        String jobId = System.schedule('ScheduledApexTest',CRON_EXP,new DailyLeadProcessor());

        Test.stopTest();



        List<Lead> checkleads = new List<Lead>();

        checkleads = [Select Id From Lead Where LeadSource = 'Dreamforce' and Company = 'The Inc'];



        System.assertEquals(200, checkleads.size(), 'Leads were not created');

    }

}
```





Apex REST Callouts

AnimalLocator.apxc

```
public class AnimalLocator{
   public static String getAnimalNameById(Integer x){
      Http http = new Http();
      HttpRequest req = new HttpRequest();
      req.setEndpoint('https://th-apex-http-callout.herokuapp.com/animals/' + x);
      req.setMethod('GET');
      Map<String, Object> animal= new Map<String, Object>();
      HttpResponse res = http.send(req);
         if (res.getStatusCode() == 200) {
      Map<String, Object> results = (Map<String, Object>)JSON.deserializeUntyped(res.getBody());
     animal = (Map<String, Object>) results.get('animal');
      }
return (String)animal.get('name');
   }
}
```

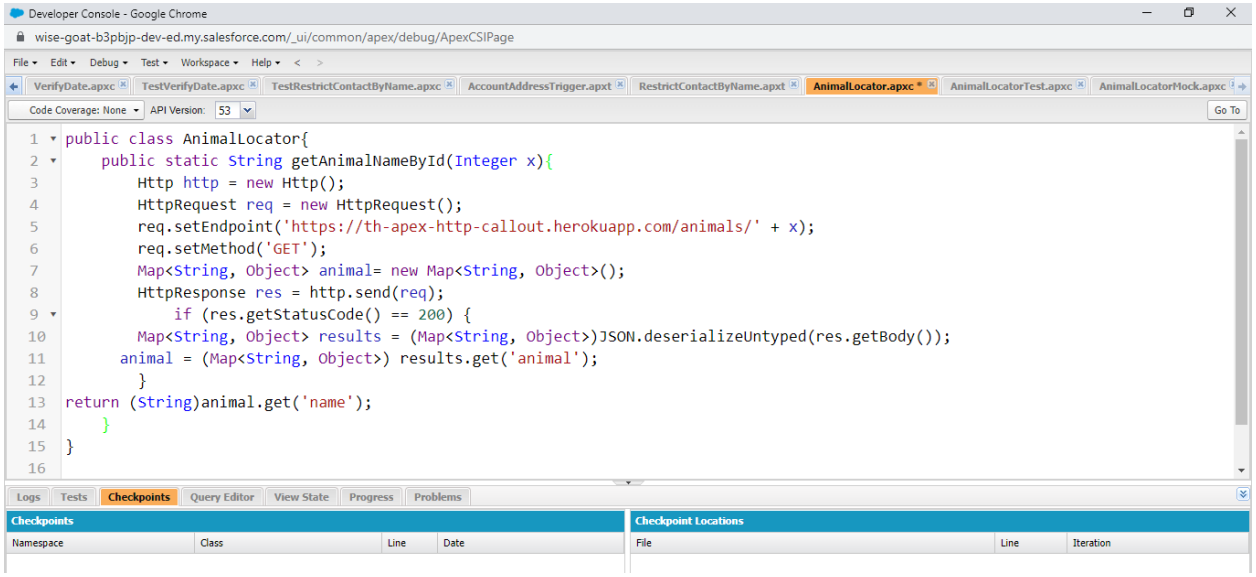
AnimalLocatorTest.apxc

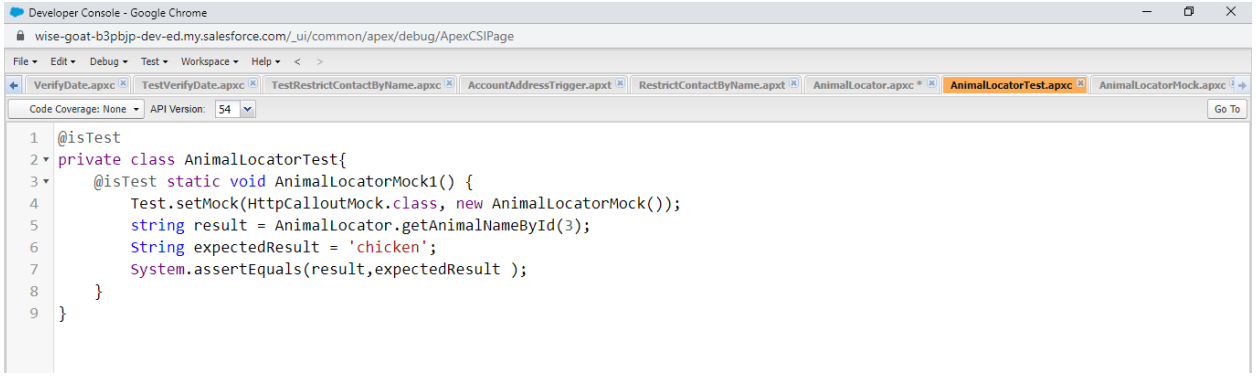
```
@isTest

private class AnimalLocatorTest{

   @isTest static void AnimalLocatorMock1() {

      Test.setMock(HttpCalloutMock.class, new AnimalLocatorMock());
```

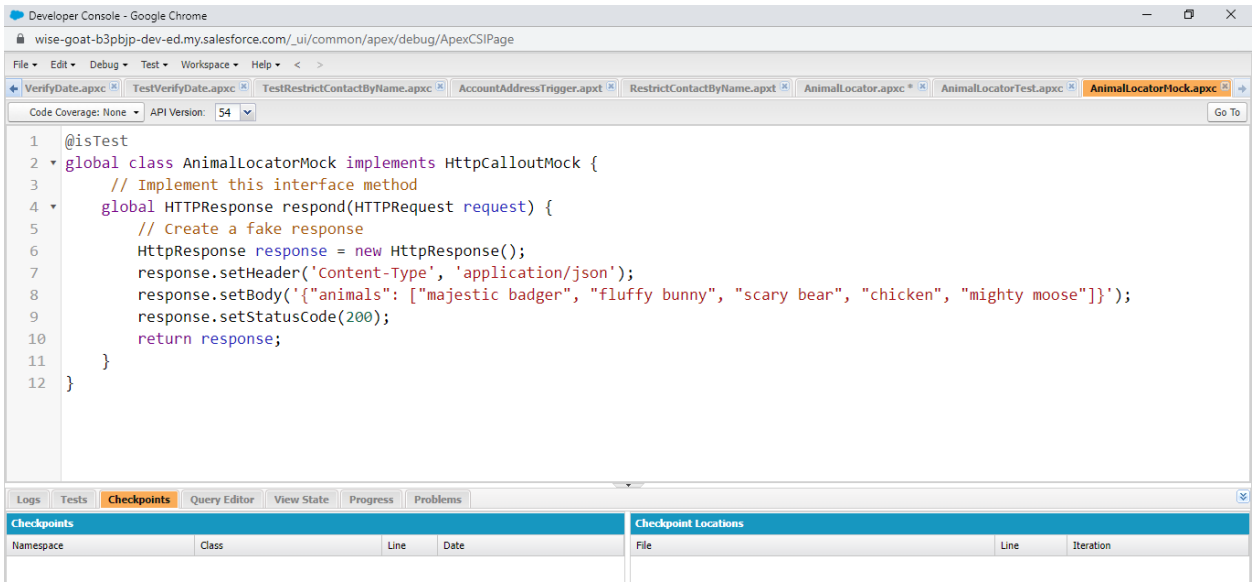
```
        string result = AnimalLocator.getAnimalNameById(3);

        String expectedResult = 'chicken';

        System.assertEquals(result,expectedResult );

    }

}
```

AnimalLocatorMock.apxc

```
@isTest

private class AnimalLocatorTest{

    @isTest static void AnimalLocatorMock1() {

        Test.setMock(HttpCalloutMock.class, new AnimalLocatorMock());

        string result = AnimalLocator.getAnimalNameById(3);

        String expectedResult = 'chicken';

        System.assertEquals(result,expectedResult );

    }

}
```







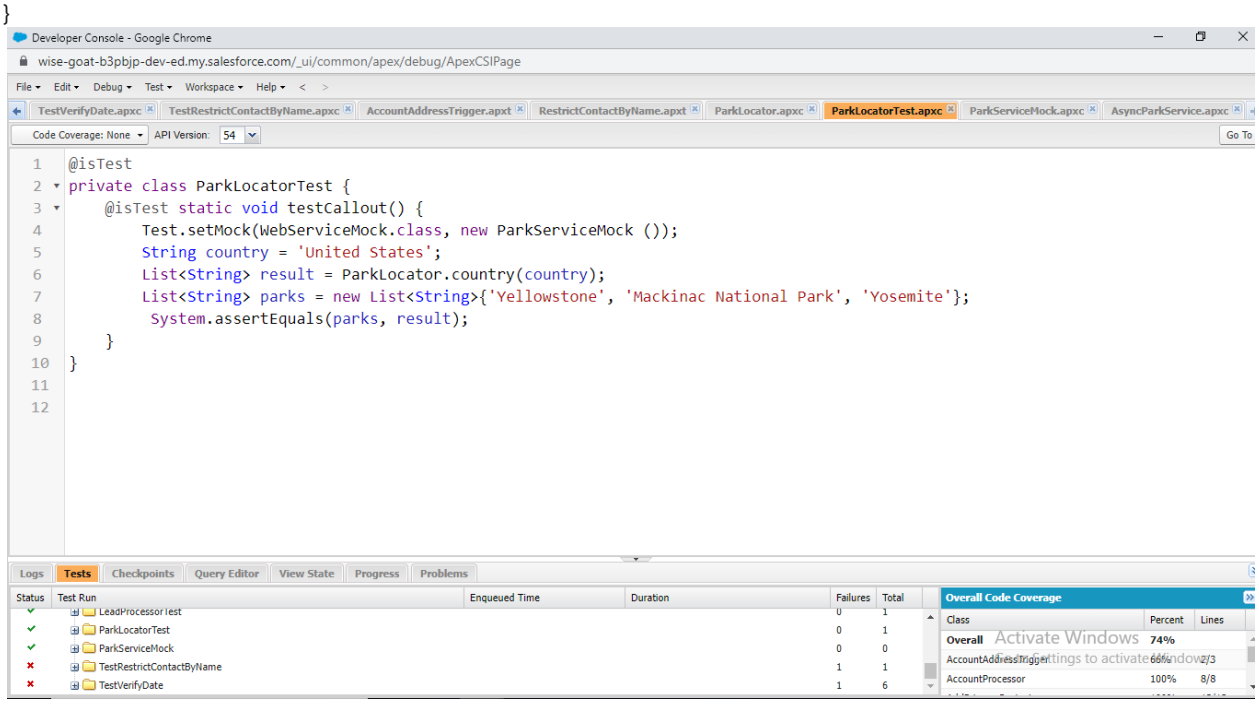
Apex Integration Services

Apex SOAP Callouts


```
public class ParkLocator {

    public static string[] country(string theCountry) {

        ParkService.ParksImplPort  parkSvc = new  ParkService.ParksImplPort(); // remove space

        return parkSvc.byCountry(theCountry);

    }

}
```

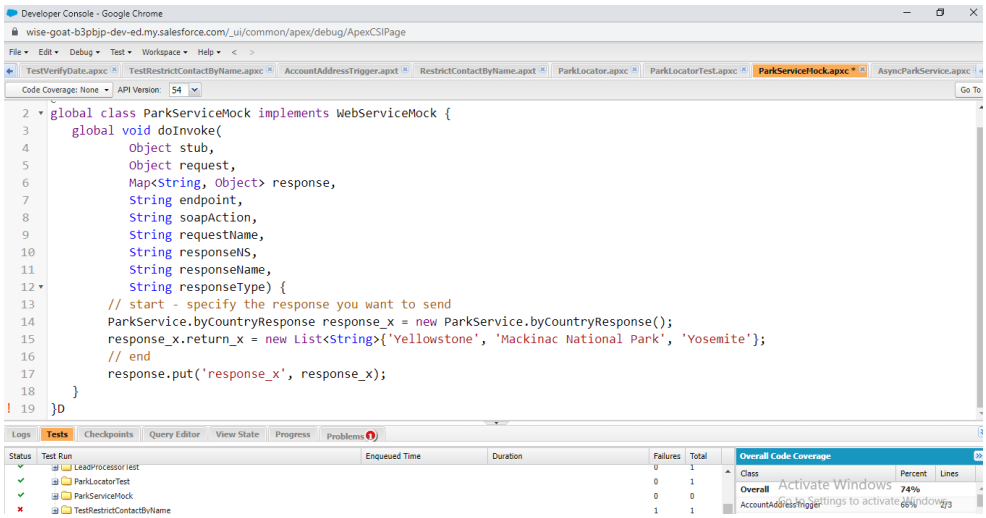
ParkLocatorTest.apxc

```
@isTest

private class ParkLocatorTest {

    @isTest static void testCallout() {

        Test.setMock(WebServiceMock.class, new ParkServiceMock ());

        String country = 'United States';

        List<String> result = ParkLocator.country(country);

        List<String> parks = new List<String>{'Yellowstone', 'Mackinac National Park', 'Yosemite'};

         System.assertEquals(parks, result);

    }

}
```



ParkServiceMock.apxc *

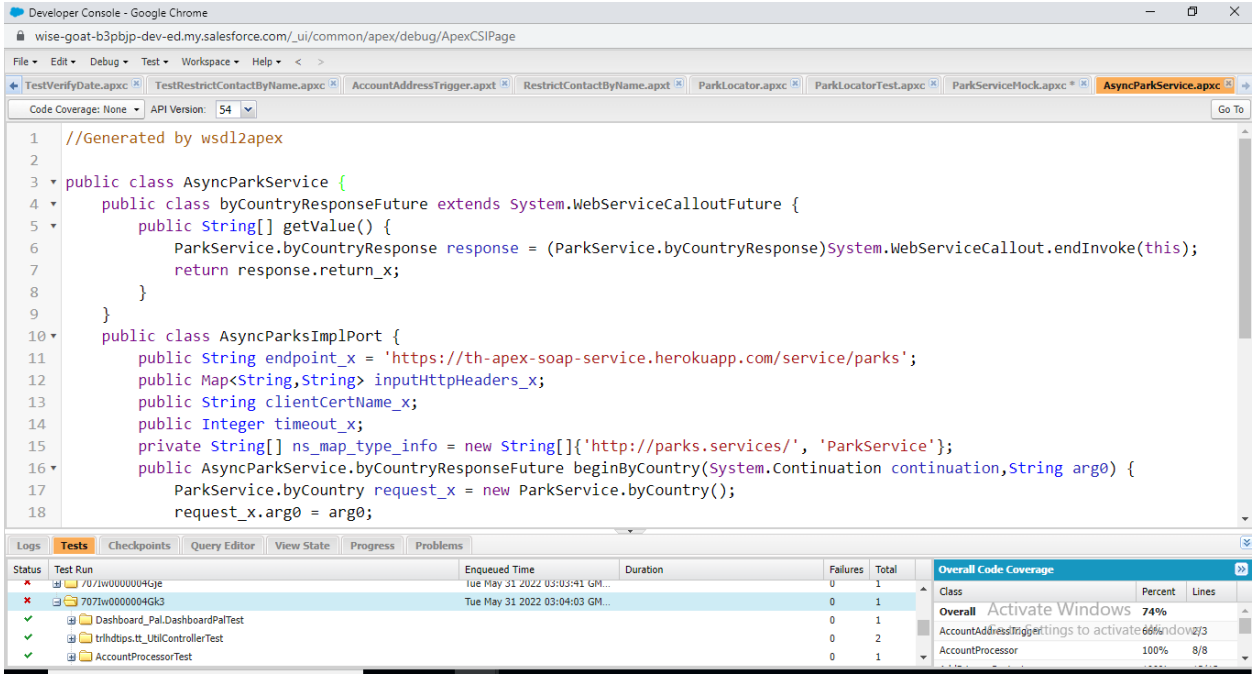
```
@isTest

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) {

      // start - specify the response you want to send

      ParkService.byCountryResponse response_x = new ParkService.byCountryResponse();

      response_x.return_x = new List<String>{'Yellowstone', 'Mackinac National Park', 'Yosemite'};

      // end

      response.put('response_x', response_x);

  }

}
```



AsyncParkService.apxc

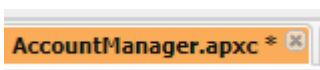
```
//Generated by wsdl2apex



public class AsyncParkService {

    public class byCountryResponseFuture extends System.WebServiceCalloutFuture {

        public String[] getValue() {

            ParkService.byCountryResponse response =
(ParkService.byCountryResponse)System.WebServiceCallout.endInvoke(this);

            return response.return_x;

        }

    }

    public class AsyncParksImplPort {

        public String endpoint_x = 'https://th-apex-soap-service.herokuapp.com/service/parks';

        public Map<String,String> inputHttpHeaders_x;

        public String clientCertName_x;

        public Integer timeout_x;

        private String[] ns_map_type_info = new String[]{'http://parks.services/', 'ParkService'};
```

```
        public AsyncParkService.byCountryResponseFuture beginByCountry(System.Continuation continuation,String
arg0) {

            ParkService.byCountry request_x = new ParkService.byCountry();

            request_x.arg0 = arg0;

            return (AsyncParkService.byCountryResponseFuture) System.WebServiceCallout.beginInvoke(

              this,

              request_x,

              AsyncParkService.byCountryResponseFuture.class,

              continuation,

              new String[]{endpoint_x,

              '',

              'http://parks.services/',

              'byCountry',

              'http://parks.services/',

              'byCountryResponse',

              'ParkService.byCountryResponse'}

            );

        }

    }

}
```

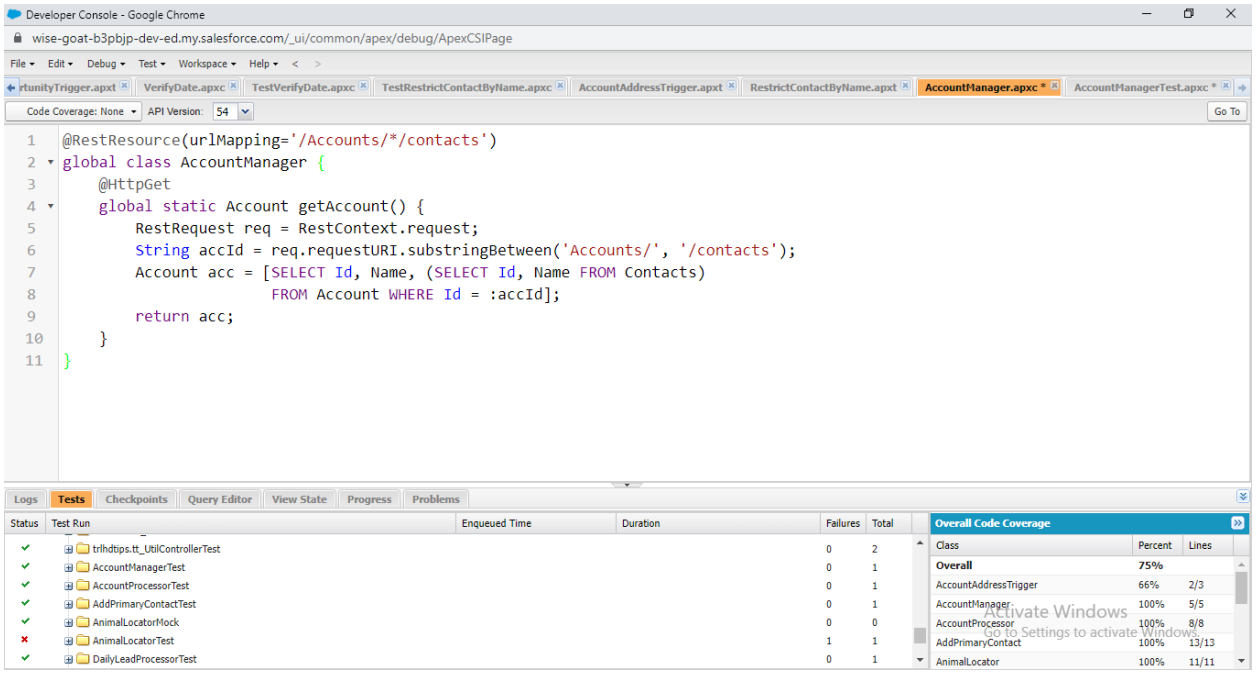


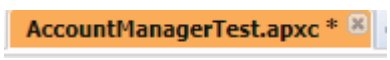
Apex Integration Services

Apex Web Services



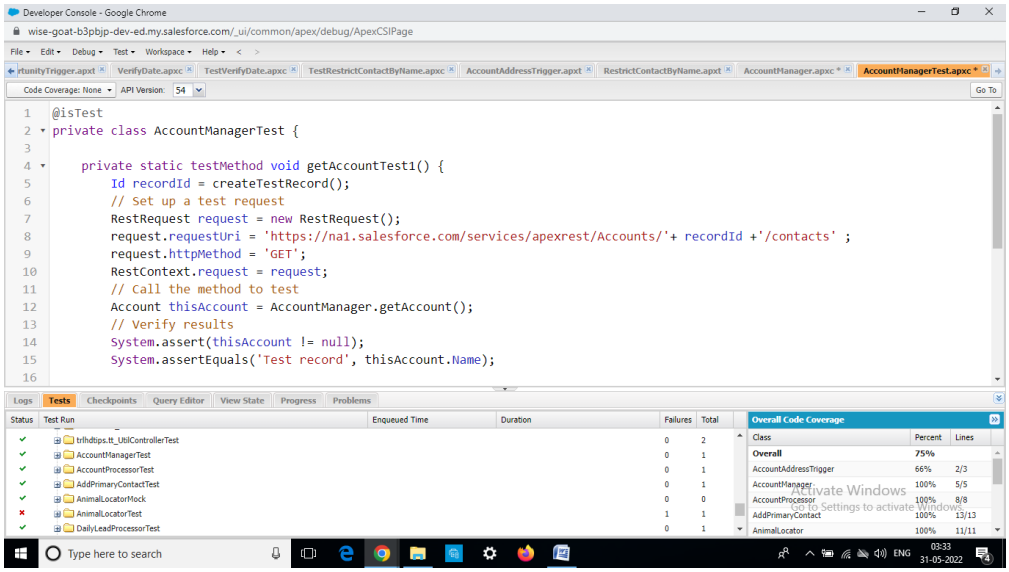

```
@RestResource(urlMapping='/Accounts/*/contacts')

global 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;

    }

}
```






```
@isTest

private class AccountManagerTest {


    private static testMethod void getAccountTest1() {

        Id recordId = createTestRecord();

        // Set up a test request

        RestRequest request = new RestRequest();

        request.requestUri = 'https://na1.salesforce.com/services/apexrest/Accounts/'+ recordId +'/contacts' ;

        request.httpMethod = 'GET';

        RestContext.request = request;

        // Call the method to test

        Account thisAccount = AccountManager.getAccount();

        // Verify results

        System.assert(thisAccount != null);
```

```
    System.assertEquals('Test record', thisAccount.Name);


  }


  // Helper method

    static Id createTestRecord() {

    // Create test record

    Account TestAcc = new Account(

      Name='Test record');

    insert TestAcc;

    Contact TestCon= new Contact(

    LastName='Test',

    AccountId = TestAcc.id);

    return TestAcc.Id;

  }

}
```



SUPERBADGE:APEX SPECIALIST

Step2: Automate 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));

            } else {

                nc.Date_Due__c = Date.today().addDays((Integer) cc.Equipment__r.maintenance_Cycle__c);

            }
```

```
            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);


    }


}
```

Step3: Synchronize Salesforce data with an external system

WarehouseCalloutService.apxc

```
public with sharing class WarehouseCalloutService implements Queueable {

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



    //class that makes a REST callout to an external warehouse system to get a list of equipment that needs to be updated.

    //The callout's JSON response returns the equipment records that you upsert in Salesforce.



    @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);
```

```
List<Product2> warehouseEq = new List<Product2>();


if (response.getStatusCode() == 200){

    List<Object> jsonResponse =
(List<Object>)JSON.deserializeUntyped(response.getBody());

    System.debug(response.getBody());


    //class maps the following fields: replacement part (always true), cost, current
inventory, lifespan, maintenance cycle, and warehouse SKU

    //warehouse SKU will be external ID for identifying which equipment records to
update within Salesforce

    for (Object eq : jsonResponse){

        Map<String,Object> mapJson = (Map<String,Object>)eq;

        Product2 myEq = new Product2();

        myEq.Replacement_Part__c = (Boolean) mapJson.get('replacement');

        myEq.Name = (String) mapJson.get('name');

        myEq.Maintenance_Cycle__c = (Integer) mapJson.get('maintenanceperiod');

        myEq.Lifespan_Months__c = (Integer) mapJson.get('lifespan');

        myEq.Cost__c = (Integer) mapJson.get('cost');

        myEq.Warehouse_SKU__c = (String) mapJson.get('sku');

        myEq.Current_Inventory__c = (Double) mapJson.get('quantity');

        myEq.ProductCode = (String) mapJson.get('_id');

        warehouseEq.add(myEq);
```

```
            }


            if (warehouseEq.size() > 0){
                upsert warehouseEq;
                System.debug('Your equipment was synced with the warehouse one');
            }
        }
    }


    public static void execute (QueueableContext context){
        runWarehouseEquipmentSync();
    }


}
```

Step4: Schedule synchronization

WarehouseSyncSchedule.apxc

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

```
}
```

Step 5: Test automation logic

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);

               }

           }

       }



       //When an existing maintenance request of type Repair or Routine Maintenance is
closed,

       //create a new maintenance request for a future routine checkup.

       if (!validIds.isEmpty()){

           Map<Id,Case> closedCases = 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>();



        //calculate the maintenance request due dates by using the maintenance cycle
defined on the related equipment records.

        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'));

        }



        List<Case> newCases = new List<Case>();

        for(Case cc : closedCases.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 multiple pieces of equipment are used in the maintenance request,

            //define the due date by applying the shortest maintenance cycle to today's date.

            //If (maintenanceCycles.containskey(cc.Id)){

                nc.Date_Due__c = Date.today().addDays((Integer) maintenanceCycles.get(cc.Id));

            //} else {

            //    nc.Date_Due__c = Date.today().addDays((Integer)
cc.Equipment__r.maintenance_Cycle__c);

            //}



            newCases.add(nc);

        }



        insert newCases;



        List<Equipment_Maintenance_Item__c> clonedList = new
List<Equipment_Maintenance_Item__c>();

        for (Case nc : newCases){

            for (Equipment_Maintenance_Item__c clonedListItem :
closedCases.get(nc.ParentId).Equipment_Maintenance_Items__r){
```

```
                Equipment_Maintenance_Item__c item = clonedListItem.clone();
                item.Maintenance_Request__c = nc.Id;
                clonedList.add(item);
            }
        }
        insert clonedList;
    }
  }
}
```

MaintenanceRequestHelperTest.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);
   }
}
```

Step 6: Test callout logic

WarehouseCalloutServiceMock.apxc

```
@isTest
global class WarehouseCalloutServiceMock implements HttpCalloutMock {
    // implement http mock callout
    global static HttpResponse respond(HttpRequest request) {
```

```
        HttpResponse response = new HttpResponse();

        response.setHeader('Content-Type', 'application/json');


response.setBody('[{"_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"}]');

        response.setStatusCode(200);



        return response;

    }

}
```

WarehouseCalloutServiceTest.apxc

```
@IsTest

private class WarehouseCalloutServiceTest {

    // implement your mock callout test here

            @isTest

    static void testWarehouseCallout() {

        test.startTest();

        test.setMock(HttpCalloutMock.class, new WarehouseCalloutServiceMock());

        WarehouseCalloutService.execute(null);
```

```
        test.stopTest();

        List<Product2> product2List = new List<Product2>();
        product2List = [SELECT ProductCode FROM Product2];

        System.assertEquals(3, product2List.size());
        System.assertEquals('55d66226726b611100aaf741', product2List.get(0).ProductCode);
        System.assertEquals('55d66226726b611100aaf742', product2List.get(1).ProductCode);
        System.assertEquals('55d66226726b611100aaf743', product2List.get(2).ProductCode);
    }
}
```

Step 7: Test scheduling logic

WarehouseSyncSchedule.apxc

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

WarehouseCalloutServiceMock.apxc

```
@isTest
global class WarehouseCalloutServiceMock implements HttpCalloutMock {
```

```
    // implement http mock callout

    global static HttpResponse respond(HttpRequest request) {



        HttpResponse response = new HttpResponse();

        response.setHeader('Content-Type', 'application/json');


response.setBody('[{"_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"}]');

        response.setStatusCode(200);



        return response;

    }

}
```

WarehouseSyncScheduleTest.apxc

```
@isTest

public with sharing class WarehouseSyncScheduleTest {

    // implement scheduled code here

    //

    @isTest static void test() {

        String scheduleTime = '00 00 00 * * ? *';
```

```
        Test.startTest();

        Test.setMock(HttpCalloutMock.class, new WarehouseCalloutServiceMock());

        String jobId = System.schedule('Warehouse Time to Schedule to test', scheduleTime,
new WarehouseSyncSchedule());

        CronTrigger c = [SELECT State FROM CronTrigger WHERE Id =: jobId];

        System.assertEquals('WAITING', String.valueOf(c.State), 'JobId does not match');



        Test.stopTest();

    }

}
```