

Apex Specialist SuperBadge -1

Apex Triggers

1. Get Started with Apex Triggers

1. RandomContactFactory.apxc

```
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;
    }
}
```

2. AccountAddressTrigger.apxt

```
trigger AccountAddressTrigger on Account (before insert,
beforeupdate) {
    for(Account account : Trigger.New){
        if(account.Match_Billing_Address__c == True){
            account.ShippingPostalCode = account.BillingPostalCode;
        }
    }
}
```

2. Bulk Apex Triggers

1. 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

1.Get Started with Apex Unit Tests

1.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;
    }
}

```

2.TestVerifyDate.apxc

```

@Test
private class TestVerifyDate {
    @Test 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);
    }
    @Test 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);
    }
    @Test static void Test_DateWithin30Days_case1() {
        Boolean flag =
VerifyDate.DateWithin30Days(date.parse('01/01/2020'),date.parse('12/30/201
9'));
        System.assertEquals(false,flag);
    }
    @Test static void Test_DateWithin30Days_case2() {
        Boolean flag =
VerifyDate.DateWithin30Days(date.parse('01/01/2020'),date.parse('02/02/202
0'));
        System.assertEquals(false,flag);
    }
    @Test static void Test_DateWithin30Days_case3() {
        Boolean flag =
VerifyDate.DateWithin30Days(date.parse('01/01/2020'),date.parse('01/15/202
0'));
        System.assertEquals(true,flag);
    }
    @Test static void Test_SetEndOfMonthDate() {
        Date returndate =

```

```

VerifyDate.SetEndOfMonthDate(date.parse('01/01/2020'));
    }

}

```

2.Test Apex Triggers

1.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');
        }

    }
}

```

2.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 allowed
for DML',result.getErrors()[0].getMessage());
    }
}

```

3.Create Test Data for Apex Tests

1.RandomContactFactory.apxc

```

    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

2.Use Future Methods

1.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;
    }
}

```

2.AccountProcessorTest.apxc

```

@IsTest
private class AccountProcessorTest {
    @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 = 'John', LastName
='Doe',AccountId = newAccount.Id);
        insert newContact2;
        List<Id> accountIds = new List<Id>();
        accountIds.add(newAccount.Id);
        Test.startTest();
        AccountProcessor.countContacts(accountIds);
        Test.stopTest();
    }

}

```

3.Use Batch Apex

```

1.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);
    }
}

```

2.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();
}
}

```

4.Control Processes with Queueable Apex

1.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,
                                                                    LastName, 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;
        }
    }
}

```

```

    }

}

2.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' )]);
    }

}

```

5.Schedule Jobs Using the Apex Scheduler

1.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;
}

}

```

2.DailyLeadProcessorTest.apxc

```

    @isTest
    private class DailyLeadProcessorTest {

        public static String CRON_EXP = '0 0 0 15 3 ? 2022';

        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();
            // Schedule the test job
            DailyLeadProcessor ab = new DailyLeadProcessor();
            String jobId = System.schedule('jobName', '0 5 * * * ?',ab);

            // Stopping the test will run the job synchronously
            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 Integration Services

```

2.Apex REST Callouts

1.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');
    }
}

```

2. 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 );
    }
}

```

3.AnimalLocatorMock.apxc

```
@isTest
global class AnimalLocatorMock implements HttpCalloutMock {
    // Implement this interface method
    global HTTPResponse respond (HTTPRequest request) {
        // Create a fake response
        HTTPResponse response = new HTTPResponse();
        response.setHeader('Content-Type', 'application/json');
        response.setBody('{"animals": ["majestic badger", "fluffy bunny",
"scary bear", "chicken" , "mighty moose"]}');
        response.setStatusCode(200);
        return response;
    }
}
```

3.Apex SOAP Callouts

1.ParkLocator.apxc

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

2.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]);
    }
}
```

3.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);
    }
}
```

4.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'}
            );
        }
    }
}

```

4.Apex Web Services

1.AccountManager.apxc

```

@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;
    }
}

```

2.AccountManagerTest.apxc

```

@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() {
    Account TestAcc = new Account (
        Name='Test record');
    insert TestAcc;
    Contact TestCon= new Contact(
        LastName='Test',
        AccountId = TestAcc.id);
    return TestAcc.Id;
}
}

```

Apex Specialist

Step2 : Automate record creation

1.MaintenanceRequest.apxt

```

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

```

2.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;
}
}
}

```

Step 3 :Synchronize Salesforce Data With an External Organization

1.WarehouseCalloutService.apxc

```
public with sharing class WarehouseCalloutService implements Queueable {  
    private static final String WAREHOUSE_URL = 'https://th-superbadge-  
apex.herokuapp.com/equipment';
```

```
    //Write a 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(){  
        System.debug('go into runWarehouseEquipmentSync');  
        Http http = new Http();  
        HttpRequest request = new HttpRequest();  
  
        request.setEndpoint(WAREHOUSE_URL);  
        request.setMethod('GET');  
        HttpResponse response = http.send(request);  
  
        List<Product2> product2List = new List<Product2>();  
        System.debug(response.getStatusCode());  
        if (response.getStatusCode() == 200){  
            List<Object> jsonResponse =  
(List<Object>)JSON.deserializeUntyped(response.getBody());  
            System.debug(response.getBody());  
  
            //class maps the following fields:  
            //warehouse SKU will be external ID for identifying which  
            equipment records to update within Salesforce  
            for (Object jR : jsonResponse){  
                Map<String, Object> mapJson = (Map<String, Object>) jR;  
                Product2 product2 = new Product2();  
                //replacement part (always true),  
                product2.Replacement_Part__c = (Boolean)  
mapJson.get('replacement');  
                //cost  
                product2.Cost__c = (Integer) mapJson.get('cost');  
                //current inventory  
                product2.Current_Inventory__c = (Double)  
mapJson.get('quantity');
```

```

        //lifespan
        product2.Lifespan_Months__c = (Integer)
mapJson.get('lifespan');
        //maintenance cycle
        product2.Maintenance_Cycle__c = (Integer)
mapJson.get('maintenanceperiod');
        //warehouse SKU
        product2.Warehouse_SKU__c = (String) mapJson.get('sku');

        product2.Name = (String) mapJson.get('name');
        product2.ProductCode = (String) mapJson.get('_id');
        product2List.add(product2);
    }

    if (product2List.size() > 0){
        upsert product2List;
        System.debug('Your equipment was synced with the warehouse
one');
    }
}

}

public static void execute (QueueableContext context){
    System.debug('start runWarehouseEquipmentSync');
    runWarehouseEquipmentSync();
    System.debug('end runWarehouseEquipmentSync');
}

}

```

Step 4 :Schedule Synchronization

1.WarehouseSyncSchedule.apxc

```

global with sharing class WarehouseSyncSchedule implements
Schedulable {
    // implement scheduled code here
    global void execute (SchedulableContext ctx){
        System.enqueueJob(new WarehouseCalloutService());
    }
}

```

Step 5 : Test Automation Logic

1.MaintenanceRequest.apxt

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

2.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;
}
}
}

```

3.MaintenanceRequestHelperTest.apxc

```

@isTest
public with sharing class MaintenanceRequestHelperTest {

    // createVehicle
    private static Vehicle__c createVehicle(){
        Vehicle__c vehicle = new Vehicle__C(name = 'Testing Vehicle');
        return vehicle;
    }

    // createEquipment
    private static Product2 createEquipment(){
        product2 equipment = new product2(name = 'Testing equipment',
                                            lifespan_months__c = 10,
                                            maintenance_cycle__c = 10,
                                            replacement_part__c = true);

        return equipment;
    }

    // createMaintenanceRequest
    private static Case createMaintenanceRequest(id vehicleId, id
equipmentId){
        case cse = new case(Type='Repair',
                            Status='New',
                            Origin='Web',
                            Subject='Testing subject',
                            Equipment__c=equipmentId,
                            Vehicle__c=vehicleId);

        return cse;
    }
}

```

```

    }

    // createEquipmentMaintenanceItem
    private static Equipment_Maintenance_Item__c
createEquipmentMaintenanceItem(id equipmentId, id requestId) {
    Equipment_Maintenance_Item__c equipmentMaintenanceItem = new
Equipment_Maintenance_Item__c(
        Equipment__c = equipmentId,
        Maintenance_Request__c = requestId);
    return equipmentMaintenanceItem;
}

@isTest
private static void testPositive() {
    Vehicle__c vehicle = createVehicle();
    insert vehicle;
    id vehicleId = vehicle.Id;

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

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

    Equipment_Maintenance_Item__c equipmentMaintenanceItem =
createEquipmentMaintenanceItem(equipmentId, createdCase.id);
    insert equipmentMaintenanceItem;

    test.startTest();
    createdCase.status = 'Closed';
    update createdCase;
    test.stopTest();

    Case newCase = [Select id,
                      subject,
                      type,
                      Equipment__c,
                      Date_Reported__c,
                      Vehicle__c,
                      Date_Due__c
                    from case

```

```

        where status = 'New'];

Equipment_Maintenance_Item__c workPart = [select id
                                           from
Equipment_Maintenance_Item__c
                                           where
Maintenance_Request__c =:newCase.Id];
list<case> allCase = [select id from case];
system.assert(allCase.size() == 2);

system.assert(newCase != null);
system.assert(newCase.Subject != null);
system.assertEquals(newCase.Type, 'Routine Maintenance');
SYSTEM.assertEquals(newCase.Equipment__c, equipmentId);
SYSTEM.assertEquals(newCase.Vehicle__c, vehicleId);
SYSTEM.assertEquals(newCase.Date_Reported__c, system.today());
}

@isTest
private static void testNegative(){
    Vehicle__C vehicle = createVehicle();
    insert vehicle;
    id vehicleId = vehicle.Id;

    product2 equipment = createEquipment();
    insert equipment;
    id equipmentId = equipment.Id;

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

    Equipment_Maintenance_Item__c workP =
createEquipmentMaintenanceItem(equipmentId, createdCase.Id);
    insert workP;

    test.startTest();
    createdCase.Status = 'Working';
    update createdCase;
    test.stopTest();

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

```

```

        Equipment_Maintenance_Item__c equipmentMaintenanceItem = [select
id
                                                                    from
Equipment_Maintenance_Item__c
                                                                    where
Maintenance_Request__c = :createdCase.Id];

        system.assert(equipmentMaintenanceItem != null);
        system.assert(allCase.size() == 1);
    }

    @isTest
    private static void testBulk(){
        list<Vehicle__C> vehicleList = new list<Vehicle__C>();
        list<Product2> equipmentList = new list<Product2>();
        list<Equipment_Maintenance_Item__c> equipmentMaintenanceItemList =
new list<Equipment_Maintenance_Item__c>();
        list<case> caseList = new list<case>();
        list<id> oldCaseIds = new list<id>();

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

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

        for(integer i = 0; i < 300; i++){

equipmentMaintenanceItemList.add(createEquipmentMaintenanceItem(equipmentL
ist.get(i).id, caseList.get(i).id));
        }
        insert equipmentMaintenanceItemList;

        test.startTest();
        for(case cs : caseList){
            cs.Status = 'Closed';

```



```

        oldCaseIds.add(cs.Id);
    }
    update caseList;
    test.stopTest();

    list<case> newCase = [select id
                        from case
                        where status ='New'];

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

    system.assert(newCase.size() == 300);

    list<case> allCase = [select id from case];
    system.assert(allCase.size() == 600);
}
}

```

Step 6 :Test Callout Logic

1.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":"C
ooling

```

```

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;
}
}

```

2.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

1.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();
}
```