

PREREQUISITES OF APEX SPECIALIST SUPERBADGE

1.APEX TRIGGERS:

- 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;
    }
}
```

2.APEX TESTING:

- 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;
}

}
```

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

```

- CREATE TEST DATA FOR APEX TESTS:

RandomContactFactory.apxc:

```

public class RandomContactFactory {

    public static List<Contact> generateRandomContacts(Integer num, String lastname){
        List<Contact> contactList = new List<Contact>();
        for(Integer i = 1;i<=num;i++){
            Contact ct = new Contact(FirstName = 'Test '+i, LastName =lastName);
            contactList.add(ct);
        }
        return contactList;
    }
}

```

3.ASYNCHRONOUS APEX:

- USE FUTURE METHODS:

AccountProcessor.apxc:

```

public class AccountProcessor {
    @future
    public static void countContacts(List<Id> accountIds){
        List<Account> accList=[Select Id, Number_Of_Contacts__c,(Select Id from Contacts) from
Account where Id in :accountIds];

        For(Account acc: accList){
            acc.Number_Of_Contacts__c=acc.Contacts.size();
        }
    }
}

```

AccountProcessorTest.apxc:

```

@isTest
public class AccountProcessorTest {
    public static testmethod void testAccountProcessor(){
        Account a = new Account();
        a.Name ='Test Account';
    }
}

```

```

insert a;
Contact con=new Contact();
con.firstName='Binary';
con.LastName ='Programming';
con.AccountId=a.Id;

insert con;

List<Id> accListId = new List<Id>();
accListId.add(a.Id);

Test.startTest();
AccountProcessor.countContacts(accListId);
Test.stopTest();

Account acc = [Select Number_Of_Contacts__c from Account where Id =: a.Id];
System.assertEquals(Integer.valueOf(acc.Number_Of_Contacts__c),1);
}

}

```

- USE BATCH APEX:

LeadProcessor.apxc:

```

global class LeadProcessor implements
Database.Batchable<sObject>, Database.Stateful {

// instance member to retain state across transactions
global Integer recordsProcessed = 0;

global Database.QueryLocator start(Database.BatchableContext bc) {
return Database.getQueryLocator('SELECT Id, LeadSource FROM Lead');
}

global void execute(Database.BatchableContext bc, List<Lead> scope){
// process each batch of records
List<Lead> leads = new List<Lead>();
for (Lead lead : scope) {

lead.LeadSource = 'Dreamforce';
// increment the instance member counter
recordsProcessed = recordsProcessed + 1;

```

```

}
update leads;
}

global void finish(Database.BatchableContext bc){
System.debug(recordsProcessed + ' records processed. Shazam!');

}
}

```

LeadProcessorTest.apxc:

```

@isTest
public class LeadProcessorTest {
    @testSetup
    static void setup() {
        List<Lead> leads = new List<Lead>();
        // insert 200 leads
        for (Integer i=0;i<200;i++) {
            leads.add(new Lead(LastName='Lead '+i,
                Company='Lead', Status='Open - Not Contacted'));
        }
        insert leads;
    }

    static testmethod void test() {
        Test.startTest();
        LeadProcessor lp = new LeadProcessor();
        Id batchId = Database.executeBatch(lp, 200);
        Test.stopTest();

        // after the testing stops, assert records were updated properly
        System.assertEquals(200, [select count() from lead where LeadSource = 'Dreamforce']);
    }
}

```

- 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:

```

@Test
public class AddPrimaryContactTest {

    @Test
    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:

```

global class DailyLeadProcessor implements Schedulable{
    global void execute(SchedulableContext ctx){
        List<Lead> leads = [SELECT Id, LeadSource FROM Lead WHERE LeadSource = "];

        if(leads.size() > 0){
            List<Lead> newLeads = new List<Lead>();

            for(Lead lead : leads){
                lead.LeadSource = 'DreamForce';
                newLeads.add(lead);
            }

            update newLeads;
        }
    }
}

```

DailyLeadProcessorTest.apxc:

```

@isTest
private class DailyLeadProcessorTest{
    //Seconds Minutes Hours Day_of_month Month Day_of_week optional_year
    public static String CRON_EXP = '0 0 0 2 6 ? 2022';

    static testmethod void testScheduledJob(){
        List<Lead> leads = new List<Lead>();

        for(Integer i = 0; i < 200; i++){
            Lead lead = new Lead(LastName = 'Test ' + i, LeadSource = ", Company = 'Test Company ' + i,
            Status = 'Open - Not Contacted');
            leads.add(lead);
        }

        insert leads;
    }
}

```

```

Test.startTest();
// Schedule the test job
String jobId = System.schedule('Update LeadSource to DreamForce', CRON_EXP, new
DailyLeadProcessor());

// Stopping the test will run the job synchronously
Test.stopTest();
}
}

```

4.APEX INTEGRATION SERVICES:

- APEX REST CALLOUTS

AnimalLocator.apxc:

```

public class AnimalLocator
{

    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);
        String strResp = "";
        system.debug('*****response '+response.getStatusCode());
        system.debug('*****response '+response.getBody());
        // If the request is successful, parse the JSON response.
        if (response.getStatusCode() == 200)
        {
            // Deserializes the JSON string into collections of primitive data types.
            Map<String, Object> results = (Map<String, Object>)
JSON.deserializeUntyped(response.getBody());
            // Cast the values in the 'animals' key as a list
            Map<string,object> animals = (map<string,object>) results.get('animal');
            System.debug('Received the following animals:' + animals );
            strResp = string.valueOf(animals.get('name'));
            System.debug('strResp >>>>>' + strResp );
        }
        return strResp ;
    }
}

```


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
global class AnimalLocatorMock implements HttpCalloutMock {
    global HTTPResponse respond(HTTPRequest request) {
        HttpResponse response = new HttpResponse();
        response.setHeader('Content-Type', 'application/json');
        response.setBody('{"animal":{"id":1,"name":"chicken","eats":"chicken food","says":"cluck cluck"}}');
        response.setStatusCode(200);
        return response;
    }
}
```

- APEX SOAP CALLOUTS

ParkService.apxc:

//Generated by wsdl2apex

```
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 request = RestContext.request;

```

```

        String accountId = request.requestURI.substring(request.requestURI.lastIndexOf('/')-18,
            request.requestURI.lastIndexOf('/'));
        List<Account> a = [select id, name, (select id, name from contacts) from account where id =
:accountId];
        List<contact> co = [select id, name from contact where account.id = :accountId];
        system.debug('** a[0]= ' + a[0]);
        return a[0];
    }
}

```

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

```

```
}  
}
```

APEX SPECIALIST SUPER BADGE

Set Up Development Org:

- Create a new Trailhead Playground for this superbadge.
- Install this unlocked package (package ID: 04t6g000008av9iAAA).
- Add picklist values Repair and Routine Maintenance to the Type field on the Case object.
- Update the Case page layout assignment to use the Case (HowWeRoll) Layout for your profile.
- Rename the tab/label for the Case tab to Maintenance Request.
- Update the Product page layout assignment to use the Product (HowWeRoll) Layout for your profile.
- Rename the tab/label for the Product object to Equipment.
- Click on App Launcher and search Create Default Data then Click Create Data to generate sample data for the application.

CHALLENGE 1-Automate record creation

- Go to the App Launcher -> Search How We Roll Maintenance -> click on Maintenance Requests -> click on first case -> click Details -> change the type Repair to Routine Maintenance -> select Origin = Phone -> Vehicle = select Teardrop Camper , save it.
- Feed -> Close Case = save it..
- Go to the Object Manager -> Maintenance Request ->Field & Relationships ->New ->Lookup Relationship -> next -> select Equipment ->next -> Field Label = Equipment ->next->next->next -> save it .
- Now go to the developer console use below code

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);

}

}

- After saving the code go back the How We Roll Maintenance , click on Maintenance Requests -> click on 2nd case -> click Details -> change the type Repair to Routine Maintenance -> select Origin = Phone -> Vehicle = select Teardrop Camper , save it.
- Feed -> Close Case = save it.

CHALLENGE 2:Synchronize Salesforce data with an external system

- Setup -> Search in quick find box -> click Remote Site Settings -> Name = Warehouse URL , Remote Site URL = https://th-superbadge-apex.herokuapp.com , make sure active is selected.
- Go to the developer console use below code .

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();
}

}

```

- After saving the code open execute anonymous window (CTRL+E) and run this method, System.enqueueJob(new WarehouseCalloutService());

CHALLENGE 3:Schedule synchronization using Apex code

- Go to the developer console use below code

WarehouseSyncShedule.apxc :

```

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

```

- Save it , after that;Go to setup -> Search in Quick find box -> Apex Classes -> click Schedule Apex and Jb Name = WarehouseSyncScheduleJob , Apex Class = WarehouseSyncSchedule

CHALLENGE 4:Test automation logic

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);
}
}

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);
    }
}
}

```

- Now Run all.

CHALLENGE 5:Test callout logic

- Go to the developer console use below code

WarehouseCalloutService.apxc :

```

public with sharing class WarehouseCalloutService {

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

```

```

    //@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());

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 = (Decimal) mapJson.get('lifespan');
    myEq.Warehouse_SKU__c = (String) mapJson.get('sku');
    myEq.Current_Inventory__c = (Double) mapJson.get('quantity');
    warehouseEq.add(myEq);
}

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

}
}
}

```

WarehouseCalloutServiceTest.apxc :

@isTest

```

private class WarehouseCalloutServiceTest {
    @isTest
    static void testWareHouseCallout(){
        Test.startTest();
        // implement mock callout test here
        Test.setMock(HTTPCalloutMock.class, new WarehouseCalloutServiceMock());
        WarehouseCalloutService.runWarehouseEquipmentSync();
        Test.stopTest();
        System.assertEquals(1, [SELECT count() FROM Product2]);
    }
}

```

WarehouseCalloutServiceMock.apxc :


```

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

        System.assertEquals('https://th-superbadge-apex.herokuapp.com/equipment',
request.getEndpoint());
        System.assertEquals('GET', request.getMethod());

        // Create a fake response
        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" }');
        response.setStatusCode(200);
        return response;
    }
}

```

- Now Run all.

CHALLENGE 6: Test scheduling logic

- Go to the developer console use below code ,

WarehouseSyncSchedule.apxc :

```

global class WarehouseSyncSchedule implements Schedulable {
    global void execute(SchedulableContext ctx) {

        WarehouseCalloutService.runWarehouseEquipmentSync();
    }
}

```

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 ');
```

```
}  
}
```

- Now run all.