

# Apex Triggers:

## Get Started with Apex Triggers:

```
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:

```
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:

## Get Started with Apex Unit Tests:

```

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
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
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);
    }
}

```

## Test Apex Triggers:

```

trigger RestrictContactByName on Contact (before insert, before update) {
    For (Contact c : Trigger.New) {
        if(c.LastName == 'INVALIDNAME') {    //invalidname is invalid
            c.AddError('The Last Name "'+c.LastName+'" is not allowed for
DML');
        }
    }
}

```

```

@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:

```

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:

```
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;
    }
}
```

```
@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='Jone',LastName='Doe',AccountId
= newAccount.Id);
        insert newContact2;
        List<Id> accountIds = new List<Id>();
        accountIds.add(newAccount.Id);

        Test.startTest();
```

```

        AccountProcessor.countContacts(accountIds);
        Test.stopTest();
    }

}

```

## Use Batch Apex:

```

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);
    }
}

```

```

@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();
}
}

```

## Control Processes with Queueable Apex:

```

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;
    }

}

}

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

}

```

## Schedule Jobs Using the Apex Scheduler:

```

public class DailyLeadProcessor implements Schedulable
{
    Public void execute(SchedulableContext SC)
    {

```



```

List<Lead> Leadobj=[SELECT Id from Lead where LeadSource=null limit 200];
for (Lead l:Leadobj){
    l.LeadSource='Dreamforce';
    update l;
}
}
}

```

```

@isTest
private class DailyLeadProcessorTest
{
    static testMethod void testDailyLeadProcessor()
    {
        String CRON_EXP = '0 0 1 * * ?';
        List<Lead> IList = new List<Lead>();
        for (Integer i = 0; i < 200; i++)
        {
            IList.add(new Lead(LastName='Dreamforce '+i, Company='Test1 Inc.', Status=
'Open Not Contacted'));
        }
        insert IList;

        Test.startTest();
        String jobId = System.schedule('DailyLeadProcessor', CRON_EXP, new
DailyLeadProcessor());
    }
}

```

## Apex Integration Services:

### Apex Integration Overview:

```

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');
}
}

```

```

@Test
private class AnimalLocatorTest{
    @Test static void AnimalLocatorMock1() {
        Test.setMock(HttpCalloutMock.class, new AnimalLocatorMock());
        String result = AnimalLocator.getAnimalNameById(3);
        String expectedResult = 'chicken';
        System.assertEquals(result,expectedResult );
    }
}

```

```

@Test
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.getStatusCode(200);
        return response;
    }
}

```

```
}  
}
```

## Apex SOAP Callouts:

```
public class ParkLocator {  
    public static string[] country(string theCountry) {  
        ParkService.ParksImplPort parkSvc = new ParkService.ParksImplPort(); // remove  
space  
        return parkSvc.byCountry(theCountry);  
    }  
}
```

```
@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);  
    }  
}
```

```
@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);
}
}

```

## 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

### 2 . 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);

    }

}

```

### 3 . 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();
}

}

```

## 4 . Schedule synchronization

**WarehouseSyncShedule.apxc:**

```

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

```

## 5 . 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);
    }
}

```

## **6 . Test callout logic**

### **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');
}
}

```

#### **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);
    }
}

```

### **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": "55d66226
        726b611100aaf742", "replacement": true, "quantity": 183, "name": "Cooling
        Fan", "maintenanceperiod": 0, "lifespan": 0, "cost": 300, "sku": "100004" }, { "_id": "55d66226726b6
        11100aaf743", "replacement": true, "quantity": 143, "name": "Fuse
        20A", "maintenanceperiod": 0, "lifespan": 0, "cost": 22, "sku": "100005" } ]');
        response.setStatusCode(200);

        return response;
    }
}
```

## **7 . Test scheduling logic**

### **WarehouseSyncSchedule.apxc:**

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

### **WarehouseSyncScheduleTest.apxc:**

```

@isTest
public class WarehouseSyncScheduleTest {

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

    }
}

```