

## 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;
    }
}
```

## Get Started with Apex Unit Tests

1)Verify Date

```
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) Test verify date

```

@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 static void Test_DateWithin30Days_case1(){
        Boolean flag = VerifyDate.DateWithin30Days(date.parse('01/01/2020'),
date.parse('12/30/2019'));
        System.assertEquals(false, flag);
    }

    @isTest static void Test_DateWithin30Days_case2(){
        Boolean flag = VerifyDate.DateWithin30Days(date.parse('01/01/2020'),
date.parse('02/02/2020'));
        System.assertEquals(false, flag);
    }

    @isTest static void Test_DateWithin30Days_case3(){
        Boolean flag = VerifyDate.DateWithin30Days(date.parse('01/01/2020'),
date.parse('01/15/2020'));
        System.assertEquals(true, flag);
    }

    @isTest static void Test_SetEndOfMonthDate(){
        Date returndate = VerifyDate.SetEndOfMonthDate(date.parse('01/01/2020'));
    }

}

```

## Test Apex Triggers

### 1) RestrictContactByName

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

```

@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

1) RandomContactFactory

```

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;
    }
}

```

## Use Future Methods

1) AccountProcessor

```

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

```

@Test
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='Jane',LastName='Doe',AccountId =
newAccount.Id);
        insert newContact2;

        List<Id> accountIds = new List<Id>();
        accountIds.add(newAccount.Id);

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

```

## Use Batch Apex

### 1)LeadProcessor

```

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

```

@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

### 1)AddPrimaryContact

```

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

```

@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')]);
    }
}

```

## Schedule Jobs Using the Apex Scheduler

### 1)DailyLeadProcessor

```
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;
        }

    }
}
```

### 2)DailyLeadProcessorTest

```
@isTest
private class DailyLeadProcessorTest {
    static testMethod void testDailyProcessor(){
        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 REST Callouts

### 1)AnimalLocator

```
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

```

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

```

## 3)AnimalLocatorMock

```

@Test
global class AnimalLocatorMock implements HttpCalloutMock {
    global HTTPResponse respond(HTTPRequest request) {
        HttpResponse response = new HttpResponse();
        response.setHeader('Content-Type','application/json');
        response.setBody('{ "animals": ["majestic badger", "fluffy bunny", "scary bear",
"chicken"] }');
        response.getStatusCode(200);
        return response;
    }
}

```

# Apex SOAP Callouts

## 1)ParkLocator

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

## 2)ParkLocatorTest

```
@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);  
    }  
}
```

## 3)ParkServiceMock

```
@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);
    }
}

```

#### 4)ParkService

//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;
}
}
}

```

## Apex Web Services

### 1)AccountManager

```

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

```

### 2)AccountManagerTest

```

@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 Superbadge**

## Automate record creation

### 1) Maintenance request

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

### 2) MaintenanceRequestHelper

```
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;
    }
}

```

```
}  
}
```

## **Synchronize Salesforce data with an external system**

:

### **1)WarehouseCalloutService**

```
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();
}

}

```

## Schedule synchronization

### 1) WarehouseSyncSchedule

```

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

```

## Test automation logic

### 1) MaintenanceRequest

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

### 2) MaintenanceRequestHelper

```
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;
    }
}
}
}

```

### 3) MaintenanceRequestHelperTest

```

@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);
}
}

```

## Test callout logic

### 1) WarehouseCalloutService

```

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');
    }

```

```

    }
}

```

## 2) WarehouseCalloutServiceTest

```

@Test
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);
    }
}

```

## 3) WarehouseCalloutServiceMock implements

```

@Test
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"},{"_i

```

```

d":"55d66226726b611100aaf742","replacement":true,"quantity":183,"name":
"Cooling
Fan","maintenanceperiod":0,"lifespan":0,"cost":300,"sku":"100004"},{"_id":"55
d66226726b611100aaf743","replacement":true,"quantity":143,"name":"Fuse
20A","maintenanceperiod":0,"lifespan":0,"cost":22,"sku":"100005"}]);
    response.setStatusCode(200);

    return response;
}
}

```

## Test Scheduling logic

### 1) WarehouseSyncSchedule

```

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

        WarehouseCalloutService.runWarehouseEquipmentSync();
    }
}

```

### 2) WarehouseSyncScheduleTest

```

@Test
public class WarehouseSyncScheduleTest {

    @Test 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 ');
```

```
    }  
}
```