

Apex Triggers:

https://trailhead.salesforce.com/content/learn/modules/apex_triggers?trailmix_creator_id=trailblazerconnect&trailmix_slug=salesforce-developer-catalyst

1.GET STARTED WITH APEX TRIGGERS:

AccountAddressTrigger code:

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

2.BULK APPEX TRIGGERS UNIT

ClosedOpportunityTrigger

```
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 :

https://trailhead.salesforce.com/content/learn/modules/apex_testing?trailmix_creator_id=trailblazerconnect&trailmix_slug=salesforce-developer-catalyst

1.Get Started with Apex Unit Testing

VerifyDate Code:

```
public class VerifyDate {  
    //method to handle potential checks against two dates  
    public static Date CheckDates(Date date1, Date date2) {  
        //if date2 is within the next 30 days of date1, use date2. Otherwise use  
the end of the month  
        if(DateWithin30Days(date1,date2)) {  
            return date2;  
        } else {  
            return SetEndOfMonthDate(date1);  
        }  
    }  
    //method to check if date2 is within the next 30 days of date1  
    @TestVisible private static Boolean DateWithin30Days(Date date1, Date date2) {  
        //check for date2 being in the past  
        if( date2 < date1) { return false; }  
  
        //check that date2 is within (>=) 30 days of date1  
        Date date30Days = date1.addDays(30); //create a date 30 days away from date1
```

```

        if( date2 >= date30Days ) { return false; }
    else { return true; }
    }

//method to return the end of the month of a given date
@TestVisible private static Date SetEndOfMonthDate(Date date1) {
    Integer totalDays = Date.daysInMonth(date1.year(), date1.month());
    Date lastDay = Date.newInstance(date1.year(), date1.month(), totalDays);
    return lastDay;
}

}

```

TestVerifyDate Code:

```

@Test
public 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 DateWithin30Days_case1(){
        Boolean
flag=VerifyDate.DateWithin30Days(date.parse('01/01/2020'),date.parse('12/30/2019'));
        System.assertEquals(false,flag);
    }

    @isTest static void DateWithin30Days_case2(){

```

```

        Boolean
flag=VerifyDate.DateWithin30Days(date.parse('01/01/2020'),date.parse('02/02/2020'));
        System.assertEquals(false,flag);
    }
    @isTest static void DateWithin30Days_case3(){
Boolean
flag=VerifyDate.DateWithin30Days(date.parse('01/01/2020'),date.parse('01/15/2020'));
        System.assertEquals(true,flag);
    }
    @isTest static void SetEndOfMonthDate(){
        Date returndate=VerifyDate.SetEndOfMonthDate(date.parse('01/01/2020'));
    }
}

```

2) Test Apex Triggers Unit

RestrictContactByName Code :

```

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 Code :

```

@isTest
public class TestRestrictContactByName {
    @isTest static void Test_insertupdateContact()
    {
        Contact cnt = new Contact();
    }
}

```

```

    cnt.LastName ='INVALIDNAME';
    Test.startTest();
    Database.SaveResult result=Database.insert(cnt,false);

    Test.stopTest();
    System.assert(!result.isSuccess());
    System.assert(result.getErrors().size() > 0);
    System.assertEquals('The Last Name "INVALIDNAME" is not allowed for
DML',result.getErrors()[0].getMessage());
}
}

```

3) Create Test Data for Apex Tests :

RandomContactFactory Code

```

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 :

https://trailhead.salesforce.com/content/learn/modules/asynchronous_apex?trailmix_creator_id=trailblazerconnect&trailmix_slug=salesforce-developer-catalyst

1)Quiz

2)Use Future Methods

AccountProcessor Code :

```
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;
    }

}
```

AccountProcessorTest Code :

```
@IsTest
public 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();
}
}

```

3)Use Batch Apex

LeadProcessor Code:

```

global class LeadProcessor implements Database.Batchable<SObject> {
    global Integer count=0;

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

    global void execute(Database.BatchableContext bc,List<Lead> L_list){
        List<lead> L_list_new =new List<lead>();

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

        update L_list_new;
    }

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

```

```
}
```

LeadProcessorTest Code :

```
@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 ip= new LeadProcessor();
        Id batchId = Database.executeBatch(ip);
        Test.stopTest();
    }
}
```

4)Control Processes with Queueable Apex

AddPrimaryContact Code :

```
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;
        }
    }
}

```

AddPrimaryContactTest Code :

```

@isTest
public class AddPrimaryContactTest {
    static testmethod void testQueueable(){
        List<Account> testAccounts=new List<Account>();
        for(Integer i=0;i<50;i++){
            testAccounts.add(new Account(Name='Account '+i,BillingState='CA'));
        }
        for(Integer j=0;j<50;j++){
            testAccounts.add(new Account(Name='Account '+j,BillingState='Ny'));
        }
        insert testAccounts;
        Contact testContact=new Contact(FirstName = 'John',LastName='Doe');
        insert testContact;
    }
}

```

```

        AddPrimaryContact addit=new addPrimaryContact(testContact,'CA');
        Test.startTest();
        system.enqueueJob(addit);
        Test.stopTest();
        System.assertEquals(50,[Select count() from Contact where accountId in(Select Id
from Account where BillingState='CA'))];
    }
}

```

5)Schedule Jobs Using the Apex Scheduler

DailyLeadProcessor Code :

```

global class DailyLeadProcessor implements Schedulable {
    global void execute(SchedulableContext ctx){
        List<lead> leadstoupdate=new List<lead>();
        List<lead> leads =[Select id From Lead Where LeadSource =NULL Limit 200];
        for(Lead l:leads){
            l.LeadSource ='Dreamforce';
            leadstoupdate.add(l);
        }
        update leadstoupdate;
    }
}

```

DailyLeadProcessorTest Code :

```

@isTest
private class DailyLeadProcessorTest {
    public static String CRON_EXP='0 0 0 15 4 ? 2033';
    static testmethod void testScheduledJob(){
        List<Lead> leads=new List<lead>();
        for(Integer i=0;i<200;i++){
            Lead l=new Lead(
                FirstName='First ' +i,

```

```

        LastName='LastName',
        Company='The Inc'
    );
    leads.add(l);
}
insert leads;
Test.startTest();
String jobId=System.Schedule('ScheduledApexTest',CRON_EXP,new
DailyLeadProcessor());
Test.stopTest();
List<Lead> checkleads =new List<Lead>();
checkleads=[Select Id From Lead Where LeadSource='Dreamforce' and
Company='The Inc'];
System.assertEquals(200,checkleads.size(),'Leads were not created');

}
}

```

Apex Integration Services :

https://trailhead.salesforce.com/content/learn/modules/apex_integration_services?trailmix_creator_id=trailblazerconnect&trailmix_slug=salesforce-developer-catalyst

1)Quiz

2)Apex REST Callouts

AnimalLocator Code :

```

public class AnimalLocator {
    public static String getAnimalNameById(Integer x){
        Http http = new Http();
        HttpRequest req = new HttpRequest();
        req.setEndpoint('https://th-apex-http-callout.herokuapp.com/animals/' + x);
        req.setMethod('GET');
        Map<String, Object> animal= new Map<String, Object>();
    }
}

```

```

        HttpResponse res = http.send(req);
        if (res.getStatusCode() == 200) {
            Map<String, Object> results = (Map<String,
            Object>)JSON.deserializeUntyped(res.getBody());
            animal = (Map<String, Object>) results.get('animal');
        }
        return (String)animal.get('name');
    }
}

```

AnimalLocatorTest Code :

```

@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 );
    }
}

```

AnimalLocatorMock Code :

```

@Test
global class AnimalLocatorMock implements HttpCalloutMock {

    global HTTPResponse respond(HTTPRequest request) {
        // Create a fake response
        HttpResponse response = new HttpResponse();
        response.setHeader('Content-Type', 'application/json');
        response.setBody('{"animals": ["majestic badger", "fluffy bunny", "scary bear",
"chicken", "mighty moose"]}');
        response.setStatusCode(200);
    }
}

```

```

        return response;
    }

}

```

2)Apex SOAP Callouts

ParkService Code :

//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 Code :

```

public class ParkLocator {

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

```

```
}
```

ParkLocatorTest Code :

```
@isTest
private class ParkLocatorTest {
    @isTest static void testCallout() {
        Test.setMock(WebServiceMock.class, new ParkServiceMock ());
        String country = 'United States';
        List<String> result = ParkLocator.country(country);
        List<String> parks = new List<String>{'Yellowstone', 'Mackinac National Park',
'Yosemite'};
        System.assertEquals(parks, result);
    }
}
```

ParkServiceMock Code :

```
@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) Apex Web Services

AccountManager Code :

```

@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;
    }
}

```

AccountManagerTest Code :

```

@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 :

https://trailhead.salesforce.com/content/learn/modules/apex_integration_services?trailmix_creator_id=trailblazerconnect&trailmix_slug=salesforce-developer-catalyst

1)Quiz

2)Automate Record Creation

MaintenanceRequestHelper Code :

```

public with sharing class MaintenanceRequestHelper {
    public static void updateWorkOrders(List<Case> updWorkOrders, Map<Id,Case>
nonUpdCaseMap) {
        Set<Id> validIds = new Set<Id>();
        For (Case c : updWorkOrders){
            if (nonUpdCaseMap.get(c.Id).Status != 'Closed' && c.Status == 'Closed'){

```

```

        if (c.Type == 'Repair' || c.Type == 'Routine Maintenance'){
            validIds.add(c.Id);
        }
    }
}

```

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

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

```

if (!validIds.isEmpty()){
    Map<Id,Case> closedCases = new Map<Id,Case>([SELECT Id, Vehicle__c,
Equipment__c, Equipment__r.Maintenance_Cycle__c,
                                (SELECT Id,Equipment__c,Quantity__c FROM
Equipment_Maintenance_Items__r)
                                FROM Case WHERE Id IN :validIds]);
    Map<Id,Decimal> maintenanceCycles = new Map<ID,Decimal>();

```

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

```

    AggregateResult[] results = [SELECT Maintenance_Request__c,
                                MIN(Equipment__r.Maintenance_Cycle__c)cycle
                                FROM Equipment_Maintenance_Item__c
                                WHERE Maintenance_Request__c IN :ValidIds GROUP BY
Maintenance_Request__c];

```

```

    for (AggregateResult ar : results){
        maintenanceCycles.put((Id) ar.get('Maintenance_Request__c'), (Decimal)
ar.get('cycle'));
    }

```

```

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

```

```

for(Case cc : closedCases.values()){

```

```

    Case nc = new Case (
        ParentId = cc.Id,
        Status = 'New',
        Subject = 'Routine Maintenance',
        Type = 'Routine Maintenance',

```

```

        Vehicle__c = cc.Vehicle__c,
        Equipment__c =cc.Equipment__c,
        Origin = 'Web',
        Date_Reported__c = Date.Today()
    );

    //If multiple pieces of equipment are used in the maintenance request,
    //define the due date by applying the shortest maintenance cycle to today's
date.
    //If (maintenanceCycles.containsKey(cc.Id)){
        nc.Date_Due__c = Date.today().addDays((Integer)
maintenanceCycles.get(cc.Id));
    //} else {
        // nc.Date_Due__c = Date.today().addDays((Integer)
cc.Equipment__r.maintenance_Cycle__c);
    //}

    newCases.add(nc);
}

insert newCases;

List<Equipment_Maintenance_Item__c> clonedList = new
List<Equipment_Maintenance_Item__c>();
for (Case nc : newCases){
    for (Equipment_Maintenance_Item__c clonedListItem :
closedCases.get(nc.ParentId).Equipment_Maintenance_Items__r){
        Equipment_Maintenance_Item__c item = clonedListItem.clone();
        item.Maintenance_Request__c = nc.Id;
        clonedList.add(item);
    }
}
insert clonedList;
}
}
}

```

MaintenanceRequest Code :

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

3)Synchronize Salesforce Data

WarehouseCalloutService Code :

```
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');
    }
}

```

4)Schedule Synchronization

WarehouseSyncSchedule Code

```

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

```

5)Test Automatic Logic

MaintenanceRequestHelperTest Code :

```

@isTest
public with sharing class MaintenanceRequestHelperTest {

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

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

```

```
}
```

```
// createMaintenanceRequest
```

```
private static Case createMaintenanceRequest(id vehicleId, id equipmentId){
```

```
    case cse = new case(Type='Repair',  
                        Status='New',  
                        Origin='Web',  
                        Subject='Testing subject',  
                        Equipment__c=equipmentId,  
                        Vehicle__c=vehicleId);
```

```
    return cse;
```

```
}
```

```
// createEquipmentMaintenanceItem
```

```
private static Equipment_Maintenance_Item__c createEquipmentMaintenanceItem(id  
equipmentId,id requestId){
```

```
    Equipment_Maintenance_Item__c equipmentMaintenanceItem = new  
Equipment_Maintenance_Item__c(  
        Equipment__c = equipmentId,  
        Maintenance_Request__c = requestId);
```

```
    return equipmentMaintenanceItem;
```

```
}
```

```
@isTest
```

```
private static void testPositive(){
```

```
    Vehicle__c vehicle = createVehicle();
```

```
    insert vehicle;
```

```
    id vehicleId = vehicle.Id;
```

```
    Product2 equipment = createEquipment();
```

```
    insert equipment;
```

```
    id equipmentId = equipment.Id;
```

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

```
    insert createdCase;
```

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

```
insert equipmentMaintenanceItem;
```

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

```
Case newCase = [Select id,  
                 subject,  
                 type,  
                 Equipment__c,  
                 Date_Reported__c,  
                 Vehicle__c,  
                 Date_Due__c  
from case  
where status ='New'];
```

```
Equipment_Maintenance_Item__c workPart = [select id  
                                           from Equipment_Maintenance_Item__c  
                                           where Maintenance_Request__c =:newCase.Id];
```

```
list<case> allCase = [select id from case];  
system.assert(allCase.size() == 2);
```

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

```
@isTest
```

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

```
product2 equipment = createEquipment();
```



```

insert equipment;
id equipmentId = equipment.Id;

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

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

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

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

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

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

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

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

```

```

insert vehicleList;
insert equipmentList;

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

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

equipmentMaintenanceItemlList.add(createEquipmentMaintenanceItem(equipmentList.
get(i).id, caseList.get(i).id));
}
insert equipmentMaintenanceItemlList;

test.startTest();
for(case cs : caseList){
    cs.Status = 'Closed';
    oldCaseIds.add(cs.Id);
}
update caseList;
test.stopTest();

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

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

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

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

```

```
}  
}
```

MaintenanceRequestHelper Code :

```
public with sharing class MaintenanceRequestHelper {  
    public static void updateWorkOrders(List<Case> updWorkOrders, Map<Id,Case>  
nonUpdCaseMap) {  
        Set<Id> validIds = new Set<Id>();  
        For (Case c : updWorkOrders){  
            if (nonUpdCaseMap.get(c.Id).Status != 'Closed' && c.Status == 'Closed'){  
                if (c.Type == 'Repair' || c.Type == 'Routine Maintenance'){  
                    validIds.add(c.Id);  
                }  
            }  
        }  
    }  
}
```

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

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

```
if (!validIds.isEmpty()){  
    Map<Id,Case> closedCases = new Map<Id,Case>([SELECT Id, Vehicle__c,  
Equipment__c, Equipment__r.Maintenance_Cycle__c,  
                (SELECT Id,Equipment__c,Quantity__c FROM  
Equipment_Maintenance_Items__r)  
                FROM Case WHERE Id IN :validIds]);  
    Map<Id,Decimal> maintenanceCycles = new Map<ID,Decimal>();
```

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

```
AggregateResult[] results = [SELECT Maintenance_Request__c,  
                MIN(Equipment__r.Maintenance_Cycle__c)cycle  
                FROM Equipment_Maintenance_Item__c  
                WHERE Maintenance_Request__c IN :ValidIds GROUP BY  
Maintenance_Request__c];
```

```
for (AggregateResult ar : results){
```

```

        maintenanceCycles.put((Id) ar.get('Maintenance_Request__c'), (Decimal)
ar.get('cycle'));
    }

```

```

List<Case> newCases = new List<Case>();
for(Case cc : closedCases.values()){
    Case nc = new Case (
        ParentId = cc.Id,
        Status = 'New',
        Subject = 'Routine Maintenance',
        Type = 'Routine Maintenance',
        Vehicle__c = cc.Vehicle__c,
        Equipment__c =cc.Equipment__c,
        Origin = 'Web',
        Date_Reported__c = Date.Today()
    );

```

```

        //If multiple pieces of equipment are used in the maintenance request,
        //define the due date by applying the shortest maintenance cycle to today's
date.

```

```

        //If (maintenanceCycles.containsKey(cc.Id)){
            nc.Date_Due__c = Date.today().addDays((Integer)
maintenanceCycles.get(cc.Id));
        //} else {
            // nc.Date_Due__c = Date.today().addDays((Integer)
cc.Equipment__r.maintenance_Cycle__c);
        //}

```

```

        newCases.add(nc);
    }

```

```

insert newCases;

```

```

List<Equipment_Maintenance_Item__c> clonedList = new
List<Equipment_Maintenance_Item__c>();
for (Case nc : newCases){
    for (Equipment_Maintenance_Item__c clonedListItem :
closedCases.get(nc.ParentId).Equipment_Maintenance_Items__r){

```

```

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

```

MaintenanceRequest Code :

```

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

```

6) Test Callout Logic

WarehouseCalloutService Code :

```

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 Code :

```

@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);
    }
}

```

```
}
```

WarehouseCalloutServiceMock Code :

```
@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 Code :

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


WarehouseSyncScheduleTest Code :

```
@isTest
public with sharing class WarehouseSyncScheduleTest {
    // implement scheduled code here
    //
    @isTest static void test() {
        String scheduleTime = '00 00 00 * * ? *';
        Test.startTest();
        Test.setMock(HttpCalloutMock.class, new WarehouseCalloutServiceMock());
        String jobId = System.schedule('Warehouse Time to Schedule to test',
scheduleTime, new WarehouseSyncSchedule());
        CronTrigger c = [SELECT State FROM CronTrigger WHERE Id =: jobId];
        System.assertEquals('WAITING', String.valueOf(c.State), 'JobId does not match');

        Test.stopTest();
    }
}
```

