

## Apex Triggers

Get started with Apex Triggers:

AccountAddressTigger:

```
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:

ClosedOpportunityTigger:

```
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:

VerifyDate

```
public class VerifyDate {  
public static Date CheckDates(Date date1, Date date2) {  
if(DateWithin30Days(date1,date2)) {  
return date2;  
} else {  
return SetEndOfMonthDate(date1);  
}  
}  
  
@TestVisible private static Boolean DateWithin30Days(Date date1, Date date2) {  
if( date2 < date1) { return false; }
```

```

Date date30Days = date1.addDays(30);
if( date2 >= date30Days ) { return false; }
else { return true; }
}

@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
@Test
private class TestVerifyDate {
@Test static void Test_CheckDates_case1()
{
Date D=VerifyDate.CheckDates(date.parse('01/01/2020'), date.parse('01/05/2020'));
System.assertEquals(date.parse('01/05/2020'),D);
}

@Test static void Test_CheckDates_case2()
{
Date D=VerifyDate.CheckDates(date.parse('01/01/2020'), date.parse('05/05/2020'));
System.assertEquals(date.parse('01/31/2020'),D);
}

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

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

@Test 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('01/01/2022'));
}
```

```
}
```

```
}
```

Test Apex Triggers

RestrictContactByName

```
trigger RestrictContactByName on Contact (before insert, before update) {
```

```
For (Contact c : Trigger.New) {
```

```
if(c.LastName == 'INVALIDNAME') {
```

```
c.AddError('The Last Name "'+c.LastName+'" is not allowed for DML');
```

```
}
```

```
}
```

```
}
```

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 Testes

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;
}
}

```

Asynchronous Apex

Use Future Methods

AccountProcessor

```

public class AccountProcessor {
@future
public static void countContacts(List<Id> accountIds){
List<Account> accountToUpdate = 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();
accountToUpdate.add(acc);
}
Update accountToUpdate;
}
}

```

AccountProcessorTest

```

@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();
}
}

```

Use Batch Apex

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);
    }
}

```

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

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;
}
}
}

```

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
DailyLeadProcessor
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
@isTest

```

```

public class DailyLeadProcessorTest {
    static testMethod void testMethod1(){
        Test.startTest();
        List<Lead> lstLead = new List<Lead>();
        for(Integer i = 0; i<200;i++){
            Lead led = new Lead();
            led.FirstName = 'FirstName';
            led.LastName = 'LastName'+i;
            led.Company = 'demo'+i;
            lstLead.add(led);
        }
        insert lstLead;
        DailyLeadProcessor ab = new DailyLeadProcessor();
        String jobId = System.schedule('jobName', '0 5 * * * ?',ab);
        Test.stopTest();
    }
}

```

Apex Integration Services

Apex REST Callouts

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');
    }
}

```

AnimalLocatorTest



```

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

AnimalLocatorMock
@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",
        "mighty moose"]}');
        response.setStatusCode(200);
        return response;
    }
}

Apex Web Services
AccountManager
@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
@Test
private class AccountManagerTest {

```

```

private static testMethod void getAccountTest1() {
    Id recordId = createTestRecord();
    RestRequest request = new RestRequest();
    request.requestUri = 'https://na1.salesforce.com/services/apexrest/Accounts/'+
    recordId
    +'/contacts' ;
    request.httpMethod = 'GET';
    RestContext.request = request;
    Account thisAccount = AccountManager.getAccount();
    System.assert(thisAccount != null);
    System.assertEquals('Test record', thisAccount.Name);
}

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

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

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;
}
}
}
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);
}
}

WarehouseCalloutService
public with sharing class WarehouseCalloutService {
    private static final String WAREHOUSE_URL = 'https://th-
superbadgeapex.herokuapp.com/equipment';

```

```

//@future(callout=true)
public static void runWarehouseEquipmentSync(){
    Http http = new Http();
    HttpRequest request = new HttpRequest();
    request.setEndpoint(WAREHOUSE_URL);
    request.setMethod('GET');
    HttpResponse response = http.send(request);
    List<Product2> warehouseEq = new List<Product2>();
    if (response.getStatusCode() == 200){
        List<Object> jsonResponse =
        (List<Object>)JSON.deserializeUntyped(response.getBody());
        System.debug(response.getBody());
        for (Object eq : jsonResponse){
            Map<String,Object> mapJson = (Map<String,Object>)eq;
            Product2 myEq = new Product2();
            myEq.Replacement_Part__c = (Boolean) mapJson.get('replacement');
            myEq.Name = (String) mapJson.get('name');
            myEq.Maintenance_Cycle__c = (Integer) mapJson.get('maintenanceperiod');
            myEq.Lifespan_Months__c = (Integer) mapJson.get('lifespan');
            myEq.Cost__c = (Decimal) mapJson.get('lifespan');
            myEq.Warehouse_SKU__c = (String) mapJson.get('sku');
            myEq.Current_Inventory__c = (Double) mapJson.get('quantity');
            warehouseEq.add(myEq);
        }
        if (warehouseEq.size() > 0){
            upsert warehouseEq;
            System.debug('Your equipment was synced with the warehouse one');
            System.debug(warehouseEq);
        }
    }
}

WarehouseCalloutServiceMock
@isTest
global class WarehouseCalloutServiceMock implements HttpCalloutMock {
    global static HttpResponse respond(HttpRequest request){
        System.assertEquals('https://th-superbadge-apex.herokuapp.com/equipment',

```



```

request.getEndpoint());
System.assertEquals('GET', request.getMethod());
HttpResponse response = new HttpResponse();
response.setHeader('Content-Type', 'application/json');
response.setBody(['{"_id":"55d66226726b611100aaf741","replacement":false,"quantity":5
,"name":
"Generator 1000
kW","maintenanceperiod":365,"lifespan":120,"cost":5000,"sku":"100003"}']);
response.setStatusCode(200);
return response;
}
}
WarehouseCalloutServiceTest
@Test
private class WarehouseCalloutServiceTest {
@Test
static void testWareHouseCallout(){
Test.startTest();
Test.setMock(HTTPCalloutMock.class, new WarehouseCalloutServiceMock());
WarehouseCalloutService.runWarehouseEquipmentSync();
Test.stopTest();
System.assertEquals(1, [SELECT count() FROM Product2]);
}
}
WarehouseSyncSchedule
global class WarehouseSyncSchedule implements Schedulable {
global void execute(SchedulableContext ctx) {
WarehouseCalloutService.runWarehouseEquipmentSync();
}
}
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();  
CronTrigger a=[SELECT Id FROM CronTrigger where NextFireTime > today];  
System.assertEquals(jobID, a.Id,'Schedule ');  
}  
}
```