Apex Triggers

Get Started with Apex Triggers

```
trigger AccountAddressTrigger on Account (before insert,before update) {

    for(Account account:Trigger.new){
        if(account.Match_Billing_Address__c == True){
            account.ShippingPostalCode = account.BillingPostalCode;
        }
    }
}
```

Bulk Apex Triggers

```
trigger ClosedOpportunityTrigger on Opportunity (after insert, after update) {
    List<Task> taskList = new List<Task>();
    //first way
    for(Opportunity opp : [SELECT Id, StageName FROM Opportunity WHERE StageName='Closed
Won' AND Id IN : Trigger.New]){
        taskList.add(new Task(Subject='Follow Up Test Task', WhatId = opp.Id));
    }

    //second way and we should use this
    /*
      for(opportunity opp: Trigger.New){

        if(opp.StageName!=trigger.oldMap.get(opp.id).stageName)
        {

            taskList.add(new Task(Subject = 'Follow Up Test Task',
                                  WhatId = opp.Id));
        }

    }
          */

    if(taskList.size()>0){
        insert tasklist;
    }
}
```

Apex Testing

Get Started with Apex Unit Tests

```
public class VerifyDate {

	//method to handle potential checks against two dates
	public static Date CheckDates(Date date1, Date date2) {
		//if date2 is within the next 30 days of date1, use date2.  Otherwise use the end
of the month
		if(DateWithin30Days(date1,date2)) {
			return date2;
		} else {
			return SetEndOfMonthDate(date1);
		}
	}

	//method to check if date2 is within the next 30 days of date1
	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
	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;
	}

}
@isTest
```

```
private class TestVerifyDate {

   //testing that if date2 is within 30 days of date1, should return date 2
   @isTest static void testDate2within30daysofDate1() {
      Date date1 = date.newInstance(2018, 03, 20);
      Date date2 = date.newInstance(2018, 04, 11);
      Date resultDate = VerifyDate.CheckDates(date1,date2);
      Date testDate = Date.newInstance(2018, 04, 11);
      System.assertEquals(testDate,resultDate);
   }

   //testing that date2 is before date1. Should return "false"
   @isTest static void testDate2beforeDate1() {
      Date date1 = date.newInstance(2018, 03, 20);
      Date date2 = date.newInstance(2018, 02, 11);
      Date resultDate = VerifyDate.CheckDates(date1,date2);
      Date testDate = Date.newInstance(2018, 02, 11);
      System.assertNotEquals(testDate, resultDate);
   }

   //Test date2 is outside 30 days of date1. Should return end of month.
   @isTest static void testDate2outside30daysofDate1() {
      Date date1 = date.newInstance(2018, 03, 20);
      Date date2 = date.newInstance(2018, 04, 25);
      Date resultDate = VerifyDate.CheckDates(date1,date2);
      Date testDate = Date.newInstance(2018, 03, 31);
      System.assertEquals(testDate,resultDate);
   }
}
```

Test Apex Triggers

```
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');
                }

            }



}
@isTest
private class TestRestrictContactByName {

    @isTest static void testInvalidName() {
        //try inserting a Contact with INVALIDNAME
        Contact myConact = new Contact(LastName='INVALIDNAME');
        insert myConact;

        // Perform test
        Test.startTest();
        Database.SaveResult result = Database.insert(myConact, false);
        Test.stopTest();
        // Verify
        // In this case the creation should have been stopped by the trigger,
        // so verify that we got back an error.
        System.assert(!result.isSuccess());
        System.assert(result.getErrors().size() > 0);
        System.assertEquals('Cannot create contact with invalid last name.',
                        result.getErrors()[0].getMessage());

    }
}
```

Create Test Data for Apex Tests

```
public class RandomContactFactory {
    public static List<Contact> generateRandomContacts(Integer numContactsToGenerate, String
FName) {
        List<Contact> contactList = new List<Contact>();

        for(Integer i=0;i<numContactsToGenerate;i++) {
            Contact c = new Contact(FirstName=FName + ' ' + i, LastName = 'Contact '+i);
            contactList.add(c);
            System.debug(c);
        }
        //insert contactList;
        System.debug(contactList.size());
        return contactList;
    }

}
```

Asynchronous Apex

Use Future Methods

```
public class AccountProcessor
{
  @future
  public static void countContacts(Set<id> setId)
  {
      List<Account> lstAccount = [select id,Number_of_Contacts__c , (select id from contacts )
from account where id in :setId ];
      for( Account acc : lstAccount )
      {
          List<Contact> lstCont = acc.contacts ;

          acc.Number_of_Contacts__c = lstCont.size();
      }
      update lstAccount;
  }
}
@IsTest
public class AccountProcessorTest {
    public static testmethod void TestAccountProcessorTest()
    {
        Account a = new Account();
        a.Name = 'Test Account';
        Insert a;

        Contact cont = New Contact();
        cont.FirstName ='Bob';
        cont.LastName ='Masters';
        cont.AccountId = a.Id;
        Insert cont;

        set<Id> setAccId = new Set<ID>();
        setAccId.add(a.id);

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

        Account ACC = [select Number_of_Contacts__c from Account where id = :a.id LIMIT 1];
        System.assertEquals ( Integer.valueOf(ACC.Number_of_Contacts__c) ,1);
  }

}
```

Use Batch Apex

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

   global Database.QueryLocator start (Database.BatchableContext bc) {
      return Database.getQueryLocator('Select Id, LeadSource from lead');
   }

   global void execute (Database.BatchableContext bc,List<Lead> l_lst) {
      List<lead> l_lst_new = new List<lead>();
      for(lead l : l_lst) {
         l.leadsource = 'Dreamforce';
         l_lst_new.add(l);
         count+=1;
      }
      update l_lst_new;
   }

   global void finish (Database.BatchableContext bc) {
      system.debug('count = '+count);
   }
}
@isTest
public class LeadProcessorTest {
    @isTest
    public static void testit() {
        List<lead> l_lst = new List<lead>();
        for (Integer i = 0; i<200; i++) {
            Lead l = new lead();
            l.LastName = 'name'+i;
            l.company = 'company';
            l.Status =  'somestatus';
            l_lst.add(l);
        }
        insert l_lst;

        test.startTest();

        Leadprocessor lp = new Leadprocessor();
        Id batchId = Database.executeBatch(lp);
        Test.stopTest();

    }

}
```

Control Processes with Queueable Apex

```
public class AddPrimaryContact implements Queueable {
    public contact c;
    public String state;

    public AddPrimaryContact(Contact c, String state) {
        this.c = c;
        this.state = state;
    }

    public void execute(QueueableContext qc) {
        system.debug('this.c = '+this.c+' this.state = '+this.state);
        List<Account> acc_lst = new List<account>([select id, name, BillingState from account
where account.BillingState = :this.state limit 200]);
        List<contact> c_lst = new List<contact>();
        for(account a: acc_lst) {
            contact c = new contact();
            c = this.c.clone(false, false, false, false);
            c.AccountId = a.Id;
            c_lst.add(c);
        }
        insert c_lst;
    }

}
@IsTest
public class AddPrimaryContactTest {

    @IsTest
    public static void testing() {
        List<account> acc_lst = new List<account>();
        for (Integer i=0; i<50;i++) {
            account a = new account(name=string.valueOf(i),billingstate='NY');
            system.debug('account a = '+a);
            acc_lst.add(a);
        }
        for (Integer i=0; i<50;i++) {
            account a = new account(name=string.valueOf(50+i),billingstate='CA');
            system.debug('account a = '+a);
            acc_lst.add(a);
        }
        insert acc_lst;
        Test.startTest();
        contact c = new contact(lastname='alex');
        AddPrimaryContact apc = new AddPrimaryContact(c,'CA');
        system.debug('apc = '+apc);
        System.enqueueJob(apc);
        Test.stopTest();
        List<contact> c_lst = new List<contact>([select id from contact]);
        Integer size = c_lst.size();
        system.assertEquals(50, size);
    }

}
```

Schedule Jobs Using the Apex Scheduler

```
global class DailyLeadProcessor implements Schedulable {
 global void execute(SchedulableContext ctx) {
        List<Lead> lList = [Select Id, LeadSource from Lead where LeadSource = null];

        if(!lList.isEmpty()) {
   for(Lead l: lList) {
    l.LeadSource = 'Dreamforce';
   }
   update lList;
  }
    }

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

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

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

        insert leads;

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

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

Apex Integration Services

Apex REST Callouts

```
public class AnimalLocator {
        public class cls_animal {
                public Integer id;
                public String name;
                public String eats;
                public String says;
        }
public class JSONOutput{
        public cls_animal animal;

        //public JSONOutput parse(String json){
        //return (JSONOutput) System.JSON.deserialize(json, JSONOutput.class);
        //}
}

    public static String getAnimalNameById (Integer id) {
        Http http = new Http();
        HttpRequest request = new HttpRequest();
        request.setEndpoint('https://th-apex-http-callout.herokuapp.com/animals/' + id);
        //request.setHeader('id', String.valueof(id)); -- cannot be used in this challenge :)
        request.setMethod('GET');
        HttpResponse response = http.send(request);
        system.debug('response: ' + response.getBody());
        //Map<String,Object> map_results = (Map<String,Object>)
JSON.deserializeUntyped(response.getBody());
        jsonOutput results = (jsonOutput) JSON.deserialize(response.getBody(), jsonOutput.class);
        //Object results = (Object) map_results.get('animal');
                system.debug('results= ' + results.animal.name);
        return(results.animal.name);
    }

}
@IsTest
public class AnimalLocatorTest {
    @isTest
    public static void testAnimalLocator() {
        Test.setMock(HttpCalloutMock.class, new AnimalLocatorMock());
        //Httpresponse response = AnimalLocator.getAnimalNameById(1);
        String s =  AnimalLocator.getAnimalNameById(1);
        system.debug('string returned: ' + s);
    }

}
@IsTest
global class AnimalLocatorMock implements HttpCalloutMock {

    global HTTPresponse respond(HTTPrequest request) {
        Httpresponse response = new Httpresponse();
        response.setStatusCode(200);
        //-- directly output the JSON, instead of creating a logic
        //response.setHeader('key, value)
        //Integer id = Integer.valueof(request.getHeader('id'));
        //Integer id = 1;
        //List<String> lst_body = new List<String> {'majestic badger', 'fluffy bunny'};
        //system.debug('animal return value: ' + lst_body[id]);
        response.setBody('{"animal":{"id":1,"name":"chicken","eats":"chicken food","says":"cluck
cluck"}}');
        return response;
    }

}
```

Apex SOAP Callouts

```
public class ParkLocator {
    public static String[] country(String country){
        ParkService.ParksImplPort parks = new ParkService.ParksImplPort();
        String[] parksname = parks.byCountry(country);
        return parksname;
    }
}
@isTest
```

```
private class ParkLocatorTest{
   @isTest
   static void testParkLocator() {
      Test.setMock(WebServiceMock.class, new ParkServiceMock());
      String[] arrayOfParks = ParkLocator.country('India');

      System.assertEquals('Park1', arrayOfParks[0]);
   }
}
@isTest
global class ParkServiceMock implements WebServiceMock {
   global void doInvoke(
         Object stub,
         Object request,
         Map<String, Object> response,
         String endpoint,
         String soapAction,
         String requestName,
         String responseNS,
         String responseName,
         String responseType) {
      ParkService.byCountryResponse response_x = new ParkService.byCountryResponse();
      List<String> lstOfDummyParks = new List<String> {'Park1','Park2','Park3'};
      response_x.return_x = lstOfDummyParks;

      response.put('response_x', response_x);
   }
}
```

Apex Web Services

```
@RestResource(urlMapping='/Accounts/*/contacts')
global with sharing class AccountManager {


   @HttpGet
   global static account getAccount() {
        RestRequest request = RestContext.request;

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

    }

}
@isTest
public class AccountManagerTest {

@isTest static void testGetAccount() {
    Id recordId = createTestRecord();
    // Set up a test request
    RestRequest request = new RestRequest();
    request.requestUri =
        'https://resourceful-badger-76636-dev-
ed.my.salesforce.com/services/apexrest/Accounts/'+recordId+'/contacts'
        + recordId;
    request.httpMethod = 'GET';
    RestContext.request = request;
    // Call the method to test
    Account thisAcc = AccountManager.getAccount();
    // Verify results
    System.assert(thisAcc != null);
    System.assertEquals('Test record', thisAcc.Name);
}

// Helper method
static Id createTestRecord() {
    // Create test record
    Account accTest = new Account(
        Name='Test record');
    insert accTest;
    return accTest.Id;
}
```

```
}
```

Apex Specialist

challenge 2

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

challenge 3

```
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');
  }

}
```

challenge 4

```
global with sharing class WarehouseSyncSchedule implements Schedulable {
   // implement scheduled code here
   global void execute (SchedulableContext ctx){
      System.enqueueJob(new WarehouseCalloutService());
   }
}
@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();
   }
}
```

challenge 5

```
@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++){

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

        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);
    }
}
```

challenge 6

```
@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":"55d66226726b611
100aaf742","replacement":true,"quantity":183,"name":"Cooling
Fan","maintenanceperiod":0,"lifespan":0,"cost":300,"sku":"100004"},{"_id":"55d66226726b611100a
af743","replacement":true,"quantity":143,"name":"Fuse
20A","maintenanceperiod":0,"lifespan":0,"cost":22,"sku":"100005"}]');
        response.setStatusCode(200);

        return response;
    }
}
@IsTest
private class WarehouseCalloutServiceTest {
    // implement your mock callout test here
            @isTest
    static void testWarehouseCallout() {
        test.startTest();
        test.setMock(HttpCalloutMock.class, new WarehouseCalloutServiceMock());
        WarehouseCalloutService.execute(null);
        test.stopTest();

        List<Product2> product2List = new List<Product2>();
        product2List = [SELECT ProductCode FROM Product2];

        System.assertEquals(3, product2List.size());
        System.assertEquals('55d66226726b611100aaf741', product2List.get(0).ProductCode);
        System.assertEquals('55d66226726b611100aaf742', product2List.get(1).ProductCode);
        System.assertEquals('55d66226726b611100aaf743', product2List.get(2).ProductCode);
    }
}
```

challenge 7

```
@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":"55d66226726b611
100aaf742","replacement":true,"quantity":183,"name":"Cooling
Fan","maintenanceperiod":0,"lifespan":0,"cost":300,"sku":"100004"},{"_id":"55d66226726b611100a
af743","replacement":true,"quantity":143,"name":"Fuse
20A","maintenanceperiod":0,"lifespan":0,"cost":22,"sku":"100005"}]');
        response.setStatusCode(200);

        return response;
    }
}
```