APEX SPECIALIST SUPERBADGE

APEX SPECIALIST SUPERBADGE CHALLENGE 1-Automate record creation

Set Up Development Org :-

1. Create a new Trailhead Playground for this superbadge.
2. Install this unlocked package (package ID: 04t6g000008av9iAAA).
3. Add picklist values Repair and Routine Maintenance to the Type field on the Case object.
4. Update the Case page layout assignment to use the Case (HowWeRoll) Layout for your profile.
5. Rename the tab/label for the Case tab to Maintenance Request.
6. Update the Product page layout assignment to use the Product (HowWeRoll) Layout for your profile.
7. Rename the tab/label for the Product object to Equipment.
8. Click on App Launcher and search Create Default Data then Click Create Data to generate sample data for the application.

Solution:

- Go to the App Launcher - > Search How We Roll Maintenance -> click on Maintenance Requests -> click on first case -> click Details -> change the type Repair to Routine Maintenance -> select Origin = Phone -> Vehicle = select Teardrop Camper , save it.
- Feed -> Close Case = save it..
- Go to the Object Manager -> Maintenance Request ->Field & Relationships ->New ->Lookup Relationship -> next -> select Equipment ->next -> Field Label = Equipment ->next->next->next -> save it .

- Now go to the developer console use below code

MaintenanceRequestHelper.apxc :-

```
public with sharing class MaintenanceRequestHelper {
   public static void updateworkOrders(List<Case> updWorkOrders, Map<Id,Case>
nonUpdCaseMap) {
       Set<Id> validIds = new Set<Id>();


       For (Case c : updWorkOrders){
          if (nonUpdCaseMap.get(c.Id).Status != 'Closed' && c.Status == 'Closed'){
             if (c.Type == 'Repair' || c.Type == 'Routine Maintenance'){
                validIds.add(c.Id);


             }
          }
       }

       if (!validIds.isEmpty()){
          List<Case> newCases = new List<Case>();
          Map<Id,Case> closedCasesM = new Map<Id,Case>([SELECT Id, Vehicle__c,
Equipment__c, Equipment__r.Maintenance_Cycle__c,(SELECT Id,Equipment__c,Quantity__c
FROM Equipment_Maintenance_Items__r)
                                                 FROM Case WHERE Id IN :validIds]);
          Map<Id,Decimal> maintenanceCycles = new Map<ID,Decimal>();
          AggregateResult[] results = [SELECT Maintenance_Request__c,
MIN(Equipment__r.Maintenance_Cycle__c)cycle FROM Equipment_Maintenance_Item__c
WHERE Maintenance_Request__c IN :ValidIds GROUP BY Maintenance_Request__c];

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

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

            );

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

            newCases.add(nc);
         }

        insert newCases;

        List<Equipment_Maintenance_Item__c> clonedWPs = new
List<Equipment_Maintenance_Item__c>();
        for (Case nc : newCases){
            for (Equipment_Maintenance_Item__c wp :
closedCasesM.get(nc.ParentId).Equipment_Maintenance_Items__r){
                Equipment_Maintenance_Item__c wpClone = wp.clone();
                wpClone.Maintenance_Request__c = nc.Id;
                ClonedWPs.add(wpClone);

            }
         }
         insert ClonedWPs;
      }
```

```
    }
}
```

MaitenanceRequest.apxt :-

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

- After saving the code go back the How We Roll Maintenance ,
- click on Maintenance Requests -> click on 2nd case -> click Details -> change the type Repair to Routine Maintenance -> select Origin = Phone -> Vehicle = select Teardrop Camper , save it.
- Feed -> Close Case = save it..

Now check challenge.

APEX SPECIALIST SUPERBADGE CHALLENGE 2- Synchronize Salesforce data with an external system

Implement an Apex class (called WarehouseCalloutService) that implements the queueable interface and makes a callout to the external service used for warehouse inventory management. This service receives updated values in the external system and updates the related records in Salesforce. Before checking this section, **enqueue the job at least once to confirm that it's working as expected**.

Solution:

- Setup -> Search in quick find box -> click Remote Site Settings -> Name = Warehouse URL , Remote Site URL = https://th-superbadge-apex.herokuapp.com , make sure active is selected.
- Go to the developer console use below code

WarehouseCalloutService.apxc :-

```
public with sharing class WarehouseCalloutService implements Queueable {
    private static final String WAREHOUSE_URL = 'https://th-superbadge-
apex.herokuapp.com/equipment';

    //class that makes a REST callout to an external warehouse system to get a list of
equipment that needs to be updated.
    //The callout's JSON response returns the equipment records that you upsert in
Salesforce.

    @future(callout=true)
    public static void runWarehouseEquipmentSync(){
        Http http = new Http();
        HttpRequest request = new HttpRequest();

        request.setEndpoint(WAREHOUSE_URL);
        request.setMethod('GET');
        HttpResponse response = http.send(request);
        
        List<Product2> warehouseEq = new List<Product2>();
        
        if (response.getStatusCode() == 200){
            List<Object> jsonResponse =
(List<Object>)JSON.deserializeUntyped(response.getBody());
            System.debug(response.getBody());
            
            //class maps the following fields: replacement part (always true), cost, current
inventory, lifespan, maintenance cycle, and warehouse SKU
            //warehouse SKU will be external ID for identifying which equipment records to
update within Salesforce
            for (Object eq : jsonResponse){
                Map<String,Object> mapJson = (Map<String,Object>)eq;
                Product2 myEq = new Product2();
                myEq.Replacement_Part__c = (Boolean) mapJson.get('replacement');
                myEq.Name = (String) mapJson.get('name');
                myEq.Maintenance_Cycle__c = (Integer) mapJson.get('maintenanceperiod');
                myEq.Lifespan_Months__c = (Integer) mapJson.get('lifespan');
                myEq.Cost__c = (Integer) mapJson.get('cost');
                myEq.Warehouse_SKU__c = (String) mapJson.get('sku');
                myEq.Current_Inventory__c = (Double) mapJson.get('quantity');
                myEq.ProductCode = (String) mapJson.get('_id');
                warehouseEq.add(myEq);
            }
            
            if (warehouseEq.size() > 0){
                upsert warehouseEq;
                System.debug('Your equipment was synced with the warehouse one');
            }
        }
    }
    
    public static void execute (QueueableContext context){
        runWarehouseEquipmentSync();
    }
```

```
}
```

After saving the code open execute anonymous window (CTRl+E) and run this method ,

```
System.enqueueJob(new WarehouseCalloutService());
```

Now check Challenge.

APEX SPECIALIST SUPERBADGE-SOLUTIONS -CHALLENGE 3-Schedule synchronization

Build scheduling logic that executes your callout and runs your code daily. The name of the schedulable class should be **WarehouseSyncSchedule**, and the scheduled job should be named **WarehouseSyncScheduleJob.**

Solution

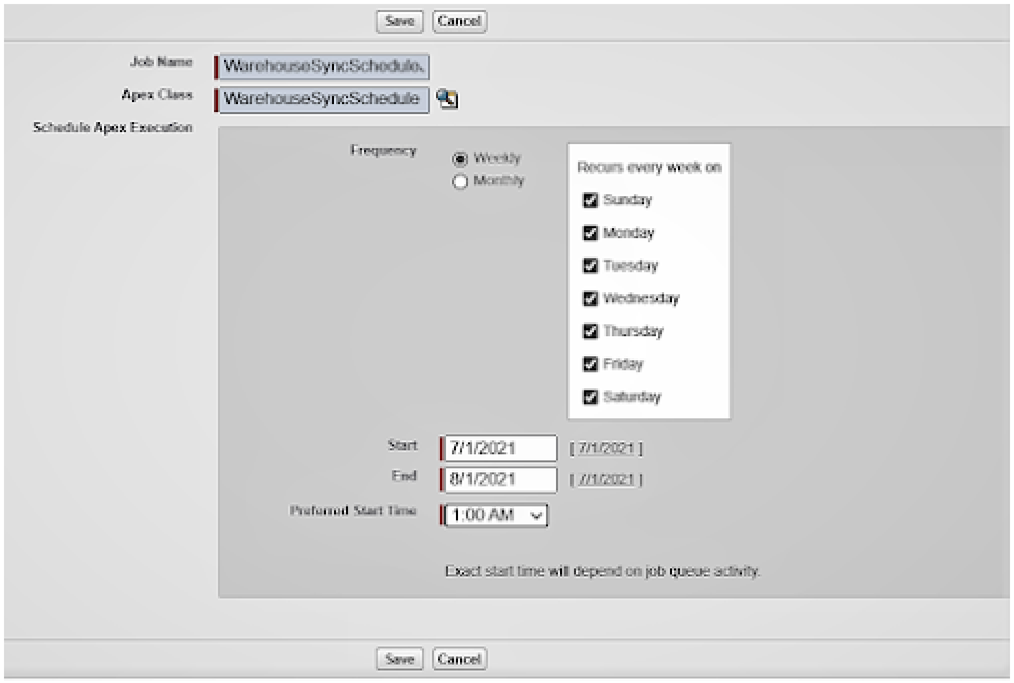
- Go to the developer console use below code :

WarehouseSyncShedule.apxc :-

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

Save it , after that...

- Go to setup -> Seacrh in Quick find box -> Apex Classes -> click Schedule Apex and Jb Name = WarehouseSyncScheduleJob , Apex Class = WarehouseSyncSchedule as it is below shown in the image ,



Job Name: WarehouseSyncSchedule.

Apex Class: WarehouseSyncSchedule

Schedule Apex Execution

Frequency: [✓ Weekly] Monthly

Recurs every week on: ✓ Sunday, ✓ Monday, ✓ Tuesday, ✓ Wednesday, ✓ Thursday, ✓ Friday, ✓ Saturday

Start: 7/1/2021 [7/1/2021]

End: 8/1/2021 [7/1/2021]

Preferred Start Time: 1:00 AM

Exact start time will depend on job queue activity.

Now check challenge.

APEX SPECIALIST SUPERBADGE-SOLUTIONS -CHALLENGE 4-Test automation logic

Build tests for all cases (positive, negative, and bulk) specified in the business requirements by using a class named **MaintenanceRequestHelperTest**. You must have 100% test coverage to pass this section and assert values to prove that your logic is working as expected. Choose **Run All Tests** in the Developer Console at least once before attempting to submit this section. Be patient as it may take 10-20 seconds to process the challenge check.

Solution:

- Go to the developer console use below code :

MaintenanceRequestHelperTest.apxc :-

```
@istest
public with sharing class MaintenanceRequestHelperTest {

  private static final string STATUS_NEW = 'New';
  private static final string WORKING = 'Working';
  private static final string CLOSED = 'Closed';
  private static final string REPAIR = 'Repair';
  private static final string REQUEST_ORIGIN = 'Web';
  private static final string REQUEST_TYPE = 'Routine Maintenance';
  private static final string REQUEST_SUBJECT = 'Testing subject';

  PRIVATE STATIC Vehicle__c createVehicle(){
    Vehicle__c Vehicle = new Vehicle__C(name = 'SuperTruck');
    return Vehicle;
  }
```

```
 
 PRIVATE STATIC Product2 createEq(){
   product2 equipment = new product2(name = 'SuperEquipment',
                                     lifespan_months__C = 10,
                                     maintenance_cycle__C = 10,
                                     replacement_part__c = true);
   return equipment;
 }
 
 PRIVATE STATIC Case createMaintenanceRequest(id vehicleId, id equipmentId){
   case cs = new case(Type=REPAIR,
                      Status=STATUS_NEW,
                      Origin=REQUEST_ORIGIN,
                      Subject=REQUEST_SUBJECT,
                      Equipment__c=equipmentId,
                      Vehicle__c=vehicleId);
   return cs;
 }
 
 PRIVATE STATIC Equipment_Maintenance_Item__c createWorkPart(id equipmentId,id
requestId){
   Equipment_Maintenance_Item__c wp = new
Equipment_Maintenance_Item__c(Equipment__c = equipmentId,
                                                   Maintenance_Request__c = requestId);
   return wp;
 }
 
 
 @istest
 private static void testMaintenanceRequestPositive(){
   Vehicle__c vehicle = createVehicle();
   insert vehicle;
   id vehicleId = vehicle.Id;
   
   Product2 equipment = createEq();
   insert equipment;
   id equipmentId = equipment.Id;
   
   case somethingToUpdate = createMaintenanceRequest(vehicleId,equipmentId);
```

```
        insert somethingToUpdate;

        Equipment_Maintenance_Item__c workP = 
createWorkPart(equipmentId,somethingToUpdate.id);
        insert workP;

        test.startTest();
        somethingToUpdate.status = CLOSED;
        update somethingToUpdate;
        test.stopTest();

        Case newReq = [Select id, subject, type, Equipment__c, Date_Reported__c, 
Vehicle__c, Date_Due__c
                      from case
                      where status =:STATUS_NEW];

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

        system.assert(workPart != null);
        system.assert(newReq.Subject != null);
        system.assertEquals(newReq.Type, REQUEST_TYPE);
        SYSTEM.assertEquals(newReq.Equipment__c, equipmentId);
        SYSTEM.assertEquals(newReq.Vehicle__c, vehicleId);
        SYSTEM.assertEquals(newReq.Date_Reported__c, system.today());
    }

    @istest
    private static void testMaintenanceRequestNegative(){
        Vehicle__C vehicle = createVehicle();
        insert vehicle;
        id vehicleId = vehicle.Id;

        product2 equipment = createEq();
        insert equipment;
        id equipmentId = equipment.Id;

        case emptyReq = createMaintenanceRequest(vehicleId,equipmentId);
        insert emptyReq;
        
        Equipment_Maintenance_Item__c workP = createWorkPart(equipmentId,
emptyReq.Id);
        insert workP;
        
        test.startTest();
        emptyReq.Status = WORKING;
        update emptyReq;
        test.stopTest();
        
        list<case> allRequest = [select id
                                 from case];
        
        Equipment_Maintenance_Item__c workPart = [select id
                                                  from Equipment_Maintenance_Item__c
                                                  where Maintenance_Request__c = :emptyReq.Id];
        
        system.assert(workPart != null);
        system.assert(allRequest.size() == 1);
    }
    
    @istest
    private static void testMaintenanceRequestBulk(){
        list<Vehicle__C> vehicleList = new list<Vehicle__C>();
        list<Product2> equipmentList = new list<Product2>();
        list<Equipment_Maintenance_Item__c> workPartList = new
list<Equipment_Maintenance_Item__c>();
        list<case> requestList = new list<case>();
        list<id> oldRequestIds = new list<id>();
        
        for(integer i = 0; i < 300; i++){
           vehicleList.add(createVehicle());
            equipmentList.add(createEq());
        }
        insert vehicleList;
        insert equipmentList;
        
        for(integer i = 0; i < 300; i++){
            requestList.add(createMaintenanceRequest(vehicleList.get(i).id,
equipmentList.get(i).id));
        }
        insert requestList;
      
        for(integer i = 0; i < 300; i++){
            workPartList.add(createWorkPart(equipmentList.get(i).id, requestList.get(i).id));
        }
        insert workPartList;
      
        test.startTest();
        for(case req : requestList){
            req.Status = CLOSED;
            oldRequestIds.add(req.Id);
        }
        update requestList;
        test.stopTest();
      
        list<case> allRequests = [select id
                                 from case
                                 where status =: STATUS_NEW];
      
        list<Equipment_Maintenance_Item__c> workParts = [select id
                                                        from Equipment_Maintenance_Item__c
                                                        where Maintenance_Request__c in: oldRequestIds];
      
        system.assert(allRequests.size() == 300);
    }
}
```

MaintenanceRequestHelper.apxc :-

```
public with sharing class MaintenanceRequestHelper {
   public static void updateworkOrders(List<Case> updWorkOrders, Map<Id,Case>
nonUpdCaseMap) {
      Set<Id> validIds = new Set<Id>();
```

```
        For (Case c : updWorkOrders){
           if (nonUpdCaseMap.get(c.Id).Status != 'Closed' && c.Status == 'Closed'){
              if (c.Type == 'Repair' || c.Type == 'Routine Maintenance'){
                 validIds.add(c.Id);



              }
           }
        }

        if (!validIds.isEmpty()){
           List<Case> newCases = new List<Case>();
           Map<Id,Case> closedCasesM = new Map<Id,Case>([SELECT Id, Vehicle__c,
Equipment__c, Equipment__r.Maintenance_Cycle__c,(SELECT
Id,Equipment__c,Quantity__c FROM Equipment_Maintenance_Items__r)
                                             FROM Case WHERE Id IN :validIds]);
           Map<Id,Decimal> maintenanceCycles = new Map<ID,Decimal>();
           AggregateResult[] results = [SELECT Maintenance_Request__c,
MIN(Equipment__r.Maintenance_Cycle__c)cycle FROM Equipment_Maintenance_Item__c
WHERE Maintenance_Request__c IN :ValidIds GROUP BY Maintenance_Request__c];

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

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

              );
```

```
            If (maintenanceCycles.containskey(cc.Id)){
               nc.Date_Due__c = Date.today().addDays((Integer) maintenanceCycles.get(cc.Id));
            }

            newCases.add(nc);
          }

         insert newCases;

         List<Equipment_Maintenance_Item__c> clonedWPs = new
List<Equipment_Maintenance_Item__c>();
         for (Case nc : newCases){
            for (Equipment_Maintenance_Item__c wp :
closedCasesM.get(nc.ParentId).Equipment_Maintenance_Items__r){
               Equipment_Maintenance_Item__c wpClone = wp.clone();
               wpClone.Maintenance_Request__c = nc.Id;
               ClonedWPs.add(wpClone);

            }
          }
          insert ClonedWPs;
       }
    }
}
```

MaintenanceRequest.apxt :-

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

run all

Now check challenge.

APEX SPECIALIST SUPERBADGE-SOLUTIONS -CHALLENGE 5-Test callout logic

Build tests for your callout using the included class for the callout mock (**WarehouseCalloutServiceMock**) and callout test class (**WarehouseCalloutServiceTest**) in the package. You must have 100% test coverage to pass this challenge and assert values to prove that your logic is working as expected.

Solution:

- Go to the developer console use below code ,

WarehouseCalloutService.apxc :-

```
public with sharing class WarehouseCalloutService {
   private static final String WAREHOUSE_URL = 'https://th-superbadge-
apex.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);
            }

        }
    }
}
```

WarehouseCalloutServiceTest.apxc :-

```
@isTest
private class WarehouseCalloutServiceTest {
    @isTest
    static void testWareHouseCallout(){
        Test.startTest();
        // implement mock callout test here
        Test.setMock(HTTPCalloutMock.class, new WarehouseCalloutServiceMock());
        WarehouseCalloutService.runWarehouseEquipmentSync();
        Test.stopTest();
        System.assertEquals(1, [SELECT count() FROM Product2]);
    }
}
```

WarehouseCalloutServiceMock.apxc :-

```
@isTest
global class WarehouseCalloutServiceMock implements HttpCalloutMock {
    // implement http mock callout
    global static HttpResponse respond(HttpRequest request){

        System.assertEquals('https://th-superbadge-apex.herokuapp.com/equipment',
request.getEndpoint());
        System.assertEquals('GET', request.getMethod());

        // Create a fake response
        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;
    }
}
```

Note-:Deleted all scheduled jobs that are under Setup -> Monitoring -> Scheduled Jobs

run all

Now check challenge.

APEX SPECIALIST SUPERBADGE-SOLUTIONS -CHALLENGE 6-Test scheduling logic

Build unit tests for the class **WarehouseSyncSchedule** in a class named **WarehouseSyncScheduleTest**. You must have 100% test coverage to pass this challenge and assert values to prove that your logic is working as expected.

- Go to the developer console use below code ,

WarehouseSyncSchedule.apxc :-

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

    WarehouseCalloutService.runWarehouseEquipmentSync();
  }
}
```

WarehouseSyncScheduleTest.apxc :-

```
@isTest
public class WarehouseSyncScheduleTest {

  @isTest static void WarehousescheduleTest(){
    String scheduleTime = '00 00 01 * * ?';
    Test.startTest();
    Test.setMock(HttpCalloutMock.class, new WarehouseCalloutServiceMock());
    String jobID=System.schedule('Warehouse Time To Schedule to Test', scheduleTime,
new WarehouseSyncSchedule());
    Test.stopTest();
    //Contains schedule information for a scheduled job. CronTrigger is similar to a cron
job on UNIX systems.
```

```
        // This object is available in API version 17.0 and later.
        CronTrigger a=[SELECT Id FROM CronTrigger where NextFireTime > today];
        System.assertEquals(jobID, a.Id,'Schedule ');

       }
}
```

run all
Now check challenge.

Apex Triggers

Get Started with Apex Triggers:-

Cha1lenge 1: Create an Apex trigger for Account that matches Shipping Address Postal Code with Billing Address Postal Code based on a custom field.
For this challenge, you need to create a trigger that, before insert or update, checks for a checkbox, and if the checkbox field is true, sets the Shipping Postal Code (whose API name is ShippingPostalCode) to be the same as the Billing Postal Code (BillingPostalCode).
The Apex trigger must be called 'AccountAddressTrigger'.
The Account object will need a new custom checkbox that should have the Field Label 'Match Billing Address' and Field Name of 'Match_Billing_Address'. The resulting API Name should be 'Match_Billing_Address__c'.
With 'AccountAddressTrigger' active, if an Account has a Billing Postal Code and 'Match_Billing_Address__c' is true, the record should have the Shipping Postal Code set to match on insert or update.

Solution:

```
trigger AccountAddressTrigger on Account (before insert, before update) {
    for(Account a: Trigger.New){
        if(a.Match_Billing_Address__c == true && a.BillingPostalCode!= null){
            a.ShippingPostalCode=a.BillingPostalCode;
        }
    }

}
```

Bulk Apex Triggers:-

Challenge 2:

Create an Apex trigger for Opportunity that adds a task to any opportunity set to 'Closed Won'.
To complete this challenge, you need to add a trigger for Opportunity. The trigger will add a task to any opportunity inserted or updated with the stage of 'Closed Won'. The task's subject must be 'Follow Up Test Task'.
The Apex trigger must be called 'ClosedOpportunityTrigger'
With 'ClosedOpportunityTrigger' active, if an opportunity is inserted or updated with a stage of 'Closed Won', it will have a task created with the subject 'Follow Up Test Task'.
To associate the task with the opportunity, fill the 'WhatId' field with the opportunity ID.
This challenge specifically tests 200 records in one operation.

Solution:

```
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:-

Create a unit test for a simple Apex class.
Install a simple Apex class, write unit tests that achieve 100% code coverage for the class, and run your Apex tests.
The Apex class to test is called 'VerifyDate', and the code is available here. Copy and paste this class into your Developer Edition via the Developer Console.
'VerifyDate' is a class which tests if a date is within a proper range, and if not will return a date that occurs at the end of the month within the range.
The unit tests must be in a separate test class called 'TestVerifyDate'.
The unit tests must cover scenarios for all lines of code included in the Apex class, resulting in 100% code coverage.
Run your test class at least once (via 'Run All' tests the Developer Console) before attempting to verify this challenge.

Solution:

1.VerifyDate.apxc

```
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;
        }

}
```

2.TestVerifyDate.apxc

```
@isTest
private class TestVerifyDate {
   static testMethod void TestVerifyDate() {
     VerifyDate.CheckDates(System.today(),System.today().addDays(10));
      VerifyDate.CheckDates(System.today(),System.today().addDays(78));
   }
}
```

Test Apex Triggers:-

Create a unit test for a simple Apex trigger.
Install a simple Apex trigger, write unit tests that achieves 100% code coverage for the trigger, and run your Apex tests.
The Apex trigger to test is called 'RestrictContactByName', and the code is available here. Copy and paste this trigger into your Developer Edition via the Developer Console.
'RestrictContactByName' is a trigger which blocks inserts and updates to any contact with a last name of 'INVALIDNAME'.
The unit tests must be in a separate Apex class called 'TestRestrictContactByName'.
The unit tests must cover scenarios for all lines of code included in the Apex trigger, resulting in 100% code coverage.
Run your test class at least once (via 'Run All' tests the Developer Console) before attempting to verify this challenge.

Solution:

1.RestrictContactByName.apxc

```
        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.apxc

```
@isTest
public class TestRestrictContactByName {
static testMethod void  Test()
  {

      List<Contact> listContact= new List<Contact>();
      Contact c1 = new Contact(FirstName='Raam', LastName='Leela' , email='ramleela@test.com');
      Contact c2 = new Contact(FirstName='gatsby', LastName =
'INVALIDNAME',email='gatsby@test.com');
      listContact.add(c1);
      listContact.add(c2);

      Test.startTest();
        try
        {
          insert listContact;
        }
        catch(Exception ee)
        {
        }

      Test.stopTest();

  }
}
```

Create Test Data for Apex Tests:-

Create a contact test factory.
Create an Apex class that returns a list of contacts based on two incoming parameters: one for the number of contacts to generate, and the other for the last name. The list should NOT be inserted into the system, only returned. The first name should be dynamically generated and should be unique for each contact record in the list.
The Apex class must be called 'RandomContactFactory' and be in the public scope.
The Apex class should NOT use the @isTest annotation.
The Apex class must have a public static method called 'generateRandomContacts' (without the @testMethod annotation).
The 'generateRandomContacts' method must accept an integer as the first parameter, and a string as the second. The first parameter controls the number of contacts being generated, the second is the last name of the contacts generated.
The 'generateRandomContacts' method should have a return type of List<Contact>.
The 'generateRandomContacts' method must be capable of consistently generating contacts with unique first names.
For example, the 'generateRandomContacts' might return first names based on iterated number (i.e. 'Test 1','Test 2').
The 'generateRandomContacts' method should not insert the contact records into the database.

Solution:
1.RandomContactFactory.apxc

```
public class RandomContactFactory {
    public static List<Contact> generateRandomContacts(Integer NumberofContacts, String lName){
        List<Contact> con = new List<Contact>();
        for(Integer i=0; i<NumberofContacts; i++){
            lName = 'Test'+i;
            Contact c = new Contact(FirstName=lName, LastName=lName);
            con.add(c);
        }
        return con;
    }

}
```

Asynchronous Apex

Use Future Methods:-

Create an Apex class that uses the @future annotation to update Account records.
Create an Apex class with a method using the @future annotation that accepts a List of Account IDs and updates a custom field on the Account object with the number of contacts associated to the Account. Write unit tests that achieve 100% code coverage for the class.
Create a field on the Account object called 'Number_of_Contacts__c' of type Number. This field will hold the total number of Contacts for the Account.
Create an Apex class called 'AccountProcessor' that contains a 'countContacts' method that accepts a List of Account IDs. This method must use the @future annotation.
For each Account ID passed to the method, count the number of Contact records associated to it and update the 'Number_of_Contacts__c' field with this value.
Create an Apex test class called 'AccountProcessorTest'.
The unit tests must cover all lines of code included in the AccountProcessor class, resulting in 100% code coverage.
Run your test class at least once (via 'Run All' tests the Developer Console) before attempting to verify this challenge.

Solution:
1.AccountProcessor.apxc

```
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;
    }
}
```

2.AccountProcessorTest.apxc

```
@isTest
public class AccountProcessorTest {
    public static testMethod void testAccountProcessorTest(){
        Test.startTest();
        Account a = new Account();
        a.Name = 'The Pirates';
        insert a;

        Contact cont = new Contact();
        cont.FirstName ='jack';
        cont.LastName ='Sparrow';
        cont.AccountId = a.Id;
        insert cont;

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

        AccountProcessor.countContact(setAccId);

        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);
        Test.stopTest();
    }
}
```

Use Batch Apex:-

Create an Apex class that uses Batch Apex to update Lead records.
Create an Apex class that implements the Database.Batchable interface to update all Lead records in the org with a specific LeadSource. Write unit tests that achieve 100% code coverage for the class.
Create an Apex class called 'LeadProcessor' that uses the Database.Batchable interface.
Use a QueryLocator in the start method to collect all Lead records in the org.
The execute method must update all Lead records in the org with the LeadSource value of 'Dreamforce'.
Create an Apex test class called 'LeadProcessorTest'.
In the test class, insert 200 Lead records, execute the 'LeadProcessor' Batch class and test that all Lead records were updated correctly.
The unit tests must cover all lines of code included in the LeadProcessor class, resulting in 100% code coverage.
Run your test class at least once (via 'Run All' tests the Developer Console) before attempting to verify this challenge.

Solution:

```
1.LeadProcessor.apxc
global class LeadProcessor implements Database.Batchable<sObject>, Database.Stateful {
    global Integer leadsProcessed = 0;
    global Database.QueryLocator start(Database.BatchableContext bc){


        return Database.getQueryLocator('select id, lastname ,status, company from Lead');

    }
    global void execute(Database.BatchableContext bc, List<Lead> allLeads){
        List<Lead> leads = new List<Lead>();
        for(Lead l: allLeads){
            l.LeadSource='Dreamforce';
        }
        update leads;

    }
    global void finish(Database.BatchableContext bc){
        System.debug(leadsProcessed + ' leads processed. Nigga!');
        AsyncApexJob job = [SELECT Id, Status, NumberOfErrors,
            JobItemsProcessed,
            TotalJobItems, CreatedBy.Email
            FROM AsyncApexJob
            WHERE Id = :bc.getJobId()];

        EmailManager.sendMail('jgatsby1996@gmail.com','Total Leads Porcessed are ','
'+leadsProcessed);

    }

}
2.LeadProcessorTest


@isTest
public class LeadProcessorTest {

    @testSetup
    static void setup(){
        List<Lead> leads = new List<Lead>();
        for (Integer i=0;i<200;i++) {
            leads.add(new Lead(Lastname='Last '+i,
                            status='Open - Not Contacted'
            , company='LeadCompany'+i));
        }
        insert leads;
    }
    static testmethod void test() {
        Test.startTest();
        LeadProcessor lp = new LeadProcessor();
        Id batchId = Database.executeBatch(lp);
        Test.stopTest();
        // after the testing stops, assert records were updated properly
        System.assertEquals(200, [select count() from Lead where LeadSource = 'Dreamforce']);
    }
}
```

Control Processes with Queueable Apex:-

Create an Queueable Apex class that inserts Contacts for Accounts.
Create a Queueable Apex class that inserts the same Contact for each Account for a specific state.
Write unit tests that achieve 100% code coverage for the class.
Create an Apex class called 'AddPrimaryContact' that implements the Queueable interface.
Create a constructor for the class that accepts as its first argument a Contact sObject and a second argument as a string for the State abbreviation.
The execute method must query for a maximum of 200 Accounts with the BillingState specified by the State abbreviation passed into the constructor and insert the Contact sObject record associated to each Account. Look at the sObject clone() method.
Create an Apex test class called 'AddPrimaryContactTest'.
In the test class, insert 50 Account records for BillingState "NY" and 50 Account records for BillingState "CA". Create an instance of the AddPrimaryContact class, enqueue the job and assert that a Contact record was inserted for each of the 50 Accounts with the BillingState of "CA".
The unit tests must cover all lines of code included in the AddPrimaryContact class, resulting in 100% code coverage.
Run your test class at least once (via 'Run All' tests the Developer Console) before attempting to verify this challenge.

Solution:
1.AddPrimaryContact.Apxc

```
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;
    }

}
```

2.AddPrimaryContactTest.apxc

```
@isTest
public class AddPrimaryContactTest {

    @testSetup
    public static void setup(){
         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;
    }

    public static testMethod void TestQueueable(){
        List<Account> ac_ca=[select id from Account where billingstate='CA'];
        contact c = new contact(lastname='bhau');
        AddPrimaryContact apc = new AddPrimaryContact(c,'CA');

        Test.startTest();
        System.enqueueJob(apc);
        Test.stopTest();


        system.assertEquals(50, [select count() from contact where AccountId IN :ac_ca]);
    }
}
```

Schedule Jobs Using the Apex Scheduler:-

Create an Apex class that uses Scheduled Apex to update Lead records.
Create an Apex class that implements the Schedulable interface to update Lead records with a specific LeadSource. Write unit tests that achieve 100% code coverage for the class. This is very similar to what you did for Batch Apex.
Create an Apex class called 'DailyLeadProcessor' that uses the Schedulable interface.
The execute method must find the first 200 Leads with a blank LeadSource field and update them with the LeadSource value of 'Dreamforce'.
Create an Apex test class called 'DailyLeadProcessorTest'.
In the test class, insert 200 Lead records, schedule the DailyLeadProcessor class to run and test that all Lead records were updated correctly.
The unit tests must cover all lines of code included in the DailyLeadProcessor class, resulting in 100% code coverage.
Run your test class at least once (via 'Run All' tests the Developer Console) before attempting to verify this challenge.

Solution:
1.DailyLeadProcessor.apxc

```
public class DailyLeadProcessor implements schedulable{

    public void execute(schedulableContext sc) {
        List<lead> l_lst_new = new List<lead>();
        List<lead> l_lst = new List<lead>([select id, leadsource from lead where leadsource = null]);
        for(lead l : l_lst) {
            l.leadsource = 'Dreamforce';
            l_lst_new.add(l);
        }
        update l_lst_new;
    }

}
```
2.DailyLeadProcessorTest.apxc
```
@isTest
public class DailyLeadProcessorTest {
    @testSetup
    static void setup(){
        List<Lead> lstOfLead = new List<Lead>();
        for(Integer i = 1; i <= 200; i++){
            Lead ld = new Lead(Company = 'Comp' + i ,LastName = 'LN'+i, Status = 'Working - Contacted');
            lstOfLead.add(ld);
        }
        Insert lstOfLead;
    }
    static testmethod void testDailyLeadProcessorScheduledJob(){
        String sch = '0 5 12 * * ?';
        Test.startTest();
        String jobId = System.schedule('ScheduledApexTest', sch, new DailyLeadProcessor());

        List<Lead> lstOfLead = [SELECT Id FROM Lead WHERE LeadSource = null LIMIT 200];
        System.assertEquals(200, lstOfLead.size());

        Test.stopTest();
    }
}
```

Apex Integration Services

Apex REST Callouts:-

##AnimalLocator.apxc

```
public class AnimalLocator
{

 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.setMethod('GET');
       HttpResponse response = http.send(request);
         String strResp = '';
          system.debug('******response '+response.getStatusCode());
          system.debug('******response '+response.getBody());
       // If the request is successful, parse the JSON response.
       if (response.getStatusCode() == 200)
       {
           // Deserializes the JSON string into collections of primitive data types.
          Map<String, Object> results = (Map<String, Object>)
JSON.deserializeUntyped(response.getBody());
           // Cast the values in the 'animals' key as a list
          Map<string,object> animals = (map<string,object>) results.get('animal');
           System.debug('Received the following animals:' + animals );
           strResp = string.valueof(animals.get('name'));
           System.debug('strResp >>>>>>' + strResp );
       }
       return strResp ;
  }

}
```

##AnimalLocatorTest

```
@isTest
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

```
@isTest
global class AnimalLocatorMock implements HttpCalloutMock {
   global HTTPResponse respond(HTTPRequest request) {
        HttpResponse response = new HttpResponse();
       response.setHeader('Content-Type', 'application/json');
       response.setBody('{"animal":{"id":1,"name":"chicken","eats":"chicken food","says":"cluck cluck"}}');
       response.setStatusCode(200);
       return response;
   }
}
```

Apex SOAP Callouts:-
##ParkLocator.apxc

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

##ParkLocatorTest.apxc

```
@isTest
public class ParkLocatorTest {
@isTest static void testMock(){
       test.setMock(WebserviceMock.class, new ParkServiceMock());
```

```
        String[] parksName = ParkLocator.Country('India');
        List<String> country = new List<String>();
              country.add('Inamdar National Park');
                country.add('Riza National Park');
                country.add('Shilpa National Park');
        System.assertEquals(country, parksName, 'park names are not as expected');
    }

}
```

```
##ParkServiceMock

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> country = new List<String>();
              country.add('Inamdar Shola National Park');
                country.add('Riza National Park');
                country.add('Shilpa National Park');
              response_x.return_x = country;
                response.put('response_x', response_x);
              }

}
```

Apex Web Services;-

```
##AccountManager.apxc

@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

@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;
    }
}
```