Apex Specialist Superbadge

Step 2- Automate Record Creation

Code:

MaintenanceRequest.apxt

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

MaintenanceRequestHelper.cls

```
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;
      }
    }
}
```

Step 3: Synchronize Salesforce data with an external system

Code:

WarehouseCalloutService.cls

```
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');
    }
}
```

Step 4: Schedule synchronization

Code:

WarehouseSyncSchedule.cls

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

Step 5: Test automation logic

Code:

MaintenanceRequest.cls

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

```
}
```

MaintenanceRequestHelper.cls

```
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;
      }
   }
}
```

MaintenanceRequestHelperTest.cls

```
@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);
    }
}
```

Step 6: Test callout logic

Code:

WarehouseCalloutService.cls

```
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');
   }
}
```

WarehouseCalloutServiceMock.cls

```
@isTest
global class WarehouseCalloutServiceMock implements HttpCalloutMock {
   // implement http mock callout
   global static HttpResponse respond(HttpRequest request) {
      HttpResponse response = new HttpResponse();
      response.setHeader('Content-Type', 'application/json');

response.setBody('[{"_id":"55d66226726b611100aaf741","replacement":false,"quantity":5
,"name":"Generator 1000
kW","maintenanceperiod":365,"lifespan":120,"cost":5000,"sku":"100003"},{"_id":"55d66226
726b611100aaf742","replacement":true,"quantity":183,"name":"Cooling
Fan","maintenanceperiod":0,"lifespan":0,"cost":300,"sku":"100004"},{"_id":"55d66226726b6
11100aaf743","replacement":true,"quantity":143,"name":"Fuse
20A","maintenanceperiod":0,"lifespan":0,"cost":22,"sku":"100005"}]');
```

```
        response.setStatusCode(200);
        return response;
    }
}
```

WarehouseCalloutServiceTest.cls

```
@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);
    }
}
```

Step 7: Test scheduling logic

Code:

WarehouseCalloutServiceMock.cls

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

```
        HttpResponse response = new HttpResponse();
        response.setHeader('Content-Type', 'application/json');

response.setBody('[{"_id":"55d66226726b611100aaf741","replacement":false,"quantity":5
,"name":"Generator 1000
kW","maintenanceperiod":365,"lifespan":120,"cost":5000,"sku":"100003"},{"_id":"55d66226
726b611100aaf742","replacement":true,"quantity":183,"name":"Cooling
Fan","maintenanceperiod":0,"lifespan":0,"cost":300,"sku":"100004"},{"_id":"55d66226726b6
11100aaf743","replacement":true,"quantity":143,"name":"Fuse
20A","maintenanceperiod":0,"lifespan":0,"cost":22,"sku":"100005"}]');
        response.setStatusCode(200);
        return response;
    }
}
```

WarehouseSyncSchedule.cls

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

WarehouseSyncScheduleTest.cls

```
@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();
    }
}
```

Process Automation Specialist

Step 2: Automate Leads

Formula Used :

OR(

NOT(CONTAINS("AL:AK:AZ:AR:CA:CO:CT:DE:DC:FL:GA:HI:ID:IL:IN:IA:KS:KY:LA:ME:MD:MA:MI:MN:MS:MO:MT:NE:NV:NH:NJ:NM:NY:NC:ND:OH:OK:OR:PA:RI:SC:SD:TN:TX:UT:VT:VA:WA:WV:WI:WY", State)),

LEN(State) <> 2,

NOT(OR(Country ="US",Country ="USA",Country ="United States", ISBLANK(Country)))

)

Step 3: Automate Accounts

Formula used:

ValidationForBilling

OR(
NOT(CONTAINS("AL:AK:AZ:AR:CA:CO:CT:DE:DC:FL:GA:HI:ID:IL:IN:IA:KS:KY:LA:ME:MD:MA:MI:MN:MS:MO:MT:NE:NV:NH:NJ:NM:NY:NC:ND:OH:OK:OR:PA:RI:SC:SD:TN:TX:UT:VT:VA:WA:WV:WI:WY", BillingState)), LEN(BillingState) <> 2, NOT(OR(BillingCountry ="US",BillingCountry ="USA",BillingCountry ="United States", ISBLANK(BillingCountry))),
NOT(CONTAINS("AL:AK:AZ:AR:CA:CO:CT:DE:DC:FL:GA:HI:ID:IL:IN:IA:KS:KY:LA:ME:MD:MA:MI:MN:MS:MO:MT:NE:NV:NH:NJ:NM:NY:NC:ND:OH:OK:OR:PA:RI:SC:SD:TN:TX:UT:VT:VA:WA:WV:WI:WY", ShippingState)), LEN(ShippingState) <> 2, NOT(OR(ShippingCountry ="US",ShippingCountry ="USA",ShippingCountry ="United States", ISBLANK(ShippingCountry))))

ValidationForType

ISCHANGED(Name) && (OR(ISPICKVAL(Type, 'Customer - Direct'), ISPICKVAL(Type, 'Customer - Channel')))

Step 4: Create Robot Setup Object

Formula Used:

Day of the week:-

CASE(weekday(Date__c), 1,"Sunday", 2,"Monday", 3,"Tuesday", 4,"Wednesday", 5,"Thusday", 6,"Friday", 7,"Saturday", Text(weekday(Date__c)))

Step 5: Create Sale Process and Validate Oppurtunities

Create Sales Process and Validate Opportunities
Create a sales process with the required stages and name it RB Robotics Sales Process. Create a record type named RB Robotics Process RT. Add a field to the opportunity page layout as described in the business requirements and create the appropriate validation rule for high-value opportunities.

Formula Used:

ValidationForHighValue

Validation: AND(ISPICKVAL(StageName , "Closed Won") , Amount>100000, Approved__c =FALSE)

Step 6: Automate Oppurtunities

Following the business requirements, create a process to alert the finance group and create tasks for account owners at appropriate times during the sales process. (Note: for the purpose of this superbadge, pretend “Integration User” is the finance group.) Make sure that your processes schedule robot setup dates and submit opportunities for approval.

For the purpose of approvals, assign Nushi Davoud as your manager and make sure your approval process automatically sends requests to the opportunity owner's manager. Notify the opportunity owner when an opportunity is approved or rejected.

Use the Finance: Account Creation, SALES: Opportunity Needs Approval, and Sales: Opportunity Approval Status Email templates included in the unmanaged package for your processes.

Step 7: Create Flow for Opportunities

Create Flow for Opportunities
Create a flow and distribute that flow with a Flow component in the Lightning page described in the business requirements. Name the flow Product Quick Search.

Note: If your org doesn't have products with RainbowBot, CloudyBot, and Assembly System in the product name, check that you created a new Trailhead Playground for this superbadge, per the pre-work requirements.

Step 8: Automate Setups

Automate Setups We need to make sure that any robot setup date that would fall on Saturday or Sunday is set to the following Monday instead.

Formula Used:

CASE(MOD([Opportunity].CloseDate + 180 - DATE(1900, 1, 7),7), 0, [Opportunity].CloseDate + 181, 6, [Opportunity].CloseDate + 182, [Opportunity].CloseDate + 180)

Apex Trigger 1st sub-module

```
trigger AccountAddressTrigger on Account (before insert,before update) {        List<Account> acclist = new List<Account>();     for(Account a : trigger.new){        if((a.Match_Billing_Address__c ==true)&&(account.BillingPostalCode != NULL))          a.ShippingPostalCode = a.BillingPostalCode;      }
}
```

Apex Trigger 2nd sub-module

```
trigger ClosedOpportunityTrigger on Opportunity (after insert, after update) {


   List<Task> taskList = new List<Task>();


   for(Opportunity opp : Trigger.new) {


                if(Trigger.isInsert) {
                        if(Opp.StageName == 'Closed Won') {
                                taskList.add(new Task(Subject = 'Follow Up Test Task', WhatId = opp.Id));
                        }
                }


                if(Trigger.isUpdate) {
                        if(Opp.StageName == 'Closed Won'
                        && 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 1st sub-module

```
@isTest
public class TestVerifyDate {

    @isTest static void test1(){
        Date d = VerifyDate.CheckDates(Date.parse('01/01/2020'),Date.parse('01/03/2020'));
       System.assertEquals(Date.parse('01/03/2020'), d);
    }

    @isTest static void test2(){
        Date d = VerifyDate.CheckDates(Date.parse('01/01/2020'),Date.parse('03/03/2020'));
       System.assertEquals(Date.parse('01/31/2020'), d);
    }
}
```

Apex Testing 2nd sub-module

```
@isTest
public class TestRestrictContactByName {

    @isTest
    public static void testContact(){
        Contact ct = new Contact();
        ct.LastName = 'INVALIDNAME';
        Database.SaveResult res = Database.insert(ct,false);
```

```
      System.assertEquals('The Last Name "INVALIDNAME" is not allowed for
DML',res.getErrors()[0].getMessage());
   }
}
```

Apex Testing 3rd sub-module

```
public class RandomContactFactory {

   public static List<Contact> generateRandomContacts(Integer num, String lastName){
      List<Contact> contactList = new List<Contact>();
      for(Integer i = 1; i<=num; i++){
         Contact ct = new Contact(FirstName = 'Test '+i, LastName =lastName);
         contactList.add(ct);
      }
      return contactList;
   }
}
```

Asynchronous Apex 1st sub-module

Accountprocessor :-

```
public class AccountProcessor {

   @future
   public static void countContacts(List<Id> accountIds){

      List<Account> accList = [Select Id, Number_Of_Contacts__c, (Select Id from Contacts) from Account
where Id in :accountIds];
      For(Account acc : accList){
```

```
            acc.Number_Of_Contacts__c = acc.Contacts.size();
        }
        update accList;
    }
}
```

Accountprocessor test :-

```
@isTest
public class AccountProcessorTest {
    public static testmethod void testAccountProcessor(){

        Account a = new Account();
        a.Name = 'Test Account';
        insert a;

        Contact con = new Contact();
        con.FirstName = 'Lakhan';
        con.LastName = 'Mukhija';
        con.AccountId = a.Id;

        insert con;

        List<Id> accListId = new List<Id>();
        accListId.add(a.Id);

        Test.startTest();
        AccountProcessor.countContacts(accListId);
        Test.stopTest();
```

```
        Account acc = [Select Number_of_Contacts__c from Account where Id =: a.Id];
        System.assertEquals(Integer.valueof(acc.Number_of_Contacts__c),1);
    }
}
```

Asynchronous Apex 2nd sub-module

LeadProcessor :-

```
public class LeadProcessor implements Database.Batchable<sObject> {

     public Database.QueryLocator start(Database.BatchableContext bc) {
        // collect the batches of records or objects to be passed to execute
         return Database.getQueryLocator([Select LeadSource From Lead ]);
    }
    public void execute(Database.BatchableContext bc, List<Lead> leads){
         // process each batch of records
            for (Lead Lead : leads) {
                lead.LeadSource = 'Dreamforce';
            }
        update leads;
    }
    public void finish(Database.BatchableContext bc){
      }

}
```

LeadProcessorTest :-

```
@isTest
public class LeadProcessorTest {

        @testSetup
```

```
    static void setup() {
        List<Lead> leads = new List<Lead>();
        for(Integer counter=0 ;counter <200;counter++){
            Lead lead = new Lead();
            lead.FirstName ='FirstName';
            lead.LastName ='LastName'+counter;
            lead.Company ='demo'+counter;
            leads.add(lead);
        }
        insert leads;
    }

    @isTest static void test() {
        Test.startTest();
        LeadProcessor leadProcessor = new LeadProcessor();
        Id batchId = Database.executeBatch(leadProcessor);
        Test.stopTest();
    }
}
```

Asynchronous Apex 3rd sub-module

AddPrimaryContact :-

```
public class AddPrimaryContact implements Queueable
{
    private Contact c;
    private String state;
    public  AddPrimaryContact(Contact c, String state)
    {
        this.c = c;
```

```
        this.state = state;
    }
    public void execute(QueueableContext context)
    {
        List<Account> ListAccount = [SELECT ID, Name ,(Select id,FirstName,LastName from contacts )
FROM ACCOUNT WHERE BillingState = :state LIMIT 200];
        List<Contact> lstContact = new List<Contact>();
        for (Account acc:ListAccount)
        {
            Contact cont = c.clone(false,false,false,false);
            cont.AccountId =  acc.id;
            lstContact.add( cont );
        }

        if(lstContact.size() >0 )
        {
           insert lstContact;
        }

    }

}
```

AddPrimaryContactTest :-

```
@isTest
public class AddPrimaryContactTest
{
    @isTest static void TestList()
    {
        List<Account> Teste = new List <Account>();
```

```
        for(Integer i=0;i<50;i++)
        {
            Teste.add(new Account(BillingState = 'CA', name = 'Test'+i));
        }
        for(Integer j=0;j<50;j++)
        {
            Teste.add(new Account(BillingState = 'NY', name = 'Test'+j));
        }
        insert Teste;

        Contact co = new Contact();
        co.FirstName='demo';
        co.LastName ='demo';
        insert co;
        String state = 'CA';

         AddPrimaryContact apc = new AddPrimaryContact(co, state);
         Test.startTest();
           System.enqueueJob(apc);
         Test.stopTest();
    }
}
```

Asynchronous Apex 4th sub-module

DailyLeadProcessor :-

```
public class DailyLeadProcessor implements Schedulable  {
   Public void execute(SchedulableContext SC){
      List<Lead> LeadObj=[SELECT Id from Lead where LeadSource=null limit 200];
       for(Lead l:LeadObj){
```

```
            l.LeadSource='Dreamforce';
            update l;
        }
    }
}
```

DailyLeadProcessorTest :-

```
@isTest
private class DailyLeadProcessorTest {
        static testMethod void testDailyLeadProcessor() {
                String CRON_EXP = '0 0 1 * * ?';
                List<Lead> lList = new List<Lead>();
            for (Integer i = 0; i < 200; i++) {
                        lList.add(new Lead(LastName='Dreamforce'+i, Company='Test1 Inc.', Status='Open - Not Contacted'));
                }
                insert lList;

                Test.startTest();
                String jobId = System.schedule('DailyLeadProcessor', CRON_EXP, new DailyLeadProcessor());
        }
}
```

Apex Integration Services 2nd sub-module

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 :-

```
@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 {
     // Implement this interface method
    global HTTPResponse respond(HTTPRequest request) {
        // Create a fake response
        HttpResponse response = new HttpResponse();
        response.setHeader('Content-Type', 'application/json');
        response.setBody('{"animals": ["majestic badger", "fluffy bunny", "scary bear", "chicken", "mighty
```

```
moose"]}');
        response.setStatusCode(200);
        return response;
    }
}
```

Apex Integration Services 3rd sub-module

ParkLocator :-

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

ParkLocatorTest :-

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

ParkLocatorMock :-

```
@isTest
global class ParkServiceMock implements WebServiceMock {
   global void doInvoke(
```

```
        Object stub,
        Object request,
        Map<String, Object> response,
        String endpoint,
        String soapAction,
        String requestName,
        String responseNS,
        String responseName,
        String responseType) {
      // start - specify the response you want to send
      ParkService.byCountryResponse response_x = new ParkService.byCountryResponse();
      response_x.return_x = new List<String>{'Yellowstone', 'Mackinac National Park', 'Yosemite'};
      // end
      response.put('response_x', response_x);
  }
}
```

Apex Integration Services 4th sub-module

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 :-

```
@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;
    }
}
```