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SALESFORCE DEVELOPER CATALYST

Apex Specialist Super Badge:

Automated Record Creation:

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);
    }
}
```

Synchronize Salesforce data with an external system

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();
}

}
```

Schedule synchronization using Apex code

WarehouseSyncShedule.apxc :

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

Test automation logic

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);


    }
}
```

Test callout logic

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":"Generat
or 1000 kW","maintenanceperiod":365,"lifespan":120,"cost":5000,"sku":"100003"}]');
        response.setStatusCode(200);
        return response;
    }
}
```

Test scheduling logic

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    ');
```

Apex Triggers

Get Started with Apex Triggers

AccountAddressTrigger

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

Bulk Apex Triggers

ClosedOpportunityTrigger

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


    List<Opportunity> relatedOpps = [SELECT Id,OwnerId,StageName FROM Opportunity  WHERE id in
```

```
:Trigger.New];

    List<Task> tasks = new List<Task>();
    for(Opportunity opp : relatedOpps)


     {
        if(opp.StageName == 'Closed Won')
         {
            Task tsk = new Task(whatID = Opp.ID, Ownerid = Opp.OwnerId, Subject='Follow Up Test Task');
tasks.add(tsk);

         }
        }
  insert tasks;


}
```

Apex Testing

Get Started with Apex Unit Tests

VerifyDate

```
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;


    }


}
```

TestVerifyDate

```
@isTest
class TestVerifyDate {

   static testMethod void TestVerifyDate() {
     VerifyDate.CheckDates(System.today(),System.today()+10);
      VerifyDate.CheckDates(System.today(),System.today()+78);
   }
}
```

Test Apex Triggers

RestrictContactByName

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

    //check contacts prior to insert or update for invalid data
    For (Contact c : Trigger.New) {
        if(c.LastName == 'INVALIDNAME') {    //invalidname is invalid
            c.AddError('The Last Name "'+c.LastName+'" is not allowed for DML');
        }
```

```
        }


}
```

TestRestrictContactByName

```
@istest
private class TestRestrictContactByName {
   @istest static void testname(){
      contact c = new contact(firstname='Satya',lastname='INVALIDNAME');
      test.startTest();
      database.SaveResult result = database.insert(c,false);
      test.stopTest();
      system.assertEquals('The Last Name "INVALIDNAME" is not allowed for DML',
result.getErrors()[0].getMessage());
   }
}
```

Create Test Data for Apex Tests

RandomContactFactory

```
public class RandomContactFactory {

  Public Static List<Contact> generateRandomContacts(integer noOfContact, String lastName)
  {
     List<Contact> con=New list<Contact>();
     for(Integer i=0;i<noOfContact;i++)
     {
        Contact c = new Contact(FirstName='Ank' + i,LastName=lastName);
        Con.add(c);
      }



     // insert con;
```

```
    Return con;
  }


}
```

Asynchronous Apex

Use Future Methods

AccountProcessor:

```
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();
     system.debug(' acc.Number_of_Contacts___c ');
   }
   update lstAccount;
 }
}
```

AccountProcessorTest

```
@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];
        System.assertEquals ( Integer.valueOf(ACC.Number_of_Contacts___c) ,1);
    }

}
```

Use Batch Apex

LeadProcessor

```
public class LeadProcessor  implements
    Database.Batchable<sObject>,   Database.Stateful   {
    // instance member to retain state across transactions
    public Integer recordsProcessed = 0;
    public Database.QueryLocator start(Database.BatchableContext bc) {
        return Database.getQueryLocator('SELECT ID, LeadSource from Lead');
    }
public void execute(Database.BatchableContext bc, List<Lead> scope){
        // process each batch of records
      //   List<Lead> lList = new List<Lead>();
        for (Lead lList : scope) {
              lList.leadsource='Dreamforce';
```

```
            }


    update scope;
  }
  public void finish(Database.BatchableContext bc){

  }
}
```

LeadProcessorTest

```
@isTest
public class LeadProcessorTest {
@testSetup
  static void setup() {
    List<Lead> llist = new List<Lead>();
      // insert 10 accounts
    for (Integer i=0;i<200;i++) {
      llist.add(new Lead(FirstName='Lead '+i,LastName='last', Company ='demo'+i));
    }
    insert llist;
    // find the account just inserted. add contact for each

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

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();
     }
}
```

Schedule Jobs Using the Apex Scheduler

DailyLeadProcessor

```
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;
        }
    }
}
```

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

Apex REST Callouts

AnimalLocator

```
public with sharing class AnimalLocator {

    public static String getAnimalNameById(Integer animalNameId) {
        String animalName = '';
        //New Http 'GET' Request
        Http http = new Http();
        HttpRequest request = new HttpRequest();
        request.setEndpoint('https://th-apex-http-callout.herokuapp.com/animals/:id');
        request.setHeader('Content-Type', 'application/json;charset=UTF-8');
        request.setMethod('GET');
```

```
        //Get response
        HttpResponse response = Http.send(request);
        //Parse JSON from the response body
        JSONParser parser = JSON.createParser(response.getBody());
        while (parser.nextToken() != null) {
          // Read entire JSON object
          if (parser.getCurrentToken() == JSONToken.START_OBJECT) {
            AnimalLocator.AnimalList animalList = (AnimalLocator.AnimalList)
parser.readValueAs(AnimalLocator.AnimalList.class);
            System.debug(animalList.animal.size());
            //Sort through the list of animals to find one with the matching ID
            //Set the animal name
            for (Integer i = 0; i < animalList.animal.size() ; i++) {
              if (animalList.animal[i].id == animalNameId){
                animalName = animalList.animal[i].name;
                break;
              } else{
                animalName = 'Could not find an Animal with a matching ID';
              }
            }


          }
        }
        return animalName;
    }


    public class AnimalList {
        public List<animal> animal; //This has to be the same name thats in the JSON file.
    }


    //animal Object Wrapper
    public class animal {
        public Integer id;
        public String name;
        public String eats;
        public String says;
    }


}
```

AnimalLocatorTest

```
@isTest
public with sharing class AnimalLocatorTest {
    @isTest
    static void testGetCallout() {
        Test.setMock(HttpCalloutMock.class, new AnimalLocatorMock());
        String result = AnimalLocator.getAnimalNameById(1);
        String expectedResult = 'Chicken';
        System.assertEquals(result,expectedResult);
        result = AnimalLocator.getAnimalNameById(4);
        expectedResult = 'Could not find an Animal with a matching ID';
        System.assertEquals(result,expectedResult);
    }
}
```

AnimalLocatorMock

```
@isTest
global class AnimalLocatorMock implements HttpCalloutMock{
    global HttpResponse respond(HttpRequest request){
        //Create Fake Response
        HttpResponse response = new HttpResponse();
        response.setHeader('Content-Type', 'application/json;charset=UTF-8');
        response.setStatusCode(200);
        response.setBody('
{"animal":[{"id":1,"name":"Chicken","eats":"Grain","says":"Cluck"},{"id":2,"name":"Dog","eats":"Chicken","says":" Woof"}]}
');
        return response;
    }
}
```

Apex SOAP Callouts

ParkLocator

```
public class ParkLocator {
    public static string[] country(String country) {
        parkService.parksImplPort park = new parkService.parksImplPort();
        return park.byCountry(country);
    }
}
```

ParkLocatorTest

```
@isTest
```

```
private class ParkLocatorTest {
   @isTest static void testCallout() {
      // This causes a fake response to be generated
      Test.setMock(WebServiceMock.class, new ParkServiceMock());


      // Call the method that invokes a callout
      //Double x = 1.0;
      //Double result = AwesomeCalculator.add(x, y);

      String country = 'Germany';
      String[] result = ParkLocator.Country(country);



      // Verify that a fake result is returned
      System.assertEquals(new List<String>{'Hamburg Wadden Sea National Park', 'Hainich National Park', 'Bavarian Forest National Park'}, result);
   }
}
```

ParkServiceMock

```
@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>{'Hamburg Wadden Sea National Park', 'Hainich National Park', 'Bavarian Forest National Park'};


       //calculatorServices.doAddResponse response_x = new calculatorServices.doAddResponse();
      //response_x.return_x = 3.0;
      // end
      response.put('response_x', response_x);
   }
}
```

Apex Web Services

AccountManager

```
@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];


  }


}
```

AccountManagerTest

```
@istest
public class AccountManagerTest {
@istest static void testGetContactsByAccountId() {Id
recordId = createTestRecord();
// Set up a test request
RestRequest request = new RestRequest();
request.requestUri =
'https://yourInstance.salesforce.com/services/apexrest/Accounts/'+ recordId+'/Contacts'; request.httpMethod
= 'GET';
RestContext.request = request;


Account thisAccount = AccountManager.getAccount();
System.assert(thisAccount!= null); System.assertEquals('Test
record', thisAccount.Name);
}
```

```
// Helper method
static Id createTestRecord() {


// Create test record
Account accountTest = new Account(Name='Test
record');
insert accountTest;
Contact contactTest = new Contact(FirstName='John',
LastName='Doe',
AccountId=accountTest.Id
);
return accountTest.Id;
}
}
```