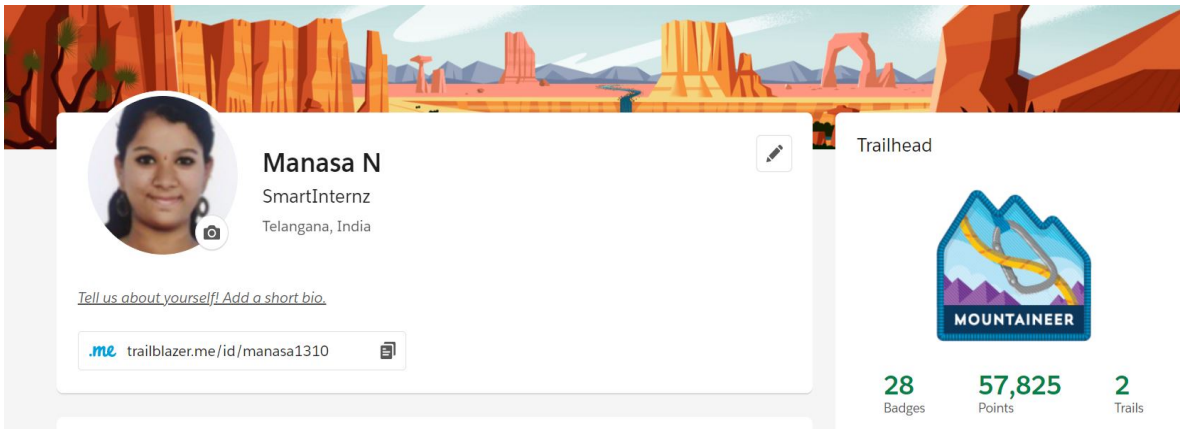



## 1.Get Started with Apex Triggers

Create an Apex trigger
Create an Apex trigger that sets an account's Shipping Postal Code to match the Billing Postal Code if the Match Billing Address option is selected. Fire the trigger before inserting an account or updating an account.

Pre-Work:

Add a checkbox field to the Account object:

- Field Label: Match Billing Address
- Field Name: Match_Billing_Address

Note: The resulting API Name should be Match_Billing_Address__c.

- Create an Apex trigger:
  - Name: AccountAddressTrigger
  - Object: Account
  - Events: before insert and before update
  - Condition: Match Billing Address is true
  - Operation: set the Shipping Postal Code to match the Billing Postal Code

AccountAddressTrigger:

```
trigger AccountAddressTrigger on Account (before insert, before update) {
    for(Account account:Trigger.New){
        if(account.Match_Billing_Address__c == True){
            account.ShippingPostalCode = account.BillingPostalCode;
```

## 2.Bulk Apex Triggers

Create a Bulk Apex trigger
Create a bulkified Apex trigger that adds a follow-up task to an opportunity if its stage is Closed Won. Fire the Apex trigger after inserting or updating an opportunity.

- Create an Apex trigger:
- Name: ClosedOpportunityTrigger
- Object: Opportunity
- Events: after insert and after update
- Condition: Stage is Closed Won
- Operation: Create a task:

■ Subject: Follow Up Test Task
■ WhatId: the opportunity ID (associates the task with the opportunity)
- Bulkify the Apex trigger so that it can insert or update 200 or more opportunities
-

ClosedOpportunityTrigger:

```
trigger ClosedOpportunityTrigger on Opportunity (after insert, after update) {
    List<Task> taskList = new List<Task>();
     for(Opportunity opp : Trigger.new) {

    //Only create Follow Up Task only once when Opp StageName is to 'Closed Won' on Create
    if(Trigger.isInsert) {
      if(Opp.StageName == 'Closed Won') {
        taskList.add(new Task(Subject = 'Follow Up Test Task', WhatId = opp.Id));
      }
    }

    //Only create Follow Up Task only once when Opp StageName changed to 'Closed Won' on
Update
    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

## 1.Get Started with Apex Unit Tests

YOUR CHALLENGE
Create a Unit Test for a Simple Apex Class
Create and install a simple Apex class to test if a date is within a proper range, and if not, returns a date that occurs at the end of the month within the range. You'll copy the code for the class from GitHub. Then write unit tests that achieve 100% code coverage.

- Create an Apex class:
  - Name: VerifyDate
  - Code: Copy from GitHub
- Place the unit tests in a separate test class:
  - Name: TestVerifyDate
  - Goal: 100% code coverage
- Run your test class at least once

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
  @TestVisible 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
 @TestVisible private static Date SetEndOfMonthDate(Date date1) {
  Integer totalDays = Date.daysInMonth(date1.year(), date1.month());
  Date lastDay = Date.newInstance(date1.year(), date1.month(), totalDays);
  return lastDay;
 }
}
```

TestVerifyDate:

```
@isTest
private class TestVerifyDate {
   @isTest static void Test_CheckDates_casel(){
      Date D = VerifyDate.CheckDates(date.parse('01/01/2020'),date.parse('01/05/2020'));
      System.assertEquals(date.parse('01/05/2020'),D);
   }
    @isTest static void Test_CheckDates_case2(){
      Date D = VerifyDate.CheckDates(date.parse('01/01/2020'),date.parse('05/05/2020'));
      System.assertEquals(date.parse('01/31/2020'),D);
   }
   @isTest static void Test_DateWithin30Days_case1(){
      Boolean flag =
VerifyDate.DateWithin30Days(date.parse('01/01/2020'),date.parse('12/30/2019'));
      System.assertEquals(false, flag);
   }
    @isTest static void Test_DateWithin30Days_case2(){
      Boolean flag =
VerifyDate.DateWithin30Days(date.parse('01/01/2020'),date.parse('02/02/2019'));
      System.assertEquals(false, flag);
   }
    @isTest static void Test_DateWithin30Days_case3(){
      Boolean flag =
VerifyDate.DateWithin30Days(date.parse('01/01/2020'),date.parse('01/15/2020'));
      System.assertEquals(true, flag);
   }
   @isTest static void Test_SetEndOfMonthDate(){
      Date returndate = VerifyDate.SetEndOfMonthDate(date.parse('01/01/2020'));
   }

}
```

## 2.Test Apex Triggers

Create a Unit Test for a Simple Apex Trigger
Create and install a simple Apex trigger which blocks inserts and updates to any contact with a last name of 'INVALIDNAME'. You'll copy the code for the class from GitHub. Then write unit tests that achieve 100% code coverage.

- Create an Apex trigger on the Contact object
  - Name: RestrictContactByName
  - Code: Copy from GitHub
- Place the unit tests in a separate test class
  - Name: TestRestrictContactByName
  - Goal: 100% test coverage
- Run your test class at least once

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
public class TestRestrictContactByName {
   @isTest static void Test_insertupdateContact(){
      Contact cnt = new Contact();
      cnt.LastName = 'INVALIDNAME';

      Test.startTest();
```

```
        Database.SaveResult result = Database.insert(cnt, false);
        Test.stopTest();

        System.assert(!result.isSuccess());
        System.assert(result.getErrors().size()>0);
         System.assertEquals('The Last Name "INVALIDNAME" is not allowed for
DML',result.getErrors()[0].getMessage());
    }}
```

## 3.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: the number of contacts to generate and the last name. Do not insert the generated contact records into the database.
NOTE: For the purposes of verifying this hands-on challenge, don't specify the @isTest annotation for either the class or the method, even though it's usually required.

● Create an Apex class in the public scope
○ Name: RandomContactFactory (without the @isTest annotation)
● Use a Public Static Method to consistently generate contacts with unique first names based on the iterated number in the format Test 1, Test 2 and so on.
○ Method Name: generateRandomContacts (without the @isTest annotation)
○ Parameter 1: An integer that controls the number of contacts being generated with unique first names
○ Parameter 2: A string containing the last name of the contacts
○ Return Type: List < Contact >

RandomContactFactory:

```
public class RandomContactFactory {

    public static List<Contact> generateRandomContacts(Integer numcnt, string lastname){
        List<Contact> contacts=new List<Contact>();
        for(Integer i=0;i<numcnt;i++){
            Contact cnt = new Contact(FirstName = 'Test '+i, lastName = lastname);
            contacts.add(cnt);
        }
```

```
        return contacts;
    }
}
```

## ASYNCHRONOUS APEX:

## 1.Use Future Methods

Create an Apex class that uses the @future annotation to update Account records. Create an Apex class with a future method 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. Every hands-on challenge in this module asks you to create a test class.

- Create a field on the Account object:
  - Label: Number Of Contacts
  - Name: Number_Of_Contacts
  - Type: Number
  - This field will hold the total number of Contacts for the Account
- Create an Apex class:
  - Name: AccountProcessor
  - Method name: countContacts
  - The method must accept a List of Account IDs
  - The method must use the @future annotation
  - The method counts the number of Contact records associated to each Account ID passed to the method and updates the 'Number_Of_Contacts__c' field with this value
- Create an Apex test class:
  - Name: AccountProcessorTest
  - The unit tests must cover all lines of code included in the AccountProcessor class, resulting in 100% code coverage.
- Before verifying this challenge, run your test class at least once using the Developer Console Run All feature

AccountProcessor:

```
public class AccountProcessor {
   @future
   public static void countContacts(List<Id> accountIds){
      List<Account> accountsToUpadte = new List<Account>();

      List<Account> accounts = [Select Id, Name, (Select Id from Contacts)from Account Where
Id in :accountIds];

      For(Account acc:accounts){
         List<Contact> contactList = acc.Contacts;
         acc.Number_Of_Contacts__c = contactList.size();
         accountsToUpadte.add(acc);

      }
      update accountsToUpadte;
   }
}
```

AccountProcessorTest:

```
@isTest
private class AccountProcessorTest {
   @isTest
   private static void testCountContacts(){
      Account newAccount = new Account(Name='Test Account');
      insert newAccount;
      Contact newContact1 = new Contact(FirstName='John',LastName='Doe',AccountId =
newAccount.Id);
      insert newContact1;
      Contact newContact2 = new Contact(FirstName='Jane',LastName='Doe',AccountId =
newAccount.Id);
      insert newContact2;

      List<Id>accountIds = new List<Id>();
      accountIds.add(newAccount.Id);

      Test.startTest();
      AccountProcessor.countContacts(accountIds);
```

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

## 2.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.

- Create an Apex class:
  - Name: LeadProcessor
  - Interface: Database.Batchable
  - 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:
  - Name: 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
- Before verifying this challenge, run your test class at least once using the

Developer Console Run All feature

LeadProcessor:

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


    public Database.QueryLocator start(Database.BatchableContext bc) {
        return Database.getQueryLocator(
            'SELECT ID from Lead'
        );
    }
    public void execute(Database.BatchableContext bc, List<Lead> scope){
        // process each batch of records
       List<Lead> leads = new List<Lead>();
```

```
      for (Lead lead : scope) {
         lead.LeadSource = 'Dreamforce';
         leads.add(lead);

      }

   }
   public void finish(Database.BatchableContext bc){

   }
}
```

LeadProcessorTest:

```
@isTest
private class LeadProcessorTest {
   @testSetup
   static void setup() {
      List<Lead> leads = new List<Lead>();

      // insert 10 accounts
      for (Integer i=0;i<200;i++) {
         leads.add(new Lead(Lastname='Lead '+i,Company = 'Test Co'));
       }
      insert leads;
   }
   static testmethod void test() {
      Test.startTest();

      LeadProcessor myLeads = new LeadProcessor();
      Id batchId = Database.executeBatch(myLeads);
      Test.stopTest();
      // after the testing stops, assert records were updated properly
      System.assertEquals(200, [select count() from Lead where LeadSource = 'Dreamforce']);
   }
}
```

## 3.Control Processes with Queueable Apex

Create a 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.
● Create an Apex class:
○ Name: AddPrimaryContact
○ Interface: Queueable
○ 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:
○ Name: 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
● Before verifying this challenge, run your test class at least once using the Developer Console Run All feature

AddPrimaryContact:

```
public class AddPrimaryContact implements Queueable {

   private Contact con;
   private String state;

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



   public void execute(QueueableContext context){
    List<Account> accounts = [Select Id, Name, (Select FirstName, LastName, Id from contacts)
                        from Account where BillingState =:state Limit 200];
   List<Contact> primaryContacts = new List<Contact>();
```

```
      for (Account acc : accounts) {
        Contact c = con.clone();
          c.AccountId = acc.Id;
          primaryContacts.add(c);

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

   }
}
```

AddPrimaryContactTest:

```
@isTest
public class AddPrimaryContactTest {

   static testmethod void testQueueable() {
      List<Account> testAccounts = new List<Account>();
      for (Integer i = 0; i < 50; i++) {
          testaccounts.add(new Account(Name='Account'+i,BillingState='CA'));
          }
       for (Integer j = 0; j < 50; j++) {
        testaccounts.add(new Account(Name='Account'+j,BillingState='NY'));
          }
      insert testAccounts;

      Contact testContact = new Contact(FirstName ='John', LastName = 'Doe');
      insert testContact;

      AddPrimaryContact addit = new addPrimaryContact(testContact, 'CA');


      Test.startTest();
      System.enqueueJob(addit);
      Test.stopTest();
      // Validate the job ran. Check if record have correct parentId now
       System.assertEquals(50, [select count() from Contact where accountId in (Select Id from
Account where BillingState =
```

```
'CA')]);
    }
}
```

## 4.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. (This is very similar to what you did for Batch Apex.)

- Create an Apex class:
  - Name: DailyLeadProcessor
  - Interface: Schedulable
  - The execute method must find the first 200 Lead records with a blank LeadSource field and update them with the LeadSource value of Dreamforce
- Create an Apex test class:
  - Name: 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.
- Before verifying this challenge, run your test class at least once using the Developer Console Run All feature

DailyLeadProcessor:

```
public without sharing class DailyLeadProcessor implements Schedulable{
    public void execute(SchedulableContext ctx) {


        List<Lead> leads = [SELECT Id,LeadSource
            FROM Lead
            WHERE LeadSource = NULL Limit 200
            ];
        for(Lead l:leads){
            l.LeadSource = 'Dreamforce';
```

```
    }
    update leads;
  }
}
```

DailyLeadProcessorTest:

```
@isTest
public class DailyLeadProcessorTest {

  public static String CRON_EXP = '0 0 0 ? * * *';
  @isTest
  private static void testSchedulableClass() {
    // Create some out of date Opportunity records
    List<Lead> leads = new List<Lead>();

    for (Integer i=0; i<500; i++) {
      if(i < 250){
        leads.add(new Lead(LastName='Connock',Company='Salesforce'));
          }else{
       leads.add(new Lead(LastName='Connock',Company='Salesforce',LeadSource='Other'));
    }
    }
    insert leads;

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


    Test.stopTest();
    // Now that the scheduled job has executed,
    // check that our tasks were created
    List<Lead> updateLeads = [SELECT Id, LeadSource
      FROM Lead
      WHERE LeadSource = 'Dreamforce'];
```

```
      System.assertEquals(200 , UpdateLeads.size(),'ERROR:At least 1 record not updated
correctly');
         List<CronTrigger> cts = [Select Id , TimesTriggered ,NextFireTime FROM CronTrigger
WHERE Id =:jobId];
         System.debug('Next Fire Time' + cts[0].NextFireTime);
   }
 }
```

## APEX INTEGRATION SERVICES:

### 1.Apex REST Callouts

Create an Apex class that calls a REST endpoint and write a test class.
Create an Apex class that calls a REST endpoint to return the name of an animal, write unit tests that achieve 100% code coverage for the class using a mock response, and run your Apex tests.
Prework: Be sure the Remote Sites from the first unit are set up.

- Create an Apex class:
  - Name: AnimalLocator
  - Method name: getAnimalNameById
  - The method must accept an Integer and return a String.
  - The method must call https://th-apex-http-callout.herokuapp.com/animals/<id>, replacing <id> with the ID passed into the method
  - The method returns the value of the name property (i.e., the animal name)
- Create a test class:
  - Name: AnimalLocatorTest
  - The test class uses a mock class called AnimalLocatorMock to mock the callout response
- Create unit tests:
  - Unit tests must cover all lines of code included in the AnimalLocator 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

AnimalLocator:

```
public class AnimalLocator {
```

```
  public static String getAnimalNameById(Integer animalId) {
     String animalName;
     Http http = new Http();
     HttpRequest request = new HttpRequest();
     request.setEndpoint('https://th-apex-http-callout.herokuapp.com/animals/'+animalId);
     request.setMethod('GET');
     HttpResponse response = http.send(request);
     if(response.getStatusCode()==200) {
       Map<String, Object> r = (Map<String, Object>)
           JSON.deserializeUntyped(response.getBody());
      Map<String, Object> animal = (Map<String ,Object>)r.get('animal');
      animalName = string.valueOf(animal.get('name'));
     }
     return animalName;
  }
}
```

AnimalLocatorTest:

```
@isTest
public class AnimalLocatorTest {

  @isTest

  static void getAnimalNameByIdTest(){
     Test.setMock(HttpCalloutMock.class, new AnimalLocatorMock());
     String response = AnimalLocator.getAnimalNameById(1);
      System.assertEquals('chicken',response);


  }
}
```

## 2.Apex SOAP Callouts

Generate an Apex class using WSDL2Apex and write a test class.
Generate an Apex class using WSDL2Apex for a SOAP web service, write unit tests

that achieve 100% code coverage for the class using a mock response, and run your Apex tests.

Prework: Be sure the Remote Sites from the first unit are set up.

● Generate a class using this using this WSDL file:
○ Name: ParkService (Tip: After you click the Parse WSDL button, change the Apex class name from parksServices to ParkService)
○ Class must be in public scope
● Create a class:
○ Name: ParkLocator
○ Class must have a country method that uses the ParkService class
○ Method must return an array of available park names for a particular country passed to the web service (such as Germany, India, Japan, and United States)
● Create a test class:
○ Name: ParkLocatorTest
○ Test class uses a mock class called ParkServiceMock to mock the callout response
● Create unit tests:
○Unit tests must cover all lines of code included in the ParkLocator 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.

ParkLocator:

```
public class ParkLocator {
    public static List<String> country(String country){
        ParkService.ParksImplPort parkService=
            new parkService.ParksImplPort();
        return parkservice.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
      String country = 'United States';
      List<String> result = ParkLocator.country(country);
     List<String> parks = new List<string>();
             parks.add('Yosemite');
             parks.add('Yellowstone');
             parks.add('Another Park');
      // Verify that a fake result is returned
       System.assertEquals(parks, 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
      List<String> parks = new List<string>();
             parks.add('Yosemite');
             parks.add('Yellowstone');
             parks.add('Another Park');
       ParkService.byCountryResponse response_x =
          new ParkService.byCountryResponse();
      response_x.return_x = parks;
      // end
       response.put('response_x', response_x);
  }
}
```

## 3.Apex Web Services

Create an Apex REST service that returns an account and its contacts.
Create an Apex REST class that is accessible at
/Accounts/<Account_ID>/contacts. The service will return the account's ID and
name plus the ID and name of all contacts associated with the account. Write unit
tests that achieve 100% code coverage for the class and run your Apex tests.
Prework: Be sure the Remote Sites from the first unit are set up.
● Create an Apex class
○ Name: AccountManager
○ Class must have a method called getAccount
○Method must be annotated with @HttpGet and return an Account
object
○ Method must return the ID and Name for the requested record and all
associated contacts with their ID and Name
● Create unit tests
○ Unit tests must be in a separate Apex class called
AccountManagerTest
○ Unit tests must cover all lines of code included in the
AccountManager 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

AccountManager:

```
@RestResource(urlMapping='/Accounts/*/contacts')
global with sharing class AccountManager {
    @HttpGet
    global static Account getAccount() {
        RestRequest request = RestContext.request;
        // grab the caseId from the end of the URL
        String accountId = request.requestURI.substringBetween('Accounts/','/contacts');



        Account result =  [SELECT Id, Name,(Select Id, Name from Contacts) from Account where
Id=:accountId];
```

```
        return result;
    }
                        }

 AccountManagerTest:

@IsTest
private class AccountManagerTest {
    @isTest static void testGetContactsByAccountId() {
        Id recordId = createTestRecord();
        // Set up a test request
        RestRequest request = new RestRequest();
        request.requestUri =

'https://yourInstance.my.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);
    }
     static Id createTestRecord() {
        // Call the method to test
        Account accountTest = new Account(
          Name ='Test record' );
         insert accountTest;
         Contact contactTest = new Contact(
         FirstName ='John',
         LastName='Doe',
         AccountId = accountTest.Id);
         insert contactTest;
         return accountTest.Id;
        }

 }
```

# APEX SPECIALIST
# SUPERBADGE

CHALLENGE1:QUIZ

CHALLENGE2:Automate Record Creation

MaintenanceRequestHelper:

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


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



                }
            }
        }

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

          for (AggregateResult ar : results){
```

```
        maintenanceCycles.put((Id) ar.get('Maintenance_Request__c'), (Decimal) ar.get('cycle'));
      }

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

           Date_Reported__c = Date.Today()

            );

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

            newCases.add(nc);
        }

        insert newCases;

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

            }
        }
        insert ClonedWPs;
      }
   }
```

```
}
```

MaintenanceRequest:

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

## CHALLENGE 3- Synchronize Salesforce data with an external system

WarehouseCalloutService:

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

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

    @future(callout=true)
    public static void runWarehouseEquipmentSync(){
        System.debug('go into runWarehouseEquipmentSync');
        Http http = new Http();
        HttpRequest request = new HttpRequest();

        request.setEndpoint(WAREHOUSE_URL);
        request.setMethod('GET');
        HttpResponse response = http.send(request);
```

```
        List<Product2> product2List = new List<Product2>();
        System.debug(response.getStatusCode());
        if (response.getStatusCode() == 200){
            List<Object> jsonResponse =
(List<Object>)JSON.deserializeUntyped(response.getBody());
            System.debug(response.getBody());
          //class maps the following fields:
            //warehouse SKU will be external ID for identifying which equipment records to update
within Salesforce
            for (Object jR : jsonResponse){
                Map<String,Object> mapJson = (Map<String,Object>)jR;
                Product2 product2 = new Product2();
                //replacement part (always true),
                product2.Replacement_Part__c = (Boolean) mapJson.get('replacement');
                //cost
                product2.Cost__c = (Integer) mapJson.get('cost');
                //current inventory
                product2.Current_Inventory__c = (Double) mapJson.get('quantity');
                //lifespan
                product2.Lifespan_Months__c = (Integer) mapJson.get('lifespan');
                //maintenance cycle
                product2.Maintenance_Cycle__c = (Integer) mapJson.get('maintenanceperiod');
                        //warehouse SKU
                product2.Warehouse_SKU__c = (String) mapJson.get('sku');

                product2.Name = (String) mapJson.get('name');
                product2.ProductCode = (String) mapJson.get('_id');
                product2List.add(product2);
            }

            if (product2List.size() > 0){
                upsert product2List;



                System.debug('Your equipment was synced with the warehouse one');
            }
        }
    }

    public static void execute (QueueableContext context){
```

```
        System.debug('start runWarehouseEquipmentSync');
        runWarehouseEquipmentSync();
        System.debug('end runWarehouseEquipmentSync');
    }

}
```

## CHALLENGE 4-Schedule synchronization

WarehouseSyncShedule:

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

CHALLENGE 5-Test automation logic

MaintenanceRequestHelperTest:

```
@istest
public with sharing class MaintenanceRequestHelperTest {
    private static final string STATUS_NEW = 'New';
    private static final string WORKING = 'Working';
    private static final string CLOSED = 'Closed';
    private static final string REPAIR = 'Repair';
    private static final string REQUEST_ORIGIN = 'Web';
    private static final string REQUEST_TYPE = 'Routine Maintenance';
    private static final string REQUEST_SUBJECT = 'Testing subject';
    PRIVATE STATIC Vehicle__c createVehicle(){
        Vehicle__c Vehicle = new Vehicle__C(name = 'SuperTruck');
        return Vehicle;
    }
    PRIVATE STATIC Product2 createEq(){
        product2 equipment = new product2(name = 'SuperEquipment',
                                lifespan_months__C = 10,
                                maintenance_cycle__C = 10,
                                replacement_part__c = true);
        return equipment;
```

```
    }
    PRIVATE STATIC Case createMaintenanceRequest(id vehicleId, id equipmentId){
        case cs = new case(Type=REPAIR,



                    Status=STATUS_NEW,
                    Origin=REQUEST_ORIGIN,
                    Subject=REQUEST_SUBJECT,
                    Equipment__c=equipmentId,
                    Vehicle__c=vehicleId);
        return cs;
    }
    PRIVATE STATIC Equipment_Maintenance_Item__c createWorkPart(id equipmentId,id
requestId){
        Equipment_Maintenance_Item__c wp = new
Equipment_Maintenance_Item__c(Equipment__c = equipmentId,
 Maintenance_Request__c = requestId);
        return wp;
 }
    @istest
    private static void testMaintenanceRequestPositive(){
        Vehicle__c vehicle = createVehicle();
        insert vehicle;
        id vehicleId = vehicle.Id;
        Product2 equipment = createEq();
        insert equipment;
        id equipmentId = equipment.Id;
        case somethingToUpdate = createMaintenanceRequest(vehicleId,equipmentId);
        insert somethingToUpdate;
        Equipment_Maintenance_Item__c workP =
createWorkPart(equipmentId,somethingToUpdate.id);
        insert workP;
        test.startTest();
        somethingToUpdate.status = CLOSED;
        update somethingToUpdate;
        test.stopTest();
        Case newReq = [Select id, subject, type, Equipment__c, Date_Reported__c, Vehicle__c,
Date_Due__c
                    from case
                    where status =:STATUS_NEW];
```

```
        Equipment_Maintenance_Item__c workPart = [select id
                                    from Equipment_Maintenance_Item__c
                                    where Maintenance_Request__c =:newReq.Id];
system.assert(workPart != null);
        system.assert(newReq.Subject != null);
        system.assertEquals(newReq.Type, REQUEST_TYPE);
        SYSTEM.assertEquals(newReq.Equipment__c, equipmentId);
        SYSTEM.assertEquals(newReq.Vehicle__c, vehicleId);
        SYSTEM.assertEquals(newReq.Date_Reported__c, system.today());
    }
    @istest
    private static void testMaintenanceRequestNegative(){
        Vehicle__C vehicle = createVehicle();
        insert vehicle;
        id vehicleId = vehicle.Id;
        product2 equipment = createEq();
        insert equipment;
        id equipmentId = equipment.Id;
        case emptyReq = createMaintenanceRequest(vehicleId,equipmentId);
        insert emptyReq;
        Equipment_Maintenance_Item__c workP = createWorkPart(equipmentId, emptyReq.Id);
        insert workP;
        test.startTest();



        emptyReq.Status = WORKING;
        update emptyReq;
        test.stopTest();
        list<case> allRequest = [select id
                            from case];
        Equipment_Maintenance_Item__c workPart = [select id
                                    from Equipment_Maintenance_Item__c
where Maintenance_Request__c = :emptyReq.Id];
        system.assert(workPart != null);
        system.assert(allRequest.size() == 1);
    }
    @istest
    private static void testMaintenanceRequestBulk(){
        list<Vehicle__C> vehicleList = new list<Vehicle__C>();
        list<Product2> equipmentList = new list<Product2>();
```

```
        list<Equipment_Maintenance_Item__c> workPartList = new
list<Equipment_Maintenance_Item__c>();
        list<case> requestList = new list<case>();
        list<id> oldRequestIds = new list<id>();
        for(integer i = 0; i < 300; i++){
          vehicleList.add(createVehicle());
           equipmentList.add(createEq());
        }
        insert vehicleList;
        insert equipmentList;
        for(integer i = 0; i < 300; i++){
           requestList.add(createMaintenanceRequest(vehicleList.get(i).id,
equipmentList.get(i).id));
        }
        insert requestList;
        for(integer i = 0; i < 300; i++){
           workPartList.add(createWorkPart(equipmentList.get(i).id, requestList.get(i).id));
        }
        insert workPartList;
        test.startTest();
        for(case req : requestList){
           req.Status = CLOSED;
           oldRequestIds.add(req.Id);
        }
        update requestList;
        test.stopTest();
        list<case> allRequests = [select id
                                  from case
                                  where status =: STATUS_NEW];
        list<Equipment_Maintenance_Item__c> workParts = [select id
                                                         from Equipment_Maintenance_Item__c
                                                         where Maintenance_Request__c in: oldRequestIds];
        system.assert(allRequests.size() == 300);
    }
}
```

MaintenanceRequestHelper:

```
public with sharing class MaintenanceRequestHelper {
```

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


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



                }
            }
        }

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

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

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

```
                Origin = 'Web',
                Date_Reported__c = Date.Today()

            );

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

            newCases.add(nc);
        }

        insert newCases;

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

            }
        }
        insert ClonedWPs;
      }
   }
}
```

MaintenanceRequest:

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

## CHALLENGE 6-TEST CALLOUT LOGIC

WarehouseCalloutService:

```
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');
  }
}
```

WarehouseCalloutServiceTest:

```
@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);
    }
}
```

WarehouseCalloutServiceMock:

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

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

response.setBody('[{"_id":"55d66226726b611100aaf741","replacement":false,"quantity":5,"name":
"Generator 1000
kW","maintenanceperiod":365,"lifespan":120,"cost":5000,"sku":"100003"},{"_id":"55d66226726b611
100aaf742","replacement
 ":true,"quantity":183,"name":"Cooling
Fan","maintenanceperiod":0,"lifespan":0,"cost":300,"sku":"100004"},{"_id":"55d66226726b611100a
af743","replacement":true,
 "quantity":143,"name":"Fuse 20A","maintenanceperiod":0,"lifespan":0,"cost":22,"sku":"100005"}]');
        response.setStatusCode(200);

        return response;
    }
}
```

WarehouseSyncSchedule:

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

```
}
```

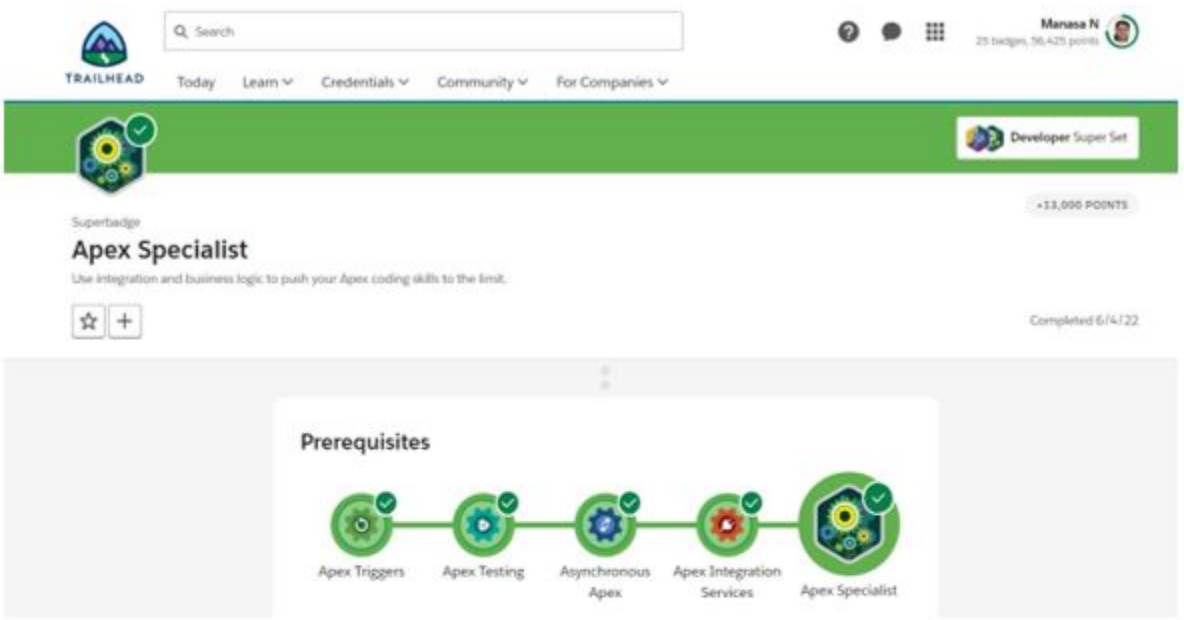
WarehouseSyncScheduleTest:

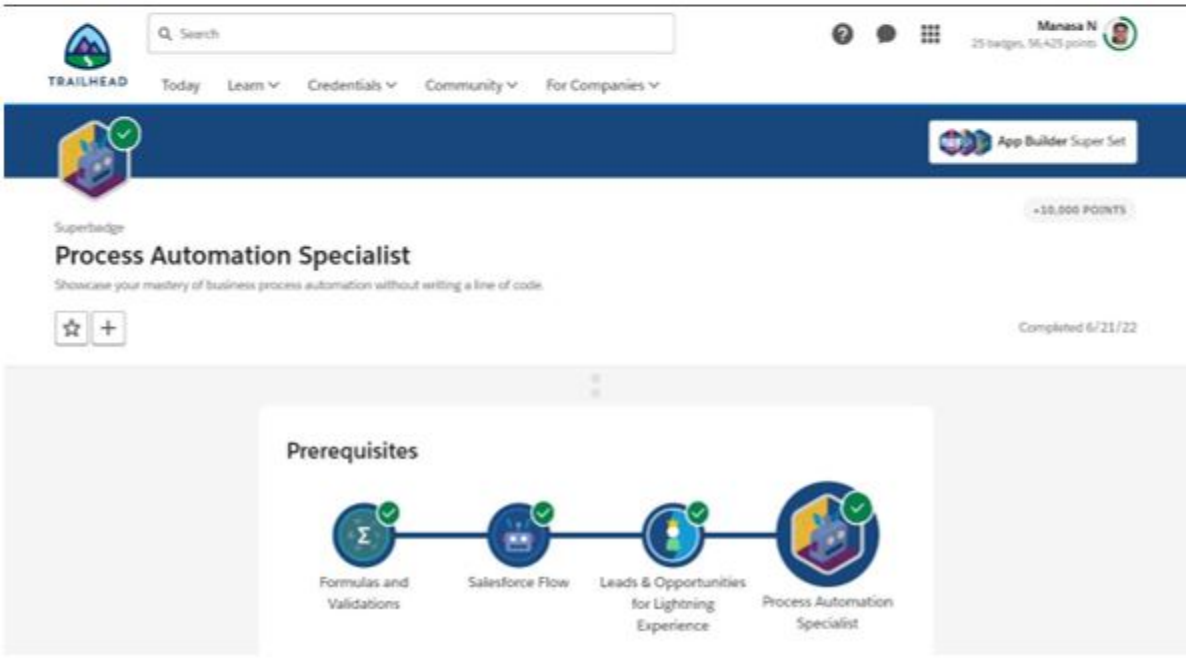
```
@isTest
public with sharing class WarehouseSyncScheduleTest {
    // implement scheduled code here
     //
    @isTest static void test() {
        String scheduleTime = '00 00 00 * * ? *';
        Test.startTest();
        Test.setMock(HttpCalloutMock.class, new WarehouseCalloutServiceMock());
        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();
    }
}
```

WarehouseCalloutServiceMock:

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

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

response.setBody('[{"_id":"55d66226726b611100aaf741","replacement":false,"quantity":5,"name":
"Generator 1000
kW","maintenanceperiod":365,"lifespan":120,"cost":5000,"sku":"100003"},{"_id":"55d66226726b611
100aaf742","replacement
 ":true,"quantity":183,"name":"Cooling
Fan","maintenanceperiod":0,"lifespan":0,"cost":300,"sku":"100004"},{"_id":"55d66226726b611100a
```

```
af743","replacement":true
,"quantity":143,"name":"Fuse 20A","maintenanceperiod":0,"lifespan":0,"cost":22,"sku":"100005"}]');
        response.setStatusCode(200);

        return response

} }
```


TRAILHEAD
Search
Today
Learn
Credentials
Community
For Companies
Manasa N
Developer Super Set
+13,000 POINTS
Superbadge
Apex Specialist
Use integration and business logic to push your Apex coding skills to the limit.
Completed 6/4/22
Prerequisites
Apex Triggers
Apex Testing
Asynchronous Apex
Apex Integration Services
Apex Specialist


TRAILHEAD
Search
Today
Learn
Credentials
Community
For Companies
Manasa N
App Builder Super Set
+10,000 POINTS
Superbadge
Process Automation Specialist
Showcase your mastery of business process automation without writing a line of code.
Completed 6/21/22
Prerequisites
Formulas and Validations
Salesforce Flow
Leads & Opportunities for Lightning Experience
Process Automation Specialist