Apex Triggers:

1) Get Started with Apex Triggers:

challenge:

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:

1. Field Label: Match Billing Address
2. Field Name: Match_Billing_Address

   Note: The resulting API Name should be Match_Billing_Address__c.

1. Create an Apex trigger:
   a. Name: AccountAddressTrigger
   b. Object: **Account**
   c. Events: before insert and before update
   d. Condition: Match Billing Address is true
   e. Operation: set the Shipping Postal Code to match the Billing Postal Code

Code for 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:

challenge:

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.

1. Create an Apex trigger:
    a. Name: ClosedOpportunityTrigger
    b. Object: **Opportunity**
    c. Events: after insert and after update
    d. Condition: Stage is Closed Won
    e. Operation: Create a task:
        i. Subject: Follow Up Test Task
        ii. WhatId: the opportunity ID (associates the task with the opportunity)
    f. Bulkify the Apex trigger so that it can insert or update 200 or more opportunities

Code for ClosedOpportunityTrigger:

```
trigger ClosedOpportunityTrigger on Opportunity (after insert,after update) {
    List<Task> tasklist = new List<Task>();
    for(Opportunity opp: Trigger.New){
        if(opp.Stagename == 'Closed Won'){
            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:

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.

1. Create an Apex class:
    a. Name: VerifyDate
    b. Code: **Copy from GitHub**

2. Place the unit tests in a separate test class:
    a. Name: TestVerifyDate
    b. Goal: 100% code coverage
3. Run your test class at least once

Code for 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;
  }

}
```

Code for TestVerifyDate:

```
@isTest
public class TestVerifyDate {

    static testMethod void testMethod1()
    {
        Date d = VerifyDate.CheckDates(System.today(),System.today()+1);
        Date d1 = VerifyDate.CheckDates(System.today(),System.today()+60);
    }

}
```

2) Test Apex Triggers:

challenge:

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.

1. Create an Apex trigger on the Contact object

a. Name: RestrictContactByName

b. Code: **Copy from GitHub**

2. Place the unit tests in a separate test class

a. Name: TestRestrictContactByName

b. Goal: 100% test coverage

3. Run your test class at least once

Code forRestrictContactByName：

```
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');
   }
 }
}
```

Code for TestRestrictContactByName:

```
@isTest
public class TestRestrictContactByName {
   static testmethod void metodoTest()
   {
       List<Contact> listContact = new List<Contact>();
       Contact c1 = new
Contact(FirstName='Francesco',LastName='Riggo',email='Test@test.com');
       Contact c2 = new Contact(FirstName='Francesco1',LastName =
'INVALIDNAME',email='Test@test.com');
```

```
        listcontact.add(c1);
        listcontact.add(c2);
        Test.startTest();
            try
            {
                insert listcontact;
            }
            catch(Exception ee)
            {
            }
        Test.stopTest();
    }

}
```

3) Create Test Data for Apex Tests:

challenge:

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.

1. Create an Apex class in the public scope

a. Name: RandomContactFactory (without the @isTest annotation)

2. 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.

    a. Method Name: generateRandomContacts (without the @isTest annotation)

    b. Parameter 1: An integer that controls the number of contacts being generated with unique first names

    c. Parameter 2: A string containing the last name of the contacts

    d. Return Type: List < Contact >

Code for RandomContactFactory:

```
//@isTest
public class RandomContactFactory {
   public static List<Contact> generateRandomContacts(Integer
numContactsToGenerate,String FName){
       List<Contact> contactList = new List<Contact>();
       for(Integer i=0;i<numContactsToGenerate;i++){
          Contact c = new Contact(FirstName=FName + ' '+ i, LastName = 'Contact
'+i);
          contactList.add(c);
          System.debug(c);
       }
       System.debug(contactList.size());
       return contactList;
   }


}
```

Asynchronous Apex:

1) Use Future Methods:

challenge:

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.

1. Create a field on the Account object:
    a. Label: Number Of Contacts
    b. Name: Number_Of_Contacts
    c. Type: **Number**
    d. This field will hold the total number of Contacts for the Account
2. Create an Apex class:
    a. Name: AccountProcessor
    b. Method name: countContacts
    c. The method must accept a List of Account IDs
    d. The method must use the @future annotation

e. 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

3. Create an Apex test class:

   a. Name: AccountProcessorTest

   b. The unit tests must cover all lines of code included in the **AccountProcessor** class, resulting in 100% code coverage.

4. Before verifying this challenge, run your test class at least once using the Developer Console Run All feature

Code for AccountProcessor:

```
public class AccountProcessor {
   @future
   public static void countContacts(List<Id> accountIds){
      List<Account> accounts = [Select Id,Name from Account Where Id IN :
accountIds];
      List<Account> updatedAccounts = new  List<Account>();
      for(Account account : accounts){
         account.Number_of_Contacts__c = [Select count() from Contact Where
AccountId =: account.Id];
         System.debug('No Of Contacts ='+ account.Number_of_Contacts__c);
         updatedAccounts.add(account);
      }
      update updatedAccounts;
   }

}
```

Code for AccountProcessorTest:

```
@isTest
public class AccountProcessorTest {
    @isTest
    public static void testNoOfContacts(){
        Account a = new Account();
        a.name = 'Test Account';
        Insert a;
        Contact c = new Contact();
        c.FirstName = 'Bob';
        c.LastName = 'Willie';
        c.AccountId = a.Id;
        Contact c2 = new Contact();
        c2.FirstName = 'Tom';
        c2.AccountId = a.Id;
        List<Id> acctIds = new List<Id>();
        acctIds.add(a.Id);
        Test.startTest();
     AccountProcessor.countContacts(acctIds);
        Test.stopTest();
    }

}
```

2) Use Batch Apex:

challenge:

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.

1. Create an Apex class:
    a. Name: LeadProcessor
    b. Interface: Database.Batchable
    c. Use a QueryLocator in the start method to collect all Lead records in the org
    d. The execute method must update all Lead records in the org with the LeadSource value of Dreamforce
2. Create an Apex test class:
    a. Name: LeadProcessorTest
    b. In the test class, insert 200 Lead records, execute the LeadProcessor Batch class and test that all Lead records were updated correctly
    c. The unit tests must cover all lines of code included in the **LeadProcessor** class, resulting in 100% code coverage
3. Before verifying this challenge, run your test class at least once using the Developer Console Run All feature

Code for 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){
   }

}
```

Code for 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();
  }
```

```
}
```

3) Control Processes with Queueable Apex:

challenge:

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.

1. Create an Apex class:
    a. Name: AddPrimaryContact
    b. Interface: Queueable
    c. 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
    d. 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.
2. Create an Apex test class:
    a. Name: AddPrimaryContactTest
    b. In the test class, insert 50 Account records for BillingState NY and 50 Account records for BillingState CA
    c. 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

d. The unit tests must cover all lines of code included in the **AddPrimaryContact** class, resulting in 100% code coverage

3. Before verifying this challenge, run your test class at least once using the Developer Console Run All feature

Code for 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;
        }

    }

}
```

Code for 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();
    }
}
```

4) Schedule Jobs Using the Apex Scheduler:

challenge:

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.)

1. Create an Apex class:
    a. Name: DailyLeadProcessor
    b. Interface: Schedulable
    c. The execute method must find the first 200 Lead records with a blank LeadSource field and update them with the LeadSource value of Dreamforce
2. Create an Apex test class:
    a. Name: DailyLeadProcessorTest
    b. In the test class, insert 200 Lead records, schedule the DailyLeadProcessor class to run and test that all Lead records were updated correctly
    c. The unit tests must cover all lines of code included in the **DailyLeadProcessor** class, resulting in 100% code coverage.
3. Before verifying this challenge, run your test class at least once using the

Developer Console Run All feature

Code for 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;
       }
   }
}
```

Code for 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:

1) Apex REST Callouts:

challenge:

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.

1. Create an Apex class:
    a. Name: AnimalLocator
    b. Method name: getAnimalNameById
    c. The method must accept an Integer and return a String.
    d. The method must call https://th-apex-http-callout.herokuapp.com/animals/<id>, replacing <id> with the ID passed into the method
    e. The method returns the value of the **name** property (i.e., the animal name)
2. Create a test class:
    a. Name: AnimalLocatorTest
    b. The test class uses a mock class called AnimalLocatorMock to mock the callout response

3. Create unit tests:
    a. Unit tests must cover all lines of code included in the **AnimalLocator** class, resulting in 100% code coverage
4. Run your test class at least once (via **Run All** tests the Developer Console) before attempting to verify this challenge

Code for 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 the request is successful, parse the JSON response.
       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;
   }

}
```

Code for AnimalLocatorTest:

```
@isTest
```

```
private class AnimalLocatorTest{
   @isTest static void getAnimalNameByIdTest() {
   // Set mock callout class
   Test.setMock(HttpCalloutMock.class, new AnimalLocatorMock());
   // This causes a fake response to be sent
   // from the class that implements HttpCalloutMock.
   String response = AnimalLocator.getAnimalNameById(1);

   System.assertEquals('chicken', response);
}
}
```

Code for 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('{"animal":{"id":1,"name":"chicken","eats":"chicken
food","says":"cluck cluck"}}');
    response.setStatusCode(200);
       return response;
   }
}
```

2) Apex SOAP Callouts:

challenge:

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.

1. Generate a class using this using this WSDL file:
    a. Name: ParkService (Tip: After you click the **Parse WSDL** button, change the Apex class name from **parksServices** to ParkService)
    b. Class must be in public scope
2. Create a class:
    a. Name: ParkLocator
    b. Class must have a **country** method that uses the **ParkService** class
    c. 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)
3. Create a test class:
    a. Name: ParkLocatorTest
    b. Test class uses a mock class called ParkServiceMock to mock the callout response
4. Create unit tests:
    a. Unit tests must cover all lines of code included in the **ParkLocator** class, resulting in 100% code coverage.
5. Run your test class at least once (via **Run All** tests the Developer Console) before

attempting to verify this challenge.

Code for ParkService:

```
//Generated by wsdl2apex

public class ParkService {
    public class byCountryResponse {
        public String[] return_x;
        private String[] return_x_type_info = new
String[]{'return','http://parks.services/',null,'0','-1','false'};
        private String[] apex_schema_type_info = new
String[]{'http://parks.services/','false','false'};
        private String[] field_order_type_info = new String[]{'return_x'};
    }
    public class byCountry {
        public String arg0;
        private String[] arg0_type_info = new
String[]{'arg0','http://parks.services/',null,'0','1','false'};
        private String[] apex_schema_type_info = new
String[]{'http://parks.services/','false','false'};
        private String[] field_order_type_info = new String[]{'arg0'};
    }
    public class ParksImplPort {
        public String endpoint_x = 'https://th-apex-soap-
service.herokuapp.com/service/parks';
        public Map<String,String> inputHttpHeaders_x;
        public Map<String,String> outputHttpHeaders_x;
        public String clientCertName_x;
        public String clientCert_x;
        public String clientCertPasswd_x;
        public Integer timeout_x;
```

```
        private String[] ns_map_type_info = new String[]{'http://parks.services/',
'ParkService'};
        public String[] byCountry(String arg0) {
            ParkService.byCountry request_x = new ParkService.byCountry();
            request_x.arg0 = arg0;
            ParkService.byCountryResponse response_x;
            Map<String, ParkService.byCountryResponse> response_map_x = new
Map<String, ParkService.byCountryResponse>();
        response_map_x.put('response_x', response_x);
            WebServiceCallout.invoke(
              this,
              request_x,
              response_map_x,
              new String[]{endpoint_x,
              '',
              'http://parks.services/',
              'byCountry',
              'http://parks.services/',
              'byCountryResponse',
              'ParkService.byCountryResponse'}
            );
            response_x = response_map_x.get('response_x');
            return response_x.return_x;
        }
    }
}
```

Code for ParkLocator:

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

```
        return parksname;
    }
}
```

Code for ParkLocatorTest:

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

        System.assertEquals('Park1', arrayOfParks[0]);
    }
}
```

Code for 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) {
        ParkService.byCountryResponse response_x = new
ParkService.byCountryResponse();
        List<String> lstOfDummyParks = new List<String> {'Park1','Park2','Park3'};
        response_x.return_x = lstOfDummyParks;
```

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

3) Apex Web Services:

challenge:

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.

1. Create an Apex class
    a. Name: AccountManager
    b. Class must have a method called getAccount
    c. Method must be annotated with **@HttpGet** and return an **Account** object
    d. Method must return the **ID** and **Name** for the requested record and all associated contacts with their **ID** and **Name**
2. Create unit tests
    a. Unit tests must be in a separate Apex class called AccountManagerTest
    b. Unit tests must cover all lines of code included in the **AccountManager**

class, resulting in 100% code coverage

3. Run your test class at least once (via **Run All** tests the Developer Console) before attempting to verify this challenge

Code for AccountManager:

```
@RestResource(urlMapping='/Accounts/*/contacts')
global with sharing 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;
    }
}
```

Code for AccountManagerTest:

```
@IsTest
private class AccountManagerTest{
    @isTest static void testAccountManager(){
        Id recordId = getTestAccountId();
        // Set up a test request
        RestRequest request = new RestRequest();
        request.requestUri =
            'https://ap5.salesforce.com/services/apexrest/Accounts/'+ recordId
+'/contacts';
        request.httpMethod = 'GET';
        RestContext.request = request;

        // Call the method to test
```

```
        Account  acc = AccountManager.getAccount();

        // Verify results
        System.assert(acc != null);
    }

    private static Id getTestAccountId(){
        Account acc = new Account(Name = 'TestAcc2');
        Insert acc;

        Contact con = new Contact(LastName = 'TestCont2', AccountId = acc.Id);
        Insert con;

     return acc.Id;
    }
}
```

Apex Specialist:

Code for CreateDefaultData:

```
public with sharing class CreateDefaultData{
    Static Final String TYPE_ROUTINE_MAINTENANCE = 'Routine
Maintenance';
    //gets value from custom metadata How_We_Roll_Settings__mdt to know if
Default data was created
    @AuraEnabled
    public static Boolean isDataCreated() {
        How_We_Roll_Settings__c  customSetting =
How_We_Roll_Settings__c.getOrgDefaults();
        return customSetting.Is_Data_Created__c;
    }
```

```
    //creates Default Data for How We Roll application
    @AuraEnabled
    public static void createDefaultData(){
        List<Vehicle__c> vehicles = createVehicles();
        List<Product2> equipment = createEquipment();
        List<Case> maintenanceRequest = createMaintenanceRequest(vehicles);
        List<Equipment_Maintenance_Item__c> joinRecords =
createJoinRecords(equipment, maintenanceRequest);

        updateCustomSetting(true);
    }


   public static void updateCustomSetting(Boolean isDataCreated){
        How_We_Roll_Settings__c  customSetting =
How_We_Roll_Settings__c.getOrgDefaults();
        customSetting.Is_Data_Created__c = isDataCreated;
        upsert customSetting;
    }

    public static List<Vehicle__c> createVehicles(){
        List<Vehicle__c> vehicles = new List<Vehicle__c>();
        vehicles.add(new Vehicle__c(Name = 'Toy Hauler RV', Air_Conditioner__c =
true, Bathrooms__c = 1, Bedrooms__c = 1, Model__c = 'Toy Hauler RV'));
        vehicles.add(new Vehicle__c(Name = 'Travel Trailer RV', Air_Conditioner__c
= true, Bathrooms__c = 2, Bedrooms__c = 2, Model__c = 'Travel Trailer RV'));
        vehicles.add(new Vehicle__c(Name = 'Teardrop Camper', Air_Conditioner__c
= true, Bathrooms__c = 1, Bedrooms__c = 1, Model__c = 'Teardrop Camper'));
        vehicles.add(new Vehicle__c(Name = 'Pop-Up Camper', Air_Conditioner__c
= true, Bathrooms__c = 1, Bedrooms__c = 1, Model__c = 'Pop-Up Camper'));
        insert vehicles;
```

```
        return vehicles;
    }

    public static List<Product2> createEquipment(){
        List<Product2> equipments = new List<Product2>();
        equipments.add(new Product2(Warehouse_SKU__c =
'55d66226726b611100aaf741',name = 'Generator 1000 kW', Replacement_Part__c
= true,Cost__c = 100 ,Maintenance_Cycle__c = 100));
        equipments.add(new Product2(name = 'Fuse 20B',Replacement_Part__c =
true,Cost__c = 1000, Maintenance_Cycle__c = 30  ));
        equipments.add(new Product2(name = 'Breaker 13C',Replacement_Part__c =
true,Cost__c = 100  , Maintenance_Cycle__c = 15));
        equipments.add(new Product2(name = 'UPS 20 VA',Replacement_Part__c =
true,Cost__c = 200  , Maintenance_Cycle__c = 60));
        insert equipments;
        return equipments;

    }

    public static List<Case> createMaintenanceRequest(List<Vehicle__c>
vehicles){
        List<Case> maintenanceRequests = new List<Case>();
        maintenanceRequests.add(new Case(Vehicle__c = vehicles.get(1).Id, Type =
TYPE_ROUTINE_MAINTENANCE, Date_Reported__c = Date.today()));
        maintenanceRequests.add(new Case(Vehicle__c = vehicles.get(2).Id, Type =
TYPE_ROUTINE_MAINTENANCE, Date_Reported__c = Date.today()));
        insert maintenanceRequests;
        return maintenanceRequests;
    }

    public static List<Equipment_Maintenance_Item__c>
createJoinRecords(List<Product2> equipment, List<Case> maintenanceRequest){
```

```
        List<Equipment_Maintenance_Item__c> joinRecords = new
List<Equipment_Maintenance_Item__c>();
        joinRecords.add(new Equipment_Maintenance_Item__c(Equipment__c =
equipment.get(0).Id, Maintenance_Request__c = maintenanceRequest.get(0).Id));
        joinRecords.add(new Equipment_Maintenance_Item__c(Equipment__c =
equipment.get(1).Id, Maintenance_Request__c = maintenanceRequest.get(0).Id));
        joinRecords.add(new Equipment_Maintenance_Item__c(Equipment__c =
equipment.get(2).Id, Maintenance_Request__c = maintenanceRequest.get(0).Id));
        joinRecords.add(new Equipment_Maintenance_Item__c(Equipment__c =
equipment.get(0).Id, Maintenance_Request__c = maintenanceRequest.get(1).Id));
        joinRecords.add(new Equipment_Maintenance_Item__c(Equipment__c =
equipment.get(1).Id, Maintenance_Request__c = maintenanceRequest.get(1).Id));
        joinRecords.add(new Equipment_Maintenance_Item__c(Equipment__c =
equipment.get(2).Id, Maintenance_Request__c = maintenanceRequest.get(1).Id));
        insert joinRecords;
        return joinRecords;

    }
}
```

Code for CreateDefaultDataTest:

```
@isTest
private class CreateDefaultDataTest {
    @isTest
    static void createData_test(){
        Test.startTest();
        CreateDefaultData.createDefaultData();
        List<Vehicle__c> vehicles = [SELECT Id FROM Vehicle__c];
        List<Product2> equipment = [SELECT Id FROM Product2];
        List<Case> maintenanceRequest = [SELECT Id FROM Case];
        List<Equipment_Maintenance_Item__c> joinRecords = [SELECT Id FROM
Equipment_Maintenance_Item__c];
```

```
        System.assertEquals(4, vehicles.size(), 'There should have been 4 vehicles
created');
        System.assertEquals(4, equipment.size(), 'There should have been 4
equipment created');
        System.assertEquals(2, maintenanceRequest.size(), 'There should have been 2
maintenance request created');
        System.assertEquals(6, joinRecords.size(), 'There should have been 6
equipment maintenance items created');

    }

    @isTest
    static void updateCustomSetting_test(){
        How_We_Roll_Settings__c  customSetting =
How_We_Roll_Settings__c.getOrgDefaults();
        customSetting.Is_Data_Created__c = false;
        upsert customSetting;

        System.assertEquals(false, CreateDefaultData.isDataCreated(), 'The custom
setting How_We_Roll_Settings__c.Is_Data_Created__c should be false');

        customSetting.Is_Data_Created__c = true;
        upsert customSetting;

        System.assertEquals(true, CreateDefaultData.isDataCreated(), 'The custom
setting How_We_Roll_Settings__c.Is_Data_Created__c should be true');

    }
}
```

Code for 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;
    }
  }
}
```

Code for 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);
   }
}
```

Code for WarehouseCalloutService:

```
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();
  }

}
```

Code for 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":"55d66226726b611100aaf742","replacement":true,"quantity":183,"name":"Cooling Fan","maintenanceperiod":0,"lifespan":0,"cost":300,"sku":"100004"},{"_id":"55d66226726b611100aaf743","replacement":true,"quantity":143,"name":"Fuse 20A","maintenanceperiod":0,"lifespan":0,"cost":22,"sku":"100005"}]');
        response.setStatusCode(200);

        return response;
    }
}
```

Code for 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);
    }
}
```

Code for WarehouseSyncSchedule:

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

Code for 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();
    }
}
```

Code for MaintenanceRequest Trigger:

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