I Have completed developer catalyst in trialhead and I have finished 2 superbadges they are
1.APEX SPECIALIST
2.Process Automation Specialist
so in this pdf iam going to mention all the codes related apex specialist super badge and apex modules and also iam mentioning all the modules names that I have completed

1.Trailhead and Trailblazer Community
2.Salesforce Platform Basics
3.Platform Development Basics
4.Customize a Salesforce Object
5.Data Modeling
6.Picklist Administration
7.Duplicate Management
8.Formulas and Validations
9.Build a Data Model for Travel Approval App
10.Improve Data Quality for Recruiting App
11.Customize User Interface For Recruiting App
12.Lightning App Builder
13.Data Management
14.Leads and Opportunities for Lightning Experience
15.Quick Start Process Builder
16.Quick Start Lightning App Builder
17.Automate Business Process For Recruiting App
18.Build a Discount Approval Process
19.Salesforce Flow
20.Flow Builder
21.Data Security
22.Keep Data Secure In Recruiting App
23.Apex Triggers
24.Apex Testing
25.Asynchronous Apex
26.VS Code Setup
27.CLI Setup
28.API Basics
29.Event Monitoring
30.Shield Platform Encryption
31.Apex Integration Services

APEX SPECIALIST SUPERBADGE CODE

1.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));
            } else {
              nc.Date_Due__c = Date.today().addDays((Integer)
cc.Equipment__r.maintenance_Cycle__c);
            }

            newCases.add(nc);
        }

        insert newCases;

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

            }
        }
        insert ClonedWPs;
    }
  }
}
```

MaitenanceRequest

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

2. 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';


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

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

        List<Product2> warehouseEq = new List<Product2>();

        if (response.getStatusCode() == 200){
            List<Object> jsonResponse =
(List<Object>)JSON.deserializeUntyped(response.getBody());
            System.debug(response.getBody());


            for (Object eq : jsonResponse){
```

```
            Map<String,Object> mapJson = (Map<String,Object>)eq;
            Product2 myEq = new Product2();
            myEq.Replacement_Part__c = (Boolean) mapJson.get('replacement');
            myEq.Name = (String) mapJson.get('name');
            myEq.Maintenance_Cycle__c = (Integer) mapJson.get('maintenanceperiod');
            myEq.Lifespan_Months__c = (Integer) mapJson.get('lifespan');
            myEq.Cost__c = (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();
  }

}
```

3.Schedule synchronization

WarehouseSyncShedule

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

4.**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);
    }
}
```

5.**Test callout logic**

WarehouseCalloutService

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


    public static void runWarehouseEquipmentSync(){

        Http http = new Http();
        HttpRequest request = new HttpRequest();

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


        List<Product2> warehouseEq = new List<Product2>();

        if (response.getStatusCode() == 200){
            List<Object> jsonResponse =
(List<Object>)JSON.deserializeUntyped(response.getBody());
            System.debug(response.getBody());
```

```
        for (Object eq : jsonResponse){
            Map<String,Object> mapJson = (Map<String,Object>)eq;
            Product2 myEq = new Product2();
            myEq.Replacement_Part__c = (Boolean) mapJson.get('replacement');
            myEq.Name = (String) mapJson.get('name');
            myEq.Maintenance_Cycle__c = (Integer) mapJson.get('maintenanceperiod');
            myEq.Lifespan_Months__c = (Integer) mapJson.get('lifespan');
            myEq.Cost__c = (Decimal) mapJson.get('lifespan');
            myEq.Warehouse_SKU__c = (String) mapJson.get('sku');
            myEq.Current_Inventory__c = (Double) mapJson.get('quantity');
            warehouseEq.add(myEq);
        }

        if (warehouseEq.size() > 0){
            upsert warehouseEq;
            System.debug('Your equipment was synced with the warehouse one');
            System.debug(warehouseEq);
        }

    }
  }
}
```

WarehouseCalloutServiceTest

```
@isTest
private class WarehouseCalloutServiceTest {
  @isTest
  static void testWareHouseCallout(){
    Test.startTest();

    Test.setMock(HTTPCalloutMock.class, new WarehouseCalloutServiceMock());
    WarehouseCalloutService.runWarehouseEquipmentSync();
    Test.stopTest();
    System.assertEquals(1, [SELECT count() FROM Product2]);
  }   }
```

WarehouseCalloutServiceMock

```
@isTest
global class WarehouseCalloutServiceMock implements HttpCalloutMock {

    global static HttpResponse respond(HttpRequest request){

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



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

response.setBody('[{"_id":"55d66226726b611100aaf741","replacement":false,"quantity":5
,"name":"Generator 1000
kW","maintenanceperiod":365,"lifespan":120,"cost":5000,"sku":"100003"}]');
        response.setStatusCode(200);
        return response;
    }
}
```

6.**Test scheduling logic**

WarehouseSyncSchedule

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

        WarehouseCalloutService.runWarehouseEquipmentSync();
    }
}
```

WarehouseSyncScheduleTest

```
@isTest
public class WarehouseSyncScheduleTest {

   @isTest static void WarehousescheduleTest(){
      String scheduleTime = '00 00 01 * * ?';
      Test.startTest();
      Test.setMock(HttpCalloutMock.class, new WarehouseCalloutServiceMock());
      String jobID=System.schedule('Warehouse Time To Schedule to Test', scheduleTime,
new WarehouseSyncSchedule());
      Test.stopTest();

      CronTrigger a=[SELECT Id FROM CronTrigger where NextFireTime > today];
      System.assertEquals(jobID, a.Id,'Schedule ');


   }
}
```

HERE IT STARTS WITH APEX MODULES

Apex Triggers

1. **Get Started with Apex Triggers**

```
trigger AccountAddressTrigger on Account (before insert,before update) {

   for(Account account : Trigger.New){
      if((account.Match_Billing_Address__c == true) && (account.BillingPostalCode !=NULL)){
         account.ShippingPostalCode = account.BillingPostalCode;
      }
   }

}
```

2. **Bulk Apex Triggers**

```
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**

```
public class VerifyDate {
        public static Date CheckDates(Date date1, Date date2) {
                if(DateWithin30Days(date1,date2)) {
                        return date2;
                } else {
                        return SetEndOfMonthDate(date1);
                }
}


        private static Boolean DateWithin30Days(Date date1, Date date2) {

        if( date2 < date1) { return false; }
        Date date30Days = date1.addDays(30); //create a date 30 days away from date1
                if( date2 >= date30Days ) { return false; }
                else { return true; }
        }
        private static Date SetEndOfMonthDate(Date date1) {
                Integer totalDays = Date.daysInMonth(date1.year(), date1.month());
                Date lastDay = Date.newInstance(date1.year(), date1.month(), totalDays);
                return lastDay;
        }

}
```

2. **Test Apex Triggers**

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


        For (Contact c : Trigger.New) {
                if(c.LastName == 'INVALIDNAME') {
                        c.AddError('The Last Name "'+c.LastName+'" is not allowed for DML');
                }

        }
}
```

3.

Create Test Data for Apex Tests

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

Asynchronous Apex

1. **Use Future Methods**

```
public class AccountProcessor {

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

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

     for(Account acc : accList){

        acc.Number_Of_Contacts__c = acc.Contacts.size();
      }

     update accList;
   }
```

```
}
```

test class

```
@isTest
public class AccountProcessorTest {
   public static testmethod void testAccountProcessor(){
      Account a = new Account();
      a.Name = 'Test Account';
      insert a;

      Contact con = new Contact();
      con.FirstName = 'Binary';
      con.LastName = 'Programming';
      con.AccountId = a.Id;

      insert con;

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

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

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

}
```

2.

Use Batch Apex

```
global class LeadProcessor implements Database.Batchable<sObject>, Database.Stateful {


   global Integer recordsProcessed = 0;


   global Database.QueryLocator start(Database.BatchableContext bc) {
      return Database.getQueryLocator([SELECT ID, LeadSource FROM Lead]);
   }


   global void execute(Database.BatchableContext bc, List<Lead> scope) {
```

```
        for (Lead lead : scope) {
            lead.LeadSource = 'Dreamforce';
            recordsProcessed = recordsProcessed + 1;
            System.debug(lead.LeadSource);
        }
        update scope;
    }


    global void finish(Database.BatchableContext bc){
        System.debug(recordsProcessed + ' records processed. Shazam!');
    }
}
```

test class

```
@isTest
private class LeadProcessorTest {


    @TestSetup
    static void setup(){
        List<Lead> leads = new List<Lead>();

        for (Integer i = 0; i < 200; i++) {

            leads.add(new Lead(LastName='Lead ' + i, Company='Company Number ' + i, Status='Open -
Not Contacted'));
        }


        insert leads;
    }

    static testMethod void test() {

        Test.startTest();
        LeadProcessor lp = new LeadProcessor();
        Id batchId = Database.executeBatch(lp);
        Test.stopTest();


        System.assertEquals(200, [select count() from lead where LeadSource = 'Dreamforce']);
```

```
    }
}
```

3.

Control Processes with Queueable Apex

```
public class AddPrimaryContact implements Queueable {
    public contact c;
    public String state;

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

    public void execute(QueueableContext qc) {
        system.debug('this.c = '+this.c+' this.state = '+this.state);
        List<Account> acc_lst = new List<account>([select id, name, BillingState from account where
account.BillingState = :this.state limit 200]);
        List<contact> c_lst = new List<contact>();
        for(account a: acc_lst) {
            contact c = new contact();
            c = this.c.clone(false, false, false, false);
            c.AccountId = a.Id;
            c_lst.add(c);
        }
        insert c_lst;


}
```

test class

```
@IsTest
public class AddPrimaryContactTest {

    @IsTest
    public static void testing() {
        List<account> acc_lst = new List<account>();
        for (Integer i=0; i<50;i++) {
            account a = new account(name=string.valueOf(i),billingstate='NY');
            system.debug('account a = '+a);
            acc_lst.add(a);
        }
        for (Integer i=0; i<50;i++) {
            account a = new account(name=string.valueOf(50+i),billingstate='CA');
```

```
            system.debug('account a = '+a);
            acc_lst.add(a);
        }
        insert acc_lst;
        Test.startTest();
        contact c = new contact(lastname='alex');
        AddPrimaryContact apc = new AddPrimaryContact(c,'CA');
        system.debug('apc = '+apc);
        System.enqueueJob(apc);
        Test.stopTest();
        List<contact> c_lst = new List<contact>([select id from contact]);
        Integer size = c_lst.size();
        system.assertEquals(50, size);
    }

}
```

4.

Schedule Jobs Using the Apex Scheduler

```
global class DailyLeadProcessor implements Schedulable{
    global void execute(SchedulableContext ctx){
        List<Lead> leads = [SELECT Id, LeadSource FROM Lead WHERE LeadSource = ''];

        if(leads.size() > 0){
            List<Lead> newLeads = new List<Lead>();

            for(Lead lead : leads){
                lead.LeadSource = 'DreamForce';
                newLeads.add(lead);
            }

            update newLeads;
        }
    }
}
```

test class

```
@isTest
private class DailyLeadProcessorTest{

    public static String CRON_EXP = '0 0 0 2 6 ? 2022';

    static testmethod void testScheduledJob(){
        List<Lead> leads = new List<Lead>();
```

```
        for(Integer i = 0; i < 200; i++){
            Lead lead = new Lead(LastName = 'Test ' + i, LeadSource = '', Company = 'Test Company ' + i,
Status = 'Open - Not Contacted');
            leads.add(lead);
        }

        insert leads;

        Test.startTest();

        String jobId = System.schedule('Update LeadSource to DreamForce', CRON_EXP, new
DailyLeadProcessor());


        Test.stopTest();
    }
}
```

Apex Integration Services

1.

Apex REST Callouts

```
public class AnimalLocator{
    public static String getAnimalNameById(Integer x){
        Http http = new Http();
        HttpRequest req = new HttpRequest();
        req.setEndpoint('https://th-apex-http-callout.herokuapp.com/animals/' + x);
        req.setMethod('GET');
        Map<String, Object> animal= new Map<String, Object>();
        HttpResponse res = http.send(req);
            if (res.getStatusCode() == 200) {
        Map<String, Object> results = (Map<String, Object>)JSON.deserializeUntyped(res.getBody());
      animal = (Map<String, Object>) results.get('animal');
        }
return (String)animal.get('name');
    }
}
```

test class

```
@isTest
private class AnimalLocatorTest{
    @isTest static void AnimalLocatorMock1() {
```

```
        Test.setMock(HttpCalloutMock.class, new AnimalLocatorMock());
        string result = AnimalLocator.getAnimalNameById(3);
        String expectedResult = 'chicken';
        System.assertEquals(result,expectedResult );
    }
}
```

mock class

```
@isTest
global class AnimalLocatorMock implements HttpCalloutMock {

    global HTTPResponse respond(HTTPRequest request) {

        HttpResponse response = new HttpResponse();
        response.setHeader('Content-Type', 'application/json');
        response.setBody('{"animals": ["majestic badger", "fluffy bunny", "scary bear", "chicken",
"mighty moose"]}');
        response.setStatusCode(200);
        return response;
    }
}
```

2.

Apex SOAP Callouts

parklocater class

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

park service class

```
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;
        }
    }
}
```

test class

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

```
    }
}
```

mock class

```
@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();
      response_x.return_x = new List<String>{'Yellowstone', 'Mackinac National Park', 'Yosemite'};

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

3.

Apex Web Services

```
@RestResource(urlMapping='/Accounts/*/contacts')
global class AccountManager {
    @HttpGet
    global static Account getAccount() {
      RestRequest req = RestContext.request;
      String accId = req.requestURI.substringBetween('Accounts/', '/contacts');
      Account acc = [SELECT Id, Name, (SELECT Id, Name FROM Contacts)
                  FROM Account WHERE Id = :accId];
      return acc;
    }
}
```

test class

```
@isTest
private class AccountManagerTest {

    private static testMethod void getAccountTest1() {
      Id recordId = createTestRecord();
```

```
        RestRequest request = new RestRequest();
        request.requestUri = 'https://na1.salesforce.com/services/apexrest/Accounts/'+ recordId
+'/contacts' ;
        request.httpMethod = 'GET';
        RestContext.request = request;

        Account thisAccount = AccountManager.getAccount();

        System.assert(thisAccount != null);
        System.assertEquals('Test record', thisAccount.Name);

    }


        static Id createTestRecord() {

        Account TestAcc = new Account(
          Name='Test record');
        insert TestAcc;
        Contact TestCon= new Contact(
        LastName='Test',
        AccountId = TestAcc.id);
        return TestAcc.Id;
    }
}
```