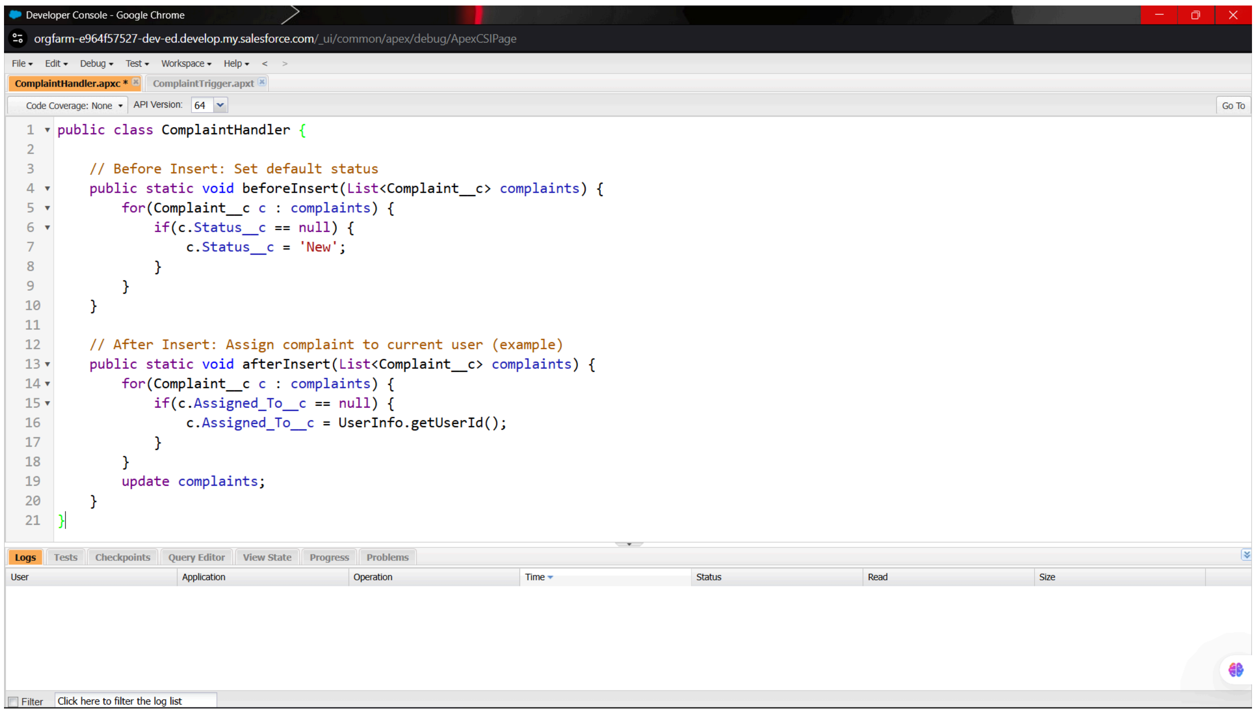
Phase-5

1️⃣ Classes & Objects

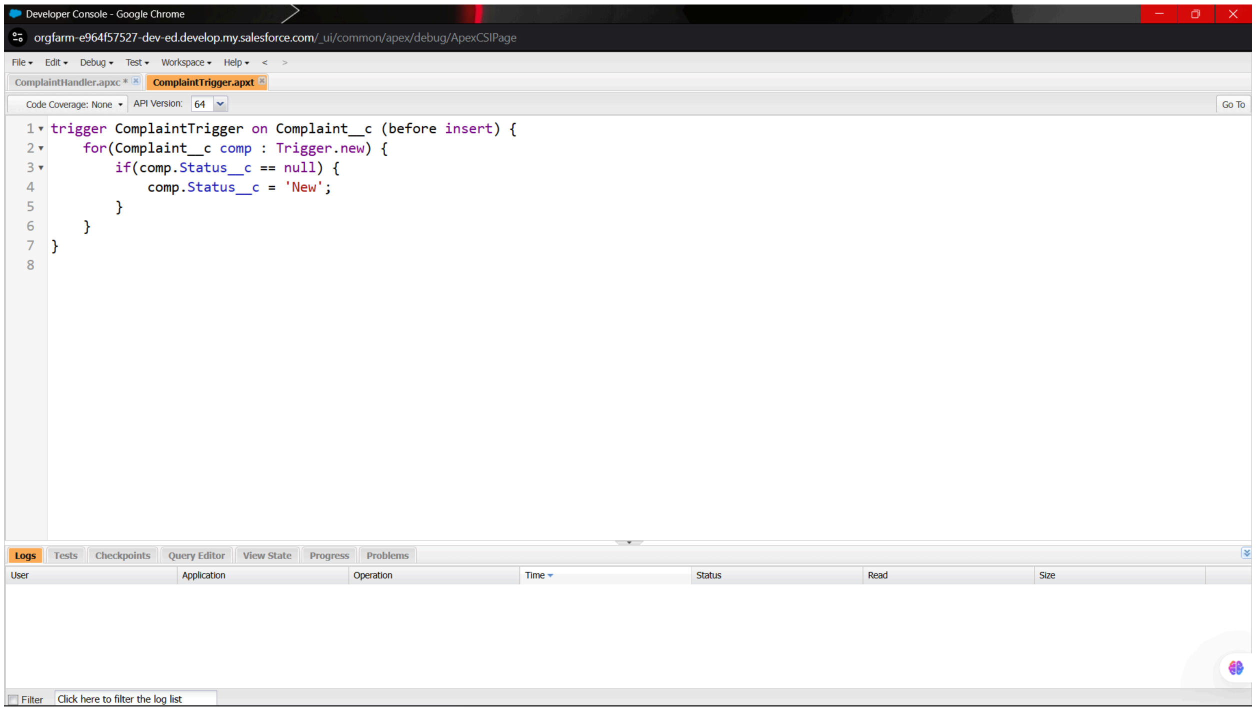
Use Case:
Apex **classes** are reusable blocks of code that can contain variables, methods, and logic. They help you organize code efficiently and encapsulate functionality. For example, you might have a `ComplaintHandler` class that processes complaints, validates data, and assigns tasks to support agents.



```
public class ComplaintHandler {

    // Before Insert: Set default status
    public static void beforeInsert(List<Complaint__c> complaints) {
        for(Complaint__c c : complaints) {
            if(c.Status__c == null) {
                c.Status__c = 'New';
            }
        }
    }

    // After Insert: Assign complaint to current user (example)
    public static void afterInsert(List<Complaint__c> complaints) {
        for(Complaint__c c : complaints) {
            if(c.Assigned_To__c == null) {
                c.Assigned_To__c = UserInfo.getUserId();
            }
        }
        update complaints;
    }
}
```

2️⃣ Apex Triggers (before/after insert/update/delete)

Use Case:
Triggers automatically execute Apex code before or after a record is **inserted, updated, deleted, or undeleted**.
Example: When a complaint is created, you want to **auto-assign it** to a queue or agent and send a notification.

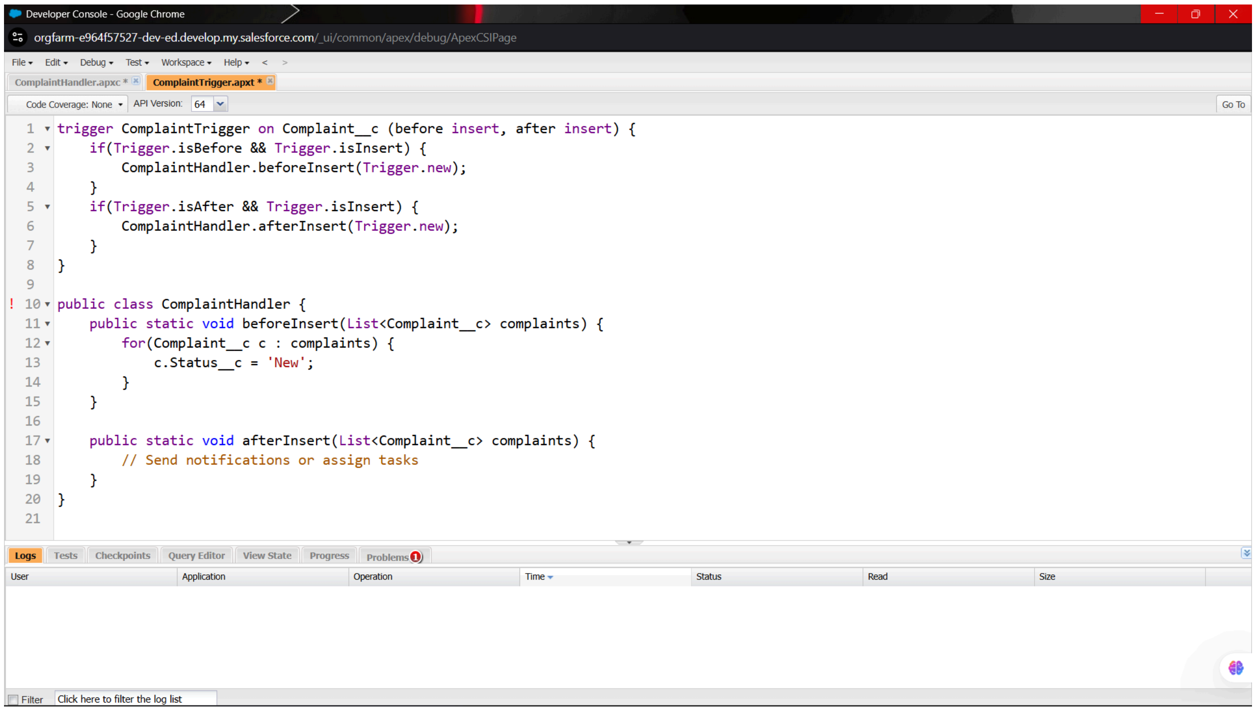

Developer Console - Google Chrome
orgfarm-e964f57527-dev-ed.develop.my.salesforce.com/_ui/common/apex/debug/ApexCSIPage
File Edit Debug Test Workspace Help < >
ComplaintHandler.apxc * ComplaintTrigger.apxt
Code Coverage: None API Version: 64
Go To
Logs Tests Checkpoints Query Editor View State Progress Problems
User Application Operation Time Status Read Size
Filter Click here to filter the log list

```
trigger ComplaintTrigger on Complaint__c (before insert) {
    for(Complaint__c comp : Trigger.new) {
        if(comp.Status__c == null) {
            comp.Status__c = 'New';
        }
    }
}
```

---

3 Trigger Design Pattern

Use Case:
 Complex triggers can become messy. The **Trigger Handler Pattern** separates logic from the trigger to make it **clean, reusable, and testable**.


Developer Console - Google Chrome
orgfarm-e964f57527-dev-ed.develop.my.salesforce.com/_ui/common/apex/debug/ApexCSIPage
File Edit Debug Test Workspace Help
ComplaintHandler.apxc * ComplaintTrigger.apxt *
Code Coverage: None API Version: 64
Go To
Logs Tests Checkpoints Query Editor View State Progress Problems 1
User Application Operation Time Status Read Size
Filter Click here to filter the log list

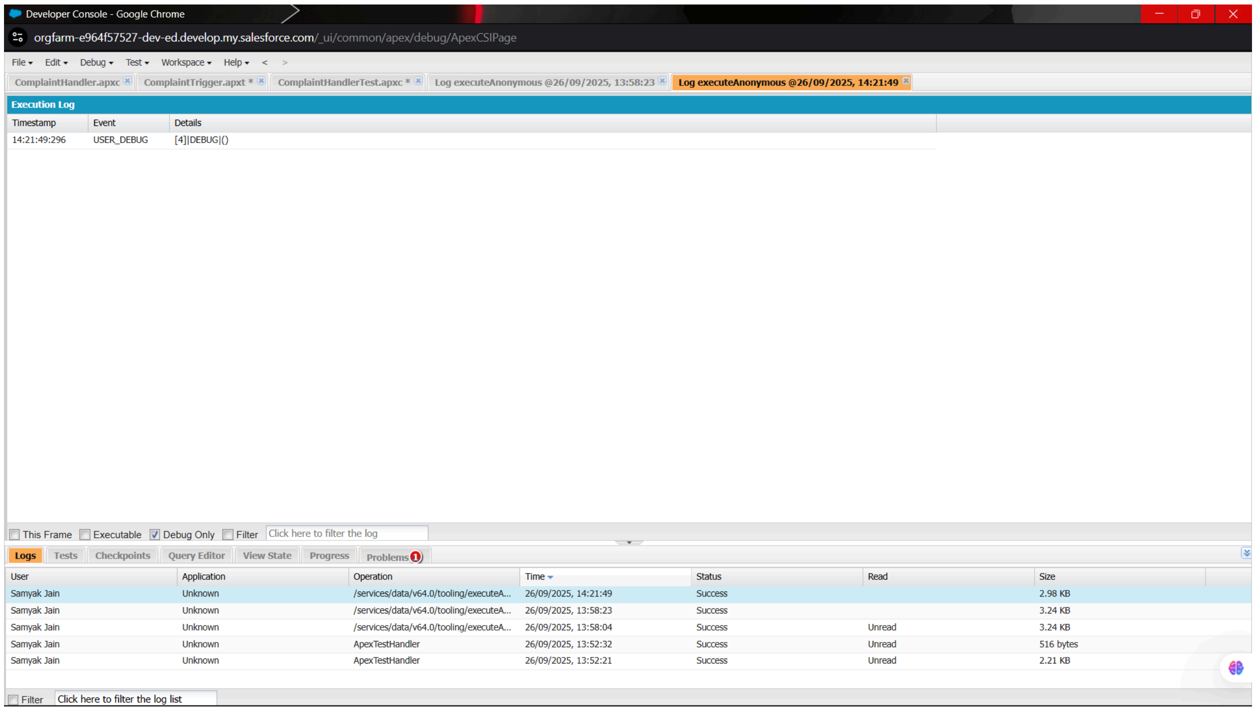
```
trigger ComplaintTrigger on Complaint__c (before insert, after insert) {
    if(Trigger.isBefore && Trigger.isInsert) {
        ComplaintHandler.beforeInsert(Trigger.new);
    }
    if(Trigger.isAfter && Trigger.isInsert) {
        ComplaintHandler.afterInsert(Trigger.new);
    }
}

public class ComplaintHandler {
    public static void beforeInsert(List<Complaint__c> complaints) {
        for(Complaint__c c : complaints) {
            c.Status__c = 'New';
        }
    }

    public static void afterInsert(List<Complaint__c> complaints) {
        // Send notifications or assign tasks
    }
}
```

4 SOQL & SOSL

Use Case:

- **SOQL (Salesforce Object Query Language)**: Fetch specific records from Salesforce objects.
 Example: Find all complaints assigned to a particular agent.

- **SOSL (Salesforce Object Search Language)**: Search for text across multiple objects and fields.


Developer Console - Google Chrome
orgfarm-e964f57527-dev-ed.develop.my.salesforce.com/_ui/common/apex/debug/ApexCSIPage
File Edit Debug Test Workspace Help < >
ComplaintHandler.apxc
ComplaintTrigger.apxt *
ComplaintHandlerTest.apxc *
Log executeAnonymous @26/09/2025, 13:58:23
Log executeAnonymous @26/09/2025, 14:21:49
Execution Log
This Frame
Executable
Debug Only
Filter
Click here to filter the log
Logs
Tests
Checkpoints
Query Editor
View State
Progress
Problems
Filter
Click here to filter the log list

Timestamp	Event	Details
14:21:49:296	USER_DEBUG	[4]|DEBUG|()

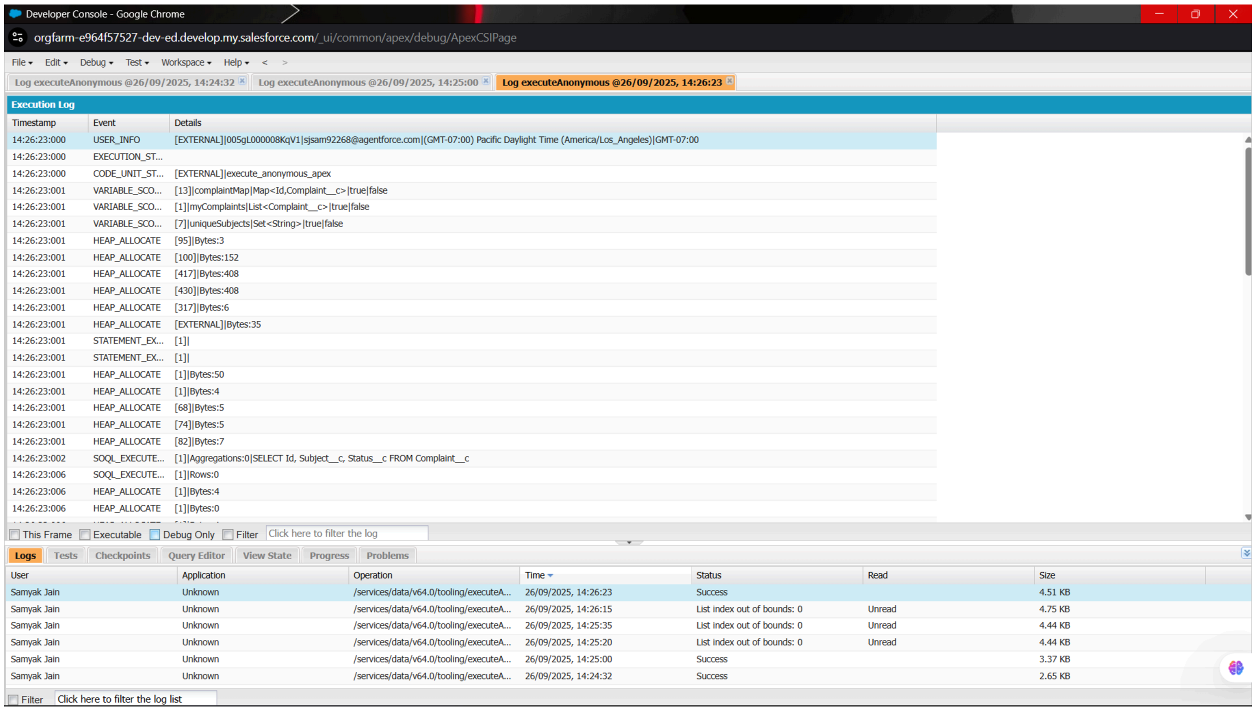
User	Application	Operation	Time	Status	Read	Size
Samyak Jain	Unknown	/services/data/v64.0/tooling/executeA...	26/09/2025, 14:21:49	Success		2.98 KB
Samyak Jain	Unknown	/services/data/v64.0/tooling/executeA...	26/09/2025, 13:58:23	Success		3.24 KB
Samyak Jain	Unknown	/services/data/v64.0/tooling/executeA...	26/09/2025, 13:58:04	Success	Unread	3.24 KB
Samyak Jain	Unknown	ApexTestHandler	26/09/2025, 13:52:32	Success	Unread	516 bytes
Samyak Jain	Unknown	ApexTestHandler	26/09/2025, 13:52:21	Success	Unread	2.21 KB

---

5 Collections: List, Set, Map

Use Case:
Collections store multiple values and are heavily used in Apex logic:

- **List:** Ordered collection of records.
- **Set:** Unique values, no duplicates.
- **Map:** Key-value pairs for fast lookups.


Developer Console - Google Chrome
orgfarm-e964f57527-dev-ed.develop.my.salesforce.com/_ui/common/apex/debug/ApexCSIPage
File ▾ Edit ▾ Debug ▾ Test ▾ Workspace ▾ Help ▾ < >
Log executeAnonymous @26/09/2025, 14:24:32
Log executeAnonymous @26/09/2025, 14:25:00
Log executeAnonymous @26/09/2025, 14:26:23
Execution Log
This Frame
Executable
Debug Only
Filter
Click here to filter the log
Logs
Tests
Checkpoints
Query Editor
View State
Progress
Problems
Filter
Click here to filter the log list

Timestamp	Event	Details
14:26:23:000	USER_INFO	[EXTERNAL]|005gL000008KqV1|sjsam92268@agentforce.com|(GMT-07:00) Pacific Daylight Time (America/Los_Angeles)|GMT-07:00
14:26:23:000	EXECUTION_ST...	
14:26:23:000	CODE_UNIT_ST...	[EXTERNAL]|execute_anonymous_apex
14:26:23:001	VARIABLE_SCO...	[13]|complaintMap|Map<Id,Complaint__c>|true|false
14:26:23:001	VARIABLE_SCO...	[1]|myComplaints|List<Complaint__c>|true|false
14:26:23:001	VARIABLE_SCO...	[7]|uniqueSubjects|Set<String>|true|false
14:26:23:001	HEAP_ALLOCATE	[95]|Bytes:3
14:26:23:001	HEAP_ALLOCATE	[100]|Bytes:152
14:26:23:001	HEAP_ALLOCATE	[417]|Bytes:408
14:26:23:001	HEAP_ALLOCATE	[430]|Bytes:408
14:26:23:001	HEAP_ALLOCATE	[317]|Bytes:6
14:26:23:001	HEAP_ALLOCATE	[EXTERNAL]|Bytes:35
14:26:23:001	STATEMENT_EX...	[1]|
14:26:23:001	STATEMENT_EX...	[1]|
14:26:23:001	HEAP_ALLOCATE	[1]|Bytes:50
14:26:23:001	HEAP_ALLOCATE	[1]|Bytes:4
14:26:23:001	HEAP_ALLOCATE	[68]|Bytes:5
14:26:23:001	HEAP_ALLOCATE	[74]|Bytes:5
14:26:23:001	HEAP_ALLOCATE	[82]|Bytes:7
14:26:23:002	SOQL_EXECUTE...	[1]|Aggregations:0|SELECT Id, Subject__c, Status__c FROM Complaint__c
14:26:23:006	SOQL_EXECUTE...	[1]|Rows:0
14:26:23:006	HEAP_ALLOCATE	[1]|Bytes:4
14:26:23:006	HEAP_ALLOCATE	[1]|Bytes:0

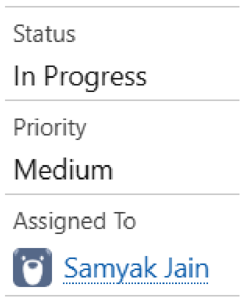
User	Application	Operation	Time	Status	Read	Size
Samyak Jain	Unknown	/services/data/v64.0/tooling/executeA...	26/09/2025, 14:26:23	Success		4.51 KB
Samyak Jain	Unknown	/services/data/v64.0/tooling/executeA...	26/09/2025, 14:26:15	List index out of bounds: 0	Unread	4.75 KB
Samyak Jain	Unknown	/services/data/v64.0/tooling/executeA...	26/09/2025, 14:25:35	List index out of bounds: 0	Unread	4.44 KB
Samyak Jain	Unknown	/services/data/v64.0/tooling/executeA...	26/09/2025, 14:25:20	List index out of bounds: 0	Unread	4.44 KB
Samyak Jain	Unknown	/services/data/v64.0/tooling/executeA...	26/09/2025, 14:25:00	Success		3.37 KB
Samyak Jain	Unknown	/services/data/v64.0/tooling/executeA...	26/09/2025, 14:24:32	Success		2.65 KB

6️⃣ Control Statements

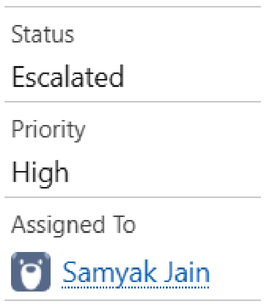
Use Case:

Used to implement decision-making and loops. Common in triggers, classes, batch jobs.
Example: Auto-escalate complaints based on priority.

```
for(Complaint__c c : complaints) {
    if(c.Priority__c == 'High') {
        c.Status__c = 'Escalated';
    } else {
        c.Status__c = 'In Progress';
    }
}
```



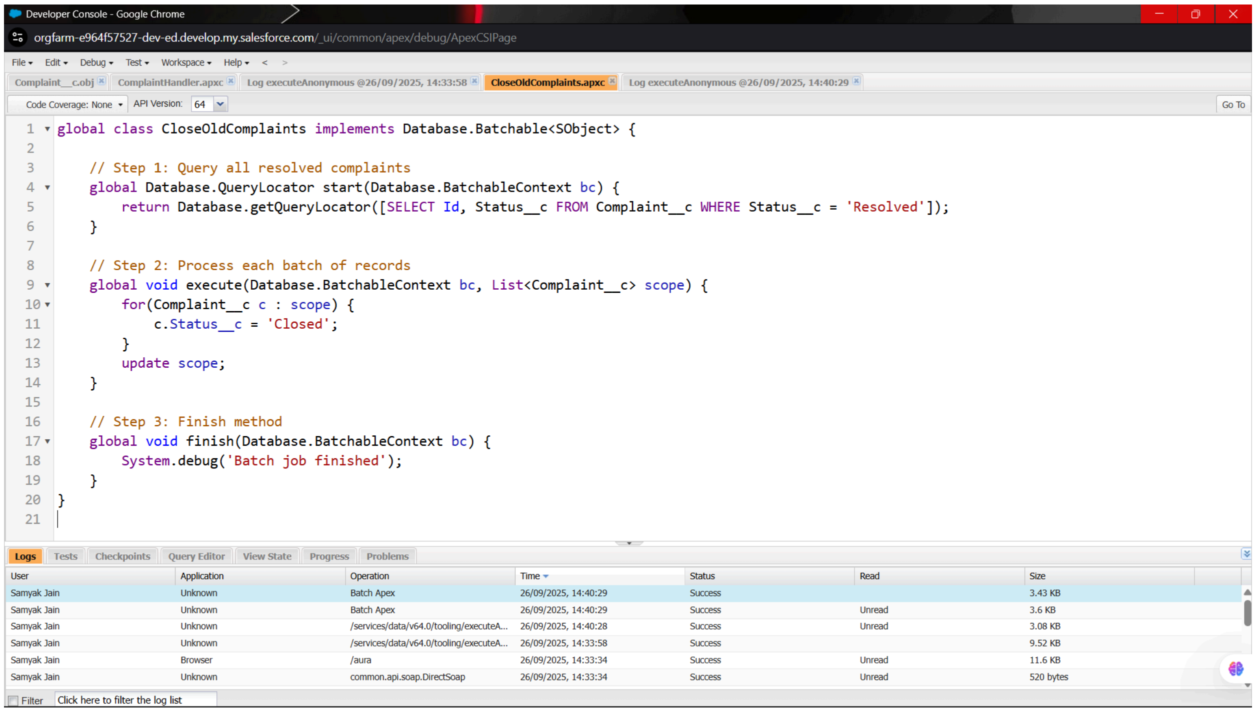
Status
In Progress
Priority
Medium
Assigned To
Samyak Jain



Status
Escalated
Priority
High
Assigned To
Samyak Jain

7️⃣ Batch Apex

Use Case:
 Handles **large data volumes (over 50k records)** asynchronously. Example: Close all resolved complaints older than 90 days every night.



Developer Console - Google Chrome

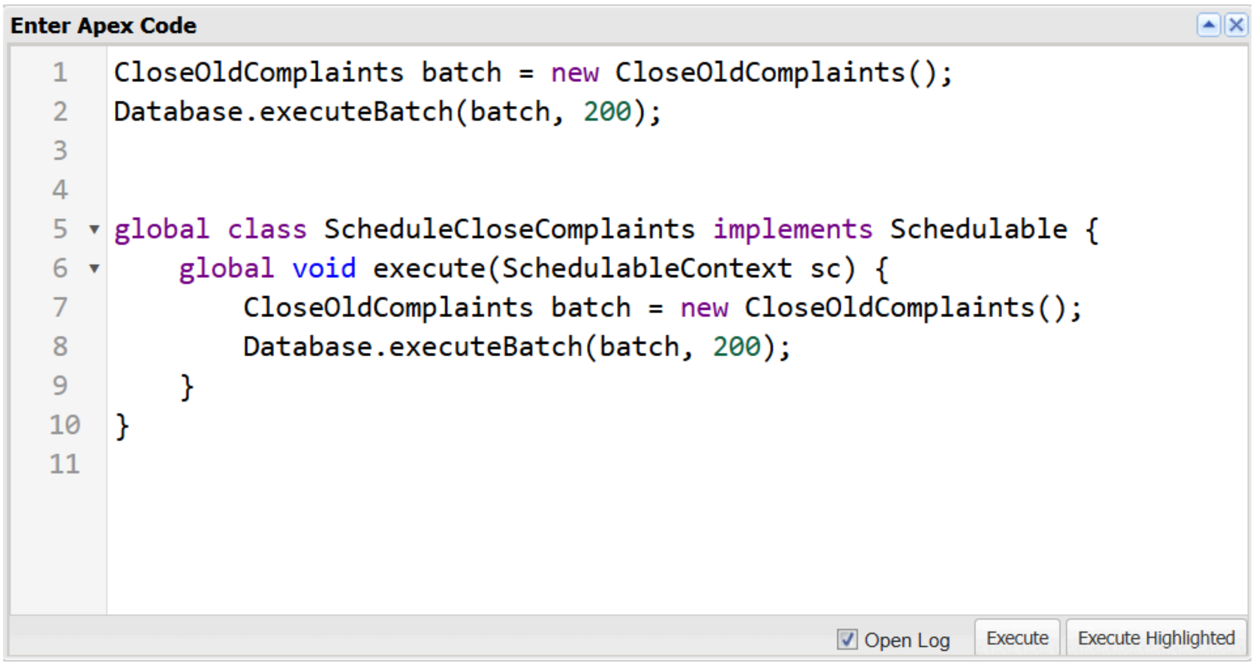
orgfarm-e964f57527-dev-ed.develop.my.salesforce.com/_ui/common/apex/debug/ApexCSIPage

File ▾ Edit ▾ Debug ▾ Test ▾ Workspace ▾ Help ▾ < >
Complaint__c.obj
ComplaintHandler.apxc
Log executeAnonymous @26/09/2025, 14:33:58
CloseOldComplaints.apxc
Log executeAnonymous @26/09/2025, 14:40:29
Code Coverage: None ▾
API Version: 64
Go To

```
global class CloseOldComplaints implements Database.Batchable<SObject> {

    // Step 1: Query all resolved complaints
    global Database.QueryLocator start(Database.BatchableContext bc) {
        return Database.getQueryLocator([SELECT Id, Status__c FROM Complaint__c WHERE Status__c = 'Resolved']);
    }

    // Step 2: Process each batch of records
    global void execute(Database.BatchableContext bc, List<Complaint__c> scope) {
        for(Complaint__c c : scope) {
            c.Status__c = 'Closed';
        }
        update scope;
    }

    // Step 3: Finish method
    global void finish(Database.BatchableContext bc) {
        System.debug('Batch job finished');
    }
}
```

Logs Tests Checkpoints Query Editor View State Progress Problems

User	Application	Operation	Time	Status	Read	Size
Samyak Jain	Unknown	Batch Apex	26/09/2025, 14:40:29	Success		3.43 KB
Samyak Jain	Unknown	Batch Apex	26/09/2025, 14:40:29	Success	Unread	3.6 KB
Samyak Jain	Unknown	/services/data/v64.0/tooling/executeA...	26/09/2025, 14:40:28	Success	Unread	3.08 KB
Samyak Jain	Unknown	/services/data/v64.0/tooling/executeA...	26/09/2025, 14:33:58	Success		9.52 KB
Samyak Jain	Browser	/aura	26/09/2025, 14:33:34	Success	Unread	11.6 KB
Samyak Jain	Unknown	common.api.soap.DirectSoap	26/09/2025, 14:33:34	Success	Unread	520 bytes



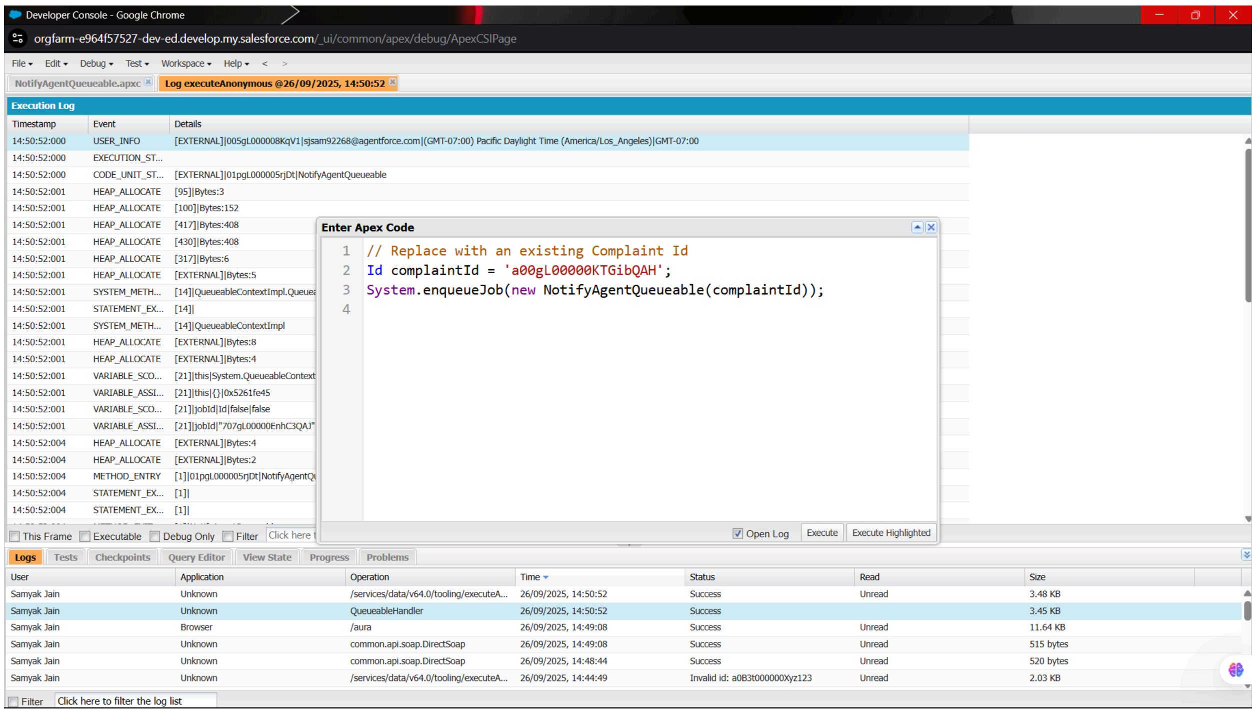
Enter Apex Code

```
CloseOldComplaints batch = new CloseOldComplaints();
Database.executeBatch(batch, 200);


global class ScheduleCloseComplaints implements Schedulable {
    global void execute(SchedulableContext sc) {
        CloseOldComplaints batch = new CloseOldComplaints();
        Database.executeBatch(batch, 200);
    }
}
```

8 Queueable Apex

Use Case:

Similar to Batch Apex but used for **smaller jobs** that need to run asynchronously. Example: Send notifications after complaint processing.



Developer Console - Google Chrome
orgfarm-e964f57527-dev-ed.develop.my.salesforce.com/_ui/common/apex/debug/ApexCSIPage
File Edit Debug Test Workspace Help
NotifyAgentQueueable.apxc
Log executeAnonymous @26/09/2025, 14:50:52
Execution Log
This Frame
Executable
Debug Only
Filter
Click here t
Open Log
Execute
Execute Highlighted
Logs
Tests
Checkpoints
Query Editor
View State
Progress
Problems
Filter
Click here to filter the log list

Timestamp	Event	Details
14:50:52:000	USER_INFO	[EXTERNAL]|005gL000008KqV1|sjsam92268@agentforce.com|(GMT-07:00) Pacific Daylight Time (America/Los_Angeles)|GMT-07:00
14:50:52:000	EXECUTION_ST...	
14:50:52:000	CODE_UNIT_ST...	[EXTERNAL]|01pgL000005rjDt|NotifyAgentQueueable
14:50:52:001	HEAP_ALLOCATE	[95]|Bytes:3
14:50:52:001	HEAP_ALLOCATE	[100]|Bytes:152
14:50:52:001	HEAP_ALLOCATE	[417]|Bytes:408
14:50:52:001	HEAP_ALLOCATE	[430]|Bytes:408
14:50:52:001	HEAP_ALLOCATE	[317]|Bytes:6
14:50:52:001	HEAP_ALLOCATE	[EXTERNAL]|Bytes:5
14:50:52:001	SYSTEM_METH...	[14]|QueueableContextImpl.Queuea
14:50:52:001	STATEMENT_EX...	[14]|
14:50:52:001	SYSTEM_METH...	[14]|QueueableContextImpl
14:50:52:001	HEAP_ALLOCATE	[EXTERNAL]|Bytes:8
14:50:52:001	HEAP_ALLOCATE	[EXTERNAL]|Bytes:4
14:50:52:001	VARIABLE_SCO...	[21]|this|System.QueueableContext
14:50:52:001	VARIABLE_ASSI...	[21]|this|{}|0x5261fe45
14:50:52:001	VARIABLE_SCO...	[21]|jobId|Id|false|false
14:50:52:001	VARIABLE_ASSI...	[21]|jobId|"707gL00000EnhC3QAJ"
14:50:52:004	HEAP_ALLOCATE	[EXTERNAL]|Bytes:4
14:50:52:004	HEAP_ALLOCATE	[EXTERNAL]|Bytes:2
14:50:52:004	METHOD_ENTRY	[1]|01pgL000005rjDt|NotifyAgentQu
14:50:52:004	STATEMENT_EX...	[1]|
14:50:52:004	STATEMENT_EX...	[1]|

Enter Apex Code

```
// Replace with an existing Complaint Id
Id complaintId = 'a00gL00000KTGibQAH';
System.enqueueJob(new NotifyAgentQueueable(complaintId));
```

User	Application	Operation	Time	Status	Read	Size
Samyak Jain	Unknown	/services/data/v64.0/tooling/executeA...	26/09/2025, 14:50:52	Success	Unread	3.48 KB
Samyak Jain	Unknown	QueueableHandler	26/09/2025, 14:50:52	Success		3.45 KB
Samyak Jain	Browser	/aura	26/09/2025, 14:49:08	Success	Unread	11.64 KB
Samyak Jain	Unknown	common.api.soap.DirectSoap	26/09/2025, 14:49:08	Success	Unread	515 bytes
Samyak Jain	Unknown	common.api.soap.DirectSoap	26/09/2025, 14:48:44	Success	Unread	520 bytes
Samyak Jain	Unknown	/services/data/v64.0/tooling/executeA...	26/09/2025, 14:44:49	Invalid id: a0B3t000000Xyz123	Unread	2.03 KB

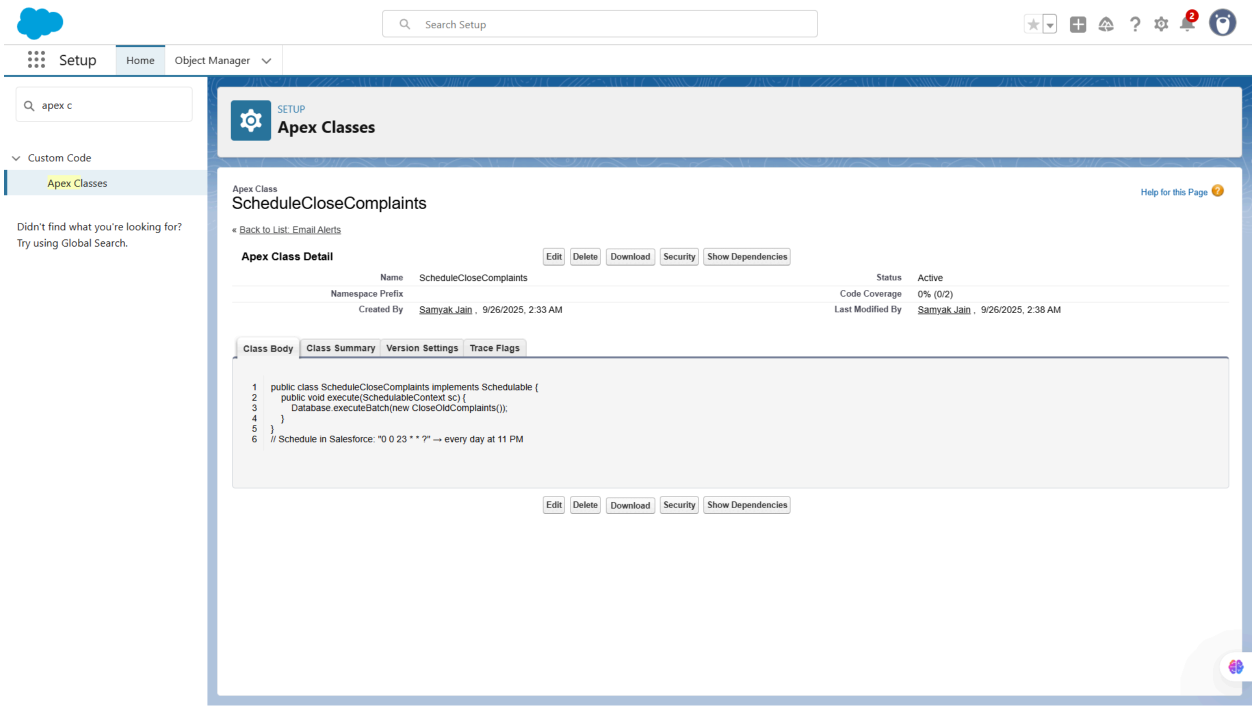
---

9 Scheduled Apex

Use Case:

Run Apex at a scheduled time or interval. Example: Run the batch job to close old complaints every night at 11 PM.

```
public class ScheduleCloseComplaints implements Schedulable {
    public void execute(SchedulableContext sc) {
        Database.executeBatch(new CloseOldComplaints());
    }
}
// Schedule in Salesforce: "0 0 23 * * ?" → every day at 11 PM
```



Apex Class
ScheduleCloseComplaints

« Back to List: Email Alerts

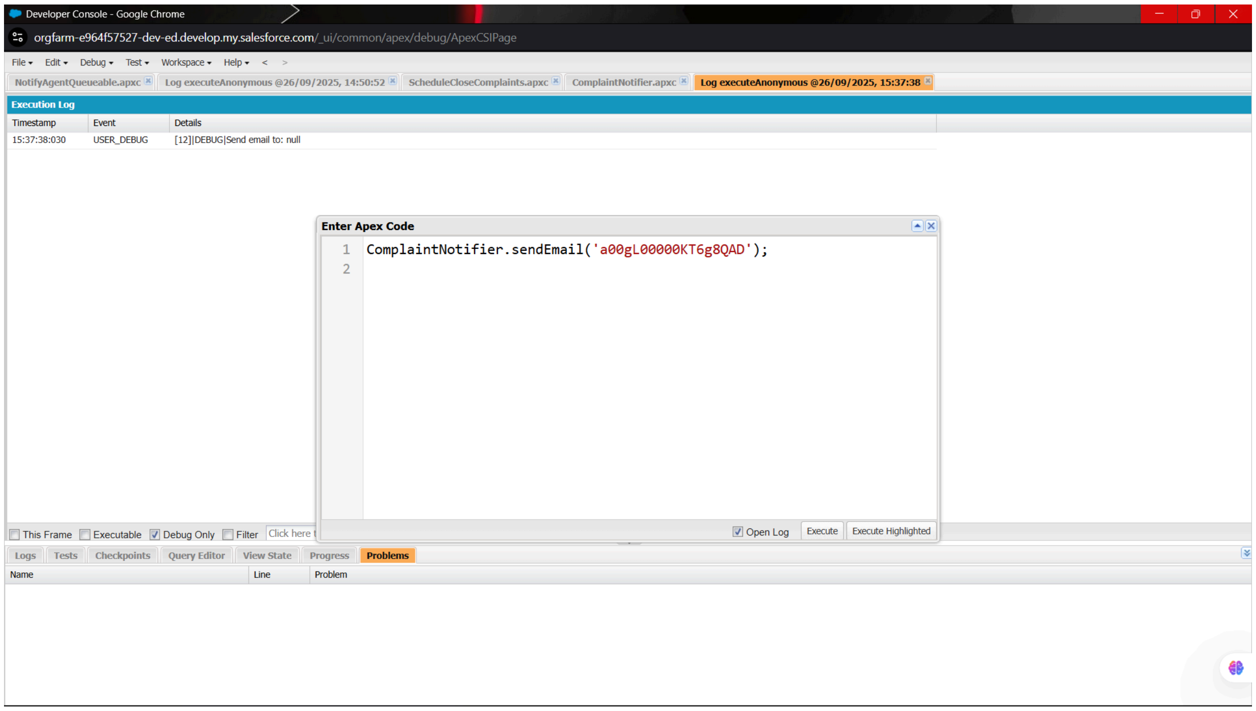
Apex Class Detail

Name	ScheduleCloseComplaints	Status	Active
Namespace Prefix		Code Coverage	0% (0/2)
Created By	Samyak Jain , 9/26/2025, 2:33 AM	Last Modified By	Samyak Jain , 9/26/2025, 2:38 AM

```
public class ScheduleCloseComplaints implements Schedulable {
    public void execute(SchedulableContext sc) {
        Database.executeBatch(new CloseOldComplaints());
    }
}
// Schedule in Salesforce: "0 0 23 * * ?" → every day at 11 PM
```

🔟 Future Methods

Use Case:
Run code asynchronously **without blocking the user**. Often used to call external APIs.
Example: Call an external system to log complaint updates.


Developer Console - Google Chrome
orgfarm-e964f57527-dev-ed.develop.my.salesforce.com/_ui/common/apex/debug/ApexCSIPage
File Edit Debug Test Workspace Help
NotifyAgentQueueable.apxc
Log executeAnonymous @26/09/2025, 14:50:52
ScheduleCloseComplaints.apxc
ComplaintNotifier.apxc
Log executeAnonymous @26/09/2025, 15:37:38
Execution Log
This Frame
Executable
Debug Only
Filter
Click here
Logs
Tests
Checkpoints
Query Editor
View State
Progress
Problems
Name
Line
Problem
Enter Apex Code
Open Log
Execute
Execute Highlighted

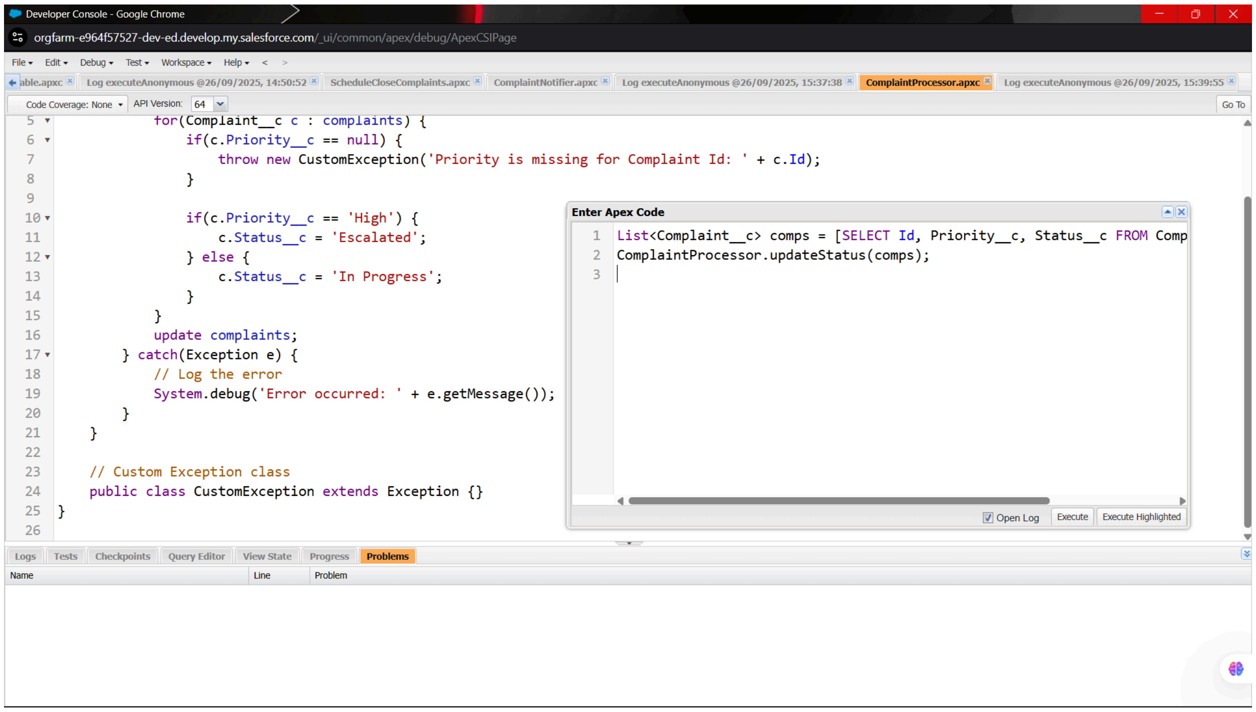
```
Timestamp     Event       Details
15:37:38:030  USER_DEBUG  [12]|DEBUG|Send email to: null
```

```
ComplaintNotifier.sendEmail('a00gL00000KT6g8QAD');
```

1️⃣1️⃣ Exception Handling

Use Case:

Prevent runtime errors from crashing code. Example: Catch an error while updating complaints.

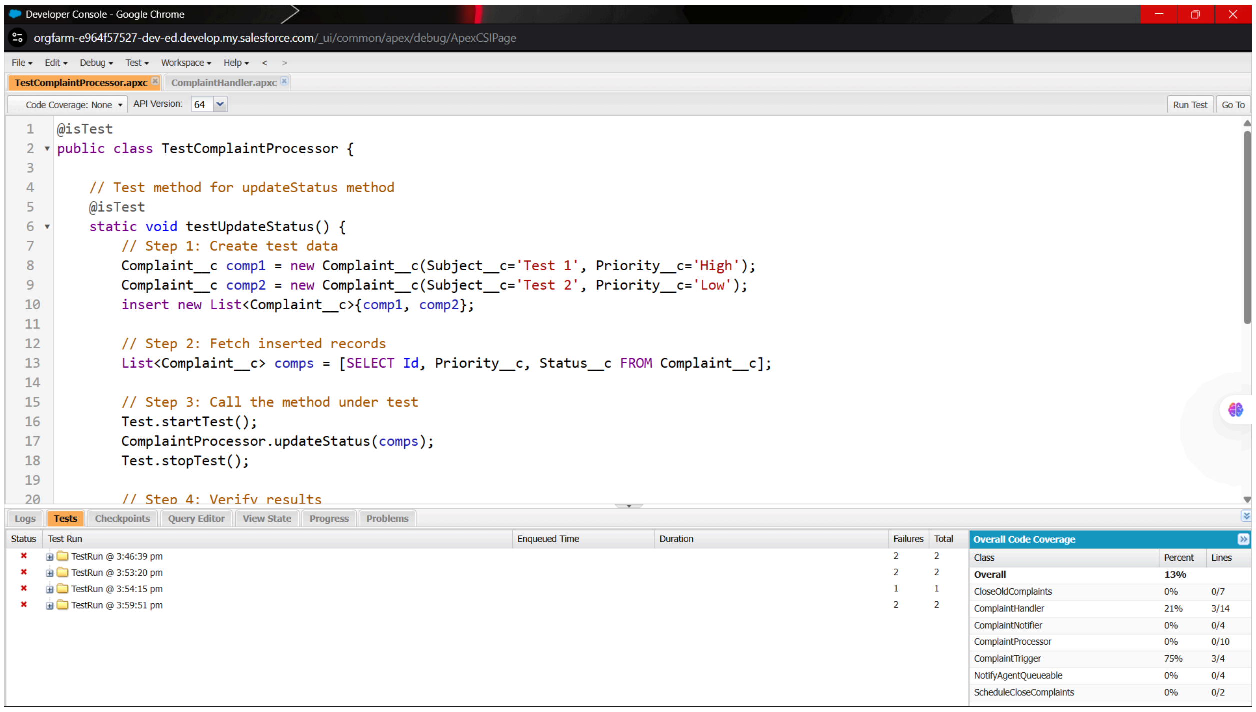

Developer Console - Google Chrome
orgfarm-e964f57527-dev-ed.develop.my.salesforce.com/_ui/common/apex/debug/ApexCSIPage
File Edit Debug Test Workspace Help
able.apxc
Log executeAnonymous @26/09/2025, 14:50:52
ScheduleCloseComplaints.apxc
ComplaintNotifier.apxc
Log executeAnonymous @26/09/2025, 15:37:38
ComplaintProcessor.apxc
Log executeAnonymous @26/09/2025, 15:39:55
Code Coverage: None
API Version: 64
Go To
Logs
Tests
Checkpoints
Query Editor
View State
Progress
Problems
Name
Line
Problem
Enter Apex Code
Open Log
Execute
Execute Highlighted

```
            for(Complaint__c c : complaints) {
                if(c.Priority__c == null) {
                    throw new CustomException('Priority is missing for Complaint Id: ' + c.Id);
                }

                if(c.Priority__c == 'High') {
                    c.Status__c = 'Escalated';
                } else {
                    c.Status__c = 'In Progress';
                }
            }
            update complaints;
        } catch(Exception e) {
            // Log the error
            System.debug('Error occurred: ' + e.getMessage());
        }
    }

    // Custom Exception class
    public class CustomException extends Exception {}
}
```

```
List<Complaint__c> comps = [SELECT Id, Priority__c, Status__c FROM Comp
ComplaintProcessor.updateStatus(comps);
```

1️⃣2️⃣ Test Classes

Use Case:
Ensure code coverage and validate functionality. Required for deploying to production.



```
@isTest
public class TestComplaintProcessor {

    // Test method for updateStatus method
    @isTest
    static void testUpdateStatus() {
        // Step 1: Create test data
        Complaint__c comp1 = new Complaint__c(Subject__c='Test 1', Priority__c='High');
        Complaint__c comp2 = new Complaint__c(Subject__c='Test 2', Priority__c='Low');
        insert new List<Complaint__c>{comp1, comp2};

        // Step 2: Fetch inserted records
        List<Complaint__c> comps = [SELECT Id, Priority__c, Status__c FROM Complaint__c];

        // Step 3: Call the method under test
        Test.startTest();
        ComplaintProcessor.updateStatus(comps);
        Test.stopTest();

        // Step 4: Verify results
```

Status	Test Run	Enqueued Time	Duration	Failures	Total
✗	TestRun @ 3:46:39 pm			2	2
✗	TestRun @ 3:53:20 pm			2	2
✗	TestRun @ 3:54:15 pm			1	1
✗	TestRun @ 3:59:51 pm			2	2

Overall Code Coverage

Class	Percent	Lines
Overall	**13%**	
CloseOldComplaints	0%	0/7
ComplaintHandler	21%	3/14
ComplaintNotifier	0%	0/4
ComplaintProcessor	0%	0/10
ComplaintTrigger	75%	3/4
NotifyAgentQueueable	0%	0/4
ScheduleCloseComplaints	0%	0/2