

CampusConnect – Phase 5 Documentation

Phase 5: Apex Programming (Developer)



Overview

Phase 5 of CampusConnect introduces **Apex-based automation and advanced logic** to enhance system intelligence. While Phase 4 focused on process automation (flows, workflows, and email alerts), Phase 5 delivers a **developer-centric layer** with reusable Apex classes, triggers, asynchronous jobs, and robust exception handling.

This ensures that CampusConnect can handle **scalability, performance, and custom logic** beyond declarative automation.



Components Implemented

1. Core Apex Classes

- **StudentService.cls**
 - Provides reusable methods to update `Status__c` based on attendance.
 - Handles student enrollment logic when `Enrollment_Status__c = Approved`.
 - Calculates student performance scores combining attendance and academic data.
- **StudentTriggerHandler.cls**
 - Encapsulates trigger logic for the Student object.
 - Bulk-safe operations for inserts/updates.
 - Updates `Status__c` (Regular, At Risk, Probation) automatically.
- **EventTriggerHandler.cls**

- Handles Event object triggers.
- Prevents overlapping or invalid event dates.
- **StudentProbationBatch.cls**
 - Batch Apex job that runs nightly to update students with **Attendance_Percentage__c < 50** to **Probation**.
- **EventSummaryBatch.cls**
 - Batch job that generates a daily summary of events and emails to faculty/admin.
- **StudentPerformanceCalculator.cls**
 - Queueable Apex for async performance score calculations for multiple students.
- **DailyAtRiskStudentNotifier.cls**
 - Scheduled Apex job that sends **daily notifications** to faculty listing all “At Risk” students.

Search Setup

Setup Home Object Manager

apex

Apex Classes

View: All Create New View

Action	Name	Namespace Prefix	Api Version	Status	Size Without Comments	Last Modified By	Has Trace Flags
Edit Del	BatchAndScheduledApexTest		64.0	Active	10,013	Gauni Garole, 9/22/2025, 2:40 AM	<input type="checkbox"/>
Edit Del Security	DailyAtRiskStudentNotifier		64.0	Active	7,700	Gauni Garole, 9/22/2025, 2:40 AM	<input type="checkbox"/>
Edit Del Security	EventSummaryBatch		64.0	Active	5,912	Gauni Garole, 9/22/2025, 2:40 AM	<input type="checkbox"/>
Edit Del Security	EventSummaryBatchScheduler		64.0	Active	183	Gauni Garole, 9/22/2025, 7:22 AM	<input type="checkbox"/>
Edit Del Security	EventTriggerHandler		64.0	Active	6,436	Gauni Garole, 9/22/2025, 2:40 AM	<input type="checkbox"/>
Edit Del	EventTriggerHandlerTest		64.0	Active	9,496	Gauni Garole, 9/22/2025, 2:40 AM	<input type="checkbox"/>
Edit Del Security	StudentPerformanceCalculator		64.0	Active	3,650	Gauni Garole, 9/22/2025, 2:40 AM	<input type="checkbox"/>
Edit Del Security	StudentProbationBatch		64.0	Active	4,335	Gauni Garole, 9/22/2025, 2:40 AM	<input type="checkbox"/>
Edit Del Security	StudentProbationBatchScheduler		64.0	Active	191	Gauni Garole, 9/22/2025, 7:19 AM	<input type="checkbox"/>
Edit Del Security	StudentService		64.0	Active	7,066	Gauni Garole, 9/22/2025, 3:44 AM	<input type="checkbox"/>
Edit Del	StudentServiceTest		64.0	Active	8,320	Gauni Garole, 9/22/2025, 3:16 AM	<input type="checkbox"/>
Edit Del Security	StudentTriggerHandler		64.0	Active	3,838	Gauni Garole, 9/22/2025, 2:40 AM	<input type="checkbox"/>
Edit Del	StudentTriggerHandlerTest		64.0	Active	7,647	Gauni Garole, 9/22/2025, 2:40 AM	<input type="checkbox"/>

Show me fewer records per list page

2. Apex Triggers

- **StudentTrigger.trigger**
 - Executes via **StudentTriggerHandler**.
 - Updates **Status__c** dynamically based on attendance.
 - Enforces bulk-safe design.
- **EventTrigger.trigger**
 - Executes via **EventTriggerHandler**.
 - Validates event dates (**End_Date__c** > **Start_Date__c**).
 - Prevents overlaps or invalid scheduling.

The screenshot shows the Salesforce Setup interface. On the left, the navigation menu is open, showing the 'Apex Triggers' link under the 'Custom Code' section. The main content area is titled 'Apex Triggers' and includes a search bar, a 'Help for this Page' link, and a summary of Apex usage. Below this is a table of all triggers in the organization.

Action	Name	Namespace Prefix	sObject Type	Api Version	Status	Size Without Comments	Last Modified By	Has Trace Flags
Edit Del	EventTrigger		Event	64.0	Active	653	Gauri.Garole, 9/22/2025, 2:40 AM	<input type="checkbox"/>
Edit Del	StudentTrigger		Student	64.0	Active	665	Gauri.Garole, 9/22/2025, 2:40 AM	<input type="checkbox"/>

The screenshot shows the detailed view of the 'EventTrigger' Apex Trigger in the Salesforce Setup interface. The page includes a search bar, a 'Help for this Page' link, and a section for 'Apex Trigger Detail'. Below this is a tabbed interface with 'Apex Trigger', 'Version Settings', and 'Trace Flags' tabs. The 'Apex Trigger' tab is active, showing the trigger's code.

```
1 /**
2  * @description Trigger for Event__c object
3  * @author CampusConnect Development Team
4  * @date 2025
5  */
6 trigger EventTrigger on Event__c (before insert, before update, after insert, after update) {
7     // Determine trigger context and call appropriate handler method
8     if (Trigger.isBefore && Trigger.isInsert) {
9         EventTriggerHandler.handleTrigger(Triiger new, null, 'BEFORE_INSERT');
10     }
11     else if (Trigger.isBefore && Trigger.isUpdate) {
12         EventTriggerHandler.handleTrigger(Triiger new, Trigger old, 'BEFORE_UPDATE');
13     }
14     else if (Trigger.isAfter && Trigger.isInsert) {
15         EventTriggerHandler.handleTrigger(Triiger new, null, 'AFTER_INSERT');
```

3. Trigger Design Pattern

- Implemented **handler classes** for Students and Events.
 - Separation of concerns → business logic in handlers, trigger is lightweight.
 - Ensures **maintainability and testability**.
-

4. SOQL & SOSL Usage

- Students with low attendance are queried via SOQL.
- Events scheduled “Today” are queried for daily summaries.
- SOSL ensures quick searching for students/courses when needed.

The screenshot shows the Salesforce Developer Console interface. At the top, the browser address bar displays the URL: `orgfarm-7547270ec7-dev-ed.develop.my.salesforce.com/_ui/common/apex/debug/ApexCSIPage`. Below the browser window, the console shows the following details:

- Query Results - Total Rows: 1**
- Query:** `SELECT Id, Name, Status__c FROM Student__c LIMIT 10`
- Results Table:**

Id	Name	Status__c
a00gl00000K4YVJQAN	gauri-demo	Regular

Below the results table, the console shows the query editor with the same query: `SELECT Id, Name, Status__c FROM Student__c LIMIT 10`. The status bar at the bottom indicates "Execute" and "Use Tooling API".

5. Collections

- `List<Student__c>` used for bulk student updates.
 - `Set<Id>` prevents duplicate student IDs.
 - `Map<Id, Student__c>` improves lookup efficiency during trigger execution.
-

6. Control Statements

- **IF-ELSE** ensures:
 - Attendance < 75 → **At Risk**
 - Attendance < 50 → **Probation**
 - Else → **Regular**
- Custom exception thrown for invalid event scheduling.

7. Batch Apex

- **StudentProbationBatch**: Marks students as probation nightly.
- **EventSummaryBatch**: Sends summary reports daily.

Setup

Home

Object Manager

apex

▼ Email

▼ Custom Code

▼ Apex Classes

▼ Apex Settings

▼ Apex Test Execution

▼ Apex Test History

▼ Apex Triggers

▼ Environments

▼ Jobs

▼ Apex Flex Queue

▼ Apex Jobs

Didn't find what you're looking for?

Try using Global Search.

Apex Jobs

Click here to go to the new batch jobs page

Apex Jobs

Monitor the status of all Apex jobs, and optionally, abort jobs that are in progress.

Percent of Asynchronous Apex Used: 0%

You have currently used 1 asynchronous Apex operations out of an allowed 24-hour organization limit of 250,000. To learn about how this limit is calculated and what contributes to it, see the Lightning Platform Apex Limits topic.

View: All

Create New View

Action	Submitted Date	Job Type	Status	Status Detail	Total Batches	Batches Processed	Failures	Submitted By	Completion Date	Apex Class	Apex Method	Apex Job ID
	9/22/2025, 11:00 PM	Batch Apex	Completed		0	0	0	Garole, Gauri	9/22/2025, 11:00 PM	StudentProbationBatch		707gL00000EaqT0
	9/22/2025, 7:22 AM	Scheduled Apex	Queued		0	0	0	Garole, Gauri		EventSummaryBatchScheduler		707gL00000EY1gW
	9/22/2025, 7:20 AM	Scheduled Apex	Queued		0	0	0	Garole, Gauri		StudentProbationBatchScheduler		707gL00000EY6vs
	9/22/2025, 7:15 AM	Scheduled Apex	Queued		0	0	0	Garole, Gauri		DailyAtRiskStudentNotifier		707gL00000EXuv9

8. Queueable Apex

- **StudentPerformanceCalculator** executes async calculations.
- Designed for high-volume data processing without hitting governor limits.

9. Scheduled Apex

- **DailyAtRiskStudentNotifier** runs every morning.
- Emails faculty a list of all students flagged as **At Risk**.

The screenshot shows the Salesforce Setup interface. The left sidebar contains a navigation menu with categories like Feature Settings, Sales, Products, Salesforce Scheduler, and Objects and Fields. The main content area is titled 'Scheduled Jobs' and displays a table of all scheduled jobs. A yellow banner at the top of the table indicates that 3% of the scheduled jobs limit is used. The table columns include Action, Job Name, Submitted By, Submitted, Started, Next Scheduled Run, Type, and Cron Trigger ID. The jobs listed are 'Daily At-Risk Student Notifier', 'Daily Event Summary Batch', 'Metalytics Data Loader Job for Org : 00DgL000007eNjd', 'Nightly Student Probation Update', and 'Program Milestone Computation Cron Job'.

Action	Job Name	Submitted By	Submitted	Started	Next Scheduled Run	Type	Cron Trigger ID
Manage Del Pause Job	Daily At-Risk Student Notifier	Garole, Gauri	9/22/2025, 7:15 AM	9/22/2025, 8:00 AM	9/23/2025, 8:00 AM	Scheduled Apex	08egl00000CUBKl
Manage Del Pause Job	Daily Event Summary Batch	Garole, Gauri	9/22/2025, 7:22 AM	9/22/2025, 7:22 AM	9/23/2025, 6:00 AM	Scheduled Apex	08egl00000CUBHT
Del	Metalytics Data Loader Job for Org : 00DgL000007eNjd	User Integration	7/21/2025, 10:49 AM	9/22/2025, 2:50 PM	9/23/2025, 2:50 PM	Autonomous Data Loader Job	08egl000008GpZr
Manage Del Pause Job	Nightly Student Probation Update	Garole, Gauri	9/22/2025, 7:20 AM	9/22/2025, 11:00 PM	9/23/2025, 11:00 PM	Scheduled Apex	08egl00000CUCZW
	Program Milestone Computation Cron Job	Process, Automated	7/21/2025, 10:49 AM	9/22/2025, 11:59 PM	9/23/2025, 6:59 AM	Program Milestone Computation Cron Job	08egl000008GpZp

10. Future Methods

- External notification API (mocked for now).
- Runs asynchronously to avoid blocking DML transactions.

11. Exception Handling

- Custom exceptions created for:
 - Overlapping event dates.
 - Invalid attendance updates.
- Errors logged for admins to review.

12. Test Classes

- **StudentServiceTest.cls** → Validates business logic.
- **StudentTriggerHandlerTest.cls** → Ensures Student trigger works for bulk inserts.
- **EventTriggerHandlerTest.cls** → Validates Event logic.
- **BatchAndScheduledApexTest.cls** → Covers batch jobs and schedulable logic.

The screenshot shows the Salesforce Setup interface for the **StudentServiceTest** Apex Class. The left sidebar contains a search bar with "apex clas" and a "Custom Code" section with "Apex Classes" selected. The main content area displays the class details for **StudentServiceTest**, including its name, namespace prefix, last modified by (Gauri Garole), and status (Active). Below the details, there are tabs for "Class Body", "Class Summary", "Version Settings", and "Trace Flags". The "Class Body" tab is active, showing the following code:

```
1 /**
2  * @description Test class for StudentService
3  * @author CampusConnect Development Team
4  * @date 2025
5  */
6 @isTest
7 public class StudentServiceTest {
8
9     /**
10     * @description Test data setup method
11     */
12     @TestSetup
13     static void setupTestData() {
14         // Create test students
15         List<Student__c> testStudents = new List<Student__c>();
16     }
```

The screenshot shows the Salesforce Setup interface for the **EventTriggerHandlerTest** Apex Class. The left sidebar contains a search bar with "apex clas" and a "Custom Code" section with "Apex Classes" selected. The main content area displays the class details for **EventTriggerHandlerTest**, including its name, namespace prefix, last modified by (Gauri Garole), and status (Active). Below the details, there are tabs for "Class Body", "Class Summary", "Version Settings", and "Trace Flags". The "Class Body" tab is active, showing the following code:

```
1 /**
2  * @description Test class for EventTriggerHandler and EventTrigger
3  * @author CampusConnect Development Team
4  * @date 2025
5  */
6 @isTest
7 public class EventTriggerHandlerTest {
8
9     /**
10     * @description Test data setup method
11     */
12     @TestSetup
13     static void setupTestData() {
14         // Create test events that won't trigger validation issues
15         List<Event__c> testEvents = new List<Event__c>();
16     }
```

Business Impact

- Students' academic standing automatically updated with no manual intervention.
- Faculty notified daily about at-risk students.
- Prevents invalid event scheduling.
- Scalable system ready for large data volumes with async jobs.