School of Computing and Artificial Intelligence

Faculty of Engineering and Technology

Sunway University

SYSTEM DESIGN SPECIFICATION

SEMESTER	: JUNE 2025
COURSE NAME	: BIS2102 INFORMATION SYSTEM ANALYSIS AND DESIGN
LECTURER	: ASSOC. PROF. TS. DR. ASLINA BAHARUM
SYSTEM NAME	: Smart Waitlist System for Enhancing iZone Subject Enrolment
PROGRAM NAME	: Bachelor of Information Systems (Honours) (Data Analytics)
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DATE OF SUBMISSION	04/07/2025
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NO OF DAYS LATE	

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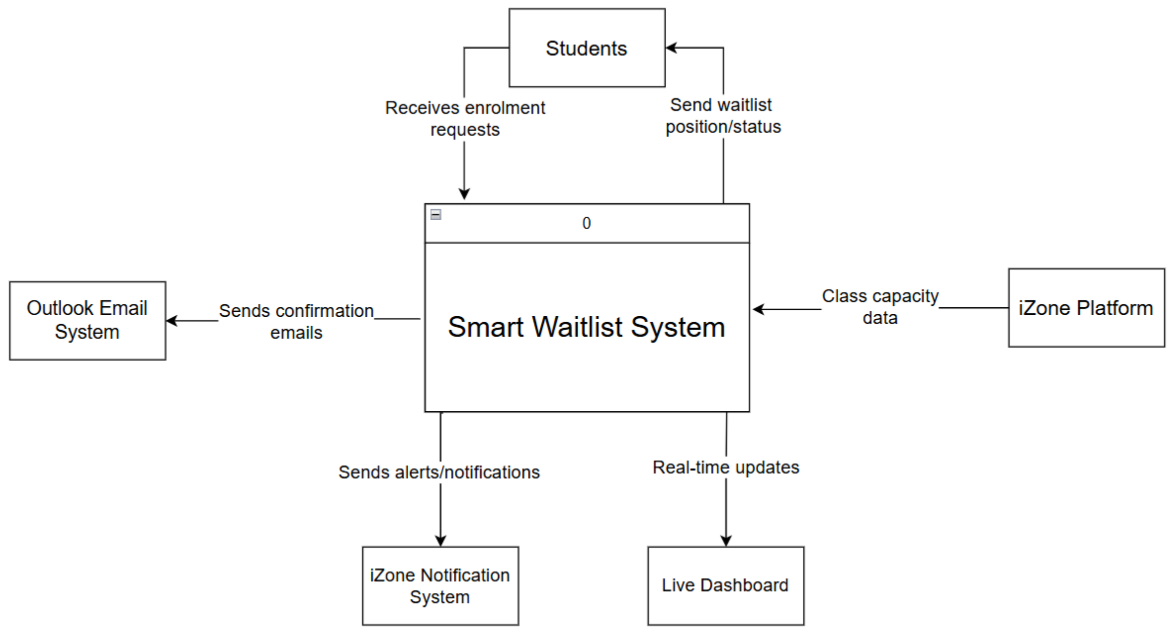
1.0 Context Diagram

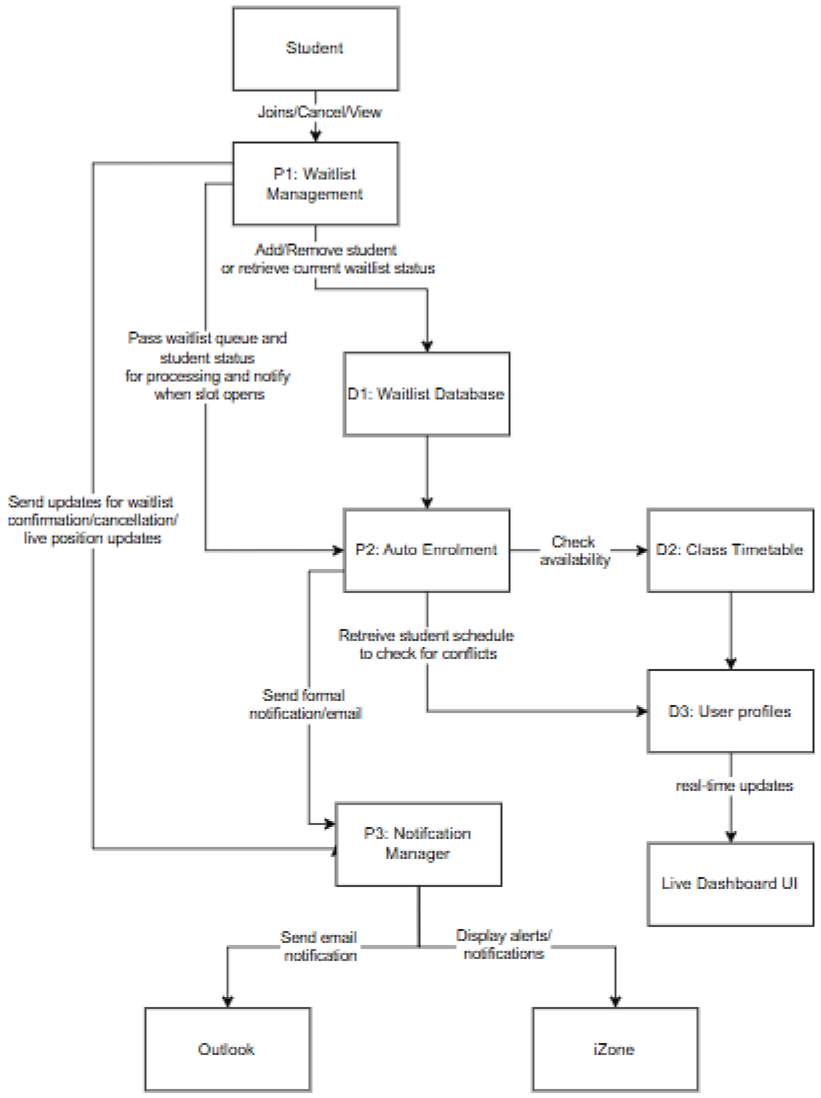
The context diagram shows how the Smart Waitlist System interacts with Students, iZone Notification System, Live Dashboard System, Outlook Email System and the iZone Platform.

Entity	Role
Smart Waitlist System	Handles all waitlist automation
Students	• Join waitlist • Cancel Waitlist • Views waitlist information on live dashboard • Receives alerts and email notifications
iZone Notification System	Sends real-time alert messages on the iZone homepage to notify students of any changes
Live Dashboard System	Displays waitlist information (position, number of students ahead, status)
Outlook Email System	Sends confirmation emails for any updates on waitlist
iZone Platform	Provides class capacity data and manages course enrolment and timetable data


Students
Receives enrolment requests
Send waitlist position/status
0
Smart Waitlist System
Outlook Email System
Sends confirmation emails
Class capacity data
iZone Platform
Sends alerts/notifications
Real-time updates
iZone Notification System
Live Dashboard

2.0 Data Flow Diagram

2.1 Data Flow Diagram Level 0


Student
Joins/Cancel/View
P1: Waitlist Management
Add/Remove student or retrieve current waitlist status
Pass waitlist queue and student status for processing and notify when slot opens
D1: Waitlist Database
Send updates for waitlist confirmation/cancellation/ live position updates
P2: Auto Enrolment
Check availability
D2: Class Timetable
Retreive student schedule to check for conflicts
Send formal notification/email
D3: User profiles
real-time updates
P3: Notifcation Manager
Live Dashboard UI
Send email notification
Display alerts/ notifications
Outlook
iZone

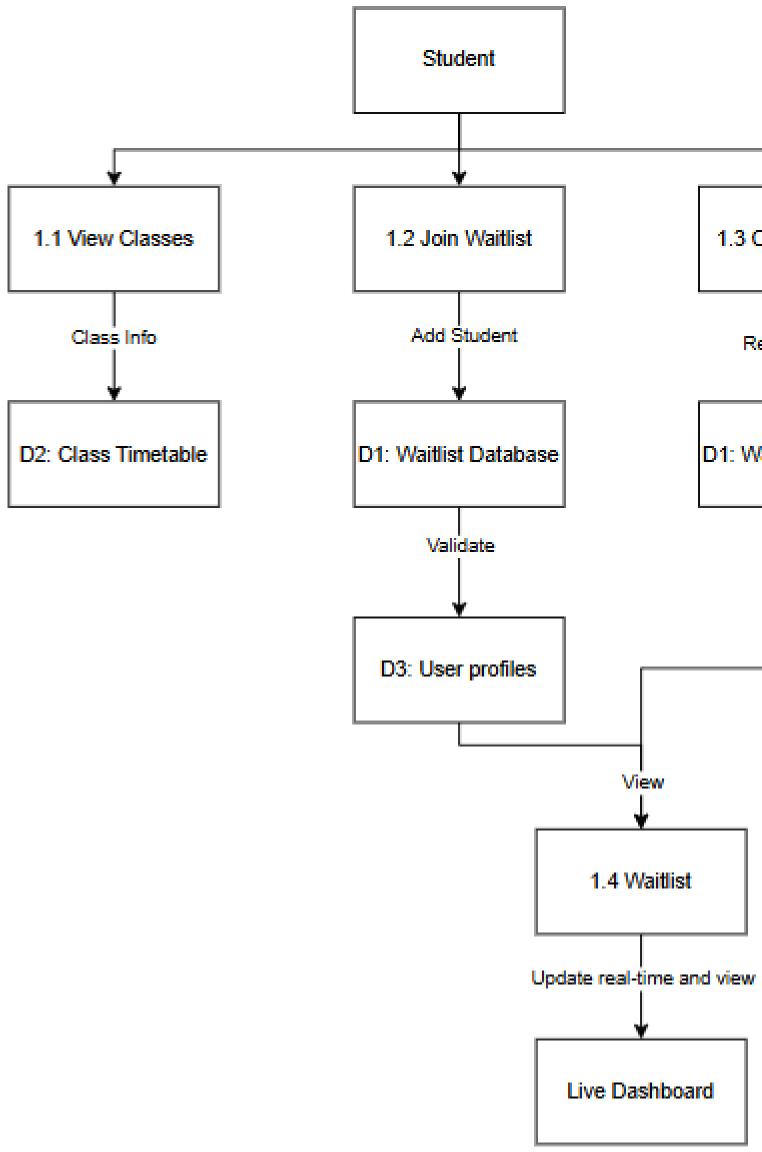
The diagram represents a high-level overview of the waitlist management system and its interaction with external entities. It includes one primary process: P1: Waitlist Management, which interacts with the Student and internal systems.

Key Features

- External Entity

  - Student: Can join, cancel, or view the waitlist
- Main Process:
  - P1: Waitlist Management – Handles student waitlist actions and communicates with the system for processing.
- Supporting Systems:
  - D1: Waitlist Database – Stores and manages waitlist data
  - P2: Auto Enrolment – Automatically checks and enrolls students based on class availability and schedule conflict.
  - D2: Class Timetable – Provides class slot availability
  - D3: User Profiles – Used to verify schedule conflicts
  - P3: Notification Manager – Sends updates through Outlook and iZone
  - Live Dashboard: Displays real-time waitlist updates.

2.2 Data Flow Diagram Level 1



This diagram breaks down the Waitlist Management process into sub-processes, detailing specific student actions and system interactions.

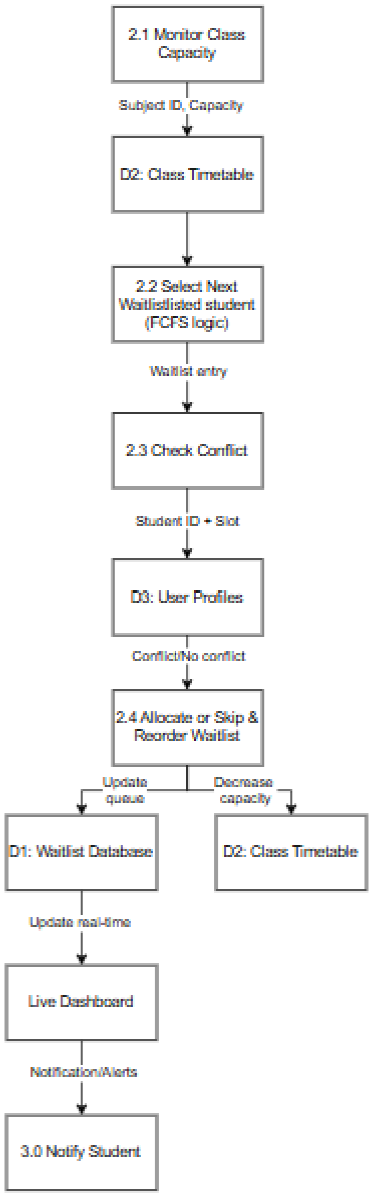
Sub-processes:

1. 1.1 View Classes:
   a. Students retrieve class info from D2: Class Timetable.
2. 1.2 Join Waitlist:

    a. Adds a student to D1: Waitlist Database
    b. Validates the entry using D3: User Profiles
    c. Updates 1.4 Waitlist, which displays real-time updates in the Live Dashboard

3. 1.3 Cancel Waitlist:
    a. Removes the student from D1: Waitlist Database
    b. Updates 1.4 Waitlist and Live Dashboard
4. 1.4 Waitlist:
    a. Central waitlist view
    b. Pushes real-time updates to Live Dashboard

2.3 Data Flow Diagram Level 2



This diagram breaks down the Auto Enrolment process, specifically how the system selects and enrolls a student when a class slot becomes available.

Sub processes:

1. 2.1 Monitor Class Capacity:
   a. Monitors class availability using D2: Class Timetable.
2. 2.2 Select Next Waitlisted Student:

    a. Uses FCFS (First-Come-First-Serve) logic to pick the next student from the waitlist
3. 2.3 Check Conflict:
    a. Cross-reference students’ existing schedule from D3: User Profiles for any conflicts.
4. 2.4 Allocate or Skip & Reorder Waitlist
    a. If there is no conflict, the student is enrolled
    b. Updates:
        i. D1: waitlist Database (removes the student or reorders)
        ii. D2: Class Timetable (decreases available capacity)
    c. Live Dashboard
5. 3.0 Notify Student:
    a. Sends email or alerts via Notification Manager

3.0 Data Dictionary

Table: Students

This table contains the personal and login information of students who uses iZone system where each student has a unique identifier and can access features like waitlists, receiving alerts, and viewing their live dashboard status during the enrolment period.

Column Name	**Description**	**Data Type**	**Length**	**Constraints**	**Default Value**	**Relationships**
StudentID	Unique identifier for each student	Integer	8	Primary Key	N/A	Referenced in: WaitlistEntry, Notifications, LiveDashboard
FullName	Full name of the student	String	100	Not Null	N/A	N/A
Email	Student's registered university email address	String	100	Not Null, Unique	N/A	N/A
IsLoggedIn	Student's current login status	Boolean	N/A	Not Null	False	N/A

Table: Subjects

This subject represents the academic courses offered at Sunway University depending on which semester. Each subject has a unique code and includes metadata such as subject name and its respective credit hours.

Column Name	**Description**	**Data Type**	**Length**	**Constraints**	**Default Value**	**Relationships**
SubjectCode	Unique identifier for each subject (Ex: BIS1234)	String	20	Primary Key	N/A	Referenced in: TimeSlots, Waitlist
SubjectName	Name of the subject	String	100	Not Null	N/A	N/A
creditHours	Credit hours for the subject	Integer	1	Not Null	N/A	N/A

Table: Timeslots

The timeslots table stores the scheduled class sessions such as tutorials, lectures, workshop for each subject. It includes the capacity and the number of students enrolled as well.

Column Name	**Description**	**Data Type**	**Length**	**Constraints**	**Default Value**	**Relationships**
slotID	Unique ID for each timeslot	String	20	Primary Key	N/A	Referenced in: Waitlist, LiveDashboard
SubjectCode	Links to Subjects table	String	50	Foreign key	N/A	References Subjects (SubjectCode)
ClassType	Type of session (Lecture/Tutorial/Practical)	String	20	Not Null	N/A	N/A
Time	Scheduled time for the time slot	String	50	Not Null	N/A	N/A
Capacity	Maximum number of students allowed	Integer	8	Not Null	N/A	N/A
EnrolledCount	Number of students currently enrolled	Integer	8	Not Null	0	N/A

Table: Waitlist

This waitlist acts as a controller for each time slot’s

Column Name	**Description**	**Data Type**	**Length**	**Constraints**	**Default Value**	**Relationship**
WaitlistID	Unique ID for the waitlist	Integer	8	Primary Key	Auto-Increment	N/A
SubjectCode	Foreign key linking to Subjects table	String	20	Not Null	N/A	References Subjects(SubjectCode)
SlotID	Foreign key linking to TimeSlots table	String	20	Not Null	N/A	References TimeSlots(TimeSlotID)

Table: WaitlistEntry

Column Name	**Description**	**Data Type**	**Length**	**Constraints**	**Default Value**	**Relationships**
EntryID	Unique ID for waitlist entry	Integer	8	Primary Key	Auto-Increment	N/A
StudentID	Foreign key to Students table	Integer	8	Not Null	N/A	References Students (StudentID)
WaitlistID	Foreign key to Waitlist	Integer	4	Not Null	N/A	N/A
Position	Queue position in the waitlist	Integer	8	Not Null	N/A	N/A
JoinTimestamp	Date and time student joined	DateTime	N/A	Not Null	CURRENT_TIMESTAMP	N/A
Status	Current status	Enum (Waiting, Enrolled, Removed)	N/A	Not Null	‘Waiting’	N/A
IsAutoEnrolled	Flag indicating if student is auto enrolled	Boolean	N/A	Not Null	False	N/A

Table: Notifications

Column Name	**Description**	**Data Type**	**Length**	**Constraints**	**Default Value**	**Relationships**
NotificationID	Unique ID for the notification	Integer	8	Primary Key	Auto-Increment	N/A
StudentID	Foreign key linking to Students table	Integer	8	Not Null	N/A	References Students(StudentID)
Message	Notification message content	String	500	Not Null	N/A	N/A
SentTime	Timestamp of when the message was sent	DateTime	N/A	Not Null	CURRENT_TIMESTAMP	N/A

Table: AlertNotifications

Column Name	Description	Data Type	Length	Constraints	Default Value	Relationships
AlertID	Unique ID for alerts	String	20	Primary Key	N/A	N/A
StudentID	Foreign key to Students table	Integer	8	Not Null	N/A	References Students(StidentID)
Message	Alert content	String	500	Not Null	N/A	N/A
Timestamp	Time created	DateTime	N/A	Not Null	CURRENT_TIMESTAMP	N/A
IsRead	If alert has been read	Boolean	N/A	Not Null	False	N/A

Table: LiveBashboard

Column Name	Description	Data Type	Length	Constraints	Default Value	Relationships
SlotID	Foreign Key linking to TimeSlots table	Integer	8	Not Null	N/A	References TimeSlots (SlotID)
StudentID	Foreign Key linking to Students	Integer	8	Not Null	N/A	References Students (StudentID)
SubjectCode	Foreign Key linking to Subjects	String	50	Not Null	N/A	References Subjects (SubjectID)

Time	Scheduled time for the time slot	String	50	Not Null	N/A	
Queue Number	The student's current position in the waitlist queue	Integer	8	Not Null	N/A	
EnrolledCount	Number of students currently enrolled	Integer	8	Not Null	N/A	
WaitlistCount	Number of students currently on the waitlist	Integer	8	Not Null	N/A	
IsSlotFull	Boolean indicator if the slot is full	Boolean	N/A	Not Null	False	Calculated
AutoEnrolmentInProgress	Indicates if auto-enrolment is processing	Boolean	N/A	Not Null	False	N/A

Relationships

- One-to-One:
    - One Student can only join one WaitlistEntry
    - One TimeSlot can only have one Waitlist
- One-to-Many
    - One Subject can have many TimeSlots
    - One Student can receive many Notifications

    - One Student can receive many AlertNotification

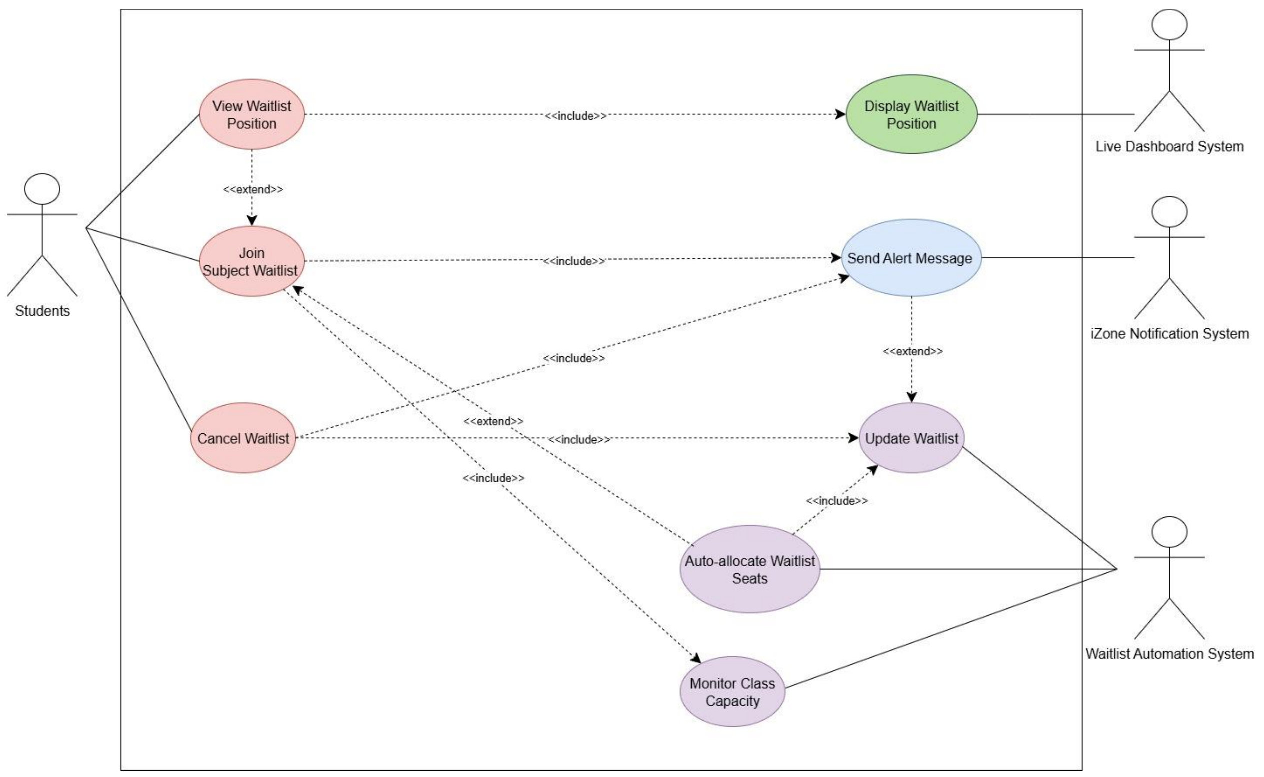
Metadata

- Data Source: iZone System Backend
- Owner: Sunway University’s IT Service Department
- Update Frequency: Real-Time (live updates during enrolment period)

Benefits of this Data Dictionary

- Clear understanding of how students, subjects, time slots, waitlists are structured
- Defines all necessary constraints to avoid duplicate waitlist entries per subject
- Supports auto-enrolment and notification workflows
- Provides a reference for system developers and university administrators

4.0 Use Case Diagram with Relationships



Include & Extend Relationship:

Include Relationship

1. Use Cases: **Join Subject Waitlist**, **Monitor Class Capacity**
   - The “Join Subject Waitlist” use case includes the functionality of the “Monitor Class Capacity” use case.
   - Waitlist automation system checks if a class is full before students joining the waitlist for a preferred time slot. Students can only join the waitlist after checking class capacity. If the class time slot is full, then students can choose to join a waitlist.
2. Use Cases: **Auto-allocate Waitlist Seats**, **Update Waitlist**
   - The “Auto-allocate Waitlist Seats” use case includes the functionality of the “Update Waitlist” use case.
   - Once a student is allocated a seat, the waitlist automation system must update the waitlist queue.

3. Use Cases: **Join Subject Waitlist**, **Send Alert Message**
    - The “Join Subject Waitlist” use case includes the functionality of the “Send Alert Message” use case.
    - Every time a student joins a waitlist, the iZone Notification System must send an alert on iZone homepage to alert the students to check their email for more details.
4. Use Cases: **Cancel Waitlist**, **Send Alert Message**
    - The “Cancel Waitlist” use case includes the functionality of the “Send Alert Message” use case.
    - When a student cancels a waitlist, the iZone Notification System must send an alert on iZone homepage to alert the students to check their email for more details.
5. Use Cases: **View Waitlist Position**, **Display Waitlist Position**
    - The “View Waitlist Position” use case includes the functionality of the “Display Waitlist Position” use case.
    - Once the student initiates the view action, the Live Dashboard System responds by displaying the relevant waitlist information such as position, and number of students ahead.
6. Use Cases: **Cancel Waitlist**, **Update Waitlist**
    - The “Cancel Waitlist” use case includes the functionality of the “Update Waitlist” use case.
    - After cancellation, the Waitlist Automation System must update the waitlist (e.g. remove the student, shift others up).

Extend Relationship

1. Use Cases: **Join Subject Waitlist, View Waitlist Position**
    - The “View Waitlist Position” use case may extend the “Join Subject Waitlist” use case.

- Students can view their waitlist information (position, status and number of students ahead) only after they have joined the waitlist. Students must click Live Dashboard manually first to view their waitlist information.

2. Use Cases: **Join Subject Waitlist**, **Auto-allocate Waitlist Seats**
    - The “Auto-allocate Waitlist Seats” use case may extend the “Join Subject Waitlist” use case.
    - After joining a waitlist, the Waitlist Automation System will automatically allocate seats to students if a seat becomes available. Seat allocation only happens when a seat opens, the student is first in the queue and has no schedule conflict.
3. Use Cases: **Update Waitlist**, **Send Alert Message**
    - The “Send Alert Message” use case may extend the “Update Waitlist” use case.
    - After any updates from waitlist, the iZone Notification System sends alert messages on iZone homepage. Alert messages will pop up on the iZone homepage when a student joins a waitlist, cancels a waitlist, is auto enrolled in a class, has a schedule conflict and when the enrolment period ends.

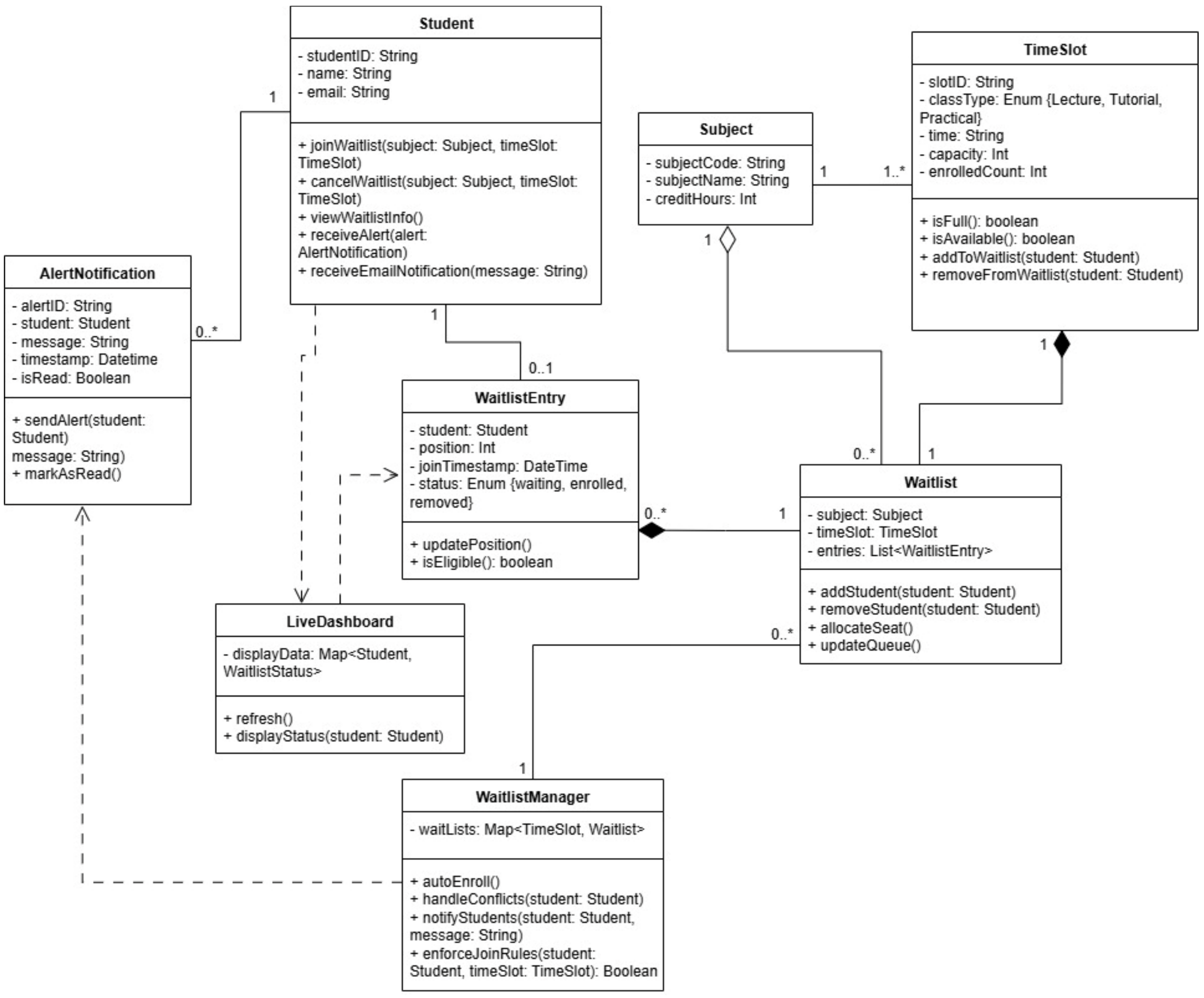
5.0 Class Diagram

In the Unified Modeling Language (UML), a class diagram is a kind of static structure diagram that illustrates a system's classes, properties, operations, and relationships between its objects to explain its structure. An essential component of object-oriented modeling and design is class diagrams.

Classes:

- Each class is represented as a rectangle and is split into 3 parts:
    - The top section is the class name
    - The middle section is for the attributes
    - The last bottom section is for the methods or functions the class perform

Diagram:



Student
- studentID: String
- name: String
- email: String
+ joinWaitlist(subject: Subject, timeSlot: TimeSlot)
+ cancelWaitlist(subject: Subject, timeSlot: TimeSlot)
+ viewWaitlistInfo()
+ receiveAlert(alert: AlertNotification)
+ receiveEmailNotification(message: String)
TimeSlot
- slotID: String
- classType: Enum {Lecture, Tutorial, Practical}
- time: String
- capacity: Int
- enrolledCount: Int
+ isFull(): boolean
+ isAvailable(): boolean
+ addToWaitlist(student: Student)
+ removeFromWaitlist(student: Student)
Subject
- subjectCode: String
- subjectName: String
- creditHours: Int
AlertNotification
- alertID: String
- student: Student
- message: String
- timestamp: Datetime
- isRead: Boolean
+ sendAlert(student: Student) message: String)
+ markAsRead()
WaitlistEntry
- student: Student
- position: Int
- joinTimestamp: DateTime
- status: Enum {waiting, enrolled, removed}
+ updatePosition()
+ isEligible(): boolean
Waitlist
- subject: Subject
- timeSlot: TimeSlot
- entries: List<WaitlistEntry>
+ addStudent(student: Student)
+ removeStudent(student: Student)
+ allocateSeat()
+ updateQueue()
LiveDashboard
- displayData: Map<Student, WaitlistStatus>
+ refresh()
+ displayStatus(student: Student)
WaitlistManager
- waitLists: Map<TimeSlot, Waitlist>
+ autoEnroll()
+ handleConflicts(student: Student)
+ notifyStudents(student: Student, message: String)
+ enforceJoinRules(student: Student, timeSlot: TimeSlot): Boolean
1
0..*
1
0..1
1
1..*
1
0..*
1
1
0..*
1
0..*
1

Key Classes:

1. Students - Represents a Sunway University student using iZone for subject enrollment

Attributes	**Data Types**	**Explanation**
studentID	String	A unique identifier of each student
name	String	Student’s full name
email	String	Student’s registered university email address
Methods	**Data Types**	**Explanation**
joinWaitlist(subject: Subject, timeSlot: TimeSlot)	-	Students join the waitlist for a specific timeslot
cancelWaitlist(subject: Subject, timeSlot: TimeSlot)	-	Cancels an existing waitlist entry
viewWaitlistInfo()	-	Opens the live dashboard to view the current position, status and number of students ahead
receiveAlert(alert: AlertNotification)	-	Receives visual alert (bell icon) on iZone homepage for waitlist updates
receiveEmailNotification(message: String)	-	Gets official email notifications via Outlook about waitlist actions

2. Subject - Represents an academic subject offered by the university

Attributes	**Data Types**	**Explanation**
subjectCode	String	Unique code for each subject (e.g., BIS1234)

subjectName	String	The subject's name
creditHours	Integer	Number of credit hours assigned to the subject

3. TimeSlot - Represents a specific session under a subject

Attributes	**Data Types**	**Explanation**
slotID	String	Unique identifier for the time slot
classType	Enum {Lecture, Tutorial, Practical}	Type of class (Lecture, Tutorial, Practical)
time	String	Day and time of the class session (e.g., MON 8am-10am)
capacity	Integer	Maximum number of students allowed
enrolledCount	Integer	Number of students currently enrolled
Methods	**Data Types**	**Explanation**
isFull()	Boolean	Returns true if the number of enrolled students has reached capacity (enrolledCount ≥ Capacity)
isAvailable()	Boolean	Returns true if there are still available seats
addToWaitlist (student: Student)	-	Adds a student to the waitlist of this time slot
removeFromWaitlist(student: Student)	-	Removes a student from the waitlist

4. Waitlist - Manages the list of students waiting for a full time slot

Attributes	**Data Types**	**Explanation**

subject	Subject	The subject the waitlist is linked to
timeSlot	TimeSlot	The specific time slot that's full
entries	List<WaitlistEntry>	- All students waiting for this time slot - A list of WaitlistEntry objects, ordered by join time
Methods	**Data Types**	**Explanation**
addStudent(student: Student)	-	Adds a student to the waitlist
removeStudent(student: Student)	-	Removes a student from the waitlist queue
allocateSeat()	-	Automatically enrolls the next eligible student if a seat opens
updateQueue()	-	Updates the queue positions after any change (e.g., a student cancels waitlist).

5. WaitlistEntry - Stores individual student's information on the waitlist queue

Attributes	**Data Types**	**Explanation**
student: Student	Student	The student on the waitlist
position	Integer	Student's current queue position
joinTimestamp	DateTime	Date and time the student joined the waitlist
status	Enum {waiting, enrolled, removed}	Current status (waiting, enrolled, removed)
Methods	**Data Types**	**Explanation**

updatePosition()	-	Recalculates the student's position when the queue changes
isEligible()	Boolean	Checks if the student can be auto-enrolled (no clashes, top of the queue, etc.)

6. WaitlistManager - The backend controller for managing waitlists and automation

Attributes	Data Types	Explanation
waitLists	Map<TimeSlot, Waitlist>	This is a mapping of time slots to their respective waitlist queues
Methods	**Data Types**	**Explanation**
autoEnroll()	-	Automatically enrolls the next eligible student when a seat becomes available
handleConflicts()	-	Skip students from waitlist queue with class schedule conflicts
notifyStudent(student: Student, message: String)	-	Send an official email notification through Outlook about any changes or updates on the waitlist
enforceJoinRules(student: Student, timeSlot: TimeSlot)	Boolean	Prevents duplicate waitlist entries for the same subject

7. AlertNotification - Handles the visual alerts on the iZone homepage (bell icon with red dot)

Attributes	Data Types	Explanation

alertID	String	Unique identifier for the alert
student	Student	The recipient of the alert
message	String	Alert message content
timestamp	DateTime	Date and time the alert was created
isRead	Boolean	Boolean value to mark if the alert has been seen
Methods	**Data Types**	**Explanation**
sendAlert(student: Student, message: String)	-	Sends a real-time visual alert to the student
markAsRead()	-	Marks the alert as read when the student views it

8. LiveDashboard - A real-time student-facing dashboard to track waitlist status

Attributes	Data Types	Explanation
displayData	Map<Student, WaitlistStatus>	A mapping of students to their current waitlist status and position
Methods	**Data Types**	**Explanation**
refresh()	-	Refreshes dashboard data to reflect the most up-to-date waitlist status
displayInfo(student: Student)	-	Shows the student’s current position, number of students ahead, and status

Relationships:

1. Association (solid line)

Classes		Explanation
Student	WaitlistEntry	- A student can only have one waitlist entry across all time slots and subjects to simplify the system design and reduce the server load. - Each WaitlistEntry is linked to one student. - One-to-one relationships.
Subject	TimeSlot	- A subject can have many time slots and each subject should have at least one time slot for a class. - One-to-many relationships.
WaitlistManager	Waitlist	- WaitlistManager manages multiple waitlists (One-to-many relationships).
AlertNotification	Student	- Each AlertNotification is sent to a specific Student. - One student can receive many alert notifications (One-to-many relationships).

2. Aggregation (hollow diamond)

Classes		Explanation
Waitlist	Subject	- A waitlist is related to a subject, but the subject exists independently. - A subject can have multiple Waitlists due to multiple time slots (One-to-many relationships).

3. Composition (filled diamond)

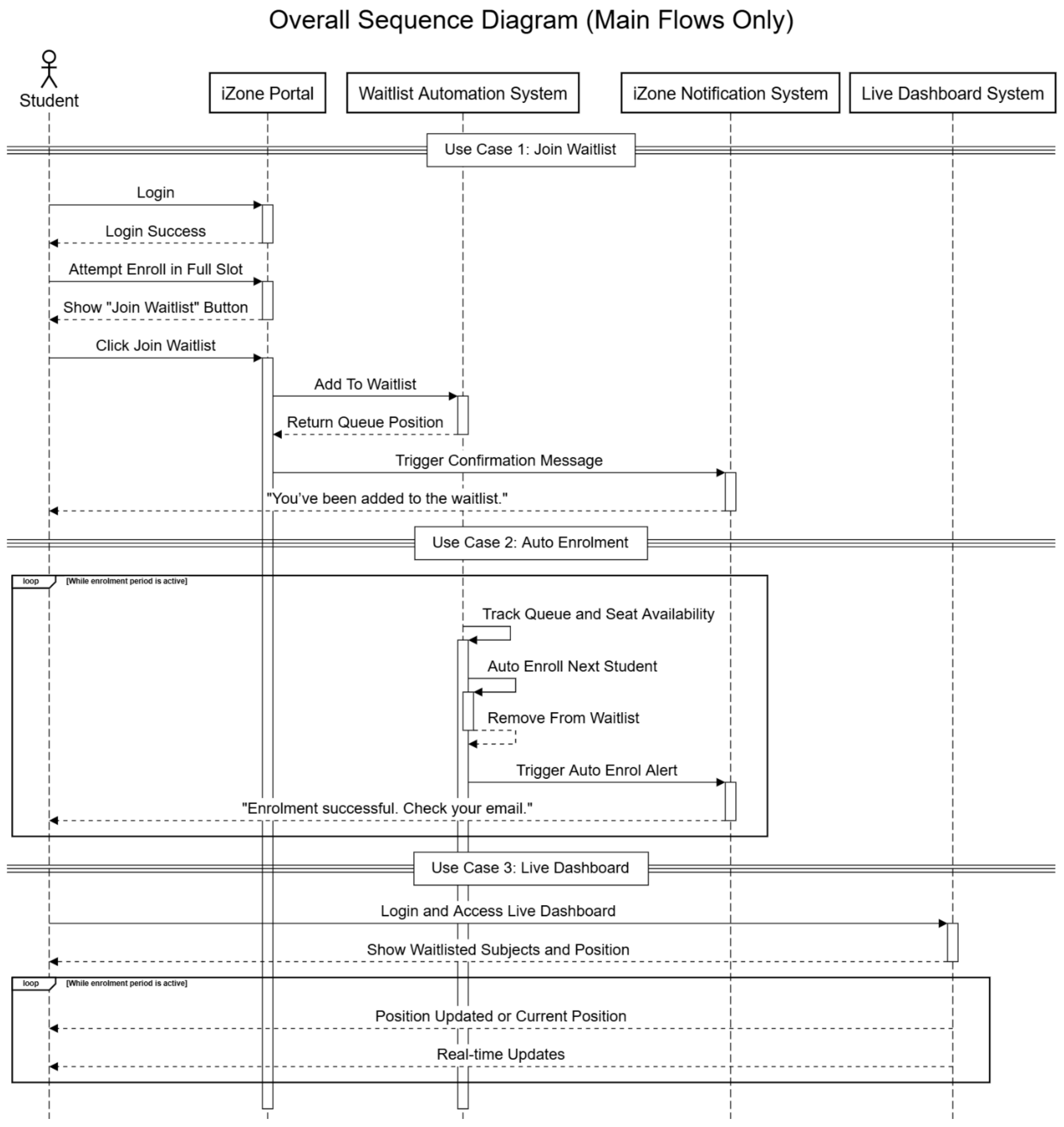
Classes		Explanation
Waitlist	WaitlistEntry	- Waitlist owns its entries. If the waitlist is deleted, entries will be deleted too.

		- One-to-many relationships
Waitlist	TimeSlot	- Each waitlist is tied to a specific time slot. - The waitlist cannot exist without its time slot. - One-to-one relationship.

4. Dependency (dashed arrow)

Classes		Explanation
WaitlistManager	AlertNotification	- WaitlistManager depends on AlertNotification to send notifications.
LiveDashboard	WaitlistEntry	- The LiveDashboard depends on WaitlistEntry to display real-time waitlist information, but it does not own or modify the data, it only reads it for display purposes.
Student	LiveDashbaord	- Student depends on LiveDashboard to access or view waitlist information include their position, and the students ahead of them.

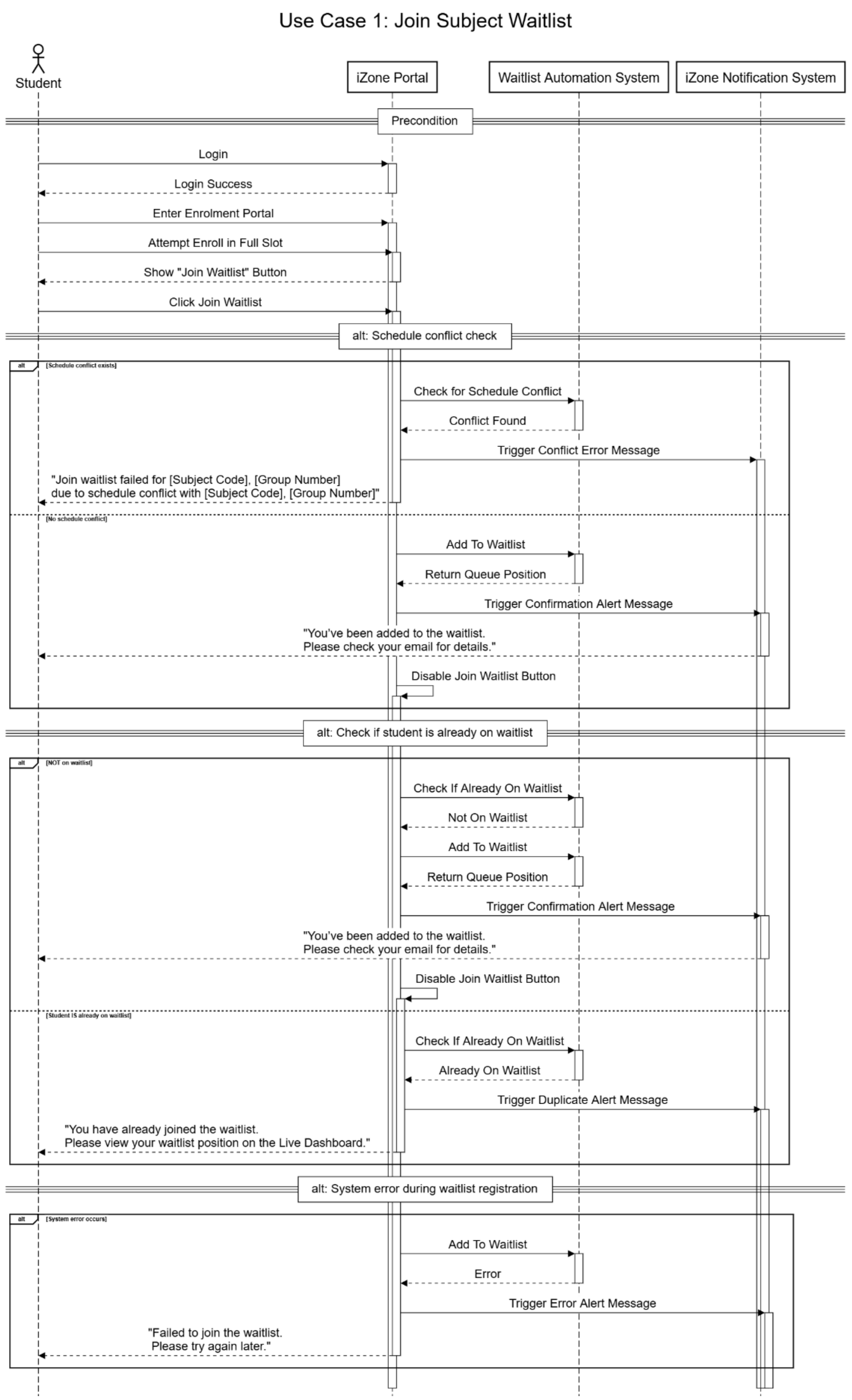
6.0 Overall Sequence Diagram


Overall Sequence Diagram (Main Flows Only)
Student
iZone Portal
Waitlist Automation System
iZone Notification System
Live Dashboard System
Use Case 1: Join Waitlist
Login
Login Success
Attempt Enroll in Full Slot
Show "Join Waitlist" Button
Click Join Waitlist
Add To Waitlist
Return Queue Position
Trigger Confirmation Message
"You've been added to the waitlist."
Use Case 2: Auto Enrolment
loop
[While enrolment period is active]
Track Queue and Seat Availability
Auto Enroll Next Student
Remove From Waitlist
Trigger Auto Enrol Alert
"Enrolment successful. Check your email."
Use Case 3: Live Dashboard
Login and Access Live Dashboard
Show Waitlisted Subjects and Position
loop
[While enrolment period is active]
Position Updated or Current Position
Real-time Updates

For a more detailed version which consists of every flows(main flows and alternative flows): SequenceDiagram.org

The above is the overall sequence diagram that shows only the main flows to provide an overall picture of the iZone Smart Waitlist System. It consists of the flow of the three main uses cases, from student joining waitlist to how the waitlist automation system will respond to student's request meanwhile students are able to receive notifications in order to catch up with the latest updates. There is also a live dashboard which allows students to check their latest status and position in the waitlist. The overall sequence diagrams mainly uses loop and alternatives logic in fragments to cover all the conditional paths such as handling errors, cancellations, conflict scheduling and sending reminders.

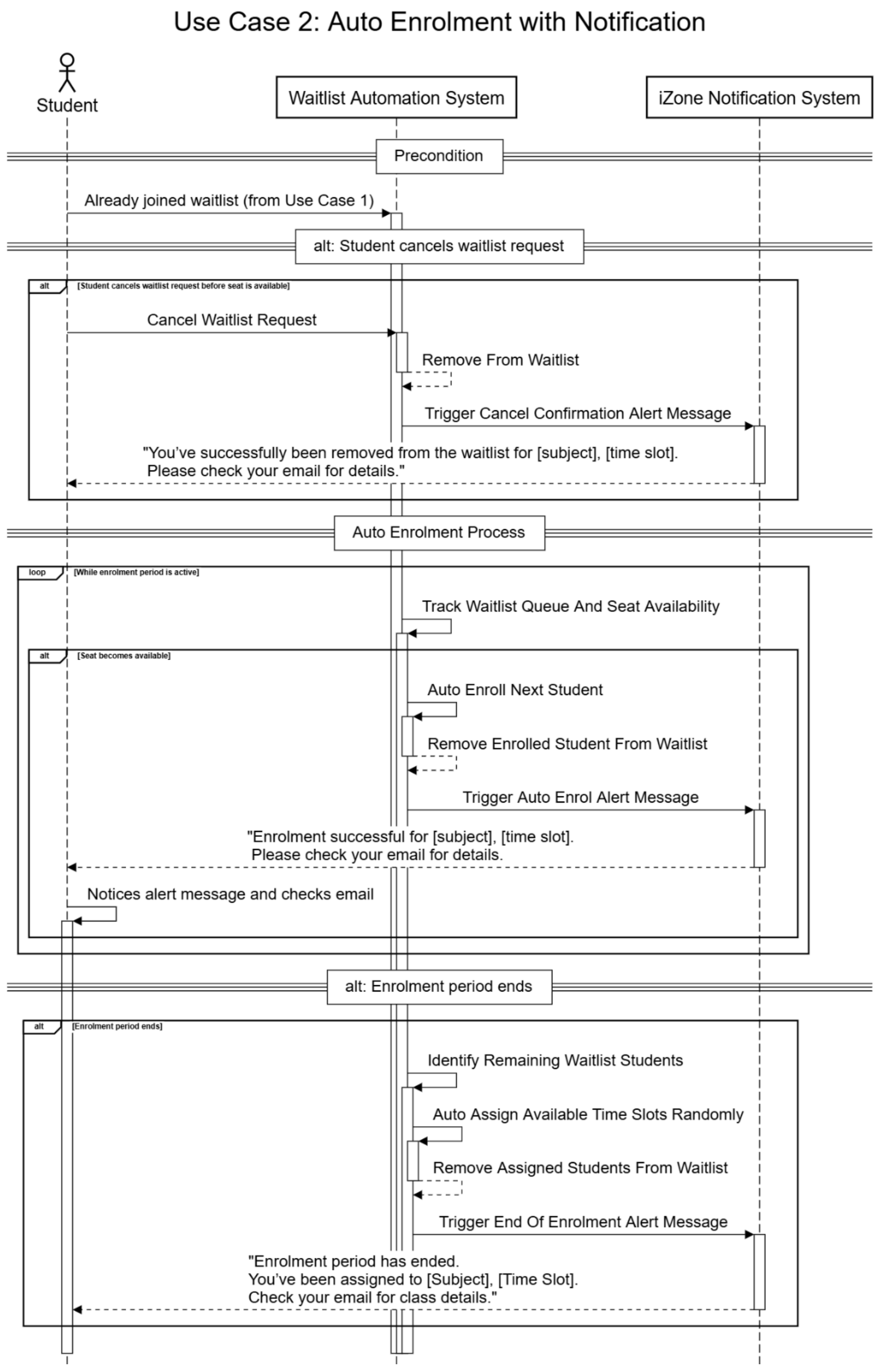
6.1 Use Case 1: Join Waitlist


Use Case 1: Join Subject Waitlist
Student
iZone Portal
Waitlist Automation System
iZone Notification System
Precondition
Login
Login Success
Enter Enrolment Portal
Attempt Enroll in Full Slot
Show "Join Waitlist" Button
Click Join Waitlist
alt: Schedule conflict check
alt
[Schedule conflict exists]
Check for Schedule Conflict
Conflict Found
Trigger Conflict Error Message
"Join waitlist failed for [Subject Code], [Group Number] due to schedule conflict with [Subject Code], [Group Number]"
[No schedule conflict]
Add To Waitlist
Return Queue Position
Trigger Confirmation Alert Message
"You've been added to the waitlist. Please check your email for details."
Disable Join Waitlist Button
alt: Check if student is already on waitlist
alt
[NOT on waitlist]
Check If Already On Waitlist
Not On Waitlist
Add To Waitlist
Return Queue Position
Trigger Confirmation Alert Message
"You've been added to the waitlist. Please check your email for details."
Disable Join Waitlist Button
[Student is already on waitlist]
Check If Already On Waitlist
Already On Waitlist
Trigger Duplicate Alert Message
"You have already joined the waitlist. Please view your waitlist position on the Live Dashboard."
alt: System error during waitlist registration
alt
[System error occurs]
Add To Waitlist
Error
Trigger Error Alert Message
"Failed to join the waitlist. Please try again later."

For clearer view: Join Waitlist Sequence Diagram.org

The sequence diagram depicts a student’s workflow for joining a subject waitlist in the iZone Portal. The actors involved are the students, iZone Portal, Waitlist Automation System and iZone Notification System. It starts with the student logging in, navigating to the enrollment portal, and trying to enroll in a particular subject. If the subject is fully booked, the system shows a button “Join Waitlist”. After students click ‘Join Waitlist’, the system will first check whether the time slot that students intended to join waitlist clashes with their current enrolled time slots. If there is a schedule conflict, an error message will be prompted. Otherwise, the system will proceed with verifying whether the student is on the waitlist for that subject. In case the student is not on the waitlist, they are added with a queue position returned and confirmation alert triggered. Otherwise, alert message is displayed. There is also an alert for errors in registration attempting to process the requests. These notifications are sent to the students by the iZone Notification System.

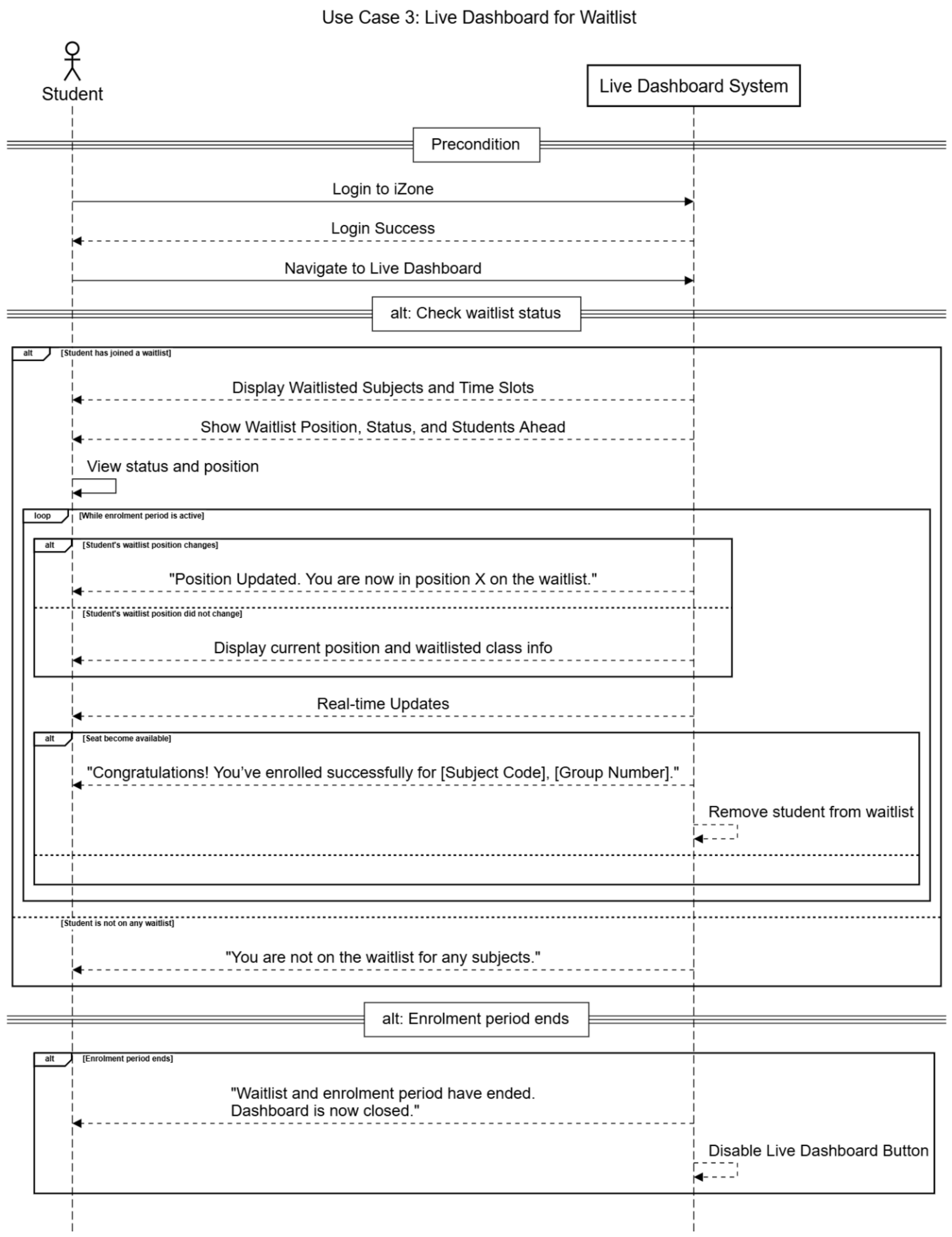
6.2 Use Case 2: Auto Enrollment with Notification


Use Case 2: Auto Enrolment with Notification
Student
Waitlist Automation System
iZone Notification System
Precondition
Already joined waitlist (from Use Case 1)
alt: Student cancels waitlist request
alt
[Student cancels waitlist request before seat is available]
Cancel Waitlist Request
Remove From Waitlist
Trigger Cancel Confirmation Alert Message
"You've successfully been removed from the waitlist for [subject], [time slot]. Please check your email for details."
Auto Enrolment Process
loop
[While enrolment period is active]
Track Waitlist Queue And Seat Availability
alt
[Seat becomes available]
Auto Enroll Next Student
Remove Enrolled Student From Waitlist
Trigger Auto Enrol Alert Message
"Enrolment successful for [subject], [time slot]. Please check your email for details.
Notices alert message and checks email
alt: Enrolment period ends
alt
[Enrolment period ends]
Identify Remaining Waitlist Students
Auto Assign Available Time Slots Randomly
Remove Assigned Students From Waitlist
Trigger End Of Enrolment Alert Message
"Enrolment period has ended. You've been assigned to [Subject], [Time Slot]. Check your email for class details."

For clearer view: [Auto Enrollment Sequence Diagram.org]

The sequence diagram above shows the use case of Auto Enrolment with Notification for students who are on a subject waitlist. The actors involved are the students, Waitlist Automation System and iZone Notification System. To begin, the process starts with the Waitlist Automation System monitoring the queue to look for available seats. Whenever a seat opens, the system automatically enrolls the next student in line, drops them from the waitlist, and sends out an auto-enrolment alert via iZone Notification System. This cycle will loop while the enrollment period remains active. If the enrollment period ends before all students are automatically enrolled, the system then randomly assigns the remaining slots to waitlisted students, disenrolls them from the waitlist, and sends an end-of-enrollment notification. Moreover, students can at any time decide to cancel their waitlist request, triggering the system to remove them from the list and send cancellation confirmation.

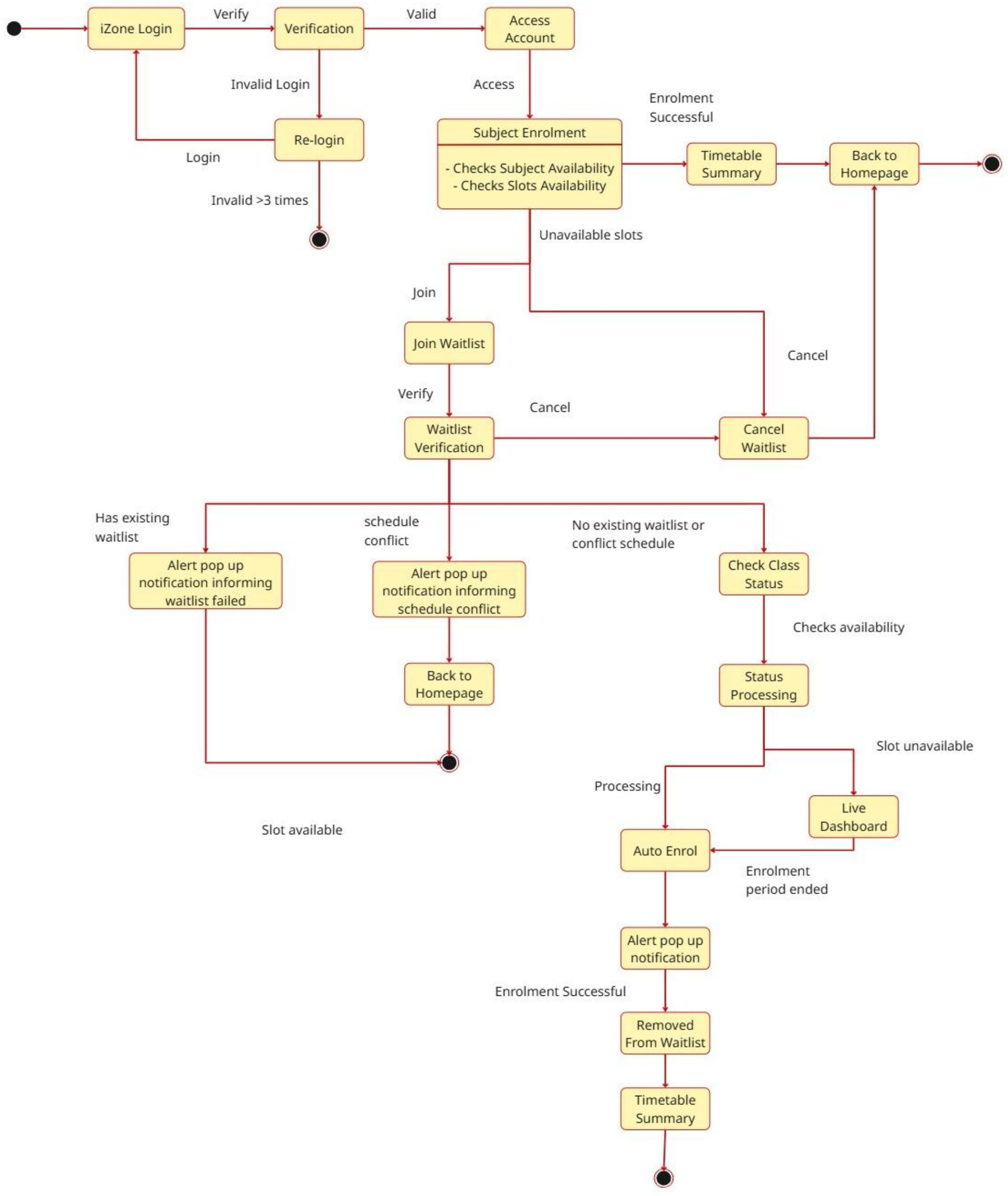
6.3 Use Case 3: Live Dashboard


Use Case 3: Live Dashboard for Waitlist
Student
Live Dashboard System
Precondition
Login to iZone
Login Success
Navigate to Live Dashboard
alt: Check waitlist status
alt
[Student has joined a waitlist]
Display Waitlisted Subjects and Time Slots
Show Waitlist Position, Status, and Students Ahead
View status and position
loop
[While enrolment period is active]
alt
[Student's waitlist position changes]
"Position Updated. You are now in position X on the waitlist."
[Student's waitlist position did not change]
Display current position and waitlisted class info
Real-time Updates
alt
[Seat become available]
"Congratulations! You've enrolled successfully for [Subject Code], [Group Number]."
Remove student from waitlist
[Student is not on any waitlist]
"You are not on the waitlist for any subjects."
alt: Enrolment period ends
alt
[Enrolment period ends]
"Waitlist and enrolment period have ended. Dashboard is now closed."
Disable Live Dashboard Button

For clearer view: Live Dashboard Sequence Diagram.org

Th sequence diagram above demonstrates Use Case 3 which is Live Waitlist Dashboard detailing the student’s engagement flow with the Live Dashboard System for tracking their waitlist. The actors involved are the student and Live Dashboard System. The process starts with logging into iZone, during which the live dashboard is accessed, and the student dashboard loads. For students entered a waitlist, the system shows pertinent subjects and time slots with the student's position, status, and number of students ahead. Throughout the enrollment period, the dashboard offers real-time updates. Data is refreshed dynamically including changes to the student’s position or status. Alert message will also be displayed on dashboard to students who is enrolled automatically when seat becomes available, at the same time, it will trigger removal of enrolled students from the waitlist. In cases where the student has no active waitlists, the system presents corresponding notifications. Upon the enrollment period ending, the live dashboard button will be disabled and students will not be able to view the live dashboard.

7.0 State Transition Diagram



State	Explanation

Log In into iZone	This is the first state where the users attempt to access the iZone portal. They will be required to input their credentials such as their id and password to begin the authentication process. After they had entered their credentials, the system will move to the verification state to check if the credentials are valid.
Verification	In this state, the system verifies the users' login credentials. If the login is valid, the user will granted access to their account. If the login is invalid, the system will move the user to a re-login state. This validation process ensures only authorized users gain access to sensitive enrolment functionalities.
Re-Login	If the verification is invalid, the student will be moved to this state. They will be prompted to try logging in again. If there are repeated invalid attempts (e.g., more than three times), the system may block access or require additional authentication. Otherwise, they are allowed to retry the login process.
Access Account	Once the student's login is valid, they will move into this state, where they can access the full features of their account. From here, they can navigate to subject enrolment actions such as joining or cancelling a waitlist. It serves as the base from which students manage their academic registration activities.
Subject Enrolment	This is a decision-making state after accessing subject enrolment. The student may choose to join a waitlist or cancel their request. This state leads the user to the appropriate pages based on their action, ensuring that the correct next steps are performed.
Cancel Waitlist	When a user chooses to cancel joining the waitlist, the system will move them here. After the waitlist request is cancelled, the user will be brought back to the home page.
Join Waitlist	If a user chooses to join a waitlist for a full class, the system will move them into this state. The system records their request, assigns them a position in the queue (based on first-come-first-served), and displays their current position.

Waitlist verification	This state verifies whether the user has an existing waitlist or has a scheduling conflict with an already enrolled subject.
Homepage	This is the main iZone homepage where the user can navigate to the subject enrolment page, the live dashboard and view the notifications.
Alert pop up notification informing waitlist failed	If the user already has an existing waitlist enrolled, they will be unable to join another waitlist due to the rule of one waitlist per student. User will receive a pop-up notification informing them of this issue.
Alert pop up notification informing schedule conflict	If the waitlist slot that the user wishes to join clashes with a subject slot that they have already enrolled for, u ser will receive a pop-up notification informing them of this issue.
Check Class Status	This state represents the system checking for seat availability. The system will continuously monitor whether seats open in the desired class. This happens behind the scenes in real time and drives the next state based on availability and eligibility.
Status Processing	If the class is not full, this state evaluates if the user is eligible for enrolment (e.g., no timetable clash, prerequisites met). If they are not eligible, the system loops them back to waitlist monitoring. If eligible, they will proceed to automatic enrolment.
Live Dashboard	User can view the position of their queue while they are waiting for a slot to open up.
Auto Enrol	In this state, the system attempts to automatically register the student into the desired class. This only happens if the student is at the top of the waitlist, a seat is available, and no conflicts exist. It's fully automated and runs without manual intervention.
Alert Pop Up Notification	The system will send a pop-up notification on iZone to alert the user that once a slot opens and the student has enrolled in the desired class and a successful enrolment email has been sent to the user's email.
Send Notification	The system will automatically send the user an email via Outlook to let them know that they have been enrolled in the class they chosen.

Removed from Waitlist	Once the student is successfully enrolled, they are removed from the waitlist queue to prevent duplicate allocations. This is a cleanup state that ensures queue accuracy and system integrity.
Timetable Summary	After a student is successfully enrolled in their preferred class (either through auto-enrolment or direct access), the system moves to the Timetable Summary state. In this state, the student can view their updated class schedule in a consolidated format.