



# **SRI LANKA INSTITUTE OF INFORMATION TECHNOLOGY**

## **Assignment-01**

**GROUP ID: SE3030\_WE\_11**

**Year 3 Semester 2**

## **SE3030 - Software Architecture**

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## Scenario

We developed a producer-consumer plugin project using eclipse Equinox OSGI Framework for a music academy which is a private institute where students can learn music by enrolling in a preferred course as per their wish. Students can take quizzes (which are added to the system by the music teachers) prior to enrolment to get a rough idea about the level he/she falls under the chosen course category (Beginner/Intermediate/Advanced). Admin can add musical instrument details and manage them when needed. Event organizers can create events and cancel scheduled events as well. Music teachers are responsible for preparing quizzes, updating/deleting questions if needed. Middle service publisher acts as a common interface for all the publisher services. Altogether 4 consumer bundles and 5 publisher bundles were implemented to cater to this scenario.

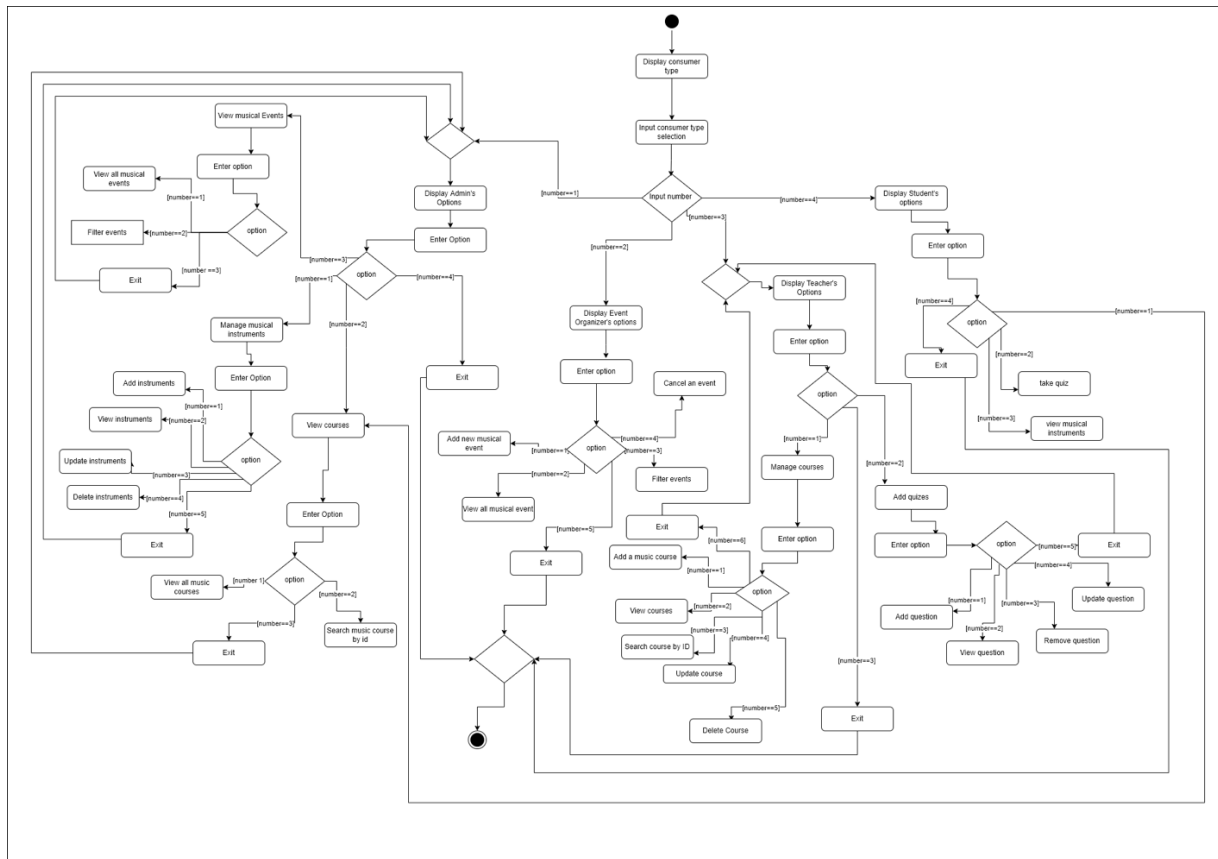
The 4 main clients/ consumers who will be using this system for multiple different purposes associated with the academy are as follows:

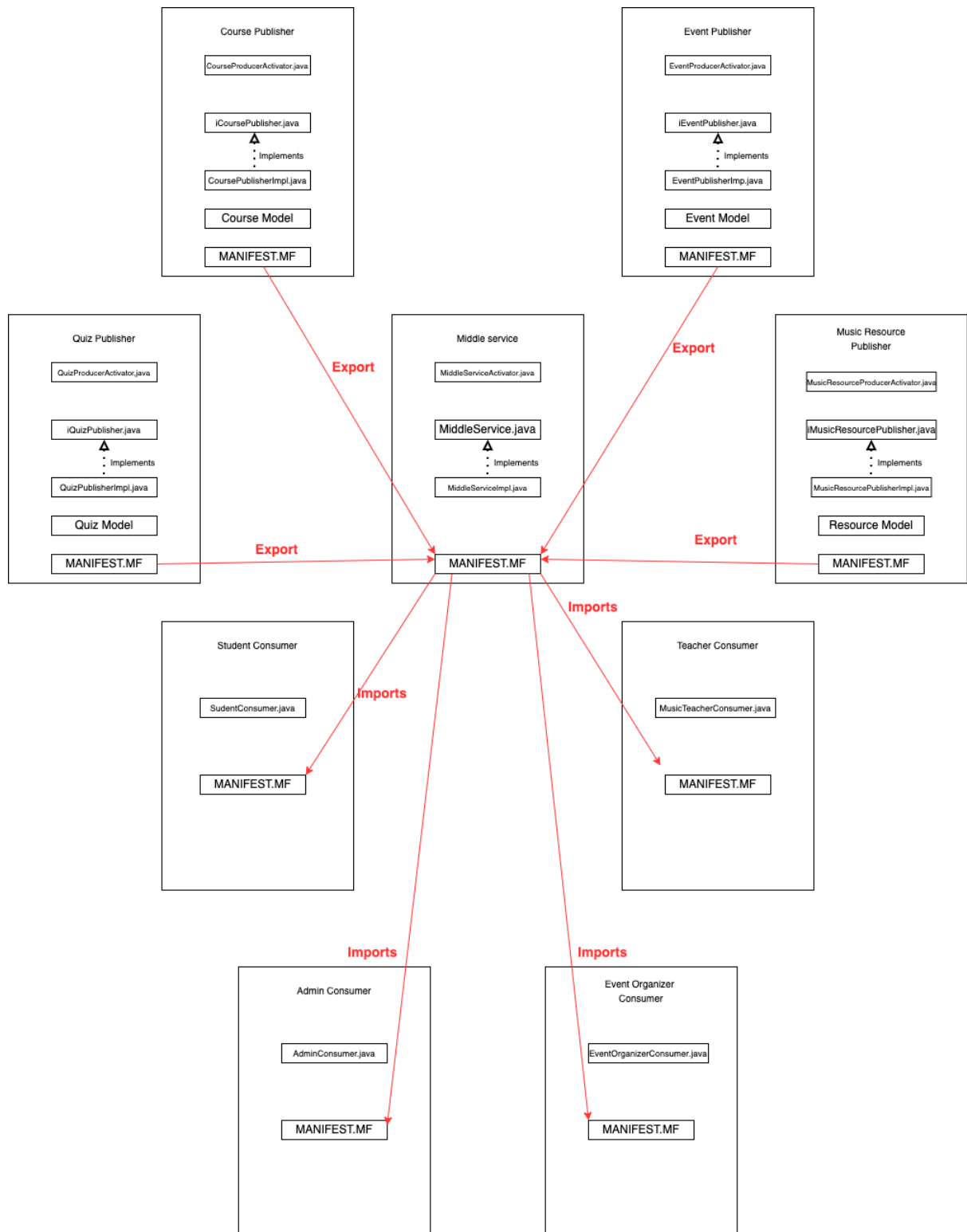
- Administrator
- Music teachers
- Students
- Musical event organizers.

The services provided by the 5 publishers to all the above-mentioned consumers are as follows:

- Students who wish to join the music academy can view all available courses (Western/Eastern/...etc) offered by the academy via this system.
- After a preferred music course is chosen by the student, he/she should face a pre-prepared small quiz relevant to the genre of the selected course to get an idea about this/her level of knowledge based on the selected genre.
- Also, the students who wish to participate in any upcoming musical event (concert/musical show/opera/jazz event or a music competition) conducted by the academy, can get to know the details of each event by filtering events according to their preferred category.
- Also, students can view all details of musical instruments that are used within the institute to train students. There can be instruments that are under sale for students so that students can purchase them as well by finding all necessary details via this system.
- Music teachers in the academy can create the above-mentioned quizzes, update, or delete already created quizzes and add new questions as well.
- Event organizers are responsible for creating new events, viewing all scheduled events, or cancelling scheduled events if needed.
- Admin can add details of resources like musical instruments, update details, or delete any of the resources that are no longer available.

## Activity Diagram





## Manifest files of all publishers and consumers

com.musicAcademy.osgi.MiddleConsumer X

```
1 Manifest-Version: 1.0
2 Bundle-ManifestVersion: 2
3 Bundle-Name: MiddleConsumer
4 Bundle-SymbolicName: com.musicAcademy.osgi.MiddleConsumer
5 Bundle-Version: 1.0.0.qualifier
6 Bundle-Activator: com.musicAcademy.osgi.middleconsumer.MiddleConsumerActivator
7 Bundle-Vendor: MUSICACADEMY
8 Bundle-RequiredExecutionEnvironment: JavaSE-11
9 Automatic-Module-Name: com.musicAcademy.osgi.MiddleConsumer
10 Import-Package: com.musicAcademy.osgi.middleservice,
11 org.osgi.framework;version="1.3.0"
12 Bundle-ActivationPolicy: lazy
13
```

com.musicAcademy.osgi.MiddleService X

```
1 Manifest-Version: 1.0
2 Bundle-ManifestVersion: 2
3 Bundle-Name: MiddleService
4 Bundle-SymbolicName: com.musicAcademy.osgi.MiddleService
5 Bundle-Version: 1.0.0.qualifier
6 Bundle-Activator: com.musicAcademy.osgi.middleservice.MiddleServiceActivator
7 Bundle-Vendor: MUSICACADEMY
8 Bundle-RequiredExecutionEnvironment: JavaSE-11
9 Automatic-Module-Name: com.musicAcademy.osgi.MiddleService
10 Import-Package: com.musicAcademy.osgi.coursepublisher,
11 com.musicAcademy.osgi.musicresourcespublisher,
12 com.musicAcademy.osgi.quizpublisher,
13 org.osgi.framework;version="1.3.0"
14 Bundle-ActivationPolicy: lazy
15 Require-Bundle: com.musicAcademy.osgi.EventPublisher
16 Export-Package: com.musicAcademy.osgi.middleservice
17
```

com.musicAcademy.osgi.AdminConsumer X

```
1 Manifest-Version: 1.0
2 Bundle-ManifestVersion: 2
3 Bundle-Name: MusicResourcesConsumer
4 Bundle-SymbolicName: com.musicAcademy.osgi.AdminConsumer
5 Bundle-Version: 1.0.0.qualifier
6 Bundle-Activator: com.musicAcademy.osgi.adminconsumer.AdminConsumerActivator
7 Bundle-Vendor: MUSICACADEMY
8 Bundle-RequiredExecutionEnvironment: JavaSE-11
9 Automatic-Module-Name: com.musicAcademy.osgi.musicResourcesConsumer
10 Import-Package: com.musicAcademy.osgi.middleservice,
11 org.osgi.framework;version="1.3.0"
12 Bundle-ActivationPolicy: lazy
13 Require-Bundle: com.musicAcademy.osgi.musicResourcePublisher;bundle-version="1.0.0"
14
```

com.musicAcademy.osgi.CoursePublisher X

```
1 Manifest-Version: 1.0
2 Bundle-ManifestVersion: 2
3 Bundle-Name: CoursePublisher
4 Bundle-SymbolicName: com.musicAcademy.osgi.CoursePublisher
5 Bundle-Version: 1.0.0.qualifier
6 Bundle-Activator: com.musicAcademy.osgi.coursepublisher.CoursePublisherActivator
7 Bundle-Vendor: MUSICACADEMY
8 Bundle-RequiredExecutionEnvironment: JavaSE-11
9 Automatic-Module-Name: com.musicAcademy.osgi.CoursePublisher
10 Import-Package: org.osgi.framework;version="1.3.0"
11 Bundle-ActivationPolicy: lazy
12 Export-Package: com.musicAcademy.osgi.coursepublisher
13
```

com.musicAcademy.osgi.EventOrganizerConsumer X

```
1 Manifest-Version: 1.0
2 Bundle-ManifestVersion: 2
3 Bundle-Name: EventConsumer
4 Bundle-SymbolicName: com.musicAcademy.osgi.EventOrganizerConsumer
5 Bundle-Version: 1.0.0.qualifier
6 Bundle-Activator: com.musicAcademy.osgi.eventorganizerconsumer.EventOrganizerConsumerActivator
7 Bundle-RequiredExecutionEnvironment: JavaSE-11
8 Automatic-Module-Name: EventConsumer
9 Import-Package: com.musicAcademy.osgi.eventpublisher,
10 com.musicAcademy.osgi.middleservice,
11 org.osgi.framework;version="1.3.0"
12 Bundle-ActivationPolicy: lazy
13
```

com.musicAcademy.osgi.EventPublisher X

```
1 Manifest-Version: 1.0
2 Bundle-ManifestVersion: 2
3 Bundle-Name: EventPublisher
4 Bundle-SymbolicName: com.musicAcademy.osgi.EventPublisher
5 Bundle-Version: 1.0.0.qualifier
6 Bundle-Activator: com.musicacademy.osgi.eventpublisher.EventProducerActivator
7 Bundle-RequiredExecutionEnvironment: JavaSE-11
8 Automatic-Module-Name: EventPublisher
9 Import-Package: org.osgi.framework;version="1.3.0"
10 Bundle-ActivationPolicy: lazy
11 Export-Package: com.musicacademy.osgi.eventpublisher
12
```

com.musicAcademy.osgi.musicResourcePublisher X

```
1 Manifest-Version: 1.0
2 Bundle-ManifestVersion: 2
3 Bundle-Name: MusicResourcesPublisher
4 Bundle-SymbolicName: com.musicAcademy.osgi.musicResourcePublisher
5 Bundle-Version: 1.0.0.qualifier
6 Bundle-Activator: com.musicacademy.osgi.musicresourcespublisher.MusicResourceProducerActivator
7 Bundle-Vendor: MUSICACADEMY
8 Bundle-RequiredExecutionEnvironment: JavaSE-11
9 Automatic-Module-Name: com.musicAcademy.osgi.musicResourcePublisher
10 Import-Package: org.osgi.framework;version="1.3.0"
11 Bundle-ActivationPolicy: lazy
12 Export-Package: com.musicacademy.osgi.musicresourcespublisher
13
```

com.musicAcademy.osgi.QuizPublisher X

```
1 Manifest-Version: 1.0
2 Bundle-ManifestVersion: 2
3 Bundle-Name: QuizPublisher
4 Bundle-SymbolicName: com.musicAcademy.osgi.QuizPublisher
5 Bundle-Version: 1.0.0.qualifier
6 Bundle-Activator: com.musicacademy.osgi.quizpublisher.QuizPublisherActivator
7 Bundle-Vendor: MUSICACADEMY
8 Bundle-RequiredExecutionEnvironment: JavaSE-11
9 Automatic-Module-Name: com.musicAcademy.osgi.QuizPublisher
10 Import-Package: org.osgi.framework;version="1.3.0"
11 Bundle-ActivationPolicy: lazy
12 Export-Package: com.musicacademy.osgi.quizpublisher
13
```

com.musicAcademy.osgi.StudentConsumer X

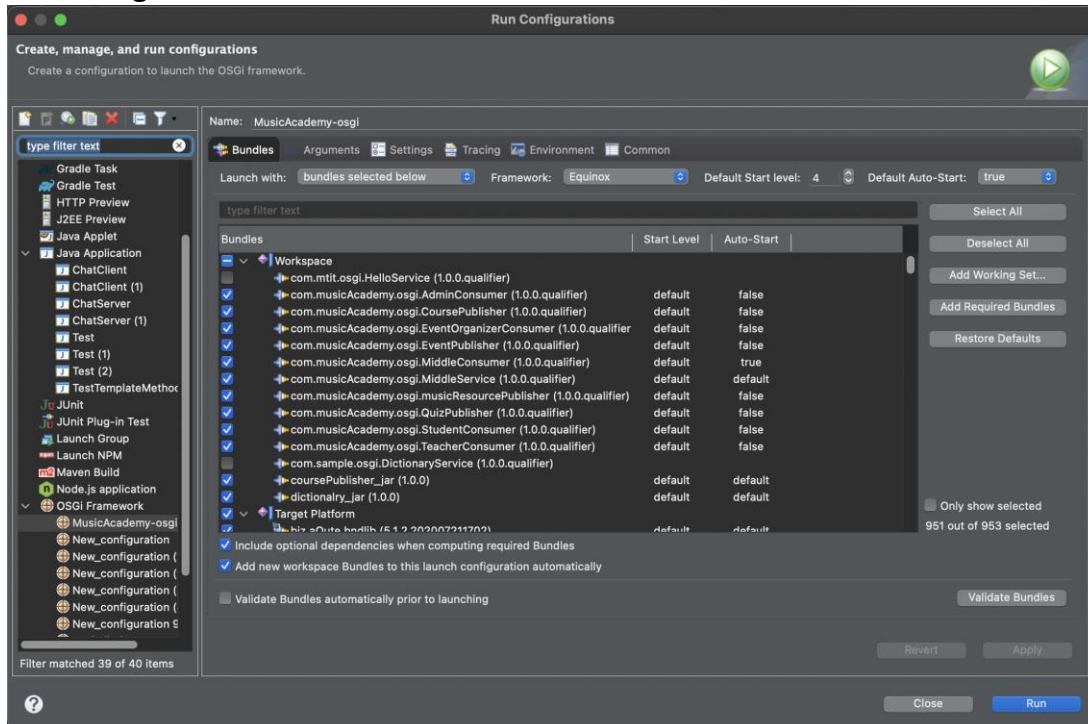
```
1 Manifest-Version: 1.0
2 Bundle-ManifestVersion: 2
3 Bundle-Name: StudentConsumer
4 Bundle-SymbolicName: com.musicAcademy.osgi.StudentConsumer
5 Bundle-Version: 1.0.0.qualifier
6 Bundle-Activator: com.musicacademy.osgi.studentconsumer.StudentConsumerActivator
7 Bundle-Vendor: MUSICACADEMY
8 Bundle-RequiredExecutionEnvironment: JavaSE-11
9 Automatic-Module-Name: com.musicAcademy.osgi.StudentConsumer
10 Import-Package: com.musicacademy.osgi.middleservice,
11 com.musicacademy.osgi.quizpublisher,
12 org.osgi.framework;version="1.3.0"
13 Bundle-ActivationPolicy: lazy
14
```

com.musicAcademy.osgi.TeacherConsumer X

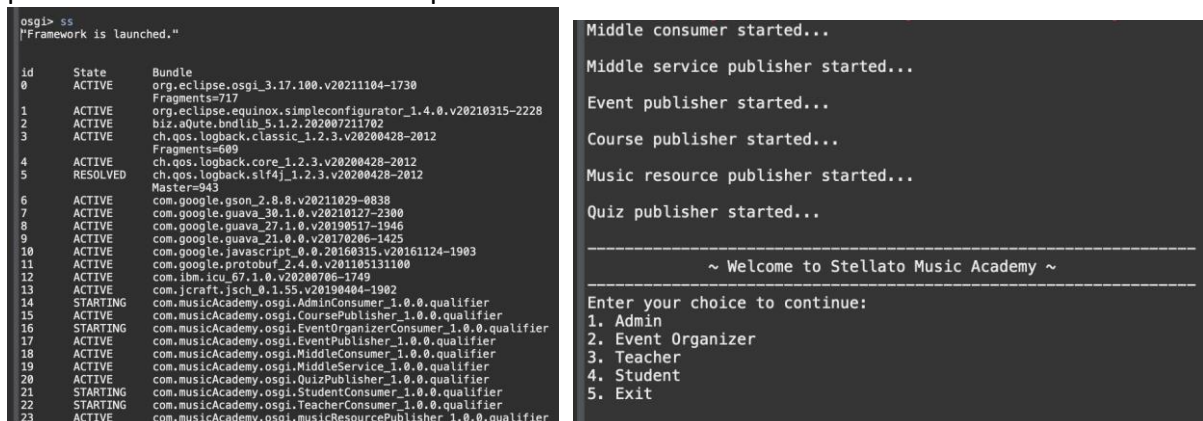
```
1 Manifest-Version: 1.0
2 Bundle-ManifestVersion: 2
3 Bundle-Name: TeacherConsumer
4 Bundle-SymbolicName: com.musicAcademy.osgi.TeacherConsumer
5 Bundle-Version: 1.0.0.qualifier
6 Bundle-Activator: com.musicacademy.osgi.teacherconsumer.MusicTeacherConsumerActivator
7 Bundle-Vendor: MUSICACADEMY
8 Bundle-RequiredExecutionEnvironment: JavaSE-11
9 Automatic-Module-Name: com.musicAcademy.osgi.TeacherConsumer
10 Import-Package: com.musicacademy.osgi.coursepublisher,
11 com.musicacademy.osgi.middleservice,
12 org.osgi.framework;version="1.3.0"
13 Bundle-ActivationPolicy: lazy
14
```



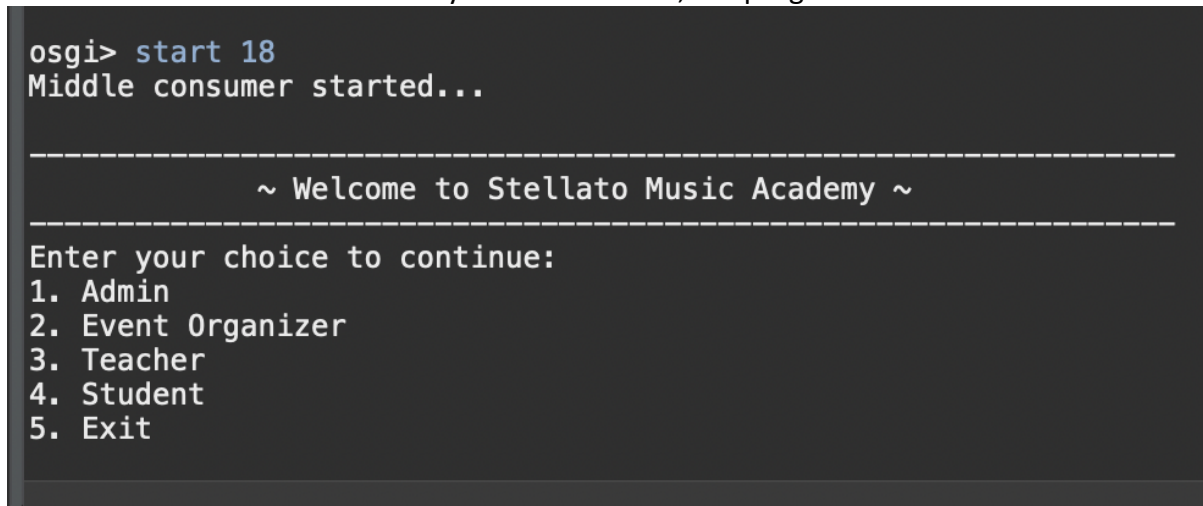
## Run configuration file



Initially the Middle service publisher & Middle consumer will be started once the program is run in the OSGi framework. Other consumers will start eventually once the user select a particular consumer out of the options to continue.



If we start the middle consumer by it's consumer ID, the program starts as below:



(1). Once Admin is selected from the main menu,  
Admin can choose a service offered to him/her out of the below options to continue:

```
-----
~ Welcome to Stellato Music Academy ~
-----
```

```
Enter your choice to continue:
```

1. Admin
2. Event Organizer
3. Teacher
4. Student
5. Exit

```
1
```

```
Admin consumer started...
```

```
Dear Admin,
```

```
Please enter your choice to continue:
```

1. Manage musical resources/instruments
2. View courses
3. View musical events
4. Exit

If Admin choose to manage Musical instrument resources, he/she will get the below options next to continue:

```
Admin consumer started...
```

```
Dear Admin,
```

```
Please enter your choice to continue:
```

1. Manage musical resources/instruments
2. View courses
3. View musical events
4. Exit

```
1
```

```
Select your choice(1-5) :
```

- 1 - Add a musical instrument
- 2 - View musical instruments
- 3 - Update musical instrument details
- 4 - Delete musical instrument details
- 5 - Exit

Add new musical instrument

```
Select your choice(1-5) :
```

- 1 - Add a musical instrument
- 2 - View musical instruments
- 3 - Update musical instrument details
- 4 - Delete musical instrument details
- 5 - Exit

```
1
```

```
-----
Select the instrument type to add a new musical instrument(1-5)
-----
```

- 1 - StringInstrument
- 2 - Keyboard
- 3 - Woodwind
- 4 - Brass
- 5 - Percussion

```
1
```

```
Enter music instrument name :
```

```
Guitar
```

```
Enter instrument model's serial number:
```

```
F310
```

```
Enter instrument's model brand:
```

```
Yamaha
```

```
Enter Price :
```

```
35000.00
```

```
-----All the Music instrument that has been successfully added to the system!-----
```

```
Do you have another musical instrument to add (Y/N) ?
```



## View existing musical instruments(resources)

```
Do you have another musical instrument to add (Y/N) ?
N
Thank you!

Select your choice(1-5) :
1 - Add a musical instrument
2 - View musical instruments
3 - Update musical instrument details
4 - Delete musical instrument details
5 - Exit
2

-----
***Retrieving all the musical instrument details***
-----

Instrument Type : String Type Instrument
Model Number : F310
Instrument Name : Guitar
Instrument Brand : Yamaha
Price : 35000.0
-----
```

## Update details of an existing musical instrument

```
Select your choice(1-5) :
1 - Add a musical instrument
2 - View musical instruments
3 - Update musical instrument details
4 - Delete musical instrument details
5 - Exit
3

-----
*****Given Below are all the musical instruments which was added to the music academy which can be updated*****
-----

Instrument Type : String Type Instrument
Model Number : F310
Instrument Name : Guitar
Instrument Brand : Yamaha
Price : 35000.0

Enter the model number of the instrument you want to update
F310
Enter the section number you want to update(1-5)
1 - Instrument Type
2 - Model Number
3 - Instrument Name
4 - Instrument Brand
5 - Price
5
Enter new price
25000.00

----- Given below are all the musical instruments after update -----
-----

Instrument Type : String Type Instrument
Model Number : F310
Instrument Name : Guitar
Instrument Brand : Yamaha
Price : 25000.0
-----
```

## Delete a musical instrument from the collection

```
Thank you!
Select your choice(1-5) :
1 - Add a musical instrument
2 - View musical instruments
3 - Update musical instrument details
4 - Delete musical instrument details
5 - Exit
4

-----
*****Given below are all the musical instruments which you can delete*****
-----

Instrument Type : String Type Instrument
Model Number : F310
Instrument Name : Guitar
Instrument Brand : Yamaha
Price : 25000.0

Enter the model number of the instrument you want to remove
F310
1
Music instrument with model number: F310 removed successfully

-----
Other instruments in the music store after deletion
-----

Do you have another musical instrument to delete (Y/N) ?
```

(2). Once Music Teacher is selected from the main menu, Music Teacher can choose a service offered to him/her out of the below options to continue:

```
osgi> start 18
Middle consumer started...

-----
~ Welcome to Stellato Music Academy ~
-----

Enter your choice to continue:
1. Admin
2. Event Organizer
3. Teacher
4. Student
5. Exit
3
Teacher consumer started...

Dear Teacher,
Please enter your choice to continue:
1. Manage courses
2. Add Quizes
3. Exit
```

If Teacher choose to manage music courses(Add new/updated/search/delete any), he/she will get the below options next to continue:

```
Dear Teacher,
Please enter your choice to continue:
1. Manage courses
2. Add Quizes
3. Exit
1
Select your choice(1-6) :
1 - Add a musical course
2 - View all music courses
3 - Search music course by Id
4 - Update music course
5 - Delete music course by Id
6 - Exit
1

=====Add New Course=====
Enter course id: C0002
Enter course name: Vocal Training Course
Enter course duration(months): Wrong Duration
Enter course duration(months): Wrong Duration
Enter course duration(months): 3
Enter course hours: 2
Enter course Music teacher: Mr.Rohan Fernando
Enter course type(Eastern or Western): Enter course details: Western
Enter course price: 25000.00

Enter number 1 to exit:
Enter any other number to add more courses:
1
```

### Add new music course

```
1
Select your choice(1-6) :
1 - Add a musical course
2 - View all music courses
3 - Search music course by Id
4 - Update music course
5 - Delete music course by Id
6 - Exit
2

=====View All Courses=====
Course Id: C0002
Course Name: Western
Course Duration: 3
Hours: 2
Teacher: Mr.
Type: Rohan
Other Details: Western
Price: 20000.0

Course Id: C0002
Course Name: Vocal
Course Duration: 3
Hours: 2
Teacher: Mr.Rohan
Type: Fernando
Other Details: Western
Price: 25000.0

Select your choice(1-6) :
1 - Add a musical course
2 - View all music courses
3 - Search music course by Id
4 - Update music course
5 - Delete music course by Id
6 - Exit
```

### Delete an existing music course

```
Select your choice(1-6) :
1 - Add a musical course
2 - View all music courses
3 - Search music course by Id
4 - Update music course
5 - Delete music course by Id
6 - Exit
5

=====Remove Course=====
Enter course Id to delete: C0002
Course Deleted
Select your choice(1-6) :
1 - Add a musical course
2 - View all music courses
3 - Search music course by Id
4 - Update music course
5 - Delete music course by Id
6 - Exit
```

**(3). Once Event Organizer is selected from the main menu, Event organizer can choose a service offered to him/her out of the below options to continue:**

```
osgi> start 18
Middle consumer started...

-----
~ Welcome to Stellato Music Academy ~
-----

Enter your choice to continue:
1. Admin
2. Event Organizer
3. Teacher
4. Student
5. Exit
2
Event organizer consumer started...

Dear Event organizer,
Please select an option(1-5) to continue:
1). Add new musical event
2). View all musical events
3). Filter events by event category
4). Cancel an event
5). Exit
>>
```

If the Event organizer choose to create a new musical event, he/she will be asked the below details to fill out and continue:

```
Dear Event organizer,
Please select an option(1-5) to continue:
1). Add new musical event
2). View all musical events
3). Filter events by event category
4). Cancel an event
5). Exit
>> 1

-----Add new musical event-----
Enter event name: Esparanza Live show
Event categories:
    (1)- Indoor concert
    (2)- Outdoor concert
    (3)- Music Festival
    (4)- Opera
    (5)- Orchestra
    (6)- Jazz event
    (7)- Music competition
Choose an event category (enter category number): 2
Enter event date (DD/MM/YYYY): 12/03/2022
Enter event venue: CINNAMON LAKESIDE COLOMBO
Enter duration: 3 hours
'Esparanza Live show' event added successfully...
Do you want to add another event? (Y/N)
n
```

View all scheduled musical events

```
Dear Event organizer,
Please select an option(1-5) to continue:
1). Add new musical event
2). View all musical events
3). Filter events by event category
4). Cancel an event
5). Exit
>> 2

Event Name: Esparanza Live show
Event type: Outdoor Concert
Date: 12/03/2022
Venue: CINNAMON LAKESIDE COLOMBO
Duration: 3 hours
-----
Event Name: BnS show
Event type: Indoor Concert
Date: 11/03/2022
Venue: Dell studio
Duration: 2 hours
-----

Dear Event organizer,
Please select an option(1-5) to continue:
1). Add new musical event
2). View all musical events
3). Filter events by event category
4). Cancel an event
5). Exit
>>
```

Can filter events by the event category(outdoor/indoor/jazz/opera/..) to find out easily as below

```
Dear Event organizer,
Please select an option(1-5) to continue:
1). Add new musical event
2). View all musical events
3). Filter events by event category
4). Cancel an event
5). Exit
>> 3

Event categories:
(1)- Indoor concert
(2)- Outdoor concert
(3)- Music Festival
(4)- Opera
(5)- Orchestra
(6)- Jazz event
(7)- Music competition
Choose an event category (Enter category number):2
|
search result 1:
Event Name: Esparanza Live show
Event type: Outdoor Concert
Date: 12/03/2022
Venue: CINNAMON LAKESIDE COLOMBO
Duration: 3 hours
-----
```

Cancel a scheduled event

```
Dear Event organizer,
Please select an option(1-5) to continue:
1). Add new musical event
2). View all musical events
3). Filter events by event category
4). Cancel an event
5). Exit
>> 4

All scheduled events:
(1). Esparanza Live show
(2). BnS show
Select which event you want to cancel(Enter event number): 2
Are you sure you want to cancel this event? (Y/N)y
Event was cancelled...

Remaining musical events:
Event Name: Esparanza Live show
Event type: Outdoor Concert
Date: 12/03/2022
Venue: CINNAMON LAKESIDE COLOMBO
Duration: 3 hours
-----

Dear Event organizer,
Please select an option(1-5) to continue:
1). Add new musical event
2). View all musical events
3). Filter events by event category
4). Cancel an event
5). Exit
>>
```

**(4). Once Student is selected from the main menu,  
Student can choose a service offered to him/her out of the below options to continue:**

```
osgi> start 18
Middle consumer started...

-----
~ Welcome to Stellato Music Academy ~
-----
Enter your choice to continue:
1. Admin
2. Event Organizer
3. Teacher
4. Student
5. Exit
4
Student consumer started...

Dear Student,
Please enter your choice to continue:
1. View courses
2. Take Quiz
3. View musical instruments
4. Exit
2
Enter the choice
1. take a test
2. Exit
1
```

If the student choose to decide to take a Quiz, he/she will be asked some music related questions as below:

```
Enter the choice
1. take a test
2. Exit
1
-----
Please select the quiz type quiz number you would like to take:
-----
1. Western Music
2. Classical Music
3. Jazz Music
4. Eastern Music
1
1. Who is the lead singer of the band 'The Beatles'?
-----Answers-----
1. John Lennon
2. Paul McCartney
3. George Harrison
4. Ringo Starr
Enter number of correct answer:
3
You are incorrect!
The correct answer is: John Lennon

2. Which of the following is not a genre of music?
-----Answers-----
1. Jazz
2. Rock
3. Pop
4. Country
Enter number of correct answer:
2
You are incorrect!
The correct answer is: Country
```

```
5. Who is the "Father of the symphony"?
-----Answers-----
1. Ludwig van Beethoven
2. Wolfgang Amadeus Mozart
3. Franz Liszt
4. Franz Joseph Hayden
Enter number of correct answer:
2
You are incorrect!
The correct answer is: Franz Joseph Hayden

-----
You scored 0 marks
-----

Do you want to take another quiz? (Y/N)
n
Do you want to continue?(y/n)
y
```



If Exit is given, the program will be terminated as below.

```
-----
~ Welcome to Stellato Music Academy ~
-----
Enter your choice to continue:
1. Admin
2. Event Organizer
3. Teacher
4. Student
5. Exit
5
Exiting...Thank you!

osgi>
|osgi>
```

We can stop the program and also start again by calling the life-cycle methods as below:

```
osgi> stop 18
Middle consumer stopped...

osgi> start 18
Middle consumer started...

-----
~ Welcome to Stellato Music Academy ~
-----
Enter your choice to continue:
1. Admin
2. Event Organizer
3. Teacher
4. Student
5. Exit
5
Exiting...Thank you!

osgi> stop 18
Middle consumer stopped...

osgi>
```

We can start and stop each consumer separately as well:

```
osgi>
osgi> start 14
Admin consumer started...

Dear Admin,
Please enter your choice to continue:
1. Manage musical resources/instruments
2. View courses
3. View musical events
4. Exit
4
Exiting...

osgi> stop 14
Admin consumer stopped...
```

```
osgi> start 16
Event consumer started...

Dear Event organizer,
Please select an option(1-5) to continue:
1). Add new musical event
2). View all musical events
3). Filter events by event category
4). Cancel an event
5). Exit
>> 5

Exiting...

osgi> stop 16
Event consumer stopped...
```

```
osgi>
osgi> start 21
Student consumer started...

Dear Student,
Please enter your choice to continue:
1. View courses
2. Take Quiz
3. View musical instruments
4. Exit
4
Exiting...

osgi> stop 21
Student consumer stopped...

osgi>
```

```
osgi> start 22
Music teacher consumer started...

Dear Teacher,
Please enter your choice to continue:
1. Manage courses
2. Add Quizes
3. Exit
3
Exiting...

osgi> stop 22
Music teacher consumer stopped...

osgi>
```

## When this project was run in Felix environment

- Installing plugins

```
g! install plugins/AdminConsumer.jar
21:38:08
Bundle ID: 7
g! install
21:40:13

g! install plugins/CoursePublisher.jar
21:40:25
Bundle ID: 8
g!
21:40:50
g! install plugins/EventOrganizerConsumer.jar Bundle ID: 9
21:40:52
g! install plugins/EventPublisher.jar 21:41:27
Bundle ID: 10
g! install plugins/MiddleConsumer.jar 21:41:40
Bundle ID: 11
g! install plugins/MiddleService.jar 21:41:50
Bundle ID: 12
g! install plugins/musicResourcePublisher.jar 21:42:01
Bundle ID: 13
g! install plugins/QuizPublisher.jar 21:42:24
java.io.FileNotFoundException: /Users/imashiuyanaHewa/Documents/Felix setup/org.apache.f
3/plugins/QuizPublisher.jar (No such file or directory)

g! install plugins/QuizPublisher.jar 21:42:45
Bundle ID: 15
g! install plugins/StudentConsumer.jar 21:42:56
Bundle ID: 16
g! install plugins/TeacherConsumer.jar 21:43:07
Bundle ID: 17
g!
21:43:18
g! lb
START LEVEL 1
ID|State |Level|Name
0|Active | |0|System Bundle (7.0.3)|7.0.3
1|Active | |1|jansi (1.18.0)|1.18.0
2|Active | |1|JLine Bundle (3.13.2)|3.13.2
3|Active | |1|Apache Felix Bundle Repository (2.0.10)|2.0.10
4|Active | |1|Apache Felix Gogo Command (1.1.2)|1.1.2
5|Active | |1|Apache Felix Gogo JLine Shell (1.1.8)|1.1.8
6|Active | |1|Apache Felix Gogo Runtime (1.1.4)|1.1.4
7|Installed | |1|MusicResourcesConsumer (1.0.0.202203202115)|1.0.0.202203202115
8|Installed | |1|CoursePublisher (1.0.0.202203202115)|1.0.0.202203202115
9|Installed | |1|EventConsumer (1.0.0.202203202115)|1.0.0.202203202115
10|Installed | |1|EventPublisher (1.0.0.202203202115)|1.0.0.202203202115
11|Installed | |1|MiddleConsumer (1.0.0.202203202115)|1.0.0.202203202115
12|Installed | |1|MiddleService (1.0.0.202203202115)|1.0.0.202203202115
13|Installed | |1|MusicResourcesPublisher (1.0.0.202203202115)|1.0.0.202203202115
15|Installed | |1|QuizPublisher (1.0.0.202203202115)|1.0.0.202203202115
16|Installed | |1|StudentConsumer (1.0.0.202203202115)|1.0.0.202203202115
17|Installed | |1|TeacherConsumer (1.0.0.202203202115)|1.0.0.202203202115
g! █
```

- Start each bundle

```
g! start 11
Middle consumer started...

java.lang.NullPointerException: Specified service reference cannot be null.

g! start 8
Course publisher started...

g! start 10
Event publisher started...

g! start 12
Middle service publisher started...

g! start 15
Quiz publisher started...

g! start 11
Middle consumer started...

-----
~ Welcome to Stellato Music Academy ~
-----
Enter your choice to continue:
1. Admin
2. Event Organizer
3. Teacher
4. Student
5. Exit
█
```

- States of each plugin after started each plugin

```

g! lb
START LEVEL 1
ID|State      |Level|Name
0|Active      |      |0|System Bundle (7.0.3)|7.0.3
1|Active      |      |1|jansi (1.18.0)|1.18.0
2|Active      |      |1|JLine Bundle (3.13.2)|3.13.2
3|Active      |      |1|Apache Felix Bundle Repository (2.0.10)|2.0.10
4|Active      |      |1|Apache Felix Gogo Command (1.1.2)|1.1.2
5|Active      |      |1|Apache Felix Gogo JLine Shell (1.1.8)|1.1.8
6|Active      |      |1|Apache Felix Gogo Runtime (1.1.4)|1.1.4
7|Installed   |      |1|MusicResourcesConsumer (1.0.0.202203202115)|1.0.0.202203202115
8|Active      |      |1|CoursePublisher (1.0.0.202203202115)|1.0.0.202203202115
9|Installed   |      |1|EventConsumer (1.0.0.202203202115)|1.0.0.202203202115
10|Active     |      |1|EventPublisher (1.0.0.202203202115)|1.0.0.202203202115
11|Active     |      |1|MiddleConsumer (1.0.0.202203202115)|1.0.0.202203202115
12|Active     |      |1|MiddleService (1.0.0.202203202115)|1.0.0.202203202115
13|Active     |      |1|MusicResourcesPublisher (1.0.0.202203202115)|1.0.0.202203202115
15|Active     |      |1|QuizPublisher (1.0.0.202203202115)|1.0.0.202203202115
16|Installed   |      |1|StudentConsumer (1.0.0.202203202115)|1.0.0.202203202115
17|Installed   |      |1|TeacherConsumer (1.0.0.202203202115)|1.0.0.202203202115

g! stop 11
Middle consumer stopped...

g! start 11
Middle consumer started...

-----
~ Welcome to Stellato Music Academy ~
-----
Enter your choice to continue:
1. Admin
2. Event Organizer
3. Teacher
4. Student
5. Exit
█

```

## Contribution

Registration No	Name	Contribution
IT19966922	H.R. Yasith Wimukthi	- Student Consumer - Quiz Publisher
IT19974774	Dasanayake N.A.C.H	- Music Teacher Consumer - Course Publisher
IT19974910	Hapugala H.A.V.V	- Admin Consumer - Music Resources Publisher
IT19961422	M.I.R Uyanahewa	- Event Organizer Consumer - Musical Event Publisher