



Sri Lanka Institute of Information Technology

SE3030 – Software Architecture : Assignment – 1

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## Scenario

Our team developed a producer-consumer scenario using the Equinox OSGI Framework for a gaming arcade which is a system where users could look at various games and play games for their own experience.

Within this system, there will be four main clients (consumers) that will be using this system for various purposes. They are,

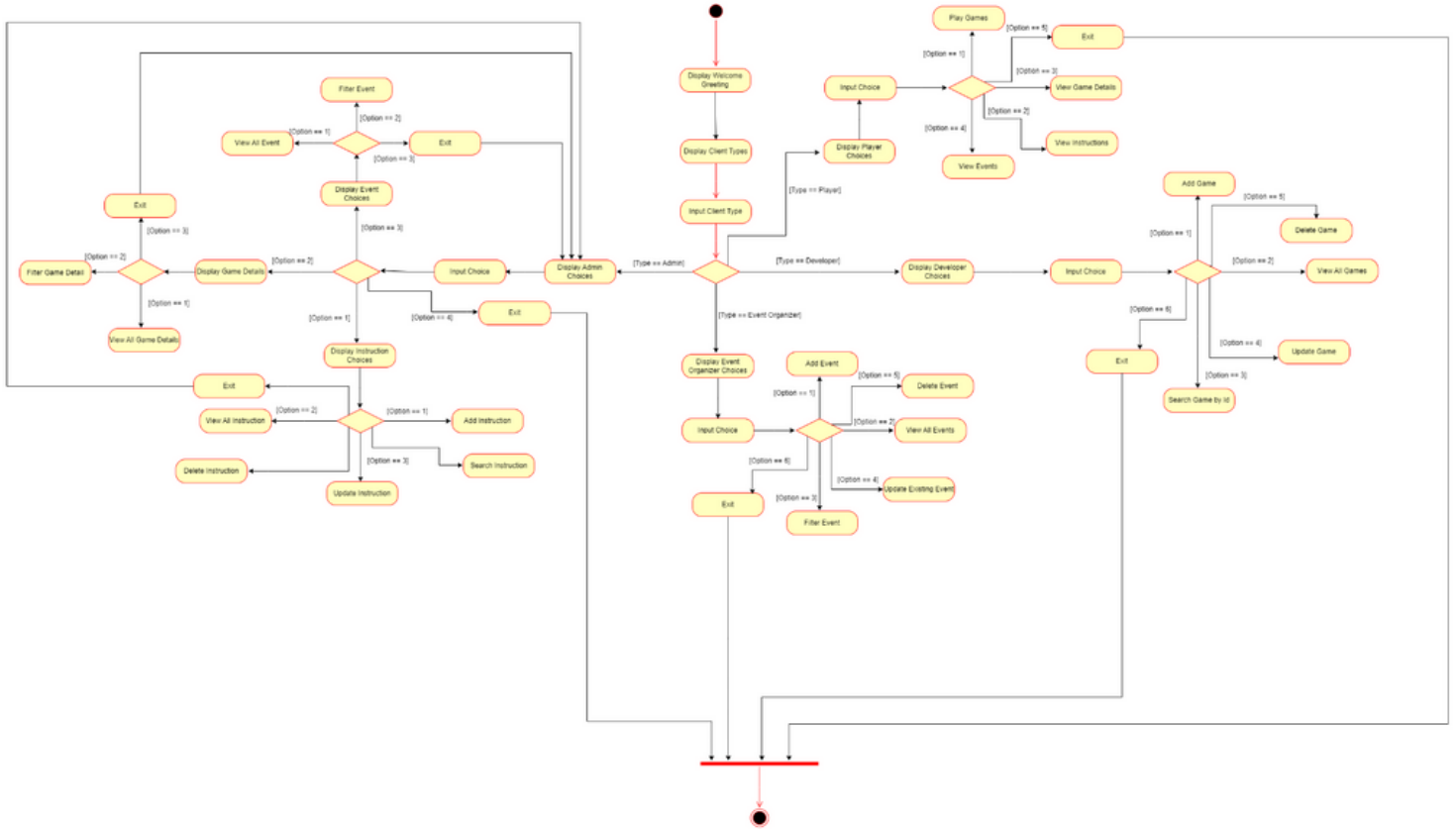
- Administrator
- Developers
- Players
- Event Organizers

Players can play games such as 'minesweeper' and 'tic-tac-toe' for a gaming experience which are implemented in the system. The players can also view game details, look at gaming events and the instructions published by the developers, event organizers and the administrators, respectively. The administrators can post instructions on how to use the system and how to play the respective games as well as they can monitor the game details posted by the developer organizations and the event details posted by the event organizers. The developers can post about their game and give descriptions for the players to give an insight about their games and also update and delete the game details, respectively. The event organizers can host events regarding game launches, parties, and post event details so the community can get notices regarding it.

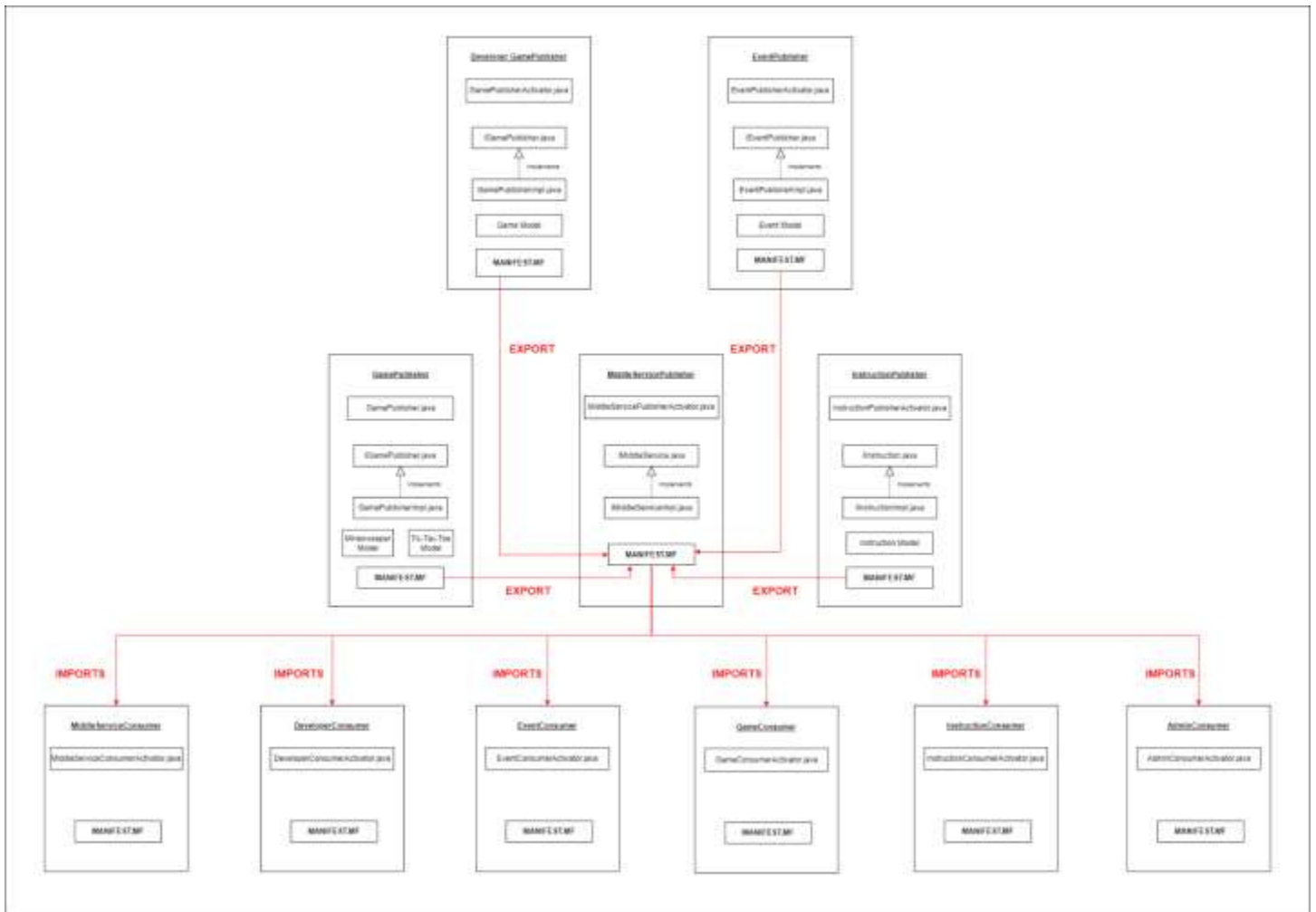
There are also 5 specific producers that provide services for the above-mentioned consumers (clients). They are,

- Instruction Publisher
- Game Publisher
- Developer Game Publisher
- Event Publisher
- Middle Service Publisher

# State Chart Diagram



# Manifest File Distribution



## Manifest Files of all the bundles

```
1 Manifest-Version: 1.0
2 Bundle-ManifestVersion: 2
3 Bundle-Name: Adminconsumer
4 Bundle-SymbolicName: com.gamearcade.adminconsumer
5 Bundle-Version: 1.0.0.qualifier
6 Bundle-Activator: com.gamearcade.adminconsumer.AdminConsumerActivator
7 Bundle-Vendor: GAMEARCADE
8 Bundle-RequiredExecutionEnvironment: JavaSE-1.8
9 Automatic-Module-Name: com.gamearcade.adminconsumer
0 Import-Package: com.gamearcade.middleservicepublisher,
1 org.osgi.framework;version="1.3.0"
2 Bundle-ActivationPolicy: lazy
~
```

```
Manifest-Version: 1.0
Bundle-ManifestVersion: 2
Bundle-Name: Developerconsumer
Bundle-SymbolicName: com.gamearcade.developerconsumer
Bundle-Version: 1.0.0.qualifier
Bundle-Activator: com.gamearcade.developerconsumer.DeveloperConsumerActivator
Bundle-Vendor: GAMEARCADE
Bundle-RequiredExecutionEnvironment: JavaSE-17
Automatic-Module-Name: com.gamearcade.developerconsumer
Import-Package: com.gamearcade.developerpublisher,
com.gamearcade.middleservicepublisher,
org.osgi.framework;version="1.3.0"
Bundle-ActivationPolicy: lazy
```

```
1 Manifest-Version: 1.0
2 Bundle-ManifestVersion: 2
3 Bundle-Name: Developerpublisher
4 Bundle-SymbolicName: com.gamearcade.developerpublisher
5 Bundle-Version: 1.0.0.qualifier
6 Export-Package: com.gamearcade.developerpublisher
7 Bundle-Activator: com.gamearcade.developerpublisher.GamePublisherActivator
8 Bundle-Vendor: GAMEARCADE
9 Bundle-RequiredExecutionEnvironment: JavaSE-17
10 Automatic-Module-Name: com.gamearcade.developerpublisher
11 Import-Package: org.osgi.framework;version="1.3.0"
12 Bundle-ActivationPolicy: lazy
..
```

```
1 Manifest-Version: 1.0
2 Bundle-ManifestVersion: 2
3 Bundle-Name: Eventconsumer
4 Bundle-SymbolicName: com.gamearcade.eventconsumer
5 Bundle-Version: 1.0.0.qualifier
6 Bundle-Activator: com.gamearcade.eventconsumer.EventConsumerActivator
7 Bundle-Vendor: GAMEARCADE
8 Bundle-RequiredExecutionEnvironment: JavaSE-17
9 Automatic-Module-Name: com.gamearcade.eventconsumer
10 Import-Package: com.gamearcade.eventpublisher,
11 com.gamearcade.middleservicepublisher,
12 org.osgi.framework;version="1.3.0"
13 Bundle-ActivationPolicy: lazy
..
```

```
1 Manifest-Version: 1.0
2 Bundle-ManifestVersion: 2
3 Bundle-Name: Eventpublisher
4 Bundle-SymbolicName: com.gamearcade.eventpublisher
5 Bundle-Version: 1.0.0.qualifier
6 Bundle-Activator: com.gamearcade.eventpublisher.EventPublisherActivator
7 Bundle-Vendor: GAMEARCADE
8 Bundle-RequiredExecutionEnvironment: JavaSE-17
9 Automatic-Module-Name: com.gamearcade.eventpublisher
10 Import-Package: org.osgi.framework;version="1.3.0"
11 Export-Package: com.gamearcade.eventpublisher
12 Bundle-ActivationPolicy: lazy|
```

```
1 Manifest-Version: 1.0
2 Bundle-ManifestVersion: 2
3 Bundle-Name: Gameconsumer
4 Bundle-SymbolicName: com.gamearcade.gameconsumer
5 Bundle-Version: 1.0.0.qualifier
6 Bundle-Activator: com.gamearcade.gameconsumer.GameConsumerActivator
7 Bundle-Vendor: GAMEARCADE
8 Bundle-RequiredExecutionEnvironment: JavaSE-1.7
9 Import-Package: org.osgi.framework;version="1.3.0"
10 Require-Bundle: com.gamearcade.gamepublisher;bundle-version="1.0.0"|
11
```

```
1 Manifest-Version: 1.0
2 Bundle-ManifestVersion: 2
3 Bundle-Name: Gamepublisher
4 Bundle-SymbolicName: com.gamearcade.gamepublisher
5 Bundle-Version: 1.0.0.qualifier
6 Export-Package: com.gamearcade.gamepublisher
7 Bundle-Activator: com.gamearcade.gamepublisher.GamePublisherActivator
8 Bundle-Vendor: GAMEARCADE
9 Bundle-RequiredExecutionEnvironment: JavaSE-1.7
10 Import-Package: org.osgi.framework;version="1.3.0"
11
```

```
1 Manifest-Version: 1.0
2 Bundle-ManifestVersion: 2
3 Bundle-Name: Instructionsconsumer
4 Bundle-SymbolicName: com.gamearcade.instructionsconsumer
5 Bundle-Version: 1.0.0.qualifier
6 Bundle-Activator: com.gamearcade.instructionsconsumer.InstructionConsumerActivator
7 Bundle-Vendor: GAMEARCADE
8 Bundle-RequiredExecutionEnvironment: JavaSE-1.8
9 Automatic-Module-Name: com.gamearcade.instructionsconsumer
10 Import-Package: com.gamearcade.middleservicepublisher,
11 org.osgi.framework;version="1.3.0"
12 Bundle-ActivationPolicy: lazy|
```

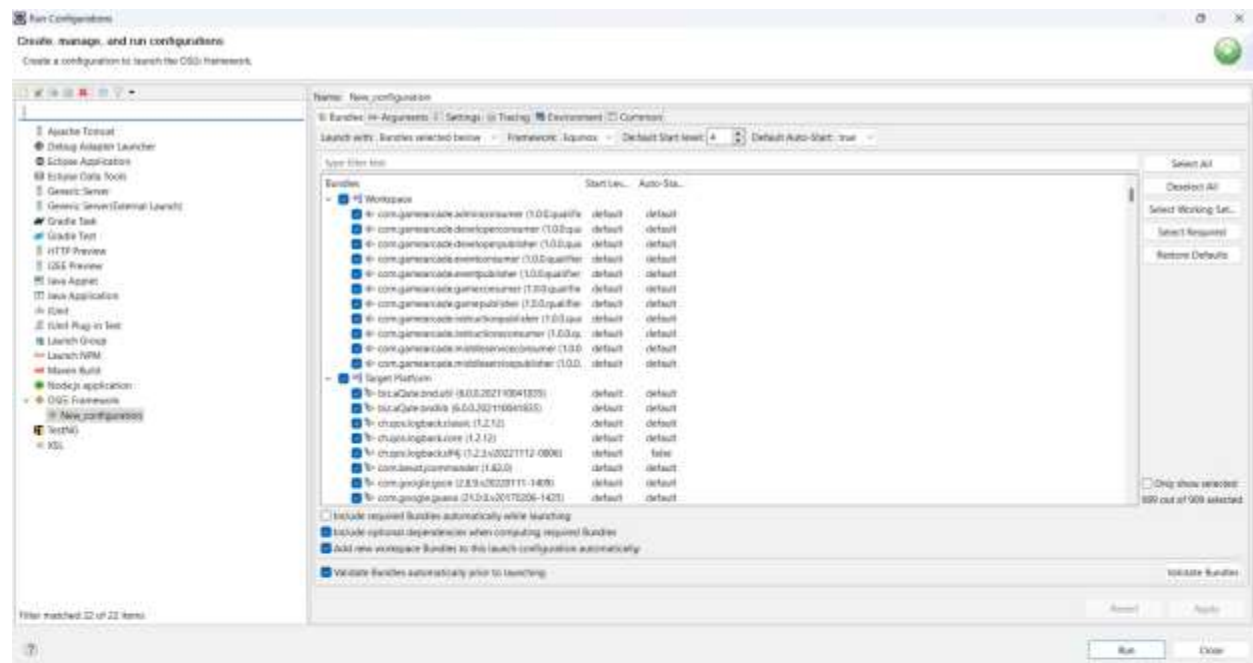
```
1 Manifest-Version: 1.0
2 Bundle-ManifestVersion: 2
3 Bundle-Name: Instructionpublisher
4 Bundle-SymbolicName: com.gamearcade.instructionpublisher
5 Bundle-Version: 1.0.0.qualifier
6 Bundle-Activator: com.gamearcade.instructionpublisher.InstructionPublisherActivator
7 Bundle-Vendor: GAMEARCADE
8 Bundle-RequiredExecutionEnvironment: JavaSE-1.8
9 Automatic-Module-Name: com.gamearcade.instructionpublisher
10 Import-Package: com.gamearcade.instructionpublisher,
11 org.osgi.framework;version="1.3.0"
12 Bundle-ActivationPolicy: lazy
13 Export-Package: com.gamearcade.instructionpublisher|
```



```
1 Manifest-Version: 1.0
2 Bundle-ManifestVersion: 2
3 Bundle-Name: Middleserviceconsumer
4 Bundle-SymbolicName: com.gamearcade.middleserviceconsumer
5 Bundle-Version: 1.0.0.qualifier
6 Bundle-Activator: com.gamearcade.middleserviceconsumer.MiddleServiceConsumerActivator
7 Bundle-Vendor: GAMEARCADE
8 Bundle-RequiredExecutionEnvironment: JavaSE-1.8
9 Automatic-Module-Name: com.gamearcade.middleserviceconsumer
10 Import-Package: com.gamearcade.middleservicepublisher,
11 org.osgi.framework;version="1.3.0"
12 Bundle-ActivationPolicy: lazy|
```

```
1 Manifest-Version: 1.0
2 Bundle-ManifestVersion: 2
3 Bundle-Name: Middleservicepublisher
4 Bundle-SymbolicName: com.gamearcade.middleservicepublisher
5 Bundle-Version: 1.0.0.qualifier
6 Bundle-Activator: com.gamearcade.middleservicepublisher.MiddleServicePublisherActivator
7 Bundle-Vendor: GAMEARCADE
8 Bundle-RequiredExecutionEnvironment: JavaSE-1.8
9 Automatic-Module-Name: com.gamearcade.middleservicepublisher
10 Import-Package: com.gamearcade.developerpublisher,
11 com.gamearcade.eventpublisher,
12 com.gamearcade.gamepublisher,
13 com.gamearcade.instructionpublisher,
14 org.osgi.framework;version="1.3.0"
15 Bundle-ActivationPolicy: lazy
16 Export-Package: com.gamearcade.middleservicepublisher
```

## Run Configuration File



```

0    ACTIVE      org.eclipse.osgi_3.18.0.v20220516-2135
1    ACTIVE      org.eclipse.equinox.simpleconfigurator_1.4.0.v20210315-2228
2    ACTIVE      biz.aqute.bnd.utill_6.0.0.202110041835
3    ACTIVE      biz.aqute.bndlib_6.0.0.202110041835
4    ACTIVE      ch.qos.logback.classic_1.2.12
5    ACTIVE      ch.qos.logback.classic_1.2.12
6    RESOLVED    ch.qos.logback.classic_1.2.3.v20221112-0806
7    ACTIVE      com.beust.jcommander_1.82.0
8    ACTIVE      com.gamarcade.adminconsumer_1.0.0.qualifier
9    ACTIVE      com.gamarcade.developerconsumer_1.0.0.qualifier
10   ACTIVE      com.gamarcade.developerpublisher_1.0.0.qualifier
11   ACTIVE      com.gamarcade.eventconsumer_1.0.0.qualifier
12   ACTIVE      com.gamarcade.eventpublisher_1.0.0.qualifier
13   ACTIVE      com.gamarcade.gameconsumer_1.0.0.qualifier
14   ACTIVE      com.gamarcade.gamepublisher_1.0.0.qualifier
15   ACTIVE      com.gamarcade.instructionpublisher_1.0.0.qualifier
16   ACTIVE      com.gamarcade.instructionsconsumer_1.0.0.qualifier
17   ACTIVE      com.gamarcade.middleserviceconsumer_1.0.0.qualifier
18   ACTIVE      com.gamarcade.middleservicepublisher_1.0.0.qualifier
19   ACTIVE      com.google.gson_2.8.9.v20220111-1409
20   ACTIVE      com.google.guava_30.1.0.v20221112-0806
21   ACTIVE      com.google.java_21.0.0.v20170206-1423
22   ACTIVE      com.google.javascript_0.0.20160315.v20161124-1903
23   ACTIVE      com.google.protobuf_3.4.0.v20180531190
24   ACTIVE      com.ibm.icu_73.2.0
25   ACTIVE      com.ibm.icu_47.1.0.v20200706-1749
26   ACTIVE      com.jcraft.jsch_0.1.55.v20190404-1902
27   ACTIVE      com.sun.el_2.2.0.v201303151357
28   ACTIVE      com.sun.jna_5.8.0.v20210503-0343
29   ACTIVE      com.sun.jna.platform_5.8.0.v20210406-1004
30   ACTIVE      jakarta.el_4.0.0.v20210105-0527
31   ACTIVE      jakarta.enterprise.cdi-api_2.0.2
32   ACTIVE      jakarta.interceptor-api_1.2.5
33   ACTIVE      jakarta.servlet_5.0.0.v20210105-0527

```



At the start, the Middle service publisher and Middle consumer will be started once the program is run with the OSGI framework. Other consumers will start eventually once the user selects a particular consumer out of the options that are available.

```
Admin consumer started...
Middle service publisher started...
Event publisher started...
Instruction Publisher started...
Game publisher started...

-----
~ Welcome to Game Arcade System ~
-----
Enter your choice to continue:
1. Admin
2. Event Organizer
3. Player
4. Developer
5. Exit
```

### **(1). Administrator**

Admin can choose a service offered to them out of the below options to continue:

```
-----
~ Welcome to Game Arcade System ~
-----
Enter your choice to continue:
1. Admin
2. Event Organizer
3. Player
4. Developer
5. Exit
1
Dear Admin,
Please enter your choice to continue:
1. Play a game
2. Manage Instruction
3. View GameDetails
4. View Event Details
5. Exit
```

If the administrator chooses to manage instructions that are intended for the users of the system they can insert new instructions, view all instructions, update instructions, and delete the specific instructions. The administrator can also view game details that are posted by developers and event details that are posted by event organizers respectively to monitor the status of them.

```

-----
Select the instruction type to add a new Instruction(1-4)
-----
1 - Player Instruction
2 - Event Organizer Instruction
3 - Developer Instruction
4 - Other
1
Enter Instruction ID (at least 4 characters):
E004
Enter instruction (cannot be empty):
This is for Player Instruction
Enter Priority (a number):
1
-----All the instructions are successfully added to the system!-----

Do you have another Instruction to add (Y/N) ?
N

-----
Select the instruction type to add a new Instruction(1-4)
-----
1 - Player Instruction
2 - Event Organizer Instruction
3 - Developer Instruction
4 - Other
2
Enter Instruction ID (at least 4 characters):
E003
Enter instruction (cannot be empty):
This is for Event Organizer Instruction
Enter Priority (a number):
1
-----All the instructions are successfully added to the system!-----

Do you have another Instruction to add (Y/N) ?
N
Thank you!

```

### Insert Instruction

```

-----
****Retrieving all the Instruction details****
-----

Instruction ID : E001
Instruction Type : Player Instruction
Instruction : Test Player Instruction
Priority : 1
-----

Instruction ID : E002
Instruction Type : Event Organizer Instruction
Instruction : Test Event Organizer Instruction
Priority : 2
-----

Instruction ID : E001
Instruction Type : Developer Instruction
Instruction : Test Developer Instruction
Priority : 1
-----

Instruction ID : E004
Instruction Type : Player Instruction
Instruction : This is for Player Instruction
Priority : 1
-----

Instruction ID : E005
Instruction Type : Event Organizer Instruction
Instruction : This is for Event Organizer Instruction
Priority : 1
-----

Select your choice(1-5) :
1 - Add a Instruction
2 - View Instructions

```

### View All Instruction

```

Enter the ID of the instruction that you want to update
E004
Enter the section number you want to update(1-3)
1 - Instruction Type
2 - Instruction
3 - Priority
1
Enter new instruction type. Below are the Instruction types,

Player Instruction
Event Organizer Instruction
Developer Instruction
Other

Developer Instruction
-----
----- Given below are all the instructions after update -----
-----

Instruction ID : E001
Instruction Type : Player Instruction
Instruction : Test Player Instruction
Priority : 1
-----

```

### Update Instruction

```

Instruction ID : E005
Instruction Type : Developer Instruction
Instruction : Instruction for Developer
Priority : 2
-----

Enter the ID of the instruction you want to remove
E005
Instruction with ID: E005 removed successfully
-----

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

Instruction ID : E001
Instruction Type : Player Instruction
Instruction : Test Player Instruction
Priority : 1
-----

Instruction ID : E002
Instruction Type : Event Organizer Instruction
Instruction : Test Event Organizer Instruction
Priority : 2
-----

Instruction ID : E003
Instruction Type : Developer Instruction
Instruction : Test Developer Instruction
Priority : 1
-----

```

### Delete Instruction

## (2). Player

Player can choose specific tasks that are available for them after selecting the player option:

```
-----
~ Welcome to Game Arcade System ~
-----
Enter your choice to continue:
1. Admin
2. Event Organizer
3. Player
4. Developer
5. Exit

Dear Player,
Please enter your choice to continue:
1. Play a game
2. View Instructions
3. View GameDetails
4. View Event Details
5. Exit
```

A player who is the most important consumer of this system can either choose to play games such tic-tac-toe or Minesweeper, view game instructions, view game details and view event details respectively to keep in touch with the present trending games and events.

```
Dear Player,
Please enter your choice to continue:
1. Play a game
2. View Instructions
3. View GameDetails
4. View Event Details
5. Exit
1
=====
Please Enter the number to play the Game
=====

1 - Tictactoe
2 - Minesweeper
Enter -1 to exit

Enter a number :
1
=====
TicTacToe started, Good Luck!!!
=====

Enter name for player X: Xplayer
Enter name for player O: Oplayer
| |
---+---+---
| |
```

```
Enter -1 to exit

Enter a number :
2
=====
Minesweeper started, Good Luck!!!
=====

Enter the Field size (> 0) : 3
Number of mines (Less than field size and >= 1) : 2
|
| 1 2 3
1 | . . .
2 | . . .
3 | . . .
```

## Play Games

```
Dear Player,
Please enter your choice to continue:
1. Play a game
2. View Instructions
3. View GameDetails
4. View Event Details
5. Exit
3

***** View All Games *****
Game Id: G0001
Game Name: Minecraft
Developer: Mojang
Genre: Adventure
Difficulty: Easy
Other Details: World Based

Game Id: G0002
Game Name: Terraria
Developer: ABC Dev
Genre: Adventure
Difficulty: Easy
Other Details: World Based
```

View all Games

```
Other Details: Adventure based open world

Dear Player,
Please enter your choice to continue:
1. Play a game
2. View Instructions
3. View GameDetails
4. View Event Details
5. Exit
4

=====View All Events=====
eventId=E001
eventName=Gaming office open
eventType=Opening Event
eventDate=2024/03/21
eventLocation=Hilton
eventDuration=3 hours

eventId=E003
eventName=Event 3 Update
eventType=Launching Event
eventDate=12/05/2024
eventLocation=Malabe
eventDuration=2h
```

View all Events

```
Dear Player,
Please enter your choice to continue:
1. Play a game
2. View Instructions
3. View GameDetails
4. View Event Details
5. Exit
2

****Retrieving all the Instruction details****

Instruction ID : E001
Instruction Type : Player Instruction
Instruction : Test Player Instruction
Priority : 1
-----

Instruction ID : E002
Instruction Type : Event Organizer Instruction
Instruction : Test Event Organizer Instruction
Priority : 2
-----

Instruction ID : E004
Instruction Type : Developer Instruction
```

View Instructions

### (3). Developer

Developer consumers can choose the specific role that are available for meant for the developers after selecting the developer option:

```
-----
~ Welcome to Game Arcade System ~
-----
Enter your choice to continue:
1. Admin
2. Event Organizer
3. Player
4. Developer
5. Exit
4
Select your choice(1-6) :
1 - Add a game
2 - View all games
3 - Search game by Id
4 - Update game
5 - Delete game by Id
6 - Exit
```

The developers can publish information regarding their newest games to give insights to the users of this system regarding the newest games that are trending. They can also view all the games that have been added to the system and search games by the respective game id. If there are any changes needed, they can alter the game details or delete the respective games.

```
***** Add New Game *****
Enter game id: 11
Id must have more than 5 characters
Enter game id: E011
Id must have more than 5 characters
Enter game id: E0011
Enter game name: Ludo
Enter game developer: Teshan
Enter genre: board
Enter Difficulty: low
Enter game details: Main_game

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

**Add New Game**

```
***** View Game *****
Enter Game Id to search: E0011
Course Found
Game Id: E0011
Game Name: Ludo
Developer: Teshan
Genre: board
Difficulty: low
Other Details: Main_game
```

**View Game by Id**

```
***** Update Game *****
Enter Game Id to update: 4
Game Not Found...
Select your choice(1-6) :
1 - Add a game
2 - View all games
3 - Search game by Id
4 - Update game
5 - Delete game by Id
6 - Exit
4

***** Update Game *****
Enter Game Id to update: E0011

Select an option to update:
1 - Update Game Name:
2 - Update Developer:
3 - Update Genre:
4 - Update Difficulty
5 - Update details
6 - Exit
5
Enter game details: Main_update

Select an option to update:
1 - Update Game Name:
2 - Update Developer:
3 - Update Genre:
4 - Update Difficulty
5 - Update details
6 - Exit
```

**Update Game Detail by Id**

```

Select your choice(1-6) :
1 - Add a game
2 - View all games
3 - Search game by Id
4 - Update game
5 - Delete game by Id
6 - Exit
5

***** Delete Game *****
Enter Game Id to delete: 60911
Game will be Deleted!
Game is Deleted!
Select your choice(1-6) :
1 - Add a game
2 - View all games
3 - Search game by Id
4 - Update game
5 - Delete game by Id
6 - Exit

```

### Delete game by Id

```

Game Id: G0007
Game Name: GTA 6
Developer: RockStar
Genre: Adventure
Difficulty: Easy
Other Details: Open world based game

Game Id: G0008
Game Name: Forza Horizon
Developer: EA
Genre: Sports
Difficulty: Easy
Other Details: Racing game

Game Id: G0009
Game Name: Elden Ring
Developer: EA
Genre: Adventure
Difficulty: Hard
Other Details: Adventure based open world

Game Id: G0010
Game Name: chess
Developer: Manula
Genre: abstract
Difficulty: strategy
Other Details: game

```

### View All Game Details

## (3). Event Organizer

Event Organizers can choose their role from the selection of the roles available that can be used to create gaming events and specific offers for the gamers.

```

-----
~ Welcome to Game Arcade System ~
-----
Enter your choice to continue:
1. Admin
2. Event Organizer
3. Player
4. Developer
5. Exit
2
Select your choice(1-6) :
1 - Add a new event
2 - View all events
3 - Search event by Id
4 - Update event
5 - Delete event by Id
6 - Exit

```

Event Organizers create new events regarding game launches and parties, game offers by selecting the add a new event option. They also have the option to view all the events that have been created by themselves and also search for specific events. They can also update or delete the events as per need by using the specific event id.



```

Select your choice(1-6) :
1 - Add a new event
2 - View all events
3 - Search event by Id
4 - Update event
5 - Delete event by Id
6 - Exit
1
=====Add New Event=====
Enter event ID: E003
Enter event name: Event3
--All Events Categories--
    (1)- Opening Event
    (2)- Launching Event
    (3)- LAN Party
Enter event type: Launching Event
Enter event date(DD/MM/YYYY): 12/05/2024
Enter event location: Malabe
Enter event duration: 2h
'Event3' added successfully!
-----
Do you want to add another event? (Y/N)
N

```

**Add new Event**

```

Select your choice(1-6) :
1 - Add a new event
2 - View all events
3 - Search event by Id
4 - Update event
5 - Delete event by Id
6 - Exit
2
=====View All Events=====
eventId=E001
eventName=Gaming office open
eventType=Opening Event
eventDate=2024/03/21
eventLocation=Wilton
eventDuration=3 hours

eventId=E002
eventName=Gaming Launch
eventType=Launching Event
eventDate=2024/04/02
eventLocation=Cinnoman
eventDuration=4 hours

eventId=E003
eventName=Event3
eventType=Launching Event
eventDate=12/05/2024
eventLocation=Malabe

```

**View All Event Details**

```

=====View Event=====
----Current Event IDs----
E001
E002
E003
Enter event ID to search: E003

=====
Event found
=====
eventId=E003
eventName=Event3
eventType=Launching Event
eventDate=12/05/2024
eventLocation=Malabe
eventDuration=2h

```

**Search Event by Id**

```

===== Update Event =====
----Current Event IDs----
E001
E002
E003
Enter event Id to update: E003

Select an option to update:
1 - Update Event Name
2 - Update Event Type
3 - Update Event Date (DD/MM/YY)
4 - Update Event Location
5 - Update Event Duration
6 - Exit
1
Enter Event name: Event 3 Update
=== Event Name Updated Successfully ===

```

**Update Event by Id**

```

Select your choice(1-6) :
1 - Add a new event
2 - View all events
3 - Search event by Id
4 - Update event
5 - Delete event by Id
6 - Exit
5
-----Delete Event-----
----Current Event IDs----
E001
E002
E003
Enter event ID to delete: E002
Are you sure you want to cancel this event? (Y/N)Y
Event deleted successfully.
Select your choice(1-6) :
1 - Add a new event
2 - View all events
3 - Search event by Id
4 - Update event
5 - Delete event by Id
6 - Exit

```

**Delete Event**

## Member Contribution

Registration Number	Name	Contribution
IT21321436	Gunatilleke M.B.D.S.	<ul style="list-style-type: none"><li>• Instruction Consumer</li><li>• Instruction Publisher</li></ul>
IT21343216	Dilshan W.A.B.	<ul style="list-style-type: none"><li>• Event Consumer</li><li>• Event Publisher</li></ul>
IT21345296	Jayakody T.N.A.	<ul style="list-style-type: none"><li>• Developer Consumer</li><li>• Developer Game Publisher</li></ul>
IT21338052	Pathirana J.K.H.	<ul style="list-style-type: none"><li>• Game Consumer</li><li>• Game Publisher</li></ul>