

Sri Lanka Institute of Information Technology



Assignment 1

Library Management System

Year 4 Semester 1

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B.Sc. (Hons) in Information Technology Specialized in Information Technology

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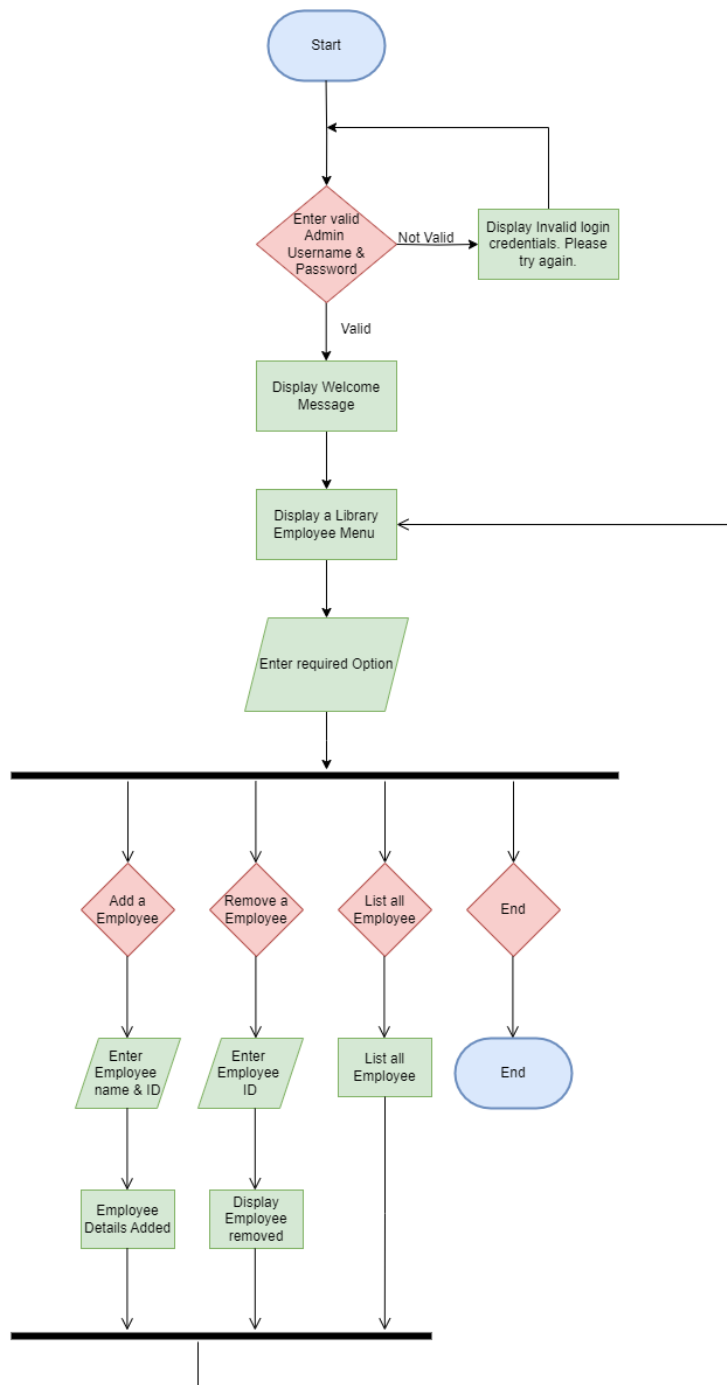
Introduction

Our project presents an innovative library management system, developed within the Open Service Gateway Initiative (OSGi) framework. This advanced system is segmented into four key components:

- **Inventory Management:** Facilitates the addition, removal, and viewing of books and other inventory items, streamlining the organization of library resources.
- **Staff Management:** Allows for the comprehensive handling of staff records, including adding, removing, and viewing staff members, thereby enhancing administrative efficiency.
- **Book Reservation:** Offers a robust platform for managing book reservations, enabling users to add, remove, and view bookings, thus improving the accessibility of library materials.
- **Customer Management:** Empowers libraries to manage their customer databases effectively, with features for adding, removing, and viewing customer information, ensuring a personalized user experience.

Leveraging the modular and dynamic capabilities of the OSGi framework, our library management system is designed for flexibility and scalability, accommodating the evolving needs of modern libraries.

Flow diagram of Staff Management.



Produce Manifest implementation.

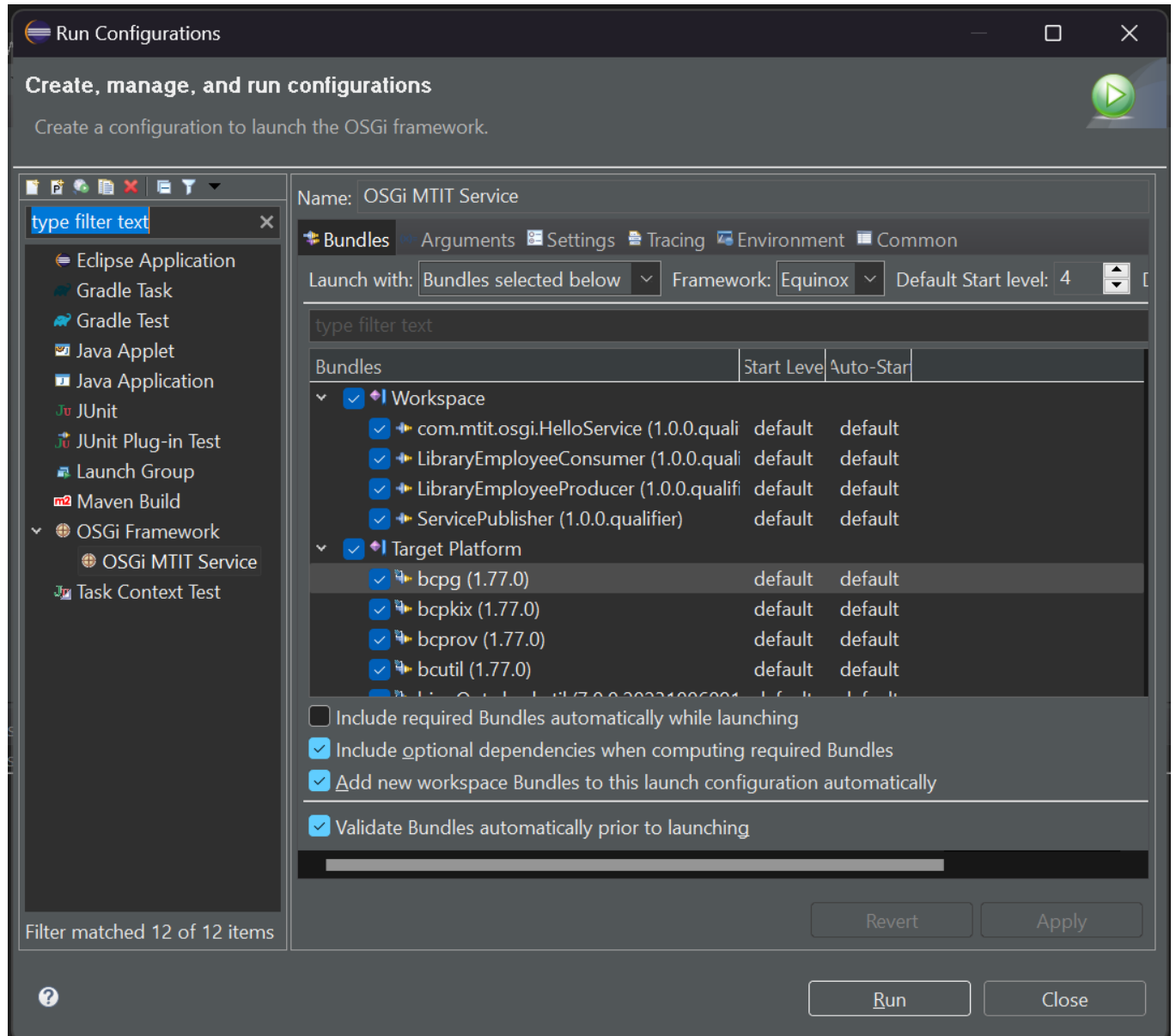
```
LibraryEmployeeProducer ×
1 Manifest-Version: 1.0
2 Bundle-ManifestVersion: 2
3 Bundle-Name: LibraryEmployeeProducer
4 Bundle-SymbolicName: LibraryEmployeeProducer
5 Bundle-Version: 1.0.0.qualifier
6 Bundle-Activator: Libraryemployeeproducer.Activator
7 Bundle-RequiredExecutionEnvironment: JavaSE-17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

Consumer Manifest implementation

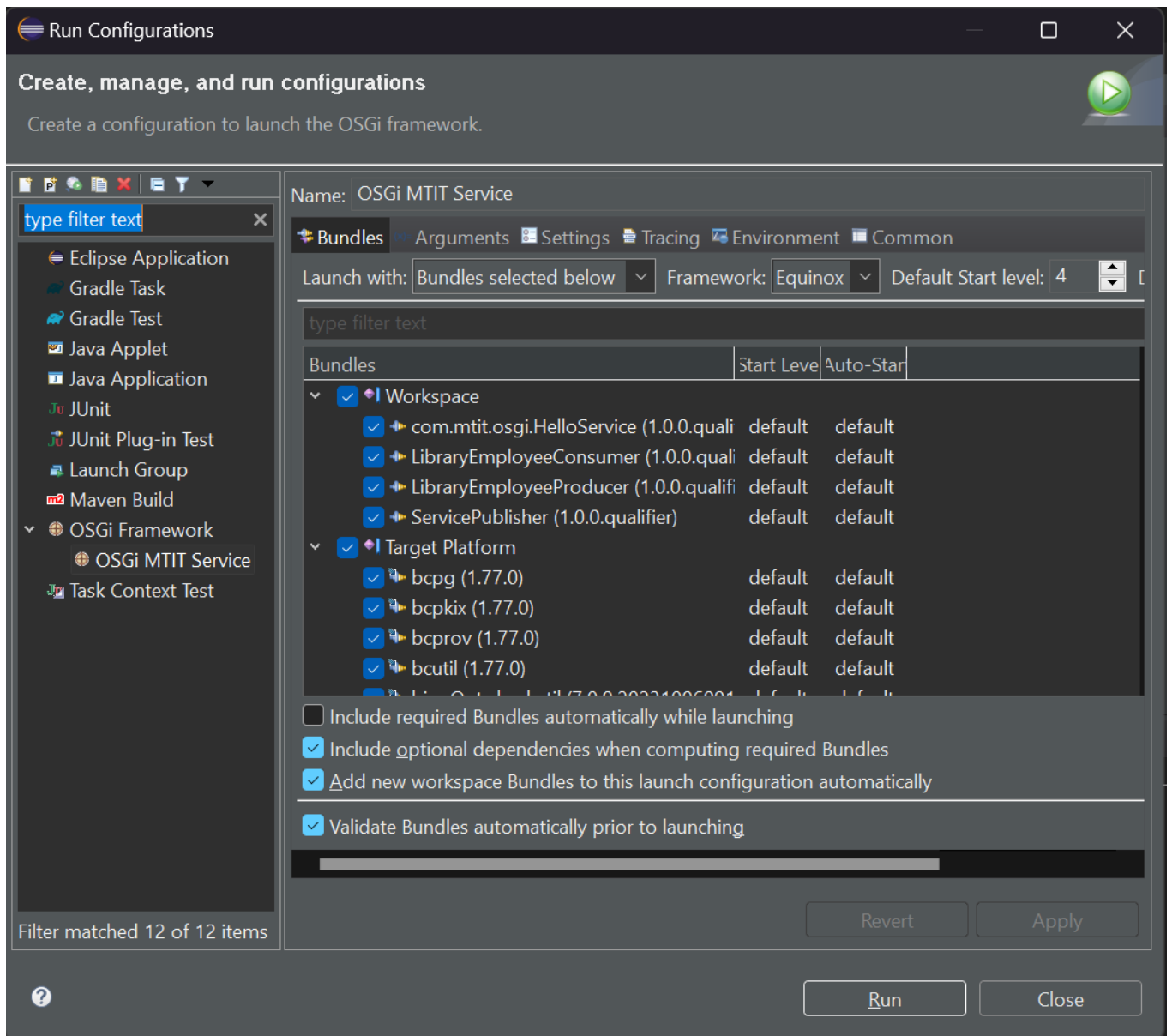
```
LibraryEmployeeConsumer ×
1 Manifest-Version: 1.0
2 Bundle-ManifestVersion: 2
3 Bundle-Name: LibraryEmployeeConsumer
4 Bundle-SymbolicName: LibraryEmployeeConsumer
5 Bundle-Version: 1.0.0.qualifier
6 Bundle-Activator: Libraryemployeeconsumer.Activator
7 Bundle-RequiredExecutionEnvironment: JavaSE-17
8 Automatic-Module-Name: LibraryEmployeeConsumer
9 Import-Package: Libraryemployeeproducer,
10 org.osgi.framework;version="1.3.0"
11 Bundle-ActivationPolicy: lazy
12 Export-Package: Libraryemployeeconsumer
13
```

Bundles

Staff Management Producer Implementation.



Staff Management Consumer Implementation



Behavior and Outputs

Available bundles status

```
START LEVEL 6
ID|State      |Level|Name
0|Active      |    0|OSGi System Bundle (3.18.600.v20231110-1900)|3.18.600.v20231110-1900
1|Active      |    1|Simple Configurator (1.5.0.v20230919-1457)|1.5.0.v20230919-1457
2|Active      |    4|LibraryEmployeeConsumer (1.0.0.qualifier)|1.0.0.qualifier
3|Active      |    4|LibraryEmployeeProducer (1.0.0.qualifier)|1.0.0.qualifier
4|Active      |    4|ServicePublisher (1.0.0.qualifier)|1.0.0.qualifier
5|Active      |    4|bcpg (1.77.0)|1.77.0
6|Active      |    4|bcpkix (1.77.0)|1.77.0
7|Active      |    4|bcprov (1.77.0)|1.77.0
8|Active      |    4|bcutil (1.77.0)|1.77.0
9|Active      |    4|biz.aQute.bnd.util (7.0.0.202310060912)|7.0.0.202310060912
10|Active     |    4|biz.aQute.bndlib (7.0.0.202310060912)|7.0.0.202310060912
11|Active     |    4|Logback Classic Module (1.4.11)|1.4.11
12|Active     |    4|Logback Core Module (1.4.11)|1.4.11
13|Active     |    4|Gson (2.10.1.v20230109-0753)|2.10.1.v20230109-0753
14|Active     |    4|Guava: Google Core Libraries for Java (32.1.3.jre)|32.1.3.jre
15|Active     |    4|Guava InternalFutureFailureAccess and InternalFutures (1.0.2)|1.0.2
16|Active     |    4|JavaEWAH (1.2.3)|1.2.3
```

Outputs

Add a Staff Member.

```
===== Library Login =====
Enter UserName : admin
Enter Admin Password : 123
=====

Welcome, Administrator! You have access to administrative functions.
Do you want to view Employee list, Add Employee, Remove Employee, or Logout?
=====

Choose an action: View Employee List (V), Add Employee (A), Remove Employee (R), or Logout (logout) = A
Provide the Employee's Name: induwara
Provide the Employee ID: 0001
Employee List:
Name: induwara, ID: 0001
Do you want to view Employee list, Add Employee, Remove Employee, or Logout?
=====

Choose an action: View Employee List (V), Add Employee (A), Remove Employee (R), or Logout (logout) =
```

List of Staff Members.

```
Choose an action: View Employee List (V), Add Employee (A), Remove Employee (R), or Logout (logout) = V
Employee List:
Name: induwara, ID: 0001
Name: pabath, ID: 0002
Do you want to view Employee list, Add Employee, Remove Employee, or Logout?
=====
```

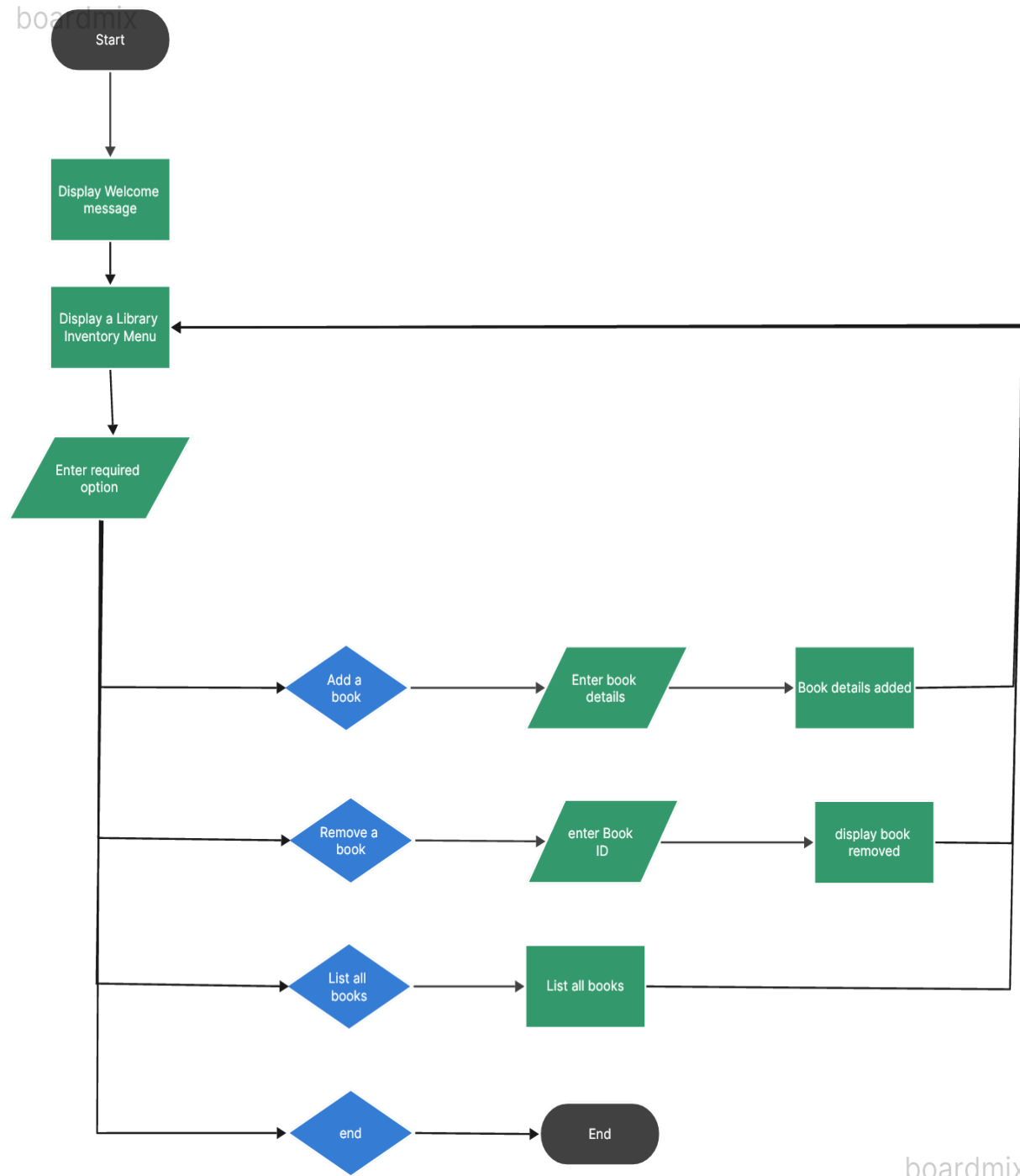

Remove a Staff Member.

```
Do you want to view Employee list, Add Employee, Remove Employee, or Logout?
=====

Choose an action: View Employee List (V), Add Employee (A), Remove Employee (R), or Logout (logout) = R
Provide the Employee ID for Removal: 0001
Employee with ID 0001 has been successfully removed.
Employee List:
Do you want to view Employee list, Add Employee, Remove Employee, or Logout?
=====

Choose an action: View Employee List (V), Add Employee (A), Remove Employee (R), or Logout (logout) =
```

Flow Diagram for Inventory Management.



Inventory Management Consumer Manifest implementation

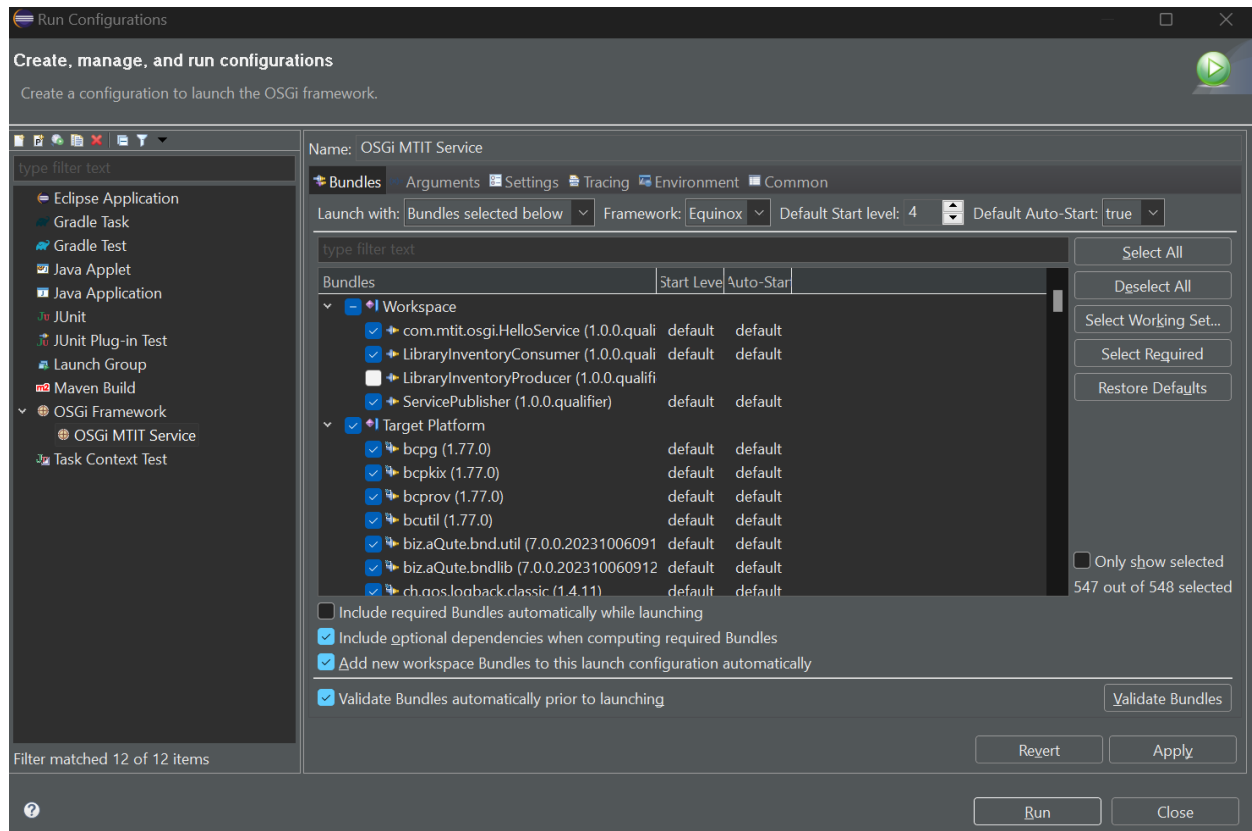
```
LibraryInventoryConsumer ×
1 Manifest-Version: 1.0
2 Bundle-ManifestVersion: 2
3 Bundle-Name: LibraryConsumer
4 Bundle-SymbolicName: LibraryInventoryConsumer
5 Bundle-Version: 1.0.0.qualifier
6 Bundle-Activator: LibraryInventoryconsumer.Activator
7 Bundle-RequiredExecutionEnvironment: JavaSE-17
8 Automatic-Module-Name: LibraryConsumer
9 Import-Package: libraryInventoryproducer,
10  org.osgi.framework;version="1.3.0"
11 Bundle-ActivationPolicy: lazy
12 Export-Package: LibraryInventoryconsumer
13
```

Inventory Management Producer Manifest implementation

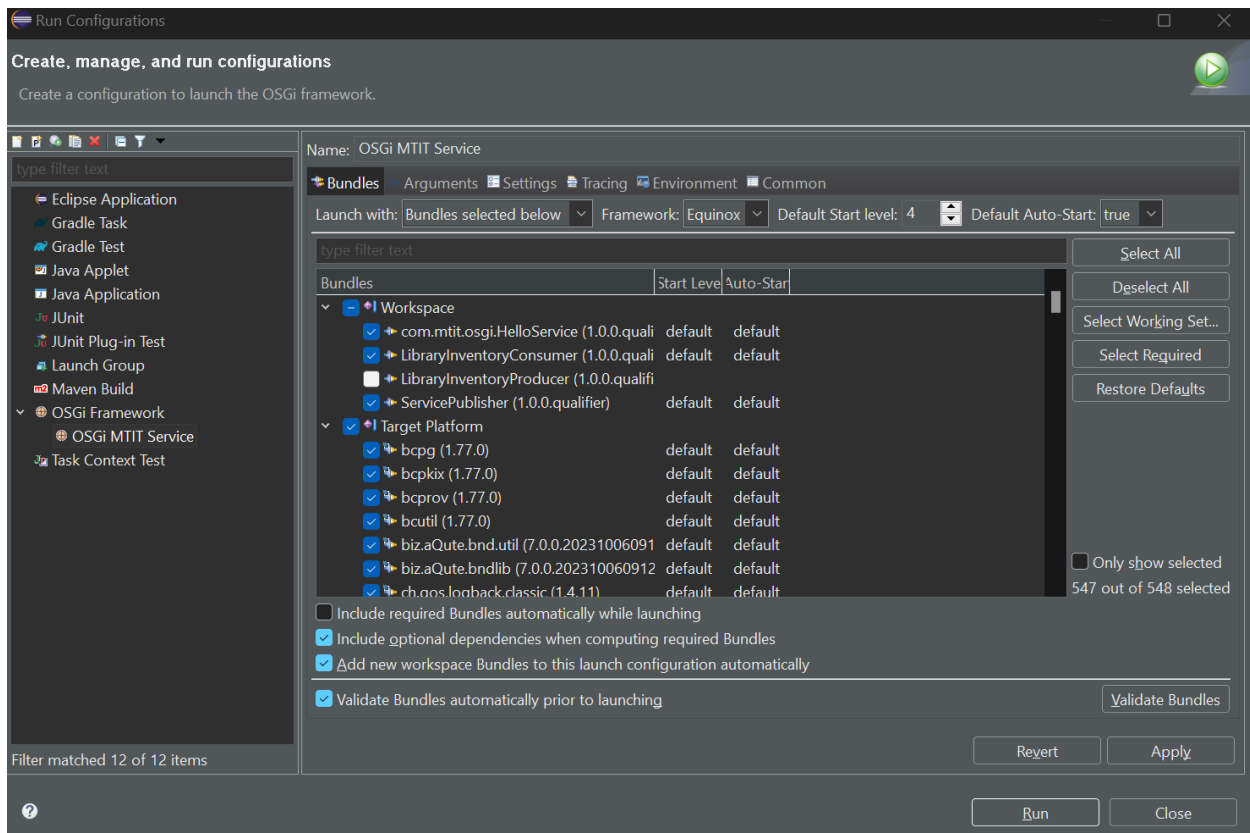
```
LibraryInventoryConsumer LibraryInventoryProducer ×
1 Manifest-Version: 1.0
2 Bundle-ManifestVersion: 2
3 Bundle-Name: LibraryProducer
4 Bundle-SymbolicName: LibraryInventoryProducer
5 Bundle-Version: 1.0.0.qualifier
6 Bundle-Activator: libraryInventoryproducer.Activator
7 Bundle-RequiredExecutionEnvironment: JavaSE-17
8 Automatic-Module-Name: LibraryProducer
9 Import-Package: org.osgi.framework;version="1.3.0"
10 Bundle-ActivationPolicy: lazy
11 Export-Package: libraryInventoryproducer
12
```

Bundles

Inventory Management Producer Implementation



Inventory Management Consumer Implementation



Inventory Management Bundle Output

Add a Book

```

Problems | JavaDoc | Declaration | Search | Console | Progress
OSGi MTIT Service [OSGi Framework] C:\Users\samir\p2\workspace\osgi.eclipse.justi.openjdk.hotspot.jre.full.win12.x86_64.17.0.10.v20240120-1143\jre\bin\java.exe (Mar 4, 2024, 1:16:01 PM) [pid: 14088]

| Options: |
|-----|
| (a) Add Book |
| (l) List Books |
| (r) Remove Book |
| (end) Exit |
|-----|
Enter choice: a
Enter Book Name: Atomic_habits
Enter Book ID: 001
Enter Book Author: James_Clear
Enter Book Publisher: James_Clear
Book added successfully.
<< Enter 'end' to exit >>

----- Book Management Options -----
| Options: |
|-----|
| (a) Add Book |
| (l) List Books |
| (r) Remove Book |
| (end) Exit |
|-----|
Enter choice:

```

Remove a Book

```

+-----+
| Options: |
+-----+
| (a) Add Book |
| (l) List Books |
| (r) Remove Book |
| (end) Exit |
+-----+
Enter choice: r
Enter Book ID to remove: 001
Book with ID 001 removed successfully.
<< Enter 'end' to exit >>
=====
===== Book Management Options =====
=====

+-----+
| Options: |
+-----+
| (a) Add Book |
| (l) List Books |
| (r) Remove Book |
| (end) Exit |
+-----+
Enter choice:

```

View Books List

```

| (a) Add Book |
| (l) List Books |
| (r) Remove Book |
| (end) Exit |
+-----+
Enter choice: l
=====
| Book List: |
+-----+
Name: atomic_habits, ID: 001, Author: james_clear, Publisher: james_clear
=====
Name: sherlock_holmes, ID: 002, Author: Arthur_conan_Doyle, Publisher: Arthur_conan_Doyle
=====
<< Enter 'end' to exit >>
=====
===== Book Management Options =====
=====

+-----+
| Options: |
+-----+
| (a) Add Book |
| (l) List Books |
| (r) Remove Book |
| (end) Exit |
+-----+
Enter choice:

```

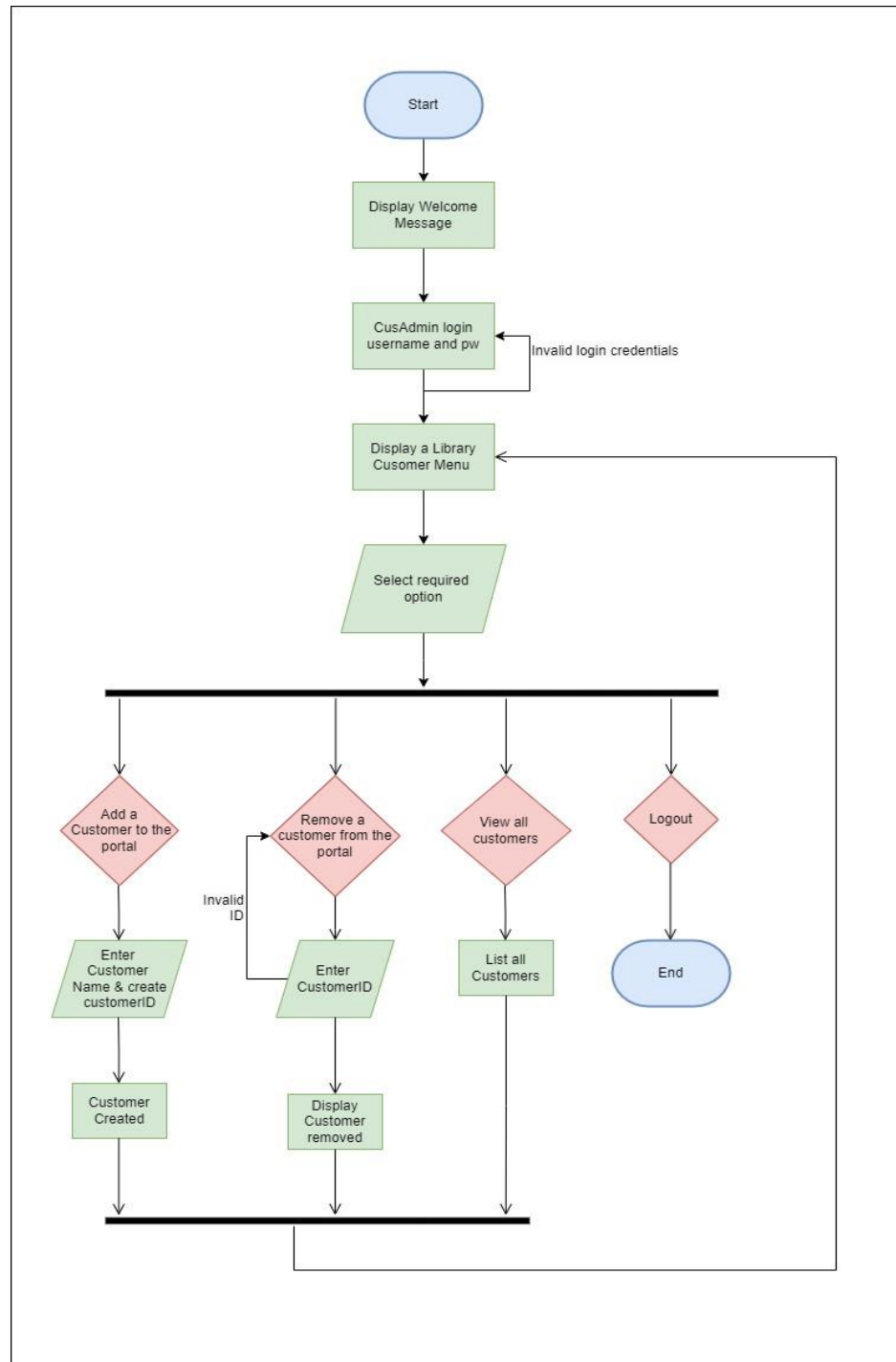
Available bundles status

```

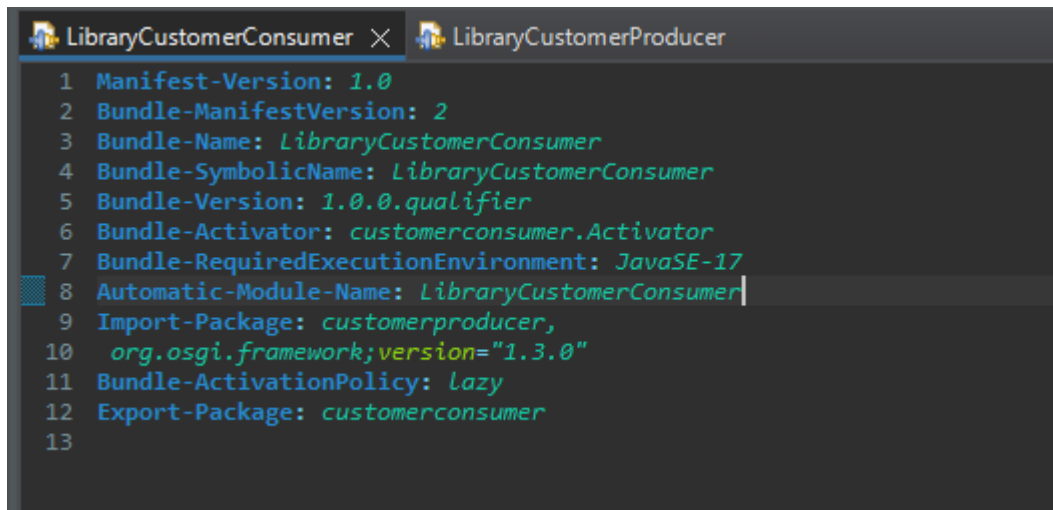
lb
START LEVEL 6
ID|State      |Level|Name
0|Active      |    0|OSGi System Bundle (3.18.600.v20231110-1900)|3.18.600.v20231110-1900
1|Active      |    1|Simple Configurator (1.5.0.v20230919-1457)|1.5.0.v20230919-1457
2|Active      |    4|LibraryConsumer (1.0.0.qualifier)|1.0.0.qualifier
3|Active      |    4|LibraryProducer (1.0.0.qualifier)|1.0.0.qualifier
4|Active      |    4|ServicePublisher (1.0.0.qualifier)|1.0.0.qualifier
5|Active      |    4|bcpg (1.77.0)|1.77.0
6|Active      |    4|bcpkix (1.77.0)|1.77.0
7|Active      |    4|bcprov (1.77.0)|1.77.0
8|Active      |    4|bcutil (1.77.0)|1.77.0
9|Active      |    4|biz.aQute.bnd.util (7.0.0.202310060912)|7.0.0.202310060912
10|Active     |    4|biz.aQute.bndlib (7.0.0.202310060912)|7.0.0.202310060912
11|Active     |    4|Logback Classic Module (1.4.11)|1.4.11
12|Active     |    4|Logback Core Module (1.4.11)|1.4.11
13|Active     |    4|Gson (2.10.1.v20230109-0753)|2.10.1.v20230109-0753
14|Active     |    4|Guava: Google Core Libraries for Java (32.1.3.jre)|32.1.3.jre
15|Active     |    4|Guava InternalFutureFailureAccess and InternalFutures (1.0.2)|1.0.2

```

Flow diagram for Member Management



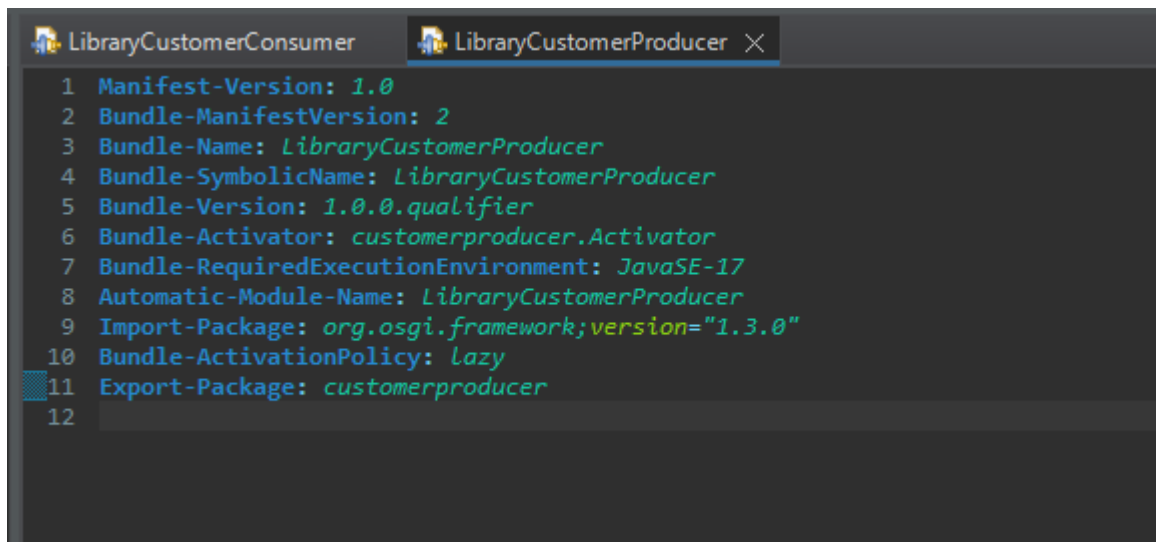
Produce Manifest implementation.



The screenshot shows an IDE with two tabs: 'LibraryCustomerConsumer' and 'LibraryCustomerProducer'. The 'LibraryCustomerConsumer' tab is active, displaying a list of manifest properties. The properties are as follows:

```
1 Manifest-Version: 1.0
2 Bundle-ManifestVersion: 2
3 Bundle-Name: LibraryCustomerConsumer
4 Bundle-SymbolicName: LibraryCustomerConsumer
5 Bundle-Version: 1.0.0.qualifier
6 Bundle-Activator: customerconsumer.Activator
7 Bundle-RequiredExecutionEnvironment: JavaSE-17
8 Automatic-Module-Name: LibraryCustomerConsumer
9 Import-Package: customerproducer,
10   org.osgi.framework;version="1.3.0"
11 Bundle-ActivationPolicy: lazy
12 Export-Package: customerconsumer
13
```

Consumer Manifest implementation

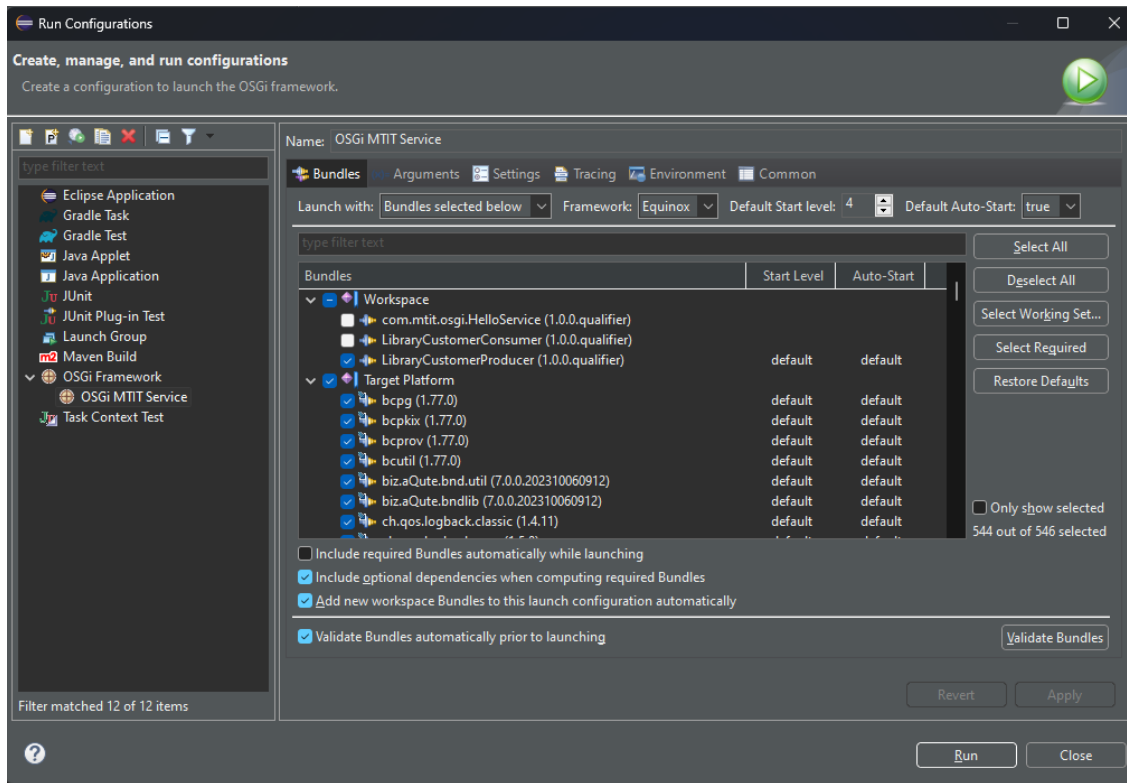


The screenshot shows an IDE with two tabs: 'LibraryCustomerConsumer' and 'LibraryCustomerProducer'. The 'LibraryCustomerProducer' tab is active, displaying a list of manifest properties. The properties are as follows:

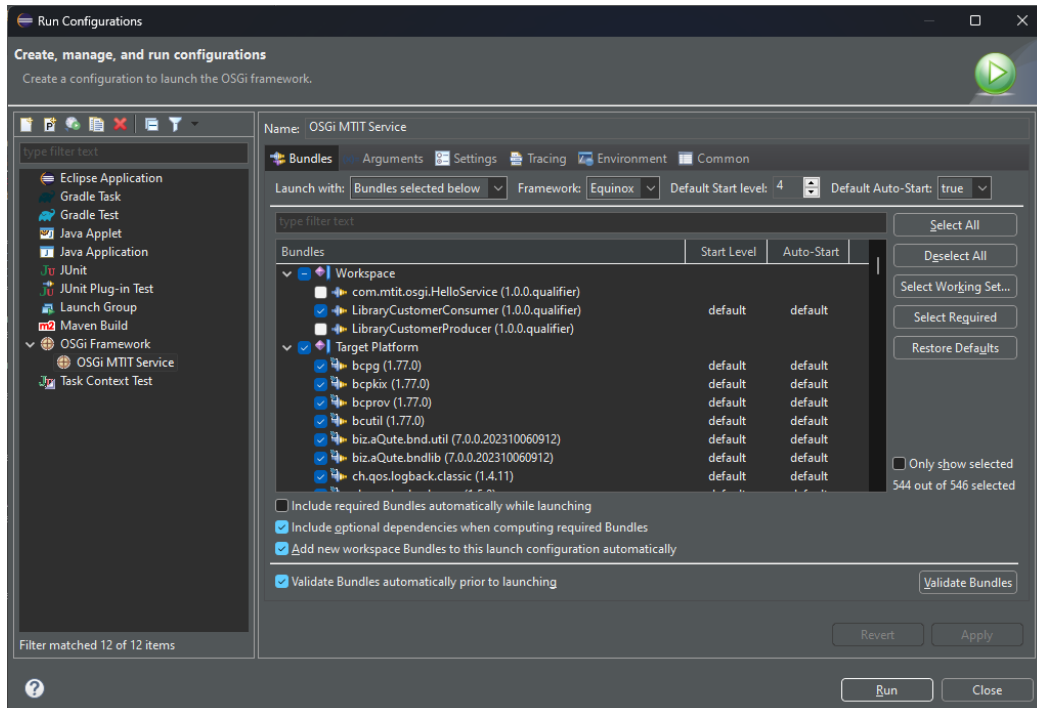
```
1 Manifest-Version: 1.0
2 Bundle-ManifestVersion: 2
3 Bundle-Name: LibraryCustomerProducer
4 Bundle-SymbolicName: LibraryCustomerProducer
5 Bundle-Version: 1.0.0.qualifier
6 Bundle-Activator: customerproducer.Activator
7 Bundle-RequiredExecutionEnvironment: JavaSE-17
8 Automatic-Module-Name: LibraryCustomerProducer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

Bundles

Member Management Producer Implementation



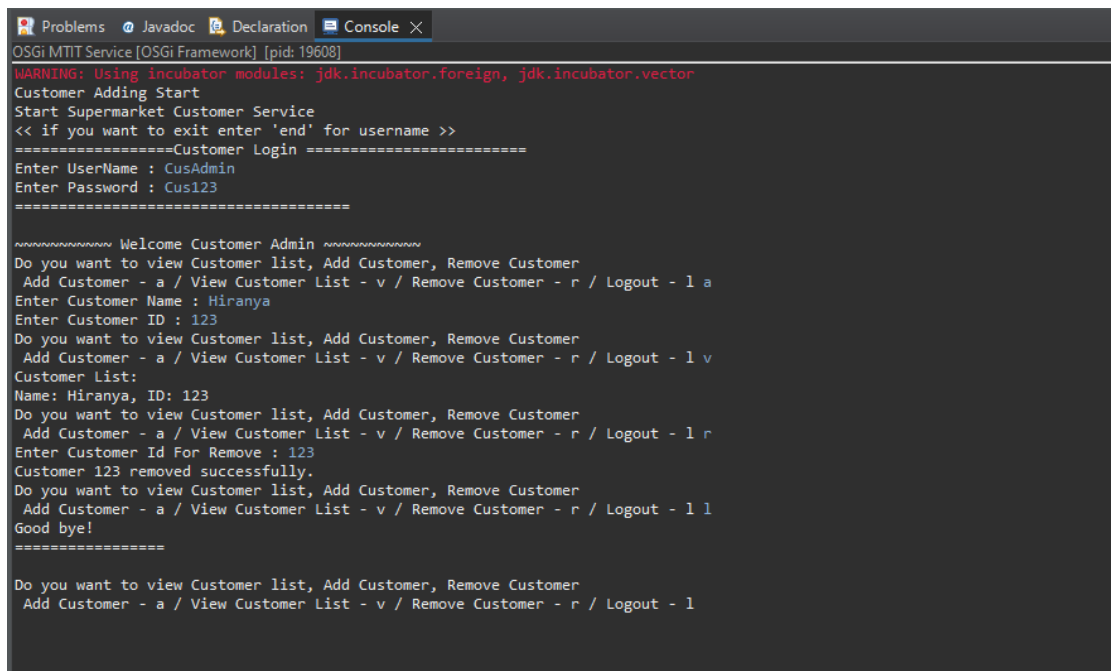
Member Management Consumer Implementation



Available bundles status

Member Management Outputs

Add member, Remove member, List view of members

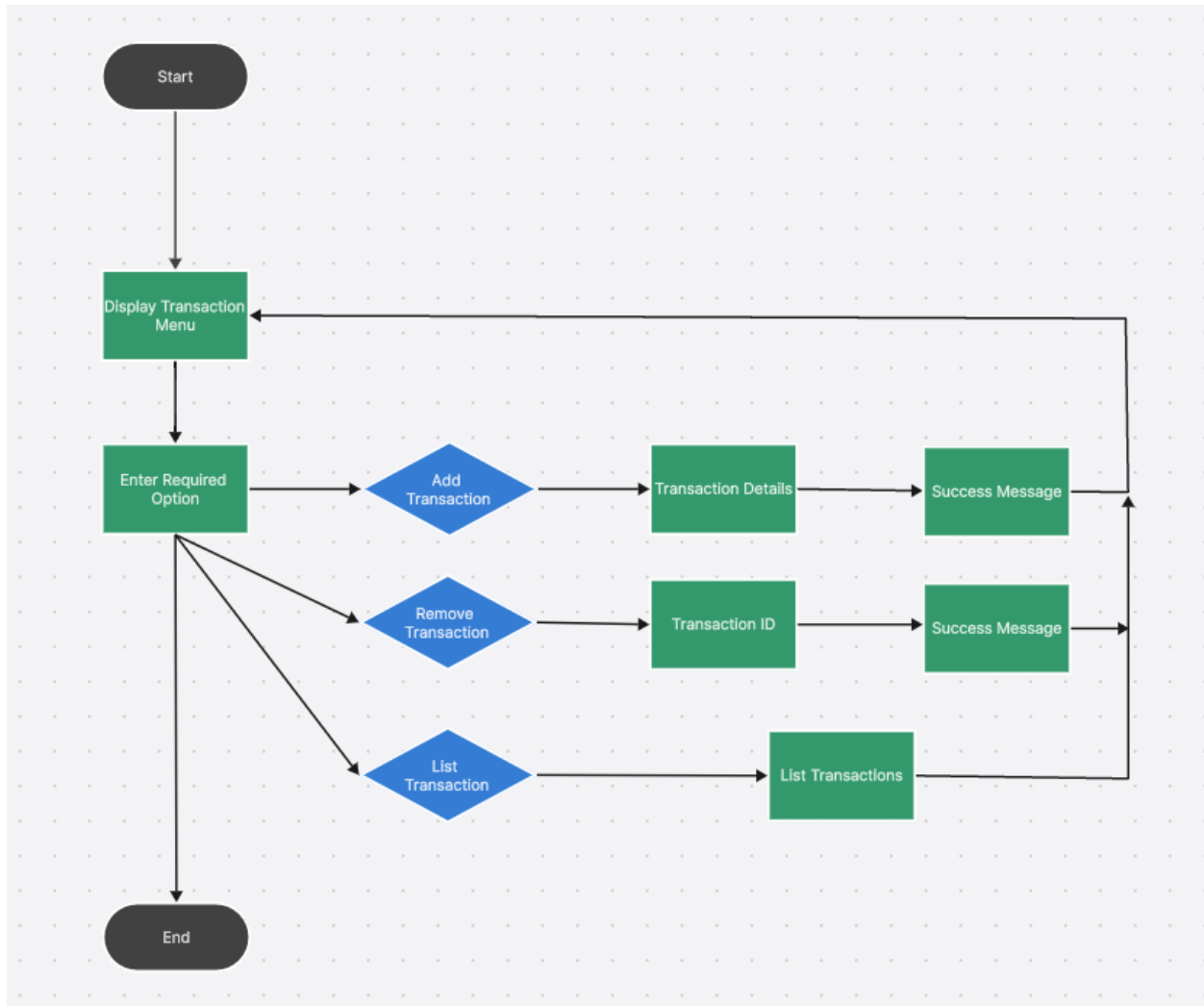


```
OSGi MITT Service [OSGi Framework] [pid: 19608]
WARNING: Using incubator modules: jdk.incubator.foreign, jdk.incubator.vector
Customer Adding Start
Start Supermarket Customer Service
<< if you want to exit enter 'end' for username >>
=====Customer Login =====
Enter UserName : CusAdmin
Enter Password : Cus123
=====

***** Welcome Customer Admin *****
Do you want to view Customer list, Add Customer, Remove Customer
Add Customer - a / View Customer List - v / Remove Customer - r / Logout - l a
Enter Customer Name : Hiranya
Enter Customer ID : 123
Do you want to view Customer list, Add Customer, Remove Customer
Add Customer - a / View Customer List - v / Remove Customer - r / Logout - l v
Customer List:
Name: Hiranya, ID: 123
Do you want to view Customer list, Add Customer, Remove Customer
Add Customer - a / View Customer List - v / Remove Customer - r / Logout - l r
Enter Customer Id For Remove : 123
Customer 123 removed successfully.
Do you want to view Customer list, Add Customer, Remove Customer
Add Customer - a / View Customer List - v / Remove Customer - r / Logout - l l
Good bye!
=====

Do you want to view Customer list, Add Customer, Remove Customer
Add Customer - a / View Customer List - v / Remove Customer - r / Logout - l
```

Flow diagram of Transaction.

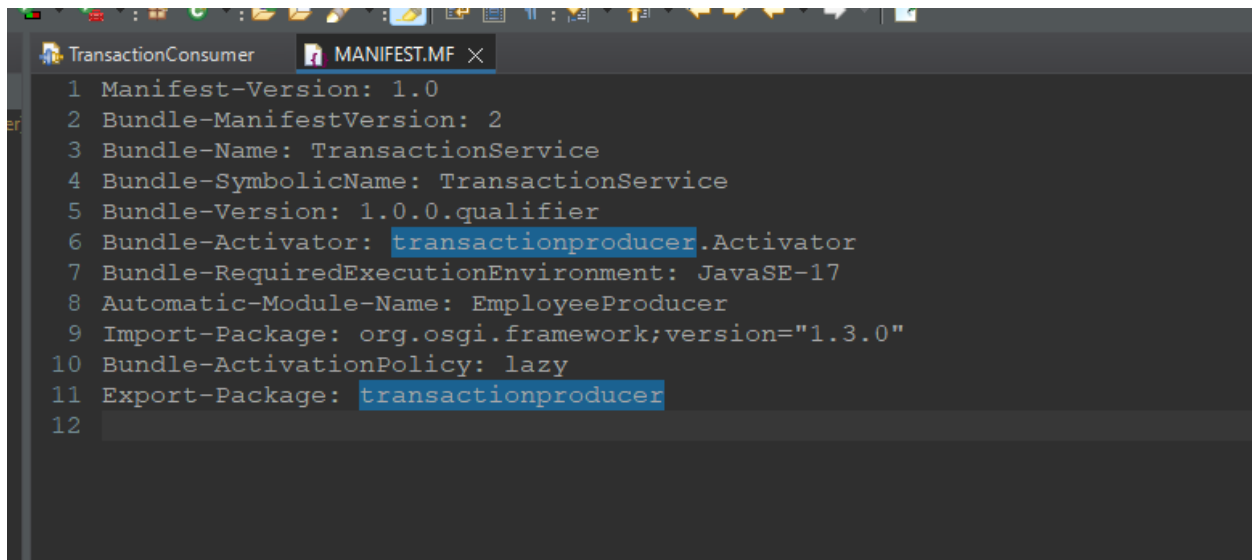


Produce Manifest implementation.

Consumer Manifest implementation

Bundles

Producer manifest file



```
TransactionConsumer  MANIFEST.MF x
1 Manifest-Version: 1.0
2 Bundle-ManifestVersion: 2
3 Bundle-Name: TransactionService
4 Bundle-SymbolicName: TransactionService
5 Bundle-Version: 1.0.0.qualifier
6 Bundle-Activator: transactionproducer.Activator
7 Bundle-RequiredExecutionEnvironment: JavaSE-17
8 Automatic-Module-Name: EmployeeProducer
9 Import-Package: org.osgi.framework;version="1.3.0"
10 Bundle-ActivationPolicy: lazy
11 Export-Package: transactionproducer
12
```

Consumer manifest file

```
TransactionConsumer x Activator.java Activator.java TransactionService.java TransactionServiceImpl.java
1 Manifest-Version: 1.0
2 Bundle-ManifestVersion: 2
3 Bundle-Name: TransactionConsumer
4 Bundle-SymbolicName: TransactionConsumer
5 Bundle-Version: 1.0.0.qualifier
6 Bundle-Activator: transactionconsumer.Activator
7 Bundle-RequiredExecutionEnvironment: JavaSE-17
8 Automatic-Module-Name: TransactionConsumer
9 Import-Package: org.osgi.framework;version="1.3.0",
10 transactionproducer
11 Bundle-ActivationPolicy: lazy
12 Export-Package: transactionconsumer
13
```

Behavior and Outputs

Outputs

Add Transactions

```
Console x
OSGi Framework [OSGi Framework] C:\Program Files\Java\jdk-21\bin\javaw.exe (Mar 4, 2024, 10:34:37 PM) [pid: 2244]
WARNING: Using incubator modules: jdk.incubator.vector
Transaction Service Start
Start Supermarket Transaction Service
<< if you want to exit, enter 'end' for Book ID >>
===== Transaction Menu =====
1. Add a Transaction
2. View all Transactions
3. Remove a Transaction
4. Exit
Enter your choice (1-4): 1
===== Add Transaction =====
Enter Book ID : 10
Enter Transaction ID : 10
Enter Transaction Type (borrow/return) : borrow
Processing Transaction - Book ID: 10, Fine Amount: 0, Transaction ID: 10, Transaction Type: borrow
Transaction added successfully!
<< if you want to exit, enter 'end' for Book ID >>
===== Transaction Menu =====
1. Add a Transaction
2. View all Transactions
3. Remove a Transaction
4. Exit
Enter your choice (1-4):
```

List of Transactions

```
===== View all Transactions =====  
All Transactions:  
Book ID: 10, Fine Amount: 0, Transaction ID: 10, Transaction Type: borrow  
Book ID: 1, Fine Amount: 0, Transaction ID: 1, Transaction Type: borrow  
Book ID: 2, Fine Amount: 2, Transaction ID: 2, Transaction Type: return  
Book ID: 4, Fine Amount: 2, Transaction ID: 4, Transaction Type: borrow  
<< if you want to exit, enter 'end' for Book ID >>  
===== Transaction Menu =====  
1. Add a Transaction  
2. View all Transactions  
3. Remove a Transaction  
4. Exit  
Enter your choice (1-4):
```

Remove a Transaction

```
===== Remove a Transaction =====  
Enter Transaction ID to remove: 10  
Transaction with ID 10 not found.  
Transaction removed successfully!  
<< if you want to exit, enter 'end' for Book ID >>  
===== Transaction Menu =====  
1. Add a Transaction  
2. View all Transactions  
3. Remove a Transaction  
4. Exit  
Enter your choice (1-4):
```