

Smart Port City

OSGi - Framework



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GitHub Link : https://github.com/Y3S1-SE-Projects/osgi-smart-port-city	

Use Case & Scenario

We will be building an OSGi application for the ongoing construction of the Port City in Sri Lanka. Our objective is to make a “Smart Port City” and *produce services* to the customers going in and out of the Port City, where they would be able to *subscribe or consume* those services at their own convenience.

However, you may ask why we have chosen the OSGi framework as our technology to develop this application? We know that among the construction of the Port City there would be many different services added from time to time such as various restaurants, different types of hotels etc. Therefore, from a developer’s point of view implementing each of these services may be a hustle and would take a long time to develop. The application would be large which can be difficult to maintain, difficult to maintain security and implement new services. New developers may find it difficult to comprehend the code and hence would increase development time. However, the OSGi framework solves this problem.

The OSGi framework provides mainly reliable configuration, strong encapsulation and high modularity. Modularity enables the program to separate the functionality of a large program into independent, interchangeable modules, in such a way that each module would contain everything it needs to execute one single functionality. Therefore, we can say that each module is fully encapsulated thus reducing security vulnerabilities. As you can see, due to these advantages of the OSGi framework for our use case this technology would be the perfect choice.



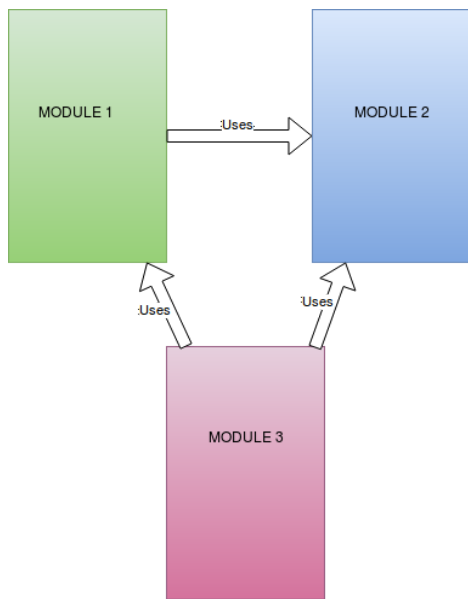


Figure 1 : Module Interaction

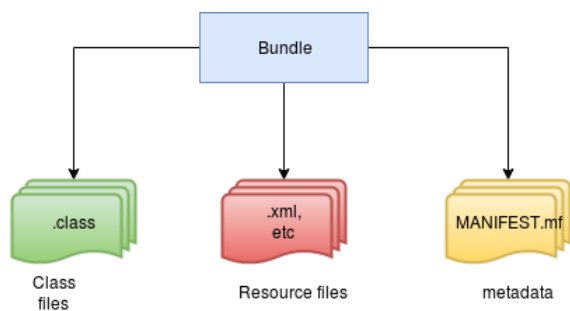


Figure 3 : Module Interaction

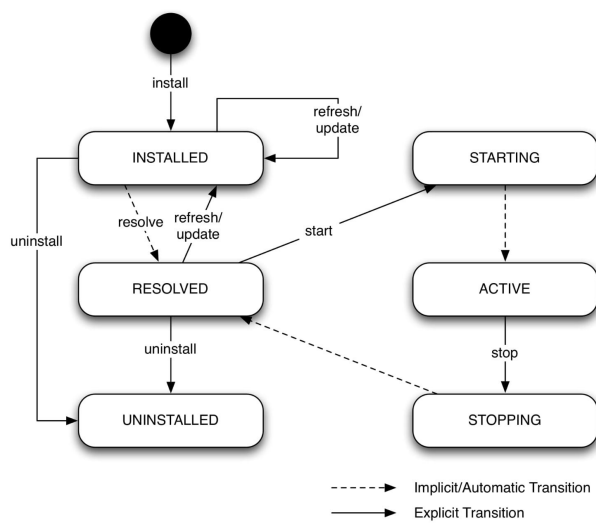


Figure 5 : OSGi Behaviours

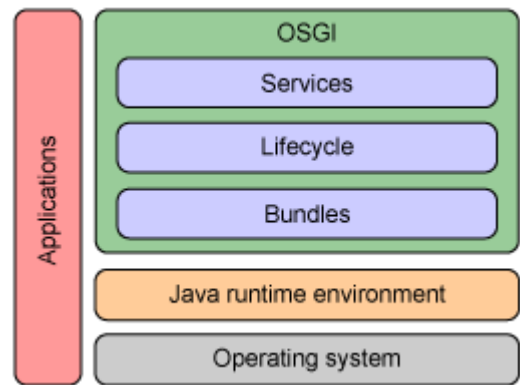


Figure 2 : OSGi Architecture

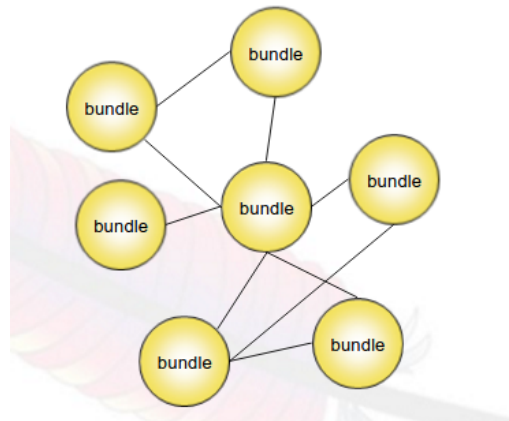
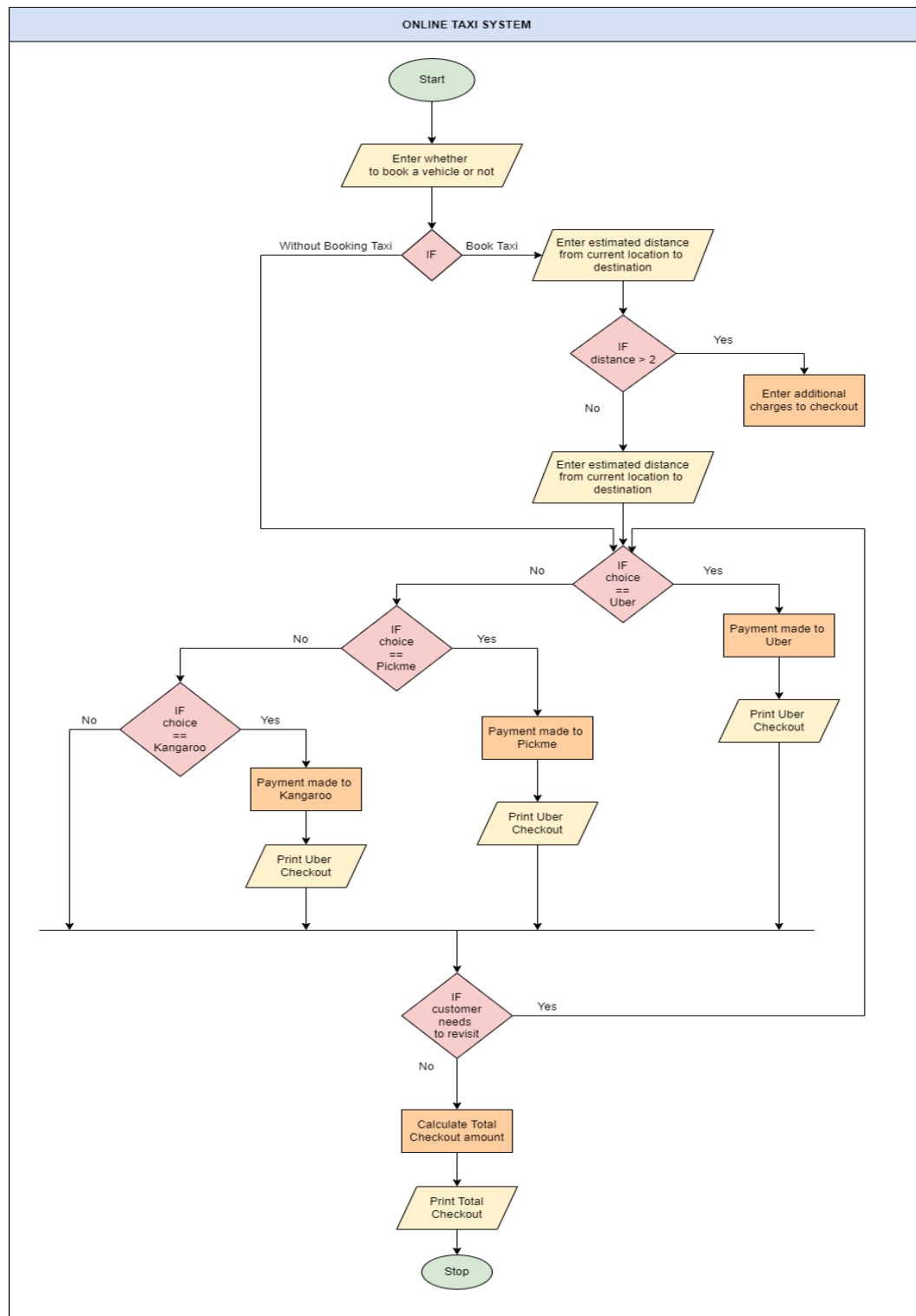
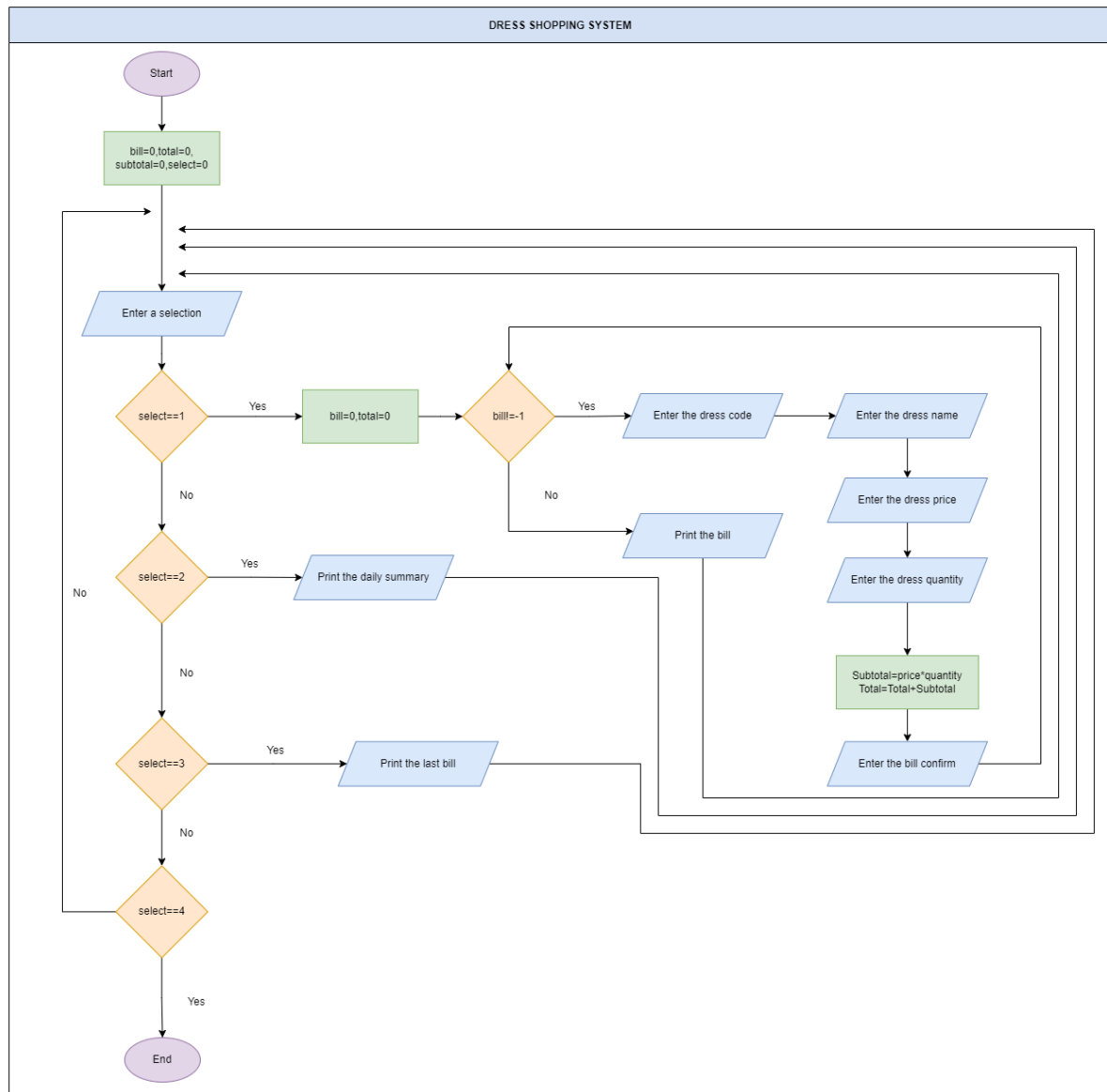


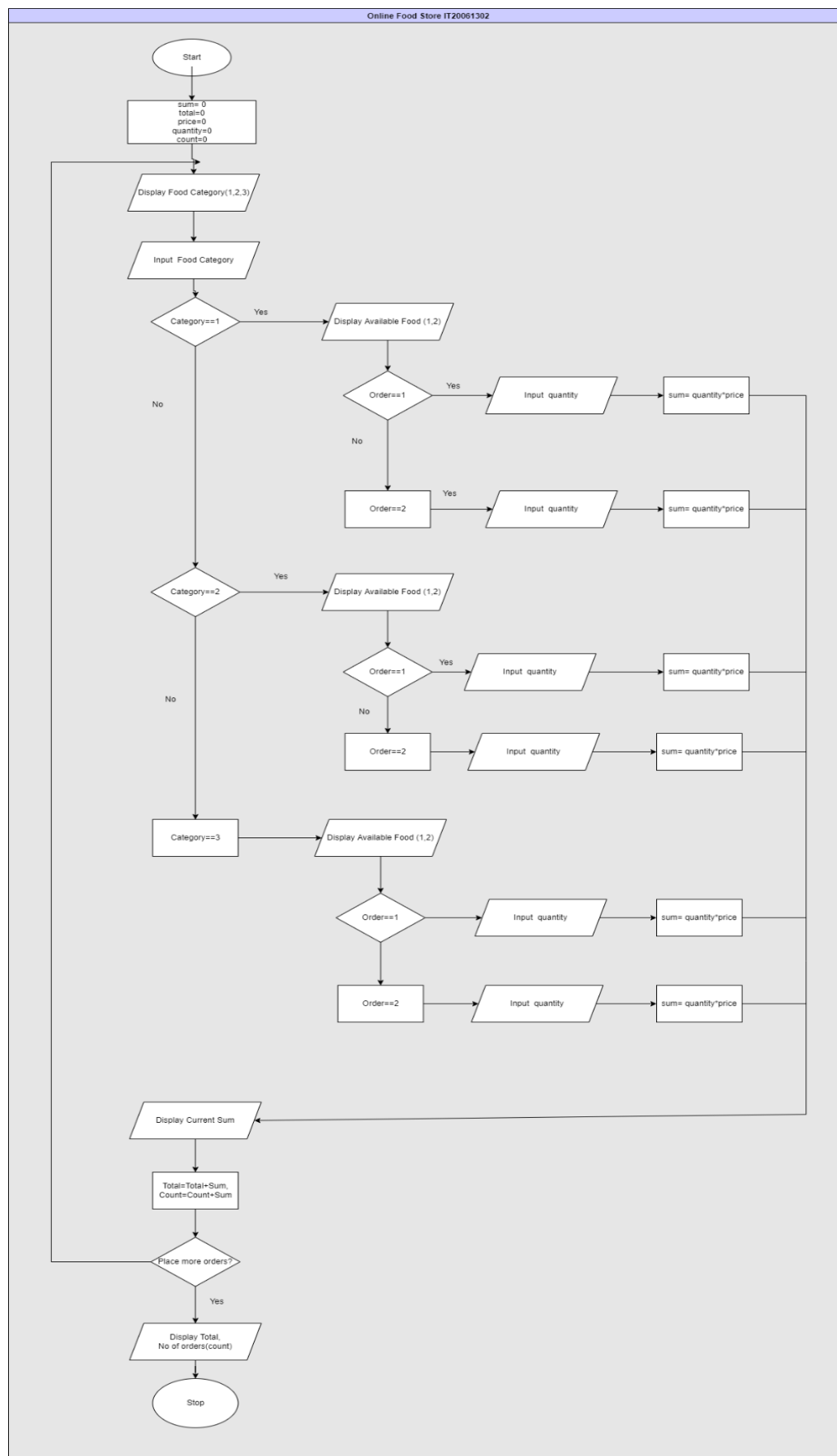
Figure 4 : OSGi Modularity

System Flowcharts

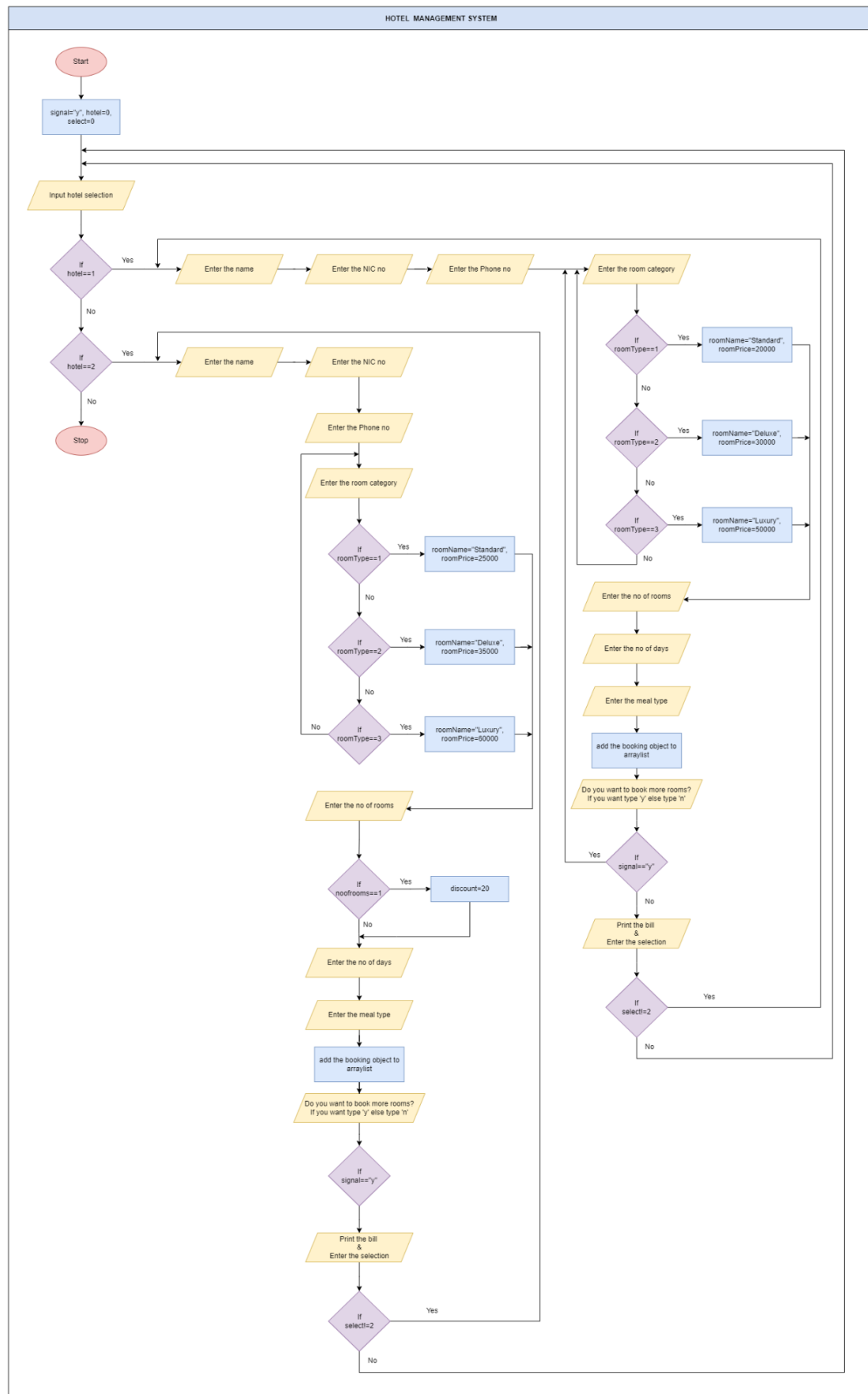
Online Taxi System - IT20013332







Hotel Management System- IT20032388





Getting Started - Installation

1. This is a basic producer and consumer application utilising the OSGi Framework.
2. Run all the producer bundles first before the consumer because you need to run these separately.
3. Make sure to create a new OSGi configuration for each producer bundle when running and also select **ONLY** the producer bundle you want to run.
4. For each producer press “Enter” and type “lb” to list all the bundles in order to check if your producer bundle is “ACTIVE” or not.
5. If you cannot find the bundle then use “Ctrl + f” to search by the bundle name or type “ss” and move to the top of the bundle list IDs, usually your desired bundle would be within the top 10 IDs.
6. Create a new OSGi configuration for the consumer bundle and run the configuration by selecting **ALL** the producer bundles including the consumer bundle.
7. Repeat steps 4 and 5 and check if all bundles, producers and consumers are “ACTIVE”. (If they are already “ACTIVE” your application will run automatically)

Console Screenshots

Online Taxi System - IT20013332 - Please note that all 4 images bellow is one continuing picture

1)

```
Console x
taxicustomer [OSGi Framework] D:\Software\eclipse\plugins\org.eclipse.justj.openjdk.hotspot.jre.full.win32.x86_64_17.0.1.v20211116-1

-----
You can book a taxi for instantaneously find a taxi. Please note that booking costs extra charges
Do you want to book an Taxi? yes or no

yes
-----
What is the distance between your current location and your destination?

150
-----
Select the type of Taxi!
1: Uber Taxi
2: Pickme Taxi
3: Kangaroo Taxi

1
Uber Taxi Service Starting ...
Welcome to Uber Taxi
*****
Taxi Prices
Tuk 1000 LKR
Zip 1200 LKR
Premier 2000 LKR
*****
You selected Uber Taxi!
1: Tuk
2: Zip
3: Premier

1
-----
How many Uber Tuks do you want to book?

5
Current Bill: 5000LKR
-----
```

2)

```
Console x
taxicustomer [OSGi Framework] D:\Software\eclipse\plugins\org.eclipse.justj.o

-----
Do you want to continue? 'yes' for YES
'no' for NO

yes
You selected Uber Taxi!
1: Tuk
2: Zip
3: Premier

2
-----
How many Uber Zips do you want to book?

9
Current bill: 10800LKR
-----
Do you want to continue? 'yes' for YES
'no' for NO

yes
You selected Uber Taxi!
1: Tuk
2: Zip
3: Premier

3
-----
How many Uber Premiers do you want to book?

3
Current Bill: 6000LKR
-----
```

3)

```

-----
Do you want to continue? 'yes' for YES
'no' for NO

no
*****
                        UBER TAXI CHECKOUT
*****
      Items  QTY    Price
tuk      5      5000.0
zip      9     10800.0
premier   3      6000.0
-----
                        Total : 21800.0 LKR
*****
                        Thank you & come again. Have nice day..!
*****

-----
Do you want to exit?
'yes' for YES
'no' for NO

```

4)

```

-----
Do you want to exit?
'yes' for YES
'no' for NO

yes
*****
                        TOTAL CHECKOUT
*****
      Items  Price
Uber      21800.0
Distance   3850.0  150.0km
-----
                        Total : 25650.0 LKR
*****
                        Thank you & come again. Have nice day..!
*****

Customer Consumer has stopped
osgi>

```

Figure 1 : Taxi System Console Output (Uber)

1)

```

Console x
taxicustomer [OSGi Framework] D:\Software\eclipse\plugins\org.eclipse.justi.openjdk.hotspot.jre.full.win32.x86_64_17.0.1.v20211116-16

-----
You can book a taxi for instantaneously find a taxi. Please note that booking costs extra charges
Do you want to book an Taxi? yes or no

no
-----
Select the type of Taxi!
1: Uber Taxi
2: Pickme Taxi
3: Kangaroo Taxi

2
*****
Taxi Prices

Tuk 50LKR
Flex600LKR
Mini 200LKR
*****
You selected Pickme Taxi!
1: Tuk
2: Flex
3: Mini

1
-----
How many Pickme Tuks do you want to book?

10
-----
Current Bill: 500LKR
-----

```

2)

```

Console x
taxicustomer [OSGi Framework] D:\Software\eclipse\plugins\org.eclipse.justi.openjdk.hotspot.jre.full.win32.x86_64_17.0.1.v20211116-16

-----
Do you want to continue? 'yes' for YES
'no' for NO

yes
You selected Pickme Taxi!
1: Tuk
2: Flex
3: Mini

2
-----
How many Pickme Flexs do you want to book?

11
-----
Current Bill: 6600LKR

Do you want to continue? 'yes' for YES
'no' for NO

yes
You selected Pickme Taxi!
1: Tuk
2: Flex
3: Mini

3
-----
How many Pickme Minis do you want to book?

3
-----
Current Bill: 600LKR
-----

```

3)

```

Console x
taxicustomer [OSGi Framework] D:\Software\eclipse\plugins\org.eclipse.justi.openjdk.hotspot.jre.full.win32.x86_64_17.0.1.v20211116-16

'no' for NO

no
*****
PICKME TAXI CHECKOUT
*****
      Items  QTY  Price
Tuk      10    500.0
Flex     11   6600.0
Mini      3    600.0
-----
Total : 7700.0 LKR
*****
Thank you & come again. Have nice day..!
*****

Do you want to exit?
'yes' for YES
'no' for NO

yes
*****
TOTAL CHECKOUT
*****
      Items  Price
Pickme      7700.0
-----
Total : 7700.0 LKR
*****
Thank you & come again. Have nice day..!
*****
Customer Consumer has stopped

```

Figure 2 : Taxi System Console Output (Pickme)

1)

```

taxicustomer [OSGi Framework] D:\Software\eclipse\plugins\org.eclipse.justi.openjdk.hotspot.jre.full.win32.x86_64_17.0.1.v20211116-1t
-----
You can book a taxi for instantaneously find a taxi. Please note that booking costs extra charges
Do you want to book an Taxi? yes or no

yes
-----
What is the distance between your current location and your destination?

100
-----
Select the type of Taxi!
1: Uber Taxi
2: Pickme Taxi
3: Kangaroo Taxi

3
*****
Taxi Prices

Tuk =100LKR
Car =700LKR
Van =900LKR
*****
You selected Kangaroo Taxi!
1: Tuk
2: Car
3: Van

1
-----
How many Kangaroo Tuks do you want?

15
Current Bill: 1500LKR
-----

```

2)

```

taxicustomer [OSGi Framework] D:\Software\eclipse\plugins\org.eclipse.justi.c
-----
Do you want to continue? 'yes' for YES
'no' for NO

yes
You selected Kangaroo Taxi!
1: Tuk
2: Car
3: Van

2
-----
How many Kangaroo Cars do you want?

15
Current Bill: 10500LKR
-----
Do you want to continue? 'yes' for YES
'no' for NO

yes
You selected Kangaroo Taxi!
1: Tuk
2: Car
3: Van

3
-----
How many Kangaroo Vans do you want?

90
Current Bill: 81000LKR
-----

```

3)

```

no
*****
KANGAROO TAXI CHECKOUT
*****
Items QTY Price
tuk 15 1500.0
car 15 10500.0
van 90 81000.0
-----
Total : 93000.0 LKR
*****
Thank you & come again. Have nice day..!
*****
Do you want to exit?
'yes' for YES
'no' for NO

yes
*****
TOTAL CHECKOUT
*****
Items Price
Kangaroo 93000.0
Distance 1170.0 100.0km
-----
Total : 94170.0 LKR
*****
Thank you & come again. Have nice day..!
*****
Customer Consumer has stopped

```

Figure 3 : Taxi System Console Output (Kangaroo)

Online Food System - IT20061302 Kuruppu S.G

```
consumer [OSGi Framework]
Service done!20
*****
Welcome to Smart Port City Food Store
*****
Which food Category would you like to have?
1. Appetizers
2. Meal
3. Dessert
1
What would you like to order?
1. Garlic Bread with Cheese LKR 400
2. Egg and Cream Soup LKR 300
2
Enter qty:
1
Current total: LKR300.0
Do you want to enjoy more food(y/n)?
y
*****
Welcome to Smart Port City Food Store
*****
Which food Category would you like to have?
1. Appetizers
2. Meal
3. Dessert
2
What would you like to order?
1. Pizza LKR 800
2. Biryani LKR 500
2
Enter qty:
1
Current total: LKR800.0
Do you want to enjoy more food(y/n)?

Console x
consumer [OSGi Framework]
*****
Which food Category would you like to have?
1. Appetizers
2. Meal
3. Dessert
1
What would you like to order?
1. Garlic Bread with Cheese LKR 400
2. Egg and Cream Soup LKR 300
2
Enter qty:
1
Current total: LKR300.0
Do you want to enjoy more food(y/n)?
y
*****
Welcome to Smart Port City Food Store
*****
Which food Category would you like to have?
1. Appetizers
2. Meal
3. Dessert
3
What would you like to order?
1. Ice cream LKR 100
2. Watalappan LKR 80
2
Enter quantity:
1
Current total: LKR800.0
Do you want to enjoy more food(y/n)?
n
*****
Number of Orders:2.0
Total bill is: LKR1100.0
*****
```

```

consumer [OSGi Framework]
*****
Which food Category would you like to have?
1. Appetizers
2. Meal
3. Dessert
1
What would you like to order?
1. Garlic Bread with Cheese LKR 400
2. Egg and Cream Soup LKR 300
2
Enter qty:
1
Current total: LKR300.0
Do you want to enjoy more food(y/n)?
y
*****
Welcome to Smart Port City Food Store
*****
Which food Category would you like to have?
1. Appetizers
2. Meal
3. Dessert
3
What would you like to order?
1. Ice cream LKR 100
2. Watalappan LKR 80
2
Enter quantity:
1
Current total: LKR800.0
Do you want to enjoy more food(y/n)?
n
*****
Number of Orders:2.0
Total bill is: LKR1100.0
*****

```

Figure 2 : Online Food Store Output

Dress Shopping System - IT20025908

```

Dress Shop Run Config [OSGi Framework] D:\eclipse\plugins\org.eclipse.justj.openjdk.hotspot.jre.full.win32.x86_
Dress shop producer service is open
Dress shop Opening
Dress shop consumer service is open
***** Welcome to dress shop *****
Select the number:
1) Start Billing
2) Day Summary
3) View the last bill
4) End the program

Enter the selection: 1
Enter the item code: 001
Enter the item name: Shirt
Enter the item price: 1000
Enter the item quantity: 3

Subtotal :3000
Total :3000

Press any key to continue or end the billing process press -1: 0
Enter the item code: 002
Enter the item name: Tshirt
Enter the item price: 1200
Enter the item quantity: 3

Subtotal :3600
Total :6600

Press any key to continue or end the billing process press -1: -1
*****
Waruna Textiles
Colombo 06
24-03-2022 19:07:35
*****
Code ID      Name      Quantity  Price      Amount
  001      Shirt         3       1000       3000
  002      Tshirt         3       1200       3600
-----
Net Total                                6600
*****
Thank you and Come again
Select the number:

```

```

Dress Shop Run Config [OSGi Framework] D:\eclipse\plugins\org.eclipse.justi.openjdk.hotspot.jre.full.win32.x86_64_
Select the number:
1) Start Billing
2) Day Summary
3) View the last bill
4) End the program

Enter the selection: 1
Enter the item code: 004
Enter the item name: Shirt
Enter the item price: 1200
Enter the item quantity: 3

Subtotal :3600
Total :3600

Press any key to continue or end the billing process press -1: 0
Enter the item code: 005
Enter the item name: Tshirt
Enter the item price: 1400
Enter the item quantity: 3

Subtotal :4200
Total :7800

Press any key to continue or end the billing process press -1: -1
*****
                          Waruna Textiles
                          Colombo 06
24-03-2022 19:08:18
*****
Code ID      Name      Quantity  Price      Amount
   004      Shirt         3      1200      3600
   005      Tshirt        3      1400      4200
-----
Net Total                                7800
*****
                          Thank you and Come again
Select the number:

```

```

Dress Shop Run Config [OSGi Framework] D:\eclipse\plugins\org.eclipse.justi.openjdk.hotspot.jre.full.win32.x86_64_
*****
                          Thank you and Come again
Select the number:
1) Start Billing
2) Day Summary
3) View the last bill
4) End the program

Enter the selection: 2

Total quantity: 12
Total sales: 14400

Select the number:
1) Start Billing
2) Day Summary
3) View the last bill
4) End the program

Enter the selection: 3

Last Bill printed

*****
                          Waruna Textiles
                          Colombo 06
24-03-2022 19:08:23
*****
Code ID      Name      Quantity  Price      Amount
   004      Shirt         3      1200      3600
   005      Tshirt        3      1400      4200
-----
Net Total                                7800
*****
                          Thank you and Come again
Select the number:

```

Figure 3 :Waruna Textile Output

Hotel Management System- IT20032388

```
Console
Consumer run config [OSGi Framework] E:\SW\Java\eclipse\eclipse\plugins\org.eclipse.justj.openjdk.hotspot.jre.full
Booking Consumer Opened
***** Welcome to Hotel Booking System *****
Select the hotel:
1) Cinnamon Grand Hotel
2) Kingsbury Hotel
3) End the program

Enter the selection: 1
***** Welcome to Cinnamon Grand Hotel *****
Select the number:
1) Start Booking
2) End the program

Enter the selection: 1
```

```
Console
Consumer run config [OSGi Framework] E:\SW\Java\eclipse\eclipse\plugins\org.eclipse.justj.openjdk.hotspot.jre.full:
3) Luxury Room - 60000

Enter the room type: 2
Enter the no of rooms: 4
Enter the no of days: 11
Enter meal type: veg
Do you want to book more rooms? If you want type 'y' else type 'n' : y

Select the room-
1) Standard Room - 25000
2) Deluxe Room - 35000
3) Luxury Room - 60000

Enter the room type: 3
Enter the no of rooms: 2
Enter the no of days: 11
Enter meal type: Non-Veg
Do you want to book more rooms? If you want type 'y' else type 'n' : n
*****
Cinnamon Grand Hotel
Colombo 03
24/03/2022 21:08:57
*****
Name: Bella
Phone no: 0777345670
-----
Room Type    Room Price    Quantity    No of Days    Amount
Deluxe       35000         4           11            1540000
Luxury       60000         2           11            1320000
*****
Net Total:                                     2860000
-----
*****
```


Console

Consumer run config [OSGi Framework] E:\SW\Java\ eclipse\ eclipse\pl
Select the number:
1) Start Booking
2) End the program
Enter the selection: 2
Select the hotel:
1) Cinnamon Grand Hotel
2) Kingsbury Hotel
3) End the program
Enter the selection: 2
***** Welcome to Kingsbury *****
Select the number:
1) Start Booking
2) End the program
Enter the selection: 1
Billing initialized

Console

Consumer run config [OSGi Framework] E:\SW\Java\ eclipse\ eclipse\plugins\org.eclipse.justj.openjd
1) Cinnamon Grand Hotel
2) Kingsbury Hotel
3) End the program
Enter the selection: 1
***** Welcome to Cinnamon Grand Hotel *****
Select the number:
1) Start Booking
2) End the program
Enter the selection: 1
Billing initialized
Enter your name: Bella
Enter your NIC no: 2987765453
Enter your Phone no: 0777345670
Select the room-
1) Standard Room - 25000
2) Deluxe Room - 35000
3) Luxury Room - 60000
Enter the room type: 2
Enter the no of rooms: 4
Enter the no of days: 11
Enter meal type: veg
Do you want to book more rooms? If you want type 'y' else type 'n' : y

Console

Consumer run config [OSGi Framework] E:\SW\Java\ eclipse\ eclipse\plugins\org.eclipse.justj.openjdk.hotspot.jre.full.
Enter the selection: 1
Billing initialized
Enter your name: Anna
Enter your NIC no: 5678987878
Enter your Phone no: 0757694453
Select the room-
1) Standard Room - 20000
2) Deluxe Room - 30000
3) Luxury Room - 50000
Enter the room type: 3
Enter the no of rooms: 1
Are you newly married couple trip? If you are type 'y' else type 'n' : y
Congrats you have a discount for this booking!!!
Enter the no of days: 4
Enter meal type: Non-Veg

Kingsbury Hotel
Colombo 01
24/03/2022 21:11:26

Name: Anna
Phone no: 0757694453

Room Type Room Price Quantity No of Days Amount
Luxury 50000 1 4 20000

Gross Total: 20000
Discount: 4000
Net Total: 16000

Figure 4 : Hotel Management System Output

Manifest Screenshots

Online Taxi System - IT20013332

```
Uber x
1 Manifest-Version: 1.0
2 Bundle-ManifestVersion: 2
3 Bundle-Name: Uber
4 Bundle-SymbolicName: Uber
5 Bundle-Version: 1.0.0.qualifier
6 Bundle-Activator: uber.activator.Activator
7 Bundle-RequiredExecutionEnvironment: JavaSE-1.8
8 Automatic-Module-Name: Uber
9 Import-Package: org.osgi.framework;version="1.3.0"
10 Bundle-ActivationPolicy: lazy
11 Export-Package: uber,
12 uber.activator
13
```

Figure 1 : Uber Manifest
(Producer)

```
Pickme x
1 Manifest-Version: 1.0
2 Bundle-ManifestVersion: 2
3 Bundle-Name: Pickme
4 Bundle-SymbolicName: Pickme
5 Bundle-Version: 1.0.0.qualifier
6 Bundle-Activator: pickme.activator.Activator
7 Bundle-RequiredExecutionEnvironment: JavaSE-1.8
8 Automatic-Module-Name: Pickme
9 Import-Package: org.osgi.framework;version="1.3.0"
10 Bundle-ActivationPolicy: lazy
11 Export-Package: pickme,
12 pickme.activator
13
```

Figure 2 : Pickme Manifest
(Producer)

```
Kangaroo x
1 Manifest-Version: 1.0
2 Bundle-ManifestVersion: 2
3 Bundle-Name: Kangaroo
4 Bundle-SymbolicName: Kangaroo
5 Bundle-Version: 1.0.0.qualifier
6 Bundle-Activator: kangaroo.activator.Activator
7 Bundle-RequiredExecutionEnvironment: JavaSE-1.8
8 Automatic-Module-Name: Kangaroo
9 Import-Package: org.osgi.framework;version="1.3.0"
10 Bundle-ActivationPolicy: lazy
11 Export-Package: kangaroo,
12 kangaroo.activator
13
```

Figure 3 : Kangaroo Manifest
(Producer)

```
TaxiTransportService x
1 Manifest-Version: 1.0
2 Bundle-ManifestVersion: 2
3 Bundle-Name: TaxiTransportService
4 Bundle-SymbolicName: TaxiTransportService
5 Bundle-Version: 1.0.0.qualifier
6 Bundle-Activator: transportservice.Activator
7 Bundle-RequiredExecutionEnvironment: JavaSE-1.8
8 Automatic-Module-Name: TaxiTransportService
9 Import-Package: org.osgi.framework;version="1.3.0"
10 Bundle-ActivationPolicy: lazy
11 Export-Package: transportservice
12
```

Figure 4 : Taxi Transport Service Manifest
(Producer)

```
TaxiCustomer x
1 Manifest-Version: 1.0
2 Bundle-ManifestVersion: 2
3 Bundle-Name: TaxiCustomer
4 Bundle-SymbolicName: TaxiCustomer
5 Bundle-Version: 1.0.0.qualifier
6 Bundle-Activator: customer.activator.Activator
7 Bundle-RequiredExecutionEnvironment: JavaSE-17
8 Automatic-Module-Name: TaxiCustomer
9 Import-Package: org.osgi.framework;version="1.3.0"
10 Bundle-ActivationPolicy: lazy
11 Require-Bundle: Uber;bundle-version="1.0.0",
12 Pickme;bundle-version="1.0.0",
13 Kangaroo;bundle-version="1.0.0",
14 TaxiTransportService;bundle-version="1.0.0"
15
```

Figure 5 : Taxi Customer
(Consumer)

Online Food Store IT20061302

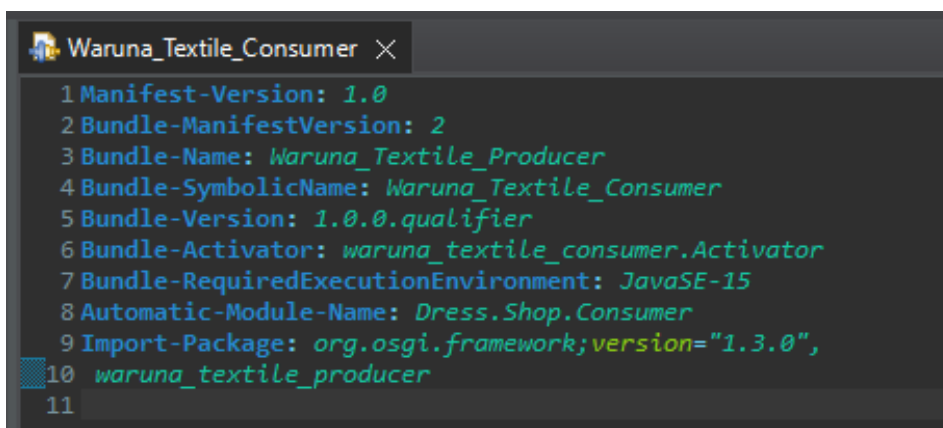
```
1 Manifest-Version: 1.0
2 Bundle-ManifestVersion: 2
3 Bundle-Name: FoodProducer
4 Bundle-SymbolicName: FoodProducer
5 Bundle-Version: 1.0.0.qualifier
6 Bundle-Activator: foodproducer.Activator
7 Bundle-RequiredExecutionEnvironment: JavaSE-17
8 Automatic-Module-Name: FoodProducer
9 Import-Package: org.osgi.framework;version="1.3.0"
10 Bundle-ActivationPolicy: lazy
11 Export-Package: foodproducer
12
13
14
```

Figure 6: Manifest File Food Producer

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

Figure 7:- Manifest File Food Consumer

Dress Shopping System - IT20025908



```
1 Manifest-Version: 1.0
2 Bundle-ManifestVersion: 2
3 Bundle-Name: Waruna_Textile_Producer
4 Bundle-SymbolicName: Waruna_Textile_Consumer
5 Bundle-Version: 1.0.0.qualifier
6 Bundle-Activator: waruna_textile_consumer.Activator
7 Bundle-RequiredExecutionEnvironment: JavaSE-15
8 Automatic-Module-Name: Dress.Shop.Consumer
9 Import-Package: org.osgi.framework;version="1.3.0",
10 waruna_textile_producer
11
```

Figure 8 : Waruna Textile Manifest (Consumer)

```

1 Manifest-Version: 1.0
2 Bundle-ManifestVersion: 2
3 Bundle-Name: Waruna_Textile_Producer
4 Bundle-SymbolicName: Waruna_Textile_Producer
5 Bundle-Version: 1.0.0.qualifier
6 Bundle-Activator: waruna_textile_producer.Activator
7 Import-Package: org.osgi.framework;version="1.3.0"
8 Bundle-RequiredExecutionEnvironment: JavaSE-15
9 Export-Package: waruna_textile_producer
10 Bundle-ActivationPolicy: lazy
11 Automatic-Module-Name: Waruna.Textile.Producer
12

```

Figure 9 : Waruna Textile Manifest (Producer)

Hotel Management System- IT20032388

```

1 Manifest-Version: 1.0
2 Bundle-ManifestVersion: 2
3 Bundle-Name: Cinnamon_Grand_Hotel_Producer
4 Bundle-SymbolicName: Cinnamon_Grand_Hotel_Producer
5 Bundle-Version: 1.0.0.qualifier
6 Bundle-Activator: cinnamon_grand_hotel_producer.Activator
7 Bundle-RequiredExecutionEnvironment: JavaSE-15
8 Automatic-Module-Name: Cinnamon.Grand.Hotel.Producer
9 Import-Package: org.osgi.framework;version="1.3.0"
10 Export-Package: cinnamon_grand_hotel_producer
11

```

Figure 10 : Cinnamon Grand Manifest (Producer)

```

1 Manifest-Version: 1.0
2 Bundle-ManifestVersion: 2
3 Bundle-Name: Kingsbury_Hotel_Producer
4 Bundle-SymbolicName: Kingsbury_Hotel_Producer
5 Bundle-Version: 1.0.0.qualifier
6 Bundle-Activator: kingsbury_hotel_producer.Activator
7 Bundle-RequiredExecutionEnvironment: JavaSE-15
8 Automatic-Module-Name: Kingsbury.Hotel.Producer
9 Import-Package: org.osgi.framework;version="1.3.0"
10 Export-Package: kingsbury_hotel_producer
11

```

Figure 11 : Kingsbury Manifest (Producer)

```

1 Manifest-Version: 1.0
2 Bundle-ManifestVersion: 2
3 Bundle-Name: Booking_Consumer
4 Bundle-SymbolicName: Booking_Consumer
5 Bundle-Version: 1.0.0.qualifier
6 Bundle-Activator: booking_consumer.Activator
7 Bundle-RequiredExecutionEnvironment: JavaSE-15
8 Automatic-Module-Name: Hotel.Consumer
9 Import-Package: cinnamon_grand_hotel_producer,
10 kingsbury_hotel_producer,
11 org.osgi.framework;version="1.3.0"
12

```

Figure 12 : Booking Manifest (Consumer)