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.

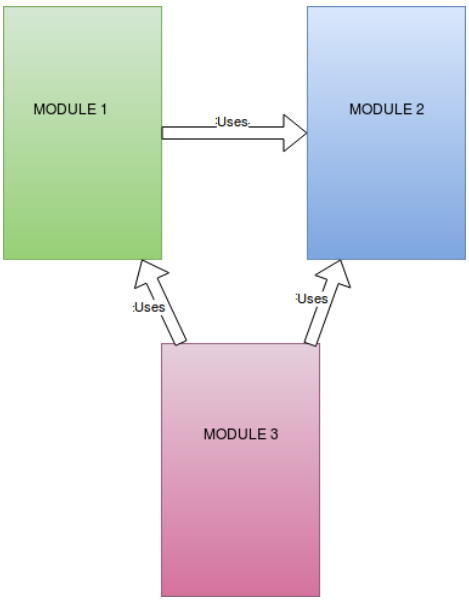


Figure 1 : Module Interaction

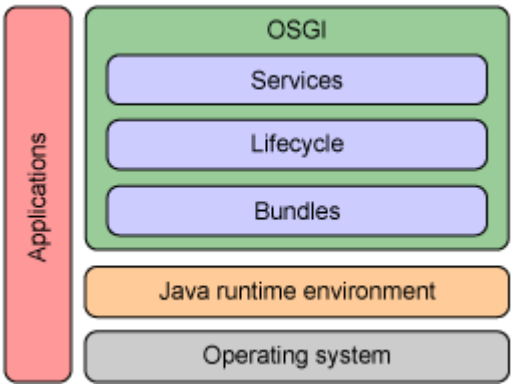


Figure 2 : OSGi Architecture

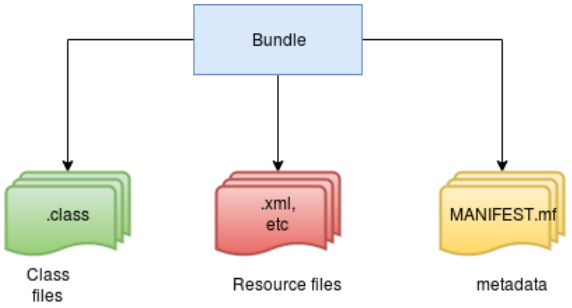


Figure 3 : Module Interaction

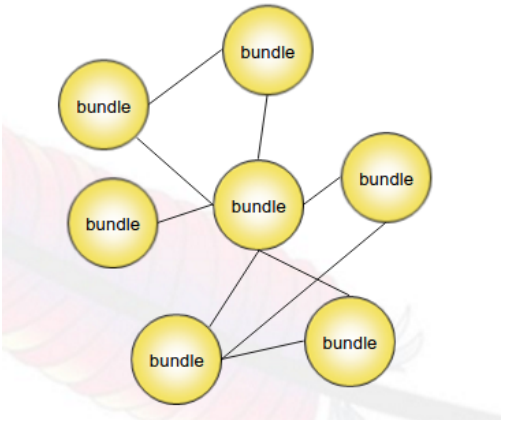


Figure 4 : OSGi Modularity

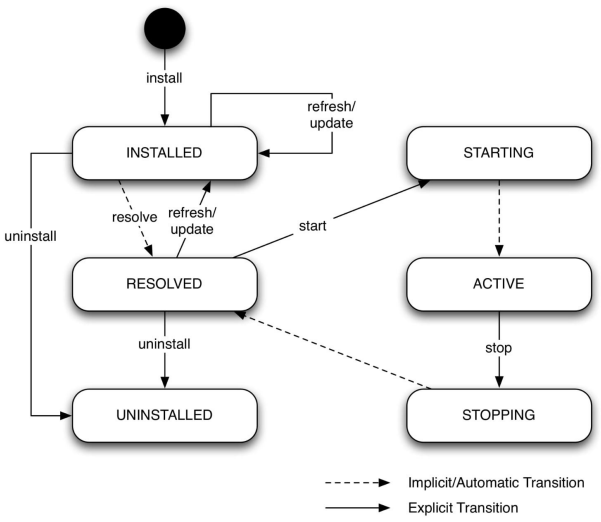
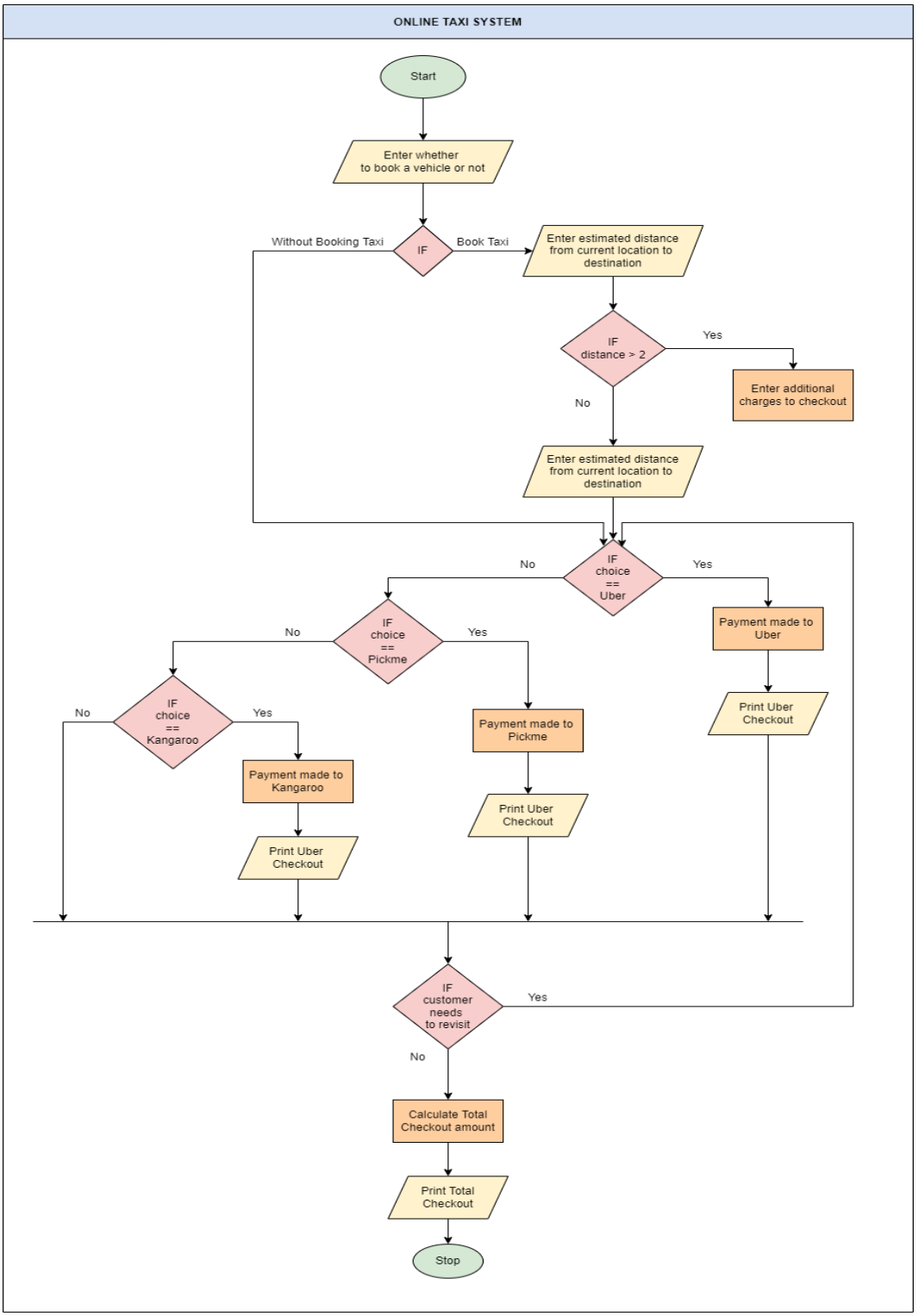


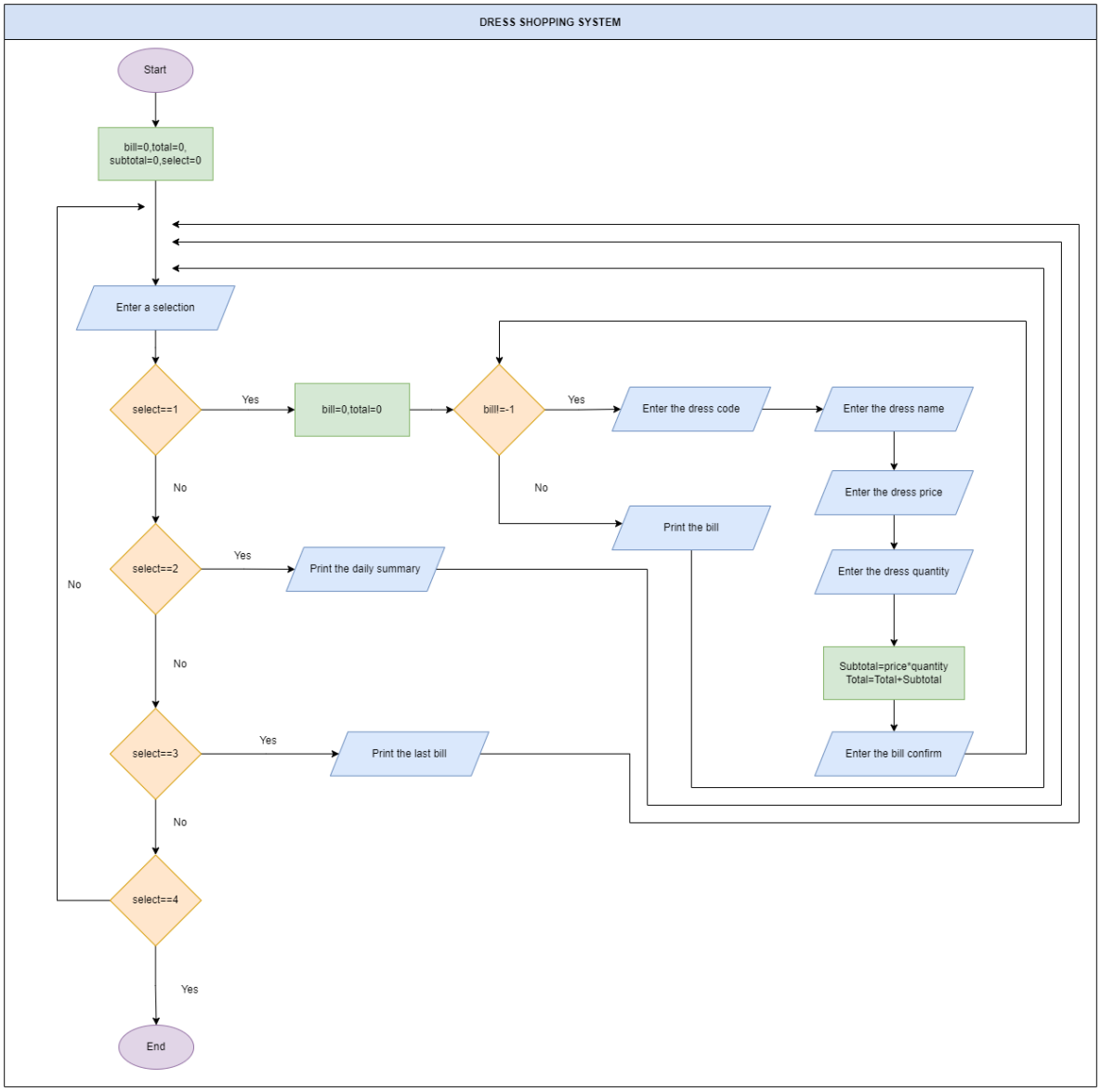
Figure 5 : OSGi Behaviours

System Flowcharts

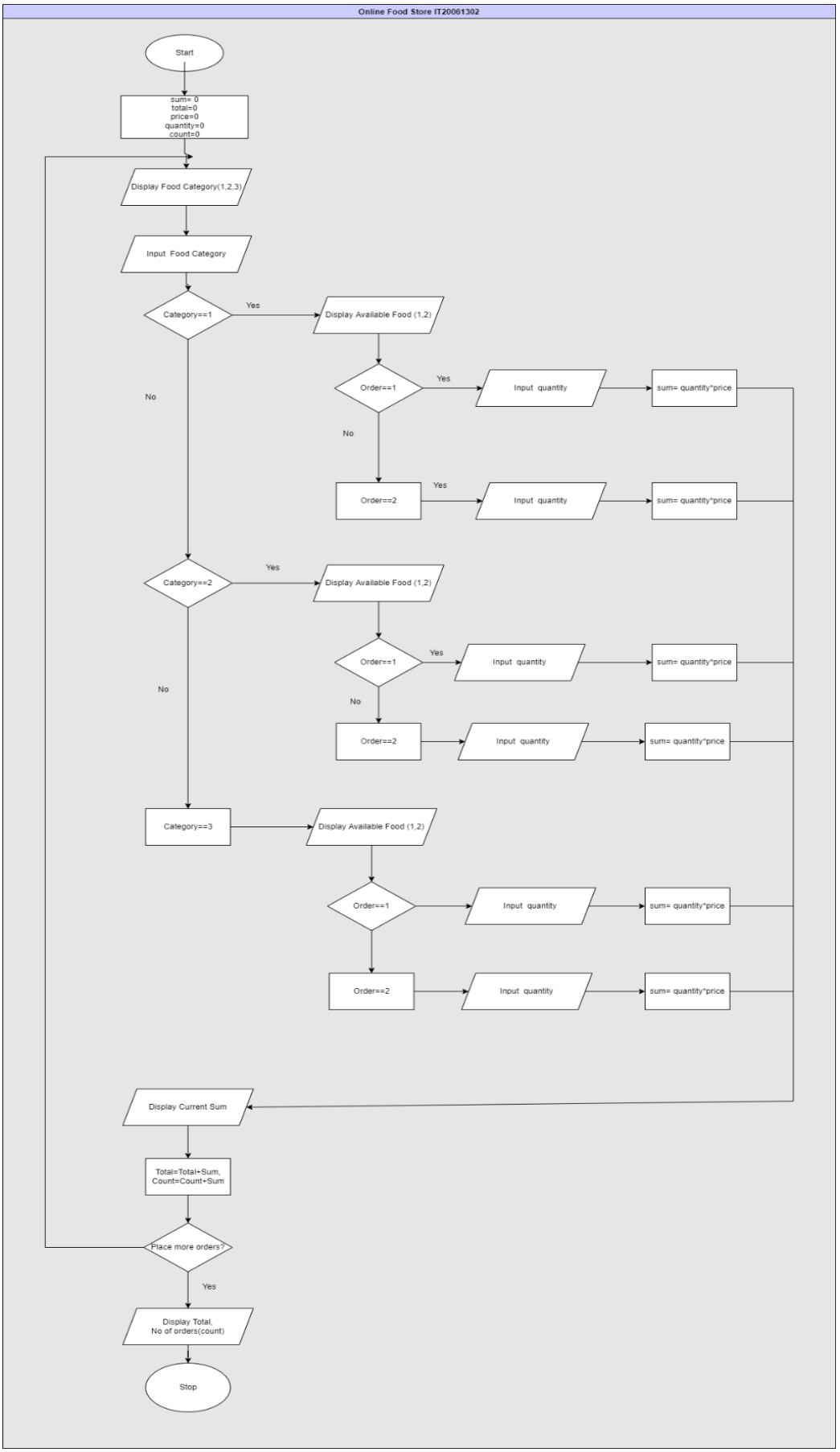
Online Taxi System - IT20013332



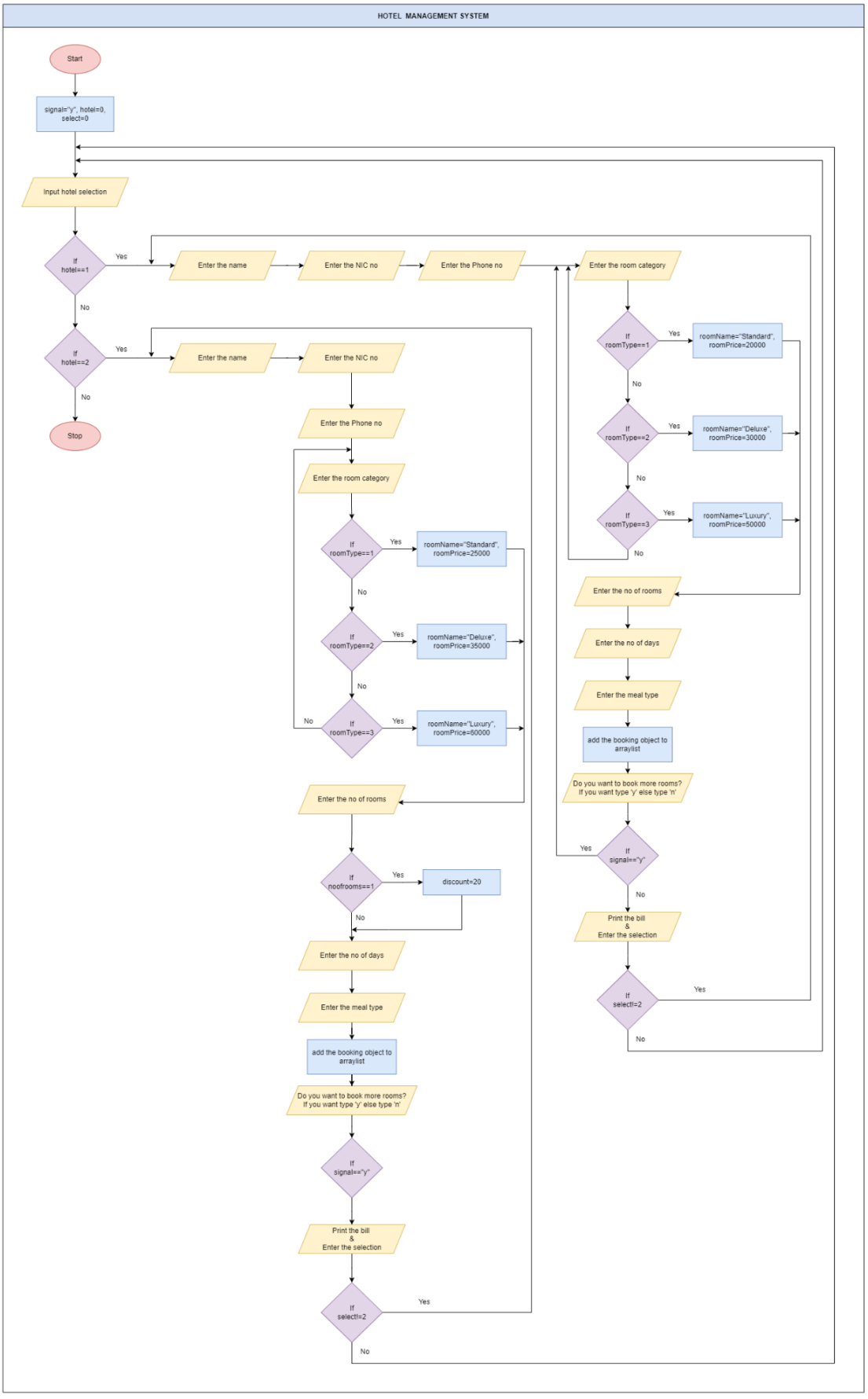
Dress Shopping System - IT20025908



Online Food Store - IT20061302



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)

To run the Taxi System :

1. Run “Uber” , “Pickme”, “Kangaroo” , “TaxiTransportService” bundle producers first
2. Finally run “TaxiCustomer” bundle consumer

To run the Food System :

1. Run “FoodProducer” bundle producer first
2. Finally run “FoodConsumer” bundle consumer

To run the Waruna Textile System :

1. Run "Waruna Textile Producer" bundle producer first
2. Finally run "Waruna Textile Consumer" bundle consumer

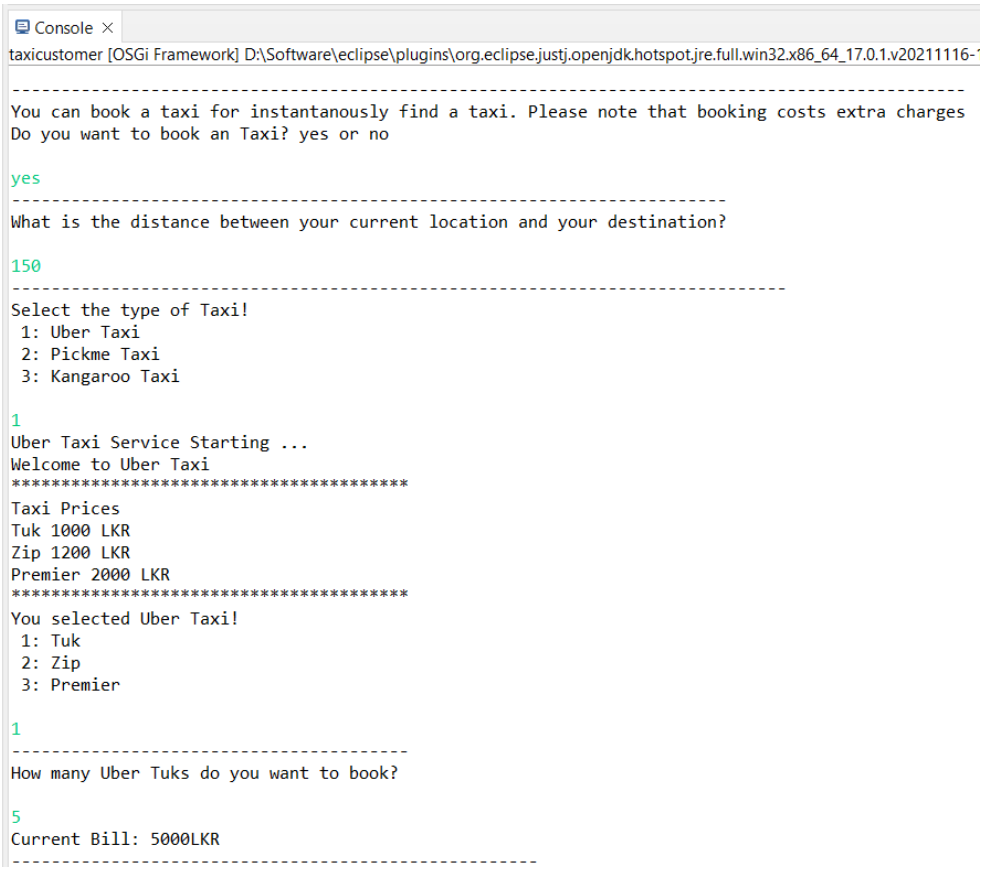
To run the Hotel Management System :

1. Run "Cinnamon Grand Hotel Producer" and "Kingsbury Hotel Producer" bundle producers first
2. Finally run "Booking Hotel Consumer" bundle consumer

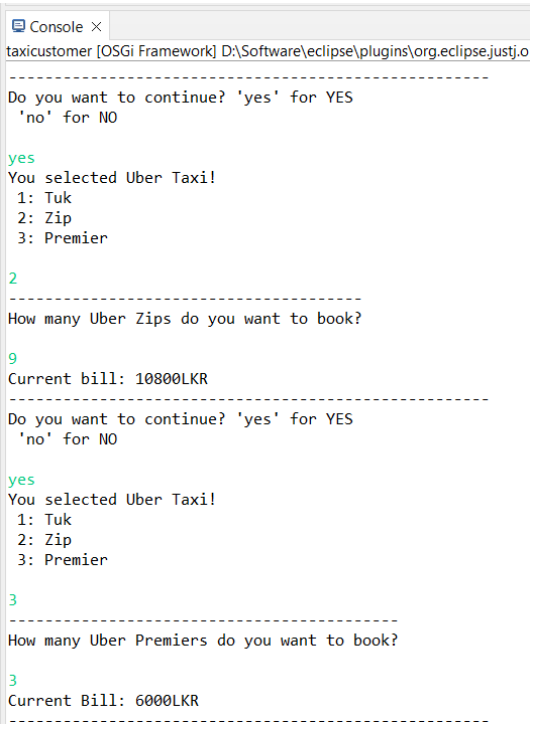
Console Screenshots

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

1)



2)



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 ×
taxicustomer [OSGi Framework] D:\Software\eclipse\plugins\org.eclipse.justj.openjdk.hotspot.jre.full.win32.x86_64_17.0.1.v20211116-16
-------------------------------------------------------------------------------------------------
You can book a taxi for instantanously 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 ×
taxicustomer [OSGi Framework] D:\Software\eclipse\plugins\org.eclipse.just
-----------------------------------------------------
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 ×
taxicustomer [OSGi Framework] D:\Software\eclipse\plugins\org.eclipse.justj.openj
 '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)

```
Console ×
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 instantanously 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)

```
Console ×
taxicustomer [OSGi Framework] D:\Software\eclipse\plugins\org.eclipse.justj.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. Biriyani LKR 500
2
 Enter qty:
1
Current total: LKR800.0
 Do you want to enjoy more food(y/n)?
```

```
Console ×
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
**************************************
```

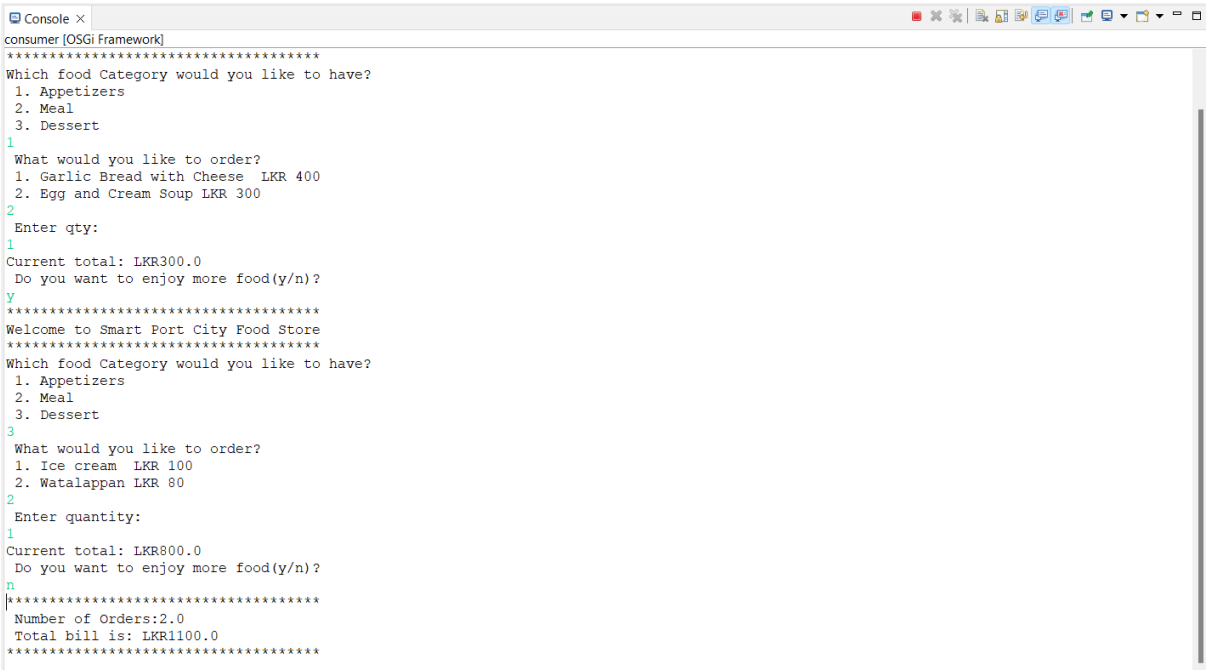
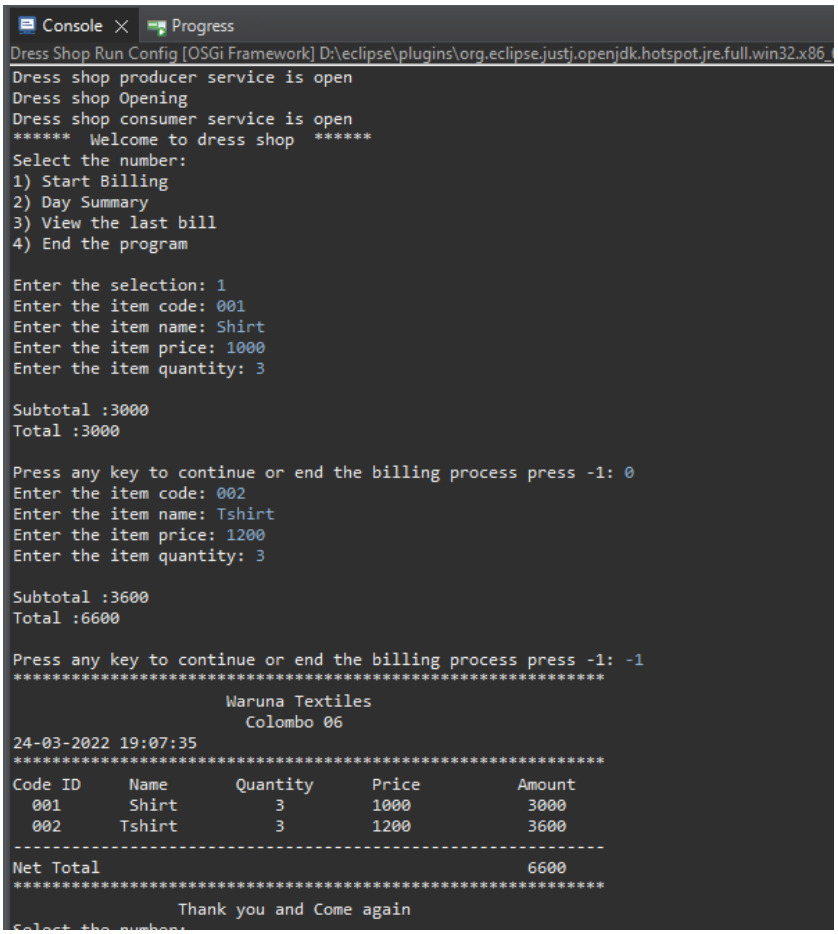
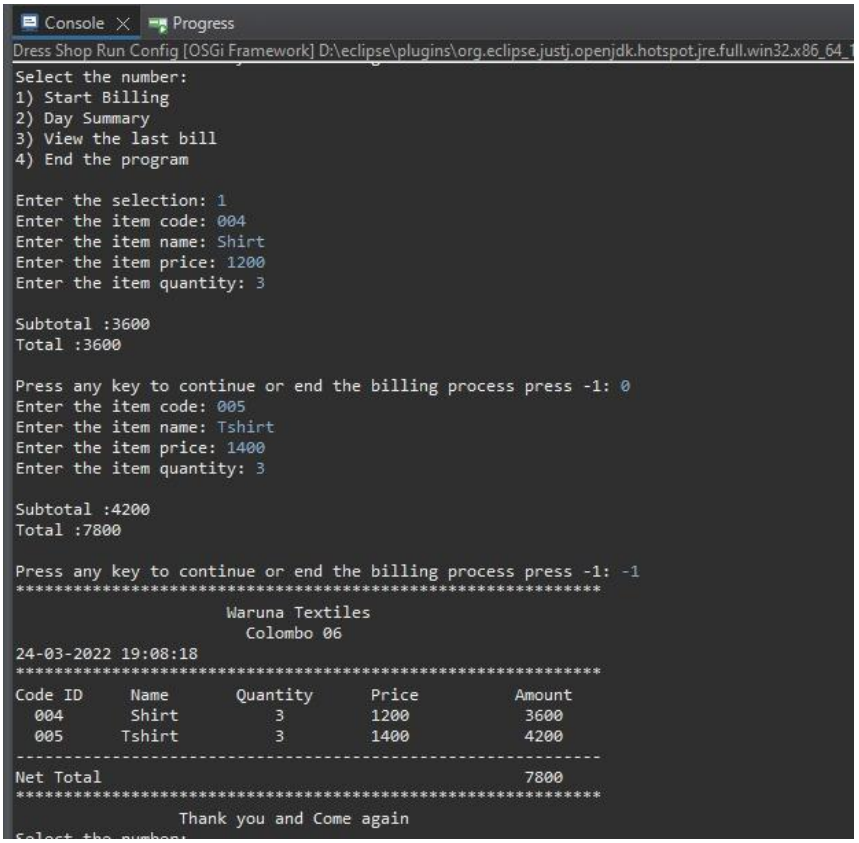


Figure 2 : Online Food Store Output

Dress Shopping System - IT20025908





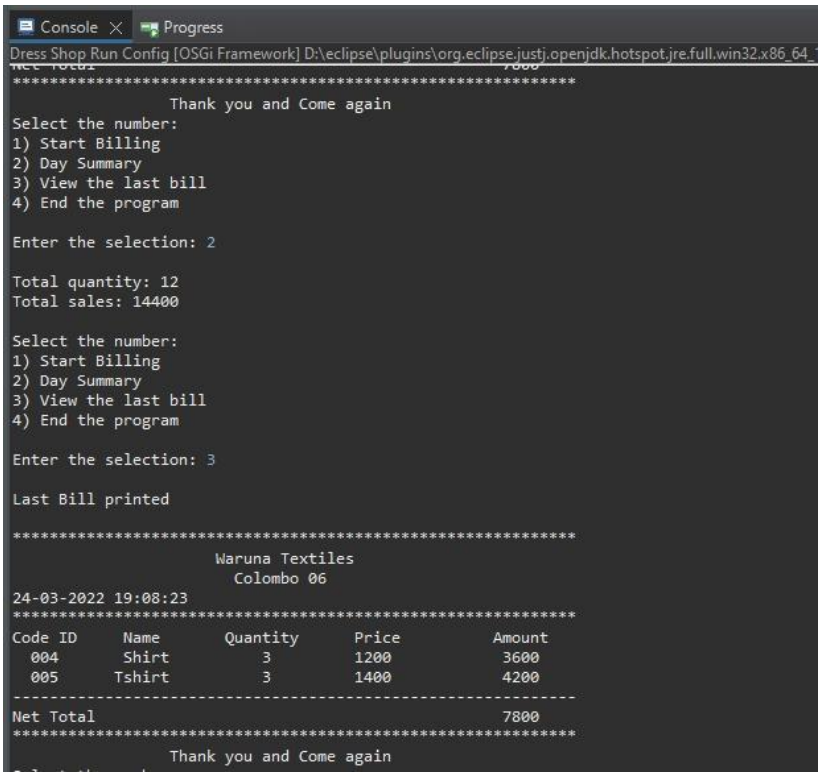
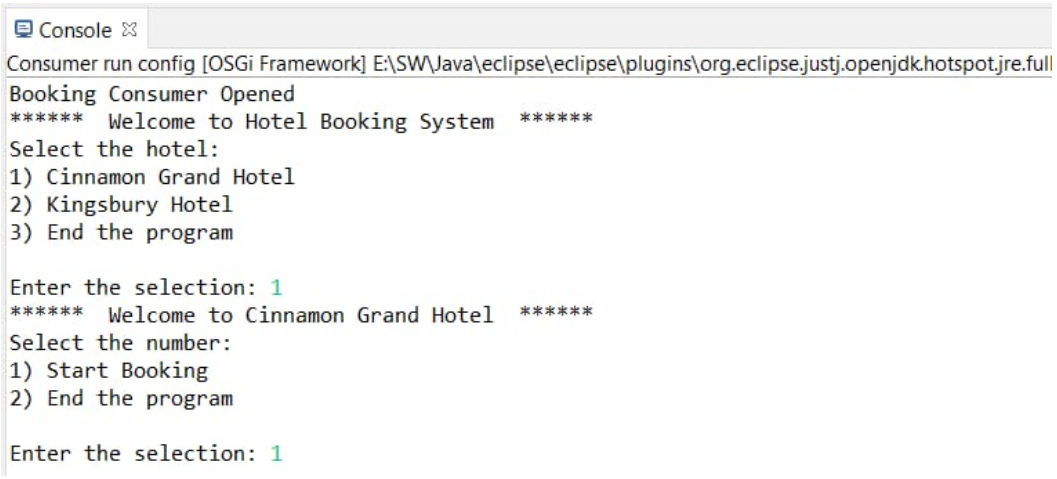


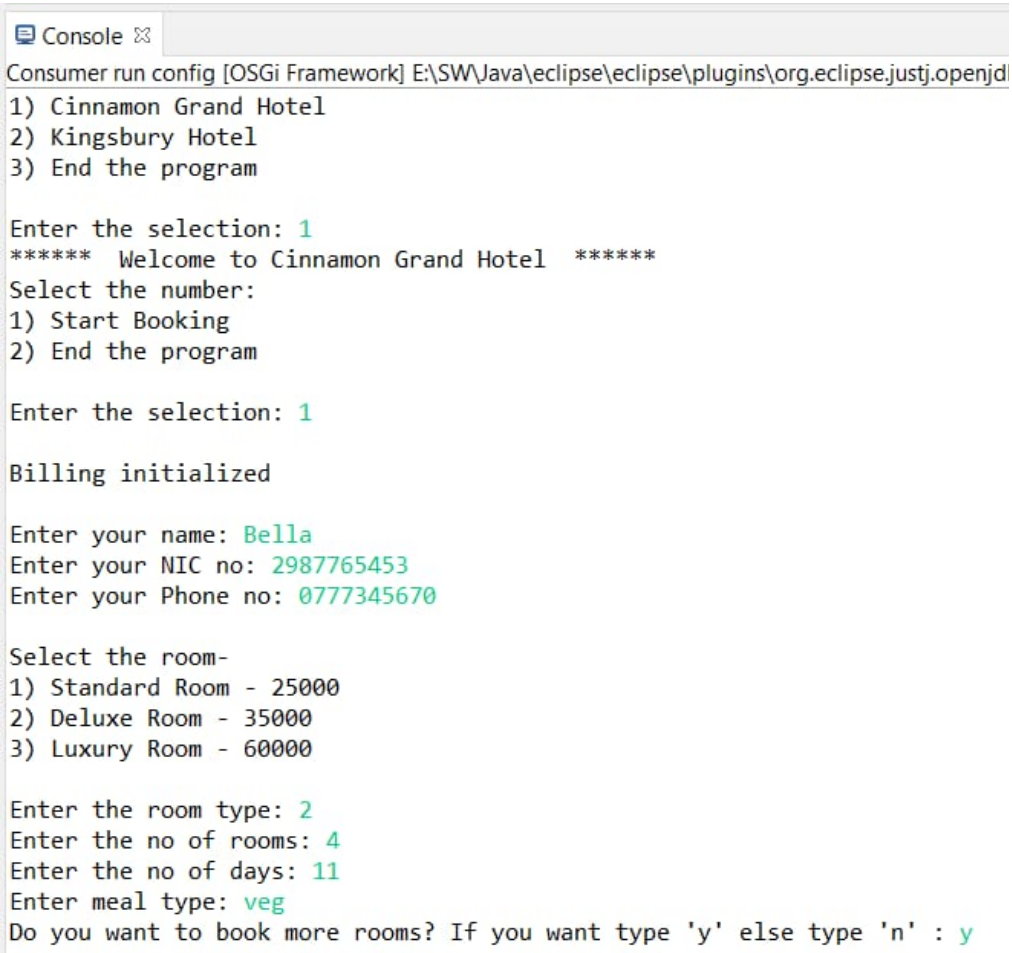
Figure 3 :Waruna Textile Output

Hotel Management System- IT20032388

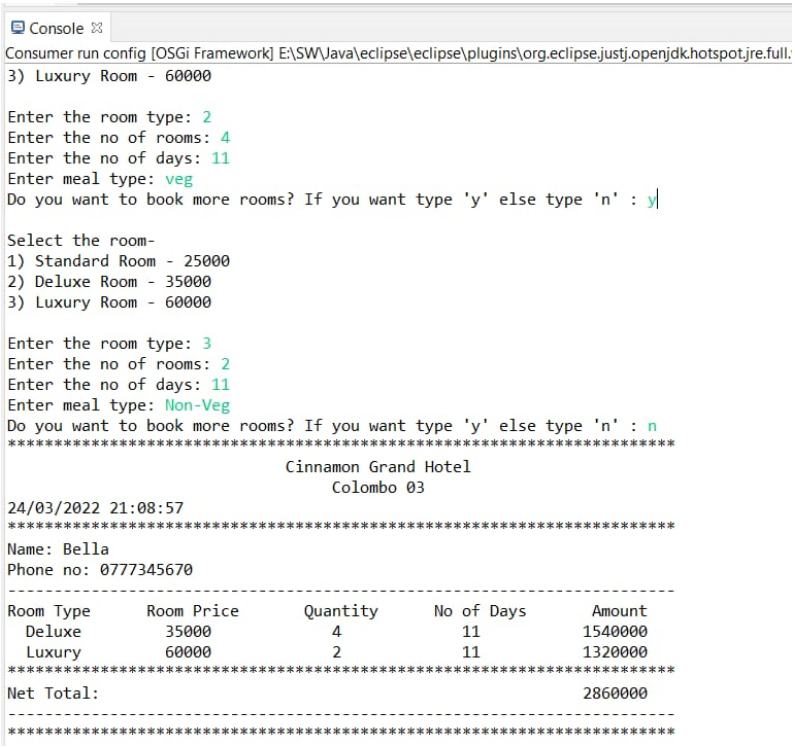
1)



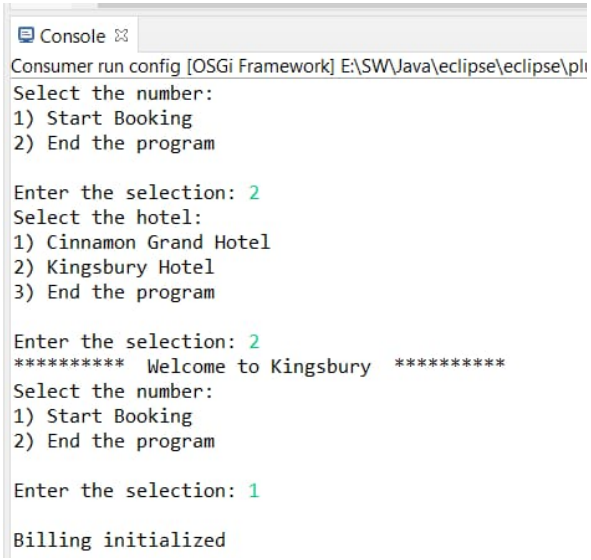
2)



3)



4)



5)

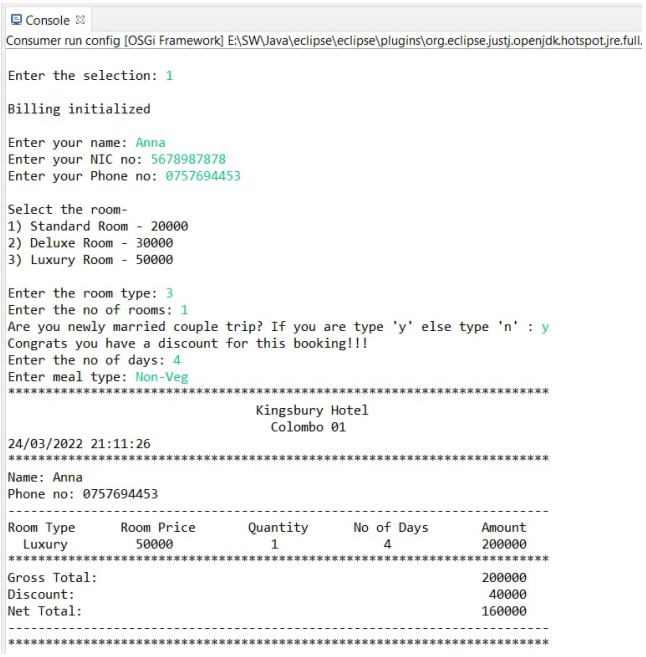


Figure 4 : Hotel Management System Output

Manifest Screenshots

Online Taxi System - IT20013332

Uber

```
Manifest-Version: 1.0
Bundle-ManifestVersion: 2
Bundle-Name: Uber
Bundle-SymbolicName: Uber
Bundle-Version: 1.0.0.qualifier
Bundle-Activator: uber.activator.Activator
Bundle-RequiredExecutionEnvironment: JavaSE-1.8
Automatic-Module-Name: Uber
Import-Package: org.osgi.framework;version="1.3.0"
Bundle-ActivationPolicy: lazy
Export-Package: uber,
 uber.activator
```

Figure 1 : Uber Manifest (Producer)

Pickme

```
Manifest-Version: 1.0
Bundle-ManifestVersion: 2
Bundle-Name: Pickme
Bundle-SymbolicName: Pickme
Bundle-Version: 1.0.0.qualifier
Bundle-Activator: pickme.activator.Activator
Bundle-RequiredExecutionEnvironment: JavaSE-1.8
Automatic-Module-Name: Pickme
Import-Package: org.osgi.framework;version="1.3.0"
Bundle-ActivationPolicy: lazy
Export-Package: pickme,
 pickme.activator
```

Figure 2 : Pickme Manifest (Producer)

Kangaroo

```
Manifest-Version: 1.0
Bundle-ManifestVersion: 2
Bundle-Name: Kangaroo
Bundle-SymbolicName: Kangaroo
Bundle-Version: 1.0.0.qualifier
Bundle-Activator: kangaroo.activator.Activator
Bundle-RequiredExecutionEnvironment: JavaSE-1.8
Automatic-Module-Name: Kangaroo
Import-Package: org.osgi.framework;version="1.3.0"
Bundle-ActivationPolicy: lazy
Export-Package: kangaroo,
 kangaroo.activator
```

Figure 3 : Kangaroo Manifest (Producer)

TaxiTransportService

```
Manifest-Version: 1.0
Bundle-ManifestVersion: 2
Bundle-Name: TaxiTransportService
Bundle-SymbolicName: TaxiTransportService
Bundle-Version: 1.0.0.qualifier
Bundle-Activator: transportservice.Activator
Bundle-RequiredExecutionEnvironment: JavaSE-1.8
Automatic-Module-Name: TaxiTransportService
Import-Package: org.osgi.framework;version="1.3.0"
Bundle-ActivationPolicy: lazy
Export-Package: transportservice
```

Figure 4 : Taxi Transport Service Manifest (Producer)

TaxiCustomer

```
Manifest-Version: 1.0
Bundle-ManifestVersion: 2
Bundle-Name: TaxiCustomer
Bundle-SymbolicName: TaxiCustomer
Bundle-Version: 1.0.0.qualifier
Bundle-Activator: customer.activator.Activator
Bundle-RequiredExecutionEnvironment: JavaSE-17
Automatic-Module-Name: TaxiCustomer
Import-Package: org.osgi.framework;version="1.3.0"
Bundle-ActivationPolicy: lazy
Require-Bundle: Uber;bundle-version="1.0.0",
 Pickme;bundle-version="1.0.0",
 Kangaroo;bundle-version="1.0.0",
 TaxiTransportService;bundle-version="1.0.0"
```

Figure 5 : Taxi Customer (Consumer)

Online Food Store IT20061302

```
Manifest-Version: 1.0
Bundle-ManifestVersion: 2
Bundle-Name: FoodProducer
Bundle-SymbolicName: FoodProducer
Bundle-Version: 1.0.0.qualifier
Bundle-Activator: foodproducer.Activator
Bundle-RequiredExecutionEnvironment: JavaSE-17
Automatic-Module-Name: FoodProducer
Import-Package: org.osgi.framework;version="1.3.0"
Bundle-ActivationPolicy: lazy
Export-Package: foodproducer
```

Figure 6: Manifest File Food Producer

```
Manifest-Version: 1.0
Bundle-ManifestVersion: 2
Bundle-Name: FoodConsumer
Bundle-SymbolicName: FoodConsumer
Bundle-Version: 1.0.0.qualifier
Bundle-Activator: foodconsumer.Activator
Bundle-RequiredExecutionEnvironment: JavaSE-17
Automatic-Module-Name: FoodConsumer
Import-Package: org.osgi.framework;version="1.3.0", foodproducer
Bundle-ActivationPolicy: lazy
```

Figure 7:- Manifest File Food Consumer

Dress Shopping System - IT20025908

Waruna_Textile_Consumer

```
Manifest-Version: 1.0
Bundle-ManifestVersion: 2
Bundle-Name: Waruna_Textile_Producer
Bundle-SymbolicName: Waruna_Textile_Consumer
Bundle-Version: 1.0.0.qualifier
Bundle-Activator: waruna_textile_consumer.Activator
Bundle-RequiredExecutionEnvironment: JavaSE-15
Automatic-Module-Name: Dress.Shop.Consumer
Import-Package: org.osgi.framework;version="1.3.0",
 waruna_textile_producer
```

Figure 8 : Waruna Textile Manifest (Consumer)

Waruna_Textile_Producer

```
Manifest-Version: 1.0
Bundle-ManifestVersion: 2
Bundle-Name: Waruna_Textile_Producer
Bundle-SymbolicName: Waruna_Textile_Producer
Bundle-Version: 1.0.0.qualifier
Bundle-Activator: waruna_textile_producer.Activator
Import-Package: org.osgi.framework;version="1.3.0"
Bundle-RequiredExecutionEnvironment: JavaSE-15
Export-Package: waruna_textile_producer
Bundle-ActivationPolicy: lazy
Automatic-Module-Name: Waruna.Textile.Producer
```

Figure 9 : Waruna Textile Manifest (Producer)

Hotel Management System- IT20032388

Cinnamon_Grand_Hotel_Producer

```
Manifest-Version: 1.0
Bundle-ManifestVersion: 2
Bundle-Name: Cinnamon_Grand_Hotel_Producer
Bundle-SymbolicName: Cinnamon_Grand_Hotel_Producer
Bundle-Version: 1.0.0.qualifier
Bundle-Activator: cinnamon_grand_hotel_producer.Activator
Bundle-RequiredExecutionEnvironment: JavaSE-15
Automatic-Module-Name: Cinnamon.Grand.Hotel.Producer
Import-Package: org.osgi.framework;version="1.3.0"
Export-Package: cinnamon_grand_hotel_producer
```

Figure 10 : Cinnamon Grand Manifest (Producer)

Kingsbury_Hotel_Producer

```
Manifest-Version: 1.0
Bundle-ManifestVersion: 2
Bundle-Name: Kingsbury_Hotel_Producer
Bundle-SymbolicName: Kingsbury_Hotel_Producer
Bundle-Version: 1.0.0.qualifier
Bundle-Activator: kingsbury_hotel_producer.Activator
Bundle-RequiredExecutionEnvironment: JavaSE-15
Automatic-Module-Name: Kingsbury.Hotel.Producer
Import-Package: org.osgi.framework;version="1.3.0"
Export-Package: kingsbury_hotel_producer
```

Figure 11 : Kingsbury Manifest (Producer)

Booking_Consumer

```
Manifest-Version: 1.0
Bundle-ManifestVersion: 2
Bundle-Name: Booking_Consumer
Bundle-SymbolicName: Booking_Consumer
Bundle-Version: 1.0.0.qualifier
Bundle-Activator: booking_consumer.Activator
Bundle-RequiredExecutionEnvironment: JavaSE-15
Automatic-Module-Name: Hotel.Consumer
Import-Package: cinnamon_grand_hotel_producer,
 kingsbury_hotel_producer,
 org.osgi.framework;version="1.3.0"
```

Figure 12 : Booking Manifest (Consumer)