

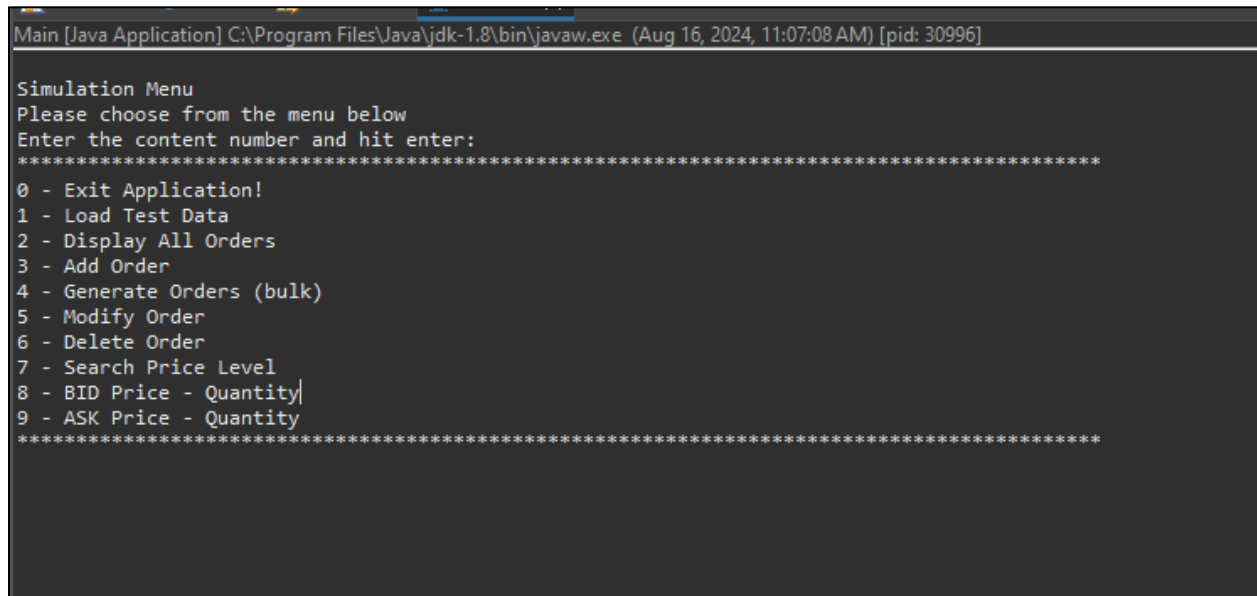
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## Order Book Application Instruction Manual.

### Startup:

When you click start in your IDE to run the application, you will be greeted with a menu with the following options:

```
0 - Exit Application!
1 - Load Test Data
2 - Display All Orders
3 - Add Order
4 - Generate Orders (bulk)
5 - Modify Order
6 - Delete Order
7 - Search Price Level
8 - BID Price - Quantity
9 - ASK Price - Quantity
```



```
Main [Java Application] C:\Program Files\Java\jdk-1.8\bin\javaw.exe (Aug 16, 2024, 11:07:08 AM) [pid: 30996]

Simulation Menu
Please choose from the menu below
Enter the content number and hit enter:
*****
0 - Exit Application!
1 - Load Test Data
2 - Display All Orders
3 - Add Order
4 - Generate Orders (bulk)
5 - Modify Order
6 - Delete Order
7 - Search Price Level
8 - BID Price - Quantity
9 - ASK Price - Quantity
*****
```

You are to then enter the number corresponding to the function available on the menu, e.g. 0 to Exit Application, 1 to Load Test Data e.t.c.

## 1. Load Test Data:

This function loads predefined orders into the application. Clicking this will provide you with the below output:

```
*****
1
Generating Orders...
Test data loaded successfully.
```

The menu will then be displayed to ask you what you would like to do next.

## 2. Display All Orders:

This function displays all the orders that have been created or generated in the application. So far, we have only loaded the test data, if we choose Display All Orders, we will get the BID orders printed in a table format by the Key followed by the ASK orders. This provides the user with a nice readable view of all the orders generated in the application for this session. From here the user will be able to choose an order the user would like to delete or modify and copy the OrderId to be used.

```
*****
2
BID
+-----+
| Price | Orders |
+-----+
| 3.0    | OrderId: BID-bf6b8bd6-e98f-498b-b4da-1e87e179688f, Price= 3.0, Quantity= 78, Side= true |
| 3.0    | OrderId: BID-2ea5e50b-25a1-434a-bf78-92ed102efffe, Price= 3.0, Quantity= 80, Side= true |
| 3.0    | OrderId: BID-f11be44a-9ea8-4a1a-af29-f02fa8a80c92, Price= 3.0, Quantity= 12, Side= true |
| 3.0    | OrderId: BID-d0371a39-6ea6-49e0-9e96-e924af872cd0, Price= 3.0, Quantity= 20, Side= true |
| 4.0    | OrderId: BID-0615fd0c-da2c-4244-ab0d-dea12f5c9bd7, Price= 4.0, Quantity= 41, Side= true |
| 4.0    | OrderId: BID-3ac07c15-ead1-41e7-b114-50d28f9ce9d8, Price= 4.0, Quantity= 25, Side= true |
| 4.0    | OrderId: BID-a8ac6bab-f1cd-4393-96ae-f06450799cf0, Price= 4.0, Quantity= 69, Side= true |
| 4.0    | OrderId: BID-d854f04f-35db-4297-801e-151b1c862f6c, Price= 4.0, Quantity= 37, Side= true |
| 5.0    | OrderId: BID-c14a6a96-bae8-4aec-a451-6157d94a429c, Price= 5.0, Quantity= 22, Side= true |
| 5.0    | OrderId: BID-b46f6f71-fbbe-4ac9-b426-9c83f447e4bf, Price= 5.0, Quantity= 44, Side= true |
| 5.0    | OrderId: BID-9f82b3ba-d984-4806-9c29-69ca8fb93a52, Price= 5.0, Quantity= 18, Side= true |
| 5.0    | OrderId: BID-182766aa-0ce3-4104-b263-160c70bcb796, Price= 5.0, Quantity= 15, Side= true |
| 6.0    | OrderId: BID-df502920-e4dd-4c41-8357-2616ed265f66, Price= 6.0, Quantity= 98, Side= true |
| 6.0    | OrderId: BID-699fbb5b-45e7-4c0f-ab2a-0003669178dc, Price= 6.0, Quantity= 3, Side= true |
| 6.0    | OrderId: BID-30e6e038-dbb5-4af9-a265-9ad79ba777f1, Price= 6.0, Quantity= 77, Side= true |
| 6.0    | OrderId: BID-8a7d70d7-e514-49f5-be09-8a52f7182374, Price= 6.0, Quantity= 29, Side= true |
| 7.0    | OrderId: BID-c012fede-f18f-44b5-9b57-f6c84335a4ff, Price= 7.0, Quantity= 6, Side= true |
| 7.0    | OrderId: BID-9977dffc-31d6-4e54-82e9-f7058d92b5e6, Price= 7.0, Quantity= 51, Side= true |
| 7.0    | OrderId: BID-62548816-0851-44cd-9d7e-004098e0f664, Price= 7.0, Quantity= 58, Side= true |
| 7.0    | OrderId: BID-e9ff74a0-9a07-4cf4-b6b1-2e8248e7f12e, Price= 7.0, Quantity= 37, Side= true |
| 22.14  | OrderId: BID-3289bffd-6c7f-4358-bafe-d91bc9114fb4, Price= 22.14, Quantity= 69, Side= true |
| 28.95  | OrderId: BID-9781a983-eb1e-4d82-89cd-2ee81e0960b8, Price= 28.95, Quantity= 56, Side= true |
| 32.98  | OrderId: BID-87a7a7d7-7357-4549-b879-c826aae4d17f, Price= 32.98, Quantity= 75, Side= true |
| 46.91  | OrderId: BID-3e20bdcf-2652-4b0a-bb72-f738fffdaf17, Price= 46.91, Quantity= 79, Side= true |
| 67.17  | OrderId: BID-2275ce5e-7f8e-46a3-bb1e-6979c694b43a, Price= 67.17, Quantity= 31, Side= true |
| 68.67  | OrderId: BID-59feb0f5-6e07-42b2-861d-fb5a40d2b52e, Price= 68.67, Quantity= 95, Side= true |
```

ASK	
Price	Orders
3.0	OrderId: ASK-defc8cf2-4fc1-4321-ae2-6dd9fc9347ce, Price= 3.0, Quantity= 75, Side= false
3.0	OrderId: ASK-af40f2cf-ca27-493e-98db-097e10bd6cc7, Price= 3.0, Quantity= 18, Side= false
3.0	OrderId: ASK-c3141083-5b3a-450f-8287-223240b30e66, Price= 3.0, Quantity= 93, Side= false
3.0	OrderId: ASK-d261a908-fd78-45de-861f-aeb43fb43830, Price= 3.0, Quantity= 74, Side= false
4.0	OrderId: ASK-c9bbd66d-ac90-4cb2-990a-d184960f3ce0, Price= 4.0, Quantity= 69, Side= false
4.0	OrderId: ASK-1fa5ac56-f350-4eee-9d12-d70fbed2d42a, Price= 4.0, Quantity= 31, Side= false
4.0	OrderId: ASK-30fcc207-e96d-4b3e-b969-993e64b31f90, Price= 4.0, Quantity= 96, Side= false
4.0	OrderId: ASK-518ad81e-9999-43f8-9208-4de0e0d4ec0a, Price= 4.0, Quantity= 67, Side= false
5.0	OrderId: ASK-e3870ec6-ea3f-4607-95f0-43e91eb7f694, Price= 5.0, Quantity= 9, Side= false
5.0	OrderId: ASK-c8d167a1-5236-4208-9b10-888c499bca22, Price= 5.0, Quantity= 65, Side= false
5.0	OrderId: ASK-8badb160-7f6d-406a-9a73-90299598a17d, Price= 5.0, Quantity= 81, Side= false
5.0	OrderId: ASK-ed158780-042d-4da7-b341-be5ee62690d0, Price= 5.0, Quantity= 60, Side= false
6.0	OrderId: ASK-31491dd1-412d-4309-b25a-d9eb1d72cc61, Price= 6.0, Quantity= 94, Side= false
6.0	OrderId: ASK-f3217380-4113-4fcb-a4f8-8e1f99efb1b2, Price= 6.0, Quantity= 65, Side= false
6.0	OrderId: ASK-a8b2e68f-9796-4c80-85ee-9ec94e17a338, Price= 6.0, Quantity= 27, Side= false
6.0	OrderId: ASK-8d78bf27-9146-46c4-b84c-aa2248e957da, Price= 6.0, Quantity= 32, Side= false
6.13	OrderId: ASK-6ac77263-19b6-44ab-9b01-3c60f5bb0070, Price= 6.13, Quantity= 27, Side= false
7.0	OrderId: ASK-7bd1243d-ae87-4937-ab70-b04a2f5d3b1f, Price= 7.0, Quantity= 14, Side= false
7.0	OrderId: ASK-8348166d-908a-4b83-aa0e-67a4e8a9f606, Price= 7.0, Quantity= 74, Side= false
7.0	OrderId: ASK-a1dfc386-08ff-410a-93b0-dd4d06c63f39, Price= 7.0, Quantity= 59, Side= false
7.0	OrderId: ASK-a336f5f6-22ef-4d4d-8094-7398bb293d2c, Price= 7.0, Quantity= 16, Side= false
25.75	OrderId: ASK-507fa41f-5bb7-4277-937c-51173cf25559, Price= 25.75, Quantity= 40, Side= false
37.71	OrderId: ASK-7a6f37ca-3acc-4d93-8afe-38a6f37eabac, Price= 37.71, Quantity= 49, Side= false
63.68	OrderId: ASK-6d31b5f0-8aee-4224-8675-c2b42744e736, Price= 63.68, Quantity= 28, Side= false

You will find the Menu will be displayed once again after the tables have been printed to screen. The user can then choose their next step.

### 3. Add Order

This is to add new orders, the user will be asked to enter the order price, order quantity and if it is a buy or sell order. Using this information the application will create a new order and add it to the corresponding TreeMap either the bidMap or the askMap. The application will display the newly created order for the user to see.

OrderId: ASK-0f66779f-5815-4c4a-9421-92472145e0ac, Price= 9.5, Quantity= 5, Side= false

```
Simulation Menu
Please choose from the menu below
Enter the content number and hit enter:
*****
0 - Exit Application!
1 - Load Test Data
2 - Display All Orders
3 - Add Order
4 - Generate Orders (bulk)
5 - Modify Order
6 - Delete Order
7 - Search Price Level
8 - BID Price - Quantity
9 - ASK Price - Quantity
*****
3
Enter order price:
9.5
Enter order quantity:
5
Is this a buy order?
Enter True or False
false
Order OrderId: ASK-0f66779f-5815-4c4a-9421-92472145e0ac, Price= 9.5, Quantity= 5, Side= false added successfully.
```

Now if we click on Display all Orders, we will be able to see out newly created order in the ASK table:

ASK	
Price	Orders
3.0	OrderId: ASK-0ef0204c-7948-4f29-b63b-59e4549690e5, Price= 3.0, Quantity= 23, Side= false
3.0	OrderId: ASK-7ecf77d6-6fd3-452d-a4c6-2539947009e4, Price= 3.0, Quantity= 8, Side= false
3.0	OrderId: ASK-e0adec57-7bb5-4c43-a197-1ddcb4899178, Price= 3.0, Quantity= 34, Side= false
3.0	OrderId: ASK-5ab21cfc-aaf9-4dc7-b08a-cd5c50c38ee1, Price= 3.0, Quantity= 6, Side= false
4.0	OrderId: ASK-b03c3d13-032b-4c6d-884b-313a2d146ce4, Price= 4.0, Quantity= 84, Side= false
4.0	OrderId: ASK-c5fb499b-6c01-4962-83d5-8557f1c9e234, Price= 4.0, Quantity= 81, Side= false
4.0	OrderId: ASK-fbabaa1e-6554-4835-9d6e-ad45d950c5e2, Price= 4.0, Quantity= 100, Side= false
4.0	OrderId: ASK-ae989387-2760-4cfa-91fb-37fd7c2861a9, Price= 4.0, Quantity= 1, Side= false
4.01	OrderId: ASK-ed203a59-1ebd-4cf2-b2f4-cf4a96529b50, Price= 4.01, Quantity= 39, Side= false
5.0	OrderId: ASK-7e7ed6dd-4bff-4ea2-bc3d-6b6902324809, Price= 5.0, Quantity= 56, Side= false
5.0	OrderId: ASK-c0c83798-a615-415c-b016-ac32ad29d760, Price= 5.0, Quantity= 3, Side= false
5.0	OrderId: ASK-3963f647-0da5-4dc3-98da-ce7ced312a6e, Price= 5.0, Quantity= 68, Side= false
5.0	OrderId: ASK-4d250694-c448-469c-b588-181345befe45, Price= 5.0, Quantity= 45, Side= false
6.0	OrderId: ASK-66e4d3cb-d5ac-4812-b3d9-1cc60c9e7951, Price= 6.0, Quantity= 93, Side= false
6.0	OrderId: ASK-bebda269-6703-4d83-9fcc-c1158a62e10a, Price= 6.0, Quantity= 69, Side= false
6.0	OrderId: ASK-d3b929c7-479d-40a6-a1a3-eeb19637611e, Price= 6.0, Quantity= 58, Side= false
6.0	OrderId: ASK-044cbc24-583a-4221-8810-beb0dfdbe4d5, Price= 6.0, Quantity= 26, Side= false
7.0	OrderId: ASK-31bee226-907d-4219-9cea-04d339097ded, Price= 7.0, Quantity= 56, Side= false
7.0	OrderId: ASK-34ded8ea-e18c-41c0-ae6d-57ef719c8e60, Price= 7.0, Quantity= 56, Side= false
7.0	OrderId: ASK-edd2ae44-ab34-4b06-ac63-987fa4a2eea5, Price= 7.0, Quantity= 20, Side= false
7.0	OrderId: ASK-f8adee8a-16d7-459c-8d5d-24731bcf65cf, Price= 7.0, Quantity= 30, Side= false
9.5	OrderId: ASK-0f66779f-5815-4c4a-9421-92472145e0ac, Price= 9.5, Quantity= 5, Side= false
15.73	OrderId: ASK-a12d947e-2642-464c-0354-120eb5fc2c02, Price= 15.73, Quantity= 36, Side= false
18.58	OrderId: ASK-a34a462e-e97c-47a9-990b-f5a7b00b4eba, Price= 18.58, Quantity= 80, Side= false
94.41	OrderId: ASK-f9be8022-34ab-4c55-b571-15f3820a9b51, Price= 94.41, Quantity= 69, Side= false
95.38	OrderId: ASK-9c23a3d5-548a-48e8-aa57-248f9bb9a401, Price= 95.38, Quantity= 78, Side= false

Simulation Menu

#### 4. Generate Orders (bulk)

This function is to give the user the opportunity to generate many orders for each ASK and BID if they wish. Here the user can use all new orders generated with this function, or the user can generate orders together with the test data.

```
Simulation Menu
Please choose from the menu below
Enter the content number and hit enter:
*****
0 - Exit Application!
1 - Load Test Data
2 - Display All Orders
3 - Add Order
4 - Generate Orders (bulk)
5 - Modify Order
6 - Delete Order
7 - Search Price Level
8 - BID Price - Quantity
9 - ASK Price - Quantity
*****
4
Please enter how many buy orders you would like to generate:
10
Please enter how many sell orders you would like to generate:
10
Bulk orders generated successfully
```

Now if we display all orders, we should see 10 more orders added to the bid and ask tables. Looking at the ask table we can see there are 10 more orders added to it:

ASK	
Price	Orders
3.0	OrderId: ASK-0ef0204c-7948-4f29-b63b-59e4549690e5, Price= 3.0, Quantity= 23, Side= false
3.0	OrderId: ASK-7ecf77d6-6fd3-452d-a4c6-2539947009e4, Price= 3.0, Quantity= 8, Side= false
3.0	OrderId: ASK-e0adec57-7bb5-4c43-a197-1ddcb4899178, Price= 3.0, Quantity= 34, Side= false
3.0	OrderId: ASK-5ab21cfc-aaf9-4dc7-b08a-cd5c50c38ee1, Price= 3.0, Quantity= 6, Side= false
4.0	OrderId: ASK-b03c3d13-032b-4c6d-884b-313a2d146ce4, Price= 4.0, Quantity= 84, Side= false
4.0	OrderId: ASK-c5fb499b-6c01-4962-83d5-8557f1c9e234, Price= 4.0, Quantity= 81, Side= false
4.0	OrderId: ASK-fbabaa1e-6554-4835-9d6e-ad45d950c5e2, Price= 4.0, Quantity= 100, Side= false
4.0	OrderId: ASK-ae989387-2760-4cfa-91fb-37fd7c2861a9, Price= 4.0, Quantity= 1, Side= false
4.01	OrderId: ASK-ed203a59-1ebd-4cf2-b2f4-cf4a96529b50, Price= 4.01, Quantity= 39, Side= false
5.0	OrderId: ASK-7e7ed6dd-4bff-4ea2-bc3d-b6b902324809, Price= 5.0, Quantity= 56, Side= false
5.0	OrderId: ASK-c0c83798-a615-415c-b016-ac32ad29d760, Price= 5.0, Quantity= 3, Side= false
5.0	OrderId: ASK-3963f647-0da5-4dc3-98da-ce7ced312a6e, Price= 5.0, Quantity= 68, Side= false
5.0	OrderId: ASK-4d250694-c448-469c-b588-181345befe45, Price= 5.0, Quantity= 45, Side= false
6.0	OrderId: ASK-66e4d3cb-d5ac-4812-b3d9-1cc60c9e7951, Price= 6.0, Quantity= 93, Side= false
6.0	OrderId: ASK-bebda269-6703-4d83-9fcc-c1158a62e10a, Price= 6.0, Quantity= 69, Side= false
6.0	OrderId: ASK-d3b929c7-479d-40a6-a1a3-eeb19637611e, Price= 6.0, Quantity= 58, Side= false
6.0	OrderId: ASK-044cbc24-583a-4221-8810-beb0dfdbe4d5, Price= 6.0, Quantity= 26, Side= false
7.0	OrderId: ASK-31bee226-907d-4219-9cea-04d339097ded, Price= 7.0, Quantity= 56, Side= false
7.0	OrderId: ASK-34ded8ea-e18c-41c0-ae6d-57ef719c8e60, Price= 7.0, Quantity= 56, Side= false
7.0	OrderId: ASK-edd2ae44-ab34-4b06-ac63-987fa4a2eeaa5, Price= 7.0, Quantity= 20, Side= false
7.0	OrderId: ASK-f8adee8a-16d7-459c-8d5d-24731bcf65cf, Price= 7.0, Quantity= 30, Side= false
9.5	OrderId: ASK-0f66779f-5815-4c4a-9421-92472145e0ac, Price= 9.5, Quantity= 5, Side= false
15.73	OrderId: ASK-a12d947e-2642-464c-8354-120eb5fc2c02, Price= 15.73, Quantity= 36, Side= false
18.58	OrderId: ASK-a34a462e-e97c-47a9-990b-f5a7b00b4eba, Price= 18.58, Quantity= 80, Side= false
21.77	OrderId: ASK-713cf006-6235-4e11-8f75-86837cd38804, Price= 21.77, Quantity= 64, Side= false
40.1	OrderId: ASK-817e5135-9f8b-4c48-b4a7-4429082afcc68, Price= 40.1, Quantity= 32, Side= false
56.17	OrderId: ASK-1b512813-612e-4f41-8f58-8ffa17b646b9, Price= 56.17, Quantity= 99, Side= false
62.43	OrderId: ASK-c386f721-2c00-45d6-9d8e-5d04620f0ec1, Price= 62.43, Quantity= 92, Side= false
66.97	OrderId: ASK-b385d5fa-2faf-4a8f-9d4f-b8ee9df3a468, Price= 66.97, Quantity= 86, Side= false
67.5	OrderId: ASK-a9e33af9-09d8-48e4-b939-17d31588690e, Price= 67.5, Quantity= 35, Side= false
85.34	OrderId: ASK-ee580744-97b0-463d-9223-a2fb2424f744, Price= 85.34, Quantity= 25, Side= false
90.64	OrderId: ASK-08fca852-7652-4e64-adde-a26aab8a27ab, Price= 90.64, Quantity= 9, Side= false
94.41	OrderId: ASK-f9be8022-34ab-4c55-b571-15f3820a9b51, Price= 94.41, Quantity= 69, Side= false
95.38	OrderId: ASK-9c23a3d5-548a-48e8-aa57-248f9bb9a401, Price= 95.38, Quantity= 78, Side= false
96.63	OrderId: ASK-a6a43ba0-61e7-4bd1-8cdd-69f5edb30fa3, Price= 96.63, Quantity= 20, Side= false
98.02	OrderId: ASK-6168c114-658b-47f5-bb2b-3611666b36e8, Price= 98.02, Quantity= 17, Side= false



## 5. Modify Order

This functionality is to modify an existing order using the orderId and providing a new quantity. Let us use the order we added manually above in chapter 3:

OrderId: ASK-0f66779f-5815-4c4a-9421-92472145e0ac, Price= 9.5, Quantity= 5, Side= false

We can see the quantity is = 5, we will update this to 99.

```
Simulation Menu
Please choose from the menu below
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*****
0 - Exit Application!
1 - Load Test Data
2 - Display All Orders
3 - Add Order
4 - Generate Orders (bulk)
5 - Modify Order
6 - Delete Order
7 - Search Price Level
8 - BID Price - Quantity
9 - ASK Price - Quantity
*****
5
Enter the order Id:
ASK-0f66779f-5815-4c4a-9421-92472145e0ac
Enter the new quantity for this order:
99
Order ASK-0f66779f-5815-4c4a-9421-92472145e0ac was successfully updated.
```

Viewing all orders again reveals that the quantity has been changed to 99:

```
ASK
+-----+-----+
| Price | Orders |
+-----+-----+
| 3.0    | OrderId: ASK-0ef0204c-7948-4f29-b63b-59e4549690e5, Price= 3.0, Quantity= 23, Side= false |
| 3.0    | OrderId: ASK-7ecf77d6-6fd3-452d-a4c6-2539947009e4, Price= 3.0, Quantity= 8, Side= false |
| 3.0    | OrderId: ASK-e0adec57-7bb5-4c43-a197-1ddcb4899178, Price= 3.0, Quantity= 34, Side= false |
| 3.0    | OrderId: ASK-5ab21cfc-aaf9-4dc7-b08a-cd5c50c38ee1, Price= 3.0, Quantity= 6, Side= false |
| 4.0    | OrderId: ASK-b03c3d13-032b-4c6d-884b-313a2d146ce4, Price= 4.0, Quantity= 84, Side= false |
| 4.0    | OrderId: ASK-c5fb499b-6c01-4962-83d5-8557f1c9e234, Price= 4.0, Quantity= 81, Side= false |
| 4.0    | OrderId: ASK-fbabaa1e-6554-4835-9d6e-ad45d950c5e2, Price= 4.0, Quantity= 100, Side= false |
| 4.0    | OrderId: ASK-ae989387-2760-4cfa-91fb-37fd7c2861a9, Price= 4.0, Quantity= 1, Side= false |
| 4.01   | OrderId: ASK-ed203a59-1ebd-4cf2-b2f4-cf4a96529b50, Price= 4.01, Quantity= 39, Side= false |
| 5.0    | OrderId: ASK-7e7ed6dd-4bff-4ea2-bc3d-6b6902324809, Price= 5.0, Quantity= 56, Side= false |
| 5.0    | OrderId: ASK-c0c83798-a615-415c-b016-ac32ad29d760, Price= 5.0, Quantity= 3, Side= false |
| 5.0    | OrderId: ASK-3963f647-0da5-4dc3-98da-ce7ced312a6e, Price= 5.0, Quantity= 68, Side= false |
| 5.0    | OrderId: ASK-4d250694-c448-469c-b588-181345befe45, Price= 5.0, Quantity= 45, Side= false |
| 6.0    | OrderId: ASK-66e4d3cb-d5ac-4812-b3d9-1cc60c9e7951, Price= 6.0, Quantity= 93, Side= false |
| 6.0    | OrderId: ASK-bebda269-6703-4d83-9fcc-c1158a62e10a, Price= 6.0, Quantity= 69, Side= false |
| 6.0    | OrderId: ASK-d3b929c7-479d-40a6-a1a3-eeb19637611e, Price= 6.0, Quantity= 58, Side= false |
| 6.0    | OrderId: ASK-044cbc24-583a-4221-8810-beb0dfdbe4d5, Price= 6.0, Quantity= 26, Side= false |
| 7.0    | OrderId: ASK-31bee226-907d-4219-9cea-04d339097ded, Price= 7.0, Quantity= 56, Side= false |
| 7.0    | OrderId: ASK-34ded8ea-e18c-41c0-ae6d-57ef719c8e60, Price= 7.0, Quantity= 56, Side= false |
| 7.0    | OrderId: ASK-edd2ae44-ab34-4b06-ac63-987fa4a2eea5, Price= 7.0, Quantity= 20, Side= false |
| 7.0    | OrderId: ASK-f8adee8a-16d7-459c-8d5d-24731bfc65cf, Price= 7.0, Quantity= 30, Side= false |
| 9.5    | OrderId: ASK-0f66779f-5815-4c4a-9421-92472145e0ac, Price= 9.5, Quantity= 99, Side= false |
| 15.73  | OrderId: ASK-a12d947c-2642-464c-8354-129eb5fc2c02, Price= 15.73, Quantity= 36, Side= false |
| 18.58  | OrderId: ASK-a34a462e-e97c-47a9-990b-f5a7b00b4eba, Price= 18.58, Quantity= 80, Side= false |
| 21.77  | OrderId: ASK-713cf006-6235-4e11-8f75-86837cd38804, Price= 21.77, Quantity= 64, Side= false |
| 40.1   | OrderId: ASK-817e5135-9f8b-4c48-b4a7-4429082afc68, Price= 40.1, Quantity= 32, Side= false |
| 56.17  | OrderId: ASK-1b512813-612e-4f41-8f58-8ffa17b646b9, Price= 56.17, Quantity= 99, Side= false |
| 62.43  | OrderId: ASK-c386f721-2c00-45d6-9d8e-5d04620f0ec1, Price= 62.43, Quantity= 92, Side= false |
| 66.97  | OrderId: ASK-b385d5fa-2faf-4a8f-9d4f-b8ee9df3a468, Price= 66.97, Quantity= 86, Side= false |
| 67.5   | OrderId: ASK-a9e33af9-09d8-48e4-b939-17d31588690e, Price= 67.5, Quantity= 35, Side= false |
| 85.34  | OrderId: ASK-ee580744-97b0-463d-9223-a2fb2424f744, Price= 85.34, Quantity= 25, Side= false |
| 90.64  | OrderId: ASK-08fca852-7652-4e64-adde-a26aab8a27ab, Price= 90.64, Quantity= 9, Side= false |
| 94.41  | OrderId: ASK-f9be8022-34ab-4c55-b571-15f3820a9b51, Price= 94.41, Quantity= 69, Side= false |
| 95.38  | OrderId: ASK-9c23a3d5-548a-48e8-aa57-248f9bb9a401, Price= 95.38, Quantity= 78, Side= false |
| 96.63  | OrderId: ASK-a6a43ba0-61e7-4bd1-8cdd-69f5edb30fa3, Price= 96.63, Quantity= 20, Side= false |
| 98.02  | OrderId: ASK-6168c114-658b-47f5-bb2b-3611666b36e8, Price= 98.02, Quantity= 17, Side= false |
```

## 6. Delete Order:

This function deletes an order from the order book using the orderId. We will now delete the order we created from the order book using this function.

OrderId: ASK-0f66779f-5815-4c4a-9421-92472145e0ac, Price= 9.5, Quantity= 5, Side= false

```
Simulation Menu
Please choose from the menu below
Enter the content number and hit enter:
*****
0 - Exit Application!
1 - Load Test Data
2 - Display All Orders
3 - Add Order
4 - Generate Orders (bulk)
5 - Modify Order
6 - Delete Order
7 - Search Price Level
8 - BID Price - Quantity
9 - ASK Price - Quantity
*****
6
Enter the order Id:
ASK-0f66779f-5815-4c4a-9421-92472145e0ac
Order ASK-0f66779f-5815-4c4a-9421-92472145e0ac was successfully deleted.
```

Viewing all orders we can see that the order with price 9.5 no longer exists:

ASK	
Price	Orders
3.0	OrderId: ASK-0ef0204c-7948-4f29-b63b-59e4549690e5, Price= 3.0, Quantity= 23, Side= false
3.0	OrderId: ASK-7ecf77d6-6fd3-452d-a4c6-2539947009e4, Price= 3.0, Quantity= 8, Side= false
3.0	OrderId: ASK-e0adec57-7bb5-4c43-a197-1ddcb4899178, Price= 3.0, Quantity= 34, Side= false
3.0	OrderId: ASK-5ab21cfc-aaf9-4dc7-b08a-cd5c50c38ee1, Price= 3.0, Quantity= 6, Side= false
4.0	OrderId: ASK-b03c3d13-032b-4c6d-884b-313a2d146ce4, Price= 4.0, Quantity= 84, Side= false
4.0	OrderId: ASK-c5fb499b-6c01-4962-83d5-8557f1c9e234, Price= 4.0, Quantity= 81, Side= false
4.0	OrderId: ASK-fbabaa1e-6554-4835-9d6e-ad45d950c5e2, Price= 4.0, Quantity= 100, Side= false
4.0	OrderId: ASK-ae989387-2760-4cfa-91fb-37fd7c2861a9, Price= 4.0, Quantity= 1, Side= false
4.01	OrderId: ASK-ed203a59-1ebd-4cf2-b2f4-cf4a96529b50, Price= 4.01, Quantity= 39, Side= false
5.0	OrderId: ASK-7e7ed6dd-4bff-4ea2-bc3d-6b6902324809, Price= 5.0, Quantity= 56, Side= false
5.0	OrderId: ASK-c0c83798-a615-415c-b016-ac32ad29d760, Price= 5.0, Quantity= 3, Side= false
5.0	OrderId: ASK-3963f647-0da5-4dc3-98da-ce7ced312a6e, Price= 5.0, Quantity= 68, Side= false
5.0	OrderId: ASK-4d250694-c448-469c-b588-181345befe45, Price= 5.0, Quantity= 45, Side= false
6.0	OrderId: ASK-66e4d3cb-d5ac-4812-b3d9-1cc60c9e7951, Price= 6.0, Quantity= 93, Side= false
6.0	OrderId: ASK-bebda269-6703-4d83-9fcc-c1158a62e10a, Price= 6.0, Quantity= 69, Side= false
6.0	OrderId: ASK-d3b929c7-479d-40a6-a1a3-eeb19637611e, Price= 6.0, Quantity= 58, Side= false
6.0	OrderId: ASK-044cbc24-583a-4221-8810-beb0dfdbe4d5, Price= 6.0, Quantity= 26, Side= false
7.0	OrderId: ASK-31bee226-907d-4219-9cea-04d339097ded, Price= 7.0, Quantity= 56, Side= false
7.0	OrderId: ASK-34ded8ea-e18c-41c0-ae6d-57ef719c8e60, Price= 7.0, Quantity= 56, Side= false
7.0	OrderId: ASK-edd2ae44-ab34-4b06-ac63-987fa4a2eea5, Price= 7.0, Quantity= 20, Side= false
7.0	OrderId: ASK-f8adee8a-16d7-459c-8d5d-24731bcf65cf, Price= 7.0, Quantity= 30, Side= false
15.73	OrderId: ASK-a12d947e-2642-464c-8354-120eb5fc2c02, Price= 15.73, Quantity= 36, Side= false
18.58	OrderId: ASK-a34a462e-e97c-47a9-990b-f5a7b00b4eba, Price= 18.58, Quantity= 80, Side= false
21.77	OrderId: ASK-713cf006-6235-4e11-8f75-86837cd38804, Price= 21.77, Quantity= 64, Side= false
40.1	OrderId: ASK-817e5135-9f8b-4c48-b474-4429082afcf68, Price= 40.1, Quantity= 32, Side= false
56.17	OrderId: ASK-1b512813-612e-4f41-8f58-8ffa17b646b9, Price= 56.17, Quantity= 99, Side= false
62.43	OrderId: ASK-c386f721-2c00-45d6-9d8e-5d04620f0ec1, Price= 62.43, Quantity= 92, Side= false
66.97	OrderId: ASK-b385d5fa-2faf-4a8f-9d4f-b8ee9df3a468, Price= 66.97, Quantity= 86, Side= false
67.5	OrderId: ASK-a9e33af9-09d8-48e4-b939-17d31588690e, Price= 67.5, Quantity= 35, Side= false
85.34	OrderId: ASK-ee580744-97b0-463d-9223-a2fb2424f744, Price= 85.34, Quantity= 25, Side= false
90.64	OrderId: ASK-08fca852-7652-4e64-adde-a26aab8a27ab, Price= 90.64, Quantity= 9, Side= false
94.41	OrderId: ASK-f9be8022-34ab-4c55-b571-15f3820a9b51, Price= 94.41, Quantity= 69, Side= false
95.38	OrderId: ASK-9c23a3d5-548a-48e8-aa57-248f9bb9a401, Price= 95.38, Quantity= 78, Side= false
96.63	OrderId: ASK-a6a43ba0-61e7-4bd1-8cdd-69f5edb30fa3, Price= 96.63, Quantity= 20, Side= false
98.02	OrderId: ASK-6168c114-658b-47f5-bb2b-3611666b36e8, Price= 98.02, Quantity= 17, Side= false

## 7. Search Price Level

This functionality provides us with a list of orders of 1 side (bid or ask) and all with the same price. The orders are displayed with highest priority at the top.

```
Simulation Menu
Please choose from the menu below
Enter the content number and hit enter:
*****
0 - Exit Application!
1 - Load Test Data
2 - Display All Orders
3 - Add Order
4 - Generate Orders (bulk)
5 - Modify Order
6 - Delete Order
7 - Search Price Level
8 - BID Price - Quantity
9 - ASK Price - Quantity
*****
7
Is this a buy order?
Enter True or False
False
Enter the price to search:
4.0
Printing searched orders for price: 4.0
in descending priority order.

OrderId: ASK-b03c3d13-032b-4c6d-884b-313a2d146ce4, Price= 4.0, Quantity= 84, Side= false
OrderId: ASK-c5fb499b-6c01-4962-83d5-8557f1c9e234, Price= 4.0, Quantity= 81, Side= false
OrderId: ASK-fbabaa1e-6554-4835-9d6e-ad45d950c5e2, Price= 4.0, Quantity= 100, Side= false
OrderId: ASK-ae989387-2760-4cfa-91fb-37fd7c2861a9, Price= 4.0, Quantity= 1, Side= false
```



## 8. BID Price – Quantity

This provides the user with a display of all the bid prices and the different quantities per price going down in priority.

```
Simulation Menu
Please choose from the menu below
Enter the content number and hit enter:
*****
0 - Exit Application!
1 - Load Test Data
2 - Display All Orders
3 - Add Order
4 - Generate Orders (bulk)
5 - Modify Order
6 - Delete Order
7 - Search Price Level
8 - BID Price - Quantity
9 - ASK Price - Quantity
*****
8
+-----+-----+-----+-----+
| Price | Quantity | HighestPriority | -----> LowestPriority |
+-----+-----+-----+-----+
| 3.00  | 95 49 68 26 |
| 4.00  | 80 40 5 60  |
| 5.00  | 51 74 9 31  |
| 6.00  | 18 27 85 28  |
| 7.00  | 18 47 73 17  |
| 9.13  | 19          |
| 10.79 | 8           |
| 11.20 | 1           |
| 14.39 | 97          |
| 17.76 | 67          |
| 19.94 | 3           |
| 36.56 | 56          |
| 40.28 | 98          |
| 55.67 | 14          |
| 67.53 | 57          |
| 75.07 | 67          |
| 78.88 | 88          |
| 79.44 | 85          |
| 88.51 | 78          |
| 96.95 | 92          |
```

## 9. ASK Price – Quantity

This provides the user with a display of all the ask prices and the different quantities per price going down in priority.

```
Simulation Menu
Please choose from the menu below
Enter the content number and hit enter:
*****
0 - Exit Application!
1 - Load Test Data
2 - Display All Orders
3 - Add Order
4 - Generate Orders (bulk)
5 - Modify Order
6 - Delete Order
7 - Search Price Level
8 - BID Price - Quantity
9 - ASK Price - Quantity
*****
9
+-----+-----+-----+-----+
| Price | Quantity | HighestPriority | -----> LowestPriority |
+-----+-----+-----+-----+
| 3.00  | 98 31 100 31 |
| 4.00  | 77 80 77 9   |
| 5.00  | 89 14 6 16   |
| 6.00  | 8 30 90 28   |
| 7.00  | 84 75 43 23  |
| 16.40 | 96           |
| 22.76 | 29           |
| 30.21 | 88           |
| 45.92 | 72           |
| 93.17 | 63           |
```

#### 10. Test case viewing priority change when updating and order.

From the latest screenshot provided we can see that there is an ask order of price 3.00 with quantity 23 that has a priority of 1 (2<sup>nd</sup> in the queue):

```
Simulation Menu
Please choose from the menu below
Enter the content number and hit enter:
*****
0 - Exit Application!
1 - Load Test Data
2 - Display All Orders
3 - Add Order
4 - Generate Orders (bulk)
5 - Modify Order
6 - Delete Order
7 - Search Price Level
8 - BID Price - Quantity
9 - ASK Price - Quantity
*****
9
|-----+-----+-----+-----+
| Price  | Quantity | HighestPriority |-----> LowestPriority |
|-----+-----+-----+-----+
| 3.00   | 94 23 52 |
| 4.00   | 11 70 98 |
| 5.00   | 23 68 92 |
| 6.00   | 25 55 89 |
| 7.00   | 51 48 47 |
| 13.31  | 47       |
| 57.43  | 99       |
| 61.34  | 75       |
| 62.40  | 44       |
| 94.73  | 58       |
```

We are going to update this order and change the quantity to 99, we should see that the 23 quantity will disappear and we will see a 99 quantity be added in after the last 52 quantity order. First, we will need to get the orderid for this order, we will use the 7 – Search Price Level to show us the detailed orders in order of priority for price 3.0. We can see that it is priority 1 (2<sup>nd</sup> in the list) below:

```

Simulation Menu
Please choose from the menu below
Enter the content number and hit enter:
*****
0 - Exit Application!
1 - Load Test Data
2 - Display All Orders
3 - Add Order
4 - Generate Orders (bulk)
5 - Modify Order
6 - Delete Order
7 - Search Price Level
8 - BID Price - Quantity
9 - ASK Price - Quantity
*****
7
Is this a buy order?
Enter True or False
false
Enter the price to search:
3.0
Printing searched orders for price: 3.0
in descending priority order.

OrderId: ASK-58730dcf-ab8a-46f2-8666-1330adaeb816, Price= 3.0, Quantity= 94, Side= false
OrderId: ASK-c8947f62-7c9a-4e05-9fa4-852572b33707, Price= 3.0, Quantity= 23, Side= false
OrderId: ASK-271431f6-fbc8-4ee1-a817-c93f9e963862, Price= 3.0, Quantity= 52, Side= false

```

OrderId: ASK-c8947f62-7c9a-4e05-9fa4-852572b33707, Price= 3.0, Quantity= 23, Side= false

Now we shall update this order with quantity 99.

```

Simulation Menu
Please choose from the menu below
Enter the content number and hit enter:
*****
0 - Exit Application!
1 - Load Test Data
2 - Display All Orders
3 - Add Order
4 - Generate Orders (bulk)
5 - Modify Order
6 - Delete Order
7 - Search Price Level
8 - BID Price - Quantity
9 - ASK Price - Quantity
*****
5
Enter the order Id:
ASK-c8947f62-7c9a-4e05-9fa4-852572b33707
Enter the new quantity for this order:
99
Order ASK-c8947f62-7c9a-4e05-9fa4-852572b33707 was successfully updated.

```

First we shall view 7 - Search Price Level for ask price of 3.0. We can see that our order with ordered: ASK-c8947f62-7c9a-4e05-9fa4-852572b33707 is now at the bottom of priority with an updated quantity of 99:

```
Simulation Menu
Please choose from the menu below
Enter the content number and hit enter:
*****
0 - Exit Application!
1 - Load Test Data
2 - Display All Orders
3 - Add Order
4 - Generate Orders (bulk)
5 - Modify Order
6 - Delete Order
7 - Search Price Level
8 - BID Price - Quantity
9 - ASK Price - Quantity
*****
7
Is this a buy order?
Enter True or False
false
Enter the price to search:
3.0
Printing searched orders for price: 3.0
in descending priority order.

OrderId: ASK-58730dcf-ab8a-46f2-8666-1330adaeb816, Price= 3.0, Quantity= 94, Side= false
OrderId: ASK-271431f6-fbc8-4ee1-a817-c93f9e963862, Price= 3.0, Quantity= 52, Side= false
OrderId: ASK-c8947f62-7c9a-4e05-9fa4-852572b33707, Price= 3.0, Quantity= 99, Side= false
```



Now if we look at 9 – ASK Price – Quantity view we can see 99 quantity for 3.0 price being at the lowest priority:

```
Simulation Menu
Please choose from the menu below
Enter the content number and hit enter:
*****
0 - Exit Application!
1 - Load Test Data
2 - Display All Orders
3 - Add Order
4 - Generate Orders (bulk)
5 - Modify Order
6 - Delete Order
7 - Search Price Level
8 - BID Price - Quantity
9 - ASK Price - Quantity
*****
9
+-----+-----+-----+-----+
| Price | Quantity | HighestPriority | -----> LowestPriority |
+-----+-----+-----+-----+
| 3.00  | 94 52 99 |
| 4.00  | 11 70 98 |
| 5.00  | 23 68 92 |
| 6.00  | 25 55 89 |
| 7.00  | 51 48 47 |
| 13.31 | 47       |
| 57.43 | 99       |
| 61.34 | 75       |
| 62.40 | 44       |
| 94.73 | 58       |
```