



**GTU Department of Computer Engineering**  
**CSE 344 - Spring 2024**  
**Final Project Report**

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**Pide Shop**

In this project, I implement The Pide Shop system. System is designed to manage a food delivery service where orders are received from clients, prepared by cooks, cooked in an oven, and delivered by delivery personnel to specified locations. The system utilizes multi-threading and networking to handle concurrent client connections and efficiently manage order processing.

The main task of the Pide Shop application is to simulate a food production and delivery system. This involves managing orders for pides from customers, coordinating the preparation and cooking of the pides in a special oven, and organizing their delivery by personnel on motorcycles. The system includes a manager to assign orders, cooks to prepare and cook the pides, and delivery personnel to transport the pides to customers. The application also choose the most efficient personel end of the client.

## **Design and Architecture**

The application consists of two main components:

**Server:** Accepts connections from clients, receives and logs their positions, and sends messages to the connected clients.

**Client:** Connects to the server, sends its position, and listens for messages from the server. The server listens on a specified port for incoming client connections.

For each client connection, it has new process to handle communication with that client, allowing the server to handle clients simultaneously.

## **Client Design**

The client performs the following tasks:

Connects to the server using the specified IP address (optional) and port number. Sends the number of clients and its (x, y) position to the server. Listens for messages from the server and displays them. Handles SIGINT (Ctrl-C) signal to close the connection and exit gracefully.

## Server Design

The server performs the following tasks:

Accepts incoming client connections. Handle a new process for each client to order delivery. Receives the number of clients, and their positions (x, y coordinates) from each client. Sends messages to the connected clients. Handles SIGINT (Ctrl-C) signal to gracefully shutdown (after all orders done), ensuring all client connections are closed properly.

## Threads and Thread Pools

**Manager Thread:** Coordinates order assignments from a queue to cook threads.

**Cook Threads:** Prepare orders, manage an oven capacity, and transition orders to the delivery queue.

**Delivery Threads:** Deliver prepared orders to clients based on their positions.

**Client Handling Threads:** Manage communication with individual clients, receive orders, and send responses

## Data Structures

**Order Struct:** Stores details about each order, including state (received, preparing, cooking, ready, delivered).

**Oven Struct:** Manages the oven capacity and current orders being cooked.

**Various Mutexes and Condition Variables:** Ensure thread synchronization for accessing shared resources like order queues, client sockets, and efficiency tracking arrays.

## Signal Handling

Handles SIGINT and SIGTSTP signals for graceful shutdown, closing sockets, and notifying threads to exit.

## Efficiency Tracking

cook\_efficiency and delivery\_efficiency arrays track the number of orders processed by each cook and delivery person, respectively. These are logged and periodically printed to identify the most efficient personnel.

## Logging

Utilizes a logging function (`log_message`) to record significant events (e.g., order assignment, delivery completion) in a file (`shop_activities.log`).

## Socket Communication

Uses TCP sockets for communication between the server and clients. It manages multiple client connections concurrently and sends/receives order details and positions.

## Communication Protocol

**Server-Client Interaction:** Clients connect to the server and send their order details. The server acknowledges connections, receives orders, assigns them to cooks, manages cooking and delivery, and sends status updates back to clients.

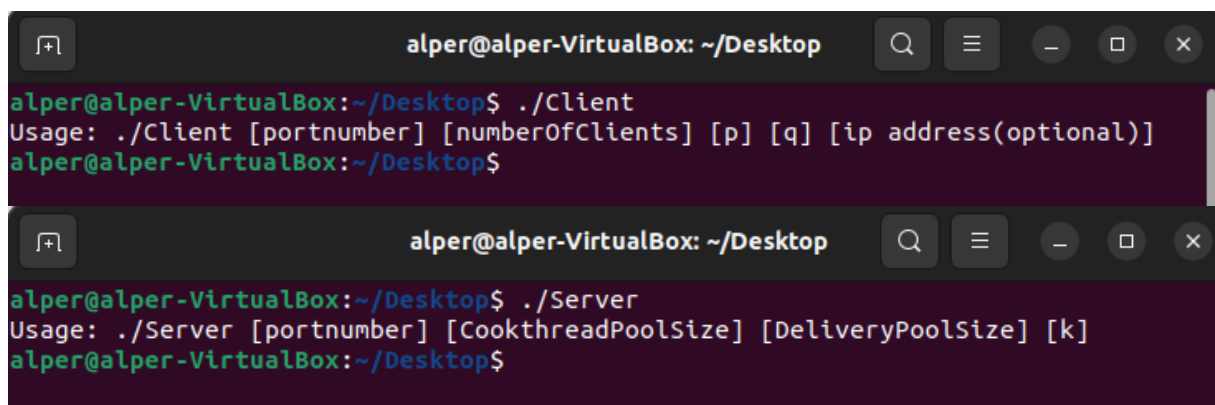
**Order Lifecycle:** Orders progress through states (`ORDER_RECEIVED`, `ORDER_PREPARING`, `ORDER_COOKING`, `ORDER_READY`, `ORDER_DELIVERED`) as they move from receiving to delivery. Each state transition is logged and may trigger updates to client connections.

**Shutdown:** Upon receiving a shutdown signal (`SIGINT` or `SIGTSTP`), the server broadcasts signals to all threads to close connections and shut down gracefully.

The PideShop system exemplifies a robust application of multi-threading and network programming to manage concurrent food delivery orders. It demonstrates effective use of synchronization techniques and signal handling for managing server shutdowns. The integration of logging ensures transparency in system activities, aiding in debugging and performance monitoring.

## Compile and Examples

For compile the code we can use Makefile. With **make** command program will compiled. Makfile also include makeclean command. **Usage:**

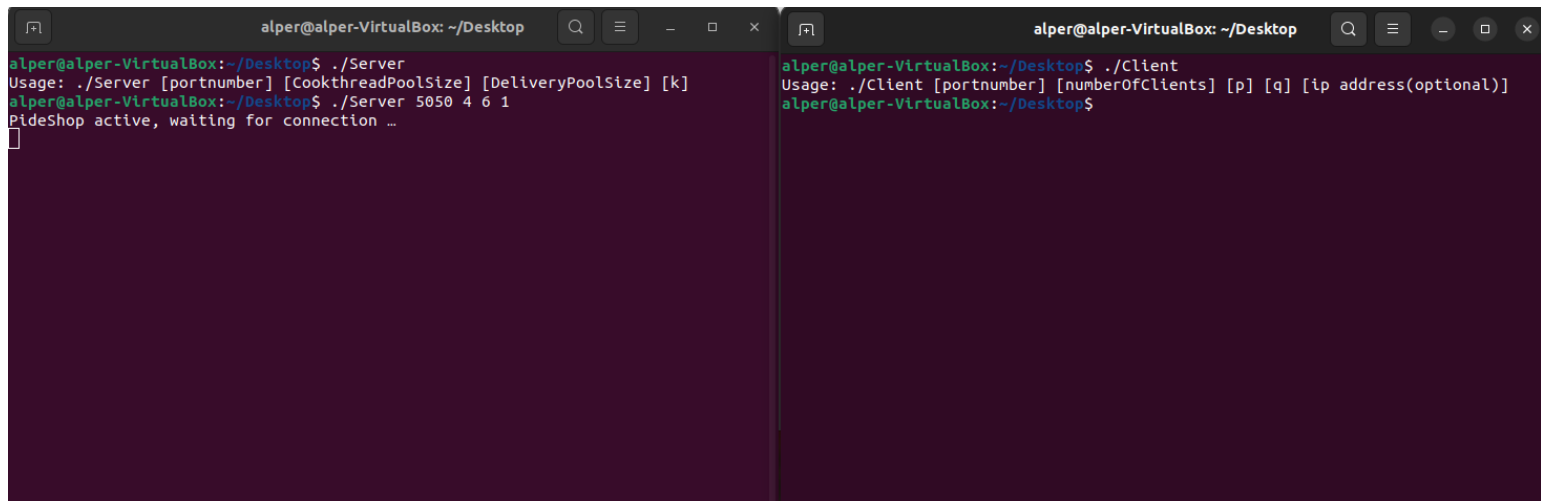


```
alper@alper-VirtualBox: ~/Desktop
alper@alper-VirtualBox:~/Desktop$ ./Client
Usage: ./Client [portnumber] [numberOfClients] [p] [q] [ip address(optional)]
alper@alper-VirtualBox:~/Desktop$

alper@alper-VirtualBox: ~/Desktop
alper@alper-VirtualBox:~/Desktop$ ./Server
Usage: ./Server [portnumber] [CookthreadPoolSize] [DeliveryPoolSize] [k]
alper@alper-VirtualBox:~/Desktop$
```

# Test Examples

## Server waiting for customers

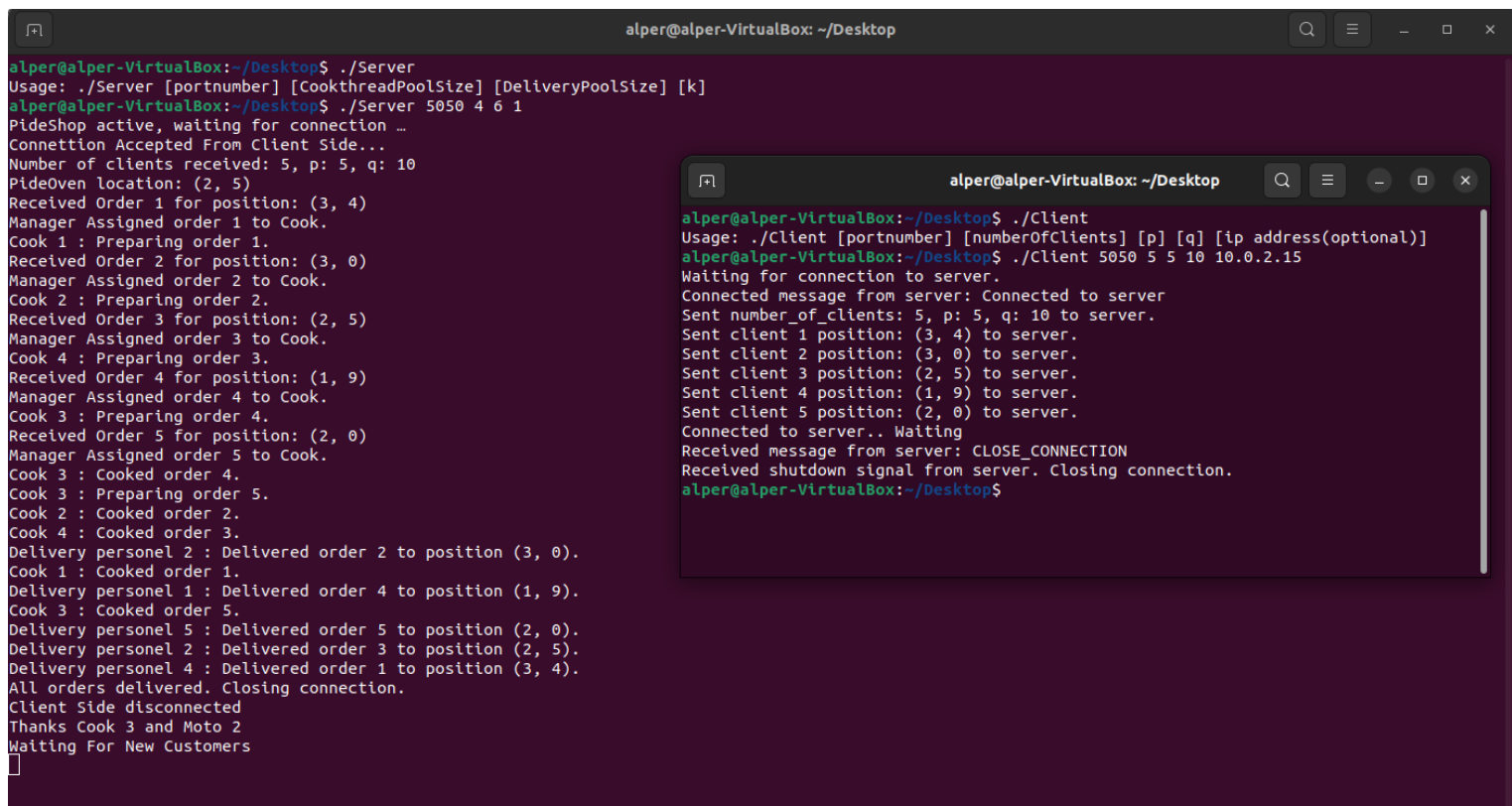


The image shows two terminal windows side-by-side. The left window is titled 'alper@alper-VirtualBox: ~/Desktop' and shows the execution of the './Server' command. The output indicates the server is active and waiting for connections. The right window is also titled 'alper@alper-VirtualBox: ~/Desktop' and shows the execution of the './Client' command. The output indicates the client is ready to connect.

```
alper@alper-VirtualBox:~/Desktop$ ./Server
Usage: ./Server [portnumber] [CookthreadPoolSize] [DeliveryPoolSize] [k]
alper@alper-VirtualBox:~/Desktop$ ./Server 5050 4 6 1
PideShop active, waiting for connection ...

alper@alper-VirtualBox:~/Desktop$ ./Client
Usage: ./Client [portnumber] [numberOfClients] [p] [q] [ip address(optional)]
alper@alper-VirtualBox:~/Desktop$
```

## Server still active Client closed after all orders delivered

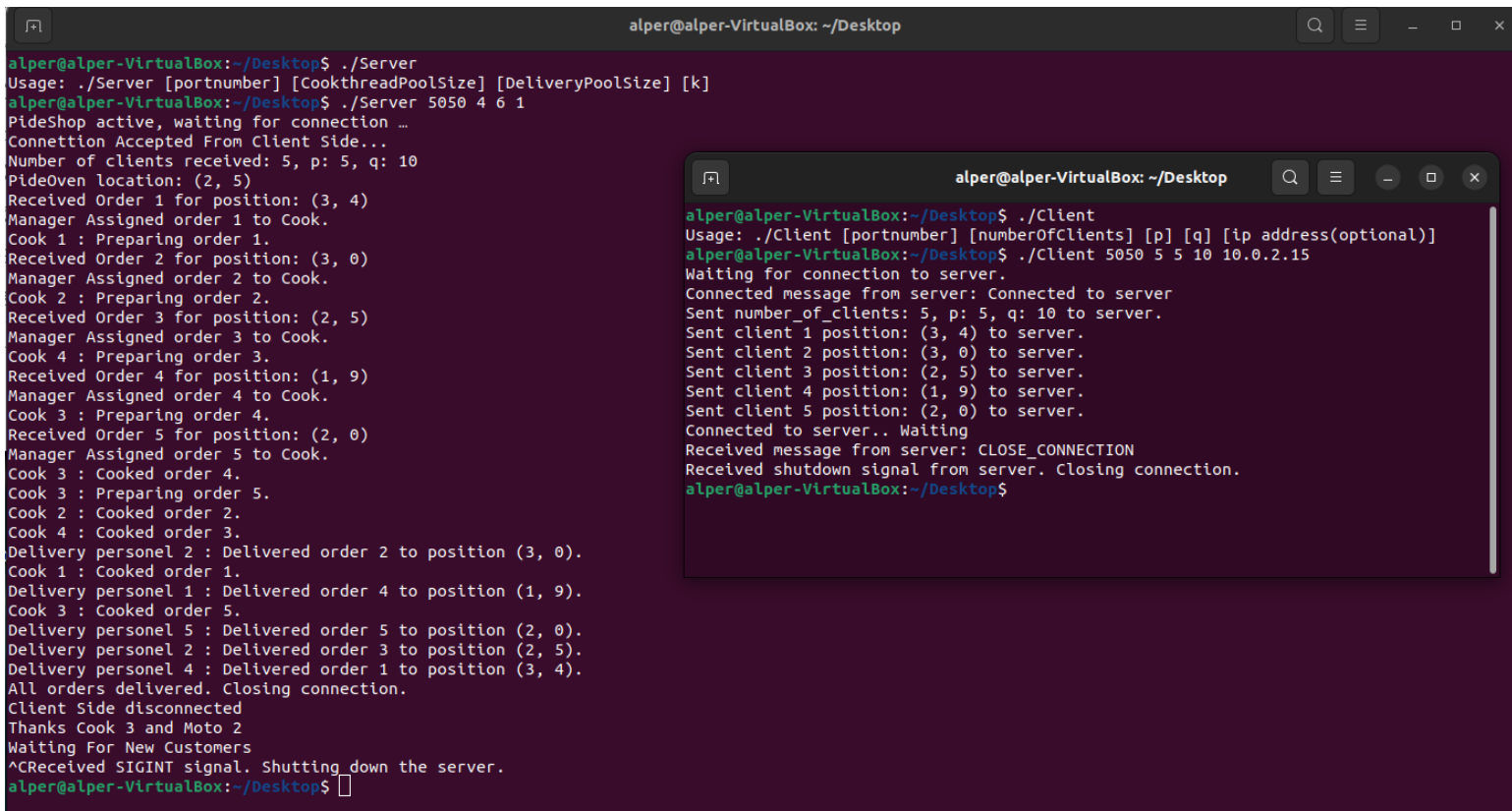


The image shows two terminal windows. The left window, titled 'alper@alper-VirtualBox: ~/Desktop', shows the server's output as it receives and processes five orders. It details the assignment of orders to cooks, the preparation of each order, and the delivery of each order to a specific position. After all orders are delivered, the server closes the connection and waits for new customers. The right window, also titled 'alper@alper-VirtualBox: ~/Desktop', shows the client's output as it connects to the server, sends the number of clients and their positions, and receives the shutdown signal from the server.

```
alper@alper-VirtualBox:~/Desktop$ ./Server
Usage: ./Server [portnumber] [CookthreadPoolSize] [DeliveryPoolSize] [k]
alper@alper-VirtualBox:~/Desktop$ ./Server 5050 4 6 1
PideShop active, waiting for connection ...
Connettion Accepted From Client Side...
Number of clients received: 5, p: 5, q: 10
PideOven location: (2, 5)
Received Order 1 for position: (3, 4)
Manager Assigned order 1 to Cook.
Cook 1 : Preparing order 1.
Received Order 2 for position: (3, 0)
Manager Assigned order 2 to Cook.
Cook 2 : Preparing order 2.
Received Order 3 for position: (2, 5)
Manager Assigned order 3 to Cook.
Cook 4 : Preparing order 3.
Received Order 4 for position: (1, 9)
Manager Assigned order 4 to Cook.
Cook 3 : Preparing order 4.
Received Order 5 for position: (2, 0)
Manager Assigned order 5 to Cook.
Cook 3 : Cooked order 4.
Cook 3 : Preparing order 5.
Cook 2 : Cooked order 2.
Cook 4 : Cooked order 3.
Delivery personel 2 : Delivered order 2 to position (3, 0).
Cook 1 : Cooked order 1.
Delivery personel 1 : Delivered order 4 to position (1, 9).
Cook 3 : Cooked order 5.
Delivery personel 5 : Delivered order 5 to position (2, 0).
Delivery personel 2 : Delivered order 3 to position (2, 5).
Delivery personel 4 : Delivered order 1 to position (3, 4).
All orders delivered. Closing connection.
Client Side disconnected
Thanks Cook 3 and Moto 2
Waiting For New Customers

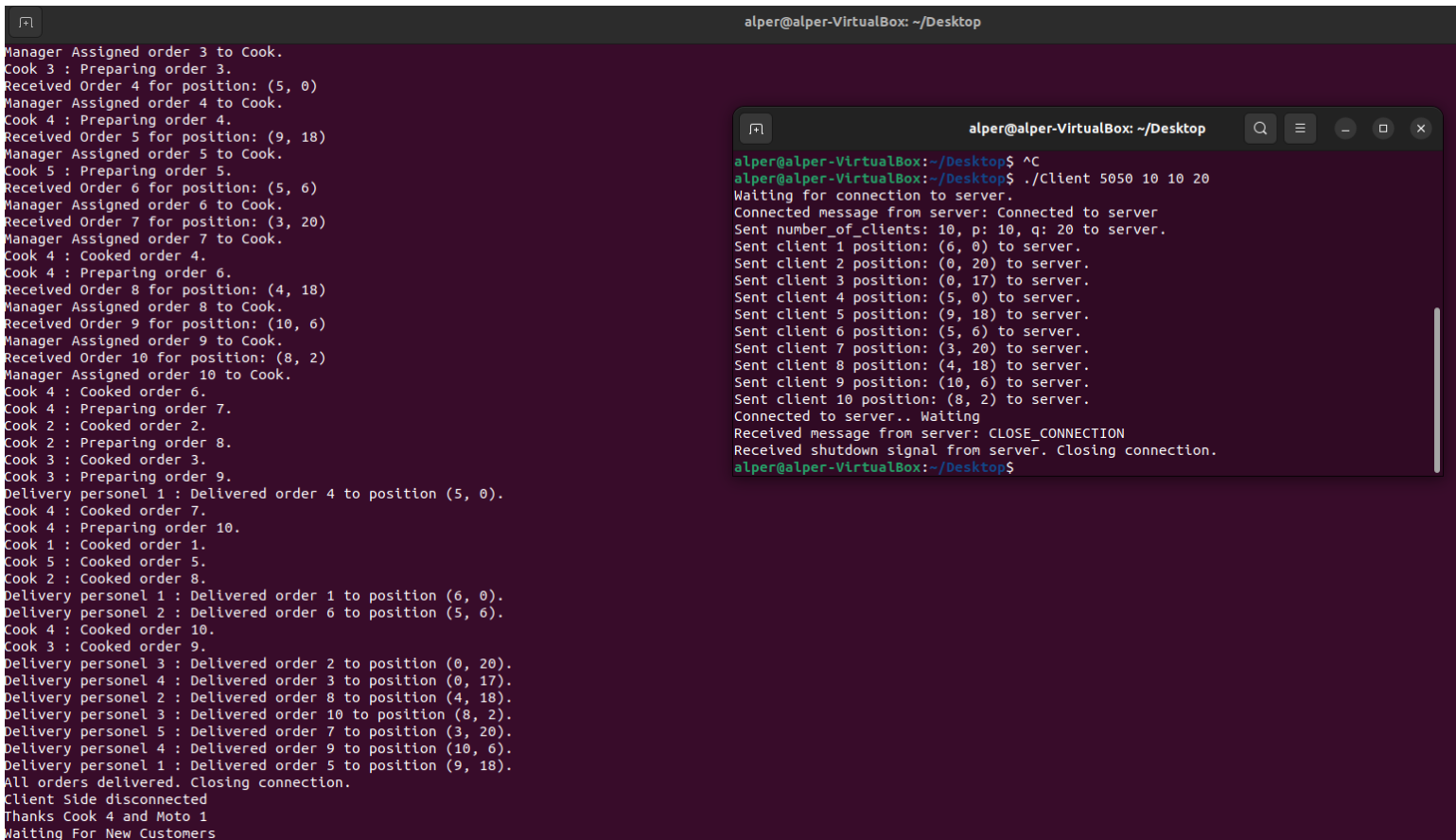
alper@alper-VirtualBox:~/Desktop$ ./Client
Usage: ./Client [portnumber] [numberOfClients] [p] [q] [ip address(optional)]
alper@alper-VirtualBox:~/Desktop$ ./Client 5050 5 5 10 10.0.2.15
Waiting for connection to server.
Connected message from server: Connected to server
Sent number_of_clients: 5, p: 5, q: 10 to server.
Sent client 1 position: (3, 4) to server.
Sent client 2 position: (3, 0) to server.
Sent client 3 position: (2, 5) to server.
Sent client 4 position: (1, 9) to server.
Sent client 5 position: (2, 0) to server.
Connected to server.. Waiting
Received message from server: CLOSE_CONNECTION
Received shutdown signal from server. Closing connection.
alper@alper-VirtualBox:~/Desktop$
```

# ^C Signal Check



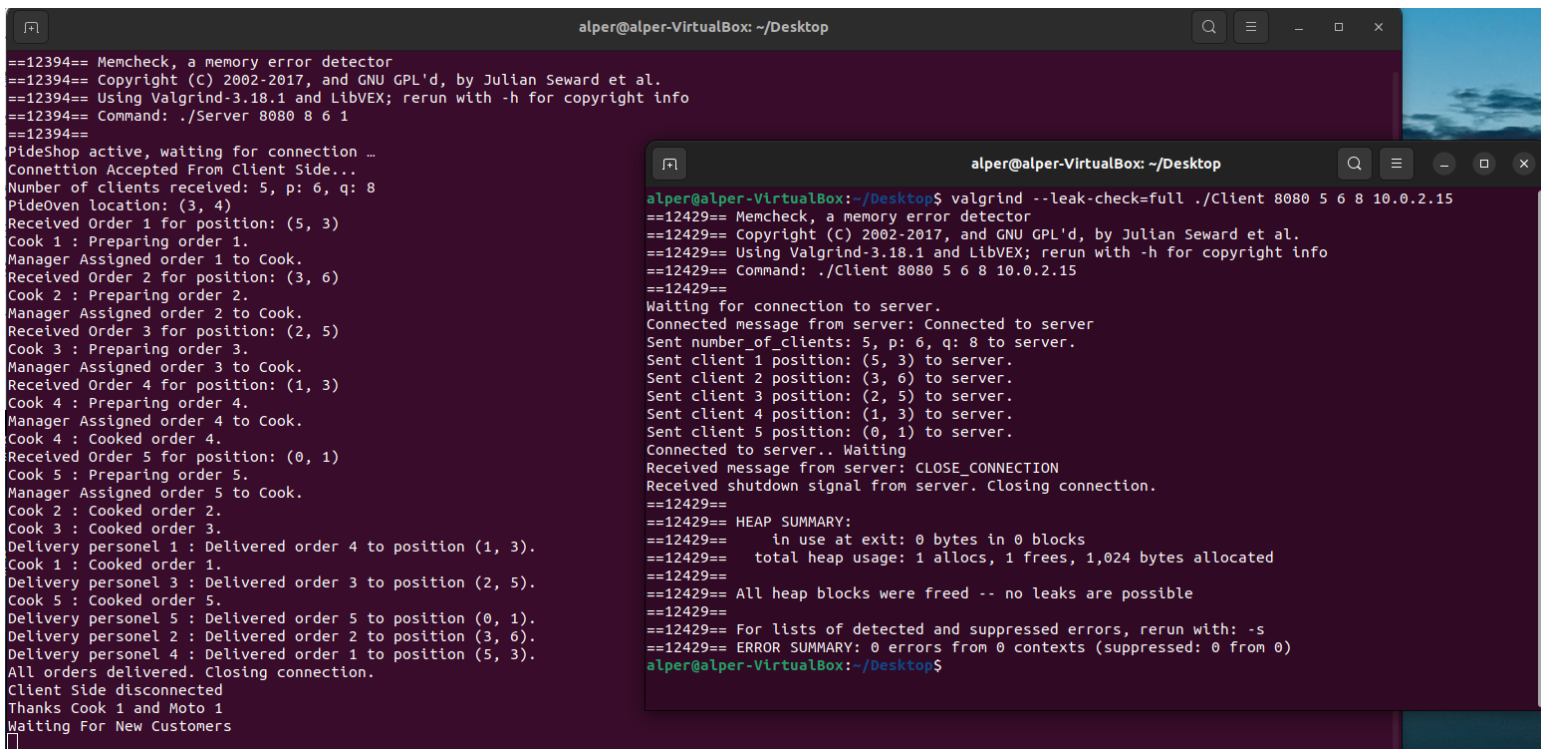
```
alper@alper-VirtualBox: ~/Desktop
alper@alper-VirtualBox:~/Desktop$ ./Server
Usage: ./Server [portnumber] [CookthreadPoolSize] [DeliveryPoolSize] [k]
alper@alper-VirtualBox:~/Desktop$ ./Server 5050 4 6 1
PideShop active, waiting for connection ...
Connettion Accepted From Client Side...
Number of clients received: 5, p: 5, q: 10
PideOven location: (2, 5)
Received Order 1 for position: (3, 4)
Manager Assigned order 1 to Cook.
Cook 1 : Preparing order 1.
Received Order 2 for position: (3, 0)
Manager Assigned order 2 to Cook.
Cook 2 : Preparing order 2.
Received Order 3 for position: (2, 5)
Manager Assigned order 3 to Cook.
Cook 4 : Preparing order 3.
Received Order 4 for position: (1, 9)
Manager Assigned order 4 to Cook.
Cook 3 : Preparing order 4.
Received Order 5 for position: (2, 0)
Manager Assigned order 5 to Cook.
Cook 3 : Cooked order 4.
Cook 3 : Preparing order 5.
Cook 2 : Cooked order 2.
Cook 4 : Cooked order 3.
Delivery personel 2 : Delivered order 2 to position (3, 0).
Cook 1 : Cooked order 1.
Delivery personel 1 : Delivered order 4 to position (1, 9).
Cook 3 : Cooked order 5.
Delivery personel 5 : Delivered order 5 to position (2, 0).
Delivery personel 2 : Delivered order 3 to position (2, 5).
Delivery personel 4 : Delivered order 1 to position (3, 4).
All orders delivered. Closing connection.
Client Side disconnected
Thanks Cook 3 and Moto 2
Waiting For New Customers
^CReceived SIGINT signal. Shutting down the server.
alper@alper-VirtualBox:~/Desktop$
```

# Another Example



```
alper@alper-VirtualBox: ~/Desktop
alper@alper-VirtualBox:~/Desktop$ ./Server
Usage: ./Server [portnumber] [CookthreadPoolSize] [DeliveryPoolSize] [k]
alper@alper-VirtualBox:~/Desktop$ ./Server 5050 10 10 20
PideShop active, waiting for connection ...
Connettion Accepted From Client Side...
Number of clients received: 10, p: 10, q: 20
PideOven location: (2, 5)
Received Order 1 for position: (3, 4)
Manager Assigned order 1 to Cook.
Cook 1 : Preparing order 1.
Received Order 2 for position: (3, 0)
Manager Assigned order 2 to Cook.
Cook 2 : Preparing order 2.
Received Order 3 for position: (2, 5)
Manager Assigned order 3 to Cook.
Cook 4 : Preparing order 3.
Received Order 4 for position: (1, 9)
Manager Assigned order 4 to Cook.
Cook 3 : Preparing order 4.
Received Order 5 for position: (2, 0)
Manager Assigned order 5 to Cook.
Cook 3 : Cooked order 4.
Cook 3 : Preparing order 5.
Cook 2 : Cooked order 2.
Cook 4 : Cooked order 3.
Delivery personel 2 : Delivered order 2 to position (3, 0).
Cook 1 : Cooked order 1.
Delivery personel 1 : Delivered order 4 to position (1, 9).
Cook 3 : Cooked order 5.
Delivery personel 5 : Delivered order 5 to position (2, 0).
Delivery personel 2 : Delivered order 3 to position (2, 5).
Delivery personel 4 : Delivered order 1 to position (3, 4).
All orders delivered. Closing connection.
Client Side disconnected
Thanks Cook 4 and Moto 1
Waiting For New Customers
^CReceived SIGINT signal. Shutting down the server.
alper@alper-VirtualBox:~/Desktop$
```

# Example With Valgrind --leak-check



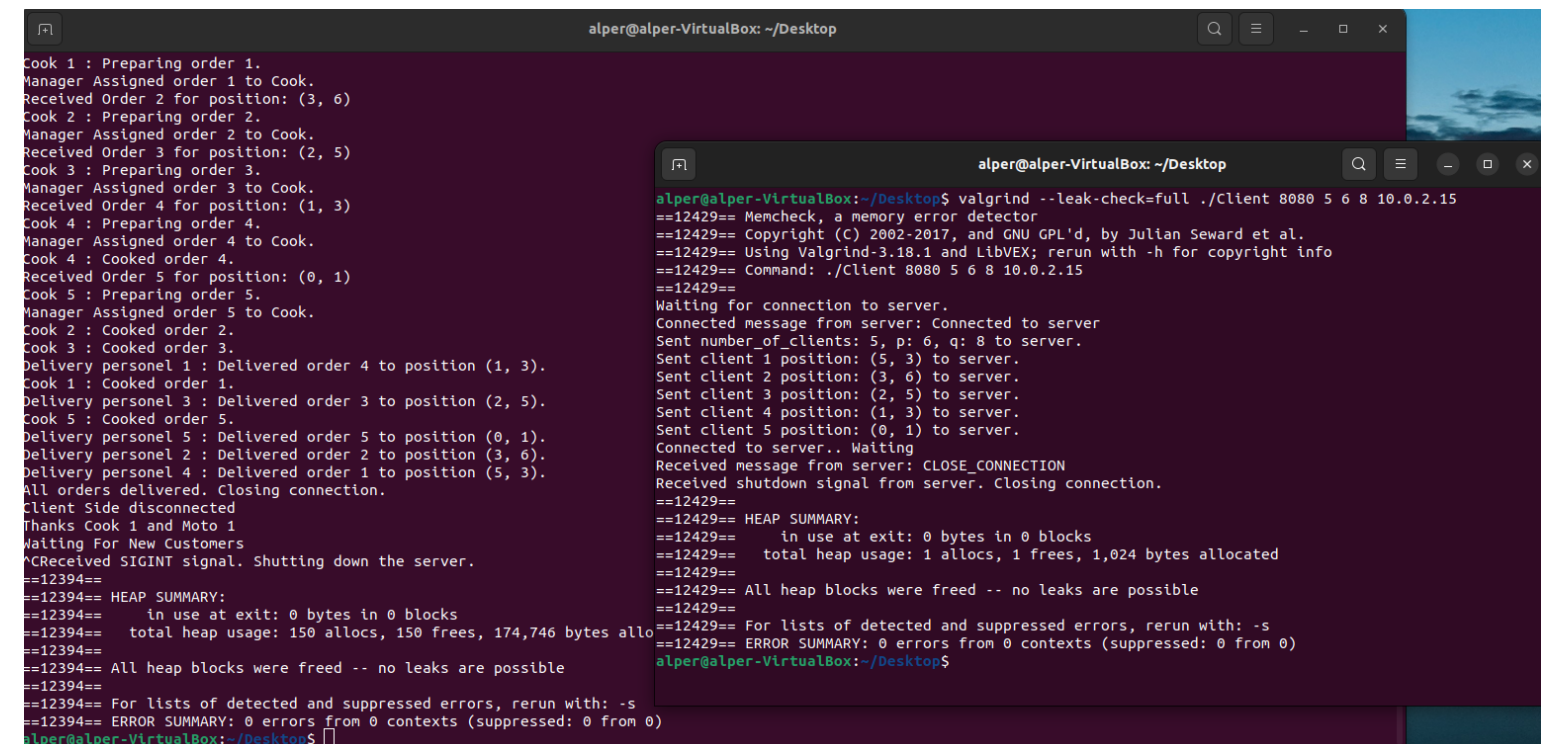
The image shows two terminal windows. The left window displays the output of a server program, and the right window shows the output of the same program run under Valgrind.

```
alper@alper-VirtualBox: ~/Desktop

==12394== Memcheck, a memory error detector
==12394== Copyright (C) 2002-2017, and GNU GPL'd, by Julian Seward et al.
==12394== Using Valgrind-3.18.1 and LibVEX; rerun with -h for copyright info
==12394== Command: ./Server 8080 8 6 1
==12394==
PideShop active, waiting for connection ...
Connetction Accepted From Client Side...
Number of clients received: 5, p: 6, q: 8
PideOven location: (3, 4)
Received Order 1 for position: (5, 3)
Cook 1 : Preparing order 1.
Manager Assigned order 1 to Cook.
Received Order 2 for position: (3, 6)
Cook 2 : Preparing order 2.
Manager Assigned order 2 to Cook.
Received Order 3 for position: (2, 5)
Cook 3 : Preparing order 3.
Manager Assigned order 3 to Cook.
Received Order 4 for position: (1, 3)
Cook 4 : Preparing order 4.
Manager Assigned order 4 to Cook.
Cook 4 : Cooked order 4.
Received Order 5 for position: (0, 1)
Cook 5 : Preparing order 5.
Manager Assigned order 5 to Cook.
Cook 2 : Cooked order 2.
Cook 3 : Cooked order 3.
Delivery personel 1 : Delivered order 4 to position (1, 3).
Cook 1 : Cooked order 1.
Delivery personel 3 : Delivered order 3 to position (2, 5).
Cook 5 : Cooked order 5.
Delivery personel 5 : Delivered order 5 to position (0, 1).
Delivery personel 2 : Delivered order 2 to position (3, 6).
Delivery personel 4 : Delivered order 1 to position (5, 3).
All orders delivered. Closing connection.
Client Side disconnected
Thanks Cook 1 and Moto 1
Waiting For New Customers

alper@alper-VirtualBox: ~/Desktop$ valgrind --leak-check=full ./Client 8080 5 6 8 10.0.2.15
==12429== Memcheck, a memory error detector
==12429== Copyright (C) 2002-2017, and GNU GPL'd, by Julian Seward et al.
==12429== Using Valgrind-3.18.1 and LibVEX; rerun with -h for copyright info
==12429== Command: ./Client 8080 5 6 8 10.0.2.15
==12429==
Waiting for connection to server.
Connected message from server: Connected to server
Sent number_of_clients: 5, p: 6, q: 8 to server.
Sent client 1 position: (5, 3) to server.
Sent client 2 position: (3, 6) to server.
Sent client 3 position: (2, 5) to server.
Sent client 4 position: (1, 3) to server.
Sent client 5 position: (0, 1) to server.
Connected to server.. Waiting
Received message from server: CLOSE_CONNECTION
Received shutdown signal from server. Closing connection.
==12429==
==12429== HEAP SUMMARY:
==12429==    in use at exit: 0 bytes in 0 blocks
==12429==   total heap usage: 1 allocs, 1 frees, 1,024 bytes allocated
==12429==
==12429== All heap blocks were freed -- no leaks are possible
==12429==
==12429== For lists of detected and suppressed errors, rerun with: -s
==12429== ERROR SUMMARY: 0 errors from 0 contexts (suppressed: 0 from 0)
alper@alper-VirtualBox:~/Desktop$
```

## Then Close the Server with ^C



The image shows two terminal windows. The left window displays the output of a server program being interrupted with Ctrl+C, and the right window shows the output of the same program run under Valgrind.

```
alper@alper-VirtualBox: ~/Desktop

Cook 1 : Preparing order 1.
Manager Assigned order 1 to Cook.
Received Order 2 for position: (3, 6)
Cook 2 : Preparing order 2.
Manager Assigned order 2 to Cook.
Received Order 3 for position: (2, 5)
Cook 3 : Preparing order 3.
Manager Assigned order 3 to Cook.
Received Order 4 for position: (1, 3)
Cook 4 : Preparing order 4.
Manager Assigned order 4 to Cook.
Cook 4 : Cooked order 4.
Received Order 5 for position: (0, 1)
Cook 5 : Preparing order 5.
Manager Assigned order 5 to Cook.
Cook 2 : Cooked order 2.
Cook 3 : Cooked order 3.
Delivery personel 1 : Delivered order 4 to position (1, 3).
Cook 1 : Cooked order 1.
Delivery personel 3 : Delivered order 3 to position (2, 5).
Cook 5 : Cooked order 5.
Delivery personel 5 : Delivered order 5 to position (0, 1).
Delivery personel 2 : Delivered order 2 to position (3, 6).
Delivery personel 4 : Delivered order 1 to position (5, 3).
All orders delivered. Closing connection.
Client Side disconnected
Thanks Cook 1 and Moto 1
Waiting For New Customers
^CReceived SIGINT signal. Shutting down the server.
==12394==
==12394== HEAP SUMMARY:
==12394==    in use at exit: 0 bytes in 0 blocks
==12394==   total heap usage: 150 allocs, 150 frees, 174,746 bytes allocated
==12394==
==12394== All heap blocks were freed -- no leaks are possible
==12394==
==12394== For lists of detected and suppressed errors, rerun with: -s
==12394== ERROR SUMMARY: 0 errors from 0 contexts (suppressed: 0 from 0)
alper@alper-VirtualBox:~/Desktop$

alper@alper-VirtualBox:~/Desktop$ valgrind --leak-check=full ./Client 8080 5 6 8 10.0.2.15
==12429== Memcheck, a memory error detector
==12429== Copyright (C) 2002-2017, and GNU GPL'd, by Julian Seward et al.
==12429== Using Valgrind-3.18.1 and LibVEX; rerun with -h for copyright info
==12429== Command: ./Client 8080 5 6 8 10.0.2.15
==12429==
Waiting for connection to server.
Connected message from server: Connected to server
Sent number_of_clients: 5, p: 6, q: 8 to server.
Sent client 1 position: (5, 3) to server.
Sent client 2 position: (3, 6) to server.
Sent client 3 position: (2, 5) to server.
Sent client 4 position: (1, 3) to server.
Sent client 5 position: (0, 1) to server.
Connected to server.. Waiting
Received message from server: CLOSE_CONNECTION
Received shutdown signal from server. Closing connection.
==12429==
==12429== HEAP SUMMARY:
==12429==    in use at exit: 0 bytes in 0 blocks
==12429==   total heap usage: 1 allocs, 1 frees, 1,024 bytes allocated
==12429==
==12429== All heap blocks were freed -- no leaks are possible
==12429==
==12429== For lists of detected and suppressed errors, rerun with: -s
==12429== ERROR SUMMARY: 0 errors from 0 contexts (suppressed: 0 from 0)
alper@alper-VirtualBox:~/Desktop$
```



# Tests With Multiple Clients (50)

```
alper@alper-VirtualBox: ~/Desktop
Delivery personel 3 : Delivered order 28 to position (0, 7).
Cook 1 : Cooked order 40.
Cook 1 : Preparing order 47.
Delivery personel 5 : Delivered order 31 to position (4, 0).
Delivery personel 5 : Delivered order 34 to position (1, 10).
Delivery personel 5 : Delivered order 40 to position (3, 5).
Delivery personel 2 : Delivered order 39 to position (2, 7).
Delivery personel 1 : Delivered order 36 to position (3, 7).
Cook 6 : Cooked order 37.
Cook 6 : Preparing order 48.
Delivery personel 4 : Delivered order 24 to position (3, 10).
Cook 5 : Cooked order 43.
Cook 5 : Preparing order 49.
Cook 7 : Cooked order 41.
Cook 7 : Preparing order 50.
Cook 5 : Cooked order 49.
Delivery personel 4 : Delivered order 49 to position (5, 0).
Cook 4 : Cooked order 46.
Delivery personel 3 : Delivered order 35 to position (2, 8).
Delivery personel 3 : Delivered order 46 to position (0, 2).
Cook 3 : Cooked order 42.
Delivery personel 5 : Delivered order 37 to position (5, 10).
Cook 7 : Cooked order 50.
Delivery personel 2 : Delivered order 43 to position (3, 9).
Cook 8 : Cooked order 45.
Cook 2 : Cooked order 44.
Delivery personel 4 : Delivered order 45 to position (5, 0).
Cook 1 : Cooked order 47.
Delivery personel 1 : Delivered order 41 to position (5, 5).
Delivery personel 1 : Delivered order 47 to position (0, 5).
Delivery personel 4 : Delivered order 44 to position (3, 3).
Delivery personel 3 : Delivered order 42 to position (4, 0).
Cook 6 : Cooked order 48.
Delivery personel 5 : Delivered order 50 to position (1, 9).
Delivery personel 1 : Delivered order 48 to position (5, 2).
All orders delivered. Closing connection.
Client Side disconnected
Thanks Cook 1 and Moto 1
Waiting For New Customers

alper@alper-VirtualBox: ~/Desktop
Sent client 17 position: (0, 4) to server.
Sent client 18 position: (5, 1) to server.
Sent client 19 position: (1, 10) to server.
Sent client 20 position: (4, 6) to server.
Sent client 21 position: (5, 3) to server.
Sent client 22 position: (1, 7) to server.
Sent client 23 position: (3, 4) to server.
Sent client 24 position: (3, 10) to server.
Sent client 25 position: (2, 1) to server.
Sent client 26 position: (5, 2) to server.
Sent client 27 position: (4, 0) to server.
Sent client 28 position: (0, 7) to server.
Sent client 29 position: (2, 4) to server.
Sent client 30 position: (4, 10) to server.
Sent client 31 position: (4, 0) to server.
Sent client 32 position: (4, 5) to server.
Sent client 33 position: (4, 10) to server.
Sent client 34 position: (1, 10) to server.
Sent client 35 position: (2, 8) to server.
Sent client 36 position: (3, 7) to server.
Sent client 37 position: (5, 10) to server.
Sent client 38 position: (1, 8) to server.
Sent client 39 position: (2, 7) to server.
Sent client 40 position: (3, 5) to server.
Sent client 41 position: (5, 5) to server.
Sent client 42 position: (4, 0) to server.
Sent client 43 position: (3, 9) to server.
Sent client 44 position: (3, 3) to server.
Sent client 45 position: (5, 0) to server.
Sent client 46 position: (0, 2) to server.
Sent client 47 position: (0, 5) to server.
Sent client 48 position: (5, 2) to server.
Sent client 49 position: (5, 0) to server.
Sent client 50 position: (1, 9) to server.
Connected to server.. Waiting
Received message from server: CLOSE_CONNECTION
Received shutdown signal from server. Closing connection.
alper@alper-VirtualBox:~/Desktop$
```

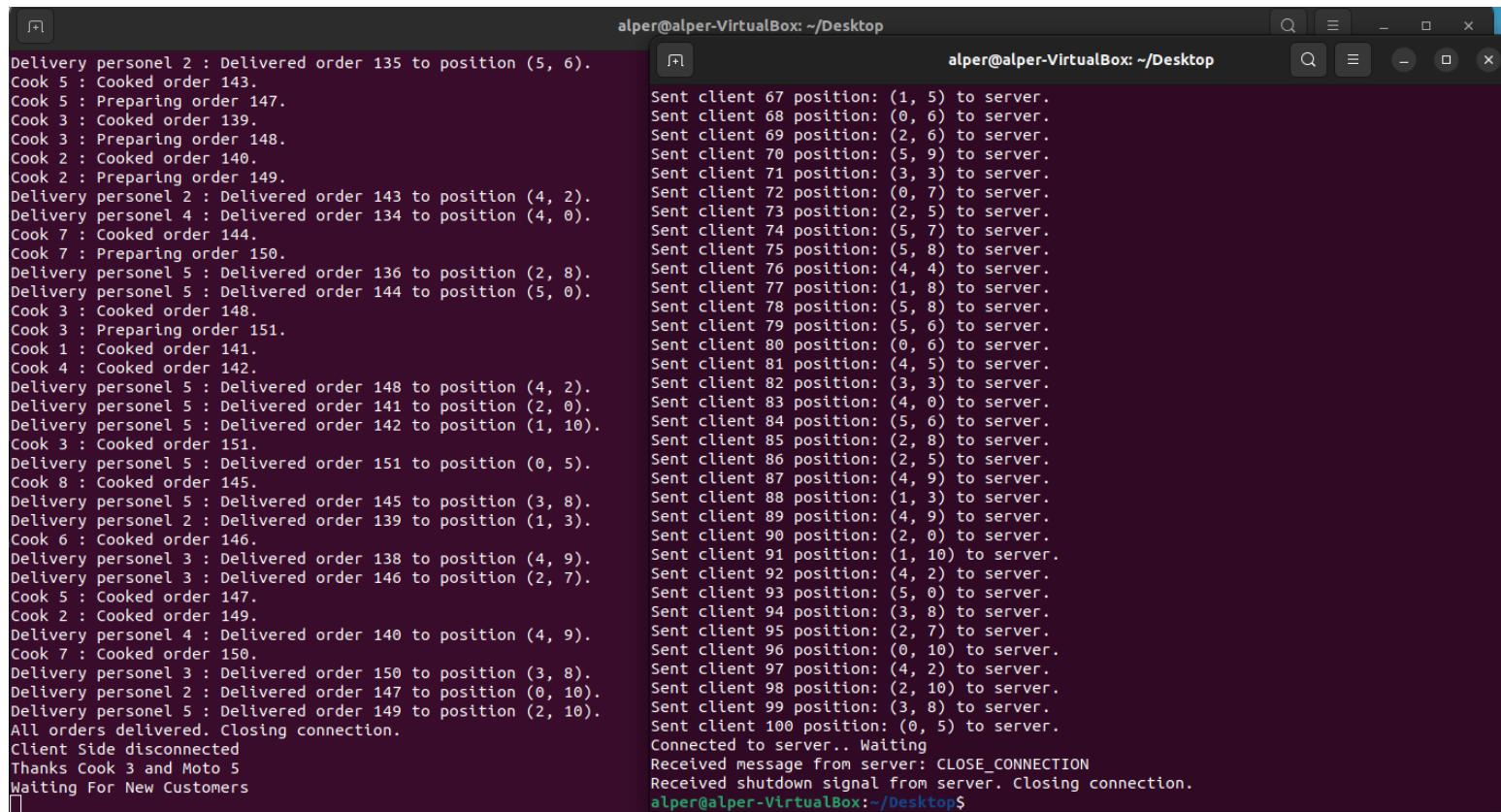
## Log File

```
[Sat Jun 15 06:09:37 2024] PideShop active, waiting for connection ...
[Sat Jun 15 06:09:48 2024] Connection Accepted From Client Side...
[Sat Jun 15 06:09:48 2024] Number of clients received: 50, p: 5, q: 10
[Sat Jun 15 06:09:48 2024] PideOven location: (2, 5)
[Sat Jun 15 06:09:48 2024] Received Order 1 for position: (2, 7)
[Sat Jun 15 06:09:48 2024] Manager Assigned order 1 to Cook.
[Sat Jun 15 06:09:48 2024] Cook 1 : Preparing order 1.
[Sat Jun 15 06:09:48 2024] Received Order 2 for position: (3, 10)
[Sat Jun 15 06:09:48 2024] Manager Assigned order 2 to Cook.
[Sat Jun 15 06:09:48 2024] Cook 2 : Preparing order 2.
[Sat Jun 15 06:09:48 2024] Received Order 3 for position: (5, 4)
[Sat Jun 15 06:09:48 2024] Manager Assigned order 3 to Cook.
[Sat Jun 15 06:09:48 2024] Cook 3 : Preparing order 3.
[Sat Jun 15 06:09:48 2024] Received Order 4 for position: (2, 5)
[Sat Jun 15 06:09:48 2024] Manager Assigned order 4 to Cook.
[Sat Jun 15 06:09:48 2024] Cook 4 : Preparing order 4.
[Sat Jun 15 06:09:48 2024] Received Order 5 for position: (5, 3)
[Sat Jun 15 06:09:48 2024] Manager Assigned order 5 to Cook.
[Sat Jun 15 06:09:48 2024] Cook 5 : Preparing order 5.
[Sat Jun 15 06:09:48 2024] Received Order 6 for position: (0, 1)
[Sat Jun 15 06:09:48 2024] Manager Assigned order 6 to Cook.
[Sat Jun 15 06:09:48 2024] Cook 6 : Preparing order 6.
[Sat Jun 15 06:09:48 2024] Cook 4 : Cooked order 4.
[Sat Jun 15 06:09:48 2024] Cook 6 : Cooked order 6.
[Sat Jun 15 06:09:48 2024] Received Order 7 for position: (5, 6)
[Sat Jun 15 06:09:48 2024] Manager Assigned order 7 to Cook.
[Sat Jun 15 06:09:48 2024] Cook 7 : Preparing order 7.
[Sat Jun 15 06:09:48 2024] Received Order 8 for position: (4, 0)
[Sat Jun 15 06:09:48 2024] Manager Assigned order 8 to Cook.
[Sat Jun 15 06:09:48 2024] Cook 8 : Preparing order 8.
[Sat Jun 15 06:09:48 2024] Received Order 9 for position: (2, 0)
[Sat Jun 15 06:09:48 2024] Manager Assigned order 9 to Cook.
[Sat Jun 15 06:09:48 2024] Cook 4 : Preparing order 9.
[Sat Jun 15 06:09:48 2024] Received Order 10 for position: (4, 1)
[Sat Jun 15 06:09:48 2024] Received Order 11 for position: (2, 6)
[Sat Jun 15 06:09:48 2024] Manager Assigned order 10 to Cook.
[Sat Jun 15 06:09:48 2024] Cook 6 : Preparing order 10.
[Sat Jun 15 06:09:48 2024] Received Order 12 for position: (0, 4)
[Sat Jun 15 06:09:48 2024] Received Order 13 for position: (5, 2)
[Sat Jun 15 06:09:48 2024] Received Order 14 for position: (5, 9)
[Sat Jun 15 06:09:48 2024] Received Order 15 for position: (3, 0)
[Sat Jun 15 06:09:48 2024] Received Order 16 for position: (2, 8)
[Sat Jun 15 06:09:48 2024] Manager Assigned order 11 to Cook
```



## Tests With Multiple Clients (100)

I make his test without closing server so total orders 50+100



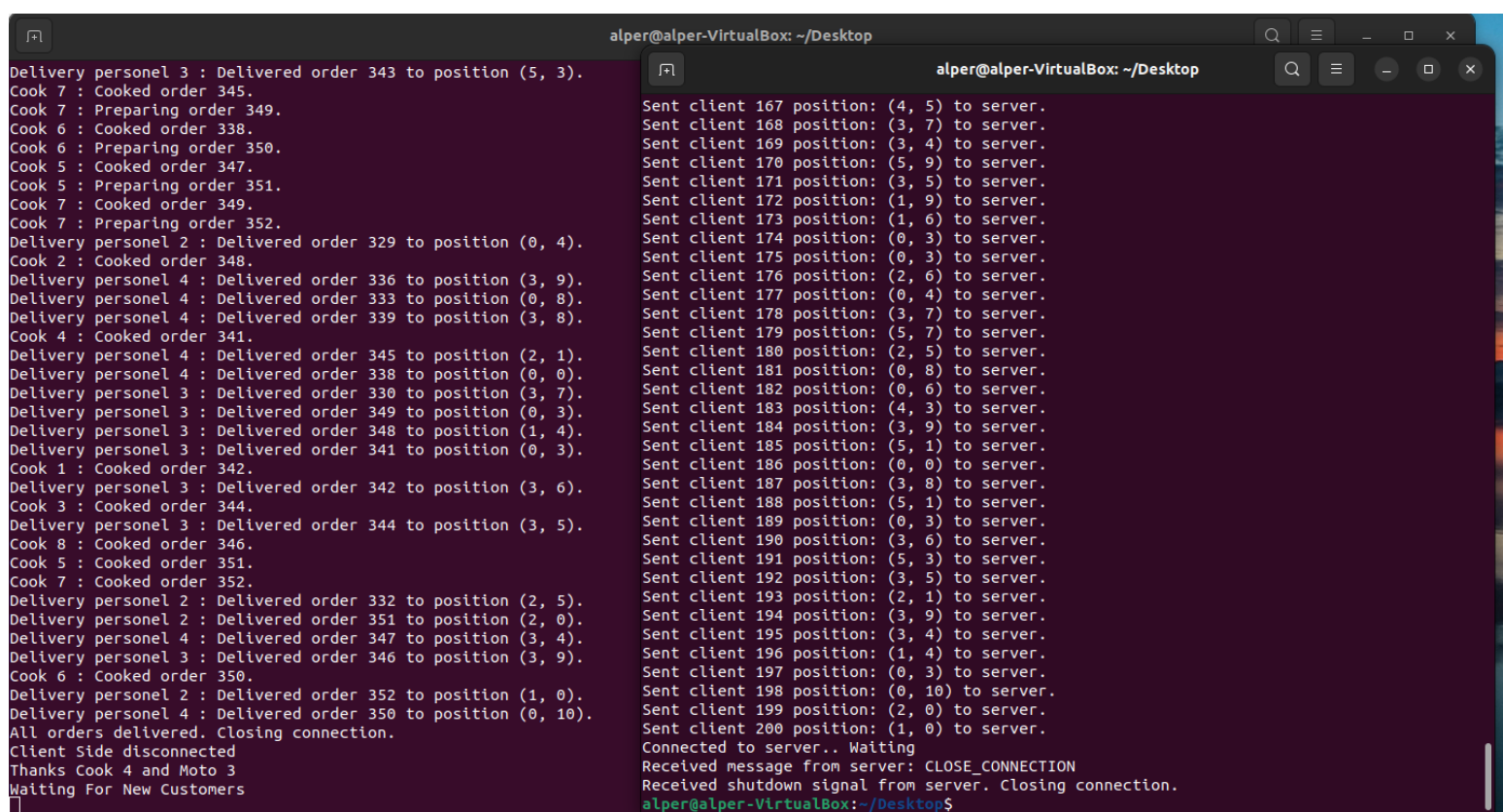
The image shows two terminal windows from a VirtualBox environment. The left window displays the server's log for the first 100 clients, showing a sequence of delivery and cooking actions for various orders. The right window shows the server's log for the next 100 clients, continuing the sequence. Both windows end with a shutdown signal from the server.

```
alper@alper-VirtualBox: ~/Desktop
Delivery personel 2 : Delivered order 135 to position (5, 6).
Cook 5 : Cooked order 143.
Cook 5 : Preparing order 147.
Cook 3 : Cooked order 139.
Cook 3 : Preparing order 148.
Cook 2 : Cooked order 140.
Cook 2 : Preparing order 149.
Delivery personel 2 : Delivered order 143 to position (4, 2).
Delivery personel 4 : Delivered order 134 to position (4, 0).
Cook 7 : Cooked order 144.
Cook 7 : Preparing order 150.
Delivery personel 5 : Delivered order 136 to position (2, 8).
Delivery personel 5 : Delivered order 144 to position (5, 0).
Cook 3 : Cooked order 148.
Cook 3 : Preparing order 151.
Cook 1 : Cooked order 141.
Cook 4 : Cooked order 142.
Delivery personel 5 : Delivered order 148 to position (4, 2).
Delivery personel 5 : Delivered order 141 to position (2, 0).
Delivery personel 5 : Delivered order 142 to position (1, 10).
Cook 3 : Cooked order 151.
Delivery personel 5 : Delivered order 151 to position (0, 5).
Cook 8 : Cooked order 145.
Delivery personel 5 : Delivered order 145 to position (3, 8).
Delivery personel 2 : Delivered order 139 to position (1, 3).
Cook 6 : Cooked order 146.
Delivery personel 3 : Delivered order 138 to position (4, 9).
Delivery personel 3 : Delivered order 146 to position (2, 7).
Cook 5 : Cooked order 147.
Cook 2 : Cooked order 149.
Delivery personel 4 : Delivered order 140 to position (4, 9).
Cook 7 : Cooked order 150.
Delivery personel 3 : Delivered order 150 to position (3, 8).
Delivery personel 2 : Delivered order 147 to position (0, 10).
Delivery personel 5 : Delivered order 149 to position (2, 10).
All orders delivered. Closing connection.
Client Side disconnected
Thanks Cook 3 and Moto 5
Waiting For New Customers

alper@alper-VirtualBox: ~/Desktop
Sent client 67 position: (1, 5) to server.
Sent client 68 position: (0, 6) to server.
Sent client 69 position: (2, 6) to server.
Sent client 70 position: (5, 9) to server.
Sent client 71 position: (3, 3) to server.
Sent client 72 position: (0, 7) to server.
Sent client 73 position: (2, 5) to server.
Sent client 74 position: (5, 7) to server.
Sent client 75 position: (5, 8) to server.
Sent client 76 position: (4, 4) to server.
Sent client 77 position: (1, 8) to server.
Sent client 78 position: (5, 8) to server.
Sent client 79 position: (5, 6) to server.
Sent client 80 position: (0, 6) to server.
Sent client 81 position: (4, 5) to server.
Sent client 82 position: (3, 3) to server.
Sent client 83 position: (4, 0) to server.
Sent client 84 position: (5, 6) to server.
Sent client 85 position: (2, 8) to server.
Sent client 86 position: (2, 5) to server.
Sent client 87 position: (4, 9) to server.
Sent client 88 position: (1, 3) to server.
Sent client 89 position: (4, 9) to server.
Sent client 90 position: (2, 0) to server.
Sent client 91 position: (1, 10) to server.
Sent client 92 position: (4, 2) to server.
Sent client 93 position: (5, 0) to server.
Sent client 94 position: (3, 8) to server.
Sent client 95 position: (2, 7) to server.
Sent client 96 position: (0, 10) to server.
Sent client 97 position: (4, 2) to server.
Sent client 98 position: (2, 10) to server.
Sent client 99 position: (3, 0) to server.
Sent client 100 position: (0, 5) to server.
Connected to server.. Waiting
Received message from server: CLOSE_CONNECTION
Received shutdown signal from server. Closing connection.
alper@alper-VirtualBox:~/Desktop$
```

## Tests With Multiple Clients (200)

I make his test without closing server so total orders 50+100+200



The image shows two terminal windows from a VirtualBox environment. The left window displays the server's log for the next 200 clients, continuing the sequence of delivery and cooking actions. The right window shows the server's log for the final 200 clients, ending with a shutdown signal from the server.

```
alper@alper-VirtualBox: ~/Desktop
Delivery personel 3 : Delivered order 343 to position (5, 3).
Cook 7 : Cooked order 345.
Cook 7 : Preparing order 349.
Cook 6 : Cooked order 338.
Cook 6 : Preparing order 350.
Cook 5 : Cooked order 347.
Cook 5 : Preparing order 351.
Cook 7 : Cooked order 349.
Cook 7 : Preparing order 352.
Delivery personel 2 : Delivered order 329 to position (0, 4).
Cook 2 : Cooked order 348.
Delivery personel 4 : Delivered order 336 to position (3, 9).
Delivery personel 4 : Delivered order 333 to position (0, 8).
Delivery personel 4 : Delivered order 339 to position (3, 8).
Cook 4 : Cooked order 341.
Delivery personel 4 : Delivered order 345 to position (2, 1).
Delivery personel 4 : Delivered order 338 to position (0, 0).
Delivery personel 3 : Delivered order 330 to position (3, 7).
Delivery personel 3 : Delivered order 349 to position (0, 3).
Delivery personel 3 : Delivered order 348 to position (1, 4).
Delivery personel 3 : Delivered order 341 to position (0, 3).
Cook 1 : Cooked order 342.
Delivery personel 3 : Delivered order 342 to position (3, 6).
Cook 3 : Cooked order 344.
Delivery personel 3 : Delivered order 344 to position (3, 5).
Cook 8 : Cooked order 346.
Cook 5 : Cooked order 351.
Cook 7 : Cooked order 352.
Delivery personel 2 : Delivered order 332 to position (2, 5).
Delivery personel 2 : Delivered order 351 to position (2, 0).
Delivery personel 4 : Delivered order 347 to position (3, 4).
Delivery personel 3 : Delivered order 346 to position (3, 9).
Cook 6 : Cooked order 350.
Delivery personel 2 : Delivered order 352 to position (1, 0).
Delivery personel 4 : Delivered order 350 to position (0, 10).
All orders delivered. Closing connection.
Client Side disconnected
Thanks Cook 4 and Moto 3
Waiting For New Customers

alper@alper-VirtualBox: ~/Desktop
Sent client 167 position: (4, 5) to server.
Sent client 168 position: (3, 7) to server.
Sent client 169 position: (3, 4) to server.
Sent client 170 position: (5, 9) to server.
Sent client 171 position: (3, 5) to server.
Sent client 172 position: (1, 9) to server.
Sent client 173 position: (1, 6) to server.
Sent client 174 position: (0, 3) to server.
Sent client 175 position: (0, 3) to server.
Sent client 176 position: (2, 6) to server.
Sent client 177 position: (0, 4) to server.
Sent client 178 position: (3, 7) to server.
Sent client 179 position: (5, 7) to server.
Sent client 180 position: (2, 5) to server.
Sent client 181 position: (0, 8) to server.
Sent client 182 position: (0, 6) to server.
Sent client 183 position: (4, 3) to server.
Sent client 184 position: (3, 9) to server.
Sent client 185 position: (5, 1) to server.
Sent client 186 position: (0, 0) to server.
Sent client 187 position: (3, 8) to server.
Sent client 188 position: (5, 1) to server.
Sent client 189 position: (0, 3) to server.
Sent client 190 position: (3, 6) to server.
Sent client 191 position: (5, 3) to server.
Sent client 192 position: (3, 5) to server.
Sent client 193 position: (2, 1) to server.
Sent client 194 position: (3, 9) to server.
Sent client 195 position: (3, 4) to server.
Sent client 196 position: (1, 4) to server.
Sent client 197 position: (0, 3) to server.
Sent client 198 position: (0, 10) to server.
Sent client 199 position: (2, 0) to server.
Sent client 200 position: (1, 0) to server.
Connected to server.. Waiting
Received message from server: CLOSE_CONNECTION
Received shutdown signal from server. Closing connection.
alper@alper-VirtualBox:~/Desktop$
```