

711 Assignment Two Report

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Lab machine

The machine I tested the program is located at 303S Ground floor. The testing C#.Net Environment is .Net version 4.6.2, the programs are developed in .NET version 4.7.2, and it is executable. Microsoft visual studio development environment is used.

711 A2

Name	Date modified	Type	Size
Middleware1	15/09/2019 9:10 AM	File folder	
Middleware2	15/09/2019 9:10 AM	File folder	
Middleware3	15/09/2019 9:10 AM	File folder	
Middleware4	15/09/2019 9:10 AM	File folder	
Middleware5	15/09/2019 9:10 AM	File folder	
Network	15/09/2019 9:10 AM	File folder	
run.bat	15/09/2019 9:17 AM	Windows Batch File	1 KB

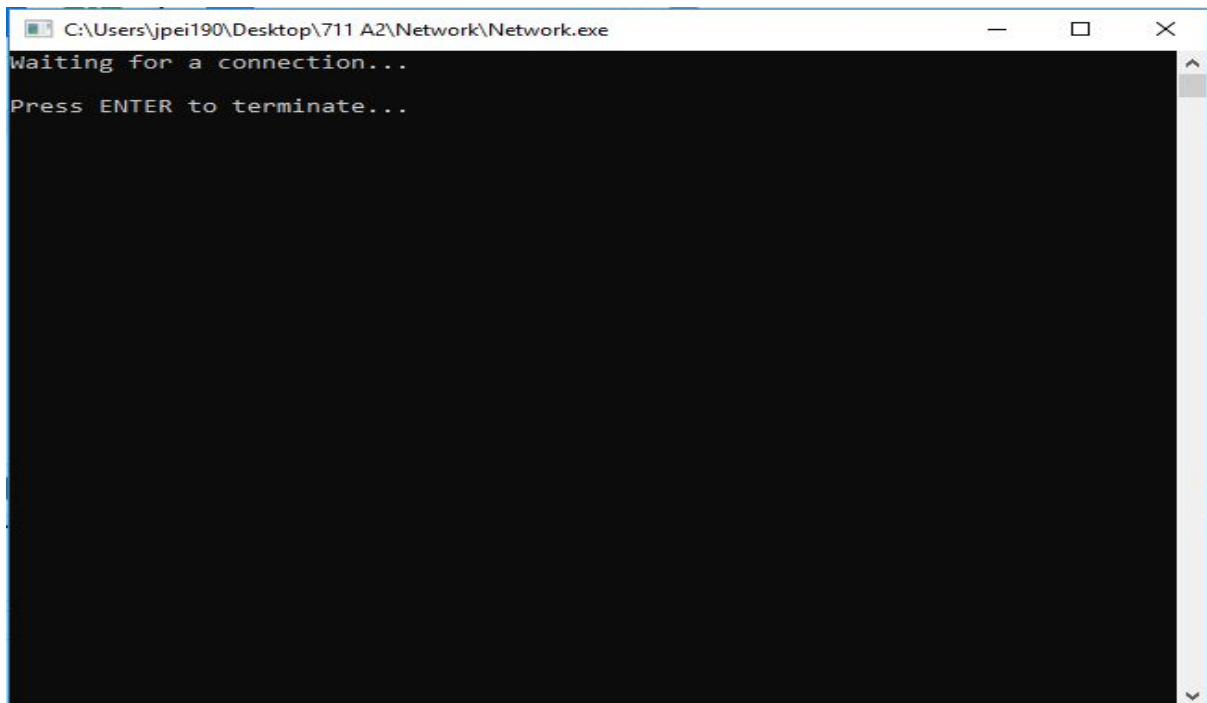
Under the submitted folder, There are 5 middleware folders where each folder contains one corresponding middleware program. A batch file “run.bat” is there for compiling and executing programs.

Instruction of using the programs

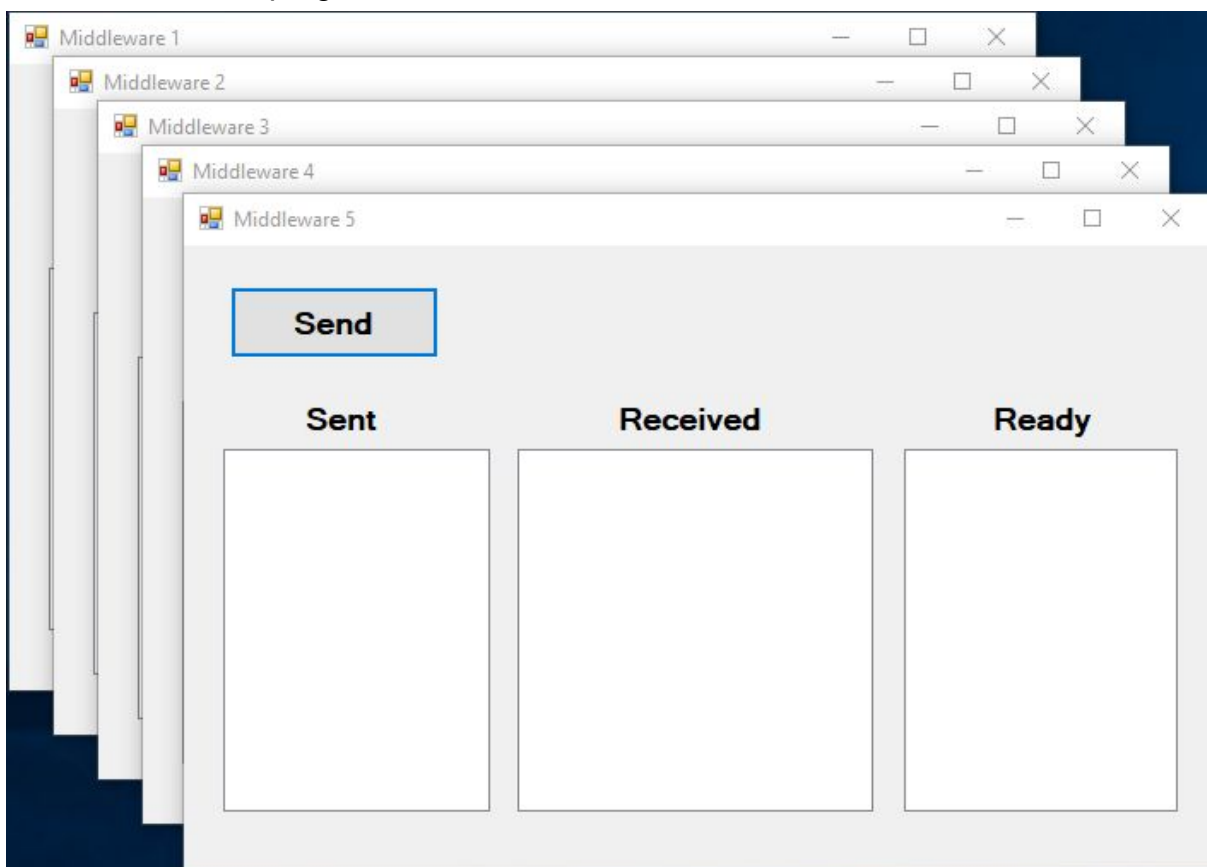
```
run.bat - Notepad
File Edit Format View Help
msbuild Middleware1\Middleware_1.sln
msbuild Middleware2\Middleware_2.sln
msbuild Middleware3\Middleware_3.sln
msbuild Middleware4\Middleware_4.sln
msbuild Middleware5\Middleware_5.sln
csc /out:Network\Network.exe Network\Network.cs
start Network\Network.exe
start Middleware1\Middleware1\bin\Debug\Middleware1.exe
start Middleware2\Middleware2\bin\Debug\Middleware2.exe
start Middleware3\Middleware3\bin\Debug\Middleware3.exe
start Middleware4\Middleware4\bin\Debug\Middleware4.exe
start Middleware5\Middleware5\bin\Debug\Middleware5.exe
```

The batch file are written as shown above, in order to run the programs, make sure the Network application is placed in the same directory as the Middleware folders.

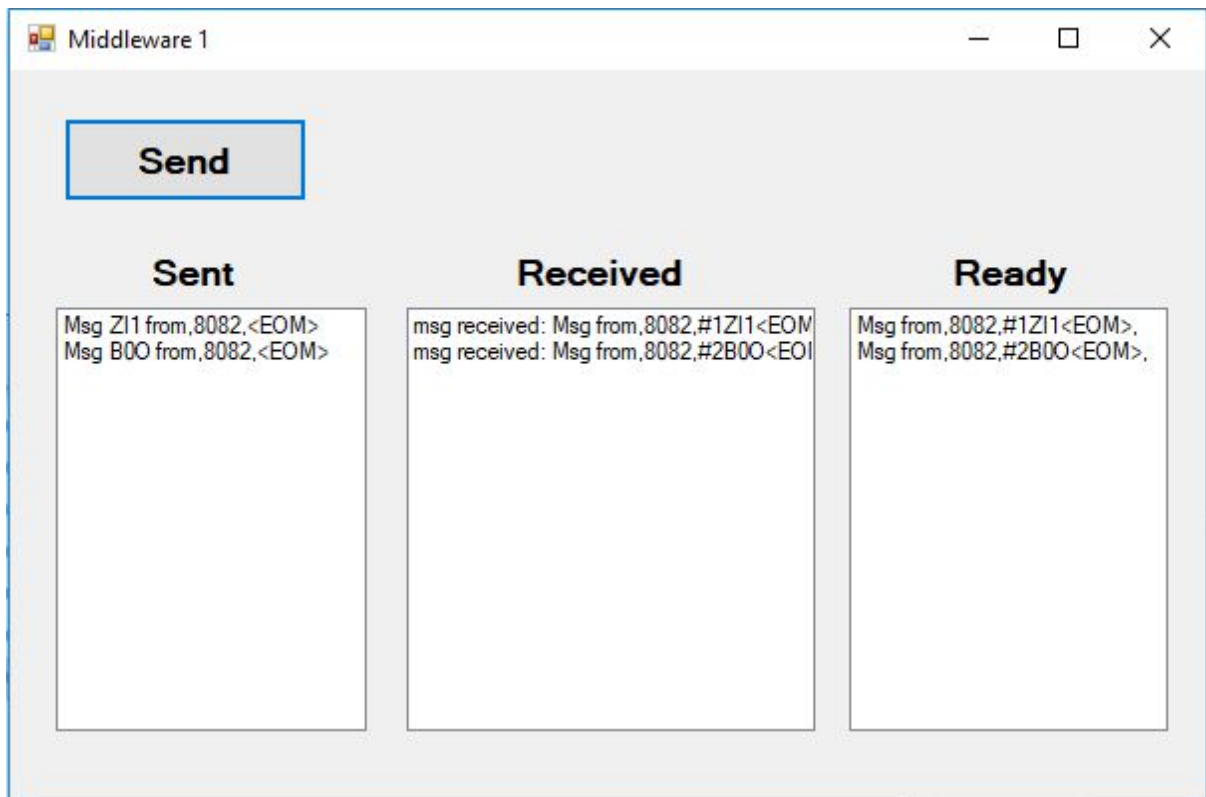
Double click the “run.bat” file, the network.exe will be executed which is used for multicasting messages.



also 5 middleware programs will be executed



Each middleware has a unique ID number.



Click “Send” button in one of the middlewares. The “Sent” listbox contains the messages that are being sent to multicast network. “Received” listbox contains the messages that are received from the multicast network. Lastly the “Ready” listbox contains the messages that are ready for delivery to its corresponding application. Each unique message that is being sent is randomly generated from alphabet and numbers. From the “Received” and “Ready” listbox the message content has a slight difference. Each message begins with “#1” indicate this is the first message sent from port 8082, message begins with “#2” indicate this is the second message sent from port 8082, etc.

```

C:\Users\jpei190\Desktop\711 A2\Network\Network.exe
Waiting for a connection...
Press ENTER to terminate...
Message received: Msg from,8082,#1ZI1<EOM>delay time for 8082 is 14278
delay time for 8083 is 4572
delay time for 8084 is 15106
delay time for 8085 is 2416
delay time for 8086 is 9240
Waiting for a connection...
Waiting for a connection...
Message received: Msg from,8082,#2B00<EOM>delay time for 8082 is 679
delay time for 8083 is 14528
delay time for 8084 is 7847
delay time for 8085 is 19704
delay time for 8086 is 2344
Waiting for a connection...
Message received: Msg from,8086,#1JNN<EOM>delay time for 8082 is 5003
delay time for 8083 is 7535
delay time for 8084 is 7740
delay time for 8085 is 14606
delay time for 8086 is 2731

```

From network's end, Sender port number is shown in the first line, with the message content sent from the sender port.

```
C:\Users\jpei190\Desktop\711 A2\Network\Network.exe
Waiting for a connection...
Press ENTER to terminate...
Message received: Msg from,8082,#17I1<EOM>delay time for 8082 is 14278
delay time for 8083 is 4572
delay time for 8084 is 15106
delay time for 8085 is 2416
delay time for 8086 is 9240
Waiting for a connection...
Waiting for a connection...
Message received: Msg from,8082,#2B00<EOM>delay time for 8082 is 679
delay time for 8083 is 14528
delay time for 8084 is 7847
delay time for 8085 is 19704
delay time for 8086 is 2344
Waiting for a connection...
Message received: Msg from,8086,#1JNN<EOM>delay time for 8082 is 5003
delay time for 8083 is 7535
delay time for 8084 is 7740
delay time for 8085 is 14606
delay time for 8086 is 2731
```

The rest are the delay time for multicasting the message to different port.

```
C:\Users\George\Desktop\711 A2\Network\Network.exe
Message received: Msg from,8083,#1MZM<EOM>delay time for 8082 is 6798
delay time for 8083 is 14095
delay time for 8084 is 7093
delay time for 8085 is 4236
delay time for 8086 is 19777
Waiting for a connection...
Waiting for a connection...
Message received: Msg from,8083,#2ZTU<EOM>delay time for 8082 is 13916
delay time for 8083 is 10675
delay time for 8084 is 11513
delay time for 8085 is 12567
delay time for 8086 is 12239
Waiting for a connection...
Message received: Msg from,8083,#3I4W<EOM>delay time for 8082 is 4917
delay time for 8083 is 16728
delay time for 8084 is 12743
delay time for 8085 is 12012
delay time for 8086 is 11555
Waiting for a connection...
Message received: Msg from,8086,#1T7B<EOM>delay time for 8082 is 10706
delay time for 8083 is 18830
delay time for 8084 is 1079
delay time for 8085 is 19785
delay time for 8086 is 18778
Waiting for a connection...
Message received: Msg from,8084,#1SEQ<EOM>delay time for 8082 is 10511
delay time for 8083 is 2667
delay time for 8084 is 9396
delay time for 8085 is 14849
delay time for 8086 is 14144
Waiting for a connection...
Message received: Msg from,8082,#1LSW<EOM>delay time for 8082 is 6411
delay time for 8083 is 19064
delay time for 8084 is 12709
delay time for 8085 is 17871
delay time for 8086 is 17812
Waiting for a connection...
Message received: Msg from,8085,#1BI9<EOM>delay time for 8082 is 1004
delay time for 8083 is 4472
delay time for 8084 is 19764
delay time for 8085 is 969
delay time for 8086 is 12863
```

Middleware 1

Send

Sent

Msg L8W from,8082,<EOM>

Received

msg received: Msg from,8083,#1MZM<EO
msg received: Msg from,8083,#2ZTU<EO
msg received: Msg from,8083,#3I4W<EO
msg received: Msg from,8086,#1T7B<EO
msg received: Msg from,8082,#1L8W<EO
msg received: Msg from,8085,#1BI9<EOM
msg received: Msg from,8084,#1SEQ<EO

Ready

Msg from,8083,#1MZM<EOM>,
Msg from,8083,#2ZTU<EOM>,
Msg from,8083,#3I4W<EOM>,
Msg from,8084,#1SEQ<EOM>,
Msg from,8086,#1T7B<EOM>,
Msg from,8082,#1L8W<EOM>,
Msg from,8085,#1BI9<EOM>,

Middleware 2

Send

Sent

Msg MZM from,8083,<EOM>
Msg ZTU from,8083,<EOM>
Msg I4W from,8083,<EOM>

Received

msg received: Msg from,8083,#1MZM<EO
msg received: Msg from,8083,#2ZTU<EO
msg received: Msg from,8083,#3I4W<EOM
msg received: Msg from,8084,#1SEQ<EO
msg received: Msg from,8085,#1BI9<EOM
msg received: Msg from,8086,#1T7B<EOM
msg received: Msg from,8082,#1L8W<EO

Ready

Msg from,8083,#1MZM<EOM>,
Msg from,8083,#2ZTU<EOM>,
Msg from,8083,#3I4W<EOM>,
Msg from,8084,#1SEQ<EOM>,
Msg from,8086,#1T7B<EOM>,
Msg from,8082,#1L8W<EOM>,
Msg from,8085,#1BI9<EOM>,

Middleware 3

Send

Sent

Msg SEQ from,8084,<EOM>

Received

msg received: Msg from,8083,#1MZM<EO
msg received: Msg from,8083,#2ZTU<EO
msg received: Msg from,8083,#3I4W<EO
msg received: Msg from,8086,#1T7B<EO
msg received: Msg from,8084,#1SEQ<EO
msg received: Msg from,8082,#1L8W<EO
msg received: Msg from,8085,#1BI9<EOM

Ready

Msg from,8083,#1MZM<EOM>,
Msg from,8083,#2ZTU<EOM>,
Msg from,8083,#3I4W<EOM>,
Msg from,8084,#1SEQ<EOM>,
Msg from,8086,#1T7B<EOM>,
Msg from,8082,#1L8W<EOM>,
Msg from,8085,#1BI9<EOM>,

Middleware 4

Send

Sent

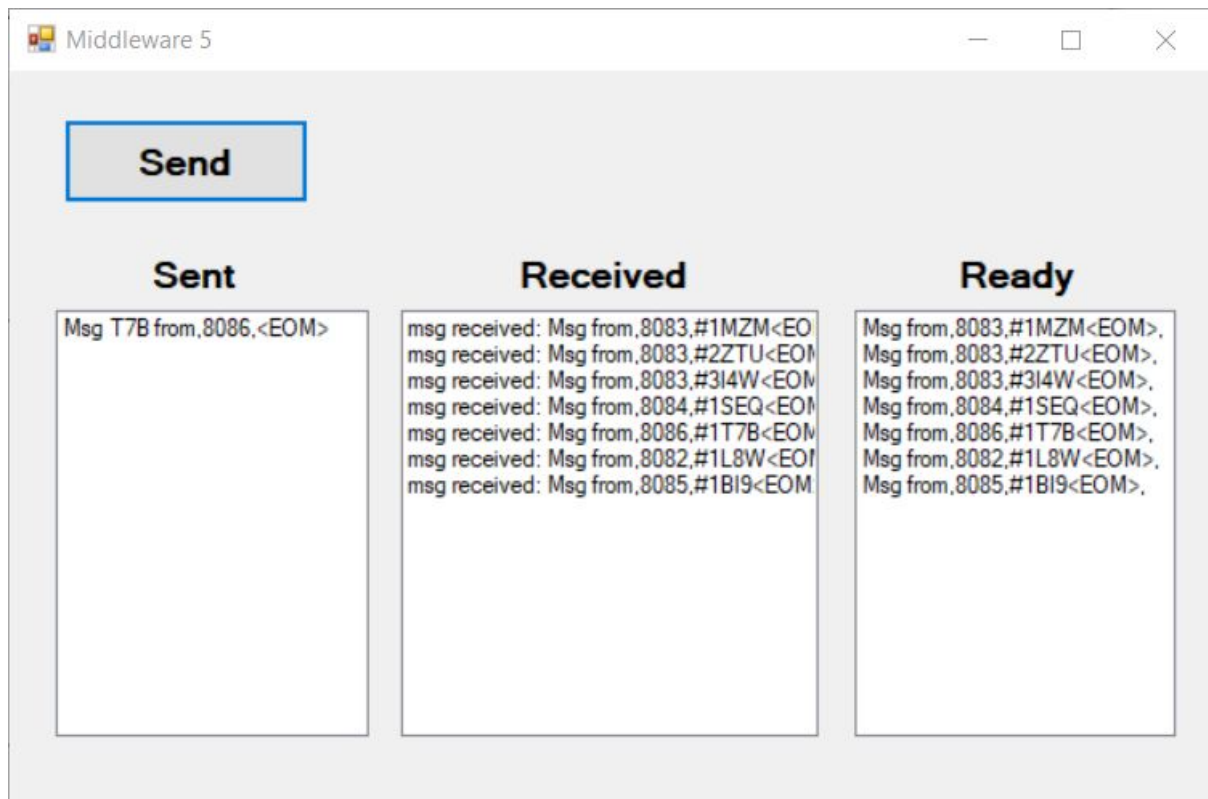
Msg BI9 from,8085,<EOM>

Received

msg received: Msg from,8083,#1MZM<EO
msg received: Msg from,8083,#2ZTU<EO
msg received: Msg from,8083,#3I4W<EO
msg received: Msg from,8085,#1BI9<EOM
msg received: Msg from,8084,#1SEQ<EO
msg received: Msg from,8086,#1T7B<EO
msg received: Msg from,8082,#1L8W<EO

Ready

Msg from,8083,#1MZM<EOM>,
Msg from,8083,#2ZTU<EOM>,
Msg from,8083,#3I4W<EOM>,
Msg from,8084,#1SEQ<EOM>,
Msg from,8086,#1T7B<EOM>,
Msg from,8082,#1L8W<EOM>,
Msg from,8085,#1BI9<EOM>,



In this scenario, the first picture shows delay times that are managed by Network application. Middleware 2 firstly multicasts 3 messages, then it received 3 messages from itself, then followed by message sent by port 8084(middleware 3), port 8085(middleware 4), port 8086(middleware 5) and port 8082(middleware 1).

In “Ready” listbox, the total ordering makes messages in the same order in each middlewares, and ready to forward the messages to its corresponding application. From the “Received” listbox in every middleware, we can clearly see that due to the network delay, each middleware receive different messages at different times.

Causal Ordering and Total ordering

When we multicast, it is assumed that the machine that execute application may have one core unit. If an application is executing, it may need more than just one thread to process (2 or more threads). The constantly changing thread cause poor resource management in the machine’s core, and it is better for all existing threads to assign the resource used for each thread.

- **Causal ordered multicast** delivers messages so that potential causality between different messages is preserved. In other words, if a message m1 causally precedes another message m2, regardless of whether they were multicast by the same sender, then the communication layer at each receiver will always deliver m2 after it has received and delivered m1.
- **Total-ordered delivery** means that regardless of whether message delivery is unordered, FIFO ordered, or causally ordered, it is required additionally that when messages are delivered, they are delivered in the same order to all group members.