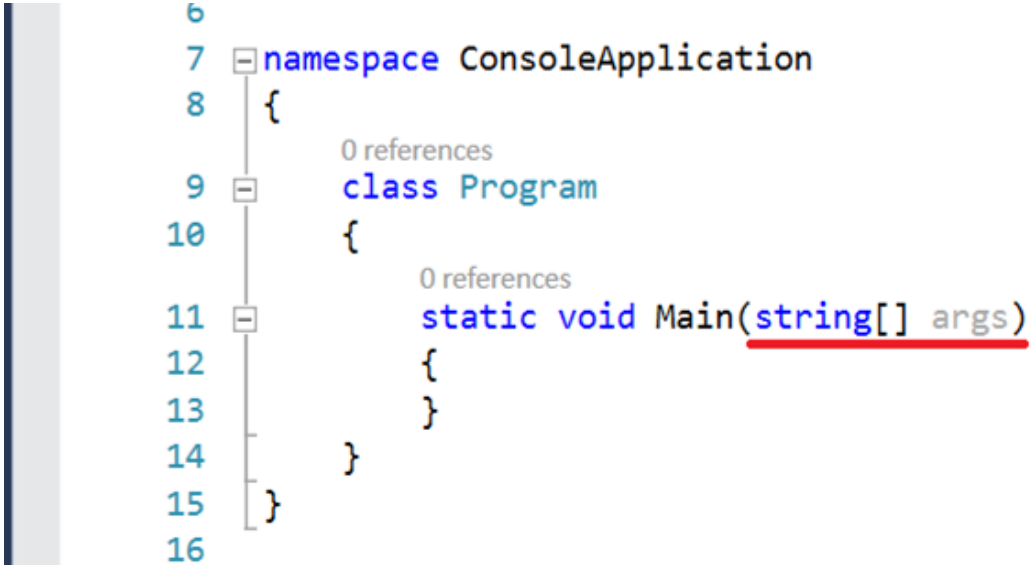
CS421:PA1 InstantMessenger Tutorial

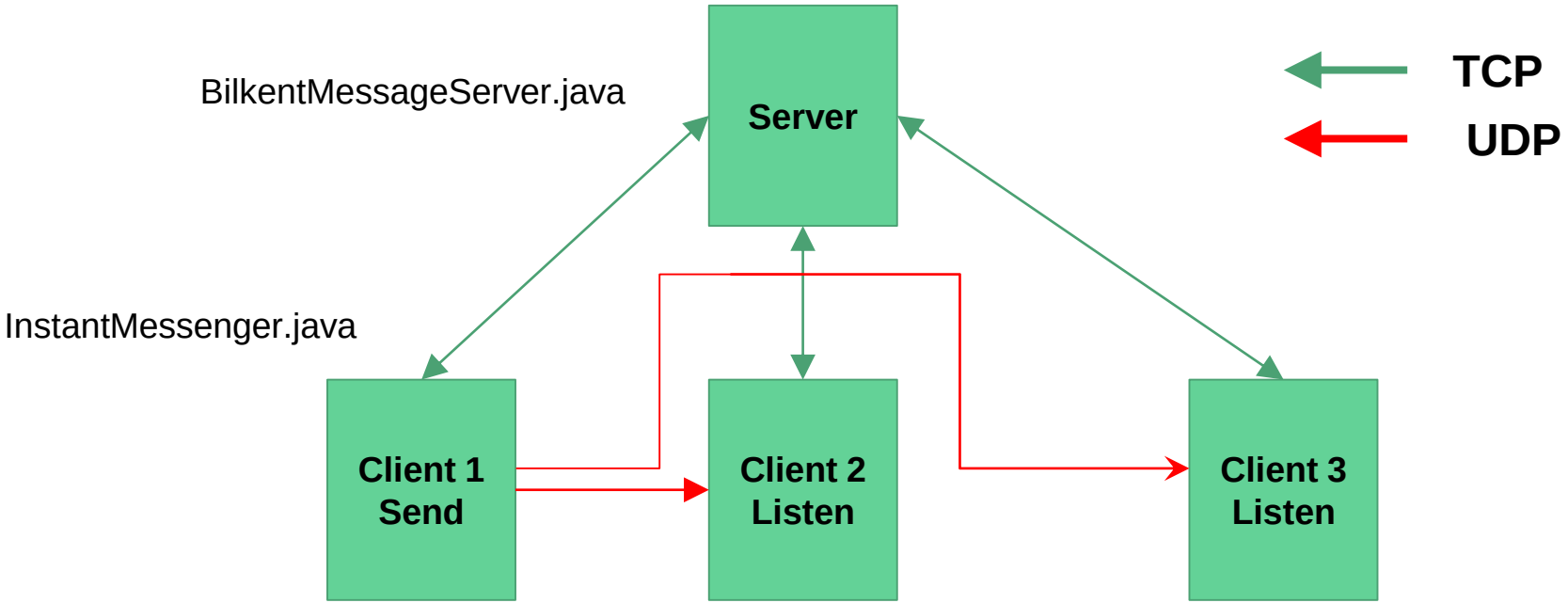
Bilkent University
Fall 2017

A Reminder about Java

What is a console application?



A Glimpse of the Architecture



To do

- Open several command prompts
- Run the server: java BilkentMessageServer (*source code will be provided)*
- Run client programs: java InstantMessenger … (*you will implement)*
- Send some messages and test the code

1) Initial steps of client program

- Open a UDP socket & bind to an available port
- If mode = **listen:**
  - Register username, IP, and port to the server using **HTTP POST** request
  - Start listening for incoming messages
  - Loop forever
- Else if mode = **send:**
  - Get userlist.txt from the server using **HTTP GET** request
  - Enter a read-evaluate-print loop

2) Communication with the server

- HTTP POST request:
  - Body of the request:
    - REGISTER <username>@<IP>:<Port>
    - Example: REGISTER yarkin@192.168.1.13:54321
  - Should update the file “userlist.txt” in the server
- HTTP GET request:
  - Should retrieve “userlist.txt” from the server
  - Store usernames, IPs and port numbers

A sample «userlist.txt» file

```
bulut@139.179.103.25:58484
yarkin@139.179.103.25:58485
mordecai@139.179.103.25:58486
rigby@139.179.103.25:62501
pops@139.179.103.25:55784
skips@139.179.103.25:55787
benson@139.179.103.25:62970
```

2) Communication with the server

- Don’t forget to check the response codes!
- If response code is not 200 (OK), act accordingly
- Some error cases:
  - Invalid characters in the username (space, “:”, “@”)
  - User already exists
  - Wrong syntax in REGISTER command
  - ...

3) Communication among the clients

- If mode = **listen:**
  - Listen for incoming messages through UDP socket
  - Determine username of the sender
  - Print <username>: <message> (e.g. bulut: hello)
  - Loop back

CORRECTION: «Determining the sender»

- In the assignment it says: «You should use the address information of the received packet to determine the username of the sender.»

CORRECTION: «Determining the sender»

- In the assignment it says: «~~You should use the address information of the received packet to determine the username of the sender~~.»
- Senders are NOT registered in the server, you CANNOT use address information.
- Do something else to get the username of the sender.

3) Communication among the clients

- Else if mode = **send:**
  - Wait for user input
  - Determine the command that user entered
  - Take action according to the command

3) Communication among the clients

- Else if mode = **send:**
  - List of commands:
    - list
    - unicast <username>: “<message>”
    - broadcast “<message>”
    - multicast [<username1>, ..., <usernameN>] “<message>”
    - exit

3) Communication among the clients

- **list ➜** update the userlist (HTTP GET), print the users
- **unicast ➜**
  - update the userlist, then send message to the destination
  - print error message if user is not found (e.g. “user X not found”)
  - print confirmation message if user is found (e.g. “message is sent to X”)
- **broadcast ➜** update the userlist, then send message to everybody

3) Communication among the clients

- **multicast →**
  - update the userlist, then send the message to the specified users
  - print error messages for users that are not found
  - print confirmation messages for users that are found
- **exit →** quit the program

How to Test Your Program

1. Run the BilkentMessageServer to check if it works.
   To check it you can use Advanced REST Client and OpenHttp Requester add-ons for Chrome and Firefox respectively.

2. After you write your program you will open 3 clients and 1 server on your computer. Make sure that you give different usernames for the clients. (Restart the server if there are errors)
   One of the clients should be in “send” mode the other two are “listen” mode

3. You can try to send messages to other users, with commands like unicast, multicast and broadcast.

Example

- Compile BilkentMessageServer.java
- Open 4 command prompts
- Command prompt 1:
  - >> java BilkentMessageServer
- Find the server IP (which is your IP)
  - Hint: type “ipconfig” in the command prompt
  - Let us assume we find the server IP as 192.138.1.34
- Command prompt 2:
  - >> java InstantMessenger rick 192.138.1.34 listen

Example

- Command prompt 3:
  - >> java InstantMessenger jerry 192.138.1.34 listen
- Command prompt 4:
  - >> java InstantMessenger morty 192.138.1.34 send
    >> Users: jerry, rick

Example

- Since morty is sender, rick & jerry are listeners, you can type any command you want in morty’s prompt

- Examples:

>> list
>> Users: jerry, rick
>> unicast jerry “Hello jerry!”
>> Message sent to jerry
>> multicast [jerry, rick] “Hello guys!”
>> Message sent to jerry
>> Message sent to rick
>> broadcast “Hello everybody!”
>> exit

Example

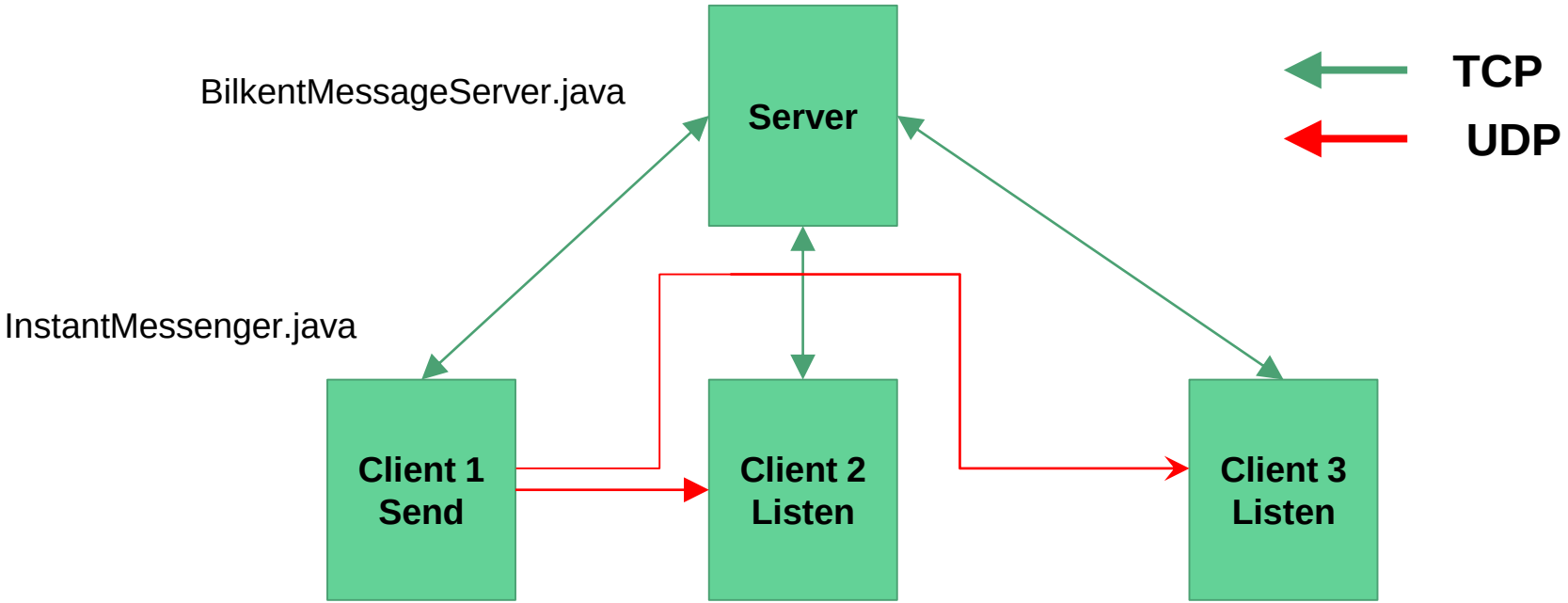
- jerry will see:

  >> morty: Hello jerry!
  >> morty: Hello guys!
  >> morty: Hello everybody!

- rick will see:

  >> morty: Hello guys!
  >> morty: Hello everybody!

Demo Time!


BilkentMessageServer.java
Server
TCP
UDP
InstantMessenger.java
Client 1
Send
Client 2
Listen
Client 3
Listen

Assignment Report

- A complete description of your protocol for peer-to-peer communication between the clients. (How clients understand who sent the message, etc.)
- How can you improve the protocol? List 3 things that would improve this messaging application.
- **30%** of the assignment grade