

BLG433E: Computer Communications

Homework #1

Due Date 01.04.2018, 23:00

In this homework, you are asked to implement a protocol for a simple **message board application (MBA)**. In this application, a **message board server (MBS)** waits on a well-known UDP end-point (i.e., IP address and port number). Each **message board client (MBC)** can register itself to the **MBS**, create new message board(s), get the messages on a message board, and add messages to a message board. **We will test your MBC with our MBS and your MBS with our MBC, so please obey the protocol message formats specified below!** The **MBA** works as follows:

(1) **MBS** starts accepting **MBC** requests on the port defined in the program as **MBS_PORT** (e.g., 12345). Then, **MBS server** prints out the message “**MBS Started**”.

(2) An **MBC** starts with asking a **username** and **password** from the user which are sent to **MBS** for registration. The **MBS** location is defined in the program as **MBS_ADDRESS** (e.g., “localhost” or “127.0.0.1”) and **MBS_PORT**. **MBC** sends registration information in a message which contains following fields separated by colons:

REG USER_NAME PASSWORD

For example, a user with **USER_NAME** “**ayar**” and **PASSWORD** “**BLG433E**” is registered to **MBS** with a message “**REG:ayar:BLG433E**”.

As a response, **MBS** prints out the message “**Registration request arrived from user ayar**”.

(3) The **MBS** confirms registration if either there is no other registration with the same **USER_NAME** (of course, **MBS** creates the user record in that case) or there is already a registration with same **USER_NAME** and **PASSWORD**. **MBS** sends back a message which contains following fields separated by colons:

ACCEPT USER_NAME

In our case, **MBS** confirms registration request of user **ayar** with a message “**ACCEPT:ayar**”.

The **MBS** rejects registration request if the user was already registered with another password. In that case, **MBS** sends back a message which contains following fields separated by colons:

REJECT USER_NAME

In our case, **MBS** can reject the registration request of user **ayar** with a message “**REJECT:ayar**”.

MBS also prints out a message reporting the registration request and the response (e.g., “Successful user registration: ayar” or “Rejected user registration: ayar”).

(4) If the **MBC** gets a **REJECT** response, it prints out an error message reporting unsuccessful registration and exits (e.g., “Rejected user registration: ayar”).

Otherwise (i.e., after successful registration), the **MBC** prints out a message reporting successful registration (e.g., “Successful user registration: ayar”) and waits for new commands from the user.

(5) A user can create a message board on **MBS**. The user supplies the message board name and **MBC** sends the request to **MBS** which contains following fields separated by colons:

CREATE BOARD_NAME

In our case, a "**BLG433E_HW1**" message board can be created with the following message "**CREATE:BLG433E_HW1**".

If a message board with **BOARD_NAME** doesn't exist, then **MBS** confirms creation of message board with a message sent to **MBC** which contains following fields separated by colons:

ACCEPT BOARD_NAME

In our example, **MBS** confirms creation of message board with the following message "**ACCEPT:BLG433E_HW1**". **MBS** also prints out the message "**BLG433E Message Board Was Created!**".

If a message board with **BOARD_NAME** exists, then **MBS** rejects creation of message board with a message sent to **MBC** which contains following fields separated by colons:

REJECT BOARD_NAME

In our example, **MBS** rejects creation of message board with the following message "**REJECT:BLG433E_HW1**". **MBS** also prints out the message "**BLG433E Message Board Couldn't Be Created!**".

(6) A user can get the lists of created message boards from **MBS**. **MBC** sends the request to **MBS** which contains following fields separated by colons:

LIST BOARDS

In our case, list of all message boards can be requested with the following message "**LIST:BOARDS**".

MBS sends the list of message boards to **MBC** with the message which contains following fields separated by colons:

LIST BOARDS BOARD_NAME_1 ... BOARD_NAME_N

In our case, list of all message boards contains only the "**BLG433E_HW1**" message board. Thus, the response message is: "**LIST:BOARDS:BLG433E_HW1**". If there is no message boards, then no message board name is given after the colon as follows: "**LIST:BOARDS:**".

(7) In order to add a message to a message board, **MBC** sends the request to **MBS** which contains following fields separated by colons:

ADD USER_NAME PASSWORD BOARD_NAME MESSAGE_CONTENTS

In our case, user **ayar** can add a message "**It is HW1 of BLG433E**" to the board **BLG433E_HW1** with the following message "**ADD:ayar:BLG433E:BLG433E_HW1:It is HW1 of BLG433E**". You can assume that user messages don't contain colon (:) character.

MBS sends the acceptance notification message (if both username/password and boardname are valid) to **MBC** with the message which contains following fields separated by colons:

ACCEPT USER_NAME BOARD_NAME MESSAGE_CONTENTS

In our case, accept message is as follows **"ACCEPT:ayar:BLG433E_HW1:It is HW1 of BLG433E"**. **MBS** also prints out the message **"ayar added the message "It is HW1 of BLG433E" on BLG433E Message Board!"**.

If **USER_NAME/PASSWORD** and/or **BOARD_NAME** is/are invalid, then reject message contains empty strings on invalid fields. For example:

- If **USER_NAME/PASSWORD (ayar/BLG433E)** is invalid and **BOARD_NAME (BLG433E_HW1)** is valid, then **MBS** sends the message **"REJECT::BLG433E_HW1:It is HW1 of BLG433E"**.
- If **USER_NAME/PASSWORD (ayar/BLG433E)** is valid but **BOARD_NAME (BLG433E_HW1)** is invalid, then **MBS** sends the message **"REJECT:ayar::It is HW1 of BLG433E"**.
- If both the **USER_NAME/PASSWORD (ayar/BLG433E)** and **BOARD_NAME (BLG433E_HW1)** are invalid, then **MBS** sends the message **"REJECT:::It is HW1 of BLG433E"**.

(8) In order to get messages on a message board, **MBC** sends the request to **MBS** which contains following fields separated by colons:

LIST MESSAGES USER_NAME PASSWORD BOARD_NAME

In our case, all message on **BLG433E_HW1** board can be requested with the following message **"LIST:MESSAGES:ayar:BLG433E:BLG433E_HW1"**.

As in (7), if **USER_NAME/PASSWORD** and/or **BOARD_NAME** is/are invalid, then reject message contains empty strings on invalid fields. For example:

- If **USER_NAME/PASSWORD (ayar/BLG433E)** is invalid and **BOARD_NAME (BLG433E_HW1)** is valid, then **MBS** sends the message **"REJECT::BLG433E_HW1:It is HW1 of BLG433E"**.
- If **USER_NAME/PASSWORD (ayar/BLG433E)** is valid but **BOARD_NAME (BLG433E_HW1)** is invalid, then **MBS** sends the message **"REJECT:ayar::It is HW1 of BLG433E"**.
- If both the **USER_NAME/PASSWORD (ayar/BLG433E)** and **BOARD_NAME (BLG433E_HW1)** are invalid, then **MBS** sends the message **"REJECT:::It is HW1 of BLG433E"**.

Otherwise, **MBS** sends the list of messages to **MBC** with a series of UDP datagram messages each of which contains following fields separated by colons:

MESSAGE BOARD_NAME USER_NAME MESSAGE_NUM MESSAGE

To order messages, **MESSAGE_NUM** field is used. Messages are numbered starting from 1 and end of the message list is specified by **MESSAGE_NUM** of -1. **USER_NAME** is the name of the user who added the message to **BOARD_NAME**.

In our case, **MBS** sends list of all messages on **"BLG433E_HW1"** message board with following two messages: **"MESSAGE:BLG433E_HW1:ayar:1:It is HW1 of BLG433E"** and **"MESSAGE:BLG433E_HW1:ayar:-1:"**. **MBC** presents all the messages (except the end-of-messages indicator message!) along with their adders to the user.

You have to submit:

1. The **source files** for **MBS** and **MBC** which are written in **python**. The files must be named as **"student_id_mbs.py"**, **"student_id_mbc.py"** where **student_id** is your student number. Please write your name, surname and student ID at the start of the source file. In addition, don't hesitate to write comments to ease understanding your code.
2. A **PDF report** named as **"student_id.pdf"**. The report must be written in our department's software report format: ["https://portal.cs.itu.edu.tr/tr/ogrenciler/belgeler/kilavuz.pdf/view"](https://portal.cs.itu.edu.tr/tr/ogrenciler/belgeler/kilavuz.pdf/view).