KTH ROYAL INSTITUTE
OF TECHNOLOGY

Socket Programming Project

IK1203

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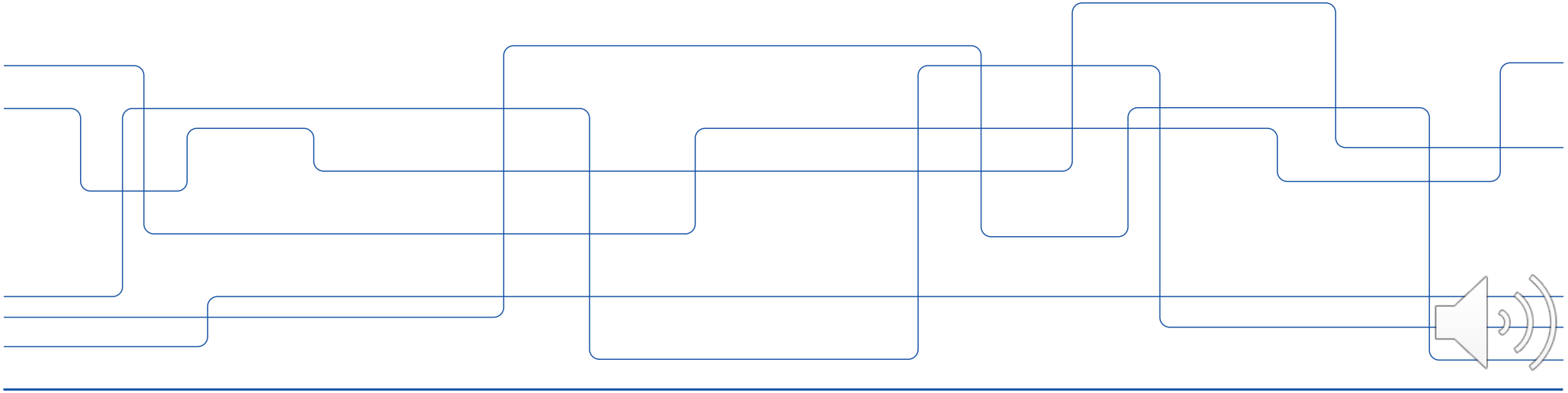


Socket Programming Project

- Learn about
  - > *Socket programming in Java*
  - > *TCP client and server*
  - > *HTTP server*
  - > *Concurrent servers*
  - > *Data encoding and decoding*

Project Organization

- A series of tasks
  - *A task typically involves implementing a client or server in Java*
  - *Tasks build upon each other*
  - Four tasks
  - About a week to complete each task
  - Submit solution in Canvas

Submitting Solutions

- Upload a ZIP archive with your source code
- We use tools to evaluate your solutions
  - *Therefore, you solution must be submitted exactly according to the instruction*
  - *Otherwise it can't be graded, and you fail*
- You get templates with the correct structure from us
  - > *Don't change the structure!*

Supervision

- Supervision sessions in Zoom
- Sign up in Canvas
- Discuss, ask questions, get technical help, …

- You must sign up no later than 18:00 the day before the supervision slot to be guaranteed a seat.
- If there are no students sign up, we reserve the right to cancel the slot.
- If you change your mind, please be respectful and cancel your reservation.

Task 1: TCPAsk

- A client that contacts a TCP server (of any kind), and prints out whatever the server returns

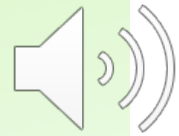
```
$ java TCPAsk time.nist.gov 13
time.nist.gov:13 says:

59253 21-02-08 09:33:40 00 0 0 421.6 UTC(NIST) *
```

- You get the source code to TCPAsk
- But most of the work is done by the class TCPClient
  - Your job is to implement TCPClient

Task 2: HTTPEcho Server

- A server that returns whatever data it receives from the client
- The data is returned as a HTTP response (200 OK)
  - The data from the client is in the body of the response
- For instance, connect to it from your web browser
  - You should see something like this *in your browser*:

```
GET / HTTP/1.1
Host: localhost:8888
Upgrade-Insecure-Requests: 1
Accept: text/html,application/xhtml+xml,application/xml;q=0.9,*/*;q=0.8
User-Agent: Mozilla/5.0 (Macintosh; Intel Mac OS X 10_13_2)
AppleWebKit/604.4.7 (KHTML, like Gecko) Version/11.0.2 Safari/604.4.7
Accept-Language: en-us
Accept-Encoding: gzip, deflate
Connection: keep-alive
```



Task 3: HTTPAsk Server

- An HTTP server that uses your TCPClient class from Task 1
  - "Web-based TCPAsk"
    - > *HTTPAsk is both server and client*
- Browser specifies server hostname and port as "query" data in GET request
- HTTPAsk returns response from server, as body in HTTP response
- In other words:
  - HTTPAsk is a web server, which calls TCPClient
  - Use it as a middleman (proxy) to access other servers
  - See the result in your web browser
    - > *(As long as the servers respond in a format your browser can display)*

```
GET /ask?hostname=time.nist.gov&port=13 HTTP/1.1
```

Task 4: Multi-threaded HTTPAsk Server

- A concurrent server, that can handle many clients at the same time.
  - > *The HTTPAsk server in Task 3 only needs to deal with one client at a time.*

General Instruction

- There are probably many Java libraries that could do this job for you
- See the instructions and examples for what libraries and classes you may use
- If you want to use anything else, you need permission
  - > *Ask on the forum (and expect “no” for an answer)*
  - > *You are here to learn!*

Byte Streams I/O

- It is a requirement that you use byte streams for networking
  - See “Socket Programming” lecture
- In other words, use a socket’s InputStream and OutputStream directly
  - > *Read and write operations*
  - > *As shown in the Socket Programming lecture*
- You **may not** use “wrapper” classes such as:
  - InputStreamReader/OutputStreamWriter
  - BufferedReader/BufferedWriter
  - DataInputStream/DataOutputStream
- Do proper explicit encoding/decoding when needed
  - > *Use UTF-8 for strings*
- (For other I/O, like terminal/keyboard, there are no particular requirements)

Individual Assignment

- You may collaborate, but each student submits his/her own solution
- We will check for duplicates/plagiarism
  - We have tools for this
  - The tools know the common tricks, so don't even think about it…
- Suspected cases of plagiarism will be reported
  - After manual checks
- Do not make your code public on GitHub (or anywhere else)
  - Someone could copy your code, and then you are both in trouble

Evaluation

- Your submission needs to meet a number of requirement

- It should:
  1. *Have the correct format*
  2. *Compile without errors*
     - We don't fix your code, not even simple mistakes
  3. *Pass a number of test scenarios*
  4. *Pass manual code review*

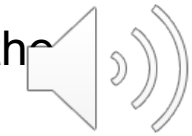
- If you do not pass, you may get a second chance, if:
  - > *You have made a serious attempt*
  - > *You have submitted in time*

Test Scenarios

- We run your programs and do a number of functional tests
- Some tests described in the instructions (but not all)
- Output from tests included in feedback
  - > *Can be terse, and may not always pinpoint the problems exactly*
  - > *Could be of some help in debugging*
- It is part of the challenge to test and debug the code
  - You do the debugging!
  - We do not point out exactly what is wrong

Running the Test

- Once a day, for the last three days before the due date, we will check that your submission is complete and compiles correctly.
  - > *This does not include running the actual test*
  - Two days before the due date, we will make a pre-run of the automated test, and you will receive the output as feedback
    - > *Simpler version of the final tests*
  - After the due date, we will do both automated checks and manual evaluation.
  - In this way, hopefully you will not fail because of simple mistakes in the submission
  - It is also an incentive for you not to wait with the submission until the last minute



Frequently Asked Question 1

- **Question**: Can you run the tests more often?
- **Answer**: No, because:
  - > *The tests are for evaluation and grading, not for debugging*
  - > *It would encourage bad development habits – brute-force trial-and-error*
    - Also known as “whack-a-mole programming”

Frequently Asked Question 2

- **Question**: You say that my submission fails your tests, but it works for me. Could there be something wrong with your tests?
- **Answer**: No. This simply means that there is an error in your submission that you have not been able to find. Try to understand what the test is about, and think of a way of reproducing it yourself.

Good Luck!