



Distributed Systems - Exercise

Exercise sheet 1

The first exercise will target the development of distributed applications using Java New I/O (NIO). Notes and tips regarding the development of a Java NIO application are presented during the introductory talk and can be looked up using the corresponding slides published on the ISIS website.

Exercise 1: Java NIO SMTP Server

Develop an Email-Server using Java NIO, that implements a reduced version of the SMTP¹ protocol. The server shall support the commands HELO, MAIL FROM, RCPT TO, DATA, HELP and, QUIT. Received emails are to be stored efficiently in a file following the naming convention <sender>_<message_id> under the directory <receiver>, where <sender> corresponds to the email address of the sender and <receiver> to the email address of the recipient. The values for <sender> and <receiver> can be extracted from the commands MAIL FROM and RCPT TO. <message_id> is an integer value between 0 and 9999 randomly created by your server implementation. A simple SMTP client created with Java NIO, which can be used to create test mails, is published on the ISIS website. The exercise can be considered as successful, if the server implementation can handle emails generated by the test client.

The implementation has to comply with following technical requirements:

- The server has to be able to deal with multiple emails received concurrently without creating additional threads. You are required to use the selector approach introduced by Java NIO instead.
- All I/O operations regarding the network and file system have to be solved based on the channel abstraction introduced by Java NIO. Usage of the former stream approach is not allowed.
- The SMTP protocol is based on the US-ASCII character set encoding. Consider this requirement within your implementation.

Additional notes and assessment:

- Important parts of the implementation have to be annotated with comments.
- Each exercise has to be completed in teams of 4 students.
- The exercise will be evaluated in a separate appointment (see ISIS announcements). Every group member must be able to present the solution and answer arbitrary questions about the code and principles behind it.

¹ Jonathan B. Postel, RFC 821: Simple Mail Transfer Protocol, August 1982, <https://datatracker.ietf.org/doc/html/rfc821>