

Home Assignment

The home assignment is mandatory for the course. You should select one of our two scenarios to follow:

Scenario 1: Online multi-player Pac-Man game

You should design and implement the server structure and the communication protocol for an online multi-player Pac-Man game. A basic game without networking will be provided for you to work from as well as an interface to TCP and UDP which has been modified in order to simulate the behaviour of a "bad" network (with packet loss and delays).

The assignment can be split into two parts:

1. Design and implement. Draft your design so you agree on how the problem should be solved. Implement using our platform and using whatever tools you prefer. Our platform is available [here](#).
2. Evaluation and experiments. Your design should be tested using different parameters for the network behaviour. Your results should be documented and evaluated.

Rules:

- You are not allowed to use any application layer protocol off the shelf. You should design the application layer protocol.
- The players can be anywhere in the world. Significant delays as well as lost packets will occur. Your task is to make the game as playable as possible.
- All application layer packets should be documented in your report.
- It should be possible to serve new users as these arrive.
- You may use a client-server or peer-to-peer solution as you see fit. Motivate your choice and evaluate it in the evaluation stage.
- If a user-server connection is closed down, or suddenly interrupted, how is this handled?
- When do you use TCP and UDP on the transport layer? State this for all application layer packets sent.
- Don't overdo the report. 10 pages maximum (a bit more if you use many figures and screen shots). Write well rather than long.

Scenario 2: Design of a new global communication network

You and your group have been selected by IRTF (Internet Research Task Force) to make a proposal for a completely new network infrastructure to possibly replace the current version of Internet.

You have completely free hands. However you have to convince the networking community that you have taken at least the following factors into account:

- Current and expected future services and traffic levels.
- Security and integrity.
- Scalability and deployment issues.

- Level of centralized/decentralized control.
- Possibility for companies to compete in delivering network equipment and services.
- Hardware component issues and reliance on future development.

The report should further contain:

- Detailed proposal on construction, component requirements, protocols, network architecture, data formats. Reasons why your proposal is better or superior to current Internet including foreseeable developments of the current state-of-art, and possibly a new name for your network.
- Add a section "Overview of proposals for next-generation Internet" that is based on literature/web search of papers in the field. The section should be limited, one to three A4 pages and should contain at least two "in-depth" citations. These citations should not be to the course books. A starting point could be Wikipedia on Future Internet.
- 15 pages maximum.

General instructions (for both scenarios)

1. First, find some partners. You work in **groups of 4 persons**.
2. Not later than **November 16**: Contacting the corresponding supervisor with the names of the group members. Scenario 1: [Ingemar](#); Scenario 2: [Guilherme](#)
3. Study the problem and plan your solution. For scenario 1, start implementation as soon as possible!
4. Checkpoint, not later than **November 27**.
Scenario 1: **Report your progress** to your supervisor. What is the plan? How much of the implementation is working?
Scenario 2: **Send an outline of the report, marked with your group number, by mail to your supervisor** as a pdf file attachment. The purpose of the outline is to show that you have started to work with the assignment and has some initial plan. Your supervisor will get back to you as soon as possible with an OK or comments about things to take into consideration. You may book a shorter meeting with your supervisor for further discussion.
5. Produce results described in the Scenarios above.
6. Each student gets 1,5 ECTS credits for the home assignment, which is equivalent to at least one week full time work. This means that for a group of 4 students, **the contents and the quality of your results should reflect the work of four persons during at least one week of full-time work, which is equivalent to one person's work during at least four weeks**.
7. The target audience for the report are M Sc. students similar to yourselves with understanding of networks, but with no previous knowledge about your particular subject!
8. The sources of information that you have used must be clearly given as references!
9. If some text is copied/cited it must be within quotation marks and attached with a proper reference to the original material. Use citations sparingly! The major part of your report must be in your own wording.
10. Abbreviations and acronyms should be explained when first used or tabulated in the introduction of the report.
11. Not later than **December 14**:
 - Submit the report electronically as PDF files.
 - For scenario 1, also include source-code.

- Files for Scenario 1, PacMan, report and source-code, are [mailed to Ingemar](#), and for Scenario 2, [report to Guilherme](#).

The result will be graded **P=Pass**, **C=Complement** or **F=Fail**. The graded report will be handed back to you on **December 18** at the latest.

If you need to complement your results, the complemented material must be handed in not later than **January 20**. You are allowed to book a short meeting with your supervisor until December 19, if you have some questions regarding improvement of the report. The graded reports will be handed back to you on **January 31**.

Only two hand-in occasions are offered. Projects not passed the second time will be graded as fail.

A group will fail if it does not work and write the report according to the above instructions.

If parts of the text has been plagiarized from other sources, the report will be graded as fail, and the disciplinary board will be informed.