

The purpose of this document is to give you an overview regarding the project work of HPCSA.

Project Overview

In order to obtain the credits, you will work on a student project in relation to a topic available for this course. This project will commonly involve the evaluation of a tool used in HPC system administration. You will be assigned an expert supervisor who can guide and help you - make good use of her/him.

Have a look at the list of topics on the course webpage (¹) and contact us with the topic of your choosing. We will then match you with a supervisor. The supervisor will know that you are assigned to them, but it is your responsibility to contact them.

You will then work practically on a project related to your topic during the semester, becoming more knowledgeable regarding this topic. A topic might be e.g., evaluating tool(s) used in the space of the topic together with theoretic understanding. Your project might involve evaluating a tool but might as well also be focused on using or expanding it. You are expected to do some research into what the tool is and its common usage. Furthermore, you should set up the tool and experiment with it, what it can do and what it cannot, as well as, what its strength and shortcomings are. This should cover both functionality and usability. Depending on the topic and tool you will be able to utilize the GWDG HPC cluster, or you will have to work with your own hardware (e.g. VirtualBox) as we cannot give you root access to the cluster.

At the end of February (20-24.02.23) there will be a 5 day block course (9:00-18:00) during which additional lectures and exercises, similar to the two block sessions on the 26.10.23 and 02.11.23, will take place. As part of the block course you will present the results of your project in a 15-20 min presentation.

Finally, at the end of the semester (31.03.23), you will hand in a report about your project with up to 15 pages of text in the main parts (not counting preamble and appendix). The report should be long enough to cover your project in sufficient detail. Your grade for the course will only depend on the report. In order to hand in your report, send it, along with your presentation, via email to jonathan.decker@uni-goettingen.de. Also state in the email whether you agree to the report and presentation being published on our webpage.

The successful participation in the project will be awarded with the university's credits consists of the following stages and rough schedule:

1. Block session: You completed the block sessions (26.10.2022, 02.11.2022).
2. Decide on a topic¹ and send it to us.
3. Assignment of supervisor: We will assign a supervisor per student.
4. Contact your supervisor to discuss potential projects and create a work plan.
5. Literature review: Investigate your topic.
6. Check relevant software tools and start experimenting with them. Try to explore them before starting a more systematic analysis.
7. Work on your project during the semester and stay in contact with your supervisor (you can set up regular, e.g., bi-weekly meetings).
8. Prepare a presentation of your results and give it during the block course 20-24.02.23 - if you want to

¹https://hps.vi4io.org/teaching/autumn_term_2022/hpcsa#topics_for_practical_works

give a later presentation (at the end of term), let us know.

9. Preparation of the report: Summarize your project, goals, approach, results, challenges, and the evaluation. Discuss with the supervisor as needed.
10. Submission of the report (until the last day of the term). The report accounts for 100% of the grade. If you have produced source code during your project, submit it along with your report. Optimally, the source code and your results (e.g. measurements) should be in a Gitlab or Github repository.

Details about the content of presentation and report are described further down in the document.

Estimated by 30 hours per credit point, the amount of hours to be spend on the project are estimated as follows:

Credits	Block course	Supervisor interactions	Project Work	Prep talk	Block Sessions	Prep report
5	40	4	72	16	8	20
6	40	6	80	16	8	30
9	40	10	156	16	8	40

This is just a suggestion for your project plan to show how the available time can be distributed.

Task 1: Project Work

You should discuss with your supervisor what kind of project you would like to work on. Depending on the topic your work might involve almost exclusively coding or even no coding at all. You must run the software (tools) you and your supervisor agreed on either on the SCC or on your own hardware.

Investigate the topic and tool. What is the tool? What is its intended use-case? What is its history? What features does it have? How is it deployed? Who uses it? And so on.

Set up your tool and experiment with it. Try starting by simply exploring the tool before investigating it more systematically. You can, for example, think of use-cases and attempt applying it to them. If possible you can also stress test the tool.

Make sure to document your work so you can use it to write your report.

Hints

- Your SSH keys for the SCC will be valid for the entire duration of the course and can be used for your project as necessary.
- When working on a remote machine, we recommend using a tool such as SSHFS to mount the code remotely. This way you can use any IDE or editor on your local machine while you edit data on the cluster directly. Some IDEs/editors are also able to copy files to a remote machine.
- Please host the code you produce on the GWDG Gitlab CE instance² such that your supervisor can inspect your code. You may also include your presentation and report in a Git Repository or even the same as your code.

Task 2: Presentation

The presentation should take 15 to 20 minutes and cover your topic sufficiently. The target audience for the presentation are your fellow students, so it should cover your topic in enough detail to get an overview. It

²<https://gitlab-ce.gwdg.de/>

should at least cover:

- Motivate your topic
- Provide some theoretic background
- Describe the software

You are free to use any software you want to prepare your presentation. However, we suggest you use LaTeX. The GWDG provides a LaTeX environment *ShareLaTeX* that can be used by all students³. Furthermore, you can find presentation and report templates on our webpage⁴.

Task 3: Report

The report should be at most 15 pages without preamble and appendix so from introduction until including conclusion. The report will account for 100% of your grade. You have to submit your source code, if you produced any, along with your report. Optimally, the source code and any result (e.g. performance measurement, install scripts) should be in a Gitlab or Github repository.

You should structure your report along the sample outline provided below. The report must be submitted in PDF format.

3.1 Report Outline

This is a template with an outline for a final project report. Depending on the project you worked on, this template might not be fully applicable. Adapt it as you see fit.

1. Abstract

- Short description of the topic
- The goals of your project
- What you did
- Brief description of what you achieved/discovered

2. Introduction

- Brief description of your topic and goal
- Objectives and motivations for your project
- Brief description of your approach
- Quick summary of your most significant outcomes and their interpretations
- Organization of the report (Outline)

3. Background

- Introduce your topic
- What is its history
- What is it commonly used for
- What is its state, is it still in development, is it stable

³<https://sharelatex.gwdg.de>

⁴<https://hps.vi4io.org/teaching/ressources/start#templates>

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- Who uses it
 - What else is interesting about it

4. Methodology

- Problem statement, what do you want to achieve?
- Solution approach
- How do you plan to set up your software
- What work do you want to do with it
- What is your expected outcome
- How do you plan to evaluate/extend the software
- Include figures

5. Implementation (if relevant)

- Discuss key implementation details of your solution
- Include relevant excerpts from your source code
- Is your code able to satisfy all functional requirements

6. Evaluation/Results

- What were your expectations
- Did the software meet your expectations (if not how)
- What was unexpected
- What were you able to do with the software
- How does it relate to alternative options, e.g., similar software
- What is the software now able to do thanks to your work
- Did you perform any measurements
- What significant observations did you make
- Include figures and tables

7. Challenges / Discussion

- Mention the issues and challenges you faced and how you overcame them or if they are actually remaining (you cannot do everything)
- What would you have done differently

8. Conclusion

- Summarize what your topic is
- Include your most important findings
- Was your project successful
- What did you learn
- What did you achieve

9. Appendix

- Long code snippets
- Additional screenshots/graphs
- Bibliography

Make sure that you cite any external resource used and also indicate the sources for any figure used as this is good practice. Note that we will use software for detecting plagiarism.

We strongly suggest that you use LaTeX to work on your report but won't enforce it as long as you submit your report in PDF format. The GWDG provides a LaTeX environment *ShareLaTeX* that can be used by all students <https://sharelatex.gwdg.de>. Further, you can find presentation and report templates on our webpage⁵.

⁵<https://hps.vi4io.org/teaching/ressources/start#templates>