Software Engineering Project "Bugfind"
Final Report

Project group

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Final Report

UNIVERSITY OF HELSINKI

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- v0.1, 25.3.2001 (first draft)
- v0.2, 6.4.2001 (some ideas for the content)
- v1.0, 9.4.2001 (finalizing done)

Contents

1 General final report

Our software engineering project, *Bugfind*, ended up being a success or partial success; this depends on the viewpoint. If one thinks about it as a strict course project in a classical software engineering, then one could say that it is a big success. On the other hand, if one looks into it from the point of the software's functionality, then one can certainly find some problems, thus validating the claim of "partial success". However, under any reasonable expectations, one cannot say that our project has failed.

The project started with no one really knowing what we were supposed to do. This created a bit of pressure for the preliminary planning phase, and the initial project plan had to be done quickly. As one can see from the project plan, we chose the classical waterfall model for the project model. Thinking about it now, it wasn't the most suitable model for this project. In fact, we used a "simplified prototype model" in practice; however, the project schedule and the documentation sequence followed the original waterfall model. Reason for using the prototype is simple: we had no experience about the subject, so we had to try our ideas in practice in the design phase; most of the ideas turned out to be working and then the first prototype, which just "glued" the preliminary module versions together, was quite easy to produce. This nasty thing could have been prevented by choosing the prototype model (or something like it) in the first place, but for the reasons mentioned it wasn't that easy to decide back then.

The cluster where we implemented the software had another, rather irritating, problem: one graduate student from the Helsinki University of Technology kept running his motion-planning software now and then, taking practically all the CPU time and memory for himself. Despite our several requests for the customer to keep him away from the machines we required, he was still hanging around with his processes. Now this clearly affected our testing procedures, especially with the distribution scheme and benchmarking; thus even now we're not exactly sure how well our distribution scheme performs in practice.

One more problem was the lack of a good real-world input data. We requested this kind of data several weeks before the actual testing was supposed to be taking place, but we didn't manage to get anything until very late in the testing phase. So the testing with the expected input was severely limited, and we didn't have enough time to make the necessary changes to the design or even try our ideas whether they would work to fix the problems encountered. Fortunately we did get some ideas how to improve the situation in hand and wrote them down into the maintenance document's To-do list.

Despite of this, we think that we managed to produce a working design (at least in theory), a working implementation and lots of documents in the given time. Of course the program is still uncompleted in the sense that it doesn't give results as good as expected with the real-world data and it's widely unoptimized. However, many improvements are listed in the maintenance document's To-do list, which probably would dramatically increase the efficiency of Bugfind, if implemented.

2 Project timing

The schedule for the project was excellent, considering that we didn't, frankly, have any clue about the software's true complexity and therefore couldn't make very comprehensive and accurate schedules. The only thing we knew was that we should really spend most of the time with the requirements specification and design, due to our lack in the background information. However, the software design is critical and strongly emphasized in software engineering anyway, so there wasn't any big compromises to be made.

Considering the fact that we were able to finish the project one week before the scheduled deadline and finished almost all of the phases in the reserved time shows that the schedule was realistic and working. Most of the problems we faced were due to reasons independent from us, as stated above, and not because of too tight schedules.

3 Personal comments

3.1 Perttu Haimi

I took the project because of biological connection. I learned some stuff, not so much from biology, but bits and pieces that may turn out to be useful later. I met some interesting people.

3.2 Petteri Hintsanen

Before the project I had, frankly, no interest to software engineering due to my bad experiences with the subject. This project seemed to be the most interesting from the options available back then, especially because it was mainly dealing with a classical number-oriented computer science.

The project itself was *very* educating: I learned that with the right people the software engineering *is* really rocking and even nice. For the first time I was working with people who knew theoretical basis of software engineering and knew the tools in hand as well. The result was a solid desing, a working piece and a project finishing a week before deadline. Can't even imagine that in the commercial world where I had been.

3.3 Philipp Masche

I chose this project, because it seemed the most interesting and because it has a biolocical context.

The aspect of language and beeing the only foreigner in the team turned out to be no problem at all. I think we managed to communcate in fo reverybody a foreign language without to much additional effort. Fo rme it is the first time, that I programmed a larger program in C, using makefiles etc. was new for me. Therefore I gained a lot of experience in that area too, because other team members are quite skilled in that. In the beginning I was a little unsure, if it is good to be the chairman, but it turned out, that I could add my skills in moderating meetings etc. In the whole I think, we were a good mix of different persons with a big range of skills and aproaches to problems.

3.4 Toni Ruokolainen

I chose this project mainly because of three reasons: first, there was some distribution involved in this project and second, I've always been interested in biology (haven't studied it since lukio, but anyway). Third reason was that it sounded like a *real* project dealing with a *real* problem (and an interesting one too).

The project itself was very interesting went pretty well. All that documentation stuff sometimes feeled like pain in the.. erm.. whatever, but it was the first time I was ever involved in a real software engineering project with a strict outline. And the experience was quite nice actually, because after thinking about the problem and solving those before doing any code (well not quite) we had not so big problems while implementing our code. The team was very nice too, because everybody did their work and we had enough technical and theoretical knowlegde behind them. At start it was a bit difficult to start-up my english-speaking-skills again, but after a couple of meetings it was no problem anymore. The only thing I was disappointed was my personal contribution for the project, but partly I can blame on Scientific Writing course and some responsibilities for work I had (or maybe these are just excuses for my laziness..).

3.5 Osku Salerma

I made this project my first choice because it seemed the most challenging of the projects available, and I was interested in learning distributed programming. Of course, the project description also said that we would we using OpenGL etc, and that sounded interesting too, but in the end there was plenty to do even without graphical user interface programming.

The project went pretty smoothly, I think. We were able to dive right in to the design phase, work out an initial design, prototype it, and it turned out to work ok. Everybody did something, no one had reason to complain "I did everything and you guys did nothing!", so it was a nice experience. In the end phase, we had too grandiose plans "Let's do this and that before the end too!", then nobody got around to doing them, and we just finished the documents and called it done. So in hindsight, if we had buckled down, we could have finished the project couple of weeks earlier.

4 Minutes

4.1 Meeting of 22.1.2001

Pöytäkirja
Project-group BUGFIND
22.10.2001, 10-12h
Present: Osku, Perttu, Peter, Petteri, Philipp, Toni

- Our customer gives us a wide overview of the biological context and some details of our project.
- General reponsibilities within the project-group:
- Project-web-pages, Perttu
- System-operator for the cluster, Osku
- Checking out about MPI, Toni
- Taking care for the project-plan and preparing a draft of the project-plan until wednesday, Petteri
- Chairman and meeting-protocols, Philipp

Next meeting wednesday 12-14h

4.2 Meeting of 24.1.2001

Pöytäkirja
24.10.2001, 12-14h
Present: Osku, Perttu, Peter, Petteri, Philipp, Toni

1. Review to the given tasks of last meeting:
   - Projectplan see below
   - MPI, MPIch Toni will propably spent more time in it at the weekend. Further he will try to create a kind of "Hello World!"-program using MPI.
   - Webpages: there are now some simple but convincing webpages at www.cs.helsinki/group/bugfind
2. Language of the documentations: Pete will check, in which language different documents have to be.
3. Project-Plan Following the draft of Petteri, some detailed work is still to be done for finishing the project-plan. Everybody should try to finish his part until monday, so that the final version of the project-plan can be finished by wednesday 31.01.

   The tasks are divided as follows:
   - general stuff, Petteri
   - size-approximation (LOCS), Philipp
   - reasons why we choose the waterfall-model, Petteri
   - schedule , Perttu & Osku
     - project-plan ready next week
     - 2 weeks requirements
     - 6 weeks for design
     - 4 weeks for implementation
     - 2 weeks for testing
     - 1 week final works
   - Milestones: completiondays for varios specifications, Perttu & Osku
   - dividing the tasks, Philipp
   - Risk analysis, Petteri
   - dividing the tasks, Philipp
   - Risk analysis, Petteri
4. Other stuff

Toni is creating a first version of a requirement-paper
For the task-dividing, Osku and Toni take distribution, Petteri algorithms.
Next meeting is monday (29.01.) 9h at rautatieasema, east-entrance.

4.3 Meeting of 31.1.2001

Pöytäkirja
31.1.2001, 12-14h
Present: Osku, Perttu, Peter, Petteri, Philipp, Toni

1. Projectplan

   The projectplan is now finished. The schedule could be more detailed, we have to update it eventually. Everybody reads the pp.

2. Language of documentation

   Except the projectplan, which is now in finnish, all further documents will be written in english language.

3. Requirement-Specification-Paper

   A first raw version of the Software-Requirements-Specification has been prepared by Toni. Some detailed work is still to do:

   - Chapter 2: Something about Parallel computing. Toni
   - Chapter 3: Toni
   - Chapter 4: A Graph of the "big picture", where our project fits in. Toni
   - Chapter 5: 5.1 checking out something about the 3D-model and the micrograph. Pertu 5.2 A raw data-flow and control-flow diagram considering the facts we allready now. Toni
   - Chapter 6: 6.1-6.3 postponed, allready kind of design-work 6.4 & 6.5 Petteri
   - Chapter 7: Philipp
   - Chapter 8: Some performance-calculations, usability (number of involved nodes etc.) user-made errors, programming-style-paper. Osku
   - Chapter 9: bottom-up module-testing, testpictures etc. Philipp
   - Chapter 10: 10.3 Some guesses. Osku

   The tasks described above should be finished until next week wednesday 7.2.

4. Distribution Next aim is to get a test-program, which transfers lot of data between nodes.

5. Miscellaneous Peter gets us somehow a mailinglist. Osku is now responsible to make each week a backup of the cvs-folder etc.

Next meeting is monday, 5.2.

4.4 Meeting of 5.2.2001

Pöytäkirja
5.2.2001, 10-12h
Present: Osku, Perttu, Peter, Petteri, Philipp, Toni

1. Comparison

   Perttu found a paper about a histogram-pattern-search. This opened the question, how we are going to solve the comparison between the projection and the image. We will discuss the topic during our next meeting.

2. specification-paper chapter 6

   - 6.1 Picture and a description of all matches
   - 6.2.1 some easy text
   - 6.2.2 using old source
   - 6.2.3 using old source
   - 6.2.4 will be erased
   - 6.2.5 collecting results and processing output-data
   - 6.3.1 transfering image and the 3D-model to each node, divide the projection-raster
   - 6.3.2 gathering the results, when they are available
   - 6.4 using old source (we should review this section later again)
   - 6.5 we have still to work at this section

   Osku adds the changes in section 6.3, Philipp adds the changes in the other sections until wednesday (7.2.)

3. specification-paper other chapters

   - 7.1 as input-parameters is only used the name of the config-file.
   - 7.2 description of configuration-file this week from Peter
   - 7.3 description of output-parameters this week from Peter

Next meeting is wednesday, 7.2.

4.5 Meeting of 7.2.2001

Pöytäkirja
7.2.2001, 12-14h
Present: Osku, Perttu, Peter, Petteri, Philipp, Toni (late), Teemu Kivioja

1. Comparison/Matching

   Teemu gave us a longer presentation about the possibilities to find the 'interesting' areas in the picture by using a gaussian-filter. He will give us some good links about this topic, if needed.

2. Requirement-Specification-Paper

   After almost all work on the plan as agreed last week is done, we can start now with the finalization of the paper. The aim is, to do all changes until next monday (12.2.) and doing then a formal review.

   Osku will add the steps of the customer-specification-paper to section 6.5. Petteri will complete the section 6.4

   The output-format should be like:

   ```
   POSX=1234\n
      Y=5678\n
   ANGTHETA=34.567\n
   ANGBETA=22.33\n

   etc.
   ```

   as record-separator should be used '%'.

   As input-parameters for the config-file: image, model, diameter,...
   but as few parameters as possible.

Next meeting is monday, 12.2.

4.6 Meeting of 12.2.2001

Pöytäkirja
12.2.2001, 10-12h
Present: Osku, Perttu, Peter, Petteri, Philipp
Apologized absence: Toni

1. Requirement-Specification-Paper

   All troubles with CVS seem to be solved, nothing of the paper got lost really. Perttu (?) will ask our customer, if the input/output-specification is acceptable as it is, the paper seems ready for the formal review. Next week friday it will be frozen.

2. Pictures and Projections

   Perttu and Petteri have had already some success with trying to use the old source-code, it seems the projection works pretty well. From now we collect any relevant image-data in the directory /home/bugfind/data/ or self-describing subdirectories.

3. Code

It seems the old source-code suffers a kind of overkill in its whole structure, which we should somehow reduce before we reuse it so we have not such a mess at least in the beginning of the coding-work.

As Peter recommends, we should comment at least a little more the main ideas in the code as his group has done. Obvious things shouldn't be commented of course.

4. Distribution

   It seems that the package-limitation for the MPIch we use is ca. 64MB data. So we have to split any bigger data, which makes live not easier.

5. Formal Review

   Next meeting is monday, 14.2. This meeting will be the formal-review-meeting for the requirement-specification-paper. Everybody reads the actual version of this paper before the meeting. Concerning the instructions for the Software-Engineering-Project, Peter (our instructor) has to be the chairmen, Philipp will be the secretary, Perttu will be the presenter which leaves open, who is the expert.

4.7 Meeting of 14.2.2001

Pöytäkirja
14.2.2001, 12-14h
Present: Osku, Perttu, Peter, Petteri, Philipp, Toni

1. Requirement-Specification-Paper

   After the formal review was canceled, we did a thoroughly review anyways. The data-flow and the control-flow images will be updated by Toni, all the other changes will be done by Petteri.

4.8 Meeting of 19.2.2001

Pöytäkirja
19.2.2001, 10-12h
Present: Osku, Perttu, Peter, Petteri, Philipp, Toni

1. Requirement-Specification-Paper

   Except the bibliography the paper is now supposed to be ready. The bibliography will be added soon.

2. Design-Paper

   A sceletton of the paper will be prepared by Toni till wednesday.

We will try to have soon (2 weeks) something like a prototype. The known subtasks are divided as follows:

- configuration-file: Osku
- projection: Petteri
- gaussian-filtering: Philipp
- findmax:?
- scaling:?
- rotation:?
- comparison: Toni
- distribution: Osku
- reading image-file and model: Perttu
- generating some test-pics: Perttu

The directory-structure of the cvs/scr/ is:

test/. all testing in explaining-named subdirectories.
bugfind/. only the Makefile
src/. the source of the actual version
tools/. testing tools
include/. header-files

3. Miscellaneous

an additional configuration file parameter will be

PARTICLESIZE=n n is the suspected size of the searched particles

Peter suggested, that because probably soon the scanners will be able to produce 16Bit-images, we should code open to upgrades. That means at all occurences of 'unsigned char' in the code we should use the 'typdef unsigned char uchar' and if we refere in e.g. arrays to the x-st field, we should address like a [x * sizeof(uchar)].

Perttu suggested, that we should use a special memory-allocation instead of malloc.

About these topics we have to talk again.

4.9 Meeting of 21.2.2001

Pöytäkirja
21.2.2001, 12-14h
Present: Osku, Perttu, Peter, Petteri, Philipp, Toni

1. Requirement-Specification-Paper

   The requirement-specification-paper is now official frozen and finished.

2. Programming-details

   The discussion how to allocate memory has still not ended, for now we use Osku's wrapper. After the model (see last pöytäkirja) we try tro create a first running program which basically does the things which are already coded. The specification of the main functions will be added by Osku to the CVS and should be used as far as possible.

4.10 Meeting of 26.2.2001

Pöytäkirja
26.2.2001, 10-12h
Present: Osku, Perttu, Peter, Petteri, Philipp, Toni

1. Testimages and model

   Perttu gave us an impressing overview of the testpictures he generated (rod, mickey ...). The can be filled with different kind of noise etc.

2. Correlation

   Toni found out, that a normal correlation doesn't work so fine with noisy images. He will ask Teemu for further suggestions.

3. findmax

   Testing how filtering and findmax will work with gimp seemed promising.

4. Desing-paper

   Everybody adds his part he did so far in the prototype to the paper.

5. Webpage

   The minutes should be replaced now to a subpage.

4.11 Meeting of 28.2.2001

Pöytäkirja
28.2.2001, 12-14h
Present: Osku, Perttu, Peter, Petteri, Philipp, Toni

1. Further configuration-parameters

DENSITY=n gives the density of the projection-grid, n^3 projections will be done

SEARCHRADIUS=n sets the squaresize of the candidate-centrepoints for the correlation around the resulting coordinates from findmax.

THRESHOLD=f f is a float. defines the maximal correlation-threshold for a particle-match.

marks a line as comment
These configuration-parameters will be added later to the specification.

2. Correlation

   According to Teemu, there seems to be no other appropriate way for comparing image and projection. Petteri will take over the correlation.

3. testimages etc.

   Perttu will ask from Janne some real-life-testimages.

   We need a tool to cut out particle-images from the micrograph. Perttu will generate this tool.

   Osku will include a status-display in the prototype for time-intensive functions. Perhaps we can also expect a e.t.a?

4. Design paper

   Since we have around 4 weeks left to finish the design-paper, everybody should add to the CVS, what he has coded/extracted.

4.12 Meeting of 7.3.2001

Pöytäkirja
7.3.2001, 12-14h
Present: Osku, Perttu, Peter, Petteri, Philipp
Absent: Toni

1. Requirement-Specification-Paper

   Perttu did some superficial changes, which cannot be seen as changing a frozen paper, like font-size etc.

   But some of Jannes suggestions are still not done.

   Petteri will take care of the changes which have to be done now as official changes which are documented in the doc of changes etc.

2. First running bugfind

   Except scaling and the result-return are all parts somehow included.

The distribution is not working as we wanted, instead each slave-node figures out itself, which projections are its tasks.

3. Fault tolerance

   This can be added later, if there is then still time ...

4. Testing

   1-node-testing is not possible, because the master-node does not take part in the projection, correlation etc. 2-nodes-testings will be done. Further should for testing a 'quality-image' be proceeded, which contains at each pixel the correlation-quality.

5. Task division

   Perttu generates test-images of small size (2MB)

   Petteri defines, how we write pseudo-code in our design-doc and creates a nice table for section 1.4 in the design-doc.

   Toni should document his modules in the design-doc.

   Further tasks are the preparations (scelettons) of other doc-papers like the test-doc, manual, final-doc, thinking about which of our modules are testable with a test-case-engine and which not.

6. Some things everybody should note

   Instead of assert we use if (blabla) panic(); which can be found in misc.c

   Everybody should commit directly after work and not days later and also update before work and not days before!

4.13 Meeting of 12.3.2001

Pöytäkirja
12.3.2001, 10-12h
Present: Osku, Perttu, Peter, Petteri, Philipp, Toni

1. Time-schedule

   There are only 2 weeks left to finish the design-paper. Our priority is set on this work now.

2. Programming

   Malfunctions are probably in the comparison and findmax. There are some "FIXME"'s in the code to solv ...

   The open tasks are devided as follows:

- Scaling, Petteri
- Visualisation of the results in an image, Perttu
- Fixing the malfunctions in findmax and comparison, Toni
- New distribution approach, Osku

3. Design Specification

   There are still a lot of holes in the paper, the tasl of filling them is divided as follows:

   - Chpt. 3, Section 5.1, Philipp
   - Sections 2.4, 5.2.7, 5.7, 6.2.7, Petteri
   - Sections 5.4, 5.9 Toni

   Would be great, if this work is done until next meeting on wednesday, 14.3.

4. Formal review

   Wednesday we decide, which part of the design-spec we pick for a formal technical review, and when we will do this. So we can invite Juha Taina this time in time.

5. Laitospäivä

   We will decide later, if we have rescources left to present our project-group at this event, which happens at the 6th of april.

4.14 Meeting of 14.3.2001

Pöytäkirja
14.3.2001, 12-10h
Present: Osku, Perttu, Peter, Petteri, Philipp, Toni

1. Programming

   The gaussian does not work as expected, scaling is still not implemented.

   Philipp and Perttu try to make our gaussian working, Toni tries to grab the gaussian from the gimp. Petteri implements scaling Osku changes the distribution, so that slow nodes get less work

2. Design Specification Paper

   Only scaling is missing, since we have stil no odea how to implement it. We try to have the formal technical review at monday, the 26th of march, Philipp asks Juha Taina. We would like to do the review with the chapters 2 and 3. Next week monday we will do a total workthrough to eliminate mistakes and inconsistencies. Next week wednesday we will have the paper in a finished state, so we can give it to Juha Taina and Janne to read it.

3. Laitospäivä

   Since we have no choice but have to present our project at the laitospäivä, we will plan this at wednesday, the 28.3.

4.15 Meeting of 19.3.2001

Pöytäkirja
19.3.2001, 12-10h
Present: Osku, Perttu, Peter, Petteri, Philipp, Toni

1. Programming

   We have decided as group, that we will use the Gaussian, we took from the Gimp. The Scaling module Petteri wrote is not perfect but for our problem sufficient.

2. Design Specification Paper

   For finalizing the paper, the following tasks are given:

   - Osku: Text in 2.2 & 2.3, module description of main and config
   - Perttu: module description of file. Petteri: remove from 3.2.2 zero-writing in create image, module description of scaling, new section about SE-principles in our team, finalizing the pseudo code.
   - Philipp: all the other changes discussed in the meeting.
   - Toni: module description of the Gaussian filter.

4.16 Meeting of 21.3.2001

Pöytäkirja
21.3.2001, 12-14h
Present: Osku, Perttu, Peter, Petteri, Philipp, Toni

1. Design specification paper

   The only things missing are the Gaussian, Config and Main module description.

   Philipp will give today the actual version to Janne and Juha Taina.

2. Formal Technical Review

   The Formal Technical Review will happen at next monday in the meeting from 10-12h. Petteri will be the secretary and Chairman. Everybody else prepares himself to have questions and answers for the sections 2 and 3.

4.17 Meeting of 28.3.2001

Pöytäkirja
28.3.2001, 12-14h
Present: Perttu, Peter, Petteri, Philipp, Toni
Apologized absence: Osku

1. Design specification paper

   The paper is now in the state, that we can freez it, except som very small changes, Petteri will do.

2. Laitoskarnevaali

   The event at fryday, the 6.4. will start at 11h and end at 15h. Philipp will create a sheet which presents the Software-Engineering of our work. Petteri will create a nice, coloured logo and also a presentation of the images. Toni will create a sheet which gives an idea of the scientific context, in which bugfind is placed.

   The tasks should be done until next monday, so we can discuss and change them, if necessary.

3. Testingplan

   We still don't know, if there are suitable testing tools, which we can use for the module-testing of bugfind. Candidates are dejagnu and gregg. Petteri tries to find out, if they are of any use. Toni will start to think about a perl-testing tool.

   Everybody should start to think about testcases for the different modules and add them to the testingplan doc.

4.18 Meeting of 2.4.2001

Pöytäkirja
2.4.2001, 10-12h
Present: Osku, Perttu, Peter, Petteri, Philipp, Toni

1. Testing Plan
   Each test case consists of

   - Description
   - (tested module)
   - list of input parameters
   - optimal result
   - comparison
   - auto test/manual test

For the module-tests we have gathered the following ideas, which should be more specified by the person mentioned for each module:

Config: (Philipp)

- Wrong data
- non-existing file
- wrong numeric params
- float / int
- empty value
- unknown option
- duplicate values

Misc: (Philipp)

- memory allocation
- panic

File: (Perttu)

- Wrong data
- non-existing file
- loading routines
- loading-saving-loading
- loading files from oxxxge (?) sources (couldn't read that)

Gaussian: (Perttu)

- comparison with other programs
- one point test
- border test
- fourier spectrum
- radius ¿ image
- negative radius
- null-radius

Projection: (Petteri)

- clipping

Interpolation: (Petteri)

- comparison with other programs
- negative pixel values
- too big coordinates

Scaling: (Petteri)

- Comparison with other programs
- destination size ≤ 0
- downscale and then upscale image and compare with original

Rotation: (Petteri)

- 2PI rotation
- alpha-minus-alpha rotation
- trivial images, like lines, circle etc.
- null images
- 3D point

Findmax: (Toni)

- image with known maxima
- box-size ≤ 0
- unicolor-image

Comparison: (Toni)

- compare same image
- compare with negative
- radius ≤ 0
- fix-point ≤ 0, fixpoint $>$ image size

MPI: (Osku)

- sending big data

Osku implements a test-engine.

Ideas to consider (has not to do anything with the testing ?)

- Down scaling
- filtering with Gaussian radius 5 before comparison

4.19 Meeting of 4.4.2001

Pöytäkirja
4.4.2001, 12-13h
Present: Osku, Perttu, Peter, Petteri, Philipp, Toni

1. Laitoskarnevaali

   We meet Friday at 10:50h in front of the room, where we meet usually mondays. Perttu brings some tape, Petteri, Philipp and Toni bring their papers.

2. Testing

   The automated testcases can be added to the bugtest.c in .../src/test/module_test/. Further the cases should be added in the testing_plan documentation in .../doc/testing_plan/modules/. Completed tests should be documented in test.txt in the group/bugfind home directory. Each testcase gets a name like "config-6".

3. User manual

   The user manual should for now just contain a rough description of the config-file parameters, how to run the program and maybe some suggestions for the different parameters.

4.20 Meeting of 9.4.2001

Pöytäkirja
9.4.2001, 10-12h
Present: Osku, Perttu, Peter, Petteri, Philipp
Excused absence: Toni

1. Testing

   The testing is not yet finished, some specifications of testcases and their implementation is still missing.

2. Documentations

   There exist now first versions of the user manual and the maintenance documentation. All still not finished documentations we have to create are:

   - Testing Plan/Testing Report
   - User Manual
   - Maintenance Documentation
   - Final Report
   - Modification Documentation
   - (Listing of the source-code)

   The changes of the distribution design have to be added to the modification doc.

4.21 Meeting of 23.4.2001

Pöytäkirja
23.4.2001, 10-12h
Present: Osku, Perttu, Peter, Petteri, Philipp, Toni

1. Module-Testing

   All testcases of the module testing are specified now. Around the half of the testcases are not yet implemented and done.

   Perttu does the file and gaussian module testing and writes a paragraph about the integration testing,

   Petteri does the rotation and projection module testing

   Philipp does the config and misc module testing.

   All this tests should be finished until next weeks monday.

2. Validation testing

   Testcases for validation testing could be:

   - Easy artificial particle (rod)
     - random image with noise
     - scaled random image with noise
   - 3D cross
     - center of mass not in the center of the model, same tests as above.
   - Ribosome model
     - real model ...
   - Angle test
     - visual comparison of output angles to original values of the testimage
   - Noise test
     - simple model
     - varying noise levels
     - correlation value plot
   - Scale test
     - effect of scaling to correlation values
   - d450.mrc (pizza)
     - different radius, search radius
   - one pizza with random background, correlationvalues at all points in the image, so that we see the areas of the best matches.

3. Documentations

   The implementation paper's freezing-date has already passed by. Osku will write around one A4-page, so we have this paper finished soon.

   The maintenance documentation and the final report both need to be written at least as scelettons. Perttu writes the maintenance paper.

   Peter brings a folder for our paper next wednesday.

4. Customer presentation

   Philipp asks Janne, if the customer presentation can be at the 7.5 or 9.5.

4.22 Meeting of 30.4.2001

Pöytäkirja
30.4.2001, 10-12h
Present: Osku, Perttu, Peter, Petteri, Philipp, Toni

1. Testing Documentation
   The module-testing is now almost finished, Philipp takes care of the validation-testcase-descriptions and the finalizing.

2. User Manual
   Osku finalizes this paper.

3. Final Report
   Philipp makes a sceletton. Toni integrates the minutes in the paper.

4. Maintenance Document
   Petteri finalizes this paper.

   For the to-do list:

   - use of MPI-multicast, when there is a better version available.
   - "better" correlation calculation
   - tools, which would be nice to have ...

   A list of tools we have, how they are called and basically what they are for.

   Where is which data and configurations.

4.23 Meeting of 7.5.2001

Pöytäkirja
7.5.2001, 10-12h
Present: Osku, Perttu, Peter, Petteri, Philipp, Toni

1. Documentation work

   Final report: The last pöytäkirja (this), the completed timetable and working hour description are still missing, Toni is taking care of it. Everybody adds his last hours ASAP to the homepage. Missing personal comments of Toni and Perttu should be added ASAP as well.

   Maintenance Document: There is a major mistake in the scaling-ToDo-description. Perttu is taking care of this and makes also the minor changes like corrections etc.

   User Manual: Osku finalizes this document, everybody should read it afterwards.

   Testing Document: Philipp makes the corrections, Perttu will eventually add some validation terst cases. Validation test cases, which are not done yet, will be removed from the document.

   Modification Document: Petteri finalizes this document.

2. Customer meeting

   If everything goes like expected, then we have the meeting at the 11th of May from 10-12h. Peter is reserving a room for it (?). Petteri prepares what will happen there.

3. Miscellaneous

   Philipp places bugfind config files in /home/bugfind/data/config/.

5 Formal technical review

Formal Technical Review (FTR) report
Monday, 26th March, 2001; 12-14.
Present: Perttu, Peter, Petteri, Philipp, Toni
Apologized absence: Osku
Supervisor: Juha Taina
Chairman and secretary: Petteri
Presenters: Petteri, Philipp and Toni

The sections 2 and 3 were discussed in detail, as planned. Each section was presented by the author mainly responsible for the section in hand.

Juha Taina made a suggestion about including more material into the preface section describing the software in a slight more detail. However, the paper is mainly used by us as a reference, so on the other hand there might not be any need for it. This issue probably needs to be discussed in the next meeting.

- Section 2.1

  Philipp gave us a detailed explanation about the Figure 1. Since we're using a non-standard notation for data and control flow, we should add a small legend to the side of the figure describing the notation. In addition, the new distibution scheme adds one new control flow arrow ("angles") into the figure.

  The descriptive text was skimmed through by everyone present. The only addition required is the description of the new control flow arrow.

- Section 2.2

  Again Philipp described this section. The only flaw in the figure was the use of word "hotspots", which should read "maxima". However, our customer Mr. Ravantti asked whether it's possible to use the main node for comparison calculations in addition to the slave nodes. In this case, the figure and the distribution scheme will be changed once again. Again, this issue needs further discussion.

  Paragraph 2 probably does not resemble the real situation. It says that the micrograph is loaded two times into the memory, which is probably not what we want. This issue needs investigating. The text could describe the different phases in a bit more detail; by introducing the concept of particle diameter, for example.

"Write result" and "postprocessing" boxes don't have descriptive texts.

The correlation could be mentioned as being a method for comparison.

- Section 3

  Petteri described the section 3, which describes the data structures used in the software.

  For all subsections, the repetitive phrases describing the absence of encapsulation should be removed and merged into a one sentence in the preface of the section 3. All "accessor functions" should be called "interface functions".

- Section 3.1.4

  Some kind of explanation about the coordinate system used should be included. The rotation module already describes the rotation matrices used, but the axis orientation, for example, isn't documented anywhere in the paper.

- Section 3.3

  Blobs is a wrong term for particles. Threshold value is not used in the comparison phase, but in the postprocessing phase.

- Section 3.4

  A new row could be included into the table describing the references to the global data.

- FTR decision

  We decided to accept the paper with the suggested modifications. Some issues need further discussion; they are left untouched for now and investigated in-depth in the next meeting.

6 Working hours

Name / Week	3	4	5	6	7	8	9	10	11
Perttu Haimi	2	16	19	19	12	21	6	15	17
Petteri Hintsanen	7	15	13	13	15	18	13	16	16
Philipp Masche	3	13	12	17	17	19	6	15	17
Toni Ruokolainen	3	13	14	13	9	16	8	0	20
Osku Salerma	3	15	10	14	16	16	13	19	16

Name / Week	12	13	14	15	16	17	18	19	Total
Perttu Haimi	22	4	16	10	0	18	12	14	223
Petteri Hintsanen	11	9	17	8	2	6	8	8	195
Philipp Masche	15	11	18	7	5	9	10	8	202
Toni Ruokolainen	10	8	8	10	0	2	6	11	151
Osku Salerma	12	0	10	4	0	4	2	8	162

6.1 Hours for Perttu Haimi

```
Hours for Perttu Haimi

Week 3

19.1 2h  meeting

Total (week 3): 2h

Week 4

22.1. 2h Meeting with the customer
23.1. 2h Web pages
24.1. 4h Web pages, Meeting: project planning
25.1. 1h Mail to customer, reading material
26.1. 3.5 h Learning cvs, sceleton of req-document
27.1. 3.5h irc-meeting with Osku, reading material
Total (week 4): 16h

Week 5

29.1. 4 h Meeting with the client, reading
30.1. 4 h Writing req-document, reading
31.1. 4 h Meeting, copying articles
1.2.  2 h Adding the source code of the old project to our cvs-tree,
browsing the code.
3.2.  5 h Reading articles

Total (week 5): 19h

Week 6

5.2. 4 h Meeting, reading and copying articles.
6.2. 3 h Reading articles
7.2. 2 h Meeting with Teemu Kivioja
10.2. 2 h Familiriazing with the source code from the previous project.
11.2. 8 h Writing small testprogram for converting mrc to pgm, and splitting
 3d model to flat pictures.

Total (week 6): 19h

Week 7

12.2. 4 h meeting, making a picture for req-document, organizing files etc.
13.2. 4 h bugfixing of mrc2pgm, pgm2mrc
14.2. 4 h meeting, reading articles
```

Total (week 7): 12h

Week 8

19.2. 3 h meeting
21.2. 2 h meeting
24.2. 8 h Programming testgen for generating test pictures
25.2. 8 h Programming testgen for generating test pictures

Total (week 8): 21h

Week 9

26.2. 2 h meeting
28.2. 4 h meeting, emails to customer

Total (week 9): 6h

Week 10

5.3. 2 h meeting
6.3. 7 h writing testing parts for design document,
customer changes to requirements specification.
7.3. 6 h meeting, making test pictures

Total (week 10): 15h

Week 11

12.3. 2 h meeting
13.3. 3 h programming visres
14.3. 2 h meeting
17.3. 10 h experimenting with file loading routines, bf_assert, mem
Total (week 11): 17h

Week 12

19.3. 6 h meeting, testing main loop, checking ribosome.mrc, limit to visres
20.3. 4 h writing file module info to design document
21.3. 10 h meeting, writing and debugging simple gaussian
22.3. 2 h comparison of simple gaussian and gimp gaussian

Total (week 12): 22h

Week 13

26.3. 2 h FTR-meeting
28.3. 2 h Meeting

Total (week 13): 4h

Week 14

2.4. 2 h Meeting
3.4. 6 h Writing file and gaussian module tests to testing document, making axes-model for angle testing, modifying visres to allow model overlays on image.
4.4. 2 h Meeting
6.4. 2 h Department day
8.4. 4 h Experimenting with the angle system, making a picture of axes-model with projections from different angles.
Total (week 14): 16h

Week 15

9.4. 6 h Meeting, studying function optimisation methods from Numerical recipes in C
11.4 4 h Finding info on fourier transforms.
Total (week 15): 10h

Week 16

Easter holiday

Total (week 16): 0h

Week 17

23.4. 2 h Meeting, changing new testimages from tif to mrc
25.4. 5 h Meeting, learning how to make fourier power spectra with matlab to evaluate the quality of gaussian filter.
28.4. 3 h Making some 2D fourier images, changing resgen to use new definition of signal to noise -ratio. File module tests except no. 2 which needs an mrc file viewer.
29.4. 8 h Writing todo-list for maintanance document.
Total (week 17): 18h

Week 18

30.4. 2 h Meeting
6.5. 10 h testing memory allocation of slave node loop, programming function to make model cubic, testing the effect of noise, gaussian module tests for gimp gaussian, simple gaussian and floating point gaussian.

Total (week 18): 12h

Week 19

7.5. 2 h Meeting
8.5. 8 h Final tests: angle test, benchmarking. Writing results to documents.
9.5. 2 h Meeting
11.5. 2 h Demo for the customer

Total (week 19): 14h

6.2 Hours for Petteri Hintsanen

Hours for Petteri Hintsanen

Week 3

```
19.1.  2h    first meeting
19.1.  2h    familiarizing with the project, CVS, etc...
20.1.  1,5h  familiarizing
21.1.  1,5h  still more familiarizing
Total (week 3): 7h
```

Week 4

```
22.1.  2h    meeting with the customer, Mr. Ravantti
22.1.  2h    writing a sketch for the project plan (pp)
23.1.  1h    writing the sketch (pp)
24.1.  1h    writing the sketch (pp)
24.1.  2h    meeting
24.1.  4h    writing the project plan and configuring the cluster (pp)
25.1.  3h    writing the project plan and some miscellaneous things (pp)
Total (week 4): 15h
```

Week 5

```
29.1.  2h    meeting with the customers at Viikki Biocenter
30.1.  1,5h  finalizing the project plan (pp)
31.1.  2h    meeting
31.1.  1,5h  finalizing the project plan (pp)
1.2.   2h    looking for algorithms, etc... (rs)
2.2.   2h    looking for algorithms (rs)
3.2.   2h    looking for algorithms (rs)
Total (week 5): 13h
```

Week 6

```
5.2.   2h    meeting
6.2.   1h    reading about image processing (fft etc.)
7.2.   2h    meeting with Mr. Kivioja
```

```
8.2.   4h    looking into projection code and updating docs (rs)
9.2.   2,5h  looking into projection code and cvs problems (rs)
10.2.  1,5h  finalizing the projection section in the req. spec. (rs)
Total (week 6): 13h

Week 7

12.2.  2h    meeting
14.2.  1,5h  extracting projection and image handling code (rs/ds)
14.2.  2h    meeting
14.2.  1h    fixing the req. spec. (rs)
15.2.  1,5h  fixing the req. spec. and extracting code. (rs/ds)
16.2.  2h    extracting code (rs/ds)
17.2.  2,5h  extracting code (rs/ds)
18.2.  2,5h  extracting code (rs/ds)
Total (week 7): 15h

Week 8

19.2.  2h    meeting
20.2.  2,5h  finalizing the requirements specification (rs)
21.2.  2h    meeting
21.2.  1,5h  freezing the requirements specification (rs)
22.2.  2h    experimenting (ds)
23.2.  3h    experimenting (ds)
24.2.  3h    prototype coding (ds)
25.2.  2h    prototype coding (ds)
Total (week 8): 18h

Week 9

26.2.  2h    meeting
28.2.  1,5h  prototype coding (ds)
28.2.  2h    meeting
28.2.  1,5h  writing the design document (ds)
1.3.   3h    writing the design document (ds)
3.3.   1h    writing the design document (ds)
4.3.   2h    writing the design document (ds)
Total (week 9): 13h

Week 10

5.3.   2h    writing the design document (ds)
6.3.   2h    writing the design document and fixing the req. spec. (ds)
7.3.   2h    meeting
7.3.   2,5h  writing the design document (ds)
10.3.  3h    writing several documents (rs/ds)
11.3.  4,5h  writing several documents, prototype coding (rs/ds)
```

```
Total (week 10): 16h

Week 11

12.3.  2h    meeting
13.3.  3h    writing the design document, prototype coding (ds)
14.3.  3h    meeting, prototype coding (ds)
15.3.  2h    prototype coding (ds)
16.3.  3h    prototype coding (ds), miscellaneous
18.3.  3h    prototype coding (ds)
Total (week 11): 16h

Week 12

19.3.  2h    meeting
20.3.  4h    writing the design document, prototype coding (ds)
21.3.  2h    meeting
22.3.  1,5h  writing the design document (ds)
25.3.  1,5h  preparing for FTR, miscellaneous (ds)
Total (week 12): 11h

Week 13

26.3.  2h    ftr, design paper sections 2 & 3 (ds)
26.3.  1h    ftr report (ds)
26.3.  1,5h  fixing the design document (ds)
28.3.  2h    meeting
30.3.  2h    preparing presentation stuff (misc)
31.3.  0,5h  freezing the design document (ds)
Total (week 13): 9h

Week 14

2.4.   2h    meeting
2.4.   3h    web publishing :-P (misc)
3.4.   2,5h  implementation and testing (im)
4.4.   2h    meeting
4.4.   1,5h  testing interpolation (ts)
5.4.   2h    testing scaling, miscellaneous (ts)
6.4.   4h    laitoskarnevaali (misc)
Total (week 14): 17h

Week 15

9.4.   2h    meeting
10.4.  4h    fixed bugs in interpolation and scaling (ts)
11.4.  2h    meeting
Total (week 15): 8h
```

Week 16

22.4. 2h   writing test cases and implementing tests

Total (week 16): 2h (low hours due to the easter vacation and being sick)

Week 17

23.4. 2h   meeting
24.4. 2h   finishing module testing functions and corresponding
             document parts
29.4. 2h   writing maintenance and testing document, e-mails
Total (week 17): 6h (low hours due to being sick, again)

Week 18

30.4. 2h   meeting
3.5.   3h   fixing the documents, writing the maintenance document,
             collecting tools
4.5.   1,5h finishing the maintenance document
6.5.   1,5h writing the final report
Total (week 18): 8h

Week 19

7.5.   2h   meeting
8.5.   2h   finalizing
9.5.   2h   project closing
11.5. 2h   customer presentation
Total (week 19): 8h

6.3 Hours for Philipp Masche

Hours for Philipp

Week 3

19.1 2h   meeting
19.1 1h   reading papers

Total (week 3): 3h

Week 4

22.1 2h   meeting with the customer
22.1 1h   pöytäkirja

```
24.1 2h    meeting
24.1 1h    pöytäkirja
25.1 1h    project-plan (size-estimation)
25.1 1h    project-plan (task-division)
25.1 1h    learning about CVS
25.1 1h    project-plan
26.1 0.5h  some miscellaneous things in the cluster and cvs
26.1 1h    getting familar with c again, trying with MPI, www
27.1 1.5h  looking in some old source

Total (week 4): 13h

Week 5

29.1 3.5h  meeting in the Belford-labs
30.1 0.5h  preparing next meeting
31.1 2h    meeting
31.1 1h    pöytäkirja
31.1 0.5h  miscellaneous stuff
31.1 0.5h  searching the web for grafic-algorithms
 2.2 0.5h  discussing stuff with Toni
 2.2 0.5h  thinking about algorithms
 4.2 2.5h  writing Ch.7&9 of the req-spec
 4.2 0.5h  preparing next meeting

Total (week 5): 12h

Week 6

 5.2 2h    meeting
 5.2 0.5h  pöytäkirja
 5.2 1.5h  browsing old scourcecode
 7.2 1h    some changes in the req_doc
 7.2 0.5h  preparing next meeting
 7.2 0.5h  proof-reading req_doc
 7.2 2h    meeting
 8.2 1h    pöytäkirja, some other stuff
10.2 2h    req_doc
10.2 1h    browsing old source-code
11.2 2h    browsing old source, looking at data
11.2 3h    familiarizing with C
Total (week 6): 17h

Week 7

12.2 2h    meeting
12.2 1h    pöytäkirja
13.2 1.5h  preparing review
```

```
14.2 1h    preparing meeting and review, other stuff
14.2 2h    meeting
17.2 3h    learning about makefiles and c
18.2 2h    learning about math.h & gaussian-filter etc.
18.2 5h    writing gaussian-filter

Total (week 7): 17h

Week 8

19.2 2h    meeting
19.2 1.5h  pöytäkirja
19.2 3.5h  gaussian-filter coding and testing
20.2 4h    gaussian-filter coding and testing
21.2 1h    gaussian-filter
21.2 2h    meeting
21.2 3h    gaussian-filter
23.2 1h    pötyäkirja & discussing with Petteri about findmax etc.
24.2 1h    coding averaging-filter
Total (week 8): 19h

Week 9

26.2 2h    meeting
28.2 1h    pöytäkirja, changes in the website
28.2 2h    meeting
28.2 0.5h  pöytäkirja
28.2 1h    design-paper (gaussian description)
Total (week 9): 6h

Week 10

 6.3 1h    reading the emails
 7.3 2h    meating
 9.3 1h    pöytäkirja
 9.3 2h    testing and browsing the prototype
 9.3 1h    gaussian-description
11.3 1h    learning LaTeX-details
11.3 2h    gaussian-description
11.3 1h    checking the design-paper
11.3 2h    control-flow and data-flow
11.3 1h    searching for infos
11.3 1h    miscellaneous
Total (week 10): 15h

Week 11

12.3 2h    meeting
```

```
12.3 1h    pöytäkirja
12.3 2h    design-doc, architecture-xfig
13.3 4h    design-doc
13.3 1h    thinking about the project
14.3 2h    meeting
14.3 1h    pöytäkirja/asking Juha Taina
15.3 2h    finalizing the design-doc
16.3 2h    finalizing the design-doc
Total (week 11): 17h

Week 12

19.3 2h    meeting
19.3 0.5h  pöytäkirja
19.3 2.5h  finalizing the design-doc
21.3 0.5h  reading the design-doc
21.3 2h    meeting
21.3 2h    making the changes in the design-doc
22.3 0.5h  pöytäkirja
22.3 0.5h  clustering
25.3 4.5h  Adding loads of documentation scelettons
Total (week 12): 15h

Week 13

26.3 0.5h  preparing FTR
26.3 2h    FTR
26.3 1h    thinking about the testing
27.3 0.5h  reading the design paper
28.3 2h    meeting
28.3 3h    pöytäkirja & presentation
29.3 2h    reading dejagnu docu

Total (week 13): 11h

Week 14

 2.4 2h    meeting
 2.4 0.5h  pöytäkirja
 4.4 1h    writing testcases
 4.4 2h    meeting, pöytäkirja, changes in sheet for the karnevaali
 4.4 0.5h  testcases
 4.4 1h    user manual
 6.4 5h    laitoskarnevaali (misc)
 6.4 3h    testing real-data
 8.4 3h    documentation work
Total (week 14): 18h
```

```
Week 15

 9.4 0.5h  preparing for the meeting
 9.4 2h    meeting
 9.4 0.5h  pöytäkirja
10.4 0.5h  testing
11.4 2h    testing
11.4 2h    meeting
Total (week 15): 7h

Week 16

20.4 3.5h  testing with real and fake models
21.4 1.5h  testing with real and fake models

Total (week 16): 5h

Week 17

23.4 2h    meeting
23.4 1h    pöytäkirja + miscellaneous
25.4 0.5h  meeting
28.4 1.5h  module testing misc & config
28.4 1h    testing doc
29.4 3.5h  TMV-data validation testing

Total (week 17): 9h

Week 18

30.4 2h    meeting
30.4 0.5h  pöytäkirja
 5.5 1h    reading maintenance paper
 5.5 3.5h  finalizing test-doc and validation testing
 6.5 3h    finalizing some documents
Total (week 18): 10h

Week 19

 7.5 2h    meeting
 7.5 0.5h  pöytäkirja
 8.5 2h    final work
 9.5 2h    meeting
11.5 2h    customer meeting
Total (week 19): 8h
```

6.4 Hours for Toni Ruokolainen

```
Hours for Toni

Week 3

19.1 2h  meeting
20.1 1h  initial checkup of MPI-documents

Total (week 3): 3h

Week 4

22.1 2h  meeting with the customer
24.1 2h  meeting
26.1 3h  meditating (reading documents, hackin' in da cluster :)
28.1 6h  started writing the requirement analysis and first MPIch program
Total (week 4): 13h

Week 5

29.1 3h  meeting with the customer in Viikki
29.1 2h  programming first MPI-program in cluster. Writing and translating
         Requirement analysis document.
30.1 1h  Req.analysis & document reading
31.1 4h  Writing req.analysis with Perttu. Meeting.
         Writing some more requirements; searhing & reading (ir)relevant information.
2.2  3h  Reading some documents on pattern-matching
4.2  1h  Reading documents again
Total (week 5): 14h

Week 6

5.2  3h  Meeting and MPI-programming
7.2  5h  Meeting, writing req.document, searhing for information
9.2  4h  Fighting with CVS, testing MPIch-broadcasting at home
10.2 1h  Reading documents, writing req.document
Total (week 6): 13h

Week 7

12.2 2h  Trying to correct mistakes I made with CVS
14.2 4h  Making some pictures, meeting
15.2 3h  Fixing pictures, trying to find information on image correlation
Total (week 7): 9h

Week 8
```

```
19.2 3.5h Meeting. Reading documents
20.2 2h  Finding and reading more documents on image correlation.
21.2 5h  Writing design document, meeting, starting the compararison module.
22.2 3h  Writing correlation code
23.2 3h  Experimenting with image-correlation
Total (week 8): 16h

Week 9

26.2 4h  Meeting. Coding.
28.2 4h  Meeting. Coding. Documenting
Total (week 9): 8h

Week 10

5-11.3 0h Being busy with an exam, work and scientific writing course. Sorry guys!
Total (week 10): 0h

Week 11

12.3 2h  Meeting
14.3 11h Documenting, meeting, ripping Gimp Gaussian IIR filter and experimenting
15.3 4h  Testing the code in cluster (looks good!). Added code for multiple hit detection
16.3 3h  Doing nice pictures, updating web-page, clustering, figuring out the Gimp Gaussia
Total (week 11): 20h

Week 12

19.3 3h  Meeting, surfing on the net :) (finding relevant information)
21.3 3h  Meeting, etc.
25.3 4h  Writing the document, scratching my head with Gimp code
Total (week 12): 10h

Week 13

26.3 2h  Formal technical review
28.3 3h  Meeting, finishing up documentary
30.3 2h  Finding stuff for Laitoskarnevaalit presentation
1.4  3h  Writing presentation, trying to do some graphics (with bad results :)
Total (week 13): 8h

Week 14

2.4  2h  Meeting
4.4  3h  Meeting, thinking about test-cases
6.4  3h  Laitoskarnevaalit
Total (week 14): 8h
```

```
Week 15

10.4 4h  Coding test-cases for findmax & comparison
11.4 6h  Test-case & other coding, meeting
Total (week 15): 10h

Week 16

Easter break
Total (week 16): 0h

Week 17

23.4 2h Meeting
Very low hours due because of exam..
Total (week 17): 2h

Week 18

30.4 3h Meeting and documentation
6.5 3h Documentation
Total (week 18): 6h

Week 19

7.5 2h Meeting
8.5 5h Documentation and testing
9.5 2h Meeting
11.5 2h Customer meeting
Total (week 19): 11h
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6.5 Hours for Osku Salerma

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Hours for Osku Salerma

Week 3

19.1 2h    meeting
20.1 1h    reading papers

Total (week 3): 3h

Week 4

22.1 3h    meeting, checking out cluster (remotely...)
24.1 4.5h  meeting, designing/implementing time-tracking script/templates/www
26.1 3h    studying cvs and latex, reading some more papers
27.1 4h    studying cvs and latex, irc-meeting with perttu, ebola-picture
```

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           for www-pages, work on project plan
28.1 0.5h  browsing mpi www-pages

Total (week 4): 15h

Week 5

29.1 3.5h  viikki excursion, some more mpi studying
31.1 2h    meeting
4.2  4.5h  req.doc. writing, backups, latex studying, more stuff...

Total (week 5): 10h

Week 6

5.2  2h    meeting
7.2  3.5h  meeting, work on req.doc, reading papers
9.2  2.5h  reading, cvs problems
10.2 1h    fixing cvs problems
11.2 5h    coding mpi speed_test program, managing to crash kl03, etc

Total (week 6): 14h

Week 7

12.2 3h    meeting, studying mpi
13.2 1h    browsing old source code
14.2 5h    meeting, browsing old source code
15.2 1h    studying mpi
16.2 1h    studying mpi
17.2 2h    browsing old source code, thinking about distribution
18.2 3h    studying latex, misc stuff

Total (week 7): 16h

Week 8

19.2 4h    meeting, coding
20.2 3h    fixing req.spec., coding
21.2 4h    meeting, prototype work
22.2 3h    prototype work
25.2 2h    prototype work

Total (week 8): 16h

Week 9

26.2 4h    meeting, prototype work
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27.2 5h    prototype work
28.2 3h    meeting, prototype work
4.3  1h    prototype work

Total (week 9): 13h

Week 10

5.3  2.5h  meeting, prototype work
6.3  1.5h  prototype work
7.3  7h    meeting, prototype work
8.3  3h    prototype work
10.3 0.5h  prototype work
11.3 4.5h  prototype work

Total (week 10): 19h

Week 11

12.3 4h    meeting, prototype work
13.3 3h    prototype work
14.3 2h    meeting
15.3 2h    prototype work
16.3 1h    email, prototype work
18.3 4h    prototype work

Total (week 11): 16h

Week 12

19.3 3h    meeting, protype work
20.3 1h    design spec work
21.3 3h    meeting, design spec work
25.3 5h    investigating mpi overhead

Total (week 12): 12h

Week 13

week spent being sick

Total (week 13): 0h

Week 14

2.4  2h    meeting
3.4  1h    test framework
4.4  3h    meeting, new distribution approach
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6.4  3h    department day
8.4  1h    testing real data

Total (week 14): 10h

Week 15

9.4  2h    meeting
11.4 2h    meeting

Total (week 15): 4h

Week 16

Total (week 16): h

Week 17

23.4 2h    meeting
25.4 2h    meeting

Total (week 17): 4h

Week 18

30.4 2h    meeting

Total (week 18): 2h

Week 19

7.5  4h    meeting, polishing documents
9.5  2h    meeting
11.5 2h    meeting with customer

Total (week 19): 8h
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