PUSS214208

v. 0.2

TimeMate

Project Final Report

Group 2

Responsible: Project Management Group

Authors: Project Management group

2021-03-18

Contents

1 Document History

Version	Date	Responsible	Description
0.1	2021-03-17	PG	Document created.
0.2	2021-03-19	PG	Ready for informal review.

2 Terminology

See table 1.

SG	System management Group
DG	Developer Group
TG	Test Group
PG	Project Management Group
SDP	Software Development Plan
SRS	Software Requirements Specification
SVVS	Software Verification and Validation Specification
SVVI	Software Verification and Validation Instruction
STLDD	Software Top Level Design Document
SVVR	Software Verification and Validation Report
SSD	System Specification Document

Table 1: Terminology

3 Referenced Documents

- Software Development Plan, v. 1.1, Doc. number: PUSS214200.
- Project Instruction (Projekthandledningen).

4 Executive Summary

This report summarises the work done by project group 2 in the course *Programvaruutveckling för stora projekt*. The project took took place during January, February and March of 2021. It involved 21 students and 3 faculty members at Lund University. The aim of this project was to give students practical experience of working in a large group to produce a time reporting software. Whilst the a time-reporting software was the end product, this report mainly focuses on the lessons learned during the course of the project. The group delivered a product that met the requirements within the allotted time space and considered a success.

This report is structured as the following: Section 5 gives an historic overview of the project, section 6 aims to analyse the result and reason why certain actions occured and how to prevent them. Section 7 gives six tips for future project groups and lastly section 8 presents a conclusion of the project.

5 Project Overview

This section aims to give an overview of the project and is structured as the following: Section 5.1 to 5.4 describes the work process for each phase as well as how they turned out. Figures are included which displays the reported time from each member of the group. Section 5.5 to 5.10 does not belong to a specific phase, but rather describes how certain aspects of the project turned out.

The project officially started on week 3 and lasted until the end of week 11.

5.1 Phase 1. Week 3-5

PG started planning and gathering the group during week 2 to prepare for phase 1. The first phase was a bit of a scramble as people tried to figure out their role, what all the documents where for, how github worked and what latex is. In other words, there was a lot of new information to take in.

Writing the SDP, SRS and SVVS, which would lay the ground work for the next few months, went quite well. The first informal review failed to catch most of the critical errors, which led to the formal reviewer not approving the documents for baseline. After reworking the documents, and our review process, we held a second informal review. This time around, the remarks where significantly more useful but the structure of the meeting didn't support the ensuing discussions. During the transition into phase 2 we took what we had learned and made some adjustments to our review methods.

Writing the SDP, SRS and SVVS, which would lay the ground work for the next few months, went quite well. The main reason for the delay was that the formal review resulted in quite a few changes. This was due to our informal review not catching most of the flaws in our documents. The reasons for why that was and how we corrected for it is detailed in the analysis section.

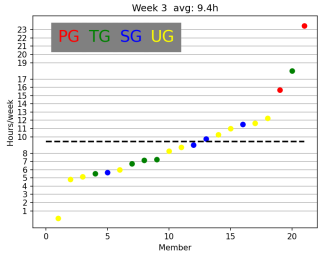

Figure 1: Worked hours week 3

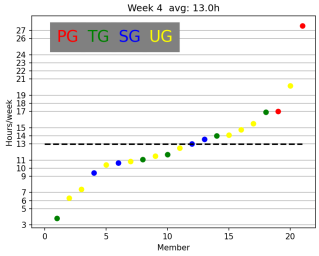

Figure 2: Worked hours week 4

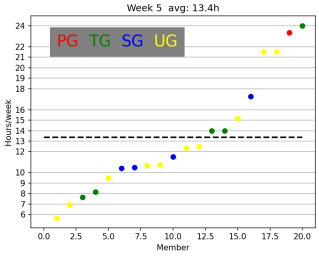

Figure 3: Worked hours week 4

5.2 Phase 2. Week 6-7

Due to the delay at the end of phase 1, the second phase was compressed to stay on schedule. There was a slight panic at the beginning of the phase as the document deadline was closer than some group members had anticipated. This was solved with some swift scheduling and effective work distribuition within the DG. They scheduled an extra work shift and dedicated 3 members to doing graphics for the STLDD, which helped pipeline the writing process. DG had spent some time during phase 1 preparing for this document, which helped them get started with writing.

The writing of SVVI went straight forward as TG was very focused throughout the phase.

The formal review went well. The reviewer had a few remarks, but left it up to us to correct them and put the documents in baseline. A couple of members from TG and DG where tasked with doing this, whilst the others started with development and testing. Getting a head start in the next phase whilst others finished up the current phase became a common strategy, even if it contradicted the strict rules outlined in the waterfall method.

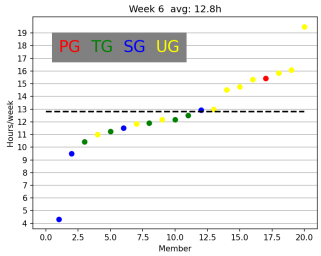

Figure 4: Worked hours week 6

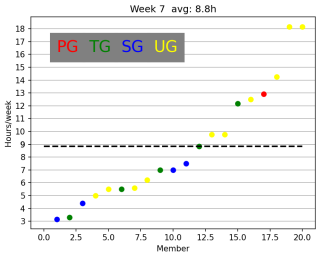

Figure 5: Worked hours week 7

5.3 Phase 3. Week 8-9

Phase 3 *unofficially* started on time, but *officially* three days late, due to the formal review result in Phase 2. This meant that the group had roughly a week to finish all the code before the first informal review. This caused some panic and many memebers did not believe that the deadline

would be reached.

DG spent a lot of time trying to translate the contents of STLDD to practical code and ambiguities started to show regarding how the system was suppose to fit together. This meant that valuable time that should have been spent producing running code, was instead speant on understanding the STLDD as well as the SRS. This lead to the existence of *heroes* that put in considerably more hours than others, as seen in figure 7.

Uncertainties regarding the purpose and responsibilites of SG was somewhat unclear became very obvious during this phase. The initial plan was that SG was supposed to aid DG and handle the communication between DG and TG and assist any of the groups if needed. It seemed like there were either a missunderstanding of this, or a lack of communication between SG and the rest, because according to SG, no one needed help, but in reality, DG was quite far behind even early in phase 3.

The informal review was pushed forward a day and reviewing of code convention and code style was ignored due to such "unfinished" code. Instead, only functional tests and system tests were reviewed, which all passed. However, there were still minor deviations in the system compared to the SRS as well as plenty of undocumented and ugly code.

The second informal review was pushed from Friday to Tuesday week 10, which was enough for the group fix the corrections. After this review, further fixes were required, such as deleting unused variables and missing javadoc comments. Corrections were made and on Friday week 10 phase 3 reached baseline.

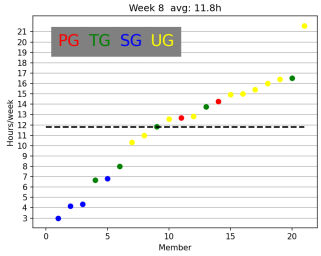

Figure 6: Worked hours week 8

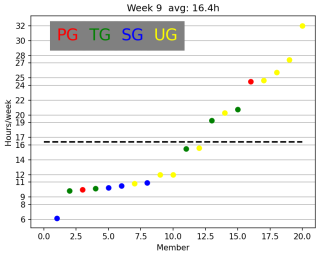

Figure 7: Worked hours week 9

5.4 Phase 4. Week 10-11

Once phase 3 had reched baseline the group took a break from the project and instead focused on studying for other exams (week 11 was exam week). However, certain parts of phase 4 were already almost done during phase 3 such as SSD, SVVR and the demo for the Acceptance meeting.

The last project group meeting was in week 11 and informal review for phase 4 on Friday week 11. Figure 8 clearly shows that the project was *not* in focus and week 11 is spent writing this report so the graph is not included.

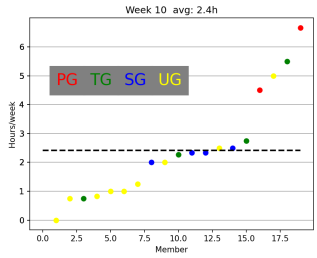

Figure 8: Worked hours week 10

5.5 Reported Time

Figure 9 illustrates the average worked hours/week for each phase. This number (9.8h/week) is very close to the expected value stated in SDP which was 10 hours per week. However, even though the *average* hours worked during the project came out to be almost exactly what was expected, it is clear from figure 1 to 8 that the hours were *not* evenly distributed. Clear hereos started to show early on and while this was discussed as a potential risk early in the project, it seemed unavoidable. After week 5, PG showed graphs from reported work time to point out the differences and invited the people who had spent less time to spend more, and to the ones who spent more time, to spend less as well as ask for help.

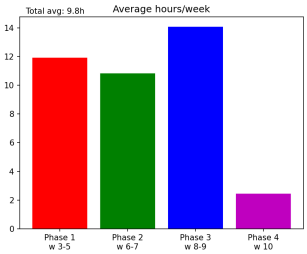

Figure 9: Summary of average worked hours during the project.

5.6 Keeping Schedule

As described in section 5.1-5.4 each phase was delayed by a few days up to a total week. Figure 10 illustrates the differences between the planned schedule and when baselines were actually reached.

5.7 Version Control & Configuration Management

The decision to use git as version control was taken during phase 1 and it worked quite well. The few issues that we did have were small and easy to deal with. To educate the group, PG held a 45

Week	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Phase
3								1
4								
5								
6								2
7								
8								3
9								
10								4
11								
12	Hand in			Acknowledgement				
	Informal review	Formal review	Second review	Dedicated development time	Project meeting			

Figure 10: Schedule from SDP, showing when each baseline was reached.

minute long education of basic usage of git which was also recorded so that members that missed it could watch afterwards.

While git was used to update files, E-PUSS was used to track the version numbers of the documents. These were recorded in the Status Reports.

One thing that differed from the initial plan of git usage was when updating the version of a document that had reached baseline. For this to work efficiently, a *patch* branch was created which forked from the *development* branch. The updated document was then put into the *patch* branch which then got merged to *master*. This process took a little longer, but seemed like a solid solution that kept the *master* branch up to date, and secure.

Figure 12 and 11 illustrates the commit distribution and commit history during the project. As of writing this report, a total of 18 out of 21 group memebers have commited to the github repository with a total of 1,139 commits.

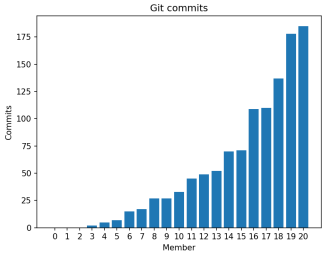

Figure 11: Commit distributed throughout the group.

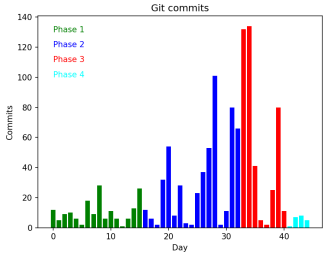

Figure 12: Commits for each phase.

5.8 Status & Problem reports

13 problem reports were reported during the lifetime of the project. All of the reports resulted in an update of the documents which lead to an update of the status reports. However, some of the problem reports were logically connected and thus only resulted in a single update in the status reports.

As seen in figure 13 most documents did not require more than one or two changes after baseline was reached. Documents for phase 4 is not included in the figure since none of the documents for the phase are in baseline as of writing this report.

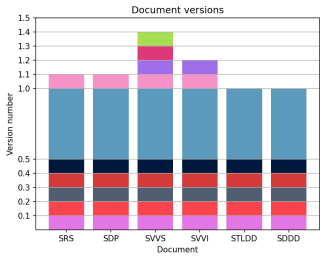

Figure 13: Document version numbers from phase 1-3

5.9 Online Communication

After the first project meeting (held on Zoom) the decision to move to Discord was taken. For the remainder of the project Discord served as the only communication channel and worked flawlessly.

However, while the online communication worked very well for the most part, it resulted in a lack of connection between group memebers. For instance, even though two of the ground rules specified in SDP were to actively participate during meetings, and, as much as possible have the camera on, this did not happen. The majority of the time during the project group meetings was spent as a monologue from the president with a handful of cameras on. When discussions occured it was mostly the same people who spoke, which resulted in about 15 people not saying a word during the entire meeting. This caused frustration as it was difficult to gauge the response of the group.

5.10 Running the system locally

Getting the system to run locally caused more issues than expected and even late into phase 3 there were several members who's local servers would'nt run. To aid people with this, a cheat sheet was created which included step by step instructions how to get the system running. Though it is unknown if and how much this helped, it seemed like a natural and reasonable solution.

6 Analysis

This section desribes our perception of how the project went and how it lined up with our expectations. This section follows the same structure as the Project Overview.

6.1 Phase 1. Week 3-5

The first informal review, the bulk of the remarks consisted of grammatical errors, rather than flaws in the content. To correct for this, we introduced a guiding document that was supposed to aid reviewers. The idea of this document was to be a reference for all future reviews, and thus cointained information about reviewing code that would have to be filtered out when reviewing a docuement and vice versa. The document did help to some extent, since the next batch of reviewers had quite a few more useful remarks. Not to say that correct grammar and spelling isn't important, content is simply more important.

The influx of usefull remarks exposed another flaw in our review process. The inital plan was that each reviewer presented their remarks, which would then be either accepted or discussed further. The reference document had failed to mention how a reviewer would go about organizing their remarks, which led to poorly structured presentations and discussions that were hard to follow.

To ensure the quality of future reviews we threw out the reference document and took a simpler approach that borrowed heavily from the format of the formal reviews. Reviewers got a review guide that was specific to the item being reviewed and all remarks were filled into a simple table that was then sent to the authors of the document before the meeting. During the review meeting, only remarks that warranted discussion were mentioned and all other remarks were fixed. This procedure was kept during the rest of the project and it worked very well.

We also focused on improving the work distribution and staying on schedule. The following list describes the measures we took:

- Increase the scheduled work shifts from 1 to 2 per week.
- Have PG engage more with the groups, instead of relying on group leaders to act as a bridge between management and other members.
- Redistribute tasks from PG to SG and TG.

6.2 Phase 2. Week 6-7

There is not a lot to be said about the second phase. A lot of what had made the first phase difficult was ironed out during the transition. Group members where getting more comfortable with their roles and the tools we used.

6.3 Phase 3. Week 8-9

As explained in section 5.3 this phase became quite stressful and was a week late to reach baseline. The reason behind the stress and delay was probably a combination of the following:

- Important and time-consuming activites in other courses.
- Poor understanding of how the system was actually suppose to be work and put together.
- Lack of communication between the groups in DG which resulted in extra work, such as different variable names between frontend/backend.
- SG feeling unsure what to do which meant that important workforce was missed. Figure 6 and 7 clearly illustrates this as SG only spent an average of 7 hours while DG spent 17 hours on average.
- Uncertainties in SRS, which resulted in certain ambiguities regarding requirements for the system. For instance, certain design choices were either not specified or not specific enough which resulted in that DG had to improvise.
- Lack of knowledge and experience with the technologies, which meant that valuable time was spent on doing research on how certain technologies or frameworks work (like jsp, tomcat etc). This should have been done earlier in the project so that phase 3 could be entirely about implementing the STLDD instead of googling.
- The waterfall method is not suited for a project when the group has little to zero experience with the technology. Because of this, we believe that an agile development method would be more suitable for this project.

6.4 Phase 4. Week 10-11

This phase was very straightforward and by the time phase 3 reached baseline, the group was comfortable and knew their roles. The majority of SSD and SVVR were already finished which meant that it went without issues. Though we must note that the writing of this document is done in phase 4 so it is not oficially over yet.

6.5 Reported Time

While the group did agreed early to not have heros in the project, they did occur anyways. Unfortunately we believe that this is unavoidable and a natural result of working in a big group of people in a school project. We motivate this rather cynical statement with the fact that people take school more or less serious and have different goals and ambitions. If a group with three students where student A and B aims to learn as much as possible and are ready to work 10 hours a week, while student C only wants to pass the course and is not ready to put more than 5 hours a week, the hereos will show up and some people will do less.

This was not unexpected and in fact, something that PG pointed out very early on. On several occasions members were encouraged to talk about their goals and ambitions so they would get an understanding of what to expected from each other. Wether this had an impact or not is unknown but we felt that there was not much more to do.

6.6 Keeping Schedule

We believe that the schedule was kept with minor deviations, but we did underestimate the time to reach a baseline. We believed that baseline would be reached straight after formal review, without any marks. This turned out to be quite naive since none of the formal reviews resulted in baseline without *any* adjustments required.

Several members argue that more time should have been spent during phase 3 and this was in fact the initial plan. However, after a dicussion, the group *did* take the decision to have two weeks for phase 3. While more time during phase 3 obviosuly would make it less stressful, one can argue that the reason it was stressful was not because of lack of time, but rather because of poor communcation between the groups, poor preparation and the rest of the possible reasons mentioned in section 6.3. Also, if more time would be spent on phase 3, the time has to come from somewhere, for instance phase 2, but then there would be less time to do the planning. Thus we propose the following improvements if we would do the project again:

- PG should be more strict from the beginning and be *very* clear what each group should do and what their responsibilities are.
- DG should choose their groups during the first week so that they can start to work and do research as soon as possible.

6.7 Version Control & Configuration Management

As explained in section 5.7 there were 3 members that did not do a single commit to the project repository. While the cause of this is unknown we consider one of the following explanations:

1. They do not know how to use git.
2. They have worked in groups and thus not needed to commit anything themselves.
3. They have not participated to the project.

As we will not investigate this any further we do believe that it would have been better if every member was forced to do several pushes to the repository as soon as the decision to use git was taken. This would reduce the chances that people do not know how to use the tool and thus eliminate option 1.

As a side not we would also like to mention that version control systems like git should be introduced in our education, since they are such a vital part of software engineering.

6.8 Status & Problem reports

Even though the UI of E-PUSS seems to be form the 90's, the functionality worked pretty well for creating problem reports and handling status reports. Even though git has support for both of these, the amount of work and time to ensure that everyone gets the education required to use it seemed not worth it and thus we believe that it was the right decision to use E-PUSS.

6.9 Online Communication

The biggest benefit of online communication was that it was very easy and quick to contact people and to share files, join different rooms etc. It was also easier for people to participate during meetings since no travelning was required. However, as described in 5.9 the lack of participation and active cameras hade a negative impact on the communication.

6.10 Running the system locally

To reduce problems to get the system running locally, we conclude in the following possible solutions:

1. Set a deadline for everyone to get the system running locally. A list could be used so that each member can sign when they have the system running as well as a help list if they need guidance. This would force people to get the system running and PG and SG would notice who had not.

2. While out of our hands, the laboratories in the course should be introduced earlier.

6.11 Group Managers

Besides the project managers, we appointed a manager for each work group SG, DG and TG. The tasks of the system manager and test manager were outlined in the Project Instructions and were quite clear, but the role of devolpment manager was not specified and thus *not* clear. This resulted in the some ambiguities for the development manager regarding what the responsibilites and what purpose the role served. This also lead to certain tasks falling between the cracks or delayed, such as splitting DG intro groups, telling inner groups in DG what to do etc.

We believe that this could have been prevented by carefully specifying the responsibilites of the role in the beginning of the project and having a stronger conversation the person who had the role. Another option would be to *not* have a development manager and instead give the responsibilities to SG. This could also result in the role and purpose of SG more clear, which as discussed in 6.3 was a problem during phase 3.

7 Six tips for future project groups

To help future project groups we have acquired five tips that we would like to share. They come as a result of the project and the lessons we have learned.

7.1 Tip 1

In the beginning, ensure that you spend enough time to fully understand the purpose and the responsibility for each role. Spending more time on this early on will be useful as the project proceeds as it will help to ensure that everyone knows what to do, and what their responsibilites are. It is also important to convey this information to the groups.

7.2 Tip 2

Since this semester has four courses running in parallel, it could be a nice idea to book times for the group to not only for work on the project, but also to study for other courses. This could improve the teambuilding and communication within the group and ensure that people do not fall behind in other courses.

7.3 Tip 3

Ensure that you know what you want to review during the informal reviews. The following questions can be used:

1. *Who* is reviewing
2. *What* should the revieweer look for
3. *Where* should the comments/notes from the reviewer be, and in what format

Also remember that the informal reviews are meant to catch errors and *improve* the documents. It is pointless to have a review if everyone just agrees and finds nothing. We believe it is better to be *too* hard than too gentle.

7.4 Tip 4

Just like any other programming project, development time is very hard to estimate. The third phase was by far the most stressful due to optimistic planning and delays caused by earlier phases. When making a schedule for a future project, it would be wise to give development as much time as possible and take into account that things does not work out of the box.

7.5 Tip 5

Use each phase as a learning experience, be open to alter your procedures based on feedback from the group, *even if* it requires making changes to baselined documents.

7.6 Tip 6

Spend time to actively ask and talk about feedback.

Feedback does not come on its own however, you will actively have to talk to your group members to identify issues.

8 Conclusion

An important thing to consider is the external stress factor that other courses, and seperate modules of this course, introduced. It has been a shared sentiment within the group that the work load during this semester has been overwhelming. Several group members have had issues balancing school work, some even putting other courses on hold. Whilst it is expected of a student who studies at full pace to put 40 hours/week into their school work, the reality of the situation is that most do not. The the sudden jump in time required had a big impact on the stress level felt by the

group. Despite this, the group came togheter and worked hard to get results.

TimeMate was delivered on time and all the major requirements were met. By this metric it would be fair to say that the project went well. There are multiple lessons to learn from this, which are very welcome. As preparation, as well as during, the writing of this report the group discussed the project. The perception within the group is that the project was fun and very valuable from an academic standpoint. So in conclusion, the members of project group 2 are proud of their collective effort and consider this project to have been a rather stressful, but equally valuable, experience.

9 Acknowledgements

Thank you to Christine Lindholm for you guidance and patience.

Thank you to Emelie Engström for making making our documents legible.

Thank you to Anders Bruce for your technical expertise.

Lastly, a big thank you to every member in group 2:

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- Alexandra Galonja (DG)
- Anna Bergvall (DG)
- Annelie Sinander (DG)
- Hjalmar Janson (DG)
- Oscar Johansson (DG Leader)
- Sebastian Forslund (DG)
- Abd Salam (DG)
- Alaa Wahbah (DG)
- Alexander Olofsson (DG)
- Johan Wulf (DG)
- Alexander Möhle (TG Leader)
- Lazar Trpeski (TG)
- Max Palmgren (TG)
- Malte Wallander (TG)
- Anas Abu Al-Soud (TG)