**Business Case**

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(TINF20C, SWE I Praxisprojekt 2021/2021)

Project: Websockets in LwIP HTTP Server

Customer: Rentschler & Holder

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| --- | --- | --- | --- |
| **Version** | **Date** | **Author** | **Comment** |
| 0.1 | 24.09.2021 | Benjamin Esenwein | created |
| 0.2 | 08.10.2021 | Benjamin Esenwein | ready for review |
| 0.3 | 13.10.2021 | Benjamin Esenwein | Incorporation of the internal review and optimisation of readability |
| 0.4 | 02.11.2021 | Benjamin Esenwein | Optimisation of the business case to the main components from the supplier's point of view |

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# Purpose and scope

The goal is to fix the architectural flaws of the patch "#9525 (httpd: add websocket support)" in coordination with the project community. This experimental base should be improved and brought through the approval process in the open-source project.

Furthermore, a demo server is to be designed and implemented in a virtual environment under Windows.

For demonstration and testing purposes of the features, a GUI-based test client shall be designed and implemented.

# Reasons for the BC

In this business case, we want to overview what the costs and risks are in advance of the project. This overview is used to decide how profitable the project is and whether it is worth implementing. Where might problems arise during marketing?

The customer requires delivery of the project by xx.xx.2022, with a maximum of 180 working hours per employee.

# Expected benefit

* eigene Profitabilitätsrechnung – was kann für ein Gewinn erwirtschaftet werden
* welche Kosten entstehen für den Entwickler

|  |  |
| --- | --- |
| Use / Benefits | Justification / Measurement |
| Standardization | Users have a fully functional IP stack with http support on Windows systems. While also containing all standard functionalities of the TCP/IP stack. |
| Cost reduction / efficiency increase | The resource-efficient structure of the source code allows users to deploy the lwIP stack even on low-power devices. |
| Profitability Calculation | This is an open-source project. Accordingly, profit is not the primary interest of this project. The project is developed with the aim to represent a time and cost saving for companies and developers. |

Table 1: Qualitative and quantitative project benefits

# Expected limitations

Due to the ongoing Covid-19 pandemic and constantly changing regulations, it is now unfortunately not possible to collaborate regularly in our office. Thus, the focus is on working in the home office, which increases the risk of communication problems.

During the project, the project staff has limited time to work on the project. All employees study alongside their work, and full-time work performance cannot be expected.

Furthermore, two employees are taking part in a semester abroad. This may mean that the workload has to be redistributed and / or fewer hours can be worked.

# Time frame

The project will begin on Sept. 10, 2021 and is expected to be completed by May 20, 2022. From December 2021 to February 2022, work can only continue on a limited basis due to internal company restructuring measures. This has been taken into account in the schedule. The following specific targets are to be achieved:

Semester 3:

* The documentation should be recorded in the Customer Requirement Specification (CRS), System Architecture Specification (SAS) and System Requirement Specification (SRS).
* The analysis phase must take place in the lecture weeks 1-6 (until 15.10.2021)
* The design phase is to take place in lecture weeks 7-11. The first implementation of a prototype is also scheduled here in order to reduce the project risk in the following semester.
* The following documents must be submitted by 10.12.2021 at the latest: CRS, BC, SRS, SAS, project plan.
* Project documentation and operating instructions must be submitted by XX.XX.2022.

Semester 4:

* Implementation of the system and creation of module documentation (MOD)
* Carry out system testing and create a system test plan
* Finalisation of all documents to be submitted
* Product presentation

Projekt- und Produktdokumentation

Detailed working time allocation of employees to task areas (specified in working hours):

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Laura Reeken  (Project Manager) | Benjamin Esenwein  (Product Manager) | Yannis Plaschko  (Test Manager) | Maximilian Meier  (Head of Development) | Lucas Kaczynski  (Technical Editor) | Isabel Schwalm  (System Architect) |
| Documentation | 35 | 30 | 30 | 30 | 40 | 25 |
| Analysis | 20 | 20 | 20 | 20 | 25 | 25 |
| Design | 10 | 15 | 5 | 10 | 5 | 20 |
| Coding | 20 | 25 | 25 | 30 | 25 | 30 |
| Testing | 15 | 20 | 40 | 20 | 20 | 20 |
| GitHub organization | 20 | 20 | 5 | 20 | 10 | 10 |
| Meetings | 20 | 20 | 20 | 20 | 20 | 20 |
| Customer exchange | 10 | 5 | 5 | 5 | 5 | 5 |
| Project management | 20 | 20 | 5 | - | 5 | - |
| Presentation | 5 | 5 | 5 | 5 | 5 | 5 |
| Total (hours) | 175 | 180 | 160 | 160 | 160 | 160 |

Table 2: Project plan

# Risks

Internal Risks

* Human Factors

To ensure that this project can be implemented, a refresher course in the C programming language is necessary.

* Technological Factors

An analysis of the present system for the Windows environment is inevitable in order to implement the patch in the latest version of lwIP

* Physical Factors

Virtual machines ensure that a development environment can be set up. Emerging errors in this environment must be avoided.

External Risks

* Economic Factors

The costs have to be kept in mind. A rough time schedule structures the process.

* Legal Factors

We also ensure compliance with software licences. Likewise, care must be taken not to become involved in any accusations of plagiarism. The head of development is specifically responsible for this.

[Business-Risiken 2017: Unternehmen fürchten Betriebsausfälle und Cybercrime (plusserver.com)](https://www.plusserver.com/blog/business-risiken-2017-cybercrime)

[Business Risk - wikiCFO (archive.ph)](https://archive.ph/20130209064558/http:/www.wikicfo.com/Wiki/Default.aspx?Page=Business-Risk&NS=&AspxAutoDetectCookieSupport=1)

[Business Risk Definition (investopedia.com)](https://www.investopedia.com/terms/b/businessrisk.asp#axzz27Teb1xOk)

# Cost Calculation

Due to the current Corona pandemic, most of the work is done in the home office. The rent for an office is still payable, but the heating costs are minimal.

A server in Germany was rented for the project. This incurs monthly costs of 60 euros.

Is it okay if we start from an "embellished" real situation and take something like this into account?

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Laura Reeken  (Project Manager) | Benjamin Esenwein  (Product Manager) | Yannis Plaschko  (Test Manager) | Maximilian Meier  (Head of Development) | Lucas Kaczynski  (Technical Editor) | Isabel Schwalm  (System Architect) | Percentage distribution |
| Documentation | 35 | 30 | 30 | 30 | 40 | 25 | 19,01 % |
| Analysis | 20 | 20 | 20 | 20 | 25 | 25 | 13,07 % |
| Design | 10 | 15 | 5 | 10 | 5 | 20 | 6,53 % |
| Coding | 20 | 25 | 25 | 30 | 25 | 30 | 15,58 % |
| Testing | 15 | 20 | 40 | 20 | 20 | 20 | 13,57 % |
| GitHub organization | 20 | 20 | 5 | 20 | 10 | 10 | 8,54 % |
| Meetings | 20 | 20 | 20 | 20 | 20 | 20 | 12,06 % |
| Customer exchange | 10 | 5 | 5 | 5 | 5 | 5 | 3,52 % |
| Project management | 20 | 20 | 5 | - | 5 | - | 5,03 % |
| Presentation | 5 | 5 | 5 | 5 | 5 | 5 | 3,02 % |
| Total (hours) | **175** | **180** | **160** | **160** | **160** | **160** | **100,00 % = 995 hours** |
| Hourly wage[[1]](#footnote-2) | 26,50 € | 25,00 € | 24,50 € | 25,50 € | 20,00 € | 27,50 € |  |
| Estimated total costs per employee | 4.637,50 € | 4.500,00 € | 3.920,00 € | 4.080,00 € | 3.200,00 € | 4.400,00 € |  |
| TOTAL costs | **24.737,50 €** | | | | | |  |

Table 3: Project costs

|  |  |  |  |
| --- | --- | --- | --- |
|  | Price | Duration | Total costs |
| Office costs | 760 € | 6 months | 4.560 € |
| Internet | 50 € | 24 months | 1.200 € |
| Additional costs | 100 € | 6 months | 600 € |
| TOTAL |  |  | **6.350 €** |

Table 4: Fixed costs

# Offer

This results in the following offer for the client:

|  |  |
| --- | --- |
| Costs | 24.737,50 € |
| Fixed Costs | 6.350,00 € |
| Offer | **31.087,50 €** |

Table 5: Final summation

1. (Source: stepstone.de) [↑](#footnote-ref-2)