

Assignment:

Architekturdokumentation

**Student:** Jacob Müller

**Email:** Jacobmueller11@gmail.de

**Date of birth:** 10.02.1995

**Matriculation number:** 800913

**Academic institution:** Knowledge Foundation @ Reutlingen University

**Study program:** Master of Science Professional Software Engineering

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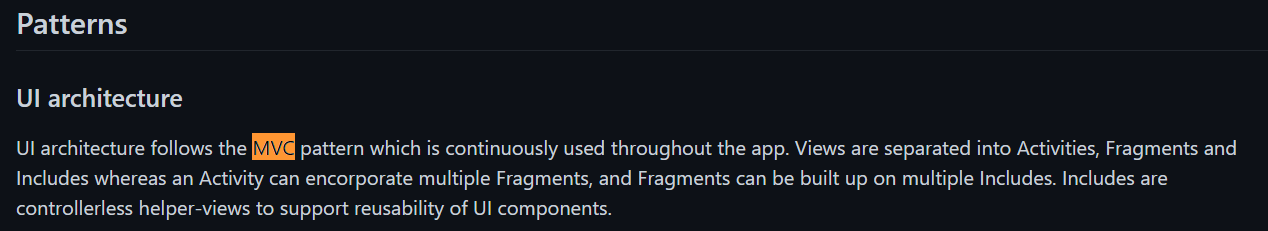
# Introduction

This assignment is created for the Software Architecture class of the Professional Software Engineering Masters Class of the Knowledge Foundation Reutlingen. The goal of this Assignment is to conduct an analysis of the architecture of the Corona WarnApp (CWA), by analyzing three different aspects of the CWA.

The report will proceed as follows. First, the CWA is analyzed based on the architectural pattern used. Next the layered architecture of the verification server is analyzed and documented. Afterwards three distinct architectural decisions are analyzed. Ultimately the overall documentation is evaluated based on arc42 standards.

# Architectural Pattern

MVC (in UI)



https://github.com/corona-warn-app/cwa-app-android/blob/main/docs/architecture-overview.md

Client server  
Proxy  
anything

# Layered Architecture

# Architectural Decisions

In this chapter three architectural decisions of the CWA are analyzed and compared to the documentation requirements in the ISO 42010 standard. Given that there was no log of architectural decisions found in the different architectural documents, decisions described within the main architecture documentation files is analyzed.

The first architectural decision is found in the solution architecture document and explains the necessity of the Verification server. In order to understand the decision the documentation in the verification-server/docs/architecture-overview.md is analyzed.

|  |  |
| --- | --- |
| ISO norm | CWA Documentation |
| Evidence of consideration of alternatives | * Not available |
| Record key decisions | * Validation of upload requests of users * Provide information about status of Sars-Cov-2 tests * Obtain proof document for health authorities |
| Contains information items | * No unique identifier or owner for the decision * no statement of the decision * no correspondences or linkages concerns to which it pertains * Only narrow correspondences or linkages to affected AD elements * No rationale linked to the decision * No forces and constraints on the decision * No assumptions influencing the decision * No considered alternatives and their potential consequences |

The table above displays the contained information from the CWA documentation. On top of this the ISO norm 42010 requires further information, which have not been included.

There has been **no documented alternative** to the Verification server decision.

Regarding the **recording of the key decision**, many relevant points have only briefly been stated. For instance the reasoning for the component is threefold. The verification server is necessary because it validates upload requests of users, provides information about the covid status and gives proof documents to health authorities. However, the points are only briefly been mentioned and further evaluation have been omitted. For instance, the commercial implications have been neglected as well as the project management relevancies. On top of this the implication for the key stakeholders is not outlined in at all.

Next to this, it also misses various **information items**. It does not contain a unique identifier for the decision nor does the decision have an owner. There is no detailed constraint overview resulting from this decision, nor are alternatives described. Next to the overview graph of the architecture, the verification server documentation does not link other Architectural modules to the documentation. Ultimately, the documentation is describing the functionality of the verification server, but does not explain the decision for the architecture.

The next architectual decision analysed is the decision to integrate a CWA Server. In order to understand the decision the documentation in the cwa-server/docs/architecture-overview.md is analyzed.

|  |  |
| --- | --- |
| ISO norm | CWA Documentation |
| Evidence of consideration of alternatives | * Not available |
| Record key decisions | * Enable users to take part in exposure notification framework * Compliance to the specification   affecting key stakeholders or many stakeholders • essential to project planning and management • expensive to enforce or implement • highly sensitive to changes or costly to change • involving intricate or non-obvious reasoning • pertaining to architecturally significant requirements • requiring major expenditures of time or effort to make • resulting in capital expenditures or indirect costs |
| Contains information items | * No unique identifier or owner for the decision * no statement of the decision * no correspondences or linkages concerns to which it pertains * YES: correspondences or linkages to affected AD elements * No rationale linked to the decision * No forces and constraints on the decision * No assumptions influencing the decision * No considered alternatives and their potential consequences |

This documentation has a similar level of detail as the documentation of the prior architecture decision. It also does not contain considerations of an alternative architecture to the CWA-server. It also does only gives a high level justification for the architectural decision. The information items are similarly narrow as in the prior architecture, with the exception, that there are various cross references to other architecture files in this documentation.

The next architectual decision analysed is the decision how to integrate the CWA mobile client. In order to understand the decision the documentation in the cwa-app-android/docs/architecture-overview.md is analyzed.

Similar to the two architecture decisions described above, this documentation also neglects information about the decision in various aspects. It does not contains information about potential alternatives and omits similar information regarding the decision as the two examples above. However, this documentation has a higher level of detail in explaining the necessity for the component by illustrating the four key reason on a detailed level. It also has an extended section with key references to external used libraries.

Conclusively, all three architectural decisions lack the list of alternatives and information on the decision. In order to evaluate the architectural decisions, the list of alternatives would have been helpful to proof considerations of other potential solutions. It might have been omitted to keep the architecture documentation small and not overcomplicate the reading. In order to derive alternatives, the lead architecture or any team member, which was part of the architectural steering could have provided information. An example for an alternative could have been for instance a verification within the CWA-server and not externally in a verification server.

# Structure of Corona Documentation

The structure of the CWA is being displayed within the Repository on github. The following observations were made with regards to the structure of the CWA documentation:

One of the first observations made, when analyzing the documentation of the CWA, is the **general toolset** and features used for displaying the documentation. In general WIKIs like confluence are suitable and convenient for documentation. However the CWA documentation is part of the repository in a folder with redundant markdown and pdf files. This makes the navigation and understanding of the documentation overwhelming and complex at first sight. The ease of navigation is further diminished, as there is additional documentation markdowns outside of the documentation folder. There are specific architectural documentation file within the distinct services in other folders. For example, within the cwa-server/docs is additional architectural documentation in the architecture.md file. This combination of centrally and decentraly stored architectural information hinder both, transparent insights and efficient information retrieving. Further, the decentrally stored architecture documentation have not been referenced in the solution architecture documentation. For example it has been stated that “*The documents will be linked here, as soon as they are available*”. Therefore the documentation is outdated, as the documents are already available. On the positive side however, there is cross-references available to the other documentation files in the same folder, enabling convenient technical navigation through the documents. A migration to a traditional WIKI system could enhance the transparency and readability of the documentation.

In order to evaluate the general structure of the architectural documentation, the solution architecture markdown file is analyzed. The architecture is analyzed based on the ISO norm 42010 and a estimation is to be made, whether the documentation fulfills the standard. Therefore the mandatory acceptance criteria are evaluated.

The figure below compares the structure of the documentation with the structure of the ISO norm 42010 on a high level:

Figure 1 ISO42010 Fulfillment Overview

|  |  |  |
| --- | --- | --- |
| Mandatory ISO42010 requirement | | Presence in CWA Documentation |
| Name of Architecture | | “CORONA-WARN-APP SOLUTION ARCHITECTURE” |
| System of Interest | | “CWA” |
| Supplementary information | | Miscellaneous |
| Architecture evaluations | | N.a. |
| Rationale for key decisions | | Available in introduction |
| Stakeholder description & categorization | | Implicit referenced and not described |
| Concerns of CWA | | available |
| Concern Stakeholder tracing | | N.a. |
| Viewpoint - concern match | Implicit | |
| Viewpoint - rational match | Implicit | |
| Viewpoint - stakeholder match | N.a. | |
| Model kinds | | Take out |
| Model kind convention | | Take out |
| Model kind correspondence rule | Take out | |
| Correpsondence rules | | Take out |
| Sources | | Take out |
| Views for each viewpoint | Take out | |
| known inconsistenciers | Take out | |
| Correspondence | | Take out |

In order to display the shortcomings, the missing mandatory documentation points are analyzed:

In order to satisfy the ISO standard, **architecture evaluations** must be included into the documentation. Given that there is no evaluation available, the CWA solution architecture either has not been evaluated, or the evaluation has not been documented. Given the scope of the CWA, most likely architecture evaluations took place and were omitted. In order to improve the quality of the documentation, architecture documentation could be integrated by the leading architectural committee.

In the introduction, the **rationals** for the key architectural decisions is stated. However, the structure of the introduction is not conscious. For example, the paragraphing in the introduction section seems to only partly follow a structural logic.

Further, a **stakeholder description** is a required part of an architectural documentation. This has only implicitly been done in the documentation. The stakeholder User has been used 56 times in the solution architecture documentation whilst not been described in detail. The developer has only once been referenced. Therefore the documentation is not fulfilling the stakeholder description requirement. In order to get a better understanding for the motivation of specific architectural decisions, an explanatory paragraph could be inserted to introduce the key stakeholder.

The specific **Viewpoints** documentation in accordance with the Iso standard has partly been included. For example there is a an excessive documentation on the security architecture addressing the data privacy and security concerns. This Viewpoint is realized into a dataflow **view** in figure 3 in the solution architecture documentation. The explicit connection to certain stakeholders however has been omitted in the security section as well.

Models

Sources

Inconsistencies

Correspondence

Due to the difficult navigation through the documentation, it can be not granted that all items marked not available are non-existent. However, if the item cannot be found after close analysis, most likely other consumer of the architecture would not be able to find it either. Therefore it can be seen as missing.

# References

**Websites:**

# Appendices

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**Appendix 1 Sprint Items**

