MASARYK UNIVERSITY

FACULTY OF INFORMATICS

Design and Implementation of a Mobile Application with Offline Support

Master's Thesis

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Brno, Fall 2025

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FACULTAS ARTIS INFORMATICÆ
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Declaration

Hereby I declare that this paper is my original authorial work, which I have worked out on my own. All sources, references, and literature used or excerpted during elaboration of this work are properly cited and listed in complete reference to the due source.

Jiří Loun

Advisor: RNDr. Pavel Novák

Acknowledgements

TBA

Abstract

In this thesis, ... !present tense!

Keywords

Mobile, React, React Native, Kotlin, Offline mode, Architecture, Synchronization

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Introduction

The primary objective of this thesis is to ...

It consists of ... chapters; the first chapter contains ...

The end application is ...

Decribe motivation and purpose, business context ...

Why does the app solve the problem? What value does it bring?

1 Offline-enabled mobile applications

1.1 Concept

thick client app capable of managing its own state not relying on server

1.2 Issues to be tackled

1.2.1 Offline data availability

data have to be downloaded in advance, kept updated; security concerns

1.2.2 Partial changes management

BE and FE must cooperate on keeping the data up to date without bulk-downloading over and over

1.2.3 Local data management

local DB, need to essentially fake your own BE on FE - the client thickness

1.2.4 Server synchronization

synchronize data client->server, manage conflicts - describe strategies, options

1.2.5 Offline authentication, authorization

app usability strongly relies on the user remaining authenticated while offline

2 Technical approaches

2.1 Frameworks

list of FE approaches to take with their (dis)advantages

2.1.1 React-Native

2.1.2 React PWA

2.1.3 Native approaches

Kotlin

Flutter

2.1.4 Others

2.2 Local data management

approaches to tackle the local data management

2.2.1 Local database

fake database

2.2.2 Request intercepting, processing

fake server

2.2.3 TBA?

2.3 Synchronization

2.3.1 Mitigation

2.3.2 Duplication

2.3.3 Atribute timestamping

2.3.4 Advanced synchronization management

(approaches based on advanced methods like GIT etc)

3 Implementation

3.1 Functional and non-functional requirements

3.2 Architecture, technology stack

3.3 Axios Interceptor

3.4 Local data management

3.5 Synchronization

4 Issues and future work

Conclusion

A Electronic attachments