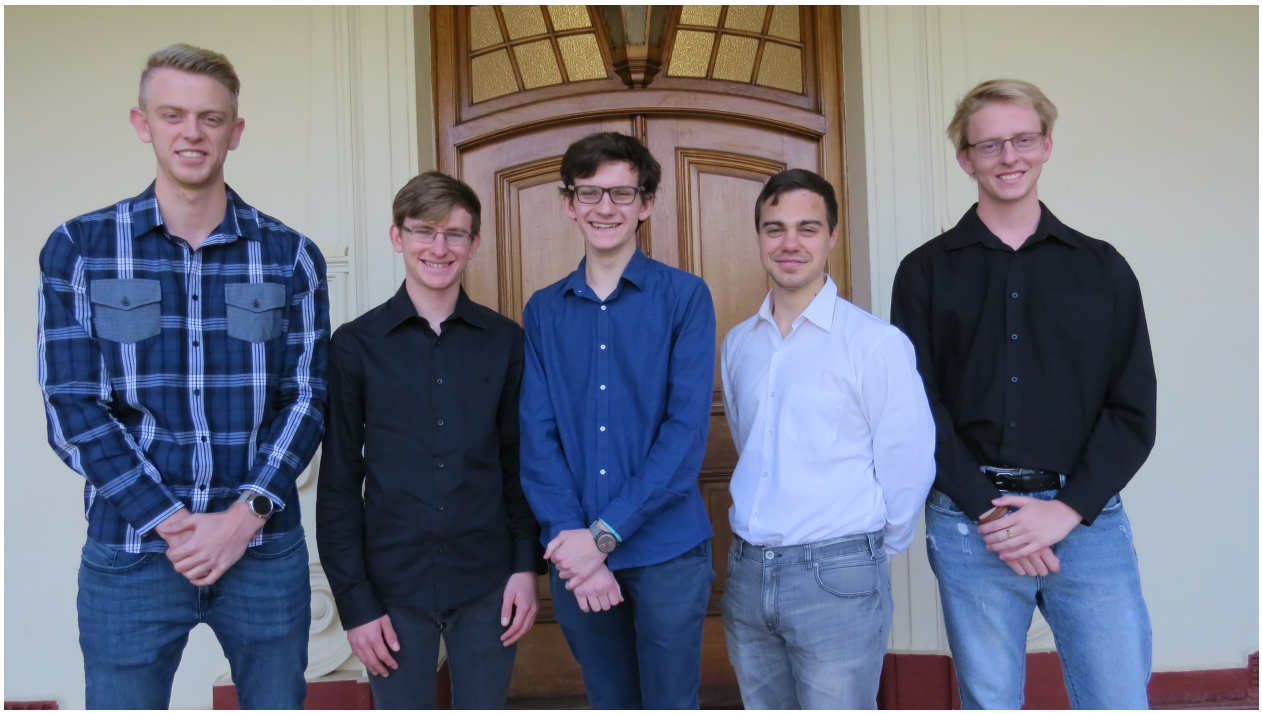
UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Tender: COMPIAX - Split Bill

Team: Java the Hutts

May 2017



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1 Project Description

The purpose of this project is to develop a mobile application that is able to split any restaurant bill amongst the people around the table. Users will use the application to take a photo of the bill, which will be interpreted by the application using OCR. Users will be able to add other people that are around the table by scanning their relevant QR codes if they have the app, otherwise users can still be added manually by those that have the app installed. An interface will be provided where users can select their items on the bill, thus providing them with their respective sub-totals and the ability to add a tip. This interaction will also live sync with users around the table to allow everyone to see what everyone else is selecting and how much they are paying. The app also incorporates machine learning to allow the application to interpret bills from different restaurants.

2 Execution

2.1 Administrative Tasks

2.1.1 Meetings

We firmly believe that active user involvement is imperative and will have frequent meetings with the client during development as well. We would like to work closely with the client to ensure that requirements misconceptions are corrected early on and that the client's feedback can be addressed properly and timely. The exact details and times of these meetings will be negotiated with the client. We do, however, think that it is imperative for at least the following meetings to happen:

1. As soon as the project is allocated and before the first demo (between 18 May 2017 and 25 May 2017)
2. After the first demo (week of 29 May 2017 to 2 June 2017)
3. In the week before or after the second demo (from 24 July 2017 to 4 August 2017)
4. In the week before or after the third demo (from 28 August 2017 to 8 September 2017)
5. In the week before the final evaluation phase starts (from 9 October 2017 to 13 October 2017)

2.2 Development

2.2.1 Methodology

We plan on following the Agile Unified Methodology to implement this product. We will develop this product in iterations and strive to have a working prototype at all times. We feel that it is beneficial to adopt an iterative approach to our development rather than a sequential process like Waterfall. This will ensure that design issues and changes in requirements are identified early on, and will allow us to deliver a working system within our time constraints. We will have a brief planning phase in which we identify requirements, derive use cases and assign those use cases to iterations. Changes in requirements will be addressed during the requirements phase of each of the following iterations. We will have weekly team meetings and will have set meetings with the client after each iteration.

2.2.2 Proposed technologies

The following are the proposed technologies for the project:
Note: These technologies are just proposals and are not final. All of it is up for discussion with the client at the first meeting.

- The mobile application will be developed using IONIC instead of a native application. This will allow the app to run on multiple platforms.
- QR code scanning for adding users. This will be more feasible than a technology like NFC since QR codes are more widely supported.

- Tesseract API for Optical Character Recognition. After much research it was decided that this will be the best option for an OCR engine to interpret the bills. It also makes provision for training that could be useful in the Machine Learning module.
- SimpleCV for using computer vision to improve interpretation accuracy.
- Node.js server. The reason we would like to add a server to the project is to allow for live syncing (since we are not using NFC) and we would also like to have the machine learning happen server-side. This saves computational power on the mobile devices and also enables better learning. For example if one phone learns a new bill, all phones that have the app installed will be able to interpret that bill. This minimizes OCR failure since it will only fail once per restaurant.
- Python will be used for back-end programming. The main reason for this is that it will ensure rapid development and aid us in developing quick prototypes. There are also numerous resources to aid with the necessary OCR.
- MongoDB database server to save user account information and bill history.
- SQLite for local storage on the mobile device. This could be used to store unseen bills for later synchronization with the server.
- Docker and Docker swarm to deploy the server.

Following is the deployment diagram showing the different artifacts and technologies:

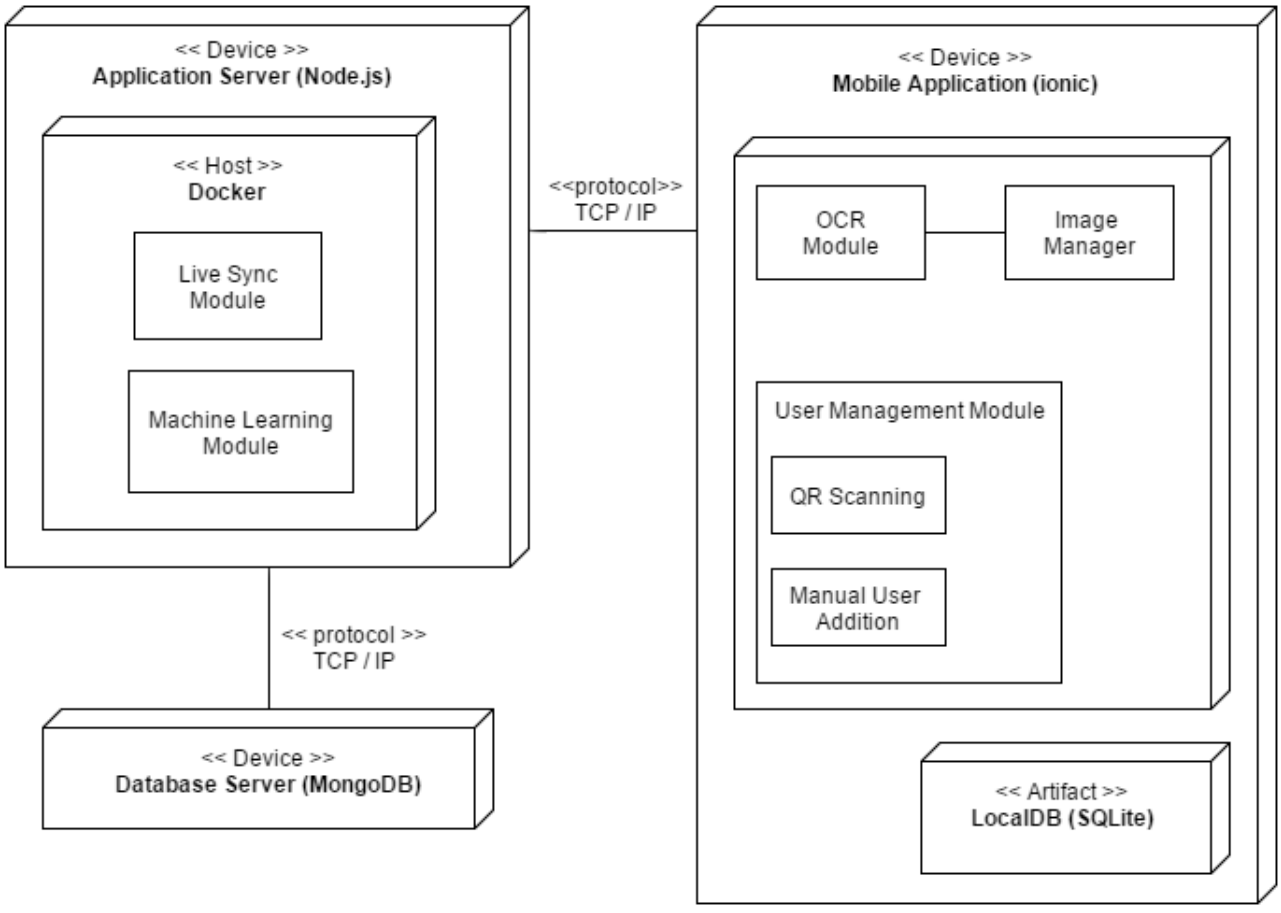
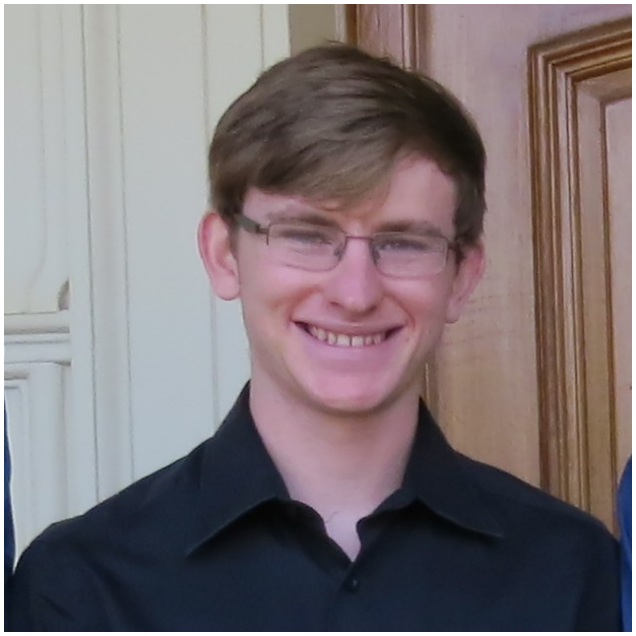


Figure 1: Deployment Diagram

3 The Team

3.1 Marno Hermann

Role Developer



Introduction I am a goal driven individual always trying to better myself and the people around me. Well balanced person that enjoys his morning runs. My passion for mathematics and solving puzzles ignited my interest in Artificial Intelligence. Specifically in optimisation since I have a knack for mathematics. Currently studying BscIT specialising in Applied Mathematics. I have developed several applications that is currently in use by different businesses in South Africa. I thus have experience in the development environment.

Skills

- Programming languages: C++, Java, C#, x86 Assembly, Delphi
- Extensive SQL knowledge
- Love to work in pressure situations
- Analytical Person

Achievements

- I am a Microsoft Certified Technology Specialist (MCTS) completed 70-516 exam
- Golden key member
- 92% for Matric 2014
- Second student in Department of Computer Science 2015
- GPA above 75% for first and second years of study
- Finished Comrades 2016
- Through Barnton Consulting developed programs for SAB Miller, Premier Foods, Dartcom and RCL Foods.

Find me on the Web

- Github (https://github.com/MarnoH)

3.2 Andreas Nel

Role Code Reviewer

Introduction Ambitious, calculating, focused (with a tinge of dry humour). I spend a large amount of my time trying to improve my skill set and myself as a person, leading to me having held various positions in the past such as a sales person, waiter, research assistant and intern. I am extremely curious about the fields of Artificial Intelligence and Computer Security, and have quite recently also enjoyed working with computer networks.

Skills

- C++
- Java
- JavaScript (includes NodeJS, KnockoutJS)
- Bash Scripting
- Web Development
- SQL (includes MySQL, PostgreSQL)
- Object-Oriented Programming

Achievements

- Golden Key member
- GPA above 75% for both my first and second years of study
- One of the highest achievers in IT in Mpumalanga during the National Senior Certificate exams with an average of 96%
- DUX learner Matric 2014

Find me on the Web

- GitHub (https://github.com/AndreasNel)
- LinkedIn (https://www.linkedin.com/in/andreas-nel-340805130)

3.3 Stephan Nell

Role Developer

Introduction Calm and patient problem solver, who enjoys a good challenge. Always responsive to guidance and advice and seeking to make the most of my ability. I enjoy experimenting with new technologies and various networking problems. I am someone who collaborates well with others in a team and is always willing to go the extra mile to solve a problem and improve on current solutions. Currently, I enjoy my Networking and Artificial Intelligence courses, and I am determined to further my studies in Artificial Intelligence and Computer Security.

Skills

- C++
- Java
- Web Development
- SQL (includes MySQL, PostgreSQL)
- x86 Assembly
- Leadership

Achievements

- Golden Key member
- GPA above 75% for my second years of study.

Find me on the Web

- GitHub (https://github.com/nellstephanj)
- LinkedIn (https://www.linkedin.com/in/stephan-nell-201710b8/)

3.4 Nicolai van Niekerk

Role Team Lead

Introduction Studying BSc IT specializing in software development, I have been exposed to the Systems Development Life Cycle since my first year at university. I am a quick learner and love to challenge myself to solve new problems and apply the knowledge that I have learnt. I love working in teams and have a particular passion for Software Engineering. I am very competitive and obsessed with developing myself in every aspect of my life.

Skills

- Good time and task management
- Good communication skills
- Quick learner
- Proficient in many programming languages including C++, Java, C# and x86 Assembly
- Well versed in every aspect of the LAMP stack
- Experience with MEAN stack
- Database design and SQL
- Systems Analysis and Design
- UX Design

Achievements

- DUX learner Matric 2014
- Top academic achiever TuksVillage residence 2015 with a GPA of 91.9%
- Top student in Department of Computer Science 2015
- GPA above 85% for first and second years of study
- Golden Key member

Find me on the Web

- Github (https://github.com/Nicvaniek)
- Linkedin (https://www.linkedin.com/in/nicolai-van-niekerk-70970b109/)

3.5 Jan-Justin van Tonder

Role Developer

Introduction Cool, calm, constant tinkerer and copious coffee drinker. I am constantly on the lookout for new challenges with a willingness to learn new, strange and wonderful things. I have a passion for computers and, in particular, Computer Networks as well as Artificial Intelligence. Being a BIT student, I have been exposed to the full spectrum of Information Technology, ranging from information science to computer science. I currently work as a Teaching Assistant for COS 216 (Netcentric Computer Systems) at the University of Pretoria.

Skills

- C++
- Java
- C#
- SQL
- PHP
- Python
- MEAN stack
- Web Development
- Object-Orientated Modeling
- Systems Analysis and Design

Achievements

- Top achiever for BIT on first year level 2015
- Top 5 academic achievers in Kollege residence 2015
- Golden Key member
- GPA above 75% for first and second year

Find me on the Web

- Github (https://github.com/jan-justin)
- Linkedin (https://www.linkedin.com/in/jan-justin-van-tonder-358bab142/)