UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
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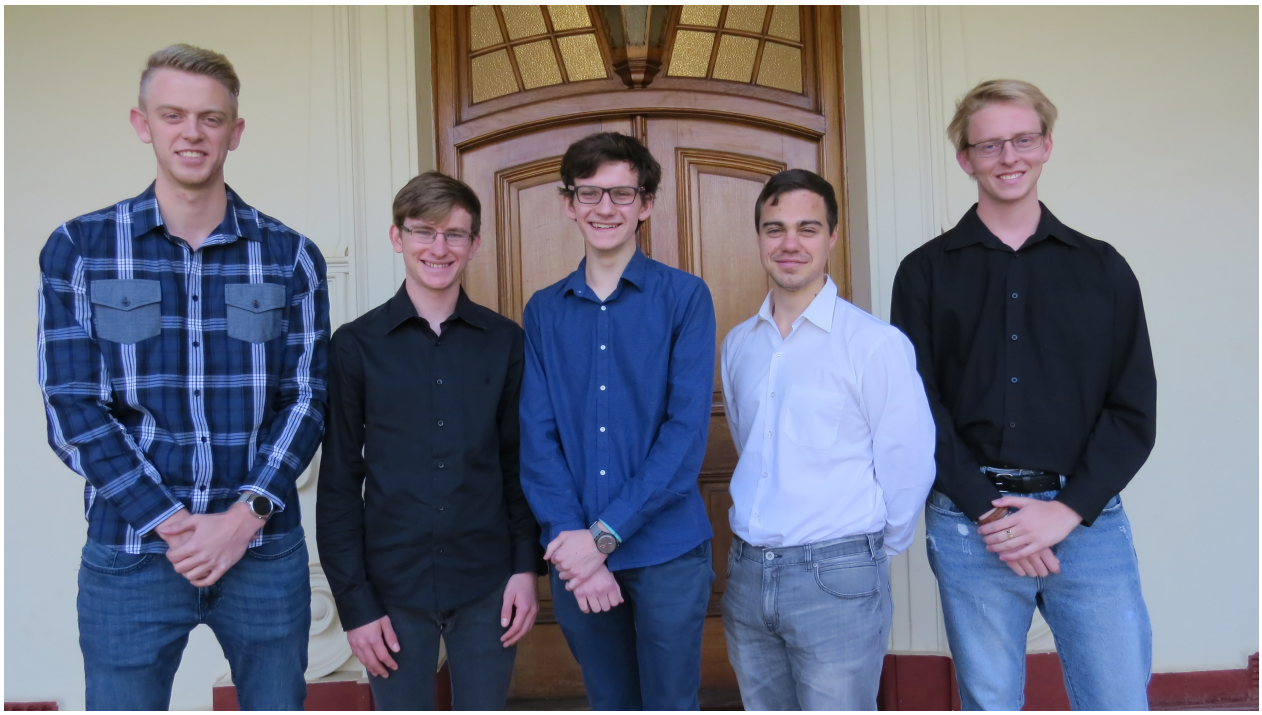
# Tender: Quant Engineering Solutions - Electronic ID Verification

**Team:** Java the Hutts

May 2017

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# Contents



# 1 Project Description

The project will be in the form of an API that can be run from the Python programming language. The user will be able to provide the API with data that usually appears on an ID or passport (such as a name, surname and ID number), a photo of the person whose data is provided and a scanned copy of the relevant ID/passport/driver's license. The software will then proceed to extract data from the provided identification documentation and compare it with the data that was provided. The software will then provide the user with a percentage value for each of the fields that was provided (including the picture) that indicates how much the provided data matches with the extracted data. The extraction process will make use of computer vision (such as OCR and face recognition technologies) in order to obtain usable data from the identification documentation.

# 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

**NOTE:** The use of these technologies are not set in stone and may be negotiated with the client in order to obtain the best possible result. As far as possible, we will try to use only open source or free-to-use technologies during the implementation of this project in order to minimize cost to the client.

- Docker for the deployment of the API.
- Git and GitHub for source control.

- Tesseract API for Optical Character Recognition. After much research has been conducted, we have established that this is the best API to use for OCR that is currently available based on preliminary tests.
- jQuery Face Detection plugin. This plugin would be useful for extracting the face from the provided identification documentation on the front end of the application before sending it to the back end to be processed.
- SimpleCV for face detection and comparison. This library was chosen because it integrates very easily with Python (which is used by the client) and it provides simplified access to the popular OpenCV library that is used for face detection and recognition.

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

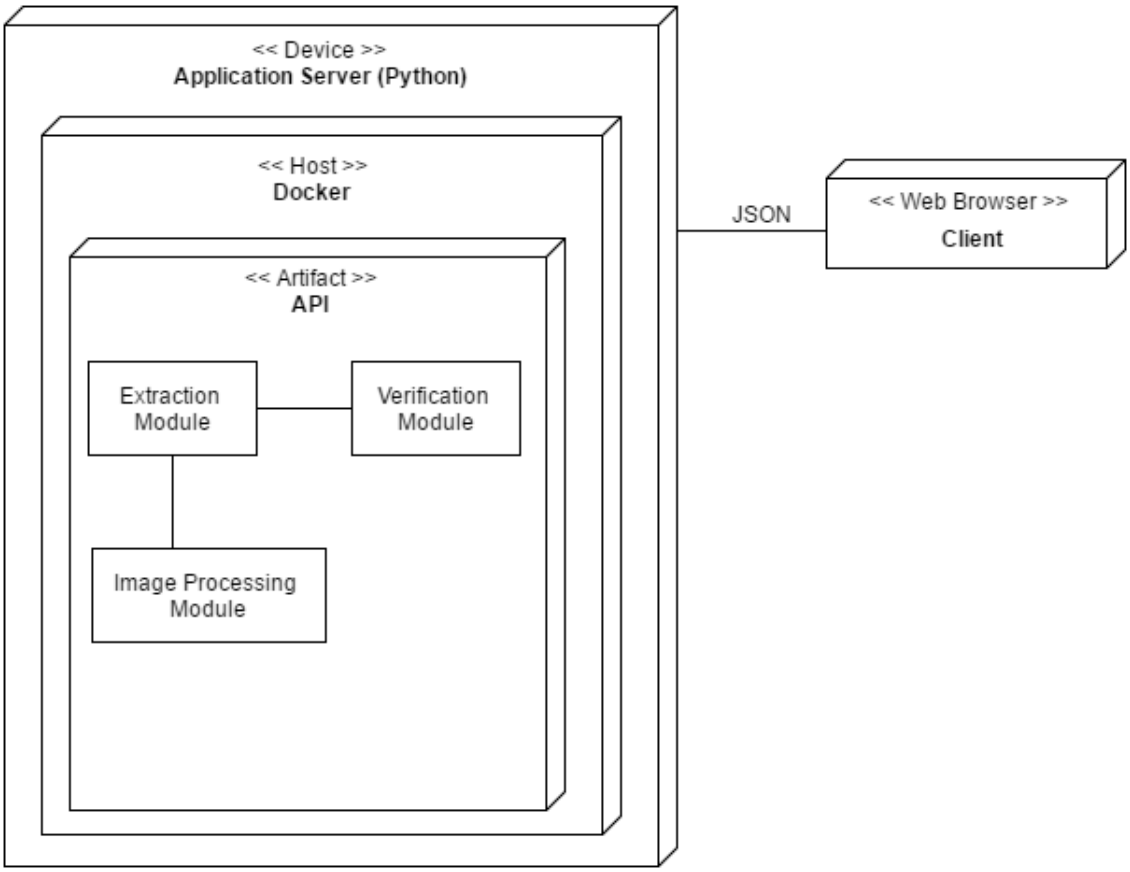



Figure 1: Deployment Diagram

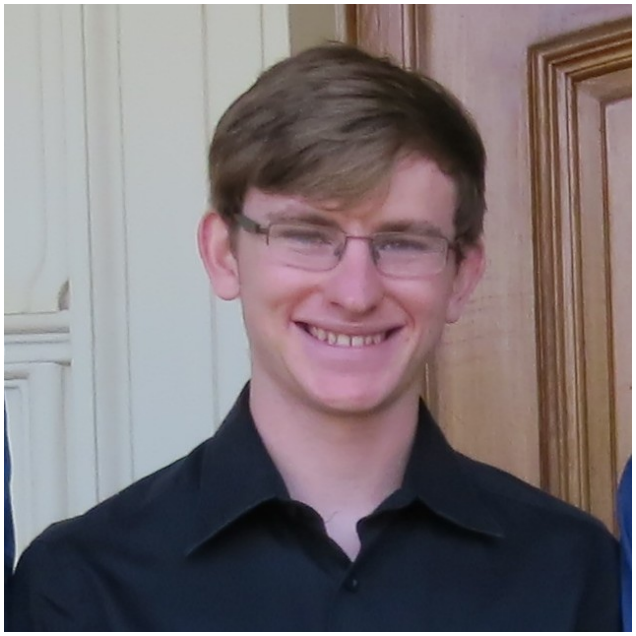
### 2.2.3 Proposed Design Patterns

- Abstract Factory to create objects that can be compared to each other in order to determine similarity.
- Strategy to swap the different algorithms that are used to compare objects of different types, such as text and images.
- Prototype to reduce the overhead of creating new comparable objects by cloning them instead.

# 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/)