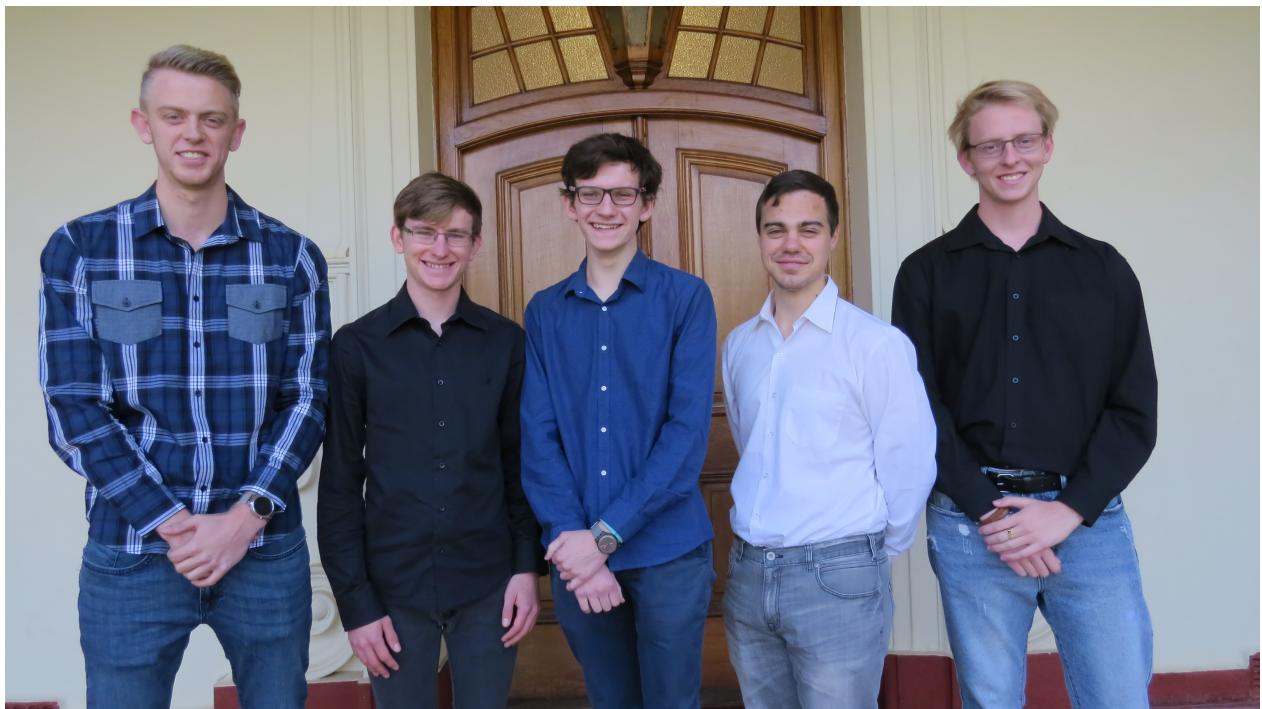


UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

CSIR - Electronically Timing Athletes (ETA)

Team: Java the Hutts
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1 Project Description

How we understand your problem is that you would like an electronic version of time trials held at the CSIR club. These time trials happens weekly and can differ in distance. We will have the task to capture the result of the individual athlete and link these results to his registered RFID-tag. Each runner must register his RFID-tag using a well developed user-friendly GUI. The results captured must be stored in a database to enable statistical analysis of the data. For example the improvement seen in consecutive time trials. Some analysis on how quick an athlete recovers by examining his month time trials will also be interesting figures etc. These statics should be very accessible and easy to generate the different reports. For some added features if time permits, manual entries can also be added by the club chairman of the different races of these athletes and this can then also be linked to their account. This feature will then aid the club in keeping track of how many kilometres an athlete has done in club colors, so that club challenges for certain amount of kilometres ran per year can also be tracked. (We know this is beneficial since some of our members also prefer transportation by foot.)

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 registration and result portal will be designed for a web interface that is both desktop and mobile friendly and will adhere to HCI standards.
- It was decided that an Arduino board with several extensions will be used to communicate with the RFID scanner and provide an external display. The reason for use of Arduino instead of other technologies like Rasberry Pie is that Arduino board with added extensions worked out more cost-effective and provided more extensions that suited the project needs.

Race data will either be extracted by connecting the Arduino to a computer with USB and extracting the race data from the SD card and subsequently uploading the data through the result portal to the server or once a Wifi connection is established the data can upload automatically to the server.

The Following Arduino extension will be used:

- **UNO R3 Development Board Microcontroller for Arduino** UNO R3 is the most popular Arduino microcontroller and is designed with extensive use in mind.
- **SD card Module.** The SD card module will enable us to store the runner's data in the situation where communication with a server is not possible.
- **Hengjiaan NFC RFID RC522 RF IC Card Sensor RFID Reader Modules.** The following reader has both NFC and RFID capabilities and will support all major RFID card types.
- **S50 Card Keychain.** Although the RFID module will be able to communicate with multiple RFID cards S50 seems to be the most durable and lightweight options for runners to use.
- **6F22 9V Battery Holder Case w/ DC Jack for Arduino - Black + Red** To allow for portability and use in remote locations an external battery module will be required.
- **16 * 2 Character LCD Display Module with Blue Backlight.** The screen module will allow for a detailed display of time and will be able to give the user the necessary feedback when the user taps/swipes the RFID tag.
- Due to the lightweight nature of the Arduino board, a lightweight operating system will be required. We decided on the FreeRTOS since it is widely supported platform and included specially designed capabilities for Arduino.
- Node.js will allow us to easily manage request from the Web Client and will allow for backend computation of the Statistical aspects of the product.
- MongoDB database will be used for storing user details and all the necessary data collected by the Arduino module



2.3 Deployment Diagram

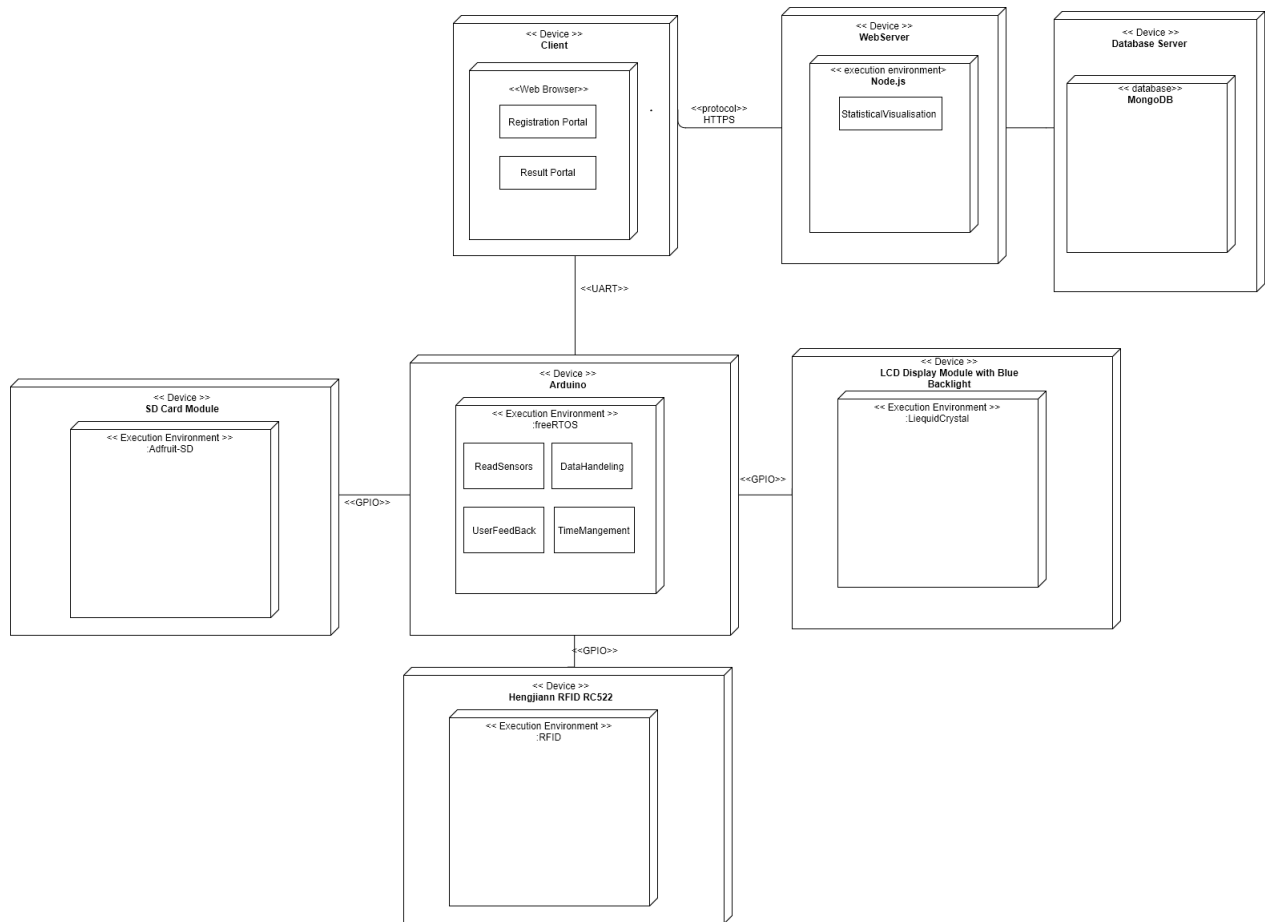


Figure 1: Deployment Diagram

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/>)

