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| Start | Finish | Author | Description | Reason | Version |
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| 19/07/2017 | 20/07/19 | Vinicius | It points out the Application that can be build to solve the problem | Client wants to know the options available and the advantages and disadvantages of each | 1.0 |
| 23-07 | 23-07 | Vini | Reordered solutions. Added why not reasons to "Computer application" | After meeting with organizer this solution proof to be unviable | 1.1 |
| 03-08 |  | Vini | Added conclusion | Makes it clear to understand our point of view. | 1.2 |

Application Solutions

In this section, we would like to emphasize potential applications which aim to fulfil the project scope. We concentrate our discussion on what they are, and why or why not proceed with them. We have identified three ways the application can be built; web-based application, mobile device application and a computer application. We list them below.

Web-Based application:

**What:** It is an application which runs in a web browser.

**Why:** Because any computer or mobile device, using any operation system such as windows, Linux, Android or IOS, can access and use the application as long as there is access to the internet (or the network where the app is hosted) and a web-browser capable to surf the internet. This is the most universal approach compatible to all devices.

Mobile phone application:

**What**: it is an application that runs on mobile devices, smart-phones or tablets.

**Why:** The great majority of people have at least one type of mobile devices in New Zealand. A mobile phone application are usually more user friendly. It is easier to access and the user interface is easier to interact with.

**Why Not:** There are several types of mobile phones and tablets which increases the complexity of creating an application but it gets more complicated when we look at their operational systems(OS). The most common ones are Android, IOS and Windows and therefore supporting all the OS may not be feasible.

Furthermore, in order to use and application in a mobile device it must be downloaded and installed first. Usually an application is considerably large. To download the application, users must have access to the internet or downloaded it before coming to the MATHEX competition, otherwise having hundreds of people downloading at the same time using the same network will generate the network to be very slow generating delays on the scoreboard system. Lastly, because uploading the app to the device’s respective app store would incur additional fees, it will need to be downloaded from an unauthorised location, which many users may not trust.

Computer application (Physical Scoreboard):

**What:** A desktop application that runs in a computer. This approach would not be available to the spectators but only to the judges so the answers can be entered. The score board would be mirrored to a screen(s) through a projector positioned such that spectators can visualize the scoreboard.

**Why:** The aim of this solution is simplicity. It would reduce significantly the amount of resources needed such as powerful servers, internet access and Wi-Fi connection for spectators. Due to the low traffic of data one computer could take over all the work that needs to be done ( See Solution 3 of hardware requirements section). The most important part of this solution is setting up a project\screen at the venue. However, the simplicity of this solution may not satisfy all client's requirements. Further costs are expected for implementing a projector and screen.

**Why Not:**  There is a high risk that implementing a scoreboard using a projector will not solve the problem. It is possible the spectators will have problems seeing the screen's content . Also, only the top teams will be shown on the screen unless a different solution is provided. At this stage, this approach does not add any considerable value to the MATHEX competition instead more complications.

Note: The application used by the judges to enter the answers is not defined here. It could be a mobile app, an web-page or another computer application.

**The Application - Conclusion**

Based on the assessment above, the Web-Based application solution is the best option that satisfy the project scope. It is simple to used and avoids any further steps from users. Also, facilitates implementation due to its universal framework.