Singularity Software
Milestone 1

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1 Executive Summary

This document summarizes the problem addressed by the Siftables Emulator project. After providing a brief summary of the clients—Tim Ekl and Eric Stokes—and the current solution, or lack thereof, it goes on to provide more detail about the stakeholders involved in the project and their primary concerns and needs. Those stakeholders include the clients and the developers of Sifteo Cube programs, who will be the primary users of the software. Finally, an overview of the proposed product and its key requirements and features, as agreed upon by the client and Singularity Software, is detailed and the constraints surrounding the project's development are enumerated. Future documents will use the information contained herein as a starting point from which to provide more details of the final solution.

2 Introduction

Developers of applications for the Sifteo Cubes currently must test programs they create for the platform on the Cubes themselves. With a full release of the Cubes and corresponding Application Programming Interface (API) still pending, developers unable to join the Sifteo Early Access program are left without a software-based interface within which to productively develop Sifteo programs. As such, Singularity Software will provide, in the form of the Siftables Emulator, a software-based emulator for the Sifteo Cubes that will allow any developer to try programming in the unqiue environment provided by the Cubes.

3 Client Background

Clients Tim Ekl and Eric Stokes are alumni of Rose-Hulman. Mr. Ekl is currently working on a M.S. degree in Engineering Management; Mr. Stokes is currently working for n~ask Signal Processing Systems in Denver, Colorado. As former Rose-Hulman students, the clients are avid users of technology who follow new trends in the industry. As a result of this interest in new technology, both Mr. Stokes and Mr. Ekl discovered and purchased Sifteo Cubes, a revolutionary product that consists of a set of (anywhere from 1 to 6) mini computers. While both clients have a set of 3 Sifteo Cubes, they realized that not everyone interested in the project could have the luxury of physical hardware to work with. As such, they asked Singularity Software—via the Junior Project proposal process at Rose-Hulman—to construct a software emulator for the Cubes that would make the development of Sifteo applications easier, especially in the testing phase.

4 Current System

Currently there is no way to simulate Sifteo Cubes. Mr. Ekl has developed a basic emulator in the past, but at the client's request, that code will not be used or examined during the creation of Siftables Emulator. At this time, the only way to test applications developed for the Cubes is on the Cubes themselves. This approach is expensive and bulky, given the limited number of Sifteo Cubes currently available; this limit has negatively affected the number of applications which have been created.

From a programming standpoint, Sifteo has announced that they will be releasing their API later this month; as of this printing, the API has not yet been made public.

5 User/Stakeholder Description

5.1 User/Stakeholder Profiles

5.1.1 Sifteo application developers

As the primary target audience of the system, developers targeting the Sifteo platform are assumed to have a reasonable amount of technical background; they are not novice computer users and are familiar with programming concepts like Object-Oriented Programming and APIs. As developers may hail from platforms ranging from Windows to Mac to Linux, cross-platform support is an important consideration.

Possible problems for this user type include an unstable or crash-prone system: as developers are writing and testing their own code, it is essential that the emulator does not contribute to the failures that the user must debug. Developers will deem the emulator project a success when they can successfully program and test software that uses any or all of the features of the Sifteo cubes on their development platform.

5.1.2 Clients

The clients (Tim Ekl and Eric Stokes) are assumed to be a subset of the Sifteo application developers user class. However, their programming knowledge and knowledge of the Sifteo Cubes is known to be more advanced than that of the average application developer. As such, their needs require that the emulator is capable of being pushed to the same limits as the actual platform.

5.1.3 Singularity Software

Singularity Software, as the team behind Siftables Emulator, is primarily interested in the creation of a finished product that can be delivered to the clients at the conclusion of the Rose-Hulman junior project cycle. As a team, we are less familiar with the Sifteo platform and are also relatively inexperienced with the scale of project the Emulator entails.

5.1.4 Sriram Mohan (CSSE Department)

As the advisor of the Junior Project, Dr. Mohan has a vested interest in the creation of a finished, deliverable product. His key responsibility is to review documents created within the scope of the Junior Project series of courses.

5.2 User Environments

5.2.1 Sifteo application developers

The typical Sifteo application developer may be working on his own, or he may be working with a team of developers; he or they will be working on workstations or powerful development laptops that have a significant amount of graphics horsepower. They may

or may not be connected to the Internet during development, depending on the location in which they are developing. Additionally, they may be Windows, Mac, or Linux users and will be using various Integrated Development Environments (IDEs) specific to their platform; integration between such IDEs and the Siftables Emulator, while possibly desirable, is not a requirement.

5.2.2 Clients

Mr. Stokes and Mr. Ekl are both primarily Mac users, although both clients also own and occasionally use Windows machines as well. Their environment is essentially the same as that of the typical Sifteo application developer.

5.3 Key Needs

5.3.1 Emulate Sifteo Cubes in a desktop GUI application

No emulator currently exists for the Sifteo platform; the need is currently either filled by homebrew efforts like Mr. Ekl's Java-based emulator, or circumvented by using the Cubes themselves as a testing platform. The clients envision a solution where all of the interactions possible with a set of Early Access Sifteo Cubes can be replicated in a software emulator.

5.3.2 Develop an API for creating applications in the emulators Cubes

An API is necessary to facilitate interaction with the virtual Sifteo Cubes. Currently, no API is made available by Sifteo for the physical cubes, and no emulator API exists because no emulator exists. The clients would like an API with which the virtual Cubes can be programmed. Mr. Ekl stipulated that shadowing the official Sifteo API, while potentially beneficial for long-term development, is not a requirement.

5.3.3 Showcase Cube/emulator functionalities with samples

Sifteo currently provides example games that run on the Cubes as a showcase of what the platform can achieve and what unique features it can offer to the user. The clients would like to have a similar showcase available for the emulator as an aid in understanding both the emulator platform and the larger Sifteo Cubes programming platform.

5.4 Alternatives & Competition

Singularity Software's Siftables Emulator will be the first software of its kind for the Cubes. The only true competition is the Sifteo Cubes themselves. The Cubes have the advantage of physicality—as tactile objects, they will always be superior in terms of user experience when compared to an emulator. However, they are expensive and only manufactured in limited quantities at the moment; the Siftables Emulator is, by contrast, infinitely available as an open source piece of software.

6 Product Overview

6.1 Product Perspective

Siftables Emulator is a free independent system used to emulate the way Sifteo Cubes handle motions and interactions.

6.2 Elevator Statement

Due to the limited availability of Sifteo Cubes, developers unable to obtain a set of Cubes have no good way to test the programs they create for the platform. At Singularity Software, our goal is to develop an emulator for the Cubes that will be able to emulate an arbitrary number of Sifteo Cubes and the way they handle physical motions and interactions. Along with the emulator itself, Singularity will develop an API and example games and programs.

6.3 Summary of Capabilities

The main features of our emulator work together to allow developers to quickly start Sifteo application development by making a virtual edition of the Cubes available for emulation and testing.

Feature	**Benefit**
Workspace where multiple cubes can be emulated	A user-friendly way to develop for multiple cubes
Buttons to control the cubes	An easier way to control the basic movements of the cubes in place of physical manipulations
Ability to load programs into the cubes	Allows the user to test his own programs and example programs in the emulator
Example games (requirement)	Gets new emulator users started with the platform
Open source (requirement)	Allows the community to contribute improvements to the emulator
API (requirement)	A standard way of interacting with the virtual Cubes

6.4 Assumptions and Dependencies

Sifteo has plans to release an API of their own for the Cubes; Singularity will attempt to make our API shadow much of the language and functionality of the official Sifteo API.

6.5 Estimate of Cost

Because it is an open source piece of software, Singularity Software does not believe that the Siftables Emulator will incur any monetary costs throughout the project.

7 Features

Two attributes accompany each feature described below: **Status**, which is a measure of the feature's progress duing the project definition period, and **Priority**, which indicates the relative importance of each feature.

Feature	Description	Status	Priority
An individual, manipulable Cube	The user will be able to manipulate a virtual Sifteo Cube with his mouse	Approved	Critical
A workspace with multiple Cubes	The user will be able to place a number (1-6) of Cubes on the workspace and manipulate them	Approved	Critical
Buttons to control the cubes	The user will be able to click buttons that correspond to each manipulation possible with a physical Cube	Approved	Critical
Cubes interact with each other	Each Cube on the workspace will interact and communicate with neighboring Cubes	Approved	Critical
The ability to load programs into the cubes	The user will be able to load a program of his creation onto the virtual Cubes in the workspace	Approved	Critical
Auto-align	The user can activate a mechanism that aligns all Cubes on the workspace to a grid or other order	Proposed	Useful
Zoom ability	The user will be able to zoom the workspace to focus on an individual cube, a group of cubes, or the whole space	Proposed	Useful

8 Constraints

While much of this project is open-ended, there are a few basic constraints. At the direction of the clients, all code should be open source and version-controlled. Mr. Ekl requested that the emulator run easily on Mac as well as Windows, with the stipulation

that Linux compatibility would satisfy the Mac requirement for Singularity's testing purposes. In addition, the clients requested that an issue tracking system be put in place and used throughout the development process. Finally, the emulator must be completed by the end of the year to satisfy the requirements of the clients and of Dr. Mohan.

Glossary

Sifteo Cubes are small machines capable of loading programs and interacting with one another as well as responding to predefined movements. 3

References

1. Sifteo Inc. Online: http://www.sifteo.com

2. Tim Ekl. Client Meeting. 12 September 2011 12:45 p.m.

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