

Group Projects A.Sc.1 - Architecture

Contents

2016-2017

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1. Project Overview

Pota Cola is the biggest soda company in the whole world. So famous that it has even become a household name.

The secret of such a great success is intimately bounded with its recipe. Kept secret for more than a century, the recipe has never been known fully by a single person since the inventor. He's the one who supervised the production lines' creation which never stopped working since.

Until recently, nobody minded knowing where the precious document was, certainly lost, as the business took care of itself. Bottles got out of production lines and customers were more than happy to drink them.

Time doing its job, the perfectly engineered machines have met their end of life. Unfortunately, the clever inventor died in April 1975 leaving nobody with a clue on how to make new ones.

Actual CEO found in a box, hidden in the archive department, a bunch of old 5 and a quarter inches floppy disks with labels stating "Confidential", and, next to them, a note stating "CHIP-8. Execute in order".

He then recalled that his predecessor told him the recipe wasn't lost, as everybody thought, but encoded in a computing program.

As he can't trust anybody to have the full recipe in his hands, he chose not to use one of those CHIP-8 emulators that can be found on the internet but to make a new one built so he can recover the formula and copy it on a more recent medium. To be sure no leak at any level could happen, he wants that emulator to run on a freshly installed Debian Jessie on his x86 32 bits computer.

Your team has been chosen for this incredible opportunity to save your favorite drink from an avoidable end.

2. Functional Expression

2.1. Operation

Your emulator must implement a complete CHIP-8 virtual machine that can load and run code designed for that platform. Your solution must also provide a virtual display. You're free to use any language you want, and any library you find suitable, except for the actual emulation. You can for example use SDL for graphics, but you can't use any library that would provide a ready-to-use CHIP-8 implementation.

You must also provide a debugging environment that allows to:

- Run code step-by-step (instruction per instruction)
- See registers status
- See memory map

2.2. Technical requirements

Your emulator must work on a Windows or Linux system. For the purpose of the POC, this operating system must run on a x86 32 bits Virtual Machine as the CEO's computer is of that kind. The keyboard to interact with the CHIP-8 emulator can be a physical or a virtual one at your convenience

2.3. Bonus features

The creator of the Pota Cola was a genius in various domains. It may be very interesting to understand the step by step procedure of his program. But, as actual CEO doesn't feel comfortable doing so just by reading the code from scratch each time he wants to work on it, he will use the step by step feature allowing him to take his time.

As he's not found of letting his computer on all night longs, he would like a "Save/Load State" feature that could allow him to take his analyze at the exact point he left it. Every memory, register, step of computation must be saved and be restored at will.

2.4. Resources

Here is a non-limitative list of resources that you could find useful:

- <http://devernay.free.fr/hacks/chip8/C8TECH10.HTM>
- <http://www.multigesture.net/articles/how-to-write-an-emulator-chip-8-interpreter/>
- <https://web.archive.org/web/20151229075253/http://chip8.com/?>

3. Deliverables

Students should include the following elements in their final delivery:

- A zip archive with the project source code. The source code must also come with the build system used (Project file, autotools...), if any.
- Project documentation, based on the template.
 - Technical documentation explaining your choices and/or implementation choices/details on the following items (at least):
 - Memory implementation
 - Graphics management
 - User manual

The first document is an academic document. Address the reader as a teacher, not a client. The last one (User manual) should address the reader as a user. These documents can be in French or in English, at your option.

4. Graded Items

The project will be graded as follows, on a 110/100 scale:

- Core features (50 points)
 - The emulator can load code from a file (5 points)
 - The emulator can run CHIP-8 code (30 points)
 - The emulator has a display (10 points)
 - The emulator handles keyboard (physical or virtual) (5 points)
- Debugging (50 points)
 - The user can run code step-by-step (20 points)
 - The user can see registers values (10 points)
 - The user can see memory content (20 points)
- Bonus features (10 points)
 - Bonus features done by the students (10 points)