Lab 0: Computer Science Unplugged: Marching Orders

Due date: March 27, end of lab period.

About the Lab

Throughout the course you will be working with **CSC 448** students on programming assignments. Your **CSC 448** teammate will be developing software for you to use.

An important aspect of the interaction between you and the **CSC 448** students is that you will be expected to provide problem requirements (specifications) for the **CSC 448** students to turn into software.

One of the key things about requirements, instructions and specifications, is that in order to be successful they have to be **formal**, **precise**, **understandable** and **complete**.

This lab assignment illustrates this point using a simple Computer Science Unplugged activity called Marching Orders.

Computer Science Unplugged[1] is a collection of activities designed to illustrate core principles of computer science and computer organization **without the use of computers**.

The lab will be done in teams of five people: three **CSC 448** students paired with two**CHEM 441** students. You will be divided into pairs at the beginning of the lab, and then, you will be matched with a team of **CSC 448** students, once the two classes are mixed.

[1] http://www.csunplugged.org

Lab Assignment

Marching Orders

Each team will be engaged in a CS Unplugged[2] activity called `Marching Orders`. The goal of this activity is to establish that in order for the computing devices to produce correct output, they should receive *formal*, *precise* and *complete* instructions.

The activity proceeds as follows. One person in the group, referred to as a *conductor* receives a paper card showing a picture that consists of a number of different components. All other people in the team become *artists*.

The goal of the conductor is to make all artists reproduce the image on the card. To achieve this goal, the conductor describes the image in a series of drawing instructions. The artists follow the instructions by drawing what they believe the conductor asks them to draw. At the end of the activity, the original image is compared to the images produced by the artists, and any errors made by the artists are noted.

The conductor shall strive to make the instructions as clear and precise as possible (and of course, the instructions shall be complete - i.e., describe the image in its entirety).

The marching orders game will be played in three rounds with a number of modifications.

Round 1. The **CSC 448** students will be the conductors, the **CHEM 441** students will be the artists. The goal of this round is for the **CSC 448** students to **show** their **CHEM 441** partners *how the marching orders should be given to achieve the best result.*

Round 2. The **CSC 448** students become artists, while **CHEM 441** students become conductors. This is an informal round. The artists are allowed to ask clarifying questions to the conductors to make sure they understood the instructions.

Round 3. The **CHEM 441** students continue being conductors, with **CSC 448** students continuing to be artists. This time, the artists are not allowed to ask clarifying questions.

More specifically, here is how each round will proceed.

Round 0

Once the two classes are mixed together (half of each class will remain in each of the two classrooms), and the teams are assigned, make introductions.

[2] http://www.csunplugged.org

Note: In each round, please make certain that the artists do not get to see the image before the completion of all the instructions from the conductor. If the images were inadvertantly revealed, please contact one of the instructors to receive replacement images.

Round 1

CSC 448 students will discuss with you their understanding of the game. Two of the students then will take turns playing the role of the conductor, while you (**CHEM 441**) students) will play the roles of the artists during this round. You will have to draw two images following the instructions given to you by the **CSC 448** conductors. For each image:

1. The conductor produces the instructions (either reads them from the written copy, or speaks them directly).
2. The **CHEM 441** artists work on drawings following the instructions. They may ask clarifying questions if necessary, *however, you should plan your instructions so that the number of questions is minimized!*
3. The remaining **CSC 448** members of the team watch the artists and make notes on when the artists make errors.
4. Upon completion of the drawings, the original drawing and the drawings rendered by the artists are compared to each other, and any differences are discussed by the team members. It is important to determine why mistakes happened: was it a misunderstanding of the instruction, or was it a simple "typo", or something else entirely.

Round 2

CSC 448 students become artists. Each **CHEM 441** student receives a card to describe. They take turns at being the conductor: each student describes their card in turn.

1. The conductor can spend a few mins thinking about how best to describe their image. This is your time to decide **how you want to describe the image**.
2. When the conductor is ready (s)he can start giving instructions to the artists.
3. The artists shall try to follow the instructions precisely. Clarifying questions to the conductor are allowed at this stage.
4. The remaining **CHEM 441** student shall record the instructions supplied by the conductor.

5. Upon completion, the drawings made by the artists are compared to the original image, and to the list of recorded instructions. Any mistakes made by the artists are discussed and documented by the team using the specially provided forms. For each mistake, record the specific instruction that was misinterpreted, discuss why it was misinterpreted, and what would have been a better way to describe the same part of the drawing. Note, how many artists made the same (or similar) mistake(s).

Round 3

CSC 448 students continue as artists. **CHEM 441** students continue taking turns as conductors. Each conductor gets a new image to describe. The activity proceeds the same way as in **Round 2**, *except, the artists are no longer allowed to ask any questions: they must follow the instructions as presented to them without and feedback.*

Deliverables.

Each team prepares and submits at the end of the time alotted for the lab a team report detailing the experience. For each round of the activity, the report shall contain:

1. The original drawing.
2. The instructions given out by the conductor.
3. The drawings made by the artists.
4. The completed *error analysis log* — the forms for it will be provided for you in the lab.

Put a cover sheet with the names of all students in the team, and submit the hardcopy of the report to Dr. Goodman.

Good luck!