# 15-110: Principles of Computing, Spring 2018

## Programming Assignment 1

### Due: Tuesday, January 23 by 9PM

Note: You are **responsible for protecting your solutions** to the following problems from being seen by other students both physically (e.g., by looking over your shoulder or verbal discussion) and electronically. In particular, since the lab machines use the Andrew File System (AFS) to share files worldwide, you need to be careful that you do not put files in a place that is publicly accessible.

If you are doing the assignment on the Gates-Hillman Cluster machines we use in the lab or on `unix.andrew.cmu.edu`, please remember to have your solutions inside a `private` folder (which is under your home directory). Our recommendation is that you create a `pa1` folder under `~/private/15110` for this assignment. That is, the new directory `pa1` is inside the directory named `15110`, which is inside the `private` directory.

## Overview

For this assignment, you will create a text file for each of the problems below. You should save all of these files in a folder named `pa1`. Once you have every file, you should zip up the `pa1` folder and submit the zipped file on Autolab. See Lab 1 for a reminder of how to do this.

## LightBot

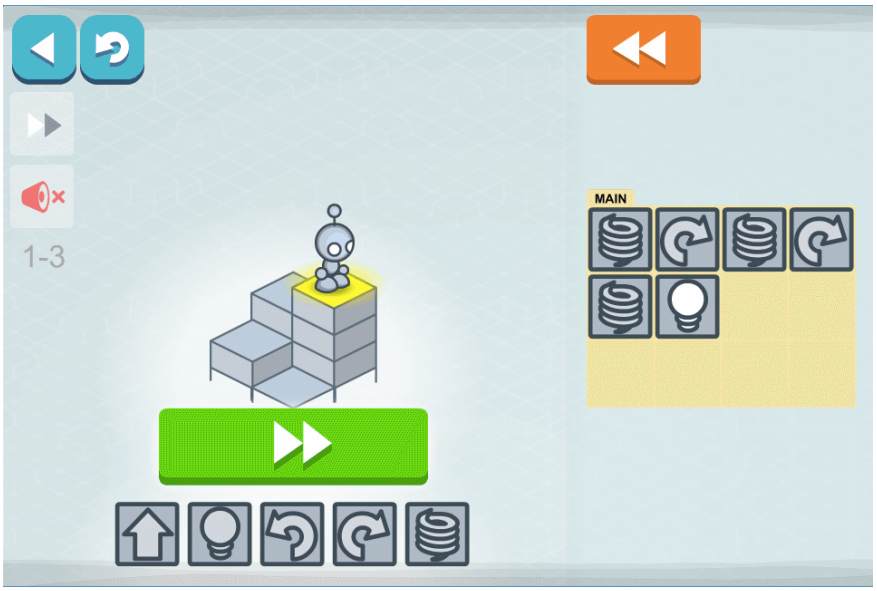
As you saw in class, we used a game called LightBot to introduce the idea of computational thinking, solving a problem by breaking it down to simpler steps and put these steps in the right order to solve the larger problem. In class, we solved some problems from this website:

http://lightbot.com/hour-of-code.html

(You will need to make sure you have Flash active on your computer to run the online version. You can also download an iOS or Android app for this program if Flash doesn't work on your computer.)

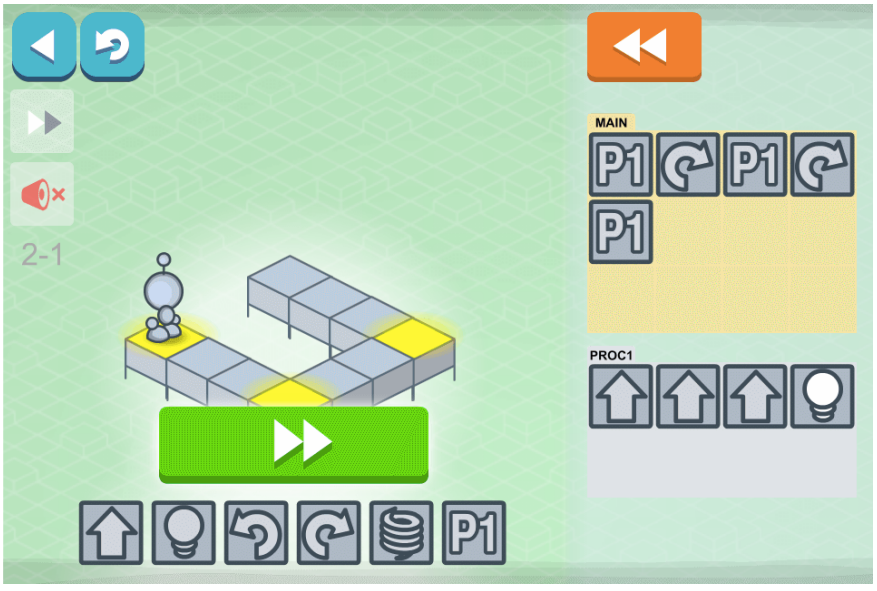
When we solve the puzzles, we put instruction blocks in place to form a "program" for the robot. As you saw in lab, you can also write these programs textually, which is what we will be doing when we start to learn Python, a programming language for computers.

As an example, here is the solution for Level 1, Puzzle 3 and it's corresponding "program":




```
def main():
    jump()
    right()
    jump()
    right()
    jump()
    light()
```

If the solution requires an additional procedure like in Level 2, Puzzle 1, we can include both to create the "program" in single file:



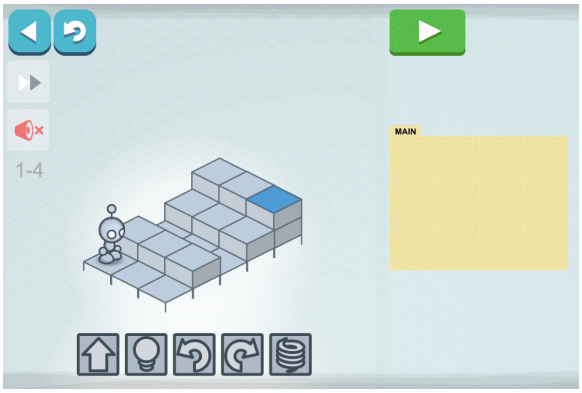

```
def main():
    p1()
    right()
    p1()
    right()
    p1()

def p1():
    forward()
    forward()
    forward()
    light()
```

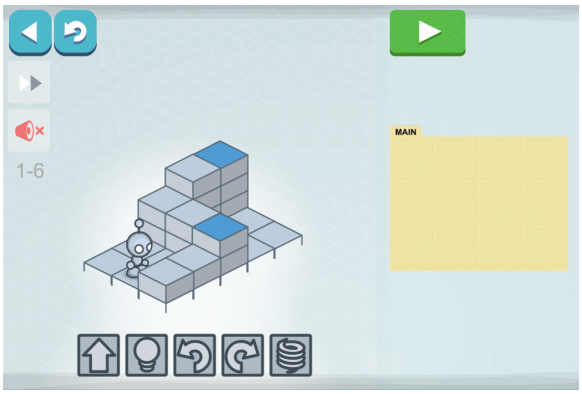
## Assignment

Solve the following five problems from the LightBot activity online. First solve them using the instruction blocks as we did in class. Then write the solution as a "program" in a text file, one solution per file.

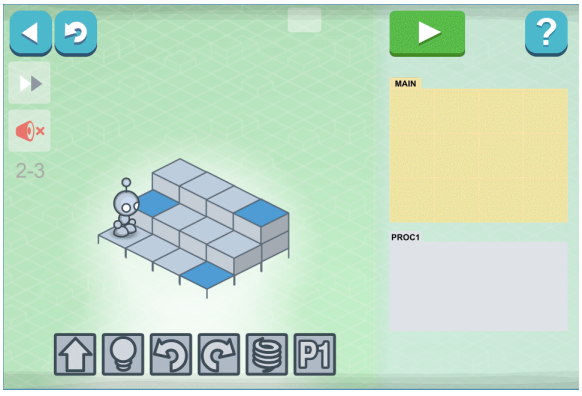
1. [2 points] Solve Level 1, Puzzle 4 and store the solution as a "program" in the file `lightbot-1-4.txt` in your `pa1` directory.



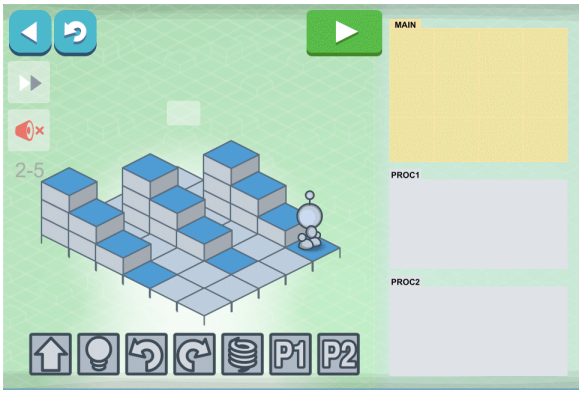

2. [2 points] Solve Level 1, Puzzle 6 and store the solution as a "program" in the file `lightbot-1-6.txt` in your `pa1` directory.



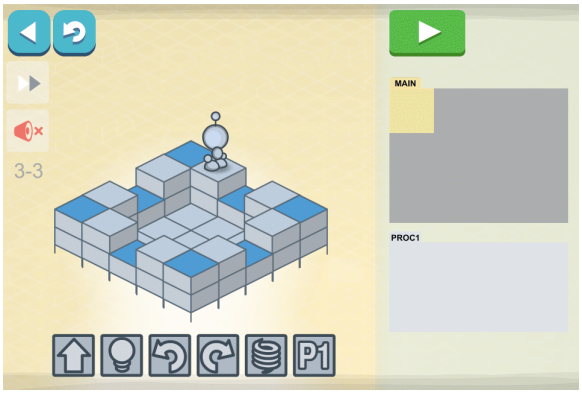

3. [2 points] Solve Level 2, Puzzle 3 and store the solution as a "program" in the file `lightbot-2-3.txt` in your `pa1` directory.



4. [2 points] Solve Level 2, Puzzle 5 and store the solution as a "program" in the file `lightbot-2-5.txt` in your `pa1` directory. (HINT: Use P1 to climb and light the tiles. Use P2 to set LightBot up for the next climb.)




5. [2 points] Solve Level 3, Puzzle 3 and store the solution as a "program" in the file `lightbot-3-3.txt` in your `pa1` directory. (HINT: look for something you can repeat over and over and put this in the procedure 1 and your last instruction in procedure 1 will be P1 to allow you to repeat the instructions. What do you put into main to start the process going?)




## Submission

You should now have the `pa1` folder that contains the following 5 files:

```
lightbot-1-4.txt        lightbot-2-3.txt        lightbot-3-3.txt
lightbot-1-6.txt        lightbot-2-5.txt
```

Zip up the folder and submit the zipped file named as `pa1.zip` on Autolab to the `pa1` assignment by the indicated deadline. You can resubmit as many times as you need to up until the deadline, but only the last submission will be graded. Be sure to check on Autolab when you submit to make sure you can see your five files and the contents are correct! If you see empty files or the wrong files, fix this error and resubmit!