Birzeit University - Faculty of Engineering and Technology
Electrical & Computer Engineering Department - ENCS4330
Real-Time Applications & Embedded Systems - 2^{nd} semester - 2020/21

Project #3
POSIX threads under Unix/Linux
Due: June 4, 2021

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Simulation of ball catching game

We would like to build a multi-threading application that simulates a catching game that kids often play at home. We'll assume we have 4 brothers/sisters that will participate in that game.

The game is described as follows:

1. Initially, 3 of the kids are assigned as players while the 4^{th} kid is assigned the role of ball-seeker. The players are usually located at triangle edges while the ball-seeker is located in the middle of that triangle.
2. The ball is with one of the players and the game consists of throwing the ball from one player to another and avoid having the ball-seeker catch the ball.
3. The players and the ball-seeker are not all equally tall. Assume all have tallness that is random in nature but belongs to the range [160 cm ... 190 cm].
4. A player who has the ball can select randomly another player to throw the ball to.
5. When a player throws a ball without jumping, assume the ball goes to a height that is equal to that of the player that threw it in addition to a random extra height in the range [10 cm ... 250 cm].
6. If a player that has the ball and would like to throw it to another player while jumping, the ball goes higher by an extra random height in the range [10 cm ... 50 cm]. Thus, that makes it more difficult for the ball-seeker to catch it. The fact that a player having the ball jumps or not when throwing the ball is random.
7. While trying to catch the ball being thrown among players, the ball-seeker might jump to catch the ball. Assume that the fact that the ball-seeker jumps or not while trying to catch the ball is random. However, if the ball-seeker jumps, he/she gains an extra margin in the range [10 cm ... 50 cm].
8. Assume the ball-seeker is able to catch the thrown ball if the height of the thrown ball is less than or equal to his/her current height.
9. When a player loses the ball, he/she becomes the new ball-seeker while the current ball-seeker becomes a player.
10. The above-described game continues until anyone of the players has become a ball-seeker for 5 times.

What you should do

- Write the code for the above system.
- Compile and test your program.

- Check that your program is bug-free. Use the `gdb` debugger in case you are having problems during writing the code (and most probably you will :-). In such a case, compile your code using the `-g` option of the `gcc`.
- Send the zipped folder that contains your source code and your executable(s) before the deadline. If the deadline is reached and you are still having problems with your code, just send it as is!