B4 - Unix System Programming

B-PSU-401

lemIPC

Semaphores and Segments of Shared Memory

2.1

lemIPC

binary name:	lemipc
group size:	2
repository name:	PSU_lemipc_$ACADEMICYEAR
repository rights:	ramassage-tek
language:	C
compilation:	via Makefile, including re, clean and fclean rules

- Your repository must contain the totality of your source files, but no useless files (binary, temp files, obj files,...).
- All the bonus files (including a potential specific Makefile) should be in a directory named *bonus*.
- Error messages have to be written on the error output, and the program should then exit with the 84 error code (0 if there is no error).

Authorized Functions: standard C library and system calls related to IPCs.

Electronic Arts(c) (hereafter referred to as *EA*), a small comapany specialized in maple syrup import/export, has decided to widen its circle of activities in order to increase its gain.
In order to do this, they have chosen to enter the emerging market for video game applications.

EA is not planning on taking the easy way out.
They want to make a huge splash, and release the first innovative, immersive, addictive (and most importantly) profitable game to ever hit the market.

They are calling upon you to create this masterpiece, which will go down in the history of of video games.

The mission

Your mission is to develop a program that meets the following requirements:

- The goal is to fight players (divided between several teams) on a two-dimensional game board.
- The last team standing wins.
- To kill a player, a minimum of two players from the same team (and different from the first) must be in contact with the other player. This means on a square next to the one where the player you want to kill is standing (including diagonally).
- The players will be able to move both vertically and horizontally.
- When a player realizes he/she is surrounded by at least 2 players from the opposing team, he/she must leave the game board (yes, because it is well-known that NPC are honest in games. They scrupulously follow the rules. Yep, ask the mustached plumber on his kart if he sometimes cheats…nope!)
- A square cannot hold more than one player at a time.

Terminal

```
~/B-PSU-401> ./lemipc --help
USAGE
      ./lemipc PATH TEAM_NUMBER

DESCRIPTION
      PATH         path you'll give to ftok
      TEAM_NUMBER  team number of the current champion (greater than 0)
```

Technical Constraints

Each client is a process, and there should only be one executable, which means that the first player to start must create shared resources (shm, msgq, semaphores).
Similarly, when a player leaves the game, he/she must check if he/she is the last player on the board.
The last process to quit is responsible for cleaning all IPCs that were created by the first process.

The board must be stored in a shared memory segment (shm).
Each player can see the contents of the board, but it in order to change it, he/she must abide by the shared resource and competitive access restraints (semaphores).

A player can only communicate with other players by msgQ.

You must implement some kind of team strategy.

On the board, a player can see if a square is empty or not.
In this case, it's th number of the team that is available.
It is not possible to differentiate between two players of the same team.

You must display what's happening on the board.
The interface must be done in text mode.
Only the first player (the one who creates the board) displays the content.

The process must continue to operate, even after his/her death.