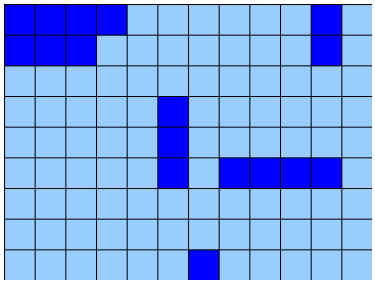
BattleShip

Programming Lab Semester Project

Introduction*:* the goal of this project is to implement a battleship game as depicted in the figure bellow. The game should consider two players, a given set of game pieces, i.e., ships, a map with ***n*n*** *cells*, and it must follow a turn-based game play, i.e., players take turns.



Objectives

a) Implement the game locally (single machine), where both players share the same shell interface. Max grade: 12/20

1) The initialization of the game must support ***both a randomize setup and manual selection***. In the first, the game pieces must be placed randomly across the map (orientation must also be random). In the manual setup, each player must deploy each game piece through a simple command line interface.
2) Each game piece must be backed by a **user defined data structure**, and the map should be a data structure that references these game pieces.
3) Algorithmic efficiency on insertion, lookup and deletion will be accounted for your final grade.

b) Implement the game state using a quad-tree data structure. Max grade: 18/20

a) Algorithmic efficiency on insertion, lookup and deletion will be accounted for your final grade.

c) Implement the game locally (single machine) where players do not share the same shell interface. The two shell interfaces must be connected through an inter-process communication mechanism:

1) Use system v semaphores and **text files** to synchronize both clients *Max grade: 19/20*
2) Implement another version that uses inter-process communication (IPC) such as **pipes**. The buffers used for performing IPC must be controlled by memory(s) poll(s), i.e., a set of pre-allocated memory buffers normally with a fixed size. The buffers should use a zero-copy approach, where they should be passed from layer to layer without copying (only by reference). Max grade: 20/20

d) Bonus:

1) Implement the game across the network (two machines), using TCP/IP sockets. Max grade: 2/20

1) One machine can act as the server (no needed for true peer-to-peer design).
2) Use threads to separate network, logical and interface code executions.

2) Implement a graphical interface using SDL, QT or similar. Max grade: 2/20