Problem Set 5

CPSC 489/689 Quantum Algorithms

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The assignment is due Wednesday, Mar 4, 2003.

Demonstrate your program between 2pm–5pm
to Neelima Chinthamani in HRBB 509A

Replace the two functions `applygate` and `measure_state` with sensible code, completing the simulator alfred.

Package the program with the GNU build system. Write `configure.in` and `Makefile.am`, and package the program such that it is possible to obtain an executable by invoking configure and make.

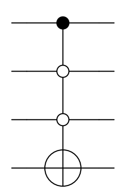
Hints: The GNU automake manual is somewhat misleading in the re-naming conventions of the lex and yacc outputs.

- The standard output of `flex alfred.l` are the files `yy.tab.c` and `yy.tab.h`, which are re-named to `alfred.c` and `alfred.h`, respectively.
- The standard output of `yacc -d alfred.y`, or its bison equivalent, are the files `y.tab.c` and `y.tab.h`, which are renamed to `alfred-alfred.c` and `alfred-alfred.h`, respectively. Consequently, you want to include the file `alfred-alfred.h` instead of `y.tab.h` in the scanner file `alfred.l`.

The file `Makefile.am` can contain as little as four lines, specifying the program, the sources, the libraries, and the options for yacc (`alfred_YFLAGS = -d`). You do not need to specify any dependencies!

Make sure that your program will compile if we delete the output of lex and yacc (or flex and bison), before invoking make.

The alfred language specifies the gate



by `G([3,-1,-2],0,[0,1,1,0])`, where the most significant qubit at position 3 is a 1-condition, and the 0-conditions of the qubits at position 1 and 2 are specified by -1 and -2. The lexer will translate these conditions into the following bit masks

$$\texttt{ocnd} = 0110_2 = 6,\ \texttt{icnd} = 1000_2 = 8,\ \texttt{gpos} = 0001_2 = 1.$$