CSC 20: Project 2 - Logic gates

This semester we are going to build a simple logic simulator. The steps to using the simulator will go something like this:

~ Users of the simulator will specify a boolean logic formula using text.
~ The simulator will build an equivalent logic circuit in memory.
~ The user of the simulator will specify input values for the circuit.
~ The simulator will evaluate the circuit and print the result.

As a first step, this project involves writing some simple classes to model basic logic gates: And, Or, Not, Nand, Nor, Xor, Xnor. If you are unfamiliar with logic gates, read the Wikipedia article for background: https://en.wikipedia.org/wiki/Logic_gate. The most important part of the article is the collection of truth tables which define what output your gate should produce for each given input (0=false and 1=true).

Specification:

You should write seven classes called And, Or, Not, Nand, Nor, Xor, Xnor. All of the classes should implement the GateOutput interface, and all except Not should also implement the GateInputDouble interface. Not should implement the GateInputSingle interface.

A call to `input`, `input1`, or `input2` with a GateOutput parameter is specifying that the gate's input should be read from the output of the gate provided as a parameter. A call to `input`, `input1`, or `input2` with a boolean parameter is specifying that the gate's input is wired to the provided boolean value. A gate's input methods may be called more than once, but it is only the most recent call to an input method that should be considered active. All inputs should initially be wired to false as a default upon construction.

A call to `output` should determine its input value(s), apply the logic that the class is named for, and return the appropriate boolean value.

None of these gates should provide a constructor with arguments.

Here are the interfaces you should use. Each should go into its own file (eg, `GateOutput.java`).

```
public interface GateOutput {
    public boolean output();
}

public interface GateInputSingle {
    public void input(GateOutput gate);
    public void input(boolean value);
}

public interface GateInputDouble {
    public void input1(GateOutput gate);
    public void input1(boolean value);
    public void input2(GateOutput gate);
    public void input2(boolean value);
}
```

To Receive Credit:

Follow the directions in Project Requirements and DBInbox Submission, and submit by 11:59pm, Sunday, March 5, 2017.

Questions?

If something is not clear, ask questions in class, on Piazza, or in office hours. Do not wait until the last minute to clear things up. Start early!

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