Energy-efficient heating-cooling system X89493_en

Design a circuit that controls a heating-cooling system of a room that has a remotely-controlled window. The system has four temperature sensors: two inside the room and two outside. The sensors inside the room indicate whether the temperature is too high (*hot_in*=1) or too cold (*cold_in*=1). The sensors outside the room indicate whether the temperature is sufficiently hot (*hot_out*=1) or cold (*cold_out*=1) to acclimatize the room.

The control system must save as much energy as possible, opening the window (*open_window*=1) when the outside temperature can be used to acclimatize the room. In case the outside temperature is not appropriate, the cooler of the heater must be activated.

Note that *hot_in* and *cold_in* can never be at 1 simultaneously. Similarly for *hot_out* and *cold_out*.

Specification

module *heater_cooler_window* (*hot_in*, *cold_in* , *hot_out* , *cold_out* ,
heater , *cooler* , *open_window*);
input *hot_in* , *cold_in* , *hot_out* , *cold_out* ;
output *heater* , *cooler* , *open_window*;

Input

- *hot_in* is the input that indicates when the inside temperature is too hot.
- *cold_in* is the input that indicates when the inside temperature is too cold.
- *hot_out* is the input that indicates when the outside temperature is hot.
- *cold_out* is the input that indicates when the outside temperature is cold.

Output

- *open_window* is the output that controls the opening of the window.
- *heater* is the output that activates the heater.
- *cooler* is the output that activates the cooler.

Problem information

Author: Jordi Cortadella

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