g55_rules - Crazy Eights Legal Move Checker

Group 55
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1 Circuit Description

The *g55_rules* circuit has two 6-bit inputs (`play_pile_top_card` and `card_to_play`) and one 1-bit output (`legal_play`). Based on the inputs, the circuit determines if the attempted move is legal in the game of Crazy Eights. Specifically it checks that `card_to_play` is a card of a value of 8, or a card of the same value as `play_pile_top_card`, or a card of the same suit as `play_pile_top_card`, or any suit and value if `play_pile_top_card` has a value of 8. The value and suit are encoded in 6-bit unsigned integer V where $V = (value - 1) + (suit * 13)$.

A pinout of the circuit is as follows:

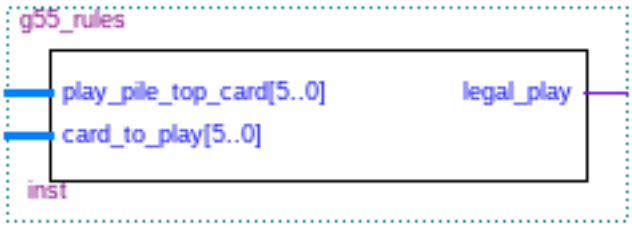

Figure 1: *g55_rules* Pinout

2 Testing

The circuit was tested using a timing simulation. Due to the high number of possible input patters, inputs were chosen that both matched and failed each rule resulting in a true and false output respectively. The worst-case maximum propagation delay is 19.910 ns.

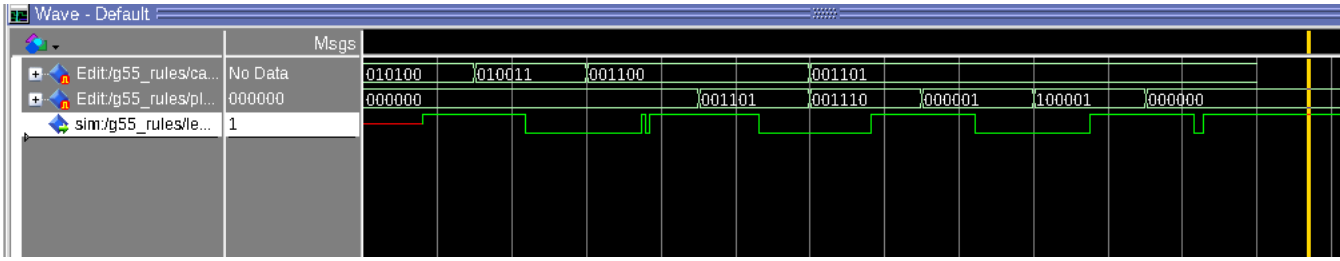

Figure 2: *g55_rules* Timing Simulation Results

3 FPGA

The *g55_rules* circuit uses a total of 40 logic elements representing less than 1% of the total available elements on the FPGA.