CSSE2010

CSSE2010/CSSE7201
Learning Lab 5

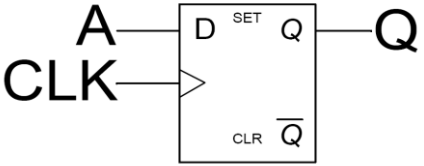
Logisim & Flip-flops

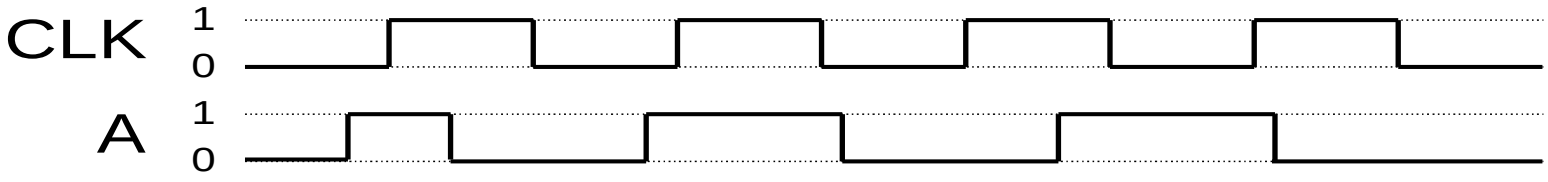
School of Information Technology and Electrical Engineering
The University of Queensland

Learning Lab 5 - Flip-flops

- Recall: there are two types of logic circuits. Combinational and sequential
- The basic building block of sequential circuits are flip flops (stores 1-bit of information)
- Today's lab: simulate circuits having D-flip flops using Logisim

Which diagram captures the behaviour of this circuit?





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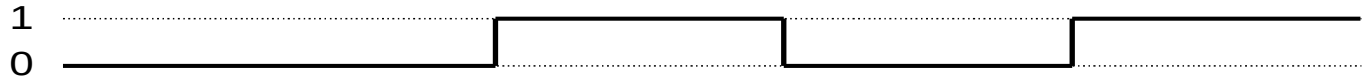

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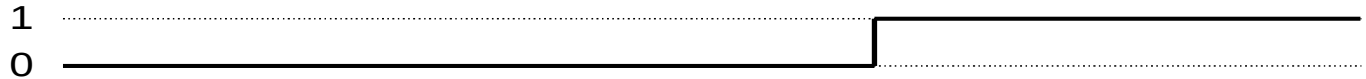

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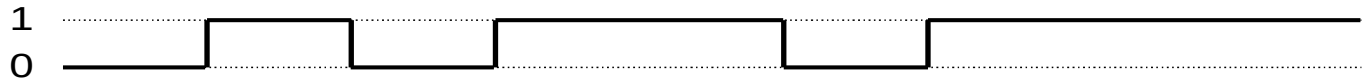

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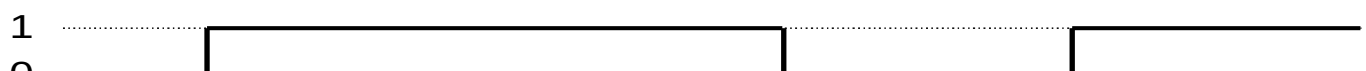
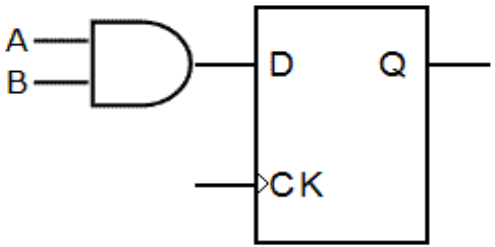


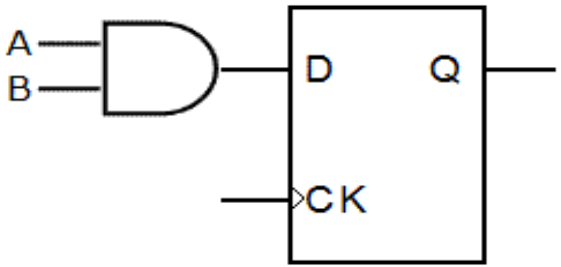
Logisim

- Go through the Logisim tutorial if you haven't done already
- 3 Tasks
- Draw and simulate
  1. A 2-input NOR gate
  2. An RS-Latch (two cross coupled NOR gates)
  3. A D-Flip-flop circuit:
     - Make sure you work out what all of the inputs on the Logisim D Flip-flop do



D-Flip-flop circuit

- Consider Circuit (below)
- Draw a circuit schematic diagram that
  - Uses a 74HCT74 (and other chips as needed)
  - Uses pushbuttons for CLK (CK), PRE and CLR inputs
    - Consider inverters between buttons and PRE/CLR inputs. Why?
  - Uses switches for A and B inputs
  - Uses LEDs for Q and Q' outputs
- Have schematic checked by a tutor
- Build/simulate the circuit & test it



Latch circuit

- Design a latch out of cross-coupled NAND gates
- Predict its behaviour
  - How can you set it or reset it?
- Draw a circuit schematic
- Build/simulate it
- Test it