

Decoders, Busses, Memory

Saulius Gražulis

Vilnius, 2020

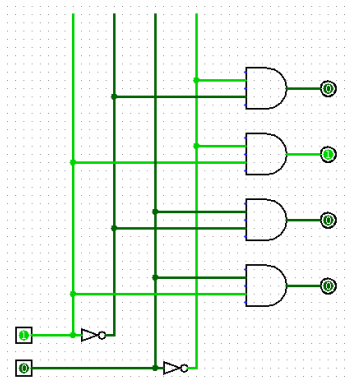
Vilnius University, Faculty of Mathematics and Informatics
Institute of Informatics



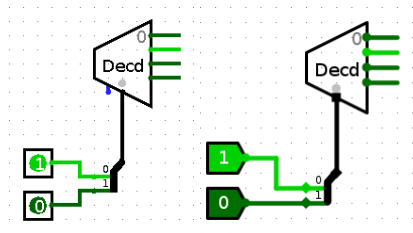
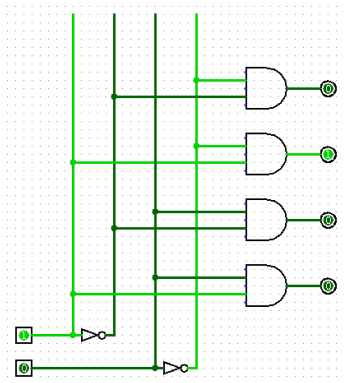
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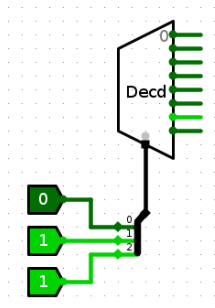
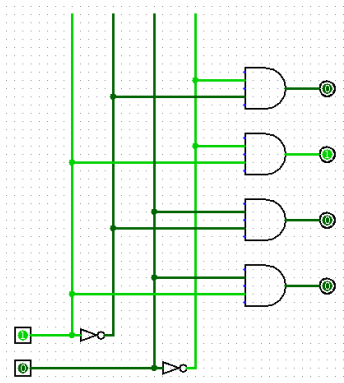
Decoders



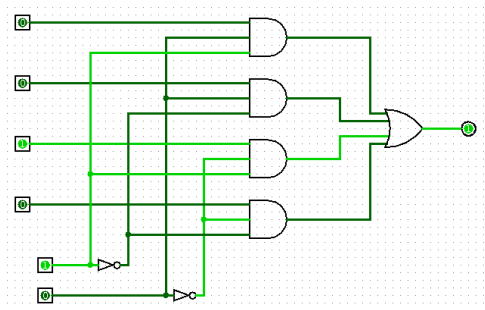
Decoders



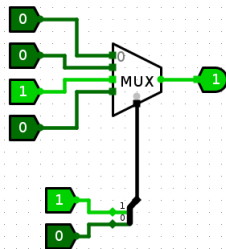
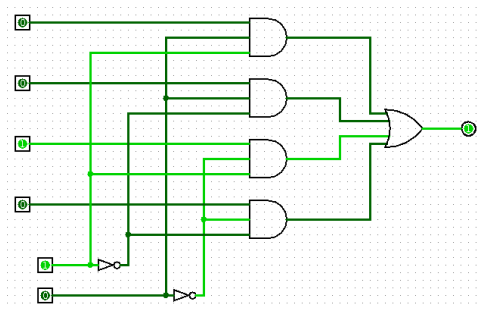
Decoders



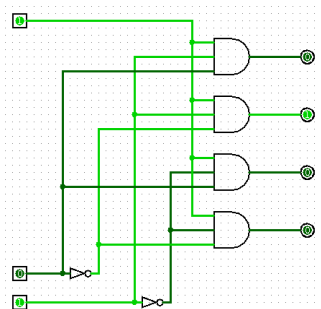
Multiplexers



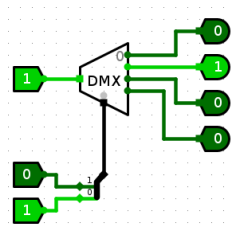
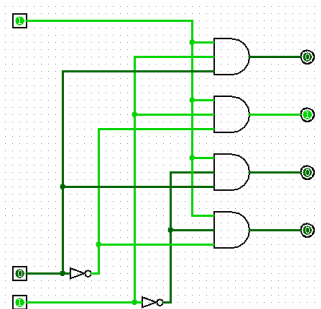
Multiplexers



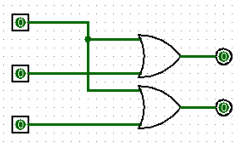
Demultiplexers



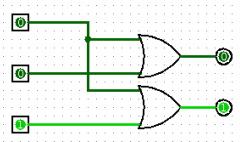
Demultiplexers



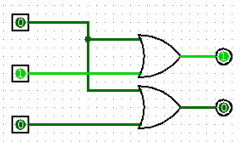
Encoder



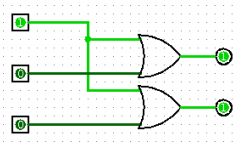
Encoder



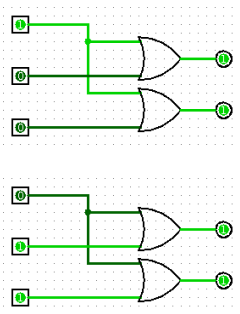
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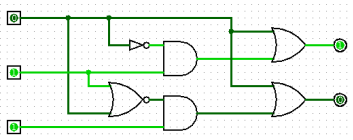
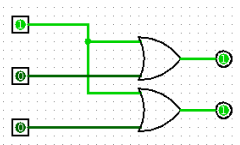
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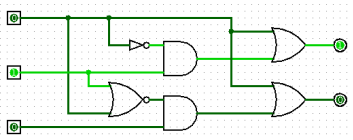
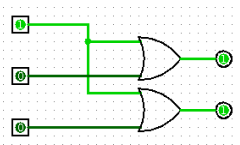
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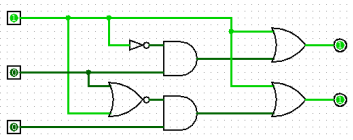
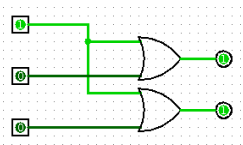
Priority encoder



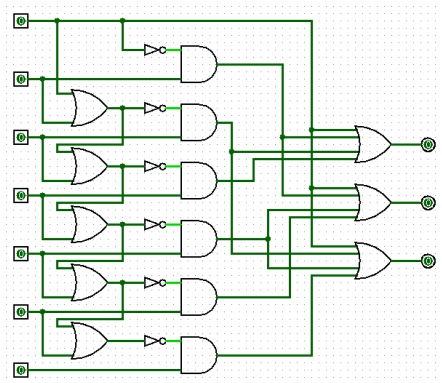
Priority encoder



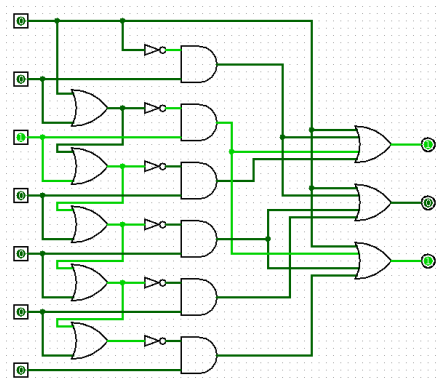
Priority encoder



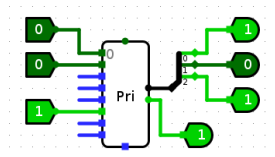
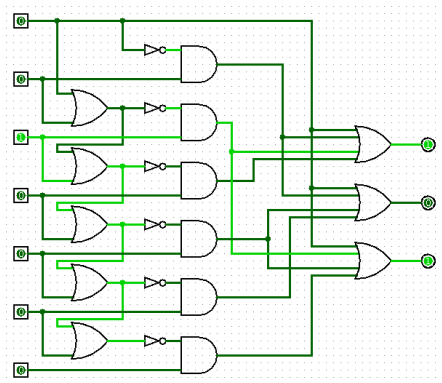
Priority encoder



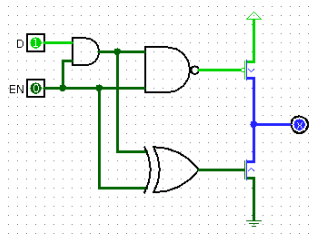
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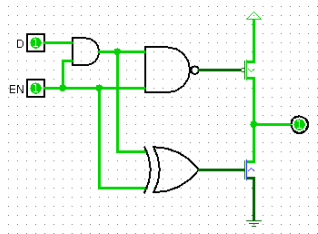
Priority encoder



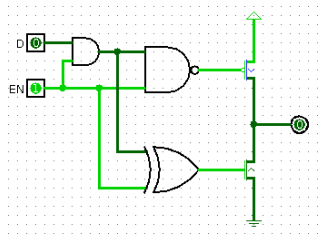
3-state output



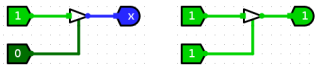
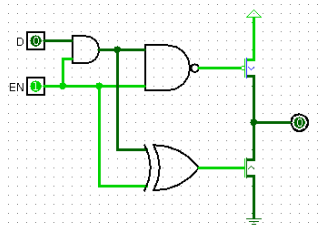
3-state output



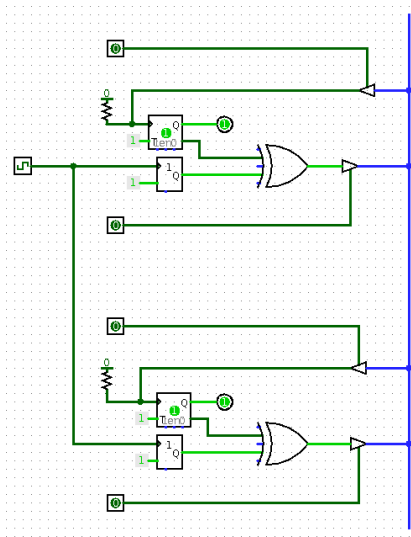
3-state output



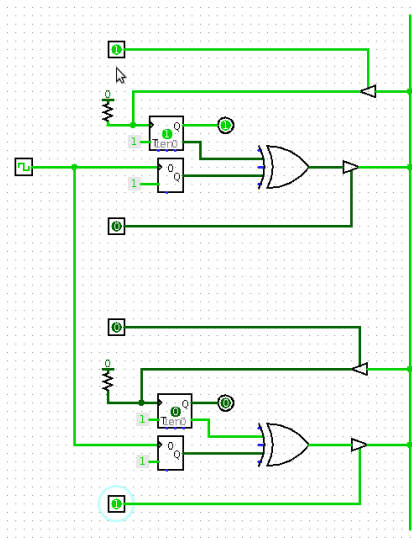
3-state output



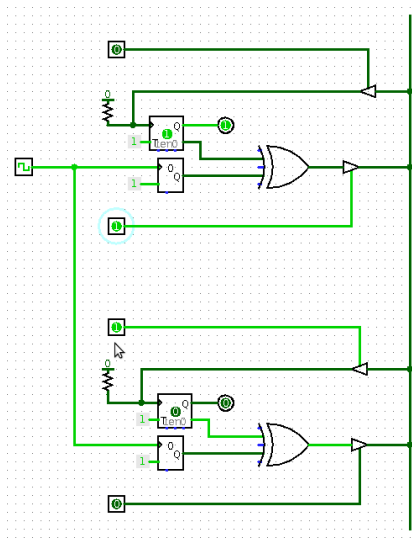
3-state output



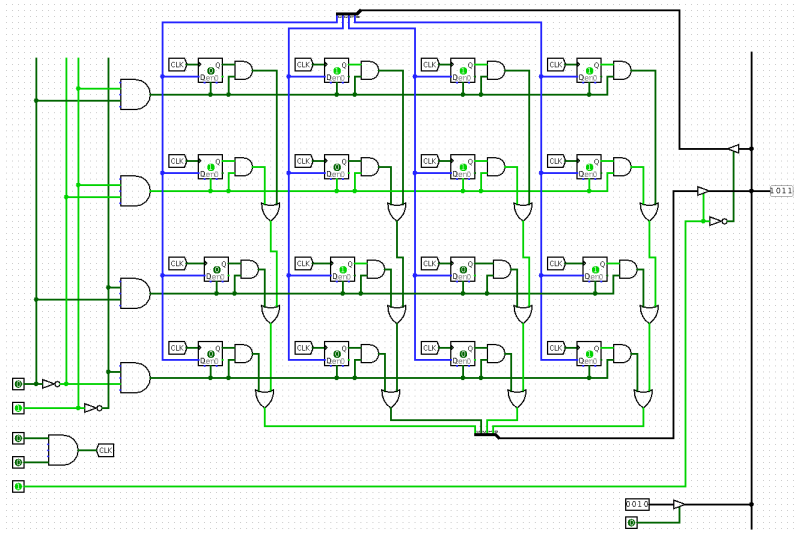
3-state output



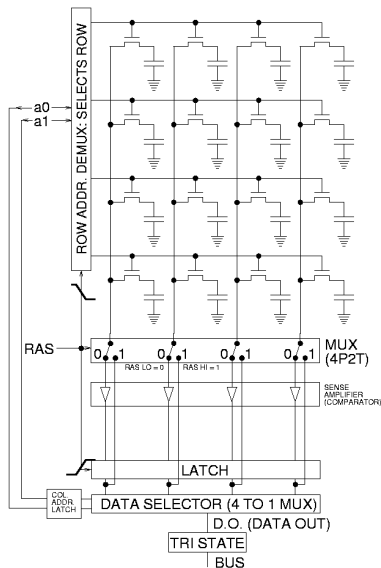
3-state output



Static RAM

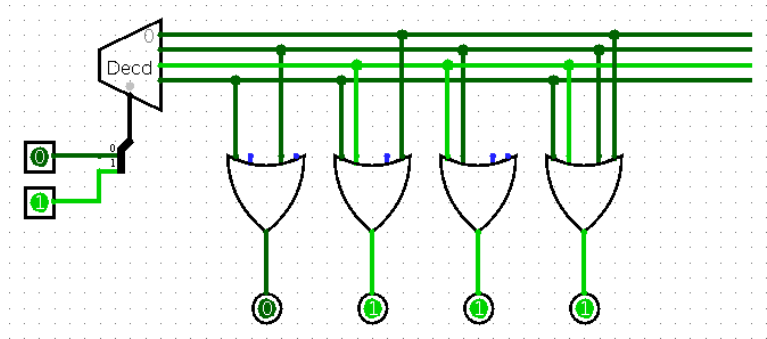


Dynamic RAM

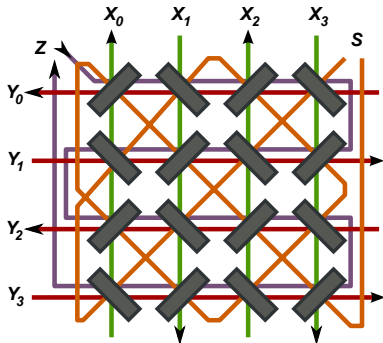
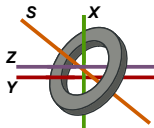


- Capacitors used instead of triggers to reduce size;
- Small capacitors discharge rapidly!
- \Rightarrow memory needs to be refreshed (i.e. each row accessed) at least once each 64ms.

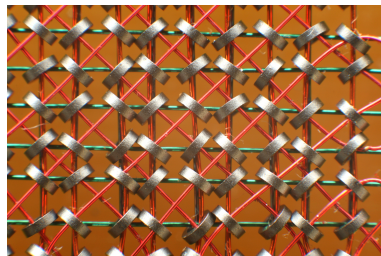
Glogger at [English Wikipedia](#)
CC BY-SA



Core memory



Both core drawings: By Tetromino -
Own work, CC BY 3.0



Konstantin Lanzet / CC BY-SA



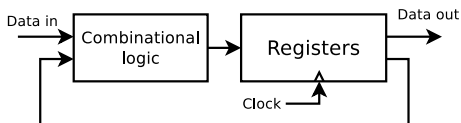
Wikipedia: [Skylab](#). Image by NASA, public domain.

On March 11, the ATMDC powered up for 5 minutes to obtain telemetry confirmation that it was still functioning. The software resumed the program cycle where it had left off 4 years and 30 days earlier.

<https://history.nasa.gov/computers/Ch3-5.html>

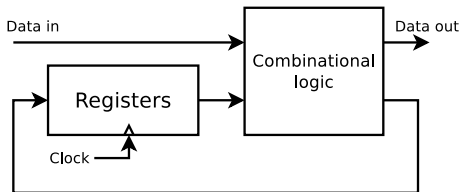
Finite automata: Moore and Mealy machines

Moore automaton:



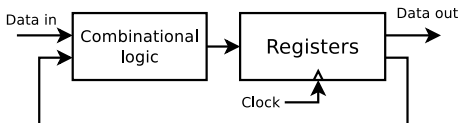
Finite automata: Moore and Mealy machines

Mealy automaton:

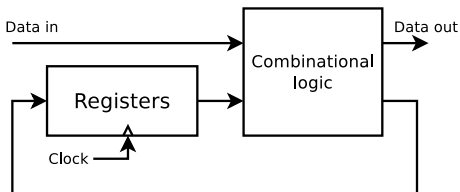


Finite automata: Moore and Mealy machines

Moore automaton:

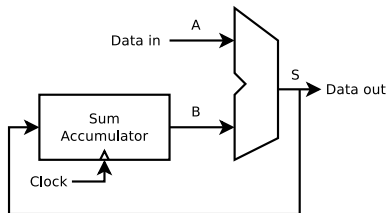


Mealy automaton:



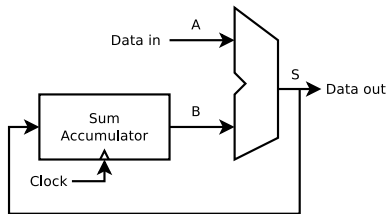
Integrator: an abstract scheme

Integrator:

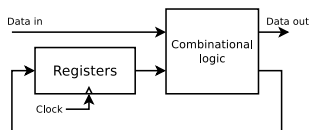


Integrator: an abstract scheme

Integrator:

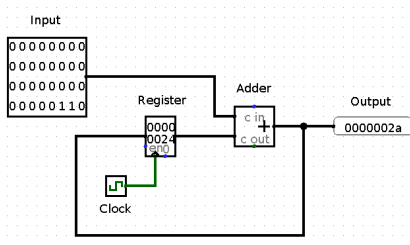
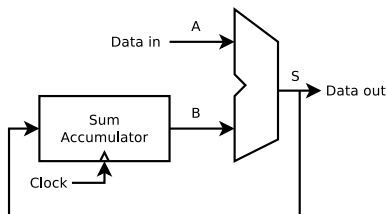


Mealy automaton:

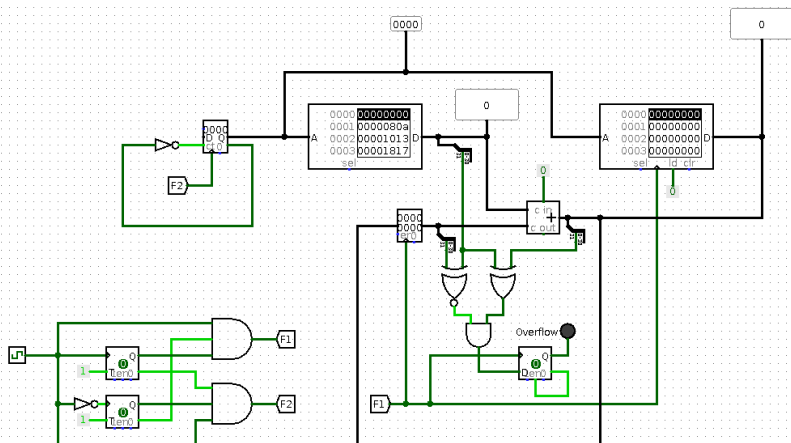


Integrator: an abstract scheme

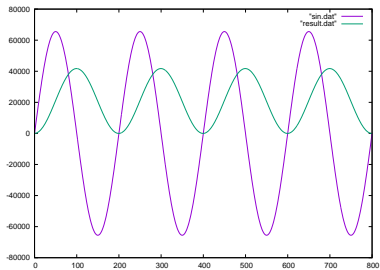
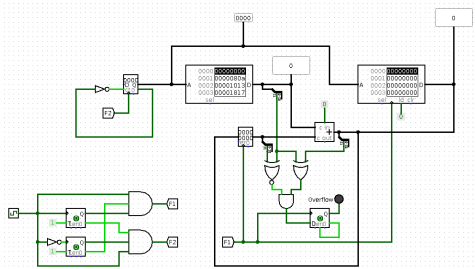
Integrator:



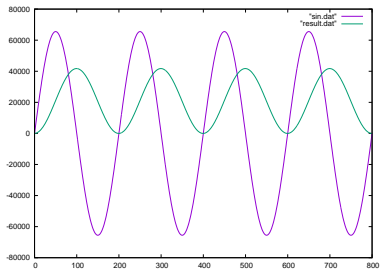
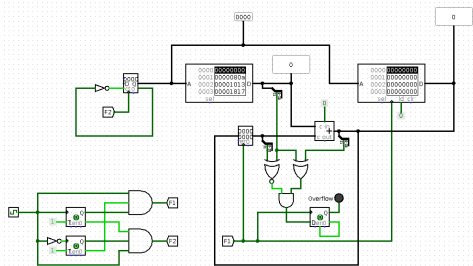
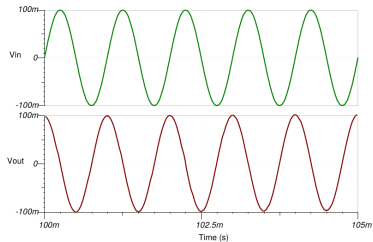
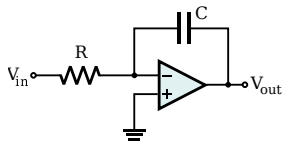
Example: integrator



Example: integrator



Example: integrator



Example: integrator

