CSE216 Programming Abstractions

Event Driven Simulation

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Event-driven Simulation

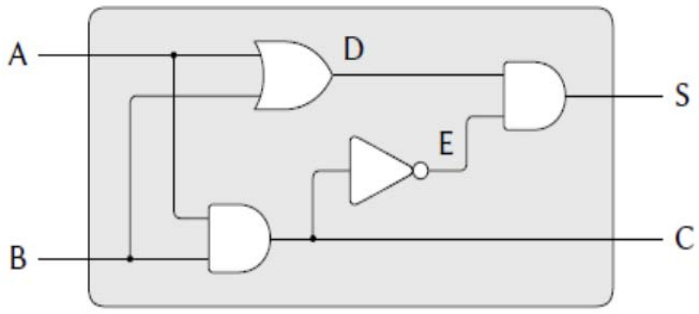
- Event-driven simulation
  - An action (event) triggers further events that happens at a later time
  - Those events trigger more events, and so on

Event-driven Simulation

- Typical architecture
  - Event generators have a list of event callback procedures
  - Event receiver registers its event callback to the generator's list
  - When a generator fires an event, all event callback procedures are invoked

Digital Circuit Simulator

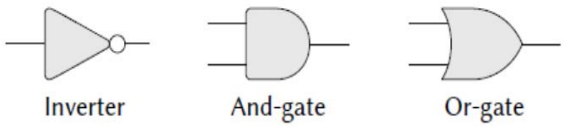
- Wires
  - Carry digital signals (0 and 1)
  - Function as event generator
  - When its signal value is changed, its registered callback procedures (gates) are invoked



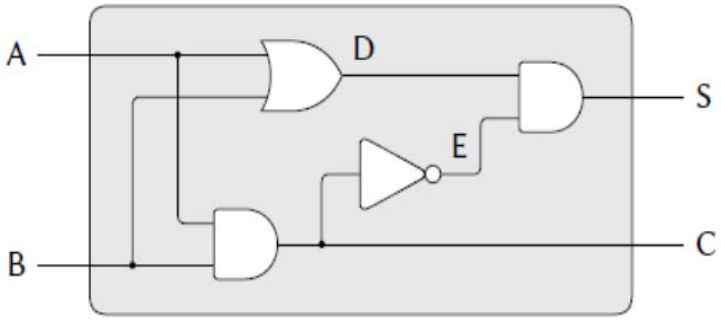
A half-adder circuit.

Digital Circuit Simulator

- Logical gates
  - Inverter, and-gate, or-gate



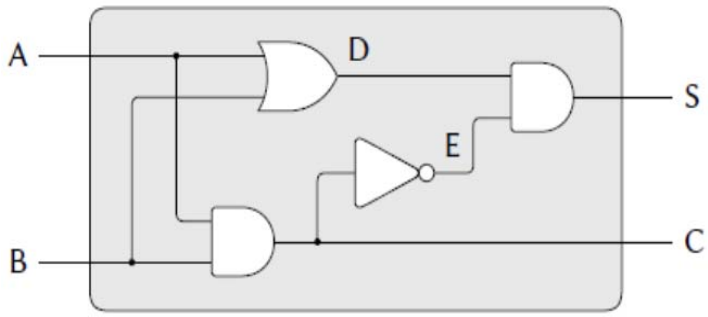
  - Connect wires
  - Produce output signals computed from input signals
  - Output signal is delayed by a time dependent on the gate



A half-adder circuit.

Digital Circuit Simulator

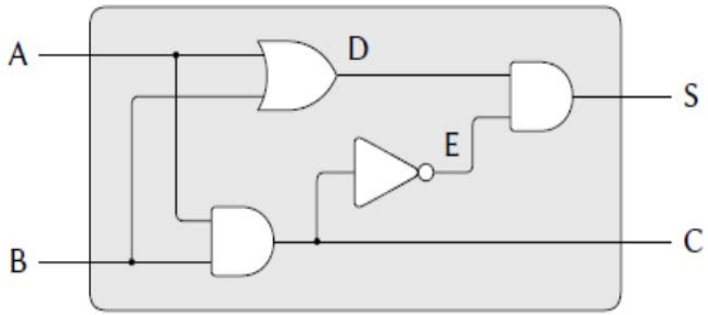
- Logical gates
  - Functions as event receiver
  - Registers its callback procedure to input wire(s)
  - When the callback is invoked, it updates the signal value of the output wire



A half-adder circuit.

Digital Circuit Simulator

- Half adder
  - Adds two bits A and B
  - Produces their sum and carry

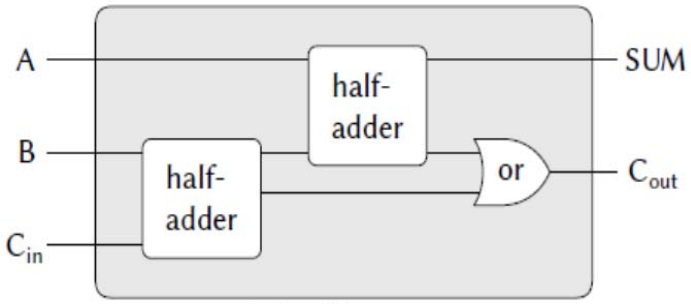


A half-adder circuit.

Inputs		Outputs	
A	B	C	S
0	0	0	0
1	0	0	1
0	1	0	1
1	1	1	0

Digital Circuit Simulator

- Full adder
  - Adds three bits A, B, and C_{in}
  - Produces their sum and carry (C_{out})



A full-adder circuit.

Inputs			Outputs	
A	B	C_{in}	C_{out}	S
0	0	0	0	0
0	0	1	0	1
0	1	0	0	1
0	1	1	1	0
1	0	0	0	1
1	0	1	1	0
1	1	0	1	0
1	1	1	1	1

Digital Circuit Simulator

- n-bit Ripple-carry adder
  - Adds n-bit binary numbers