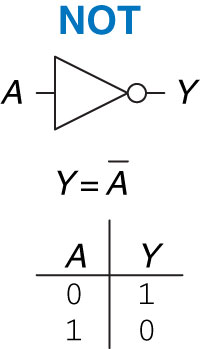
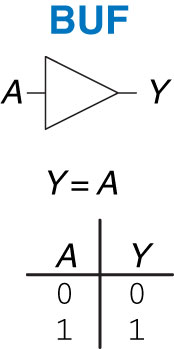
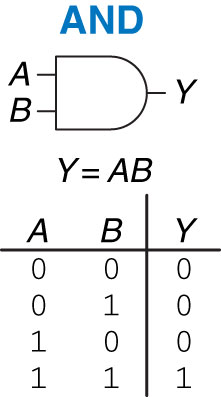
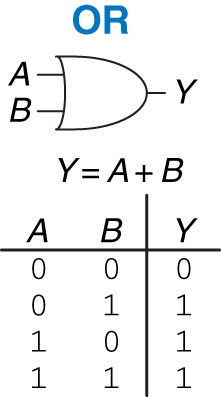
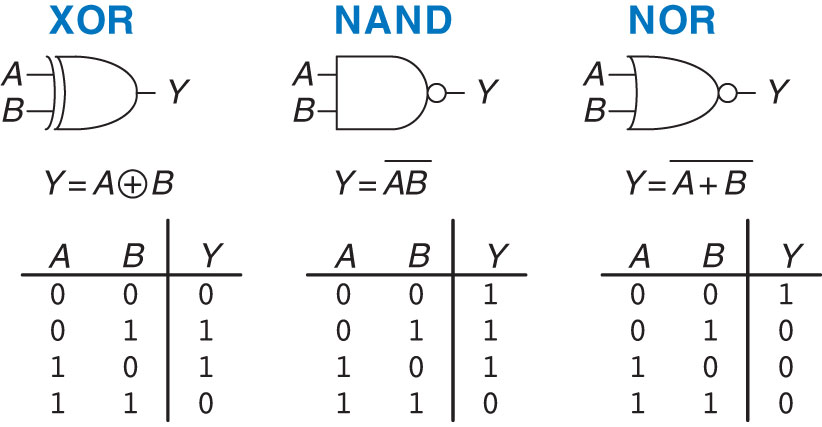
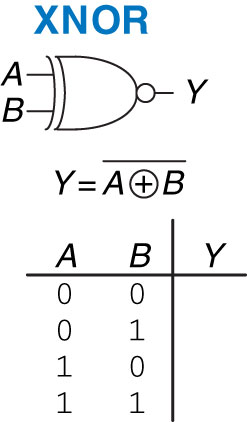
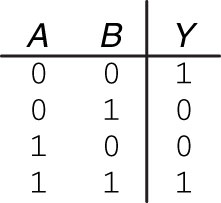
**Gates**

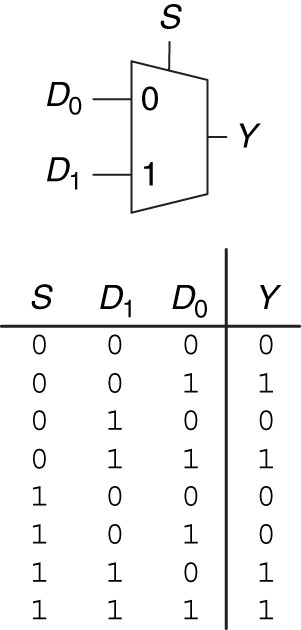
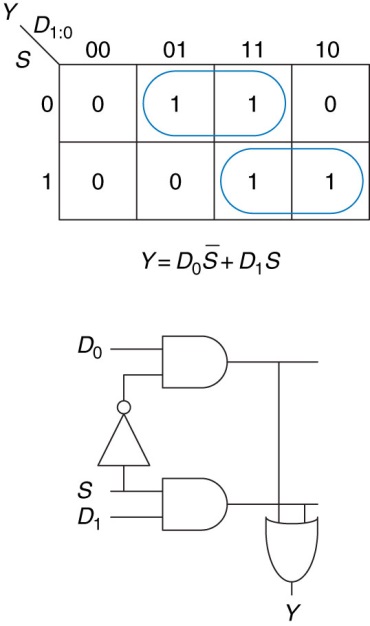
**   **

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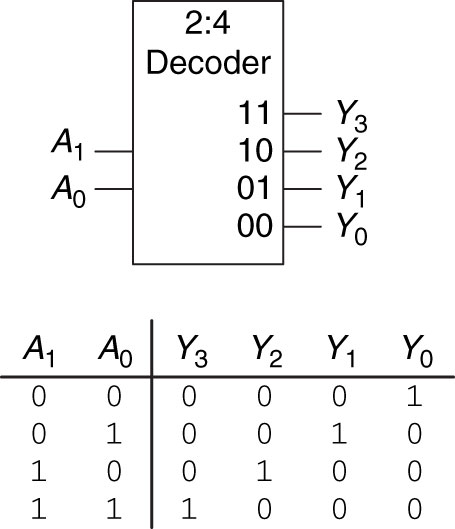
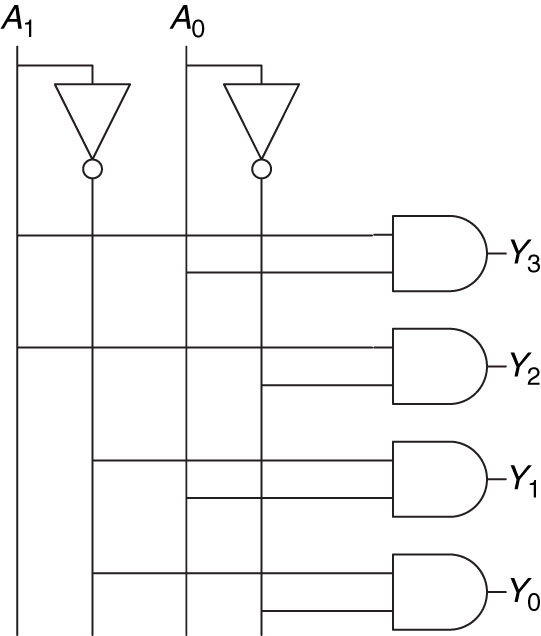
** **

**Multiplexer**

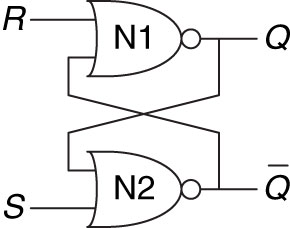
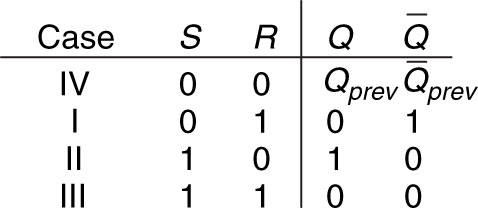
|  |
| --- |
| **If S == 0 then Y = D0**  **If S == 1 then Y = D1** |

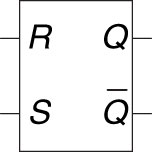
** **

**Decoder**

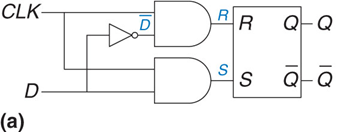
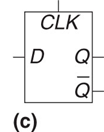
** **

**SR latch**

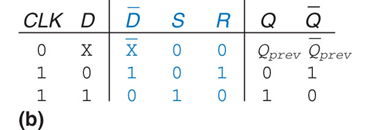
** **

****

**D latch**

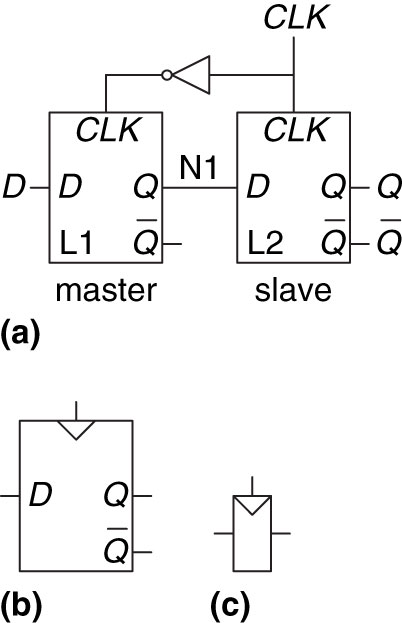
** **

|  |
| --- |
| **If CLK == 1 then set D = X**  **If CLK == 0 then select Q** |

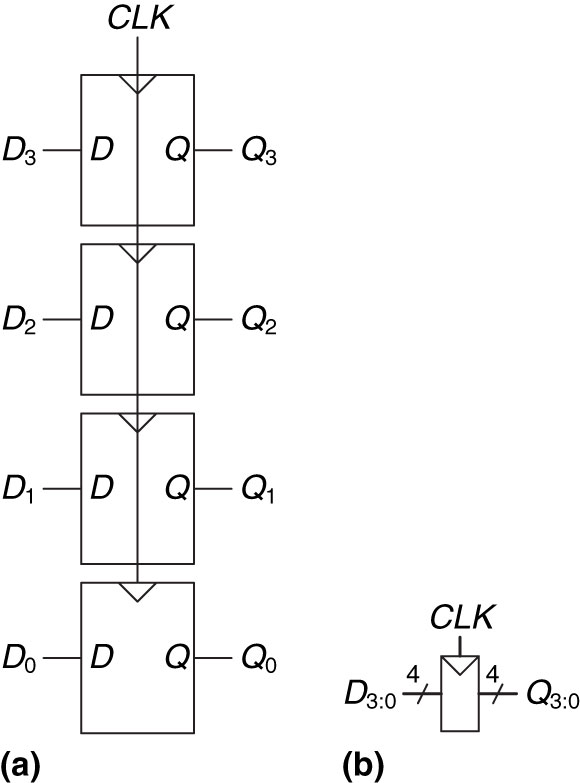
****

**D flip-flop**

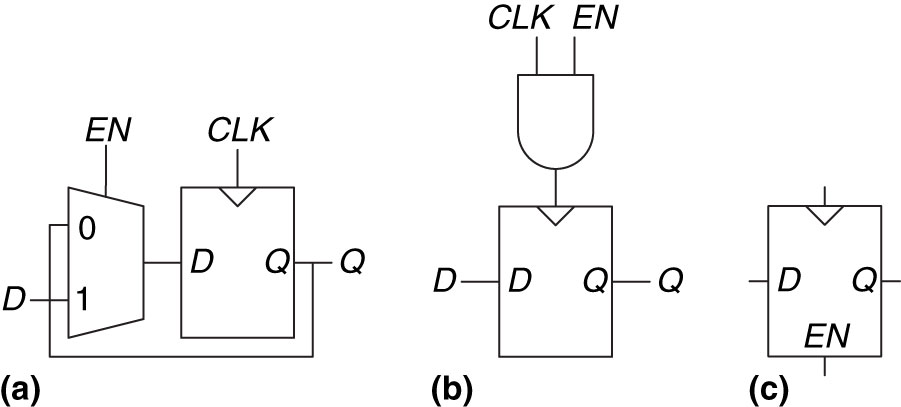
|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CLK** | **D** | **-D** | **S** | **R** | **Q** | **-Q** |
| **0** | **X** | **X** | **0** | **0** | **Qp** | **-Qp** |
| **1** | **0** | **1** | **0** | **1** | **0** | **1** |
| **1** | **1** | **0** | **1** | **0** | **1** | **0** |

****

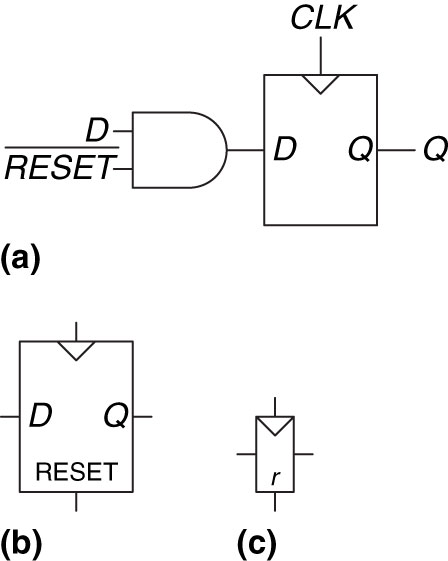
**4-bit register**

****

**Enabled flip-flop**

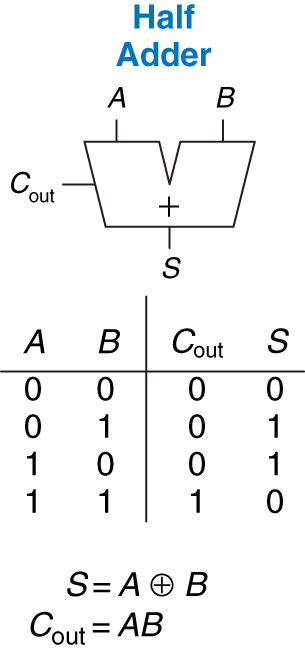
****

**Synchronously resettable flip-flop**

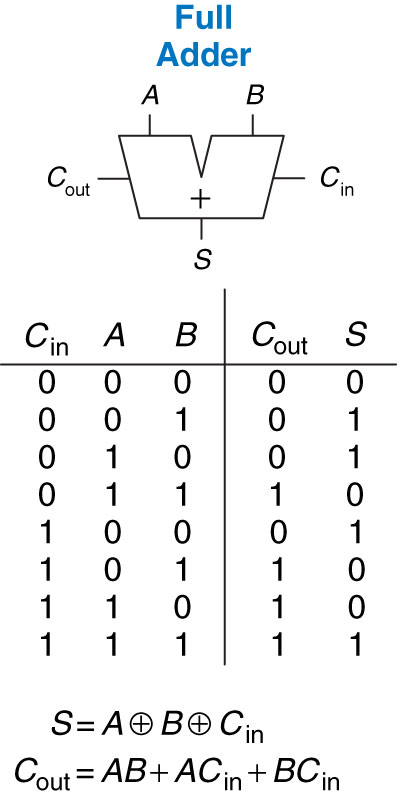
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**1-bit half adder**

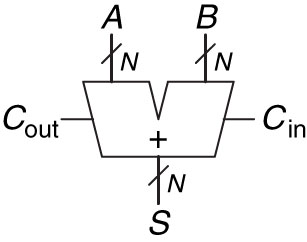
|  |
| --- |
| **Carry bit** |

****

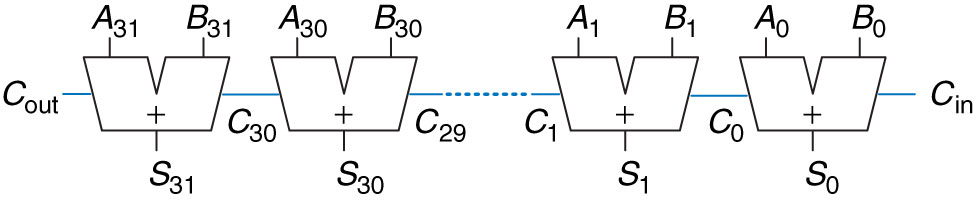
**1-bit full adder**

****

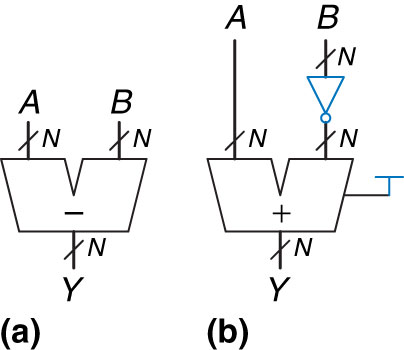
**Carry propagate adder**

****

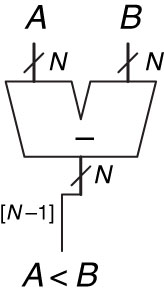
**32-bit ripple-carry adder**

****

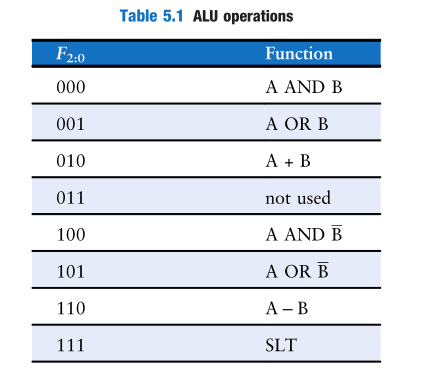
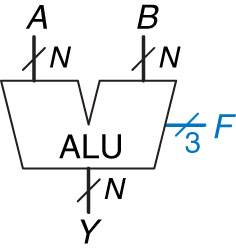
**Subtractor**

****

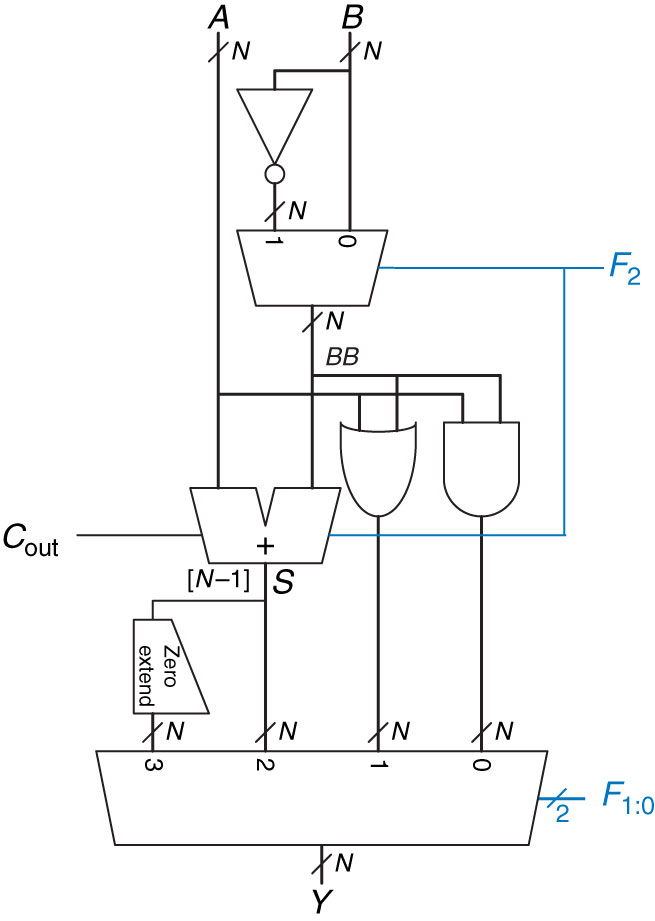
***N*-bit magnitude comparator**

****

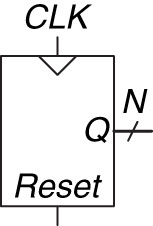
**ALU**

****

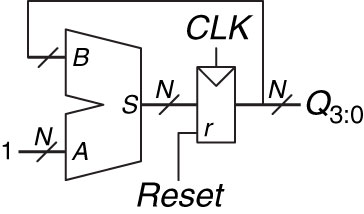
***N*-bit ALU**

****

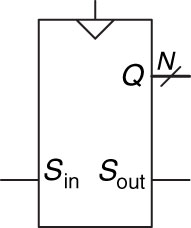
**Counter**

****

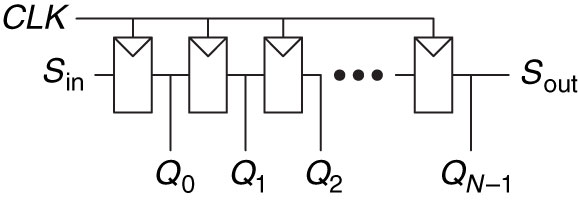
***N*-bit counter**

****

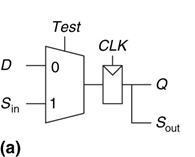
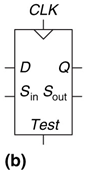
**Shift register**

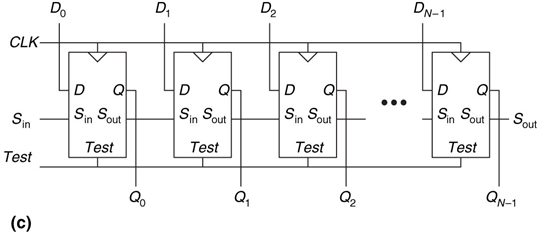
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**Shift register**

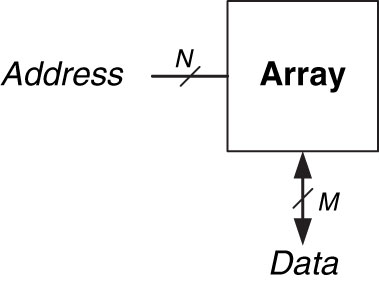
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**Scannable flip-flop**

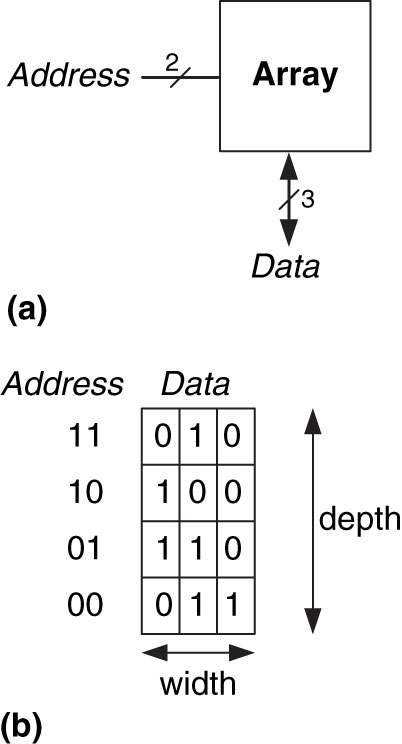
** **

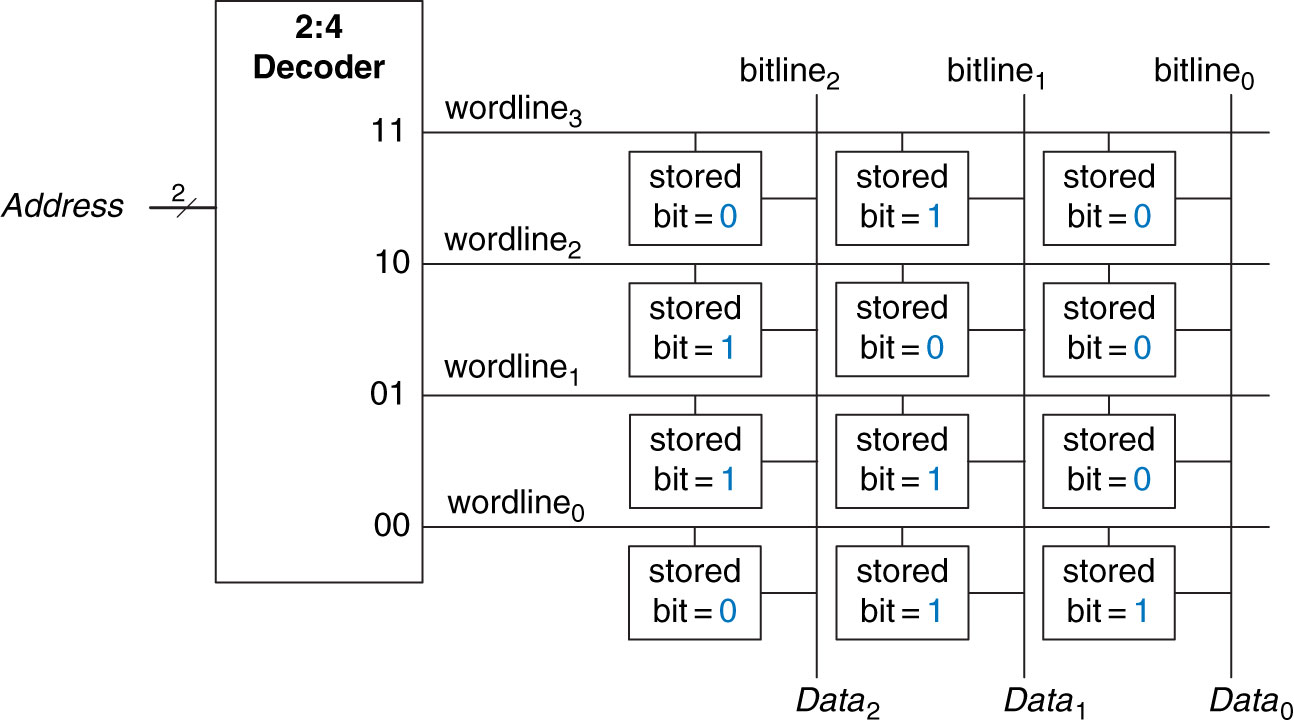
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**Generic memory array**

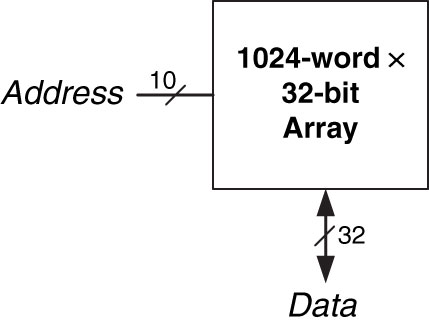
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**4-3 memory array**

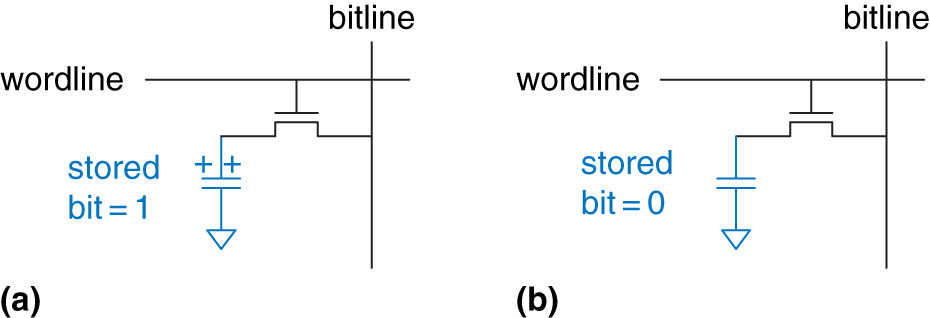
****

****

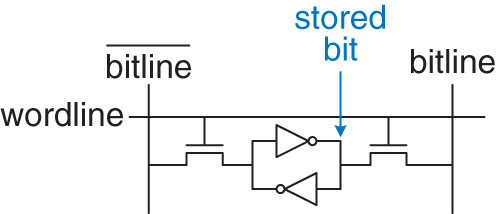
**32 Kb array: depth = 210 = 1024 words, width = 32 bits**

****

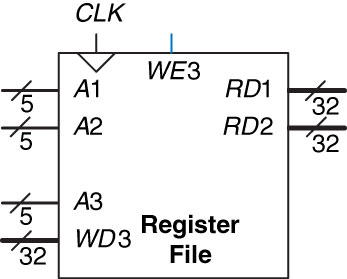
**DRAM stored values**

****

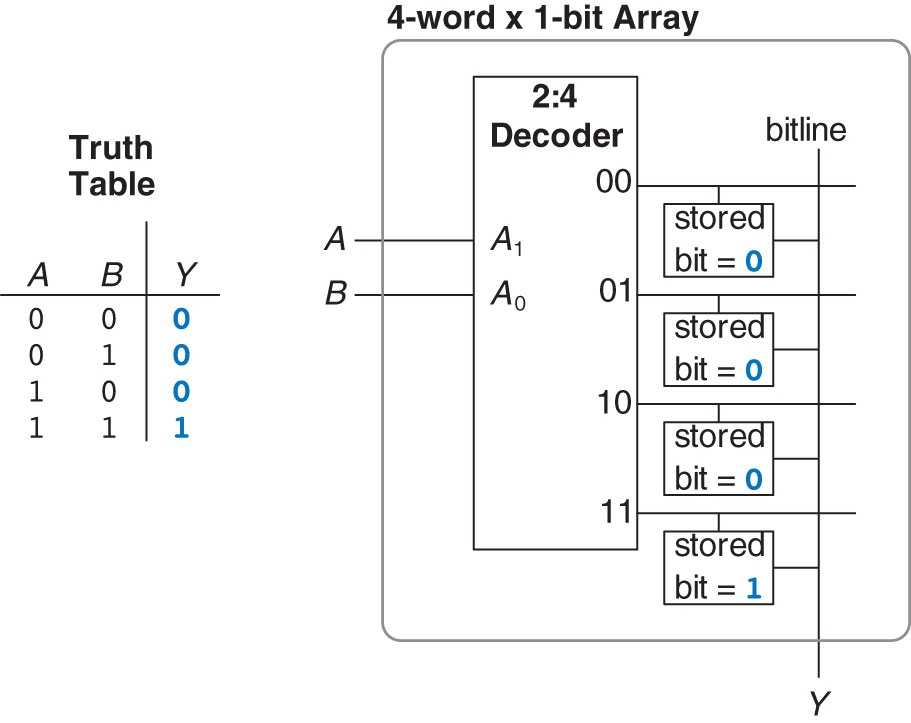
**SRAM bit cell**

****

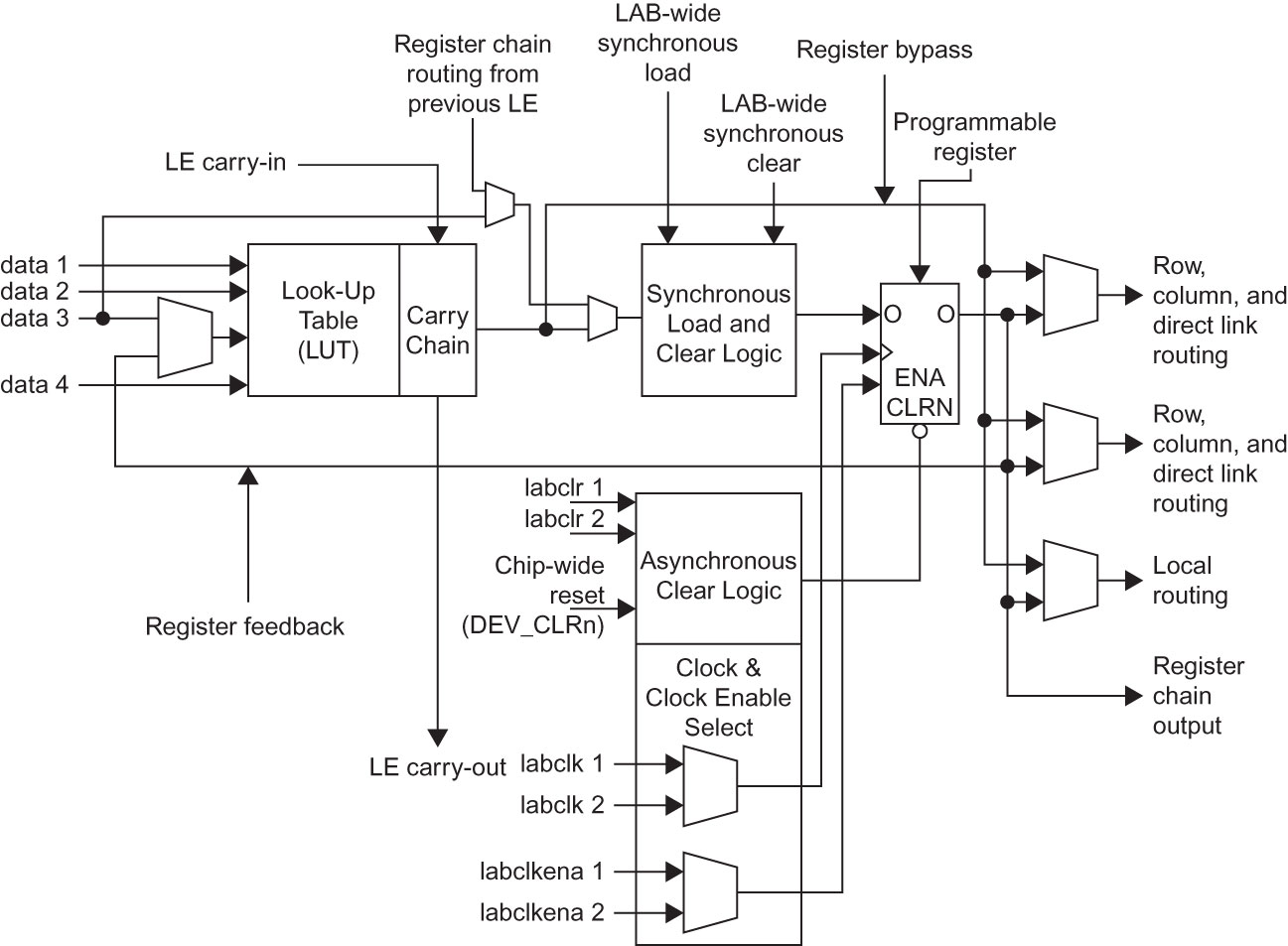
**32-32 register file with two read ports and one write port**

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**4-word 1-bit memory array used as a lookup table**

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**Cyclone IV Logic Element (LE)**

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