Computer Organization

Introduction to Boolean Logic

Boolean Values

- All data can be broken down to simple binary values
  - 0 / False
  - 1 / True

- These values are used in what is known as Boolean Functions
  - These functions consist of various Boolean Operators such as And, Or, Not, Xor, Nand, etc.

Truth Tables

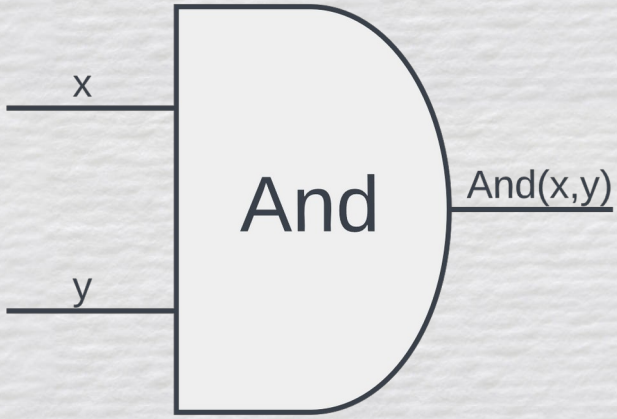
- All Binary Functions can have their inputs/outputs be represented by truth tables

x	*y*	And
1	1	**1**
1	0	**0**
0	1	**0**
0	0	**0**

Boolean Functions – And

- And
  - A function that expects all inputs to be true (functions very similar to basic multiplication)

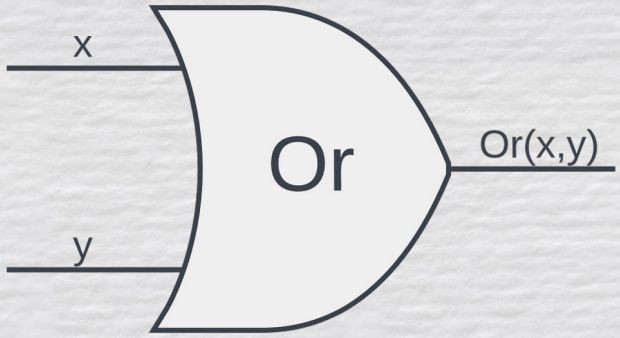
x	*y*	And
1	1	**1**
1	0	**0**
0	1	**0**
0	0	**0**



Boolean Functions – Or

- Or
  - A function that expects at least one input to be true (functions very similar to basic addition)

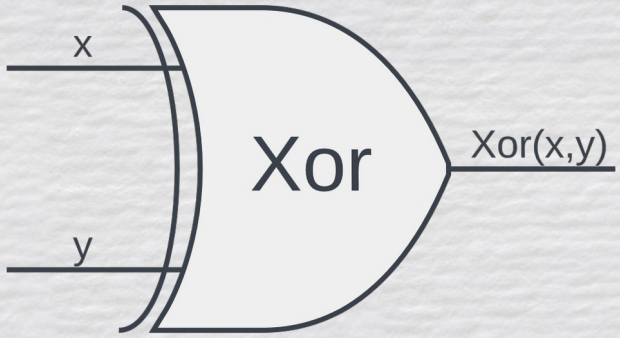
x	*y*	Or
1	1	**1**
1	0	**1**
0	1	**1**
0	0	**0**



Boolean Functions – Xor

- Xor
  - A function that expects differing inputs

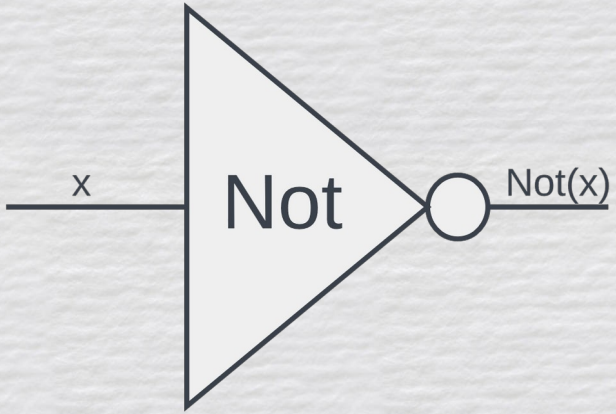
x	*y*	Xor
1	1	**0**
1	0	**1**
0	1	**1**
0	0	**0**



Boolean Functions – Not

- Not
  - A function that outputs the opposite of the input

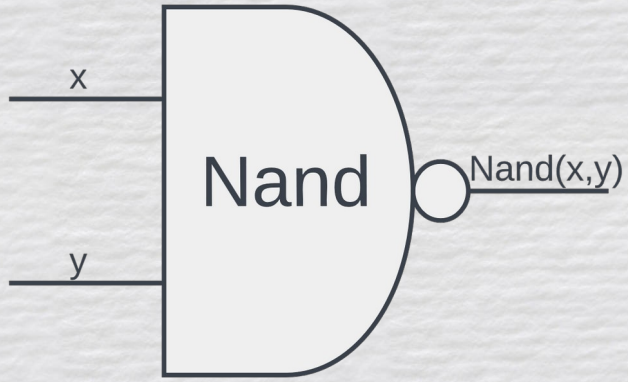
x	Not
1	0
0	1



Boolean Functions – Nand

- Nand
  - A negated And function

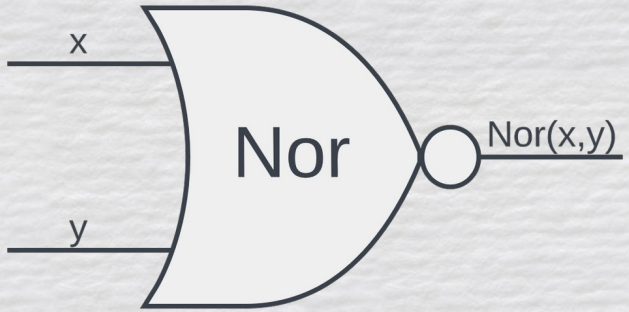
x	*y*	Nand
1	1	**0**
1	0	**1**
0	1	**1**
0	0	**1**



Boolean Functions – Nor

- Nor
  - A negated Or function

x	*y*	Nor
1	1	**0**
1	0	**0**
0	1	**0**
0	0	**1**



Boolean Functions – Xnor

- Xnor
  - A negated Xor function

x	*y*	Xnor
1	1	**1**
1	0	**0**
0	1	**0**
0	0	**1**