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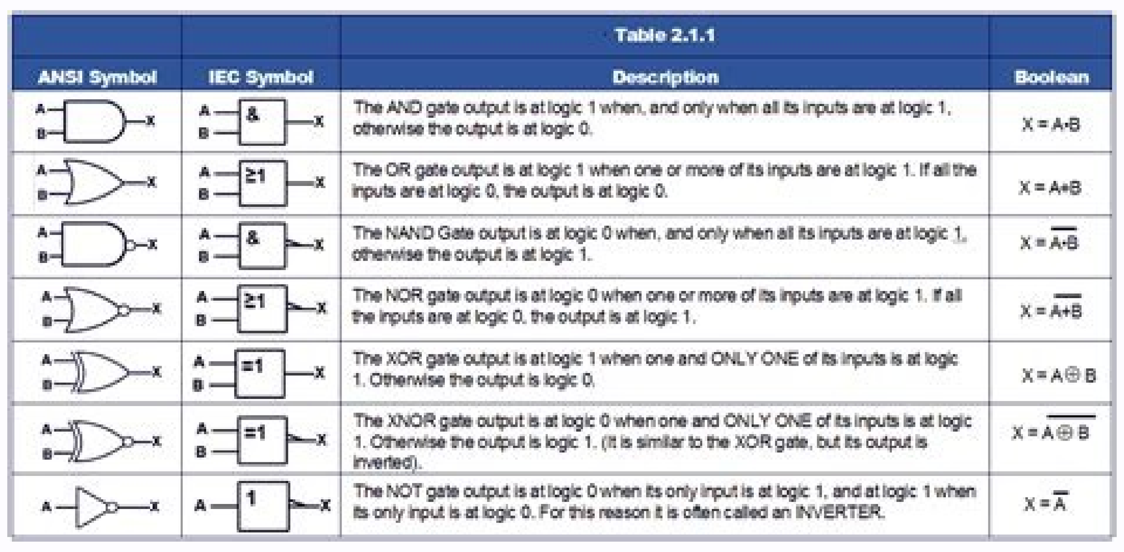
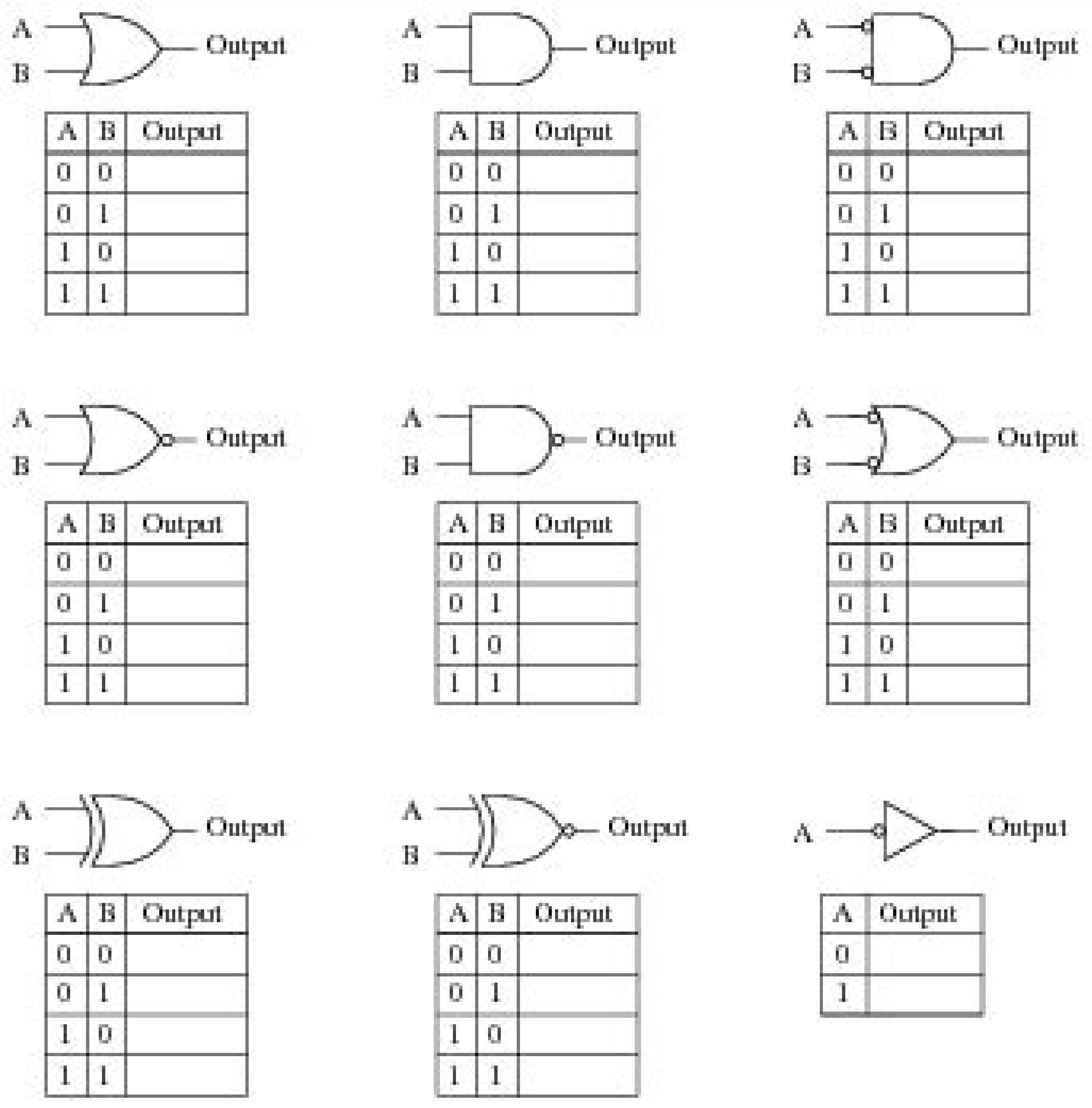
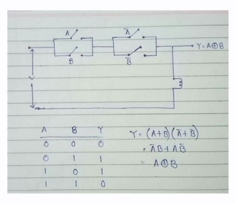
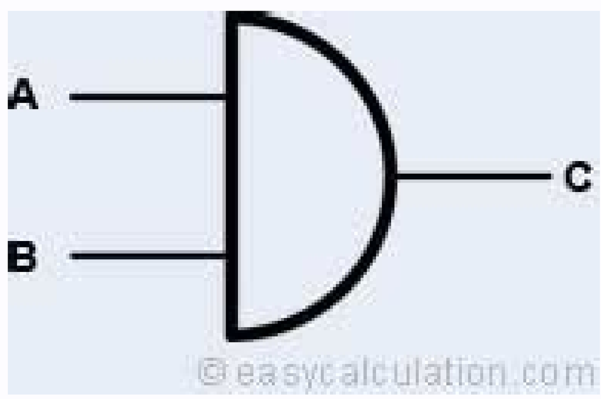
Xor and xnor logic gates pdf software

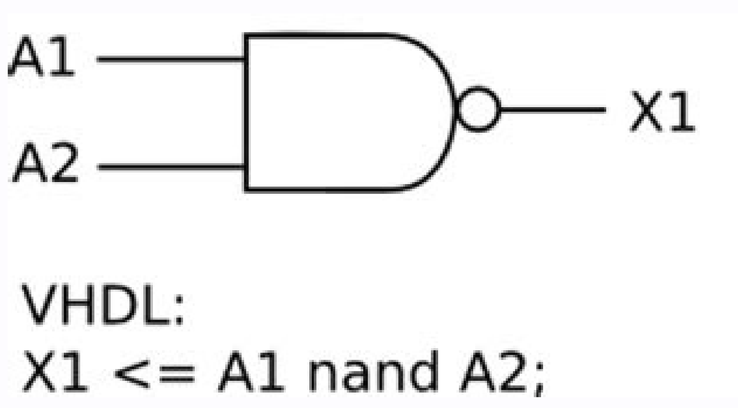


ANSI Symbol	IEC Symbol	Table 2.1.1 Description	Boolean
	&	The AND gate output is at logic 1 when, and only when all its inputs are at logic 1, otherwise the output is at logic 0.	$X = A \cdot B$
	≥1	The OR gate output is at logic 1 when one or more of its inputs are at logic 1. If all the inputs are at logic 0, the output is at logic 0.	$X = A + B$
	&	The NAND Gate output is at logic 0 when, and only when all its inputs are at logic 1, otherwise the output is at logic 1.	$X = \overline{A \cdot B}$
	≥1	The NOR gate output is at logic 0 when one or more of its inputs are at logic 1. If all the inputs are at logic 0, the output is at logic 1.	$X = \overline{A + B}$
	=1	The XOR gate output is at logic 1 when one and ONLY ONE of its inputs is at logic 1. Otherwise the output is logic 0.	$X = A \oplus B$
	=1	The XNOR gate output is at logic 0 when one and ONLY ONE of its inputs is at logic 1. Otherwise the output is logic 1. (It is similar to the XOR gate, but its output is inverted).	$X = \overline{A \oplus B}$
	1	The NOT gate output is at logic 0 when its only input is at logic 1, and at logic 1 when its only input is at logic 0. For this reason it is often called an INVERTER.	$X = \overline{A}$









A1	A2	X1
0	0	1
0	1	1
1	0	1
1	1	0

Truth tables for 2 and 3 input XNOR functions are shown in Fig. It has one input and one output. In most logic gates, the low state is approximately zero volts (0 V), while the high state is approximately five volts positive (+5 V). It turns yellow. This "odd detector" nature of the XOR relationship holds for any number of inputs.
AND | OR | XOR | NOT | NAND | NOR | XNOR The AND gate is so named because, if 0 is called "false" and 1 is called "true," the gate acts in the same way as the logical "and" operator. This is our way of differentiating between 0 (off) and 1 (on). $$\begin{align} F=\overline{A\oplus B\oplus C} &\iff F=\overline{A} \oplus B\oplus C &\iff F=\overline{A}\oplus \overline{B}\oplus \overline{C} \\ F=A\oplus B\oplus C & \iff F=\overline{A}\oplus \overline{B}\oplus C &\iff F=\overline{A\oplus \overline{B} \oplus C} \end{align}$$ An even more succinct description of the XOR and XNOR function outputs can be drawn from the properties discussed. Most electronic devices we use today will have some form of logic gates in them. However, with an XOR, (exclusive OR), if both inputs are 1, the output is 0. The symbol for NAND is the same as that for AND except for the addition of a small circle on the right side. Additionally, you can rename an output by double clicking on its label. For all other scenarios, the XOR behaves the same as the OR. XNOR gate Input 1 Input 2 Output 1 1 1 1 1 1 Complex operations can be performed using combinations of these logic gates. TTL IC's may commonly be labeled as the 7400 series of chips, while CMOS ICs may often be marked as a 4000 series of chips. This prevents any false switching of the gate. Most logic gates have two inputs and one output. In fact, this property can be generalized to XOR/XNOR functions of any number of inputs: any single input inversion changes the function output between the XOR and XNOR functions; any two input signal inversions does not change function outputs; any three input signal inversions changes the function output between the XOR and XNOR functions, etc. If the input is 1, then the output is 0. To delete nodes, click the small cross in the top right corner of its enclosing box. The logic state of a terminal can, and generally does, often change as the circuit processes data. This controlled inversion function will be useful in later work. Click the on/off switch and see what happens. Input 1Input 2Output 001 101 011 110 OR Gate The OR gate has two inputs and one output. A useful application of the XOR function is the "controlled inverter" circuit illustrated below in Fig. The demo above allows you to create sequences of logic gates to see how they behave when connected to various inputs and outputs. The XOR output is asserted whenever an odd number of inputs are asserted, and the XNOR is asserted whenever an even number of inputs are asserted: the XOR is an odd detector, and the XNOR an even detector. NOT Gate The NOT gate is also known as an inverter because the output is the exact opposite of the input. Commonly used logic gates are TTL and CMOS. Pull-up and pull-down resistors are used when there are any unused logic gate inputs to connect to a logic level 1 or 0. TTL, or Transistor-Transistor Logic, ICs will use NPN and PNP type Bipolar Junction Transistors. Inverter or NOT gate The NAND gate operates as an AND gate followed by a NOT gate. XOR and XNOR gate symbols are shown below in Fig. More typically, XOR and XNOR logic gates are built from three NAND gates and two inverters, and so take 16 transistors. If at least one of the inputs is 1, then the output will be 1. Input 1Input 2Output 000 100 010 111 NAND Gate The NAND gate behaves in the opposite fashion to an AND gate. Logic gates can be made of resistors and transistors or diodes. To connect them, click and drag from the hollow circle on the right side of the on/off switch, and release the mouse when you are over the solid circle on the left side of the "output" block. Pull-up resistors are connected to Vcc (+5V), and pull-down resistors are connected to ground (0 V). This same property holds for the XOR function—inverting any single input variable will result in XNOR function, and inverting two inputs will again produce the XOR function. Initially, you are presented with a simple on/off input and an output. CMOS, or Complementary Metal-Oxide-Silicon, ICs are constructed from MOSFET or JFET type Field Effect Transistors. Our "on/off" switch and "output block" aren't actually logic gates, but they are required because they give us the 1s and 0s needed to see how the gates behave. False represents 0, and true represents 1. The new node will be placed in the top left hand corner, and you can drag it to your desired position. Input 1Input 2Output 000 101 011 111 NOR Gate Just as the NAND gate could be thought of as an AND followed by a NOT, a NOR can be thought of as an OR also followed by a NOT. For example, logic gates can be used in technologies such as smartphones, tablets or within memory devices.In a circuit, logic gates will make decisions based on a combination of digital signals coming from its inputs. But in practice, there is a limit to the number of gates that can be packed into a given physical space. This very useful property will be exploited in data error detection circuits discussed later. 4. You can think of it as an AND gate followed immediately by a NOT gate. The two possibilities are written out in the table below. The output is 1 if both inputs are 1, and for all other cases the output is 0. It acts in the manner of the logical operation "and" followed by negation. Tables listing all logical possibilities like this are known as truth tables. 1 and the equivalent two-variable logic expressions $F_{SOP}=A\cdot \overline{B} + \overline{A}\cdot B$ and $F_{POS} = (A+B)\cdot (\overline{A} + \overline{B})$. A logic gate can be thought of like a light switch, wherein one position the output is off -- 0, and in another, it is on -- 1. For now, note the XOR output is asserted whenever an odd number of inputs are asserted. If both the A and B inputs are inverted, XNOR outputs are still produced: $F = \overline{A \oplus B}$ produces the same output as $F = \overline{\overline{A} \oplus \overline{B}}$. Some representative cases are shown. (In the symbol, the input terminals are at left and the output terminal is at right.) The output is "true" when both inputs are "true." Otherwise, the output is "false." In other words, the output is 1 only when both inputs one AND two are 1. If neither input is 1, the output will be 0. The output is "false" if both inputs are "true." Otherwise, the output is "true." NAND gate Input 1 Input 2 Output 1 1 1 1 1 1 1 The NOR gate is a combination OR gate followed by an inverter. A logic gate is a device that acts as a building block for digital circuits. OR gate Input 1 Input 2 Output 1 1 1 1 1 1 1
The XOR (exclusive-OR) gate acts in the same way as the logical "either/or." The output is "true" if either, but not both, of the inputs are "true." The output is "false" if both inputs are "false" or if both inputs are "true." Another way of looking at this circuit is to observe that the output is 1 if the inputs are different, but 0 if the inputs are the same. XOR gate Input 1 Input 2 Output 1 1 1 1 1 1 A logical inverter, sometimes called a NOT gate to differentiate it from other types of electronic inverter devices, has only one input. Composition of logic gates High or low binary conditions are represented by different voltage levels. The truth table, derived directly from the XOR truth table, uses an XOR gate with one input tied to a signal named "control". To add a new logic gate, or an additional input or output block, choose from the dropdown menu and then click "add node". At any given moment, every terminal is in one of the two binary conditions, false or true. There are seven basic logic gates: AND, OR, XOR, NOT, NAND, NOR, and XNOR. Compound XOR functions like $F = A \oplus(B\cdot C)$ can always be written in an equivalent SOP or POS forms: $F_{SOP}=A\cdot \overline{B\cdot C} + \overline{A}\cdot (B\cdot C)$ and $F_{POS} = (A+B\cdot C)\cdot (\overline{A} + \overline{B\cdot C})$ The XNOR function is the inverse of the XOR function. The name NAND comes from joining NOT and AND. CMOS circuits for either function can be can built from just 6 transistors, but those circuits have some undesirable features. Its output is "true" if both inputs are "false." Otherwise, the output is "false." NOR gate Input 1 Input 2 Output 1 1 1 1 1 The XNOR (exclusive-NOR) gate is a combination XOR gate followed by an inverter. Arrays of logic gates are found in digital ICs. As IC technology advances, the required physical volume for each individual logic gate decreases and digital devices of the same or smaller size become capable of performing ever-more-complicated operations at ever-increasing speeds. Logic gates are commonly used in integrated circuits (IC). When control is a '1' the input A is inverted, but when control is a '0' A is simply passed through the logic gate without modification. The XOR function is frequently used in digital circuits to manipulate signals that represent binary numbers—these circuits will be presented in a later module. Since the output of a 2-input XNOR is asserted when both inputs are the same, it is sometimes referred to as the Equivalence function (EQV), but this name is misleading because it does not hold for three or more variables (i.e., the output of a 3-input XNOR is not asserted whenever all three inputs are the same). They perform basic logical functions that are fundamental to digital circuits. Depending on the type of logic gate being used and the combination of inputs, the binary output will differ. A resistor can commonly be used as a pull-up or pull-down resistor. The following illustration and table show the circuit symbol and logic combinations for an AND gate. For each of the logic gates, outputs are hollow circles, and inputs are solid circles. Logic gates are based on Boolean algebra. More succinctly, inverting an odd number of inputs changes an XOR to an XNOR and vice-versa, inverting an even number of inputs changes nothing, and inverting the entire function has the same effect as inverting a single input. Its output is "true" if the inputs are the same, and "false" if the inputs are different. Input 1Input 2Output 001 100 010 110 XOR Gate With an OR gate, if both inputs were 1, the output was 1. If you need more space, click on the "Full screen mode" button which will increase the size of the workspace to fill the size of the window. It reverses the logic state. To remove connections, you can click on the input (solid circle) and drag away and release, or alternatively you can right click anywhere on the connection. In theory, there is no limit to the number of gates that can be arrayed together in a single device. 3. If the input is 0, then the output is 1. Input 1Input 2Output 000 101 011 110 Credits Circuit Description This is a simulation for the equivilant electrical circuits of the logic gates XOR and XNOR The Exclusive OR (or XOR) relationship $F = A\oplus B$ is defined by the truth tables shown in Fig. Its output is 0 when the two inputs are 1, and for all other cases, its output is 1. AND Gate The AND gate has two inputs and one output. 2, and it can be seen that for each combination of inputs, the output is the inverse of the XOR truth tables above. The Exclusive NOR (or XNOR) relationship $F = \overline{A \oplus B}$ shown in the truth tables has the equivalent two-variable logic expressions: $F_{SOP}=\overline{A}\cdot \overline{B} + A\cdot B$ and $F_{POS} = (\overline{A}+B)\cdot (A + \overline{B})$ If either the A or B inputs are in the XNOR truth table inverted, then XOR outputs are produced; that is, $F = \overline{A \oplus B}$ produces the same logic output as $F = \overline{A}\oplus B$ or $F = A \oplus \overline{B}$. AND gate Input 1 Input 2 Output 1 1 1 1 1 The OR gate gets its name from the fact that it behaves after the fashion of the logical inclusive "or." The output is "true" if either or both of the inputs are "true." If both inputs are "false," then the output is "false." In other words, for the output to be 1, at least input one OR two must be 1.

2-input XNOR gate using 2x1 mux: Figure 9 below shows the truth table of a 2-input XNOR gate. If we observe carefully, OUT equals B' when A is '0' and equals B when A is '1'. So, a 2-input XNOR gate can be implemented from a 2x1 mux, if we connect SEL pin to A, D0 to B' and D1 to B. XNOR Gate From other Logic Gates: (Combinational Logic) XNOR operation can be achieved with a combination of different logic gates. Boolean expression of XNOR is given below. Sum of Product. In this expression, we use the sum of Min terms. Min terms are the product of inputs for which output is HIGH state "1". In electronics and logic, an XOR gate with more than 2 inputs is commonly regarded as a cascade of 2-input XOR-gates, thus behaving as a parity-checker with the output being on if there is an odd number of inputs turned on. In terraria, however, an XOR-gate with multiple inputs only turns on when exactly one input is turned on. History [] The LOGIC LAB is a application for simulating simple circuits of logic gates on the screen. Its an experimental project of freelance Flash Platform developer Kris Temmerman. For contact information and other cool flash projects visit his site: freelance RIA application developer 13.11.2019 · The way they did this is by using the binary logical operations: NOT, AND, OR, XOR, NAND, NOR, and XNOR. Since the invention of transistors, manufacturers are now able to produce Integrated Circuits that readily perform these logical operations. Such chips are ... A bitwise OR is a binary operation that takes two bit patterns of equal length and performs the logical inclusive OR operation on each pair of corresponding bits. The result in each position is 0 if both bits are 0, while otherwise the result is 1. For example: 0101 (decimal 5) OR 0011 (decimal 3) = 0111 (decimal 7) . The bitwise OR may be used to set to 1 the selected bits of the register ...

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