A FORMAL TECHNICAL TEXT

3-state Logic

Roughly speaking, one can freely connect the output of one logic gate to the input of another. While it does not really make sense to connect two inputs together since neither will drive current along the wire, connecting two outputs together is more dangerous since both will drive current along the wire. The outcome depends on a number of factors but is seldom good: the transistors which are wired to fight against each other typically melt and stop working

We can mitigate this fact by introducing a slightly different style of logic called 3-state logic; we do not go into a great deal of depth about how such logic gates are constructed but instead focus on their behaviour. The central component in 3-state logic is a switch which is sometimes called an enable gate. The single transistor implementation of the gate and the more common symbolic description are shown in Figure 2.7. The gate has some interesting characteristics in terms of its behaviour which is shown as a truth table in Table 2.3. Notice that we have introduced a new logic state, hence the name 3-state, called Z or high impedance. When the enable signal en is set to 0 the gate does not pass anything through to the output r, it is not driven with anything so in a sense some other device can be connected to and drive the same wire. However, when en is set to 1, the gate passes through the input x to the output r: nothing else should be driving a value along this wire or we are back to the situation which caused the original melted transistor. In summary, the high impedance signal acts as a sort of "empty" value allowing any other signal to overpower it without causing damage to the surrounding transistors. Thus, careful use of enable gates allows two or more normal logic gate outputs to be connected to the same wire: as long as only one of them is enabled at a time, and hence driving a signal along the wire, there will be no disasters

The next issue to address is how one combines simple Boolean logic gates to create higher-level functions. Fortunately we have already covered a lot of material which enables us to do this in a fairly mechanical form. In particular, given a truth table that describes the function required, one can perform a simple sequence of steps to extract the corresponding sum of products (SoP) expression built from a number of minterms: 1. Imagine there are n inputs numbered 1...n, and one output: • Use Ii, j to denote the value of input j in row i.

(an excerpt from Daniel Page's book *Practical Introduction to computer architecture*)

A LITERARY TECHNICAL TEXT

Maria reverted to the standard clock rate, and a macroscopic view of her twenty-one Petri dishes—just as a message popped up in the foreground:

JSN regrets to advise you that your resources have been diverted to a higher bidder. A snapshot of your task has been preserved in mass storage, and will be available to you when you next log on. Thank you for using our services.

Maria sat and swore angrily for half a minute—then stopped abruptly, and buried her face in her hands. She shouldn't have been logged on in the first place. It was insane, squandering her savings playing around with mutant A. lamberti—but she kept on doing it. The Autoverse was so seductive, so hypnotic . . . so addictive.

Whoever had elbowed her off the network had done her a favor—and she'd even have her fifty-dollar log-on fee refunded, since she'd been thrown right out, not merely slowed down to a snail's pace. Curious to discover the identity of her unintentional benefactor, she logged on directly to the QIPS Exchange—the marketplace where processing power was bought and sold. The connection to JSN had passed through the Exchange, transparently; her terminal was programmed to bid at the market rate automatically, up to a certain ceiling. Right now, though, some outfit calling itself Operation Butterfly was buying QIPS—quadrillions of instructions per second—at six hundred times that ceiling, and had managed to acquire one hundred percent of the planet's traded computing power.

Maria was stunned; she'd never seen anything like it. The pie chart of successful bidders—normally a flickering kaleidoscope of thousands of needle-thin slices—was a solid, static disk of blue. Aircraft would not be dropping out of the sky, world commerce would not have ground to a halt.. . but tens of thousands of academic and industrial researchers relied on the Exchange every day for tasks it wasn't worth owning the power to perform in-house. Not to mention a few thousand Copies. For one user to muscle in and outbid everyone else was unprecedented. Who needed that much computing power? Big business, big science, the military? All had their own private hardware—usually in excess of their requirements. If they traded at all, it was to sell their surplus capacity.

Operation Butterfly? The name sounded vaguely familiar. Maria logged on to a news system and searched for reports which mentioned the phrase.

.(an excerpt from Greg Egan’s novel ***Permutation city***)