A formal technical text

3.5.2 Using the Pre-processor Constant values without an obvious meaning in a C program or Verilog program are often called “magic”: they make things work but it often is not clear why their specific value is chosen. As a solution to this problem, C allows the use of a preprocessor with which one can manipulate the source code before it is fed to the compiler. For example, instances of defined macros are replaced with an associated value; the program source code is hence more easily understood. Although less sophisticated than the C pre-processor, Verilog allows similar functionality through directives to the tool-chain. Perhaps the most simple example is the ‘include directive which allows one to include the contents of a Verilog source file in another. This practise should be used with care so that cycles of inclusion.avoided and is best used, for example, to include a single file of macro definitions that are common to the entire model. Continuing the similarity with the C pre-processor, the ‘define directive allows the definition of a macro which is replaced the associated value when used subsequently. Listing 3.17 shows the use of ‘define in action by implementing an adder whose input and output ports are wider than 1-bit. By altering the definition of the macro WIDTH, we can change how wide these ports are without fiddling with the main module definition. Note that when using a macro in C, one would only need to use the macro identifier WIDTH while in Verilog we are required to prefix the identifier with a quote to get ‘WIDTH. Conditional inclusion or exclusion of Verilog code can be achieved using the ‘ifdef, ‘ifndef, ‘else, ‘elsif and ‘endif directives. This sort of construct can alter the source code fed to the Verilog tool-chain by simply changing some defined constants rather than major alterations to the source code itself.3.5 Effective Development 131 ing 3.18 demonstrates an example; we have two different implementations of the adder module and select which one is used in the design by simply defining or not defining the GATES macro. Code for whichever branch is taken is fed to the toolchain, the branch which is not taken is omitted as if it were never there or simply commented. Since macros can be defined by the tool-chain as well as in the source code, conditional inclusion and exclusion of code can offer a neat way to configure a design for different purposes and situations. The ‘timescale directive is a means of changing the unit of time during simulation. This alters the units used to define timing delays without the need to scale them all by hand, a daunting task in a large design. Use of ‘timescale follows the general format: ‘timescale / ; where the field determines the unit of measurement while the field specifies the precision to which delays are rounded. There are some constraints as to what values can be used in both fields but these are largely dependent on the simulator.

(an excerpt from Daniel Page’s book Practical introduction to computer architecture)

A Literary technical text

Peruvian mathematician, Ricardo Salazar, had eventually proved that they shouldn't have bothered: the Autoverse rules were poised on the border between two radically different levels of algorithmic complexity, and any tinkering in the hope of improved efficiency was necessarily self-defeating. The presence or absence of gravity, in itself, had no bearing on Autoverse chemistry—but the roots of both phenomena in the simple automaton rules seemed to be inextricably entwined.

Maria was aiming for a star with four planets. Three small worlds, one giant. The seed-world, Lambert, second from the sun—with a decent-sized moon if possible. Whether or not tidal pools had been a driving force in real-world evolution, life's bridge from sea to land (and even though the sun itself would cause small tides, regardless), it couldn't hurt to make Lambert as generally Earth-like as possible, since Earth was still the only example to turn to for inspiration. With so much about terrestrial evolution still in dispute, the safest policy was to cover every factor which might have been significant. The gravitational effects of the other planets would ensure a reasonably complex set of Milankovitch cycles: minor orbital changes and axis wobbles, providing long-term climate variations, ice ages and interglacials. A belt of comets and other debris would complete the picture; not merely supplying an atmosphere, early on, but also offering the chance of occasional mass-extinctions for billions of years to come.

The trick was to ensure that all of these supposedly evolution-enhancing features coincided with a version of Lambert which could support the seed organism in the first place. Maria had half a dozen possible modifications to A. lam-berti in mind, to render it self-sufficient, but she was waiting to see what kind of environments were available before making a final decision.

That still left unanswered the question of whether the seed organism—or life of any kind—could have arisen on Lambert rather than being placed there by human hands. Max Lambert's original reason for designing the Autoverse had been the hope of observing self-replicating molecular systems—primitive life—arising from simple chemical mixtures. The Autoverse was meant to provide a compromise between real-world chemistry—-difficult and expensive to manipulate and monitor in test-tube experiments, and hideously slow to compute in faithful simulations—and the tantalizing abstractions of the earliest "artificial life": computer viruses, genetic algorithms, self-replicating machines embedded in simple cellular automaton worlds; all trivially easy to compute, but unable to throw much light on the genesis of real-world molecular biology.

Lambert had spent a decade trying to find conditions which would lead to the spontaneous appearance of Autoverse life, without success. He'd constructed A. lamberti—a twelve-year project—to reassure himself that his goal wasn't absurd; to demonstrate that a living organism could at least function in the Autoverse, however it had come to be there. A. lamberti had permanently side-tracked him; he'd never returned to his original research

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