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(Bricken)Technologies™

Iconic Logic™ Solves Fundamental Circuit Design Problems

The State-of-the-Art

Hardware design tasks are changing rapidly. Deep sub-micron technology is providing ample computational area, but requires careful optimization of wiring. Portables require low power designs for which logic that is not in use does not draw power. The generality of embedded microprocessors and DSPs is proving too costly for intensive communications applications. The decreased development time offered by reconfigurable devices is paid for with significantly lower design efficiency and performance. Multi-protocol, multi-mode, multi-function devices are obsoleting ASIC solutions.

These changes are taking place in a context in which *time-to-market* and *development costs* are paramount. There is literally no time left for careful design and no money left for tailored hardware. Designers must achieve increased performance, faster turn-around, and design flexibility while producing inexpensive just-in-time chips. And due to the complexity of designs, designers are completely dependent on their automated software design tools. Where will the next revolutionary change in EDA tool performance come from?

Iconic Logic

How quickly could you bring a chip to market if design did not require verification? How efficient could designers be if they did not have to concern themselves with timing? What would be the economic benefit if only fully testable designs with simple wiring were sent to fabrication?

What kind of innovation could make such profound changes in our industry? What kind of EDA tool could automate circuit design to the extent that we could simply ask for what we want? BTC's response to these questions is **Iconic Logic**, a new way of using logic which is simpler than Boolean. BTC has packaged this fundamentally new *calculus of design* in a product which can rapidly generate fabrication-ready designs that are error-free, verified, and testable.

Common wisdom suggests that the semiconductor industry understands logic, the foundational mathematics underlying all design and indeed all computation. Although the logic we work with is known to create complex synthesis problems, in today's sophisticated design environment no one expects that a fundamental change in the way we use logic itself could significantly improve the circuit design process. Until now!

A Truly Different Technology

Here's how it works: the designer specifies the desired functionality of the envisioned circuit in a subset of HDL that does not have timing or delay concepts. The design is submitted to Iconic Logic, together with preferences for the qualities of the implementation. Qualities like performance, area, power usage, wiring complexity, fault-tolerance. Iconic Logic quickly returns a fabrication-ready, fully verified and routed netlist which satisfies the design parameters. And for the fab house, a superb set of test-vectors and a custom simulation engine.

This tool is not for everybody, you cannot build a Pentium with it. Iconic Logic is only for the 95% of designers who would like *instant time-to-market.*

Under the hood of BTC's Iconic Logic product is the right way for circuit designers to approach logic. Iconic Logic is conventional logic with all of the redundancy removed. This is not last century's logic of ANDs, ORs, and NOTs; this is a formal system which is powerful enough to automatically remove those annoying complexities that logic synthesis is supposed to solve. This is body of techniques which has complete control over the structure and behavior of a circuit once the functionality has been designated. This is a technology which integrates technology mapping with design to such an extent that *it can tell you* what the best clocking regime, placement, and routing is for your given design and technology preferences. This is an automated calculus which *cannot* change the HDL specification, a calculus which removes redundant components, false paths, reconvergent paths, and routing bottlenecks to get to the heart of the design intentions. Then all that remains for it to do is to provide layout and timing options for approval. And if you wish a pretty good solution to your design problem, say within 10% of optimal, then click on *automated design* and you are ready to go to fabrication with a verified netlist the same day.

Automated iconic verification is not equivalence-checking, it is not model checking, it is not BDDs. The concepts and tools of iconic logic will be totally unfamiliar. It wouldn't help if we were to tell you that it is *unary* rather than binary, missing half of everything. It probably wouldn't clarify things if we were to say iconic variables have an inside, or that iconic design cannot tell the difference between gates and wires. So BTC has simply chosen to put the power of Iconic Logic in your hands, as a commercial EDA tool designed to make life easier.

Breakthrough Technology

Iconic Logic is the *distilled essence* of what we know as the conventional timed logic of gates and registers. Nothing is lost but the irrelevancies. Design optimization and design flexibility come freely through the simplicity of the new iconic methods. Designers use exactly the tools they have always used to create a functional specification in their favorite *untimed* HDL. Learning new skills and mastering new techniques is not necessary, although some may find it difficult to abandon their addition to complexity. Our minds need ANDs, ORs, and NOTs, words which have evolved within our languages for thousands of years. Iconic computational tools do not use the linear, sequential concepts; instead design intentions are expressed in a higher dimensional language which supports complete parallelism. By providing preferences for implementation qualities, the chip or board designer tells Iconic Logic how to convert parallel logic icons back into the timed combinatorial networks understood by the fabrication process. The conversion from RTL to physical implementation can be black-box, until you get really curious.

Iconic logic is *the next breakthrough circuit design technology*. Completely compatible with existing design techniques and existing circuit specifications: it is underneath what we already use. Complete command over the structure of a given circuit: logical networks are its native language. Completely scalable to deep sub-micron design size and layout: Iconic Logic is too simple to be inefficient.

BTC intends to license its Iconic Logic software and related Intellectual Property to one or more established EDA tool companies. For more information, contact:

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