

Formalization of Reliable Digital Circuits

Using B method and VHDL

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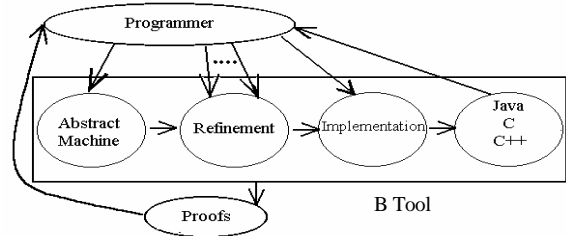
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B Method

Mathematical tools (set theory, logic) : to specify and implement a model.

Refinement : Abstract machine $\xrightarrow{*}$ Implementation
Specification \Rightarrow Deterministic computation

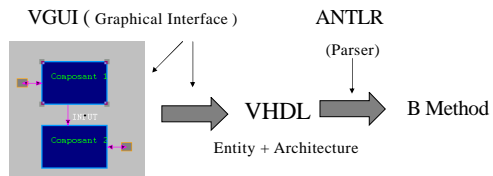
Proofs : automatically generated by Atelier B (FR) & B_Toolkit (UK)



Circuits Design \Leftrightarrow B Method

Functional Specification	Abstract Machine
Operational Spec. + components	Refinement
Validation	Theorem Proving

VHDL : Very high speed circuits Hardware Design Language



Conclusion

Features

- Translation at a high level preserving modularity and hierarchy (\Leftrightarrow ?)
- VHDL Modules with initialization and invariant properties (logic formulas)
- Top-down approach for design of digital circuits with pre-verification
- Validation of properties described by logic formulas
- Embedded systems with mixed software and hardware components

Limits

- Interactive proofs
- Real Time
- Large scale circuit