

PyLog: An Algorithm-Centric Python-Based FPGA Programming and Synthesis Flow

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The fast-growing complexity of new applications and new use scenarios poses serious challenges for computing systems. Heterogeneous systems consist of different types of processors and accelerators, and provide unique combined benefits of hardware acceleration from each individual component. CPU-FPGA heterogeneous systems provide both programmable logic and general-purpose processors, and they have demonstrated great flexibility, performance, and efficiency. Heterogeneous systems have been created and deployed in many different applications and scenarios. However, as system complexity and application complexity grow rapidly, programming and optimizing heterogeneous systems require great manual efforts and consume a lot of time. In this work, we propose a Python-based high-level programming framework to simplify programming and optimization of CPU-FPGA heterogeneous systems. The proposed high-level operations isolate underlying hardware details from programmers and provide more optimization opportunities for the compiler.

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