Hardware Decompilation Through Equality Saturation

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Hardware decompilation is the process of recovering higher-level programming abstractions within a *netlist*. Our previous work established the new problem of *hardware decompilation* and introduces a pass for *hardware loop rerolling*. We propose a new pass for doing hardware decompilation which identifies standard library components in a gate-level netlist by using Equality Saturation to efficiently search for the standard libary component in the netlist. We achieve this by extracting a rewrite rule from EGraph representation of the standard library component. By applying the extracted rewrite rule and the standard rewrite rules for logical equivalences on the EGraph representation of the gate-level netlist, we can extract out the standard libary components we are looking for. Future work includes generating or creating with other forms of rewrites to extract out other sorts of high level abstractions.
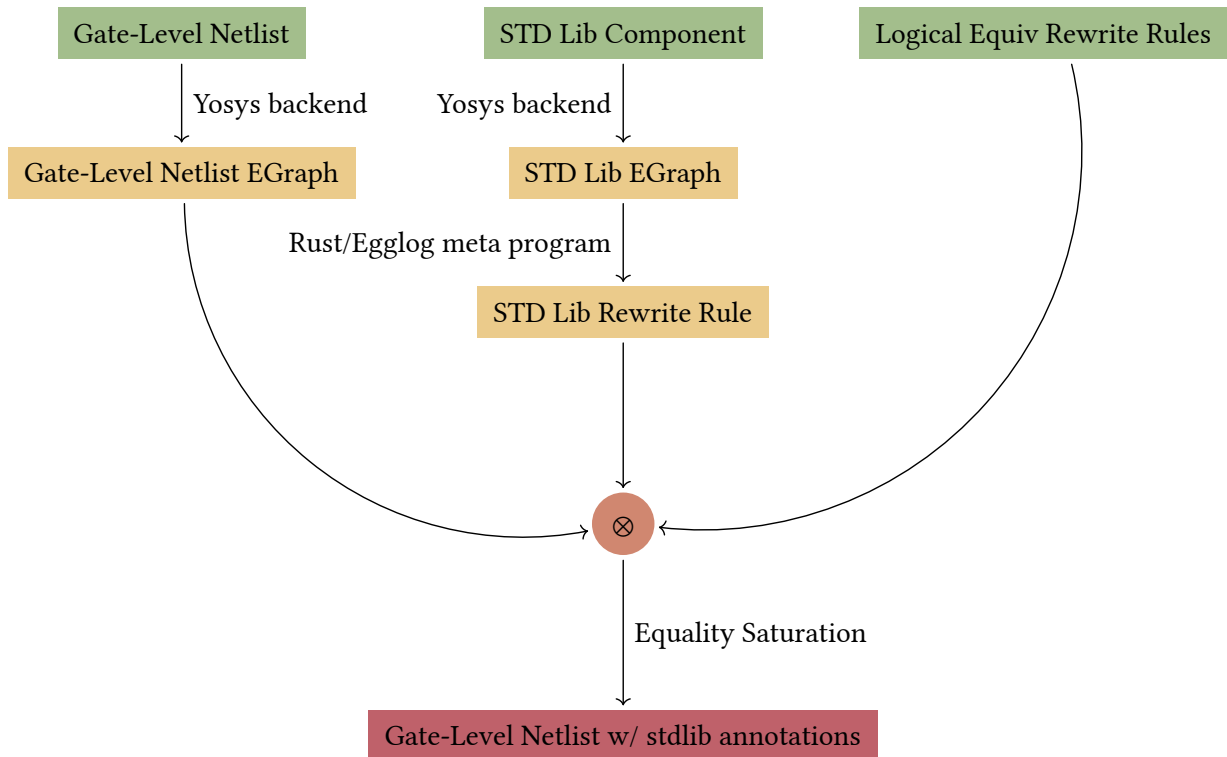

Figure 1: Diagram of the process