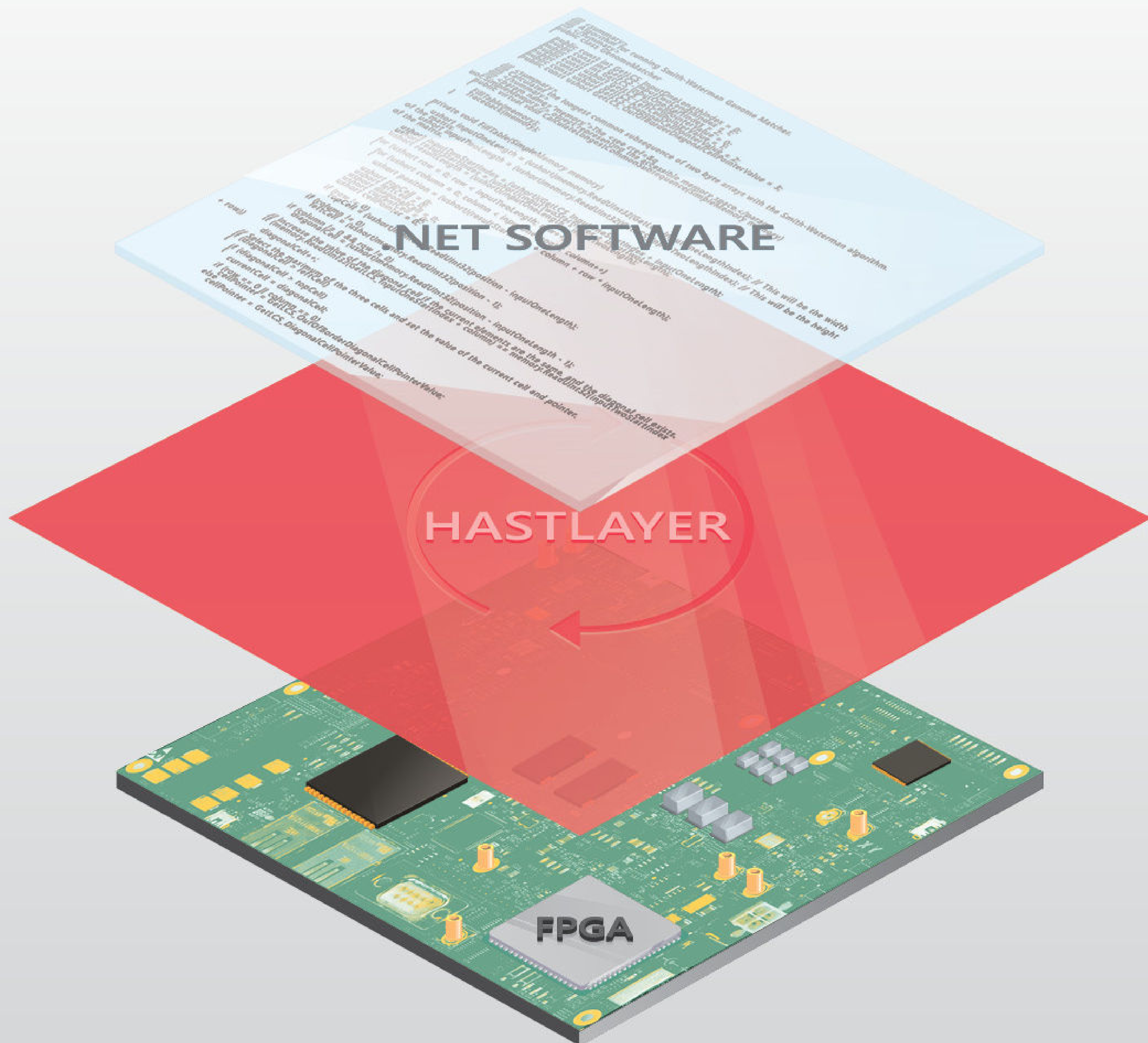


# HASTLAYER



CONNECT AN FPGA TO YOUR COMPUTER    WRITE .NET CODE    HASTLAYER WILL TRANSFORM YOUR CODE INTO FPGA-IMPLEMENTED HARDWARE

## HIGH-LEVEL FPGA LOGIC SYNTHESIS FROM .NET PROGRAMS FOR SOFTWARE DEVELOPERS



<http://lombiq.com/hastlayer>

### THE POWER OF FPGAS AT THE HAND OF SOFTWARE DEVELOPERS

Hastlayer aims to provide software developers of the .NET platform a tool to accelerate performance-critical parts of their programs with FPGAs. Hastlayer automatically generates FPGA-implemented logical circuits from .NET program code and masks that part of the software was swapped out with a hardware implementation – the surrounding software uses the hardware component just as it would be standard .NET software.

Hastlayer is intended to be used by software developers with no hardware design knowledge. By effectively giving them a programmer-focused high-level synthesis toolbox Hastlayer allows developers to utilize the power of FPGAs with their existing skills. This has the potential to increase the number of companies and institutes adopting field-programmable solutions.

### WHY .NET?

Hastlayer can process software written for Microsoft's .NET platform (which is now open-source and not locked to Microsoft). One of the advantages of .NET is that a large number of programming languages can be used to write software for it, in a way that as a step all programs, written in either language, will be transformed (compiled) to the same programming language called Common Intermediate Language (CIL).

Since Hastlayer processes CIL programs this means that the input of Hastlayer can be a program written in dozens of programming languages (including several of the most popular ones as C#, C++, Python, PHP, even the now very popular web scripting language JavaScript), thus being readily available for the vast majority of the world's software developers.

### WORKING WITH HASTLAYER

Using Hastlayer aims to be an as seamless experience as possible, for software developers not having any FPGA design knowledge. The general process of utilizing Hastlayer to convert a piece of software into an FPGA-implemented hardware that delivers the same logic is as following:

- A performance-critical part of the software is factored out to a separate assembly (class library).  
The Hastlayer class library is added to the software and configured.
- Method calls to the performance-critical component are changed to go through Hastlayer. This makes it possible to direct calls to the hardware implementation when it's ready but keep the option to run the standard software assembly if e.g. an FPGA is not present.
- The conversion of the performance-critical assembly is done by Hastlayer: VHDL code is generated which is put into the Hastlayer hardware framework, then synthesized and used to program a connected FPGA with the existing vendor toolchain.
- Method calls are now directed to the FPGA and are executed by logic circuits.

### ABOUT LOMBIQ TECHNOLOGIES

Lombiq is a technology solutions company, primarily providing software development services built on the Microsoft .NET platform, focused on web application development with the Orchard content management system (<http://orchardproject.net/>). We're the world-wide leading integrators of Orchard and one of its main developers.

The Hastlayer project is a hardware-based extension of .NET programs and thus connected to the core expertise of our company. It's also the key initiative of our Research and Development pursuit, an element of our strategy from the founding of Lombiq in May, 2013.

Our main business activity is currently providing software development services, including custom software development, advisory and training. For the time being our customers are without exceptions foreign from the USA, Canada and EU.

R&D PROJECT OF

