The goal of the Custom-Fit Processor (CFP) project at HP Labs is to produce a scalable and customizable technology platform for embedded VLIW processors. The CFP project targets System-On-Chip designs, where currently a combination of core processors, DSP engines and specialized ASICs is required for high-performance applications. Custom-designing a core processor provides enough performance to absorb some ASIC/DSP functionality, reduce costs and time-to-market.

The first outcome of the CFP project is the Lx Family of Embedded VLIW Cores, designed by STMicroelectronics and Hewlett-Packard Laboratories. For Lx we developed the architecture and software from the beginning to support both scalability (variable numbers of identical processing resources) and customizability (special purpose resources). The Lx technology is based on:

- A new clustered Very Long Instruction Word (VLIW) core architecture and microarchitecture that ensures scalability and customizability; and that we can customize to a specific application domain.
- A software toolchain based on aggressive instruction-level parallel (ILP) compiler technology that gives the user a uniform view of the technology platform at the programming language level.

The first Lx implementation shows that specialization for an application domain is very effective, yielding to large gains in the price/performance ratio. Using the design of Lx as a concrete example, the talk will address issues like: When is scaling or customization beneficial? How can one determine the degree of customization or scaling that will provide the greatest payoff for a particular application domain? What architectural compromises have to be made to contain the complexity inherent in a customizable and scalable processor family?