

# Similar products, different features

BigLever Software, Inc. has a product exclusively developed to facilitate software mass customization. The centerpiece of the BigLever solution is Gears, a software product line development tool. BigLever also has an innovative software product line methodology that complements Gears.

Gears is designed to accelerate the development of standalone or embedded software for a product line portfolio of similar products with variations in features and functions. Gears is used throughout a development organization – by developers, architects, build engineers, configuration managers, test developers, product managers, and project managers – to engineer their software product line portfolio as though it is a single system rather than a multitude of products.

Gears can be used in any or all stages of the portfolio development life cycle for more effective requirements management, change and configuration management, source code development, software builds, testing, and document development.

BigLever's software product line methodology approach is based on new methods across three primary categories:

- **Software mass customization:** The dichotomy of Domain Engineering (DE) and Application Engineering (AE) in early

generation software product line methods introduces dissonance and inefficiency in software development. The software mass customization methodology utilizes abstraction and automation to eliminate application engineering and thereby the negative effects of the DE/AE dichotomy.

- **Minimally invasive transitions:** The amount of cost, time, and effort required for organizations to adopt early-generation software product line methods is disruptive and prohibitive. Minimally invasive transition methods enable rapid adoption of software product line practice with low disruption, low cost, and rapid return on investment.
- **Bounded combinatorics:** Combinatorics in feature models, requirements, architecture, implementation variation points, and test coverage can easily exceed the number of atoms in the universe, which leads to complexity, errors, and poor testability. New methods for bounded combinatorics utilize modularity, hierarchy, encapsulation, abstraction, and constraints to reduce combinatorics from exponential and astronomical to linear and tractable.

Anyone who has to manage multiple product variations such as those from a line of flexible and customizable products can benefit from using Gears for software mass customization.

## Design cycles in a flash

New tools enhance simulation and software development of various module combinations before a physical piece of hardware is available for development. These tools enable better hardware decisions and shorten design cycle times because the software team can write and test code to the simulation models. Combining simulation with a good modularity strategy creates a powerful customization solution.

### VaST Systems

Several companies are starting to offer practical virtual simulation tools that allow testing and development before final hardware and software development. These tools help speed the development process and enable faster responses to mass customization opportunities.

VaST Systems technology includes an ultrafast, full event wheel, simulation engine, plus specialized peripheral, bus, and processor modeling techniques to achieve high performance in every component of a system on a chip. VaST's CoMET, Meteor, Metrix, and Peripheral Device Builder provide quick development and exploration environments tightly integrated with the models and the simulator. The combined power of VaST tools and models allows a single-core simulation to achieve up to 200 MIPS, while multicore systems with tiered memory structures, multilevel buses, bus bridges, and peripherals can be simulated at up to 100 MIPS depending on the configuration.

These speeds are fast enough to support real-world tasks, such as booting an RTOS in a matter of seconds. The VaST virtual system prototype can run the same compiled and linked target code as the

actual hardware device while accurately representing the system's real-world behavior. Meanwhile, the integrated environment provides real-world synchronization between all of the cores, buses, memories, and peripherals.

### Virtutech

Virtutech's product suite Simics can simulate any computer system, from a single board computer to cabinets containing hundreds of microprocessors, allowing software development and test to be completed in a simulated environment. Even production binaries run unchanged so everything right up until the final test of the software on real hardware can be accomplished using the simulated system. Simics is used for developing software for high-performance computing, communications, and aerospace/defense applications.

Virtutech Simics is a family of products optimized to the tasks performed by different engineers. Simics Developer and Simics Hindsight are products for the software developer and quality assurance engineer. Simics Model Builder is a product for engineers building the system models required by Simics Developer. Simics includes Device Modeling Language (DML), which enables anyone to create high-performance device models that can then be combined into models of complete systems. Simics Architect facilitates a much finer-grained examination of the system to examine architectural tradeoffs such as bus widths, cache sizes, or queue depths. Additionally, custom solutions can be developed to perform data analysis or to integrate Simics into nonstandard environments.