



BIGLEVER NEWSLETTER: From the PLE Frontline

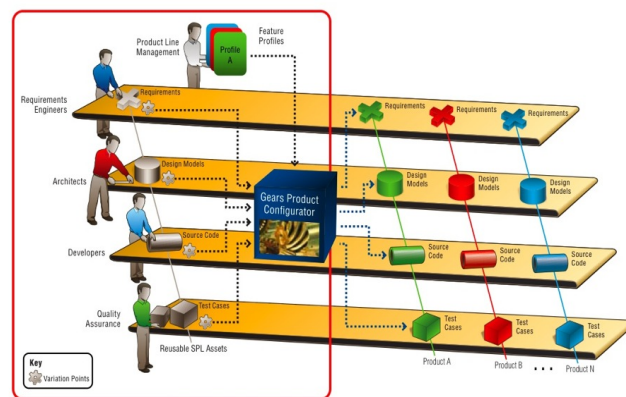
Getting Started with Product Line Engineering – A View from the Inside Part 2: How to Build a Production Line

Greetings from Paul Clements:

In this newsletter series, I'm discussing BigLever's getting started approach and the hands-on three-day workshop at its heart. In [Part 1](#) of the series, I outlined the general steps that we take during the three days, which includes establishing a hierarchical production line structure, traversing it, and building a production line for each node. In this installment, I'll expand on what that last step entails.

In BigLever terminology, a production line is the automated infrastructure for producing the products in a product line. Think of it as the factory, which takes lifecycle product assets (requirements, code, tests, or user manuals, to name but a few), exercises the variation points in those assets according to the features of a particular product, and produces instances of the assets appropriate for that product. Gears is the engine that translates feature choices for a product into the set of assets configured for that product.

The red outline shown in the illustration encloses the production line: Assets endowed with feature-based variation points, descriptions of products (called feature profiles), and Gears. (Click image to enlarge.)



The "real work" of a Getting Started Workshop, then, is to build the production lines along the way. Here's how it works.

At a Getting Started Workshop, someone from the customer organization always operates the Gears tool, not BigLever. We coach the "driver" regarding how to create a new production line: Set up the files and folders, create the base file, and so forth. Once this preliminary setup is done, our production line is built in three steps:

■ About this Newsletter Series

As BigLever Software's Vice President of Customer Success, Dr. Paul Clements helps BigLever customers understand and apply the latest product line engineering (PLE) approaches, create optimized deployment plans, and establish successful ongoing PLE practices.

In this *From the PLE Frontline* newsletter series, Dr. Clements shares his unique insights, observations, and valuable lessons learned from interactions and collaboration with customers.

We appreciate your interest and welcome your feedback regarding your organization's PLE challenges and issues.

■ Video: Introduction to PLE

Have you ever wanted to explain PLE in a nutshell to colleagues, co-workers or decision-makers in your organization?

This new introductory video – [Product Line Engineering for Systems and Software](#) – conveys both the technical and strategic business impact of PLE, in a way that crosses all organizational boundaries.

Featuring some of the industry's most notable PLE deployments, this 11-minute video provides a concise view into how PLE is changing the fundamentals of how companies create, maintain, evolve, and compete with their product lines.

>> [View the video.](#)

■ SPLC Best Paper Award

The [International Software Product Line Conference \(SPLC\)](#) brings

First, we elicit features for that product line from the participants.

You'd think this would be the step that, on a flowchart, would be labelled "Magic happens here," but in fact it's surprisingly straightforward. We ask, "How does this part of your system differ from product to product?" That's it. To our surprise and pleasure, the differences usually come pouring out. Those that signify distinguishing customer-facing characteristics are features.

Our Gears operator captures the features by building a feature tree -- essentially, a decision tree that lays out the choices that must be made to specify individual products. In a matter of minutes we have a nice feature model defined.

Then we ask which combinations of these features are useful, and our operator captures those as feature profiles. (An important point about feature profiles is that they prevent you from worrying about the often-astronomical number of feature combinations that you don't care about.)

Next we explore if there are any combinations of features that must always co-occur, or must never co-occur, and we help our operator turn those into feature assertions, which are a vital part of the domain knowledge. Finally, we ask our Gears operator to build a matrix for this product line, which is a Gears construct for specifying all of the choices associated with particular products.

Second, we turn our attention to configuring one or more assets by inserting variation points.

Each Getting Started Workshop has a focus (established during the preparation phase) on particular lifecycle assets. Requirements are a favorite, but code, user manuals, project plans, build scripts, test artifacts, and more also frequently play a role. This step involves working on the focused asset associated with the production line we just built.

Suppose the asset is a requirements specification, maintained in DOORS. We will comb the existing specification looking for places where it differs from specs for other products, or where it is product-specific, or where it attempts to be product-agnostic through "if" clauses. We then convert those areas to variation points, demonstrating the DOORS/Gears interface.

Third and finally, we actuate.

Actuation is the term we use for Gears configuring shared assets into product-specific instances, based on the feature profile for a product. Once we have an asset "wired up" with variation points expressed in terms of the features in our feature model, we add it to the production line's matrix, and the operator pushes the Gears "actuate" button for a product. We then examine the generated asset instances, to show that they are configured appropriately for that product. We repeat the actuation step for every product in the matrix.

For a workshop really "in the groove," we can accomplish this milestone by lunchtime on the first day.

together leading PLE experts – including practitioners, researchers and educators – to discuss the latest innovations and advances in the industry.

At SPLC 2012, BigLever co-presented a case study paper entitled *Mega-Scale Product Line Engineering at General Motors*. This paper was selected by the program committee to receive the Best Paper Award for the Industry Track, which provides practitioners the opportunity to learn from the experiences and successes of other practitioners in the field.

This case study highlights the innovative new Bill-of-Features™ approach that enables companies to address the complexities that occur in the engineering of highly complex product lines. Analogous to the Bill-of-Materials, a term that is used in mechanical design to designate the listing of parts that characterize a product, Bill-of-Features is the listing of PLE features that characterize a product.

>> [See the case study.](#)

■ Getting Started Package

BigLever's Getting Started Package is an intense, hands-on program which entails the creation of a tangible, small scale pilot project that serves as the catalyst for learning and change within your organization. This special package – a \$10,000 value – costs \$5,000 and includes:

- 3 days of onsite pilot project development and consulting
- 1/2 day each of interactive offsite preparation and post-processing to summarize results
- Satisfaction Guarantee: Cost of the package is refundable if you are not 100% satisfied.

The Getting Started Package will help you energize and accelerate your PLE transition, gain

Next: Observations.

In my final installment I'll explore some key observations about the getting started process and the insights that companies gain from this experience.

Best Regards,
Dr. Paul Clements
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organizational buy in, and illuminate the technical and strategic benefits, and return-on-investment.

[>> Learn more.](#)

■ **About BigLever**

BigLever Software, Inc.TM is the leading provider of systems and software product line engineering framework, tools and services. BigLever's patented GearsTM solution enables organizations to reduce development costs and bring new product line features and products to market faster, enabling businesses to more reliably target and hit strategic market windows.

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