Experiences with Software Product Line Engineering

This chapter:

- Summarises 15 cases of applying the software product line engineering paradigm in industry.
- Reports on examples of cost reduction, shorter development times, and quality improvement achieved by introducing the software product line engineering paradigm in industry.
- Provides annotated references for further reading about the success stories, obstacles faced, and experience gained.
21.1 ABB

Company background: Asea Brown Boveri (ABB) is a leading global technology company and has two main business areas, the power and automation technology for utility and industry customers [ABB 2004].

Products: ABB’s power technology comprises, for instance, high- and medium-voltage products, transformers, and utility automation products. The automation technology branch comprises products such as control systems and robotics [ABB 2004].

Platform: ABB gained plenty of experience with different software product lines. The first example is the ABB Gas Turbine Family, which covers the power range of 35 to 270 MW with five basic turbine types varying in size, combustion technologies, and equipment [Ganz and Layes 1998]. The second example is the Semantic Graphics Framework. It supports the development of graphical applications that realise special requirements in the engineering domain [Rösel 1998]. The third example is ABB’s train control product line which is an embedded real-time software system for controlling train movement [Eixelsberger and Beckman 2000].

Experience: The experiences of ABB with the software product line approach are positive. The Semantic Graphics Framework has been in use for several years in different business units. More than ten industrial applications have been derived from it [Rösel 1998]. The reference architecture of the turbine control system for the ABB Gas Turbine Family led to shorter development time, higher code quality, and eased the exchange of modules [Ganz and Layes 1998]. For the train control product line, ABB expected significant quality improvements and savings when developing additional product line members [Eixelsberger and Beckman 2000].

Annotated References


This paper describes the object-oriented design principles of the control architecture of the gas turbine software product line. These principles are for example the use of object hierarchies and data encapsulation.


This paper shows the evolution of the Semantic Graphics Framework from a prototype to a software product line for different industrial appli-