Chapter 21

A Process Model for Certification of Product and Process

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Software certification has become more and more popular, especially for software developers, as it can provide confidence to customers that the product is of acceptable quality. Software certification can be done at two levels: the development process and the software product itself. There are many different certification schemes, such as ISO 9001 and CMM for development process, and Y2K compliance for software product. This chapter first identifies two process models, one for process certification and another for product certification. We then propose a certification process for Commercial off-The-Shelf (COTS) product and its development process. Finally a generalized model of certification process (GCM) for both product certification and development process certification is developed. Example certification schemes are then mapped to this model to illustrate its validity. The evaluation shows that the popular certification schemes fit well into GCM. GCM may be used as a basis to develop a certification scheme for particular application domains or to validate a particular certification process.

INTRODUCTION

In recent years, certification has gained prominence in the standards world. In fact, it has its origins in the very foundation of standardization. Certification is the procedure by which a third party gives written assurance that a product, process or service conforms to specified characteristics. Certification involves an assessment process, which compares the actual measurements of the characteristics of interest with the specifications of those characteristics.

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Both ISO and IEEE define certification similarly. According to ISO, conformity certification is “the action of certifying by means of a certificate of conformity that a product or service is in conformity with specific standards or technical specifications” (Geneva, 1980). IEEE defines conformity certification as “the process of confirming that a system, software subsystem, or computer program is capable of satisfying its specified requirements in an operational environment” (Neumann, 1989).

Historically, software certification is an extension of system certification. In most systems, software is only one of the components. As shown in Figure 1, certification can serve as:

- a guarantee to the customer that the software product possesses a certain set of well-defined attributes that make it suitable for its intended use, and
- a protection for the producer against costly legal suits by the customer, when the customer is not satisfied with the product.

Software certification can be done at two levels: process certification and product certification. Historically, as software was perceived as intangible, a common way to certify software was to rely on the thoroughness of its development methodology. This led to the certification of process. The basic assumption is that the development process can assure that the developed product complies with its specifications.

Recently, developing software systems from Commercial Off-The-Shelf (COTS) components has received great attention, as it promises a more cost-effective way for software development (Voas, 1999; Voas, 1998; Software Engineering Institute, 1995). However, there is often difficulty in selecting the right COTS and gaining confidence that the COTS will function as advertised. An objective of this study is to develop a certification model for COTS products, to ensure the quality and functionality of the COTS products, as well as to give confidence to the customers of COTS products. Also, a general certification model is needed to act as a basis to develop a certification scheme for particular application domains and to validate a particular certification process.

Figure 1: Use of Certification

![Figure 1: Use of Certification](image-url)