



Chapter VI

Software Confederations—An Architecture for Global Systems and Global Management

Jaroslav Král
Charles University, Prague

Michal Žemlička
Charles University, Prague

ABSTRACT

Many (especially the large) software systems tend to be virtual peer-to-peer (P2P) networks of permanent autonomous services (e.g., e-government should be supported by the network of information systems of individual offices). The services are loosely coupled, a service can join/leave the system quite easily. We call such networks software confederation (SWC). The paradigm of the SWC is orthogonal to the paradigm of the object-oriented methodology. The architecture of SWC is an engineering necessity in the case of global or very large information systems (IS) and provides many software engineering advantages like incremental development, openness, modifiability, maintainability, etc. SWC is a necessity in many other cases. SWC supports the trend of large enterprises or modern states

to be decentralized, dynamic, and able to work in the time of globalization. Software confederations are the result of the tendency to globalization, and at the same time, the tool allowing of implementation of IS for a globalized society. SWC changes basic features of a CEO's work as well as a CIO's. In both cases, it supports the decentralization. This paper discusses the motivation of software confederations, the techniques of their design and implementation, including the use of XML (inclusive SOAP-UDDI), their software engineering advantages, relation to object-oriented technology and methodological consequences of their use. The main conclusion is that the concept of SWC is the crucial for the future software and information technologies and substantially changes the management tasks of the CIO and CEO.

INTRODUCTION

The last 15 years were impressive for the success of object-oriented (OO) software and OO methodology. The OO paradigm was so successful and has become a respected standard. A unified OO methodology known as UML (unified modeling language) was developed by OMG and included into successful CASE tools. The success of OO was so great that it has overshadowed cases when object-orientation is not the best technique to use. Examples are the integration of legacy systems as well as of third-party products providing permanent services. Such systems are used as black boxes. Such architecture becomes crucial for information systems in global world and for global management. The architecture is not properly supported by the standard OO paradigm formalized in UML.

It appears, but is not generally accepted, that OO is good for systems that are mainly sequential. These systems have been developed mainly from scratch (with the exception of the use of OO libraries) and as one logical unit for example, the developers have good knowledge about all the parts of the developed system or they can easily gain it; no large constituent parts of the system must be used as black boxes). The result is that the reusability of the object-oriented code is rather low (Finch, 1998). The number of cases when people must use a paradigm other than an object-oriented one is surprisingly large. This scenario occurs when information technology should support global activities or the cooperation between competing companies.

It is usually required and expected that company information systems should support all company activities. The company cooperates with many external subjects; the set of these subjects and the level of the cooperation with particular partners changes quickly. It is therefore not possible to have an inflexible company IS.

It seems reasonable to enable temporal groups of companies to build information systems supporting their cooperation needs and common activities. On the other hand, it is reasonable that information systems of the members of such groups (coalitions) should be insensitive to the environment changes and protected against the attacks of outsiders (e.g., hackers) on their systems and data.

The easiest way to complete this task is to implement interconnections of existing information systems of the cooperating companies. Access gates of the companies' information systems than can serve both as watchdogs against hacks and espionage and as data transformers (they e.g., can convert the communication protocols from the proprietary one to the public one—and vice versa).

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