KNOWLEDGE ENGINEERING: PRINCIPLES AND TECHNIQUES
Proceedings of the International Conference on Knowledge Engineering,
Principles and Techniques, KEPT2009
Cluj-Napoca (Romania), July 2–4, 2009, pp. 1–4

DISTRIBUTED COLLABORATIVE SYSTEMS SECURITY

CRISTIAN CIUREA(1), MARILENA DUMITRACHE(2), AND MIHAI DOINEA(3)

Abstract. This paper describes key concepts of collaborative systems and presents the main properties and quality characteristics for the collaborative banking systems. The article analyzes different ways to increase the efficiency and the performance level in collaborative banking systems.

1. Collaborative banking systems

Collaborative systems are an important subject of knowledge-based society and an important part of the human activities is involved in this field. Science has great impact on the development of different types of collaborative systems from various activity fields [4]. After the criterion type of application, collaborative systems are: collaborative systems in education; collaborative systems of defense; collaborative systems in production; collaborative banking systems. A collaborative banking system differs from a classical banking system due to the following advantages: full transparency; perfect communication between employees; fostering teamwork; increased quality of services; rapid progress. In a collaborative banking system are the following components: the material, which includes buildings, equipment and other property; the energy, consists of flows of electricity, internet and intranet connections, alternative channels of communication; the information, comprising all software and hardware resources available to the bank to conduct its business; the human, including human resources of the bank, the categories of personnel and the qualification levels of them. Regarding the collaborative banking system, an indicator for increasing the efficiency is the level of staff training. Considering the qualifications period of five years, an employee has a minimum number of one qualification in five years and a maximum of one per year. The maximum number of training sessions that the bank will finance, over a period of five years, is calculated according to the relationship:

$$\mathrm{NT} = 5 * \mathrm{NP},$$

2000 *Mathematics Subject Classification.* code, code.
Key words and phrases. distributed systems, collaborative systems, security, quality characteristics.

©2007 Babeş-Bolyai University, Cluj-Napoca

where:

- NT - the total number of training or qualifications supported by the bank;
- NP - the number of people employed in the bank and are eligible for training.

We are considering the case study of a banking business process regarding the activation of electronic banking services. In this business process, which is a collaborative work, we found two partners: customer and bank. The bank is represented by four entities or departments, like branch, technical assistance, adminstration and intervention. Regarding the technical assistance department, this is made by five employees which need to be trained. If we take into account the duration of trainings, in the formulas for calculation of the indicators will appear another two variables: Dmin = minimum duration of training, expressed in calendaristic months; Dmax = maximum duration of training, expressed in calendaristic months. In this case, the total number of training sessions supported by the bank within five years, expressed in calendaristic months, is given by the relationship:

$$NT = 5 * NP * Dmax$$

The degree of increasing the level of staff training will be determined with the same formula, with the difference that the number of persons qualified in five years is weighted with the duration of qualifications for each person [5]. The collaborative banking systems should work better than other types of systems, because these systems creates a collaborative environment where people can work better together, can share information without the constraints of time and space.

2. Architectures of distributed applications in the banking system

Distributed architecture is a n-tier application architecture wherein application components may be distributed across multiple computer systems. There are three types of distributed systems architecture: 2-tier architecture, 3-tier architecture and Client/server architecture. Because the banking applications are very complex, it was realized that the 2-tier architecture is not enough and for this reason the banking systems implement for their applications the 3-tier architecture which has a presentation layer (tier), an application layer (middle tier) and a data layer as presented in [1]. Regulations like cxEuropean Union Payment Services, Basel II and EU Credit for Consumers lead to new changes in the way payments are made. To resist banks must standardize business processes made possible by service-oriented architecture (SOA). SOA is a software architectural concept that defines the use of services to support the requirements of software users. It is a system for linking resources on demand. In an SOA, resources are made available to other participants in the network as independent services that are accessed in a standardized way. This provides for more flexible loose coupling of resources than in traditional systems architectures. [3] If there are a typical set of core banking

systems for instance trade finance, bill pay, loan, treasury, and external payment systems and more others, will result an appreciable number of unique network connections and message types (accept out-payment instruction, retrieve in-payment profile). This number can be reduced implementing SOA, which provides a way to employ reusable services to achieve the different payment transaction types. A primary aim of using SOA to simplify payments is to enable banks to reconfigure existing IT assets, not to built or purchase a new application, when new regulations or customer demands appear. It may be said that SOA services allows more flexibility for change and a better way of distribute the products, because the channel applications and channel support applications are no longer tightly linked to core banking systems. We define GA, an accessibility degree of a user into a distributed application:

$$GA = \frac{AN}{TN}$$

where:

- AN - number of accessed nodes by a user through a work session;
- TN - total number of application nodes.

The accessibility degree take values into the interval [0; 1]. This indicator measure how many options was accessed by a particular user during a work session, divided by the total number of options for the distributed application.

3. Security of quality characteristics

Banking systems are totally dependent on distributed software applications, and Internet resources. The fact that this area of communication is highly vulnerable, the importance of quality characteristics in collaborative banking systems has increased and client orientation is one of the top priorities due to the competitive level on the market. The most important characteristics of distributed collaborative systems are:

- *reliability* - the characteristic which defines the capability of a banking system to maintain its services provisions under defined conditions, as they are presented when the bank officially launched the system, for defined periods of time, assuring the strategic objective of the institution; one aspect of this characteristic is fault tolerance described as the capacity of systems to withstand component failure, recovering and continue functioning to its optimal parameters;
- the characteristic that reveals the distributed collaborative system ability to be transferred from one environment to another with minimum costs of adaptability is called *portability*;
- banking systems *complexity* is given by the operations involved in transactions and by the collaborative aspects of the subsystems which defines them;

- *scalability* is the collaborative system characteristic which is found between a commercial bank and its branches; the each and every collaborative system defined at branch level which must be integrated into the central bank unit collaborative system, involves costs which reported to the total value of the system gives the capacity of integration;
- *maintainability* refers to the process of maintaining in operational limits the entire informational system; bank persistence on the market is dependent on the reliability and maintainability characteristics.

Assuring these characteristics for distributed collaborative systems involves using security methods and techniques starting at physical layer, protecting the equipments on which collaborative systems are running and the area in which they are stored, up to data layer, protecting the sensitive information using encryption techniques.

4. Conclusions

The field of collaborative systems is a domain that has many published papers and that has acquired in the last period a great volume of theoretical knowledge. The quality characteristics have a great impact on the number of factors and as result on the scale of the model. In the end, equilibrium must be reached, between the model dimension and its capability to give significant results. The knowledge-based society evolves only through the high quality of citizen-oriented collaborative systems. [4]

References

[1] Mihai DOINEA - eBusiness security architecture, Revista Informatica Economica, vol.XIII, nr1/2009, pg. 137

[2] $http://www-05.ibm.com/de/financialservices/pdf/ibv_soa_banking.pdf$

[3] Liu LILAN , He YU'AN, Yu TAO, Xiong ZONGHUI - Research on SOA-based Manufacturing Grid and Service Modes, Sixth International Conference on Grid and Cooperative Computing, Los Alamitos C.A., 2007, pp. 608-613, published by IEEE

[4] Ion IVAN, Cristian CIUREA - Quality characteristics of collaborative systems, Proc. The Second International Conference on Advances in Computer-Human Interactions, vol. I, Cancun, Mexico, 2009, pp. 164-168, published by IEEE

[5] Ion IVAN, Catalin BOJA, Cristian CIUREA - Metrici ale sistemelor colaborative, teorie si practica, Editura ASE, Bucuresti, 2007

(1)(2)(3) Academy of Economic Studies, Bucharest, Romania

E-mail address: (1)cristian.ciurea@ie.ase.ro

E-mail address: (2)dm.marilena@gmail.com

E-mail address: (3)mihai.doinea@ie.ase.ro