Genericity, and Customisation in a Lotus-based Solution for Communication between Local Public Institutions

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Abstract: The paper presents the intention of development of a generic network for communication – co-operation between local public institutions. This network is a generalised form of a real-world application, already developed under the Lotus Platform. This application ensures the restricted access of several authorised persons from local public institutions to log to a central server and to access the appropriate interfaces that allow them to send information. Other users are able to initiate the data collecting process. This project has as a result an automated data collecting system and has other useful functions as: centralisation of the data in a protected database, access to automated reports, public access to certain information via a WEB site, selective access to the database, accordingly to the role of the users, customisation of the interfaces, data exchange with other information systems etc.
The solution will contribute to the genericity, and customisation improvement by a research with the objectives emphasised in the paper. This research will yield a software pattern, and also suggests several ways to make easy the customisation, including an original representation of the information.
Several estimations of the expected results, and conclusions are issued.

Keywords: document management, E-administration, Lotus technology, genericity, software patterns, UML, customisation

1 A Regional E-administration Network, based on Lotus Technology

Document management systems allow people on an Intranet to work co-operatively. This class of systems is used extensively in administration. During the last years the importance of the information systems in administration (*E-administration*) increased enough, our country included. The demand of using this kind of systems is a European Priority, as well. Thus, new tendencies as [1]:

- Restructuring of public sector functions and service provision along with the trend towards privatisation, public-private partnerships, and outsourcing;

- Supply of new generations of information and communication technologies and related services;

- General change of management philosophies and their implementation in public sector activities

are reflected in specific vertical levels as Federal, Regional or Local ones. In this domain actions were taken in Timiş County, several of them with important results more specific, in our project, in public institutions. A PHARE-CBC financing allowed to the Timiş County Regional administration (CJT) to develop a system, called SICIRAP („*Information system for inter-institutional co-operation in network for the local and county public administration for economic and intercultural development inside the cross-border region of Timis County - Ro and Csongrad County – Hu*") as part of a future integrated E-administration network [2]. This step also have integrate a former system as seen in Figure 1 (thus, the application accesses the database of this former project, called ADETIM in the figure), allowing to use the new system to collect valid data (useful for promoting the local economic development), from the city halls of Timiş County, as well.

This new project is developed accordingly to the general requirements of this kind of systems [3] and by taking into account ideas from other European Projects [4], [5]. The experience of our neighbours [6] and of developing countries [7] was also important for us.

The network allows special nominated persons from the local public institutions (30 city halls) to connect with authentication to a central server and to access the appropriate forms in order to send different information. This project ensures other useful functions as: centralisation of the data in a protected database, access to automated reports, public access to the allowed information via a WEB site, selective access to the database accordingly to the role of the users. The basic scenario of collecting information is presented in [2] and consists of four steps: the request (by the Validator, i.e. CJT/ADETIM client), the filling of the information requested (by the City-Hall clients), the validation and the consultation (based on different filtering criteria). The Data collecting cycle is presented in Figure 1. The solution is based on *Lotus* (IBM) technology, thus the core is a *Lotus Domino Server*. One of the external databases is *MySQL* (in the left). The other one belongs to the former project, mentioned above. This special structure with two external databases ensures the integration of the former project as part of a unitary, long-term approach.

In the system two other autonomous small applications are required: one for data import from external sources or between the two databases of the system, and the other one for filling the tables described above, that codify the information

structure. This editor is useful especially when the Administrator intends to introduce new documents in the system.
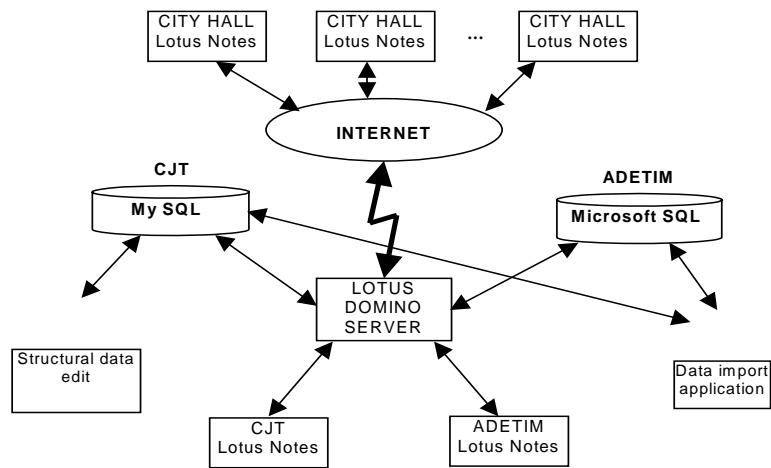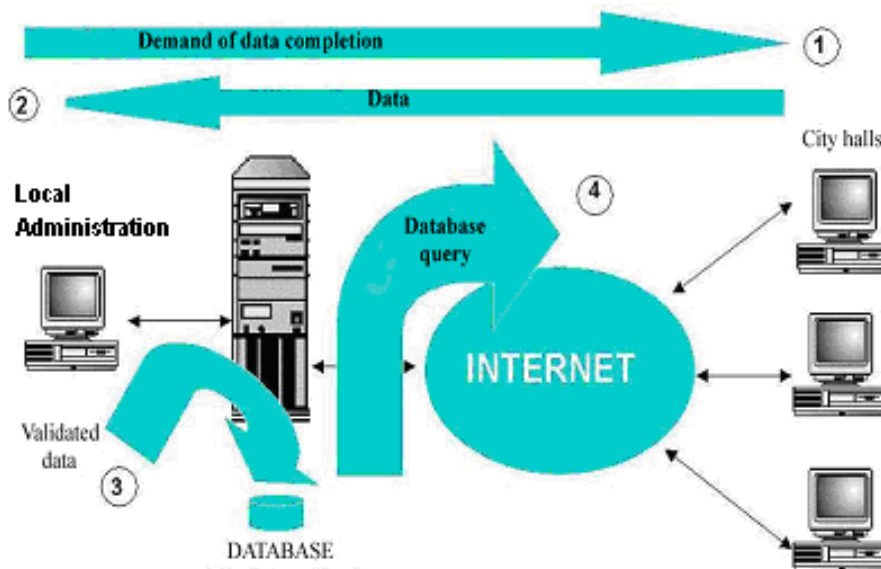

Figure 1
The SICIRAP System

Figure 2
The basic Scenario of Data collecting cycle

The user interfaces are presented in the paper [2]. The user interface refers to documents contained by several domains (like sport activity, budget, communications, infrastructure, learning, transporting, urbanism, etc.) and sub-domains. There are several types of users: administrator, validator, city hall user and general user. Each user should access only the specific data regarding his/her activity.

The users of the SICIRAP system have the possibility to generate custom reports. They generate the reports they need directly from Lotus Notes. A general user has access to reporting interface from a web browser, by clicking a special link from the CJT website. The results of the reports generated from Lotus Notes are displayed in a view (similar with a table sheet), but the results of the reports generated from web browsers are displayed in a HTML-generated table.

This system is nowadays implemented.

A new project financed by IBM allowed us to improve and generalise the solution previously developed. The new research objectives include:

- studies and contributions to the genericity of the information systems used in local administration,

- modelling of this kind of systems,

- improvement of interfaces (related to the customisation and to the other information systems),

- development of new models and methodologies for customisation.

2   Genericity

Based on the experience of developing the described data collecting system, we intend to improve the generality rate of the solution. We consider that the system is able to answer to the request of reducing bureaucracy and improve the quality of the collected information. That is the reason why an effort to build a generic solution is justifiable and we hope that more local and regional administration entities will use this solution, with specific customisation.

The improvement of the generality rate will be done by related studies of the information systems used in local administration, and modelling of this kind of systems, with *UML* and associated specific tool *Rational ROSE*. The final goal is to define an architectural pattern specific to this kind of applications. This will allow to the developers to obtain simple and robust solutions for similar E-administration systems.

We will start our research from the physical architecture that is represented in Figure 3. Then, we will add to these the basic *Use Cases* and scenarios depicted by the corresponding sequence diagrams. For each component of the system, the class diagram and the corresponding state diagram will be developed and an architectural pattern will be yield from all these. Based on the architectural pattern, a generalisation will be possible and an easy-to-use solution of customisation for specific e-administration problems will be available.
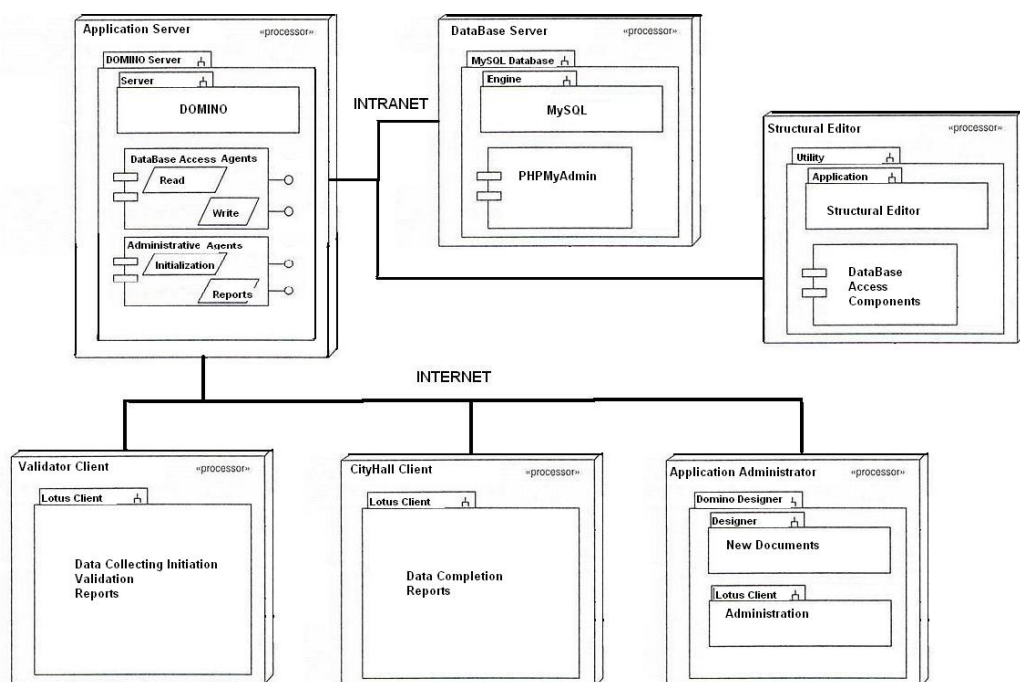

Figure 3
The physical Architecture of the System

3   Customisation

For the family of data collecting applications in local, and regional administration, the process itself (i.e. the "business" solution) is the same (as depicted in Figure 2). Thus, the customisation means the description of the newly desired documents. A system like *Lotus* is document-oriented, and contains specific instruments for an easy-to-use document design (*Lotus Designer*). The customer must have skills to

use this designer. But the interaction with the external databases introduces new difficulties in the sense that the interaction of the information from the fields with the specific fields of the external databases can be somehow formalised and represented.
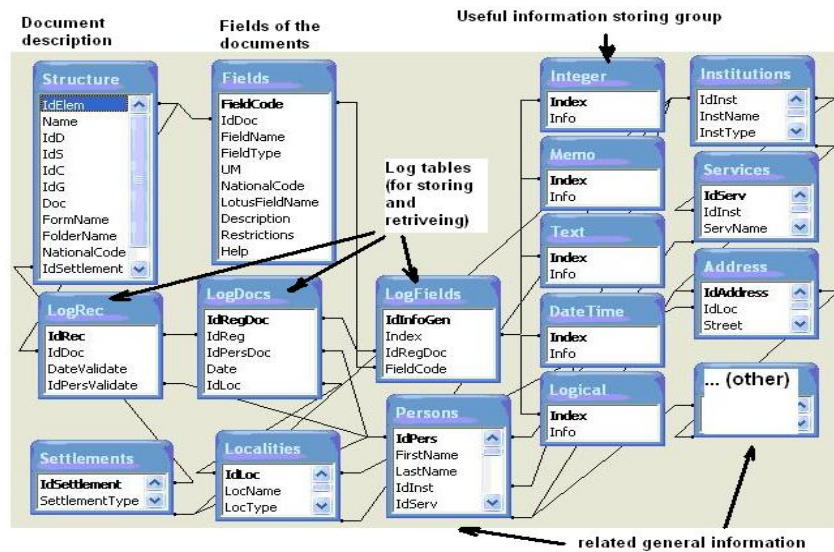

Figure 4
The *MySQL* external database structure

That is the reason why the main effort for an appropriate customisation is located in this relationship. In this respect, the application uses a special-structured, „object-oriented" external database [8]. This structure makes the adding of a new document easier, because when a new form (and a corresponding new document) is needed in the system, is not necessary to modify the structure of the database. An easy-to-use procedure is completely defined and partially automated. This allows more flexibility and a unitary approach for future developments. There is a table (called *Structure*) that codifies the *tree* (the classification) of the information, as presented above. At the last level of the *tree* are *leaves*. A *leaf* matches to a document, which describes the specific data that are collected. Some of these documents are *water supply services, libraries, schools, phone problems, school transport, electricity problems, and sport activities*. For each document there is a form, which describes it in Lotus and is used to collect the information from City Halls. Each document has a number of fields, which are registered in another table (called *Fields*), linked to the first one. A record of this table describes a field from a document, storing the name, the type, and the name of the Lotus field, some restrictions for the field, help and a detailed description. The information itself is stored in several simple-structured tables, each with an index and the information itself. There are tables for integer or double values, text

information, date and time, currency, memo fields, and others. The information retrieval is based on three log tables. The first one is called *LogRec* and marks each recording session (i.e. a data collecting cycle), storing the moment of data saving and the user who initiated the data saving. This table is linked to the second table (called *LogDocs*) that collects the specific data for each document. The last log table (*LogFields*) stores information about each field from a saved document. The target table, where information is stored, is selected due to the data type of each field (from the *Fields* table). The index of each record from these target tables is written in *LogFields* table. The MySQL database of the system contains a lot of other tables, which store information about localities, institutions, system users, services etc.

The information storing/retrieving is done with some agents (special scripts), which run on *Lotus Domino server* and read/write from/in the database. The agents are used for writing or reading information in/from the external database, when a report is required or when validated data are available. The storing process creates a record in *LogRec* table, which will be linked to a number of new records from *LogDocs* table. Each record from *LogDocs* table (which describes the information from a document) has some fields that are stored in one of the target tables (*Integer, Logical, Memo,* and other tables) depending on field type. The index from this table is written in *LogFields* table, together with the field code. In this way the information could be find very easy.

The most important advantage of this object-oriented structure is that it makes the adding of a new document type easier than in other cases. Therefore, when a new form is needed, is not necessary to modify the structure of the database adding a new table for storing the information about new document type. This problem can be solved adding some records in *Structure* and *Fields* tables. There is an autonomous small application that is used to edit these two tables (see Figure 5). If the document, which is added, belongs to a new domain, this domain must be added first in the structure (as a new *branch* in the *tree*). After that, the document (a new *leaf*) can be described. It will be added in *Structure* table and its fields will be stored in *Fields* table (using the same application). Then, a designer user must add a new form (corresponding to the new document) to the application and the system is able to store-retrieve new data without any other major intervention in the system (although minor interventions must be done but the user has a complete documentation related to these and was trained to proceed). The needed initialisations (as the new required folders in the outlines) will be executed by a special agent launched by the administrator of the system.
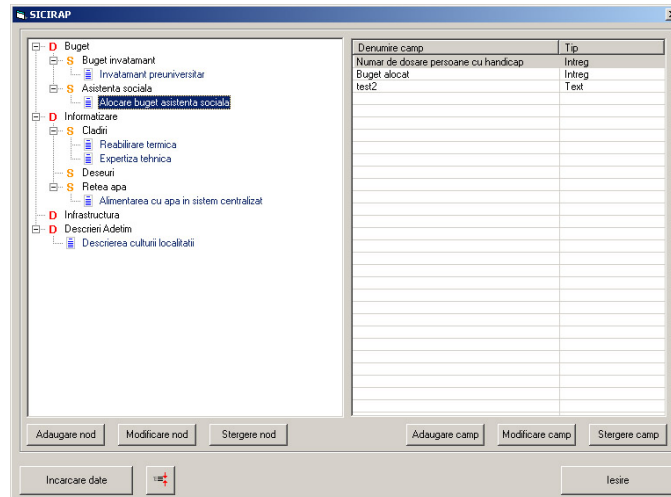
Figure 5

The Database Customisation Utility (Structural Editor)

Thus, the steps for adding new documents are:

1   design of the new document in *Lotus Designer*

2   addition of new records for the newly created document with the small utility

3   creation of a new *Outline* and population with the appropriate source-code in *Lotus Script*, for its buttons (commands); this process requires the intervention and customisation in source-code, so far

4   run of a specialised agent for initialisation (initiated by a command from the Administrator interface) that creates new required folders for the City-Halls and for the Regional Administration-type user.

As seen, for several of the steps medium-level programming skills are required so far. The intention for the future is to enlarge the automation process in order to automate the step 3 (that requires the highly qualified engineering activity) as possible. We will study the opportunities supplied by the languages supported (*Lotus Script* or *JAVA*) in order to include more as possible from the operations required, in the initialisation agent (from step 4). We intend to improve the other steps from the point of view of the automation, as well, if possible.

In the Table 1, a (subjective) ranking of the skills required for the customisation is presented, for the actual system, and as is intended.

As seen, the improvements targeted with our research will have as a result, the important decrease of the IT professional skills requirements (15% for step 2 and

39% for step 3). But we suppose that is possible to build a tool for a complete automation of step 3. Here, the discussion is about the cost/performance ratio.

Table 1
Ranking of the skills needed for customisation

Step	Required								
	Tool	Knowledge (so far)				Knowledge (future)			
		Public Admi-nistra-tion	Progr am-ming	Data-bases	Prog-ram archi-tecture	Public Admi-nistra-tion	Prog ram-ming	Data-bases	Prog-ram archi-tecture
design of the new document	Lotus De-signer	10	5	2	5	10	5	2	5
addition of new records for the newly created document	Spe-cial Utility	10	0	8	2	10	0	5	2
creation of a new *Outline*	Lotus De-signer	7	8	5	8	5	5	3	6
run of an initializa-tion agent	Lotus Notes	0	0	0	2	0	0	0	2

Conclusions

The research suggested by this project will boost the development of the domain of information systems for local administration due to the genericity of the investigated solutions and the issued model. The resulted architectural pattern will help the developers to rapidly generate new applications belonging to the described class.

The results of the project will also influence the didactical activity, in the sense that we will add in our Curricula the lectures appropriate for the dissemination of this experience. We also will use the computer cluster created in the frame of the project and the gained expertise for future researches (MD and PhD).

From the local perspective, we will influence the development of the software industry. Thus, we will improve the professional skills of the future software engineers by improved training related to the domain of the project and we will add new opportunities as using a new evolved software product.

This project also contributes to the increase of the business value of a certain class of information systems (for local administration) as improvement of the business performance through services innovation, more specific in business transformation and services innovation (architecture of business and processes). The project will

also bring contributions in the area of Information management and analysis (storage/search/retrieval).

Acknowledgement

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