AN APPROACH BASED EGP FOR THE INTEROPERABILITY OF E-GOVERNMENT SERVICES

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ABSTRACT

The e-government implies an interoperability between the various existing administrative services so that the work of institutions can be more transparent for the citizen, more reliable and economic. This interoperability is the key problem in the development of the e-government services. In this context, we define an approach to implement the mechanism of interoperability of the information system of the e-government. We propose an applicatif protocol based on TCP/IP which allows the technical interoperability by ensuring the data exchange between the Public Administration.

A case study was developed to validate the approach suggested and some interfaces developed were presented.

Keywords: *E-government, Interoperability, TCP/IP, Protocol*

1. INTRODUCTION

The current trends in e-government applications call for joined-up services which were effective, simple to use, shaped around and responding needs of the citizen, and not merely arranged for the provider's convenience. In this way, the users don't need to have any knowledge of –nor direct interaction with- the government entities involved. The latter need to be exchanged and processed seamlessly across government.

However, the new concept (e-government) can be defined as being the use of communication and information technologies, by the administration, to manage its relationships with its managed or other administrations [1].

Interoperability is a key issue in the development of current e-government services. Various sources agree on the definition of interoperability considering it as a capacity of various types of networks, computers, operating systems, business applications, software or services (data-processing or not), to work together by using specifications, languages and common protocols, and to give access to their resources in a reciprocal way [2]. In other words, it is the capacity of the data-processing programs which is based on the exchange of information and the mutuel use.

Thus the interoperability consists of making function heterogeneous systems together. It is considered also as a fundamental requirement to share and re-use knowledge between networks, and re-organise administrative processes to better support the services themselves [3].

Three levels of interoperability were individuated: technical, semantic and organizational [3]. The first one refers to the topic of connecting systems, data formats and protocols, including telecommunications. The second one concerns the exchange of information in an understandable way; whether within and between administrations, either locally or across Contries and with the entreprise sector. The third level refers to enabling processes to co-operate, by re-writing rules for how Public Administrations (PAs) work internally, interact with their customers, use ICTs.

We can't speak about e-government without approaching the concept of interoperability. The last, becames an aim in PAs view of the e-government.

The present paper adresses the issues of technical interoperability by proposing an approach which needs to integrate a component ensuring the data exchange between the public administrations (interoperability).

Many e-government projects were developed and various approaches were proposed for the design and the development of an architecture to deliver e-government services to citizens.

The eGOV project [4] proposes an architecture to enable 'one-stop government'; in order to describe services a markup language (GovML) has been developed, GovML defines a set of metadata to describe PA services and life events.

The EU-PUBLI.com project [5] defines a Unitary European Network Architecture; it proposes a middleware solution to connect heterogeneous systems of different public administration and to enable a service-based cooperation between PA.

The eGOVSM project [6] supports the automation of administrative process involving several administration and allowing the reuse of data. The eGOVSM is formalized using a set of XML Schema models in order to support the realization of an interoperable system.

The "Protocole d'Echanges Standard et Ouvert" (PRESTO) [7] specifications, along with clarifications, amendments, and restrictions of those specifications that promote interoperability.

Protocols such us eLINK, FAST and ebMS2 are very known.

These projects prove the feasibility of a protocol of data exchange between PA, while ensuring the aspect

of interoperability, but they did not explore the possibility of introducing a protocol based TCP/IP into a distributed environment.

In this article, we interst more particulary in the aspects of interoperability using (the standard in fact) TCP/IP architecture in the distributed environment by integrating a new protocol in the application layer and by developing a new approach to ensure the interoperability between the hosts of PA, which exchange the data.

The paper is organised as follows. In section 2 we provide some aspects of the approach suggested and in section 3, we present the protocol we define.
In section 4, we present the types of the communication based on this protocol. Some aspects of implementation will be provides in section 5.
The final section contains our conclusion and some perspectives.

2. OVERVIEW OF THE APPROACH BASED EGP FOR THE E-GOVERNMENT

The suggested approach follows a process of dialogue that we will detail. It should ensure the interoperability of the information systems representing the PAs which offer the services of e-government.
The architecture exposed on figure 1 is an infrastructure which uses a protocol (set of rules of communication) based on the model TCP/IP and ensures the aspects quoted before by using a new mechanism of interoperability.
Each protocol is characterized by a mechanism which is associated for it. The EGP (for, Electronic Government Protocol) protocol is on the level of client and the level of host.
It should be known that the agencies (physical counter) of the PAs that belong to the same branch of industry are all connected (centralized) to the same host. Consequently, they share the same data base. The used approach is similar to the architecture of bus communication JAVA-RMI (Remote Method Invocation). In this architecture, there are the Skeleton host side and the Stub client side [8].
We stress that the EGP protocol uses two modes of communication: the interaction between the client and the server; the interoperability between hosts.

When a citizen presents himself to a counter for a given service, the EGP protocol (client protocol side) used by the counter in order to obtain information about the citizen by exchanging the data between hosts.
In this case, the EGP protocol (client protocol side) collects all information necessary by sending the request to the host of the public administration concerned.
The EGP (host protocol side) used by the host of the PAreceives the request sent then seeks in its data base.

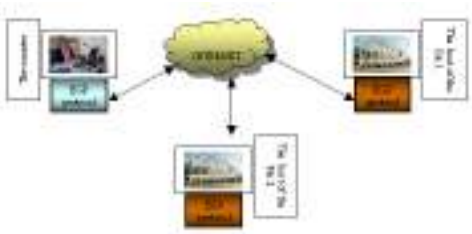

Figure 1: An architecture based EGP in the e-government.

If the response is available in its data base it will send it to the requester counter. If the information which is needed exceeds those which exist in its data base, the EGP (host side) should interoper with others host which already exist and will transmit the request.
The citizen can directly reach the portal of the government via Internet and can select the service which he needs. The type of selected service enables him to be connected directly with the host of the administration that offers this help.

We should taken into consideration that HTTP protocol is present in our architecture and in which all the advantages remain available. We will use it in the exchange of the web page. Owing to the fact, that it is regarded as a standard, it will facilitate the installation of interoperability.

3. PRESENTATION OF THE PROTOCOL BASED EGP

We introduce our applicatif protocol which allows the data exchange thus interoperability between the PAs, integreted into the TCP/IP architecture.
EGP is a protocol in text mode, synchronous which uses simple commands. The port chosen by default is the 3366, it used by the host to receive a connection.

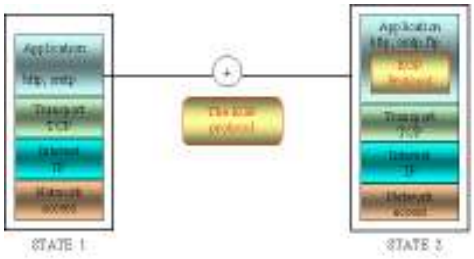

Figure 2: Integrating of the EGP protocol.

While adding EGP protocol, the TCP/IP passes from the state 1 to state 2 (figure 2).
The definition of a EGP protocol, is based on certain characteristics which will fix, and offers several advantages which will quote.

The data exchange, the solution to the heterogeneity problem, flexibility, transparency, security and the interoperability.

Thanks to the EGP protocol we profit from the services offred by each PA of the system of the e-government. This interoperability is technical by exchanging data.
In the following section we will present the different types of communication based EGP.

4. DIFFERENT TYPES OF THE EGP COMMUNICATION

In the proposed approach, we will define two modes of communication. The first one, is the interaction between the client and the server. The second one, is the interoperability between various hosts.

For better understanding, we will initially expose the format of a request and its treatment as well as the EGP answer. Thereafter, the mechanism of the dialogue between the client and the server on the one hand and between several hosts, on the other hand by ensuring interoperability.

4.1. SPECIFICATION OF THE EGP PROTOCOL

To be interoperable, we need to define the parts of the EGP request and answer.

4.1.1. PARTS OF THE EGP REQUEST

There are two parts in the EGP request: the command and the header.

The command corresponds to the various commands that the protocol employs to dialogue. They are sent to the host concerned and are interpreted by this last.

The second parts, is the header which consists of several lines whose form is always the same one. The name of field followed by sign of equality (=) and the value that each one wants to associate with him. The fields can be various types according to the associated use. Its value is that one which was seized by the civil servant of the PA counter.

4.1.2. SPECIFICATION OF THE EGP RESPONSE

The EGP answer consists of several of the same lines format. Each line corresponds to a field that is required by the request of the client, follow-up of the sign (=) and of the value of the field which is in the data base of the associated host.

4.2. INTERACTION BASED EGP BETWEEN CLIENT AND HOST

The interaction between the client and the server is the first communication mode of the EGP protocol.

The client must send a request near the host that is associated for it. The command part of the EGP request can be one of the commands used by EGP for communication.

The communication between the client and the server is established in two phases according to the EGP process. The first, consists of the authentification of the public administration near the host, followed second which carries out the interaction between the client and the host by sending the request established by the PA with the host concerned. We will detail the two phases of the EGP protocol.

4.2.1. AUTHENTICATION OF THE CLIENT

The client must initially authenticate himself near the host to be able to obtain the right of access to the adequate services.

The client creates his request of authentication by respecting the format EGP presented before. First of all, it establishes connection to the port 3366, then, sends command (CONNECT), followed header which consists of two fields. The first is the identifier of PA, the second is its password.

The command is initially sent to the host followed directly transmission of the header part.

Once, the command (CONNECT) received by the host, this last tests it. It will note that this command is what allows the authentication of a PA by checking if the data of fields of the header really exist in its data base and so to decide if the client has or has not the right to be connected to the host specified by its address IP.

4.2.2. INTERACTION BETWEEN THE CLIENT AND THE HOST

The mechanism of communication adopted by the type of protocols request/answer is the same one as for EGP protocol between client/server (figure 3). It consists of 1,2,…,6 steps in the planing of the figure 3. the difference is in the level of commands used and specificties of the mechanism applied by each protocol.

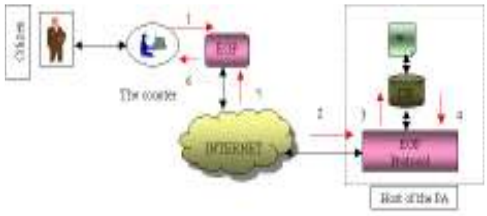

Figure 3: Interaction based EGP between the client and the host.

Concerning the first part of the EGP request, it will be one of the command of the EGP protocol. The part of the header, as for it, contains the various fields according to the request.

Once that the host receives the request (step 2), it treat it (steps 3, 5). The first operation to be carried out is the reading of the command. It interprets it by substituent it by an adequate request applied on its local data base (LDB) (step 3). If the response is in its LDB, it will bild its EGP answer. In the contrary case, it sends the request to other hosts which exist.

Before sending the answer to the client, EGP host will use two characters which are specific for him and which facilitate the interaction between the client and host (steps 5, 6). One is character (# 0) (a sharp followed by number 0) and the other is character (#1) (a sharp followed by number 1).

When the character (#0) is sent to the client, this last interprets as no answer, therefore, it does not receive an EGP answer on behalf of the host.

In the contrary case, if the character (#1) is sent by the host of the PA to the client, this last interprets it as being that EGP answer's exists well, and thus, automatically it prepares to receive it and to read it.

4.3. MECHANISM OF INTEROPERABILITY BETWEEN HOSTS

The distributed hosts owe interoper to provide a service and a help to the citizen. However, this communication must ensure the interoperability in order to obtain the communication between hosts.

When a client sends a request which cannot be satisfied by the host to which it is connected, the communication between the hosts is established (interoperability).

The processus of the technical interoperability in this case is consists of two phases: the first is the authentication of the host near to another, and the second, consists of the effectif EGP interoperability by sending a request.

4.3.1. AUTHENTICATION OF THE HOST

We can connect to the host of the government, starting from address IP and of port 3366 of the EGP protocol.

Once connected, the host can be authenticated near to several hosts, by using the same format of EGP request of authentication employed in the case of client/server.

Once authenticated, the host will be able to send its request to the other hosts near of which it was authenticated to supplement missing information by interoperating and to post then on the interface of the PA.

4.3.2. EFFECTIF EGP INTEROPERABILITY

The particularity of the EGP protocol is that ensure the interoperability between several hosts.

The exchange of commands and characters (#0) and (#1) emphasised the concept of the interoperability.

The commands exchanged between the hosts are the same ones in the case client/server.

The use of character (#1) and (#0) remains always valid in the dialogue between the hosts to ensure the interoperability. In the case where is an answer after treatment of the request, the host sends a character (#1) to warn the host receiving that an answer exists and that it will be sent. In the contrary case, a character (#0) is sent to it. Also, certain commands will be refuted by the host which appears by the sending of a character (#0) to the requester host.

The client sends a request to the host by using the EGP client (figure 4). The request is received by the component of EGP host 1 (admitting that this request is sent to host1) what corresponds to the step 2.

This last seeks information in its data base in substituent the command by the adequate request (step 3). When the informations required by the client exceeds those of the host 1, it transmits a request which supplements missing information with the EGP client 1 which constitutes a component of EGP in the same host (step 5).

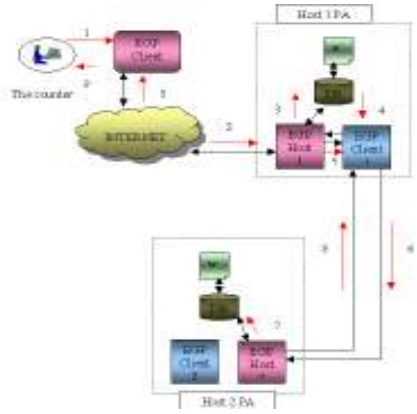

Figure 4: Interoperability between hosts.

This part adopts the behavior of a EGP client. In other term it sends the request to the component EGP host 2 (step 6) that carries out a information retrieval corresponding to the command sent. According to the planing of figure 3, we notice well that the behavior in distributed environment is the same mechanism as in the client/server model what corresponding to architecture P2P; and which characterized our protocol.

Once the found answer, it will be automatically sent to the EGP client 1 (communication of the type request/answer) (steps 7, 8). This last, sends it directly to the EGP host 1 component.

The EGP client receives the answer which will be then posted on the interface of the agency of the public administration what corresponds at steps 5 and 9.

5. CASE STUDY: "MANAGEMENT OF PAs: HOSPITALS, COMMUNES, POLICES FORCES"

We illustrate the implementation of our architecture via an application of a scenario suggested, the end-user can be a citizen or a PA.

We will employ three types of hosts: a host of the communes, a host of a hospitals, like that of various police forces (figure 5). Each one of these hosts centralizes a whole of PAs that are associated for it and can inetroperate.

We assume that the three data bases are heterogeneous and nonredundants: that of the commune is developed in Acess, the hospital and police force in MySql (relational). The fields of these various data bases are nonredundant.

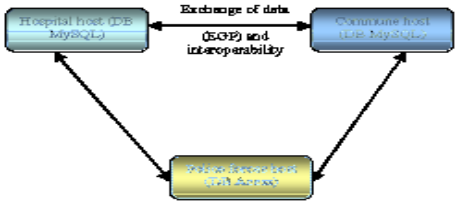

Figure 5: Different PAs in the study case.

In our suggested application, the citizen presents himself at the level of the hospital (physical counter) for a given service (such us his admission to the hospital). The counter relating to a hospital identifies the citizen from his number who is in his electronic identity card.
Once its number's seized, a research is launched. The EGP protocol client side sends an EGP request by using the command GET(*) which is associated with the number of the citizen. All the information contained in the data base of the host of a hospital is accessible by this counter which represent the interaction between the client and the host.
On the other hand, the commune cannot reach certain data contained in the data bases of the other hosts relative to this same citizen.
The counter of a hospital, automatically sends two commands using the EGP protocol, GET(*) to the host of the hospital to have all informations in the data base of the hospital and GET(NOM,PRENOM) with that of the commune, so the interoperability between the commune and hospital host appear. Moreover, there were a communication between client/server (the PA of the hospital and its host) and a communication (interoperability) between two hosts, that of the hospital and the commune.
The interfaces of the various PA are ergonomic and simple to use.
There is a button (to post), is used to obtain adequats information with the number read from the electronic identity card of the citizen. A button (to restore) to initialize all the fields of the interface.

6. CONCLUSION AND PERSPECTIVES

The concept of interoperability is usually present when we speak about installation of the e-government.

The present paper adresses the issues of technical interoperability by proposing an approach which propose to integrate a component ensuring the data exchange between the public administrations (interoperability). We set up an applicatif protocol baptized EGP. This last was added by the application layer of architecture TCP/IP. EGP is used in a distributed environment whose the commands employed in the communications are simple. This facilitate the data exchange between the PA and the interoperability between hosts of the e-government.
In this protocol, we have specified two types of communication. The first one, is the interaction between the client and the serveur, and the second one, is the interoperability between hosts.
Some interfaces of the PA where made while being based on ergonomic aspects to make them easier to be used by persons in charge for the physical counters. Our next work will consist of supplementing the public portal of the e-government that provides services to the citizens being anywhere in the world.

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