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Serbian ePayment Shared Component for Reuse in E-government Services

Aleksandar Ivic
(University of Novi Sad, Faculty of Technical Sciences, Trg Dositeja Obradovica 6, Novi Sad, Serbia, IvicAca@uns.ac.rs)
Stojan Ivanisevic
(University of Novi Sad, Faculty of Economics, Segedinski put 7-9, Subotica, Serbia, StojanIvanisevic@uns.ac.rs)
Darko Stefanovic
(University of Novi Sad, Faculty of Technical Sciences, Trg Dositeja Obradovica 6, Novi Sad, Serbia, darkoste@uns.ac.rs)
Teodora Lolic
(University of Novi Sad, Faculty of Technical Sciences Trg Dositeja Obradovica 6, Novi Sad, teodora.lolic@uns.ac.rs)
Djordje Obradovic
(University of Novi Sad, Faculty of Technical Sciences, Trg Dositeja Obradovica 6, Novi Sad, Serbia, obrad@uns.ac.rs)

Abstract

One of the key components required to implement complex e-government services is a payment system. Sophisticated government services often require payment from citizens as well as businesses. In many cases, the number of required tax payments is greater than one. The number of tasks required of citizens and businesses is variable and dependent upon the complexity of the government service required. Payment must be in accordance with the tax code, the purpose of the tax as well as code classification of the tax. All of these parameters are required to verify the payment and process the requested government service successfully.

The complex process of implementing eGovernment has many potential problems and critical points. Various internal and external factors generate these problems. The sheer size of the system, technical complexity and necessary security measures required to implement eGovernment system show the extreme complexity of the task. Bureaucracy and required legislative changes offer numerous obstacles on the path of eGovernment implementation. Implementing payment in governmental services is an important milestone in the development and implementation of e-government services. For the ePayment+ system implementation, many of the obstacles mentioned above had to be solved. The most common problems are legal acceptance of the payment, the problem with banking fees or provisions, the complex implementation technology and multiple governmental bodies and banks involved in the process. This article describes the solution implemented in Serbian E-government. This solution provides universal service to the all government agencies. Serbian ePayment+ module is built to be reusable and easily compatible with existing or new e-government systems. ePayment+ service was built for the government sector in Serbia and offered free of charge to all governmental bodies, agencies, institutions, etc..

This article presents the technical implementation of the service with technical details, usage details and recommendations for further improvements.

Key words: *E-government, E-payment, Payment gateway*

1 INTRODUCTION

Serbian national E-government portal has a huge impact on the level of electronic services in Serbia. Numerous benchmarking agencies, including UN, noted the advancement in the level of electronic services. This portal is the reason for particularly notable jump in Serbia digitalization performance rankings. Serbia's performance advanced 30 positions and got ranked as a 51st country in the world ranking. The Digital Agenda Authority is responsible for introducing online services

to improve economic efficiency and citizens' quality of life as well as implementing e-government by a "one-stop-shop" principle in Serbia. Among other initiatives, the Authority created Serbia's e-services portal, eUprava (http://www.euprava.gov.rs), which aggregates services and information from over 27 governmental authorities, including several municipal authorities[1].

The services provided by eUprava portal included services for citizens, business and services between government agencies. However, implementing such a complex system requires solving of many legislative, technical, financial and security issues. The System must have strong security because of multiple user backgrounds[2]. Availability of the services and permissions is adjusted based upon the user role in the system.

During the development of the national portal, Serbian legislation envisages that the proof of the payment is the first page of invoice stamped and signed by the processing authority, e.g. bank. The legislation was only one stopper for the development of complex electronic services.

The financial aspect is one of the most challenging aspects of this system because government services often require payment of one or more administrative taxes[3]. Governmental agencies in Serbia carry financial transactions through Treasury, which belongs to Ministry of the Finance. There was no automatic payment status information system for the governmental agencies to get the status of the payment for their accounts automatically. Unfortunately, most of the agencies have no technical and human capabilities to handle the transactions regardless of such system exists. A significant number of the complex government services require multiple administrative tax payments. The users have to fill multiple invoices, the clerks have to process multiple invoices, and the tracking of the payment is burdensome. This process is error prone, expensive and overall non-efficient process [4].

The main focus of this article is technical information regarding solving the complex issues of administrative tax payments. Identification of the payment and pairing with the user request is essential to avert abuse. The process has to be automatic, with human interference. The usual mechanism for automatic pairing is payment ID number foreseen on Serbian invoices. Generating, tracking and pairing of the ID numbers with a user request for service is only possible if handled by IT system. For eUprava implementation, the ePayment+ system was developed to handle administrative tax payments.

2 EPAYMENT+ SYSTEM

As the solution to all the issues mentioned above, the ePayment+ system designed as a G2G service for all government agencies. ePayment+ is the service component for the payment of governmental taxes for the eUprava portal. G2G During the initial development, ePayment+ was removed from "eUprava" portal and deployed t as an independent component for payment services.

The ePayment improves the ability to pay the fees to external applications of any governmental institutions. Every state agency can completely automate the process of submitting electronic payment requests. If a government agency does not have the necessary resources to develop E-government service, it can implement the pre built ePayment+ system and integrate it with an electronic service at the eUprava portal at any time. The previously established electronic services within eUprava can seamlessly be integrated to use the ePayment+ system. Entire service creation and integration with ePayment+ is automated and completed through intuitive and easy to use wizard by the employees in the government body that provide the service without the engagement of The Digital Agenda Authority personnel. The ePayment system is offered for free for all government agencies as G2G service on portal eUprava on public web address: http://www.euprava.gov.rs/eusluge/opis_usluge?generatedServiceId=1621.

The ePayment system can accept payments through multiple payment channels. Multiple payment channels are important for the adoption of ePayment [5]. At the service creation moment, the payment channels include Invoice, Dina card – Serbian national payment card, Visa, Master, Maestro. ePayment+ system can be easily expanded with other payment channels as well.

2.1 Registration for the ePayment+ service

For the usage of the G2G platform, another government agency developed the qualified signature G2G service on portal eUprava. The qualified personal electronic signature for personal authorization in the government agency is necessary for the authentication. In recent years, along with the extraordinary diffusion of the Internet and a growing need for personal verification in many daily applications, automatic signature verification become a prerequisite for building complex systems[6]. In the process of the registration, the user fills out the list of applications and IP addresses of the application servers. The registration process is as simple as it could be and can be done electronically, without papers. After the registration, the authorised representatives of government agencies can approve colleagues for the usage of the ePayment platform.

2.2 Creation of the ePayment service

A single institution may be a provider of multiple E-government services. Thus, it is possible to define multiple ePayment services under one agency. For each of the ePayment service authorised a representative of the institution to have to enter all relevant parameter to determine payment for the service. The issue is that the payment parameters may be different for the same service. For example, some services fee depends on the number of the pages issued as government service output. That brings us to

the fixed and non-fixed payment parameters for service. Thus the user in backend interface defines fixed and variable parameters. Each institution can generate multiple ePayment+ services that are independent.

2.3 Communication with the Treasury Department

ePayment+ system is completely integrated with the Treasury System to exchange the data and determine individual payment statuses. If bank transfer passes the administrative tax, the payment is announced by the end user while the Treasury system uses the Web service to mark the payment as completed at the moment of payment completion.

3 INTEGRATION OF THE EPAYMENT+

The integration with ePayment+ system is possible via Web service or Web Page Interface.

3.1 Web Service integration

Web service was implemented to facilitate complete automatization for the government institutions with sufficient technical capabilities to develop their solutions and automatize the payment for their services. (See Figure 1. and Figure 2.) The support for the desired payment channel was the only mandatory condition for the implementation of Web service integration. Public governmental entities use their portals to connect with ePayment web service by using predefined payment parameters. Web service automatic returns the information about transaction realisation as well as the transaction reference number for the chosen payment channel. This procedure ensures the highest possible quality of the government sector integration with payment systems.

Web service implements SOAP methods:

```
public bool Ping(ServiceAuthHeader ServiceAuthHeader)
```

Ping tests the availability of the service. ServiceAuthHeader have authentication purpose.

```
public int GetNewPaymentRequestsCount(ServiceAuthHeader ServiceAuthHeader)
```

Return the number of all the requests.

```
public Request GetPaymentRequestById(ServiceAuthHeader ServiceAuthHeader, string uniqueRequestId)
```

Get the data for the request identified by uniqueID.

Table 1. Methods for web service integration

Property	Description
ExecutedServiceId	Id of payment
GeneratedServiceId	The id of the generated service. One institution may have more than one
RequestDate	The date of the request for the ePayment+
PaymentChannelId	The Id of the payment option (Visa, Master, bank transfer)
Amount	The summary amount
AmountSettled	The paid amount
FullPaymentDate	The date of the payment
IpgApprovalCode	The Internet Payment Gateway code is shown upon payment completion via the IPG channel.
ExecutedServiceStatusId	Payment status
StatusDate	Date of last status change
JmbgOrPib	Shows ID of the service user.

```
public Request[] GetPaymentRequestsByDate
(ServiceAuthHeader ServiceAuthHeader,
string date)
```

```
public Request[] GetNewRequests
(ServiceAuthHeader ServiceAuthHeader)
```

```
public NotSynchronizedPaymentRequest[] GetNot
SynchronizedPaymentRequest(ServiceAuthHeader
ServiceAuthHeader)
```

3.2 Web page integration

Government entities without sufficient technical and human resources to use the Web service can use the Web interface to provide the payment services to their users. A special part of ePayment+ system developed to facilitate payments by only providing a link and necessary parameters to establish a possibility to pay for a service online enables this feature. The functioning of this subsystem is similar to the principles of the “Internet Payment Gateway”. Most currently deployed and developing government ePayment systems function as a payment gateway[7].

How do these systems integrate between themselves? The institution which wants to use ePayment+ system needs to create a page on its website according to the recommendations in the ePayment+ manual which is describing necessary programming code for the successful implementation of the service. Users get redirected to the ePayment+ system where they select the appropriate payment channel (bank transfer, bank cash payment, DINA, Visa, MasterCard). Users return automatically to the precisely defined page on the

institution website which enables them to purchase the service if the transaction is successful or to the exit pages if the transaction is unsuccessful or cancelled. Users can easily pay for the service by using this web page integration, but communicating with the external government institution is a more complex issue. Government institution needs to be informed about payment status and useful completion and verification. A separate web service completes the entire process of integration between external systems and ePayment+ system.

There is a difference between successful and unsuccessful payment via web page. Two predefined pages are mandatory on the external government institution website – successful transaction page ad an unuseful or cancelled transaction page. Regardless of these pages, the external institution has to send an email to the user who is requesting the service whenever the transaction is initiated regardless of the outcome. The table below describes the parameters on the web pages with the examples of as implemented on the eUprava Portal.

Table 2. Unsuccessful transaction page parameters

ExternalExecutedServiceId	Request Indentifier
TransactionDate	Transaction Date and Time
TransactionAmount	Transaction Amount
FullName	First and last name of transaction sender
Address	Transaction sender address

Table 3. Successful transaction page parameters

ExternalExecutedServiceId	Request Indentifier
AuthCode	Authorization code
PaymentId	Unique Payment ID
TransactionId	Unique Transaction ID
TransactionDate	Transaction Date and Time
TransactionAmount	Transaction Amount
FullName	First and last name of transaction sender
Address	Transaction sender address

There are multiple scenarios in the definition of payment service

1. No payment parameters are forwarded. In this case, the predefined records are used to complete the payment from ePayment+ service. This scenario does not require "divPaymentData" element.

2. One or multiple payment parameters are forwarded. In that case, only those parameters with the valid pairing of the treasury expected parameters will be processed. For payments without an adequate pair of treasury parameters, the predefined parameters in the ePayment+ system will be used.

ePayment+ system integrates forwarding of payment reference ID to the Treasury Department. However, this option should be avoided because Treasury Department has very strict rules which enable pairing of such transactions. For that purpose, a special algorithm for transaction ID assigning has been developed within ePayment+ system. In the case of the collision, it is possible to lose transaction confirmation from the Treasury Department.

4 FURTHER SYSTEM DEVELOPMENT

4.1 Banking fee budget

Payment card providers insist that the giver for the service pays for the banking fee. The current legislation does not allow tax reduction to cover banking fees. This obstacle can be overcome in two possible manners:

Creation of fee budget used supplement difference between paid amount and the tax amount. This model was used for the first two years of ePayment+ system use. (2011, 2012)

Changing of the current legislation is necessary to enhance the growth of electronic payment service and general acceptance of electronic payments.

4.2 Customer care

Payment card providers require guaranteed quality from the service provider. If the user is not satisfied with the provided service, he can request money back. On the other hand, the Administrative procedure law, Section 3. states that the service user pays tax for the initiation of the certain administrative procedure regardless of the outcome of the procedure. If the initiated procedure has unacceptable outcome for the person initiated it does not involve returning the money. Therefore a collision between viewing tax as payment for the service which has to be refundable by card provider's rules and administrative procedure which is a process with a service as a result exists. The Posible solution for this conflict is a creation of a separate budget used for the reconciliation of these issues.

Further legislation change can allow users to request money back if the administrative process does not yield desired results or it is not completed in time.

Another important question arises because of the nature of the ePayment+ system. International card providers rules require mandatory service completion if it is paid. In the ePayment+ system case the system is only hosting the service for different government instances and cannot guarantee the service provision.

4.3 Increased system promotion and acceptance

Many governmental institutions through Serbia are unaware of the system existence and functionality. Systematic potential user identification and promotional activities need to be conducted together with technical and legal assistance.

4.4 Automatic foreign currency conversion

Non-resident users do not have domestic (RSD accounts). It would be highly valuable for them to provide them with the ability to pay with foreign currencies preferably USD and EUR. Automatic conversion can significantly improve the service.

4.5 New payment channels adoption

Newly available payment channels should constantly be added to the system to provide higher adoption rate and easier use. All the card providers should integrate their payment cards with this system. If the new payment channel arise, e.g. payment through a mobile phone or via cryptocurrencies, the architecture of the ePayment+ service will allow smooth integration.

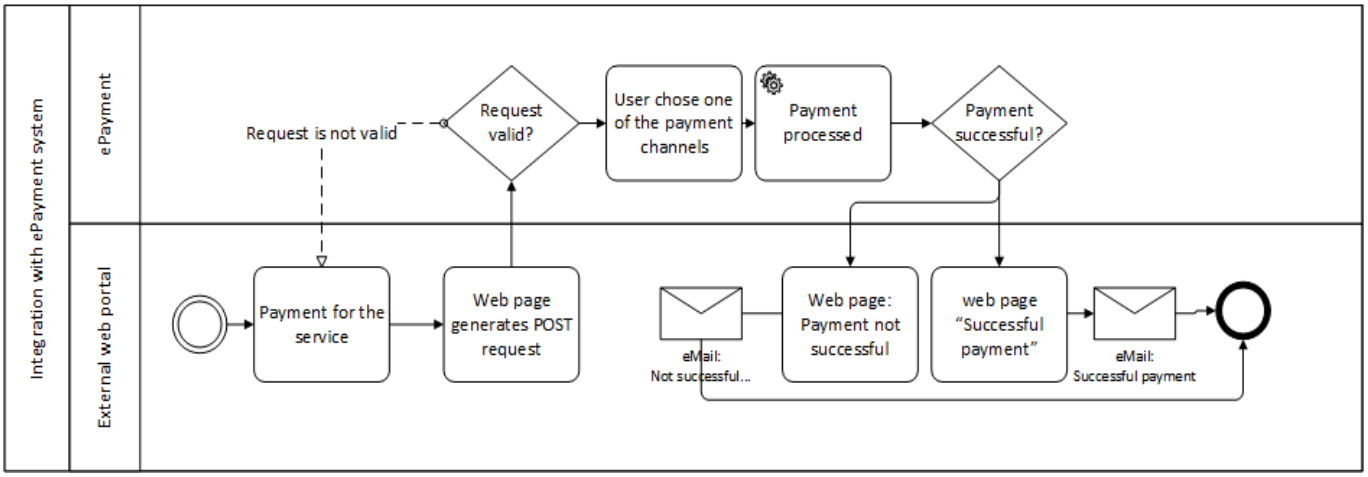

Figure 1. External application integration via web services with ePayment+ system

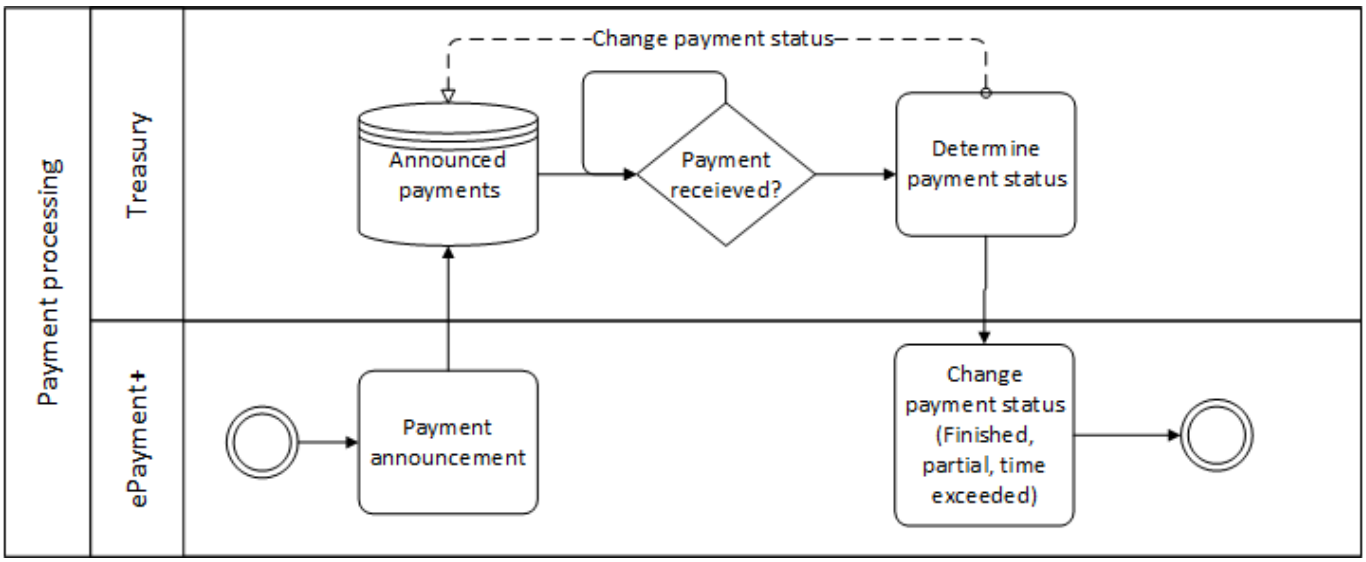

Figure 2. Integration of ePayment+ with Treasury system

6. CONCLUSION

This system is one of the core systems required for the introduction of more complex e-government services with reusability and interconnectivity in mind. The modular design and easy customisation, as well as high level of optimisation, make this system a core system of the future eGovernment of the Republic of Serbia. Together with other eGovernment systems it provides synergetic bonuses to the overall efficiency and reduces administrative cost with the government as well as reduces unnecessary bureaucracy.This system can be used by all governmental bodies to build complex payment services with little technical and human resources. Local government bodies precisely lack technical and human capital required to build this sort of solutions, and therefore the highest acceptance and usage should be within small and local governmental entities. Because of the lack of promotion and awareness those that require this system the most are uninformed about its existence. This system has a problem with its deployment and acceptance as shown in chapter 5. To solve this issue a top down principal through the ministry of interior should push this system adoption. Parallel with adoption additionally recommended legislation changes should occur to allow this system to function for the benefit of government as well as citizens. The problem in ePayment+ system implementation resides between the collision of two very strict bureaucracy types – banking sector and government sector bureaucracy. A leap forward is necessary to cut the bureaucracy and use the benefits of increased efficiency, reliability and security of this system.

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