

# TOPIC: INVENTORY MANAGEMENT SYSTEM PROVINCIAL GOVERNMENT OF IMBABURA THROUGH TECHNOLOGY INTEGRATION "BUSINESS PROCESS MANAGEMENT (BPM)" AND "RICH INTERNET APPLICATIONS (RIA)

Cristian Vicente Ipiiales Flores  
Universidad Técnica del Norte  
Carrera de Ingeniería en Sistemas Computacionales  
Email: cristianipialesystem@gmail.com

**Summary.** *This project is a system of inventory management by the provincial government of Imbabura by integrating "Business Process Management (BPM)" technology and "Rich Internet Applications (RIA)" specifically to record the activities performed in the different processes department of General Service as recording inputs and outputs warehouse inventory, purchase requisitions and / or services, ordering and delivery of goods, materials and supplies. For its development we worked with agile methodologies and RUP SCRUM in which we work directly and continuously with the system user. The software tools used for this project are founded on the MVC architecture with Zend Framework based on PHP on the server and Adobe Flex on the client, in addition to using the PostgreSQL database. In conclusion, the development and use of the system will control the warehouse inventory, making it easier to know what resources the institution, which materials have been delivered to different departments, with which material is arranged and that department has orders and missing by pack off.*

## Keywords

GPI, Zend Framework, PostgreSQL, SCRUM, RUP.

## 1. Introduction

In the Provincial Government of Imbabura they are running improvement projects to optimize processes, as well as methodologies that define how it is carried out all activities of the institution with the help of the Administrative Management which is part of providing support to the GPI units and advise the authorities in making decisions in administrative matters.

The various restructurings in the field of public administration in our country have led to decentralized autonomous governments generate a variety of projects to achieve large provincial objectives. Such projects require, undoubtedly efficient management as inputs, materials, supplies, machinery and equipment are concerned, without forgetting the internal requirements of the general administration.

The main objective is to develop the Inventory Management System for the Provincial Government of

Imbabura using BPM and RIA, which automate the management and inventory control technology. All this in order to generate quick access to information and integrate the process of inventory control processes of budget planning and procurement planning.

## 2. Materials and Methods

Then the tools and methodology used for the development of publicizing database concepts, language, framework, reporting and system development methodology are described.

### 2.1 Development Tools

The development tools used to create the system are as follows:

#### PostgreSQL

It is a DBMS (database management system data) relational and object-oriented free, released under the BSD license (permissive free software license).

PostgreSQL allows that while a process writes in a table, others from accessing the same table without locks. Each user gets a consistent view of the last thing that he did commit. [1]

#### Zend Framework

It is an open source object-oriented framework for PHP 5 web services and web applications.

The components of Zend Framework form an extensible and powerful web application framework when combined, based on MVC high performance, an abstraction of database easily to use, and form which facilitates the provision of XHTML forms, filtering and validation to consolidate all operations using object-oriented interface. [2]

#### Apache Http

It is an application server in a distributed network that provides the business logic for an application program. The application server is often seen as part of a three-tier application, consisting of a server graphical user interface

(GUI), an application server (business logic), and a server database and transaction.

The Apache HTTP Server is open for the development and maintenance of the Apache Web server code. [3]

#### **Adobe Flex**

It is an application framework open source high productivity for building and maintaining expressive web applications that deploy consistently on all major browsers, desktops and devices. It provides a modern, standards-based language and programming model that is compatible with common design patterns suitable for developers from different backgrounds.

Flex has several components and features that provide functionality such as Web services, remote objects, drag and drop, sortable columns, graphics, animation and other simple interactions. Language and file structure are seeking Flex decoupling of logic and design. [4]

#### **PHP**

It is a programming language commonly used server-side web development designed for dynamic content code. The code is interpreted by a web server with a PHP processor module which generates the resulting Web page. PHP has a command line interface that can be used in standalone graphical applications. [5]

#### **ActionScript**

It is a model and own programming language Flash OOP.

The ActionScript is based on the ECMA-262 specification, like other languages like Javascript.

It is a programming interface expanded and improved applications (API), a real model objects, based on the specification of events. [6]

#### **Adobe Flash Builder**

It is a development tool based on Eclipse that allows you to create in no time mobile applications, web and desktop expressiveness using ActionScript framework and open source Flex. [7]

#### **ProcessMaker**

Software used to automate workflows large-scale BPM, opensource simple and profitable. It is a business process manager. [8]

## **2.2 Development Methodology**

The RUP and Scrum methodologies used together on projects Software Development, are responsible for maintaining order, control and prioritization of time for optimal results in activities, plus correct documentation.

The documents are part of the software development methodology are:

#### **Technology project**

Document where all activities aimed at achieving a specific objective of research, development and technology innovation in a time interval and defined cost, in addition to specifying the scope, justification, beneficiaries among other aspects of the system to be developed is described.

#### **Meeting Minutes**

Document containing the topics discussed at a working meeting which can be with people within the area of systems or users where it aims to obtain requirements for system development and then specify the commitments that resulted from the meeting.

#### **User Stories**

Document containing the requests of the end user on the computer system to develop.

#### **Product Backlog**

Document lists all user stories determining the priority of each.

#### **Spring**

Document containing the tasks to be performed based on user stories and a timeline detailing the specific time to perform them.

#### **User manual**

Document focused to the end user in which the functionality of the system in each of its modules is described in detail.

#### **Technical manual**

Focused document for specialists in the area of systems in which the system architecture, installation, configuration, system requirements including technical data described.

#### **Term Project Act**

Document which details which has been completed by the activities of the development process and the application is approved by the people who are given the project..

## **3. Results**

Then the development and operation of the software is described following the process established by the Directorate of ICT is based on the two agile development methodologies RUP and SCRUM.

### **3.1 System Architecture**

The architecture of Inventory Management System is based primarily on the MVC design pattern, where each of these components are used according to the needs and characteristics of the framework used to develop the system; besides having the ability to add more layers for better code structure and improve scalability.

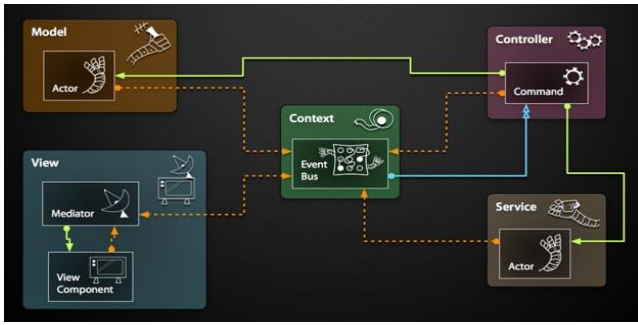


Figure 1: Architecture GPIGESTION

**Model:** Layer in which the consultations, and data manipulation operations (CRUD) are performed.

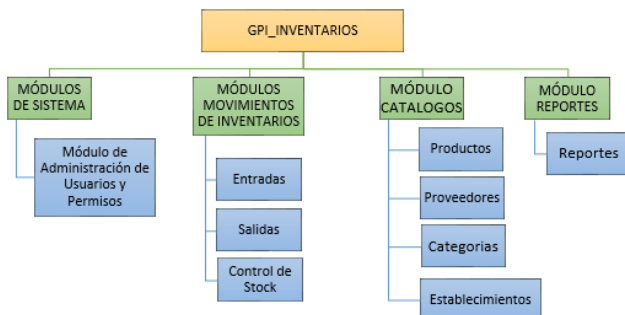
**Vista:** The graphical interface of the application, for which data is presented to the user.

**Controller:** user Actions performed in view related business methods created in the model and displays it in the selected view.

**Service:** Requests to services established for the application.

### 3.2 System Modules

Based on the job description and inventory management processes currently running on the GPI and the information they generate, it has designed the scheme of Inventory Management System as important modules having the following:



**Administration module:** Responsible for all administrative functions of the application and security is based on permissions granted according to the role and user type.

According to the type of access and authorization tree options of the modules.

**Catalog Module:** Shows default all products with the Provincial Government of Imbabura, stock and stock control manner. In addition to the catalog of products according to the Classifier Central Product Classification (CPC) for the registration of all existing products, types of products and the category to which it belongs according to the level or node where you are.

**Module Movements Inventory:** The inventory movements are automatically recorded by the system and result of operations of inputs and outputs, in addition to these movements there are other types of transactions that also

involve movements that must be settled manually so that the data produced later are real, these operations can be, for example, products that are transferred from one branch to another (Transfers), broken (losses), returns and transfers. Movements can be input product, output product or both at the same time.

**Reports module:** This module will allow configure the report in print and screen. Reports module generates reports available for inventory management in PDF format.

### 3.3 Processes Inventory Management System.

The inventory item is a key aspect in the management of a public or private institution. an analysis of the close relationship between variations of products in inventory with the determination of product characteristics is made. It contains the practical application of an inventory management system, in order to present a simplified manner a detail of stores reports and input and output products.

CATALOGO INVENTARIOS		CONTROL INVENTARIOS	
PLANIFICACIÓN	ORGANIZACIÓN	EJECUCIÓN	CONTROL
CATALOGO BIENES Y SERVICIOS (CPC)	CATEGORIZACION	GESTIONAR MOVIMIENTOS DE INVENTARIOS: INGRESOS, EGRESOS, DEVOLUCIONES, TRASPASOS Y TRASLADOS	CONTROL DE STOCK (EXISTENCIAS)
BODEGAS	PRODUCTOS: IDENTIFICACION CARACTERISTICAS COSTOS ASOCIACION	TOMA DE INVENTARIO FISICO	ESTADISTICAS DE COSTOS
PROVEEDORES	RECEPCION Y ALMACENAMIENTO	INVENTARIO INICIAL	REPORTES DE MOVIMIENTOS DE INVENTARIOS: INGRESOS, EGRESOS, DEVOLUCIONES, TRASPASOS Y TRASLADOS KARDEX
PLAN ANUAL DE COMPRAS (PAC)	PETICION INVENTARIO	GESTIONAR PUNTOS DE REORDEN	SOLICITUD DE COMPRA
		ELABORAR SALIDA	ENVIO A DEPARTAMENTO
			OBSERVAR DE MANERA GRÁFICA LA FINALIZACIÓN DE LAS ACTIVIDADES

## 4. Conclusions

- The Provincial Government as a public entity to reduce costs, raised make a suite of systems with user friendly allowing transactions automatically, fast and efficient interface.
- Scrum agile methodology is teamwork that provides a disciplined approach to the allocation of responsibilities, each iteration executed in short and fixed periods provide a complete or partial results that can be delivered to the customer upon request.
- RUP it is a software engineering process that provides an effective methodology to model and document a software project.
- The use of free software, provides the approach to new technologies as part of the educational process, in addition to economic benefits since it is not necessary to pay for software licenses.
- The Inventory Management System is fully integrated with the other modules, it is functional

and easy to use, designed and developed exclusively to meet the needs of all stakeholders.

- By automating inventory management processes is obtained:
  - a. Saving time and costs when making transactions.
  - b. Fast and updated so that information related to inventories.
- The documentation, information, forums, blogs about Flex is still very scarce in the handling of database and integration into Flex 4 is a more current version and brings many changes.
- Using Zend Framework, he helped develop the application of reliable and fast, also offers a high-performance, robust implementation Standard Model, View, Controller and an abstraction user-friendly database to use.
- The design of the database was developed based on the needs, size information, ease of access, removal of the required information and focus Multi-Companies allowed to operate with unlimited number of companies and institutions in the same system.

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