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**TITLE:** CONTROL SYSTEM FOR INSPECTION PROCESS MANAGEMENT  
PLANNING GAD-I

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# TITLE: CONTROL SYSTEM FOR INSPECTION PROCESS MANAGEMENT PLANNING GAD-I

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**Abstract.** *This project is a system for process control in the Planning of GAD-I, specifically for the registration and control of inspections carried out to the premises within the city. For its development we worked with the existing methodology in TICs Directorate based on XP and Agile SCRUM development in which work directly and continuously with the system user. The software tools used for this project are based on the MVC architecture with Symfony ExtJS4 on the server and on the client, in addition to using the PostgreSQL database. In conclusion, the development and use of the system generates better performance in carrying out the processes as there is control and record of inspections.*

**Keywords:** *GAD-I, Inspections System, PostgreSQL, Symfony, ExtJS4, Agile Development.*

## 1. Introduction

One of the processes within the Planning inspections are carried out buildings in Canton Ibarra, that it is run by inspectors who are responsible for verifying that the development of a work or construction is being out in accordance with drawings, specifications and parameters adopted in accordance with standards established Ordinances Building Code and other relevant laws.

Information construction, inspection reports and other documents related to the process are carried mostly by hand and printed within folders which makes it difficult to keep track and proper operation, fast and efficient by inspectors to verify works and buildings that are being made that results in the illegal construction of buildings that have breached the rules.

The main objective is to develop and implement a Process Control System for Inspection Planning and thus facilitate monitoring, information management and inspection results within the processes running in this direction.

## 2. Materials and Methods

Then the tools and methodology used for the development of publicizing database concepts, languages, frameworks, reports and system development methodology are described.

### 2.1. Development Tools

The development tools used to create the system are:

### PostgreSQL

It's a database manager object-relational, distributed under BSD license and its source code freely available. It is the management system databases more powerful open code.

PostgreSQL uses a client / server model and uses multi-processes rather than multithreaded to ensure system stability. A fault in one process will not affect the rest and the system will continue to operate. [1]

### Symfony 1.4.6

It's a PHP framework that facilitates and streamlines the development of web applications. Symfony handles all common and boring aspects of web applications, allowing the programmer is dedicated to provide value by developing the unique characteristics of each project.

Also separates the business logic, the logic of the presentation server and the web application. [2]

### Ext JS 4.0.7

It's a JavaScript library for developing interactive web applications using technologies such as AJAX, DHTML and DOM. It was developed by Sencha.

The current version that is being developed is the ExtJS 4 including a refactoring of the entire framework from which include a new class structure and dynamic loading of objects, packet data, new graphics and themes. [3]

## **Sencha Touch 2**

Sencha Touch is a JavaScript MVC framework that uses web standards HTML5 and CSS3 to create web applications for mobile devices with a touch screen with the appearance of being Native iOS, Android and Blackberry systems. [4]

This framework has been created by the same company Sencha improving its performance to be built on the same architecture of ExtJS 4 and class system, taking advantage of the robust feature selection ExtJS. [5]

## **OpenLayers**

It's a Javascript library for free use to access, manipulate and display maps in web pages. It provides an application programming interface that allows the creation of web clients to access and manipulate geographic information from a variety of sources, and can incorporate dynamically maps endowed with various controls like zoom, measure distances and many other tools. [6]

## **GeoExt2**

It is an open source library that allows the creation of GIS desktop applications and through the web. This is a JavaScript framework combining GIS OpenLayers functionality user interface provided by the library ExtJS Sencha. [7]

## **JasperReports**

It's an Open Source reporting tool that has the ability to present reports on the screen, printer or a PDF, HTML, XLS, CSV and XML. It is entirely written in Java and can be used in a multitude of Java enabled applications generating dynamic content. Its main purpose is to help create written reports, ready to print in a simple and flexible way.

JasperReports organizes retrieved from a relational database through JDBC according to the report design defined in an XML data file. [8]

## **PHP/Java Bridge**

It's a bridge XML-based network protocol, that can be used to connect a native script engine PHP or Java virtual machine. PHP / Java Bridge allows developers to access Java classes in PHP. It also allows access to PHP scripts into Java classes. Because of this interoperability, developers can build interactive web pages using PHP, but delegate tasks to Java classes, allowing each technology used for their strengths and avoid their weaknesses. [9]

## **2.2. Development Methodology**

The methodology used GAD-I is rapidly developing, and is constituted by Scrum XP and methodologies, which has taken the most efficient of each process, in order to obtain more efficient projects and in a short time.

The documents are part of the software development methodology are as follows:

### **Technology Project**

Document where the set of activities to achieve a specific objective of research, development and technology innovation in a range defined time and cost, in addition to specifying the scope, justification, beneficiaries among other aspects of the system under development is described.

### **Minutes of Meeting**

Document containing the topics discussed in a workshop which can be with people in the area of systems or users where the objective is to obtain requirements for system development and then specify the acquired commitments that resulted from the meeting.

### **User Stories**

Document containing the end user requests on the computer system to be developed.

### **Product Backlog**

Document that lists all user stories determining the priority of each.

### **Stack Iteration**

Document containing the tasks to be performed based on the user stories on a timeline detailing the specific times to perform the same.

### **User Manual**

Document focused to the end user which details the functionality of the system in each of it's modules.

### **Technical Manual**

Document focused for specialists in the area of systems in which the system architecture, installation, configuration, system requirements described among other technical data.

### **Act of Term Projects**

Document which details have been given for completion activities of the development process and

the application is approved by the people who are given the project.

### Characterization Applications

Document where the specified application type which has some of its development features detailed summary.

## 3. Results

Following the development and operation of the software is described following the process established by the GAD-I methodology TIC Directorate is based in both agile development methodologies and SCRUM best known XP.

### 3.1. Integrated System Architecture

The architecture of the GAD-I Embedded System, is mainly based on the MVC design pattern, where each of these components was 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 the scalability.

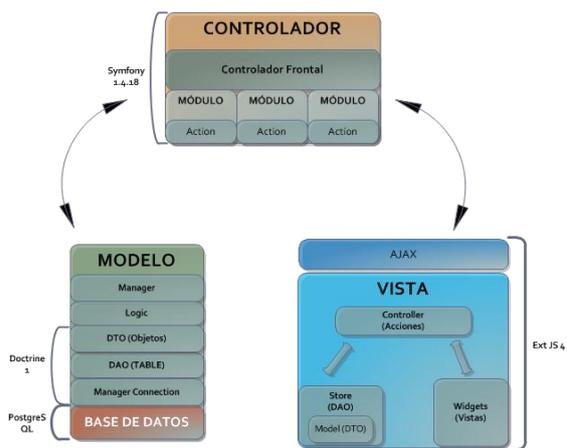


Figure 1: System Architecture GAD-I

**Model:** This layer using the Doctrine ORM allows communication and data collection through the DTO classes created from tables in the database and use the DAO to execute SQL queries and DQL.

The manager acts as an intermediary by which applications request is received from the controller, and calls the SQL or DQL queries for obtaining data via persistent objects.

**Controller:** This layer is responsible for consultation and interact in the model data to be sent and presented at the view.

**View:** The view layer is created using the ExtJS framework which provides us with rich and dynamic components for better management and presentation of information to the customer.

This framework uses as its main means of an Ajax request data connector, allowing improving the outcome of the response and access to it.

### 3.2. Core of view Integrated System

The GAD-I Core Embedded System related view is founded by a core architecture, so that this is more manageable and allows us to obtain a unique presentation and access to the system, as this has several applications have different functions depending on the permissions of the user logged.

The Core of the view consists of the following layers:

**Imi Ajax Connect:** Allows communication between client view and the logic on the server (Front Controller).

**Api Application:** It is the primary instance of the Integrated System-level view that allows the management of controllers and views created in the execution of the application, that is responsible for eliminating instances and listeners assets to close an application.

**Desktop:** It is the main view of the Integrated System, is responsible for the load management applications within your environment.

**Application Manager:** This component handles the loading of the main view and an application assigning allowable options within the same depending on the user entering the Integral System.

**Application:** This component represents an application on the server level, in which each layer whatever with: Windows Manager and Module.

### 3.3. Modules System Inspections

Depending on the needs and requirements obtained 2 types of users or roles for System Inspections which are:

**User Manager:** It is responsible for creating the Inspection Schedule and Inspection Sheets process.

**User Architect / Inspector:** It is responsible for generating, recording, and query reports of inspections.

Then the developed inspection system modules are described.

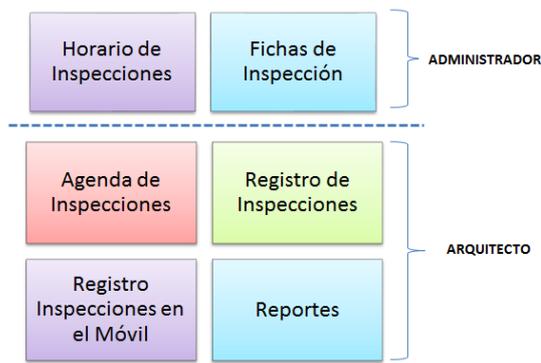


Figure 2: Modules System Inspections

**Module Schedule Inspections:** Module where parishes days and architects are assigned to which information is collected to generate the schedule inspections then used to assign a date to visit the premises.

**Listing Inspection Module:** This module records inspection process or type of process which contains categories and data that can be simple, single and multiple selection are created. This tab is used to record the data obtained at the time of inspection.

**Diary Inspection Module:** This module selected to perform inspection procedures are displayed; further use of maps showing the location of the premises and displayed a route that provides support at the time of inspection is created.

**Registration Module Inspections:** In this web-based module with data of inspections are recorded as: photos, record, observations and persons responsible for the inspection. Besides that the inspections can then search through some filters like: dates, schedule, number of pending and approved inspections.

**Registration Module at Mobile Inspections:** This module is similar to the previous one except that its goal is to make a quick registration of the data obtained from the inspection; this is possible since it was created to run on mobile devices and use it in the exact place of the visit to each of the premises.

**Reports Module:** This module is used to generate and print graphs and statistical reports based on data inspections and can be used by architects for support in meeting existing indicators..

### 3.4. Functional Description System Inspections

The operation generally Inspections System is described in function of the 2 types of user:

**Administrator:** The administrator user accesses the module hours where inspections by assigning parishes days and architects can create and print the current Schedule of inspections which works within the Department of Planning.

This user also has access to module Sheets Inspections where you can view and create new records by type of procedure in which you can create or add categories and in turn these create the data that will contain the information that is used for recording inspection. This record can be viewed and displayed in PDF format.

**Inspector:** This user has access to Agenda Inspections module having a direct relationship with the Paperwork Management System as this is where the formalities necessary information are created.

After creating procedures with inspection are received and displayed in the Calendar module inspections and with the help of a map of the properties location, the user creates the route and schedule that results in generating a PDF file with basic information the paperwork and sent an e-mail informing citizens the assigned date which will be visiting the site.

Having raised his record inspections, which may be through a web and mobile environment is performed; these required data obtained from the inspection are recorded and finally the user can check inspections and generate reports with statistical data inspections.

## 4. Conclusions

- By using the system can achieve a more efficient and organized management inspections including its recorded data.
- It was possible to study some of the processes and standards related to the inspections among which is the Approval of Plans and Reporting Regulation Urbana.
- Within Planning Department the type of inspection is more accomplished Plan Approval in which a visit to the property is performed to check whether it meets the requirements and documents submitted to that procedure.
- Through the support of area personnel and organization processes a survey of all processes running on the Planning where inspections and formalities related to it was included.
- The methodology used for the development of the inspection system is implemented in the "Department of Systems GAD-I" which was created by the union of 2 agile development methodologies known as: SCRUM and XP.
- For the development of the system was studied and training framework Symfony MVC 1. 4 and for views was studied and used the framework for building RIA applications ExtJS 4.0.

- One of the objectives accomplished is to inform the public that date will carry out an inspection at the premises; this was accomplished by creating the Agenda Inspections where inspections are generated by creating a route according to the location of the properties in the map module and emails sent to citizens at the date assigned to his parish in the Inspection Timetable module.
  - It was determined that inspections of most of the procedures within the Department of Planning are similar so they created the modules for use and inspection log for any of the types of procedures.
  - At the inconvenience of not having a document inspection data sheets register the module inspections where an administrator user can structure a record by process or type of process the necessary data submitted to register was created.
  - A module or additional application designed is the Registration Inspections from a mobile device to help reduce paper usage and the time for the citizen to continue or complete the necessary formalities, as it can record data at the same time to make an inspection.
  - The inspection system has a direct relationship with the Paperwork Management System because it is a procedure in which you create and then select the architects that need inspection are then displayed in the Agenda for Inspections module.
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