UNIVERSIDAD TÉCNICA DEL NORTE

FACULTAD DE INGENIERÍA EN CIENCIAS APLICADAS

CARRERA DE INGENIERÍA EN SISTEMAS COMPUTACIONALES

ARTÍCULO CIENTÍFICO

TEMA:

"IMPLEMENTATION OF COMPUTER SYSTEMS FOR HOMECARE BILLING OF THE BOARD OF WATER AND SEWER ILUMAN"

AUTHOR: MARCELO YAMBERLA CAÍZA

DIRECTOR: ING. PEDRO GRANDA

IBARRA – ECUADOR

2015

Implementation of computer systems for homecare billing of the board of water and sewer iluman.

Author-Marcelo YAMBERLA CAÍZA

Universidad Técnica del Norte, Av. 17 de Julio, Ibarra, Imbabura
marcelo_ok@hotmail.es

Abstract. *This project "implementation of computer systems for Homecare TURNOVER OF THE BOARD OF WATER AND SEWER Iluman." Involves the creation of a new system of online home business-oriented billing or administrative boards of potable water and sewerage.*

Introduction

It all began in the parish of San Juan de Ilumán canton Otavalo Imbabura province, the parish has a population of about 10,000 inhabitants, has water sources in different areas of the parish. The JAAPAI provides drinking water to seventeen communities and neighborhoods that make up the parish. The company has 34 years of service, it is autonomous; the highest authority is the board of council composed of community leaders from the parish.

They currently have 1,500 active members, several resources such as equipment, plumbing materials, office staff and others.

The current directors are in charge of the administration until 2015, will provide solutions to the problems and needs of the management company. One of the requirements is to implement new technology systems and software to facilitate the administration and management of resources.

Thanks to this project the administration and billing will be improved with the benefit to users and business, reducing time and cost; in order to provide a quality service.

Problem

The specific problem of the managing board of drinking water is the time of reading, control and information delivery. The Board is currently conducting readings on sheets of paper increasing the risk of data loss, errors in reading of water consumption, waste of time data delivery, thereby causing inconvenience to users and dissatisfaction on bills, among other.

Justification

The development of computer systems for home sales of the Board of Water and Sewer Ilumán, was planned in order to provide the community members and business, reducing time and cost billing services and different procedures of the company.

The reason for the approach is for the great benefits that have citizens and directors of the company, such as:

CITIZENS

- Home Monthly billing
- Monthly users at home Collection
- Elimination of time, during offices of the Board
- Elimination of transport cost, during a offices of the Board
- Reduction of accident risks (user) or loss of money (users elderly)
- Delivery Notification of the Monthly Return
- Correction time reading drinking water, where there is error in it.

COMPANY

- Risk reduction in leaf loss reading drinking water
- Correction time in reading drinking water

- Elimination of time typing data drinking water system
- Home visit debtors, with the monthly bill.
- Reducing high percentage of debtors, by applying the home billing system
- Invoicing product sales and monthly consumption
- Monthly Billing managers and community leaders for prompt correction or justification of communal fines.
- Activity Reports

General Objective

Build computer systems to develop home turnover, the Board of Water and Sewer Ilumán to improve the quality of service and billing process.

Scope

Computer systems were developed for the mobile platform and the web, in order to meet user needs and achieve quality software for home sales of the Board of Water and Sewer Ilumán. This product will possess the following features:

MODULE MANAGER

- Register as institutional user to persons designated by the institution, assigning user type: Universal or optional.
- Terminate users when deemed appropriate.
- Delegate Administrator functionality to any of its users by giving them high, selecting the system administrator. In any case, the administrator can continue to manage the system.
- Customer login
- List Price (commercial and residential)
- product categories (Water and Sewer)
- To authorize the operation of the system update data in each of the activities.
- Product Sales Report
- Report collection
- Customer List
- Sales records (summaries and details)

MODULE COLLECTOR

- Registration of drinking water in the internal database of the device
- Registration of drinking water in the institutional server
- Registration communal fines
- Reports

BILLING MODULE

- Invoicing product sales
- Turnover monthly consumption
- Consultation form water
- Printed Notice of monthly consumption bill
- Home Issuing monthly consumption billing
- Issue sales invoice service
- Reports

Analysis

The present project implementation expected results, with user satisfaction and management. Its development was very dynamic thanks to free tools like Bootstrap, which facilitated Netbeans coding html5, javascript and css. Another tool large storage media is the database developed in the PostgreSQL tool.

The project provides billing solutions, reading consumption of potable water storage users, meter management, management of communal fines by leaders and most gerenciación amount the Company for making decisions according to the results obtained in statistical graphics.

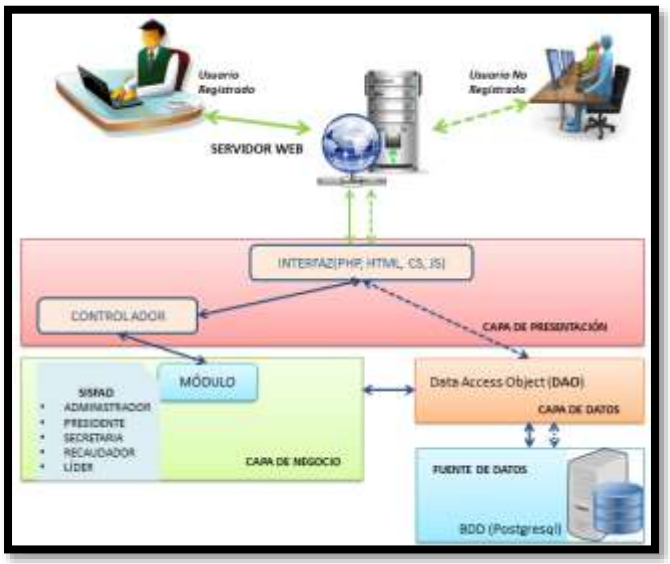
Use can be made in different sizes of devices with the Bootstrap tool; installation is very simple, only required to have installed on your computer an updated browser with Internet access.

The project caters for all companies engaged in the management of water and wastewater.

The capacity of the data flow is varied according to the Internet access package that has your device and data storage space depends Hosting hired.

The advantage when development was to use the RUP methodology to clarify the difficulties of the project, and facilitate internal understanding of the project.

Software architecture



Source: Own

Community event

Source: Own

Conclusions

1. The implementation of the system of home turnover reached expected goals because the system meets the requirements specified registration and updating of monthly consumption in real time, online billing, online registration of Community fines via by the leaders Community and reporting on each activity.
2. The system is developed in a generic manner to be implemented in any company or joint management aimed at water and wastewater.
3. In implementing the billing system of home could be seen a considerable reduction in administrative time and users.
4. The use and research of free software tools enables billing via online home.
5. RUP for their breakdown or phases provided for successful completion of projects was used.
6. The system interface is adaptable to any type computing devices.
7. Responsive desing technique (adaptable design) was employed using the Bootstrap framework.
8. Implementing new technologies allow the company to get closer to users.

Acknowledgements

I thank my teachers and thesis advisor career in Computer Engineering from UTN and staff of the managing board of potable water and sewerage Ilumán.

Recommended

1. Training system is recommended to all the directors responsible for the administration, and that this will help to efficiently use the system.
2. Spread the entire community about new services provided by the online system approach to the user's home.
3. All system users are recommended to have a data plan (internet) on devices that use the system.
4. Have a browse on their devices updated.

5. It is recommended to monitor the project so that new modules that contribute to the management are implemented.
6. It is recommended to hire a system administrator to follow up and support the system.
7. To register a new account registration as a user access the institution is recommended.
8. To observe pdf format reports recommend using the latest version of the Polaris application on mobile devices and pc adobe read.
9. For the record, update and delete data must be authorized by written request to the directors of the institution.

Bibliography

1. Fundación Wikimedia, Inc. (1 de julio de 2015). *Windows Phone*. Recuperado el 3 de julio de 2015, de Windows Phone: https://es.wikipedia.org/wiki/Windows_Phone
2. About.com. (2012). *Los 10 mejores teléfonos celulares de 2012.* Recuperado el 8 de Julio de 2014, de Los 10 mejores teléfonos celulares de 2012: http://celulares.about.com/od/informe_de_celulares/tp/Los-10-Mejores-Tel-Efonos-Celulares-De-2012.htm
3. Android. (2009). *Android*. Recuperado el 7 de febrero de 2014, de Android: http://developer.android.com/sdk/index.html?utm_source=weibolife
4. Android Zone. (21 de mayo de 2013). *Historia de android, La evolución a lo largo de sus versiones*. Recuperado el 7 de febrero de 2014, de Historia de android, La evolución a lo largo de sus versiones: http://androidzone.org/2013/05/historia-de-android-la-evolucion-a-lo-largo-de-sus-versiones/
5. Apple. (2015). *¿Qué es iOS?* Recuperado el 3 de Julio de 2015, de ¿Qué es iOS?: https://www.apple.com/es/ios/
6. Apple. (2015). *Novedades de iOS 8.* Recuperado el 03 de julio de 2015, de Novedades de iOS 8.: https://www.apple.com/es/ios/
7. arkaitzgarro. (22 de febrero de 2014). *RESPONSIVE WEB DESIGN*. Recuperado el 3 de julio de 2015, de RESPONSIVE WEB DESIGN: http://www.arkaitzgarro.com/responsive-web-design/capitulo-1.html
8. Blowcs. (18 de julio de 2013). *Responsive web design*. Recuperado el 7 de julio de 2015, de Responsive web design: http://blowcs.com/responsive-web-design/
9. Chavez, A. (17 de Septiembre de 2013). *Si eres desarrollador web, debes utilizar Bootstrap y punto.* Recuperado el 5 de Julio de 2014, de Si eres desarrollador web, debes utilizar Bootstrap y punto.: http://alanchavez.com/wp-content/uploads/2013/09/Twitter-Bootstrap-Logo.jpg
10. Fundación Wikimedia Inc. (28 de junio de 2015). *Diseño web adaptable*. Recuperado el 7 de julio de 2015, de Diseño web adaptable: https://es.wikipedia.org/wiki/Dise%C3%B1o_web_adaptable
11. Google Inc. (2014). *Android.* Recuperado el 8 de Julio de 2014, de Android: http://www.android.com/
12. Hilera., J. M. (1 de 11 de 1998). *Modelado de documentación multimedia e hipermedia*. Recuperado el 05 de 06 de 2015, de Modelado de documentación multimedia e hipermedia: http://pendientedemigracion.ucm.es/info/multidoc/multidoc/revista/cuad6-7/colabora.htm
13. Hispasec Sistemas. (25 de Octubre de 2013). *Hispasec*. Recuperado el 5 de Julio de 2014, de Hispasec: http://unaaldia.hispasec.com/2013/10/comprometen-el-sitio-oficial-de-php.html
14. JorgeLessin.com. (2014). *Qué es Bootstrap y como funciona en el diseño*

web. Recuperado el 9 de Julio de 2014, de Qué es Bootstrap y como funciona en el diseño web: http://jorgelessin.com/que-es-bootstrap-y-como-funciona-en-el-diseno-web/

15. Libros WEB. (2014). *El patrón MVC*. Recuperado el 9 de Julio de 2014, de El patrón MVC: http://librosweb.es/symfony_1_2/capitulo_2/el_patron_mvc.html
16. LOS TOPS. (26 de junio de 2014). *Los 10 mejores celulares del 2014*. Recuperado el 08 de Julio de 2014, de Los 10 mejores celulares del 2014: http://tops10.loquenosabias.com/los-10-mejores-celulares-del-2014
17. NetBeans.org. (2013). *Logo*. Recuperado el 5 de Julio de 2014, de Logo: https://netbeans.org/community/teams/evangelism/collateral.html?print=yes
18. OPTIMOCLICK. (2014). *¿Qué es Bootstrap?* Recuperado el 3 de julio de 2015, de ¿Qué es Bootstrap?: http://zumodemarketing.com/que-es-bootstrap/
19. PAREDES VELASCO, M., SANTACRUZ VALENCIA, L., & DOMÍNGUEZ MATEOS, F. (2012). *PROGRAMACIÓN MULTIMEDIA Y DISPOSITIVOS MÓVILES. CFGS.* RA-MA EDITORIAL.
20. PHP GROUP. (6 de febrero de 2014). *PHP*. Recuperado el 7 de febrero de 2014, de PHP: http://www.php.net/
21. PostgreSQL. (2 de Octubre de 2010). *Sobre PostgreSQL*. Recuperado el 3 de julio de 2015, de Sobre PostgreSQL: http://www.postgresql.org.es/sobre_postgresql
22. PostgreSQL-es. (2013). *PostgreSQL-es*. Recuperado el 5 de Julio de 2014, de PostgreSQL-es: http://www.postgresql.org.es/
23. Rodríguez, E. F. (3 de junio de 2011). *iOS*. Recuperado el 7 de julio de 2015, de iOS: http://luxstevejobs.comxa.com/obra1.html
24. SQLite. (3 de febrero de 2014). *SQLite*. Recuperado el 7 de febrero de 2014, de SQLite: http://www.sqlite.org/index.html
25. Sun Microsystems, Oracle. (1 de Junio de 2010). *Netbeans*. Recuperado el 7 de febrero de 2014, de Netbeans: https://netbeans.org/
26. Taringa. (2013). *Estos son los 10 mejores celulares del 2013*. Recuperado el 8 de Julio de 2014, de Estos son los 10 mejores celulares del 2013: http://www.taringa.net/posts/info/16445038/Estos-son-los-10-mejores-celulares-del-2013.html
27. The PHP Group. (05 de 06 de 2015). *php.net*. Recuperado el 05 de 06 de 2015, de php.net: http://php.net/images/logos/php-med-trans.png
28. Tinoco, R. (5 de marzo de 2009). *El patrón MVC*. Recuperado el 3 de julio de 2015, de El patrón MVC: http://raultinoco-cea2.blogspot.com/2009/03/el-patron-mvc.html
29. Windows Phone. (2015). *El smartphone más personal del mundo*. Recuperado el 02 de febrero de 2015, de El smartphone más personal del mundo: http://www.windowsphone.com/es-ec/features

About the Authors...

Author - MARCELO YAMBERLA CAÍZA
Student Career Computer Systems Engineering from the Technical University of North City Ibarra-Ecuador.