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Evaluation of Free Technologies, as Tools for Business Process Management (BPM)

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Abstract
The article presents an evaluation of free technologies for business process automation, with emphasis only on tools compatible with the General Public License (GPL). The compendium of technologies was based on promoting a Service-Oriented Enterprise Architecture (SOA) and the establishment of a Business Process Management System (BPMS). The methodology for the selection of tools was Agile UP. This proposal allows businesses to achieve technological sovereignty and independence, in addition to the promotion of service orientation and the development of free software based on components.

Keywords: BPM, BPMS Suite, Open-Source Software, SOA, Enterprise Architecture, Business Process Management

1. Introduction

This work is motivated, as organizations think more about automating their processes using a methodology and a clearly defined standard, a justification for using BPM is the continuous improvement of these business processes, in that context, BPM stands for Business Process Management, which is one of the trends in management using information technologies, which allows a deliberate and collaborative way to systematically manage all business processes of an enterprise.

In order to align technologies with the vision and objectives of the business, it is necessary to establish a reference Enterprise Architecture based on technologies, and these technologies can be free alternatives. The Enterprise Architecture (EA) is the logic of how business processes are organized and articulated with the IT infrastructure to support the business model of an enterprise. The Enterprise Architecture reflects the level of information integration and the normalization or standardization of processes for an optimal operation of the enterprise. Based on these, BPM works with a service-oriented architecture (SOA), capable of integrating and deploying business processes. BPM uses modeling standards, such as the BPMN notation, which allows fluid communication with a minimum of effort between business processes and the organization itself.

BPM constitutes a technology management alternative capable of optimizing, automating, and continuously improving the business processes of organizations in view of the fact that processes are dynamic, the organization evolves and changes.

On this occasion, we present an evaluation of the existing tools that work with free licenses and collaborative schemes, which allows us to support the management of business processes from modeling, automation, improvement, and monitoring of business processes.

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2. Review of the literature

2.1. Enterprise Architecture

Enterprise Architecture (EA) is the logic of how business processes and IT infrastructure are organized to support an enterprise's business model. The Enterprise Architecture reflects the level of information integration and the standardization of processes for the optimal functioning of the enterprise.

2.2. The Gartner Group model

The Gartner Group model defines the Data, Applications, Integration and Access Points domains, which make up the Information Architecture. On the other hand, the Infrastructure, Systems Management and Security Domains make up the Technical Architecture. In each of these seven domains, there are components, i.e., tools that have been developed specifically to be reused; and patterns, solutions to problems in each domain, using the reusable components.

2.3. Business Process Management (BPM)

For KHAN Rashid, it is the discipline of modeling, automating, managing and optimizing processes to increase the profitability of a business. In this view, the objective of process management is focused on increasing profitability. [4]

2.4 Enterprise Application Integration

EAI, or Enterprise Application Integration, is a set of technologies based on industry standards that allow deliberately articulating and integrating different heterogeneous technological solutions with different mechanisms allowing the use of standards for the coupling and expected solution.

2.5. Service Oriented Architecture

SOA (Service Oriented Architecture) has as its main objective to isolate any application of the technology platform and business processes from the rest of the architecture, simplifying significantly the effort of Enterprise Application Integration (EAI).

2.6 SOA and BPM

On the basis of the ideal applications exposed on the services defined by SOA, there is a need to orchestrate and manage business processes (BPM), which constitutes a paradigm to address business improvement processes, increasing efficiency and facilitating integration.

2.8 XPDL

XML for Process Definition Language (XPDL) is a standardized XML file format that can be used to exchange processing models between tools, it is used to perform portability between different BPMS (Business Process Suites).

2.9 BPEL

Business Process Execution Language (BPEL) is a language defined in XML that is designed to orchestrate processes automatically.

2.10 BPMS

Business Process Management Suites (BPMS) are technological tools that contain different components to streamline the modeling, execution, deployment, automation, improvement and monitoring of business processes.

2.11. Process Life Cycle

Business processes have a life cycle (see Figure 1), BPM supports this cycle in each of the phases specified, with its different components: BPA (Business Process Analyses) for the definition, modeling and simulation of business processes; BRE (Business Rules Engine) and Business Process Execution Engine (BPE) enable the implementation and execution of business processes; finally, BAM (Business Activity Monitoring) monitors, analyzes and optimizes business processes.

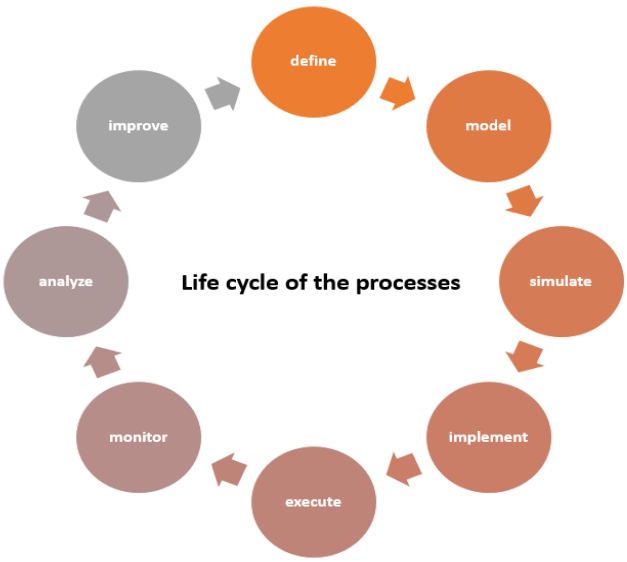

Figure 1: Life cycle of a business process
Source: Own elaboration

3. Problem definition/formulation

The high cost of BPMS solutions, and the growing demand for free solutions to manage business processes, it is necessary for a medium or small business to select a tool that allows to design, automate, monitor and improve business processes. Many businesses use different solutions with free licenses and

the constant evolution of BPMS that are incorporating better design mechanisms, automated tools, intuitive business rules engines and components that allow you to monitor processes in execution times in order to constantly improve and innovate business processes.

4. Method of analysis

Business Process Management (BPM) induces analysts to align Information Technology systems with strategic goals, creating well-defined enterprise business processes, monitoring their performance, and optimizing them for greater operational efficiencies. [7]

In addition, BPM enables change management to improve business processes, unifies disciplines such as Workflow Simulation, Enterprise Application Integration (EAI) and business-to-business (B2B) integration into a single standard.

Business Process Management Systems (BPMS) are suites that allow modeling, simulating, implementing, executing, monitoring, analyzing and optimizing business processes using XPDL (XML Process Definition Language), a language for the definition of a Workflow. [8]

From that point of view, it focuses on comparing different free and open-source software solutions that support technologies such as SOA, EAI, XPDL and BPEL, so that they can be considered by companies as viable alternatives and incorporate them within their Technological Architecture.

5. Results and discussion

5.1.Results obtained

5.1.1. Tool evaluation and selection

Once the Enterprise Architecture and the architecture of the business processes on which the use of the BPMS based on free software will be determined, a matrix of criteria was created that will allow the selection of these technologies.

For the evaluation of BPMS technologies based on free software and according to the proposed enterprise architecture, 7 criteria formulated by Forrester [6] were established, and 4 products developed with free technologies were selected: Process Maker, BonitaSoft, and JBPM.

Table 1. BPMS products based on free software evaluated

Evaluated product	Tested version	Tested Operating System	Download URL	BPMS Logo
Process Maker [11]	v 3.2 (Stable)	Linux Generic or Fedora Linux v.33	https://cutt.ly/yEUJ5nr	ProcessMaker Workflow Simplified
BonitaSoft [12]	2021.2-u0 Community Edition	Linux Generic or Fedora Linux v.33	https://cutt.ly/CEUKvqL	bonitasoft
JBPM [13]	7.59	Linux Generic or Fedora Linux v.33	https://cutt.ly/DEULsfG	jBPM

The following are the technological and licensing characteristics of the suites evaluated:

Table 2. Technological characteristics of free BPMS suites

Evaluated product	License	Language	Database	Container
Process Maker	GNU Affero General Public License version- versión 3	PHP	MYSQL	It does not have
BonitaSoft Studio	Community Public Apache License (CPAL)	Java / JSP	MYSQL	Tomcat
JBPM	Apache License 2.0	Java/ JSP	MySQL	Tomcat

Source: Own elaboration

Range of evaluations according to Forrester:	
Score	**Level**
25	Fair
50	Good
75	Very Good
100	Excellent

Finally, the Agile UP methodology was applied for the use and development of a database application, using BPMS, obtaining the following results

Table 3. Evaluation of Open Source BPMS Technologies

Criteria to consider	Process Maker	BonitaSoft Studio	JBPM
Design	100	100	50
Automation	100	100	75
WorkFlow Experience	50	100	75
Administration and Monitoring	100	75	50
Analysis and optimization	100	100	75
Product Architecture	50	75	100
Market presence	75	75	25
Score Obtained	**575**	**625**	**450**

Source: Own elaboration

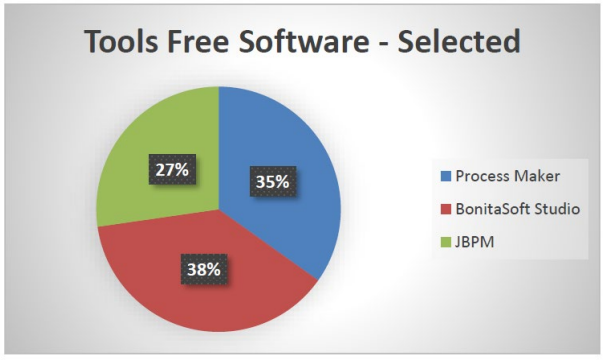

Figure 2. Scores obtained according to evaluation criteria

5.2. Discussion

Taking into account the results of Table 3 and Figure 2, it was decided to choose and select the free information technology offered by BonitaSoft Studio in its Community Edition version under CPAL license.

Bonita Soft, uses a persistence model capable of connecting different database managers, in this case, it supports MySQL, MariaDB and PostgreSQL, free alternatives that allow having free licenses for the community.

In the case of the operating system, it was decided to install BonitaSoft Studio on Fedora Core 25, which is suitable and adaptable to any enterprise architecture.

Another feature of BonitaSoft Studio is that it supports Windows, MacOS and Linux platforms. The BPMS technologies, legally evaluated, are compatible with Free Software licenses (GNU/GPL) and Open-Source licenses.

6. Conclusions

This choice for the free solution BonitaSoft Studio, constitutes a complementary part of the process management, standardization, management and innovation of processes, aligned with the business strategy ensures the effectiveness of the process and creates an added value in the productive chain of business.

BPM perfectly articulates business processes, strategies and technologies becoming a paradigm of analysis, design and development-oriented processes.

BPM uses modeling standards such as the BPMN notation that allows fluid communication with a minimum of effort between business processes and the organization itself.

BPM constitutes a technology management alternative capable of optimizing, automating and continuously improving the business processes of organizations today facing a highly competitive and changing market.

BPM and BonitaSoft Studio constitute a viable, sustainable and highly eligible technological alternative for organizations that want to automate their processes and open lines of research in the improvement of their methodology, methods, techniques, continuous process management.

References

[1] Arraz, V., Comparación de las herramientas BPM, Universidad de Valladolid. Escuela de IngenieríasIndustriales. España, Vol. 10/Edición 2, pp. 1-3, 2016
[2] Martínez J., Bazan P., Lorenzón E., WICC 2010 - XII Workshop de InvestigadoresenCiencias de la Computación. Argentina, 2010
[3] Rodríguez A., Bazán P., Díaz F., WICC 2010 - XII Workshop de InvestigadoresenCiencias de la Computación. Argentina, 2010
[4] Khan R., Evaluating BPM Software, Business Integration Journal, 2010
[5] Smith H., Fingar P., Business Process Management: the third wave. The. breakthrough that redefines competitive advantage for the next fifty years, 2003
[6] Forrester R., How BPM Suites Support Forrester's Digital Business Architecture, 2015
[7] Burlton, R., (2009). Business Process Management: Profiting from process, Unites States of America
[8] Smith H., Fingar P., Business Process Management: the third wave. The breakthrough that redefines competitive advantage for the next fifty years, 2013.
[9] Thomas E., Design Pattern, Unites States of America, 2013
[10] The Forrester Wave™ (2019). The Forrester Wave™: Software For Digital Process Automation For Deep Deployments, Q2 2019, 2019
[11] http://www.processmaker.com/
[12] http://es.bonitasoft.com/
[13] https://www.jbpm.org/