Open source workflow software research for documents management

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Abstract

An open source based workflow application is an important solution that integrates document management, user management, security tool (which enables users to sign and encrypt documents) and workflow design tool (which allows users to share and reuse formal descriptions of workflow). There are currently many available workflow management software. However, most of them are released under commercial licenses and do not allow easy customization. In this project we build a unified solution from several open source packages. We modify Eclipse and transform it to a visual workflow design tool. The output of this tool will be the input of the jBPM core engine running on JBoss platform. Another certificate authentication subsystem is responsible for certificate generation and verification. We also develop a user management subsystem using LDAP. Finally, we also enhance the document management subsystem with PDF conversion feature. With this feature, user can easily print their documents together with digital signature.

1. Practical needs

Nowadays, public administration reform has been implemented in many different jobs in society. The needs for computerizing and standardizing management systems are imperative. The implementation of workflow system will bring more practical benefits in enterprise management such as decreasing the transfer of documents (which means the document will be passed to the receiver immediately), increasing the usabilities (users can monitor the status of documents), saving costs and human resources.

The current open source systems which are used to build up workflow systems have been developed and released unconnectedly, seperately as the recommended standard of WfMC \(^1\) and OMG \(^2\). Because of those reasons, the workflow management system must be rebuilt and developed consistently from business process design to workflow system deployment and meet the practical requirements.

2. Analysing and evaluating the solution

New features

jBPM supplies basic modules which are in the most generalizations to develop a complete product in comparison to other solutions such as wfmOpen, XFlow, Taverna, EnhydraShark, ...\(^3\) The new features of jBPM are the agility and opening of the modules which allow developers to customize and add more function in specific contexts.

Other jBPM new points are the J2SE core – pure Java platform which is used to define processes and their instances. Hence, the jBPM can be packed, built and deployed in EJB forms on many different J2EE supported servers.

By investigating many open source workflow systems, jBPM system incuding source code is released widely in open source community. The speciality of the publishing is the description document and supporting community which was completely developed.

However, the jBPM source code was released in older versions and contained undiscovered hidden bugs. The supporting community was mainly organizations, individuals who have experience or have used jBPM system.

The framework structures of wfmOpen, XFlow, Taverna, EnhydraShark, ...\(^3\) are not flexible and agile as pluggable framework of jBPM. As a result, the jBPM system can be developed and added more modules depending on practical requirements.

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\(^1\) WfMC – Workflow Management Coalition – http://www.wfmc.org


\(^3\) References.
By examining the workflow system core with criteria above, the jBPM system which integrated in JBoss server was chosen.

**Figure 1 – Former jBPM system**

jBPM system was first released as primitive form. It just supplied some basic symbols to demonstrate the workflow. Moreover, eclipse is used to design workflow process/business process but not fully support. The integration between seperated modules to form a complete workflow management system with the lowest costs and the most customizations is difficult to deploy it in practice. Farmore, the development of authentication system, digital signature on documents and workflow process was not implemented.

In order to implement the complete workflow system based on jBPM to reality, we need to implement some more additional components such as:

- Improve business process jPDL editor.
- Improve jBPM execution core in order to create multi-instance.
- Building document management system which controls the document transfers.
- Increasing the usabilites of jBPM management interface.
- Integrating current Database with LDAP.
- Configuring jBPM current database to MySQL database.
- Building & integrating document authentication module to authenticate user in jBPM system.

**Disadvantages**

Basic modules was released without main function of a workflow process such as notation system of the process editor, processing unit, scheduler, document processing of the jBPM core, user management system, user rights management system, document mapping function ...

The free version of JBoss server doesn’t run stable (usually in out of memory state, the system doesn’t recogonize the change from client – we currently increase virtual memory as a temporary solution)

The business specification language in jBPM system is jPDL. This language can be extended by allowing developer to adding more new definitions and notations to describe the process. However, jPDL doesn’t belong to standard languages which are presented by WfMC or OMG. So the standardization the extended business notations is a problem.

In comparison with other workflow system such as XFlow, wfmOpen, Taverna, EnhydraShark, …, jBPM system still has some disadvantages in standardization the business process model. On the other hand, the features of jBPM such as pluggable model, full published source code and complete document supporting system are better than other open source workflow systems. These meet the customization needs of a practical workflow system.

**3. Difficulties in developing progress and solutions**

The current framework of jBPM system only supports some simple functions such as managing the process without any attached documents. Because of the need to control documents, the authors decided to examine OpenKM, this is an open source system which
manages the documents storing and versioning. However, this system source code was not released and didn’t have any attached manuals or documents. So the authors decided to analyse it and built a new document management.

Although jBPM supports GPD process designer suite, the source code of newer GPD version was not published and the older one was not tested so the hidden bugs were included.

In editor, there is not any document for this part. Firstly, the authors chose NexusBPM which supports user to design business process. This system included documents and source code for reference and we can develop a new one based on it.

jBPM supplies GPD source code, but it doesn’t have any supporting document. So the authors researched the NexusBPM in order to re-design and customize jBPM GPD source code.

Extensibility of jPDL is an advantage. However, when we added some more document nodes, the process description file was not stable. It meant that the core system couldn’t understand the new notations, so we had to develop processing function in the core system to process the document nodes.

With the languages which are ruled restrictively and formally as the standard of workflow organization, the ability to improve and customize is very difficult for many kinds of servers to execute without adding any extra execution modules.

Solutions to reuse: when designing and deploying a business process, possibility of reusing a process in different units is also a problem in developing workflow system. Level of reusing is defined as following:

Reusing process is defined as possibility of reusing defined business process meaning when business process was designed and deployed once, with the same business process but different participants users can start a quickest new process without rebuilding from the beginning. Solutions to this problem is to allow generalizing participants in process when designing. With each of processes manipulation, specific nominating participants will help users ability to reuse the process comprehensively. In that case, there are two main parts which are reusing defined documents and reusing participants in process.

Reusing documents is defined as an abstract name used in designing process. When deploying, mapping between real documents and abstract document will be done.

Reusing participants is defined as, same as solutions with documents, participants in designing workflow process are also nominated by giving name in general such as title or role. When deploying, mapping will be done again to specify participants.

Because of the possibility of generalizing participants and documents when designing business process and the possibility of mapping general definition to detail definition, workflow has high possibility to reuse and no need to build from the beginning.

Documents in this process will be signed by electronic signature of participants. With documents necessary to have confirmation and agreement, electronic signature of participants will be used to sign in order to guarantee authentication and value of documents.

4. Conclusion & development

- Development of ad-hoc management support:
  In reality, there are processes which are not defined before use such as transferring announcement. When A receives announcement and send to B, B can freely transfer announcement without prior nomination. This process ends in any indefinite step. This is ad-hoc form.

  jBPM now do not absolutely support this property; hence, another development of jBPM is to build ad-hoc management support in any form to serve users’ requirements.

  This is highly practical need; however, it needs time to research solutions of this problem in detail.

- Research of process deployment in runtime:
  In reality, probably a process is not defined comprehensively and completely. Users can create a step X which is a result of another step which is not nominated when designing process. This is sub process deployment in runtime.

  In presence, jBPM system supported deploying process with any step which can be results of other processes. However, this process must be designed and deployed in consistence with developing business process.
In term of operating concept, jBPM system will be deployed main process in the same time with all sub process (if available). When information activates node with sub process, it will be processed. At that time main process will be in standby status until all sub processes are finished. Therefore, in order to implement any process, it is necessary to intervene in jBPM system to develop users’ right to implement ready sub process or ad-hoc form.

5. References

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