Work Flow Management Systems: Architecture and survey of products and its limitations

Raghav Kashyap
Department of computer science
Amity school of engineering
and technology, Amity University
Uttar Pradesh (India)
raghav.k286@gmail.com

Ankit Shrivastava
Department of computer science
Amity school of engineering
and technology, Amity University,
Uttar Pradesh (India)
ankit.76365@gmail.com

Roshan lal Chhokar
Department of computer science
Amity school of engineering
and technology, Amity University,
Uttar Pradesh (India)
rchhokar@amity.edu

Abstract- **An organisation produces its work by passing through several business processes and documentation. Today, all most every organisation uses to manage these business process and documentation by the help of Information Technology. Those software products which manages several business work flows and also manages documentation is called work flow management system. There are numerous products has been launched by several organisations. Though all these systems are efficient enough but also have some limitations like less flexibility with other work flow management systems, fault tolerance and no or less efficient escalations. In this paper, we discussed contemporaneous systems and their limitations. We also expatiate the direction of research for potential future for development of efficient work flow management system.**

Key Words: Work flow management system, escalation, Process manager.

I. INTRODUCTION

Work flow management system is the area of research which is not new but it attracts incessantly researchers, developers and user. The main motivational factor of any work flow management system is to manage various business processes and make paperless office. Work flow management system is intended to develop the concepts like supported co-operative work, paperless office, form processing and office documentation [1].

The technologies has egressed the more advancement in networking, distribution of data and enterprise applications. The growth of information and documentation has become a reality and demand of such a system which is capable of managing the information and documents in the organisations. This made the existence of work flow management system. The scope and interest of developer is clear in mind but what about the researchers? This will be answered in later section of this paper.

In this paper we will discuss the general architecture of work flow management system in next section. Then we will discuss the contemporary work flow management systems and existing limitations.

II. ARCHITECTURE

The reference model [2] of work flow management system is the basis of architecture of any work flow management system but this has problem that no escalation mechanism is facilitated when delay occurs in a process. Another problem with that model was that work flow enactment services has integrated work flow manager which sometimes causes the delay and increases the cost of work flow management system. In this paper we proposed the more enhanced architectural view in the figure 1.
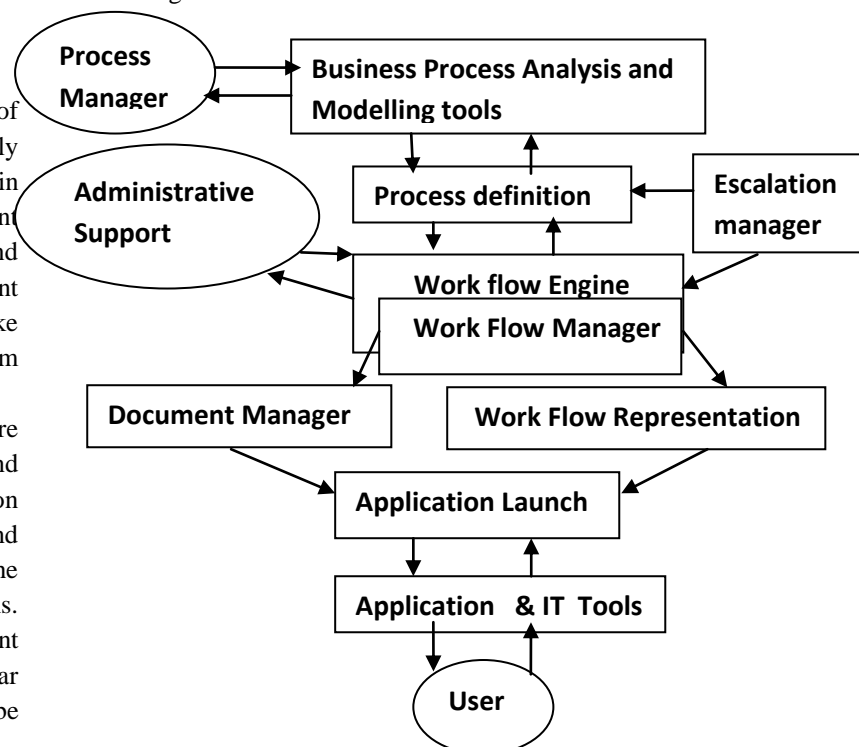

Figure 1 [Proposed Architectural View]

In the Figure1we have shown the general architecture of work flow management system which has some important components:

- *Process manager:* process management can be manual or automated. Process manager designs the processes and manages them. Process definition comprise with several sequence of steps which may be expressed in text or graphical form or in the formal language notation[2].Process manager works at build time which means that in this business transactions are converted into programming language logics. It is responsible for deletion of processes.

- *Escalation manager***:** The escalation manager is automated run time process which is triggered when work flow system fails to pursue its task in certain time limit. Escalation manager uplifts the process to complete soon[7]. It is a place where research is growing day by day.

- *Work Flow Manager :* It is real time automated activity which manages or decides the work flow of the system. It is responsible for managing flow of work and defining new flow to work. It is part of work flow engine which works in support to escalation manger and has mechanism to define every process at even critical positions.

- *Document Manager:* It manages document and store them. Document manager routs the document to its belonging person and keep track of progress of every read and write operations in documents. It is responsible for adding new documents and routing to relevant person in organisation.

The other components in architecture are business process analysis and modelling tools, administrative support, application launch and application and IT tools. Business processing analysis and modelling tools are used to define the methods which continuously improve the business processes to get better results. Where administrative support facilitates the administrator of an organisation to manage every activity on the system. Application and It tools are used to create and use the database and other document software to manipulate the documents.

III.WORK FLOW PRODUCTS

There are numerous work flow management products and tools available in market. We have surveyed on products which are having abbreviated introduction here:

- *Web Sphere MQ Workflow 3.4:*
It is launched by IBM which is entirely based on application and messaging infrastructure. This also facilitates the messaging between server and client. Activities can be defined or implemented with the assistance of ActiveX objects and Java APIs and using Web Client technology for rapid application development, as well as automated generation of JSP files based on process definitions [4]. It is very robust and used with large number of different activities with reusability. It is very costly product.

- *W4 3.0 (W4):* Designed for use on the Internet from the beginning, W4 provides an excellent level of functionality with production workflow throughput [4]. It offers very simple mechanism where HTML forms are automatically created. It is desegregated with API in Java, C++, Visual C++. It is a good application but has higher cost

- *INCONCERT:* It is developed by TIBCO which have object oriented technology, document management and process modeling which enables users to quickly build the processes. This product supports dynamic changes in a application. It has very robust rule engine.

- *COSA Workflow:* it is COSA Solutions product. COSA Workflow join a powerful organization model featuring multiple group hierarchies to a Petri net formalism to describe the procedure [4]. These Petri net allow to make flexible and powerful process definition with synchronizing the multiple flows. COSA offers an HTML work list handler and Lotus Notes integration. Activities can be scripted or programmed through a comprehensive API.It is very complex and costly product.

- *Web Flow:* This is comprise with object oriented approach and offers high level of reusability. It is launched by SAP Labs. This is more useful for web content management. It uses XML to communicate to workflow engine.

- *I-Flow:* It is developed by Fujitsu. It has the mechanism to convert or redefine the process and work flow at run time. I-Flow is written in Java and uses adapters classes (that can be sub-classed) for accessing facilities like file system and directories [4]. Work flow features are added as component to existing application. End user has authority to define the new processes.

- *File NET P8 BPM Suit:* It is highly complex architecture based model which leverages the distributed architecture and has high scalability factor. It is the first application developed on J2EE platform. In this Ad-hoc define and run application is facilitated to end users.

- *FlowMind4.1.7:* It is AKAZI technology product which is written in JAVA with API. It is comprises the every support to process management: process modelling, IT integration, deployment, use, administration and continuous optimisation. It facilitates easy analysis and design of web processes. In this development is based on Java.

- *Staffware Process Suite***:** Staffware Process Suite (SPS) offers a good balance between production and administrative workflow requirements while delivering very high production and path through throughput [4]. It is most famous and used product. It provides very easy way to implement and has OO development toolkit to make a RAD environment.

- *Joget Work flow:* this is developed by Open Dynamics Inc. which is more efficient and fast to build the work flow system. It facilitates the mechanism to create the forms faster using Java API. It has better work flow engine. It has segregated work flow manager and monitor. It is very efficient and user friendly but it also has higher cost.

- *AMODIT:* AMODIT is an innovative workflow system, which implements patented method of modelling of workflows [5]. Using artificial intelligence techniques of dynamic dataflow analysis and prediction of user behaviour dramatically reduces costs of deployment [5]. It is developed in 4 languages English, Polish, German, Arabic. It has very efficient work flow engine. It is launched by DataCom Inc.

The other products which are currently used are listed in table 1.1.

Supplier	Product
Adobe	Livecycle
CSC	e4
CSE	CSE Workflow
GoPro	GoPro Case
Handysoft	BizFlow
Hitachi (Japanese)	WorkCoordinator
London Bridge	Vectus
Lotus	Lotus Workflow
Microsoft	Access Workflow, Exchange Workflow
Oracle	BPEL Process Manager
Savvion	Business Manager
Sonic Software	Sonic
Unisys	InfoImage
Vision Software	BizAgi
Wipro	Flow-briX
Workplains	Work+

Table 1.1

IV. Limitations:

As we have mentioned as an example of several work flow products in market but still there are some limitations. Firstly, there is no such standard product is made which can be accepted for every organisations. One organisation has different purpose of documentation than other organisations. Here purpose means that some organisations processes the documents in image format while some of them uses word file (.doc extension) or Pdf format. So there is not such standard product is available which is universally accepted. Other reason for not having particular standard is difference of work flow. It means that every organisation has its own work flow which may be different from others.

Another limitation is cost of developing the work flow system. Since work flow management system consumes lot of effort and time which increases the cost of development of it. Other factor affecting the cost is need of dynamic changes because requirement varies according to time. This proportionally increases the cost of software product.

It is often happens with most of the systems that each time system gets delay into its processing. In other words delay takes place into process to its actual time and then system got stuck into the trouble. This may lead to data lost or increase in processing time [7]. This situation has a solution that process must begin from its initial state. But this is not an efficient solution to the processes. Although many other methods have been proposed and implemented but those all are not enough sufficient[6][8]. Other limitations are also be considered like flexibility, portability, testability, reusability, reliability, maintainability and fault tolerance must be taken under consideration.

V. Conclusion

work flow management system has been proven fertile area of research and development both. Though there are several products in market but all there is standard product is remaining which is available at low cost and higher efficiency. Some better algorithmic implementation is still required to improve the escalation techniques and also to improve process management. It has broader scope of research in escalation management and process management.

VI. References

1. G.Alonso, D.Agrawal, A.El Abbadi and C.Mohan "Functionality and limitations of current work flow management systems".
2. David Hollingsworth"Work flow management Coalition Work Flow Reference Model", 19 Jan 1995.
3. www.workflow.co.uk/Documents/MA01WorkflowProducts.doc
4. http://www.waria.com/books/study-products.htm
5. http://www.amodit.com/en/StronaGlowna.aspx.
6. M. Keil, R. Mixon, T. Saarinen, and V. Tuunainen, "Understanding runaway information technology projects: Results from an international research program based on escalation theory," J. Manage. Inform. Syst.vol. 11, pp. 67–87, 1995.
7. Gary Pan, Shan L. Pan, and Michael Newman," Managing Information Technology Project Escalation and De-Escalation: An Approach-Avoidance Perspective ", IEEE TRANSACTIONS ON ENGINEERING MANAGEMENT, VOL. 56, NO. 1, FEBRUARY 2009
8. E. Carmel and S. Becker, "A process model for packaged software development," IEEE Trans. Eng. Manage., vol. 42, no. 1, pp. 50–61, Feb.1995