The Design of Work Flow System in Enterprise E-Business under the Strategy of Advanced Manufacture

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Abstract. With the application of logistic chain administration technology, enterprise e-business has welcomed the period of inter-enterprise information integration. The inter-enterprise distributive Work flow System, as a cooperative technology, holds a vital position in the enterprise e-business. The paper attempts to analyze the weakness of the widely-used work flow System nowadays and put forward a new work flow System, which is based on Web Service and accords with the traits of distributive system. Then the author indicates that this work flow will play an important role in enterprise e-business under the strategy of Advanced Manufacture.

Introduction

The development and application of the enterprise e-business can be divided into five periods: the application of single business function, the application of department-leveled integration, the application of integration within the whole enterprise, the integration of customers and servers, inter-enterprise integration and dynamic e-business. With the application of logistic chain Administration technology, enterprise e-business has welcomed the period of inter-enterprise information integration. The inter-enterprise distributive Work flow System, as a cooperative technology, holds a vital position in the enterprise e-business under the strategy of advanced manufacture.

As we know, the advanced manufacture technologies, including the concurrent engineering, extreme manufacturing, virtual manufacturing, management of logistic chain, reconstruction of management process in enterprises and so on, emphasizes the combination of the administration technology, the manufacture technology and information technology. One of the common traits of these new technologies is the emphasis of the process integration and process reconstruction, which are the differences between the advanced manufacture technology and traditional manufacture technology, the latter raised the design level, the manufacture means and growth rate only through the technology. Thus with the advanced technologies, the organization structure has been transforming from traditional functional organization structure into process organization structure.

Nowadays, the idea and ways of reconstruction of management process in enterprises has been paid much attention, the advanced manufacture strategy has been put into practice and the organization structure of the enterprise has been transforming from traditional functional organization structure into process organization structure. All these changes lead to the wide application and quick development of work flow administration technology and work flow system software, which is the effective support tools for procedure modeling, optimized analysis and management process.

Enterprise E-Business and the Work Flow System

The idea of work flow, which was put forward for the routine activities in daily life, originated from the domains of production organization and work atomization. It decomposes and watches the work to increase the efficiency, reduce the cost and raise the competition of the enterprise. As a matter of fact, the organization and optimization of process has been practicing since the Age of Industrialization, which is the main research focus of enterprise management. These jobs were finished by humans before the invention of computer; after this, the work flow, which has developed
since the middle of 1980s, provides the advanced methods for enterprise. Then the work flow technology has been paid much attention and widely used in the libraries, hospitals, insurance companies, banks and so on, especially in the manufacture area.

At the beginning of 1980s, a non-paper working environment based on computer was expected to raise the efficiency of the collection and handling of the information and realize the store, application and share of it. Thus, some companies have established the forms-rooting application, which were used on big-scaled or small-scaled machine for electricalization and automation the forms, which was the rudiment of modern work flow system.

In the middle of 1980s, the companies such as FileNet and ViewStar opened the market on work flow products first. They combined graphic scanning, composite files, structural rooting, case tracking, key index with CD storage, all of which formed an image managing system. That system could send the files to related technicians according to some rules, which was the early work flow system. The representatives among them were Work flow Business System of FileNet in 1984, ViewStar of ViewStar company in 1988, coordinator of Action Technology in 1980s.

In 1990s, as the widely use of computer, fast development of computer network technology and the quickly raised information level of companies, the information resource of the companies took on traits of isomer distributed, loosely coupling. The distributed characteristic of enterprises and policies of detailed information of daily activity and the mature of Client/Server system structure, distributed management (CORBA, WWW, COM/DCOM, JAVA) have proved that the age of assembly information management has fade out, and the realization of huge, isomerism, distributed implemented circumstance make missions executed efficiently. The development and widely use of Internet and e-business should that e-business has become the new model of commercial activity, whose important function was the management and monitoring of commercial process, such as SCM (Supply Chain Management) and CRM (Customer Relationship Management). Under such circumstances, work flow system changed from non-paper working environment into a necessary tool that assimilate complicated information and realize the automation of operation flow, which let work flow technology develop into a new stage and let us engaged in the work flow system to a deeper and wider field. In 1993, the establishment of standardized organization and WFMC (Work flow Management Coalition), symbolized that work flow technology has hold an important position in computer application field. From then on, the concepts and terms have been accepted and the research of work flow technology and related products has entered a new stage.

Many scholars attempted to give a definition to work flow and WFMS, yet everyone has his understanding of work flow and WFMS, so it is quite difficult to give it a uniform description. The WFMC’s definition is: work flow is the full or part automation of enterprise’s mission flow, it translates documentation, information or mission from a participant to next participant following some process rules. Work flow system is a computer system that uses software to define, create and manage work flow’s execution. This system runs on one or more work flow engine that can help user understanding flow definition.

In our opinion, work flow is a operation flow computer model which was used by enterprise to realize structural or unstructured management, it defines what it is (the basic description of flow, the action of elements which composed flow and action description), how to do (the sequence of action that composes the operation flow, information flow between each action, action’s contents), who do it (the participant, organizer, manager of the operation flow and the security information), when to do (start time of operation flow, time limit of mission), where do it (distributed policy). To normal operation flow, work flow has characteristics as below:

- Computer management: management of work flow is the enterprise’s operation flow which operated by computer, but a operation flow managed by bands, also not a computer application which just part of mission was done by computer;
- Self-motivated move: operation flow realize operation and operation’s information moving between participants, we don’t need to assign mission by hand;
• Operation flow has explicit or implicit computer definition: the definition should describe all the information which was needed by the operation flow’s execution on the computer clearly.

Work flow system is a computer software system that support the work flow realized, it is the aggregation of tools and these tools are used to realize work flow’s definition, start, attemperation, monitoring and analysis.

Analysis of Work Flow Technology under Advanced Manufacturing Policy

It is said that new technology in advanced manufacturing technology mainly includes concurrent engineering, celerity manufacturing, virtual manufacturing, and reconstruction of enterprise management process. These advanced manufacturing technologies depend on the work flow technology, but at the same time, work flow technology needs to improve to meet the need of these technologies. For example, in the logistic chains and celerity manufacturing management, the enterprises’ computer using have been the integration of information. But the actual implementation situation of work flow system is far away from people’s expectation. Because the lack of uniform standards in the early time of work flow system development, different companies’ work flow system have so many differences on function, adopted supporting technologies, developing technologies and interfaces. It has become the main problem of work flow system development. In nowadays, enterprises which adopt work flow system in management is very few, and these implementation are finite, it can’t support enterprise’s key operation flow. We can get some reasons from user implementation angle, and they are listed as below:

• The implementation of work flow needs to be supported by bottom communication basic structure: it is also said that work flow needed to build on appropriate bottom communication base, so that it can implement the distributed computing environment for executing work flow system. We can choose some technology such as CORBA, DCOM, JAVA, but they are all not mature in the practice, from the product used now that can realize distributed computing environment, and the price is also very high for enterprise. If a enterprise wants to realize a work flow system, we need to spend money and effort on constructing bottom environment, this situation is not expected by enterprise, and actually it also restrict the implementation in enterprises of work flow system:

  • Low level of standardization: different products provided by different suppliers have their own work flow model \ definition language of work flow and API functions. In the lack of standardization, once user chooses a product, it would be very difficult to change to another product of the same kind; and because that there is no ex-operating interface between different systems, uses have many troubles.

  • Complexity of implementation: the implementation of work flow system in company is a very complex process. This process needs to finish such tasks as below: Capsular outside application system so that work flow can activate it at appropriate time; build the distributed computing condition for the execution of work flow mechanism; design and develop the corresponding user interface; decide the corresponding management rules and user operating rules and so on.

  • System safety: In nowadays, work flow system can’t provide trusty and correct support for the concurrent access and errors in a running system. When the work flow is running, there would occur the situation such as many actions access the same resource at the same time, one action would overlap another when there are in data operation. Otherwise, if the work flow were interrupted improperly in the execution, how to resume data and how to keep the execution is a problem needed to be resolved.

  • Performance: most of work flow product can’t satisfy the need of company dealing ten thousands of operation per day and even thousands of operation per day.

After all, from the implementation angle, the insufficiency of work flow system focus on such aspects: can not work together; limited capability, can’t be competent for cosmically access (the
Design of Work Flow System Based on Web Service Technology

Web Service seems to be a new word for most people, but each leading technical forum is focusing on the development of Web Service. Many people would have a misconception when they first get to know Web Service, they will think that this is a new system structure or a new programming environment. Web Service is not just mean the website. For outer users, Web Service is a component/object deployed on the Web, it is entirely based on the existing technical rules, such as XML, HTTP, SOAP and so on. It has characteristics as below: whole capitulation, the criterion of in-compact coupling using entente, using standard protocol and highly integrated capability. The public technical standard based on Web Service such as SOAP/WSDL/UDDI/WSFL has become the actual industrial standard or in the process of establishing. IBM and Microsoft, as the leader of Web Service structure, are globally spreading Web Service technology.

Web Service is the product of enterprise e-business developing and maturing. Work flow technology is the embodiment of enterprise e-business, Web Service takes new power in to work flow technology, we can use Web Service technology to realize distributed work flow system, and this would help solving the shortage of work flow technology which under advanced manufacturing policy.

A work flow model is meant a abstract flow expression model which can be understood by computer. Work flow model is the start of work flow system, and also is the key of the system. Work flow usually can be divided into two parts, one is the Meta-Model of model, it is used to describe each element of model and the relation between elements; the other is the flow definition language of model, it can give the expression of flow script.

In the design of work flow system which based on Web Service technology, we used WSFL which was put forwarded by IBM in 2001-4. IBM has referred this language to W3C, it is believed that it would become the international standard. And meta-model include: Temporal Model, Resource Model, Organization Model and Process Model and so on. It is listed as below:

Temporal Model: define kinds of time setting and time scale of the work flow in execution, such as lasting time, holiday, work time and so on, it is the definition time dimension of work flow model;

Resource Model: it is used to describe each supporting condition that needed to be deployed of action execution, such as tools, equipment, machines and information like this;

Organization Model: it is used to build the organization model of a company, it can assign action, it is data that excerpted by the user interchanged mission, it is organized by entities such as user, organization, position and role;

Process Model: we adopt IBM WSFL as the flow definition language. It is a language based on XML, it also can be easily and effectively understood by man and machine. It is described by active network diagram, a work flow process can be looked as a diagram with direction which was composed by nodes and the edge between these nodes. In this diagram, node presents action, edge presents the sequence of actions.

Summary

The conception of work flow is produced in the Enterprise Management for improving efficiency, it tries to make execution of concurrent mission of enterprise to be linear through advanced electronic communication and network technology. From user angle, it likes a procedure listed as below: special mission is sent to user’s desktop, then user can use some application to access and deal these data, and do the execution as asked, at last the result of execution would be sent to the next user. If we do this procedure as this, one step by one step, it composes the corresponding work flow. Work flow technology is an important technology to implement the automation of enterprises’ mission, the
existence and rapid development satisfy the need of building enterprise flexible application system, so people call work flow technology as BOS.

In the situation of advanced manufacturing policy in nowadays, work flow faces the harder challenge. New Web Service technology and its structure provide new power to work flow technology. So we can use Web Service technology to implement distributed work flow management system, it also can help solving work flow technology’s scarcity.

Of course, though work flow technology has been implemented in many systems all over the world, but this technology is far away from mature, especially people in country just focus this technology on research of some easy applications, most key technology are needed to develop. Furthermore, Web Service itself is in development, though each great supplier has promised developing software to support Web Service, but in the next few years, this tools are not mature, it is still not idealized in practical applications. And many problems need to be solved, for example, WSFL has put in to the W3C, but it is not confirmed as the standard flow definition language of Web Service work flow, WSEL doesn’t even have a biographical criterion. The work flow systems based on Web Service structure, no matter in theory or in practice, have many problems, and it is worthy researching.

References


