

Study of Workflow Management System in E-commerce

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Abstract

E-commerce is the future of enterprises to improve their international competitiveness and expand the market, an effective way. Electronic commerce (e-commerce) applications are developed to allow companies to communicate with their partners, suppliers and consumers on the internet. The migration from traditional business to e-commerce requires fundamental changes in business operational systems. It is not sufficient to focus on the development of web-based interfaces only. The front-end of a system for e-commerce should be supported by the back-end infrastructure. A Workflow Management System (WFMS) is important for linking front-end and back-end applications to automate business processes.

Keywords: Workflow Management System (WMS); e-commerce.

1. INTRODUCTION

Corporations, markets and the global economy are being transformed by e-commerce. E-commerce affects how business transactions are performed. On the internet, customers can easily find products and services, and compare prices and qualities. At the same time, companies can easily find customers and suppliers, and arrange to trade with them. User-friendly interfaces, targeted advertisements, up-to-date product catalogs and personalised stores are common features of e-commerce. Nevertheless, the front part of the web might conceal inefficient and inflexible operations

that are slow and complex. With the web, companies can communicate with their customers, suppliers and partners to carry out e-commerce transactions. However, the transformation from traditional ways of doing business to e-commerce requires a fundamental re-implementation of back-end operational systems. Simply developing web-based interfaces to the legacy application is not enough. Human interventions would be involved in different processes such as repeated data entry, the monitoring of processes, the handling of exceptions and the scheduling of different activities. Inefficient e-commerce processes lead to high operating costs and affect the profits of the companies using them. Most e-commerce applications have the front-end of the web powered by an application server supporting the dynamic generation of web content and linking the front-end to business applications (Montagut F, Molva R, Golega ST, 2008). There should be a back-end system managing inventory, procurement, billing, payments, shipments and other functions required to perform the transaction. In fact, workflow management is necessary to connect front-end and back-end applications. The Workflow Management System (WFMS) is a key technology for integrating, automating, and monitoring business and e-commerce processes and for providing the online delivery of services (Cichocki et al., 1998; Georgakopoulos et al., 1995; Leymann and Roller, 2000). When processes span many systems and departments in a company, it is often difficult to monitor them. Without tracking capabilities, it is not easy to locate which process has problems and needs to be

modified. It is often necessary to interfere with the running processes to manage unexpected situations and carry out corrective actions.

2. WORKFLOW MANAGEMENT SYSTEM (WFMS)

According to Marshak (1994), essential workflow characteristics are tasks/activities to be performed by (role-playing) persons using supporting tools that give access to various shared information resources. In the past, there was no agreed way on how to categorise workflows or WFMS. There were several attempts to classify current workflow products. Alsop (1994) divided workflow into ad hoc workgroup support, task automation, document flow and process automation; Frye (1994) divided workflow into three categories: mail-centric, document-centric and process-centric. Georgakopoulos et al. (1995) characterised workflow along a continuum from human-oriented to system-oriented. Ader (1997) categorised workflow into production workflow, administrative workflow, ad hoc workflow, and collaborative workflow. A WFMS is a technological system in which workflow processes are defined, performed, managed and monitored through the execution of computer software and in which the order of events is driven by processes. A business process is a set of one or more procedures or activities that realise business objectives or policy goals such as insurance claims process, an order process, or a loan process (Ould, 1995; Chang et al., 2000). An ideal WFMS should support the model-driven design, analysis and simulation of business processes and provide features for monitoring the execution of processes and reacting automatically to exceptional situations. Successful e-commerce companies should develop their e-commerce applications on top of WFMS tools that can help companies to drastically reduce costs, improve the quality of services and time to market and respond to an ever-changing

business environment. The worldwide commercial WfMS market, estimated at \$213.6 billion in 2002, is expected to double by 2008 (Wintergreen, 2003). Moreover, WfMS also plays an important role in cooperative business domains, including supply chain management (SCM) and customer relationship management (CRM).

The most fundamental requirement for success in the domain of e-commerce is the ability to faultlessly integrate and interoperate diverse operations provided by different business processes. The integrated workflow should be easily accessed by processes using the network infrastructure. There are three basic components in a system of e-commerce: data management, workflow processes, and commercial functions. Data management deals with how data are stored, retrieved, searched, and presented to users of different applications such as product catalogs. Data management should also include logical-level functions (e.g., data modelling) and physical-level functions (e.g., indexing). These functions have been under continuous development and can be implemented in typical database management. Workflow processes are collaborative actions in which workers follow business procedures and regulations to achieve business objectives efficiently and effectively. A WFMS should be capable of handling modelling, of routing and monitoring workflows, automating tasks, formalising communications, and integrating systems (Zhao et al., 1998).

Commercial functions are the core activities in commercial transactions such as payment and cataloging. These activities are often contained in the business processes and management of data. Thus, some commercial activities are supported by database management systems and some are supported by WFMS. The business processes in e-commerce are mainly of the production type and data transactions are often well defined (Becker and Muehlen, 2002).

A working definition of workflow management stems from an industrial consortium called Workflow Management Coalition (WfMC, 1993; Fischer, 2004):

“A workflow management system is one which provides procedural automation of a business process by management of the sequence of work activities and the invocation of appropriate human and/or IT resources associated with the various activity steps.”

Hu and Grefen (2003) proposed a three-layer workflow concept framework to realize workflow enactment flexibility by dynamically binding activities to their implementations at run time. Rouibah and Caskey (2003) described an engineering workflow approach to control early phases of product design that is suitable for concurrent engineering's dynamic and iterative processes. Narendra (2004) developed a three-tier architecture that supports adaptive workflow and demonstrate it on a real-life example in insurance claims processing. Yang et al. (2004) presented a web-based network management system architecture that is built around a data storage and management module that is responsible for collecting data from managed objects via SNMP/CMIP. Liu et al. (2005) presented the system design and implementation of a workflow-supported inner supply chain system and an integrated interface for a large motorcycle corporation in China.

3. WORKFLOW MANAGEMENT SYSTEM IN E-COMMERCE

Many of the business processes in E-commerce applications can be managed and partially automated with the help of workflow management system. Such E-business workflow systems help employee electronically collaborate to accomplish structured work task within knowledge-based business processes. Workflow management in both E-business and E-Commerce depends on a workflow software

engine containing software models of the business process to be accomplished. The workflow models express the predefined sets of business rules, roles of stakeholders, authorization requirements, routing alternatives, database used, and sequence of tasks required for E-commerce process.

Thus, workflow systems ensure that the proper transactions, decisions and work activities are performed, and correct data and documents are routed to the right employees, customers, suppliers and other business stakeholders.

4. A MODEL OF A WORKFLOW MANAGEMENT SYSTEM IN E-COMMERCE

A WFMS delivers work items to the defined users and supports work performance by invoking appropriate applications and utilities (Kobielus, 1997). Towards this direction, a company's technology infrastructure can build on web-based workflow management. This is the evolution of the traditional WFMS that supports the automation of e-commerce processes within a company (Prisecaru OO. 2008). The following model consists of:

- Back-end processes
- Customer front-end process
- Supplier front-end process

i. Back-end processes: The back-end processes enable customers to purchase the company's offerings over the web. The e-commerce processes manage the electronic presentation of goods and services, online order-taking and the presentation of bills, automated customer account inquires, and the handling of online payments and transactions.

By offering e-commerce solutions, a company will benefit in the following ways:

- improved margins by using a lower-cost online channel

- reduced costs associated with eliminating paper-based processes such as postage, printing, and handling
- a reduction in float through the use of electronic transfers or just-in-time payments
- the provision of a faster, more responsive service to customers.

ii. Customer front-end process: The customer front-end process entails supporting, developing, and retaining profitable customers. It uses the concept of customer self-service. This allows a company to analyse past customer behaviour so as to personalise its offerings and anticipate the wants and needs of customers. The long-term goal is to transform single-transaction customers into lifetime customers.

The benefits to companies include:

- fine-tuned target market segmentation
- improved customer retention by building loyalty
- improved customer satisfaction
- increased customer mind share (i.e. the first company that comes to the customer's mind when a particular industry/product is mentioned) and spend share (i.e., the company from which the customer would prefer to buy the product)
- established competitive advantage
- increased profitability.

iii. Supplier front-end process: A supplier front-end process works with the suppliers to ensure that there are sufficient products to sell. Giving suppliers access to the internal resource planning applications of an enterprise will help them to better anticipate the company's needs. Manufacturers and vendors can share sales forecasts, manage inventories, schedule labour, optimize deliveries, and improve productivity.

The benefits to companies include:

- lower operating costs from reduced inventory requirements

- improved customer satisfaction resulting from maintaining adequate stock (this will ensure that the company's offerings are fresh and attuned to trends and changes in the marketplace)
- fewer order entry errors, less reworking, faster communications and, ultimately, improvements in productivity resulting from better data integrity. This will improve the company's competitive position.

The above model shows customer and supplier front-ends connecting to a company's internal business process. The front-ends are an external interface to allow customers and business partners to access the company's internal business processes. The networked systems improve efficiency by giving business partners, suppliers, and distributors access to the company's internal business processes. E-commerce systems that enable web-based payment and other secure transactions are the key to both the business-to-consumer and business-to-business sides of the model (Van der Aalst WMP, van Hee K. 2002).

5. RECOMMENDATIONS

The WFMS is a technology that can automate workflows and manage information across organisational boundaries and dramatically improve the productivity of organisations. This is essential to the implementation of e-commerce processes. A thorough understanding of the work process within an organisation is essential before implementing the WFMS. It is necessary to consider issues such as the way business is organised, the skills of the staff, the existing computer hardware, software and network infrastructure. WFMS is not an end itself. It is not as simple as installing a spreadsheet software package. Rather, its adoption may involve significant changes in working practices and organisational structures. It also needs to be associated with business process reengineering, which can provide a solid understanding of business services to

determine workflow automation needs (Abbott and Sarin, 1994).

In order to achieve success, people can use the new technology in an appropriate manner to support their working environment and work relationships. A training session should be provided to all levels of staff in the organisation. A WFMS is quite different from other software tools with which members of an organisation are familiar. Instructing new users in the operation of the workflow automation application will not be adequate. WFMS technology represents a new way of performing tasks in a business organisation. With a WFMS, the ways in which people do their jobs in an office are changed. The training should develop a new framework for understanding the technology and its potential.

The WFMS will, no doubt, develop to be an important technology for office automation. WFMS technology presents the opportunity to fundamentally change the way business is done, especially e-commerce. However, without an appropriate framework for understanding the technology and for fitting the premise of the technology into the organisation's structure, culture, and policies, the impact of WFMSs will be quite limited. Business processes are at the centre of every e-commerce operation. Thus, the WFMS should be at the heart of any e-commerce solution. They are designed to provide the required performance and to be scalable, reliable, and highly available to maintain the requirements of e-commerce applications. WFMSs allow for incremental and controlled processes for automation. Typically, when they are first introduced to the business world, they are only used to schedule and monitor the working steps, but the process is still carried out using the same, old technology (e.g., e-mail). Consequently, the different steps in the process can be gradually automated, possibly by implementing the interaction with external

systems. Once a process has been designed and automated, it can be measured and incrementally improved. Most of the WFMSs, such as Lotus NotesTM and ExchangeTM, lack the mechanism to separate the predefined process flow from the application tasks. Because processes evolve, business rules change and the role assignments may also change, an essential requirement of WFMS is to allow flexibility in configuring process logic without having to modify the application tasks, which are complex and expensive to change. One of the enhancements is to develop a graphical workflow map interface. Although the model developed in this project provides the mechanism for separating the process flow definition from the application tasks, users should feel that it is more convenient to use the workflow map to specify the business roles, rules and routings that are essential for the automation of a business process. Another direction can focus on providing the functions to take the cost statistics for each process, and provide a way of measuring the workload and throughput of a business process that is not present in the workflow model. With those capabilities, the subsequent changes can be incorporated into the procedural rules that define the business process, allowing for better management and planning of the workflow.

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