The Concept and Design of a Productive Co-working System Based on Email Messaging

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Abstract—As email exchange activity between companies and their customers continues to increase, issues of efficiency and communication quality are becoming more important. Many companies or organizations provide their representative email addresses to customers, partners, clients, or relevant others. The unified management of email messages is significant for productivity improvement, customer service quality, and effective internal controls. In this paper, we propose a software design of a unified management system of email messages and its web-based implementation. The application’s key concept is to provide productive co-working environments. Its capital features are ticket management with such attributes as status, assignees, custom fields, and their history references. Workers in organizations can access pieces of messages including their histories under appropriate access controls. The developed system is designed for a seamless and natural workflow with fewer custom configuration settings. The paper concludes with results about appropriately sharing information among workers the productivity and quality of organizations.

Index Terms—Email, Productivity, Unified messaging, Knowledge management

I. INTRODUCTION

As a communication infrastructure, email is widely utilized in companies. Staff members can exchange information within the company and engage in outside communication with customers and business partners. Email media have various point of view advantages over such existing media as telephones, facsimiles, and paper. Using email, any digitalized materials can be simultaneously delivered to multiple addresses with only a moderate time lag.

However, communication barriers exist among email senders and recipients. If a sender expects a reply and none is received, the sender must consider when and how to deal with subsequent conversation. Answers also depend on the situations. In many cases, email correspondents do not have enough information about other parties.

Since email is utilized in various business activities, it is related to several corporate systems such as customer relationship management, sales force automation, groupware, and collaborative software. Sharing knowledge from daily activities in the workplace is important [1]. This research’s approach enhances the effectiveness of communication based on existing email systems by realizing smooth communication based on an email-oriented software solution. Email infrastructure is available, cost effective, and the staffs of companies, customers, and business partners have already conferred “official” status on email messages. This paper proposes a system design of a unified email management system that works with existing email exchange systems.

II. EMAIL MESSAGING INFRASTRUCTURE

A. De-facto standard of email transfer protocols

An email message is composed and received on an email client and to improve work performance. This approach contributes to transferred by one or more Mail Transfer Agents (MTAs) through the Internet. The Simple Mail Transfer Protocol (SMTP) is the most well-known scheme for sending messages from email clients to MTAs and relays between MTAs [2]. A message consists of mail headers and bodies. Headers have such parameters as subjects, recipients, accepted dates and times, and various other fields so that email clients and MTAs are appropriately processed. Post Office Protocols (POPs) or Internet Message Access Protocols (IMAPs) are used for receiving emails [3] [4]. Message bodies are extensible using Multipurpose Internet Mail Extensions (MIMEs) to compose a message with attachment files, a message written in multi languages, Hyper Text Markup Language (HTML) messages, and so on [5].

B. Concerned factors in email communication

An autonomously controlled email exchange system has been realized on the Internet with the proven technologies described above. People trust that an email will be delivered successfully within a few seconds or minutes. If the delivery fails for any reason, people expect that the email will be returned or they will be notified by email clients. In most cases, senders cannot know whether the recipients have read the message unless both senders and recipients use a receipt notification function and recipients reply. Email exchanges supposedly have latency.
Another characteristic feature of an email message is that it can be sent to one or more recipients using such header fields as ‘To’, ‘Cc’, and ‘Bcc’. Email addresses in the ‘To’ field are the primary recipients. ‘Cc’ (Carbon copy) and ‘Bcc’ (Blind carbon copy) are copies of the message delivered to persons who should or may be notified of the message’s existence. Those in the ‘Bcc’ field are never known by others except the sender and the person in the ‘Bcc’ field. When one or more recipients reply to the message to all recipients in the ‘To’ and ‘Cc’ fields, the messages derived from the primary single sender will be discursively delivered to all recipients. As a result, the email messages are scattered, and the credibility of the message context may become lost.

III. EMAIL COMMUNICATION CHALLENGES

Email communication is widely realized due to its readiness. Table 1, which compares messaging media, shows that email has greater flexibility of communication patterns than other major media.

A. Characteristics of email conversation

Email can be utilized for the following purposes: private conversations (1:1), as a medium for advertisements or announcements (1:N), for collecting information (N:1), and for sharing information within a group (N:N). In corporate activity, the patterns may correspond to the following: between staffs (1:1), between staffs and notifications for their supervisors, managers, bosses, or colleagues (1:N), such deliverables as application forms (N:1), and open discussion (N:N). Undesirable communication occurs since email communication patterns are too flexible.

B. Typical trouble using email in workplaces

Table 2 shows typical problems in email communication, especially in the workplace. Using standard email clients or Webmail, communication chains sometime are disrupted due to various situations. For example, the more often senders and recipients exchange topics, the more difficulty participants experience with the comprehensive and panoramic views of the message’s history. Sometimes the attention level for a particular topic varies among participants.

For customer support using standard and non-shared email, representatives have difficulty performing their duties with other assignees in the company. In addition, if a pile of incoming email is received from customers to a single representative email address, efficiently assigning workers and handling respective emails is also difficult on a support team. Potential problems under standard email environments are caused by mismatches of email messaging standards and desirable communication rules of organizations.

C. Factors that cause communication barriers

For communication in the workplace, workers often use standard email tools to communicate with their colleagues, supervisors, customers, and business partners. Using standard email clients, scattered messages are stored on individual employee computers. For better continual communication, persons concerned about a topic should be in the comfortable communication environment to be involved, which is easily realized in face-to-face communication in organized environments. In other words, awareness management [6] is crucial for email communication.

Email exchanges have a time lag because recipients do not always read emails. To encourage and facilitate smooth communication, compensating for the weaknesses or obstacles of email messaging methods is desired.

IV. PHILOSOPHY AND SYSTEM REQUIREMENTS

In this section, a design is proposed for our enhanced email messaging system that solves the issues described in the previous section.

A. Philosophy

Smooth communication both inside and outside of organizations improves their efficiency. Work performance can be increased by enhancing email exchange tools that are coordinated with standard email infrastructure. Co-working environments using email workflow improve both the individual skills and the service quality of organizations.
B. System requirements

The following are the requirements of a productive co-working system based on email messaging. The system must:
- Bind message exchanges both inside and outside of organizations.
- Interface with de-facto standard email delivery protocols.
- Provide authoring environments to internal users (staffs) who can utilize individual email clients as well as web browsers.
- Provide generic email messaging environments to outside users (customers) who can send and receive email using standard email clients.
- Unify all email messages, both internal and external.
- Provide natural environments within which internal users can operate.
- Be able to apply generic operations for any kind of organization.
- Easily customize the attributes of message form templates.
- Be accessible by internal users with appropriate access control.
- Suggest that internal users navigate the expected subsequent action.

V. Functions and System Structures of Developed System

This section describes the system’s functions and its structure to realize the requirements of the previous section.

A. Functions

1) Ticket management

All incoming emails into the system and the newly created messages through the HTML based forms by internal users are converted to a set of consistent message data called a ‘ticket.’ A ticket is defined as a series of messages, and each element message is called a ‘ticket history.’ The items of the ticket history are aligned in a time series, and each item has attributes defined by the system administrator in addition to email headers and body values. Tickets are listed on the query results page as a line with ordered column values (Fig. 1). The order of the columns is configurable to fit any work styles in various organizations.

2) Status

‘Status’ represents a ticket’s state to help workers clarify the standpoint of the affairs of business processes (see colored boxes on left in Fig. 1). The ordered elements of Status are ‘inquiry,’ ‘open,’ ‘closed,’ and ‘KB’ by default. KB stands for Knowledge Base. Additional statuses can be created between ‘open’ and ‘closed.’ Examples of custom statuses are ‘accepted,’ ‘ordered,’ and ‘Shipped.’

3) Assignment/escalation

Tickets are assigned to authorized internal users. Since assigned users are expected to handle tickets, natural workflow and operation is simplified on the ticket edit screen (see upper area in Fig. 2). Assigned users are informed by notification email messages sent by the system.

4) Notification and message template

Notification email messages are sent to assignees every time a ticket is updated. The message template of notifications can be edited from the administration menu. Runtime variables such as customer names, the email addresses of logged-in users, and ticket statuses can be expressed in template text boxes (Fig. 3). Fig. 4 shows a notification message sent to an internal assigned user. For example, a representative of the customer support desk can edit reply messages drafted by another worker with knowledge in specific domains.

5) Custom field

The custom field is an additional data field of the ticket schema. Adding or removing operations can be executed.
This system’s structure is based on HUB Engine ARIGATAKI, which is a database engine that easily relates data structures [8]. This engine consists of four tiers: database application, data transaction, generalized ticket controller, and API. An advantage of using HUB Engine ARIGATAKI is that applications can treat their data models as simple virtual tables without programming database schema and access codes.

VI. CONCLUSION

To improve work performance in various kinds of workplaces, an enhanced email management system was designed and developed. The design’s approach utilizes existing email infrastructure and interfaces with such standard email protocols as SMTP, POP, and IMAP. Standard email clients are widely applicable communication tools; however, they are often maladapted to desired workflow. Our proposed system realized effective enhancement to such ordinary email exchanges as sharing unified messages on intuitive screens. As a result, an environment for smooth communication, both inside and outside of an organization, is realized for messaging.

The HUB E-Mail Manager, which is an implementation of this design, has been running in many companies for such purposes as manufacturing, asset management, customer support, project management, knowledge base, sales support, alert notification, and individual mailboxes.

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