The Design and Prototyping of the Chronobot System for Time and Knowledge Exchange

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ABSTRACT

We are involved in the development of a time/knowledge exchange-based system. One of the objectives of the system is to improve the effectiveness of e-learning and distance education. The system envisioned is a chronobot-based system. In this chapter, we discuss the architecture of such a time/knowledge exchange-based system. We propose a constraint satisfaction algorithm for time/knowledge exchange in order to solve the time/knowledge exchange problem, which interoperates with the various chronobots, coordinates the settlement of a bid in a distributed manner, and selects the best bid using a metric known as the QoB (Quality of Bid).

Keywords: cost-based algorithm; distance education; distance learning; information exchange; information sharing; interactive technology; knowledge delivery; knowledge transfer; virtual classroom; Web-based training

INTRODUCTION

The uniqueness in the concept of a chronobot is the exchangeability of time and knowledge. We envision our contributions as threefold. First, we have proposed a time/knowledge exchange system that is unique in terms of its characteristics of interexchangeability of time and knowledge. Second, we have outlined a detailed protocol to perform time/knowledge exchange efficiently in a distributed and coordinated manner. Third, we have explored the system architecture in terms of the implementation.

The rest of the paper is structured as follows. We discuss the full-blown system architecture of the chronobot-based system. Then, the typical scenarios of the system are analyzed. Next, we discuss related work and finally conclude with discussions on the super remote and extreme remote.

ARCHITECTURE OF THE CHRONOBOBOT-BASED SYSTEM

The chronobot-based system is essentially a time/knowledge exchanger, consisting of various components, chief of which are the user profile manager, the bid manager, which utilizes the time/knowledge
exchange protocol to settle the bid, and the exception handler. We now describe the basic functionality of each of these components.

The user profile manager’s main function is to get the profile of the user and update the database accordingly. This is handled using a user interface with various parameters such as name, address, area of expertise, years of experience, credit card information, and so forth. In other words, the main responsibilities include handling the user profile, authentication of a user, and updating the database accordingly with all the information of the user.

The bid manager is one of the most important components of the time/knowledge exchange system. The bid manager creates various bidding rooms, where users of different backgrounds login, depending on their expertise. Registration and validation of the user is required before communicating with the bid manager.

Typically, a user starts a bidding process when the user describes the amount of time needed (bid resource), the time interval after which the bidding will end, a short description of the job, weights to be assigned to various parameters, which judge the bidders based on their prior experience, along with an optional item of naming a price for the bid, if the bidding fails. All the users logged in the room get the message about a new bid being open. They can then bid their time. One or more bidders may be chosen as the winners by the bidding algorithm. The bidder is then informed of the final result of the bid and the winners, if any, while all the bidders are informed of their success or failure. In case one or more bid winners default (break the bid contract), then an exception handler is called, and, based on the exception handler’s results, a fresh bidding can be started or an expert called to replace the defaulter.

The exception handler handles exceptions that arise in the bidding process, such as default by a user. This module handles such situations by selecting a paid expert. The exception handler also can come to the rescue of the bidding manager in case of failure of the process of bidding, in which case the bidding manager would request the exception handler to select the appropriate expert for the incomplete deal. Hence, the basic functionalities of the exception handler are summarized in the following sections.

**Handling the User Default**

Here, the exception handler is given a message from the bid manager to handle the defaulting case of a bid. The exception handler computes the penalty that needs to be charged to the defaulter. The defaulter is charged the penalty, using his credit card information. Then the database is accessed to retrieve the information related to experts who are willing to work and to be paid by the hour. An efficient algorithm to sort the list of experts, based on their expertise and number of hours willing to be paid, is executed. Now the expert selector would select the expert who can fix the default bid case, thus gracefully handling the exception.

**Handling Failed Bidding Case**

Here, the exception handler is invoked by the bid manager to handle an unsuccessful bidding process. The bidding process may lead to failure for multiple reasons, such as insufficient number of bidders, no match of the expertise of the bidders with the requirements, and so forth. The exception handler would access the database server to retrieve related information of the experts. As stated previously, an algorithm is used to sort the experts and
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