An Adaptive Interface for Dynamic Generation of Personalized Learning Documents

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1 A subject-oriented navigation

The work presented in this paper consists to design an adaptive interface allowing learners to make effective learning activity. That is, our interface is based on an original concept, namely the subject-oriented navigation. The subject-oriented navigation improves the standard navigation especially by eliminating the well-known *lost in hyperspace* of the traditional web navigation. So, information search is more efficient.

In the subject oriented navigation approach, a search session begins by defining a *subject*. A *subject* is an object on which the search session will be oriented. That is, our idea is that all information tracked by user is related to a defined *subject*. In e-learning, learner may track information related to a defined course. As example, we give a simulation of a learning activity in Fig. 1.

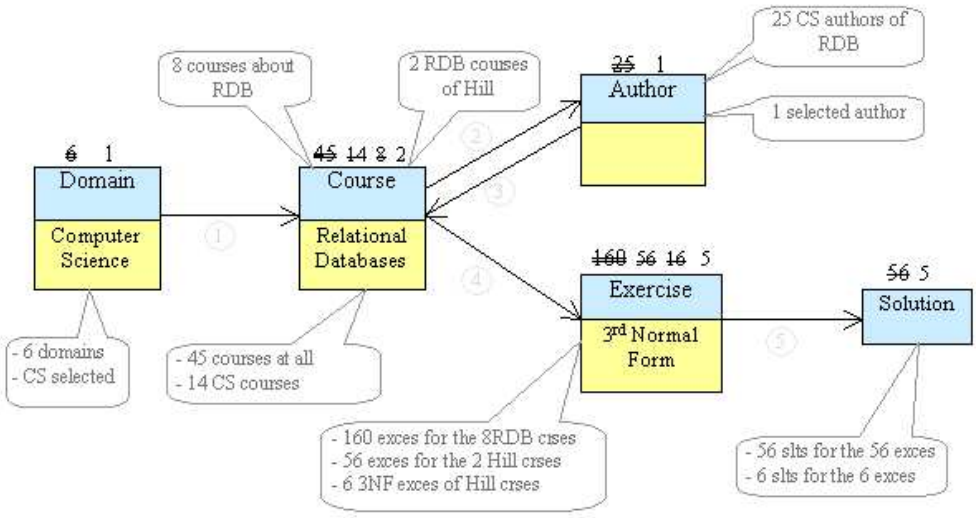

Fig. 1. An example of a course-oriented navigation in e-learning

The learner starts the search at the topic *Domain*. The interface indicates 6 learning domains, which are related to 45 courses. We note that the interface is adaptive. That is, the topic map is not visualized entirely. At each moment, there is one active topic (now the topic *Domain*) and only the topics related directly to the active topic are

shown. That is, the entire topic map is shown progressively following the learner navigation.

The learner selects the domain *Computer science* as subject, the interface presents only courses related to this learning domain, there are 14 courses about *Computer science* domain. Then, the learner navigates to the topic *Course* (new activated topic). The interface visualizes only three related topics: *Domain (1 domain)*, *Author (25 authors of the 14 courses)* and *Exercise (160 exercises covering the 14 courses)*. From the 14 courses, the learner selects *relational databases* courses, there are 8 RDB courses. Then, the topic map is adapted. That is, now the topic author contains only *relational database* authors and the topic exercise contains only exercises about *relational* databases. The adjusted cardinalities indicate that there are 8 *relational databases* courses authored by 25 authors for which we have 56 exercises.

The learner navigates to the topic *Author* and selects from the 25 RDB authors *Peter Hill*. The topic map is adapted by selecting only the two RDB courses authored by *Hill* and the 16 exercises related to RDB courses of *Hill*. Then, then learner selects exercises about *3rd Normal Form*; there are 5 exercises. Finally, he navigates to the solutions given to the 5 exercises about *3rd Normal Form* of *RDB* courses authored by *Hill*.

2 Generating personalized virtual learning documents

At the end of a learning session, pertinent information selected by learner are assembled in a single document with respect to learner needs, preferences and data structure given by the explored topic map. This document is called personalized virtual learning document.

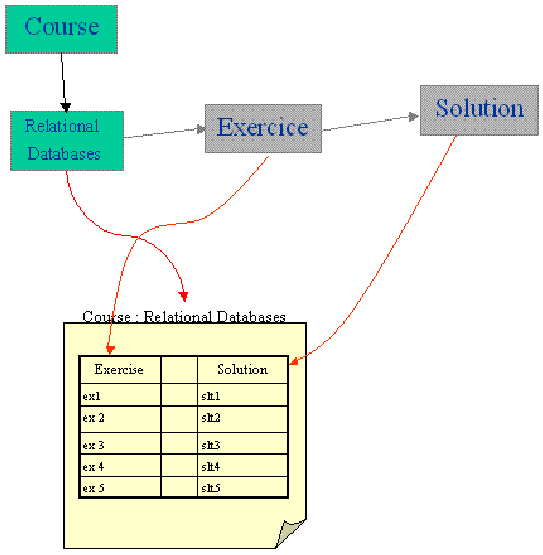

Fig. 2. Mapping navigation path to virtual learning document