RECOMMENDATIONS TO CONNECT ACADEMIA WITH INDUSTRY

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Abstract

Today's students are no longer satisfied with an education that prepares them to be a "Renaissance Man". They increasingly question the relevance of their courses towards preparing them for their future professions. Consequently, many academic programs are attempting to tie classroom experience with industry-relevant skills. This paper discusses attempts to make a database management systems (DBMS) course relevant to students whose major is geographical information science (GIS). Although the paper focuses upon GIS majors, the methods used to connect academia and industry can be generalized to other technical fields, such as engineering.

Introduction

The DBMS course, "Scientific Application of Databases (COSC2415)", is a required part of the GIS, (geomatics) curriculum at Texas A&M University-Corpus Christi (A&M-CC). Although it is a sophomore-level course, most students actually enroll during their senior year since they assume that it is not relevant to their major. This perception of a disconnection between "book-learning "and its "real-world" application is a major impediment to successfully teaching this course.

Most of the students taking this class intend to become surveyors. Being surveyors, they will collect data onsite and upload it to a database. There are GUI-based DBMS tools available that can be used to develop a database application without the user having any theoretical knowledge of a relational database model.

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Consequently, students do not feel a need to learn the principles of database management systems or good programming and design principles. As a result, it is a big challenge for an instructor to prepare lectures that integrate the business programming aspects of any application along with the theoretical concepts.

Recommendations

After teaching this course for the first time, it was obvious that a total revamp was needed in order to engage the students in the learning process. In order to make this course relevant the instructor needed to gain a broad understanding of the field. The approach was two-fold; confer with employers, and, collaborate with GIS instructors.

1. **Confer with local employers**. Local surveying companies can explain the database management tools they use in their business or typical real-world job assignments.

   Approach: Working along these lines, we contacted three local surveying companies[5]. In order to understand their business, and keeping database concepts as the key point of discussion, we spoke to their project managers. Since the profession of surveying is typically about data collection and its manipulation to generate meaningful reports, some of the questions we asked were:

   1. What type of projects do they work on?
   2. How is the data collected for any typical project?
   3. How is the data stored, retrieved, or manipulated when needed?
   4. What is the typical size of their databases?
   5. What types of DBMS tools do they use?
   6. What type of database do they develop for various projects?
   7. How much relational database knowledge do they expect their employees to have?
   8. Finally, will they be willing to collaborate with a faculty member teaching this course to make it more meaningful, thus increasing students' interest in this class?

   Outcome: We received positive responses from all the companies we approached. They were willing to discuss their business and showed interest in collaborating with the faculty to reshape the theoretical aspect of course material with a practical approach. Students always appreciate when they see a connection between what they learn in a classroom environment and its reflection in professional applications. In addition, this collaboration bridges the gap between academia and industry. This semester was spent towards building a positive working relationship with industry. As the course is offered only once a calendar year, we will implement the plans generated by these ideas in Fall 2005.

Future Approaches:

1. Guest lecturers from local companies: Invite the project manager or a company representative to spend a lecture period discussing their company's typical projects and their DMBS needs.
2. Touring the facilities: On site visits, touring various local oil refineries and other industrial sites will give students a great opportunity to learn from the professionals on site.
3. Coordinate projects with local companies: Have students work with companies on an assignment as a class project. Have a team of students work with local companies on a real world project that uses DBMS applications.

2. **Collaborate with GIS instructors.** GIS instructors can better explain how relational database concepts relate to GIS classes, to understand the concepts of spatial database management systems, and see the relevance of these concepts in the practice of their profession. An instructor must try to tie the problems together and show the connection between theories and practical aspects learnt from two or more courses.

   Approach: Working along these lines we invited one of the GIS instructors on the second day of class to informally discuss DBMS and its relevance to GIS. Prior to this class presentation, the two instructors discussed a number of topics. The database instructor posed to the GIS colleague an almost identical set of questions as those to the local businesses. This enables the DBMS instructor to compare industry expectations with GIS related database concepts in the curriculum.

   Outcome: We received positive responses from other GIS instructors when approached. They were willing to discuss the importance of this class to GIS majors and showed interest in collaborating with students to help them gain a better understanding of the subject material, and how this course will help them in their profession as a surveyor. Further prior knowledge of the future use of DBMS concepts in GIS courses kindles their interest and improves motivation. Plans for two class projects emerged from this collaboration. (1) Our university's computer services, responsible for maintaining all computers at our institution, has a need to quickly locate the specifications of computers in any room in every building on campus. This can be accomplished using a spatial database. Since this project directly ties GIS with the students' own university, it is expected that they will enthusiastically implement it. (2) Most students in this course are employed in GIS related industries. They have access to real data used by their employers. They are also familiar with the nature of GIS related databases their employers use. As a part of the course requirement students will work in teams on the design and implementation of a GIS-DBMS, treating their own employer as a client.

Future Approaches:

1. Emphasize the importance of database concepts in pre-requisite classes, and provide specific examples of how that could be applied to other GIS classes.
2. Have students collaborate with a GIS instructor to work on an academic project that integrates the concepts of relational and spatial DBMS.

Conclusion

Although the paper focuses upon a DBMS course for GIS majors, the recommendations can be generalized to any technical course. For example, the instructor must begin with an understanding of the discipline at the academic and industrial level. Once the instructor has the basic understanding, the instructor can collaborate with his/her peers and industry leaders to design relevant course requirements and assignments.

Since this course is only taught once in a school calendar, it remains to be seen if a systematic working relationship with industry will result. Future papers will discuss the results of assessing the implementation of these recommendations.

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