Integrating Enterprise Resource Planning into CS Education

In June 2008, the East Tennessee State University department of Computer and Information Sciences became a member of the SAP University Alliance. Alliance membership allows the department to offer students the opportunity to use the same Enterprise Resource Planning systems used by thousands of companies worldwide. Students have been able to take classes featuring hands-on use of SAP ERP, SAP NetWeaver, and related products. In addition to covering foundational concepts, students will explore deployment, configuration, and development in this complex environment.

SAP estimates that as many as 40,000 SAP-knowledgeable graduates are needed to meet global demand over the coming two years. Worldwide, 75,000 companies have purchased and maintain SAP software, resulting in 12 million users in some 120 countries. To help support this growing need for SAP-educated graduates, the company offers the SAP University Alliance program to selected universities around the world.

In October of 2008, the East Tennessee State University Computer and Information Sciences department hosted its first annual SAP Advisory Group Meeting. Representatives from Eastman Chemical, EDS, CGI-AMS, General Shale Brick, Gilbarco, Graceway Pharmaceuticals, IBM, King Pharmaceuticals, Northrop Grumman, Nuclear Fuel Services, Oak Ridge National Labs, and Y-12 National Security Complex participated in the meeting. The purpose of the meeting was to discuss technology and employment needs of regional companies, and to review ETSU’s new SAP Initiative. Gail Corbitt, the SAP University Alliance Director for the United States spoke with attendees on the benefits and opportunities ETSU’s University Alliance membership provides. Assistant Professor Dr. Tony Pittarese, ETSU’s SAP Coordinator, briefed the group on the department’s future plans.

Meeting attendees made several important points regarding ETSU’s upcoming plans. Among them were the following:

- Technical employees frequently lack understanding of fundamental business processes underlying ERP systems. They don’t readily see how all the components fit together or understand their purpose.
- Students should be given a broad exposure to concepts and applications, with businesses building on that foundation with their own industry and company-specific training.
- SAP development skills in both ABAP and Java are valuable and in high demand in the market.
- Many companies are facing the pending retirement of much of their ERP-knowledgeable workforce. New employees are needed to fill this gap.

Future meetings of this newly established SAP Advisory Group are planned each Fall semester. Companies wishing to get involved should contact Dr. Tony Pittarese (pittares@etsu.edu) for more information.

Teaching Business Information Systems Concepts Using Simulation

It is challenging to present ERP systems and products such as SAP to students in a manner they can understand. The size and complexity of the software systems make it challenging for students to see the "big picture" and to understand how such a system can both assist a company with day-to-day management and also help create a strategic advantage in the marketplace.

To address this challenge, researchers at HEC Montreal have developed a business simulation that runs in the SAP ERP environment. ERPsim allows students to work in teams managing virtual muesli (cereal) companies operating in a simulated German muesli market. Over the course of several
weeks, teams compete with one another in a realistic market environment. As they learn how to run their operations and make effective decisions, they are exposed to facets of SAP ERP and the general concepts behind business processes and enterprise-level software systems.

In ERPsim, SAP functionality is presented much in the same way it would be used in an actual business situation. Since students are responsible for items such as forecasting, purchasing, production, marketing management, and financial management, they are exposed to a wide array of SAP transactions. The competition among teams encourages students to progressively improve their decision making and execution: enhancing their understanding of SAP ERP functionality.

The simulation begins with each team taking over an existing company with finished goods in inventory and debt related to recent expansion. Their first activity is to study the cost factors of the available goods, analyze the market, and set selling prices in two distribution channels. The simulator plays the role of business customer, placing orders from grocery stores, hypermarkets, and independent grocers. Students gain experience adjusting to business conditions and competitor activity throughout a simulated quarter of operation—with each “day” in the quarter bringing in new orders and presenting market fluctuations. Things happen very quickly as a simulated day lasts only a minute in real time. Throughout the quarter (which runs for about 1 hour) students monitor the competitive and financial impacts of their decisions, and make adjustments to their activities. All of the information they receive, and all of the strategic moves they make happen within SAP ERP. At quarter’s end each team can see how their financial statements stack up against the competitors, and all of the strategic moves they make so that pricing, sales activities, and production mesh well into an effective strategy.

In the second activity, raw materials have been depleted and teams must engage in purchasing. Both manual item purchasing and purchasing through MRP are available. Previous weeks’ activities continue and other elements such as planning marketing expenditures, paying down company debt, and investing in improved manufacturing equipment are also available to teams. At this point, students operate the entire cash-to-cash cycle as they use company funds to purchase materials, produce products, sell those products, and collect payments from customers.

The last significant item introduced in the simulation allows teams to reconfigure the composition of their products through adjustments to bills of material. Customers prefer certain formulations over others, and these preferences change over time. Teams may change their cereal formulations and introduce new flavors and box sizes, all under the watchful eye of the virtual Muesli Manufacturing Association which enforces industry-wide product quality and formulation standards.

Throughout the semester students master the essential SAP ERP operations. At semester end, the simulator is then reset and the class engages in a day long simulation competition. After six quarters of operation a winning team is determined, and students analyze their activities and outcomes to present a final oral and written report to their “Board of Directors” (played by their fellow students and instructor) in upcoming class sessions.

ERPsim was used for the first time at ETSU in the Fall 2008 semester. ETSU is one of fewer than 40 universities in the U.S., and the only university in this region (Tennessee, Kentucky, West Virginia, Virginia, North and South Carolina, Alabama, and Mississippi) using this tool. Student response has been extremely favorable. ERPsim is planned for use in future undergraduate and graduate classes as a vehicle for managing students’ first exposure to ERP.

ETSU’s initial participation in the SAP University Alliance program has been supported by Eastman Chemical.

“Because the Department of Computer and Information Sciences will be graduating students with basic business acumen and SAP exposure, I believe this program will greatly benefit ETSU, its students, and the regional companies that recruit from ETSU.”

Keith Sturgill
Chief Information Officer, Eastman Chemical

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**Course Profile: Fundamentals of Business IS**

*Fundamentals of Business IS* is ETSU’s first undergraduate course offering featuring SAP content. The course is designed for students with a computing background, but little or no knowledge of business processes and enterprise information systems. Integrated business computing is covered, along with the underlying business concepts needed to understand and guide system implementation.

Lecture and discussion components are supplemented with weekly hands-on exercises in SAP ERP using ERPsim (see Teaching Business Information Systems Concepts Using Simulation, page 1).

Topics covered in the class include the following:

**Introduction to Financial Accounting:** Coverage of basic accounting concepts such as sales, expenses, assets, equity, liabilities, etc. How to read and understand a balance sheet and income statement. How to interpret financial statements generated by SAP ERP.

**Business Structure, Functions, and Processes:** What do the various functional areas of a business do? How do hand-offs between functional areas work? How can a well-defined business process effectively unite the workflow among diverse business departments?

**Introduction to Enterprise Resource Planning and SAP:** What do ERP systems do in an organization? What enterprise systems came before contemporary ERP systems? What is SAP’s role in the ERP marketplace and what are the competitive products? What are the various components that comprise SAP ERP and related product extensions?

**Marketing Information Systems and the Sales Order Process:** The role of CRM systems and Business Intelligence Systems in strategic corporate management is presented. The order-to-cash cycle is covered in detail as a sample of common business process.

**Production and Supply Chain Management Information Systems:** How to use ERP systems to plan and manage interactions with suppliers and in-house production. The overall rationale for collaboration with supply chain members is explored.

**Human Resource Management in ERP Systems:** How have ERP systems moved beyond the management of sales and production into other key information handling processes of a company? What can a human resources management system do for a company?

**SAP Development and Administration:** What jobs are there for those considering a career in enterprise systems working with SAP? The jobs of developers, Basis and NetWeaver administrators, and configuration consultants is considered.

**SAP Landscape Concepts:** What SAP-related terminology and concepts are needed to understand core SAP concepts? Fundamental concepts of configuration and deployments are discussed.

During the summer, specialized courses can be tailored to meet the needs of area businesses or groups of employees. Depending on class size, multiple companies could share the same customized course.

For details, please contact Dr. Tony Pittarese, pittares@etsu.edu, 423-439-6951.

**Upcoming Classes**

**Fundamentals of Business IS**
May 18 – July 10
Tuesdays & Wednesdays
4:30-7:30 p.m.

**Enterprise and e-Business Integration**
Fall 2009
A graduate-level course that begins with coverage of SAP ERP as a vehicle for integrated business processes. NetWeaver Portals and Visual Composer are introduced.

**Business Involvement:**

*We need your help*

The integration of ERP concepts and SAP resources into courses at ETSU is just beginning. One major goal of this project is to create internship opportunities for current students and job opportunities for our graduates. We also desire to enhance our relationship with businesses in this region.

We welcome involvement and input from local businesses. Several companies have sent employees to attend classes on campus. Some individuals have volunteered to come speak in classes.

In order to expand future course offering and make courses relevant, one area of ongoing expense is faculty training. SAP provides training to faculty members free of charge during summer months. The only expense is travel, lodging, and meals. Businesses that are willing and able to contribute funds to this effort are greatly appreciated.

Other opportunities for participation exist. One Saturday each semester is devoted to an ERPsim competition. To assist with logistics, students are provided a boxed lunch, and a small prize is provided to the winning team members. A contribution ($300—$400) to support this activity would be appreciated by the students.

An International ERPsim competition is held each year. Teams compete from their home campuses with other universities world-wide. A company wishing to sponsor an ETSU team could provide lunch for the participants and small incentives for those participating. This would be an excellent opportunity for corporate publicity.

If your company wishes to participate or provide support for these or other activities, please contact Dr. Tony Pittarese, 423-439-6951 or pittares@etsu.edu.

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