e-business Solutions

IBM

University of Alabama Museums digs up the past with WebSphere and DB2.

Application	Cataloging and studying archaeological field data
Business Benefits	Provides consistent, searchable body of knowledge; minimizes cost of carbon dating; query time for field data reduces from days to seconds; enhances learning experience
Software	IBM DB2® Universal Database™ for Windows NT® IBM Intelligent Miner™ for Data IBM WebSphere™ Application Server Lotus® Domino™ Lotus Notes® Java™ technology
Hardware	IBM PC server IBM ThinkPad®

More than 10,000 years ago, prehistoric people—living by their wits and using roughly hewn tools—found shelter for themselves in the recesses of the limestone caves bordering the Tennessee river. Today, archaeologists are using tools of a different kind—sophisticated computers, instruments, IBM WebSphere Application Server and the knowledge accumulated in IBM DB2 Universal Database—to reconstruct life as it might have been in earlier times. Each summer, a team of professional archaeologists from the University of Alabama Museums, as well as undergraduate and graduate students from other universities, explore Dust Cave, near Florence, Alabama, using an onsite computer network to record their discoveries as they dig.

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—*Dr. Boyce Driskell, Senior Archaeologist, University of Alabama Museums*

Computers have long been used to record archaeological data. But, according to Dr. Boyce Driskell, senior archaeologist with the University of Alabama Museums and

At Dust Cave, archeologists, students and other experts are reconstructing prehistoric life with traditional archeological tools and two new ones—DB2 and WebSphere Application Server.

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DB2 and WebSphere Application Server are helping students and archeologists consolidate and compare field data.

director of the Dust Cave project, "This is the first time the use of computers is actually influencing the excavation process." Earlier at the site, scientists from various disciplines used disparate individual databases on their workstations to record data. As a result, correlating zoological data with biological or sociological data, for example, was very tedious. This, in turn, made it difficult to get an accurate overview of what life might have been like during the period for which excavation was being conducted.

However, by consolidating the data into a common relational database—DB2 Universal Database for Windows NT—different data from common coordinates at the dig site can be compared simultaneously on an intranet powered by WebSphere Application Server. "This has led to breakthrough thinking on what to look for as the dig continues," explains Driskell. "We can query our database and come up with the information we need within seconds. The analysis made possible by this has pointed out the need for additional data that was not being collected in the past. And, if it is not collected at the time of excavation, it is lost forever." So, excavation procedures are being adjusted to gather additional information based on the insights that the DB2 analysis provides.

Saving money by avoiding duplication
The database is also helping to cut costs. For instance, while collecting samples for carbon dating, researchers refer to the database to determine whether they already have carbon dating for a particular level or whether projectile points—spearheads or other hunting tools used by the inhabitants of the site—are available to indicate a probable date. Based on this information, they decide which samples to send for carbon dating. Since carbon dating is an expensive procedure—varying from $250 to $600 per sample—using the database amounts to a considerable cost saving.

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Tools of the trade

Research at Dust Cave is supported through grants from the Alabama Historical Commission, the Alabama Humanities Foundation and the Tennessee Valley Authority. "Our use of state-of-the-art technology from IBM and the support they've provided have certainly enhanced the project's ability to attract funding as well as its appeal for students," says Driskell. By participating in the Dust Cave project, students gain working knowledge of modern data management and analytical tools that are a boon for every researcher. According to Driskell, it's a lesson they're eager to learn. He notes that when students come to the site their instinctive reaction is, "Wow, all those computers!"

Students log field data into a relational database

"The project has been evolving over the past three to four years, but this is the first time we've networked the students with individual IBM ThinkPads," Driskell says. Students use the laptops to log field data, which is stored in a DB2 database. They access the database from a standard Web browser—a capability made possible by WebSphere Application Server. All of the students' database activities—such as inserting new records, looking up data and updating information—are delivered on a secure intranet.

When a student makes a request to DB2, he or she calls up a standard Web page from the intranet. The student then fills out a form on the Web page and the resulting request calls a servlet, made available by WebSphere Application Server. The servlet communicates with DB2, executing the requested transaction. Then, the student receives a response in the form of a Java technology server page, which looks like a standard Web page.

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—Dr. Boyce Driskell
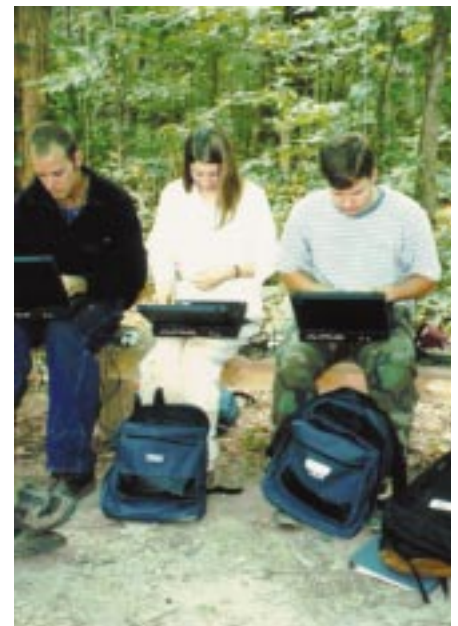
IBM ThinkPad laptops are used for logging field data.

The laptops are also equipped with software tools, such as Lotus Notes, which students use to communicate with each other, as well as create calenders and work schedules.

Before the introduction of DB2 and e-business to the site, students recorded their daily activities on written forms and paper logs—media that were difficult to use for research and ad hoc inquiries. While students still learn how to use field books, they also learn how to enter data into relational database structures. "It used to take us days to query data, but with DB2 and WebSphere Application Server, it's now a matter of seconds," says Dr. Rod Riley, IBM's technical consultant for the project. Earlier, as associate director of the Seebeck Computer Center and leader of the Advanced Technology Group (ATG) at the University of Alabama, Riley was instrumental in conceptualizing the project.

Ancient tales told on the Web
At the end of each dig, students are required to publish their individual research projects on the department's Web server. Using Lotus Domino, they build their own Web pages, which are then posted to the university's Web site after the summer dig is over. "Since we can't provide an Internet connection at the site, we copy the Web site to our Dust Cave server so that students can still access earlier research papers. We have an intranet, so to speak," explains Riley.

Weathering the elements
What was envisioned simply as a way to provide records of past excavations at the site has evolved into a sophisticated way of collecting and analyzing data, even as excavation continues. "The whole range of IBM products, and particularly DB2 and WebSphere Application Server, have proved so reliable and flexible that we keep coming up with new things that we want them to do," says Driskell.

Students and staff are using SQL queries, and this summer, IBM Intelligent Miner for Data will be a part of the research project. Intelligent Miner will be used to analyze the distribution of lithics and debitage—the debris that results from toolmaking.

"Dust cave is a fine example of how IBM products are being used effectively in an environmentally hostile set-up," says Riley. Agreeing, Driskell explains, "The system is functioning without any glitches in this hot, dusty and humid backwater swamp, running on a portable generator that services the entire camp, from the kitchen to the living quarters. That's quite a testimony to its reliability."