

## Humboldt-Universität powers life sciences research with IBM Scholars Program.

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### Overview

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■ **Application**

*Introductory and advanced data management curriculum based on IBM DB2® Universal Database™*

■ **Business Benefits**

*For students: Enhanced employment opportunities through strengthened job skills from hands-on training on market-leading database*

*For Humboldt-Universität: Thousands of euros saved in yearly software licensing fees, support expenses and other IT resources; lower educational costs; research results available in days rather than weeks or months; heightened ability to attract new students through real-world instruction*

■ **Software**

*IBM DB2 Universal Database, Version 8.1*

■ **Hardware**

*IBM @server® pSeries®*

■ **Services**

*IBM Scholars Program*



*Founded from the concept of providing superior teaching, research and all-around student education, Humboldt-Universität serves students from many different countries.*

Located in Berlin, Germany, Humboldt-Universität is known the world over as a breeding ground for outstanding scientists. Since its inception in 1810, the school has produced nearly 30 Nobel Prize winners, beginning with Jacobus Henricus van't Hoff, who received the award in 1901 for his research into the laws of chemical dynamics.

Today, the tradition continues, with IBM DB2 Universal Database playing a major role in the development of future scientists. Humboldt-Universität,

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*—Professor Johann-Christoph Freytag,  
Computer Science Department,  
Humboldt-Universität*



Humboldt's Computer Science Department maintains a strong working relationship with the IBM Böblingen lab.

which employs 450 professors and has nearly 38,000 students, uses DB2 software from IBM to teach bioinformatics students how to utilize computational methods to solve one of the most exciting and important problems in contemporary biology—alternative gene splicing, a natural phenomena that occurs when genes split to produce different proteins.

The Computer Science Department of Humboldt-Universität received DB2 through the IBM Scholars Program, a unique offering developed to support higher education institutions with instructional, learning and non-commercial research opportunities. The program provides accredited and approved academic institutions with access to a wide range of IBM products, including no-charge licenses for IBM software and academic discounts for IBM servers.

### **DB2 simulates alternative splicing**

Although discovered in 1980, alternative gene splicing was considered very rare until just a few years ago. Indeed, researchers generally agreed that no more than five percent of human genes undergo alternative splicing. A major breakthrough came when scientists realized that the information from sequencing projects could be used to computationally predict alternative splicing, which sparked a new wave of research.

“In the transformation process of going from a gene to a protein, nature sometimes acts unpredictably,” explains Professor Johann-Christoph Freytag, head of the Computer Science Department's bioinformatics and database systems lab. “We are studying this process by simulating it using sophisticated algorithms that are included in DB2 as user-defined functions (UDFs). This helps us produce results in days—not weeks or even months.”

*“The innovative query rewrite and optimization technologies in DB2, Version 8.1, allow us to spend more time analyzing research findings and less time on performance improvement and tuning issues. No other database provides the advanced availability, scalability and manageability features that DB2, Version 8.1, delivers.”*

*—Professor Johann-Christoph Freytag*

Presently, the worldwide demand for alternative gene-splicing data is enormous, because it leads to the development of new drugs for healthcare purposes.

To help meet that demand, Humboldt-Universität leveraged the program to receive three DB2 Universal Database, Version 8.1, information management systems, at no cost to the school. The institution runs DB2 Universal Database on IBM @server pSeries servers, which it received through a Shared University Research [SUR] grant from IBM. "The IBM Scholars Program allows us to provide students with unique, hands-on training in life sciences," says Freytag. "Thanks to IBM, we can deliver a highly relevant and rich educational experience while keeping training costs to a minimum."

### **Hands-on training with DB2 Universal Database**

The university's computer science curriculum includes both introductory and advanced database concept classes, covering everything from the fundamentals of data retrieval to integration of distributed information management systems. Between 50 and 150 students work with DB2 Universal Database each semester. The school also partners with the IBM Böblingen Lab to offer a course for students wanting to take the exam to become a DB2 Certified Database



*Students capitalize from their hands-on experience with DB2 Universal Database through improved job placement opportunities and high-level research activities.*

Administrator. Last year, about 70 students participated in the DB2 certification program, with 50 of the students passing the final exam.

In the bioinformatics and database systems lab, a part of the Computer Science Department, students learn to apply database technology to real-world biological studies, most of which seek to shorten the development times of new drugs. For example, the students are taught how to create more meaningful queries using IBM DB2 Query Manager as part of semantic query processing. "We use vocabularies from ontology sources to reformulate the user query to its

semantic equivalent," he says. "In doing so, we can provide results that are more relevant to the user."

After they receive their degrees, the students can pursue rewarding careers at any number of companies or research institutions in the area seeking individuals with strong database backgrounds. "There's a big job market for graduates with DB2 expertise," says Freytag. "IBM is one of the world's top database vendors, and it really helps to add DB2 experience to your resume. Plus, our bioinformatics students utilize their DB2 skills to further their research activities in support of important on-going research and drug development initiatives."

## Oracle not an option

Freytag had considered using other database systems for the university's educational and research purposes, but none of the solutions compared to DB2 Universal Database. "DB2 Universal Database definitely has an advantage over everything else on the market," he says. "For example, DB2 has a much better query processing engine than Oracle and queries are executed more efficiently in the DB2 runtime environment."

Freytag was particularly impressed with DB2 Universal Database, Version 8.1, the latest release. "The innovative query rewrite and optimization technologies in DB2, Version 8.1, lead the industry," he explains. "They allow us to spend more time analyzing research findings and less time on performance improvement and tuning issues. No other database provides the advanced availability, scalability and manageability features that DB2, Version 8.1, delivers."

Moving forward, Freytag plans to introduce more comprehensive concepts into his classes, such as how to speed data retrieval using new storage and index structures. He'll also show students how to leverage techniques

from data warehousing and data mining to support collaborative research efforts through data integration. And as the curriculum develops, the IBM Scholars Program will continue to provide Humboldt-Universität with immediate access to new releases of DB2 Universal Database.

"As a result of the program, the university has enhanced its curriculum while saving thousands of euros a year in software, services and other resources," he says. "It was not within the school's budget to offer students the kind of training we provide today. Humboldt-Universität may even generate another Nobel Prize winner, thanks to IBM."

### For more information

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For more information about the IBM Scholars Program, visit:  
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For more information about Humboldt-Universität, visit:  
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