NDSU NORTH DAKOTA STATE UNIVERSITY



CAPSTONE PROGRAM

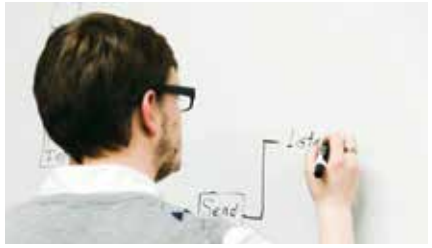
Department of Computer Science

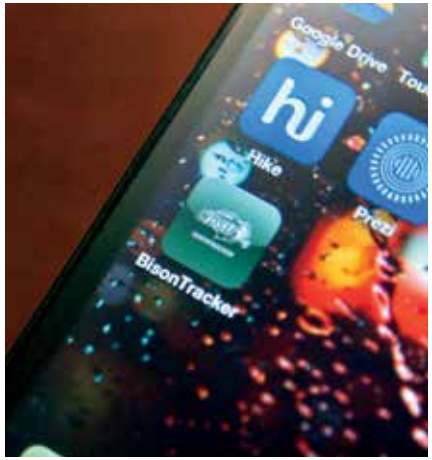
STUDENTS AND INDUSTRY COLLABORATING
FOR SOFTWARE SUCCESS

During their final semester, NDSU students majoring in computer science take part in a capstone project. The objective of the program is to provide students with experience that combines valuable teamwork skills with the technical knowledge they have acquired.

Students in the NDSU Department of Computer Science Capstone Program have completed more than 100 projects since 2004 in conjunction with regional and international corporate, industrial and government clients/sponsors. The partnership provides both groups with ongoing benefits.

The capstone project process begins in the fall semester when clients/sponsors are contacted to discuss their willingness to support a project during the spring semester. Project size is discussed with the capstone coordinator during the fall.





Students are then presented with a list of clients/sponsors and their proposed projects. Typical projects include software development, which will be done by defining requirements, analysis and design, coding, testing, final integration and acceptance testing.

After applying for a project with a client/ sponsor, students are assigned to teams and begin meeting with clients/sponsors to complete a needs analysis and to negotiate a final project definition and statement of work. Student teams are expected to keep regular contact with their client/sponsor so progress and direction can be reviewed and questions answered. Clients/sponsors are expected to have a senior developer available to answer questions and review work. Student teams also regularly meet with the capstone program coordinator. Secure websites are established for each project where information can be accessed by the student team, client/ sponsor and instructors.

At least two formal presentations/demonstrations will be made to the client/sponsor during the semester. One will be approximately halfway through the semester and will provide an update on progress to that point. The final report will be presented at the end of the project.

BENEFITS TO THE CLIENT/SPONSOR

- Completion of a small project by NDSU students at little or no cost to the client/sponsor
- Get to know upcoming graduates and establish more contacts with NDSU
- Gain satisfaction in having helped students learn about working in the "real world"



BENEFITS TO THE STUDENT

- Learn project management skills including:
  - Identifying cross-functional roles and relationships
  - Managing resources such as people, time and equipment
  - Enhancing the ability to deal with others in a team environment
  - Improving communication skills essential to planning, influencing, integrating, reporting and documenting projects
- Gain real-world industrial experience by developing software for regional and international companies
- Obtain experience following project management processes for initiation, planning, execution, control and closure
- Gain experience following Software Engineering Institute's Capability Maturity Model Integration like processes, modified for agile development for software development



Clients and sponsors include:

3M
Architecture Technology Corp. (ATC)
Alliant Techsystems Inc. (ATK)
Bolder Thinking
Ericsson (Sweden)
Forum Communications Co.
IBM
Inwerken (Germany)
John Deere Corp.
Microsoft
National Information Solutions Cooperative (NISC)
Noridian Mutual Insurance Co.
NDSU Center for Nanoscale Science and Engineering
Polaris Industries Inc.
RDO Equipment
Rockwell Collins
Thomson Reuters
Upper Great Plains Transportation Institute (UGPTI)

Note: Companies that are part of the NDSU Computer Science Industry-University Consortium are given priority when capstone projects are assigned. For more information on the Industry-University Consortium visit http://icp.cs.ndsu.nodak.edu

Examples of previous projects

WEB-BASED TROUBLE LOGGING SYSTEM

The team designed and developed a Web-based trouble logging system, which allowed the client/sponsors to monitor and track the progress of all the trouble logs in one place. Since the data is stored in a database, it can be accessed over time to track usage of the trouble log system.

FACEBOOK APPLICATION DEVELOPMENT

The team developed Web-based and desktop Facebook applications to demonstrate how they are built. The project included creating documentation on how to build applications.

SIMULATE A RADIO INTERFACE

The team built a message simulator to test radio communications with munitions systems. The simulator used RS232 communications and ran on PCs. It included a user interface that allowed users to construct and send messages as well as log and display all message traffic. The system included support for error checking (ACK/NAK, CRC) of messages. The interface could be configured for baud rate, com port, parity, # of bits, # stop bits, etc.

AUTOMATED TEST SUITE FOR DENIAL OF SERVICE AND INTRUSION ATTACKS

The team built an extensible framework for an automated suite of test cases that ran on a Linux platform and simulated denial of service and intrusion attacks. The tool included a GUI interface to select and run tests. Around 50 different network attacks were included with the system. An audit log and error log are produced as the system runs.

CLOUD-BASED CUSTOMER DASHBOARD

The students developed tools to collect call event data from a cloud-based ACD, delete data when calls were complete and aggregate data to be used on a dashboard that displays system status.

FRAMEWORK FOR MOBILE PHONE APPLICATIONS

The team developed two prototype systems (running on two different platforms) that access Web services provided by the sponsoring company.

SHOP FLOOR IT HEALTH CHECKER

Students developed tools to analyze shop floor computers that are reporting problems and report results (network issues, application availability, database issues, etc.) to help desk personnel who then perform more detailed analysis.

PROPOSAL AND JOB SETUP SYSTEM

The team designed and developed a sales proposal and job setup program for a heating, air conditioning and plumbing company that allows the comfort consultant to efficiently and effectively produce a job-specific price quote for the customer on the first appointment, thereby increasing the opportunity to close the sale immediately.

IDENTITY PRESERVATION IN A GRAIN MILL

The students developed an online system to track grain production through harvest. A farmer or administrator can add and update all aspects of field information, such as plant and field variables, chemicals applied and harvest information, and export data to a spreadsheet.

WEB-BASED SURVEY SOFTWARE

The team developed a Web-based application that runs on top of a survey-processing engine and allows users to create and maintain surveys for use on their websites. Multiple surveys and various kinds of questions can be created and edited.

WEB-BASED COMPETITIVE ANALYSIS TOOL

Students developed a tool to automatically search competitors' websites to determine what they are charging for products, making sure not to be detected during the search.

SPORTS SCORE DATABASE

Students created a Web application that allows registered users to input sports scores and related statistics into a standardized database from which other media outlets can pull the stored information.

FOR MORE INFORMATION

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