A Schema for Biomedical Computing with M

by Nicolas A. Thireos

Since 1986 Rochester Institute of Technology (RIT) has offered its students a credit course in "MUMPS Programming" as part of its biomedical computing curriculum. M Technology was known only as MUMPS at that time, and that is the title as it appears in the course catalog today. RIT is a leading academic institution located in Rochester, New York. It offers traditional programs and degrees in higher education as well as degrees toward new careers that are emerging in business, industry, and health care. In October 1993 *U.S. News and World Report* listed RIT as the leading university in the North for academic reputation, based on that magazine's survey of college presidents and deans.

To understand the setting in which M is taught, it is important to look at the academic program focusing on M. With RIT's history of offering educational programs for newly developing careers, it was inevitable that the phenomenal growth of computer use in medicine would attract its attention. The result was the introduction of biomedical computing as a bachelor of science degree program at RIT twelve years ago.

Career-Oriented Program

Biomedical computing combines science and computer science to prepare qualified individuals for a modern career in health care. The students enter this program as either freshmen or transfers from other academic institutions. The requirements for acceptance are a good academic standing and interest in computers and science. Students receive a strong education in computer science, biology, chemistry, medical terminology, anatomy and physiology, and clinical-laboratory instrumentation. Calculus, statistics, and a variety of liberal arts courses are also part of the curriculum.

After the first two years, students participate in the cooperative-education program (co-op), which offers paid employment in the biomedical-computing field for one or two academic quarters each year while they complete the second half of their undergraduate education. Upon graduation these specialists enter careers in hospitals, clinics, medical research facilities, the pharmaceutical industry, private industry in health-related projects, or the medical-software industry. Their responsibilities have included software development, consulting, teaching, research, software sales, and management. At a time when other college graduates are struggling to find jobs, biomedical-computing graduates have the luxury of choosing among several job offers they receive. While most biomedical-computing students begin their careers immediately after graduation, others pursue advanced degrees in science, computer science, or health-related fields. Since biomedical computing is also a strong premedical program, some of our graduates elect to go to medical, dental, or veterinary school.

Developing the RIT Course

The idea for the course "MUMPS Programming" was born in 1985. The director at that time, Richard Garnham, felt it was imperative to include M in the students' education since so much medical software is written in M. After contacting the then-MUMPS Users' Group for companies' names that offered free versions to academic institutions, he contacted Digital Equipment Corporation for its DSM.[1]

Since M is easily taught as a first computing course, we debated whether this should be the first computing course for students, or whether there should be some prerequisites. We examined the first three computer-science courses offered: "Survey of Computer Science," "Algorithmic Programming with Pascal," and "Data Structures." Since these had been laying an excellent foundation, we decided to leave them unchanged and to introduce M as the fourth course, and at a higher level. After developing a course, I taught RIT's first M course in spring 1986.

Since the prerequisites cover basic computing concepts, this course begins with the study of the whole M language. We then study examples of file organization and the database capabilities of M. In the ten-week academic quarter the students write four-to-five assigned individual computer programs tailored to the health-care field. Near the end of the quarter, everyone (usually six to twelve students) participates in a project together. This is a much more complicated computer program requiring many routines, which must be written and tested by the students according to predetermined conventions. The class then assembles these routines to form

a working application package similar to one that might be used in an actual work environment. The class also writes minimal documentation.

Someone becomes the volunteer project leader. I give the class some general guidelines, and the students begin their cooperative project. Over several days, there is time in class to plan tasks and to design the system. Students also meet outside of class as much as they need. The project leader distributes the tasks, assigns routines that each student—including the leader—must write, and sets the target dates. The students know that unless they cooperate and the system they develop is completed and working without error, they will not get a good grade in the course. A typical class project would be to develop a menu-driven database system similar to dBase III Plus, but limited to a dozen or so commands. For the short time available to complete the project, there is a lot of work, but the students really enjoy it and consider it the best part of the course. (They include this experience on their resumes, and employers show great interest in it. One of my previous students, who was also project leader, is now part of a development team at a major M company.)

Redesigning for Other Businesses

This academic year, RIT introduced a course called "Computers in Medicine," which is an introduction to computing and the applications of computers in medicine. This will replace the first course called "Survey of Computer Science" for all students in the Allied Health Sciences Department. Allied health sciences include biomedical computing, medical technology, nuclear medicine, physician assistant, and medical sonography (ultrasound). The students were introduced to the use of operating systems, application packages such as WordPerfect and FoxBase+, a program editor, and a programming language—M.

After a week's instruction in M, these novices successfully wrote a small payroll program for a doctor's office. Most of them had no previous knowledge of programming: Only one out of forty-two students in two sections did not submit a good working program for a grade. Textbooks claim that M is easy to learn and that beginners can start writing small programs immediately after a short introduction. This experiment proved this claim to be very true.

The RIT experience has demonstrated that M is not only easy to learn for beginners but is also very powerful and suitable for complex and sophisticated applications.

In addition, RIT has a one-week intensive course intended for professionals from the work force. These individuals come to learn M because their employers have installed big software systems written in the language, which they must now employ. Some are from hospitals, medical laboratories, and other health-related organizations, but the myriad of big and diverse applications written in the M language also has brought professionals from software companies, financial organizations, the shipping industry, and even the police force.

The recent extensions and enhancements to the language continue to make M an exciting technology. They dictate the need for us to develop a second M course to teach future computing professionals about new capabilities to keep them in the forefront as well. M

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Endnote

1. The version used then was DSM (Digital Standard MUMPS). There are free student versions of M available from the MTA office at 301-431-4070.