Abstract

*ASmallFootprint* is a suite of products and services developed at Marist College as part of a strategy that includes working with industry to leverage technology and expertise. *ASmallFootprint* is an Internet radio delivery system. The suite of products and services includes creation and management of content, hosting services, delivery, and consulting.

Background

Marist College has been exploring streaming media technologies and the potential of Internet radio since the spring of 2000. A strategy was defined by the President’s Committee on Business Ventures that includes research with new technologies through collaborations and partnerships with the private sector. An outgrowth of this initiative was the promotion of streaming audio to students through a new student-run college Internet radio station and the development of a proprietary delivery mechanism for exploring new ways of communicating within organizations, and providing education, training, professional and personal development content and delivery.

The strategy has resulted in the integration of new and emerging technologies into the curriculum of the Marist College School of Communication and the Arts. This leverages the financial outlays to benefit the broadest constituency and creates expertise in the student and faculty bodies for continued research and development.

The new Internet radio paradigm for communication has the potential of evolving into a new form of portal for higher education and other organizations such as
High schools (refer to the paper in these proceedings entitled "Internet Radio: The New Portal" by Barbara E. McMullen, Director of the Center for E-Business, Marist College, Poughkeepsie, New York).

New streaming media technologies, products, and services are currently being developed through a collaboration with the IBM corporation and NY State grant funding for streaming media and Linux development to help enhance the economic viability of businesses in New York State. Several initiatives are operating in parallel and are expected to come together into a comprehensive program that is fully integrated into the curriculum and college life as well as generating new revenues for the college.

The Internet radio delivery mechanism, called **ASmallFootprint**, was beta tested with IBM Poughkeepsie internal communications. The radio metaphor has been enhanced over the past year with video, presentation slides, visualizations, community building tools, streaming text and pictures, and more. Continued product development revolves around personalization of look, feel and media choices as well as providing anytime and anywhere support to a mobile society by delivering audio communications to personal hand held devices, automobiles, and airplanes, among others.

**ASmallFootprint**

**ASmallFootprint** is a suite of products and services, owned by Marist College. Products include **Corporate Radio** which is a product deployed for internal communications and e-learning. **SupplierNet Radio** is designed for suppliers who wish to communicate with their customers. Customers are provided product information, daily special offers and pricing, as well as e-learning modules that include topics such as how to sell the supplier's products. **MaristCollegeChat** is a first attempt at a new form of portal and provides a different personalized look and feel for different constituents. **HighSchoolRap** is a variation of the new portal.

The current state of development includes content creation, uploading and scheduling of personalized content and viewing with a branded and personalized jukebox. The jukebox metaphor supports the idea of a managed playlist of content that is delivered from a stream server according to the content's schedule. Content is distributed to users according to the group or groups they belong to (where a group can be defined as one individual). Choices are made when content is uploaded to the server. Metadata is also applied to the content at upload time.

The user downloads the playlist one time on each machine where the content is to be listened to and viewed. From that point forward the playlist content is
managed for currency and is available at any time from any place. The user simply presses the play button on the personalized jukebox and the content that has been selected for the user is played.

The jukebox playlist is refreshed automatically with scheduled content using an on demand method with results that are similar to those created from a push technology. Content is primarily streaming audio but can include video, presentation slides, visualizations, links to Web pages and community building tools, streaming text and pictures and more. The product enables other services such as content production, licensing, syndicating and distribution. Hosting services for streaming media are also enabled although ASmallFootprint uses streaming content stored anywhere.

Below is the jukebox that was installed for Debbie at IBM in Poughkeepsie. Across the top is a large button that, when clicked on, takes the user to the W3 intranet site. The play, stop, pause, next and previous buttons enable the user to manage their own current playlist of content. A menu button displays today’s playlist and content and allows the user to skip around if they wish. A question mark takes the user to a help page which generates an email to Marist with the user’s question or problem. There is a volume slider and a timing slider.

Although it sits quietly as a small footprint on Debbie’s desktop, other features can be activated. A pop-out window shows a mini web page with supplemental text and graphic information for each topic. A pop-down window shows a visualization or video with other enhancements such as text, pictures, and links to full text transcriptions, threaded discussions, chat rooms, and forums. A pop-out window shows today’s content, personalized and selected for Debbie.
A partnership with industry that benefits all

The joint study between Marist and IBM has the benefit of enabling Marist, its students and faculty, to participate in the creation of new streaming technologies (server, player, mobile, wireless), new business models, and new deployment methods (to wireless handheld devices, for instance). The study enables Marist to adapt the ASmallFootprint application to a new and more viable technology as well as provide an application for an end-to-end solution that can be used as a proof-of-concept for IBM.

Taking the concept to the next step was the most exciting part of the joint study. Working with IBM scientists in Germany, a research projects was designed that would be conducted by the Center for E-Business and four of the students who worked in the center. The students include two undergraduate computer science students who are Linux systems administrators and two graduate students one of which is a software designer and the other a programmer. The center has just recently added a fifth student programmer as the project gets into some significant C code complexities.
The project is to build a new streaming media player for a wireless Compaq iPAQ pocket PC. The iPAQ is a Windows CE device. The first challenge was to remove Windows CE and install a version of Linux that would facilitate the development and provide a good user interface. QPE with Qt was installed with a cross compiler and debugger on both a PC and iPAQ. The same environment was installed on a PC for player development and porting. The QPE MPEG player was analyzed including the sound system, graphics system, codec, and GUI. The formats to be supported in the phase-1 are one video format (MPEG-1), one audio format (mp3), and the API's for decoders will be defined.

The required features for phase-1 include synchronized audio and video and store and forward (path plus URL). To build the new player we analyzed existing players and are in the process of choosing a sound system, graphics system and codecs. The chosen feature components will be integrated into the basic player and tested on both environments.

In phase-2 the player will support RTP/RTSP streaming protocols (Linux on an iPAQ with streaming from an Apache http server has been done by several people. We want to add the other protocols.) This is a challenge not only because of the complexity of the code (the reason for the additional programmer) but because of the size of the code. We have a very limited amount of room on the iPAQ and we need a player that will fit. The player will work with IBM’s Video Charger stream server which will be ported to Linux/390 (a mainframe environment that supports virtual servers) – refer to Educause Effective Practice, “Leveraging Linux Research: Virtual Server Hosting” by Kamran Khan, VP IT and CIO, Marist College, Poughkeepsie, New York, for a description of this environment (http://www.educause.edu/ep/ep_item_detail.asp?ITEM_ID=54). Such a technology environment and player do not exist in the market place today.

We also require the player to have a plug-in architecture, which will, in the long term, support the addition of billing and metering and digital rights management among others. We would also like to explore the idea of having the codecs work as plugins. Another major requirement for the pervasive Linux player is the ability to play MPEG-4 video.

Marist gains by having the knowledge and expertise of scientists and others at IBM working with our faculty and students. IBM gains by having students stretch their labor force as paid interns. They are also able to find future employees from the intern pool.

The research, to date, has resulted in a joint patent proposal between IBM Germany and Marist College for a method of adding billing and metering and digital rights management on the player end of the streaming process.
Seeing this product through from idea to beta test is an exercise that enables the College to sort out a variety of issues and prepare for a new development plateau, which is to position a product for technology transfer.

Conclusion

It is expensive for a small to medium sized liberal arts college to acquire and develop cutting edge technologies to support today’s curriculum and help educators prepare today’s work force. A strategy that includes a working relationship with industry partners to acquire technology for R&D and turn out products can help resolve this resource dilemma. Marist College has developed the relationships through joint studies to work with industry partners. The issues include balance and management of joint development relationships.

Marist has also been exploring opportunities in hosting streaming media as a revenue stream to help support its investments in technology. The proprietary software environment for personalizing, selecting and organizing materials for delivery of audio and video will be licensed to those embarking on a hosting relationship with Marist. Content will originate with other organizations and institutions as well as be provided by Marist. Marist will not only create content but it will acquire, market and license third party content to organizations and institutions to be delivered through ASmallFootprint, its proprietary delivery product, which is also a candidate for technology transfer.

A discussion of how the Marist/IBM joint study research with Linux enhances the teaching and learning environment at Marist see the Educause effective practice

About Marist College

Marist College is a nationally recognized regional college listed as a top tier college by U.S. News & World Report, rated “highly selective” by TIME/The Princeton Review and listed in Yahoo’s 100 most wired colleges and universities (2001. A liberal arts college situated on the Hudson River in Poughkeepsie, NY, it has 3600 full-time undergraduates in 27 degree programs and 600 graduate students in MBA, MPA, Psychology, Computer Science, and Information Services programs.

Marist has a commitment to technology. Information Technology is emphasized in the Marist College Mission Statement and Strategic Plan. A unique partnership with IBM has resulted in its current joint study focusing on zSeries (S/390) mainframe computing with Linux and streaming media research and development. With its ATM backbone network, Marist has 215 faculty, 1632 student, and 320 networked pc. There are an additional 415 networked PCs in labs and 20 multimedia classrooms. The library has 205 workstations, four multimedia classrooms, and over 400 network ports for student laptops.

A digital library and archival collection of digital information in multiple formats (video, audio, animation, images and text), which runs on the IBM S/390 is the foundation for Marist’s multimedia technology initiative. A collaboration with the FDR presidential library has resulted in a digital library and database for scholars and researchers that is unique to presidential libraries.