information services and technology

IS&T

News about Information Services and technology throughout MIT

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Quantum Leap: An MIT Professor Takes on the Cosmos

• Lee Ridgway

Are there days when you feel like a cog in the machine? Or, to be au courant, like bits streaming in some giant computer? That feeling may be on the mark, according to Seth Lloyd, in his book *Programming the Universe: A Quantum Computer Scientist Takes on the Cosmos* (Knopf, 2006). Lloyd, a professor in MIT's Department of Mechanical Engineering, is a leading researcher in quantum computing – which takes place at the level of individual atoms. The thesis of his book is that the universe is nothing more, or less, than the ultimate quantum computer.

The idea of the universe as computer is not new. Lloyd refers to Isaac Asimov's short story, "The Last Question," from 1956, and Stephen Wolfram's book, *A New Kind of Science*, from 2002. Lloyd credits Konrad Zuse, developer of the first electronic digital computer in the 1940s, and Edward Fredkin, a former MIT professor, with first proposing, in separate papers in the 1960s, that the universe is a digital computer. Then there's the 1999 movie, *The Matrix*, which brought the concept of the universe as computer to the masses.

Bits of a Bigger Picture

The universe as computer might seem to be just another metaphor in a long string of myths and constructs. Humans have long struggled to come to grips with the origins, enormity, and complexity of the cosmos. Often, the metaphors have drawn upon the most advanced technology of the time. For example, after the invention of the mechanical clock in the 14th century, people would often compare the universe to the workings of a clock.

But Lloyd is not dealing in metaphors (though he does make good use of them in explaining difficult concepts). He lays out his position in the first paragraph of his introduction, where we get the universe as "the biggest thing there is," the bit (those 0s and 1s of computers) as "the smallest possible chunk of information," and the laws of quantum mechanics as governing the universe. Lloyd states that "The history of the universe is, in effect, a huge and ongoing quantum computation. The universe is a quantum computer." In the next 200+ pages, Lloyd explicates this assertion.

Not Just for Geeks

Reading about computing, quantum mechanics, and the universe may sound more than daunting for the average person. Aren't these the domains of computer scientists and programmers; theoretical physicists and mathematicians; astrophysicists and astronomers? Add to the mix the notion that the universe is computing information, and Lloyd has lots of explaining to do.

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Quantum Leap

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He does this in a manner aimed not so much at the specialist, but at the layperson who keeps up with scientific matters in the media, and who's had at least an introductory course in physics.

Lloyd succinctly describes digital computers (like laptops) and how they compute, and also provides some history. He summarizes the workings of the abacus and mechanical computing machines. For those steeped in the ways of computational devices, this part of the book could be skimmed, but for the novice, it's worth reading closely. Lloyd covers how to count in binary, bits and bytes, logic gates and circuits, and the logical expressions AND, OR, NOT, and COPY.

A Barrel of Monkeys

In Chapter 3's "story of the universe," Lloyd tackles the first and second laws of thermodynamics. In the course of this discussion, he moves from the traditional way of describing the universe in terms of physics, chemistry, and biology, to his computational view of the universe as an information processor.

Students of introductory physics know that the laws of thermodynamics are concerned with energy. Lloyd covers the first law – about the conservation of energy – in one page.

He gives the second law – generally summarized as "entropy" – more complete coverage. This is because he equates entropy, at the scale of atoms, with information. As Lloyd sums it up, "...entropy is the information required to specify the random motions of atoms and molecules." This section sets the stage for a more detailed discussion of quantum mechanics and quantum computing. This is also where Lloyd introduces a million monkeys, typing randomly away. These monkeys return periodically to help make key points as the book moves forward.

Weird Science

Next comes the fun part, especially if you like brain-warping ideas. Quantum mechanics is – as Lloyd happily points out – weird science. It's a strange mesh of wave-particle duality, Heisenberg's uncertainty principle, Schrödinger's equation, and other theories. Lloyd knows that he must carefully guide readers toward an understanding of this abstruse science. For the most part he succeeds, though you may need to reread paragraphs as you go along.

This short course in quantum mechanics leads to quantum computing, Lloyd's home turf. In about 20 pages, he lays out the theory, the physics, the current state of the experiments, and the potential of quantum computers.

In the last quarter of the book, Lloyd ties it all together in his hypothesis of a quantum-computing universe, from its creation, to life, to the current moment and the future. It is here that philosophical questions arise. If information implies intelligence, and the universe is the ultimate information processor, is the universe intelligent? Lloyd hedges on this, saying, "In the final analysis, to say that the world is alive, or that the universe thinks, is only a metaphor." Readers are left to ponder this; meanwhile, those quanta keep computing.

MIT Faculty and TAs Invited to Educational Technology Day

Date: Tuesday, September 12
Time: 1:00–5:00 pm
Place: Building 9, Rooms 151 and 152

Faculty and teaching assistants (TAs) – especially those new to the Institute – are invited to join representatives of IS&T's Academic Computing and other MIT offices concerned with educational technology for an afternoon series of presentations and demonstrations. Educational Technology Day will spotlight established and emerging technologies and services that support teaching and learning.

Show and Tell

Presentations will cover these technologies and more:

- *Stellar:* MIT's course management system
- *Wikis:* Collaborative Web environments for projects and constructivist learning
- *Blogs:* Interactive diaries, which can be used to support student learning
- *Podcasting:* Publishing of sound and video files
- *Digital video production and streaming:* Creating and posting large video files
- *Image repositories and tools:* Access to collections of digital images, which can be recombined and annotated using tools being developed at MIT
- *Geographic information systems:* Digital maps that can be combined with census or other data to provide new insights

There will also be continuously running demonstrations – and refreshments. For the full schedule, see

`http://web.mit.edu/acs/www/edtechday.html`

Consultants from Academic Computing will be on hand to discuss your teaching needs. You can also send email to <et-consult@mit.edu> to set up an appointment.

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`http://web.mit.edu/ist/news/`

New Web Site Opens Door to Mathematical Tools at MIT

• Violeta Ivanova

Information Services and Technology (IS&T) recently launched Mathematical Tools at MIT, a web site that gives the community access to comprehensive information on math software and related topics. Located at

http://web.mit.edu/ist/topics/math/

this new resource features an overview of commonly used computational and numerical software. It also has links to

- Information about math software licenses
- Tools for web publishing of mathematics
- Tutorials and FAQs
- Support resources

Math Software Overview

For academic use and research at MIT, three math software packages take the lead: MATLAB, *Mathematica*, and Maple.

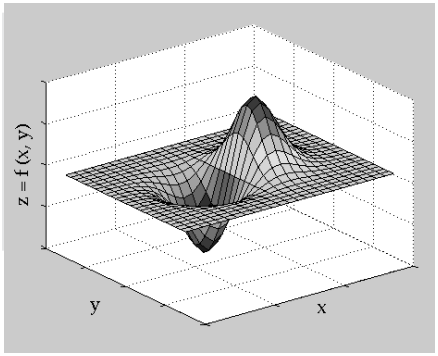
MATLAB

The MATLAB product family, from The MathWorks Inc., includes a set of modules – called "toolboxes" – for numeric computation, visualization, and algorithm development. The main module, MATLAB, is the most commonly used math software at MIT. It includes

- Built-in functions for data analysis, statistics, linear algebra, differential equations, and other computations
- High-level programming capabilities for developing user-defined functions and algorithms
- Functions for 2D and 3D visualization

MATLAB is the foundation for Simulink, a simulation and modeling platform, and all other MathWorks products. Users can extend the main MATLAB module with add-on toolboxes for advanced statistical analysis, algorithm optimization, signal and image processing, and discipline-specific functions such as bioinformatics.

A good knowledge of matrix mathematics is essential before using MATLAB; the name stands for Matrix Laboratory, and all computations are done in matrix form.



MATLAB lets users compute and plot a 3D surface over a 2D grid.

Mathematica

Mathematica, powerful symbolic math software from Wolfram Research Inc., handles complex computations that can include millions of terms. It also provides math typesetting capabilities and high-precision numeric computation abilities.

Mathematica has built-in functions for data analysis, statistics, linear algebra, differential equations, and 2D and 3D visualization. Add-on functions can handle advanced mathematical analysis. While some MIT classes use *Mathematica*, it is most often employed as a research tool.

Maple

Maple, from Maplesoft Inc., provides capabilities for numeric and symbolic computations; math typesetting and symbol recognition; data analysis and statistics; linear algebra and differential equations; and 2D and 3D graphics.

And More

All three of the major math packages are licensed for use on Athena. Athena users can access other math software as well – including Stata, SAS, and Splus. For a complete listing, see

http://web.mit.edu/acs/www/numerical.html

Math Software Licenses

Members of the community can acquire MATLAB, *Mathematica*, and Maple for personal and MIT-owned computers through IS&T's Volume Site License Software. Costs and restrictions vary depending on the package and whether you are faculty, student, or staff. For full details about math software licenses, see

http://web.mit.edu/ist/products/vsls/#spec

MATLAB is available at no charge to MIT students for academic use on personally owned machines only. For more information, students can go to

http://matlab.mit.edu/

Math Web Publishing Tools

Presenting formulae and computations on the Web is challenging, since browsers are not generally configured to handle math notation. IS&T maintains information about technologies for publishing math on the Web, including web pages on

- MathML (Mathematical Markup Language, a W3C standard)
- web*Mathematica* (available free of charge to licensed *Mathematica* users)
- MATLAB Web Server (a toolbox available to licensed MATLAB users)

Tutorials and Training

IS&T offers training on math software throughout the year, including a monthly MATLAB Quick Start class and a hands-on series, Introduction to MATLAB, during IAP. A schedule of classes is posted on the Mathematical Tools at MIT page, under Training.

IS&T also maintains online tutorials and other resources related to math software. These materials range from video tutorials and FAQs to lectures and exercises. For example, you can access a standalone tutorial on MATLAB, based on the IAP series, at

https://web.mit.edu/ist/services/educomp/math/intromatlab.html

Support

IS&T offers limited support for math software that includes installation and runtime issues. No support is provided for setting up computations. To seek assistance, contact the Athena Consultants at <olc@mit.edu> or 253-4435.

IS&T's Educational Technology Consultants provide the following services free of charge to faculty, instructors, and teaching assistants (TAs)

- Assisting with the use of math software in academic courses
- Organizing and teaching training sessions in academic departments
- Programming support for the development of educational materials

Faculty, instructors, and TAs can contact the Educational Technology Consultants at <et-consult@mit.edu> or 253-0115.

The Medium Is the Message: IS&T Releases Jabber Service

• Joanne Hallisey

After a successful pilot, IS&T has released Jabber as an instant messaging (IM) service for MIT. IS&T launched this fully supported service in response to community demand for better online collaboration tools. Jabber is the first of several collaboration tools that IS&T will introduce on an experimental basis over the next year.

How IM Works

Instant messaging enables online text-based communication in real time between two or more people. The IM client indicates whether people on a user's list of contacts are available, or are busy or away from their computers. A message log lets users retain information exchanged during IM sessions, such as URLs or work assignments.

IM continues to grow in popularity, not only for personal exchanges, but for business and academic uses. IM enhances the ability to multi-task and get answers on the spot. It also has the potential to humanize electronic interactions by adding a sense of immediacy and connection.

Jabber at MIT

IS&T's Jabber service lets MIT users communicate with one another and with Jabber users at other universities and elsewhere on the Internet. Use of the MIT namespace (*username@mit.edu*) makes it easier to identify screen names of community members.

While Jabber itself is not a multi-protocol IM client, there are IM clients that support Jabber and let you chat with users on AOL, ICQ, MSN, Yahoo, and other commercial IM services.

Jabber relies on XML-based protocols to create standard IM functionality: one-to-one chat, multi-user chat, and the ability to subscribe to someone else's presence. It also supports the creation and joining of chat rooms for group communication.

IS&T chose Jabber because it is an open-source protocol supported by many clients on multiple platforms. This means that users can access the Jabber service from nearly any combination of hardware and operating system. Since the code is not proprietary, various developers have created a wealth of Jabber-based software.

Jabber Clients

Gaim and Adium are well-known Jabber clients, and were tested successfully in the MIT environment during the Jabber pilot. IS&T has released installers for Gaim 1.5.0 for Windows and Adium 0.89.1 for Macintosh. Linux and Athena users have access to Gaim 1.5.0 as part of Red Hat Enterprise Linux.

These clients, recommended for all members of the MIT community, will also be part of the suite of core applications for incoming students this fall.

For download links, go to the Jabber Instant Messaging Service page at

`http://web.mit.edu/ist/services/messaging/jabber.html`

Note: IS&T has no immediate plans to discontinue support for the MIT-only Zephyr messaging service.

Extending Jabber's Reach

Testing the Jabber protocol on campus is the first step in a strategy to implement an integrated platform of "presence" applications that enable real-time communication. In addition to IM, the Jabber protocol can extend presence services to email, voice over IP (VoIP), and conferencing. It works with a wide range of devices, including computers, cell phones, and PDAs.

Support

If you have questions about installing Jabber or using the service, go to the Jabber service web page noted above and click on the link for the IM client for your platform. For help with Jabber, contact the Computing Help Desk at <computing-help@mit.edu> or 253-1101.

If you have suggestions about the Jabber service, contact the release team at <wocky-release@mit.edu>. Community feedback will be instrumental in determining how the service evolves.

This column presents announcements about IS&T-supported software. For more information about recent releases, see `http://web.mit.edu/swrt/`

Backing up Intel-based Macintoshes

Tivoli Storage Manager (TSM) is MIT's enterprise data backup and restoral software. The current version, TSM 5.3.4, does not work on Intel-based Macintoshes. IS&T has documented this on its support page for Intel Macs at

`http://web.mit.edu/ist/topics/macos/intel.html`

IS&T recently discovered that an older version of TSM, 5.2.3, does work on Intel Macs, with the exception of being able to perform scheduled backups. IS&T now recommends that users in departments, labs, and centers adopt TSM 5.2.3 as an interim solution for backing up Intel Macs until the universal version of TSM is available. IBM expects to release the universal version by year end or in early 2007.

To learn more about this issue, see

`http://itinfo.mit.edu/article.php?id=8173`

Single Download for "Getting Started"

The start of a new academic year brings the usual rush of new students and faculty. One of the first things newcomers want to do when they arrive on campus is to get their computers or laptops set up on MITnet.

In the past, IS&T created and distributed a CD that contained a set of network-related software. This year, the primary mode of distribution will be a Student Bundle, available as a web-based download via the MIT Software Distribution Site at

`https://web.mit.edu/software/`

Separate versions of the bundle are available for Windows, Macintosh, and Linux users. Contents vary depending on the platform, but all of the bundles include software for virus protection, Kerberos authentication, Jabber instant messaging, and file transfer.

If you work with incoming students or new staff, you may want to direct them to this download. IS&T plans to update the online Student Bundle as needed; it has also created a limited number of "getting started" CDs for those who stop by N42 with questions about connecting to MITnet.

Email Authentication Remains a Work in Progress

• Jag Patel

A common question from computer users is "Why can't we stop all the spam?" Another here-and-now headache is phishing, where scam artists use forged email to try to trick you into divulging personal financial data.

While spam and phishing are different problems, they are possible for the same reason: the Simple Mail Transfer Protocol (SMTP) lacks built-in security services. This protocol has been used for more than 25 years to send email around the world. As it exists, SMTP does not have the ability to authenticate the senders of email, to ensure that the source of the email is trustworthy. Given the open nature of SMTP, spammers and phishers can easily send email from forged email addresses.

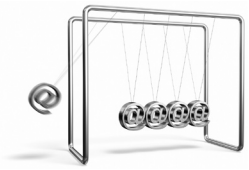
Extensions and Filters

To address security gaps in email, programmers have deployed several extensions to SMTP and other techniques. Unfortunately, no one solution has been effective. Internet Service Providers (ISPs) and users may filter their mail using software such as SpamAssassin or Bayesian filters. With filters, not all spam (or phishy email) is caught, and occasionally legitimate mail is tagged or discarded as spam. Block lists, which list suspicious sources of email, let a user or ISP reject email from a listed location. One issue with block lists is that users may not have the same Internet Protocol (IP) address when sending mail – the same email author could have one address at work, one at home, and one from a wireless network at a cafe.

Proposed Solutions

The Internet Engineering Task Force and major ISPs are looking at solutions to help establish the identity of an email sender. The solutions involve identifying where the email comes from, and determining if the identified source is trustworthy.

Two proposals include Sender Policy Framework (SPF) and Domain Keys Identified Mail (DKIM). SPF is based on comparing the IP address the email came from with who is allowed to use that IP address. For MIT, this may mean



that mail from *anyone@mit.edu* is "legitimate" only if it comes from 18.7.22.100, the IP address for outgoing.mit.edu. Messages from *@mit.edu* that don't come from 18.7.22.100 would be treated as suspicious. DKIM determines email authenticity by looking at digital signatures.

Both methods have issues. SPF may fail to identify legitimate email from those who use email forwarding services, like MIT's Infinite Connection for alumni. DKIM has a high computational overhead, though this may disappear as computers become more powerful.

IS&T will continue to track advances in email authentication, and will consider approaches that might work in the MIT environment. There are no quick fixes, and it's likely that multiple approaches will be needed to quell email forgeries. To learn more about email authentication, visit

`http://wikipedia.org/wiki/E-mail_authentication`

VoIP Pilot Provides Telephone Services over MITnet

• Dan Arsenault and Robyn Fizz

With the participation of colleagues from several MIT groups, IS&T is piloting Voice Over Internet Protocol (VoIP) technology to provide telephone services via the MIT network. VoIP is not intended to replace existing phone service options at MIT, but to coexist with them, providing the community with more choice. VoIP offers both convenience and customization, and is a key application in a set of converging next-generation communication technologies.

The VoIP Pilot

MIT's VoIP pilot, which began in March 2006, has over 400 participants. They are sending and receiving phone calls over the network using one of three types of VoIP phones:

- VoIP desk sets that resemble the current ISDN phones
- Wireless VoIP phones that are similar to cell phones
- VoIP conference phones

VoIP offers features similar to those of MIT's current telephone service, but with some additional capabilities:

- The VoIP voice mail system – separate from the system on MIT's ISDN phones – provides the option for messages to be sent to email.
- User preferences can be updated via web-based self-service tools.
- Records of voice messages can be tracked online.
- VoIP can be integrated with other network applications for greater flexibility in delivering voice services.

Pilot participants have also discovered other advantages:

- When a configured VoIP desk phone is plugged into a home network router, the phone continues to have an "MIT presence" (i.e., it works as if it is still calling from MIT).
- International travelers who use the MIT VoIP service can make remote calls as local calls, cutting down on expensive international calling fees.
- An MIT phone number can be assigned to multiple devices.

Housemasters for new MIT residences are also testing VoIP, and MIT may implement it in new construction where infrastructure cost reductions can be realized.

Forward Motion

VoIP is part of MIT's Integrated Communications Project (ICP), an exploration of real-time digital services. ICP initiatives range from expanded audio conferencing to dorm collaboration spaces to Jabber instant messaging.

After reviewing the findings of the pilot, IS&T will determine next steps in rolling out VoIP at MIT. Interim pricing for VoIP services is comparable to traditional phone service; IS&T is working with its User Pricing Committee to develop a pricing structure for FY08.

If you have questions about the pilot or planned service, send email to the VoIP Support Mailing List at <voip-pilots-support@mit.edu>.

Request Tracker: Your Ticket to Managing Customer Cases

• Stephen Turner

Several groups at MIT get a stream of email or calls from customers – inquiries, requests for service, or problem reports. Since responding often involves a few rounds of clarification, research, and follow-up, it can be a challenge to keep on top of it all. IS&T's Request Tracker (RT) service, open to the MIT community, provides support groups with an effective solution for tracking customer cases.

RT is a powerful open-source system that enables a group of people to manage requests and issues submitted by customers. Each part of the conversation between a support provider and customer is logged, making it easy for the support group to track where each case stands. RT is also very flexible, enabling each group to modify RT's functionality to serve that group's needs.

Widespread Adoption

Several IS&T groups, including the Computing Help Desk, recently migrated from the homegrown Casetracker tool to RT. The switch enables them to take advantage of valuable features like access control – to determine who can read and respond to cases – and customized email responses to clients or consultants.

RT is also the system of choice for several other groups at MIT, including

- *Environment, Health, and Safety Office (EHS)* – for questions and requests concerning hazardous waste disposal, recycling, prevention of pollution, and industrial hygiene
- *HR-Payroll* – for tracking issues related to the recent go-live effort
- *MIT Libraries AskUs Service* – for questions about subject matter, collections, and library services

Tech Specs and Developments

Request Tracker at MIT is a web-based system that runs on an Apache web server on a Unix machine. The RT software is based on Perl and uses the templating system Mason. Underlying the system is an Oracle database. MIT certificates are used to control access to the system.

IS&T has been actively participating in the community of RT developers. Some of the enhancements made by IS&T programmers have been incorporated into the core RT system; others have been well received as add-on contributions to the product via an RT wiki.

RT at MIT

MIT's Request Tracker system resides at

`https://help.mit.edu/`

For an overview of the service, go to

`http://web.mit.edu/ist/services/rt/`

If you have questions about RT, you can reach the Request Tracker team at <tooltime @mit.edu>.

Using RT to Track Your Cases with IS&T's Computing Help Desk

The Computing Help Desk uses Request Tracker to handle the various inquiries that come its way. Any question you ask the Help Desk – by email, phone, or during a walk-in visit – is recorded in RT in the form of a "ticket."

You can use RT to review and update your existing tickets. First, make sure you have working certificates. Then go to

`https://help.mit.edu/SelfService/`

The system displays any open tickets you have. Selecting the "Closed tickets" link shows you all of your cases that have been resolved.

To view the full description of a ticket in a list, click on the ticket entry. By using the "Update This Ticket" button, you can note additional information and steps you have tried.

To submit a new question to the Help Desk, use the "New ticket" link on the left. On the following screen, choose the MIT Computing Help Desk (or Business Applications from the drop-down menu) and press "Go." Next, fill in the Subject line to summarize your question, and use the box marked "Describe the issue below" to detail the problem as accurately as you can. The Help Desk will get back to you either by email or phone.

Procurement and IS&T Revamp SAPweb Purchasing Applications

• Lorraine Rappaport

Coming in September, several SAPweb purchasing applications will sport a new look. In cooperation with the Procurement Department, IS&T is updating the SAPweb Create Requisition, Display Purchase Order, and Display Invoice applications. The basic functionality of these applications will remain the same.

The changes are primarily a behind-the-scenes infrastructure conversion from MIT's custom code to SAP's new, fully supported Web Application Server and NetWeaver platform. These changes will give users a more consistent experience among the various SAPweb applications. The revamped applications will have a uniform look-and-feel, including those familiar blue backgrounds.

Added Features

Users will also see several enhancements, including

- Ability to search for a range of purchase orders (POs) by date, vendor number, cost object, profit center, fund center, and other search parameters
- Additional payment history information, including split distributions and details about non-check payments (e.g., wire transfers)
- Ability to add new lines to the Create Requisition form individually instead of preselecting the number of line items that are displayed
- Improved look-ups for vendors, G/L accounts, and material groups
- Clearer error messages

The conversion of the SAPweb purchasing applications will be done in stages to ensure a smooth transition.

Get Acquainted

IS&T and Procurement will give free demo sessions in early September on these enhancements to SAPweb. You can also get an informal look at the new screens by stopping by Procurement's booth at the MIT Vendor Fair on September 14.

To learn more about the upcoming changes and to view the schedule of demo sessions, visit the SAPweb site at

`http://web.mit.edu/sapweb/`

and click on the Purchasing tab.

AdminIT Program: Resources for Desktop Computer Maintenance

• Chuck King

Most administrative staff at MIT don't have much spare time to maintain their computers – upgrading software, installing anti-virus patches, backing up files, running disk utilities. While some larger departments on campus have a staff of information technology (IT) professionals, many departments have no IT support or depend on one or two IT staff with very full workloads.

Are there any options for departments in need of IT support and maintenance? The short answer: yes. IS&T's expanded AdminIT Program offers desktop IT services to administrative members of the MIT community at no charge to the department. The goal is to increase the reliability of administrative computing through standardization, timely hardware and software upgrades, and effective end-user support.

IS&T works with assigned liaisons in departments, labs, or centers (DLCs) to set up the AdminIT program in any given area.

AdminIT Services

Key services of the program include

• *Semiannual preventive maintenance visits.* During a typical preventive maintenance visit, an IS&T consultant ensures that a computer's hardware, software, and virus protection is up to date and that a sound backup strategy is in place.

• *Specialized computer support.* IS&T offers ongoing support via telephone and email; for emergencies, IS&T consultants make on-site visits.

• *Options for administrative desktop renewal.* Through a related initiative, the Administrative Desktop Renewal Program, IS&T assists departments with equipment standardization, desktop life cycles, and discounts on large purchases of computer equipment. This program is limited to qualified administrative users only.

• *Forum for IT communication.* The AdminIT Program facilitates communication between administrative departments and IS&T on topics such as hardware standards and support processes.

Behind the Scenes

The AdminIT and Administrative Desktop Renewal Programs are run by IS&T's Departmental Information Technology Resource (DITR) Team. Equipped with broad knowledge of IT services and MIT's strategic plans for computing and networking, DITR helps MIT community members apply computer technology to their work and research.

For details about AdminIT or Administrative Desktop Renewal, go to

`http://web.mit.edu/ist/services/hardware/adminit/`

If you're interested in or have questions about these programs, send mail to <ditr@mit.edu>. To learn more about DITR's services, including for-fee service level agreements, go to

`http://web.mit.edu/ist/teams/ditr/`

SAP's Manufacturing Resource Planning Suite Debuts at Broad

• Ian Bennett

The Eli and Edythe L. Broad Institute – a research collaborative of MIT, Harvard and its affiliated Hospitals, and the Whitehead Institute – was founded in 2003 to bring the power of genomics to biomedicine. Its scientists construct tools for genomic medicine for the global scientific community and apply these tools to the understanding and treatment of disease.

While driven by its research goals, the Broad Institute relies on robust business systems to operate efficiently. Its procurement systems have been integrated into SAP since October 2003. More recently, though, the Broad Institute needed a replacement system for production processing and stock keeping – one that would be fully integrated with its financial systems.

Getting to the Goal

In November 2005, a project team – composed of select users from Broad, SAP experts from IS&T's Student and Administrative Information Services (SAIS), and a few key consultants – came together to evaluate options for the replacement system. The team selected SAP's Manufacturing Resource Planning (MRP) suite.

With SAP's tight integration to business processes and the unusual application of standard manufacturing processes within a pure research environment, the MRP project proved challenging. The implementation, which interfaces with the Broad's Process Information System, was released this past June. It includes the following SAP modules:

- Materials Management
- Production Processes
- Quality Management
- Product Costing

The end result is a modified manufacturing implementation that supports enhanced inventory tracking, limited product and project costing, quality management, and process order management. Despite its complexity, the system is both flexible and easy to use.

This highly scalable solution will be able to handle expansions into new areas and projects. The team expects that the development of these tools for the Broad Institute will have wider application potential for other areas at MIT.

To Learn More

For more information on the implementation of SAP's MRP suite at Broad, contact Bob Romanowicz at <rroman@mit.edu>. To learn more about the Broad Institute's mission and research, see

`http://www.broad.mit.edu/`

Getting Help

If you don't know where to get help for your computer, network, or telephone problems, dial one of the help lines listed to the right.

If you prefer to use email, you can send your questions to the corresponding email addresses on the far right. (When logged into Athena, you can also use the `olc` command to send questions to Athena's online consultants.)

You can also submit a question online via Request Tracker on the Getting Help page at

`http://web.mit.edu/ist/help/`

For help with...	Dial...	Or send a message to...
General computing questions Macintosh, Windows, network/ connectivity, business applications, computer buying advice	253-1101	computing-help@mit.edu
Academic computing	253-0115	et-consult@mit.edu
Athena Computing Environment	253-4435	olc@mit.edu
Computer and printer repairs	253-0815	pcservice@mit.edu
Disabilities and computing	253-7808	atic@mit.edu
Telephone and voice mail services	253-3670	telecom-csr@mit.edu
Telephone repairs	253-4357	3help@mit.edu
Unix/Linux	253-1103	unix-linux-help@mit.edu

Surf Sites: Universal Truths

Seth Lloyd takes on the big questions about the nature of reality in his new book, *Programming the Universe* (see lead article). Based on his research in quantum mechanics, Lloyd equates the cosmos with a giant quantum computer. Other branches of science have their own spin on the origins and evolution of the universe. From astronomers to string theorists, there's a world of speculation out there.

To learn more about the vast cosmos in which we live, check out some of the sites to the right.

Antimatter: Mirror of the Universe
`http://livefromcern.web.cern.ch/livefromcern/antimatter/`

Astrobiology Magazine
`http://www.astrobio.net/`

Cosmic Evolution – From Big Bang to Humankind
`http://www.tufts.edu/as/wright_center/cosmic_evolution/`

Cosmic Log – Quantum fluctuations in space, science, exploration
`http://cosmiclog.msnbc.msn.com/`

The Elegant Universe (Nova)
`http://www.pbs.org/wgbh/nova/elegant/`

The Official String Theory Web Site
`http://www.superstringtheory.com/`

Universe Forum
`http://cfa-www.harvard.edu/seuforum/`

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