USENIX notes

USACO: The USA Computing Olympiad

by Rob Kolstad
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[Editor's note: USENIX is a major sponsor of USACO.—RK]

The end of the domestic programming contest season is upon us. Juniors Eric Price (from Thomas Jefferson High School of Science and Technology) and home-schooled Alex Schwendner maxed the US Open with perfect 1000 point scores. They and 14 others will attend USACO training camp in Wisconsin to compete for four spots on our international traveling team headed to the International Olympiad in Informatics (IOI) in Athens, Greece, this September.

The coaches have huddled and run the USACO finals at the University of Wisconsin–Parkside. I thought you might be interested in some of the students and their interests/accomplishments. I know that we read in the newspapers too often about all the bad things that pre-college students do, whether it's wild parties that get out of hand or serious crime (my community has seen a few deadly shootings lately). The students introduced below appear to exemplify the other side of the coin. Camp participants are chosen based on their potential to win a gold medal at the international competition this year or in some future year.

A quick survey of the seniors on the All-American team yields these results: five students bound for MIT, two for Harvard (both originally from California), and one each headed for Princeton and Carnegie Mellon in Pittsburgh.

We asked them for quick little introductions on a mailing list set up for finalists, and these are presented below, in no particular order.

USACO Finalist Competitors

Joe Zimmerman is a 15-year-old Rhode Island sophomore. "I started programming in sixth grade, having stumbled across a copy of VB somewhere in my travels. Of course, I was immediately hooked, and went on to learn C++, C, Java, BASIC, in that order. Eventually I heard of these nifty things called algorithms, and a couple of years and a lot of problems later, here I am." Joe also qualified for the USA Math Olympiad (USAMO) this year (as did many other USACO members). Joe is a Linux and MacOS fan. He also enjoys "Frisbee, learning languages, watching *Seinfeld*, reading a good book, hanging out with friends, etc."

Russian immigrant Boris Alexeev, graduating senior from Athens, Georgia, not only attended last year's camp and IOI (B-team member) but also likes "math, bouldering, driving, ultimate Frisbee, music, black currant sorbet, foosball, Perl, air hockey, philosophizing, and pretty solutions." Boris also placed second in the Intel (formerly Westinghouse) Science Talent Search, a prize worth $75,000. Boris intends to major in computer science theory.

Marcello Herreshoff attends high school across the street from Stanford University in California. He runs an extensive Web site with, among other things, free software he created, poems he's written, and political and philosophical postings. He enjoys programming, poetry, juggling, hand-blowing soap bubbles, classical piano performance, philosophy, mathematics, and playing the jaw harp. He listed languages he knows: "C/C++ (with GNU extensions, of course!), Perl, various shells, Scheme/Lisp html (if you are userly enough to actually consider it a language), LaTeX, m4, cpp and other macro languages," and others. He has

created "a Linux tutorial, a planetary simulator, a version of vi written entirely in Perl, [and] a contribution to xbindkeys allowing for scheme-based configuration files."

Fourteen-year-old John Pardon hails from Durham, North Carolina, where his father is a math professor. He is interested in computer science, math, and cello. He recounts, "I don't remember exactly when I started programming; it was sometime before 4th grade, though. I took the USAMO this year for the first time and was invited to [training camp]. I am taking Calculus BC this year. I have been playing the cello for eight years. I play with the Duke University String School in their orchestra and in a chamber group. My favorite piece is the Elgar Concerto for Cello." At camp, we learned that his fifth grade programming project was an expression parse, complete with a proper parse tree. "Dad found a graduate student to help me," he demurs.

Eric Ma, from Maryland, is another math and computer competitor. "I began programming in around seventh grade with True Basic, then learned about USACO in ninth grade and began learning C++ that year.... Like a lot of others, I play chess, the piano, cards, and of course, video games. I also like listening to music (just about anything), and watching and playing sports, especially football (go Packers!) and basketball."

Anthony Kim, junior from TJHSST, likes computer programming and math and is "a dedicated member of TJ's math team and computer team. I started programming in QBasic when I was in sixth grade. I wrote several simple programs that printed out various star pyramids, [performed] basic computations, or drew something. Then I stopped programming during the following two years in middle school for some reason. I returned to programming (this time in C++) my freshman year in an introductory computer science course and took interesting computer science courses offered at TJ later. I like to play basketball, football, Frisbee and computer games (mostly old arcade games now)."

Talented Adam Rosenfield from Lexington, Massachusetts, was another member of last year's IOI B-team and says, "I've been programming since I was about nine or so. I started with QBasic, moved on to Pascal, and then on to C++, which is what I use now. I also know Java.... I enjoy playing video games, especially RPGs, adventure, and RTS games, watching the local sports teams, biking, skiing, playing Frisbee, and playing bridge. I also play the clarinet in my school's wind ensemble." Adam has been a USAMO participant for four years.

Fifteen-year-old Richard Ho also attends high school across the street from Stanford. "My interests are in computers, math, and piano. I've taken BC calculus AP during my freshman year. Also, I qualified for the USAMO in both my freshman and sophomore years. I've also received second place category award in the California State Science Fair. I started programming with TI-BASIC on my TI-89, and moved on to C/C++ when I was 10. This year, I learned Java and Scheme in school.... I like playing the piano; I have played piano for more than 10 years. I also enjoy listening to classical music, although playing it is more enjoyable." Richard's impromptu extended piano concerts at camp were awesome. Coach Percy Liang, an excellent keyboard artist who sometimes spends 20 hours/week practicing, said, "Richard's massive repertoire is incredible."

Nate Bauernfeind, 17, attends a boarding school in northern Wisconsin. "I've been programming ever since I can remember (my parents claim since before I could talk, but well... you can never trust parents). I've learned pretty much all on my own. In sixth grade I learned VB, and the following summer I took a C++ class. I enjoy playing basketball, ultimate Frisbee, photography, reading, chess, and disturbing the peace with my guitar."

Home-schooled Alex Schwendner, 17, has attended three USACO camps and two IOIs already. Alex occasionally audits graduate math classes at the University of Texas in his home town of Austin. "My favorite data structures are tries and hash tables," he writes, "and my favorite algorithms include network-flow, FFT, Bellman-Ford, Rabin-Karp, and DP algorithms. I enjoy programming for interesting projects when I have a good idea for one. I really like LaTeX. I also do the Math and Physics Olympiads, and have been invited to both of their camps this year (and previously). I'll be going to RSI (Research Science Institute) at Caltech and to MOP (the Math Olympiad Program [training camp]) later this summer. I enjoy bridge, fencing, chess, Diplomacy, science fiction, and juggling."

Junior Tom Belulovich from New Jersey "started tinkering around with QBASIC when I was about eight or so, and started learning C++ Freshman year. I also do math competitions, like AMC, AIME, and USAMO."

Colorado junior Ben Joeris says, "I've been programming since I was 10. I worked for a startup game company during junior high, but they went belly up.... Recently I have been working on research in circular string-searching algorithms with applications in group theory with Ross McConnell, a professor at Colorado State University. I enjoy playing violin (and, occasionally, guitar), composing music, and solving fun math problems. I'm also into Science Olympiad. Of course, I also love listening to music. My personal favorite bands are Anti-Flag, Propagandhi, and Apocolyptica."

Math and computer whiz Anders Kaseorg, 18, is a home-schooled senior from Charlotte, North Carolina, who won this year's national championship for sustained performance throughout the year. He has "been programming from age five, though I only started USACO last year right before the Open, in time to make training camp and the IOI team. I also do math competitions: this will be my fifth year at the Math Olympiad Program.... I juggle approximately seven balls and five clubs, and like playing the piano, Frisbee, and chess."

TJ senior Brian Jacokes has attended two camps already. He likes "math contests, ultimate Frisbee and disc golf, piano, ska music, reading (Vonnegut and Rushdie), ice cream, ping pong, chess, running (mile, 2-mile, 5k), *The West Wing,* bridge, poker, and Minesweeper. Oh, and I like pirates (not the music/software pirates [but] the ones that sail the high seas and say 'ARRRR' and plunder booty). I'm a fan of vi, Linux, and dynamic programming." Brian left camp after contest two (about 1:30 p.m. on Friday), flew to his home near Washington, DC, ran a distance event in the regional track competitions, and returned in time to win Saturday's five-hour competition that started at 8 a.m.

Tiankai Liu, 18, from California, appears extensively in the new book *Countdown* about the USA Math Olympiad team members. He attends Exeter, a prestigious private boarding school on the East Coast, and is heading into his third training camp. He's won two gold IOI medals already and more medals in international math competitions. "I started programming in QBasic in second grade. In my childhood, I wasted a lot of time playing computer games and trying to make my own. I couldn't understand pointers, so I only switched to C in tenth grade. I am also interested in mathematics. I have competed in MATHCOUNTS, ARML, USAMO, and the IMO. My hobbies include piano (which I've played for many more years than I'm good for), foreign languages (of which only in French am I close to being competent), and Quadball."

Notice the frequent ties to early programming experience, math, piano, juggling, and Frisbee. I don't know exactly how to interpret this. They are a very interesting group of people who obviously focus a bit on the technical side of life but who universally seem to have other interests, some quite far afield from those of stereotypical nerds.

The Finals

The final competition week proceeded swimmingly, with USACO director Don Piele organizing operations and head coach Rob Kolstad coordinating the contests, grading system, and extracurricular events (miniature golf, movie night, business simulation contest, amusement park—that sort of thing).

Four coaches kept the problems and analyses running smoothly:

- CMU grad student Hal Burch. You've seen his work at the map of the Internet in *National Geographic* magazine. He also co-founded a startup company with our own Bill Cheswick. Hal earned a Best Paper award at USENIX's LISA 2000 conference.
- MIT grad student Brian Dean. Brian won MIT's highest award for graduate teaching assistants last year. He's working on a multimedia algorithm book, currently at 400 pages.
- Harvard alumnus and MIT graduate student Russ Cox. Russ recently earned his Emergency Medical Technology certificate and has directed two musical theater productions over the last couple of years.
- Recent MIT graduate Percy Liang. Percy also coached MIT's ACM contest team, which placed fifth in the international final (highest of all USA teams).

Results were often printed and distributed before the competitors rose from their seats after the intellectually strenuous three- and five-hour competitions.

The opening "fun" contest (used to make sure the competitors are familiar with the extant machines, environment, and compilers) was to recode the itoa() function for speed. The better programs were running at 20x the speed of sprintf() using very clever algorithms.

A new fun event this year was IBM's "CodeRuler," a Java-based competition in which programs role-played a medieval kingdom, directing peasants and knights to take over land and even other kingdoms. A colorful presentation of the teams battling each other in frame-by-frame animation pitted USACO programs not only against each other (in rounds with 4–6 total "rules") but also against the ACM champions from this year's world competition. My recollection is that only a program from Russia bested the best of the USACO competitors' submissions. A final round showcased the program from coaches Dean and Liang against the best of the USACO finalists. Happily, the coaches prevailed. I think the IBM representative was impressed.

We chose the four finalists to represent the USA in September's International Olympiad to be held in Greece:

- Senior Brian Jacokes
- Senior Anders Kaseorg
- Junior Eric Price
- Junior Alex Schwendner

This is potentially the strongest team we've ever had, so my hopes are high for a great medal performance.

This year's USACO program was sponsored by:

- USENIX
- SANS
- ACM
- IBM

We're seeking sponsors at the contest level for next year so that we can expand our program to individuals closer to the entry level. Long discussions at camp evolved a sort of "trickle-up" theory that suggests that higher quantity and quality at lower levels will foster higher quantity and quality at higher levels as the years go by. We're expanding the competition rule; this year's highest-level competitions had as many as 300 people—all competing a full level above the highest-level competitions of only two to three years ago.

Learn more about USACO at *http://www.usaco.org,* or even try the training at *http://train.usaco.org/usacogate.*

Alain Hénon Retires

by Rob Kolstad
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Al Hénon, *;login:* managing editor since 2001 and typesetter since 1997, has retired as of the June issue. Al marshaled authors (and editors) extremely successfully during his tenure. Full of life and energy, his international background contributed a real flair to everything he touched.

I asked Al why he would want to retire, given the success we're having. "Rob," he said, "I've had a job continuously since 1958. That's going on 46 years without taking any real time off. I think it's time." Well, I guess so!

Please join me in thanking Al for his superb contributions and in wishing him the greatest success in his next venture. Please join me in welcoming Jane-Ellen Long back as our managing editor.

The USENIX Association Financial Report for 2003

by Ellie Young
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The following information is provided as an annual report of the USENIX Association's finances. The accompanying statements have been reviewed by Michelle Suski, CPA, in accordance with Statements on Standards for Accounting and Review Services issued by the American Institute of Certified Public

Accountants. Accompanying the statements are several charts that illustrate where your USENIX and SAGE membership dues go. The Association's complete financial statements for the fiscal year ended December 31, 2003, are available on request.

FINANCIAL STATEMENTS SUMMARY

Although the trend of low conference attendance continued in 2003, USENIX is a healthy organization. In 2003, holding the same number of conferences as the previous year, USENIX had a net operating deficit of $116K (vs. $831K in 2002). During the budgeting process, USENIX attempted to break even by raising registration fees slightly, continuing to spend less in good works, and reducing staff, overhead, and expenses. Even so, a deficit resulted, due to lower conference attendance at most conferences, attrition/penalty fees imposed by the hotels for our failure to meet room block commitments, and lower membership revenue. The performance of the Reserve Fund improved, and this offset the deficit. USENIX ended the year with an increase in net assets of $457K.

USENIX MEMBERSHIP DUES AND EXPENSES

USENIX averaged 6,500 members in 2003, a 14% drop from 2002. Of these, 53% opted for SAGE membership as well.

Chart 1 shows the total USENIX membership dues revenue ($650K) for 2003, divided into membership types. Chart 2 presents how those dues were spent. Note that all costs for producing conferences, including staff, marketing, and sales and exhibits, are covered by revenue generated by the conferences.

SAGE

Chart 3 shows SAGE revenue sources for 2003 (primarily, membership dues of $130K and the revenue share from the LISA conference of $109K). Chart 4 shows all SAGE expenses (a total of $262K).

OTHER USENIX PROGRAMS

Chart 5 describes how the money allocated to Student Programs, Good Works, and Standards Activities ($108K) was spent in 2003. Chart 6 shows how the USENIX administrative expenses were allocated. (The category "other" covers such items as taxes, licenses, bank charges, and miscellaneous expenses.)

Chart 1: USENIX Membership Revenue Sources 2003

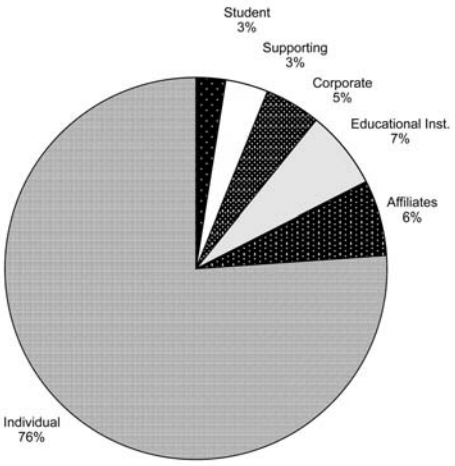


Chart 2: Where Your 2003 Membership Dues Went

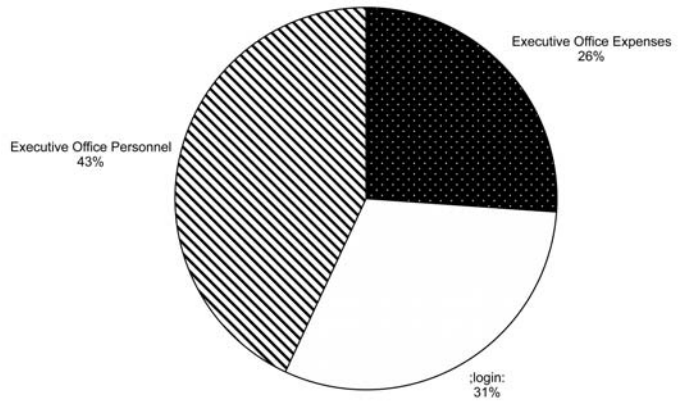


Chart 3: SAGE Revenue Sources 2003

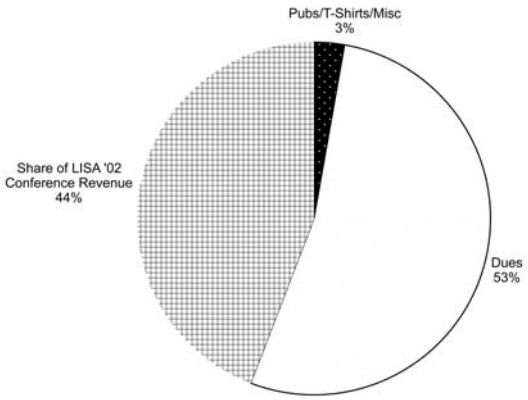


Chart 4: SAGE Expenses 2003

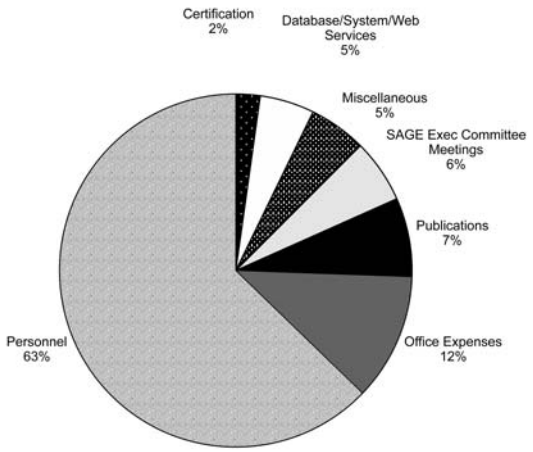


Chart 5: Student Programs & Good Works 2003

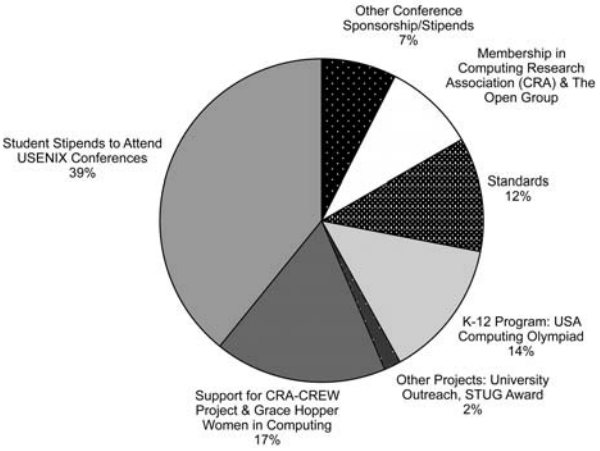
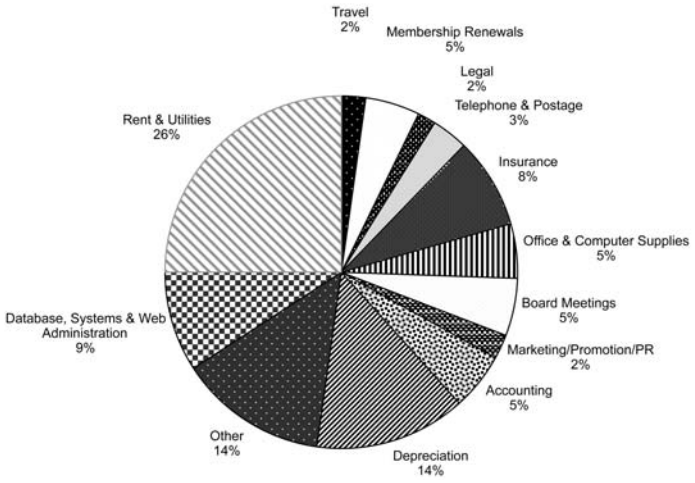


Chart 6: USENIX Administrative Expenses 2003



USENIX ASSOCIATION
STATEMENTS OF FINANCIAL POSITION
As of December 31, 2003 and 2002

ASSETS	2003	2002
Current Assets		
Cash & cash equivalents	$ 705,498	$ 1,049,294
Receivables	91,265	44,919
Prepaid expenses	24,409	27,824
Inventory	16,519	22,045
Total current assets	837,691	1,144,082
Investments at fair market value	4,916,653	4,346,762
Property and Equipment		
Office furniture and equipment	444,540	433,538
Less: accumulated depreciation	(321,667)	(256,939)
Net property and equipment	122,873	176,599
	$ 5,877,217	$ 5,667,443
LIABILITIES AND NET ASSETS		
Liabilities		
Accrued expenses	$ 108,036	$ 355,568
Deferred Revenue	13,000	12,390
Total liabilities	121,036	367,958
Net Assets		
Temporarily Restricted Assets		
Unrestricted Net Assets	5,756,181	5,299,485
Net Assets	5,756,181	5,299,485
	$ 5,877,217	$ 5,667,443

USENIX ASSOCIATION
STATEMENTS OF ACTIVITIES
For the Years Ended December 31, 2003 and 2002

	2003	2002
REVENUES		
Conference & workshop revenue	$ 3,049,096	$ 3,371,062
Membership dues	649,079	741,587
Product sales	13,524	20,129
SAGE dues & other revenue	136,119	137,182
SAGE Certification	1,200	847
Total revenues	3,849,018	4,270,807
OPERATING EXPENSES		
Conferences & Workshops	2,577,839	3,083,362
Membership; login:	470,772	553,228
Projects & GoodWorks	148,854	300,281
SAGE	242,773	442,427
SAGE Certification	6,878	316,236
Management and General	406,727	367,678
Fund Raising	110,840	39,007
Total operating expenses	3,964,682	5,102,218
Net operating surplus/(deficit)	(115,664)	(831,411)
NON-OPERATING ACTIVITY		
Donations	100	45,560
Interest & dividend income	170,155	156,327
Gains & losses on marketable securities	461,758	(865,941)
Investment fees & other	(59,653)	(69,785)
Net investment income & non-operating expense	572,360	(733,839)
Increase/(decrease) in net assets	456,696	(1,565,250)
Net assets, beginning of year	5,299,485	6,864,735
Net assets, end of year	$ 5,756,181	$ 5,299,485

USENIX ASSOCIATION
STATEMENT OF FUNCTIONAL EXPENSES
For the Years Ended December 31, 2003 and 2002

	Conferences and Workshops	Programs and Membership	Student Programs, Good Works and Projects	SAGE	Sage Certification	Total Program	Management and general	Fund Raising	Total Support		2003 Total	2002 Total
Operating Expenses												
Conference & workshop-direct	$ 1,631,705	$	$	$	$	$ 1,631,705	$	$	$ 0		$ 1,631,705	$ 1,865,746
Personnel and related benefits:												
Salaries	573,940	141,455	26,957	120,053		862,404	209,324	78,977	288,302		1,150,706	1,166,739
Payroll taxes	41,362	10,194	1,943	8,652		62,151	15,085	5,692	20,777	o	82,928	86,091
Employee benefits	107,408	26,472	5,045	22,467		161,392	39,173	14,780	53,953	o	215,345	210,737
Membership/proceedings		7,370				7,370			0		7,370	70,683
Membership/login:		187,520				187,520			0		187,520	216,016
Membership/e-learning						0			0		0	53,015
SAGE expenses				68,839		68,839			0		68,839	190,885
SAGE Certification expenses					6,878	6,878			0		6,878	309,885
Student programs, Good Works, and projects			108,019			108,019			0		108,019	285,583
General and administrative	223,424	97,761	6,891	22,762	0	350,837	143,144	11,391	154,535		505,372	646,838
	$ 2,577,839	$ 470,772	$ 148,854	$ 242,773	$ 6,878	$ 3,447,115	$ 406,727	$ 110,840	$ 517,567		$ 3,964,682	5,102,218

USENIX ASSOCIATION
STATEMENTS OF CASH FLOWS
For the Years Ended December 31, 2003 and 2002

	2003	2002
CASH FLOWS FROM OPERATING ACTIVITIES		
Change in net assets	$ 456,696	$ (1,565,250)
Adjustments to reconcile increase in net assets to net cash provided by/(used for) operating activities:		
Depreciation	64,728	73,735
Net investment income designated for long-term purposes	(108,132)	(73,987)
Realized & unrealized gains on investments	(461,758)	865,941
Decr/(Incr) in receivables	(46,346)	22,017
Decr/(Incr) in inventory	5,526	9,180
Decr/(Incr) in prepaid expense	3,415	81,153
Incr/(Decr) in accrued expenses	(247,533)	(277,935)
Incr/(Decr) in deferred revenue	610	(50,655)
Total adjustments	(789,490)	649,449
Net cash provided by operating activities	(332,794)	(915,801)
CASH FLOWS PROVIDED BY/(USED FOR) INVESTING ACTIVITIES:		
Purchase of investments	(3,730,254)	(3,765,885)
Sale of investments	3,730,254	3,765,885
Withdrawals from reserve fund		1,499,872
Purchase of property & equipment	(11,002)	(10,962)
Net cash used for investing activities	(11,002)	1,488,910
Net change in cash & equivalents	(343,796)	573,109
Cash & equivalents, beginning of year	1,049,294	476,185
Cash & equivalents, end of year	$ 705,498	$ 1,049,294

Restructuring of SAGE Governance

by Kirk McKusick
USENIX Board of Directors
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Executive Summary

The USENIX Board of Directors, in conjunction with the SAGE Executive Committee, have decided that the current Special Technical Group (STG) model of governing SAGE has outgrown its usefulness. Beginning in July, SAGE ceased to be an STG and instead is governed by a subcommittee comprised of USENIX Board members and members of the SAGE community. The SAGE Executive Committee has been empowered to explore and undertake steps to create a separate nonprofit association to which SAGE's assets will be transferred upon successful completion of defined milestones.

Whether SAGE remains within USENIX or spins off as a separate organization, USENIX is dedicated to ensuring that current SAGE benefits and services are maintained. In particular:

- USENIX values the system administrators in its membership.
- USENIX will ensure that system administration services are supplied to its members.

If a nonprofit SAGE organization is formed, USENIX will ensure an orderly transition of benefits and services to the new organization and will cooperate with that organization to the mutual benefit of members of both organizations.

The Details

USENIX set out—over 14 years ago—to create a special technical group for system administrators. USENIX continues to want to serve sysadmins. The current system, however, does not seem to be working. Although the costs are down (SAGE almost breaks even), progress is slow.

The challenge is, then, how do we continue to serve sysadmins while changing the environment to a successful one? USENIX wishes to continue the services to system administrators that they deliver well, including the LISA conference, *;login:* (which includes much sysadmin content), the salary survey, SAGE booklets, and the sage-members mailing list. However, building a much larger, member-driven SAGE would require a significant restructuring of USENIX's business processes and probably needs to be done within a wholly different organizational structure from that of USENIX and its STG model.

Therefore, it was resolved by the USENIX Board of Directors that the STG framework for SAGE governance be dissolved effective June 30, 2004. USENIX will continue to send renewal notices to and collect dues from SAGE members and will continue to run the LISA conference, provide system administration content in *;login:*, and provide SAGE-related services including the salary survey, SAGE booklets, and the sage-members mailing list. The existing SAGE Executive Committee will serve out their terms, but no elections will be held to instate a new executive committee. During this wind-down phase of the SAGE Exec, their primary role will be to determine whether to pursue option (2) below and, if so, to initiate appropriate actions. During this time SAGE will be governed by a subcommittee of the USENIX Board composed of Geoff Halprin, Jon Hall, and Mike Jones, along with SAGE member David Parter and possibly another member of the SAGE community.

Option (1): USENIX continues to offer a SAGE membership and to provide the system administration program as an essential

part of USENIX activities. Existing programs and services are folded back into USENIX, to be governed by a subcommittee of the USENIX Board. This option starts upon the dissolution of the STG framework and will be continued for the indefinite future or until programs and services are transferred to a new organization set up under option (2).

Option (2): Separate SAGE from USENIX and allow it to go its own way under the SAGE name. A detailed memorandum of understanding was passed, containing specific milestones that are go/no-go decision points. These milestones will be further refined when and if a separate SAGE organization comes into existence.

Whichever path SAGE chooses, USENIX remains committed to its members who are system administrators and looks forward to serving their needs in the future, independently and, if SAGE becomes a separate organization, in collaboration with that organization.

2004 STUG and Flame Awards Go to M. Douglas McIlroy

Doug McIlroy, winner of both the 2004 Software Tools User Group Award and the 2004 USENIX Lifetime Achievement Award, wrote some of the most basic and timeless tools for UNIX, including sort(1), spell(1), diff(1), join(1), graph(1), speak(1), and tr(1); significantly influenced the design of macros; contributed to various computer languages; and also delved into computer security, graphics, cartography, storage allocation, and garbage collection, and even documentation techniques. For more information, see *http://www.usenix.org/about/flame.html* and *http://www.usenix.org/about/stug.html.*