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THIS YEAR WE'LL CONTINUE TO CARRY THE torch for more powerful systems, more flexible storage, richer networks, more elegant applications, smoother integration, automated management, and granular security. Which wishes will be granted, and where will the action be? Who will make up for the disappointments of 2004? Read on for our analysis of leading technology trends, our hopes and expectations for 2005, and our picks for top IT products for 2004.

ILLUSTRATIONS BY TOM WHITE

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The vast conspiracy to bury innovation has been broken.

Innovation Trumps Commoditization

Worthwhile platform and architecture choices abound

IN 2004, WE STARTED SEEING THE products of engineering that went on underground during the recession. Whereas the market as a whole is doing the wait-and-see, early adopters are partying their butts off over true competition in operating systems and CPU architectures, the long-delayed delivery of the Java promise, and the essential paradigm shift from fast processors to fast throughput. Much of the technology that vendors were forced to put in the deep freeze has thawed. In 2005, the rest of IT will see why those forward-looking geeks (present company included) are so giddy.

First, Sun rescued Java by becoming honestly and deeply engaged with the grassroots Java developer community. The impact of the fulfillment of the Java promise extends well beyond open source and academia. Oracle stands out as an example: The vendor now offers its entire commercial Java product line for free download. Oracle permits license-free use of its software for development and testing. You pay only when you deploy, and then only when you deploy to an Oracle-branded server. Expect to see more of the “develop now, pay later” approach to platform promotion in 2005.

Sun is also gearing up for the official launch of its most ambitious operating system project to date, Solaris 10. This release, currently available as an early-access download, marks the return of enterprise-grade Unix to the PC. Those who argue that Linux already has that territory covered should to take an honest look at Solaris 10's specs and pedigree. If Sun follows through, Solaris 10 will be hard to match for performance

and high availability, and its binary compatibility with Linux will haul in open source developers who, after they land on Solaris, might like Solaris better than Linux.

And Solaris 10 will sell, along with Red Hat, Novell Suse Linux, and Apple's OS X. The 64-bit future is here. Among the OS platform players, only Microsoft faces the overwhelming challenge of convincing thousands of ISVs to port their 32-bit applications to 64-bit hardware. Windows has a well-earned reputation as a haven for the kind of sloppy

code that mucks up big systems and gets Unix programmers fired. Our tip: If you buy into 64-bit Windows, go with managed (.Net) and Java applications whenever you can.

As hardware gets more expensive in 2005, IT will discover it has three new friends: AMD, IBM, and Apple. AMD owned 2004, forcing Intel to ape its instruction set and closing deals with all the first-tier server vendors but Dell, which has expressed interest in climbing aboard. Why would IBM, HP, Sun, and Dell opt for AMD's Opteron over Intel's new Xeon EM64T (Extended Memory 64-bit Technology)? Because Intel planted the 64-bit instructions in a 32-bit Xeon chip that lives on Intel's

VoIP Rings in the New Year

Internet telephony has finally come into its own

I REALLY BLEW IT LAST YEAR when I wrote about networking in the 2004 Technology of the Year Awards (infoworld.com/781). It appears that I read the landscape the same way the Democratic National Committee read the hearts of the American people.

At the end of 2004, VoIP is finally the hot-button issue everyone had predicted it would be, and I didn't see it coming. Sure, I'd heard all of the blue-sky talk about Internet telephony, going back to 1996 or 1997; I just didn't believe it. My reaction to these optimists has always been, “Yeah, yeah, when the old PBX is paid for.”

Well, it is now. More importantly, PBX kingpins Avaya and Siemens have tried to wrap their arms around the VoIP boom by introducing line cards for their systems that — surprise! —

will only support proprietary handsets.

Meanwhile, the networking community is still waiting for vendors to deliver usable IPv6 networking gear — in this case, “usable” is short for “something vendors will release for review.” Readers will recall that I'd banked on that happening in 2004, and now they know why I go to Vegas with a stack of good books instead of a stack of dead presidents.

I also didn't accurately assess the need for speed — 40 Gigabit Ethernet network hardware still seems to be coming “next year,” although in November, Japanese researchers announced a technological breakthrough that pushes the boundaries of optical switching: the so-called “Femto” switch appears to be the first device that uses a phenomenon called “virtual excitation” to shove photons at that speed.

Wireless networking stagnated this



PLATFORMS

BEST SERVER HARDWARE

Apple Xserve G5

Tightly integrated hardware/OS combo raises the bar for other server makers

BEST BLADE SYSTEM

HP Consolidated Client Infrastructure

Combines popular management tools with unrivaled reliability and scalability

BEST OPERATING SYSTEM

Mac OS X 10.3 (Panther)

Continues to set the standard for simplicity and ease-of-use among 64-bit-capable OSes

BEST VIRTUAL SERVER

VMware ESX Server 2.1.1

Enables an extraordinary array of high-availability services and management capabilities

Power Mac G5 workstation, the Xserve G5 rack server, and the iMac G5 integrated desktop. IBM's exquisite multi-core Power5 processor made its debut

ages-old shared I/O bus. For Opteron and Athlon 64, AMD completely redesigned the processor and the system buses. If you're not into architectural nuts and bolts, take our word for it: Intel's got a lot of catching up to do.

As does Microsoft, Intel faces more than one unfamiliar competitor. IBM, which developed the Power4 and Power5 multicore enterprise CPU architectures, knows a little something about 64-bit scalable systems and buses. IBM's unexpected PowerPC 970FX elevated PowerPC to the performance level of a single-core Power4 chip. It hit the market in an IBM blade server but more visibly as an accolade-winning series of business-targeted 64-bit systems: The

in 2004 as part of a lineup that carries sub-\$20,000 servers closer to mainframes than they've ever been (infoworld.com/2382).

Smart buyers of servers and workstations next year will be choosing between 64-bit x86 and 64-bit PowerPC. Smart x86 buyers will look beyond application compatibility and recognize AMD's commanding engineering lead. Last year's experience leaves us with the ability to make one fail-safe call: If you buy 64-bit x86, buy into Opteron and Athlon 64. And now is an ideal time to get acquainted with Power/PowerPC systems from IBM and Apple, and also to explore Solaris 10 and Mac OS X.

— Tom Yager

year as vendors jockeyed with proprietary approaches to enhancing 802.11g technology. There was one hopeful sign in the ongoing clash between marketing and common sense: In October, the Wi-Fi Alliance announced that it would rap the knuckles of any vendor caught pitching pre-802.11n products as "Wi-Fi" certified — even to the point of withdrawing certification from gear that causes problems with existing products. Because the IEEE is not expected to ratify the 802.11n amendments until late 2006, this will cramp the styles of the LinkNetSysGears somewhat.

Wireless security improved somewhat with the release of products supporting WPA2 (Wi-Fi Protected Access 2), an upgrade to WPA that supports AES (Advanced Encryption Standard). Vendors have backfitted WPA support into as many devices as possible, although too many shops are forced by the lowest-common denominator approach to use WEP, which itself is only slightly more secure than pig latin.

Gigabit Ethernet to the desktop remained an elusive goal for many shops that could have used it to improve backup and restore processes. Cable plants that aren't up to snuff remain the greatest obstacles to deployment, as per-port prices will continue to drop in 2005.

Storage networking remains a sore spot for many shops that are choosing to cope with new regulations for e-mail retention by simply buying more and bigger chunks of rotating brown matter. The choice between traditional FC (Fibre Channel) and upstart IP-based transports remains a poser for many buyers. The only clear choice is for those maintaining wide-area SANs, where the limitations of FC are obvious.

Some progress has finally been made toward securing the Domain Name System. DNSSEC (DNS Security Extensions) uses digital signatures to provide authentication of zone data being transferred between DNS servers. The bad news is that it's still a proposed

standard, and I don't expect to see useable implementations of DNSSEC for two or three years.

— P.J. Connolly

NETWORKING

BEST NETWORKING HARDWARE

Extreme Networks BlackDiamond 10808

Excellent performance paired with a powerful and flexible operating architecture

BEST WAN ACCELERATOR

Riverbed Steelhead 2000

Reduces file-transfer times via WAN links by several orders of magnitude

BEST IP PBX

Zultys MX250 Enterprise Media Exchange

Not the most scalable or feature-rich, but the best truly standards-based solution we tested

BEST WIRELESS LAN SOLUTION

Trapeze MX-20 Mobility System

Takes the gold for polish, flexibility, granular management, and seamless roaming



The major contributors to FC's success were the usual culprits.

Fibre Channel Still Rules the SAN

In a red hot year for storage network solutions, iSCSI still simmered

IF YOU WERE EXPECTING BREATH-taking new storage technologies to appear, 2004 was probably a disappointment. But if you were looking for better storage solutions at lower prices, then it was your kind of year.

We saw many of the technologies that emerged in 2003 generate mainstream solutions last year. The technologies were familiar, but some of the names in the enterprise storage market were new. For instance, Rackable Systems — better known for its innovative, high-density server solutions — jumped into the midtier storage space with both feet, adding NAS and iSCSI SAN appliances to its product portfolio.

Another newcomer, Apple Computer, which quietly unveiled the Xserve RAID in mid-2003, increased the volume (so to speak) to 3.5TB in summer 2004 (infoworld.com/1613). A very affordable SAN for the entry-level market, Xserve RAID was one of the first to blend FC transport and SATA drives, now a standard combination.

Another interesting trend in 2004 was storage vendors branching into new spaces. In EMC's quest to expand revenue sources and open new markets, the company formed a partnership with Dell which produced the Dell/EMC AX100 (infoworld.com/2344), a price-competitive, lightweight, and likeable SAN solution that earns our Technology of the Year award in its category. Combining FC transport and SATA drives for entry-level customers, the Dell/EMC "SAN in a can" was the most complete single-shelf SAN we reviewed in 2004, edging out worthy competitors such as Apple and nStor.

FC and iSCSI are often pitted as com-

peting choices, and so are SAN and NAS solutions, but Network Appliance resolved both disputes this year with its FAS200 storage appliances, which incorporate all of those features and more in a single, fast, reliable, and exceptionally scalable product.

It's difficult to put the NetApp FAS270C in one of the traditional storage categories; it's flexible enough to compete equally well as a filer or as a block-level storage device. We arbitrarily decided to honor its heritage by awarding it Best NAS Solution of 2004.

Interestingly, the FAS270C was also the most successful iSCSI SAN we saw in 2004, rising above a flat performance by other players in the IP-storage arena. Stonefly Networks' elegant virtualization router was another exception

(infoworld.com/1465). Anyone who anticipated iSCSI taking the entry-level market by storm in 2004 was forced to eat FC (Fibre Channel), which continued to strengthen its hold on the storage networking market.

The major contributors to FC's success were the usual culprits: Emulex, which broke the 4Gbps barrier; QLogic, with its innovative SANbox 5200 switch; and Brocade, with its Multi-protocol Router, which bridges multiple SAN islands with aplomb. With so many good FC products, our task to choose a single winner was not easy. In the end, the laurel goes to Brocade's Multiprotocol Router. If you need it, you need it bad.

Just about every major tape drive technology improved in 2004. Sony SAIT (Super Advanced Intelligent Tape) remained the king of capacity with 500GB on a single reel, but LTO (linear tape open) is hot on Sony's heels. Toward year-end, Certance and HP released LTO-3 Ultrium drives that can store 400GB per reel at unrivaled speeds (see Product Previews, page 12). Next year we should see enterprise libraries taking advantage of the new drives.

With luck, 2005 will also bring SAS (serial attached SCSI) drives. The results from a December plug-fest, with vendors bringing their prototypes to the Interoperability Lab of the University of New Hampshire under the sponsorship of the SCSI Trade Association, were encouraging. With a similar party scheduled for April, new SAS products probably won't appear until the end of 2005. They should be worth the wait.

— Mario Apicella

STORAGE

BEST SAN SOLUTION

Dell/EMC AX100

Simple to set up, easy to manage, comprehensive in capabilities, and competitively priced

BEST STORAGE ROUTER

Brocade Silkstorm Multiprotocol Router

Consolidates multiple SAN islands regardless of their transport protocol

BEST IP STORAGE ROUTER

Stonefly Networks i3000 Storage Concentrator

Provides a safe, easy migration path from direct-attached storage to IP SANs

BEST NAS SOLUTION

NetApp FAS270C

Manageable, scalable, high-performance; close to the ideal multipurpose storage solution

Real network management became possible for smaller shops this year.

Hands Across the Enterprise

Management tools continue to extend their reach

VIEWED AS A PIPE DREAM ONLY a few years ago, the “autonomous datacenter” gained momentum in 2004, leading some to claim IT as we know it will be dead within a decade. But that’s obvious, isn’t it? In 1994, Usenet was still useful, and Spam tasted great at 1 a.m. The question remains, How soon will we get there — and who’s behind the wheel?

The good news is it’s coming together faster than you think, and vendors of every stripe are pitching in. Hewlett-Packard’s Adaptive Enterprise, IBM’s On Demand, and similar initiatives from every management software vendor from BMC to Veritas are squarely focused on reducing IT expenses by providing processing resources that can be used for any application or infrastructure component as load demands. Today’s Web server becomes tomorrow’s Citrix server.

One noteworthy trend in 2004 was dedicated service processors in enterprise-class servers. First developed by the big players in commodity servers, add-ons such as the Dell Remote Assistant Card and HP’s Integrated Lights-Out technology are moving from optional to integrated. Even smaller server vendors such as Newisys are incorporating them. When tied together with management software twine, these dedicated processors make remote BIOS-level monitoring and modifications much simpler.

Real network management became possible for smaller enterprises this year. For a long time, desktop access to network services was provided by dumb hubs in closets that were left alone until they failed. With the push toward inte-

grating VoIP, wireless, and network-level authentication — and the need to more closely monitor traffic within the enterprise — the edge is getting smarter. With these smarts comes more administrative overhead, and suddenly, managing access devices for 500 users becomes troublesome.

Notably, Cisco has been slow to offer reasonably priced, dedicated management tools for its switching and routing line. CiscoWorks still exists but misses the mark for the smaller infrastructure. New switching vendors, notably Dell, are capitalizing on this shortcoming by offering low-priced managed switches for both the core and the edge of

smaller networks. In addition to the devices themselves, Dell is providing an integrated management framework, giving administrators a central application to manage servers and switches. Although clearly an attempt to lock customers into Dell’s product line, the carrot doesn’t look half bad.

Vendors such as AlterPoint and Rendition Networks (infoworld.com/1321) have been aiming a bit higher, providing centralized device management tools that ease the burden of managing large networks. These tools are especially well-suited to widespread, heterogeneous networks, as well as networks undergoing a phased transition to a

Better Quality Through Software

Dev tools address the challenges of evolving architectures

SOA (SERVICE-ORIENTED ARCHITECTURE) edged out *Web services* in 2004 as the preferred label for decentralized systems woven together by the exchange of XML messages. Whatever you call this approach to application development, it presents new challenges in terms of quality control. As applications extend beyond the enterprise to include partner services, it becomes crucial to monitor and debug your interaction with those services.

Mindreef’s SOAPscope 3.0 (infoworld.com/1585) meets this need in an effective way and at a bargain price. With its integration of Web Services Interoperability Organization (WS-I) testing tools, SOAPscope made it easier for developers to create WS-I-

compliant services that can work reliably with similar services.

As three-tier systems increasingly federate with remote services, real-time analysis of system health and application response time becomes essential. So it’s no surprise that application performance management products such as ProactiveNet (infoworld.com/2274) were in demand this year. That trend will accelerate in 2005.

Whereas the growth of Web services can make life more complicated for developers, parallel growth in the use of Java and .Net can create new opportunities to improve software quality. For example, Compuware’s new DevPartner Fault Simulator runs a .Net application in a sandbox that it subjects to



new hardware vendor. With the potential to automate changes throughout the network from a single console and to apply and enforce best practices from the core to the edge, these tools are finally bringing fine-grained control to administrators of large networks.

As the boundary between systems and networks continues to blur, consistent network management will be mandatory and compulsory. Gone are the days of simply plugging a system in to an RJ45 jack and ensuring that a DHCP lease was granted. Network-level access control is here to stay, and for the short term, administering it will be somewhat of a headache.

Nevertheless, we're seeing progress. Prevalent use of network-level authentication standards 802.1x and EAP (Extensible Authentication Protocol) got

a major boost from companies rolling out these technologies for Wi-Fi access. When a 802.1x/EAP framework is in place on the WLAN, extending its reach to every corner of the wired network becomes that much easier.

That's not to say that deploying wireless networks is simple. Despite the challenges, however, more planned and

SYSTEMS MANAGEMENT

BEST SYSTEMS MANAGEMENT SOLUTION

Novell ZENworks 6.5

Venerable suite that improves support for handhelds and reaches out to Linux

BEST NETWORK MANAGEMENT SOLUTION

Rendition Networks TrueControl 3.0

Feature-rich, broad in scope, and excels in change management and reporting

sanctioned corporate WLANs turned up in 2004 than any other year, and vendors have been scurrying to meet the management demand. The kinks are still being worked out, and despite the fact that no solid standard for WLAN deployment and management yet exists, there's always hope for 2005.

Overall, 2004 brought management tools — and their limitations — to the forefront. IT directors saw HIPAA and Sarbanes-Oxley written on the wall and realized that the budget needed to account for ways to prove compliance. Centralized control of every aspect of the network — from the configuration and monitoring of devices to who gets access to what and when — is the only realistic way to get there, and we know it.

— Paul Venezia

“environmental faults” such as lost connectivity or disk failure. The tool also exercises error-handling code by enabling developers to program exceptions that can be thrown by .Net classes.

The reflection — or introspection — features of Java and .Net lend themselves to this kind of approach. The VM environment is inherently friendly to a whole set of monitoring, analysis, and simulation techniques, which will play a growing role in the assurance of software quality.

But 2004 was also a year in which a venerable tactic, source code analysis, emerged in new forms. Agitar Software's Agitator (infoworld.com/1889) reads Java source files, performs data flow analysis, and acts as an intelligent assistant to the developer who is already committed to writing unit tests but needs help formulating testable assertions.

Our Nov. 1 article on the new breed of source code analyzers (infoworld.com/2230) explored how companies such as Coverity and Fortify are revitalizing analysis techniques that many programmers have long thought moribund. These tools will work with Java and .Net code, but they don't depend on the fancy machinery built into VMs. Their pattern-recognition algorithms will also ferret out potentially troublesome inconsistencies in C, C++, or SQL code.

Throwing more software at the problem of software quality might seem ironic. But the reality is that high-quality software requires superhuman attention to detail. The right partnerships between computers and programmers will be the key to success, and we continue to find new ways to forge those partnerships.

— Jon Udell

APP DEV

BEST WEB SERVICES DEVELOPMENT TOOL

Mindreef SOAPscope 3.0

Must-have testing and analysis tool for developers working with Web services

BEST JAVA DEVELOPMENT TOOL

Agitar Agitator 1.5

Automates unit testing to the proper degree by recognizing when it needs human help

BEST APPLICATION TESTING TOOL

RadView TestView

Powerful, sophisticated Web application testing tool accessible even to nonprogrammers

BEST SOFTWARE CHANGE MANAGEMENT SOLUTION

IBM Rational ClearCase 6.0

Easy to set up, complete, and tightly integrates with development tools

If DB2 8.2 was groundbreaking, the Oracle Database 10g release was earthshaking.

Data Under Lock and Key

Database management vendors aim to assist compliance

THE YEAR IN DATABASES SAW its share of technology advances. The rise of commodity 64-bit hardware, native XML storage in relational databases, configuration wizards, auto-tuning ... all these developments are making databases more powerful, flexible, and easy to manage. Perhaps the biggest trend, however, in terms of what will drive the direction of databases and related products in 2005, is to demonstrate compliance with the likes of HIPAA, Sarbanes-Oxley, and other regulations.

Database activity auditing is a standard component of internal and external audits, and we're already seeing products designed to make these exams easier. Lumigent stepped up to the plate in 2004 with a new version of Entegra that tracks all database activity, including changes to stored procedures, database schema, and access permissions (infoworld.com/2048).

Promising the ultimate safeguard for sensitive data, data-level encryption products are also big right now. Raising the bar for third-party vendors (as always), Microsoft is incorporating cell- and column-level encryption into SQL Server 2005. Meanwhile, solutions such as Application Security's DbEncrypt (infoworld.com/1778) make it very easy to encrypt column- or table-level data. DbEncrypt only works for SQL Server and Oracle databases, however. Ingrian's DataSecure appliance takes a broader sweep, encrypting data in applications, databases, and storage systems all over the network. Whether you want easy global management or minimal network overhead, there's an approach that's right for you.

Among the database vendors themselves, the race is on to produce the most automated RDBMS. IBM's DB2 8.2 broke new ground in multiquery optimization and introduced other important self-tuning capabilities. The stated goal, self-healing, is in sight, but today, admins must script the fixes. Nevertheless, the health monitoring capabilities are there, and IBM is clearly positioned to be the leader in this emerging area of database technology.

If DB2 8.2 was groundbreaking, the

Oracle Database 10g release was earthshaking (infoworld.com/1527). In addition to the new "grid management" capabilities, which allow admins to reallocate cluster resources dynamically among business processes, 10g introduced a number of automated administrative features — including memory, storage, and configuration management — that make it much easier for DBAs to stay on top of large, complex environments.

Formerly the palace of the rich, 64-bit computing has finally broken through, thanks to AMD's Opteron and Intel's EM64T. More midsize businesses are starting to invest in this technology, and

Desperately Seeking SOA

Enterprise apps look beyond the Web services specs

THE ENTERPRISE SOFTWARE acronym of the year must be SOA (service-oriented architecture). The concept behind SOA — that applications should expose their functionality as "services" in a way that can be accessed by any authorized external system — isn't new. We've heard promises of a universal integration platform before, accompanied by the same consultants salivating over the billable hours implicit in the "revolution." What's new about SOA is that the promise might actually be fulfilled.

For more than a decade, various platform vendors have attempted to implement SOAs using methods such as RPCs and enterprise message buses. Although many organizations have implemented those technologies as part of tactical integration projects, the solutions proved expensive to implement on a large scale (in part due to

their proprietary nature), hard to maintain, and relatively limited in scope.

Using XML to define data and SOAP to define loosely coupled RPCs, Web services seem to be the long-sought linchpin of SOAs. That's because they comprise the first real integration technology based on genuine standards that span nearly every operating system, application stack, programming language, and network topology.

Every top-tier vendor now offers an SOA strategy, and services are now at the heart of application platform offerings as diverse as BEA WebLogic, Microsoft .Net, IBM WebSphere, and Oracle 10g. Traditional integration players such as Sonic Software, Tibco, webMethods, and WRQ are leaping onto the SOA bandwagon, and newer players such as Grand Central Communications are redefining themselves as SOA powerhouses.



DATABASES

BEST DATABASE

Oracle Database 10g

Leader in innovation is also packed with features that ease administration

BEST MOBILE DATABASE

IBM DB2 Everyplace Enterprise 8.1.4

Easy to set up, straightforward to manage, and ready for customization

BEST CONTENT MANAGEMENT SOLUTION

CrownPeak Advantage CMS

Powerful and extensible system that won't confound business users

it will very soon become the standard by which we measure third-party applications. Oracle and DB2 were among the first applications to run on 64-bit Linux, and they'll be among the first to climb on 64-bit Windows when it arrives in Q1 2005.

Slower to catch on have been the CRM and ERP packaged application giants such as PeopleSoft, SAP, and Siebel and content management heavyweights such as EMC's Documentum division, Interwoven, and Vignette. Yet there's no doubt they'll all be singing the SOA song soon, along with application service providers such as Salesforce.com.

The database community is also heading toward SOA. Plans are afoot to enable IBM DB2, Microsoft SQL Server 2005, Oracle 10g, Sybase ASE, and other platforms to participate actively in Web services-based SOA activities as first-class citizens — even without the use of application servers. This will have profound implications for the design and management of widely distributed n-tiered applications because, in effect, hierarchical tiers will become horizontal peers.

The rise of SOAs will reap an unexpected benefit for many companies, eventually enabling them to take part in vast trading networks built around

Open source databases created some buzz this year, with MySQL finally adding stored procedures and Ingres being offered by Computer Associates under an open source license. Not only are these databases gaining popularity, but they are finally being legitimized by vendors who are writing applications for them. In 2005, expect to see not only applications that use these databases but also third-party tools for monitoring and administering them.

As open source databases become more functional and manageable, shops will begin jumping off Oracle, DB2, SQL Server, and Sybase. This likelihood is already forcing Oracle to

reduce its prices, and it will force the big four commercial players to increase functionality to justify their costs.

Finally, expect to see a big push for process-modeling tools, as compliance controls come forward this year. Ensuring the integrity of information in the database will only get harder, as products such as IBM's DB2 Information Integrator make it easier to query and load data from many different sources. Auditors will want to know where this data is coming from, whether you can track it, and whether you know how to troubleshoot integrity problems. The cat is out of the bag.

— Sean McCown

dotcom survivors such as Amazon.com and eBay. In the meantime, the biggest challenge is how to get there without breaking the bank or giving away the store. It's not trivial to service-enable existing applications, to build the right Web services hooks into new applications, or to ensure SOAs incorporate proper access controls and security safeguards. After all, thanks to HIPAA and Sarbanes-Oxley, good security isn't just good IT policy, it's the law.

To address those concerns, numerous vendors — Actional, Amber Point, Cape Clear, and Infravio, among others — began offering in 2004 solutions that manage, secure, and route messages in an SOA, in many cases adding multiple layers of complexity to what's intended to be a lightweight, loosely coupled messaging system. A danger is that those management layers will evolve into closed or proprietary software stacks or will turn into performance choke points, thereby negating many of the benefits SOAs plan to

offer. But don't worry, there will always be plenty of consultants to help you navigate those shoals.

— Alan Zeichick

ENTERPRISE APPS

BEST ENTERPRISE PORTAL

Plumtree Enterprise Web Suite

Scores top marks in the most critical test: ease of integrating with other applications

BEST CRM APPLICATION

Salesforce.com Winter '05

Flexible, easy to use, manageable, feature-rich, and unrivaled in extensibility

BEST PROCESS AUTOMATION SOLUTION

Microsoft BizTalk Server 2004

Brilliantly executed orchestrator puts BPM in the hands of businesspeople

BEST WEB SERVICES INTEGRATION SOLUTION

Grand Central Business Services Network 4.0

BPEL support sets this hosted integration and management platform apart

Flexible, direct, lightweight ... Wikis suit a wide range of applications.

Year of the Enterprise Wiki

Lightweight Web collaboration gets down to business

WARD CUNNINGMAN CREATED the first Wiki site in 1995 to collaborate with a band of like-minded programmers on the elucidation of common software patterns. That work continues today at Microsoft, where he works in the patterns and practices group. Meanwhile, the Wiki concept — a Web site that every reader can also write and edit — has flourished beyond all expectations.

Flexible, direct, lightweight, and requiring only a Web browser to use, Wikis suit a wide range of applications.

There are Wiki implementations for a dozen programming languages and content management systems. Wikipedia, the collaborative encyclopedia project that began in 2001, reached critical mass in 2004. Wikipedia milestones this year included the millionth article, the 30,000th contributor, and an explosion of press coverage.

This past year was also the year in which the term “enterprise Wiki” stopped sounding like an oxymoron. As have other open source technologies —

Linux, Apache, Perl — Wikis had long flourished under the corporate radar. An amusing and telling example occurred right here at *InfoWorld*. Our CTO, Chad Dickerson, became interested in TWiki, a Wiki implementation that's often used to coordinate help desk and customer support activities. When he began installing the software, however, he learned that IT operations manager, Kevin Railsback, had already done so!

The anarchic nature of the Wiki can make it seem an unlikely ally of the enterprise information manager. Modern Wikis, though, are less fragile than they may seem. Enterprise Wikis such as TWiki and Socialtext log transactions and can roll back to a prior version of

Traveling the Road to Prevention

Networking and security vendors steer toward granular control

EVEN THOUGH IT HAPPENED late in the year, 2004 will probably be remembered as the year that Microsoft's Internet Explorer slipped. Mozilla's Firefox browser finally reached release status in early November, and by early December had made a noticeable dent in IE's market share. The main driver for Firefox's success is not necessarily its innovative features, but rather the lack of easily exploitable security holes. It seems that the serious flaws in Microsoft's browser finally led many users to decide it's time for a change.

In addition to more critical security issues in IE last year, Microsoft also brought us Windows XP SP2 (Service Pack 2). Hailed from Redmond as a security blanket for XP, it was soon clear it was also an application killer, rendering hundreds of applications

unusable following installation. Microsoft subsequently removed SP2 from its automatic update service, but continues to remind users to install SP2 whenever they visit the Windows Update site. All this trouble and fuss for a service pack that many admins believe merely treated some symptoms but didn't address the real problems.

On the Linux front, the release of the v2.6 kernel brought some significant changes in core-level security. The official inclusion of the SELinux (Security Enhanced Linux) code base into the v2.6 kernel introduced much-needed granularity to controlling privilege elevation on Linux systems.

A few layers below these events, Cisco and Microsoft were not-so-quietly planning a joint effort to combat viruses, worms, and intruders, announcing that they were working to bring toge-

ther Cisco's NAC (Network Admission Control) and Microsoft's NAP (Network Access Protection) technologies to provide for simplified system patching, policy adherence, and problem resolution before potentially destructive systems are permitted normal network access. Although nothing is likely to be released for at least a year, it's a step in the right direction — if you're a Microsoft and Cisco shop.

Across all the layers, a shift was definitely felt in the intrusion detection space. In 2004, IPS products found their footing, and IDS vendors saw the writing on the wall, and began incorporating inline blocking capabilities into their products. It's always been nice to know when abnormal events have occurred on your network, but the capability to prevent them from doing any harm is the ultimate goal.



COLLABORATION

BEST ENTERPRISE IM SOLUTION

IBM Lotus Instant Messaging 3.1

Covers all the bases, including secure communication with other IM communities

BEST IM MANAGEMENT SOLUTION

IMlogic IM Manager 6.0

Brings flexible enforcement policies and strong security to all types of IM

BEST TEAM COLLABORATION SOLUTION

Groove Virtual Office 3.0

Full-featured peer-to-peer app is still the leader in shared workspaces

every page. With that safety net in place, users can create, edit, and reorganize collections of documents while enjoying two crucial degrees of freedom.

First, the Wiki strips hypertext authoring to the bare essentials, making it easy for anyone to contribute. Second, unlike e-mail, blogs, and discussion forums, the Wiki promotes consensus

above individual authorship. It's hard to quantify the value of that style of work but easy to see how it might complement other modes of collaboration. And of course, modern Wikis also integrate with e-mail and blogs.

One of Socialtext's most interesting deployments ended before most people found out about it: The software was part of the infrastructure of the Howard Dean presidential campaign. In our March cover story on social software in the enterprise (infoworld.com/1312), I described how the product was used at Ofoto to coordinate the activities of a software development team.

In October, another enterprise-oriented Wiki, JotSpot, emerged on the

scene. As shown in an *InfoWorld* screen-cast (infoworld.com/2384), the goal of JotSpot, still in beta by year's end, is to combine the traditional virtues of the free-form Wiki with tools for gathering, searching, and reporting on structured data. In early testing, I liked JotSpot's approach to the rapid development of simple document-oriented applications.

As the Wiki phenomenon enters its second decade, it's hard to predict just how the technology will evolve. Two things seem certain: Wiki culture will continue to thrive, and enterprise users will continue to seek lighter, easier collaboration tools. Sounds like a winning combination.

— Jon Udell

Network managers received plenty of encouragement to block threats in 2004, a year in which several security breaches affected millions of innocent people. The October break-in at the University of California, Berkeley netted a cracker roughly 1.4 million names and Social Security numbers. Utah State University unwittingly exposed 7,000 Social Security numbers and names of students, faculty, and staff on its Web site for an extended length of time, correcting the problem in October. Universities weren't the only targets, of course. In March, Equifax announced that criminals posing as credit issuers illegally accessed the credit files of 1,400 Canadians.

Of course, good security goes beyond keeping the bad guys out. More mundanely, it requires granular and manageable access control; and on that front, 2004 saw a few break-out products in identity management. The high point perhaps came from Oblix, which put together the first true

SAML-compliant, cross-domain identity management platform, permitting companies to control access to applications served from partners (infoworld.com/1368).

Speaking of securing access, 2004 may also be remembered as the year SSL VPNs pushed traditional IPsec VPNs aside. The relative simplicity and resource-level control of the SSL VPN seems to be proving hard to match for general client access, although IPsec will continue to be widely used for site-to-site connectivity.

All considered, network security made some gains, but it also took some losses. Yet another year went by without a standard means of ensuring our Windows client systems are protected against the ever-growing array of worms and viruses. The Cisco and Microsoft efforts will hopefully bring some needed defenses, but it may be years before we see the results. For the moment, vigilance is the only solution.

— Paul Venezia

SECURITY

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BEST HOST-BASED IDS

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1 WHAT IS YOUR ORGANIZATION'S PRIMARY BUSINESS ACTIVITY AT THIS LOCATION? (PLEASE CHECK ONE ONLY):

General Business Industries

- ☐ 01. Defense Contractor / Aerospace
- ☐ 02. Retail
- ☐ 03. Wholesale / Distribution (non-computer)
- ☐ 04. Pharmaceutical / Medical / Dental / Healthcare
- ☐ 05. Financial Services / Banking
- ☐ 06. Insurance / Real Estate / Legal
- ☐ 07. Transportation / Utilities
- ☐ 08. Media (print / electronic)
- ☐ 09. Communication Carriers (telecomm, data comm., TV / cable)
- ☐ 10. Construction / Architecture / Engineering
- ☐ 11. Manufacturing & Process Industries (other than computer-related)
- ☐ 12. Research / Development

Technology Providers

- ☐ 13. Managed Service Provider / Business Service Provider
- ☐ 14. Technology Service Provider (ISP / ASP / MSP, etc.)
- ☐ 15. Computer / Network Consultant
- ☐ 16. Systems or Network Integrator
- ☐ 17. VAR / VAD
- ☐ 18. Technology Manufacturer (hardware, software, peripherals, etc.)
- ☐ 19. Technology - Related Retailer / Wholesaler / Distributor

Government / Education

- ☐ 20. Government: federal (including military)
- ☐ 21. Government: state or local
- ☐ 22. Education

☐ 98. Other _____
(Please specify)

2 WHAT IS YOUR PRIMARY JOB TITLE? (PLEASE CHECK ONLY ONE):

IT / Technology Professionals

- ☐ 01. Chief Technology Officer (CTO)
- ☐ 02. Chief Information Officer (CIO)
- ☐ 03. Chief Security Officer (CSO)
- ☐ 04. Vice President (including SVP, EVP, etc.)
- ☐ 05. Director
- ☐ 06. Manager / Supervisor
- ☐ 07. Engineer
- ☐ 08. Systems Analyst / Programmer / Architect
- ☐ 09. Consultant / Integrator
- ☐ 10. Developer
- ☐ 11. IT Staff
- ☐ 12. Other IT Professional _____
(Please specify)

Corporate / Business Management

- ☐ 13. CEO, COO, President, Owner
- ☐ 14. CFO, Controller, Treasurer
- ☐ 15. Vice President (including SVP, EVP, etc.)
- ☐ 16. Director
- ☐ 17. Manager / Supervisor
- ☐ 18. Other Business Management Title _____
(Please specify)

☐ 98. Other Title _____
(Please specify)

3 PLEASE INDICATE YOUR JOB FUNCTION(S)? (PLEASE CHECK ALL THAT APPLY):

IT / Technology Functions

- ☐ 01. Executive
- ☐ 02. Department Management - IT
- ☐ 03. Research and Development Management
- ☐ 04. Systems / Network Management
- ☐ 05. Management of Enterprise Applications (CRM, ERP, SCM, etc.)
- ☐ 06. Applications Development
- ☐ 07. Consultant / Integrator
- ☐ 08. Other IT Department Management _____
(Please describe)
- ☐ 09. Other IT - Staff _____
(Please describe)

Corporate / Business Functions

- ☐ 10. Executive
- ☐ 11. Department Management - Business
- ☐ 12. Financial / Accounting Management
- ☐ 13. Research and Development Management
- ☐ 14. Sales / Marketing Management
- ☐ 15. Other Department Management
- ☐ 16. Other Department Staff _____
(Please describe)
- ☐ 98. Other _____
(Please describe)

4 HOW MANY PEOPLE ARE EMPLOYED AT THIS ORGANIZATION, INCLUDING ALL OF ITS BRANCHES, DIVISIONS AND SUBSIDIARIES? (PLEASE CHECK ONE ONLY):

- ☐ 01. 20,000 or more
- ☐ 02. 10,000 - 19,999
- ☐ 03. 5,000 - 9,999
- ☐ 04. 1,000 - 4,999
- ☐ 05. 500 - 999
- ☐ 06. 100 - 499
- ☐ 07. 50 - 99
- ☐ 08. Less than 49

5 OVER THE COURSE OF ONE YEAR, DO YOU BUY, SPECIFY, RECOMMEND, OR APPROVE THE PURCHASE OF THE FOLLOWING PRODUCTS OR SERVICES WORTH:

* CONSULTANTS: PLEASE INCLUDE WHAT YOU RECOMMEND FOR YOUR CLIENTS AS WELL AS WHAT YOU BUY FOR YOUR OWN BUSINESS, IF APPLICABLE. IF YOU CANNOT DISTINGUISH BETWEEN THIS AND OTHER LOCATIONS, PUT RESPONSE IN THE FIRST COLUMN.

- | | | |
|----------------------------------|--------------------------------|----------------------------|
| 01. \$100 million or more | 06. \$5,000,000 to \$9,999,999 | 11. \$100,000 to \$399,999 |
| 02. \$50,000,000 to \$99,999,999 | 07. \$2,500,000 to \$4,999,999 | 12. \$50,000 to \$99,999 |
| 03. \$30,000,000 to \$49,999,999 | 08. \$1,000,000 to \$2,499,999 | 13. Less than \$49,999 |
| 04. \$20,000,000 to \$29,999,999 | 09. \$600,000 to \$999,999 | 14. None |
| 05. \$10,000,000 to \$19,999,999 | 10. \$400,000 to \$599,999 | |

Product category	For this location: (write code in box)	For other locations: (write code in box)
Large systems	<input type="text"/>	<input type="text"/>
Client computers	<input type="text"/>	<input type="text"/>
Networking / Telecom (including servers)	<input type="text"/>	<input type="text"/>
Internet / Intranet / Extranet	<input type="text"/>	<input type="text"/>
Security	<input type="text"/>	<input type="text"/>
Storage	<input type="text"/>	<input type="text"/>
Peripheral equipment	<input type="text"/>	<input type="text"/>
Software	<input type="text"/>	<input type="text"/>
Service / Support	<input type="text"/>	<input type="text"/>

Please answer the questions on the following page. 

6**PLEASE TELL US YOUR INVOLVEMENT WITH YOUR COMPANY'S STRATEGIC TECHNOLOGY INITIATIVES (PLEASE CHECK ALL THAT APPLY):**

- ☐ 01. Integrate Technology with company goals
- ☐ 02. Define Architecture
- ☐ 03. Choose Technology Platforms
- ☐ 04. Develop Technology Integration Strategy
- ☐ 05. Test, pilot, implement emerging technologies
- ☐ 06. Scalability Planning
- ☐ 07. Build, Run Web Services
- ☐ 08. Internet / Network Infrastructure
- ☐ 09. Customer Relationship Management
- ☐ 10. External Partnership Management
- ☐ 11. Budgeting
- ☐ 12. Recruitment & Retention
- ☐ 13. Other _____
(Please describe)
- ☐ 99. None of the above

9**ARE YOU INVOLVED IN BUYING, SPECIFYING, RECOMMENDING OR APPROVING THE FOLLOWING TECHNOLOGY SERVICES? (PLEASE CHECK ALL THAT APPLY):**

- ☐ **01. Technology Services**
- ☐ 02. Systems / Application Integration
- ☐ 03. E-Business / Internet / Intranet / Extranet
- ☐ 04. Application Development
- ☐ 05. Application Hosting (ASP)
- ☐ 06. Web Hosting
- ☐ 07. Web Development
- ☐ 08. Security
- ☐ 09. Storage
- ☐ 10. Content Delivery Networks
- ☐ 11. Disaster Recovery / Business Continuity
- ☐ 12. Outsourcing
- ☐ 13. Utility Computing Services
- ☐ 14. Telecommunications
- ☐ 15. Call Center / IT Services
- ☐ 16. Consulting
- ☐ 17. Other Technology Services

7**ARE YOU INVOLVED IN BUYING, SPECIFYING, RECOMMENDING OR APPROVING THE FOLLOWING SOFTWARE? (PLEASE CHECK ALL THAT APPLY):**

- ☐ **01. Enterprise / E-Business Applications**
- ☐ 02. Customer Relationship Management (CRM / eCRM)
- ☐ 03. Enterprise Resource Planning (ERP)
- ☐ 04. Supply Chain / Procurement
- ☐ 05. Business Process Management
- ☐ 06. Business Intelligence / Data Mining
- ☐ 07. Knowledge Management
- ☐ 08. Portals
- ☐ 09. Collaborative Applications / Groupware
- ☐ 10. Project Management
- ☐ 11. Financial / Payroll / Billing
- ☐ 12. E-business / E-commerce
- ☐ 13. Database Management Systems (DBMS)
- ☐ 14. Data Warehouse
- ☐ 15. Manufacturing
- ☐ 16. Asset Management / Software Distribution
- ☐ 17. Performance / Application Management
- ☐ 18. Streaming Media
- ☐ 19. Other Enterprise / E-Business Applications
- ☐ **20. Integration Software**
- ☐ 21. Web Services
- ☐ 22. Web Services Orchestration
- ☐ 23. Application Servers
- ☐ 24. Enterprise Application Integration (EAI) / Middleware
- ☐ 25. Business Process Management
- ☐ 26. Legacy Application Integration Tools
- ☐ 27. Other Integration Software
- ☐ **28. Application Development**
- ☐ 29. Application Development Tools
- ☐ 30. Application Servers
- ☐ 31. Web services
- ☐ 32. Java / J2EE
- ☐ 33. XML
- ☐ 34. .NET
- ☐ 35. Testing Tools
- ☐ 36. Other Application Development Software

10**ARE YOU INVOLVED IN BUYING, SPECIFYING, RECOMMENDING OR APPROVING THE FOLLOWING PRODUCTS OR TECHNOLOGIES? (PLEASE CHECK ALL THAT APPLY):**

- ☐ **01. Networking**
- ☐ 02. LANs (Local Area Networks)
- ☐ 03. WANs (Wide Area Networks)
- ☐ 04. Switches / Routers / Hubs
- ☐ 05. Caching / Load Balancing
- ☐ 06. Grid / Utility Computing
- ☐ 07. E-mail
- ☐ 08. Instant Messaging / Peer-to-Peer
- ☐ 09. Content Delivery Networks
- ☐ 10. Network and Systems Management
- ☐ 11. Traffic Monitoring and Analysis
- ☐ 12. QoS (Quality of Service)
- ☐ 13. VoIP (Voice over IP)
- ☐ 14. Telecommunications
- ☐ 15. IP Telephony
- ☐ 16. Wireless
- ☐ 17. Remote Access
- ☐ 18. Web / Video Conferencing
- ☐ 19. Other Networking
- ☐ **20. Storage**
- ☐ 21. High-end / Enterprise Class Storage
- ☐ 22. Network Attached Storage (NAS)
- ☐ 23. Storage Area Networks (SANs)
- ☐ 24. Storage Management Software
- ☐ 25. IP Storage
- ☐ 26. Direct Attached Storage (DAS)
- ☐ 27. Storage Blades
- ☐ 28. Storage Backup (Tape, Disk, Optical, RAID)
- ☐ 29. Removable / Portable Storage
- ☐ 30. Disaster Recovery
- ☐ 31. Other Storage
- ☐ **32. Security**
- ☐ 33. Anti-Virus / Content Filtering
- ☐ 34. Firewall
- ☐ 35. VPN (Virtual Private Network)
- ☐ 36. Identity Management / Authentication
- ☐ 37. Intrusion Detection
- ☐ 38. Encryption
- ☐ 39. Other Security
- ☐ **40. Internet / Intranet / Extranet**
- ☐ 41. Web Servers
- ☐ 42. Web Development / Authoring Tools
- ☐ 43. Web Performance Management / Monitoring Software
- ☐ 44. Content Management / Document Management
- ☐ 45. Content Delivery Networks
- ☐ 46. Internet Software
- ☐ 47. Other Internet / Intranet / Extranet

8**ARE YOU INVOLVED IN BUYING, SPECIFYING, RECOMMENDING OR APPROVING THE FOLLOWING HARDWARE? (PLEASE CHECK ALL THAT APPLY):**

- ☐ **01. Hardware**
- ☐ 02. Mainframes
- ☐ 03. NT / Windows 2000 / .NET Servers
- ☐ 04. Unix Servers
- ☐ 05. Linux Servers
- ☐ 06. Blade Servers
- ☐ 07. PCs / Workstations
- ☐ 08. Notebooks / Laptops
- ☐ 09. PDAs / Handhelds / Pocket PC / Wireless Devices
- ☐ 10. Other Hardware
- ☐ **11. Peripherals**
- ☐ 12. Laser Printers
- ☐ 13. Inkjet Printers
- ☐ 14. Monitors
- ☐ 15. Flat Panel Displays
- ☐ 16. UPS (Uninterruptible Power Supply)
- ☐ 17. Network Copiers
- ☐ 18. Other Peripherals

11**WHICH OF THE FOLLOWING OPERATING SYSTEMS ARE IN USE OR PLANNED FOR USE AT THIS LOCATION? (PLEASE CHECK ALL THAT APPLY):**

- ☐ 01. Windows XP
- ☐ 02. Windows 2000
- ☐ 03. Windows NT
- ☐ 04. Windows 95/98
- ☐ 05. Windows CE
- ☐ 06. Mac OS (Macintosh)
- ☐ 07. Solaris
- ☐ 08. UNIX
- ☐ 09. Linux
- ☐ 10. MVS, VMS, ESA
- ☐ 11. VM
- ☐ 12. OS 400
- ☐ 13. Netware
- ☐ 14. Palm OS
- ☐ 15. Other OS

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