

The background of the cover is a world map with glowing purple and white lines representing data connections. The text is overlaid on this background.

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Supporting Enterprise Networks and Operating Environments

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Enterprise Dark Data Is a Hidden Asset

By Andy Green



Message from the President

Over the last several years, NaSPA has often endeavored to find tips for the Information Technology (IT) professional that keep our organization interesting and engaging to our membership. This month we have an article (by yours truly) that discusses what you should do if you are ever called to testify in a lawsuit as an I.T. expert. There are two reasons you should have a look. The first is to protect the interests of your company or organization should someone ever claim that it – or YOU – were negligent in the provision of your services. The second reason is that there is money in being an expert if you have the skills and charisma that it takes to be one. The article offers a few tips to help you sell your expertise as a service to law firms who may just want to tap into your many years of I.T. experience to help them prevail in litigation. While we are discussing all this, have you updated your DISASTER RECOVERY PLAN? There's no better way to be sued than to let this action item lapse until after it's too late.

On a more upbeat topic, we have learned from our members that many of you are Ham Radio Operators. Our own founder Scott Sherer holds an Amateur Extra radio license and operates as KC9WPS. I hold an Amateur Extra class license and operate as KW5P. Sharon Wrobel holds a General Class License and operates as K5SMW. So what does this have to do with NaSPA?

First, it's fun and helps keep NaSPA interesting and engaging by doing something a little bit different. Second, one component of amateur radio is that it is a technology for "when all else fails." It would astound you how useful it is in disasters and for disaster recovery of all kinds of technical platforms. Finally, we think it may help us get the word out more about NaSPA. There are over 4 million Hams in the USA and 50% of those hold higher level licenses that allow them to work the HF (High Frequency) bands. That, in and of itself is interesting. (Just a few days ago I worked the official Russian station for the Sochi Olympic games from my home here in Dallas) On any given weekend there are literally thousands of technical-savvy, accomplished, intelligent professionals on the air. Scott, Sharon and I believe that at least some of them would be interested in NaSPA, and make great members.

So, if you are a Ham let us know and we will publish your call sign in a future edition of Technical Support. Watch for upcoming details about a NASPA NET and a NASPA QSO Party to honor and commemorate 28 years of service to the Information Technology Community. If this goes over well we may make it a regular thing but in any case we'll have some fun at it and mix things up a little. Email your call sign to president@naspacom or editor@naspacom and let's "QSO" with some like-minded IT professionals.

Leo A. Wrobel

Editor in Chief Technical Support Magazine

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Enterprise Dark Data Is a Hidden Asset

By Andy Green, content specialist at [Varonis](#)

In my mind, Dark Data is a subset of Big Data--enormous but without formal boundaries as defined by database schemas. In other words, it's the human generated content in documents, presentations, spreadsheets, notes, and other readable formats that make up the bits and bytes of a corporate file system.

Dark Costs

Corporate Dark Data comes about as a natural by-product of employees creating content to communicate ideas--every document is after all a just a thought that's been converted to bits. However, we've grown accustomed to treating our file system as an enormous storage medium: files are continuously added, and hardly ever deleted.

Of course, ultimately there are real costs in terms of buying additional network access servers and paying admins to manage and protect all this data. And then the costs associated with a breach can be very high. There are also hidden costs when you can't find the information you need because it's hiding somewhere in the sprawl or has been inadvertently deleted. But as users, we don't pay much attention, until we run out of disk space, hit our quota, or can't find something we desperately need.

Dark Value: Infonomics

Looking on the other side of the balance sheet, analysts such as Gartner's Doug Laney see Dark Data as a new kind of asset class worthy of being put on the corporate books. Laney has even proposed various methods to value corporate information--you can choose from fuzzier non-financial valuations such as IVI (intrinsic value of information) or MVI (market value of information), a more bottom-line technique based on how much someone is willing to pay. And

Gartner has a whole theory around this topic, which it calls Infonomics.

Back to the nitty gritty of file system economics. One use case I've heard analysts discuss comes out of the insurance world.

Suppose an important customer has made a complaint about a pending claim. No doubt much of the information about the claim has been broken down into searchable database records. But not everything.

Think of all the communication between the company and the customers: Word docs and PDF files, notes from claim inspectors, and other file content associated with their interactions, along with any internal emails. To get a better sense of how the company responded or failed to respond, it would make sense to search for this customer-related information in the file system, using appropriate keywords associated with name, account number, email addresses, etc.

And if the company wanted even more context, it would search also for customers with a similar complaint and then correlate all the results. For example, it may point beyond a one-off problem to a root-cause stemming from, say, a workflow glitch or perhaps even an individual agent mishandling a specific kind of issue.

This is, of course, quite valuable information, which may not show up through conventional methods involving CRM or other corporate IT systems.

Dark Ops

As I talked about in a previous post, to speed up the search for customer information, it makes great sense to use metadata-based classification methods. Let's take the insurance claim example: you'd want your file system searches to be restricted to folders belonging to



certain internal groups and active within specific time periods; e.g., property insurance department in July.

Outside of strictly dollar-and-cents issues, there's also daily operational work that can be handled best on the dark side. A relevant use case in this area typically involves internal compliance or governance. Perhaps a financial company is doing trading or financial transactions on a specific security, or maybe there's a request for information from the corporate counsel (for example, e-discovery).

The operational issue is to find all the relevant information in the file system and then freeze or quarantine the files, putting highly-restricted permissions on the contents. In other words, you wouldn't want an employee accidentally acting on or changing information that's currently the basis for a larger strategic initiative.

Dark New World

The key takeaway for IT is to start looking outside the well-defined world of databases and enterprise systems (CRM, ERP). The raw data that's created every day by employees as they use the file system has non-zero value. Taken together, this dark data mass has both significant intrinsic value and is also a good source of operational intelligence.

See more at: http://www.ittoday.info/Articles/Enterprise_Dark_Data.htm#sthash.yZIX7J3R.dpuf

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Evaluating or Serving as an I.T. Expert Witness

By Leo A. Wrobel

Over the last several years, the author has endeavored to find tips for the Information Technology (IT) professional that are just slightly off the normal beaten path. This is one of them. In this article we will discuss what you should do if you are ever called to testify in a lawsuit as an I.T. expert. In addition, we will look at a few tips to help you actually sell your expertise as a service to law firms who may just want to tap into your many years of I.T. experience to help them win in litigation.

Considering the depressed state of the economy (which may serve to encourage legal action) as well as the normal and ever present prospect of “Rambo litigation,” we believe every I.T. professional should have at least a rudimentary idea of what could happen if their organization was sued. For a recent case in point one need only look at the recent fiasco regarding Target Stores.

Before continuing, please understand that I am not an attorney and we are not giving legal advice. I do however presently own, or have owned, companies that have been involved in litigation of many types. I have (god help me) literally worked with dozens of lawyers and some of the most high power law firms in the U.S. I have both been called to testify in lawsuits so I speak from personal experience. For example, see <http://www.tellawcomlabs.com> I mention all this only to establish the fact with you the reader that we have been to this rodeo before. Having said all this, let us tell you what we know about how to look out for “number one” without stepping in “number two.”

While lawyers are important in any legal action, expert witnesses also play a major role in the U.S. judicial system. Experts presented in the course of a legal proceeding can in fact significantly enhance the prospects for plaintiffs (those bringing a suit) or defendants (those defending against one), and often radically change the course of a case. Both plaintiffs and defendants make use of expert witness testimony. Engaging the right expert, however is no small matter.

While lawyers are important in any legal action, expert witnesses also play a major role in U. S. judicial systems.

Most people think of retaining expert witnesses based on a rather narrow criteria. Consider the old adage about buying real estate that says the three most significant factors are “location, location, and location.” While true to an extent with real estate, such a narrow focus is not appropriate when retaining, selecting or acting as an expert witness. You can’t automatically assume the most important criteria are “knowledge, knowledge, and knowledge.” While credentials are the first thing one looks for before standing up an expert, there is a LOT more to consider before retaining the right one.

One of the foremost factors in choosing an expert witness is his or her ability to digest and assimilate complex technical facts, draw a conclusion, and present it in an understandable manner to non-technical people. (e.g. a Judge or Jury) There are a number of criteria that come to mind which best describe the ideal candidate: (1) Knowledge, (2) Communications Skills, (3) Personality, (4) Trustworthiness, (5) Honesty, and (6) a Humble and Earnest demeanor and (7) General Credibility. Valuable traits, such as, openness, honesty, and a genuine desire to help a jury or judge understand a case will go a long way. These should never be overlooked or underestimated. With the exception of the first trait listed above, knowledge, (which can be easily checked and verified) the other traits are much more nebulous and difficult to measure. Other personal skills come in to play such as the following:

In order to assist a judge or jury in deciding a case, an expert must have extensive knowledge, training or



experience in the field in which he or she will testify. It is important to look at where and how the professional has excelled in his or her industry. How many years does the professional have in the business? Has the professional published any books or trade articles? Where has he or she practiced before? What kind of employment record does the professional have? What professional organizations does the professional belong to (e.g. NaSPA, etc – have you joined yet? <http://www.naspa.com/join.taf>).

Besides knowledge and “book smarts” there are many other things to consider when selecting or retaining an expert witness. For example, what if your expert cannot communicate his or her knowledge to a non-technical judge or jury? What if they are an exceedingly poor public speaker? What if they freeze up under the pressure of an intimidating lawyer under cross-examination? What if the judge or jury simply does not LIKE your witness? Any one or more of these negative traits can prejudice a case.

If there is a possibility that you could be called as an expert witness in the future, or if you wish to offer these services, do everything you can to hone your communication skills! Join toastmasters, accept public speaking engagements, and lead high-pressure meetings within your organization. To be sure, any of these steps will enhance your professional career in other untold ways. Such experience can also keep you from freezing up under pressure and blowing it, in the potentially hostile venue of the court.

If you are LOOKING for an expert witness, you will obviously check their background, experience,

degrees, licenses, certifications, employment history, where they have testified before, and for whom. Find out if other law firms have used them. If so, get references – particularly on their ability to communicate to an arbitration panel, judge or jury. There are also a few indicators of ability to communicate you can pick up on from a review of the potential candidate’s background, to wit:

- If the potential witness is well known on the speaking circuit that is one indication that they are accustomed to speaking in front of large crowds.
- If they have assisted law firms in the past, chances are they are comfortable under the pressure of the courtroom.
- If they are published, this should indicate to you that they know how to organize a pattern of thoughts into coherent and concise conclusions.
- If their job description specifies they are in an executive management consultant position, this will indicate they can communicate with executives. This might seem contradictory to what we said earlier, when we said a good witness should be able to “dumb down” his or her expertise in order to explain it to non-technical judges or juries. Even so, someone in the corner office, legal department or both will probably have to approve the expert witness, as these kinds of resources are expensive. The ideal candidate should be able to present oneself in *either* forum.

Once the candidate has passed this first hurdle, interview them by phone or in person. Again pay particular attention to their ability to communicate their expertise. If you are satisfied with their abilities in this area, then look for the following other traits:

Personality

Whether an expert has previously testified in front of a jury or judge is not as critical an element as is his or her professional experience and credibility. An experienced witness is not only competent in his or her profession but also has a congenial personality. Whether we like it or not, all kinds of dynamics are in play in the courtroom and only a fraction of them pertain to the actual merits of the case. A judge or jury that does not like a witness will develop an unfavorable impression of them that could prejudice the whole case. The key things (besides knowledge and communication already covered above) a judge or jury will home in on (and which you should as well) are:

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Trustworthiness

It's difficult to measure trustworthiness. It is possible however for a good potential expert witness to exhibit the *impression* of trustworthiness. One component is reputation. Your witness for example might be well known, and therefore a judge or jury for this reason may be more at ease with taking their testimony at face value. Even things like extracurricular activities might come into play. A recognized personality like a former Dallas Cowboy or Denver Bronco might just be noteworthy enough to be more believable, even if this aspect of their life is only tangential (at best) to their purpose for testifying. Whether the person is or was an elected official, for example, could be a plus or a minus depending on the circumstances. Is the person well known for volunteer work or philanthropy? If so work it into the biography included in any pre-filed testimony. It's also vital to add the importance of working with your lawyer at this phase. A good one will know the kinds of traits to present and may even know the judge personally if the action is brought locally. In fact, in my experience there is such a thing as "home field advantage" when it comes to lawyers. My lawyer friends often speak of being "home teamed" when having to try a case in a distant jurisdiction, where opposing counsel knows the judge and surroundings better than they do. What's true for lawyers is also true for expert witnesses.

Humbleness and "Open" Demeanor

We place these two together for a number of reasons. First, it is virtually impossible for you to know absolutely if a potential witness is honest. As we stated earlier, however, the perception of honesty is a primary consideration in the courtroom. This is accomplished in large part by an attitude that has been characterized to me in the past as being "humble and earnest."

People in general (which includes judges and juries) do not like to be bombarded with the "expertise" of others because it makes them feel less intelligent or that the person is "showing off." Therefore, some of the most effective witnesses are those who can project expertise and authority on a subject without putting people off or making them feel belittled.

Credibility

While any expert's opinions must be reliable, *your* expert's opinions must also be believable. Any conclusions must be based on generally acceptable stan-

dards in the appropriate profession or field. Proof may come from offering up treatises on the subject, articles in trade journals or the testimony of peers. However, more than simply citing standards, experts must also be able to fill the gaps between the facts they are examining and the resulting conclusions. An expert must be able to explain precisely why, under his or her methodology, an apple is not a pear.

It is not sufficient to simply make the connection, say, between the building damage and the tornado or critical data loss with a mishandled back up process. An effective expert witness must be able to show a well-reasoned basis for making that connection. If the expert is unable to prove that his theory is accepted in the field or if he is unable to hook up the given facts with his conclusion through common sense reasoning, again, the judge may not permit the expert to testify.

Your expert should be a person who is truly able to give the judge or jury a crash course on the subject in an engaging way *that holds their attention*.

As we stated earlier, the best experts almost consider the courtroom as their classroom. That's why experts that frequently stump the lecture circuit can be in high demand. These people have the skill to pass along what can be very technical information in common, ordinary, everyday terms without talking down to their audience. More importantly, they are able to show how an understanding of the subject matter applies to the dispute at hand. These experts are also, for all of these reasons, generally expensive to retain.

What Do Expert Witnesses Charge?

In a sentence, expert witnesses can charge what the market will bear for someone with their field of expertise. A nationally known figure may command a fee of \$1,000 per hour or more, whereas a very good and well experienced Information Technology expert may testify for up to \$300 per hour. Interestingly, how well known an individual is may not always be the most critical factor. Some studies, in fact, show that jurors are actually more likely to trust experts who testify infrequently and non-professionally, particularly as opposed to "professional witnesses" for example, employed full-time in a large corporation. This is also where your NaSPA membership may help you. Consider for example publishing for Technical Support Magazine and get your name out there! It may be the best "advertising" for your skills you can provide and open the door for you to some lucrative engagements. Good luck!

Learning from the Fast Developing Practice of Lean IT

By Steve Bell

Clear about a half an hour on your schedule and watch this. Bell has some great insights here! If you like these videos in the electronic version of *Technical Support Magazine* let us know and we'll find more! We found this on our longtime supporter's web site. Thank you again [Auerbach](#).

<https://www.youtube.com/watch?v=07dGZPqEd78&feature=youtu.be>



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Metrics for Hard Disk Drives and Solid State Devices

By Hubbert Smith

Ever run into one of those personalities who, when you ask the time of day, tells you how to build a clock? We're just looking for the time of day—we don't want or need to know how to build a clock. This metaphor applies well to data center storage. Storage vendors and suppliers have been known to claim leadership based on one (and usually only one) dimension of their product.

My favorite example is when a newbie enterprise solid state product marketing person claimed a high performance number (something like 100,000 IOPS, or input-output operations per second) and then crowed that to achieve that same number of IOPS would require some hundreds of 15K rpm drives. While we can relate to the notion that a vendor needs marketing sound bites—such as the world's best storage performance benchmark—we also know performance benchmarks alone are not the whole story. We know IOPS can be large or small; the workload can be random or sequential; the workload can be some mix of reads or writes. The one-dimensional "market-ecture" above, though factually correct, does not remotely resemble anything in the real world. The benchmark above assumed the smallest possible block size (512 bytes), 100 percent random workload, and 100 percent read 0 percent write workload—a situation never encountered in mainstream data storage.

- In the real world, block sizes vary, but the typical block size is 4,000 bytes (not 512 bytes).
- In the real world, the workload is sometimes random and sometimes sequential (not 100 percent random).
- In the real world, there is a mix of reads and writes; the rule of thumb is a 70:30 read:write ratio (not read-only).
- And obviously, the workload (mix of block sizes, read versus write, and random versus sequential) can vary based on the storage task/application, as

well as on the time of day, week, month, quarter, or even year.

Our approach is to focus on real-world benchmarks, real-world use cases, and key components. We make a conscious effort to cull the noise, the irrelevant, and the imponderable from the equation.

We'll discover how to establish your own relevant criteria, applicable to your shop, rather than buying into those one-dimensional talking points. To be fair, to counterbalance the self-serving people; the data center storage industry has no shortage of good folks whose first instinct is to make things right with the customer. The techniques and approaches we'll cover will help you clearly identify those good folks in the industry, in contrast to the other kind.

For HDD building blocks, our approach is to structure a decision-making process around key metrics: price, performance, power, and capacity. As our objective is to turn raw data into useful information; we can take these four key variables (raw data) and evaluate them using key ratios (useful information), as shown in Table 1.

Key Ratio for Hard Drives	Ratio	Example
Performance/Cost	IOPS/\$	300 IOPS, \$200 IOPS/\$ = 1.5
Performance/Power	IOPS/watt	300 IOPS, 12 watts IOPS/watt = 25
Capacity/Cost	GB/\$	300G, \$200 GB/\$ = 2
Capacity/Power	GB/watt	300G, 12 watts GB/watt = 33

Table 1. Hard Disk Drive Key Ratios (Bigger is Better)

Notice the benefit (performance or capacity) is always in the top of the fraction (numerator), and the expense (cost or power) is always in the bottom of the fraction (denominator).

This way, bigger is always better.

	10K	15K	7200		10K	15K	7200	
			2TB		400G	144G	2TB	
performance	300	400	120		IOP/\$	1.5	IOP/\$	0.7
capacity	400	144	200		IOP/Watt	25.0	IOP/Watt	17.1
power	12	7	7		GB/\$	2.0	GB/\$	1.1
price	\$200	\$300	\$180		GB/watt	33.3	GB/watt	28.6

Table 2. Hard Disk Drive Key Ratios Raw Data (Sources: Vendor HDD data sheets, Nextag.com for approximate price, storagereview.com for approximate Web server performance.)

The key ratios chart in Table 2 serves to simplify the total storage view. It tells us 10K drives are better in GB/\$, better in GB/watt, and better in IOPS/\$; but not better in IOPS/watt than 15K rpm drives. It also serves as the underlying data for Figures 1 through 7.

Storage system engineering is sometimes (but not always) about performance, and it's also important to see the entire picture including price, power, and capacity (Figure 1).

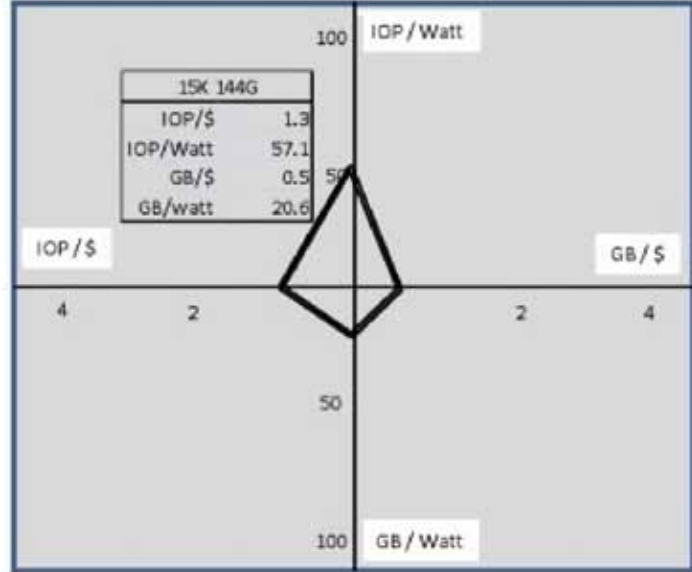


Figure 1. Key Metrics for 2.5" Small Form Factor 15K rpm, 146G

Clearly, the strength of this product is IOPS/watt. It's noticeably anemic in the areas of GB/\$, GB/watt, and IOPS/\$. The creators of this small form factor 2.5" HDD product were motivated by their IT customers to add more storage performance in over-full data centers with limited power, limited A/C, and limited floor space (sound familiar?).

In situations where slow storage interferes with end-user productivity (and, as a result, this costs the company money), this class of performance-optimized HDD or SSD is the right tool for the job. But in situations where storage performance has a minimal impact

on end-user productivity (e.g., e-mail), there are other, more financially responsible tools for the job.

Let's review the same chart for a typical 10K rpm drive (Figure 2).

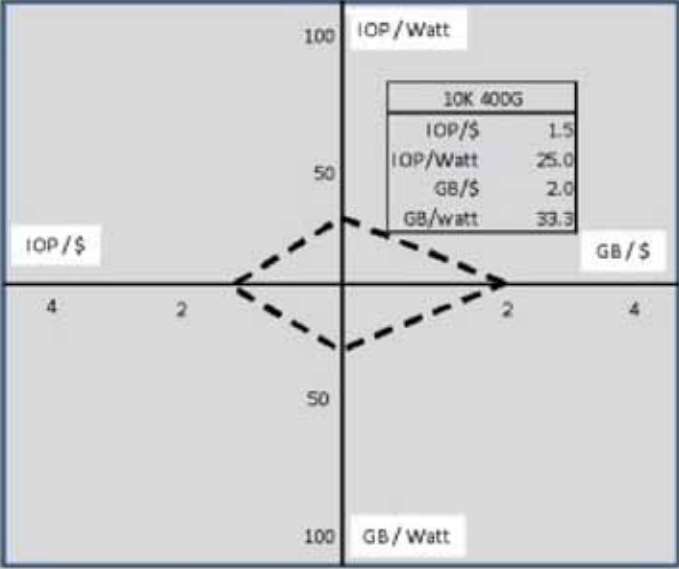


Figure 2. Key Metrics for a 3.5" 10K rpm, 400G

The 10K rpm product diagrammed above shows some balance across IOPS/\$, IOPS/watt, GB/\$, and GB/watt. This characterization is for a 3.5" drive. It consumes more power, but it also has more platter space with better total capacity, better capacity/\$, and good sequential performance. The ratios improve our shared understanding of the merits of a specific HDD (the basic building block of storage).

Storage systems engineering is sometimes (but not always) about performance.

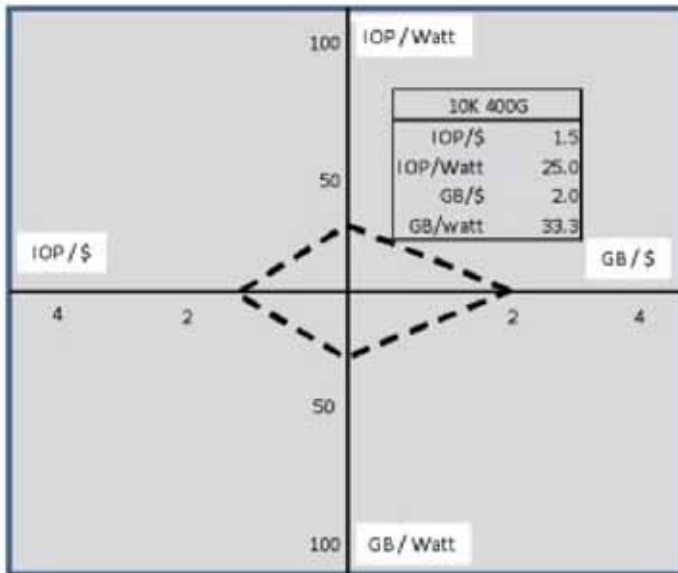


Figure 3. Combined Chart for Evaluation of Key Storage Ratios: IOPS/\$, IOPS/watt, GB/\$, GB/watt (Bigger is Better)

What does Figure 3 tell us? We are looking at the tradeoffs between a 10K rpm 450G drive as compared to a 15K rpm, 144G drive. In this example (no surprise) the 10K rpm drive exceeds the 15K drive in GB/watt and GB/\$. Also (no surprise) the 15K drive exceeded the 10K drive in IOPS/watt. The interesting surprise, however, is that the 10K drive exceeded the 15K drive in IOPS/\$.

So, do we conclude we should use 10K rpm drives throughout your system?

This analysis indicates we should use 10K rpm drives as the default. But, when performance is the top criteria, this analysis leads us to apply 15K rpm drives.

This is just a simple example. And the analysis gets even more interesting when we add enterprise solid state devices (SSDs).

We know some systems should be optimized for performance, and other systems should be optimized for capacity, and still other systems should be optimized for a combination of both performance and capacity. With this insight and structure, we'll be able to objectively compare and buy the right tool for the job. Later in the book, our sections on Service Level Agreements (SLAs) will map to this approach. Sometimes we need a moving van, sometimes a sports car, right? This approach balances technology against power and cost of ownership. This metrics/ratio approach will drive closure on the question of "when is good enough really good enough?"

It gets better in Figure 4.

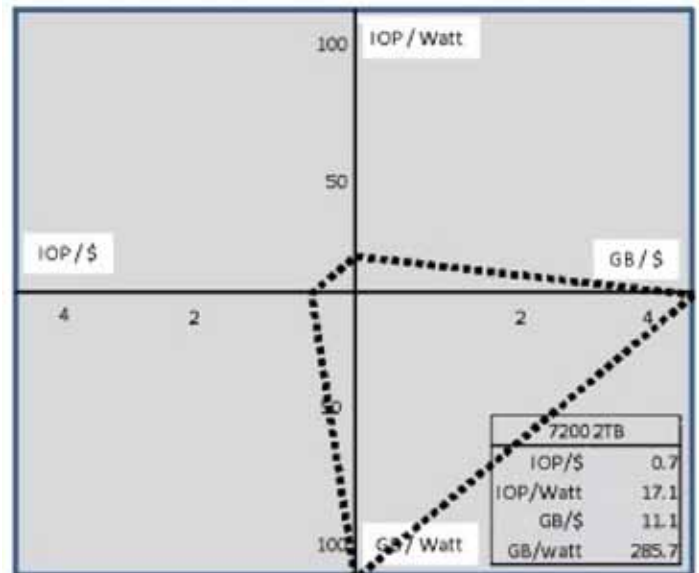


Figure 4. Key Metrics for a 5400 rpm, 2000G, 120 est IOPS, est \$180 (Bigger is Better)

We could double the scale of this diagram and the GB/watt (almost 300) and GB/\$ (11) would still be off the scale.

The capacity-optimized disk drive is an incredible tool to achieve economic delivery of service levels. Capacity-optimized drives are not the right tool for situations where storage performance has an impact on user productivity and therefore costs the company money, but in almost every other instance the capacity-optimized drive is a tool that truly can save money and still get the job done.

There are data center professionals who have serious reservations regarding the reliability of high-capacity drives in the enterprise as well as regarding the use of SATA (serial advanced technology attachment) as an enterprise drive interface. It's likely these reservations are based on stale information and assumptions. Highly reliable capacity-optimized drives have been shipping for the better part of a decade. They are available in both SAS interface (for dual controller implementations) and SATA (for single controller and server-direct-attached implementations). These enterprise-class capacity-optimized drives (Raid Edition or NL-Nearline) demonstrate 1.2 million hours mean time to failure, consistent with other 10K and 15K drives.

Although there is much more to the subject than we touch on here (we will cover it in later sections on manual tiering and automated tiering), solid state devices make great sense when used in conjunction with capacity-optimized drives. SSDs make limited sense in general IT applications employing single-

tiered approaches. But an approach that uses SSDs plus capacity-optimized HDDs properly, in two-tier applications, offers a significant advantage in IOPS/\$, IOPS/watt, GB/\$, and GB/watt over any single-tier storage system (see Figures 5, 6, and 7).

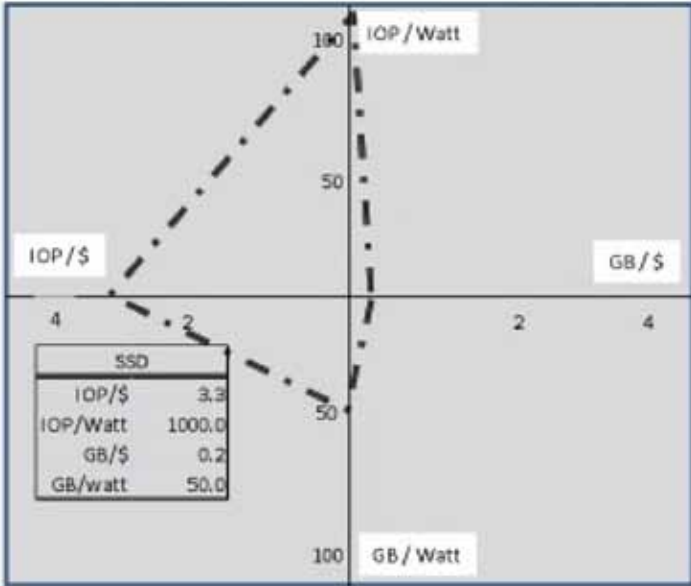


Figure 5. Key Metrics Comparison for SSD; Assume 100GB, 2000 IOPS, \$600 (Bigger is Better)

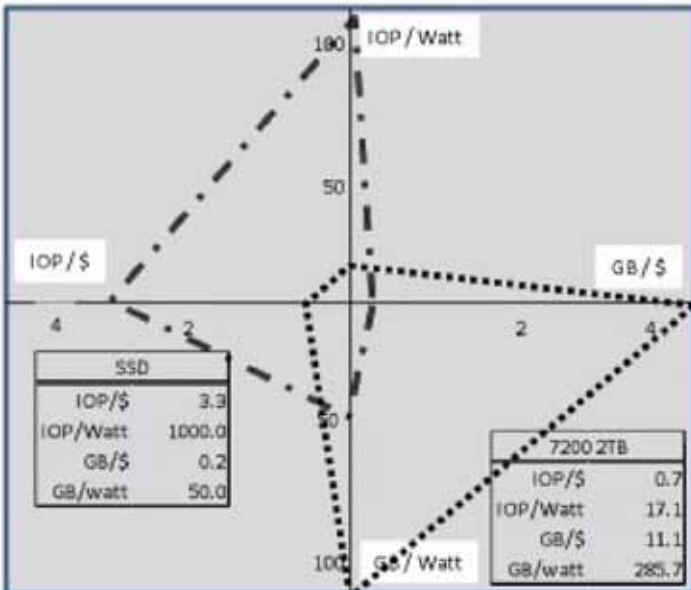


Figure 6. Key Metrics Comparison for SSD with Capacity-Optimized 7200 rpm Drives (Bigger is Better)

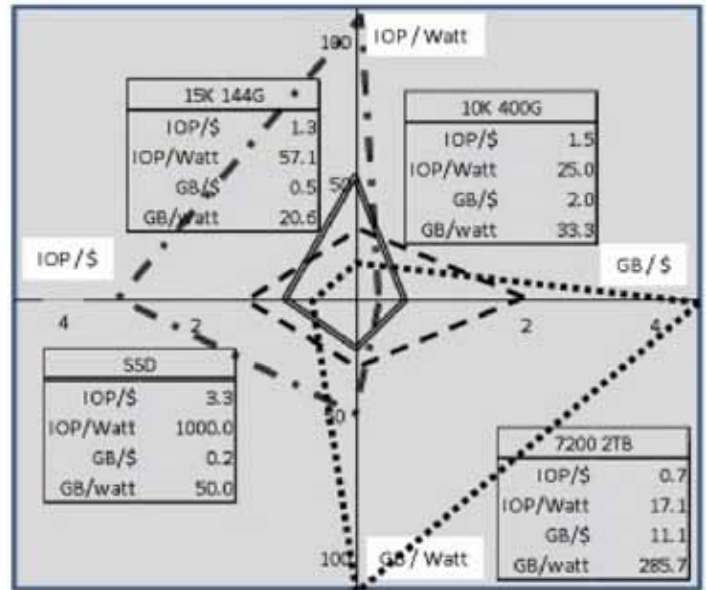


Figure 7. Key Metrics Comparison for 15K, 10K, 5400 rpm, and SSD (Bigger is Better)

Notice the storage device classes that are strongest: capacity-optimized and SSD. Everything else is a compromise. For the upcoming sections, we will walk before we run, so I will not mention SSDs for the next few sections, but we'll cover SSDs and where and why they make financial sense later in the book.

The bottom line is that these products (high-capacity HDD, 15K rpm HDD, SSDs) align to storage service levels (Tier 2 and Tier 1). When these technologies, plus people, plus processes, are intelligently applied to deliver on service levels and manage aging data from tier-to-tier-to-tape archival, the operational savings and capital savings are compelling.

Table 3 shows the underlying data driving the charts in this article.

My point is that considering the ratios of IOPS/\$, IOPS/watt, GB/\$, and GB/watt enables us to avoid getting tangled in information spaghetti. Using key ratios, we trade confusion for clarity as we compare one class of drives to another class of drives. New HDD products will emerge with improved capacities, improved performance, improved pricing.

	10K	15K	7200 2TB	SSD	10K 400G	15K 144G	7200 2TB	SSD
performance	300	400	120	2,000	IOP/\$ 1.5	IOP/\$ 1.3	IOP/\$ 0.7	IOP/\$ 3.3
capacity	400	144	2,000	100	IOP/Watt 25.0	IOP/Watt 57.1	IOP/Watt 17.1	IOP/Watt 1000.0
power	12	7	7	2	GB/\$ 2.0	GB/\$ 0.5	GB/\$ 11.1	GB/\$ 0.2
price	\$200	\$300	\$180	\$600	GB/watt 33.3	GB/watt 20.6	GB/watt 285.7	GB/watt 50.0

Table 3. Raw Data for Key Metrics Comparison for 15K, 10K, 5400 rpm, and SSD (Source: Vendor data sheets for typical drives, typical performance data (Web server IOPS) from storagereview.com, typical prices from nextag.com)

I hope that makes sense, and that we can declare "confusion avoided" instead of falling victim to analysis paralysis or stalling our investigation.

A side note on the drives we've examined: You may read this and think, "He said 400 GB, didn't he mean 450 GB?" At the time I put this section together the 400G 10K rpm drive was based on four platters of 100 GB each. Along the way, the platter density changed from 100 GB to 150 GB per platter. Now we see a 450 GB 10K rpm product, not a 400 GB product. That's the nature of the HDD industry.

The 450 GB product is based around three platters of 150 GB each (significantly less expensive to produce; its higher bit density offers higher sequential performance). The raw data will change quickly; it's the ratios that are the main event. Ratios turn data into information.

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How My Role Models Led Me to a Career in IT and Helped Me Create Work-Life Balance

By [Susan Bligh](#)

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Susan Bligh shares how the roles models in her life—male and female, good and bad—helped her make the decisions that have enabled her to flourish in both her professional career and her personal life.

If I ask my seven-year-old daughter what she wants to be when she grows up, she will tell me one of many answers, but it's always the same theme – a nurse, a ballerina, a teacher, an artist. If she chooses to be any of those, I will swell with pride, but I also want her to know there are other choices. My answers were similar when I was seven too, until I turned eight and realized there were others doors I could open. This happened because of my first role model in IT – my mother.

When I was in third grade, my mother announced to my sister and me that she was going to get a university degree. This was relatively unheard of: a stay-at-home mother of two in her thirties, going back to university. What was even more astonishing was that she had decided to get a degree in Computing Sciences. This was a time when few families had home computers, and Computing Sciences was about as real to the average person as Star Trek.

I saw my mother put in countless hours in front of a computer, creating lines of code that would eventually make something as simple as a dot flash on and off on the monitor. I was hooked from the first time I saw the “Game of Life” run from something as simple as a combination of 0's and 1's. I also saw her organizing carpools so my sister and I could still take part in our competitive sports, helping us with our homework and teaching us valuable skills such as how to make our own healthy lunches.

My mother always told my sister and I that anything was possible if you work hard enough and make speed

bumps out of any obstacles put in your way. When I was 16 and my girlfriends were spending their summers at the lake, I got a summer job working for a company that created software for realtors. I spent the summer learning about graphical interfaces, databases and coding. I took as many courses in high school as I could in computer programming; often I was the only female in the room. I always felt I had something extra to prove. The boys in my class expected me to ask them for help, but I wanted to show them they should be asking me for help.

As soon as I finished high school, I followed in my mother's footsteps and started my Bachelor of Science in Computing Sciences. Through my mother's journey, I knew it would be difficult but possible.

After my first year in university, I got a summer student position at a company that created software for Stock Exchanges. I went in as a receptionist/file clerk, but as soon as they learned I could code, I was quickly



moved to the programming department. As a 19-year-old blonde girl in the cube-land of male programmers, I had to prove to them I had something more to offer other than just being a young female that could check if their GUI was “pretty”. My first assignment was to make all the text boxes a consistent height and width for the entire software application. I spent months doing similar repetitive work before I decided I needed a way to show my company I had more to offer.

Other Role Models

My mother introduced me to a couple of women she thought I could learn from. One woman in particular gave me some incredible insight into the life of a female in a company that was 75% male. Although she was not a programmer, she was what I desired to become; she was a woman in a lead position who was also the mother to three wonderful children. I gleaned all I could from her, not just about her work but about how to balance being a female, wife, mother, employer and employee.

I asked her opinion on how to move past the monotonous work I was being given. She told me I needed to show them I had skills that were being overlooked and that I could add value to the team. She also gave me guidance on how to do this without coming across as someone who wasn't willing to “pay their dues.” She encouraged me to find a problem my team had been trying to solve and think outside the box to come up with a solution. I reached out to my classmates and co-workers and worked through a few lunch hours. I managed to solve a coding problem that had been puzzling our team for a while. I gave credit to those who helped me and proved to my manager I was ready for more responsibility. At the same time, I gained respect with my co-workers, and since I shared credit I was not considered a threat.

I worked anywhere from 25-40 hour work weeks through my entire time in school. This was an incredible opportunity to learn from professionals, as well as start my resume early.

All my co-workers were men, and at school there was one female to every 15 males. Even 15 years after my mother took her degree, the field was predominantly male. In my second year, I had a female Teacher's Assistant for one of my classes. She had finished her Computing Science degree and was working toward her masters. I developed a mentoring relationship with her. She shared techniques with me that she used during her degree to navigate through the male-dominated



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environment. One technique in particular was difficult for me, but proved to be quite valuable. She encouraged me to learn to love some of the social activities my male peers were involved with. Even if I would rather go home and read a novel, I should spend some time playing Nintendo and Playstation with my peers. At work, I learned how to play pool and foosball. By engaging in shared activities with my peers and coworkers I became a team player. I was invited more frequently in on discussions and my opinion seemed to hold more weight.

I also discovered being female meant that I was not threatening, and the men did not feel they had the need to compete against me. They were thrilled to share their knowledge with me and every chance I got, I asked questions.

After graduating with a degree in Computing Sciences and five years working as a programmer, I was ready for my next challenge. I got married and wanted to move into a field that allowed me to leverage my passion for technology and my skills as a communicator. I wanted to be a business analyst; the bridge between the technology and business worlds.

I asked a friend's father who was a hiring manager for a large company to review my resume. He said to me, "If you get an interview and they notice your wedding ring make sure you make it clear to them that you will NOT be having babies anytime soon. You're the prime age to be taking maternity leave." I had a new challenge; I now had to compete for jobs as a newly married woman, and apparently that could be viewed as a hindrance in my career.

Again, my role models gave me great advice. I spoke to my mentors and my mother. I was told that being a wife and a mother added to my skill set, rather than taking away from it. I went into my interviews with that thought bolstering everything I said. At one interview, I noticed the interviewer's gaze sweep over my left hand. Instead of trying to hide the fact that I was newly married, I used my wedding as an example when asked if I had any project management experience. At the end of the interview, he told me that was the first time he'd ever thought of planning a wedding as project management experience. He then spent twenty minutes discussing his daughter's upcoming wedding and all the issues he was experiencing. I had made a personal connection with him and in the end was offered the job.

I soon got hired in at a Health Care provider as an analyst. During my time at this company, I had my first child. My next challenge had started--the challenge of being a working mother. When I first went back to work, I struggled with working reduced days and how I felt it looked to my coworkers. I needed to pick up my daughter from day care so I was no longer free to work until 6 or 7pm if I wanted to. I felt that I would be overlooked for interesting projects and that the perception of my new time table was that I couldn't pull my weight. After talking through my fears with a female colleague who had teenage children, I understood that these were just that – my fears. I feared these things, and until I actually let my new timetable affect my capability no one else shared my perceptions. As soon as I realized no one was actually treating me differently my fears subsided.

After five years with that company, I made the move to the oil and gas plant as a business analyst, and I had a second child. Along with the skills from my previous jobs, as a mother I now have a tool belt full of other useful skills: time management, financial management, communication, scheduling, and patience. I knew my value to my company, and after my second maternity leave, I requested the option to work from home on Fri-

days so that I could see my children to school and meet the other parents and teachers.

The world has changed since I first started working, and men are much more involved in parenting. My male manager was supportive of my request, and with that one small change in my work week my life felt much more balanced. I no longer have to say no to play dates because I don't know who the children or parents are, and my children look forward to each Friday when mommy does the drops off/ pick up from school.

My team supports SAP software used for oil and gas plant maintenance. This means that my co-workers are 90% male. The first day I started this job I was the only female in a room of twenty men, and about twenty years younger than most of them. When they started to talk about pigging pipes, compressors and isolation valves, I knew I had to leverage the skills I had learned earlier to my advantage. I put my pride aside and asked questions--lots of them. I showed vulnerability in my lack of knowledge, and the men were eager to teach me. Once again, I had a role model to help me navigate this mostly male environment—my father.

My father is a humorous man and taught me from a young age how to talk with men. He taught me how to understand sarcasm and jokes, and how not to bring emotion into heated conversations. I once needed to have an important conversation with a male co-worker about a project he and I were working on. I asked my father for advice on how to approach him about a sensitive topic. He advised me to stick to the facts and listen more than I speak. He knew me well, so the advice was well-suited; I needed to reign in my feelings and open myself up to his ideas. The approach worked and the conversation was very successful. It is important to me to have male mentors as they too have a lot to offer.

Being a Role Model to Others

I have taken a special interest in mentoring young women and encouraging others to find mentors. I get so much out of my mentors that I want to give back to the next generation. At work, I let senior managers know that mentorship relationships are important to me through my yearly goals. By making it part of my goals, I get buy-in from my management that it is important to them too and the relationship is supported. I've had several managers approach me asking if I would consider mentoring one of their new staff members. I've also helped co-workers find mentors for their teenage children.

Having a mother in the field as a role model has been a huge benefit. If you don't have someone in your life that can be a mentor for you, find someone else. It is important to find mentors who have done something with their life that you are in awe of. In the days of social media, finding someone who is doing something interesting is easy enough. Find a blog that interests you or traverse through LinkedIn and ask for introductions. They don't have to be triathletes, vice presidents or the city's most frequent volunteer. They just need to be someone you admire, for any reason at all. They need to be someone you can learn from, and sometimes the people you least expect can be the person you learn the most from. One of the people I've learned the most from is a friend and old coworker who works in the Human Resources field. Her skill set and passions are about as far from mine as possible, yet I've learned so much about human nature from her. In workshops when I'm facilitating many people at one time, I've leveraged so many of the "soft skills" that our relationship has brought out in me.

Don't forget to learn from people you may not admire as well. I once had a manager who was incredibly respected at work and was moving up the ladder at a rapid pace. However, she once told me in order to get

ahead I should never talk about my family at work and should always be the first one in and the last one out of the door. She had no work/life balance, and her role as a mother was obviously not an asset to her but something that was to be hidden. I learned a lot from her about the person I knew I did not want to be.

I hope, if my daughter's interests lie with technology, to provide the same guidance to her one day as my many role models have to me. Being a wife and mother and working full time is certainly a balancing act, but if you open yourself up to learning from others (including your children) it is a very rewarding and fulfilling experience. Navigating the waters of a career in technology and the challenges of being a working mother in a predominately male field has been a journey I would never trade.

Susan Bligh has been in the IT industry for 17 years and has an enthusiasm for business process and operational excellence through the use of technology. She is currently a lead Business Analyst at an Oil and Gas company in Calgary, Alberta. She has previously worked in software development and training, client management, and database administration. She is passionate about bringing people together to learn from each other in the forms of mentorships, communities of practices, communities of interest and role models. She was recently a panel member for a discussion about Community of Practices at the 2013 BA World conference in Calgary.



Do You Live in Fear of an IRS Audit?

5 Red Flags to Avoid on Your Return

By Rick Rodgers, CFP

It is no secret that one of the biggest fears people have is receiving an audit notice from the IRS. It ranks right up there with being diagnosed with a life-threatening illness. Of course, the IRS does nothing to alleviate this fear because the more frightened you are, the less likely you will be to cheat on your taxes.

The IRS audited one out of every 104 tax returns in federal fiscal year 2013. It's becoming increasingly evident that the greater your total income, the more you'll attract the agency's attention. Last year, the IRS audited about 10.85 percent of taxpayers with income greater than \$1 million. The audit rate dropped to 0.88 percent for those with income less than \$200,000.

Some of the audits were taxpayers pulled at random. The rest of the returns are selected for examination in a variety of ways.

Lowering your IRS profile will help minimize your chances of being audited. Here are five ways to help you stay off the audit list.

1 **Large Itemized Deductions:** The IRS has established ranges for the amount of itemized deductions based on a taxpayer's income. Deductions that exceed the statistical "norm" for a given state and region may be red-flagged for a closer look. This does not mean that you shouldn't take legitimate deductions. Your deductions could exceed the IRS range due to high medical expenses and large charitable contributions. Take all valid tax deductions – just be sure you keep your backup documentation.

2 **Self-Employment Income:** The IRS believes that the vast amount of underreported income occurs among the self-employed. Self-employed taxpayers are audited by the IRS far more frequently than those who receive a W-2 for wages. People who are employed by others and receive W-2 income but also

run a business that reports a loss are especially high on the IRS radar screen. You will need to be able to prove you are operating a business with the intention of earning a profit and not just trying to write off the expenses of a hobby. You will need to be able to pass both the "passive loss" and "hobby loss" rules in order for the deductions to stick.

3 **Business Expenses:** Big deductions for business meals, travel and entertainment are always ripe for audit. A large write-off will raise red flags if the amount seems too high for the business. Taxpayers claiming 100 percent business use of a vehicle is also a huge red flag. The IRS knows it's extremely rare for an individual to use a vehicle strictly for business. The IRS looks for personal meals or claims that don't satisfy the strict substantiation requirements.

4 **Rental Properties:** The IRS is scrutinizing rental real estate losses for those who claim to be real estate professionals. You must meet two requirements: 1. More than half of the personal services are performed in real property trades or businesses in which you materially participate, and 2. You perform more than 750 hours of services in real property trades or businesses in which you materially participate.

5 **Home Offices:** Taxpayers who operate a business from their home are entitled to deduct the portion of their home that is dedicated to operating the business. The IRS believes that many taxpayers use this deduction as a means of writing off personal expenses and carefully scrutinize tax returns that claim the home office deduction. Claiming this deduction greatly increases the chances that your tax return will be audited. You should consult a tax expert to deter-

mine if you are entitled to claim this deduction. If the tax savings are minimal you may opt not to claim the deduction simply to avoid the scrutiny. For details, see IRS Publication 587.

There is no way to completely audit-proof your return, and if you do get an audit notice from the IRS, don't take it personally. It does not mean the IRS believes your return is fraudulent. When you get a notice, pick up a copy of IRS Publication 1 "Your Rights as a Taxpayer." Be courteous and helpful without volunteering more information than what is requested. Plan ahead so that you are organized and can answer questions promptly. Ask for a postponement if you need more time to prepare.

If you are a self-employed taxpayer or have unusual circumstances that place your return outside of the statistical norm, let a professional prepare the return. Self-prepared returns are themselves more likely to be audited. The IRS believes that a non-professional has limited knowledge of the 4,000 pages of tax code.

Tax law is complex. The fee charged by an Enrolled Agent or CPA can be easily justified by the peace of mind they bring if you get the dreaded audit notice.

Certified Financial Planner Rick Rodgers is president of Rodgers & Associates, "The Retirement Specialists," in Lancaster, Pa., and author of "The New Three-Legged Stool: A Tax Efficient Approach to Retirement Planning." He's a Certified Retirement Counselor and member of the National Association of Personal Financial Advisers. Rodgers has been featured on national radio and TV shows, including "FOX Business News" and "The 700 Club," and is available to speak at conferences and corporate events (www.RodgersSpeaks.com).





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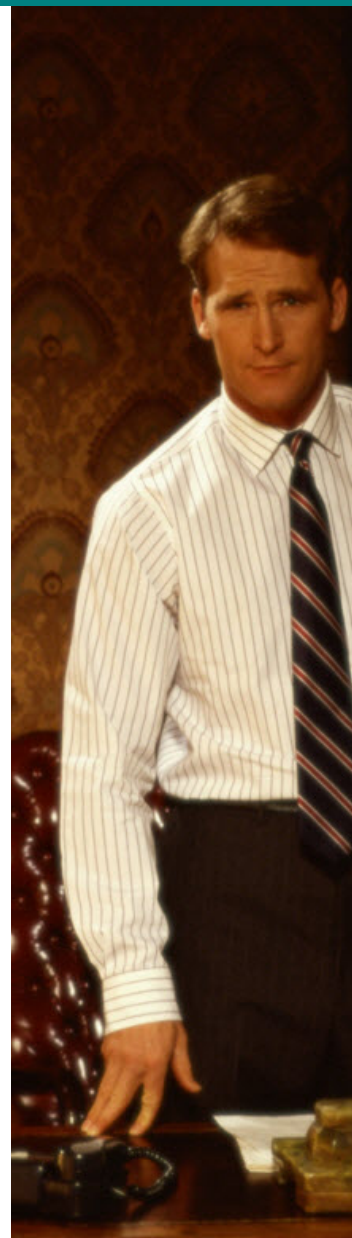
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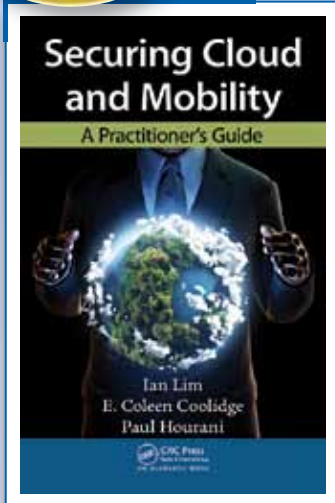
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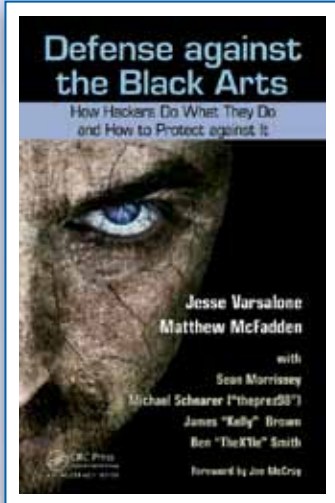
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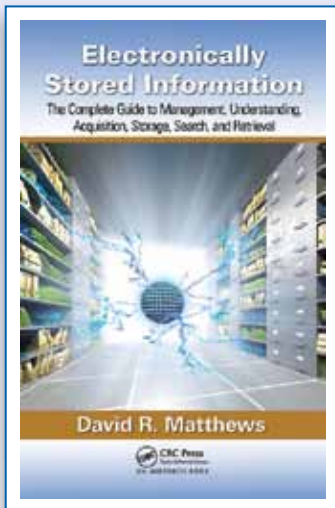
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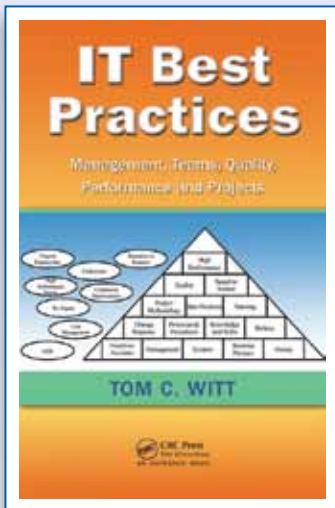
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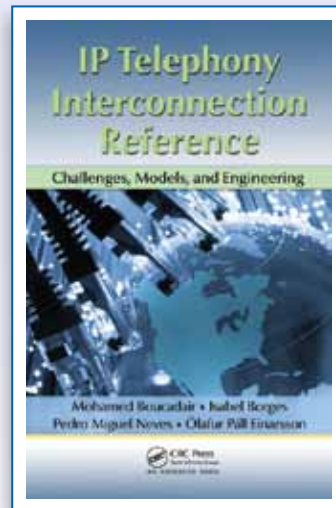
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