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BEFORE NETAPP

On Computers, Colleges, Castration, and Risk

My good fortune to be involved in technology came from not listening to my mother. When I was young, a family friend taught me the rudiments of programming, and I loved it. I read early computer hobby magazines like *BYTE* and *Dr. Dobb's Journal*. At fourteen, I bought a build-it-yourself mail-order computer called an IMSAI 8080. It had binary toggle switches on the front and little flashing lights. I programmed the lights to go back and forth. A television set was the display, and an audiocassette tape recorder was my first storage system ever. This was in 1977, right at the dawn of the personal computing era.

My mother seemed to feel that working with computers was not a serious profession. Perhaps she saw a matchbook cover that read, "You, too, can learn computer repair!" with a picture of some guy fussing with vacuum tubes and his butt crack hanging out. She made her opinion clear: computers were fine as a

hobby, like ham radio, but you would never make that your career.

Computers challenged me, but high school did not. Some might feel that high school boredom is normal. My mother disagreed, and she worked to make education rewarding for her children. My younger sister had learning disabilities, but somehow, whenever we moved to a new location, or my sister graduated from one school to another, a perfect program for her needs was always just starting. Years later, I commented on this lucky streak to my father, who said, "Dave, you do know

Sordid Details Explained

The 42nd Street Fleabag

I was, in fact, conceived in a dodgy hotel outside Times Square. My parents had arrived in New York on their way to Europe. Bad planning and bad luck conspired to put them up in a low-cost hotel in Midtown. My father told me, "The place wasn't so bad," but my mother insisted, "Oh, yes it was," in that tone of voice that ends discussions. They went out for dinner, and by the time they got back, the drug store had closed.

That night in Times Square had to be my beginning. My father had been away on a business trip for a couple of weeks before, and their trip to Europe was romantically challenged due to a rough ocean crossing that left them both hopelessly seasick.

That was my first trip to Europe, and I don't remember a thing.

Opium

My mother was on a trip to India, and her tour group came to a little hut in the desert. Mom approached some wizened old men who were stirring a pot of liquid, and one of them cupped some of the fluid in his hand and offered it to her. She asked the guide if she should partake. He told her that it would be the polite thing to do, so she slurped the liquid from his hand. Only then did the guide tell her it was opium.

the reason for that coincidence is because that's what your mom did with her life?" Many school systems were not aware of the laws about what schools must do for students with learning disabilities. My mother made them aware.

My problem required a different approach: the law protects students with disabilities, but not students with boredom. My mom came across an article in *Smithsonian* magazine about young teens taking college courses at George Washington University (GW) in Washington, D.C., not far from our home in Virginia. We followed up, and at age fourteen, halfway through

Much later, at a family gathering, Mom was sitting with a particularly staid relative, and I took it upon myself to suggest that she tell us all about the time she did heroin. "It wasn't heroin. It was opium," she blurted out. She then reconsidered and said, "I mean, I don't know what you're talking about."

The Cathouse College Fund

While living in Virginia, my parents owned some investment property in Northern California. One day, the local sheriff called my father and asked if a man named Kentucky Wooten was his property manager. Dad had never heard of the man. It turned out that this con artist searched property records for out-of-state owners, rented out their property illegally, and pocketed the cash. He rented the ramshackle house on my parent's property to an enterprising woman and her two grown daughters, who established the property as the local whorehouse. Evicting anyone in California is tough, but tossing out pregnant women is especially hard. So, for the next couple years, at any one time, at least one of the women was pregnant, staving off any attempt to clear them out. My grandfather, who lived nearby, collected the rent for my parents until my grandmother found out and put a stop to it. Eventually, my parents did extricate themselves from being brothel owners, and later the property paid their kids' college tuition.

my sophomore year of high school, I started college: high school classes in the morning and college classes in the afternoon. I had always planned to be an engineer, like my father, but my adviser at GW felt that a narrow focus was bad for kids so young. For every course in calculus or physics, he made me take one in literature, philosophy, or creative writing. Even for an engineer, writing is a powerful tool; being forced to take classes with term papers was lucky for my later career. Never underestimate the power of a clearly written proposal.

This mix of college and high school worked well, but after a year and a half, my high school principal told me that I needed another year of high school math to graduate. Despite my three semesters of college calculus, he suggested pre-calculus, since that was the most advanced math class available. He also said that I'd never be successful without a high school diploma. That was an early lesson in idiot bureaucrats. I dropped out of high school to go to college full time.

GW taught me to love liberal arts, so even though I planned to be an electrical engineer, I didn't want to attend an engineering school like MIT or Caltech. I chose Swarthmore College in Pennsylvania because it is a liberal arts school with a solid engineering program. That didn't work out so well, because engineering prerequisites dominated my coursework. I could share a dorm with nonengineers, but I couldn't take many classes with them. Always read the fine print.

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Even though I was at Swarthmore, I was still supposed to be a senior in high school, so colleges continued to send me applica-

tions. One was from Deep Springs College, a two-year liberal arts school located on a cattle ranch and alfalfa farm in California's high desert. The school had three hundred head of cattle and twenty-six students who worked the ranch when not studying. It looked crazy, but I mentioned it to my uncle, a Russian history professor at Cornell, and he said, "Deep Springs is a great school. If they invited you to apply, you must." Instead of trying to take liberal arts courses at the same time as engineering, I decided to go to Deep Springs for a concentrated dose. If you keep your eyes open, solutions often present themselves.

Deep Springs College was founded in 1917 by L.L. Nunn, a high-tech entrepreneur of his time. His story is a lesson in business. He was a pioneer in alternating current (AC) electricity, which powered his mine in Telluride, Colorado. In the late 1800s, there was a battle between George Westinghouse, who thought AC was best, and Thomas Edison, who preferred direct current (DC). Westinghouse was right—AC is what we use today—but Edison was a brilliant if unorthodox marketeer. AC was too dangerous, Edison argued, and to prove his point, he traveled from town to town, publicly electrocuting dogs and cats. Search the Web for "edison electrocute elephant" for an unsettling video. Edison even funded an electric chair company—AC powered of course—to promote the link between AC and death. L.L. Nunn convinced Westinghouse that a remote mountain mine was the perfect proving ground for this dangerous technology. It worked, and Nunn converted his mining company into a power company, electrifying mines across the rugged West.

Finding skilled workers so far from civilization was a challenge, so Nunn started a school to train electrical engineers.

That sparked a lifelong interest in education, and Nunn later bought a ranch in eastern California, two valleys over from Death Valley, and started Deep Springs College there. Deep Springs combines a liberal arts education with hard physical labor, desert isolation, and student self-governance. Students select the faculty as well as the next year's incoming class. The isolation and small size—just twenty-six students—create an intense community life. Nunn believed that ranch work helped balance intellectual pursuits. Adolescents reading Aristotle and Nietzsche can get a little full of themselves, but it is hard to take yourself too seriously when shoveling cow manure.

Ranch work can be risky. If someone gave you a dull pocket knife, pointed out a five hundred pound bull calf, and said, "Jump that fence and cut off his balls," would you do it? If you were fool enough to try, you'd probably end up with a broken arm (best case). Most people intuitively avoid foolish risk. But what if the ranch manager demonstrated the procedure and explained its importance? Castrated bull calves are easier to manage and fetch a higher price at market. Before Deep Springs, I could never have imagined performing rudimentary surgery on a touchy region of an enormous, angry beast; now I've done hundreds. Risk can be managed.

People are sometimes shocked that I've slaughtered cows and pigs for food. They say, "That's awful—I couldn't do it." But how is paying someone else to kill your food for you more moral than doing it yourself? The reality is, they could do it if they needed to. Ranch life demands self-sufficiency: it includes many jobs that you may not want to do, that you may not even be qualified to do, but when no one else is available, you do them anyway.

Years later, these lessons were surprisingly relevant in Silicon Valley start-up companies. Not the details, but the attitudes and styles of thinking.

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After George Washington, Swarthmore, and Deep Springs, I was ready for a break from college. I spent the next two summers as a paid cowboy for Deep Springs. Between the two summers, I rented a room by the week in a seedy part of San Francisco and looked for work.

Short on cash, I spotted a place where you could sell your blood. What the hell, I thought, and got eight bucks twice a week for my plasma. Mom was appalled. My parents were not rich, but they were comfortable. Both came from families that had little money during the Depression, and like many from that era, they were savers. They would have taken care of me, but I wanted to make it on my own.

The state employment agency wasn't much help for landing a computer job. San Francisco wasn't as close to Silicon Valley as it appeared on the map, and the job agent knew nothing about computers except that they involved typing. She gave me a test, and I could bang out seventy words a minute, so she sent me to an insurance company where I spent the winter typing people's names and diseases on index cards. I'd rather have been shoveling shit. A winter of typing at Blue Shield gave me a very clear vision—better than most students have—of why I should return to college.

I applied to Princeton and was accepted as a physics major. Even though physics had been my favorite part of electrical

engineering at Swarthmore, I struggled immediately. Princeton had multiple class tracks: physics for nonmajors, for majors, and for honors. I was in the middle track and getting middling grades. Meanwhile, I was taking computer classes just for fun. I talked my way into the "cutter course," designed to weed out students who didn't belong in computer science. The professor told me that I didn't have the right background and would not do well. Eventually he relented, and he later gave me one of only three A+ grades that he had ever handed out. When I got a programming assignment, I would rush home to start work. The problems were like fun puzzles. Physics homework was a painful grind.

Aristotle said that the secret to happiness is to find what you do well and do it. Getting a C– on a required physics course finally convinced me I was in the wrong place. I changed my major to computer science. Thank goodness for that bad grade. Had I been a tiny bit better at physics, I might be a second-rate physics teacher at a second-rate school today. My brain was not wired well for physics, but it worked great for computer science. This was before people saw computers as the path to riches. I didn't switch to computer science for the money; I switched because I loved the work.

The Secret to Success

Jeff Bezos, founder of Amazon.com, was my roommate for a year at Princeton. He also started as a physics major and switched to computer science. The president of Princeton told me that they were examining the room we shared for the secret to entrepreneurial success. In our senior year, we discovered a mummified mouse in an old couch that we scavenged off the street, and we hung it by a string over the entrance to the room. Perhaps that was it.

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After Princeton, in 1986, I moved to Silicon Valley. Résumés are generally boring, so I decided to include "herded, branded, and castrated cattle" on mine, if only to see whether anyone actually read the whole thing. During one interview, I watched the hiring manager read my résumé. She scanned down the page and her eyes went wide. She cracked a little smile and said, "Management experience, I see."

My first real job was computer programming at a two-year-old start-up called MIPS Computer Systems, which designed computer processor chips. It had about a hundred employees and was growing fast. Too fast. This was my first experience with rapid growth, and it taught me how growth can cause pain and confusion. There were always new bosses, and communication was spotty and vague. Being a programmer at a chip company put me outside the company's core mission. I wanted to be part of a company where my work was the focus; I wanted to be on the cutting edge. After two years, I decided to leave.

In 1988, I joined Auspex Systems as employee number seventeen. It was my first small start-up, and product development had barely begun. Our goal was to build a network storage system that was bigger, faster, and more reliable than anything on the market—better, in particular, than anything from Sun Microsystems, which was the market leader.

Start-ups have a sort of pulse. You work work work: no customers and a limited supply of money. It's very creative and exciting because you are inventing from scratch. Eventually, hopefully, it all comes to a crescendo where you ship version 1.0. Then the creative work goes into a lull. You want to ship the exciting new features of 2.0, but first you have to do the bug fixes of 1.0.1 and the minor features of 1.1 and 1.2. But the

features that matter most to customers often aren't the most exciting to design and develop. I had a knack for finding small projects that made the customer's life better. At a trade show after the 1.3 release, we had a poster listing four new features, and three of them were things that I had thought up and developed. If you focus on customers instead of technology, that lull becomes more interesting.

I went through several bosses at Auspex—I might have been a problem employee—but James Lau was the boss that stuck. Our skills and styles were a perfect match, his strengths aligning with my weaknesses and vice versa. For the past twenty years, James has always been my boss or my partner. I also met Mike Malcolm, who was brought in by Auspex's venture capitalists (VCs) to help resolve some technical disputes among the engineers. He was like a professor overseeing unruly graduate students, which wasn't a surprise since he actually had been a professor of computer science at the University of Waterloo in Canada. He had also started and been the CEO of Waterloo Microsystems, an operating system company that competed with and lost to Novell and Microsoft. Together Mike, James, and I started NetApp, but that came later.

In the early 1990s, Silicon Valley was an entrepreneurial wonderland, and for anyone involved in start-ups, it was tempting to start your own. Pen-based computers looked like a great opportunity. They were small, portable computers that you could carry with you all day and operate with a pen. Apple had the Newton, Microsoft had Pen Windows, and there were also start-ups like Go, EO, and Momenta. James and I observed that each new generation of computers created the opportunity for new start-ups. The people who quit their jobs

and developed the first programs for PCs or for Apples hit it big. Our idea was to leave Auspex and develop applications for these emerging pen-based computers.

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The decision to quit Auspex was hard. We were in on the ground floor, working with people that we liked and respected. Only a small fraction of start-ups even get funding, and of those, only a fraction survive to ship product, never mind getting profitable or going public. So it seemed like a big risk. Then I examined the situation from a different perspective. Several of my friends had left jobs to earn law degrees or MBAs, and nobody viewed that as risky. I figured that starting a company had to be at least as educational as an MBA. So my downside was the same as theirs—a year or two without pay—and my upside was much better, because we had some probability, no matter how small, of creating a successful company.

Castrating a bull is a metaphor for learning to take risk. Dropping out of high school, moving to San Francisco, switching majors, leaving MIPS—all were early experiments in risk taking. Each taught something valuable about what I wanted (for example, a career in computer science), or what I didn't (a career typing "osteoporosis" and "chlamydia" on index cards). You shouldn't take risks so dangerous that they might kill you. Or if you must, get lessons first. But even when not deadly, risk should feel uncomfortable, should push you beyond the familiar and safe. An ex-girlfriend arranged a special Vietnamese meal for me: snake prepared seven ways. As the guest of honor,

I knew I'd be the one to eat the raw heart. What I hadn't realized was that it would still be beating when I swallowed it.

The trick is figuring out which risks are worthwhile. Sometimes opportunities arise—but should you grab them? Was it really sensible to leave high school, quit a great job, or jump that fence into the bull's pen with a dull pocket knife? Those choices all worked out pretty well for me. You obviously can't accept every risk that comes your way—you shouldn't—but when I look back at the really significant turning points in my life, they all involved risk. That ex-girlfriend? She's my wife now. Perhaps *How to Choke Down a Live, Beating Snake Heart* should have been this book's title, but that seemed like too much. All in all, the snake was better than the dog meat.

James agreed with me that starting a software company to develop applications for pen-based computers was a worthwhile risk, and the two of us left Auspex in January 1991. One risk that never occurred to us was that Auspex might sue us. Nevertheless, our former boss threatened exactly that. He was upset with us for leaving and said that the other engineers had to understand that leaving was not okay. James objected that our new venture was not even remotely competitive, so Auspex had no grounds for a suit.

Our former boss explained, "You don't understand the legal system. Maybe I can't win, but I have more money, so I'll have better lawyers. If anybody else leaves, I'll sue you, even if they don't join your company. I have to stop the bleeding." That lawsuit never materialized, but the threat left a sour taste in our mouths.

In any case, we didn't have much luck starting our company. Venture capitalists were very happy to talk with start-up-experienced programmers like James and me; they were

curious about what we thought and tried to hire us for their other projects, but they were not happy to give money to two technical guys without business experience or a CEO. Basically, they bought us lunch. Eventually we teamed up with another fledgling venture, but never got much traction. To make matters worse, Pen Windows, Apple Newton, and the other devices were not catching on. Today lots of people use smartphones and tablet PCs, but the hardware back then was too heavy, too bulky, and the handwriting recognition didn't really work. It was an idea ahead of its time.

It's hard to be at the right place at the right time, so perhaps the best alternative is to go to the right place and wait there. VCs never gave us money, but we met quite a few of them, which helped us understand how they think. I had saved some money from MIPS' going public, and we also took some consulting jobs to make ends meet, but my bank account was running low. It was almost a year since we'd left Auspex, and I was unsure what to do, when James called one day and said, "I just heard from Mike Malcolm. He wants to have lunch with us to talk about building toasters."

INTERLUDE
What NetApp Does

My mom periodically brings groups of her friends, mostly people outside the tech industry, to NetApp headquarters for a tour. Everything goes great until one of them asks, "What exactly does your company do?" Explaining high-tech companies is hard. I used to struggle, but now I have an answer.

NetApp sells giant boxes of disk drives—hundreds or thousands of disks—to big corporations with lots of data to store. Many movie studios keep animation and special effects on our systems. Yahoo stores e-mail for hundreds of millions of users. Others store less interesting stuff like financial data, information about customers and employees, or maybe engineering designs for cars and chips. Most Americans have indirectly used a NetApp product without ever knowing it.

We sell big boxes of disks, but the trick is, we don't make the disks or even the boxes they go in. We buy those from other companies. Our most important product is software that helps customers deal with the problems they have on account of all the disks we sold them. We protect data in case disks fail. If a whole data center burns down, we've got software that makes sure there's a second copy of the data someplace far away.

Recently we've been getting into more advanced forms of protection. If the Securities and Exchange Commission (SEC)

visits your company and wants to see e-mails that your CEO sent five years ago, you had better be able to find them. We have software that makes sure your data has been saved and proves that it hasn't been tampered with. Or if you have private information that you don't want anyone else to see, even if they steal it, we have encryption to make it unreadable. Banks use our encryption to protect their customers' financial data, and the military uses it in Humvees in Iraq to make sure that secrets stay secret.

In other words, even though we sell big systems full of disk drives, mostly what customers like about us is that we help them manage all that data more efficiently and easily than our competitors. Customers can store lots of data in one place, be confident that it's safely protected, and manage the whole process with as little hassle as possible.