Things I Wish Iíd Been Told

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Tips For Students with a Bachelors in Computer Science

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This essay is based on notes from a lecture I gave at Stanford in 1999. That lecture was easily the most popular one of the course and several people encouraged me to put the ideas on-line.

The idea behind the lecture was to provide very basic information that the average computer science student needs, and that my friends and I found that we were not given by the time we had graduated from college. Some of the advice here is from my own experience, but a lot is also from the experience of friends, several of whom kindly shared advice they wished they'd gotten earlier.

I should emphasize that the advice here is not comprehensive. It is intended simply to ensure someone starts out with some basic information. For more complete advice you will need to consult a financial advisor and, possibly, a lawyer. Keep in mind, too, that the advice here is heavily tuned for computer science and electrical engineering students who plan to work for high-tech firms in California.

Money

A lot of the advice has to do with handling money, so let's start there.

Salary and Taxes

Table 1: Salary and Taxes for a New Computer Science Graduate

	Annual	Monthly
Salary	50,000	4,167
Federal Tax	8,899	742
State Tax	2,759	230
Medicare	725	60
Social Security	3,100	258

Net after taxes	34,517	2,877

I asked contacts in human resources at some Silicon Valley companies what they paid new undergraduates. The salary range was from the mid-40s to the low-50s. Table 1 shows roughly how much you actually receive per month, after taxes, on such a salary if you live in California.

A few comments are in order. First, you're paying a lot of money in taxes. You're in the highest state tax bracket (9.3%). You're in the 28% Federal tax bracket and likely in a few years to graduate to the 31% bracket. Basically that means that for every new dollar you receive in salary or interest on your bank account, you only get 60 cents after taxes. That point is worth repeating another way: an extra dollar in salary is **not** really a dollar, it is 60 cents.

It is also important to remember to prepare to pay your taxes. If you somehow receive $10,000 without the taxes taken out, remember that you need to put $4,000 away to pay your taxes. People have been known to spend windfalls on a new car, or a down payment on a house, only to scramble to pay the tax bill at the end of the year.

The last major point of Table 1 is that, even after taxes, you have a lot of money. Despite the cost of living in Silicon Valley (and we'll get to living expenses in a moment) you're taking enough money home each month to support a family, not just one person. By some standards you're even considered rich, because with a salary like this at age 22, trends say you'll be wealthy when you're 40. People who sell luxury goods will be beating a path to your door. Ignore them. A more serious concern is that you're worth suing: you can pay a several hundred thousand-dollar judgement spread out over several years. So make sure you've got lots of liability insurance on your auto insurance.

Living Expenses

So how much does it cost you to live each month? That's a question Table 2 tries to answer.

Table 2: Living Expenses		
	Yearly	**Monthly**
Car Expenses	6,800	567
Benefits	2,000	167
Rent (shared @ $600/mo)	7,200	600
Food	3,600	300

College Debt	1,200	100
Net	13,717	1143

Rent is your biggest expense. The best advice I can give you is that you learned in college how to live with roommates and now is a good time to put that learning to use. Rent a house or apartment with some roommates for a few years. Renting a nice apartment by yourself is extremely expensive in Silicon Valley (it can easily run $1800/mo, which is more than you can afford) and you don't need that much space. So share space, and put the money you save someplace useful.

The second biggest expense is your car. The car expenses here include gas, the cost of car payments or saving to buy the next car, repair costs and insurance. An important tip: as a new rich person, you're exactly the kind of person whom auto salespeople want to persuade to buy an expensive car. You can afford something fancy ($35K+ car), but don't do it. For one thing, expensive cars not only cost more to buy, but also increase your insurance and usually cost more to get serviced. Buy a good quality used or, if you must, new car in the less expensive class (under $22K). It will do just as a good a job of getting you to work as the more expensive car.

Food is the next biggest expense. The costs here assume you know how to cook. If you don't know how to cook, you should learn. If you cook, you'll eat very well on $10 per day (and that includes a morning stop at Starbucks for coffee). If you don't cook, you can easily spend double that, which works out to $3,600 more (after tax!) per year.

Benefits are probably your next biggest expense. I'll talk about benefits in a moment. Finally, there's paying off your college loans.

There are other expenses, such as clothes and telephone and cable TV bills. Rather than track all these little bills separately, I suggest you do something simple. Give yourself an allowance, say $500 a month, to cover clothes (Silicon Valley doesn't require expensive clothing), telephone, cable TV, dates, and things like skiing trips at Tahoe. And have the rest of your money direct deposited into a savings account, where you won't see it when you pull up your checking account balance at the ATM machine.

Benefits

A feature of your job compensation that people don't discuss enough is benefits. Your employer typically provides a bunch of benefits, for which you pay a little bit and your employer pays the lion's share. Here are a few tips about benefits.

You need medical insurance. Take the time to read the plan benefits carefully. Reimbursement plans vary widely.

Your most important benefit after medical insurance is disability insurance. Suppose you're in an auto accident and are paralyzed, or you get such a bad case of carpal tunnel you can't work for two years. Where do you get the money to support yourself? The answer is disability insurance. A typical disability insurance benefit will pay you 60% of your current salary if you are disabled, and you'll need every cent.

Unless you've got someone who depends on you (children, elderly parent) for financial support, you typically do not need life insurance. If you do have a dependent, talk to an accountant to figure out how much life insurance you need. It may be a lot (like $1 million or more).

Retirement

While often discussed as part of a benefits package, retirement plans are so important they need to be discussed separately.

The most important piece of advice I can give and the one I and many of my friends wish we'd been given is "save as much as you possibly can for retirement now, while you are young!" A simple little example may help explain. Suppose you put $2,000 a year into a retirement account for the next ten years and the account earns 7% interest (which you reinvest). In the eleventh year, you stop putting money in. Your friend starts saving $2,000 a year in the eleventh year and puts away that much every year until he retires. Who has more money in their retirement account? The answer is that you do. And the reason is that, by the magic of interest and compounding, your account in the 10^{th} year is earning more than $2,000 per year and your friend's contributions are therefore less than what your money is earning by itself. So, the best possible thing for you to do is stuff money into retirement accounts right now.

The other half of the story is to find tax-deferred investments. Remember the discussion of your tax bracket earlier. Interest is taxable. So the 5% or so you get on your savings account is really only 3% after taxes. The game is to put your money into accounts where the gains are not taxed. The two types of tax-deferred retirement accounts you are most likely to run into are 401(k) accounts and Individual Retirement Accounts (IRAs).

In a 401(k) account, your employer takes a certain percentage of your paycheck, pre-tax, and puts it into a retirement account for you. The account should give you several

choices of mutual funds to invest your money in. Employers typically match your contribution at some rate (such as $1 for every $2 you put in). In general, you should take the maximum withholding you can.

An IRA account is similar but you have to set it up yourself. Each year you can put $2,000 into an IRA. Sometimes this money is pre-tax but in your case, it will probably be post-tax. But the gains in the account are not taxed until you retire, soyou still get the tax-deferral benefits. You should think seriously about having an IRA, in addition to your 401(k) plan.

Some people worry because the money in an IRA or 401(k) often cannot be taken out before retirement without a penalty. That's a valid worry, but the likelihood you'll need the money is small and the risks of not properly saving for retirement are large.

Credit Cards and Bank Accounts

People often wonder how many credit cards and bank accounts they need. Here are some simple answers that work for many people.

You need two or three general credit cards such as Visa, MasterCard or American Express. One is for regular use. One is the reserve if the other one gets lost or cancelled due to fraud (both of which will likely happen to you sometime). The third card is for your business expenses. In most cases, your employer will give you a company credit card. If they don't give you one, you should have one so that you don't mingle your money with the company's money. You're a good enough credit risk that you should be able to get all these cards (except the Amex) without paying any annual fees.

Pay your entire credit card balance each month or the monthly interest will soon make a serious dent in your salary.

Similarly you need two or three bank accounts. One account is your regular checking account with ATM access. That's where you put your monthly allowance and living expenses and is the account you live out of. The second account is a savings account or money market account and is where you deposit the rest of each paycheck so it earns a reasonable interest while you decide where to invest it. And if you have a lot of business expenses that need to get reimbursed, I recommend getting a third account that is solely for paying the corporate credit card. Put reimbursements into this account and pay the credit card from this account. If the account goes negative, it is a fast sign that you didn't get reimbursed.

If you are married, make sure to keep at least one credit card and bank account in your own name to maintain your personal credit rating.

Becoming a Smart Consumer

Take a little time to become a smart consumer. Subscribe to *Consumer Reports* and *BayArea Checkbook*. *Consumer Reports* will help you learn who makes good products and who doesn't. *Checkbook* will help you find a good car repair place and a good dentist (among other things).

Stock Grants and Options

If you work in high tech (especially in a startup), you're likely to find yourself offered stock or stock options in your company. Stock and stock options are an incredibly complex topic and you should get a financial advisor to help you. That said, here are a few things to think about.

First, two quick definitions are in order. If you own a share of stock, you own a little piece of the company. A stock grant is giving you shares, so you own a piece of the company. If you own an option, you have the right for a certain period of time (usually 5 or 10 years) to buy some amount of stock at a given price. So stock options are the right to buy stock at a given price, if you want to. If the stock goes up (above the given price) you can buy the stock and sell it at a profit.

Thinking about stock options is simpler because eventually you must use them (exercise) or lose them (the options expire). There are lots of ways to think about stock options but I have found two particularly useful. The first way to think about options is if the profit you can make on the options is big enough that you start worrying about the stock price, exercise the options and put the money someplace where you won't worry about it. The second way to think (which only makes sense if you have options on a few thousand shares or more) is that the options are a chance to get rich and you should hold them as long as you think the stock might go up before the options expire. This second theory is sometimes described as the "rocket" theory. But be warned, if you sign up for the rocket theory, you may be rich on paper one day and worth nothing the next if the stock drops (as it often does for high tech companies).

Thinking about stock grants is harder, because you own the stock and there's no fixed date by which you have to sell it. But the basic ideas still apply. If you're worrying, find a safer investment.

If you are joining a startup, you will probably be offered a grant of shares when you join. You should view those shares as lottery tickets. Only about one startup in ten succeeds so there's about a one in ten chance you'll ever get to sell those shares for any money. A related issue is, if the company succeeds, how much will those shares really be worth? While everyone would love to persuade you their company is the next Cisco, most startups would be very happy if their share price got to $10. If you think the number of shares you are offered, multiplied by $10 a share, isn't worth the risk of joining the startup, either don't join or ask for more shares.

Career Advice

Here are a few career tips my friends and I wish we'd gotten.

Managing Your Boss

Most of us started with the idea that our boss would tell us what to do and our job was just to do it. But white-collar jobs aren't like that any more. In many cases, your boss can't do your job and may not even fully understand it. So your relationship with your boss is more symbiotic. Your job is to make your boss look good, by using your skills to do your job well and *also* to help your boss do his or her job well. In return, your boss (if she or he is any good) will do his or her best to make you look good.

An example may help here. Suppose you discover your boss is lousy at estimating how long a software effort will take. Lots of employees would either tell their boss that the boss has screwed up (never a popular activity with the boss) or just work on the deadline they know is infeasible and figure it is the boss' problem when the work comes in late. The right thing to do is to do the estimates for your own work yourself and politely offer them to your boss. A good boss will graciously accept them and use them.

Another way of expressing the idea behind this example is the following. Part of your job is figuring out what your boss is good at and what your boss is bad at, and asking your boss for help with things that your boss is good at, and politely giving your boss help with the things your boss is bad at.

Experiment

Your 20s are a great time to take risks and try new things. So feel free to experiment with different jobs. Your goal should be to learn what types of jobs you'd like to be doing for the next 40 years or so. Trying different jobs is an excellent way to learn.

Avoid Becoming a Manager

While you experiment, however, avoid management positions. It is very easy to become a manager. The technical field is always happy to find a new mid-level manager who is technical competent. And your pay will initially rise much faster than if you stay a techie.

But there's a serious downside. It is very hard to stay technically competent as a manager. So once you move to management, in about 7 to 15 years, you'll have no useful technical skills. You just be another technically weak mid-level manager with indifferent business skills (since you don't have an MBA). When times get tough, companies work very hard to keep their technical staff (and may even offer raises) while they are laying off mid-level managers. And it is a lot harder to find a new job as a manager than as a techie.

Learn to Write

Writing is a vital skill. If you can spell out your thoughts (and their implications) in a way that ordinary humans can understand, you're more likely to get your project funded, have marketing promote it, and have sales get customers for it. Writing ability also earmarks you as someone worth watching, as a technical star. It means you can craft standards, write technical articles for trade and scientific journals, and help create business plans. You are likely to become known outside your company as a talented person, which is important for career building. (Many companies require outside validation of your talents to promote you to the very top technical positions).

Learn to Speak Well

Speaking well is the companion of writing well and probably matters even more because you'll communicate most of your ideas by speaking to people in meetings. Like writing, speaking well is a key skill for moving ahead.

Finish Projects

Another thing to keep in mind while you experiment is that the job market pays a considerable premium to people who complete projects, especially people who worked from start to finish on a product. Employers like to hire people that they know will see a project through. They also value people who already have experience bringing a product to a successful release.

Reviews and Raises

In established companies, you will typically get a job review and a pay raise every year. In really good companies, the amount of your pay raise will have some relationship to the quality of your job review. In a startup, you may have to take the lead in asking for a review and raise and you should probably ask about once a year.

In either case, whether you are getting an annual review and raise or have to ask for them, you should do some homework first. Sit down and list all the things you did during the year and candidly assess how well you did them. Then discuss that list with your boss, before your boss prepares a review. Because, in all likelihood, your boss will not remember your accomplishments as well as you do. So it is your job to remind your boss so they appear in the review, and justify that pay increase you want.

Keep Your Skills Current

A common career mistake is to fail to keep your technical skills current. Indeed, as you get older, your set of skills should be continuing to grow. Take the time to learn new programming languages as they become important. Keep track of technology as it changes. The simplest way to do keep current is to join a technical society like ACM or IEEE and read the monthly magazines they send you for interesting ideas. Many conferences have good tutorials, which is another way to keep in touch with progress in the field. Another nice feature of professional societies is that they have a wide range of group insurance plans that can be used to supplement gaps in your employer benefits (especially if, say, you are with a startup).

Having a Life

Finally, don't forget to be well rounded. A friend once told me that when he joined the high-tech industry in the 1960s, his employer padlocked the office doors on Sunday to ensure that employees spent at least one day a week doing something other than working. I wish more companies thought that way today. Sometimes the best way to improve your productivity is to work less. It certainly makes you a better person. So join a hiking club, or a church activity, or volunteer for a charity. It will expand your mind, introduce you to new people and probably make you happier.