

McBain's Redemption

Preface

Alex Rexton was ten years old when he saw his first episode of Star Trek. He thought the storyline was predictable but was fascinated with the transporter and decided he was going to invent one. He was extremely bright and excelled in math and science. In fact, they were the only subjects he cared about, and it was evident in the grades he received. The next day he went to his local library and picked up some college-level books.

Alex was surprised when he realized he was quickly able to understand what he was reading, but some of the math involved concepts he knew nothing about. So, he went back to the library and took out books on geometry, trigonometry, and calculus. When his father, who was a mechanical engineer, saw what Alex was reading he told Alex he still had all his college textbooks, so there was no reason to get them from the library. He also said that if there was something he didn't understand, ask him about it.

Alex returned all the books and began learning geometry. He went through the entire book in ten days. The next subject he decided to study was trigonometry. Some of the material was already covered in the geometry book he just finished, but he found it to be more difficult to learn. As a result, it took him almost three weeks to finish the book. Then he went on to calculus and quickly discovered he was fascinated by it. He was so totally preoccupied with learning advanced math that his schoolwork suffered. When he received failing grades in several subjects his father asked what happened. Alex told him regular school simply didn't interest him. He only wanted to study math and science. It took a while, but his father finally convinced him that the other subjects were important too, especially if he wanted to go to a technical college.

As a result, Alex did the minimal work needed to pass everything, but he still spent far more time with math and science. He also continued with his college-level self-instruction. When he started high school three years later, he finally had a chance to select some of the subjects he wanted to study. He soon discovered his math and scientific knowledge far exceeded that of his teachers. His father realized Alex was wasting his time in high school and contacted the dean of admissions at Clifton University, where he received both his bachelor's and master's degrees in mechanical engineering. He asked him if there was any way the college would accept Alex as a student. The dean explained there was an established procedure to determine if a gifted child could bypass high school. It involved personal

interviews and rigorous testing. Alex's father told the dean that he wanted Alex to be evaluated as soon as possible and quickly agreed to pay all the required fees for the tests.

Alex found the interviews interesting and was pleased to discover that he finally found people who were more knowledgeable than he was. He knew if they agreed to accept him as a student, he'd be challenged for the first time in school, and he wanted that. The tests he was given were more difficult than he expected, but it was nothing he couldn't handle. After the tests were graded and the dean received the results, he immediately called Alex's father. He told him that Alex had received the highest test scores of anyone who had previously been tested. He also said Alex could enroll at the beginning of the next semester.

Alex was thrilled when he received the news. Fortunately, the college campus was located only a few miles from his house, so he'd be able to live at home. Because of the test scores he received, he was placed in advanced physics and math classes immediately. He was extremely excited about that, but less so with the history, English, and social studies classes he was required to take.

His physics professor, Dr. Gerald Bessler, had reviewed Alex's test scores and couldn't believe anyone could score that high, especially someone who didn't even have a high school education. Dr. Bessler questioned Alex relentlessly during the first day of class. Alex answered every question correctly. As the class was ending Dr. Bessler asked Alex to meet with him in his office at 4:00 that afternoon.

Alex knocked on Dr. Bessler's office door at exactly 4:00. Dr. Bessler said, "Come in Mr. Rexton."

Alex walked in and Dr. Bessler said, "Please sit down. I want to apologize for harassing you during class this morning. I must tell you, I found it difficult to believe anyone without a formal education could score that high on the tests. It's now obvious you received an excellent education."

Alex replied, "Sir, I'm largely self-taught, although my father did help somewhat. I have been studying college-level physics and math since I was ten years old. But I'm sure you'll laugh when I tell you why I became obsessed with those subjects."

"Okay, tell me. I promise I'll do my best not to laugh."

"When I was ten years old, I watched an episode of Star Trek. I saw them use the transporter and decided I wanted to be the person to build the first one."

Dr. Bessler smiled but didn't laugh. He said, "After studying physics for that long you must realize a transporter is impossible to build, at least with our current technology."

"Yes sir, I do realize it's currently impossible. But my goal is to go beyond current technology and develop the technology that will make building a transporter possible."

"That's a lofty goal you've set for yourself. But I'm fascinated by your determination. I'll help you in any way I can. I think we're going to be working closely together for the next several years so please call me Gerry, and if it's okay with you, I'll call you Alex."

"Yes, Gerry. That would be fine."

Chapter 1

During the first few weeks after Alex started at Clifton University he and Dr. Bessler became friends, despite the twenty-year difference in their ages. They decided to pursue Alex's dream of building a transporter. They agreed that the first two things they needed were computers several orders of magnitude faster than anything currently available and a device that could scan an object at the atomic level.

Alex had been thinking about ways to increase the processing speed of computers for a while and had some ideas he wanted to discuss with Gerry. They were having dinner at a nearby restaurant and Alex said, "I'm sure you realize the only way to make a computer fast enough for our application is to eliminate wires and replace them with modulated light waves. It would also eliminate the heat problem that occurs with the extremely fast computer chips. It would require designing light transmitters and receivers which are only a few cubic nanometers in size."

"Yes, you're right. I'll bet you have some idea how to do that, don't you?"

"Yeah, I do. I made some preliminary design drawings last night instead of sleeping. I'll email them to you when I get home."

Gerry asked, "How can you build anything that small?"

"You don't build it; you print it on a 3D printer. Look at my drawings and you'll see how I think it can be done."

"Okay, I'll do that. But even if the design looks promising, where can we get the money we need to build it? College professors are reasonably well paid, but not enough to fund that kind of research."

"I know, but I think it's possible to build a large prototype. We could build a CPU that was perhaps five inches square and a half-inch high with a limited instruction set that could demonstrate the concept. It would be

extremely fast, capable of processing more than a trillion instructions per second.”

Gerry thought about what Alex said for a few seconds and replied, “Something that large could probably be built with one of our 3D printers in the lab.”

“Exactly, and once we build a prototype, I guarantee the chip manufacturing companies will offer us all the money we’ll need to fund the project in exchange for the rights to its design.”

“I’ll look at it this evening. If your design has potential, it must be patented immediately. The patent must be in your name because the university would own the rights to anything I develop.”

“I think my dad could help with that. He has several patents for manufacturing equipment he designed.”

“You should show him your design when you get home.”

Alex smiled and said, “I already did that. I showed him the drawings this morning. He looked at them for a few minutes and told me he was impressed, and he was going to spend some time today studying them.”

“I met your father while they were considering your admission request. We spent about an hour together. He’s a highly intelligent and capable guy, and if he was impressed with the design, I’m sure I’ll be as well.”

When Alex arrived at home his father, Daniel, was waiting for him. He said, “Alex, I started looking at the drawings you gave me this morning when I got to my office. I ended up spending most of the day studying them. I knew you were smart, but this design is way beyond anything I thought you’d be capable of. I underestimated you.”

“It’s only a preliminary design. There’s a lot of work that needs to be done.”

“Yes, I realize that. But the concept is amazing. It’ll revolutionize the computer industry.”

“That was my plan. I want to sell the design and get enough money to fund the research project Dr. Bessler and I are working on. I’m going to send the drawings to Dr. Bessler and he’s going to look at them tonight.”

“I’m sure he’ll be just as impressed as I was. You must patent this as quickly as possible.”

“Dr. Bessler said the same thing. I know you have some patents. Can you help us with that?”

“Yes, of course. Since tomorrow is Saturday, ask him to come over around 10:00.”

“Okay, thanks, dad.”

Alex went up to his bedroom and sent the drawings to Gerry. He went to bed a short time later, but he woke up when his phone rang a few minutes after 5:00 AM. He glanced at the screen and realized the call was from Gerry. “Good morning, Gerry. I usually like to sleep until about 7:00, but I’m sure you must have a good reason for calling me this early.”

“I’ve been up all night going over your design. I decided that if I can’t sleep, you shouldn’t be able to either. Anyway, your design concept is amazing, and I see no reason why it won’t work as we expect it to. I did some preliminary calculations and based on somewhat conservative estimates, I believe our CPU could run at one hundred thousand GHz. That’s about thirty thousand times faster than the fastest processors currently available.”

Alex didn’t attempt to calculate the speed of his processor’s design. He knew it would be substantially faster than anything currently available but was caught off guard by what Gerry said. He replied, “Gerry, I never thought it would be that fast. Are you sure your calculations are correct?”

“I checked them twice because I didn’t believe it either. We must start the patent process immediately, and we need to begin construction on the prototype as quickly as possible.”

Alex said, “My father will help us with obtaining a patent. Can you be here at 10:00?”

“Yeah, I’ll be there.”

Gerry arrived right on time. The three of them sat down at the kitchen table. Gerry said, “Mr. Rexton, thank you for helping us with this.”

“You’re welcome. I’m happy to help. Please call me Dan. I’ve studied Alex’s drawings and they’re impressive, but I think they need to be more complete to obtain a patent. I’ll contact the attorney I used for my last patent on Monday morning and set up an appointment with him for the following week. That should give you and Alex enough time to finalize the drawings.”

Alex said, “I’ll start working on them immediately. I’m sure I can complete them in a week.”

Gerry asked, “Dan, did Alex tell you I calculated the speed of his processor design?”

“Yes, he said it would run about thirty thousand times faster than anything currently available. If your calculations are correct, this design will be worth an unbelievable amount of money. I assume you guys are going to build a prototype.”

Gerry answered, “Yes, we are. But it’s going to take at least a year or two. The first step is to create the instruction set and build the processor.

We're not worried about size at this point. I think we just need to prove the concept is workable."

Dan replied, "I agree. The computer chip manufacturing companies will be begging you guys for the manufacturing rights. I hope when the time comes, you'll select an American company."

Alex said, "Dad, don't worry about that. I guarantee you these chips will be made here, not in China."

As promised, Dan set up a meeting with the patent attorney who was a partner in the law firm that handled all the legal matters for the company he worked for. Alex had completed the drawings on time and gave them to the attorney at the meeting. Gerry explained the concept to the attorney who said he'd have the application completed within a week and would submit it to the patent office as soon as it was ready.

Alex and Gerry began working on the prototype immediately. Time was a problem because Alex was still a student and Gerry had classes to teach, but they still managed to work on it every day. A year and a half later the prototype was ready. They spent the next two months evaluating it and tweaking the design. It didn't quite meet the speeds Gerry had initially calculated, but it was close. The processor was running at ninety-one thousand GHz, but they were sure the speed would increase when the size of the processor chip was reduced.

Alex and Gerry sent out twenty packets to the largest computer chip manufacturing companies in the United States. Inside were drawings and specifications for the processor Alex designed. They also included the documentation they used to obtain their patent.

They expected to be swamped with requests for more information, but it soon became obvious that the people who received the packet thought it was a hoax. After two weeks only one company responded. Alex had just finished breakfast when his phone rang. He was excited to see the call was from Pinnacle Cybernetic Systems. He answered, "Hi, this is Alex Rexton. Can I help you?"

"Mr. Rexton, my name is Quincy Taggart. I'm a digital design engineer at Pinnacle Cybernetic Systems. I received the package you sent a few days ago, but I didn't have an opportunity to open it until yesterday afternoon. I had difficulty believing the specifications until I examined the design. You indicated you have a working prototype. I'd love to see it."

"Mr. Taggart, I'd be happy to demonstrate it for you. The instruction set for the processor is a subset of a normal microprocessor and the operating system has limited capability. The design allows us to enter complex math problems and the system solves them almost instantaneously. We created a test problem to check the processor speed. When we entered

the same problem into the fastest computer at the university, it took the computer twenty-three minutes to resolve. Our prototype resolved the problem in .97 seconds.”

“Can you send me a copy of the test problem?”

“Of course. Just give me your email address.”

“Sure, it’s qtaggart@pinnacle.pcs.”

“Okay, I’ll send it in a few minutes. When would you like to see the prototype?”

“How about next Saturday?”

“That would be fine.”

Then Quincy asked, “Can I bring my own problem?”

“Of course. Please feel free to test it in any way you like. Would you like me to send you the instruction set as well?”

“Yes, that would be helpful.”

“You’ll have everything a few minutes after we’ve finished.”

“Thanks. I’m assuming the prototype is at Clifton University.”

“Yes, it is. Are you flying or driving?”

“I’m flying. Why?”

“Send me your flight information and Gerry and I’ll pick you up.”

“I don’t want to pry, but you sound noticeably young. How old are you?”

“Does that matter? I’m seventeen. Gerry is thirty-nine and has a Ph.D. in physics. He’s a tenured professor.”

“I guess your age is irrelevant. I’ll be flying in one of the company jets. I’ll let you know what time I’ll arrive this afternoon. I’m looking forward to this demonstration.”

“And I’m looking forward to demonstrating it for you.”

Alex and Gerry met Quincy at the airport, and they all went to the physics lab where the prototype system was set up. The system consisted of a large circuit board with the processor chip mounted in the middle. The processor was six inches square and a half-inch thick. The only input device was a keyboard, and the only output device was a monitor.

Quincy examined the system for about a minute and said, “That’s without a doubt the largest microprocessor I ever saw. I assume you made it using a 3D printer.”

Alex replied, “Yes, you’re correct. If you want to enter your test program, type ‘start new’ and then key in your program. When you’re finished type ‘exec’ to run it.”

Quincy said, “Okay.” Then he sat down and entered his test program. It took him several minutes to key it into the system. When he was done, he double-checked each line of code to make sure there were no

errors. When he was finished, he said, “The program is designed to solve a complex series of equations with seven unknown integers. The only way to solve it is by trial and error. Each unknown starts at one and continues through one thousand. All the correct values are between nine hundred and a thousand. I ran it on the fastest system we make, and it took eight hundred fifty-three seconds to solve the problem. How long do you think it’ll take your system to solve it?”

Gerry smiled and said, “Less than five seconds.”

“Well, we’ll know if you’re correct in a few moments. The system will display a running elapsed timer that will stop when the problem is solved.” Then he entered the execute command.

They were all watching the screen. The system completed its task in 1.93 seconds.

Quincy stared at the screen for several seconds before he said excitedly, “That’s truly incredible! Is it okay if I spend a couple of hours running more tests?”

Alex replied, “Of course. Spend whatever time you need to satisfy your curiosity.”

“Thank you.”

Gerry said, “We’ll leave you alone for a while and we’ll return in about an hour.”

Quincy was still staring at the monitor and just waved his hand dismissing them.

Alex and Gerry walked over to the school cafeteria, got something to drink, and sat down at a table. Gerry said, “I’ll bet he’s going to give us a lowball offer which we won’t accept. We’re going to need a lot of money to finance our transporter project. At least ten million dollars, but your chip design is worth a hundred times that amount.”

Alex said, “I don’t think he’s going to pay us a billion dollars.”

“No, he’s not. I’m thinking we should ask for ten million upfront and ten dollars for every chip sold. That would not only give us a tremendous amount of cash up front, but also a regular, and I might add, substantial income.”

“Yes, it would. But something is bothering me. Timothy McBain owns pinnacle. He’s on every most wanted list in the world and he’s been charged with seven counts of first-degree murder. I’m wondering if we can trust them.”

“I don’t think McBain is directly involved with the company anymore. Besides, Pinnacle is the largest manufacturer of computer chips and computers in the world. But we should hire an attorney to handle everything for us.”

“I’ll call my dad and ask him. He may know somebody.” Then he called his father and said, “Dad, the guy from Pinnacle just ran his test program on our prototype. It ran his program in under two seconds. When he ran it on Pinnacle’s fastest system it took eight hundred fifty-three seconds. Gerry and I are sure he’s going to make us an offer, and we need an attorney to handle this for us. Do you have any suggestions?”

“I’ve been thinking about this for the last several days, so I contacted the lawyer who handled your patent and asked him to recommend someone. He suggested Greg Stevens, who’s a senior partner in their firm and handles most of their large clients. I spoke to him briefly yesterday and he was already aware of your patent. When I told him someone from Pinnacle was going to evaluate your prototype today, he said I should call him immediately if they make any offer to you. Don’t agree to anything and don’t tell him what you want for the rights to your design. Let him handle that.”

“Okay dad, I’ll call you again if he makes an offer.”

“I’ll be waiting for your call.”

Alex told Gerry what his father said, then they walked back to their lab. They found Quincy sitting at a desk talking on his phone. When he noticed them walk in, he ended the call and said, “I want you to know I’m convinced your processor design is a fantastic success. I’ve been authorized to offer you a substantial amount of money for the manufacturing rights. You guys are going to be extraordinarily rich.”

Alex asked, “What’s your offer?”

“How does two million dollars sound?”

“It doesn’t sound particularly good at all. This processor design was just the first step in a very long-term project and we’re going to need money to fund the development. If you’re interested, I’ll have my attorney contact you. His name is Greg Stevens.”

“Well, Pinnacle is interested, but I doubt we’d be willing to pay more than what I offered.”

“Would you like my attorney to contact you, or should we look for another company?”

Quincy replied, “Yes, please have Mr. Stevens contact me.” Then he handed Alex his card.

Gerry asked, “Would you like us to take you back to the airport now?”

“I’d like to make another call first. It’s personal and I’d like to have some privacy. Is that okay?”

Gerry said, "Sure, we'll go back to the cafeteria. When you're finished, turn right when you leave the lab. The cafeteria is on the right at the end of the hallway."

Alex and Gerry left the lab. As soon as Alex closed the lab door he said, "You were right. He made a lowball offer. I think he was surprised I didn't accept it."

"And disappointed too. I'm sure he'll make us another offer when he gets here."

"If he does, I'll just turn him down again."

Their wait was short. Quincy arrived less than five minutes after they sat down. Quincy sat down at the table and said, "I've been authorized to raise our offer to five million dollars. It would be paid out at one million dollars per year for five years. Is that acceptable?"

Alex asked, "Quincy, what percentage of the worldwide sales of computer systems does Pinnacle have?"

"About 13%."

"As a guess, what does that amount to in dollars?"

"Probably about fifty billion."

"So, each 1% of annual computer sales is worth roughly four billion dollars. I'd guess being able to offer the fastest computer ever built would increase your percentage by at least 10%. Based on that estimate, Pinnacle sales will increase by forty billion dollars, and you're offering me five million. Am I correct?"

"Yes, that's a reasonable estimate. But substantial changes are needed for the chip design. The size must be reduced, and the instruction set enhanced. Then we need a new motherboard design due to the changes in the processor chip. Because of the speed of the processor, other components will have to be redesigned to handle the faster speeds. You didn't do that. I suspect if you did, the speed would have increased by an additional ten or twenty percent. All these things are time-consuming and cost a lot of money."

Alex said, "I agree with everything you said. It'll take at least a year to create a system you could sell. But even if you spent a couple of billion dollars for development, and I think that's an extremely high estimate, the return on your investment would make the development costs appear minimal."

"Okay, what do you want?"

"I want you to talk to my lawyer. I'll have him call you Monday."

"Okay, I'll speak with him on Monday. Will you promise you won't accept an offer from another company until after our negotiations are completed?"

“I’ll give you a week. That should be enough time.”

“Thank you, Alex. Can you take me back to the airport now?”

Gerry replied, “Sure, let’s go.”

After they dropped Quincy off at the airport, Alex called his dad. He said, “Quincy, the guy from Pinnacle, offered me two million. I turned him down and then he offered me five million. Then I explained to him that Pinnacle stood to increase sales by about forty billion dollars per year and that he’d have to deal with our attorney. I’ll text you Quincy’s phone number.”

“You handled that exactly right. I’ll call the attorney as soon as I get your text. Do you know what you want from Pinnacle?”

“Yeah, we want ten million upfront and ten dollars for every chip that’s sold. Do you think that’s reasonable?”

“Yes, I think it’s very reasonable. I’ll tell the attorney that’s the minimum you’ll accept.”

“Thanks, Dad. I’ll be home soon.”

Gerry asked, “Was your dad okay with what you did?”

“Yeah, he said I did exactly the right thing.”

On Tuesday evening when Alex came home his father said, “I just heard from Greg Stevens. He told me Pinnacle agreed to fifteen million upfront and twelve dollars for each chip sold.”

Alex smiled broadly and said, “That’s great, the attorney did a wonderful job.”

“Greg requested that you and Gerry form a corporation as quickly as possible. Then you must grant the patent rights for the processor to the corporation. There should be three officers. Because of your age, Gerry should be president, you should be vice president, and I’ll be treasurer. We’ll sign the contracts and receive the initial payment at Pinnacle headquarters in San Francisco on Friday. Pinnacle is sending a plane to pick us up on Friday morning. Greg is going to go there on Wednesday to work on the contracts, so everything will be ready by the time we arrive.”

“I’ve never been on a private plane before. It should be interesting. How do we form a corporation?”

“I’ve already started the process. It’s going to be called RB Technology Corporation. The attorney who handled your patent is handling it. He’ll be here tomorrow evening so everything can be signed, and he’ll file all the paperwork with the state on Wednesday morning. On Thursday we’ll open a bank account for the new corporation.”

“We won’t have any money to open the account until Friday.”

“It’s not a problem. I’ll give you ten thousand dollars to open the account, although you won’t need that much. You can pay me back later.”

“Thanks, dad. I don’t think we could have done this without you.”

“I’m glad to help in any way I can. Besides, it’s nice to have a son who owns half of a multimillion-dollar corporation.”