Oral History of Edward Smith

Interviewed by:
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Spicer: So, welcome, everyone. This is Tuesday, November 17th, 2020. We're here with Ed Smith, an African-American game developer and entrepreneur who's here to tell us about his amazing life story. Ed, thank you, and welcome for being with us today.

Smith: Oh, it's my pleasure. Thank you for having me, Dag.

Spicer: So you've had a really interesting life. Why don't we start at the beginning and tell us-- could you tell us a little bit about where you grew up and what it was like growing up in your area?

Smith: Yeah, I can. So I grew up in Brooklyn, New York, during some very tough times, the '50s, '60s, when there was a lot of turmoil going on, and there was a lot of crime, of course, drug addiction, a lot of ways to fail rather than succeed, yet somehow I was able to overcome those desires that were out there and get into the world of technology.

Spicer: Right. Now, I think the area that you lived in was called Brownsville. Could you tell us a bit about that and what it was like to live there?

Smith: Yeah. So Brownsville in Brooklyn was an environment where you had multiple housing units, high-rise housing units that were called 'projects,' and these housing units were stacking African-Americans up and not giving them a lot of opportunity to see anything other than the environment that they had to both grow up in and live in and come home from work into that same environment, and Brownsville, again, was that environment, that community, that permeated the use of alcohol, drugs, crime. It was very demoralizing, and there was a reason for that. In Brownsville, many of the folks who grew up there, they just gave up. The environment was so bad, you really just did not see a way out, and that was the biggest problem that I saw growing up in that environment, and I always wondered why many of the folks that I grew up with would just give up, and it happened so often that even today many of the folks that I grew up with are either in jail or dead.

Spicer: So sorry to hear that. How did you manage to hang on, and did you get any encouragement from your folks or friends or family or..

Smith: I really did not have any mentors, anyone that would encourage me to do the things that I chose to do. It was really on me, and I have no idea how I came to the decision to do the things that I did. To this day, it just-- it shocks me that I did what I did, and when I think back on it, I'm thinking, okay, I knew I wanted to just get an education, learn some things about technology, try to get a good job and try to get out of Brownsville. But I really didn't have much encouragement from anyone who was a mentor or people that I would look up to and would tell me, "This is what you should do." It really just came to me, I guess, on my own and mainly because of the work that I would do around the neighborhood, around Brownsville, fixing appliances, and I really got the bug for electronics, and I just decided, well, if I'm going to do anything in my life, maybe I should just go ahead and see if I can get into a magnet high school and study technical electronics, and that's exactly what I did.

Spicer: That's wonderful. So you saw education as the way out.

Smith: Yes.

Spicer: Right. Now, I want to learn more about your going around and fixing things. Tell us more about that, and how did you learn to do that?

Smith: It was, again, one of those things. It just comes natural to some people. I can remember I think it was the first thing I fixed was a toaster, right? My mom had a toaster, and the toaster wouldn't work, and it was a bad filament, and I went down to Radio Shack, I think, or someplace, and I got another filament and put it in, and it worked, and then I tried something else. I think it was a vacuum cleaner after that, and then the word got out in the neighborhood that I could fix things, and all of a sudden I had my bedroom filled up with these appliances, and it was pretty simple for me to deconstruct these things, figure out where the problem was and then get the right part and get it working again.

Spicer: That's amazing. What kind of things were you reading? How did you gain this knowledge, or did you just sort of work your way through it?

Smith: Well, I started fixing things when I was really young. I'm thinking maybe 10 or 11 years old. Yeah, yeah, when I fixed that toaster, that was-- I was 10 years old. Yeah, and I can remember when I was fooling around with it, and once I-- one day I plugged it in to see if it would work. I still had the entire housing that was open, and I touched a contact, and I got my first shock, and I said, "Okay, I know how that feels." What I didn't know was what the premise behind electrical current was like. So that got me even more curious as to understand why people did get shocked and why electrical current was the way it was. So I did a lot of studying about electricity. I would visit the Radio Shack store often, because that's where everything was that you wanted, and I felt that I could just learn these things on my own, and as I got older, maybe by the time I was 13, I got into high school, I started reading some of the popular electronics magazines, Popular Science. Omni magazine was out, I think, back then, maybe not, but there were a couple of really good magazines that just showed you some of the things that were out there and how they worked.

Spicer: Right. Now, New York was a particularly fertile area. I think Canal Street was a place where there was a lot of war-surplus electronic stuff, and people liked to go there. Did you ever go down there, and was that a source for you of parts or knowledge -- going to some of these many electronics shops in New York?

Smith: Yeah, Dag. I actually lived on Canal Street, so, again, this is as I got older. I started fixing things in the neighborhood, and as I started getting older and started fixing more things and started to build some things, Canal Street was my technology haven. I could go there, and I could get parts for anything that I wanted, and it was just an amazing place to be, and, more importantly, because the people who were there were just like me. They wanted to learn different things. They wanted to get information, and the people on Canal Street were more than happy to share what they knew with the folks who would shop around their environment. It was the best world for me as a kid trying to learn technology.

Spicer: Wow, and I think, if I'm right, sort of recalling my own experiences, people are very kind to youngsters usually, and they're very forthcoming with information. Did you find that, too, being a little younger, sort of people really went out of their way to be nice to you and explain things and..

Smith: Yeah. It's interesting that I learned at a very young age that if you ask questions of folks, they give you the answers that you need to have. So they are more than willing to help you, as long as you're willing to reach out and ask the questions. So, yes, I was able to go there on a regular basis. When I had a problem, I would ask the questions. They would give me the advice that I needed, tell me what type of a part I needed to get, tell me what type of circuitry I needed to get. They were very good at leading me in the right direction.

Spicer: Were there any people of color in this world, the electronics world, that you could relate to or..

Smith: Sorry, Dag. I am it.

Spicer: Okay. That is kind of what I thought, but yeah.

Smith: It's unfortunate that, again, growing up in Brownsville, no one was thinking about studying technical electronics, very few people, and, again, I'm not sure how I got looped into it, but none of my friends, no one that I knew in the neighborhood or even outside of the neighborhood, was involved in anything around electronics.

Spicer: Tell us a little bit about the high school years now. So you're 13, 14, and you're just starting high school. What was high school like for you, and did you have any extracurricular interests at all, or..

Smith: So, high school was probably one of the best things that happened to me, and, again, it's because I spent half the day in a technical electronics class, and I had a great teacher, who would educate me the right way, who would give me the opportunity to show other students what to do, because I was one of the better students, and it was the best thing I could have ever done as a youth in high school [was] to be able to go to Westinghouse [George Westinghouse High School] and study technical electronics. My teacher back then, his name was Mr. Russian, and for the first two and a half years he taught my electronics class. But then he passed away. So my final year in Westinghouse was not the best year, because I was really bummed out. I can tell you that. That was one of the first mentors I really did have, and when I lost Mr. Russian, I really felt bad. I really didn't even want to go to school anymore. So I was on my way to being at the top of the class, ready to get a scholarship at RPI, Rensselaer Polytechnic Institute. All of these things were right in front of me when I was a junior. By the time I became a senior, I stopped going to a lot of classes. I barely passed tests. I went from an A student to a B student very quickly, and I lost my scholarship.

Spicer: As a senior, what was your next step?

Smith: Well, a lot of things happened at that time when I was a senior in high school. Personally, I was just about to have my first child. So this is another thing that caused me to be, I guess, bummed out. I

realized that I had to finish school and get a job, because there was a child on the way, and I was not one of those deadbeat dads. I really felt it was important for me to take care of my child. So my last year in high school was really just about, "I want to get this thing done. I want to get out of high school, and I want to get a job and start paying some bills so that I can raise my new family." But that's not to say I never thought about going back to school, which I did, but I knew I had to get my foundation in place.

Spicer: Now, what year would this have been?

Smith: This was '72, 1972.

Spicer: Okay. Thank you. So, yeah, there's a lot going on in society and the world, definitely very turbulent times. Well, what did you do? Did you find work right away and begin working?

Smith: Yeah. I guess the good news is when you attend a school like Westinghouse and you get out, a lot of the businesses know of the school and had no problem hiring someone who had that level of education. So I think when I got out of Westinghouse I got a job-- let's see. Yeah, so I got a job making computer-operated surveillance systems. It was called COPS, even though there were no computers at the time. It just had a catchy name to it. But I went to this factory environment in Long Island, and I was responsible for building the prototype for this new surveillance system, and I did that for about a year. I knew it wasn't a permanent position, and once I completed that, I was onto looking for other work that I could get.

Spicer: Can you tell us a little bit about the technology involved or-- this is transistors or ICs at this point, or..

Smith: Yeah. For the computer surveillance system, it was all transistors. So it was just a matter of-- not just the transistors themselves but connecting a television set in a person's home over the coax cable to a central unit so that when someone rang the doorbell, the person in the apartment can turn it to a channel, Channel 3, I think it was, and they could see who was at the door.

Spicer: Well, now, doesn't that sound familiar today?

Smith: Exactly. I got my Ring doorbell that does that for me pretty easily now.

Spicer: Exactly. That's wonderful. So, that's very interesting. Did the company make a go of it, or how did they make that…?

Smith: Yeah. They did well, and I honestly don't know what happened to them, because, for some reason, the technology never took off in any of the apartments that I visited. So maybe it was in some of the other apartments in Midtown, I guess, where a lot of the money was. But I didn't see it happening in my neighborhood.

Spicer: Interesting. That involved the design and construction of a prototype, that job..

Smith: Correct.

Spicer: … and then that went into production?

Smith: Then that went into production. I did help to install the first unit at one of the housing complexes in Lower Manhattan, so I connected it up to the different levels, different floors in the building and got it to work, and it was a nice system. It really was, and I think it was all about the crime during the time, which is what made this thing very popular, because a lot of people were coming into these housing units with ill intentions.

Spicer: Right. Okay. What happened next? Can you tell us about your child, if that's not too personal? You mentioned becoming a father as a senior, and were things-- where you were starting a new family, I guess, at this time?

Smith: Yeah. When you're 18 years old and you have a child, you don't have a lot of experience, a lot of knowledge. You really don't know what to do. Luckily I had a mother who was very helpful, and my wife -- and we're still married today, and we've had a second child since then -- she was great, and the two of us together, we pretty much figured it out, and I can tell you that there were some ups and downs, but at the end of the day, we knew that we were going to stick it out. We were going to raise our daughters, and we were going to make the best life we could out of the environment that we were in.

Spicer: Thank you for sharing that with us. Can you spell COPS?

Smith: C-O-P-S, COPS, Computer-Operated Policing System.

Spicer: Got it. Thank you. Okay. Well, what happened next?

Smith: So after I did that short stint for this company, they were called Futuronics, I had to find another job, and I also registered to attend Pace University. The job I found was at a company called Marbelite, and Marbelite was a firm that manufactured traffic-control units for the state of New York, the state of California, the state of Florida. Many different states would procure Marbelite traffic systems, and these systems were solid-state, mechanical, and they were multi-intersectional units, and I was hired to test those traffic systems.

Spicer: Okay. Now, this is the box that switches the lights on and off? I

Smith: That's it.

Spicer: Yeah. Right, and so I imagine, like you say, it's transistors. It's probably stepper motors or relays?

Smith: Yeah, servo motors. Yes, absolutely. If it was a solid-state unit, you would have a series of motor drives in there and you would have pinouts so that as the motor turned, depending where the pin was, it

would click on a light, and if you had three motors running at the same time, you could have one click on a light. One could click on a don't-walk sign, one to click on something else, that kind of thing.

Spicer: Right. So this is the thing we all wish we could get in and change when we're stuck behind a red light for too long, right?

Smith: Well, yeah, yeah. You're absolutely right. I can tell you one quick story about that. When I was doing that work, I was in the neighborhood one day, and I was going somewhere. I don't recall where, but there was a signal, a traffic signal that was out in the street, a big intersection. So the lights were just flashing. Cars were blowing their horns at each other. It was pretty much chaos, and there was a person who was going to the box, the main box, and that person was-- I think he was a policeman. I guess it turns out that policemen have the key to the box so that they can turn on and turn off the flashers. So I wanted to walk up to the cop and say, "I can fix that for you," and then I thought better of it, because he probably would look at me and say, "There is no way you even know what you're talking about."

Spicer: Yeah. Right. I think one of the early applications for the microprocessor was exactly that application. Intel's first chip, the 4004 -- one of the applications they advertised was traffic control, traffic-light control. Was your company using the microprocessor yet, or was it still discrete components and electromechanical stuff?

Smith: For the first two years when I was there, it was mechanical and electromechanical, solid state, and then we had the introduction of the microprocessor, and that's really the thing that changed my life for the better, again. Again, I was one of the best people they had as far as testing those systems, and when it came to the design of these new traffic systems and the testing of these new traffic systems, I and another one of the employees were tapped to work on those systems. So, yes, that was the launch pad for me as far as getting my education around microprocessor technology.

Spicer: Now, one of the interesting things about the microprocessor is, in a way, [is that it] kind of reset everyone … all engineers had to kind of go back and learn this stuff, because it was new not just for you, who were-- you were still early to the field. But even to older, more veteran engineers, they didn't know what a microprocessor was, either. Everyone became at the same level all of a sudden. Everyone needed to learn this newfangled microprocessor stuff and understand how hardware was sort of somewhat transitioning to software a little bit. So how did you learn about the microprocessor? How did you learn how they work and how to program them and that kind of thing?

Smith: So, the company that came to Marbelite was Fairchild. Fairchild introduced Marbelite to their microprocessing set, and since we were tapped to do the work on those units, I went to a facility in Fairchild to study their microprocessors. So I spent maybe three or four months or so at Fairchild simply studying the architecture of the microprocessor or the microchip.

Spicer: Wow. Was this back in Silicon Valley you had to travel to go to Fairchild, or..

Smith: No, no. So Marbelite was a company they were-- it was a factory environment in downtown Brooklyn. The Fairchild folks had a facility in New Jersey. So we went to New Jersey to get the training on the Fairchild chip, and we took that training back to Marbelite to implement it in those traffic systems.

Spicer: Wow, that's really great. So you're one of the first generation of engineers to learn the microprocessor and how to use it.

Smith: That's an interesting point, because when I was doing it, I had no idea what I was doing. First generation of anything, it didn't matter to me. What really mattered was I got a pretty cool job. That's what mattered to me.

Spicer: Yeah. They kind of supported you to go out and learn new things, which is-- that's pretty unusual for companies, so that's great. So they must've seen a lot of potential in the microprocessor. Did you see a lot of potential in the microprocessor at that time?

Smith: I saw all types of potential in the microprocessor. It wasn't just in the traffic systems. I mean, you had microprocessors ending up in your watch during those times, in calculators, in adding machines. They were showing up in places that you would think there's probably no way it's going to happen. So, all of a sudden, in a-- I say a very short period of time, two or three years, processors-- chips were coming out in everything and everywhere, right? You had VCRs that had chips in them. You had all types of devices, stereo systems with chips in them. So the processor became the foundation for all of the new technology that was coming out at that time, and if you bring it all back to what you see today, there is not a single device that you own that you plug in that probably does not have a chip in it.

Spicer: Exactly, yes. Just to get the specifics, was it the F8 microprocessor that you were learning about, Fairchild's?

Smith: That was the F8, and that was the same processor that-- I'm going a little bit ahead, but that was the same processor that was used to design one of the first video games by a guy named Jerry Lawson, which was the Channel F.

Spicer: Right, and Jerry Lawson is another African-American engineer, so you two are sort of twin spirits in many ways.

Smith: Yeah. I wish I had a chance to really get to know Jerry, and unfortunately I did not.

Spicer: Yeah. He passed away too early. So you're at Marbelite, and can you tell us-- did your work change? Once you got the microprocessor training, how did your work change?

Smith: So once I got the training on the microprocessor and I was doing the work at Marbelite, things were going very well. We started to put our designs, and based on what we learned, into production. So we started to get the first units out into the street that were microprocessor-operated traffic systems. I think the state of New York was the first to purchase them, but that's when I realized-- and, again, this is

because I started reading many, many different publications. I was a very, very avid reader. I would read so many different technical publications it'd just boggle your mind. There was so much to learn, so much more that you could absorb that I wanted to absorb it all. So I decided, based on what I was learning and reading, that even though the job at Marbelite was pretty cool, there were a lot of other things going on that were even better, and I wanted to be a part of that bigger world of technology.

So I started looking elsewhere, and I was lucky enough to find the next job, and that job was at APF Electronics, because they were involved in video game designs. So, again, as I was reading all of these different publications, looking at the industry, the pizza-shop arcades were a big hit back then, and I wanted to be at the leading edge of all of that, and if I could, I would take that opportunity to take that knowledge that I had at Marbelite, and I was able to take that to APF and help them to design some of the new things that they were looking to design around next-generation video games. Keep in mind when I started with APF, they had one game, and it was called "TV Fun," which was basically "Pong." So they wanted to move to the next generation, and for that to happen, they needed a cartridge-based video game, color graphics, joysticks, IO that was going to give you additional functionality if you needed it, and they needed people who understood microprocessor technology.

Now, this is in New York City. There's a lot of people who knew microprocessor technology on the West Coast, but trying to find people who knew this on the East Coast in New York, that was a challenge. There were not a lot of people who knew microprocessor technology on the East Coast. So when I saw the opportunity from an advertisement, I jumped all over it, and I got the job, and I got the job, because I really did understand the technology, the architecture, buss architecture, specifically, because when you're talking about-- even with the traffic systems, it's all about buss technology, and that's the piece that I brought to the table at that time.

Spicer: Well, APF now, they're a very interesting company. It actually stands for the names of the founders, I think. Is that right?

Smith: Yeah, Al and Phil Friedman.

Spicer: Okay. Wonderful, and now..

Smith: Catchy stuff.

Spicer: Tell us a bit about the company just for background… did you know anything about them before you joined, and what did you learn once you were there?

Smith: I knew absolutely nothing about this company until I joined them. But then once I did join them, I started to find out quite a bit about this company, and one thing I found out was the company was owned by folks who were Jewish, and they had a military background, and a lot of the stuff that they did in the military was around electronics, and they had a lot of people who spent time overseas working on building things for the Army and the Navy. So the owners of APF, they took their military training and started this company.

Spicer: Okay, and were their customers initially-- they were military, and then they switched to a consumer company, or how did that transition work, because they made..

Smith: Well, this was..

Spicer: … calculators, I think, right? They were very big in calculators for a while.

Smith: Very big in calculators. It was before my time when they were doing the other stuff around the military devices although I knew this was something they did. By the time I was with APF, they had moved completely into the consumer-electronics world, and I think a lot of the reasons for that had to be with the way at that time that firms in Japan, in Taiwan, all these different countries in Asia, would manufacture low-cost, knockoff devices that would be shipped here into the U.S. So APF at that time, quite frankly, they were a knockoff provider of consumer-electronics products.

Spicer: Okay, and their manufacturing was in Asia?

Smith: Manufacturing was all done in Asia, everything shipped here to the U.S. and then sold in the U.S.

Spicer: Right. I know with the "Pong" game I think you said it was called "TV Fun." Was that based on the General Instrument chip that everyone… all the clone makers…

Smith: Same chip, same chip, yep.

Spicer: Okay. Well, tell us about your first project, then, at APF and what they had you working on.

Smith: Yeah. So, when I joined APF, the first thing they said to me is, "You need to make sure that you are able to do the design work and build out the prototypes and draft the schematics and test these games as quickly as possible, because we don't have a lot of time to waste." So this was a rapid-development environment. So for the first month that I was at APF, I spent hours with the engineering team, mainly laying out the architecture for that second-generation video game, which was called the MP1000, and the design work we did at that time was-- I thought it was pretty cool. There were not too many eight-bit video games, color video games, at that time, and we had one of them. So we designed that architecture, and the thing about this is I'm a hardware guy. So I learned microprocessor technology. I learned how to build out a console. I learned how to allow for a cartridge to be inserted into the console without blowing it up, which was Jerry Lawson's design. So I learned that, but I was not a game programmer. So we had the game programmers, who would write the games. My job was to make sure that console could handle the games.

Spicer: Okay, so, well, the MP1000 sounds interesting. Where did it fit in the marketplace, because you mentioned it had color, which is unusual at the time, and I guess people used an RF modulator, I suppose, to connect to their TVs?

Smith: That's exactly right. So it was RF modulator, connect to a color TV, and, yeah, that was it. You could play multiple video games. There was a built-in video game, and there were the cartridges that you would purchase, and we tried to get cartridges out that were fun. I'm not going to say that we had some of the best video games out there, but we had some fun video games out there, and I think one of the better video games that we did at the time was one that everybody was doing at the time… we called ours "Space Destroyers," but there was "Space Invaders." So we had our version of that. We did a "Rock 'Em, Sock 'Em Robot" video game. We did backgammon, hangman, a number of different games that were just fun games to play, and I think it was pretty cool.

Spicer: Now, what kind of memory did you have on the cartridges to work with when the software people were writing the code to do the game? Do you remember the size of the ROMs they had in those cartridges at all?

Smith: Yep, 8K.

Spicer: Eight K?

Smith: Not a lot. That's not a lot. It's very tight.

Spicer: What was the microprocessor in that game?

Smith: That was a heated discussion we had when we came up with the design..

Spicer: I'm sure.

Smith: … and we settled in on-- which was at that time, I guess, revolutionary, and that was a Motorola 6800 microprocessor. Yeah, and the reason was that Motorola was trying to get into the market aggressively, and they had some of the best pricing available to us, and when you're talking about a company like APF, who's building knockoffs and everything is about cost, the Motorola processor for us was half the cost of the other ones.

Spicer: Wow. I know that Steve Wozniak, when he did the Apple-1-- I'm sure you know this… he left a slot for the 6800, so you could put in either a 6800 or a 6502 [microprocessor].

Smith: 6502, yeah.

Spicer: … in the board, probably for the same reason, right, cost. So, okay. Well, how did it do in the marketplace, the MP1000?

Smith: We sold thousands of those units. Our biggest distributor was Sears. So every Sears store across the country had the MP1000.

Spicer: Now, that must've been pretty nice for you to be able to walk into a Sears and see your work. Did you ever do that just for fun?

Smith: Yeah. I would love to tell you it was a good story, but the story is that I was taking my daughters-- my wife and my daughters shopping for school clothes, and we're at the mall, and I see the Sears store there, and we go into Sears. My wife takes my daughters over to the kids section to look at clothes. Naturally I wander right into the electronics section, and, lo and behold, right there was… along with the Atari and other games, the MP1000, and I got so excited to see that game sitting there that I walked up to the salesperson, and I said, "Hey, I helped design that game." That salesperson gave me such a look of disbelief that he just completely crushed everything that was in my mind at that time. I walked out of that Sears store so dejected that I never brought up the fact that I did that ever again.

Spicer: Ed. So sorry.

Smith: That's the nature of the color of your skin, unfortunately, Dag.

Spicer: So sorry. Well, tell us what happened at APF after they… what was the next product there?

Smith: Yeah. So this is the industry. This is the fun stuff that was going on at the time. The industry, again, was moving so fast. Year after year, something different was going on. So it started with video games, and then all of a sudden personal computers started to come out. Apple started to have their success. So we felt at APF that we may be able to have a position in the market that was different from Apple, different from Radio Shack and from the others who were primarily hobbyist systems.

What we were talking about at APF through a lot of discussions was we want to build a personal computer console to the MP1000 video game. Keep in mind all the processing power for that personal computer was already in the MP1000. All we had to do was expand it out to a computer console, and since we already had a number of our units sold for the video game, we thought all we had to do was manufacture a nice console. People who owned the MP1000 would buy the console unit and turn their video game into a personal computer. That was the concept, and that's what we did. We went ahead, and we built the Imagination Machine personal computer based on the MP1000 video game.

Spicer: Wonderful. Now, first of all, I have to ask about the name. So that's an amazing name, very evocative and positive. So tell us about that. How did they come up with the name?

Smith: So we had a guy who was in our marketing department. His name was John Ruggerio, and John came up with the advertising slicks for the game and for the personal computer, and he came up with the name "Imagination Machine," and his idea was that this is not a hobbyist thing. This is a home environment, a home-computing environment, and it's supposed to be a system that would allow for you to play games, to do your home finances, maybe do some word processing so you can do your homework. But it was never meant to be anything more than that.

Spicer: Okay. Was there a thought of maybe offering a printer?

Smith: Yeah. So, that's the whole idea around the Imagination Machine was you could have this expansion bus connected to the Imagination Machine, and through that expansion bus, you could add additional cartridges, if you will, and one of the cartridges was an RS-232 cartridge, which would allow you to connect to a printer. There was also a Centronics cartridge if you wanted to connect to a Centronics printer. The RS-232 cartridge would also allow you to connect to a modem.

Spicer: Right. What about the software side? There's always a disconnect, as you know, between the hardware and the software. The software is almost always behind the hardware. What kind of software was offered with the Imagination Machine?

Smith: So the Imagination Machine, when we first introduced it to the marketplace… the software that came with it was a BASIC programming cartridge, so that you could actually go ahead and do BASIC programming. It also had a personal finance cartridge. It had a word-processing cartridge, and it had a spreadsheet cartridge. So those were the first pieces for the Imagination Machine.

Spicer: That's amazing. What about the keyboard? How did that plug in, or did it-- was there a connector on the front or something, or..

Smith: Well, the entire concept of the Imagination Machine was you had this console unit..

Spicer: Okay, so it's <overlapping conversation>.

Smith: … and the console unit had the keyboard. It had the tape drive built into it so that you can store data. So all of that was a part of the console, and the MP1000 video game would sit on top of that console, and there was a connection between the MP1000 game and the Imagination Machine console that was called the J-connector, which I designed, that married the two systems.

Spicer: Okay, now I understand. That's great. So the Imagination Machine was essentially a way to add onto the MP1000, to add on and to expand the ecosystem that the MP1000 had sort of..

Smith: Exactly. That's exactly right.

Spicer: … created.

Smith: So you started with the MP1000, and once you were able to connect the MP1000 to the Imagination Machine console, from that point you could build it out to many, many other different things.

Spicer: Right. So the Imagination Machine itself requires the MP1000. It's not a standalone computer.

Smith: That's correct.

Spicer: Okay, got it. That's great. Well, tell us. I'm kind of curious about the industrial design. This is kind of a side issue, I guess, but is there any interesting stories about how-- why it's the shape and the color

and-- that it is and any interesting design choices that were made? I think there's some wood-grain paneling on the sides or something.

Smith: Yeah, on the MP1000, yes, there was always, I guess, a design concept that said for a video game, you had to have this wood-grain look to it. Everybody had it. Atari had it. I don't know why, and it was weird to me, but that's what they did; however, when it came to the personal-computer part of it, all of that went right out of the door. There was no wood-grain design. In fact, it was all plastic-injection molding.

Spicer: This, of course, was made in Asia, offshore, right? Was Sears and Montgomery Ward, which you didn't mention before but I think I read in an article, they were also a big customer of yours, Montgomery Ward?

Smith: Sears and Montgomery Ward in their catalog, yes.

Spicer: Did they also adopt the Imagination Machine in their stores?

Smith: Oh, yeah. Yeah. In fact, this is when my career really was going… was skyrocketing, I could say. Once I was getting the work done on the Imagination Machine and we started shipping that unit, we started putting it into production. One of the first things I was asked to do was to go to Chicago-- and, again, you're talking about a kid from Brooklyn who really never traveled -- to get on a plane and go to Chicago and meet with the executives at Sears. I can only tell you that this was the most invigorating thing that ever happened to me as a young man [was] to go into the Sears Tower and go to the top of the Sears Tower, where they actually had a board room, and I'm standing there looking out at Lake Michigan, something I've never seen before in my life, and I'm standing there in awe, and I-- for a while-- it took me a little bit of a-- I had to bring myself back to say, "You got to remember why you're here," and once I took all of that in, yes, I then presented the Imagination Machine to the executives at Sears, and they ate it up. They loved it. They thought this was one of the best things for their consumers that they could sell. So they took thousands of units to sell, along with the MP1000.

Spicer: Fantastic. Now, that must've been quite a-- from coming where you grew up to standing at the top of the Sears Tower. It must've been quite a moment for you.

Smith: It's funny, because growing up in New York, in Brooklyn, all of my life, I had never even considered going into the Empire State Building and going up to the top of the Empire State Building. That was never a thought that I had. But when I got into Chicago and I got to that Sears Tower and I looked out and I saw that view, I was just in awe, and it was at that time that I realized I had exactly-- I had gotten to exactly where I wanted to be in my career.

Spicer: That's amazing. How old were you at that time?

Smith: I was 24 years old.

Spicer: Wow. That's awesome. Yeah. So the meeting went well, and-- to say the least, and what was the reaction when you got back to work? They must've been very happy with your performance.

Smith: Yeah, yeah, they were very happy. Again, the reason they took me with them to pitch the Imagination Machine was because the salespeople at APF-- I mean, they could sell a video game, but they couldn't talk RAM, ROM and all of that on the personal computer side. So I was the guy who was going through the technical architecture of the Imagination Machine, and when Sears went ahead and placed the order, I got back to my drafting table, I think it was at that time, and the sales guy comes up to me and pats me on the back, tells me what a great job I did and then tells me he just made $20,000 that month. I only made $18,000 the entire year. So that was a revelation to me at that time as well.

Spicer: Yeah. You can't compete with Sales. They're always going to make-- that's a lesson you learned early.

Smith: Yeah. These things were happening to me, as I said, moving so fast, I had no idea what salespeople did. I'm just this tech guy. I'm just doing my thing, and this-- you made what? It shocked me.

Spicer: Yeah, definitely. Well, did that influence your thinking or later career decisions at all that-- to be more sales-oriented or to…?

Smith: I think my decision-making was kind of thrust on me, because, again, at APF we had the Imagination Machine. It was selling. The salespeople really didn't know what they were doing, so I was going out with the salespeople pushing the machines with them, and I said to my boss, "If I'm going to help these guy sell it, I need to get a part of the commission," and at one point I actually did do that. I moved from an engineering role, design engineer, which was what I was hired for, and all of a sudden it's like overnight I became a technical specialist, and that role, technical specialist, over the years that I've been in technology, meant that you were a pre-sales guy. You had the technical knowledge that you could share with a customer, and because you were able to share that and help close a deal, you got a commission, and that's the role that I played.

Spicer: Right. I was going to ask exactly, and you sort of answered it a little bit, was how important were the feeds and speeds, as we used to call them in the old days, that the specs-- how much did people care, and then related to that is, who were your competitors in the market?

Smith: Yeah. Well, first of all, as far as feeds and speeds were concerned, it was all about the chip manufacturers. They were the guys who would determine your feeds and your speeds. So it was Motorola for us, and for others it could've been Intel, Fairchild, etcetera. But we all had the same environment as far as an eight-bit system that we worked with. So that didn't change. The competitors were companies like Radio Shack with the TRS-80, Apple, of course. By the way, Atari announced that they were going to build a console for their video game, and that's why we did it first. We wanted to get the jump on Atari, but they never did come out with a console for that video game, the 2600.

Spicer: So they had the same idea but didn't do it.

Smith: Didn't do it.

Spicer: Right. Now, just to skip back a little bit, you mentioned you went to Pace University for a little bit. Can you tell us just a bit? I know this is out of time sequence, but I wanted to just close the loop on that, what you studied there and for how long.

Smith: So when I decided to take up computer technology at Pace, I honestly did not know what I was getting into. Now, keep in mind I had just started working at Marbelite at the time designing traffic-control systems based on microprocessor technology. At Pace, and I found this to be true over the years, universities are slow to catch up to the innovations that go on on the outside. So at Pace they had me studying Fortran and EBCDIC, which was punched cards, and I'm at Pace, and I'm thinking, "Why am I doing this? This makes no sense." But that's exactly the environment that I was in at Pace. Luckily they had a great marketing program, and I did very well there.

Spicer: Good, so you did get some use out of the studies there.

Smith: Yes, indeed.

Spicer: But the technology courses were kind of a washout, it sounds like.

Smith: Yeah, yeah. I was shocked. I just didn't realize that depending on the university that you are going to, and most of them are going to be laggards, very few of them are going to be innovators. I would say Stanford is an innovative university. MIT is an innovative university. Most universities, however, are not innovative at all. They are teaching you what is already out there in the world, were you to get a job around, not something that you can build from scratch and take it with you as a new career.

Spicer: Right. I think, too, somewhat true that we've moved-- what used to be electrical engineering-- I mean, it's still called that, but it's essentially become computer science in that so much of the hardware skills have transitioned into a software world, and-- like circuit design, for example, if you were doing an ASIC or an FPGA. It's essentially a software problem now.

Smith: Absolutely. Yeah. In fact, you're right. Most of it is a software problem. Even chip designs are a software problem these days.

Spicer: Right. Yeah, so I remember Bob Pease. I don't know if you remember that name. He was a famous analog circuit designer in the Valley here. He wrote articles and so on. He used to make fun of people who spent too much time doing theoretical studies of their circuits like running SPICE models, for example, of the circuits and-- without actually building them, and he said, "My favorite programming language is solder."

Smith: Solder.

Spicer: … "build a circuit. Take measurements and really see how it works. You can't just live in the computer."

Smith: That's nice. I like that.

Spicer: Yeah. I thought you would as a hardware guy.

Smith: I can smell the solder now.

Spicer: Exactly. Yeah, it's not that healthy for you, as it turns out. No. Well, now, tell us about APF now just as a company, how it was managed and do you feel it was run well? Or how did they do financially?

Smith: Well, APF, again, they started out, as I mentioned, as a consumer electronics company, mainly to be able to import consumer electronics products. And for that piece of the business they did well. The thing that happened to APF was the desire for them to move quickly to get a large share of a market that they thought was out there and to invest heavily into that, only to see that market completely dry up.

So even though APF was a great company, great people, The Imagination Machine just didn't sell as well as they thought it would. And the main reason was, even though the concept was there as a family video game and personal computer, families were not buying personal computers. Accountants were buying them. Writers were buying them. Hobbyists were buying them. But no one who had a family was plunking down four hundred bucks for a personal computer at that time. It just wasn't happening. So that market for a family system didn't materialize until years later.

Spicer: That's really interesting because you see a lot of advertising geared towards educational-- like, "If you don't buy this computer, your kids will fall behind in school." That kind of messaging, you know. You need the computer to keep up and those kind of-- very direct educational appeal to customers. But did that come later then, do you think?

Smith: It came after the introduction of The Imagination Machine.

Spicer: Right. And then there's sort of-- there's sort of a blurry area between machines that can play games and machines that can serve a dual purpose and also play something more educational.

Smith: Yes. And even at that time, if there was a desire for a family to invest in a personal computer, they did not invest in The Imagination Machine console. They would go ahead and buy a separate personal computer.

Spicer: I see. And what year was The Imagination Machine out, again?

Smith: The Imagination Machine came out in 1978.

Spicer: Okay. So this is just after the big-- we call it the pre- Cambrian explosion in 1977, right? Where you have the Apple II, the PET and the TRS 80.

Smith: Correct.

Spicer: Yes. So you did have some pretty stiff competition there, it seems.

Smith: Oh, yes. Oh, yes.

Spicer: Definitely. But what did you work on with… sorry… let me ask, what was the ultimate fate of APF? Did they get bought out or sell the company or go under?

Smith: They went under. They were liquidated.

Spicer: Ah. Okay. That's too bad.

Smith: Yes.

Spicer: They certainly made an impact. How many Imagination Machines do you think were made in total? I'm very curious to know.

Smith: I would guess that there were probably in the neighborhood of maybe twenty thousand.

Spicer: Okay.

Smith: That sounds about right.

Spicer: Right. And the same-- maybe a slightly larger number of the MPF-1000?

Smith: Well, the MP-1000, that was probably more like a hundred thousand.

Spicer: Oh, wow.

Smith: Oh, yes.

Spicer: Okay. Now are those still readily available on, say, eBay or are they all pretty rare now? I know The Imagination Machine is rare.

Smith: The Imagination Machine is definitely rare. The MP-1000, you might get lucky to find one, but, yes, they're not readily available. I have the entire package.

Spicer: Yes. That's fantastic. Now can you tell us about your co-workers a little bit? I've just read about this guy Irving Boilen, is that his name?

Smith: Yes.

Spicer: Was he a fellow engineer at APF?

Smith: Irving Boilen was one of the lead engineers, and he was one of the guys who would go back and forth between the U.S. and overseas to work with the folks there to build the console units. So Irv was Ken Boilen's father, and Ken Boilen was my boss.

Spicer: Oh, wow. Okay. So he was kind of responsible for-- kind of a production engineer, I guess, right? He'd go over to--

Smith: He was an engineer. He was a computer-- not computer-- an electronics engineer, but, yes, production and design engineer.

Spicer: Ed, you know, I was reading this article in Fast Company, which I'm sure you're familiar with, just a beautifully written article, by the way, about you. And I couldn't believe that someone had made a computer to run JOSS, which-- do you know that language at all? It comes from the JOHNNIAC computer at the RAND Corporation. It's really obscure. I was just wondering if you had any insight into why he chose that language.

Smith: You know, I don't. I wish I did, but all I could tell you is that we knew we needed a language.

Spicer: Okay.

Smith: And, for some reason, it was that language that was selected.

Spicer: Wow. That's really interesting. Yes. Well, so what happened after-- tell us about your-- you know, what happened at APF and when you left the company and what happened after.

Smith: So since things started to go south at APF, no fault of anyone's other than, you know, we tried to do something that we thought was going to be innovative and that people would latch onto. Unfortunately, that didn't happen, so I was given the opportunity to look for other employment while still getting a paycheck at APF. That's how nice these folks were. And it took me a couple of months, and I did find a job at-- wait for it-- at Apple Computer.

Spicer: Oh. Hey.

Smith: And it's interesting that I went to work for Apple in the upstate New York territory as a technical specialist, basically going to all of the Apple dealers and helping them to understand the computers, to make sure they had them properly displayed, and to present at different shows and conferences.

Spicer: Wow. So you really went from kind of an engineer in the laboratory to a very public-facing position, which is really great. I mean, that's a wonderful progression of your career, to see that.

Smith: It was. It wasn't expected, but I'll take it.

Spicer: Did you enjoy that work?

Smith: Yes, I did. I did. Quite frankly, I really wanted to-- and if I were a single man without a family, I would have gone to Silicon Valley and I would have stayed in the hardware space. But there's just not a lot of jobs in hardware in the northeast part of the United States.

Spicer: Right.

Smith: So I knew I had to do something else. And, luckily, I had the ability to get a job at Apple that allowed me to further my career in a way that I didn't expect but it turned out to work out very, very nicely.

Spicer: Fantastic. How long did you stay there with Apple?

Smith: I stayed with Apple for-- well, this is the thing about Apple at that time. The Apple II was doing well. The Apple IIe came out. I was there maybe two years or so, and the Apple… Apple themselves decided that they were going to come up with their business computer. And their business computer was called the Apple III. The Apple III was a bigger dud than The Imagination Machine. It didn't sell at all. It stunk.

Spicer: Right.

Smith: I hated pitching that machine. So they took the smart stuff they did with the Apple II and just pushed it aside in favor of this monolithic machine called the Apple III. It failed miserably. They tried to retrench as quickly as they could, and they came out with another miserable mistake, which was the Apple Lisa. And by the time they came out with the Lisa, Apple's stock started to tank. Their revenue was dropping. IBM was already going into the marketplace with their new PC.

Spicer: Right.

Smith: So that was the change for Apple, at the time.

Spicer: Right. And the IBM PC, of course, came out in '81. August of '81. So that really put-- and it had good and bad effects, right? I mean, it was bad in that, all of a sudden, everybody had this eight hundred-pound gorilla competitor to deal with. But it was good in the sense that it legitimized the personal computer, which many people had considered, up to that time, kind of a toy, in some ways, not a serious business tool. So, yes, there's-- IBM was a mixed blessing, I think. When the Apple III, I remember, and maybe you can tell me if this is true, that there was a problem with the chips, the way they were-- problems with the sockets that they used, and you would actually drop the Apple III about a foot onto a surface and it would reseat the chips? Did you ever hear that one?

<Pause>

Spicer: Ed, the IBM PC was like a shot across the bow for many people making PCs and selling software. How did it affect you when you were working for Apple?

Smith: Yes. You know, and this is something that I've got to take back from when I was at APF and then bring it back to the days when IBM came out with the PC.

Spicer: Sure.

Smith: When we were at APF, we wanted to design The Imagination Machine to be a cartridge-based system like the Apple, so that you can add additional functionality into it as you went on. The folks in our marketing department, they did not want to add functionality. They wanted to ship units. And we lost that battle, and we also lost the battle with the tape drive that was built into it when, at the same time, floppy disk drives were just coming out.

So then, when I was at Apple and we had the Apple IIe, which was a great machine-- you pop open the top, you plug in all of your different expansion cards. People loved it. Hobbyists loved it. People were making money because they were building boards for it. That was a great business for not just Apple but for third parties. So then Apple decided to completely abandon that business when they came out with the Apple III and then the Lisa.

So when IBM came out with the PC, and I saw the PC, my first reaction was: they just took everything in the Apple playbook and put it into the IBM PC, while Apple was abandoning their own playbook. And that just… that hurt to see it happen. And Apple never was able to move away from that. They were never able to change what they started at that time. So Apple would go ahead and come up with their next design, which was the Macintosh computer. And the Mac, as you probably know, was a closed environment, no expansion capabilities at all. It sold somewhat okay, but it wasn't really taking off in the marketplace. And Apple themselves were struggling to stay in the computer hardware business. So that was a very disappointing thing to see happen, to see Apple just completely abandon their bread and butter and come up with closed architectures that never sold.

Spicer: Right. So abandoning the expansion bus and the ability to just plug in cards was a key feature of that. By the way, can you tell us what is on your wall behind you that looks like a circuit board or something? Is that a part of the Apple II or anything? Or am I not seeing that right?

Smith: No, it's a computer design and it's got-- I guess you can call them different bits that are popping out. So it's like an 8-bit architecture computer design – an ABICUS design.

Spicer: Oh, nice. Yes. It looked like something computer-related. But, yes, so I think this argument that you're pointing out here about the abandonment of an expansion buss-- or expansion slots, I should say-- in the Apple III and so on, reflects Steve Jobs' desire to have a closed system, right? And the tension was between Wozniak, who, of course, wanted an open system. He's a hardware guy. He thinks you should just continually be able to add or subtract to the system as you want. And, as you pointed out, that's what

people really wanted. And so it was a big philosophical argument, I think, between Wozniak and Jobs as to whether to have an open system or not.

Smith: Yes, absolutely. In fact, I can tell you that, while I was still with Apple, I heard the rumblings as to why Jobs decided to leave Apple, and the main reason was that he lost control of the engineering environment at Apple. And his desire was to continue to have open architecture technology. I mean, just look at what IBM did with the PC. Look at all of the manufacturers of cards that would go into that machine. These companies made tons of money from the IBM PC.

Now, of course, again, things mature, and now everything is built into the box, but, at one time, you had an environment where people could just make tons of money, and they loved working with companies like -- not just IBM -- but, of course, the clones would come out. So you had this huge, now, environment of IBM-compatibles that you would never see with Apple. There has never been an Apple-compatible at all.

Spicer: Right. And did you-- so how long did you stay with Apple and what made you decide to leave?

Smith: Well, I was laid off. Apple started losing money.

Spicer: Oh, okay.

Smith: Yes. So I was there for maybe three years, I think. Four years. And then they just started losing money. When they did not sell the Lisa, they really went… started going into the wrong direction and they had to retrench. So I left Apple in '82, '83.

Spicer: Right. That sounds about right for the Lisa. And the Mac, of course, came out in '84.

Smith: Right.

Spicer: Now when that came out, I'm sure you know, it didn't sell very well.

Smith: No.

Spicer: Actually, nobody really knew what to do with it, and it took at least a year before, I think, sales started to pick up.

Smith: Well, you know, even when the Mac did come out, just to get it to boot up you had to keep flipping floppy disks back and forth into the machine, and you really couldn't do a lot with it at that time. I think all you had was 16k of memory at the time. So they had some growing pains. And I don't think they really overcame those growing pains, because the Mac, even though it's a really -- it's a great computer today -- but the IBM PC world just completely dominated the marketplace.

Spicer: Yes. How did that impact your choice of jobs? Your next job. Did you work in-- well, tell us what you did.

Smith: Well, so, you know, once I was out of Apple, I tried to figure out what was my next step. And one thing I started to realize as I was learning more about the industry and the things that go on in the industry-- it became apparent to me that you have this world where you can be working on the design of things. You can work in the delivery of products, and you can also work at the retail end, or you can be a consultant. So I started to see all of these different roles that were available for me to latch onto, and I wanted to, first of all, just get a job. And I was lucky enough to have already known the folks at a company called The Computer Factory. And The Computer Factory was one of those retailers where, when I went out to pitch The Imagination Machine with the sales guys, we pitched to Jay Gottlieb at The Computer Factory. So as I was looking to get new employment, I called Jay Gottlieb. And sure enough, he had an opportunity for me to open up the Philadelphia region for The Computer Factory. So I went into the retail end of the business.

Spicer: Right. And now what was your position there? Was it sales or managerial stuff?

Smith: I was the sales-- I was the regional manager, I guess. Yes.

Spicer: Okay. So you had salespeople reporting to you, I guess?

Smith: Mm-hm.

Spicer: Yes. And what were the main products that you were selling?

Smith: This is where it really gets fun, right? Because, again, when you're so enamored with changes in technology, all of the new things that are coming out, and then you have an opportunity to work at a retailer where you pretty much see everything that's new coming out, and, even if you didn't see everything new, you knew there were things that were out there that you should at least convince your managers to adapt, to take on.

Spicer: Very inspiring.

Smith: Well, at The Computer Factory, we were selling the IBM PCs, the IBM clones, the Compaq luggables. But we were also selling optical character recognition systems, at the time. OCR systems. We were selling networking systems, right? There was Banyan Networks. There was the Corvus Omninet, and there was the Novell Network. So we were selling network-- well, I say "we." That was my charter when I got to the Factory, was to convince management that you need to sell not just PCs, but you need to sell these add-on solutions that really make the PC a better system for business. So I convinced the factory to take on the networking stuff. Optical character recognition stuff. Computer-aided drafting stuff.

Spicer: Oh, wow.

Smith: So I was involved in a lot of those new initiatives at The Computer Factory so that, by the time I was looking to move on, I had a ton of knowledge in those different technologies, none more so than the

knowledge I had in computer networking, which actually got me the job at Novell that I was with for thirteen years.

Spicer: Wow. So I was just going to ask you, before we get to Novell, at this time people are just sort of barely appreciating the importance of connecting computers together and how networks might be useful for that, and I guess, obviously, having a print-- being able to share resources like printers was a big driver of that. Can you tell us a bit about what people's perceptions about networks were at the time? Did they see value in connecting their computers together or did you really have to convince them that this was a useful technology?

Smith: Well, you know, when you are talking to a corporation, a large business, or a law firm, or an accounting firm-- when you're talking to these companies that understand the importance of being able to share information, that was the most important thing about networking, the ability to share information. So a lot of these different firms, just based on the way their business ran, understood the importance of computer networking, which made it a very easy sell. If you try to go into an environment where it's less likely that they would understand the importance of being able to share information, you may not get a great sell. You wouldn't get a great sell if you go into a manufacturing environment and try to sell them computer networking. It's just not going to happen, right?

Spicer: Right.

Smith: And manufacturing, you do one thing. You do it, and you get it done, and that's it. But if you are in a law firm, and you've got multiple documents that have to be shared back and forth… and if you've ever been in a law firm before computer networking, and you could see the amount of floppy disk drives that would go… floppy disks that would go back and forth, back and forth from one room to the other, you understand the importance of computer networking.

Spicer: That's a good point. They call that Sneakernet, right? You wear your running shoes [and hand carry a floppy disk to the remote system].

Smith: Sneakernet. You got it. That's right.

Spicer: Did you have to deal-- at the time, of course, you had this big MIS-- what they used to call MIS, right? Management Information Systems, infrastructure that was largely mainframe-based. Did you have to interact with that type of business and how did that go? It must have been a bit of a tough sales job in some cases.

Smith: Yes. So, you know, the thing that we tried to do was to avoid contact with people in MIS. I mean, that's really… that was.. because their jobs were on the line. They did not want to see this upstart networking thing infringe on the way they did their job over the last thirty years or whatever it was. Right?

Spicer: Right.

Smith: They want their green screen terminals. They wanted people to access those terminals with their normal logins, plugged into the wall, and they didn't want to change that at all. In fact, it took a lot, and I can remember the days, in the early days of the PC, it took a lot just for an employee to bring a PC into their job and put it on their desk. That was almost a no-no at one point.

And then, all of a sudden, these PCs started to just proliferate. And now that they're there, they go, "Well, I guess we should connect them." Right? So it wasn't as though they had this grand plan to say, "We're going to invest in all of these PCs and bring them in and we'll network them together." This all happened through a morphing type of a situation. It's like I don't want to do it, but I guess I have to do it, because everybody's doing it.

Spicer: Wow. So people maybe, at the departmental level, had-- or the work group level, sort of went out and got their own stuff, their own PCs because--

Smith: Yes. That's exactly what happened.

Spicer: Because they were so cheap. They could afford to do that.

Smith: They were so cheap, and they could get their jobs done.

Spicer: Right.

Smith: So they didn't have to wait for the mainframe.

Spicer: Right. What was the ultimate impact of that? I mean, I guess, mainframes-- they're still used, obviously, but not in the same way maybe.

Smith: Well, yes. Mainframes are always going to be around. There is always a purpose for large high-functionality-type systems like mainframe computing, especially when you look at areas like artificial intelligence and virtual reality. To design certain things in programs like space exploration, there's always going to be a need for high-capacity computing. So that's not going to go away. The key thing that did happen, though, is the computing power became so powerful that you didn't need a mainframe to do certain things anymore. And that's where the PC really came about. It shined because there was now this desire for people to say, "I can do this," without having to worry about getting onto a mainframe to make this kind of stuff happen. And the computing power at the desktop level over the years-- I mean, we started from a 4-bit microprocessor and by the time we got to 64-bits, I mean, it's like that's it. Why do we need anything else, right? The average consumer-- and I tell to my friends, and they always ask me-- they say, "So what kind of computer should I buy? Should I buy the new 64-bit blah-blah-blah? Or should I buy the 32-bit--" And I go, "Look, the only thing you're going to do with that thing is you're going to do word processing; you're going to do some email; and that's it. Don't buy the biggest box that you see out there. You're never going to use all of that computing power. Nobody does."

Spicer: Yes.

Smith: You know? That's just too much power right now.

Spicer: In fact, I'm using a 2012 Mac, which just shows you that the amount of power that I really need peaked about eight years ago. I just don't need a faster laptop.

Smith: That's it. Exactly. Exactly.

Spicer: Word doesn't need to run any faster than it does already. .

Smith: Yes, but then you know you have the advertisements. They're always pushing the new powerful processor blah-blah-blah and I'm going, you know, guys, this is just like somebody trying to tell you you need an eight-cylinder engine in your--

Spicer: Yes, a Ferrari.

Smith: Yes, exactly. And you can't even go more than seventy miles an hour on the highway.

Spicer: Yes, exactly. Great. Well, let's pivot to Novell and your career there. How did you hear about that? How did you start? You didn't have to go to Utah, did you? I mean, to work in Utah. Or were you working back east. Tell us a bit about that.

Smith: Ah. Ah, okay. So the way I got the job at Novell was I was actually at The Computer Factory doing some work there, and I did a presentation at a computer club. And I can't recall what the name of that computer club was, but it was probably a good hundred people in the room. And the presentation was about different networks, so it was Corvus, it was Banyan, and it was Novell. And I was really just there to share my insights as to what the differences were between those networking systems. So I got done. A guy walks up to me and he says, "I'm with Novell. You just did a great presentation. How would you like to come work for us?"

Spicer: Oh, wow.

Smith: And that's exactly how that happened. And I said, "I would love to come work for you." And sure enough, pretty much just like that, in 1988, I was an employee of Novell, and, yes, I did go to Utah a lot. I mean, I was in Utah maybe once a month or once every other month for the first five years or so of employment at Novell. And I enjoyed every single time being in Utah. That is a beautiful place. I mean, it's just-- forget Sears Tower, at that point. When I saw Utah, I go, "This is God's heaven."

Spicer: Wow.

Smith: So, yes, I would always go to Utah. Novell's office was in… just outside of Salt Lake City. Just south of Salt Lake City. Sandy, Utah. Provo, Utah, actually. And they have a nice office there. The president of Novell was a mentor of mine, Ray Noorda, who was an ex-engineer himself, military guy. We

got along extremely well. Unfortunately, Ray didn't stay long enough. He started the company when he was already in his seventies.

Spicer: Wow.

Smith: So he wasn't able to last long. He got dementia pretty early on. But he was a great person to have learned quite a few things around the environment of software sales.

Spicer: Right. What kind of things did he instill in you? Give you ways of approaching customers? Those kind of things?

Smith: Yes, well, one of the first things Ray would say is-- he would look at your watch. And if you were wearing a Rolex or a Movado, he would say, "You see my watch? This watch cost me ten dollars. It tells time." That's Ray, right? Ray, if you would pick Ray up in your car from the airport, which I did from time to time, and one of my colleagues had a Mercedes, Ray told my colleague, "Why do you have this car? You don't need this car." Right? He said, "You spent twice as much for a car when all you need is a Ford." That's Ray.

Spicer: Very practical.

Smith: He was an "aw shucks" kind of guy. And that's really what I learned from Ray. You don't need to be something that you're not. Be who you are. You know? Appreciate what you have and understand that, just because there are things out there that have more bells and whistles, can do things a little bit better, at one point you have to understand why you're purchasing a product. And that's the thing that I learned from Ray. You purchase a product for a specific functionality, and as long as you remember that, you don't go ahead and spend more money than you should on a product that can give you the same functionality for a lot less.

Spicer: Right. Now did that philosophy have an impact on product development in terms of providing very simple-to-use [networking software], [to] get up and running pretty quickly with Novell? Was that an important part of their conception? I'm just trying to think compared to, say… it's not the Ferrari. It's a Chevy maybe, [but] in the best way-- is that a fair enough comparison?

Smith: That's exactly it, and, you know, so during the development of the networking operating system, it was that same philosophy. Ray wasn't looking to build a mainframe operating system, right?

Spicer: Right.

Smith: Ray said, "We have this PC here. This PC has certain functionalities that we can take advantage of. And those functionalities can be leveraged in a networking operating system." And that's what he built.

Spicer: What was going on in the world of networking generally at this time? This was really the sort of networking heyday, I think, right? Where there were multiple vendors and you had to-- I think Scott

McNealy or somebody at Sun said "the network is the computer." That, hey, the network is actually really, really important. It's a real thing in and of itself, and it's--

Smith: Yes. Yes.

Spicer: It needs experts to just know how it works and set it up for you and get the most out of it.

Smith: Yes. Yes, I remember that line, "The network is the computer." And that really goes back to the fact that, when you started to connect computers together, the concept was: you are leveraging multiple microprocessors in a networked environment, so that you can utilize that power of the entire network.

Spicer: Right.

Smith: Yes.

Spicer: Yes, and then there's Metcalfe's Law, I guess. You know, the Ethernet… [the] guy who did Ethernet [Robert Metcalfe] who said basically the more people on the network, the more useful [and valuable] the network is.

Smith: Yes. Yes. Well, you know, and, again, the point is that, when you start to proliferate the network, it's very difficult to pull it back, right? So as more people start to log onto networks, they're logging on for a specific reason. It could be to tap into the computing power of another PC. It could be to grab different files from another PC. It could be to leverage some type of a hardware capability that's only on that PC. But it's all within the network, and as long as that network is available to you, you can latch onto any of those types of computing environments.

Spicer: Right. How did… Novell I think of as sort of the eventual winner of the network wars. I don't know if that's… if you share that belief, but certainly for a while they were a market leader. How did you differentiate Novell's products from the others?

Smith: So Novell was somewhat unique in that Novell had a very large community of users. And this is before MIS was really providing oversight on the networking part of the business. And Novell had a very, very strong community of users as well as dealers who would go out and push the networks to these different firms. And these dealers knew exactly who to target when it came time to sell Novell networks. So they knew who needed this stuff, right? They knew accounting firms needed networking. They knew law firms needed networking. There were a number of different businesses, just based on the nature of their business, where networking just made sense. And they went after that business. On the other hand, you had companies like IBM. And if you think about their business, which was still mainframe--

Spicer: Right.

Smith: --and IBM did have a token ring network. And I can tell you because I was pushing Novell, at the time, against IBM. The last thing IBM wanted to do was to sell their customers token ring networks. They didn't want to sell them networks at all. They just wanted to keep selling them the mainframe.

Spicer: Oh.

Smith: Keep your terminal. No problem. Everything's fine. That was the business IBM was in at the time. However, the client was saying, "Well, we think we have a need for networking, so it's either going to be you or it's going to be somebody else." So IBM would give in and say, "Okay, if you want the network, here it is. It's token ring." And it was just okay. It didn't do a lot of the things that Novell did. In fact, Novell was one of the first networks that allowed for you to have email communication to desktops.

Spicer: Oh really? Wow, that's a very interesting little feature.

Smith: Yes.

Spicer: Yes.

Smith: That was a very important feature.

Spicer: Oh my goodness. So everyone on the network could send emails to anyone else.

Smith: Yes, exactly.

Spicer: Wow. That's really-- I never knew that. How interesting. Do you have any interesting customer stories of Novell customers?

Smith: Ooh. This is going to go back to the token ring story that I was just about to-- that I stopped at, but I'm going to build on that.

Spicer: Sure.

Smith: So one of the biggest clients Novell had at the time was Campbell's Soup in New Jersey. And they also had Pepperidge Farm.

Spicer: Oh, yes.

Smith: And we had sold them a lot of Novell networks. A lot of Novell operating systems. Novell servers. And we had a meeting scheduled, and the meeting was to identify areas where additional Novell operating systems could be installed. So I go to the meeting. I had one of the technical specialists with me. We walk into the conference room, and IBM is sitting there. And I look up at the CIO, and I said, "Is there a reason why they're here?" And he says, "Oh, no. They're just going to share their insights into what they think needs to happen around their piece of the business." That's the way he positioned it. So I

sat back. IBM gets up and they put up a chart. And the chart has a line-by-line comparison of Novell network versus IBM token ring network. And this person is going back and forth, saying, "Token ring is better at this because of this. Novell can't do that." And I stopped him right in the middle of his presentation. I said, "I am not sitting through this. We are leaving. If you expect us to be able to compete with IBM on what we know is a better product, then you are delusional and I am just going to walk out." And the CIO actually said, "I'm sorry. You're right. I should not have put you through this." And he threw IBM out of the room. But now it gets more interesting than this, because IBM was a Novell customer, as well. IBM sold Novell networks, as well.

Spicer: Oh, interesting.

Smith: Oh, yes. So when they threw IBM out, IBM called our vice president of sales. I get back to my office. He calls me and he goes, "What did you do?" And I told him. I said, "I wasn't going to sit there and let those guys just berate us like that." And he said, "You know, that took a lot of balls, but you did exactly the right thing."

Spicer: Oh, that's great.

Smith: So that was the IBM story at Novell.

Spicer: Wow. Yes, it's pretty unfair to set you up like that.

Smith: Oh, that was-- but, you know, it's not the first time that kind of thing happened. As I learned, in the business that we're in, sometimes you get blindsided.

Spicer: Yes, right. Well, Novell sounded like-- what year-- can you tell us the years you were there, just so we get the chronology right?

Smith: Yes. I was at Novell from 1988 through 2001.

Spicer: Okay. Great. Any other Novell stories before we move on?

Smith: Oh man, you know.

Spicer: I'm sure you have lots.

Smith: Yes. Yes. The one story that I think about quite a bit is, you know, you have a law firm in Philadelphia called Morgan, Lewis & Bockius. A pretty good-size law firm. And they were hesitant in investing in a network. And I went out with the sales rep, and Morgan Lewis was looking at Banyan. In fact, they purchased Banyan. And the rep told me that we could take Banyan out because it wasn't performing the way the client expected them to. So when we got to the firm, and we saw the way Banyan was installed, we knew it wasn't the problem with Banyan. It was the problem with the person who installed it, but we didn't tell the client that. We just told the client, "This is a bad network. You need

Novell." And he pulled Banyan out and put Novell in, and everything else was great after that. But that was the key thing about networking at that time. The systems were great if you implemented them correctly.

Spicer: Sure.

Smith: Back in those days, it wasn't very easy to configure networks. You had to know a lot about the intricacies of the hardware that you were connecting to and the operating environment that you were setting up.

Spicer: Oh yes.

Smith: So, yes.

Spicer: Do you remember every time you added a card to a PC, you had to set the interrupts and the--

Smith: The net cards and the interrupts. Yes. Exactly.

Spicer: Yes. That's not easy for a regular person if they don't really--

Smith: No.

Spicer: --know how to do that. So. Anyway, so okay. What happens after Novell, Ed? In 2001.

Smith: 2001. Novell, by the way, they started to go under. The networking business became commoditized, and that was due to Microsoft. So all of a sudden, everything that was being sold as a network operating system was now being built into Microsoft Windows.

Spicer: Okay.

Smith: So networking was now a part of Windows, and it just took Novell's business completely out of the marketplace. So, yes, I was laid off from Novell, and I went to work for a company called Infosys.

Spicer: Oh, yes.

Smith: Which is an Indian-based IT consulting and outsourcing firm. And I decided to take that job, and I was just thinking about the trajectory of my own career, and I'm thinking, okay, look. I've been doing design work on video games and personal computers. I've been in retail. I've been managing dealers, and I've worked for one of the biggest software firms in the industry. I think I should look at what they do on the other side of the business, which is the consulting side. And I went to work for Infosys in consulting. And my primary role, by the way, was strategic partnerships. Right? So I was responsible for bringing in new partners based on certain technologies that we wanted to adapt and deliver services around. And that was my role at Infosys. So now I'm spending a lot of time in India.

Spicer: Oh my gosh. Wow.

Smith: Yes. Yes.

Spicer: That's a long flight.

Smith: Oh yes.

Spicer: Well, tell us a bit about the nature of your work at Infosys. I know it's a gigantic company with a global presence.

Smith: Yes. Yes, well, you know, when I started with Infosys, they were maybe eight hundred million dollars in revenue.

Spicer: Okay.

Smith: Today I think they're twenty billion dollars in revenue.

Spicer: Wow.

Smith: But, yes, when I started, they were just growing. They were just starting out. They were just getting their feet wet around the things they wanted to do, and I was one of the people who helped them to grow their business through partnerships.

Spicer: Ah, wonderful. I was always interested in how the Indian IT industry, which seems to have-- I'm not saying it started at about-- it started at this time, but it seemed to have really taken off. You know, the other-- there's Tata. There's Wipro. There's Infosys. These gigantic IT conglomerates all based in India. I'm so curious why India. Do you have any insights into that?

Smith: Well, the best insight I can give you is the government of India was astute enough to understand that they had a population of people who needed to have access to employment as much as possible. And the way the technology was moving at the time allowed for the government to invest in certain companies-- Tata was the first-- and allow those companies to hire people in India, train them on different technologies-- it could have been programming. In fact, it was the whole area around 1999, 2000, when the clock was going to be the big problem

Spicer: Oh, that's right.

Smith: And people didn't have a lot of COBOL expertise. They had in India [people] who knew COBOL. So they would be doing a lot of the re-engineering of systems to prepare for that change of the clock. So they were able to start there and then build their business up by adding additional offerings, time over time.

Spicer: That is a really interesting insight. Yes. The Y2K problem.

Smith: That's correct.

Spicer: Totally interesting. Wow. Thank you for that. Well, what's happening over at Infosys? Are you-- it's mainly a public-facing job, I guess, where you're connecting people together? Is that kind of what you're doing?

Smith: Yes. The job at Infosys is around making sure that you have the right technology that solves a business problem at the right time. So over the years, and you know this, I mean, Dag. The number of software companies that are out there today is just mindboggling.

Spicer: Yes.

Smith: So if you have to have an enterprise client, a worldwide client, who is going to require some type of software technology to help move their business, you have to be able to help that client in every geography where that client has a presence and deliver that solution so that all of that becomes seamless to the end user. That's a monumental task just for one piece of technology. So if you've got a client-- I mean, think of a client who uses SAP. Right? Big software platform. SAP is huge. Multinational. You have people at Infosys who would work for a single client just on SAP. That's their career.

Spicer: Oh, yes.

Smith: You know?

Spicer: For sure. Yes.

Smith: Right? It's just amazing.

Spicer: I know. Yes, we just adopted Salesforce at the Museum and it's kind of the same thing. It's not just software; it's a lifestyle.

Smith: It's a lifestyle. Exactly. So yes. And now everyone has moved to the cloud. Software as a service, or anything as a service, I guess.

Spicer: Right.

Smith: But, yes. I mean, that's just, again, the way technology is moving. Boy, it's just-- you got to keep up.

Spicer: Yes. It's almost impossible, I think. Well, are you still working for Infosys or what--

Smith: No, no. I left Infosys eight years ago.

Spicer: Okay.

Smith: Went to work for a company called Kronos. And that's because I had a friend of mine who was the Senior Director of Strategic Alliances there, and he needed some help to bring in new partners. So I went to work with him for the last five years of my career before I decided to go ahead and retire.

Spicer: Wonderful. And what does Kronos do?

Smith: Kronos is one of the leading providers of workforce management software.

Spicer: Okay.

Smith: And the big thing about Kronos that is important is, if you think about employees, not just any employee, but if you are an employee working in a retail environment or a manufacturing environment or even a hospital environment, healthcare, these employees have schedules. These schedules have to be maintained. Shifts have to be approved.

Spicer: Oh, yes.

Smith: You know, moved around. Swapped between employees. There is not a lot of software companies in workforce management who can't handle employee scheduling. That's what Kronos does better than anybody else.

Spicer: Oh, wow. That's great. And so maybe, just as we wrap up, you can tell us a little bit, because your Infosys job and the Kronos job sound somewhat similar. You're building strategic alliances and so on. How do you-- unpack that for us a little bit. How do you find people to bring into Infosys or to the other company, to Kronos?

Smith: Ah, see, that's the secret sauce of a guy like me. Right? So what you learn over time is how to make the right connections. And you start off by sitting down with your management team, your sales team, understanding what their clients are asking them to do. So at Infosys, for example, we could have a client who would say, "We are in need of a master data management solution." So the client is Goldman Sachs. And a master data management solution is a product or series of products that would allow you to have a complete 360 degree view of that individual's entire portfolio. Not just that individual's portfolio, but their wife's, their kids' and kids that have not even been born yet.

Spicer: Oh my gosh.

Smith: So if they're asking for a master data management solution, you then have to go out and figure out who is the best company to partner with to deliver a solution like that to a firm like Goldman Sachs.

Spicer: I see.

Smith: And that's not easy to do.

Spicer: No. No, it must be very relationship-driven, I would think.

Smith: Extremely. Extremely relationship-driven, yes.

Spicer: Yes. Right. Well, that's great. Tell us a bit about what you've been doing since you've retired. You're living in Florida, which sounds very nice.

Smith: Yes. Yes. So since I've left the grind, if you will, and, by the way, the reason that I did leave Kronos was the level of inquiries that I was getting over the years, starting at about, I'd say, maybe fifteen, twenty years ago, I started getting a lot of inquiries as to what I did at APF with The Imagination Machine and the MP-1000 video game. And a lot of those inquiries turned out to be things that were published, like Fast Company. And as the publications started to come out, I started to get a lot of the requests to do interviews, and I also came to the realization that I need to make sure that this story is fully documented. So I went ahead and I wrote a book, and it's aptly named "Imagine That!"

Spicer: Yes, I have it. It's great. Yes.

Smith: You have it. All right. So it took me a little time to write the book. Got the book done. And since the book has been published I can say to you that almost every other week I am on a call with a writer talking about my time at APF.

Spicer: That's wonderful.

Smith: Yes.

Spicer: I hope you think it's wonderful. It might get tiring after a while.

Smith: It's great.

Spicer: Yes. Oh, well, that's great. So any last minute thoughts you'd like-- any parting thoughts you'd like to leave with us, Ed, as we sign off?

Smith: Well, you know, first of all, I have to say that I am truly appreciative of the Computer History Museum allowing for me tell this story. If there was any institution that is worthy of positioning my story, it is the Computer History Museum, so I truly do appreciate that. And if there was one final thing that I would say, it is there are so many things in the world of technology that I will never have a chance to appreciate, but I am so happy to have been able to work in at least this piece of technology. And for that alone I am truly humbled.

Spicer: Wow. Wonderful, Ed. Thank you so much. Thank you for those kind words. And just one inspiration maybe for children of color. Do you have any words for them? How to realize their dreams?

Smith: Yes. Key thing here is, first of all, never listen to anyone say you cannot do something. That's first and foremost. If you believe you can do it, go out and do it. You can do it. You just have to be able to take the time to learn that piece of the technology. And you can learn it in stages. It doesn't have to be something that you have to do in one fell swoop.

Spicer: Right.

Smith: So don't be discouraged by anyone who tells you you cannot do something. You can do it, and you just have to take the time to study it and become proficient at it. And once you have proficiency, you will have profitability as well.

Spicer: Thank you so much, Ed.

END OF THE INTERVIEW