Oral History of Clark Masters

Interviewed by:
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Kapoor: On behalf of the Computer History Museum, I'd like to welcome Clark Masters, who is SAP, senior vice president, cloud architecture, engineering and CTO of Global Cloud Services. And I would like to talk to you about your oral history. So welcome.

Masters: Yes, welcome. Thank you, Uday.

Kapoor: And I am doing that on behalf of the Computer History Museum's oral history program, where we have captured many oral histories. And so this will be part of that. We'll archive this. So welcome. So let's get started with your early life. I understand you were born in a place called McKeesport, Pennsylvania, just outside Pittsburgh.

Masters: Yes.

Kapoor: ...1949. So let's take it from there.

Masters: Okay.

Kapoor: So tell us about your early life, and what was your childhood like? Talk a little bit about your parents.

Masters: Sure. I was born in McKeesport, Pennsylvania. My parents moved to LA when my father got a job in aerospace when I was around two years old. I grew up in a city in the LA suburbs called Gardena, California, in a small, modest home. I went to elementary school there. My father worked in aerospace, North American Rockwell, first as a tooling operator and then as a tooling engineer, building spacecraft and airplanes and things like that. He was part of the Apollo program. I had a sister who's four and a half years younger, and she was born in Gardena, California. We had family close. My grandfather, as well as my dad's sister, lived in the area.

Kapoor: Thank you. So in terms of schooling, what do you remember about any memorable teachers that had an impression on you? Any mentors? What was your childhood like in terms of playing with other people in the extended family?

Masters: Sure, sure. I went to elementary school, Chapman Elementary, in the Gardena area. It seemed like a long way, but it was probably about a mile. I used to walk to and from school. In my junior high years, I went to Perry Junior High School, and I would ride my bicycle to school and that was about five miles. My aunt and uncle and my cousins, a couple cousins lived in the area, so I have a cousin, Stan Rhodes, who's about three weeks apart in age. We grew up together and the families grew up together, and we spent a lot of time. I played a lot of sports-- youth baseball, and my father coached the baseball league teams. I played little league baseball up until I was 17 years old through the end of high school. The schooling was decent schooling, but nothing profound, I would say, from a elementary into junior high and high school.

Kapoor: Okay. Yeah, so that's good. I noticed that you actually worked in a home appliance company. Can we talk about that? Because apparently, you had a real impressionable event.

Masters: Yeah, that's, to me, an interesting story anyway. My family was not well-off. Again, my mother was a stay-at-home mother. Pretty traditional for the early '50s and during the 1950s. My father worked, so I always cut lawns and delivered newspapers, and always worked for my money and spending money and things of that nature all the way while growing up. While in high school, I worked for an appliance store, Don Spears Appliances. I would deliver refrigerators and install washing machines and things of that nature, as well as did some sales on the floor. After high school, this was Vietnam War times, so I was trying to not go to Vietnam and fight. I would go to junior college and then not, and I was kind of wondering on my future. While I was working there, I asked my boss for a raise, from a dollar seventy-five an hour to two dollars an hour. He basically said, "Well, you're draft bait, and nobody else will hire you, so I'm not giving you a raise. So I quit on the spot and that really was a life-changing event. Who knows what would happen if he would have given me the raise? The reason it was life-changing is the neighbor across the street worked for NCR and back in those days, NCR was in the computer business. There was kind of IBM, Burroughs, Unisys and NCR.

Kapoor: That's correct.

Masters: I got a job as a mail clerk there at NCR. My neighbor set me up for that, and that's how I got into what turned out to be the career path for me. I got married[1] and enlisted in the National Guard, went off to training. Ended up getting out because I checked a little form that said I had asthma as a child when I went into the military. They were so backed up that they did my examination two weeks after I was in, and everybody gets a cold when you're in basic training, so I was congested. They said, you have asthma and you can go home. I was in a month and 13 days. When I'd got back, NCR had moved from El Segundo, CA and they had relocated the software organization, which I was a part of, to San Diego. That's how I got to San Diego.[2]

Kapoor: Okay, nice. So you moved to San Diego with NCR?

Masters: Yes.

Kapoor: And what was your role at NCR at that time?

Masters: At that time, I had moved from a mail clerk to a full-blown department clerk in the document center, and was going to night school trying to complete my AA. I got an opportunity to go into computer operations. This was back in the days when there were CRAM cards, punch cards, and tapes and all of those sorts of devices. If you were a programmer, you had a card deck that you turned in and some computer operator ran it. I ended up getting the opportunity to go on night shift in computer operations,

[1] [Interviewee's note] Married Sherry Morgan in 1970 in Gardena, CA. They had two sons. Justin born in 1976, and Kevin in 1981. They divorced in 2000 and he married Joanne Masters in 2001. Clark has five grandchildren, Bailey, Savannah, Caleb, Michael and Abby.

and running all the jobs for the software developers, collecting failure information. You got to learn a lot about computers. I kept going to school. Back in those days, the programming world, the computer world, was very, very proprietary. Vendors, which you couldn't get away with today, you would hire new college grads into a training class. You would spend six months training these new grads on your proprietary technology. That's how a lot of the in-house tools were developed. Some of the universities, back in those days, didn't even have computer science programs. You would hire people based on the programming aptitudes and aptitude tests. What NCR ended up doing was developing, essentially an apprentice program. If you had computer coursework and an AA degree, they had a classification called programming technician. For every two years you worked as a programming technician you got one year of college credit. Basically if you did that for four years, you would be equated to a college graduate. That's how I moved from non-exempt and clerk, computer operations into a programming and the software development world was by going through that program.

Kapoor: So was the training done on-site at NCR or was it at a college?

Masters: It was on-site. You were expected to continue college coursework outside, but it was training really by working. I was assigned, just like the other junior programmers, to teams to do software work. I was working in the software integration world, testing, development, and those sorts of things for operating systems. The division I was with was not applications, but it was operating systems.

Kapoor: Right. So I understand that you got NCR's highest corporate R&D award for [3].

Masters: Yeah. That was pretty interesting. But back in the day, it was a waterfall, monolithic, kind of big-bang approach to putting systems together. Where the continuous integration methodology was a new concept. It's very much like Agile development is today in many respects. If you're building a Kernel for an operating system, you want to have certain pieces, like the low-level memory management or device drivers and those things, in first and test and stabilize it and then put file systems for example, and things like that on top. It was really a methodology of how to constantly integrate, constantly test to develop an end product. It was quite innovative at the time. There was a small team of us that developed it and we got submitted for the corporate R&D award for NCR and actually got that awarded.

Kapoor: Wonderful. So I guess those were the early days of building quality into the program?

Masters: Yes. I think that's a good way to think of it.

Kapoor: Okay. So then within NCR, how did your career grow?

Masters: Yeah, I started in computer operations, when I got that opportunity, and some light went off inside of me. I could not get enough of computers. Through all my school and everything else, there was nothing that really excited me until I got introduced to this. I went from a third-shift computer operator to

[3] [Interviewee's note] Outstanding Technical Achievement and in recognition of his contribution to the mainline integration method for Software Engineering.

within a year running all the shifts as the supervisor for all the computer operators on day shift. I went from there into a project leader in software integration. Went from that to manager. I ran performance analysis for NCR. I remember when I was 26 years old, having a birthday card and on my birthday card, the performance group put on it, "Give me an age you want to be, and I'll give you data to back it up." So that was my career. It turned out that it wasn't as much of a disadvantage to go through the ranks, the path I chose, compared to a new college graduate with a four-year degree. I ended up being ahead of some of those new college grads, just by opportunity, hard work and leadership skills.

Kapoor: Okay. So did you write code as well?

Masters: I did. I did, but to be honest, I wasn't very good at it. I never viewed myself as the expert, so I was always interested in breadth rather than depth. Meaning that I had an affinity to the systems side of the house, as opposed to working on a deep technology problem for a number of years and then seeing that go. I was not the researcher. I was the system guy, and I put things together to deliver a product to make them work.

Kapoor: Okay. So then how long were you at NCR? And then what was the next step? Apparently you did join some of your colleagues.

Masters: Yeah. I was at NCR until 1984, from '69 or '70 to 1984. The VP of engineering, Steve Vallender, he was ex-HP Labs, HP 2000 guy and our chief hardware architect and chief software architect had an idea to do a startup. They went out and raised money. It was venture funded. Hambrecht and Quist was the lead venture. They're no longer in the business, but they were a big player at the time. Once they got funding, then NCR probably had two or three thousand engineers in the San Diego County, and three big facilities in Rancho Bernardo, Scripps Ranch and Torrey Pines, CA. It was almost an honor to be asked to join the start-up team as there was only a handful of us, ten or so, that were asked to go with that startup. The startup was named Celerity Computing. I left NCR when I was in my early 30s, and went to work for Celerity Computing. The idea was NCR had one of the first 32-bit RISC processors called the NCR-32, and started to put that in their systems. The idea was to take that RISC processor and build a UNIX minicomputer or a big super workstation, the likes of what Apollo was building, for example, at the time. So the idea was to take that technology into the scientific and visualization areas for ECAD and applications like that, and have very high resolution, raster graphics associated with it and build a system out of it. So that's what we did.

Kapoor: So they could not get that opportunity within NCR?

Masters: Yeah, I guess. NCR was totally focused on commercial and saw no opportunity in scientific. So that's what we ended up doing, and we hired some of the chip designers, original chip designers. And we were hoping to form a partnership and build something that NCR could resell, but that never really happened.

Kapoor: Okay. So the chip designers were hired to develop chips?

Masters: No, to develop systems. We structured a purchase agreement just to buy the chips of the core CPU. But we, back in those days, didn't have the system on a chip integration, so you had to have floating point units that were separate. You had to have SRAMs and all of that for your caches, and that was the world then.

Kapoor: Okay. So you were the-- I guess you were vice president of systems engineering?

Masters: Yeah, I was. I started out doing the integrations, doing the Kernel builds, that sort of thing that we were doing. It was interesting. I had to acquire our first DEC VAX to support development. I had to figure out how to go get a Berkeley software distribution, Berkeley 4.2. I worked with a professor at UCSD in San Diego and got access to the software and had to build the whole development environment. How we were going to build the software was particularly challenging because of the byte ordering issues between the VAX and the NCR-32. They were not the same byte ordering, so all of your compilers and utilities and all of that just created logistic problems until you had a new machine that you could do things on.

Kapoor: Right. So how did things go at Celerity as a company and as a career?

Masters: Yeah, I always say that Celerity started the same year as Sun Microsystems did, but Sun did a little better than we did. We had maybe 100 customers, and I would put us in the category more of a living dead rather than a thriving business. We had some traction, but the world had changed on us. Microprocessors were happening, and we weren't getting the business. We were probably late to the market with high graphics and the minicomputers, so we played up. What we did is took that same instruction set and built a mini supercomputer. That was back in the days of Convex, Alliant and those sort of ECL-based machines. We took that same instruction set and built a vector unit and expanded the technology. We had one of the first SMP implementations based on Berkeley 4.2. We had done that work before since all the stuff we did at NCR was all symmetrical multi-processing. We took that technology, added that to Berkeley Unix and then added vector computing and built a Berkeley 4.2 mini-supercomputer.

Kapoor: Okay, thank you. So then what about what happened after Celerity?

Masters: So you may remember a company called Floating Point Systems (FPS).

Kapoor: Correct, yes.

Masters: Yeah. They were a Wall Street, highflyer based in Beaverton, Oregon. Floating Point Systems really was doing attached processors to IBM mainframes and DEC VAXs. And they missed the trend to Unix standalone computing in the scientific world in which they were playing. They were struggling financially, and they acquired us. They acquired Celerity for take over payments. The VCs took a bath, but they really wanted the product and the engineering team. In acquisitions like that, the CEO, Steve Vallender, he certainly was not part of the future, but myself, Nick Aneshansley, and Drew McCrocklin were.

Kapoor: Yeah, Nick passed away recently.

Masters: He did. Nick passed away recently. He was the hardware architect back at NCR, and the architect of the NCR-32. Drew McLaughlin was the software architect. What they wanted was me, Nick and Drew and the team that we had built for the mini-supercomputer. I was kind of elected the boss amongst the three of us, because I had the management experience, and they were both technology guys. I took over as VP of engineering for Celerity as part of Floating Point Systems, and also all of the engineering with Floating Point Systems. I spent those two years going back and forth between Oregon and San Diego, kind of spending half time in both locations trying to get all those products aligned and going.

Kapoor: Right, okay. So as you said, the FPS, there were a lot of other things happening in the modern world. And then again, tell us about what happened after that.

Masters: It's a pretty interesting part of computing, at least interesting to me. What had happened was the Cold War had ended, peace was breaking out all over the world and people were refocusing, including the government on various markets. Floating Point was running out of money. When it was a high flyer, they overspent. They had big facility debts and things of that nature. Everybody was aligning with a microprocessor company, so DEC aligned with MIPS, for example, and everybody was taking sides. What we decided to do in the biggest opportunity was to align with SPARC, from a microprocessor point of view. The CEO, Howard Thrailkill, wasn't really involved much in the alignment. But Don McDougall, who ran sales, and me, who ran engineering, we approached Sun and said, "How can we get a deal?" As it turns out, this is a funny story to me, anyway, Don McDougal and Ed Zander worked together back at Data General. It's funny how these relationships changed the path of what happens with all these companies. We were trying to get a deal signed and Wayne Rosing, who I'm pretty sure you know.

Kapoor: Yes. I'll talk a little bit about Wayne Rosing and me and how-- yeah. Go ahead.

Masters: Yeah. And so Wayne was running engineering for Sun at the time. He was my interface to talk about the partnership, and we were trying to get a deal done. We couldn't get it signed, so Don flew up to the Bay area and camped out at Ed's office. So when Ed came out of his office towards the end of the day and said, "What are you doing here?", he said, "Well, I came to sign a deal." Zander said, "Well, I don't have time to do this. I have my son's little league team, a baseball game, to go to." Don said, "I'd love to see your son play little league baseball." So Don went to the little league game with him, spent the night at Zander's house, and they signed the deal over breakfast the next day. So that's how that got done. The essence of the deal is we traded stock in Floating Point Systems for access to SPARC technology and Solaris. That sent us on the path to bringing SMP technology into Solaris. Solbourne was doing a little bit, but Sun really hadn't done much with any SMP technology or extensions. We took what we had done with Berkeley 4.2, and Sun was Unix-based, so we were able to adapt what we had done in memory management and SMP technology into Solaris. We built a binary-compatible SPARC Solaris computer that initially ran vector code and things like that, but as part of the deal, we got access to

Dragon technology. I don't know if you remember the Dragon technology done at Park between Xerox and Sun?

Kapoor: Yes.

Masters: There was a Dragon chipset done. Inside of that chipset was a one-bus system, and Sun built the SPARC Center 1000 out of a two-bus system, the SPARC Center 2000, and a four-bus system that was defined, but never run. Really, the chipsets weren't tested for it. What we did, the essence of what we were doing was to take that four-bus predefined architecture implementation and built a system out of it. That's where we built what's called the 6400, that was the 64 processor, SPARC Solaris Dragon bus-based system.

Kapoor: Yeah. This topic came up when I interviewed John Shoemaker. And of course coming from Xerox, he knew all the players. And I think there was a deal, then, on the Dragon. There was a Dragon team at Sun.

Masters: There was.

Kapoor: Great. So again, stepping back a little bit, this is great to hear on the systems side. Going back to the chip side, my role was that I was actually at Intel, and I got a call from TJ Rodgers to do the first SPARC chip in collaboration with Sun. So I was not convinced, coming from Intel-- those are the early days of CISC versus RISC. And I was really comfortable at Intel and finally decided-- TJ convinced me that this is a deal with Sun. So I put a team together with Sun engineers and Cypress engineers, and I had an office at Sun and an office at Cypress. So their first SPARC chip after the first gate array, that was done by Anant Agrawal to validate the SPARC architecture. We did that. I was the project manager for that. So there's a little bit of history on my side.

Masters: Oh yeah, that's great. That all comes together.

Kapoor: Yeah. And then of course SPARC became-- because of the SPARC International and so many other partners joined and then LSI and then TI and all that stuff. But I was actually not part of Sun because I was a Cypress employee, then I joined Fujitsu. But I was always associated with them. And Wayne Rosing, talking about that, he was my counterpart at Sun at that time for the Cypress team.

Masters: Great. Well, Wayne's a great man. I know Wayne reasonably well, both from when he was at Sun, but then also at Google.

Kapoor: Yeah, of course. Yes. So yeah, please go ahead then.

Masters: What happened at Floating Point Systems is we started building these machines. We were running out of money, and we did not have or could not see a path for the future on how we could remain independent and handle our debt. What we did is we ended up getting a deal with Cray Research. And like I said earlier, peace was breaking out all over the world and Cray was trying to make a move into

commercial computing from strictly supercomputing in the scientific arena. Their internal slogan was "From spooks and nukes to jeans and greens." They wanted to really try to make a move in commercial. As it turns out, 80 percent of the users of a Cray Research supercomputer logged in via a Sun workstation. We had already started developing compilers, scientific compiler code, both optimized libraries, matrix processing, all of those sorts of things for SPARC as part of my team. So there was synergy around the Fortran compiler and extensions and things of that nature. We ended up getting a deal done where we would dip the company into bankruptcy, and then Cray Research would do an asset buy out of bankruptcy, and buy the products and the team.

Kapoor: I see. Very interesting.

Masters: That was quite a leadership challenge, going through that. At the time, trying to keep the team together and having managed through tough times with Celerity and all of that, what was a tough decision. I was able to help provide my point of view on how to manage through this, and it ended up working pretty well. What we did is we wanted the stay package to be better than the go package. All the people that we wanted to stay, we paid off all the vacation-- which is hard to do when you're running out of money-- to make sure everybody's current and up-to-date. We put a bonus, a severance bonus in escrow, where if we got through this, then they would get it paid off as a bonus. The incentives were at least as good, if not better than a layoff package was. We were able to put that in place and hold all the employees, essentially all the key employees, to make sure the products and the technology went forward.

There was one really interesting play, and to me it was a life lesson on ethics. We were about to do the deal. We had almost signed the deal, and then all of a sudden, I got a call from the Cray Research leadership saying they’re pulling out of the deal and we're not going to do the acquisition. I said, well, what do I tell my employees? They said I don't know, tell them they have no guarantee for a paycheck because we're not picking up any of the money, and you guys are done. I called an employee meeting with all employees and that was quite chaotic times when we did that. As it turns out, what had happened is DEC was reselling, you may recall, the ECL air-cooled mini-Cray system. DEC was reselling that from Cray. DEC heard of the acquisition, and they went to Rollwagen, who was CEO at the time, and said, if you guys do this acquisition of SPARC technology, then we're going to cancel our reselling deal. Rollwagen wanted that revenue more than this acquisition, and they decided they were going to walk out of the deal. The deal lie dormant for a few days and Bob Ewald, you may know Bob.

Kapoor: No, I don't, but I've heard of him.

Masters: Yeah, so he was running a large portion of Cray at the time. They were running some program on corporate values and mission and all of those sorts of things. When he was asked to give an update at a board meeting on the corporate values, Bob said, I can't give you an update because we have no corporate values. They said are you talking about the FPS deal? He said, yeah. We made a commitment, we didn’t follow through on it, and we decided we're going to let an outside company run our business for us. That caused a discussion at the board and I got a call that said, Can you pull the team back together? The deal's on. That's how it happened. So that was pretty rocky times for a little bit, but it turned out to be

very successful. They put a Cray guy in charge, as you would expect, a guy named Martin Buchanan, who I ended up having a great relationship with. I was made chief scientist, and then Martin moved on to something else. I took over manufacturing and sales and led the division, the SPARC division of Cray Research up until it was acquired. Cray was acquired by SGI.

Kapoor: Right. So then tell us about that part, because that is really big.

Masters: Oh yeah. So that was another fun time. You probably know Tom Jermoluk. He was CEO of SGI at the time.

Kapoor: Again, I know the name but I don't him.

Masters: Yeah. When the acquisition happened, when SGI acquired Cray Research, at that time I was reporting to Bob Ewald. It could have been Les Davis. I don't know if you know Les Davis? He's quite a brilliant engineer. He built all of Seymour's designs. Really, Seymour was the blank-page idea guy and Les Davis was the consummate engineer that delivered all those supercomputers. But that's a diversion. When SGI bought Cray, I got summoned by Jermoluk to Silicon Valley. I was living in San Diego and had my engineering team here and in Oregon still. Jermoluk summoned me and said he wanted to talk to me about how my division fits into Silicon Graphics. They had talked to me about some other jobs inside of SGI, but I decided I would declare my colors. I told Jermoluk that if he wasn't going to go SPARC Solaris, and I thought he should, I didn't see a fit. He said he wasn't going to go SPARC Solaris and he didn't see a fit either. So he said, So what's your recommendation? I said, well, it's really two options. I said we shut down the development and redirect the team on a new mission, or I go sell the division. He said that's the way he thought, too, and go sell the division. He called up Kelly, I forget his first name. I think he's still on the board of MIPS. But he was his corporate counsel and ran administration, so he called in Kelly and said, hey, go work with Clark and get the division sold. Well, I always give him credit. He said go find the best home for your customers and go find the best home for your employees. He did not say, keep this out of the competition's hands or anything like that. But it turned out to be a disastrous move for SGI that he made that decision. I worked with Kelly and wrote the prospectus and shopped the deal to all the SPARC partners. To Fujitsu, to Amdahl, to all of the people in the SPARC community and certainly to Sun. I remember it was a Sunday meeting or whatever, I went there with Kelly and met with Masood Jabbar and John Shoemaker about acquiring the division. We talked through the possibilities, and they sent SGI a message and they said you have way too much confidential Sun IP information, so that should not be in Silicon Graphics' hands, and Silicon Graphics better be very careful on how it handles it. They put them on warning on the IP peril that Silicon Graphics was in with the acquisition. Anyway, a deal ended up being structured.

Kapoor: Right. So talking about that, were there any other responses from other people like Fujitsu and Amdahl?

Masters: We had discussions, but nothing too serious. It wasn't like there was a bidding war for the technology.

Kapoor: As you mentioned the name, Bob Ewald, I dealt with an Ewald. I didn't remember his first name, but there was a relationship with an EDA company when I was at Sun. And I was managing all of the EDA resources. And one of that company had actually violated a deal with another EDA company. So they were sued. So Ewald was representing one of those companies. So maybe it was the same guy.

Masters: I don't know. This guy, he came from Sandia Labs and was at Cray for quite a while. So I doubt if it's the same guy.

Kapoor: Okay. E-W-A-L-D?

Masters: Yes, E-W-A-L-D. Yep.

Kapoor: Okay, sorry.

Masters: No problem. What we did, and very few of the Sun guys will tell you this part of the story. Very few Sun guys will know this part of the story. But they structured the acquisition without taking the new product that we had under development that turned out to be the E10K. But Sun, they had a bunch of NIH stuff. David Yen was doing his thing. They bought Thinking Machines and had all the advanced interconnect work going on out of Boston with Papadopoulos and those guys from Thinking Machines. They were off building this big NUMA sort of machine. I was building a real SMP, we were, at Cray. There was a lot of internal disagreement on what to do with the acquisition. They structured the deal without the new product. John Shoemaker and Ed Zander talked to me about that and I said well, that's crazy. If all you want out of this is the engineers, I'll just put a sign up across the street and I'll deliver every one of them to you. If you don't want the new product and the IP, which is the value of the deal, then it's a dumb deal to do. They listened to me, even though I was officially on SGI's side. I was in a tough position. I needed to make the right things happen for my SPARC customers and my employees. I told them you'd better go back and get the product. And they did. They approached Cray or SGI and said Yeah, we've kind of been thinking about it and we might want to build this new product so give me-- let me buy a license, a fully-paid-up license for that product, royalty-free. They paid, I don't know, ten million or so for a full-up license to the E10k. That was added onto the deal at the last minute. The acquisition happened on July 1st of 1996. We shipped our first products in January or February of 1997 and the E10k was obviously a raving success. We sold 7,000 of them at a million each at 70-plus points gross margin. We put five billion plus of margin in Sun's coffers, and that doesn't count service and support or anything like that for the E10k.

Kapoor: Yes. Yeah, no, I've heard very positive things about that deal, and the consequent sales and all that.

Masters: It really helped fuel Sun in the enterprise. My team brought the knowledge of the enterprise and high-end computing and all that to Sun. It really changed Sun from a workstation company to a enterprise server company. There was an interesting thing that I forgot to tell you about in the acquisition of Cray and the DEC interventions and the mini-Crays and that sort of thing. The way they reconciled it with DEC is that, and I found out about this in the press conference with Rollwagen and McNealy, about the

Floating Point Acquisition at Cray, that we were going to build machines a million dollars and up. The mini-Cray was $500,000 to a million. They positioned it as it's not competitive. That's the first time I knew what our mission was, is when Nick and Drew and I went to the press conference on the acquisition. I remember me saying, "Well, I know how to make a machine that costs a million. I don't know how to make one that's worth a million." That's when almost around the coffee machine-- it was probably the bar, but we decided the only way to make that work was to take a big machine and divide it up into smaller pieces. That's where we came up with all the partitioning and dynamic reconfiguration and all of the enterprise RAS capabilities that were built into the E10k so we could essentially sell a bunch of smaller machines and be able to gang those into one large SMP with no performance penalty.

Kapoor: Great.

Masters: That's what really drove the decision to innovate on those technologies. Both Nick, Drew and I had sat around and said if we'd really known how hard it was, we probably wouldn't have done it. It was a business necessity that drove the technology innovation that has really survived decades on RAS and high availability and hot servicing, and essentially containerization and all of those technologies we pioneered at Sun are based on that machine.

Kapoor: Right. And where were the containers technology that was also-- Sun tried to market that, right? They actually built these containers.

Masters: That's right. Built containers in Solaris and didn't really know how to sell it outside of Solaris.

Kapoor: Right. So tell us more about, then, what happened. Because when I joined Sun in '99, and I know Sun was going gangbusters, but then came the dot-com bust. And I remember seeing John (Shoemaker) in the restroom one morning. And I said, "John, how are things?" I was working in his division. I joined Sun in his division, which was the central engineering team. And so I asked him, he said, "I don't know. Nobody is buying anything." That was probably the ground zero of the dot-com bust. So tell me about your perspective.

Masters: Well, those were very interesting times. It had been a rocket ride and nobody could believe that that rocket ride was running out of gas and that the bubble on the dot-com boom was bursting. Most of the companies, Sun included, were in denial. What we saw was a radical decline in orders and demand and things of that nature right after the turn of the millennium. Before 2001/2002, Sun was so successful that the fish were jumping in the boat. All you had to do was put them on a stringer. Where now, all of a sudden, you had to sell. You had really different value propositions that you were doing. It was datacenter consolidation and efficiency and cost reduction and those sorts of things. During those times, the E10k or the high end was fairly stable. It wasn't on the growth path, but we were probably doing $500 million a quarter at the peak in dot-com, but we dropped down to three or four hundred (million) a quarter, as I recall, during those early days. Where we were getting hit was on the mid-range servers and some of the volume products that was getting more competitive pressure from the X86 World.

Kapoor: So at this time, you were EVP of the enterprise systems products?

Masters: Yes, I was. Also, at that time, Ed (Zander) left in the early 2000s. Zander left, and Larry Hambly and John Shoemaker and that sort of thing. Scott kind of became an operating CEO. Up until then, I was reporting to John Shoemaker, along with Mark Canepa who was running storage. David Yen was running microprocessors at that time.

Kapoor: Yeah, I was there at that time.

Masters: Yeah. You probably ended up working in my organization if you were still in central engineering when I took over Enterprise System products.

Kapoor: Yes, correct.

Masters: Yeah. What we did is we had resurrected the x86 products, Solaris on x86. We had that business, and we consolidated all of the X86 products, and I think that was all under Neil Knox. The lower end of SPARC was run by Neil Knox and I ran all the mid-range and high-end. All of this was reporting into Shoemaker. When Shoemaker and Ed's regime left, Scott became president and CEO operating the company. I was reporting to Scott. I had all the SPARC stuff. David had microprocessors.

Kapoor: Yeah. So around that time, I did move to microelectronics, because I was managing all of the EDA stuff, so we consolidated all the EDA under microelectronics.

Masters: Okay, that makes sense. And so Knox was running it for a while, but then we put David in charge and that whole transition happened. Johnathan Schwartz was running Solaris.

Kapoor: Yeah, so we'll come back to all of that. So then when did you transition to Federal Systems?

Masters: Yeah. That was in the Jonathan Schwartz era. What happened was that Scott was running the company and Scott and the Board decided they were going to put Jonathan in charge. We were having trouble making our numbers and I don't know how much pressure Scott was under to make a change. But I remember the phone call when Sun/Scott signed the deal with Microsoft to settle the Java lawsuit. It was, like, $2.3 billion or $2.8 billion settlement, and he was in New York. He was announcing earnings and we were announcing this Microsoft deal the next morning. He said it's almost signed. We're going to get the jets in the air and we'll announce it in the morning. Ballmer[4] is flying down, and we assume we can get it all signed so we can do the announcement. That's great. So we're going to get the two-plus billion in the bank and then Scott said as part of that, I'm going to announce Jonathan Schwartz-- and Johnathan was on the line with all of us-- he was going to announce Jonathan Schwartz as president and COO of Sun Microsystems. That was a shock to all of us, or at least to me. Essentially, nobody said anything. He said okay, let's move on. As part of that, then Jonathan and I, we were probably the two power brokers of Scott's direct reports. We agreed on almost nothing as far as the strategy. Since he was president, it was not going to work with me reporting to him and running a large part of the organization. So what happened is he let (Neil) Knox go and some of the other people, but I don't know whether Scott or

[4] [Interviewee's note] Steve Ballmer, CEO of Microsoft

Papadopoulos or whatever, but they decided that they didn't want to let me go. They wanted me to stay with the Company. They were reorganizing my organization, but asked me to take over Sun Federal, still be part of the executive management group and that sort of thing. Rather than leave the company, they asked me to do that. After thinking about it, then getting over the emotions of all that change, I decided that I would stay and try to help. I had a lot of equity, and if I could help try and turn the Company around, then I was committed to help turning it around. So I took on that role.

Kapoor: I interviewed Scott, and I specifically-- because I had a lot of people knew that I was going to interview him. He hadn't given too many interviews about the Sun-- what happened at Sun, right?

Masters: Yes.

Kapoor: They sent me all kinds of questions for him. And so I was trying to be as blunt as possible, to ask him, "So tell me, why Jonathan?" I never got a really straight answer. First of all, as far as Sun going out of business or whatever happened to Sun, I asked him what happened. Because sometimes those are market forces, they determine. So I felt like saying, "Well, but then there are other things one can do. You can reposition yourself to come out of your doldrums." But I never got a very clean answer. They said it was just market forces.

Masters: Well, I can tell you what the discussion was internally, if you would like.

Kapoor: Oh, of course.

Masters: Internally, it was a strategic discussion. Primarily Ed and Scott became unaligned. What Ed wanted to do and Shoemaker and some of the others was put the brakes on and cut spending, do layoffs and all of those sorts of things to size the company with the market. What Scott was advocating, and as CEO he won, turned out to be not the right move, but it was valid. I mean, I didn't really object. But his thinking in his strategy was that this is temporary. It's a V. And now we have the opportunity to get stronger relative to competition. What we should not do is cut back. We should continue to invest in engineering and products and all of that and emerge from the upside of the V in a stronger position. That was really the chasm between Ed and Scott and various sides of the leadership team at that time. That's the way I understood it.

Kapoor: That I remember. Even publicly that was said. I think there were some-- but then as far as selection of Jonathan..

Masters: Oh, that's another discussion.

Kapoor: Yeah, so like you said, when it was announced, you were all stunned and shocked.

Masters: Yes, yes.

Kapoor: So what is your feeling?

Masters: My opinion is and I don't want to quote Scott, but my opinion was that Scott was enamored with how Jonathan handled himself, was good on his feet and all of those sorts of things. He had a lot of smart ideas that aligned with Scott's pretty well in a lot of things. You know how good and dynamic Scott can be and what a leadership vision he can convey, and he can motivate thousands. I think a lot of the stuff on Solaris and SPARC and all of those sorts of things really aligned with Scott's inner self on how he felt. Jonathan kind of inherited a lot of those ideas, and Scott thought he was the right dynamic leader to take us to the next level. I believe the mistake was that that's not what he needed. He was already a dynamic spokesman and leader and all that. What Sun needed was a strong operations hand at that point in time. He should have put (John) Shoemaker in as president and CEO, in my opinion.

Kapoor: Right. Or you.

Masters: Or me, maybe. But..

Kapoor: Yeah. I mean, I'm just thinking in hindsight, but the other two acquisitions, the storage and..

Masters: Oh, StorageTek?

Kapoor: StorageTek and MySQL. I mean, people couldn’t fathom where is the value? I mean, most acquisitions people get and then immediately you add to your revenue, right?

Masters: Yeah. StorageTek brought in revenue. MySQL didn’t. That was at the end of my time at Sun.

Kapoor: But StorageTek was still-- I mean, people thought of that as a dinosaur.

Masters: Exactly. It was an old, old, tape-based primarily, large enterprise tape company. But I think we wanted to double down on storage. I was involved on the side on those things. For whatever reason, we thought the deal was right and thought we could grow the storage business and leverage that technology as a lever to grow the storage business. Because Sun, historically, was largely unsuccessful in storage. Everybody else was making a lot of money attaching storage to Sun equipment, and Sun didn’t have much of a storage play. The idea was to do that acquisition, build around it and have Sun be a much stronger player in the storage business.

Kapoor: But like you were saying, that was a tape-based storage. So when they tried to sell it as a tape storage, being very valuable because so much of the data of the world is on tape, and all of that. But I think most of the people were looking for things like network storage.

Masters: Yeah, exactly. They had some of that technology, but Sun could never take it and transform it into products that would fit Sun's product strategies. There were lots of starts and stops, which you probably remember. I can't even remember all the projects. But we were never successful.

Kapoor: Correct. And EMC was another company that I think there was some talks or whatever. I don't remember exactly what happened.

Masters: There was always discussions and things like that about how it would be a strong play with combining EMC and Sun. Apparently Michael Dell thought that would be a strong play in the later years. But I think Joe Tucci and Scott never could come to an agreement on how that would work and never really believed in it enough to really make it happen. I got to know Tucci afterwards as part of SAP and working with Dell and all of that now. But I wasn't involved in the details of that discussion, but I know it was discussed. We also, I'm sure Shoemaker told you, almost bought Apple.

Kapoor: Oh yeah, yeah. That has been in many interviews that I've done. And we actually have captured both the business history and the technology history, and I was part of arranging those panels and all. So those are all well-documented. So tell us, then, about your next steps. Anything you want to say about Federal.

Masters: Yeah. When I took over Sun Federal, the business had been struggling as part of the whole dot-com bust. My job was to turn it around and get the growth going. John Marselle, you probably remember John, he had moved to run the Americas for a while, and then he was replaced. He was kind of off on the side. I decided that I would bring John back. John and I talked. I always had a lot of respect for John Marselle, and he had really built the federal business at Sun, so I thought we could use his help in rebuilding it. I brought him back to run strategic sales and tactical sales and put TK, who was doing a lot of that-- Tom Kreidler-- put him in charge of international. He ended up leaving, and Marselle taking over Federal sales. I also at that time, Kim Jones, who is CEO of Curriki, she worked for me and ran education, the education business at Sun. Initially, we put education and federal under me.

Kapoor: Yes. Scott was very enamored with that. He was involved with that for a while.

Masters: Yeah. I always tease Scott that to replace me after I left Sun, it took two of them. It took him and Bill Vass to replace me because I was president *and* chairman of Sun Federal. Scott and Bill Vass took it over. But as part of that stint in there, they asked me to take over industry sales as well. We were trying to spin up a vertical sort of approach rather than a horizontal geographic approach to the market in Sun sales. We had ten verticals, telcos, manufacturing, retail, and financial services and all of that. I built up a central team with leadership and programs in each one of those areas. We got the field sales to align with one or two industries and build communities out of those industries to share programs and best practices and all of those sorts of things. As part of Sun Federal, I ran the tactical sales team as well as the strategic sales team. Also, at times, back in the Cray days, I ran sales teams as well. That's what I was asked to do, and spin those up on the verticals during that time, between 2004 and 2006.

Kapoor: Okay. So then what-- I mean, I'm trying to remember now, when things came to where-- I know that the Oracle acquisition happened in 2010. The deal closed in 2010. I was there through all of this. So tell me about your timeline, what happened.

Masters: Yeah. In 2006, basically, I wasn't happy in the organization. I don't think Jonathan was happy with me in the organization. So basically in 2006, we mutually decided it was time for me to move on. I left Sun in 2006 and I thought about retiring, but I just couldn’t do it.

Kapoor: Right. Okay. So tell us about Astute Network, then.

Masters: Yeah. I was looking around since there's only so much golf you can play and so many trips to Saint Andrews that you can do. I did a couple of those and decided to get back in the game. I was actually at one point-- this is kind of interesting, I was a candidate to be CEO of SGI when it was trying to recover. They ended up hiring Bob Ewald as CEO of SGI at that time. And so Bob and I knew each other, and he was trying to recruit me to go run engineering for him at SGI. That would have been quite a turn of events if I'd chose that. But I decided that I didn't want to go that route. I was looking around and there was an opportunity to be CEO of a startup in San Diego called Astute Networks. What Astute did is they had, they were a silicon player initially, a TCIP offload engine. They had developed an ASIC and some of the software that runs on the ASIC. What we did is they were struggling, and they were a venture-funded startup, I forget all of them. One of them was Bank of America and another was Sevin Rosen and such. US Ventures, USVP, those sort of guys. They (Asute Networks) were running out of money and they decided to go make a systems play. Well, they had the wrong leadership and the wrong staff to make a systems play. A systems play being to take their ASIC and build a system product out of it. There was an opportunity to build a storage product that was very high-performance and would go into telco racks and be ruggedized. ATCA as a format was happening in the telco arena. We built an ATCA format drive to go into, to be environmentally sound, and run in distributed locations throughout the network in various centers and stations across the globe. Our customers were the equipment providers, Lucent and ZTE, Huawei, those sorts of things, who were building ATCA products. We had some design wins, and then the 2008 happened, the housing crisis happened, and the economy went in the tank. Everybody put their foot on the brake and we couldn't make it through that.

Kapoor: Meanwhile, you were also on the board of several entities. SonicWall.

Masters: Yeah. SonicWall was kind of in that timeframe, as I recall. (John) Shoemaker was on the board. He introduced me to SonicWall and I was on the board of SonicWall during that period of time. A great company. Had lots of good technology. They could do deep packet inspection technology on the fly with no performance penalties. They were making a move from ASICs to microprocessors, distributed out in the network to do all the deep packet inspection and security sorts of things. Their problem was they were a cash pump generating a lot of money, but didn't have a real growth strategy. I ended up being on the board, leading the compensation committee for a couple years, and then Thoma Bravo came along and made a private equity, take private deal. Paid a premium, took it private, and eventually sold it to Dell and spun it back out again. That was a good learning experience and I was part of that.

Kapoor: Okay. So then moving on to after Astute Networks, then it looks like you took some time off.

Masters: I did some consulting, but looking for opportunities and then came to SAP.

Kapoor: Also served on the board of Plexi.

Masters: Yeah, that was after I became part of SAP. I was at home and Scott McNealy was consulting with Vishal Sikka in the Bay Area at SAP and Hasso Plattner, the founder of SAP. Haso also owns or did

own-- I don't know if he still does, I assume so, the San Jose Sharks. You know Scott's passion for hockey. Scott was on the Board of the Sharks.

Kapoor: Yeah, he built a stadium at home.

Masters: Yep. Yep, he has his own Zamboni machine. Anyway, Scott was consulting, and SAP had just come out with SAP HANA, which is an in-memory, columnar database.

Kapoor: I heard enough about that from Larry when I was at..

Masters: Yeah. Larry didn't like that too much. Anyway, they were trying to figure out what to do with the infrastructure. Actually even considering going into the hardware business, because they needed very large systems to run a true, in-memory database. Scott basically said well, if I had this problem, I would hire Clark. That's the story that I heard. Scott called me on a Friday morning and said hey, I'm working with SAP, are you interested? I said, yeah. It never hurts to talk, and I'm interested. The next week, I flew to the Bay area from San Diego and interviewed with Vishal Sikka, and was hired as a senior vice president for Vishal with two or three main goals. One is to figure out what to do with an infrastructure to support HANA and how SAP should play that hand and what the opportunities were. Then also how do we leverage the hyperscalers? If you remember, this was like 2012, 2013. AWS, for example, had very small instances and could not support enterprise workload. How do we motivate those guys and engage with them and get them so they're capable of running SAP payloads? That's what I ended up doing. I went to work for SAP.

Kapoor: Were you working for Vishal?

Masters: I was reporting to Vishal for a while. He hired me in as a direct report. Then SAP, like our large companies reorganize all the time, so I went under the HANA team. Franz Farber was the architect of HANA in Germany. Since I was building infrastructure for HANA, it made sense to align there. I went to work for Franz.

Kapoor: Vishal left, right?

Masters: Yeah. A couple years-- a year or so after.

Kapoor: And then he took over Infosys for a while.

Masters: He was CEO of Infosys, and now he's on the Board of Oracle.

Kapoor: Okay. I see.

Masters: Yeah. I was there for a couple of years doing that stuff and involved in the early days of HANA and what SAP strategy should be. We built a thing in my team called the petabyte farm. That came out of a discussion with Hasso and Vishal on what would it take, as a vision, if we could build a capability to

house the data of all of SAP customers, not just one. What would that look like? As an engineering project, we started building what we code named the petabyte farm. I think the calculation at that time was if we had ten petabytes of DRAM, we could probably house all of the customers' data. That was probably an order of magnitude low, but it forced us to do some things for thinking about how you scale it, how you deploy it, how do you run bare metal in a virtualized world and all of those sorts of things we had to figure out. In partnership with IBM and HP and Intel, we built this petabyte farm or a big lab, and we put 200 one-terabyte servers to do early benchmarks on scaling, both out for data warehousing and up for transaction processing. Because the joins, as you would imagine, doesn't scale out well because moving data between machines to join data together just is a performance and a technology problem. For transaction processing workloads, you have to scale it up and you can scale it out for data warehousing workloads. Me and my team did the early work on that, and we actually proposed, I proposed, that was one of the six-month goals that Vishal had for me, was what to do with the petabyte farm. We've got fifty million invested or something, and it's a pretty expensive sandbox and hobby. So is there commercial opportunity or not? So I looked at it, my team looked at it, and said we think there's a commercial opportunity. We proposed what became HANA Enterprise Cloud, or now it's ECS, Enterprise Computing Services or something. But essentially, the idea was cloud hosting, to help accelerate the adoption of HANA. The value proposition is Mr. or Ms. Customer, please let me assess your SAP workload. Let me transform it to a cloud infrastructure, let me onboard it, and operate it on your behalf. It's a cloud hosting sort of model. I had proposed acquiring Virtustream. I don't know if you know Virtustream?

Kapoor: No, I don't.

Masters: Virtustream was acquired by EMC, which later became and is still part of Dell today, as one of Michael's companies.

Kapoor: I see.

Masters: They were building this sort of capability and the founders came from Accenture, Deloitte, that sort of consulting background to customers at the application side. They had IP and they had a business. I said let's buy that business and let's build around that business. I got pretty far. In the end, the deal wasn't done, but to exit as friends with Virtustream, we had bought ten percent of Virtustream. We had valued the deal at $400 million when we were going to acquire it. We brought ten percent for $40 million, and three years later, EMC bought them for $1.2 billion. We made a profit of $80 million on our $40 million in two and a half to three years.

Kapoor: Right. So talking about the competition in the cloud world, Larry was talking about-- at least when I left-- I retired three years ago-- was the autonomous cloud. So what's the-- how do you compare to that? And then AWS and-- so where are things now in terms of technology?

Masters: Yeah. My team and myself are right in the middle of all of those discussions. And a colleague, one of my direct reports, and I authored a multi-cloud strategy paper in 2014/2015, somewhere in that timeframe. I still tell my engineers to this day that I can make the case that you're twice as smart as a Google engineer but not ten or twenty times as smart. We are getting outspent by orders of magnitude

every day and cannot compete on an infrastructure level with the hyperscalers. What we have to do is leverage them, the AWS, Azure, Google and now Alibaba to take advantage of their capabilities for infrastructure as a service and redirect our activities to make SAP payloads run on those as well as our internal infrastructure.

Kapoor: Right, right. No, that's interesting. So you think that Oracle will do something similar because they also have a scaling issue?

Masters: Yeah. I think that that was part of the problem with the conflict between Larry Ellison and (Thomas) Kurian (CEO of Google Cloud)?

Kapoor: Yes, yes. He's at Google.

Masters: Yeah. He's at Google, and we still work with them closely and all of that. We have and we adopted a 4+1 strategy. It's AWS, Google, Azure, Alibaba, and the plus-one is the SAP internal datacenters. We're in the process and right in the middle of going to one stack internally, but also one hardware infrastructure. My team currently defines the architectural building blocks of what we build infrastructure out of for the SAP datacenters, and as CTO of Global Cloud Services, I'm involved. We started the multi-cloud project in my team, but once it got big, we spun it out. Basically the role of our current team, Global Cloud Services, is not internal IT. It's really we're responsible for the infrastructure that supports our customer-facing payloads, Success Factors, Ariba, S/4 HANA, HANA Enterprise Cloud, Business Technology Platform, all of those sorts of capabilities. We have SaaS offerings, we have platform offerings, and we have cloud hosting offerings.

Kapoor: Okay. So what about AI and deep learning? Is that something that..

Masters: Yeah. That's a very important part of the future, obviously. SAP has a big investment to imbed AI into the SAP applications, both the cloud applications and on-premise applications. Working on infrastructure, I'm not as involved in the details of that. We do support it with infrastructure either with the hyperscalers, with tensor flow sort of capabilities, or with GPUs on certain internal environments to support the acceleration. But from an infrastructure perspective, I think AI ops really has a future on efficiency. We've got projects where I've got data scientists on my team to analyze the problems and algorithms of looking at efficiency. Meaning bin packing, stacking workloads, and storage and all of those sorts of things to squeeze more out of the infrastructure, as well as telemetry on network flows and optimizations, and things like that. Because the tools aren't anywhere close to real time today, and if you look at the hyperscalers, they're making big investments in all of those technologies.

Kapoor: So this is good. I think we've come to the current status, unless you want to add something.

Masters: Yeah, a couple things. A few things that I think are interesting that we're doing that I didn’t talk about very much. But we're also doing lots of work on what Smart NICs (Network Interface Cards) look like in the future, and how those impact the infrastructure, both from a SDN and networking capability, but also from a what functions do you put in DPUs and GPUs and get out of the processor. I think that's an

exciting area. We deal with companies like Fungible and Pensando and things like that. People on my team are working on those things. We're also looking at working with all the big technology partners on the futures and thought leadership on new memory topologies and what that will look like. We have a very close relationship with Intel, HP, Lenovo, Dell on future product roadmaps. We interact on a regular basis, to try to make sure that they understand what SAP needs, and we understand what they're building and what we can do together. I think the technology future is very bright for cloud computing and some of the work that we're doing. We're also doing a lot of work on abstraction layers for payloads to enable them to run in hyperscalers as well as on-prem. We have a very close relationship with VMWare. We were on the Open Stack path for a while, but unfortunately that didn't win in the industry. We're kind of on a VMWare-first strategy for our internal datacenters. But there's lots of synergies and ways to work together on abstraction layers. We can run the existing payloads with minimum modifications on various platforms. We're probably 90 to 95 percent VMs still, but the applications are being refactored. We're supporting Kubernetes-based workloads as well as traditional VMs. We've been driving the industry, because of HANA, to get very, very large VMs. So 12 terabytes or 24 terabytes for a VM is kind of where the world needs to be for a maximum right now. All the hyperscalers, including Azure, now have capabilities and ways to get there by working with SAP and SAP customers. I think the future is bright for cloud computing. I wouldn't want to be in Larry's position to try to compete with the hyperscalers on that front. I just think it's not a game that can be won, although Oracle has done a good job of trying to leverage their database and applications into an infrastructure play as well. SAP has a little bit different strategy on that front. But overall, I always tell my team, if you can't get excited about being right in the middle of the hottest topics in cloud computing-- like in-memory computing, like hyperscaler, and hyperscaler optimization, like AI, like automation, like the refactoring, all of that-- then you shouldn't be interested in cloud computing. We have our fingers in all those areas, and that's what's exciting to me.

Kapoor: So you're attracting some good people?

Masters: Yes, we have. My team is very distributed globally, which creates some challenges, but it also made it a reasonable way to get through the Pandemic. SAP was just amazing during the Pandemic, supporting remote work,supporting our employees, and providing an environment so we could still drive the business and keep going and collaborate in a very good way. Our team is in Palo Alto, Berlin, Waldorf, Rot, multiple locations in Germany. In Belfast, we have a large team and then some in Shanghai and some in Bulgaria and the Ukraine area. So we are very, very distributed, so we've learned to work remotely in a very good way.

Kapoor: Right. So I have a thing here that says, "Get to know Clark." What makes you happy, advice for the younger self. So anything, any words of advice that..

Masters: Yeah.

Kapoor: Your philosophy.

Masters: Yeah. My philosophy was I knew I wasn't the smartest guy on the block, and that there were lots of people that were more brilliant from a technology point of view but I felt that I could always outwork

anybody. I think hard work and diligence and paying attention and that will pay off. And so my advice to my young self was, "Keep working hard, because it will pay off." The other thing that I talk about or that gets me going is the team success. As we moved from NCR to Celerity to Floating Point Systems, to Cray Research, to Sun, all the way up through Sun, those teams followed on every move, the team expanded. It didn't contract. People would follow the vision and follow the team to go on to do great things. That's what, at this point in my career, I view myself much more as a coach and a mentor for my team, rather than the one making the day-to-day decisions on everything that we're going to do. It's more, "What should the strategy be? How can I help you? How can I build the team for the next generation of leadership in cloud computing at SAP?" So that's what gets my juices going.

Kapoor: So you work hard and you also play hard. You have a very balanced family life, and I hear that you spend a lot of time with family and you play golf regularly.

Masters: I do.

Kapoor: So that's a very positive attitude.

Masters: Thank you. Yeah, one of my fondest memories, and Scott will probably not tell you, he didn't volunteer it, but I did pretty well in my golfing bets with Scott. We still stay in close contact, and (John) Shoemaker and I used to golf. It's almost a golfing culture. I love the game. I'm getting old now, so I'm not nearly as good, but I play every Saturday and Sunday if I can.

Kapoor: Yeah. I remember that when Maverick won the Stanford-- he was number one and I congratulated him, and he thanked me for that. I sent him an e-mail. And then he did-- we had 25 years of SPARC or 25 years of-- or some event I had organized at the museum. And he said he couldn't make it because he had to go and caddy for Maverick.

Masters: Yes, yes, yes, yes. That's when Maverick was in the US Open, probably. They did an article when Scott went to caddy for them in the US Open. The billion-dollar caddy daddy.

Kapoor: Yeah, exactly.

Masters: So Clark, I understand that Forbes created a list of the top ten transformational deals of the last 100 years in the year 2000. They named the Sun Microsystem purchase of Cray's Unix server business as number five on their list. So that is quite an honor. So do you want to talk about that?

Masters: Sure. Yes, it was actually quite an honor. At the turn of the millennium, Forbes did an article on transformational deals of the last 100 years. Certainly number one on that list was Microsoft getting DOS from IBM, so with Bill Gates. But the acquisition of my division by Sun Microsystems was number five on that list. And the coolest thing about it was that number eight on that list was the Yankees getting Babe Ruth from the Boston Red Sox. So that was very cool. But clearly, Sun paid, I don't know, $17 million for the acquisition of the division. We generated five-plus billion in margin, and more than that in revenue. So it was a transformational deal.

Kapoor: Anyway, so this is lovely. We really-- I enjoyed talking to you.

END OF THE INTERVIEW

