Oral History of Grant Saviers, Part 2

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Recorded October 30, 2019
Mountain View, CA

CHM Reference number: X6162.2011

Gardner: Good afternoon. I'm Tom Gardner, a volunteer at the Storage Special Interest Group at the Computer History Museum. I'm here this afternoon with Grant Saviers, who will continue his oral history, which, <laughs> as it turns out, has been postponed since 2011. So good to see you again, Grant.

Saviers: Thanks, Tom.

Gardner: Grant has a long-distinguished career in the computing industry, mainly in storage, but also in personal computers. Thirty, almost forty years in total?

Saviers: Yes, long time. <laughs>

Gardner: And first at DEC, mainly in storage, and then at the end of his DEC career, in personal computing. Then following with a number of years at Adaptec in storage adapters and storage subsystems, after which he's pursued a number of investments. When I look at your career, Grant, I see a remarkable growth in the revenues of the industries you've been participate in. DEC, I think, went when you joined it in 1968, from 57 million to more than 13 billion.

Saviers: Yes, more than 13 billion, right.

Gardner: And Adaptec, when you joined it, was about a hundred million. Went to almost a billion?

Saviers: Yes, hundred and twenty million and just broke a billion, yes.

Gardner: In both cases, you participated at an incredible rise and then left as things stopped rising.

Saviers: <laughs> Or maybe I helped them stop <laughs> I don't know. It's, you know, you never know when you look back. Those things which you said, which maybe weren't the right things to say at that time. <laughs>

Gardner: I doubt if there is causality.

Saviers: Yes, I don't think so really, but... <laughs>

Gardner: It's a weird correlation, but I think it gives you a unique perspective, which I'd like you to share with us today.

Saviers: Sure.

Gardner: As to, you know, the opportunities in growth and the challenges in growth, and you've looked at it in two big companies going from very little to very large.

Saviers: Yep.

Gardner: And both companies don't exist today.

Saviers: That's right.

Gardner: So let's start with Digital. We stopped when you left storage to take over personal computers, volunteered, I'm told.

Saviers: Yes. Jack Smith, who I worked for, was really the guy who ran the company inside. He was the chief operating officer, even though not called that. He worked for Ken, and basically almost <laughs> everybody in the company worked for Jack. He said to me, "Time for you to move on from storage. Go hire your successor, and we'll find something else for you to do in the company." That was after about 21, 22 years in storage, building it from nothing basically to about a three-billion-dollar business. The-- so I recruited a guy named Charlie Christ. He actually did some consulting for us. I think he was with Coopers, and he got to know the team, and the entire team had the chance to decide whether he was the new guy, and they agreed. They did. In retrospect, that was probably not such a great decision, but that permitted me to move on, and Jack really wanted me to move into the services business to bring technology to services, but I didn't see the services business in DEC as going anywhere or organized right, so I said, "No. But I think I want to run the PC business," which, you know, kind of fried his brain because Ken was known to be ultimately quite antagonistic to anybody in the PC business. In fact, the guy who, the VP who had run the PC business, Andy Knowles, and actually drove the growth of the PDP-11 for a long time, had left DEC in that situation and said to me, "You're out of your f'ing mind. Ken will kill you within two years." I said, "Well, you know, my equation is probably the board's going to dismiss him before he gets to me." Well, it was pretty close call. Ken won, only by two months, but anyway, that's the long and the short of moving into the PC business. But it was really interesting, an interesting challenge to join it.

Gardner: You did this around February 1989?

Saviers: That's about the right date. John Rose was totally committed to personal computers from the earliest days of personal computers. He actually designed the Rainbow, and there were the PDP-11 Pro, and a PDP-8 architecture machine. It was Ken's idea of architecture you should have different computers for different applications, which didn't make any sense to most anybody but him, but anyway, that was round one of personal computers. Round two was something designed as a VAX peripheral, called the VAXmate. That was in the mid-'80s. First version's '80, '81, second version in mid-'80s. So I joined in '89 whenthings were really rolling in the PC business. Dell and Hewlett-Packard and IBM were major forces at the time.

Gardner: Just too back up for a second, you were observer in storage when the decision was made to enter the PC business with three unique machines.

Saviers: Yes.

Gardner: Gordon Bell describes that as, “Be a leader or be a follower,” and since at that time they didn’t know what it would take to be a leader, having three architectures was the right way to go because you have now three horses in a race, not one.

Saviers: I’m surprised that-- I would want to really verify Gordon said that, because-- I think I’m not telling too many tales here, but Gordon left when he got into it with Ken, and he said to Ken, “Look. I don’t agree with what you’re doing in PCs and I don’t want to do that, so why don’t you do that and I’ll worry about the rest of the computers at DEC?” and I don’t know whether, what happened there, but that broke the relationship between Ken and Gordon.

Gardner: Pretty sure at least that was a strategic direction at DEC. Maybe it was Ken’s and not Gordon’s.

Saviers: Absolutely. Yes. Well, there were several folks that were driving the individual technologies. Of course, once you’ve got a PDP-8 group and you got a PDP-11 group and you’ve got a x86 group, everybody’s got their own horse in the race and they want to promote that horse, so either Ken went along with that or liked the idea, and it led to a what I call one of the first billion-dollar disasters at DEC, the-- it actually cost the company more than a billion dollars to write off all that mess.

Gardner: So now we’re at early ’89. You’re now in charge of the PC business of--

Saviers: Right. Well, since Ken had, in the prior two generations, put a lot of his personal imprint on the packaging of PCs, the strategy that John Rose had evolved was to, “Buy them outside. Don’t design them,” -- what he had done was contracted with Tandy, otherwise known as RadioShack, but Tandy Corporation, to build to our specifications, and those were built in a factory in Texas. I don’t remember the exact location. They had several factories in Texas, and those PCs, were designed to DEC specs, DEC architectures, if you will. We had a couple good architects in the PC group who knew, what the latest and greatest chips were that you could glue together to make a good PC, and that was the basis of the business, and the business grew to about $300 million. Just when customers said, “Well, I don’t want to buy from somebody else. I want to buy the whole thing from DEC. Will you sell me some PCs?” and at 200 -$300 million, I began to realize and John certainly realized also, that a 22 percent gross margin wasn’t going anywhere if we were going to get that business to be any larger. So the, we had to come to a decision about, “Are we going to make or buy?” and so that was one part of that PC business. Probably the more important part was that we had this great product, internetworking product called PATHWORKS, which was the only product in the marketplace that could tie together all the standards. We could interchange data between Banyan, Novell, IBM, and whatever Microsoft was doing at the time, which changed several times — we used to say there’re more Apples connected to VAXes as a result of PATHWORKS than any other computer.

So we were the go-to when, networking in those early days were little enclaves of different networks and companies. You know, this division did that network, that division did another network, and DEC could tie them together. So that was a really important product and unfortunatel got lost in the chaos after I left,

but I thought that making PATHWORKS, really investing very heavily in PATHWORKS and, yes, on a VAX as the tie-it-together PC platform in the industry, was the best strategic direction for us to go.

Gardner: Is that an internally developed product?

Saviers: Yes, it was internally. Vijay Thacker was the leader of that and the software team of probably in the order of 50 people and we wanted to-- I wanted to grow it to like three times that size right away, but it was a nice product.

Gardner: Came out of the-- which operating system?

Saviers: Well, ran it on VMS. Okay. And so it ran on a MicroVAX.

Gardner: And you mentioned the-- you were architecting the machines to be built by Tandy, but these were PC compatible, BIOS compatible.

Saviers: Yes, they were totally IBM compatible. Yes. The Rainbow was not. It was kind of close but it really wasn't. The Pro was a PDP-11 architecture, running 11 software. In fact, the guys designing the Pro decided they wanted a new operating system when RT-11 at the time was a far better thing than anybody else had in the industry, better than anything Microsoft had. Better than DOS, and then the PDP-8, the word-processing machine-- the word-processing software had existed for some time on the PDP-8.

Gardner: So you now are running the business. It's getting straight, now growing.

Saviers: Yes.

Gardner: You're adding other suppliers, building?

Saviers: Well, yes. DEC had a-- or, let's say, the European guys always wanted us to do something in Europe in terms of sourcing. They felt that local content, local content, was quite important. So we danced with Olivetti about buying Olivetti PCs and reselling them in Europe, and that really, given that we were moving towards making our own, that didn't make any sense. We had no effort going in laptops and Olivetti did, so we sourced our first-- I think it was a 386 laptop from Olivetti, and it kind of worked. It wasn't <laughs> a great product.

Gardner: As my notes show, that was about May of 1991.

Saviers: Yes, yes.

Gardner: Any interesting stories in working with an Italian company?

Saviers: Oh, boy, they like to eat and drink, I can tell you that. <laughs>

Gardner: Ivrea is an interesting town. Is that where you visited? Ivrea?

Saviers: No. Don't remember where the-- a guy named Piol. His last name was Piol, P-I-O-L, was the honcho, I think in charge of either all computers or the PC Division, and he wined and dined us and we played golf. <laughs> The Italian treatment. <laughs> It was nice, but, we did that deal with them and about the same time or maybe little earlier. I'm not sure exactly. I guess John had a pretty good relationship with Intel, and Intel, in that-- I think the winter/spring of '91, had started to sell their own motherboards. They were packaging up their chips on the motherboards, and this really got HP and IBM and Dell in particular pretty agitated, so there's a very tense relationship between Intel and those guys at that time, I think, and the upstart of that was Andy Grove said to DEC, "You guys really are systems experts. We'd like to build system-capable motherboards. Will you help us out with that? Will you get involved?" Well, that sounded like a pretty good opportunity. So we had this idea that we could build a PC workstation. So one of the very first 486 systems in the market was a workstation that was developed jointly between DEC and Intel. It had the DEC name on it, the-- I think the motherboard came from Intel, and we made some contributions to the architecture to make it a good workstation platform.

It had a big display on it and the right amount of storage and the right amount of memory to be an interesting workstation. Since there were at that time some pretty powerful CAD platforms being developed or being sold on the IBM PC architecture. By that time it'd been about 10 years since the PC launch, so it had gained some traction against the RISC workstation marketplace.

Gardner: I'm curious. What sort of architectural enhancements to make it a workstation as opposed to a faster, bigger PC?

Saviers: Well, you needed the right graphics. You needed the right memory. You needed the right amount of storage at the right performance level. You needed the networking built in. So, those were not necessarily standard things on most PC. You could plug and play that amount of stuff in, but if you integrated them you get little better performance. I mean we're dealing in the days of ISA, so, you know, <laughs> isn't a very hot bus by today's-- <laughs> by anybody's standards. <laughs>

Gardner: Okay.

Saviers: So anyway, we did a big announcement in New York. Andy Grove came. We were there and so we made that product announcement, and that was kind of the building of a relationship with Intel. That was the big first step.

Gardner: That was, I think, May 15th, 1991.

Saviers: Okay, great. So the project started early '91, late '90, right. So that led to more conversations with Intel about how we could-- now, of course, there's the pro and the con of the strategy, depending on where you're sitting in DEC, right? If you're looking at it from where the future of the computer industry's probably going, have some suspicion that Intel's going to own most of the <laughs> architecture of computers and the world, then getting on that bandwagon's probably a good thing. If you look at it from

another perspective, say, the VAX guys, you would say, “Well, gee, you know, this is a threat.” DEC was well into developing single-chip VAX implementations at that time. But from my perspective they were-- building our own fab, building our own chips, just wasn’t going to work. The economics just didn’t work. IIf you sell a hundred or two hundred or three hundred thousand chips a year and you need to invest three billion dollars annually, the arithmetic doesn’t work. So anyway. So we said, “Well, okay. Intel’sgot these-- wants to have a close relationship with us into the server market, and to do that we need to build our own systems,” and to do that we said, “What business model should we use?” and we analyzed IBM, Hewlett-Packard, Dell, and couple others probably, and concluded that Dell was the winner in terms of the best business model. So we basically said, “We’re going to wholesale adopt the Dell model. We’re going to sell direct. We’re going to build everything in one factory. We’re going to FedEx it to the customer. That way we can control quality. We can control obsolete inventory. We can build what the customer wants, and we can save a lot of money because we don’t have all this stuff spread out all over the countryside in terms of dealers.” So that was our proposal. We worked that up and proposed that in the fall of ’91, and boy, everybody thought that was pretty good idea, except Ken, and so we were doing that battle, and by the spring of ’92, it was clear that he was just going to say, “No,” or just going to fight it, and he did, and, course, he was the boss, so he won, and at that point the-- we have a management meeting. You know, 400 people in the audience. Ken announces that, “Somebody else is responsible for the PC business other than me.” So we knew it was coming, and think that was in March or April of ’92. So at that point the entire PC team basically said, “We quit.” So I outplaced the people, and I said to my boss, Jack Smith, , “I’m done. My career’s over at DEC. I don’t want to go through any more of this kind of nonsense again,” and set a departure date in June, which was when I left.

Gardner: What was the alternative that Ken was proposing or advocating?

Saviers: Well, he had a kind of a sycophant who said, “We’ve got to do the Burger King model.”

Gardner: Tell me what a Burger King model was.

Saviers: — You can have it your way — we’re going to do it in 10 or a dozen centers around the country, and we said, “Well, this guy has no clue about manufacturing.” I remember the old saying in those days, because HP would have the wrong part in the machine to sell it. We used to say, “PCs rot faster than bananas,” <laughs> and, everybody’s churning all that inventory out in the field, and it just didn’t make any sense, and plus, the quality was low as a result oflocal put-together as opposed to a real, a real factory. One of the reasons that we thought this was such a great idea for DEC at the time was we had no dealers, so we had nothing on the down-side like IBM or HP had, and, Dell didn’t have dealers at that time. We had a factory that was basically empty in Phoenix, Arizona, that had been in the business of producing terminals in high volume, so they knew the high-volume, small-stuff game, and we had a group called Accessories and Supplies, run by a vice president named John Alexanderson, and John had a billion-dollar business of $2,000 average order size. You know, it sold tape and paper and paper tape and mag tape and disk packs and odds and ends software and so on. So we had distribution, infrastructure. We had factory infrastructure, and then we had the technology relationship with Intel. So it was one of the times in my career where you say, “Wow.” “We have stars in perfect alignment. This thing can really work,” and thenKen blew it up, so that was the end.

Gardner: And did he execute the Burger King strategy?

Saviers: Well, I left, like, I don't know. I forget the date, but we can look it up. I leftJune 15th and the board fired Ken June 30th, so it was a Pyrrhic victory, if you will.

Gardner: He won the race by two weeks.

Saviers: <laughs> Yes. He won the battle and lost the war. But it was clear to many of us at DEC that it was long past time for him to go, and it was a sad, sad story. Sad, sad ending. Company was in deep trouble. Out of cash. Shrinking margins, shrinking revenues. I think you've got the chart of what happened, and I remember we had a little going-away party and the storage guys showed up as part of the send-off and I said, "Well, guys, you will be sold within two years." I said, "I've seen this movie before. It's called 'Control Data', and, companies get into trouble. They get desperate for cash. Storage business is a good, good business. We've got some good products." So Bob Palmer, who was already announced as the new CEO, will sell the storage business as-- among other things, which he did, so he sold part of the software business, he sold a really-- couple of really good products in software. He sold the networking stuff. So that kind of decimated some of the core capabilities that DEC had, unfortunately.

Gardner: They got acquired shortly after that.

Saviers: Well, '96, I think it was.

Gardner: '96?

Saviers: It was four years later that Palmer f ran out of options and sold the company to Compaq. Right.

Gardner: And they sold the storage business to Quantum in '94, I believe.

Saviers: Yes. The disk business went to Quantum, and the-- they just tossed in the DLT, which was a huge success for Quantum. <laughs> I think I told the DLT story and trying to sell that OEM in my other interview where Ken said, "No," but, you know.

Gardner: Yes. Another opportunity.

Saviers: Yes, another opportunity missed.

Gardner: So anything more you want to talk about the internals of your career at DEC before I ask you to be philosophical — you saw the rise, you saw the confusion at the end. What should people avoid as they ride up these incredible ramps?

Saviers: DEC grew at, like, 40 percent per year, plus, for, like, 10 years in a row. So we were the darling of Wall Street. You know, there'd been other, like, Xerox and even before us it was Control Data for a while, and, of course, when you do that, you build costs at an astonishing rate. You build inefficiencies

because you're hiring people to throw them at the problems or the opportunities, however you want to look at it, and DEC did have a fabulous culture of taking individual initiative and ownership for making things happen. Ken deserves a lot of credit, as I said, for the success of DEC. I mean, there's a lot of blame for the failure of DEC. So anyway, that-- those early days were terrific. Get things done. Low politics and high responsibility and great initiative for people who were willing to go, go make things happen. But you do breed in some bad habits, and you do-- and I think the time that Gordon left was a critical moment in that some changes in the profit responsibility and the business structure of the company were made around that same time, and those lost contact with the customer in a broad way inside the organization. Gordon's strategy was fantastic. We ran on that strategy for the next five years, so... But it was running on fumes by 1987, '88. You know, we'd stretched it as far as about we could stretch it, and it had been successful and it was time to set some new direction, but there wasn't the capability in the top management to think strategically about what the next step in the computer industry ought to be and how DEC should play with that. So we got very disconnected from the marketplace, aborted workstation efforts, and the VAX and VMS were great products. I mean, people still love <laughs> them in a way. VMS is still alive out there in the world, interestingly enough. So those were great accomplishments and there were a lot of infrastructure things and networking storage, clustering, et cetera, that we did that were very innovative, but you can only go so far with that beforewhat's happening in industry has got to be part of your plan.

Gardner: Note that 40 percent per year is a Moore's Law growth.

Saviers: Right. <laughs>

Gardner: And that my experience is that sort of growth covers a lot of sin.

Saviers: It does.

Gardner: If you have a 10 percent problem while you're growing 40 percent a year, you're only growing 30 percent a year. But when you stop growing, that 10 percent problem's big.

Saviers: That's right. It is. Yes.

Gardner: You talked about Gordon's strategy. Could you elaborate on what you feel was Gordon's strategy that carried you on?

Saviers: Well, it's on a chart here at the Computer History Museum because I'm sure I gave a copy of it to the museum. It's called the Big E, which talks about workstations, terminals and PCs at the bottom level of the E. VAXes at the midrange in terms of some price performance points of the VAX, individual processors, and then growing to the top level of the E with clustering and multiprocessing and explicitly ruling out, "We'll never build a mainframe," and because that was IBM territory and that was too, you know, a bridge too far, if you will. When I later, when I read some of Clayton Christensen's, it really crystallized clearly for me what was wrong at DEC. We had a served market, which was the departmental computing. The researcher, the scientist, the engineer, the academic people. We made

big inroads in the manufacturing, and control systems, and we had a good impedance match with those customers. We had what they wanted in terms of completeness of product, reliability of product, performance, price. Down at the bottom end, we were struggling. We were, , when the UNIX workstation came along, we couldn't really grasp at that. Partially poisoned, I think, by Ken's infamous "UNIX is like snake oil," but those customers wanted less.

They didn't necessarily want to buy a disk drive from us but probably half of them would've. They wanted UNIX. They didn't want VMS. They wanted raw hardware performance and build something on top of that, and we never got that straight, and then we had the underserved market where IBM was entrenched in the glass house where you needed 24-hour support. You needed all kinds of capable system management tools, database technology. You needed large disk drives, which eventually we got to, but and, so the plan was-- and they had some pretty potent technology in ECL. Water-cooled machines, et cetera. But Gordon said, "We're not--" that's just a bridge too far, and we should stay away from that. Now, I looked at Bob Supnik's oral history a bit ago and he was Mr. Alpha at DEC, and when the VAX 9000 came along to build an ECL machine, I mean, - everybody engineering knew that CMOS was going to wipe out ECL within moments of any possible ship date of a VAX 9000, which is exactly what happened, and so it was a totally wasted couple billion dollars to try building a million-dollar machine, a, sorry, an ECL machine, so anyway, yes. Another big mistake that I think should be on Ken's shoulders.

Gardner: Sounds like the middle child is a troubled child story.

Saviers: <laughs>

Gardner: In the space between the mainframe where-- a ceiling on your--

Saviers: Yes.

Gardner: Self-imposed ceiling, in part because it was IBM's market and in part because of technology decisions, because CMOS today is all mainframes. They're nothing but CMOS.

Saviers: Right. We didn't-- we could've-- we could approach, and that was the plan. The plan in storage was we are supporting the VAX 9000, in my personal opinion, was not a good idea, but I made sure that it wasn't going to have difficulties in the market because storage wasn't good enough, and sopart of a little bit how storage got into some trouble later was the fact that we tied a big part of our investment resource into making sure we had the I/Os per second and the reliability and the total system capacity to support it's called a midrange mainframe machine that the VAX 9000 should've been. So that diverted resource is little bit from probably more of what we should've been doing in the midrange, but anyway, c'est la vie.

Gardner: Following that middle child analogy, the middle market being the test equipment, scientific manufacturing. At the other end, you're being pushed up with these low-end products becoming as powerful as the mid-market products at a lower price, and, you know, you're-- where do you move?

Saviers: I don't-- well, I think there's plenty of room left. There's plenty of room. You know, the networking, tying things together. IBM was nowhere with that. Microsoft was nowhere with that at the time, so plenty of opportunity there, and, yes, play in that marketplace. You may not get the margin and we had, like, at the end, we already had 60 percent margins in the storage business for hardware. It's not bad, and it was a three-billion-dollar business, and at one point the storage business generated more profit dollars than all the rest of the hardware businesses in DEC. So it was pretty pretty good business.

Gardner: Sixty percent margin.

Saviers: <laughs>

Gardner: Seagate would be very happy.

Saviers: Oh, sure. Lots of people would be very happy. Those are margins to kill for.

Gardner: Yes. Yes.

Saviers: Anyway, it was a great ride. It was a sad ending, and certainly glad that I took the opportunity to be at DEC.. But, you know, it's kind of like today you say, "Well, we were the second largest computer company in the world," and everybody says, "Who?" <laughs>

Gardner: And by the way, that 60 percent margin on a lot of your product was bought.

Saviers: Well, at-- towards the end, not a whole lot. Yes. Between the RAs-- when the RA81, 82, RA90 came along, there was more bought at the low end than there was at the high end. But those weren't many dollars in revenue.

Gardner: So we're pretty much at the end of your DEC career/

Saviers: Right. So I leave. <laughs> Jack did well by me, 24 years and a good career and he said, "Well, we'll cut you a good deal." He did, and I made sure my guys got out with a good deal. So I said, "Well, I'm just going to do nothing for a while." You know, this has been traumatic enough, if you will, to ride this thing almost into the ground, and so I said, "Ah, I'll paint the house." <laughs>

Gardner: Before you get into your Adaptec era, I'd like to back up a little bit and talk about some of the relationships you developed with universities in the late '80s when you were in the storage business, and in particular, about Berkeley and the RAID meetings that I believe you funded.

Saviers: Yes, there were number of university relationships. Probably one of the more important one was all the work we did in ECC and Reed-Solomon with Berlekamp and a guy, another professor, at Northeastern. But, that was hardcore storage stuff. The subsystem stuff was part of the corporate university support program, Sam Fuller was the vice president of our research at DEC and he had research labs. He had two in California and he had one in Cambridge and one in the U.K., and he had

people in Maynard. So what he had done is formalized the relationship with universities by coalescing it into supporting one major university for a program I think was around three years, and so there were big numbers, and so MIT was the first choice, Carnegie Mellon was the second, and Berkeley was the third, and the Berkeley deal is typically half cash and half equipment, if you will, so that's how we put them together, and so the Berkeley totaled out to be $26 million, half cash, half equipment, is my recollection. Anyway, what Sam then did is basically recruited organizations within the company, engineering organizations, to sponsor a research program at that university, and so storage got involved with both database and some of the activities looking at storage systems there. So Sam wrote the check, the company wrote the check, and then we had people interface with Berkeley to talk about what the issues were and hopefully absorb some of the technology. So, at one point I remember giving the , the fake $26 million <laughs> check to Chancellor Tien at Berkeley, and then Mike Riggle, who was my R&D guy in storage actually interfaced to the program. I remember that Randy Katz was there and Mike Stonebraker was the database side of it, so we were sponsoring both of them and their programs as part of that overarching corporate research program, so...

Gardner: Do you know when you wrote the check or when you handed the check?

Saviers: Oh, boy. I'd have to look it up.

Gardner: The first Berkeley paper publication was around December 1987; does that help with a date?

Saviers: Yes. Yes, it's--

Gardner: Check before that or after that?

Saviers: Well, I was still at Storage, so it would have been '86-87, yes, somewhere in that ballpark, right,

Gardner: Now the Berkeley Group, development industry group, was that your process at the other investments?

Saviers: Well, I didn't have a lot of-- any significant connection to it except for the show and tells. So, when it became time to impress the visitors with FrankenRAID, I was there with Mike Riggle and we looked at it. And we had, we had before that, long before that had decided that we were going mirroring with the HSC storage subsystem and of course, EMC decided the same thing. And we felt that that was the better way for us to go and concluded that while RAID 5 was kind of an interesting technology. It was going to take a while before any serious capable RAID 5 systems would be in the market.

We knew how hard it was to do mirroring right with automatic catchup and swapping and drive replacement and everything else that goes on in a RAID system that we said, well, RAID 5's going to be a little bit more challenging. <laughs>

Gardner: You juxtaposed two things that I think are about ten years apart.

Saviers: Yes.

Gardner: My recollection is DEC if not the pioneer was certainly one of the very first in true subsystem mirroring.

Saviers: Yes.

Gardner: And EMC started at the low end in five or six years later and didn't bring it into the mainframe market until ten years later.

Saviers: Right. Well, well-- I think we look at EMC drilling this big hole in IBM You know, because the customers were saying, "I want RAID 5." Well, they didn't know what they wanted, really, but they heard, the press was gaga about RAID 5. And we said, "Well, really, go look at EMC." So we would bring out that argument to try to buttress our strategy. The other thing I think is going back and looking at the RAID paper because I browsed it as a result of you sending it again to me the HSC architecture had a heck of a lot of horsepower to do things that I don't think, maybe I don't know if they're done in RAID 5 systems. We could do out of order data transfers. We could do split transfers. We could do all kinds of things in terms of real time sector by sector optimization and since reads outnumber writes by a big factor in disk subsystems, you could play all sorts of games on N-way mirroring that give you some really substantial performance improvements. And I looked at, I have a paper that showed that we were able to get two or three times IBM's IOPS per second because of all those capabilities that we built into the HSC. Because we were using 2901 bit slices almost per drive <laughs> to do all that optimization.

Gardner: You have to be a little careful when comparing block oriented architectures such as all of DEC and the variable record length architecture of IBM.

Saviers: Yes.

Gardner: When you think IBM mainframe you have to think count key data records.

Saviers: Right.

Gardner: And that actually was an invention that's not in the RAID paper.

Saviers: Yes.

Gardner: And, you know, you couldn't do the mainframe replacement without it.

Saviers: No. You could not do it, right.

Gardner: That's why I really want to interview Moshe Yanai.

Saviers: Yes, sure, right.

Gardner: Who's the guy who brought that to EMC.

Saviers: Yes, They had to deal with all that. <laughs>

Gardner: Some of the guys said you had delegated to the RAID support of Berkeley in its activity — would you name them for me?

Saviers: Well, Barry Rubinson in think was one of the architects on the HSC. I don't know if Richie Lary was involved. He might have been. We should probably go look at his oral history and see what he says about it. Other than that, I don't know.

Gardner: Personally I know an industry consortium occurred because I know several people who attended various meetings.

Saviers: Right.

Gardner: And I'm just trying to reconstruct the history as best we can.

Saviers: Yes.

Gardner: Tell me something about some of the others. I'm curious about the ECC work and which you characterize it as part of hardcore storage.

Saviers: Right.

Gardner: How'd that go?

Saviers: Well, I might have covered this in segment one of the oral history, but Mike Riggle's strategy, he was totally committed to beating IBM first of all, because he had been at CDC and he'd, you know, <laughs> seen the ship go down at CDC. He said, "Well, we're not going to have the heads iandmedia at least in the short-term to beat them on the aerial density curve. So we've got to beat them some other way and that's got to be subsystems technology, error correcting technology if we don't have to deal with an error rate down around 10^{-8} as the raw media head interface error rate." And oh, by the way, that was pioneered earlier with the CD-ROM. So he was involved and a guy named Jack Brown. We brought the CD-ROM, made the CD-ROM a computer peripheral. Made the CD a CD-ROM computer peripheral by working with Philips and Sony and something you never get credit for. But it's how it happened. And so that was Reed-Solomon, on top of Reed-Solomon and then the storage stuff was Reed-Solomon.

Gardner: I think we covered Mike's technology thrust but I don't think we talked about the relationship where the ECC had-- I think we glossed over that.

Saviers: Right.

Gardner: So, you know, how that worked with-- Was that the MIT group?

Saviers: No, Berlekamp, - I think Berlekamp was at Berkeley.

Gardner: I think of Berlekamp at Berkeley, too.

Saviers: Yes. Right.

Gardner: So that's a third project at Berkeley?

Saviers: No, that was before the big deal project.

Gardner: Okay.

Saviers: So that was, we're going back to pret 1980 now. So Berlekamp was a consultant that Mike used and then there was another guy. John Proakis, I remember the name now, he was the guy at Northeastern who was also significant in the whole world of error correcting codes.

Gardner: Okay. So you basically worked with these professors at universities.

Saviers: Right, right.

Gardner: To bring the ECC technology. That was then you did something different at MIT. Would you like to talk or--

Saviers: No, no. I was not--

Gardner: That was not your domain.

Saviers: Yes. The Carnegie-- And Storage wasn't involved at all with MIT and Carnegie.

Gardner: Okay. So I think that pretty much--

Covers now we've gone back to your and through your entire--

Saviers: <laughs> Right. Regurgitated part of that.

Gardner: Regurgitated a bit and anything else you want to say about Digital before we segue into--

Saviers: Well, I could say a lot, you know, but it's kind of like--

Gardner: We have plenty of time.

Saviers: Why bother? <laughs>

Gardner: We have plenty of time.

Saviers: No, it's-- <laughs> Let's leave it where we left it. I think you've got the highlights. <laughs>

Gardner: I'm trying to get the lowlights.

<laughter>

Gardner: Okay. So it's now the, what, summer of '92. You're painting your house.

Saviers: Right. So the phone starts to ring, right.

Gardner: You got a call.

Saviers: So some of the top headhunters in California say, "Hey, we got something you ought to take a look at." So I said, "Well, <laughs> I had planned to-- I hadn't planned to go back to work right away. I'd like to take a few months off." "Well, you've got to come out and talk to us." So I did. And two opportunities came and moved along pretty quickly to the real job offers. One was Adaptec where John Adler was the CEO and he was the-- Larry Boucher was the founder of Adaptec. Adler was the guy who brought real business leadership to the company and made it grow. And they had worked together at IBM. But Adler said, "Look, I want to retire. I've made plenty of money. And so I'm looking for somebody to come in as President and Chief Operating Officer and within two years to take my job."Adaptec was in Milpitas, California, just around the corner from the Computer History Museum. And the other opportunity was in San Diego and I'm trying to remember the name of the company. It was a tape drive only company. Cipher, but that's not the right name. The name began with an "A."

Gardner: I think Cipher and Archive--

Saviers: Archive. It was Archive.

Gardner: Became one. There was some litigation.

Saviers: Right.

Gardner: And I think solving the litigation about that time, Archive acquired Cipher.

Saviers: Okay. So it was Archive. And the guy who was the founder of Archive, I think his name was Howard if I'm correct, said, "I want to hire a CEO. I want somebody to come in and be CEO." So, we did the dance, met the boards. It was interesting that some of the VCs were historically in common between the two companies. <laughs> So that it was kind of like Archive, Adaptec, which one am I talking to with this board member? Farrell Sanders and Greg Reyes were two of the VCs involved.

Gardner: Both on both boards or--?

Saviers: No, one on one board and one on the other — Greg was still on the Archive board and Farrell was still on the Adaptec board. But Farrell had been an investor in Archive or Cipher and Greg had <laughs> been an earlier investor at Adaptec, so <laughs> a tricky little situation. Anyway, my friend said, "Well, taking a COO job, bad deal, you know, because the CEO changes his mind, <laughs> you're toast, right. Why don't you take the CEO job? Then you start at the top." I said, "Well, I think Adaptec's the better company," and so I took the Adaptec job. And then Greg Reyes calls me up about six months later and he said, "Boy, you really blew it. We just sold Archive. <laughs> You could have been there six months and made a ton of money," so. <laughs>

Gardner: Really? I'll have to research that and we'll put the right numbers in the record.

Saviers: Right. I started at Adaptec as President and COO, basically running the business.

Gardner: So you walked in. You find the men's room and what else did you find?

Saviers: Well, partly you get the sense of the place when you're doing interviewing. Is it aggressive? Are they capable? Do they have good opportunities in the marketplace? Are they the leader? Yes, they were the leader. So that was all good stuff. You know, <laughs> Adler's position was, "Don't do anything, you'll screw it up." <laughs> And so I said, "Well, all right., I've got to run-- Got to make the numbers, right. That's my job." And so we made the numbers and we did that for many, many quarters, making the numbers. Now the challenges were, you know, the PCs are not standing still. They're going full bore in terms of architectural change. When I arrived, there were some program transfer chips and there was the mainstay of the company was something called a 1540 which was an ISA DMA bus product and that was the highest performance SCSI controller out there. We were competing with SMBIOS, of course, at the time, what was formerly NCR SMBIOS. And they were always pushing us. But as the PCI came to the market, and I'm not sure what the dates were, but that was a couple years into my, '94, maybe, '95., It was real clear that we had to be the leader in the PCI SCSI world, which we did. We built-- We were building our own chips. Not building our own chips, we were designing our own chips and having them fabbed. TSMC, Taiwan Semiconductor Manufacturing was the company that made them for us, most of them. We had a couple of other suppliers. We had a good relationship with TSMC. We had a couple of other businesses but the SCSI business was the biggest and most profitable we had. We were making disk drive controller chips for Maxtor and Conner and for Seagate. So we had a pretty capable not drive development team but everything but the mechanics development, doing all the data paths and the SCSI interface or whatever the drive interface was. So that business, it was a dogfood business. It was really, really difficult building custom ASICS. You know, you're hoping that the customer's product will be successful. You're making a lot of investment. And so it was a difficult business. We also had a printer controller business. We actually made the imager, the raster imaging guts for the Apple LaserWriter. And I was just fascinated by Apple's business model. They shipped, drop shipped from I guess it was Fuji or from Ricoh or Cannon. I guess it was Cannon. They bought the Cannon engine with no controller and they told us when to ship the controller, the power cord and the manuals in a box for the customer to put it

into the printer. So they never touched the printer at all. It was a brilliant <laughs> business model. No inventory. <laughs> No payables, you know, all receivables. <laughs>

Gardner: Control a separate cable to the--

Saviers: Yes, we, yes. We made the-- We had it in a cardboard box and the customer could slip the controller into the Cannon printer and hook up the power cord. <laughs>

Gardner: Literally slipped inside the printer?

Saviers: Yes.

Gardner: You opened a port and slipped it in and close the door.

Saviers: Right. Right. Right. <laughs> So that was kind of fun.

Gardner: <laughs> That is an amazing business model.

Saviers: Yes, yes. So of course they went on and they, I think they decided to do the controllers themselves, so that kind of business withered away and in fact, we officially got out of that business. So SCSI was the mainstream, but it was clear that there were all kinds of other stuff happening in terms of I/O interfaces. So Apple was pushing us very hard to do 1394. They really wanted FireWire to be their I/O interface so we did FireWire chips.

Gardner: Internally or at the--

Saviers: Yes,, internally. Designed them. You know, scratch designs. We had a pretty big semiconductor CAD and process team. We had about 100 people working on CAD tools and process verification with TSMC. T TSMC looked at us as a very technically competent fabless company.We would interact with them on their new shrink, whatever the new nanometers or microns were at the time, and help them debug that in terms of getting the models right. So then Fibre Channel came along and it was quite clear that we had to be the leader in Fibre Channel, so started to make the investment in terms of a very high performance Fibre Channel host adapter chip.

Then, we started to view the company as the high performance interconnect company. So the proposal was we're not the SCSI company; we want to be the high performance I/O. Adler tried to make the term I/O Ware work, but it never worked. And so we were making investments in things that we thought were going to work. We did dive into ATM, asynchronous transfer mode. Everybody said, "Well, this is the next thing, next big thing after Ethernet." Ethernet was struggling to get to 100 MEG. ATM promised 150 and 300 and et cetera. So we developed ATM chips.

Gardner: Also internally?

Saviers: Yes. Right, right. All the host adapter ATM chips. And a little apocryphal story there. I learned something about product names. The woman who was the product manager for the ATM line, we had something like 12 products, you know, various performance levels, various PC side buses, various numbers of chips, number of ports of ATM on the board. She called it the Niobe product line because this Greek goddess named Niobe had 12 children and she was extraordinarily proud of these 12 children. Well, our product manager was extraordinarily proud of her 12 products. What I learned later was the boastfulness of Niobe so irritated the other gods that they had all 12 children killed.

<laughter>

Saviers: So, and that was the fate of the ATM product line. <laughs> ATM was a bust <laughs> and Ethernet won. <laughs> So, oh, bad strategy. Good execution, bad strategy. It's another lesson in don't bet against the incumbents. <laughs> So.

Gardner: That was an interesting era when, I mean, basically, we were going from parallel to serial, right.

Saviers: Yes.

Gardner: And there were lots of technologies out there.

Saviers: Right.

Gardner: That could do it. And Ethernet won in a certain extent, sure.

Saviers: Yes. Pretty much. Yes. So anyway, on the SCSI side we're doing fast, we're doing PCI, we're doing wide PCI, we're doing, fast PCI. And we're doing on the other side, we're doing SCSI, really fast SCSI, wide SCSI, fast wide SCSI. And then one of the guys came up with LVDS, the low voltage differential signaling and that took, us to ultra SCSI and I think that was around 300 megabytes per second. Pretty rip roaring data rates. So but that was about the end of SCSI. I mean, there was not much to do in a parallel bus as you note beyond that.

Gardner: Then we went to serial SCSI.

Saviers: Right, right. Which was basically on some other networking backbone.

Gardner: I should back up a second and so you've been on both sides of the subsystem with the disk drive development, I mean, down to the recording codes and the signal processing up to the HSC attachments.

Saviers: Yes.

Gardner: I always wondered how it worked inside a controller company when you're doing the low level drive stuff but you know, not doing the drives. How did that work out? I mean, you know, how do you really get the data separator to work that you can sell to somebody else who's then going to use it in their drive?

Saviers: Well, I think I drove and when DEC drove the industry to get the data separator in a drive, we said we're not going to muck around with technology transitions. And the whole point of the MassBus way back and the whole point of then the Storage Interconnect was the real technology and hard core stuff is in the disk drive. And with LSI you're not paying much of a penalty for doing that compared to the old IBM architectures where half of it's in the controller and half of it's in the disk drive. So of course SCSI was another embodiment of that.

Gardner: Well, but now that the key electronics are in the chip which is made by Adaptec and sold to Seagate.

Saviers: Oh. Yes.

Gardner: So Seagate's got to depend upon somehow you've got to have that intimate knowledge at Adaptec to deliver a chip to Seagate or any of the hard drive companies. It was a hard problem to solve.

Saviers: Well, yes and no. I wish I'd saved this letter because it was off the curve. Tom Mitchell wrote me a letter saying, "Thanks for saving our butt in designing that disk drive for us." So we actually did most of the drive except we didn't do the heads and the media and the spindle and all that stuff, but the electronics we actually produced a prototype board for him to make that disk drive. The whole thing. So we had the capability of designing the full set, full suite of disk drive electronics.

Gardner: Right. Did have the head and disk spinners so you can drive your circuits and test them?

Saviers: Oh, yes.

Gardner: So it seems you're a disk drive company without the mechanics.

Saviers: That's right. And Seagate would call us up and say, "You know, we need the proto chip. We don't care if only 95 percent of it works <laughs> because we want to get the breadboard to work." And we'd say, "Okay. You know, we'll do the best we can."

Gardner: But that may have been a good business because the mechanics never got 60 percent margins.

Saviers: True. And we didn't have-- We had, like, 30 percent margins in that business. So it was a business that allowed us to build a pretty capable semiconductor design team, okay, with the CAD tools and the process verification with TSMC and the modeling, the individual circuit modeling verification, et

cetera. In retrospect, I should have exited that business more forcefully because the leverage we had with TSMC I think would have been sustained without it.

Gardner: I mean, you know, what, 400 million chips a year is a-- should get their attention.

Saviers: Yes. A big number. Right.

Gardner: It's only--

Saviers: Now we were-- We were a wafer buyer. We were not buying chips, we were buying wafers,

Gardner: Oh, really?

Saviers: We bought-- We had our own semiconductor test capability, so we had the whole, slice and dice wafer. Wafers came to Adaptec. We processed them in terms of chip testing. We then sent them out to a sub sent them out to a subcontractor to package them and then we tested them again in the package. So we were, when you think about fabless semiconductor companies, that's pretty far into the fab if you will. Right.

Gardner: But that's-- You know, at that time I think the hard disk drive industry was making 20 percent gross margin.

Saviers: Could be.

Gardner: And Seagate had all of it.

Saviers: Yes.

Gardner: And, you know, but they're buying a chip from you and you're having a much higher margin.

Saviers: Yes.

Gardner: I mean, and ultimately it's still that way today. To me, that's strange, I mean.

Saviers: Well, it's yes and no. Very off the topic, but I had studied when DEC said we want to be in the services business, I had studied the return on equity across all the hierarchies of the computer industry and it was the guys at the bottom and the buys at the top that made-- <laughs> made the money. So it was Intel and Microsoft and then it was some of the service-- some of the not service companies but it was like Oracle and people who had software products that they could lock in a customer with. And in the middle it was much more difficult.

Gardner: Actually, my experience is the service business is sometimes the most profitable business in a company and margin are approaching 50 percent.

Saviers: Yes.

Gardner: If you can get service density up--

Saviers: Yes.

Gardner: To keep your inventory costs low and your utilization high.

Saviers: Well, the break-fix business in service was going to go away because products were going to get so reliable they're either going to be-- or and so cheap they're they're going to be thrown away or they're going to be-- they're not going to break. My view of the service business is you've got to have a cornerstone product technology base in order to really be successful. There are probably some counter examples to that but I think that's more true than not. So anyway, Adaptec's growing like crazy. We're, a nice momentum play in Wall Street. We're making 60 percent gross margins and 22 percent profitt. And we get to have some fun. So the finance guys, the CFO came to me and said, "Why don't we do a really interesting annual report since we don't know-- people don't know what we're doing. So we had some proposals and this manga, you know, the Japanese manga idea won. And it's basically cartoons explaining what we do. And Wall Street loved it. The guy said, "Oh. I now know what you guys are doing. <laughs> I couldn't figure it out before." <laughs>

So that was a real groundbreaker in terms of annual reports. Nobody had ever done anything like that before, so when you're on top and the margins are good and the momentum is good you can have fun. Then we followed it up with this one, ABCD, all about being connected to data. Because that was the theme that was evolving in terms of we're doing everything in high performance I/O. So we had some shunts that didn't work out, but between SCSI, FireWire, then Ethernet ATM being a bust then Ethernet and then Fibre Channel, it was where we were going. And so the PCI SCSI stuff was extremely successful and a big part of our revenue was called the shrink wrap business. You could go to Fry's and you could buy Adaptec boxes with host adaptors in them and there was, ten different products on the shelf at Fry's. Or you could go to ComputerLand or whatever the othera la carte computer stores were and Adaptec products were there on the shelves as shrink-wrapped boxes. And so there was a pretty good retail business that we had and that was a good profit maker.

Gardner: Principally SCSI for upgrading systems and most, by that time, most PCs came with ATA embedded on the motherboard or--

Saviers: Yes, not quite then, but the-- ATA was still not capable for a while of tape drives and CD-ROMS, so a lot of the business-- And/or people wanted a high performance drive, disk drive, so they were going to buy a SCSI drive. So the performance wasn't there in the magnetic storage and the capability wasn't there in the CD-ROM and tape area. We had FireWire products at Fry's. So people could add that on to their PC with various buses, you know.

Gardner: FireWire being external for Mac, probably.

Saviers: Well, there were FireWire peripherals out in the marketplace that people wanted to connect to. Or, video was coming in in terms of home video editing. So I think Sony was big in terms of promoting FireWire on their cameras. Not so much anymore, but, , that was a driver also.

Gardner: So that was a good business in this middle nineties period.

Saviers: Yes, yes. Very good business. And it's how we got into trouble later, because we got blindsided by how quickly the basic volume drivers there, CD-ROMS and tape drives shifted to whatever the latest ATA was.

Gardner: ATAPI.

Saviers: ATAPI, right.

Gardner: Oh. Good point. I mean, ATAPI--

Saviers: Solved that problem.

Gardner: Everything, tape drives--

Saviers: Right.

Gardner: Well, low end tape drives, CD-ROMs, DVDs, everything became available in ATAPI right about, yes, mid- to late nineties.

Saviers: Well, it was the fall of 1997 exactly. <laughs> I can't pin it down more accurately than that, but it was right around then when it happened. Well, that's the time when the PC makers started shipping it.

Gardner: Right.

Saviers: And the peripheral guys had some stuff available that attached. So, we were watching that but apparently not watching that carefully enough and that's what caused a bad quarter in Q4 calendar 1997.

Gardner: Bad quarter in terms of inventory write-off or it was just--?

Saviers: No, it was just revenue didn't hit the goal.

Gardner: Okay.

Saviers: And profit was terrific but revenue didn't hit the goal and we got beat up terribly for that. So anyway, and before that we kind of knew that SCSI was great. We're going to keep pursuing SCSI as hard as we can in terms of making it a high performance interface. But Fibre Channel has too much traction to be ignored. The workstation community is gaga over Fibre Channel. Systems manufacturers, it

was interesting, Dell basically told us we want-- "We're going to go FireWire, period. So if you don't do FireWire, we're going to go away as a customer."

I said, "We're doing Fibre Channel." <laughs> Hewlett-Packard was actually developing a Fibre Channel chip. They took a look at ours and said, "Well, we'll get out of the Fibre Channel chip business with making a strategic deal." So we had that on the table. We had the Dell ultimatum, basically. So Fibre Channel was mainstream and I even talked to Brocade directors at that time and Fibre Channel was still not living up to the hype and they said, "Well, we'll sell you Brocade for what we got in it, $50 million dollars." And for various reasons I didn't pursue that. But, you know, there was going to be a vibrant Fibre Channel market for sure. Whether it was going to be long-term or not, history now says it was not, but it was certainly real in that time frame and was going to go somewhere in those selected markets. So we made the commitment to be the best at Fibre Channel and we did a pretty good job of that. So now we come up to, I think we covered a lot of the other technologies. The company gets to about a billion dollars.

Gardner: I don't think you've covered RAID.

Saviers: RAID, okay. Well, the other-- That's right. Let's back up. So a part of what are you going to do-- Two things. What are you going to do when SCSI slows down? And what are you going to do to get bigger than a billion dollars? <laughs> So Ethernet, FireWire, Fibre Channel. Ethernet opportunity was pretty good except Intel had just killed the Ethernet guys down around the corner. I forget the name of the Ethernet host adaptor company. But anyway, Ethernet was only looking like it was going to make any sense at all in the server market, so it was going to be a limited market. But that's where we went. And so I said, "Well, I know something about subsystems." One of the guys I had casually known at DEC, Rich Napolitano, had designed a RAID subsystem with some rather interesting capabilities with a group of ex-DEC guys in New Hampshire. And the company's name was-- you have it, I think--

Gardner: Kinesis?

Saviers: Data Kinesis.

Gardner: Data Kinesis.

Saviers: Data Kinesis, right. So somebody put me in touch with Rich and we talked and I said, "Wow, he's got some really interesting ideas. He's not only built a RAID system, he's built multi-drive data virtualization into this thing, so he can virtualize C drive across as many drives as you want," which at that time Microsoft couldn't do, which is kind of an interesting issue in the server market. <laughs> You know, you get 100 MEGS and that's it, you know. <laughs> So I said, "Wow, that's a really cool idea." And so we got together and we bought the company. And Rich came on board with the team and they pursued developing this virtualization controller, RAID sub-system, I should say. And we went around and we went to Hewlett-Packard, we went to IBM and we went to Dell and they said, "Wow. This is really cool. Let's take a look at it." In the end, not one of them would sign up for the how far ahead that was. It was too big

a leap, they thought, for their customers to take on to that level of technology advancement. Interesting comment.

Gardner: Really?

Saviers: So we retrenched. And we backed it back and we said, "Okay, <laughs> we're going to just build RAID controllers. If that's what you want, we'll build a RAID controller."

Gardner: So the RAID controller presented itself as just a big disk drive?

Saviers: In terms of the virtualization, yes, right.

Gardner: Well, without virtualization--

Saviers: Right.

Gardner: If you put a RAID 5 of four 1 gig drives, it's a 4 gig drive to the system, no virtualization.

Saviers: Yes.

Gardner: And the innovation was the way to make a lump of storage look like a bunch of different drives.

Saviers: Right.

Gardner: Block oriented drives.

Saviers: Right. It was block oriented, sure, with SCSI.

Gardner: Yes.

Saviers: So that became the cornerstone of a RAID program at Adaptec. So now we're into kind of the spring of--

Gardner: But you're not offering virtualization. In that sense, you're just another RAID box?

Saviers: Yes. That's correct. Just another RAID box, right.

Gardner: Just another RAID bunch of drives.

Saviers: Right. So the effort then became how do you package-- you know, you needed a RAID friendly slot box system with, you know, redundant power and all the other stuff that's required in a RAID box. And so--

Gardner: Hot swapping?

Saviers: Hot swapping, yes. Everything, yes.

Gardner: All the goodies.

Saviers: All the bells and whistles, right. All the goodies. So that development team was started in Longmont and so they became the RAID hardware engine makers. And so that was underway.

Gardner: So this was basically a SCSI box with a controller and slots for a bunch of drives?

Saviers: Right.

Gardner: And it presented itself as just a drive.

Saviers: Right.

Gardner: C drive, D drive, in the Microsoft world — whatever, it's more or less the same thing in any world, it's just a large block of storage.

Saviers: Yes. Right. Right. So, so we then started--

Gardner: I find that really amazing that presented the opportunity for virtualization your customers failed to recognize it.

Saviers: Well, some of the technical people understood it and saw the power in it because obviously it was hugely successful later <laughs> in the marketplace. But sometimes the early guy just collects the arrows. The marketing folks said, "Well, how would we sell this?" You know, so much in the PC world was cookie cutter like everybody else, right. And there's little tweaks in terms of the numbers games in PCs. But if you really innovate, oh, what does that mean? Or maybe they had some magic insight that we didn't have or Microsoft told them don't do that or, you know, it's all kinds of dynamics in the--

Gardner: Partitioning was known and then that's sort of a next step.

Saviers: Yes, right.

Gardner: Interesting oversight.

Saviers: Yes. Probably it would be better to get some of the detailed history from Rich, but somebody--he probably should be interviewed, do an oral history for him because he was at EMC for a long time and ran a big part of EMC.

Gardner: Sure. Business do well? You were sort of the end of your career when—

Saviers: Yes, it was extremely competitive in terms of landing a big systems company. We decided we would also go direct into the system builders marketplace, which we had a good relationship with Adaptec because we innovated with a five-year warranty, no questions asked, send it back. We had the best software. We had the best total systems capability. We had hundreds of different systems running day and night testing products for compatibility. We had unmatched data reliability. So the local system integrators when you wanted to call up your guy down the street and have him put some PCs into your office with a server, that was a big market for us, dealing direct with them, so we said, "Okay, we'll build a RAID-capable direct sales force for that." So that was part of the plan. We had sold through distributors, and we sold through retail, but we had not sold direct to system builders, system integrators.

Gardner: So you added bag-carrying sales people?

Saviers: Right, right, right. So then a big event. The parent <Hyundai> of Symbios shows up on our doorstep and says, "First guy with a $750-some million check gets Symbios." So I said, "Well, that's interesting. We have $750 million, so maybe we should take a look at this." So they were desperate for cash. They needed to close it within like 45 days, and Symbios was a well-known quantity to us because we competed with them for disk drive chips. They were doing the same thing we were, selling chips to Seagate, Conner.

We were competing in the SCSI market with them, and they had a Fibre Channel effort underway, and they had a RAID business, the NCR RAID business still in Wichita, so we said, "This is a big leap forward." It was about the same size company," and so I went to the board and said, "Let's do it." The board said, "Okay," so we were first to cross the threshold with the $750 million check.

Gardner: That was February 19, 1998.

Saviers: Yes, okay.

Gardner: That's when the offer was made public.

Saviers: Right, right. So we negotiated the deal, and we knew that it was probably going to get antitrust scrutiny, and the FTC won the coin toss with DOJ, and so they started putting us through the wringer, and we hired all the consultants and all the lawyers. One thing we didn't do, which in retrospect was a big error, because I don't think I had the experience nor did the board have the experience of how to play the Beltway bandits against the FTC, so we were severely outlobbied, and the lobbying was done by our friend over at the semiconductor company who bought Symbios in the end, and the FTC came down and said, "We don't want you to do this," and we had decided beforehand that if we got into a protracted court battle with the FTC, we weren't going to go there, so we terminated the deal, and then LSI Logic bought them.

Gardner: In June.

Saviers: Yes, Wilf Corrigan completely outmaneuvered us with the Beltway bandits because we were dealing with FTC staffers, which believed that SCSI was going to be the salvation of the universe and that putting two SCSI companies together was clearly not in the customer's interest, and we said, "Well look. Here's Intel with the, I forget what the Intel new I/O subsystem was at the time, so some name for it, that they were going to propose as better than Fibre Channel, better than SCSI, etc., etc.," so we said, "This is all temporal. SCSI's going to go away some day. The future of I/O is not all SCSI. SCSI's great. We're going to keep pursuing it. Yes, we compete, but we both know because we're investing heavily in Fibre Channel that there is a future other than SCSI."

Gardner: You as a company did not then retain Beltway bandits, lobbyists, or did not retain enough?

Saviers: Not the right guys apparently or not enough of them.

Gardner: Not the right guys or not enough of them or a little bit of both, but you did lobby?

Saviers: Oh yes, we had top-notch Washington counsel working on this, but there's a lot more to it in how you really influence the FTC than lawyering, and we didn't do a good job of that, so we lost that battle, and at that time things are difficult in terms of the relationship with the investors because we're now not a momentum company. We're now a value company. Restructured, cut R&D, cut costs, and now we're very profitable, a very profitable company, but we're not growing at big double-digit numbers, and Adler's out agitating against me on Wall Street, actually trying to take over the company, so it gets to be very complicated and messy, and Boucher decides that Fibre Channel's never going to work and no company can ever sell disk drives successfully, so we shouldn't be in the RAID business, and so he's leading that charge at the board, and subsequently I leave, so I retire from Adaptec, but, yes, when I left I said to the board three things.

"Fibre Channel is very important for the future of this company. RAID subsystems can be sold very profitably with disk drives, and if you bring John Adler back you'll never hire another CEO," because when the old guy forces out the new guy everybody's got the message, right? Well they did all three things, and so the wheels are in motion for Adaptec to die, and it did.

Gardner: It did.

Saviers: It did. It's a very sad story.

Gardner: Did you really think Fibre Channel was necessary in retrospect? As you said, Fibre Channel, it's a nice niche market.

Saviers: You have several hundred million dollars of revenue there, sure.

Gardner: Only if you have a decent percent share?

Saviers: The story told to me by the Dell sales account guy was Boucher went to Dell and said, "You're crazy. You shouldn't do Fibre Channel. SCSI's the answer." They had Security escort him from the building, so... When a customer says, "Do this," you can give it your best shot, but there's a point where you say, "Yes," and we were long past that point with Dell.

Gardner: If it's a $500 million a year business and you get 20, 30% share, that's $150 million. It's nothing to sneeze at, but if you're trying to be a billion dollar company does it matter?

Saviers: But we thought we could get 80%, right? Why not?

Gardner: More power to you.

Saviers: We had host adapters known in the marketplace. There were OEM chips that Symbios sold, but we outgunned them completely with the system integrators and the retail and the OEMs. They had Sun as a customer. That was about it, and that's not the PC business.

Gardner: And your second comment about RAID? Do you think that was accurate?

Saviers: Well, I think so. Look at the number of companies that have been bought for multibillion dollars in the RAID business in the past five years, 10 years. Big numbers. There's about half a dozen that went for multibillion dollar numbers in terms of when they were sold, so Dell buys EMC. You can go on and on about who bought whom, right?

Gardner: I think Dell's buying EMC is quite a bit later and quite a different story[1].

Saviers: But the point is there were a number of companies with innovations in RAID businesses that system companies acquired, in some cases more than one acquisition. I think Hewlett-Packard bought a couple. I would have to go look that up, but that's my recollection, so I think, yes, there was a better opportunity than going out of business.

Gardner: Impossible to dispute that. I understand from you there was a secret sauce at Adaptec.

Saviers: Right, the combinatorials when you start adding up the number of chips and the number of versions of SCSI and the number of system buses, you have to decompose that in some way, and Adaptec had this thing called ASPI, which was kind of that magic sauce that allowed drivers to be easily done and installed on operating systems because we supported more than just Microsoft of course, so ASPI migrated to Microsoft. It's still there on the driver list, but it's really the Adaptec creation of this middle layer or middleware if you will of software that allows various kinds of complexities to be more easily managed in development and software installation process, so that was one thing we had. We clearly had the best drivers, the best software support. We had the best warranty. Adaptec had a very

[1] On October 12, 2015, Dell Inc. announced its intent to acquire EMC in a cash-and-stock deal valued at $67 billion, which has been considered the largest-ever acquisition in the technology sector.

deep passion about data integrity. It was basically stop the presses if we discovered problems in a chip that affected data integrity, and occasionally we got caught up in the "Intel has a problem in a chip causing data integrity, but we got a nondisclosure, so we can't tell the customers whose problem it really is," but it was our problem.

Gardner: And you get the blame?

Saviers: We get the blame. That happened two or three times over the course of time, but I think customers really appreciated the fact that the peripherals and systems really worked when you had an Adaptec controller. That was our cachet, but if you're a system builder the last thing you want is flaky disk drives or tape drives or CD-ROMs or whatever, so we had a massive number of PCs running all peripherals and operating systems day and night doing compatibility testing of the combinatorials as well. It was an important value that the company brought to the customer.

Gardner: But Microsoft basically co-opted ASPI as I understand it.

Saviers: At some point, yes, and I don't know kind of when that happened, if it was on my shift. It might have towards the end, but it was clearly the thing to do as all the drivers moved into the Microsoft world of being automatically installed. Of course there was a number of versions of Windows where it didn't quite work, and it kind of mostly works now, so...

Gardner: It works, in my experience, amazingly well considering where we were in, say, the mid '90s.

Saviers: Yes.

Gardner: Did Adaptec ever get anything for ASPI other than thanks?

Saviers: I don't remember. Could have. Thanks. Dealing with Microsoft was always a pain. The engineers would tell you what wonderful things they embedded that you had done five years earlier on your own, so that's the way it was to work with them.

Gardner: Do you recall any of these shared incidents with Intel where problems were sitting on one side of the interface and you guys were taking the heat for the other side?

Saviers: I know there were at least two because they are memorable. It's the Intel Bridge chip. Don't ask me the codename of that chip that had the problem, but it did, and I think they might have brought out a PCI Bridge chip, which had some problems also because I remember I tried to get DEC to license me the DEC PCI Bridge chip, which was a really well-engineered chip. It was the gold standard in the industry, but they decided they were going to try and sell it. We were buying them OEM. I said, "Look, you guys. DEC's in trouble. You guys are never going to make a business out of selling chips. It doesn't fit with DEC, and license me the product. You'll get some licensing revenue. I'll sell the chip," but they wouldn't go for it, so too bad.

Gardner: So you now have left Adaptec and some of the folks you've acquired are now being laid off or shut down?

Saviers: Well, yes. Boucher says, "We're getting out of the RAID business, so we're going to terminate everybody in Longmont, so I said, "Will you sell me the business or give me the business?" "Sure." "Okay." So I found some folks to run it, and that team basically moved over to be Chaparral Network Storage, and so we raised some money, mostly small dollars, had a couple of VCs in it, so we moved forward to build RAID subsystems, and that moved forward with two CEOs, the founding CEO [Gary L. Allison] and then we hired the COO from SDK to run it.

Gardner: Who was that?

Saviers: Victor Perez[2]. He drove the company forward, found some customers, and we decided that we were going to try and sell the company.

Dot Hill bought the company. It was a transaction that everybody got out alive, and some made money. I think we were in round E or F when we sold the company, so it was a hard thing to finance.

Gardner: It did file an S-1. I don't know if it ever went public, but it did file.

Saviers: Yes, Bear Stearns was trying to take us public. Of course, they really wanted to take us public in '98, '99, and I said, "Well, gee, we hardly have anything to go public on." Said, "Well, it doesn't matter. We'll take you public." I says, "Geez. What happens two years from now?"

Gardner: Actually, it came up pretty quick. The S-1 showed about $6 million of revenue that first year, which from 0 to $6 million is an accomplishment.

Saviers: It was pretty good, yes.

Gardner: It's impressive, right.

Saviers: So we had a real product, and the team continued the product, and Chaparral was sold.

Gardner: So you were a founding investor but not a management or technical person?

Saviers: Not an operating person and not an employee.

Gardner: You were on the board?

Saviers: Yes.

[2] Appointed president, COO on January 12, 2001 having been on the Board since August 2000.

Gardner: When the company went to Dot Hill, did you keep any relationship with Dot Hill?

Saviers: No, the deal did make the employees mostly whole. We had enough cash coming in that we could basically buy out all the employee options at a reasonable number, not what they would hope for obviously but a reasonable number, but they didn't end up with nothing. The deal was a pretty good deal in the end.

Gardner: Were other parts shut down? ATM for example?

Saviers: Well, ATM had been shut down by me. Okay? I'm not sure what happened to the Ethernet. They did sell the disk chip business to TI, I think, sometime later, some residuals of it.

Gardner: Okay.

Saviers: Right. And of course, in the spring of '98 I also joined the board of Analog Devices back in Boston and served 17 years with them, so that was another major part of my life.

Gardner: I have to back up now and ask you the same question about your growth and challenges and what happens when the growth stops, what you've learned from it at Adaptec if it's anything different than what you learned at DEC.

Saviers: Well, I guess there's certain things that you look back on. You say, "I wish I'd done this or done that." I'd say shutting down the disk drive chip business-- one thing to do is always look at the core competencies in a team and figure out what they might be able to do with those competencies other than the business you decided not to be in. Typically sometimes zap it's all gone. You have people who, "I do disk drive controller chips. I'm never going to do anything else in my life," so they're not part of the new team, but there are competencies in high-performance serial data that we were dealing with that there are needs out in the world for doing that, so maybe you, say, take 10 guys, give them a year, give them 5 million bucks and say, "Find a new business, something that's big that can grow." So that's one thing I think for you to look at when you transition in and out of businesses is how to preserve some of the value. If you're just getting out, you can sell the business. That's a different whole thing, so if there's value in it in selling it as an entity, yes, that's another approach, but if you're going to just shut it down, maybe there's some more options other than just closing the doors. How hard it is to recover if you miss a technology generation, and clearly Adaptec missing Fibre Channel and missing RAID, the die was cast. What are you going to do? How are you ever going to replace that revenue once you fall out of being a leader or a very competitive participant in a given market? It's very, very difficult to catch up, maybe impossible, so that was a big mistake I think that was made after I left. You go back to DEC and you'd say the laundry list of mistakes was a little too long for this interview.

Gardner: We have time.

Saviers: Well, you really need somebody strategically thinking in a very broad sense about where the industry and the market and the customers are going, and after Gordon Bell I don't think we had that. At

least we didn't have anybody who was willing to forcefully change Ken's prejudices about that, so Gordon's strategy was fully adopted by Engineering, chugging along, worked great until late '80s and then the customers are different, the marketplace is different, the competitors are different, and the company's not dealing with that. In a way the whole industry's been tilted on end. We've gone from the vertically integrated systems companies to the layer cake. You get Oracle and Microsoft, and down here we got Intel, and we got some other middleware players. We got Cisco, so it completely deintegrated, and DEC never figured that out, never dealt with that. Gordon took a sabbatical out in Silicon Valley one summer I think before he left, and he said, "Big trouble. Where the customers and where the industry's headed is not where we're headed," and then he left shortly after that, but it was interesting.

Gardner: So any other more recent experiences you'd like to put on the record right now? It's not history anymore but 20 years from now it will be history, and your great-grandkids will love to hear you.

Saviers: Oh, it's not history, right. Well, I'm far enough from what's really happening in the computer industry that I make no forecast or prognostications about it anymore.

Gardner: Why not?

Saviers: It would just be fantasy as opposed to any grounding in reality, but I think we've seen it's so complicated in terms of social media versus the cloud. You've got this huge range of things going on, and certainly the Computer History Museum's going to try and think about some of those things now. We're thinking more about how to think and help people with what the future ought to be as opposed to what the history was, not that we're going to make forecasts, but maybe we can help the process around that, provide a forum for that. One of the ideas is, what are the ethics in developing software and starting companies? Those are interesting things that we think maybe the industry's gotten some things pretty wrong in the last five years, so yes. I have opinions about that, but I don't know if we have any solutions to that yet.

Gardner: Okay. Now will you tell me about your 40 years' experience at the Computer History Museum?

Saviers: Well, it started in Gordon Bell's living room in his house in Lincoln, Massachusetts. He was collecting slide rules and calculators and various artifacts from early computers up through electronic computers. Ken and Gordon had always been preserving the DEC stuff, so there was a warehouse up in New Hampshire filled with early DEC stuff, and so they decide they're going to have a DEC computer museum, aDEC computer museum in Marlborough in one of the buildings that we bought from RCA, so I volunteered there, and various stuff was on display including, well, Ken and Gordon discover that Whirlwind is out in the parking lot ready to be scrapped at MIT.

"Wow, this is no good." You better save this because Ken had been a key player in the development of Whirlwind, so their mission becomes saving stuff that people are going to send to the trash bin, to the recycler, and they got one of the early computers on the west coast. It's here in the main exhibit. It's was literally in the parking lot at Lockheed, I think, so they start collecting this stuff. That leads to, and I'm f a volunteer, involved not in any big way. That leads to Gordon's then-wife Gwen founding the Computer

Museum, which was a real public computer museum, not part of DEC, in Downtown Boston, and that gets started, and I become an Overseer there for a couple of years, one of the terms, and I think has a run but it gets a little confused in its mission about is it a science museum for kid, exploratorium kind of thing or is it a history museum. Meanwhile Gordon is still personally collecting, and the museum is collecting, so the collection starts expanding greatly back in Boston. They get into trouble financially, never were able to raise any sort of endowment and basically go out of business. Now, Ken Olsen was very nice. He had bought the building for them personally, the mortgage. There was a mortgage, but he put the money in initially, some of the money in initially, so the building is sold, and the proceeds go partially to the Boston Science Museum and a few items of the collection. Prior to that, Gordon had come out here to California. I had moved to California, '92, and we had a West Coast group because Len Shustek, the chairman of the board and the founder of the museum here, had called Gordon one day and said, “I want to start a West Coast computer museum. Tell me how to do it,” so we had a West Coast group of the Boston Computer Museum, not digital. It was called the Computer Museum. I misspoke there, so Gordon and Len negotiate the collection, of which Gordon personally owns some. Comes to Moffett Field, where we had gotten NASA to loan us three World War II buildings, and we start having the visible collection so put things out, put signs on them saying, “This is a Cray,” etc. That yields interest. We start building a community, and we start trying to raise some money, so when the board members now or board members all the way back to Boston, Gardner Hendrie, myself, Dave House, maybe and a couple others-- and so we start raising money and intend to build a building because Moffett has got this idea that they’re going to become a technology center and lease space to non-profits and for-profit companies, so I’m the facilities guy on the Board and conduct an architectural competition to build a building on Moffett, and we hire EHDD in San Francisco to do the architecture, and in the meantime NASA says, “We’ve got to knock down those WWII buildings,” so we design a temporary building to put up and actually go out for bids on that, and then the dot bomb happens, and some other nice things happened as a result of the exuberant investment in the stock market. Some folks wrote some big checks, so we said, “Wow, maybe we ought to rethink our plan.” Real estate values are trashed. Building a building is very expensive. Moffett’s looking increasingly dicey because we’re dealing with a lot of government regulations and regulators, and that’s not so much fun, so we look around, looked at, I don’t know, a dozen buildings and bought this one.

Carlyle in New York, the leveraged buyout and investment firm, had owned this building when SGI was in an end-of-the-year crash crunch and sold it in a period of like three weeks to Carlyle because they need $20 million, $22 million, so we say to Carlyle, “We want to buy the building,” and Donna Dubinsky, Len’s wife, spearheads the negotiation with Carlyle, convinces them to sell it to us about what they paid for it, so here we are.

Gardner: This was the SGI sales and marketing headquarters building?

Saviers: Yes, right. They designed it as a general purpose building. They could put engineering in here and whatever they wanted.

Gardner: Len said it was sales and marketing.

Saviers: Yes, it was sales and marketing.

Gardner: I figured it must have been because there's not a single straight line in the building.

Saviers: Well, SGI was fairly interested in making things pretty, too.

Gardner: True. They did. So what do you think of the museum's mission? Is it doing a good job? Can it improve? What does it do well?

Saviers: Well, I think we're the foremost collecting and exhibiting computer museum in the world by far. There's not anybody close. I was in Europe this last spring, and I went to the Deutsches Museum, and as a calibration point Len and Gardner and I went to the various computer museums in Europe in, when was it, what year was that? Oh, I know. It was two weeks after 9/11, a date that causes you to remember quite accurately when you're there, and we said, "Well, Bletchley Park, London Science Museum, Deutsches Museum, Nixdorf Museum," and got a feel for what they were doing, and that helped us set the plan for what we wanted to do, so, yes, I think we've done a great job in that core mission of collecting and exhibiting. We've also started some new things. The Entrepreneur Center is great. It's really not specific to computing only, but it is around entrepreneuring in Silicon Valley, and it's got great support. We've got an education wing now, so I think the museum has grown. It's multifaceted. I think we're really ready to take the next step. That's what Dan'l's all about is taking that next step, raising another big slug of capital money, and we're certainly in the midst of exploring that. We launched the new website here just a few weeks ago, and we're completely rebuilding the infrastructure, the IT infrastructure of the organization. Some things got behind. Those things got behind, so we're playing catch-up in those areas, but I think the plan is a good one moving forward.

Gardner: I think we are unusual in our emphasis on hardware, and a lot of places collect paper, but we do a special job in hardware, I think.

Saviers: Well, I think that's the history, yes. One sage said, "Well, we provide a great history of making sheet metal boxes," and yes, I think that's where we started collecting. We said, "Grab the old stuff before it disappears." That's really critical, and that was the initial collecting thrust. I think we got almost all the old stuff there is to collect. It may be. There may be some residuals we'd still be able to get but not many, but we realized, "Well, we've got to collect software," and so the Shustek's Center's about software, and a legacy out of Boston was the explicit decision in Boston to not collect paper, so when the collection and archives came here, there was basically nothing in the way of paper. The University of Minnesota got most of that. Stanford got a lot of that, so we were behind the curve, and that's not the case anymore. We collect paper. We collect bits. We collect software. We're clearly the leader in bringing old source code to the marketplace. Nobody else has done that.

I think we just announced we got some of Ritchie's early Unix stuff that was discovered, so we need to be very much more balanced, and I think we are, and I think we need to figure out how to work internationally, how to reach out internationally.

Gardner: Well, as one of your volunteers I thank you for the opportunity because it's been a lot of fun. I guess I've been doing this for a dozen years or so, and as a member of the SIG I'd like to thank you for the time you have spent with us today. It's been interesting to collect your perspective on the history of DEC and Adaptec and the museum.

Saviers: Well, on behalf of the museum, Tom, let me thank you for the huge number of oral histories you've done, too. You're one of the leaders in making these happen, so thanks very much for making that contribution.

END OF THE INTERVIEW

