MIPS Oral History Panel
Session 2: Building the Company

Joseph (Joe) DiNucci, John Mashey, Robert (Bob) Miller, and Edward (Skip) Stritter

Moderated by: Michael Malone

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Malone: Let's begin with the self-introductions around the table. Skip, I'm going to ask you to do it again. Let's add something new that you didn't tell us last time in your...

Stritter: Well, start with Mashey then.

Mashey: No, no, start with you!

Malone: Start with you. Start with left to right from my point of view.

Stritter: Sure. We on?

Malone: Yes, we've been rolling.

Stritter: We're rolling! I'm Skip Stritter. I was one of the founders of the company, and one of my high points was hiring Bob Miller to join the company.

Miller: I knew this would be fun.

Stritter: My background is Dartmouth College, Stanford University, Computer Science PhD. And probably most relevantly, the Motorola 68000 was the project that I did prior to coming to MIPS.

Miller: My name is Bob Miller. I was the CEO. My background was Mechanical Engineering degree from Bucknell University, Master's degree from Stanford. I then worked for IBM for 15 years. My last job at IBM was to be a Lab Director. I left IBM to become the Chief Operating Officer at Data General. And then was recruited to MIPS by Skip Stritter and John Hennessy. And joined MIPS in 1987.

DiNucci: I'm Joe DiNucci, I was born in a black-and-white movie in Pittsburgh in 1942. I was the last graduating class of Carnegie Institute of Technology before it became Carnegie Mellon. It was a Mechanical Engineering degree, '64. Have an MBA from Duquesne University in Pittsburgh. And relevant, after the steel mills, I did join Digital Equipment Corporation when it was a pretty young company in 1971. I was there for 17 years, which bridges me into MIPS. And we can talk more about what that overlap was, but [during] the 17 years with Digital, I saw a lot of changes in what systems were and so on, and all pertained to how I ended up being here.

Mashey: So I'm John Mashey. I'm from the Pittsburgh area. I grew up on a farm there. Went to Penn State doing physics and math and managed to get sucked into the computer game and ended up doing a PhD in that. Spent--

<crew talk>

Mashey: Okay.

Mashey: So, I'm John Mashey.

Malone: Look at me, John. Do it again.

Mashey: Yes, I'm John Mashey. I also grew up near Pittsburgh on a farm. Went off to Penn State in physics and math. Then ended up noticing computers, going on and doing a PhD in Computer Science. Then spent ten years at Bell Labs, where I'm one of the fairly old UNIX software guys. Came out here to Silicon Valley. Was at the time running software for a division at Convergent Technologies. And an ex-CT person named Steve Blank, who was working with the MIPS guys, brought them over. I made a bunch of comments on the chips that they were talking about, which I generally liked. Made an observation that it seemed to be designed by compiler people and chip people, but where were the operating systems people? They started asking me to come over and review the real specs. I was over there every Saturday looking at them. And then they started saying, "You're here a lot. Why don't you work here?" And I said, "Leave me alone." But by the beginning of '85, I was over at MIPS, and I ran operating systems, networking software, QA, and also helped with some of the chip specifications.

<crew talk>

Malone: In Part I, we looked at the beginnings of MIPS, and we followed the startup team when they got the product developed, they got it out, they found the first few customers. But now we're sitting end of 1986, early '87, and the company now hits that first great wall that startups hit, where now you've got to become a mass marketer of a product in a competitive marketplace. And you can't just get by on the specs or anything else. It becomes a marketing game, it becomes a relationship game. Tell me where this company is at in '86/'87, and what you realize had to be done. Start with Skip. You were there before and after.

Stritter: Right. We had a nice technology. We had a fabulous technology team. We had built our first chip. We were out of money. We had a mismatch with a CEO [Vaemond Crane], so we were looking for a new CEO, and it was a little bit tense in the basics.

Malone: Yes? How tense? I mean, was this arguments in the hallways, or was this just, "We're in trouble. We got to do something, we're not going to make it."

Stritter: We're in trouble. I think the engineers were just having fun working. You know, and they noticed the mood, of course, but it was the board and a little bit of management who were worried about it.

Malone: So what did the board say to you? Because ultimately they're the guys that tell you when you have to make the big change. So what did they say? And who said it?

Stritter: Well, you know, it's the people inside the company who went to the board to force a change. I think we realized we needed what we would call a "Big League CEO." And we needed to get to be a professional company, not just a technology company.

Malone: So how did you find Bob?

Stritter: We must have done a search.

Malone: Were you available? I mean, you're at Data General-- you're at a great big successful company!

Miller: In fact, I wasn't available. What happened was, I was getting-- so de Castro and I were increasingly disagreeing. And the single biggest disagreement was the fact that I felt we had to make a major commitment to UNIX, and move away from our proprietary operating systems. Now our single biggest competitor was Digital Equipment. And I was convinced that Digital would not adopt UNIX. So if our single biggest competitor wouldn't adopt UNIX and we would, and I can still remember drawing for de Castro on my whiteboard, "Here's the number of applications we have on AOS/VS, which was our proprietary operating system. Here's the number of applications Digital has on VMS. And this is the number of applications we could pick up if we do an industry standard UNIX. And look who has more applications." And de Castro said to me, "But how are we going to make money?" Now that was the second time I had had to answer that question to him. The first time was when I wanted a liCEO license to IBM and have IBM reselling our office automation software, and he said to me, "How are we going to make money?" And then the second time, I said, "This guy doesn't understand software. He will never understand software. I'm wasting my time."

Malone: Joe, by the way, is that true about DEC?

DiNucci: Yes, I'm sure it's true that Bob believed that Digital would not adopt UNIX, which is very fortunate for Digital. But at the time, it certainly looked like that. Digital was as proprietary as DG, maybe more. I mean, they were so invested in VMS, and it painted the house. So it was a good assumption.

Malone: So there was this feeling you had that Data General's business model was fundamentally flawed now?

Miller: That yes, oh, yes. I felt it was fundamentally flawed. That if we didn't do something, and in fact, when John Moussaris spoke [in Part 1] about how they had Stan Booth all lined up and all of a sudden, overnight, it got shut down? I was the one who shut it down. And the reason I shut it down wasn't because MIPS was a small company, it was because MIPS had no software. And whatever I did in the UNIX space, I wanted to do with a processor operating system combination that brought software with it. And so that's why-- I'm the one who killed that project. And it got shut down the day they brought it to me for my approval. And I said, "What's the software portfolio?" And they looked at me with blank stares. They said, "But it's got a really great price performance curve." And I said, "I already have a great price performance curve. What I need is software." So I had told de Castro at the end of what would have been '86, that I was leaving. I said, "I just want you to know," and he thought it was a joke, because he felt he had me locked up with stock options. And so I was, for the first time taking calls from recruiters. I hadn't been taking calls before that. John Holman called me up. I didn't know him from Adam. He said, "I have this great company..."

Malone: So you went out and got a headhunter, and sent him out looking.

Stritter: Yes.

Miller: He said, "I have this great company called MIPS." I said, "Yes, I know all about it. I just killed their project." <laughter> It's true. That's what I said to him. He said, "No, no, you got to-- let me just send you some stuff about this company." <laughs> I said, "I already know about it! You don't have to send me [anything]." So in parallel, Daisy was recruiting me.

Mashey: Ari Feingold.

Miller: To replace Ari Feingold to be the CEO of Daisy. So actually, when I went to MIPS, I did it as a side trip. My primary trip was to go to Daisy, and meet Max Palevsky down in Southern California. Daisy, I think at the time was $190 million company in the eCAD space. And I wound up going to MIPS first, Skip and John Hennessy had convinced me to make a trip. And so I went to MIPS and never left!

I was so intrigued by the team and what they were doing, because part of my background at IBM was that I had been responsible for the microprocessor strategy. So everything that John Moussaris was saying about his view of what was happening in microprocessors, the reality is the product group, which I was in, and a very senior member of, had looked at the 801 and had concluded it was going to take an enormous amount of software resource to put compilers and an operating system on the 801. That's, if you remember at the time, for those in the industry, there was no UNIX at the time the 801 first appeared. And the chip guys had made incredible claims, but that was all based on cycle times. Not necessarily running a real operating system like a VM. And so the reason the 801 didn't get funded at IBM or got very little funding was when we looked at it from a product group standpoint and we said, "Well, we had these operating systems, VM, MVS. Which one do you want to try to run?" And I think in VM some of the path lines were like 250,000 instructions. So it became clear that a RISC chip trying to run a 370 operating system was a non-starter. And that's why it never got adopted at IBM.

Malone: So Skip, were you surprised when you had a shot at a senior executive at a billion dollar computer company?

Stritter: Yes, yes

Malone: I mean, this probably wasn't what you thought you were going to get when you sent a headhunter out there.

Stritter: No, but we've talked before about we were young, a little bit naive, we didn't know what we couldn't do. So yes, we realized this was a big guy. But then we said, "Let's go get him."

Malone: So what did you see when you showed up out here? Give me a feel for what MIPS looked like in 1987.

Miller: Well, remember, well, 1987...

Malone: From an outsider.

Miller: When I came to MIPS, before I made a decision to join, and I met with this team, and part of where I was coming from, when I left IBM to go to Data General, I had 5,000 people working for me. At Data General at that point, I had 18,000 people working for me. Now I walk into this company of 60 or 80 very, very smart guys.

Mashey: Take off three zeroes.

Miller: It was very refreshing. Because I was fed up with spending most of my day dealing with administrative bullshit.….HR related, finance related. You know, sales guys that weren't meeting their quotas in Afghanistan. You know, I had had it with that stuff.

Malone: Well, there's always another factor in making a decision like this, though. And that's one's spouse. And you probably were living pretty well back there in Massachusetts. And you had the company car and everything else.

Miller: No, no. Wait a minute. Remember, I worked for DG. <laughter> The CEO drove a 15-year-old car. <laughter> Company car would be a few cuts below that.

Malone: That's Olsen with his Pinto.

Mashey: Pinto, yes, that's right.

Stritter: We flew back to Boston to interview Bob. And we said, "Bob, we want to come and see you. And we'll take you out to dinner." And Bob said, "No, my wife's looked at your financials. You can't afford to take me out to dinner."

Miller: She had actually said-- Hennessy got her on the phone, and he said, she said, "So there's..." Skip just-- I'm glad Skip reminded me of this. But what had happened is so I'd had this discussion with John Holman, and I said, "I'd like to see their financials." Now my wife had been in finance at IBM. And unbeknownst to me, these finances got sent to my house while I was at work. And I come home and my wife says to me, "Who are these MIPS guys?" I said, "Oh, they're some guys I'm talking to. They've got a really interesting technology." She says, "They're bankrupt. We got their financials today." She said, "What are you doing talking to them?" So then John called up and said, "We're in town, and we'd like to take Bob to dinner." And he said, "We're from MIPS." And she said, "You can't afford to take anybody to dinner. Come over here, and I'll make dinner." <laughter>

Stritter: So that was our first meeting at Bob's house. Barbara cooked a beautiful chicken dinner. And that was the start.

Miller: That was the chicken dinner.

Malone: So what decided you to take the job?

Miller: Well, obviously, there are various elements. I was excited about the technology. I knew what the fundamental problems were in really getting a commercial microprocessor. And my conclusion was these guys, however they had done it, had done something miraculous with the compilers and the operating system. You know, as valuable as the silicon and the architecture were, the fact that they had anticipated what they had to do in compilers and software when they were building the chip, to me, was a very big deal. So when they were taking me all through that, I said, "This may actually be a diamond in the rough."

Second was, I was frustrated at Data General. I had a good equity play, but I didn't have a excellent equity play. So this was a chance to get an excellent equity play. And come into a company that I could build from the ground up, more or less, as opposed to inheriting it, like a Daisy. When I really looked at Daisy, it had Ari Feingold culture, which is not a Bob Miller culture. So I could see myself, you know, I'd already gone through DG, where, you know, like a month after I got to DG from IBM, Herb Richmond, one of the founders said to me, he said, "So what do you think?" I said, "I think I crawled into a can of sardines, it smells so bad." And so I didn't want to go through another one of those. And I found this group extremely refreshing, great technology, and in my mind, what they had done with the compilers and the combination of that with the silicon. And I knew, or believed, I shouldn't say, "I knew," I knew that something that could run UNIX at a high performance with a discontinuity on the price/performance curve-- the PC market was gone. You know, it was Microsoft. That was going to be the answer. UNIX market was wide open. So I saw the opportunity.

Malone: So Joe and John, where were you guys in all this? When did you first hear about MIPS?

Mashey: Well, again, I heard it in around about October/November [1984]. The founders came over and presented to Convergent. And back at Bell Labs, I had been involved in evaluating some internal RISC projects for my boss's boss. And said, "Hey, I like this. This is a good way to go." I had managed an under-table project that was the first UNIX port inside Bell Labs, the Motorola chips, okay? And I had a lot of reason to like RISC chips. So I said, "I like this." But again, I gave John Hennessy a little bit of a hard time saying, "You know, John, you didn't have any operating systems people around this, did you?" And he said, "No, how did you know?" And I said, "Because there's a lot of stuff in here that no OS person ever asked for!" <laughs> And like I say, I ended up going over and being over there every Saturday, and really liking it. I had about 40 people working for me. But the train was clearly leaving the station on that once in a lifetime opportunity for a software person to actually influence a chip architecture enough to get what he wanted. And that just doesn't happen very often.

Malone: So when did you join officially?

Mashey: Well, it depends on how you count. I officially joined the beginning of January 1985. Some people claim I sort of joined in November '84.

Stritter: We got a lot of help from him before then.

Mashey: Yes, right. So I was already there. And we spent, I spent a lot of time, with the chip designers trying to get the things in that I wanted. And then frenziedly running around. because the OS and QA is sort of on the end of the chain. You know, if something is wrong upfront, you get excited. Right? Particularly there were times when-- Larry Weber's crew had the most optimizing compilers UNIX had ever seen. And there were some exciting interactions in the early days in trying to find-- let me put it this way: Combinations of a new UNIX using new aggressive compilers on a new chip on a new hardware system are pretty exciting.

Stritter: Before the hardware was there.

Mashey: Yes, before the hardware was there.

DiNucci: <inaudible>

Mashey: Yes. So that's how I was there, what I was doing when things were going on. Mostly I was trying at that point when Bob was coming on to keep certain other people around the Valley from picking off some of the best systems programmers around. Because people like Steve Jobs were in there giving giant hiring bonuses to hire some of my guys, which was not fun.

Malone: Joe.

DiNucci: So I was a lifer at Digital. And there's proprietary and then there's proprietary. And Digital owned beaches so that it could have its own sand so it could make its own glass for its CRT's, okay? It was about as integrated-- and the idea of Digital embracing somebody else's operating system, a microprocessor?! This is the company that's brought the first 32-bit microprocessor to the world as a system. The MicroVAX. And they were damn proud of it, and they should have been. And I'm a lifer and I'm boogying along, and I'm running the Western Sales Force, and find that we're getting our butts kicked in places like National Semiconductor by these little companies like Sun Microsystems, who was offering UNIX on a client server workstation environment.

So I convinced Digital-- I left my sales leadership job to take on building a workstation business. And first we built a MicroVAX-based VAX station. And it was wildly successful! I mean, it just went like a bottle rocket. It was the right configuration. But then we'd go and we'd try to run Ultrix on that, and because of the price point for the MicroVAX, which could be high, wasn't competitive. And so National would say to us, "We're not going to pay that price for a UNIX WORKSTATION." So we're getting beat. And I tried like hell to get Digital to embrace a real UNIX strategy and it wasn't happening. And I kept going back to

Maynard with market data. And nothing worked until I went with a single transparency made with an IBM orator ball (this was 15 years before PowerPoint), and it said, quote, "We have used VMS for seven years, we converted to UNIX in eight months. We will not go back," unquote. VP, R&D, General Electric, Schenectady, New York, Digital's largest customer. I said, "I'm tired of arguing with you guys. If you don't like what this man said, call him up and tell him he's crazy, because this is where it is. This isn't even the future. This is the present. We need this product."

Meantime, I had a very strong little crew up in Palo Alto, including Jim Billmaier, who was my-- I was Batman, he was Robin. And he had a good friend named Bob Rodriguez. And the two of them made this single page proposal to create a single board computer using this funny thing called a MIPS R2000 chip, just to run UNIX. That way it wouldn't disturb the price point of the MicroVAX environment and all of that. It made total sense to me. And we got on the bandwagon to sell that within Digital, which is quite a story and was a lot of fun. And one of the wildest things I've ever seen. I mean, to get a battleship like Digital to change direction…. Digital's like a $16 billion company with 110,000 people. But we got the old man behind us, Ken Olsen, rest in peace. Died last Sunday. He believed in the idea, but just like any president finds out-- the top guy can have an idea, whether or not that executes down at the waterline is a whole different question. But it was really, really exciting. And when I first came in contact with MIPS, it had to be-- I think the first contact was John. And I was impressed with the energy. Plus he's from Pittsburgh. So I could believe everything he said. And then, I think the next person I met was Skip. And I have this memory of Skip twirling a volleyball or a basketball on his finger.

Stritter: Probably a volleyball.

DiNucci: He was like this total jock, who by the way, happened to have a PhD in Computer Science from Stanford. And I was impressed with him. And then I met John Hennessy, and how can you not be impressed with these people? And they introduced me to Bob Miller. And that was an interesting meeting. But more on that later. That's how I got there.

Mashey: So that turns out to be a strange connection here. You see, because he mentioned Bob Rodriguez. Bob Rodriguez was an old buddy of mine from Bell Labs way back. But he was working in Nashua, New Hampshire, and he was part of the UNIX-y-like contingent within DEC, which you know…

DiNucci: UNIX-ish?

Mashey: UNIXish, yes, whatever you call them, yes, all right. And it just turned out, part of what he was talking about them getting together was that I ran into Bob at a UNIX conference in January, let's see, 19...

DiNucci: '86.

Mashey: No, '88. All right. That's about right. And I gave him the performance documents on MIPS and he looked at machines, he said, "Boy, these things are fast!" Right? And we were at the beer bust that night, and he-- after a few beers, he said, "What do you think? You think we could put Ultrix to this?" And I said, "Yes, you probably could." You know, and I went through the stuff, and he said, "I want to do it! I want to do it and roll it in show Ken Olsen it doesn't take 300 people and three years to do it." Right?

DiNucci: That's right.

Mashey: After a few beers. So it took us a couple months to get with a Boston MIPS sales guy to loan DEC a couple machines, and Bob and two of his buddies ported Ultrix in two-and-a-half-weeks. And all of a sudden that opened some floodgates.

DiNucci: Back in this time, we were talking, you know, I remember the idea being we could sell a workstation for $1,000 a MIP. We were thinking about a $12,000 base price for the workstation that ran 12 MIPS, which is about one-tenth of the power of a Blackberry, or something. But it was quite something at that time. That was quite a deal. And people who were savvier than I, realized what Bob knew at DG. It was really about the software. If you didn't have apps coming out your ears, don't bother. That's really where it was. And that was some pretty revolutionary times.

Malone: So Skip, give me a sense of the impact of the announcement of Bob's arrival at the firm. What was the general feeling when it got announced, and what was the impact of Bob's arrival there?

Stritter: So the engineers are in the backroom still working, right? I mean, a few guys like Mashey, and others were paying attention to what's happening in the front. But it was refreshing. We had had kind of a tight dictatorial regime that didn't work well with the engineers. Bob [Miller] came in. He's open and friendly, charming sometimes, even. <laughter> But he engages with the people, and draws them out and makes them feel like their part counts, too. And so it was a really good start.

Mashey: Well, also he knew that software was important. And I'm afraid our previous CEO [Vaemond Crane] didn't always.

Malone: Now a change of regime always leads some people to feel like, "Okay, there's been a power shift here. I've lost power. I'm out of here." Did you lose a lot or people with his arrival?

Stritter: Not too many. We didn't lose engineers. No.

Malone: Well, they didn't even know what was going on. <laughter>

Stritter: That's all we had!

Miller: Nobody had told them.

Malone: Nobody told them, yes.

Stritter: The sales force was John Hennessy. You know, we didn't lose him. <laughter>

Miller: Unfortunately, there were nine people in the salesforce, of which, only one was any good. So there was not a salesforce, unfortunately. And even that one wasn't that good. It was the guy who had the SGI account, Doug van Louven. So…

Malone: Bob, tell me, a new CEO coming in. Several things happen. One of them is you have to look at the entire field of the company, all the components and how they interact together in its relationship to the marketplace, customers, competitors. Also, you see the real books for the first time. And you get a real sense of what the dynamics and the financials of the company actually are. So give me a sense of what you saw when you got there. What pleased you, and what stunned you, what scared you.

Miller: So there's a couple of things that really stand out in my mind. One was this thing that Skip is talking about in terms of my relating to the team and the engineers. Remember, I was used to managing multi-thousand man engineering organizations. So to have 20 or 30, where you could really go out and talk to all the engineers was very refreshing to me. And what I heard was very refreshing to me. There was a lot of energy, a lot of passion, a lot of all the good things.

Malone: Did you call an all-hands meeting?

Miller: Yes. I called an all-hands meeting when I arrived. And literally the first question I got in the all-hands meeting is, "Are we going to make payroll next week?" That was the first question I received. Now, fortunately, I had negotiated with the VCs that if I'm going to take this job, <laughs> I'm not going to take it and then have to spend all my time running around trying to raise money, when we've got to fix the company. So they had committed financing.

What I didn't realize, and I learned quickly after I got there, is that the previous CFO had resigned prior to my getting there, and the Controller showed me a wastepaper basket filled with checks that he had not sent out. And said, "Now that we have money, I'm going to send these out." So half of what I thought was the cash I had, evaporated in like the first month, and I was like, "You got to be kidding me!" You know? That what I thought were the outstanding payables turned out to be a lot different than what I thought they

were. So Job One became managing cash. In spite of anything else, we had to get our arms around that. And so my focus for the first 60 or 90 days was to figure out how I could reduce the cash burn, without taking out people. Because I didn't want to take out people. They had already had a layoff prior to my getting there. And I didn't want to have to do a layoff.

Malone: What were the company's revenues when you arrived?

Miller: Negative one million. Because they had shipped a million dollars worth of equipment in the fourth quarter of '06, all of which had come back in the first quarter of-- I mean, of '86-- I'm off by a couple of decades <laughs>-- and so...

Malone: You actually took over a company with negative revenue?

Miller: Negative revenue. It was negative one million, Mike. Everything that had gotten shipped in fourth quarter had come back in first quarter. <laughs>

DiNucci: So the PE wasn't that good either.

Miller: So that was another problem that we had. We had to talk to our customers. The only thing that stuck, I think, was 30 microprocessors to Silicon Graphics, which were about $800 each. <laughs>

Malone: So how many customers did MIPS have at this point?

Miller: Well, there was Prime, SGI. I think we had indirectly or directly, the CIA, who took some servers and were doing some things at that-- in the '86/'87 [timeframe]. We didn't have a shippable product, Mike. I mean, the reality was we did not have a shippable product.

Mashey: These were development systems, really.

Group: <agrees>

Mashey: Evaluation systems more than anything.

Miller: Yes, and what I...

Malone: Did you share any of this new information with your wife?

Miller: Of course not! <laughter> She better never see this tape!

Stritter: "I told you not to go out there!"

Miller: "How are things going at the office?" I said, "It's all sweet." <laughter>

Stritter: "Great group of guys!"

DiNucci: Ralph and Alice Cramden every night.

Miller: Yes, right?

Malone: So where do you start? First thing, you got to get on top of your cash flow problem, but it sounds to me like you have to counter attack on every front. I mean, you don't have a sales force. You only have a handful of customers. You don't have a working product.

Miller: So one of the first things I did after-- you know, I figured out a lot of money was going out to foundries and we were shipping money out to foundries and getting lousy yields and that was-- so we really slowed that down. The second thing I did is I wanted to find out what did our customers think of us. So I went out and made sales calls. We had eight salesmen. I went out and made sales calls with every salesman. And my fondest recollection is the Boston area salesman picks me up in his Corvette at the airport, and we're driving along and he can't find his customers. Like I'm supposed to call on...

Malone: You got there fast. You got lost fast in that Corvette.

DiNucci: Made good time. <laughs> Can you imagine?

Miller: But so the name of our sales VP was Al Sisto, and Al actually was a hard-working guy who really-- you know, I think he had come from Intel, hadn't he? Didn't he have an Intel background?

Stritter: Must have been.

Mashey: Because it was Vaemond Crane that hired him.

Miller: Yes, I think he had an Intel background. And it just seemed that none of these guys were very effective. And so he's taking me back to the airport, and I'm saying, "Al," I mean, "John [Boston salesman], who's paying for this car?" "Well, well, the company is." And I'm driving in a Corvette with a guy who's not able to find his customers, literally, we got lost looking for his customers. Which told me how many times he called on them. And he said, "So what do you think?" I said, "You know what I think?" He said, "Before you give me an answer, take a look at this. This is a business plan for a company that I'm thinking of starting." <laughter> And <laughs> I said, "John, it's a great idea!" I said, "I haven't looked at your business plan yet," I said, "I really think you ought to pursue it."

DiNucci: Don't let the door...

Miller: So by the time I got back, I said, "There is a need for the product. We do have an opportunity to place development systems, because the customers I did call on like Prime and others, there was a need, there was a place. So the next thing I did was, I recruited what I considered to be the best sales executive I'd ever worked with in this context. You know, I'd known some great guys at IBM, but MIPS was not IBM. I mean, if you have the IBM brand, you can go call on President Obama. But if you've got the MIPS brand, you can go call on Bob Rodriguez or-- not to demean you, Joe...

DiNucci: No.

Miller: Joe DiNucci, or you know, you're not going to get to the top of the company.

DiNucci: Not to demean you. <laughter> Better known as Barack Obama.

Miller: But the point was Bill Jobe, you know, at Data General was the most effective. And he had the most "go out take no prisoners" sales organization I'd ever seen. And so I called him, I said, "Bill, you and I have to talk." And he was at some VC here, I don't know what he was doing. He had been like the CEO of Plexus, but that hadn't worked out. And so we met, and we did his comp plan on the back of a placemat in a restaurant. He signed it, I signed it, and he was onboard. Well, I said, "I don't want to bias you, but I think you have the world's worst salesforce, but why don't you go find that out for yourself."

Mashey: "Now that you've signed the contract."

DiNucci: "I don't want to demean you, Bill."

Mashey: "Meet the team."

Miller: No, I'm into-- I never want buyer's remorse. I told him that ahead of time. But I said, "I already took care of one of them for you, so you don't even have to." So that was Step Number 2.

Step Number 3 was to try to get the management team behind a different strategy. And there was a lot of in-fighting going on. The engineers had no respect for the sales organization, and even before Bill got there, what we did was we had an off-site meeting. Because I wanted to explain to him, "We're not going to send a lot of money to foundries anymore. This is a broken model. It's not working." And so we went to the Claremont Hotel, the senior engineering staff, as well as the managers. We included guys like Ed Hudson, who you've heard about, were kind of superstars. Tom Reardon, Chris Rowan. And these were all smart guys. Whether they were managers or not, had a lot to contribute in terms of-- and so I said, "We're not leaving this meeting till we come out of here with a plan that we all agree to." But we spent the first couple of hours with, "What's wrong with the company?" And there was a lot of finger pointing going on. Engineering pointing at Sales. And just non-productive, but they had to get it off their chest.

Then I said, "Look, guys. In order for us to be successful," remember where I came from. I mean, I came from IBM where I'd run the microprocessor strategy. And when we thought of microprocessors, we didn't think in terms of anything less than a million. I mean, we were developing our own microprocessors. We had, you know, different architectures. We had 32-bit microprocessors, we did things. Mainly, because we had to run our software stack. In other words, we couldn't take our software stack and move it easily to a Motorola 68000. And when you've got tons of customers and applications. So I said, "The first thing we have to realize is for us to be successful, the smallest number we can think about is ten to the sixth [power]. We can't think of a number less than ten to the sixth. Now, let's work backwards from that answer."

Malone: Skip, were you there?

Stritter: Yes.

Malone: You should interject your thoughts on what it was like. Was there a lot of finger pointing going on?

Stritter: Yes, I don't remember that so much. I remember the outcomes.

Malone: Did one million units strike you as a rather large number?

Stritter: Yes, yes. But the realization that, first of all, it had to be big, but it could be big. And that we could think of a strategy that would make us-- that would get us there.

Malone: Okay.

Miller: Well, Al Sisto came to me when we took a break in the meeting and said, "If you want me to, I'll resign now if it'll make things better." And I give him a lot of credit for seeing what was going on and saying, "Okay, I see that my staying here is only going to distract people from the answer we have to get to." And that's why to this day, I give Al a lot of credit. I think he got caught in a relatively bad situation of selling a product that as Mash says, was a development system. But presenting it as something you can use in a more robust way.

But, you know, so we came out of that meeting, we had our game plan. And Skip and I and Chet Silvestri and Bill Jobe set about trying to recruit semiconductor partners. Because what we said is, "We have to leverage their sales force. We can't build a sales force that can sell enough. We don't have the distribution channels, we don't have distributors. We can't get those design wins."

Malone: John, were you at that meeting, too?

Mashey: I don't remember that, actually. I might have been away for some reason.

Malone: But in a sense this is the meeting that defines MIPS as a real company. You come out of that meeting with a game plan for being a real business.

Miller: Right.

Malone: You're no longer a startup. You're no longer a development company. You have to really become an honest-to-god manufacturer, marketer, seller, everything.

Miller: Yes.

Mashey: Remember, I think this was talked about before, but this issue of fabless semiconductor companies. You know, it just wasn't the model that was there. And that was a lot of the problem.

Malone: So what did you do instead of foundries?

Miller: Well, so here's the difference, Mike. In the foundry situation, you pay the semiconductor company to build chips for you, and then you sell them. So the only profit incentive for them is what they can make on building a wafer for you. In our new model, we were going to license you to sell our chips, so you got

the revenue from the chips, and you paid us a license fee, and an ongoing royalty. So now, it made it worthwhile for you to take this product. And a lot of these semiconductor companies were looking for microprocessor products. So rather than us sell chips, as an example, to LSI, I mean, to SGI, LSI or IDT or Performance Semiconductor -- now what SGI liked about that is I have three sources for this MIPS processor, and I don't have to worry about little MIPS being the Achilles heel for the strategy.

Malone: So that's how you escape being the little company that probably you'd been through...

Stritter: That's the start of it. Now Cypress and IDT and Performance, that was a start. But they were little guys, too. The guys who didn't know about it yet were the Japanese.

Mashey: But these guys at least had a motivation. A lot of them were SRAM vendors, right? And this was a great excuse to go have a product portfolio to sell to somebody, because they had a microprocessor in the package.

Miller: So the other well-kept secret about RISC microprocessors is they're 70 percent SRAM. So a guy with a really good SRAM process is going to make a really good MIPS microprocessor. So by looking for guys who had good SRAM processes like Performance Semiconductor or IDT, it was a natural fit. Now rather than us paying them to make wafers, they're making them for themselves, and then they're getting to sell the chips. Now, you don't get as much revenue, but you get a lot of upfront cash, because I'm going to sell you that semiconductor license in a couple of forms. One is you're going to give me a payment upfront. And that first round was typically around one to two million dollars. And then you're going to prepay me some royalties that you're going to work down, because I'm going to have to support what you're doing. So now we were getting cash up front, even though we couldn't recognize it as revenue necessarily completely, but it moved us from where we were losing a lot of money, to now we're heading towards breakeven, and we're getting cash in the door.

Mashey: It also motivated them. I mean, I spent a lot of time over the next few years, sometimes running around with folks like, particularly from IDT, going to some of their sales conferences. They were now motivated to go out and use their sales force to find customers.

Malone: Well, I was going to say, you also gained instant marketing, sales, and everything else.

DiNucci: Right, it takes time to build those channels. And that was the genius. And from a design win target like Digital, from our perspective, what we loved about this model was multiple sources. And if I remember the fine points of the agreement, and this was from the beginning, if you were a licensee of the MIPS chip, you committed that you would build the reference design. You had to build the exact same chip that Performance was building. The exact same chip that IDT was build-- because that was part of the pitch. That was part of the infrastructure you were building. Then if you did that you also had the right

to build a derivative chip for whatever purposes you wanted for your own value. Now if you're IDT, you love this! Beause you've already got a salesforce, now you've got a really high value product to sell. You're not competing with the people who've designed it. They're not competing with you. It was a real win-win situation. I mean, the guys that had-- that didn't have VMS instructions tattooed on their arms-- which was a minority of the company, but there were a few of us-- loved this strategy. I mean, it really made a lot of sense! It was truly like a next generation way to be in this business.

Malone: So what year we looking at now? '87/'89?

Miller: '87/'88.

DiNucci: '87/'88.

Miller: Yes, we signed up our first semiconductor partners at the end of '87.

Malone: So you're booking revenues without having to beef up staff or anything else in a big way.

Miller: Right.

Malone: So all of a sudden, you're doing a lot of good to your top line and your bottom line.

Miller: And it also was funding what we really had to do which was get to the R3000 as quickly as possible. So we did have to add staff, and we did have to-- because the R2000, it became clear to us didn't have enough legs. We had to get to an R3000 very quickly.

Malone: So let's talk about the R3000.

Mashey: R3000, remember there was a pair of chips. There was a CPU and a floating point chip. And the R3000 was pretty much a shrunk R2000 but it had a more effective memory interface, it had a few bugs fixed and things like that. So in some sense, let me put it this way, from a software perspective, you sing Hosannas when you don't have to do anything. <laughs> That's a wonderful thing to have for a change, right? So and it was tuned up, so you remember our first chips ran at a glorious eight megahertz. And then the R2000s got up to 16 megahertz. R3000 was more efficient and started at 25. And R3000s were really pretty competitive chips, particularly with the floating point chip that was there. Very competitive.

Miller: So the floating point got integrated, so it was a single chip versus the two chips in a two-chip package. But the other thing that comes out of that semiconductor strategy of giving the revenue incentive to the semiconductor company, now they're giving you their latest greatest processes. Because they want the smallest possible chip. They want good yields.

DiNucci: Right, great margins.

Miller: They want all the things that they're not necessarily going to do if they're acting as a foundry.

DiNucci: Right.

Malone: Now did the R3000, did that expand your potential customer base? Or just supercharge the one you had?

Miller: No, it expanded it dramatically.

Malone: To where? What were the new markets then?

Miller: Well, Digital, Siemens, I mean, you name it, with the R3000...

Malone: You're still at DEC at this point, Joe? Okay.

Miller: So the R3000 we rapidly expanded both our customer base and our licensees.

Malone: So Joe, what did you see at DEC when you saw the 3000?

Mashey: Well, you knew it was coming.

DiNucci: Yes, I knew it was coming. And the original Rodriguez hack was on an R2000, but it proved a point.

Mashey: It wasn't a hack. It was a good port. <laughs>

DiNucci: It ran, it ran! Yes, it wasn't a hack. I just remember-- and of course, I was like the actor, and I had people like Rodriguez and [Jim] Billmaier and Mash and others who were writing the script, you know? But I got it. And I realized that the customers that really mattered going forward-- yes, there'd always be a DuPont that was totally invested in a VMS environment, they weren't going to change. But to get new business to grow in places like National Semiconductor or anywhere, the Bank of America, you really had to have an open environment. I mean, it was the new religion, and it was better than the old religion. So, it looked viable.

I think the combination of the aggressive, very, very high teeth-to-butt ratio company that MIPS was, that it was just all meat, all technology. And so what made it an acceptable supplier of technology to a company as big as Digital, that bet everything on reputation. I mean, DEC stuff works forever. It makes HP look "fly-by-night!" I mean, DEC was really serious. I mean, DEC invented remote diagnostics. I mean, DEC was truly a company that believed that you put stuff in customers, it stayed there forever, and it worked forever. So how in the world do you bridge that-- this little dinky MIPS company over on Arques in Sunnyvale to Big Digital?! And it's this model. Because it wasn't just MIPS. It was MIPS combined with their semiconductor partners that made it a viable thing. I'm curious about-- one question-- if we can back up for a minute. That model of licensing through, and then they sell--- I'm curious. That's like a huge idea. And I'm curious about the origin of that idea and -- where did it come from? Was it a burst of light, or a "Well, if we did that, then if we did...," how did it happen?

Miller: <laughs> So I came to MIPS with a game plan. I mean, I knew enough about it. And remember, I had done every kind of deal known to man between my time at IBM. At IBM, I did the first joint development program that IBM had ever done with a Japanese company, Matsushita develop a graphics chip for a display family. At Data General, you know, we were the first ones to really do a PC laptop that was fully compatible. And I licensed the turnkey manufacturing line from Matsushita that they were using for video recorders. And I knew the power of doing licensing and joint development where you gave the other guy a revenue incentive.

Malone: So in your game plan, were Japanese companies out there on the horizon?

Miller: Yes, yes.

Malone: You would go with US companies first as partners?

Miller: I'd go with whoever I could get who would be credible who would do exactly what you just said. Front the brand. Right? Exactly what you're saying. It's not MIPS calling on you, it's LSI. It's not MIPS calling on you, it's IDT. So we had to front the brand in some way. You know, Skip and I shot at Motorola, we shot at NEC, we shot at all these guys. But you know, kind of got a lukewarm to cool reception.

Stritter: Luckily, those little frontrunner guys, you know, Performance and IDT, they needed what we had, and they could do it quickly. And, they did it.

Malone: They needed you as much as you needed them.

Miller: Exactly.

Mashey: But it wasn't until the DEC deal was sort of in the works, and you know, Apple was nosing around in 1988, that we were able to get the big guys.

Miller: Yes, once we got the Digital deal, the world-- the semiconductor world, who were getting beaten to death by Intel in the microprocessor space, you know, NEC and Toshiba had been told, "Hey, nice job, guys, but no new generations. So after you've built the market and helped us build a customer base, we're taking this sole source, too bad." So they were out trying to hunt up. And I'll never forget a meeting that Skip and I had at NEC with Dr. Sasaki. And this was R3000 timeframe, prior to the Digital decision to choose MIPS. And Dr. Sasaki, I could tell, was the kind of executive who really was a visionary. He was very unusual for your typical super-large company executive. But he says, "You know, we're really investing in our V-Series chips." And he had Dr. Kane come into the room to show Skip and me this chip that was about yea-big.

Stritter: Intel architecture.

Miller: Intel architecture.

Stritter: It was four times-- two times in each dimension-- the size of our chip. It was a beauty!

Miller: And Skip and I said, "Well, how many MIPS do you expect that to run?" And he said, "Well, five." Well, we knew by that time, the R3000 was going to be about 20 MIPS, and this was-- we could have put four of our 3000 on one of those postage stamps. And I hit the software point with them, and so did Skip. But you know, it was, "Thank you very much. And don't call us; we'll call you." Well, once the Digital decision got made, then they called us, and we moved very quickly. And if I recall, we charged them for their R3000 license, Because now it was post-Digital, ten million dollars versus the one to two million.

Malone: The price went up.

Miller: Right.

DiNucci: You're welcome.

Stritter: Thanks, Joe! <laughter>

Miller: Well, so the other thing we did that people claimed you would never do is get NEC and Toshiba behind the same architecture. And Toshiba had a very good guy named Dr. Koyama. Now these are guys who, when we went to the NEC headquarters, Mike, they pointed out to us-- or I can't remember, Skip, was it Toshiba? One of the two had the taller building. And it was taller by design! <laughter> They were going to be taller than the other guy.

Stritter: But NEC was building a new building. <laughter>

Miller: That's how competitive they were.

Stritter: But Dr. Koyama, I remember the first time-- almost the first time I went to Japan, but I had been a few times, Hennessy and I went-- this was even before Bob got into sales. With Toshiba we went to the LSI lab, and Dr. Koyama was running the lab. And he came out and he gave us the warmest reception, made us feel good. And then when he started listening, you could tell, he really appreciated what was going on here. And it was quite quick for a big Japanese company, because of Koyama, to get this deal.

Malone: How long was the development of the 3000? How long did it take you?

Miller: About a year.

Malone: About a year?

Miller: Yes. But we started it-- I started the 3000 development as soon as I got to MIPS. So even though we had the 2000, I said, let's not spend much more time on the 2000. So we had...

Malone: So you had a project strategy, you had a manufacturing strategy "slash" marketing strategy. You had sales strategy, and financial strategy.

Stritter: Remember that manufacturing strategy is a financial strategy as well.

Malone: How about relations with the board?

Miller: Well, as cash was coming in versus going out, things got a lot better. <laughter>

Stritter: You started building a board at that time, too.

Miller: Yes, we started...

Stritter: When did Jimmy come?

Miller: Yes, so I started recruiting guys like Jimmy Treybig from Tandem, and Larry Sonsini joined the board. So we added to the-- but we had-- the venture capitalists, I have to say...

Malone: So Sonsini was on the board. He didn't just handle your IPO. He was actually on the board of directors.

Miller: He was on the board, yes.

Malone: Oh, that's interesting. Was that a long-term plan that you figured at some point you would have to become a public corporation? You needed a Sonsini? Or...

Miller: Well, I was always impressed with Larry, just from a) his network; and b) because he's Larry. And it's more than just having an attorney on the board. It's having an incredibly-- you know, again, you know, Joe and I have talked about this, but complimentary skills and synergy really can work. Especially if you allow open debate and discussion. And we had a board. Jimmy Treybig came with his set of views.

Malone: I was going to ask you next about Jimmy Treybig. Now that's a very different personality.

Stritter: Yes! Than Larry!

Malone: Why Treybig? He's an HP guy.

DiNucci: Cowboy.

Malone: Now at Tandem-- cowboy. Ham radio buff.

DiNucci: Systems guy.

Malone: Very different kind of...

Miller: Well, a) I really respect that he had started Tandem from scratch, built it into a multi-billion dollar company, was going to be using our technology, so good customer feedback on that.

Malone: The only man in Silicon Valley history who did a five year business plan and actually hit every single number.

Miller: Right, exactly. And then behind that good ole boy Texas, yes, there was a helluva good businessman. And he doesn't get enough credit for that.

Group: <agreed>

Mashey: But also, from a technical end, I was really glad to have him on there, because like, I used to go down to Austin to work with their folks who were putting MIPS chips with UNIX onto a triple modular redundant system down there. And being an old telephone guy who cared about reliability issues, it was extremely useful to get feedback from those folks. They helped us find things that I don't think anyone else would have. So it was nice to have somebody who thought enterprise grade stuff on the board, too.

Malone: And Joe, having given MIPS it's biggest customer, then you turn around and go work for MIPS?

DiNucci: Yes, ASAP. I mean, I was a lifer at Digital. I'd been there for 17 years. Came from Cleveland to Southern California to Silicon Valley in 1980, and but by the mid-'80s, I also realized my allegiance was-- I wanted to stay here. I did not want to move to Maine or Massachusetts under any circumstances-- for any job. And I'd turned down a series of jobs back there. So I was sort of-- that bit was set that there could be a move. And once the DEC deal got made, there was a-- without a doubt, the fastest development of a system in the history of Digital Equipment Corporation. To go from the decision to the launch of the DEC station, R3000 product DEC stations in January of '89 at the San Jose Center for Performing Arts. And that was quite a deal. And certainly after that, it's like post-partum depression. You know, the big rush, seven days a week, eighteen hours a day. Carol Peters, Tom Furlong going nuts.

And I'll never forget, the morning after the launch, Tom Furlong got the *Mercury News*, Business Section, front page, top headline, he had it blown into a poster about 12-feet long and put it in our lobby at Hamilton and Alma in Palo Alto and it said, "DEC Products Stun Valley." I'll never forget that. That was-- it was like all the things that Rodriguez and Billmaier and everybody had said could happen-- it's one thing

when your people tell you this stuff, but when the *Mercury News*, back then when it really was the *Mercury News*, puts a headline like that up about a big old-- not even a Valley company-- that was really something. That was--I remember walking into the lobby and all the guys came out onto the balconies and everybody's cheering. And it was like Egypt two weeks ago. Just, "We're free at last!" You know? It was really exciting. But, then, "now what?"

Malone: Then you realize it might never get better than this...

Miller: …at DEC.

DiNucci: Yeah. I remember Jim Billmaier came in to me in February and says to me, "I just need to know. You're a lifer; I'm not" And he was 15 years younger than me. And he says, "I'm going to leave the company sometime in the next 3 or 4 months. I'm not sure where I'm going to go, but it's going to be gone. Because, here's the reasons that Digital is doomed. This buys us some time, but it's a slowly deflating balloon, and I'm too young to die." I spent 2 nanoseconds trying to change his mind, but that wasn't going to work. So, next thing he says he's talking to MIPS. And, I go "MIPS?" [smile] He said, "Well, you realize we've been more valuable to MIPS being at Digital than we would ever be being at MIPS. That's no longer true. You should go talk to Bob."

So, I made an appointment with Bob. And, we had a little chitchat. And, just to rewind one year, the night before we went back to put our careers on the line, to go to bat at DEC for MIPS, I had called Bob. You were travelling. And I said, "I'm going back and bet it all on this. We've been through a lot. " And, I said , "I need you to tell me. I do not want to over-promise to my execs. At that point, I'm still a DEC lifer. I said, "this all has to be true. Anything we should dial back down, we'll reset, and then we will delight them. He goes-- this is in your book-- he says, "I really like your style." I said, "Well, you know, I'm not much for contracts and all that. But I trust you, so if you tell me that it's good, it's good. If you tell me, "Okay, let's take it off 15 percent, and we'll be good."" He goes, "No, everything that the guys have represented is exactly as I know it to be. And let's-- I'll pledge. If you get DEC behind this, we will deliver." And that was how that deal was done.

So I go to meet him a year later, and the DEC product is out and it's getting great reviews and people are happy, and it was a two billion dollar business in two years, by the way, epilogue. Pretty nice start. If only. Anyway, the internal saboteurs had decided it was actually the future for the company instead of just a sideline, or side show. So I go to see Bob, and I said, "I'm thinking of leaving Digital." And I said, "I don't exactly what my job here would be." He already had a great sales guy. There was no challenge there. And I had two slides, again, I got my old orator typewriter out, and I typed two-- one said, "MIPS can do anything." And I had this list of all the stuff the MIPS chip could do. And then the next slide was-- that was blow a little smoke where it would so some good. And then the next slide says, "MIPS can't do everything." "And maybe you could use some help deciding which is which." That did it. That was the core of my employment agreement. And it wasn't-- we didn't quite shake hands on that day like you did with

Bill, but within a week, we had a deal. And I remember Joe Sweeney faxed my offer back to Massachusetts, because I was back there for DEC, and it had to be in code. So it was addressed to Albert Sailor. Because my hero was Albert Einstein, and his hobby is he's a sailor. So he addressed it to Albert Sailor, with this base salary and then stock options and all that. So that's how I got to DEC--

Malone: To MIPS you mean.

DiNucci: I mean, to MIPS.

Miller: So Joe is an incredibly refreshing high-energy, but he's also one of the best and smartest sales business development guys I've ever seen. And he had to do internal selling and business development against the most hostile audience you can imagine. I mean, I saw that crew. I came back one time and I said to somebody-- I'd met with the top management staff at Digital, and I felt like I had walked into the Kremlin. These guys were the most sour-- I was like, "Man, if I had to go work with this group every day," you know, DG was bad. And I also concluded that de Castro really was a poor man's clone of Ken Olsen.

DiNucci: Ken Olsen, right. He was a little Ken Olsen.

Miller: Either they were-- neither one understood software, and neither-- you know, they were both hardware guys who would love to diddle a power supply, rather than figure out what kind of applications does this have to run? And I thought, how this guy managed to do this. If you turned him loose on the outside, he's going to be dynamite. You know, we had the semiconductor strategy pretty well in hand. But now rallying a larger audience because what we had to do, what I always said, "The super homerun in this business is when you become the defacto standard. When somebody says, "I'm going to go make a Xerox copy," but they're using a Minolta copier. Or when I ran the copier business at IBM, and I had to go to the corporate management committee and explain why I didn't think we should be in the copier business, I had gotten airlifted into this mess. And I said, "Guys, as long as they say when they're using our machines, they're making Xerox copies, we got a problem."

DiNucci: Or when you "Google" somebody on Bing. <laughter>

Miller: Right. So, that was really the bigger larger goal of-- since Sun had continued to drive a proprietary strategy, even though they claimed that SPARC also had licensees and all that, the reality was, they totally handicapped their semiconductor-- handcuffed their semiconductor partners. They couldn't go sell a SPARC chip to a SPARC competitor. They couldn't create an ecosystem that might compete with Sun. Whereas we said, "Hey man, it's a free-for-all. Whatever you want to do. We want a really competitive market. But what we really want to do is become the defacto standard for UNIX." You know, yes, Sun in many ways owns the UNIX market with Solaris. They were the first one there. But there are all these other companies selling UNIX-based products. We want to be the defacto standard.

Malone: I find it intriguing that to the general public, the whole salient point about MIPS was it was RISC. And yet, you guys by 1989/1990, that a secondary concern on your part. You were-- it was much more software, it was UNIX, it was everything else. The RISC problem had already put behind you.

Miller: Right.

Mashey: It was a good marketing prop. Yes.

Malone: Just like the fact that it was designed at Stanford, which apparently it wasn't.

Miller: That's open to debate, too.

Mashey: But the software issues, I mean, certainly a lot of people recognized that. That's certainly one of the reasons, you know, there's this little story about Joe gave this talk to Olsen, right? And shortly thereafter, Olsen gathered a bunch of the DEC fellows to come out and do due diligence on this little startup. And their chip guys were, of course, in utter pain, because they wanted to do RISC chips all along. They kept getting dragged back to do VAX stuff. And when they finally did their report, it was, "We could do chips every bit as good as these guys. We're good micro-architects." And they were. "But it'll take us years to duplicate the software."

DiNucci: That was the call.

Mashey: Right? That was the thing-- that was Bob Supnik and company, you know, they were gritting their teeth, but they gave the honest thing that they couldn't duplicate the software.

Miller: That's true.

Malone: Okay, so now you've got Joe there, you're ready to unleash sales. Where does sales go? Where were your target markets? Were you still working the valley mostly?

Miller: No, we were global at this point. We were going after Siemens...

Mashey: CDC.

Miller: CDC and every large computer company that had a big...

DiNucci: Bull?

Miller: [Groupe] Bull, <laughs> thanks for reminding me.

Stritter: All over Japan.

Miller: All over Japan. We had a guy named Tak Yamamoto, who Skip and I had known, was helping us in Japan to get to some of the biggest Japanese companies.

Malone: Now it must have helped going after Japanese companies to have strategic partners that were Japanese companies.

Miller: Oh, yes, yes. And remember, we had gotten an investment from Kubota, thanks really to an introduction that Alan Michaels had made when he was running Ardent. And they were-- Ardent was using the MIPS chips. So Alan was very worried about-- you know, I'd based my whole system design on the MIPS processors. I can't afford to have this company run out of money. So he introduced us to Kubota. So actually our first big Japanese partner was Kubota.

Stritter: And Kubota is not a traditional computer company. They're a tractor company. But they were growing their *zaibatsu* and getting into the computer business, and they needed a vehicle.

Mashey: But I think the way to categorize what was going on there a lot was that we were often dealing with existing mini-computer or mainframe companies, who were behind the power curve. They might well design some of their own systems around MIPS, but they'd also OEM systems of ours as part of their product line.

Malone: And they were looking for a radical change and shakeout right? And companies were-- now they were in the "Hail Mary" mode, where they just had to do some major <inaudible>...

<overlapping conversation>

DiNucci: AT&T was playing and it was a crazy time.

Miller: And then we also had, you know, targeted some customers for our systems, like American Airlines. We had a very big customer in American Airlines.

Mashey: Or we had that auto customer in Dayton.

DiNucci: Reynolds & Reynolds.

Miller: Joe had gotten us through his automobile passion.

Malone: I was going to say, it was an excuse to go to Detroit. Joe was Dearborn.

<overlapping conversation>

DiNucci: These are car dealers who are my next best friends.

Miller: These are guys who sold turnkey solutions to car dealers.

DiNucci: They had half the market.

Miller: But you know, you talk about when-- I always, when I talk to people in startups, I always say startups can either be a Bataan Death March, when they never hit that point where all of a sudden the company takes on a life of its own where everybody wants to talk to you. And when you hit that point where everybody wants to talk to you, that's when they're really fun and exciting.

Malone: And this happened around what, '90/'91?

Miller: No, this happened...

DiNucci: '88/'89.

Miller: When we did, our world was getting better, but it dramatically changed when we announced the deal with Digital.

DiNucci: And I would say, you mentioned Steve Blank a couple of times. And I worked with Steve post-MIPS at ePiphany and places like that. But he has a great blog now, You guys are a poster example of what he talks about. A startup is a small company in search of a business model that will make it a big company. It's not about your business plan, it's not about-- it's about your model. And you iterate your model till everybody wants to talk to you. That's really-- then, "Oh! We got it!" That's what happened.

Mashey: There was no doubt about it. MIPS looked larger than it really was.

DiNucci: It was a virtual corporation. And certainly looked larger than it really was.

Malone: I want to get some dates very firm here. Bob, you arrived and took over CEO what date?

Miller: April of ’87.

Malone: Of ’87. By end of ’88, you guys are on fire!

Miller: Right.

Malone: So in a year’s time. Plus you introduced the new product.

Miller: Right, right.

Malone: And then you decide <laughs> now that you’re running absolutely all eight cylinders and at red line, you decide to take on the most difficult challenge a new startup company ever faces. You decide that you’re going to take the company public.

Miller: Right.

Malone: Which means dividing your executive team in half when they’re already over-burdened, and having that one half run the company, and the other half put together the prospectus, do the road show, do all of that sort of stuff.

Miller: Right.

Mashey: But always never knew what you couldn’t do.

DiNucci: Everybody said you couldn’t do that.

Miller: And right. Let’s face it. Microprocessor development, when you’ve got the 900-pound gorilla in the market called Intel, is the sport of kings. I mean, you don’t do that on what’s in your piggy bank. Right?

DiNucci: Deep pockets.

Miller: So getting a source of cash, and getting the value and taking advantage of the value of the company, and the potential the company had, continue to be a priority. You know, it was great, we had cash coming in the door, but we had the R4000 project, which we had.

Malone: Oh, I forgot the new product as well. You had coming out simultaneous to all of this.

Miller: So the R4000 now...

Mashey: It was in development. That wasn't out yet.

Miller: No, it was in development, but we had to fund the development. I mean, that was a huge development effort.

DiNucci: Big deal.

Malone: I mean, there's always the financial question about going public, because you need the money to do all this stuff. But simultaneously, there's the management question. Because this is a transformative event. This is a discontinuity in the story of the company. And not only is it debilitating to the company in the ramp-up, but when you go public, all of a sudden, you're publicly reporting your financials. You gain a whole new-- you gain several million new bosses. Each one waving their single share and their retirement fund. All sorts of things. And you can no longer dole out the options as a management incentive, employee incentive. You put that on top of everything else that was going on in the company at the time. That must have been a scary decision to do. I mean, did you make that decision, or did the board make that decision?

Miller: No, we made that decision. The board didn't. I mean, the board, obviously-- I think we were on a $200 million dollar revenue pace, and about a 15 percent pre-tax profit. So we were, for all intents and purposes, fitting a profile of a company that should be able to continue to grow and prosper in the public market.

Malone: I was going to say you were so much different than a company going public ten years later.

DiNucci: Oh, yes.

Mashey: Sure, yes.

DiNucci: This was a real...

Malone: You had revenues, you had profits. You had everything.

Stritter: Fundamentals.

Mashey: Different world.

Miller: And technology. I mean, very good technology that was being proven in the market every day.

Malone: Now you presented yourselves at the time as "The first new company of the '90s," if I remember right. That was your hook.

Miller: If anyone knows, you do, Mike. <laughter>

Malone: When you went public. What's interesting about your IPO is how many well known names were involved in that. You know? You've already got-- was Davidow still on the board at this point?

Miller: Yes, oh, yes.

Malone: So you have Davidow on the board, you have Sonsini on the board. You have Treybig on the board. So these three famous Silicon Valley names. Then you go out and all of a sudden, the name Frank Quattrone appears in the process. And your underwriters were?

DiNucci: Morgan Stanley.

Malone: Morgan Stanley and Sutro , weren't they?

Stritter: Cowen.

Miller: No, Cowen.

Malone: Cowen! Cowen. Then you embark on one of the more legendary road shows with one anecdote of you climbing out of a car...

DiNucci: In Italy.

Malone: In Italy.

Miller: No, in Paris.

Malone: In Paris, and another car sideswipe-- tears the door off your hands, off the side of the car. So they could've-- you could've been killed in the middle of the road show.

DiNucci: Wasn't that the trip also where all your clothes were stolen out of your car in Rome?

Miller: No, no. That was a different one. <laughter> That was when we were going to Olivetti. That had nothing to do with the road show.

DiNucci: Ah!

Malone: Tell me briefly about that road show. Because it was truly a marathon what you guys did.

Miller: Yes, because we, you know, the Morgan Stanley felt that because we had so much visibility in Europe, and so much visibility in Japan, it would be good to take the road show to build up the book through Europe and through Japan. And we hit Paris, I remember being in Scotland one night, and <laughs> 'cause somebody told me, in this what had to look like the dullest place I'd ever been in my life, that there were a lot of really good investors here. "If they're really good investors, what are they doing here?" <laughter>

DiNucci: Yes, there were more investors than bucks. <laughter>

Miller: And oh, obviously, New York City, Chicago, Minneapolis, San Francisco. It was quite a road show. It was quite a trip. And then in the middle of it, having this whole thing blow up about Quattrone.

Malone: Yes, Frank Quattrone talks to the reporter from *USA Today*.

Miller: No, it's-- Frank Quattrone talked to *Investor Business Daily*, *IBD*.

Stritter: And what'd he say?

Malone: He predicted the stock price, didn't he, at opening?

Stritter: He just said it was hot, the hottest offering.

Miller: No, he just said it was the hottest IPO that he could remember. While he's driving his BMW down 101 talking on his cell phone.

Malone: At which point the SEC...

DiNucci: He was 32 at the time.

Malone: ...starts intervening in the process, threatening to shut down your IPO.

Miller: They weren't threatening, they said-- they gave us an ultimatum. At 7:00 at night, California time, we were at the printers. And their ultimatum was either dump Morgan Stanley as your investment banker, or we're going to stop the IPO. Because they had-- so the conversation, Mike...

Malone: The Valley history would have been different if you guys had dumped Morgan Stanley, because that would have gotten Quattrone fired, and that whole <inaudible> the Valley...

<overlapping conversation>

Mashey: It would have been a very different story.

Miller: Well, the irony was Frank Quattrone was on vacation. And his Number 2 was there at the printers with me and the attorneys and the Cowen guys. And this SEC guy from the East Coast is on the speaker. And he's saying, "I'm stopping this thing!" And Bob Latta from Wilson, Sonsini said, "Why?" He said, "Well, I got this **Investor Business Daily** article where he's quoted as saying, "This is going to be the hottest IPO or something like that. and he's a banker involved in this thing." And somebody said...

<overlapping conversation>

Mashey: He called him “Quotron” if I remember right.

Miller: We said, “What is *Investor’s Business Daily*?” The guy says, “All I can tell you is it shows up on my desk every morning,” the SEC guy. So he said, and it quotes this Frank Quotron [*sic*].” And then he spells it. And one of the, I guess it was Frank’s lieutenant says, “Oh, you mean Quattrone.” And he says, “I don’t give a damn what...” and he did say damn, “...you call him. I’m just telling you he broke the rules!” So the thing that saved it is, as I think you know, is a panic call to Larry Sonsini.

Malone: The Morgan guy went white, and the Cowen guy was cheering.

Miller: Yes, the Cowen guy was saying...

<overlapping conversation>

Miller: We can get...

DiNucci: “Put me in charge!”

Miller: What do they call it when they change the front cover where it’s just their name on it. There’s a name for that, “We can get that in the next 30 minutes.” <laughter>

Mashey: “We’re already covered.”

Stritter: “We’re already at the printers.”

Mashey: “We’re at the printer!”

<overlapping conversation>

Miller: Style guide. We can have our style guide here in 30 minutes.

Malone: Now at that moment, this is one of the legendary Valley stories of Larry Sonsini stepping in using the full weight of being Larry Sonsini.

DiNucci: Right, the Full Larry.

Malone: To do the Full Larry, to actually save your IPO.

Miller: He did. And Larry did save it. The deal had already been priced. It was on the wire. Nobody was telling the SEC guy that. That the pricing of the MIPS IPO was already on the wire. <laughs>

DiNucci: So Larry was right!

Miller: But we get hold of Larry, who was between planes at LaGuardia Airport, we tell Larry what's going on, we tell him it's been priced, it's on the wire, thank God the SEC guy hasn't looked on the wire. So Larry, the way Larry got the guy to go along with it, Larry called him up and said, according to Larry, which I believe to be true. I can't remember the SEC guy's name. It's probably just as well I don't. "What do you want to work on for the next 90 days?" The guy said, "What are you talking about?" And Larry said, "If you hold up this IPO, you're going to be working on MIPS for the next 90 days, because this isn't going to go away, it's just going to keep escalating." He said, "If I were you, I'd just let it go. No harm; no foul." <laughs> The guy agreed with him.

DiNucci: He was right!

Malone: And you guys went out the next morning! That morning?

Miller: We went out the next morning.

Malone: Opening share price?

Miller: Opening share price-- well, we priced it at...

Stritter: $17.50?

Miller: We priced it at $17.50 and it went up to about $28.00 that day.

DiNucci: That day, yes. Closed at $24.00.

Malone: I remember you guys, at the end of that day, you were a pretty happy group of fellows.

DiNucci: Oh, we were.

Miller: We were a very happy group of people, yes.

Malone: Impact on the company of going public? Because going public changes a company forever.

Miller: Uhm hm.

Malone: You hire a different sort of person. Because their ambitions and their motives are very different than people that are in a startup. What was the most obvious change to each of you when MIPS went public?

Miller: Well, Skip had been at it the longest, so.

Malone: It must have been hugely satisfying.

Stritter: Of course it's satisfying personally and stuff.

<overlapping conversation>

Malone: You were _____?

Stritter: No, the big change for me was people now knew what MIPS was. Regular people. You know, people knew where I worked. And everybody used to say, "What's MIPS?"

Miller: Yes, I think for me, I felt we had a team that could easily handle a public company. I mean, it was a very seasoned management team. We had a very strong CFO, Dave Ludvigson. We had a strong sales organization.

DiNucci: You had a lot of ….

Miller: And you know, it was in many ways a recurring revenue model, because of the licensing program. So it wasn't like even though quarters are always hard to make in the high tech world back then. I mean now there are different metrics and different ways of doing things. But we did have this recurring-- and an opportunity to continue to sell licenses and other things, where as we had a customer base that

when we had a new generation product, we could sell it to. So I felt very confident that the thing I worried about most was what was it going to do to the type of person we would recruit. Because we couldn't offer them the same upside we could offer back when the stock was fifty cents. And were we now going to get more of the larger company guy who doesn't look at equity as where I'm going to make my money.

Malone: Did you actually see that? Did that happen? Did you notice the change over time?

Miller: I think that it was not a big deal. I don't think. I think again, because we had an exciting opportunity. And in fact, now we had our own brand recognition, which we hadn't had before. And so, you know, the two more or less balanced each other out, Mike. And we continue to recruit very good people.

DiNucci: I just remember feeling really affirmed. The Digital experience for me had been really wonderful to come out of the steel mills of Pittsburgh and join a little company in 1971 and have it become what Digital was. It was great! And then I get this opportunity to join MIPS in March of '89. And nine months later it goes public! Even with the reverse split, which we did just before the IPO, two-and-a-half to one. I said, "Well, I don't like that. That didn't feel very good." But then you think, "Well, yes, but look what-- the world now says this company is worth all this money." So you think, "Wow! I did it again! I've landed in another really wonderful company!" And I also remember at the all-hands, the day of the IPO, the T-shirt-- I meant to bring it-- it had, I think the legend from the front of the stock offering printed on it, but at the top it said, "This is absolutely the last free T-shirt." <laughter> Remember that one?

Miller: Right. "No more free T-shirts."

DiNucci: "No more free T-shirts."

Mashey: To me, at least, on the engineering side, I think we were still hiring good people, because in a lot of cases, the motivation was, "Gee, I want to work with a really terrific team." And not everybody is necessarily in it to make the big money the next time. Right? But it's always a factor. But in some cases, it's, you know, these guys have done incredible stuff. I mean, c'mon, the original schedule was insane. I mean, you know, to go in a year from getting the company started to having a chip architecture, get the first chip out, have a terrific compilers, have an operating system coming up. I mean, that's crazy! So you know, around the Valley, people had a pretty high prestige from this stuff, and people wanted to work with you, you know?

Malone: Let me ask you a question I couldn't ask you at the time, because we didn't know what the future was going to be, but was an M&A out there in your mind as part of a long-term strategy?

Miller: No, no. Not at all.

Malone: Because I was there the night that you guys-- I was there all day, the day you went public and I watched the cheering and the parties and everything else. And there was the sense that MIPS had created this institution, this enterprise that was, you know, it was going to be HP, it was going to be Intel. It was going to be around for a long, long time.

Miller: Right.

Malone: And then yet, three years later, you know, I covered the news story of the acquisition. The three years there seem to be vital. And even though you were very public by law during that period, it's not really generally known what occurred during those three years between the IPO and the SGI acquisition. Give me some benchmarks, milestones during those periods. All three of you. All four of you.

Miller: So I think that, Mike, we hit a point where it was getting increasingly difficult to maintain the growth curve. And it was also--

Malone: When did you get the 4000 out?

Miller: Whoo.

Mashey: End of '91.

Miller: Yes.

Mashey: First it shipped-- it actually shipped...

Malone: That was the longest development cycle of any product to date.

DiNucci: Long.

Miller: And that product was a year behind schedule. And we...

DiNucci: That was really costly.

Malone: Why was that? Ask the two technologists there.

Stritter: Did the team get too big?

Miller: No, I think what happened was within engineering, the priorities-- engineering was getting pulled in a lot of different directions. By that time we had a lot of large system customer, OEMs, and they wanted certain things. And rather than saying within engineering, the R4000 is Job One-- and you know, most of the specs for the R4000 came from Microsoft, which is one of the little known secrets also. So the R4000 became very big and expensive. Because the reason, ironically, that it was a 64-bit processor and the industry's first 64-bit processor was Microsoft wanted it to be 64-bits.

Mashey: Uh.. no! I disagree with you, Bob. Sorry. You're wrong on that one. Because we all talked about-- we were talking about it being 64-bit in 1988.

Miller: Yes.

Mashey: Okay? I mean, that was-- I have a slightly different thing. The Microsoft thing added some complication without a doubt. But the problem is it was a very aggressive chip. It was the first 64-bit chip.

DiNucci: It was a beast.

Mashey: It had...

Malone: Did you guys go a bridge too far on that one?

Mashey: No, no.

Miller: No, they had to do it. They had to do.

Mashey: Had to do it. We knew it had to be 64 bit.

Miller: We didn't go a bridge too far. And Mash has his view. But if you ask me, what was it that tilted me to go along with the 64-bits, it was sitting in a meeting with John Hennessy and Bill Gates. And Bill Gates saying, you know, "We'll put NT on this, if you make it a 64-bit chip."

<overlapping conversation>

DiNucci: Let me set the scene for this.

Mashey: But you're right. I mean, we started with...

Miller: That has always been...

Malone: Gates was dangling the idea that you guys would be the 8088 for his NT.

Mashey: Right, right, yes.

DiNucci: And how we got there is, I think, interesting. My second day on the job, after I found my cubicle and my wastebasket, Bob Miller comes over-- this is after my secretary had a secretary when I was at Digital. I was a czar.

Miller: And I said, "I'm your secretary, Joe."

DiNucci: So Bob comes over and he says-- writes two questions on my whiteboard, which is hanging on my little partition. Should we license our compilers to Intel? And should we try to displace the Intel i860 at Microsoft which they're using for a development platform what was then called Portable OS/2, you know better as NT. Then he walked away.

So I start asking Mash and Skip and different guys. What does this question even mean? Let alone what is the answer. So I came back a couple days later and I said, "No, we shouldn't collaborate with Intel." "Why?" "Because they have more lawyers than we have engineers. They'll kill us. They're a terrible partner. They're not nice people. We don't want to work with them. And they need us a lot more than we ned them." "Yes, we should help Microsoft." "Well, make it happen." "Oh." Then you mentioned your old colleague Jon Shirley, who was then President of Microsoft, ex-IBMer, right?

Miller: Right, and Cutler was running the NT development. Who was...

DiNucci: And Dave Cutler was running the NT development because back when we were still fighting about getting MIPS into DEC, Dave Cutler was running DEC Engineering in Seattle. And he was probably the most respected engineering leader in Digital. And he was a good friend of Carol Peters, who was my buddy in Palo Alto. And she says, "You got to get Cutler onboard." So I called Cutler. And he looks at me, I'm a salesman, so he is-- I'm nothing. Yes, I'm a lower life form. And I said, you know, "Your backing on this would really matter." I said, "Carol's onboard. Tom Furlong. We have Ken Olsen aligned, but we need help." And he goes, "Those people back there are so stupid. And they're so shortsighted, it doesn't matter

whether I side with you or not. It doesn't matter whether you win or not. They're never going to stick with it anyway."

And I lost it and I said, "Look. I'm a lifer. And you're a very respected person in this company, but if you have that kind of a cynical attitude, you ought to quit. Either get onboard, pick a side and get in the fight, or get out." He hangs up on me! Five minutes later, Carol Peters comes running downstairs. "What did you say to Cutler?" So I told her. She goes, "Oh, my god." She said, "Well, here we go."

So we went back for our big showdown, should we do the MIPS deal or not?" And Dave Cutler is leading the opposition. It was like an Oxford Union Debate, and I'm the proposition; he's the opposition. And he's wearing a T-shirt with a cartoon drawing of a guy with a screw being turned through him. I said, "That's very mature, Dave. That's quite a statement you're making there." And it was quite a technical dust up. And we carried the day. We got it. Well, then he quit. Bill Gates made him an offer, and he took his whole team. The VMS team.

Miller: Did he quit before Gates gave him the offer? Because Dave called me...

<overlapping conversation>

Mashey: He was going to do a startup, right?

Miller: ...the day he was going to do a startup.

DiNucci: He was going to do a startup with you.

Miller: And he wanted me to-- not with me-- he wanted me to introduce him to the Mayfield guys. And I got his funding all lined up, and then he called and said, "Bob, I'm sorry, but Gates made me an offer I can't refuse."

Mashey: But they were going to use MIPS chips, right?

Miller: Yes.

DiNucci: Gates hired his whole team.

Miller: Yes, his startup was going to use MIPS chips.

DiNucci: Gave him a million stock options of Microsoft stock. So he goes there. So, I wrote a letter to Jon Shirley, and I still have it. And it says, basically, "I'm from MIPS, and you're developing this on i860. Which is a bad idea for two reasons. One, there's a better chip. It's ours. And two, they already have, basically, your right testicle in their right hand, why not give your left to somebody else that might preserve the species."

Stritter: Nice metaphor, Joe.

DiNucci: And two days later, I got a phone call from Nathan Myhrvold, who was the CTO at Microsoft. And he invites me up to, you know, "Bring somebody who knows what they're talking about." So I brought Skip. And we went on a Saturday. And we went out to Redmond, and sat down in Nathan's office. He consumes one 12 ounce can of Diet Coke every 12 minutes. So five an hour. And he stacks them up and he lines the logos up. I mean, talk about a Coke addiction. Whoo! But he's a smart cookie.

Stritter: Oh, yes, he is!

DiNucci: And I don't know what happened after that meeting, but two months later, Bill Gates came to Arques to MIPS headquarters for a sit-down with John Hennessy to talk it over. And my reward for getting that meeting to happen was I got to sit in and listen as long as I promised not to say anything. So I sat and listened. And I distinctly remember Bill Gates-- for some reason we weren't disclosing that it was 64-bits.

Miller: Because we still weren't-- that's why, much as...

DiNucci: But! But let me finish what I remember. Bill said-- and Bill's still pre-- this is pre-domesticated Bill. He's still lotus position, BO, rocking, you know? But scary smart. And he says to John Hennessy, "So this is a 64-bit architecture, right?" And John was evasive about the answer. He didn't crisply answer the question. So that was in, I'm pretty certain, October-- it was before the IPO.

Miller: Yes.

DiNucci: September/October 1989 was when that meeting happened. And that was a very big deal. And two months later, you and I flew to Redmond, I handed Bill this Roller Ball, and he signed the MOU to move the development of Portable OS/2 onto a MIPS platform.

Miller: Yes, so in any event, the R4000, and we committed dates to Microsoft, because we did displace the i860. We were going to be the development platform. And...

Malone: Was this a case of you guys swallowed a whale? Was it...

Mashey: No, again...

DiNucci: There was intrigue also.

Mashey: It was hyper-complicated. Not just-- I mean, it was technically complicated, because the chip was aggressive. It was a full 64-bit chip, it had everything on one chip. It had multi-processor support on chip cache control-- it had a lot of stuff on one chip, okay? It was a very aggressive chip! And then it was complexified [sic] by, for instance, talking to Tandem, and trying to make sure it would be okay for fault tolerance stuff. Doing the things that Microsoft needed. I mean, it was not trivial.

DiNucci: Backwards compatible with everything MIPS ever...

Malone: It was not only all things on chip, but it was also going to be all things to all customers?

Mashey: No, no! It just-- it was...

Miller: I don't want to characterize it like that.

Mashey: No, no, it was complicated.

Miller: This was meant to be the industry's best microprocessor. It really was. If you took a snapshot of when the R4000 came out, it literally dwarfed everything else.

DiNucci: For general purpose computing.

Miller: For general purpose computing. Functionality, performance, the fact that it was 64-bits.

Malone: And even though it took you two years, you were still ahead of the curve.

Miller: Way ahead of the curve. Yes. So that extra year cost us, but it wasn't like we had to abandon the project. And you know, if in the spirit of "Would you do it all over again?" Absolutely. And so-- and we got good licensing revenue, because people paid for licenses in advance. Because remember they were then going to fab the chip, so NEC, Toshiba, anybody-- and that got us the absolutely best design ground rules

of what was in the semiconductor industry at the time. I don't think that the R4000 is what led us to the point where we were selling the company. I think what happened was our stock price took a hit, along with a bunch of other people.

Malone: Well, it was the time for stock prices to take a hit.

Miller: Right. And SGI, who had some common board members, started lobbying with some of our board members that they were very worried that we might get acquired by NEC, or we might get acquired-- and their whole product line was based on MIPS.

Malone: Now where was Silicon Graphics in all of this?

DiNucci: Biggest customer.

Malone: Because they haven't come up for most of this conversation when they were the centerpiece of the first-- of the second year of this company, they were everything.

DiNucci: Clark and Hennessy shared an office didn't they, at Stanford?

Stritter: Yes, I think they were probably still our biggest customer.

Miller: It depends on how you measure "biggest customer." They weren't in terms of revenue to us.

Mashey: But they were very close in a lot of ways. The first--

Malone: You are the hottest chip company around, and they are the hottest workstation company on the planet.

Mashey: Yes, but it's more than that. The number of people who had worked together, who had worked for me, who I'd worked with, likewise with everybody else, was very close. You may recall how close geographically they were, right here. Okay, all right? The first UNIX System V port to MIPS, was actually done by a combined team of MIPS guys and SGI guys that worked for me over the summer of '86.

Malone: So you guys had one leg in each other's trousers.

Mashey: It was close. There were tweaks in the R3000 to help it be a better multi-processor chip for SGI's benefit particularly. Just there's a whole raft of interconnects, okay? So it wasn't like we didn't know each other. You know?

DiNucci: There was also the intrigue. I don't know if this was material. But I remember your reaction when you got a call from one of your moles at Microsoft that they'd just gotten a visit by Bill Strecker from Digital. Who wasn't so sure that the R4000 was the be-all-end-all.

Miller: It was actually John Scanlon, who at that time was at Motorola, who had just gotten a pitch from Digital about the Alpha. And they had told-- and John Scanlon says, "We're going to use the R4000," and they had told him, "Well, you know, we're a partner of MIPS, and we're not sure that there'll ever be an R4000." So I got that from the horse's mouth. I called Ken Olsen, who didn't deny it. And says, "You know, Bob, it's very hard to control your sales force. It's very hard to control what they're going to say." So it's at that point that I said to myself, "You know, I'd rather have Digital as a competitor than as a partner."

DiNucci: Least then you know what you're dealing with.

Miller: I know what we're dealing with. But I think that...

Malone: The myth of the Alpha chip distorted the industry for much of that decade, didn't it?

Miller: Right. That was the real myth.

DiNucci: It was a wound.

Miller: But the thing that nobody knows, Mike, I guess it's going to go in the archives now, is Larry Perlman, prior to the SGI acquisition, offered me that if we bought Control Data's system business, he would pay me $150 million to cover termination costs. And I sent a small team out. And they're-- if we had done that, we would have instantaneously been a billion dollar company. That was the good news. But we would have inherited a huge distraction. And the thing we were struggling with was we knew what the R4000 was going to cost us, but right behind the R4000, there was going to have to be an R10000. And that's where when I say "Microprocessors are the sport of kings," all the companies developing microprocessors were multi-billion dollar companies.

DiNucci: Nobody told Intel the game was over. They were still fighting back.

Miller: So as I thought toward the SGI combination versus say, acquiring a Control Data and getting $150 million, then having-- you know, I started having déjà vu about my days at Data General of managing down a 10,000 person organization to 2,000 people. Right? Yes, they had a great customer base, but it wasn't a technology customer base, it was a system customer base. And obviously, I had people on the board with opinions. And the SGI option was being sold as if you put MIPS and SGI together, we are going to have the next Hewlett Packard. The thing I hadn't counted on was the behavior of the SGI management.

Malone: SGI approach you guys?

Miller: Yes, they approached us.

Malone: When did that happen? Who was the emissary? Like did McCracken just call you?

Miller: Yes, McCracken called me. We sat down, discussed our combined vision. He gave me all the assurances of, "If we do this together, we'll keep your-- all customers are treated equally. You know, "We value the Microsoft component of what you've done." And...

Malone: Did you guys know this was coming, the SGI acquisition? I mean, Bob's talking to Ed McCracken. Did you guys have any glimmerings of this? Okay. I'm just curious. Did you know that the company was facing some sort of major transformation. Okay, you knew it was inevitable.

Stritter: I don't know if it was inevitable. But yes. Yes, we knew. I knew.

Malone: So you made the announcement to the company, when, how?

Miller: Well, there were various stages. So I think I brought the executive team in on it. Because a lot of work had to be done to figure this out. So I'm still trying to remember the date. Was it June of '92?

<overlapping conversation>

Stritter: It was '92.

DiNucci: Summer of '92, right.

Stritter: Yes.

Malone: Sale price was $450 million?

Miller: Yes. So I probably reached a point where I had to let the team know, because we seemed to have what would have been a good, you know, remember, the other thing is that as a CEO of a public company, if somebody says, "I'm going to give you something that's 50 percent higher than your current stock price," you're kind of in a bind. <laughter>

Malone: You kind of are, yes.

Miller: "No, we're not accepting those offers today."

Malone: You have to remind yourselves that it's not a personal decision.

DiNucci: Call back during business hours.

Miller: So I mean, that was the offer was about 50 percent above what our stock had been trading at at that point. And so, the board was...

Malone: [They] informed you it was a helluva good idea.

Miller: <laughs> The board was saying, "We probably ought to try to get a term sheet together."

Malone: Yes, okay. How many of the original founding team was still there by this point?

Stritter: Founders, just me. John Hennessy was visiting one day a week or so. He did a lot of good work for us, but he was back at Stanford.

DiNucci: Still in Stanford.

Malone: What was your reaction when you heard this? Founders have a different reaction with everybody else.

Stritter: Yes, you know, it's mixed, because SGI-- I had watched SGI get started. And that was part of the excitement that led to the MIPS excitement in the first place. And it was such a dynamic group. You saw it, too. It was flashy, but really amazing. And so that side said, "This is very interesting." But then you

have your own thing. Your own baby that's going to get diluted, going to get mixed in with everything else. So it's a mixed feeling.

Malone: How about you, Bob? I'm curious, because in one respect, taking a company as far as you did, as fast as you did, and then selling it 50 percent above the stock price, I mean, for any CEO that's a heck of a line item on in your CV. That's a huge victory for someone in your profession. On the other hand, you're giving away our baby. I mean, you built this thing. You turned it around.

DiNucci: Turned it around.

Miller: Very frankly, it wasn't supposed to be, "We're the buyer; you're the seller." That wasn't the way it was approached. It was approached as, "We're going to really have a combined company here. And we're going to leverage all of this stuff you guys have done, and we're going to bring to it our SGI glitter." So it wasn't-- you know, I've sold companies-- in fact, I just sold one a year ago. That was clearly a sale. And I knew going into that that what I was doing was selling the company.

Malone: This was going to be a merger of equals.

Miller: This was going to be a merger. It really was going to be a merger. And it didn't turn out to be a merger. So I, at the time we did it, I thought number one, I'd done something very good for all the employees in MIPS. They were all going to get jobs. Some of them were going to get very good jobs. And they were going to be now part of a company that really could become the next HP. That's the way I looked at it, Mike. I didn't look at it as I had just taken this thing and sold it. I looked at it as maybe this is the normal course to get a larger critical mass that we could use to build even bigger, better microprocessors. Because part of the attraction of SGI is, "We're a multi-billion dollar company, we could put a lot more into R&D than you can." Right?

Malone: John? I want to save you, Joe, because you stayed at SGI for a long, long time.

Mashey: Oh, I did. I stayed even longer.

Malone: Oh, both you guys stayed?

Mashey: So do...

Malone: Both you guys tell me then, the transformation. Because in a sense, you guys went on with your lives, but these guys stayed at Silicon Graphics.

Mashey: Okay, so for some number of years before, I had been, let me see, a guy who was technical some of the time, helping marketing and sales some of the time, trying to keep him honest some of the time. You told me that one time, I remember. I was supposed to keep an eye on you. But that's not so easy, right? But so I had the following job interview. Forest Basket, the CTO over there who I've known for years, called up and says, "So Mash, you know, we've been talking about what we should do with you. Why don't you come over, report to me, do what you do now, and we'll pay you more?" So I said, "Okay." That was it. So I had the same kind of troubleshooter, runaround. I had helped start the SPEC Benchmarking Group, I was still involved with that. And help out with microprocessor design doing the phases when I could. And I ran the MIPS API group to work with some of the other companies, help design systems. I was happy because I thought SGI was a cool company. I'd worked with them a lot. And the issue was, in fact, having the scale and muscle. This is Joe's thing about, there are wolf companies, and then they get to be bigger and be tigers. And there were times where we knew great stuff to do at MIPS, and we just didn't have the resources to do it. So it was pretty easy for me, and it was even a shorter commute. So. And then Joe had an interesting...

DiNucci: I mean, SGI was really a hot company in 1992.

Malone: Your office was about 50 feet from where we're sitting right now.

DiNucci: Exactly. We built this building to be headquarters for North America. But we started off...

Mashey: But I like the way you were recruited.

DiNucci: Ah, I mean, it was cool! I mean, well, once we knew what was going down, I remember Chet Silvestri, and Bob and I don't remember who else, probably Mash standing in my office at the old MIPS campus, and talking about SGI. And I remember Chet saying, "You're going to love it. It's right up your alley." He said, "I'm not going to love it, but you're going to love it." And I thought, "You don't know me. And I'm not going to love it." And I'd gone from 100,000 person company, DEC, to a couple hundred person company in MIPS, and I loved the smaller company. I loved the higher teeth-to-butt ratio. And I looked at SGI, and I thought, "It's 2,000 people or more." The only person I knew there really well was Carol Peters. And she was in engineering.

And I wasn't interested. I thought, "I'm going to find me another small company and do this again, and do another IPO, that's really-- I like that IPO stuff, that's fun." Well, McCracken calls me up out of the blue and he says, "We've only met once. He said, "I don't really know you," he said, "But I'd like you to come to SGI." And I said, "I'm not interested." And he said, "Why not?" And I said, "It's too big. And with all due respect, it's just not for me -- five years ago, maybe. But not now." He said, "You know, I need some gray beards in my salesforce." He said, "No offense," but he said, "you are one." He said, "I'll be honest with you, Reynolds & Reynolds was MIPS largest system customer, $20 million a year. They automate car

dealerships. We need to keep that account healthy. So frankly, one of your jobs is to make sure that that stays." And Mash was invaluable to that. He helped me get that deal, and he helped keep it.

Mashey: By doing a red-eye, yes, well, never mind, okay.

DiNucci: Yes, Mash and I are watching Hannibal Lector in Cincinnati, Ohio. Anyway, McCraken said, "But beyond that," he said, "I'll make you an offer. If you'll do that for me, make up a job. You can do anything you want." I said, "Okay, here you go. I don't want anybody to work for me. I would rather be Top Gun than Secretary of the Air Force. I want to be Vice President, Automotive Industries. I'll make my own travel arrangements. I'll make friends with the sales force. And you pay for my *Auto Week* subscription." He said, "Deal. Do it for one year," and he said, "Just commit for one year." I said, "Okay," so I made a deal.

That was the most fun I think I've ever had at work. I mean, it was just a hoot! I mean, I remember going to McCracken and saying, "The board is boring! You got nothing but VCs here. You need some captains of industry." "Well, go get us one." So I went after the CEO of Ford, who had just joined the board of IBM. So that wasn't going to work. So well, who's the coolest guy in the auto industry? Bob Lutz. He was then the President of Chrysler. So, we reached out to Lutz, a couple weeks later he flew out here. I remember picking him up for breakfast over at Il Fornaio in my Ferrari, and he drove my car over to SGI. And he was just the coolest stud! I mean, he still is. He's my idol. He's 78-years-old, just interviewed him for a book about a month ago. To my business partner, I said, "Boy, I wish I look like him when I'm 78." She said, "You won't." <laughter>

Malone: Too late…

DiNucci: But SGI in '92-- let's see we got here...

Malone: June '92, July '92, yes.

DiNucci: I mean, eight months later, Bill Clinton wins the surprise election. Right? And a month after that, Bill Clinton and Al Gore come to SGI for a town hall meeting in our cafeteria. How cool is that? Anna Eschoo was my date. You know, I got to bring her in. And it was just like, "This company couldn't be any cooler?" I mean…

Mashey: Well, actually... <inaudible>

<overlapping conversation>

Malone: Spielberg's doing a show right here.

DiNucci: Show, we're doing Boeing 777, we're doing Jurassic Park, Terminator II, all the movies.

Mashey: But it even started actually the week after we got there in that the salesforce invited both Joe and I to come speak-- ah, he laughs, see? They invited both of us to come and speak to the salesforce. And I put together a little talk. I gave this talk with hats. And I explained I was a competitive guy, a UNIX wizard, et cetera. And I could help them out maybe, right? But in this thing we had both put together short presentations with bullet items, all right? Well, pretty quickly up on the screen goes an image of a guy looking like Schwarzenegger on his motorcycle from Terminator, and he's driving along and it shows him coming to a hotel, which is the one we're in.

DiNucci: The Marriott in Santa Clara.

Mashey: The back door opens, he rides his motorcycle up the aisle, right?

DiNucci: Onto the stage.

Mashey: Gets up there, and the screens light up with big asteroids coming at us, and then you see they're labeled Sun, and it blows up! Okay, he says, "I want you to terminate Sun." And another one comes and it's IBM, and it blows up. "I want you to terminate IBM." And it blows up. And he says, "And if you don't, I'll be back!"

DiNucci: "I'll be back!" That's right!

Mashey: And he gets-- <inaudible>. We're sitting here going, "We've got slides with bullet items." <laughter> Joe is sitting here lusting after the visual technology. He's just- he's just like, "Oh, yes! Give it to me, give it to me!"

DiNucci: There's 2,000 people in the audience, the salesforce. Gary Lauer, who was the head of the salesforce, comes out. He's a cool guy. He runs eHealthInsurance.com. He comes out with a forklift with a pallet of Rolex watches, because in Q4, which was the April-June quarter, they had a little sales perk that if you did 110 percent of your quarter, you got a steel and gold Rolex. And he's taking Rolex's off of this Pallet, and he says, "Jerry McGuire?" Throws it out there. "Joe Markwordt." "Here's your..." I'm thinking, "I got here just a couple years too late for this," you know? I was in charge of Automotive and Aerospace industries.

Mashey: You expanded, yes.

DiNucci: And I follow the guy at Silicon Studio, with all the sizzle. The guy who started TiVo, Mike Ramsey, Silicon Studio. So I come up and I start my talk about, you know, "The really important customers to Digital are the people that make real things." And Fred Crarey, who was the Western area Sales Vice President, he stands up and says, "Joe, on behalf of 2,000 people, I gotta tell you. I can't listen to this. You know, I am just not going to sit here for two hours." He said, "If you have a little special interest group that cares about manufacturing," so this is live in front of 2,000 people. I said, "Fred, I'm not comfortable arguing with you in front of 2,000 people. Let's go to my office." Fade to black.

Then the big screen lights up, and it's him and me in my office on film, and we're arguing. And his secretary calls and says, "Fred, Demi Moore is on the line, something about "A Few Good Men."" He goes, "See? That's what I'm talking about, Joe, that's my kind of CAD." So he opens my door, and the lights blast off, and you hear, George Thorogood, dah-dah-dah-dah, "CAD to the Bone." And we're, "C-C-CAD, CAD to the bone!" And there's me with a Harley, and I had ponytail, and a tattoo, and a bimbo. And I'm singing, lip syncing, we had re-written the words to "Bad to the Bone," to "CAD to the Bone." It brought the house down. I mean, we had Ed McCracken in the band, and Bob Bishop. And that's the kind of fun SGI was up through 1995 when it was on the cover of *Business Week*, as "The Gee Whiz" company. It was really a fun place to work. And they lost their way, I mean, like a lot of companies do.

Malone: But a year later, you and I hadn't seen each other really...

DiNucci: Since the book.

Malone: Since the IPO. And I'm out here in this building for *Fortune Magazine*. I stop by MIPS, the MIPS operation at SGI, and I sense something's wrong there. But it's not something wrong with MIPS. It's like they don't feel like they have-- they're losing their role in a weird way. And then I come over and talk to you. And you said, you never said anything explicitly, but implicitly, you gave me some clues, and I began to look at SGI and their numbers and their delivery dates for their products, how they miss them, and suddenly the world's hottest company doesn't look so hot anymore.

DiNucci: It went from Champ to Chump in two years.

Malone: I remember feeling terribly sad for MIPS, because you guys had-- you know, you had made a deal with these guys, and they hadn't held up their end. They had become sup-- it'd flamed out. While your team was still over there in its own building plugging away, trying to find its place in the universe, and that *Fortune* story was the first real media beginning of the end piece for SGI. So there's a certain irony now that we're sitting here in the former SGI building, <laughter> while the company that was the biggest company in the world that's gone-- but MIPS survives.

Miller: What year was that, Mike?

DiNucci: ’96?

Malone: ’96/’97?

DiNucci: I quit in ’97.

Miller: So I was on the SGI board till ’94. And I left when they made the Cray decision. I was the only person in the board meeting who spoke up against it.

DiNucci: Like grafting a tumor on your head.

Mashey: This is...

DiNucci: The dumbest.

Mashey: The thing is there was a whole huge amount of other stories. Yes, it’s hard.

Miller: To me, the deal I thought I had when we merged the companies, what was supposed to be a merger. Was this was about building on the technology base with more investment, better people, more people. And bringing out the R10000 absolutely on time, which would have smashed the whole industry. Not only did we have the momentum, the customers, but it would have been four to five times faster than anything Intel had, and again, even more functionality.

Stritter: And we had the Microsoft play.

Miller: So they were two years late on the R10000, with more resource, more money, whatever. Why? Beause they were putting it on other things, and then to me, the icing on the cake, when the R10000 was probably a year late, going out and buying Cray. And I said, “This is swallowing your own poison pill.”

DiNucci: Right, we had them on the ropes. <inaudible>

Miller: So you know, we can-- I learned a very valuable lesson out of that whole thing. That, you know, as much as I thought I knew and understood Ed McCracken, he reminded me of another Ed that I knew

in my life, and as I was leaving the board, I literally said-- he was trying to convince me to stay, because he felt he needed me for the Japanese to keep the Japanese guys happy, because they had put in $100 million to the R10000 that I had done the deals on-- and I said, "You know what, Ed? I've already seen the end of this tape," this is now circa 1994, "With another Ed." I said, "But I'm going to tell you how this story is going to end. You're not going to want to hear it. But I'll tell you how this story is going to end."

So it is kind of sad, and you know, there are many Silicon Valley companies that take on a life of their own, and go, and they blow through, and they become HP, and they have all their little dramas and setbacks and whatever. It is incredibly interesting that MIPS is still alive and well.

Malone: Yes, Jim, before we run out of time. We are basically out of time. What do you think when you drive down Arques and you see that new MIPS sign sitting there, and you know that MIPS still survives? You know, transformed, operating in a whole new reality.

DiNucci: But it's still here.

Malone: But it's still here. And it's going to be here very likely after you're gone!

Miller: Right.

Mashey: Yep.

Malone: How does that make you feel? What do you think?

Stritter: I mean, this is where we started, so that feels good, right? And there's billions and billions of them out there in the world. And the basic, besides technology, innovation of MIPS was the business models to make our partnership, fabless semiconductor, and that's what MIPS is still doing.

DiNucci: <inaudible>

Miller: Yes, I mean 500 million [units]. We did that. We did that. We set...

Malone: 500 million a year.

Miller: Well, we set, you know, getting back to this whole notion, the keys to longevity are the architecture and the software that goes with the architecture. And we set an architecture that has

evolved, it's gone into the embedded world. I think I told you it was John Scully, who was looking for a microprocessor for the Newton that gave Dr. Sasaki of NEC and I the idea to do the embedded processor, to try to win the Newton business, which we never got. But then it wound up in Sony PlayStations and refrigerators and you name it! You know, he had set a $20 price point, set price to him. You know, very low power criteria. And we prove we could take this architecture that had been built for high-performance computing, and had all these compilers and all these tools, and put it into a $20 processor. And again, we knew it was a thing Intel couldn't do or wouldn't do.

Malone: Joe?

DiNucci: I mean, I'm really proud of a number of things in my career. And my association with MIPS is at the top of the list. And I can tell you in my travels since the MIPS days, I had occasion to get to know Jon Rubenstein, when he was on the board of Immersion, when he was still running engineering at Apple, before he went to Palm. And when he found out that I had MIPS in my background, my stature in his eyes went up. I mean, Jon is probably one of the most admired engineering leaders in the Valley. So I'm proud of that. I don't have any claim to the longevity of it. I had nothing to do with that, or hardly anything to do with it.

Mashey: Well, we wouldn't have been around, if we hadn't done the DEC deal. <laughter>

<overlapping conversation>

DiNucci: Well, that's true.

Miller: Well, we might have been, but we would have been something less significant.

Mashey: Yes.

DiNucci: SGI was fun. There's no question about it, and I had a lot of fun at SGI. Did some of my most creative work. I had great management there, too. But there was a steel in the DNA of the MIPS team, that never-- that I never saw at SGI. There were some great people. I think McCracken was actually a very strong leader himself. And I think he would admit that if he had stayed at his post through the '90s, it may have turned out differently. But he didn't. He got massively distracted with other things. And I think it really cost that company big time. It could have been different. But I'm really proud that I had anything to do with MIPS, and the people that I met there, we were still friends to this day. Bob said something very profound at his 50th birthday party at Los Alto's Country Club after we roasted him seriously. I called him Ralph Cramden, he had met his match when he met his wife Barbara, who was Alice Cramden. "Going to the moon, Alice!" "Yes, right."

Miller: The question is, "Who was Art Carney?" <laughter>

DiNucci: But around the room, I don't know, were 100 people. Some of whom you went back to high school with. And Bob said very simply, he said, "In my mind, a man is known by the friends that he keeps." And that has stayed with me. That's one of the life lessons I've taken. So I wouldn't trade it for anything. It was a life-altering experience.

Malone: John?

Mashey: And for me, well, there were a couple things. I mean, the first is being sort of an ancient UNIX guy from Bell Labs. It was really, really fun to actually help design a chip architecture that was something I wanted it-- including often getting things left out. I often told the hardware guys who'd tell me, "Well, I know you'll need this." And I'd say, "No, we don't. We work around that whenever you guys make me have it. Leave it out!" And we did a number of somewhat radical things that have persisted a long time, 'cause they actually work, right? So that was a lot of fun. It's certainly fun to see the chips still doing things and getting used. And you know, there were fun things where I helped some funny design wins. Like one time a guy from IDT around 1992 asked me to come with him to visit this little networking company, and I convinced them to use 64-bit MIPS chips. And the company's name was Cisco.

DiNucci: Whoa!

Mashey: Okay, all right? And so as a result, one of the odd things is that a huge chunk of the Internet is powered by MIPS chips, because of that, all right, so. So yes, I'm pretty proud of doing this. And the last one is, oddly, of course this has a slight correlation with one of the founders, is that you know, students in many universities if there's an architecture they learned in computer architecture, it's MIPS. Could have something to do with Hennessy, but it's okay.

DiNucci: Yes, a few textbooks that he's put out.

Miller: Certainly the textbook.

DiNucci: Yes.

Malone: Three seconds each. What are you doing right now?

Stritter: Consulting, coaching little companies.

Miller: I'm actually running a company that's putting secure messaging as a service in the cloud. And it's actually growing very fast and getting a lot of traction.

Malone: How many companies have you started since you left MIPS?

Miller: Started. Really only two, because this one is a company I started in 2000 on the Internet, and then kept going, and recently did a leveraged buyout from the VCs and moved the software into the cloud. So I bought the IP from the VCs at the end of 2009, and moved the software to the cloud. So that's a start, and kind of a continuing start. And the other one was NetPower, which didn't do well, because we were dependent on the R10000, which showed up two years late.

Malone: Joe?

DiNucci: Well, I'm still in touch with my inner adolescent, as you know, but I've embraced my role as an elder. I went back to school about seven years ago, and got certified as a professional coach. And that's led to a really nice coaching practice, named "Surviving Success," thanks to my work at Oxford. And then in parallel with that, I've been mentoring, like Skip has, smaller, younger companies. One of my classmates from coaching school and I are now partners in a company that does what we call "Enabling Thought Leadership." So that's what we do.

Mashey: So I sort of semi-retired in 2001, having had a heart attack in 1995, and my cardiologist said, "Stop." So what I do is I'm a trustee here at the Computer History Museum, so I help plan that exhibition downstairs ["Revolution"]. I've been coaching small companies, helping some get funded. There's a couple wireless sensor network companies that I help get funded. I do some consulting, and then I spend a lot of time on climate and energy issues and help climate scientists fend off the crazies that come after them. But I still get my hands down in some microprocessor design.

Malone: Gentlemen, thank you. It's been great fun.

DiNucci: Thank you, Mike.

Miller: Thank you.

Stritter: Thank you, Mike.

Mashey: Thanks.

DiNucci: Good job.

END OF PANEL

<This interview of Robert (Bob) Miller was conducted on May 26, 2011 by Rosemary Remacle for the Computer History Museum. It is supplementary to the MIPS Oral History Panel Session 2: Building the Company.>

Remacle: I'm Rosemary Remacle with The Computer History Museum, and with me is Bob Miller who was the CEO [of the company] through the ascendency of MIPS and took the company public to great acclaim. Today we're going to talk about a very specific part of MIPS' history, the formation of the ACE consortium. So, Bob, let's start with the obvious first question. Why did you decide or who decided [to form the ACE consortium? How did it get started? What was the objective of that whole effort?

Miller: So a little bit of background is: I got caught up in the UNIX wars. Whereas Microsoft had a common API and a single set of binaries that if you followed them, the API would guarantee it'd run on any Microsoft machine more or less. UNIX was just the opposite. Every vendor in the UNIX world had essentially thought that they could differentiate [their product] by creating different versions of UNIX, and that ranged from the Digital Equipment camp that was using Little-Endian to the Sony's of the world and the SGIs who were using Big-Endian. But each company who was a MIPS customer, using the MIPS architecture, was doing their own version of UNIX. And my conclusion was, if we were going to make an ecosystem work, where we could get the power of all the companies that were using MIPS so we would have real leverage on the ISVs, we couldn't go to them and have ten different APIs that they had to work with because then they had to test eight different APIs or ten different APIs.

So having talked to a number of different companies, it was clear that everyone understood this problem. Everyone felt it needed to be fixed. And in the UNIX world, the big competitor was Sun. Sun owned UNIX and had the first real commercial success with UNIX. So that became the rallying point of "we have to do something. We have to define a set of APIs for the MIPS architecture such that an ISV only has to do one port". That was the objective. And so through, really, evangelism of going out to all the various companies that were customers of ours and explaining why they wanted to be participating in this endeavor to create a common API, the ACE initiative came into being, Advanced Computer…

Remacle: Would you consider MIPS the source or the owner of ACE? Were you personally the driver or were other people at MIPS the driver?

Miller: I was personally the driver, and I was the one who went out and met with Ken Olsen and Jim Ousley at Control Data and Bill Gates at Microsoft. And ironically Bill was a big supporter, because he did not want to see Sun take over the world.

Remacle: It was in Microsoft's best interest to have that not happen…

Miller: Right,it was definitely in Microsoft's best interest. Ed McCracken at Silicon Graphics-- there had been this splinter group of MIPS users formed by Toshi Doi at Sony called the Apache Group. They were going to be the <laughs> I had a meeting with Toshi at my house. And I said, "You know, Toshi, it's cool to be called the Apache Group. But things didn't end well for them. <laughs> And so I really suggest you fall in with the rest of us." Which he did, and he was a big advocate.

Remacle: Do you have any idea why they chose the Apache name? Was it just because they thought it sounded cool?

Miller: Well, I think they chose it as the renegades. They were going to be the renegades. They saw all these big companies and Digital applying a lot of pressure to go with Little-Endian. And they were using UNIX System V which was Big-Endian. And, yeah, he was forming this group to be the renegades.

Remacle: So who else beside Sony was in the Apache Group?

Miller: Trying to remember. It wasn't any of the really big guys. They were truly a splinter group, and we could pretty easily convince their potential members why they didn't want to really be members.

Remacle: What year is this we're talking about now?

Miller: This would've been 1981.

Remacle: And so where was MIPS at that point?

Miller: We had gone public in '89. Our revenues were crossing 200 million a year. We probably had 60 licensees signed up by then.

Remacle: I think you said 1981. You meant '91?

Miller: '91, yes. I'm sorry. That was 1991. And we probably had 60 licensees signed up around the world, all the big European companies. I think Siemens was the only major company that was in the Apache Group.

Remacle: So how many companies, when it was full blown, were in the ACE consortium?

Miller: Oh, I think we reached about 100, because we also included software companies. We wanted the software companies to say "Here's the API I'm looking for, this is how you guys could really help me". And so Microsoft was a software company. They were in the ACE initiative. Santa Cruz Operations was in the ACE initiative.

Remacle: How did it work? Did you have monthly meetings, quarterly meetings?

Miller: Well, first we had to set a goal. So the goal was to create a common API for the MIPS architecture, and that was the primary goal. So then we broke it into workgroups around what the API had to be for operating systems, for applications, compilers, tools. So the goal was to have this complete ecosystem built around the MIPS architecture. And as part of what we did, we really were able to get Microsoft to commit that Windows NT would be on the MIPS architecture when they had never put it on anything but the x86 architecture.

Remacle: I believe someplace in my brain it's parked that NT was developed on the MIPS chip.

Miller: That's correct.

Remacle: That's what I thought.

Miller: NT was developed on the MIPS architecture and then ported to Intel. And so if you think about pulling together all these diverse groups-- but they all felt like they were stakeholders. And I believe to this day the reason the broad MIPS adoption has survived, and you see it in so many places and people will say things like some time during a day you will touch something that has a MIPS processor in it, was an outgrowth of the fact that they learned they could all work together, that even though they were competitors that competitors could get enough value out of having a common device, that they didn't have to differentiate on the device. Differentiate on other things. Differentiate on the applications you'll put on [the device]. Differentiate on your customer service. Differentiate on how you integrate it with other technologies. Don't look to the device. So when I was at Data General, we were doing the DG-1, first truly PC-compatible laptop, which meant that you could take any piece of software that ran on a standard PC and run it on this DG-1 unmodified. Take the floppy disk from here, put it here and it runs. I had to lecture the engineers, "In this world, differentiation is no differentiation."

Remacle: <laughs>

Miller: "You adhere to the standard."

Remacle: It just gets you in trouble <laughs>.

Miller: "And you don't say to yourself, well, I can do a better printer drive…

Remacle: <laughs>

Miller: …or I can do a better this driver." I said, "I guarantee you guys will find ways you can improve things. But when you do, you break our ability to run off-the-shelf software." And that's what we were trying to accomplish with the ACE initiative for UNIX. You could have UNIX off-the-shelf software, and everybody could count on being able to run that software and then add value in other places. A lot of companies got it. Some companies didn't. The guys who got it and did very well with it were the Japanese, in particular…

Remacle: Not a surprise when you think about it…

Miller: …NEC, Toshiba, all those guys. Silicon Graphics fought it every inch of the way because they felt they had to, quote, differentiate themselves. But at the end of the day, we did accomplish the mission. We attracted a lot of companies. We created an ecosystem around the MIPS architecture, which has now survived-- if you think this was 1991, it's now 20 years later. And it's proven itself to be very successful.

Remacle: You said you had formed working groups. How did you bring it all together?

Miller: So we, MIPS, took responsibility for essentially running the ACE consortium. We didn't say, "well, we're going to create it and we're going to leave it to everybody else to run it". We ran it. We coordinated meetings. We made sure that things were being covered that needed to be covered. We created the working groups that we felt were needed. When issues came up, we took the lead in resolving issues. We didn't leave it for the Apache Group to negotiate with Digital over Big-Endian versus Little-Endian.

Remacle: Can you talk a little bit about the Big-Endian and Little-Endian controversy or hassle?

Miller: Well, yeah, so we thought we were doing the world a favor by saying for the first time you have a processor that can run both. The Intel architecture would only run Little-Endian. All the other RISC processors only ran Big-Endian. So we thought, looking at the market, looking at who was on the Little-Endian side of things, Microsoft, Digital Equipment, few others---I think SCO was on the Little-Endian side. And then we looked at who's on the Big-Endian side. Well, Big-Endian were SGI and all the guys making servers. Pyramid and Siemens and Nixdorf were all Big-Endian. And as you probably know, it's

just how's the byte order arranged and where have people come from historically that they don't want to have to throw out everything they've done up until that point. So one of the things we said is, "Look, we'll come up with a way that we can still have this API and we'll be able to support Big-Endian and Little-Endian, so you don't…

Remacle: You could each go your own way…

Miller: …you're getting into a religious argument that it's not necessary to have and we're not going to change the architecture, we're not going to pick one over the other, we're going to support both because, you know what, guys, Microsoft has the potential to sell ten times as much software as any of the rest of you, that's the reality…

Remacle: <laughs>

Miller: …so we're not going to choose an Endian approach that eliminates Microsoft. And Sun was…

Remacle: <laughs>

Miller: …Big-Endian only. So that's a competitive advantage versus Sun. And the dream, the vision was, if we really do this right, on one platform, you could run either UNIX or Microsoft software. We never got to that.

Remacle: Did it ever get resolved, or did people just kind of live with the way it was and continue to have their little religious battles over Little-Endian, Big-Endian?

Miller: To my knowledge, it was never solved in a way where you had a common API for both Big-Endian and Little-Endian. However, we were able to build a reference platform that could run either Windows NT or UNIX System V. So that was a big step forward. You could take applications that were UNIX System V applications or you could take Microsoft applications and run it on this reference platform.

Remacle: What was the market reception to the founding of the ACE consortium? This was a fairly large undertaking by a, relatively speaking, small company at the time. What did some of the pundits and gurus and the people around have to say?

Miller: Well, they applauded the vision. They said this is exactly what somebody should step up and do. And by that time, when it came to RISC processors, there were really only two relevant processors. There were the MIPS and the Sun [processors]. And so they saw this as refreshing versus Sun basically

trying to, well, talking about all the things that Sun felt Intel was doing to screw customers, now Sun was following down the same track of you got to use our architecture, you got to use our software. So the analysts and the pundits were all very, very positive. Everyone recognized it was a tough undertaking. But most of the companies, if not all the companies, that were in the ACE consortium really held the line. They were going to make this happen, and they believed in it.

Remacle: Who were the other key players at MIPS, besides yourself, that helped make this happen?

Miller: Well, Joe DiNucci was kind of the evangelist. Chet Silvestri was very active in this [effort]. Chet was the Vice President of Technology Marketing, Stratton Sclavos. So Skip [Stritter] was very active in terms of the recruiting. So we, the whole team, really believed in it. And we thought we'd pulled a coup.

Remacle: What are the accomplishments of the ACE consortium as you look back on it?

Miller: One accomplishment for sure we got the System ISV…all in the same platform. So we're able…

Remacle: Yes ..

Miller: …to do that. We got Microsoft, as I indicated, to agree that they wanted to put their software on the MIPS architecture. Santa Cruz Operations, the Michaels brothers or father, son, uncle, I could never quite figure out the family relationships there, but they all agreed that they would be on it. Prior to that, Santa Cruz Operation's software did not run on the MIPS architecture. It was Intel only. They had flirted with putting it on Alpha. They may have put it on DEC's Alpha chip. Digital was willing to throw a lot of money at them to do that. And then we had the whole Tandem group as part of the System V. So if you look at who we had on System V, SGI, Tandem, Siemens, Nixdorf, NEC, Toshiba, Sony, we did create a common System V API for everybody.

Remacle: When was the consortium having its largest impact?

Miller: Well, prior to the SGI acquisition. See, once SGI acquired it, they were never really strong believers and they were not, in their minds, going to do anything to facilitate their competitors. So it kind of lost momentum at that point.

Remacle: And that was in…

Miller: …'92.

Remacle: So it was about a year, 18 months?

Miller: Right. And probably six or eight months before the formal announcement, a lot of work getting done, just not a formal announcement.

Remacle: You mentioned one lasting impact is that MIPS is still around and still broadly used in the marketplace.

Miller: Adopted, right.

Remacle: Were there any other impacts? Did you set an example that got picked up other places in the marketplace?

Miller: Well, as I was driving over here, I was trying to think of when did the world finally wake up and say if you want an ecosystem you have to be proactive as opposed to passive and hoping it happened. And prior to the ACE initiative, ecosystems certainly developed around things like the Intel architecture or the Microsoft platform. But this was the first time people realized sometimes you have to go out and proactively create your ecosystem. And we're living in a world today where everything is about your ecosystem…

Remacle: Think…

Miller: …literally.

Remacle: …Apple.

Miller: Think Apple. Think even the social-networking guys. Think of who Facebook tries to attract to be par-- Facebook sing-- Facebook-- can't remember what I was trying to do today where they said, "Well, if you really want to do it, sign up for us through Facebook". That's an ecosystem. I mean, it wasn't Facebook. It was some other adjunct [of Facebook's].

Remacle: One of their bazillion little applications.

Miller: Right. I can't remember off the top of my head what it was.

Remacle: What were the lessons learned given that it had an unhappy but natural death at the hands of SGI?

Miller: It was a not-so-natural death <laughs>.

Remacle: <laughs> Maybe we'll just leave it at unhappy death.

Miller: <laughs>

Remacle: But what were the lessons learned or the failures?

Miller: Well, most important lesson is yesterday's leaders are not necessarily tomorrow's leaders. And so when you're trying to assess who is it that you pay attention to and build the priorities around, you don't let-- so, at one point, I was very frustrated by this and said-- when I was trying to get this point across to my team, I said, "You know, within the ACE consortium, we have leaders and bleeders." I won't name who I put in the category of bleeders.

Remacle: That was going to be my next question <laughs>.

Miller: <laughs> I had a few favorites and one who was really consuming a huge amount of bandwidth making ridiculous requests, like to support Multibus II, which was a 15-year-old technology at that time. And I said, "Look, guys, we're going to identify the leaders. We're going to identify the early adopters. We're going to look at the companies that are quickly adopting and absorbing technology, and that's who we're going to look to to help set the direction. We're not going to let some company that has a national market share and nothing anywhere else and is living 20 years behind the power curve have a strong influence on this." So in the spirit of how we went about doing business and when you have that many companies interacting, some of which are allies, some of which are competitors, you're not going to make everybody happy. There are going to be some that are going to walk away feeling…

Remacle: So besides Microsoft, who were the five companies or whatever number you want to choose, that got your attention every single time, the leaders?

Miller: Yeah, well, certainly SGI did. Because I felt, in terms of workstations, they were one of the best we had. Tandem for the large-enterprise class. Systems at Tandem was, at that time, rapidly transitioning to UNIX-based products on the MIPS architecture. I gave far less weight to Digital than they thought they deserved. And it turned out that secretly they were working on…Alpha anyway <laughs>. Just to prove they were everything I thought they were. Sony. I thought, well, as it turned out, the Sony

PlayStation was probably the single best thing that ever happened even though Nintendo initially was not part of the ACE initiative. But Sony certainly was. And Dr. Doi was a genius. He was the guy who invented the CD. He was truly a genius. And so they were the guys I looked to, had a lot of co-- didn't always agree. Dr. Doi and I had some real battles. He's the only one that ever sent me a congratulatory letter after we started the 1991 war with Iraq <laughs>.

Miller: Just to tell you where he was coming from.

Remacle: Is there anything else that we haven't cruised through here relative to the ACE consortium and MIPS' place in the universe?

Miller: I think that we've pretty much captured what the goals were, what went well. But it actually turned out to be a shakedown cruise, in many ways, in that once you leveled the playing field on things like operating system APIs and whatever, you found out which companies really had the capability to innovate and compete…

Remacle: And do some real marketing?

Miller: …and do some real marketing. Exactly. So it became a self-fulfilling prophecy of the guys who were afraid of allowing that to happen. Most of them have disappeared, literally. Either they were bought by other companies-- kind of ironic that MIPS spun in and spun out but MIPS is alive and well as a brand. The same can't be said about some of these other companies.

Remacle: <laughs>

Miller: If I had end with one thought, what the ACE initiative was about was making it easier for the software developers to adopt a common platform, add value to their software rather than spending it on porting and qualifying ports, which, at the end of the day, benefits the customer. And so that's what it was all about.

Remacle: When I was thinking about this topic, one of the things that I thought about was this was really the first time that I can remember where people really said "You've got to have an ecosystem and we are going to take the responsibility to drive it". And today even people who are non-high-tech people understand that concept. And you see it written about in the press all the time around the social-networking stuff and Apple and so forth. So you guys were a trailblazer in that respect.

Miller: We were a trailblazer in a number of things. Our licensing model to this day has been adopted probably by thousands of companies, the whole notion of make your intellectual property available to the guys who can do the most with it, who can invest the billions of dollars in semiconductor facilities or marketing and sales.

Remacle: There was a symbiotic relationship between the licensing model and the need for the ACE consortium?

Miller: Exactly. That's exactly right. And most people failed to recognize that. Because what made a license more valuable? The more software that was available if you had that license. Intel could've made a lot more money than us. No. They've been a great success. And I always say if you put the numbers on a scoreboard, you're not going to get second-guessed and if you don't put the numbers on the scoreboard, you get a lot of that.

Remacle: Thank you for taking the time to come in here and do this stand-alone topic, but I thought it was important to get that covered.

Miller: Everyone who's looking at starting something that's essentially bare metal has to think about how do I build bare metal into a solution, how do I make that bare metal become a solution. And that's where the ecosystem comes in.

Remacle: Well, thank you so much, Bob.

Miller: Oh, my pleasure.

Remacle: And we look forward to seeing you on the 27th.

END OF INTERVIEW

