Oral History of Ken Ross

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Kenneth Ross

Conducted by Software History Center—Oral History Project

Abstract: Ken Ross reviews his early education and business experiences. He then discusses the founding of Ross Systems as a timesharing company using minicomputers instead of large mainframes and how that was financially attractive to many clients. He covers his relationship with DEC and then his recognition of the need to change Ross Systems over to a software products business. When he realized that a further set of changes would be needed, he sold the company. He was then involved with a number of additional businesses and has become a venture capitalist.

Paul Ceruzzi: I am Paul Ceruzzi and I am at the Computer History Museum in Mountain View, California, interviewing Ken Ross on November 19th, 2004. Can you give me a little bit of background starting with your years at MIT and how you started out there?

Background

Ken Ross: I started out as a student at MIT in 1961. I was going to be either a chemist or a chemical engineer, but I had no interest or skills in that area; so I started studying what they call Course 15; everything in MIT is a number. Back then you had to study engineering, so it was really electrical engineering and I became interested in computers. They didn't have a computer science major back then, but they had the start of timesharing; they had the first timesharing computer at MIT.

Ceruzzi: The Compatible Timesharing System?

Ross: It was called Project MAC. They used an IBM 7090 for their early timesharing; then they had a DEC [Digital Equipment Corporation] PDP-1 and we used to play Space Wars on that. So I was exposed to computers in college and then during the summer of 1962, I got a job at my father's department store; they had an IBM 1401 computer and I was programming that.

Ceruzzi: Using punch cards?

Ross: Punch cards, just punch cards, no discs. When the cards jammed you had to take apart the card reader and card punch, I used to be pretty good at that. And I had to be able to juggle and joggle these large decks of cards to sort them.

Ceruzzi: Did you draw the diagonal line down the cards in case you ever dropped the deck of cards?

Ross: No, no, you always designed your system so you had sequence numbers in the cards, so you could sort them. That was like a key thing.

Ceruzzi: Was that in COBOL?

Ross: No, no, in assembly Language. That was still the really early days of computing and then I have been involved with computing since then.

Ceruzzi: So the computing at MIT was something that you did in connection with other work.

Ross: Yes, I was studying for a Bachelor of Business, Industrial Management, but MIT was very computer oriented so we did programming, we used industrial dynamics, you know Professor Forrester.

Ceruzzi: Oh yes.

Ross: He was one of my professors, Jay Forrester, Industrial Dynamics, I did some of that. And then I went to Stanford Business School right after MIT, so that brought me to Silicon Valley.

Ceruzzi: Was that a common path for MIT students?

Ross: A lot of people came to California then, but one has to remember that people that, you know, now everybody's from California, but back then, this was in 1965, everybody wanted to know where you were from because nobody was from California.

Ross: I went to work for a company called Raychem in California, which is a chemical high tech company but it wasn't really computer high tech. And I ended up in a MIS/IT computer job, whatever they called it back then, and then my boss went to another company, and I ended up in a company in 1970 called Arcata National, which doesn't exist now, but it was famous for bringing in a lot of money when they sold the redwoods up here in Northern California. And at Arcata I actually used the timesharing system for the first time as an IT guy, because Arcata had 20 offices around the country, and we were trying to figure out from a computing standpoint how you could tie all of these offices together. That was my first real exposure to timesharing.

Ceruzzi: Was it an IBM system?

Ross: No it was General Electric Timesharing, and I actually don't know if they were running General Electric computers although I presume so.

Ceruzzi: So you weren't really paying attention to the nuts and bolts of timesharing.

Starting Ross Systems

Ross: Right, I was a user. And then I had this idea that I wanted to start my own company and there was some internal motivation for me to do that and I actually can't remember why, but I had a burning desire, and I did it, I quit my job and I started a company which was strictly by myself and strictly consulting, in the computer area.

Ceruzzi: Did you need money to start it?

Ross: No, I started it, I was by myself, I had a little bit of savings, it didn't really cost very much money to start it. And I did programming and studies and sort of normal stuff and I started Ross Systems. The way it got into computing was that in 1974 we were engaged by a company called Itel, which is not Intel. It was a big financial services company.

Ceruzzi: Yes I've heard of that.

Ross: And we were engaged and developed a big comprehensive financial model and a budgeting system, and again we were back on GE Timesharing.

Ceruzzi: GE was chosen by Project Mac, but you may not be aware of that.

Ross: Right. So in 1974, that was a big project, and there's two things I remember: one is that I don't remember what we were getting paid but I remember that General Electric was getting a lot more every month than we were. I also remember thinking that we could get a minicomputer and I felt I could write a spreadsheet language that would be as good as what was on the GE system, maybe better, on a minicomputer. And I remember very clearly thinking that our costs would be a lot lower because not only was the computer a lot less expensive, but the company supplied the operating system so all we had to do was program the application, while all the other timesharing companies wrote their own operating systems and their own applications.

Ceruzzi: So, who were they?

Ross: Well that would be General Electric, the Service Bureau Corporation (SBC) and there was a company called Rapidata, which was more of a local timesharing company. Those

are the ones I remember. So we basically got an account on a timesharing computer and I started writing this program.

Timesharing on Dec Machines

Ceruzzi: Where did you first encounter a minicomputer as an alternative?

Ross: I sort of knew about HP with its HP3000 and there were a number of timesharing services doing sort of small business stuff. But the DEC technology was better for commercial timesharing and I knew it. I won't bore you with all the details, but I felt that BASIC was a lot more powerful language.

Ceruzzi: Was this on the PDP-11?

Ross: Yes. It had more sophisticated technology.

Ceruzzi: The Computer History Museum has a close relationship with DEC and the PDP-11.

Ross: Anyway, so we actually wrote this financial modeling language, which ran on terminals without screens.

Ceruzzi: VT-100?

Ross: No, it wasn't, I mean we were taught Teletype, so when we started, I remember, Teletype was 10 characters a second and you dialed up a modem that would be 110 baud. And then I remember investing a lot of money in a modem that would do 300 baud and 30 characters a second, that was a big deal.

Ceruzzi: And the teletype had paper tape on top.

Ross: Yes, we had to do it, so that was the way that we would do our backups and stuff on paper tape.

Ceruzzi: And let me get this straight. The operating system was supplied by DEC?

Ross: Yes, it was the PDP-11 RSTS operating system.

Ceruzzi: I think that that operating system had a tremendous influence later on PC's.

Ross: It did, absolutely I think you can say that MS-DOS sure had some stuff from the PDP-11 operating system.

Ceruzzi: Because DEC had to fit it into a small memory set which the mainframe people didn't have to worry so much about.

Ross: Our consulting activities were funding the development of this application, but our consulting activities were actually doing significant work for a lot of the big companies like Intel, ROLM, Wells Fargo Bank, it was a nice list. When the spreadsheet/financial modeling language was complete we actually had some built-in customers. So it took off quite nicely.

Ceruzzi: So you're saying “we,” “we” meaning?

Ross: By then there were probably four, five or six people in the company. Karol Hines was one, and there were others.

Ceruzzi: How did you find people to work for you?

Ross: There were the people with the entrepreneurial spirit who liked to work with a small company.

Ceruzzi: This is in Palo Alto?

Ross: Yes, we were actually in Palo Alto. And we actually developed the program and started this whole computer service on somebody else’s computer and then we got our own rapidly.

Ceruzzi: The PDP-11?

Ross: Yes, it was a big deal for us.

Ceruzzi: Although they were relatively cheap compared to a mainframe.

Ross: Well they were still expensive, but I can't remember the price. I do remember that the disc drives were 88 megabytes, which is nothing, and they cost $40,000 each. I don’t remember how much the computer cost.

Ceruzzi: Did you need a computer room with a false floor?

Ross: Oh yes.

Ceruzzi: So they were in that sense like a mainframe.

Ross: Yes.

Ceruzzi: With racks.

Ross: I'm thinking the computer maybe cost $150,000, it was a lot of money.

Ceruzzi: But less than a mainframe.

Ross: Less than a mainframe, so you could sort of install it in a semi-formal computer room, I mean it wasn't like putting in an IBM 370.

Ceruzzi: You needed air conditioning and backup power?

Ross: I don't remember the backup power, but I do remember we needed a bit of air conditioning, and we put a special air conditioner into this room. But that part of it was pretty easy.

Ceruzzi: And then the communications facilities.

Ross: Well, by then what you got was a few telephone lines coming into some modems and the telephone lines were rollovers, and that was all it took for us, I mean we were a relatively small shop, so we had five telephone lines coming in. Later on we hooked into Tymnet and we did some more kinds of things.

Ceruzzi: We'll get to that because you talk about packet switch networks in one of your advertising copy, but this is just a plain old telephone line.

Ross: Local telephone line in Palo Alto that was into one computer.

Ceruzzi: And people who wanted to access it would literally dial that modem.

Ross: Yes. And as I just said Intel was our biggest client, and we ran a lot of their financial and accounting business on our computers. So it was a lot smaller back then, but it was still an important company.

Ceruzzi: It sounds like you were influenced by the existence of timesharing research at MIT but you were not a product of that research.

Ross: Right. Actually I wasn't really a heavy duty computer scientist, and I think that one of the things that made us successful was the thought of using a minicomputer where somebody else did the operating system etcetera, and all we had to do was focus on the business applications. And by the way, today they call that On Demand Computing, and that's all salesforce.com does.

Ceruzzi: And maybe if you had been more tuned into MIT's thing you would've stuck with the mainframe or something.

Ross: Or we would've tried to do something crazy like get in and modify somebody else's operating system.

Ceruzzi: And not focus on the customers.

Ross: Right. So we focused on the customers, and the other thing is that really a year after that, maybe two, I mean the whole concept, if you just buy our timesharing service, we're a lot cheaper than General Electric, but better than that, you always have the option to bring in the program. If you want to buy a PDP-11 we'll sell you our software, and that was a key, we were the first ones to do that.

Ceruzzi: Did you make many sales?

Ross: We sold our first package in 1976, and probably the second one in 1977, I don't remember, we didn't sell a lot of packages, but we were an early player selling packages. But more importantly, the buyer felt that they had the flexibility to do that if they wanted to, they might never want to, but they clearly could.

Ceruzzi: It was cheap enough.

Ross: Yes, they didn't have to buy a mainframe. Nobody ever wanted to deal with a corporate MIS kind of mainframe. I mean in the end a lot of people ended up buying minicomputers and I know Intel did, Wells did. As time went on we sold more and more.

Ceruzzi: But DEC got the commission for the sale.

Ross: Right, we didn't.

Ceruzzi: So you just sold the software.

Ross: DEC sold the hardware.

Ceruzzi: Now at what point did the DEC people become aware of your existence?

Ross: Ah, that's a fair question. DEC first became aware of our existence as we bought DEC computers, so for the timesharing operation we bought, I can't remember, two PDP-11/70's, but then as we got bigger we bought a lot of VAXes; we acquired about five big VAXes. So all of a sudden we became a big DEC customer and the DEC salespeople liked us. DEC became aware of us as a really good business partner with them around 1985-1986. It took them a long time to figure out what we were doing.

Ceruzzi: That's relatively late.

Ross: It was at the end game, you know, to be honest with you, they became aware at the end game for DEC.

Ceruzzi: So they didn't get involved and you could say it might've been a good thing that they didn't try to steal the business away from you and sell it themselves.

Ross: They were minicomputer hardware sales guys. We started selling software on DEC machines and DEC sold us our machines in, let's say it was 1976, and so I think there was a continuous awareness by them through 1988 about the fact that they could actually leverage their business by selling application software. And that was for DEC like a new deal, I mean at the end in the very late 1980s it was a huge deal for them.

Ceruzzi: But it was too late at that point.

Ross: Yes, exactly.

Ceruzzi: So the early days you didn't have to make a trip to Maynard or to the "Mill" or anything like that?

Ross: Yes, although, you know, over time I've gone back there and rode in the helicopters, went to the "Mill". But I never met Ken Olsen *[CEO of DEC]*.

Ceruzzi: Well we're going to get back to that later on, but I guess in the early days DEC becomes aware of you as a customer and what about the mainframe timesharing people, were they aware?

Ross: Yes, they were aware of us, I think that all of the timeshare companies, GE, everybody, yes.

Ceruzzi: There was somebody sitting here this morning.

Ross: NCSS *[National CSS]*, yes.

Ceruzzi: Were they looking to try to crush your business?

Ross: Yes. We actually really competed with them, and we were still somewhat of a local company but still we were a force in the timesharing business, and everybody knew about us and over time I mean when we first started on the minicomputers I think we were not taken seriously, but over time obviously things started to change in the business and we became much more serious, again this was before micro computers and Lotus 1 2 3, it gave you the opportunity to do your own in-house timesharing and the concept ended up being a big deal.

Ceruzzi: So did they do anything nasty to you?

Ross: I have one great nasty story.

Ceruzzi: Go ahead.

Ross: This nasty story isn't about timesharing, it's about when we were selling packages and a software company called Software International, which was owned by General Electric. As you can imagine, Software International was a small division, probably 10 levels removed from GE Corporate, and this was in the mid 1980s, they were being very nasty to us in what we felt was an anti-competitive way, and GE had just lost an anti-trust lawsuit or something, some bad thing. And we got hold of some memo that Software International had written to one of their prospects and we had our attorney send a very nasty letter to the Corporate Secretary of General Electric. And I never heard what was said, but they stopped doing it. I met some of the Software International people years later and they said that it was really interesting what happened to them after that.

Ceruzzi: Since you knew you were competing against these bigger companies, did you have a strategy about competing, if they tried to undercut your price or something?

Ross: We were always very price competitive. They were always higher priced and we were much more service oriented, I mean we were the smaller guy that had the consultants who could help the customer. That was the part of it that actually worked out pretty well. We really competed against quality, price, service, and etcetera.

Changing the Business Model

Ceruzzi: Was there any times when the company was in crisis in the early days, threatening its existence?

Ross: You know, and it's interesting to me that I always agonized, but we never really were in crisis, I mean.

Ceruzzi: I'm trying to think if there were recessions in 1974 or something like that.

Ross: Well in 1974 we were just six people, just getting going, we actually raised venture capital in 1981, so we were self-financed up until then. And once that happened we had a cushion. I can remember it being difficult, but not a crisis. Just to set the record straight, we're one of the very few software companies that was able to transition from consulting to timesharing to packaged application sales; most companies weren't able to make those business transitions. The microcomputer stuff never worked for us but the PDP's and the VAXes were a big success. So we made that transition, it was difficult, but we made it.

Ceruzzi: You must have at various times seen the world changing.

Ross: I'll give myself credit where credit is due, we definitely saw the world changing.

Ceruzzi: Did you do that by reading the newspaper or what?

Ross: I read the "tea leaves".

Ceruzzi: The tea leaves?

Ross: I'm just saying, I just knew.

Ceruzzi: But everybody reads the same trade journals.

Ross: I mean it's like you're out in the market, you read the trade journals, you know what's going on in the industry, I mean the timesharing thing was clear - I mean you couldn't bury your head in the sand on the microcomputer stuff although some people did. But you could see our financial statements; see that stuff is going down. And I guess we were lucky with the financial applications, where we met up with people from Price Waterhouse, it was Price Waterhouse back then, and they had a package and I said "Gee, this is a great package, we'll sell it on the banks." And so we built that whole business, and it worked out real well. I mean I guess there were a lot of skeptics about the growth of the minicomputer business, everybody wanted to be an IBM user on the mainframes and System 3's and whatever, but DEC was a hugely strong company in the 1980s, and we stuck to our knitting, and that was really important, and that made a huge difference. I mean sticking to our knitting allowed us to focus on a single platform, so we didn't have a lot of the technical issues that other people had to support multiple platforms; it also allowed us to leverage that marketing channel, I mean in the end we were able to leverage the DEC sales force and it made a huge difference.

Ceruzzi: I looked at your timesharing agreement and this is fascinating stuff.

Ross: That was 1985, I think.

Ceruzzi: You have these very interesting costs; the cost of connect time, the cost of CPU *[Central Processing Unit]* time, and then the cost of blocks of storage. Who came up with the figures and how?

Ross: I'm trying to remember how it started. While there were a lot of issues, it was obviously priced to be competitive with the other timesharing services, so the connect hours, I'm sure we took whatever the other timesharing services were charging and maybe charged half of that, and the disc storage, I would say the same thing, the CPU seconds weren't quite as easy to quantify, so I don't know where they came from. But once we started we stuck with that structure.

Ceruzzi: And you had to make a profit though, so you had to price it in such a way that you weren't giving it away but you also had to undercut the competitor.

Ross: Once we had the first set of pricing and we had our customers running then we were able to use benchmarks.

Ceruzzi: So, let's talk about the minicomputer. It was a different kind of computer but it still was a computer where the cycles were relatively expensive, is that right?

Ross: I mean to be honest with you, you look back at it and you wonder why anybody tolerated a pricing algorithm where you didn't know what you were buying. But it's the way people did it. And of course the money came from the CPU seconds, because you hit the button and you don't know how many seconds you're crunching out there. But we had big companies like Wells Fargo or Intel who would pay us 30 or $40,000 a month. They had a lot of users on the system.

Ceruzzi: Did people ever get into an infinite loop in their programs?

Ross: Yes, but we were very in-tune with our customers, I mean if some guy calls us up and, you know, "I left this thing in an infinite loop all night", we'd make an adjustment.

Ceruzzi: Well this is sort of the funny thing about computers though, is that if you waste gasoline or food or something, that's a real loss, but if someone left the computer running all night you weren't burning anything.

Ross: One of the other things I remember is that you could sort of measure the average rate we got per hour, the combination of connect time and CPU seconds, and somehow the number $30 an hour sticks in my mind but it could've been more. So in the end there was some sort of an overall benchmark for what people were trying to do.

Ceruzzi: Did you have in-house programmers who benchmarked the performance of your system to see how it was managing the load and everything like that?

Ross: Actually, I remember us being very conscientious about trying to make our applications very efficient in the use of computer time, although we could have made it inefficient because we would get more money that way. But we were very ethical in that.

Ceruzzi: I think in the long run it means you get more business if people know that you're doing it that way.

Ross: Absolutely. We were very conscientious about that and we tried to be fair about pricing and when things happened, like you said, if somebody left it on overnight, we'd be willing to negotiate that.

Ceruzzi: But you also probably needed to know when you're saturating the system, so you have to either buy another system or get an upgrade or something like that.

Ross: That happened, I mean we started buying computers and upgrades as we grew, we got more and more, that's when we got noticed by DEC. We used to go off and we'd have an offsite executive planning session and we'd project the growth of business and we'd project the decreasing price of computing power and da-da-da-da-da, and we'd project the number of computers we'd need to buy. We ended up building a big computer room to house all these VAX's, but the VAX's got cheaper, faster and more powerful. And I remember another funny story back then, again this was probably in the early 1980s timeframe. We just did not need a bigger computer room, I mean timesharing was going down, VAX's were cheap, and the guy that ran our operation center just didn't get it. And I went down to this big computer room and I remember walking around, see that line, I said, that's the wall. I mean he wouldn't do it, I said that's the wall, and that was the wall, we just cut the size of the computer room, whatever it was, he wouldn't get it, so we just did it.

Ceruzzi: Maybe at this time we can talk about the transition from a dial-in telephone to packet switching, is that the right timeframe?

Ross: Yes, that's fine. Obviously over time as the business grew two things happened, one is that you had more and more customers, you had people all over the country, and the big companies like Intel had people all over the world. So we needed to offer a much more robust service, and so we ended up signing up with Tymnet. Again it was pretty easy.

Ceruzzi: But in those days AT&T was still a monopoly, was that still before divestiture, for the regular phone lines?

Ross: For the regular phone lines it was for sure, but Tymnet had sold its service by then, so we could buy access through Tymnet.

Ceruzzi: And that was a packet switch network?

Ross: That was a package switch network.

Ceruzzi: So you entered into a contract with Tymnet.

Ross: Yes. If people used Tymnet, we'd pay Tymnet and they paid us.

Ceruzzi: Was there a noticeable difference between that kind of switching?

Ross: No, I mean the usage was not noticeable at all; it worked fine.

Ceruzzi: And at the same time people went from teletype to VT100's.

Ross: Yes sure, and then people were going so we can start out at 110 baud and then 300 baud and 1200 baud dial-up. During my tenure, I don't think we got faster than 1200 baud.

Ceruzzi: That was about the limit.

Ross: Yes, 1200 volume. The other thing that happened that's interesting is these big computer rooms with a lot of computers; see if I can describe it. What you really wanted to have was that your dial-up lines all came here, but they had to feed out into let's say five different computers; that was a really complicated problem back then, it wouldn't be now with Ethernet but they didn't have Ethernet. So you could buy these boxes that you'd switch on, so your dial-up on timesharing service would feed into a Micon box.

Ceruzzi: Micon?

Ross: Yes. It'd say computer number, so you knew your account was on computer three, and you'd hit three.

Ceruzzi: So who made this box?

Ross: It's a company called Micon.

Ceruzzi: It was a switch?

Ross: Yes, just a dial-in switch, and it allowed you to concentrate all your phone lines up front and then access out in a relatively simple way.

Ceruzzi: I keep talking about VT100, so it's this black and white character oriented data is what people are putting in and getting out. There's no graphics or anything like that?

Ross: No you couldn't really do that.

Ceruzzi: And no color?

Ross: No color, for sure.

Ceruzzi: Was that something you thought about?

Ross: No. I ran a different software company from 1991 to 1995 and I remember we were using black and white PC's in 1993-1994.

Ceruzzi: When Macintosh came out it was black and white.

Ross: Yes. By then everything had all of the dial-up, all the package switch, but then things were starting to go downhill.

Ceruzzi: And then the product, also people could print out stuff?

Ross: Yes, people had printers.

Ceruzzi: And they were impact printers?

Ross: Dot matrix printers.

Ceruzzi: Did people print a lot of stuff?

Ross: Sure, people printed a lot of things. We had a printer-- they could print at our place too, but I mean people would have these DEC printers *[printer model numbers were LA 400-600]*.

Ceruzzi: Big things.

Ross: Yes. And we had a Xerox laser printer.

Ceruzzi: Like the size of this table right?

Ross: No, ours wasn't that big. It was about a third of the table, it was the low end, smaller one and I remember it still cost a fortune.

Ceruzzi: I saw one, but I was not allowed to touch it obviously.

Ross: Rudimentary.

Ceruzzi: And I remember the word "laser" meant a lot back then.

Ross: Yes.

Ceruzzi: I'm just sort of establishing this benchmark: what the customer got was a terminal and printer.

Ross: Yes, and a dial-up, an account and we had to do support.

Ceruzzi: Fairly straightforward.

Ross: It was very straightforward, and they all could use it, it was easy to use. We did hand-holding and I mean basically people used us instead of spreadsheets, I mean that's what this business was about, it was a predecessor to spreadsheets on personal computers.

Ceruzzi: I know we covered that this morning, but I want to bring it in again. Then the personal computer comes along, the Apple and VisiCalc. When did you first see that?

Ross: We saw all that when it was happening. I mean we're here at Silicon Valley, I guess the question is when did people decide that it was going to be serious. And I'd say we could see it was going to be serious in 1979-1980, when did the PC come, in 81?

Ceruzzi: The IBM PC was 1981, the Apple was 1977, but VisiCalc was like 1975.

Ross: Yes. Did I print out a financial statement? I'm interested in seeing when the timesharing started going down.

Ceruzzi: Is that this one here?

Ross: Well, I have a whole bunch of them. I have some where I have the trends on it more, which I'm happy to send you.

Ceruzzi: I think you sent it to me but I just didn't print it out.

Ross Software Products

Ross: Okay, I can send all of it to you, but I mean clearly what happened was that at some point in time our timesharing revenue was marching downwards.

Ceruzzi: Because of the PC?

Ross: Absolutely, 100 percent. It was a change in technology; it was the new paradigm.

Ceruzzi: Because people were running Lotus 1-2-3.

Ross: Absolutely.

Ceruzzi: On their desks.

Ross: You could buy an IBM PC in 1981 or 1982 for 3,000 bucks and you put Lotus on it and it's 4,000 bucks, and if you were a heavy user of our service you'd pay us $10,000 a month.

Ceruzzi: To do essentially the same thing.

Ross: Yes.

Ceruzzi: Well it's not the same thing; the spreadsheet is just a sort of raw tool, but you were giving people customization.

Ross: Yes, but still, I mean the other thing is of course if you were Intel and you had a hundred people doing it and you were trying to consolidate it, it was hard to do with Lotus early in the game. Our timesharing was running along nicely, all the way into the 1980s, so it took time, but in the end everybody went away.

Ceruzzi: So your response was to do what?

Ross: Luckily we had two different strategies going. We had the DEC microcomputer software.

Ceruzzi: DEC350, the Pro?

Ross: The 350, and we had our MAPS *[Management Aid for Planning Strategies]* application that we imported down on the microcomputer, and I mean back then who knew. I don't think any of us could see people buying thousands and thousands, but you had to do it. I mean the PC was like the Internet, I mean it was the thing. So we did that activity and we also had this project going to do the mainframe COBOL based applications.

Ceruzzi: By which you would sell the application software?

Ross: Yes we were going to be a package software company, and believe me it's extremely difficult to change the culture of a company, and to change the culture of a company from timesharing to package applications was very hard. Most people didn't do it.

Ceruzzi: Did you have to hire new people or fire people?

Ross: Both, all of the above. We had to cut costs, we had to fire people. I mean you had to really beat on people to get them to go out and sell and so you had to change the salesmen and the comp plan so they couldn't just sell timesharing. It was a multi year process.

Ceruzzi: How much did you charge for the MAPS program?

Ross: I don't remember, but I'm thinking it might've been $1200, which sounds like a lot, but remember Mitch *[Kapor]* said that Lotus was about $495, and we felt ours was bigger, higher end, more valuable.

Ceruzzi: The other product was $795.

Ross: And there was no scientific basis for that price.

Ceruzzi: Did it have a spreadsheet inside it?

Ross: No; I mean there's a subtle difference between a spreadsheet MAPS. In a modeling language, a spreadsheet is very graphic and very visual, and ours was more of a row and column program, and there are some advantages and disadvantages in that, but probably not worth it going into.

Ceruzzi: Sure.

Ross: But it was a different thing, it could do some things that VisiCalc couldn't do -- that Lotus 1-2-3 couldn't do, and the same product went on the VAX, so if you were a corporation, you could tie stuff together, and that made a lot of sense.

Ceruzzi: Tie together by a wire or by just moving data?

Ross: Moving data, so you could have your data on a database and consolidate it. For a distributed corporation it actually worked very well. By the way, this other company I ran from 1991 to 1995 had a microcomputer budgeting package, Pillar did the same thing, worked really well, a famous product. But it was different.

Ceruzzi: At this point did graphics and color come in?

Ross: Oh yes, let's see, the DEC Pro350 was a black and white machine, but we had simple graphics and the HP pen plotters.

Ceruzzi: So you had the videotape of that.

Ross: Yes, so you could print out simple graphs.

Ceruzzi: Did your customers like that?

Ross: I think it was nice and they thought it was a good deal.

Ceruzzi: So I guess again technology's marching along and then comes the Xerox PARC model of computing. Was that another one of these cases, where you looked at that and said you've got to change?

Ross: Well, here's what happened, I mean the Ross Systems history is that by the end of 1988 I felt very strongly that the world was going to move towards what I thought of as, "distributing computing," so the whole VAX model was going to go away; the new model turned out to be client server. Okay, so the world was going to move there, this was 1988, I'd been doing this for 17 years, and I just didn't have the energy to want to redo the whole thing again.

Ceruzzi: Turn everything upside down all over again.

Selling Ross Systems

Ross: We ended up selling the company. It was a complicated financial transaction. The company stayed in existence, but I sold out.

Ceruzzi: And that's in here.

Ross: Yes; that's occurring in 1988, and interestingly enough the people that bought the company were ex-MSA executives. So they thought they were like too late for the game, but they were going to be the CA *[Computer Associates]* of the VAX. So that was the deal. Well, the postscript is Ross Systems just was acquired by Chinadotcom in August of 2004.

Ceruzzi: Chinadotcom?

Ross: It's a software company that has-- I don't even know what it does, but it sells a lot of software internationally, and it's a publicly traded US company.

Ceruzzi: So how long did Ross Systems last?

Ross: Ross lasted from 1972 to 2004, and I'm actually not sure if there is any software company that's lasted 32 years.

Ceruzzi: I don't think there would be.

Ross: Anyway, it was a long run. But anyway, I sold the company, they acquired the company, and they took it public.

Ceruzzi: But you sold it because you felt the effort to reinvent it again was way too much?

Ross: Yes, I didn't have the energy anymore to do that.

Ceruzzi: And this is the time when DEC got more involved in what you were doing.

Ross: Well it was the end game with DEC market, I mean the problem is I sold the company at the end of 1988, they took it over at the end of 1988, and I think that was probably the peak of the DEC market, and then the client server technology came on board and the VAX started heading downhill.

Ceruzzi: I've often wondered about that, because the people at Xerox PARC copied DEC hardware architecture for their own stuff and the VAX was an early node of the Internet, the Arpanet.

Ross: Yes, DECnet was like the basis.

Ceruzzi: So they missed the boat there.

Ross: But they had a proprietary operating system.

Ceruzzi: VMS.

Ross: Yes VMS.

Ceruzzi: You used VMS?

Ross: Oh yes, we used VMS, not UNIX; there were a lot of UNIX machines.

Ceruzzi: But there was UNIX on the VAX.

Ross: Yes.

Ceruzzi: Did you ever think of using UNIX?

Ross: We would've never thought about it.

Ceruzzi: Why not?

Ross: Well, because we were so tied in to DEC and VMS and at that point in time when I was at Ross, UNIX was pretty rudimentary.

Ceruzzi: And the people who were backing UNIX were using VAX's because they liked it.

Ross: Yes, well it was a great architecture. I mean I actually remember meeting Larry Ellison in 1976 or 1977, and he was doing some crazy thing about a relational database on a PDP 11, running UNIX. I thought he was crazy, shows you what I know.

Ceruzzi: Well there's a story, I know I'm not supposed to be telling the stories, but I hear this story that Ken Olsen said Unix was like snake oil, and he didn't like it and yet here were his customers using his computers to write Unix on, which I guess was the guy at Sun Microsystems, Bill Joy. He brought UNIX over from New Jersey to Berkeley with a VAX.

Ross: Oh yes, I mean the VAX was actually the UNIX machine of choice. But again, that was the dawn of client server, and that was pretty much the start of the decline of DEC. And so I went on to bigger and better things.

Ceruzzi: It's interesting that you got through all this and other people didn't.

Ross: I'd say back in those days the software business was a lot smaller; we were able to transition from Business Model A to B to C, but I thought it would be just too hard to go to D.

Ceruzzi: And also you did not get involved in these other issues about the IBM PC or the Macintosh or anything like that.

Ross: There was a lot of pressure. Back in 1982, 1983 we were doing the DEC Pro350 and we were doing the ERP *["Enterprise Resource Planning"]* package application. There was an enormous amount of pressure to look at various IBM products not just the IBM PC but the System 3, , AS/400, and even small mainframes. And I remember there was a lot of hype about what was going on in the PC market and the PC's were going to be more powerful. I mean this was back in the Intel 80286 age.

Ceruzzi: Sure.

Ross: But it was all hype, nobody knew where anything was going to go and you sort of always have to stick to your knitting, and quite frankly by then we weren't going to be Mitch Kapor, we weren't going to be Bill Gates.

Ceruzzi: And then in the middle of that also came the Sun workstation.

Ross: Yes we were never involved in that. The only connection is that I interviewed Vinod Khosla for a job at Ross Systems but didn't hire him.

Ceruzzi: But Sun was used by financial people.

Ross: But Sun was really an engineering workstation for most of its early life.

Ceruzzi: Okay.

Ross: We did a lot of work for Apple Computer but we never did anything with the Macintosh. Apple was another big client of ours.

Ceruzzi: They were a client?

Ross: A customer, but we never did anything with the Macintosh.

Ceruzzi: Did you think about that?

Ross: No, I mean we used Macintosh just to do desktop publishing and stuff, but we never really got involved with them.

Ceruzzi: Have we covered everything that we need to cover?

Ross: We've covered Ross Systems up until it was acquired.

Ceruzzi: Let's talk about MAPS, what language was it written in?

Ross: By the way, MAPS had many acronyms, but the original acronym was Management Aid for Planning Strategies, and then later on when there was accounting software, when we expanded, it was Management Accounting and Planning Software. And we actually licensed MAPS, the modeling language, to some guys in England and they called it Money And Profit Simulator. It was written in BASIC, BASIC Plus.

Ceruzzi: BASIC Plus?

Ross: RSTS BASIC.

Ceruzzi: Which is Digital Equipment's version?

Ross: And actually to be technically honest we wrote a lot in Pascal for the DEC Pro350, but basically for the VAX and PDP-11 DEC BASIC was a great language.

Ceruzzi: Aren't they the ones that introduced Peek and Poke, those commands?

Ross: Yes, they had everything, Peek and Poke.

Ceruzzi: USR *[User Service Routines]*, where you'd drop in the machine language for a routine.

Ross: Yes, that's one thing you could do with DEC BASIC is you could manipulate bits and bytes, and it was much more technically flexible.

Ceruzzi: Otherwise BASIC was just a toy if you couldn't do that.

Ross: Well I felt that the HP3000 BASIC never had the kind of technical features that the DEC BASIC had. DEC was a great technical company and you can look at the Microsoft BASIC and you can see elements of the DEC version o f BASIC.

Ceruzzi: Oh yes, Peek and Poke had to be, and USR.

Ross: The field statements with the half streams and it could do stuff like that.

Ceruzzi: I think Bill Gates knew who to take his stuff from.

Ross: Absolutely.

Ceruzzi: But this was again in contrast to this morning where Mitch Kapor said he could never take BASIC seriously.

Ross: Well, he was both lucky and smart. He had the right platform at the right time and he chose the right operating system and he chose the right strategy which was Assembly language. For us, because we needed a character oriented kind of a language, that kind of screen painting efficiency wasn't that important. I wrote most of the first version of MAPS personally in six months in DEC BASIC. It was an interpretive language, so you didn't have to compile and you could really develop fast.

Ceruzzi: Which is what you needed. And you developed it on a PDP-11?

Ross: Developed it on a PDP-11.

Ceruzzi: And then ported it to the VAX?

Ross: Yes but the VAX was compatible, I mean I'm sure it wasn't 100 percent, but it was 99 percent compatible.

Ceruzzi: It was supposed to be the extension.

Ross: Right, so once you got with the VAX you could start doing stuff.

Ceruzzi: Right and then eventually you'd have VAX stuff of its own.

Ross: And then we were pretty much VAX only and the PDP-11 sort of went away.

Ceruzzi: Is there anything else that we haven't covered, I guess your relationship with Tymshare for the telecommunications side, which went smoothly?

Ross: Yes. I mean that division was happy to have us as a customer even though we competed with the regular Tymshare people. The industry was pretty small back then, so there weren't that many software companies and we all saw each other at the ADAPSO conferences.

Ceruzzi: About how many employees did you have around this time?

Ross: I can't remember, I think that the company, when I exited around 1988, I think it had a couple of hundred people. I think it was doing $25 million a year then, but I can't remember the exact numbers.

Companies After Ross

Ceruzzi: Then you became a consultant again?

Ross: Well yes, I became a consultant and, you saw my resume, I did a couple of things.

Ceruzzi: Documentum, I remember that company, but I don't remember too much about it.

Ross: Oh, it just was acquired by EMC for a couple of billion dollars, it was a big company.

Ceruzzi: Well, I could never figure its relationship to Xerox.

Ross: I can tell you exactly, I know that, because I was hired in as the founding CEO of Documentum by an executive at Xerox, a guy by the name of Bob Adams, who had done the laser printer stuff, had some charter to spin technology out of Xerox, but it wasn't quite that job. He had decided he wanted to have a company, but it turned out he wanted to have some sort of printing company, an independent subsidiary. He hired two guys from Ingres, the database company, Howard Shao and John Newton, and then me, and they were database guys. So we sat around and came up with the concept of a document database, inside of Xerox, so it was still a wholly owned Xerox subsidiary. And then I ended up getting an offer, so I left, because I didn't ever think it was going to spun out of Xerox, it was too good an idea, they were the document company, they wouldn't do that. So I left to go be the CEO at Pillar.

Ceruzzi: So you left and then Documentum was just very recently sold or something?

Ross: Well, it worked for two years inside of Xerox. We developed the application, then they received outside venture capital, and they were able to spin it out as an independent company. That was probably 1994, and then it was acquired just months ago by EMC. But I'd gone on to this other budgeting company called Pillar.

Ceruzzi: What did you do there?

Ross: I was the CEO hired by the board to turn it around.

Ceruzzi: And what was their product?

Ross: It was a PC-based budget consolidation system, so I was back to my old days. It was a great product, I mean it had graphics built around the Mac and so our challenge was to port it to the IBM PC because the finance departments didn't use Macs. It was real easy to use and it didn't rely on networks. You consolidated files and people loved it. It was acquired by Hyperion Software, and even today, 10 years later, people come up to me and say how much they loved Pillar, I mean it was a much-loved product.

Ceruzzi: When you looked at that did you have all these memories of your old stuff come flooding back into your head?

Ross: Yes, I knew that business extremely well, but I don't know if I had fond memories. However, I knew the business really well, and I was a little bit skeptical that you could do this but we were able to put together the team and the technology.

Ceruzzi: On the one hand it's something you have done before, but on the other hand its success depended on them having a fresh approach.

Ross: It's a fresh approach, and so, at first I didn't understand the fresh approach and then I came to appreciate its beauty, and it's a great product.

Ceruzzi: And it's still around.

Ross: It's still around.

Ceruzzi: So at this point it sounds like you're getting ready for another change.

Ross: Well let’s see, I went through timesharing, minicomputers, then Pillar was client server architecture, and then I ended up in the Internet in a business to business model at Extricity.

Ceruzzi: It sounds like you had sand in your shoes, that you keep hopping and you weren't staying in one place, but you were in one company for 20 something years. Were you aware of this happening to you?

Ross: Well no. I'm a big believer in working for the investors. At Pillar, we were there to make money, but there were a lot of issues going on and this was a good offer so we sold the company. And then I ended up founding Extricity, a B2B software company.

Ceruzzi: There's a reference to Network General in between.

Ross: That was just a consulting job.

Ceruzzi: Was that Len Shustek's company?

Ross: Yes, I knew Len. He and Harry Saal were there.

Ceruzzi: So you've gone through all of your companies?

Ross: Probably. Actually if you think about it, I wonder how many software executives have started and ran timesharing, minicomputer, client server and Internet companies.

Ceruzzi: And you're not still at Extricity?

Ross: Oh right, that got acquired, I sold that too.

Ceruzzi: And B2B is a viable concept but it had some bad timing of coming out as the Internet bubble burst. Is that fair to say?

Ross: Yes, we developed technology that was still ahead of its time, and the problem with the B2B is a big business, but I'm not sure how big a software business it is. I mean we developed this incredibly sophisticated, really interesting technology and we sold it to some very important people, I don't know if you know TSMC (Taiwan Semiconductor Manufacturing Corporation), or Solectron?

Ceruzzi: Oh yes sure.

Ross: Solectron.

Ceruzzi: Yes they make the chips.

Ross: Right, yes. So many people work with partners all over the world. We had great stuff going on, but then the bubble burst. We tried to go public, we actually filed our S1 but we hit the wall, and then another company offered to acquire us for a lot of money and we took it.

Ceruzzi: So one of your competitors was i2?

Ross: Well i2 was sort of a competitor as well as Web Methods and TIBCO.

Ceruzzi: Driving from the airport I passed by i2 and I thought about that, because I didn't even know they were still around.

Ross: Well I think i2's on its last legs; they're not my favorite company.

Ceruzzi: But the concept is valid.

Ross: Yes, supply chain management. Unfortunately supply chain is a very broad area. Extricity was a little bit of a different twist than i2.

Ceruzzi: Isn't Web Methods a Virginia company?

Ross: Yes, right in Virginia.

Ceruzzi: That's where I hear about it. So they are competitors.

Ross: They are a competitor.

Ceruzzi: In fact they're actually doing pretty well, I think.

Ross: Pretty well, it's a pretty good company.

Ceruzzi: But you're not doing this anymore.

Investing In Companies

Ross: Yes. To be honest with you, I like selling companies, and it's really simple. You get to move on to something else and when you go public as an executive, first of all you can't really sell your stock; second of all you still have all the pressure, and most public companies end up doing poorly. So if you're the guy at Google - if you're Eric Schmidt - it's a different ballgame and most people aren't that lucky. So therefore you can move on to some new phase and that's what I did and I like doing that.

Ceruzzi: Who gets hurt when it gets sold?

Ross: Well, if it's done right I don't think anyone gets hurt, but if CA buys you they have the slash and burn approach?

Ceruzzi: Right, that's what they're famous for.

Ross: That's what they're famous for. But other people buy you and run you in a different way and I don't think anybody gets hurt, I mean there's going to be change and we all have to live with change. I mean look at Oracle or PeopleSoft. Who's going to get hurt there?

Ceruzzi: But didn't DEC get hurt when they were bought?

Ross: Yes but DEC was on its last legs. The point is, suppose DEC hadn't been bought, they would have gone Chapter 11.

Ceruzzi: Yes that's true, so it's like you're selling at your peak.

Ross: Yes.

Ceruzzi: What you're saying is that the Computer Associates model is kind of an aberration.

Ross: You might say that every software business has its economic viability, and if you're a fast-growing profitable software company and somebody buys you they're probably going to leave everything alone and let you be fast-growing and profitable. But if you're a struggling software company and somebody buys you they're going to cut expenses so that they can make a profit. And you would've had to do it anyway. As a venture capitalist when we lay off people or close companies, it's always really hard to do. But in my mind when you lay off people you're doing that to save the jobs for the people that are going to stay, not to hurt the people that are going to go.

Ceruzzi: IBM bought Lotus, somebody should ask Mitch (Kapor) about how that went off for him.

Ross: He was pretty much out of it by then.

Ceruzzi: Yes, there is this myth that big companies buy little companies to shut down the competition, if there's some competition going on.

Ross: Most big companies can’t afford to do that, although Microsoft may do that.

Ceruzzi: I think AOL bought Netscape even before then they bought ICQ which was the original instant messaging program.

Ross: The problem is in the software industry there's constant change. So where is the stability, I mean if you're a mid level programmer and your company gets bought and they reduce the staff and you have to look for a job, it's not good. But it's not like you were going to be able to stay in that company as a mid level programmer for the rest of your life; it just isn’t the way of the world.

Ceruzzi: So generally through all these cycles, you seem to be hitting home runs every time, or many times.

Ross: No, I wouldn't say that. Google is a home run, I don't hit those. I haven't hit a Google yet.

Ceruzzi: But none of these things were the Digital Equipment situation where you had to sell because it was either that or Chapter 11. That never happened. So that's pretty good.

Ross: All these were good companies, yes.

Ceruzzi: Has this translated into being good at venture capital?

Ross: I think so. But the reason I say "I think," is that I joined venture capital in 2000, so I joined after the crash. I never had the opportunity to make an investment in 1998, and sell it for a hundred times my investment in 1999.

Ceruzzi: But that wouldn't have necessarily been because those people were smart.

Ross: Exactly. So I mean the answer is, two things, I've never made any stupid dot com investments and, some of my investments are doing really well. I think that all of the companies that I have invested in and I'm on the board of appreciate my advice because I've been there before, versus being some young MBA who is telling people what to do, but really doesn't have any experience.

Ceruzzi: And is it really true that you look for one big giant blowout that'll sustain the losses?

Ross: I think that's the mathematics of venture capital, that one out of 10 is a home run and a couple are doubles or triples and the rest are either singles or zeroes. And yes, that's the math, and if the Google guy had made 200 to 1, you know, if you invest in 10 companies a million dollars each and in one of them you do 200 to 1, you can do the math.

Ceruzzi: It works out that way.

Ross: I mean realistic, yes, that's unusual but it's the math.

Ceruzzi: I think Digital Equipment was one of those for General Doriot.

Ross: Yes exactly.

Ceruzzi: And he had a bunch of others that didn't do so well.

Ross: Yes. I mean it's a hard business because it's never obvious which one's the Google.

Ceruzzi: But that's what your job is, to try to find it.

Ross: It is, it absolutely is the job, as you know.

Ceruzzi: And people come to you and pitch what they've got.

Ross: Yes, exactly.

Ceruzzi: You're still in the same business but you're doing something very different.

Ross: Yes, right now, the thing that I'm doing is something which I like a lot more. It's really hard to be a CEO, I mean it's intense, 24 by 7, and I have to tell you that it's a lot easier to tell people what to do than it is to do it yourself. So I like the fact that I am working with multiple different companies and being an investor/board member/advisor. I've done it myself; I've done it and I've been there before.

Ceruzzi: So when you're on the boards of these companies how much detail do you have to feel comfortable looking at?

Ross: I'm actually pretty detail oriented, and I think you have to be. In a small company you've got to see the detail and I hate it. When you see these stockholder lawsuits, and the guys on the board say, "I didn't know what was going on". That's horrible I think. Take Enron as an example; I don't know anything about it, but the board wasn't doing its job if it didn't know what was going on with some of those things.

Ceruzzi: But that would never happen in your situation.

Ross: Well I hope not.

Ceruzzi: Presumably the companies are a lot smaller and they're more focused on what you know, the subjects that you know.

Ross: But I think when you're working with companies you've got to be involved in the details.

Ceruzzi: And it's your money too.

Ross: Well, in the venture capital business it is not really your money, it comes from the limited partners. But, you're responsible for the money and you have to be involved in the economics of it. I was just on a conference call earlier with one of my companies and I'm watching the dynamics that are going on and I have some very specific things that they should do. And one of my fellow board members was saying “Gee, I've never run a company, these are interesting things.” I don't know that I'm right but I'm very sure that they need to do some of these things.

Ceruzzi: How many boards are you on?

Ross: Around eight.

Ceruzzi: Is that reasonable?

Ross: That’s totally reasonable, I mean some people are on double that number and it's not a reasonable thing, you're running around all the time.

Ceruzzi: Are they local, all Silicon Valley?

Ross: Yes.

Ceruzzi: Do you fly all over the world?

Ross: No, I don’t fly.

Ceruzzi: Did you ever?

Ross: No, I was on a board in New York once, and yes I don’t travel around.

Ceruzzi: If there's anything you feel like we've missed in terms of the actual creation of the software, it sounds like keeping close to the customer’s needs is the answer.

Ross: That always makes a big difference, understanding the customer.

Ceruzzi: And maybe the other thing is that the sort of MIT top down theory of computer science and timesharing wasn’t as important as the bottom up satisfying the customer’s needs.

Ross: I think that Ross Systems was successful because it capitalized on and added to existing technology; it used the DEC and the timesharing and then we were able to focus on the customer business problems and write software to solve them, versus trying to do something from the ground up.

Ceruzzi: And it sounds like graduate school and the Raychem Corporation was where you learned who the customer was.

Ross: Yes, actually that is true. I made my mark at Raychem on a budgeting package, that was the same thing.

Ceruzzi: Businesses need budgets, that's never going to change.

Ross: I did that for a long, long time.

Ceruzzi: So no matter how much the computers change, the need for these figures is never going to change.

Ross: Well actually if you saw that MAPS Pro videotape and listened to the kinds of features and things, it's still true today, it's no different.

Ceruzzi: That's why this whole business about B2B *[Business to Business]*, everyone can see the need or the obvious advantages of it and yet for some reason it doesn't quite snap.

Ross: Well, my theory, and obviously I've agonized over this, is that everybody's doing B2B but there's not one application, I mean the way that these companies interact is done a lot of different ways and so they just pull bits and pieces together. I'm really going to get off the subject but I'll do it anyway. The technology for B2B is really changing a lot now, and so a lot of standards have come into play recently. Have you heard of RosettaNet?

Ceruzzi: I don't think so.

Ross: Okay, RosettaNet is a set of standards that was originally formed in the electronic industry using the Internet to do different kinds of transactions. And so now a company like Intel or whoever can set up a RosettaNet gateway and any of their suppliers can link in using anybody else's software. So the standards are migrating upward that allows B2B to happen in a more effective way. One of the problems with Extricity is that we were required to sell software to every partner, versus just one. So we sold TSMC, which is where we have a big hub, and then went out and tried to sell that compatible software to all of their customers, but then they had to implement it and it was too big a project and nobody wanted to do it. And it got worse because with Dell, for example, you have 5,000 suppliers. So the trick for B2B applications to be successful is for the standards to come in where Dell can set up a standard and all these other guys can just use it.

Ceruzzi: I guess I got interested in the whole notion of doing it for medical records. Healtheon was the company, and I thought this was perfect because everybody knows what a mess healthcare information is, but it didn't work because the doctors didn't want to cooperate.

Ross: That whole healthcare IT stuff is going to be a big area, the standards aren't there yet, and it's just going to have to evolve. The other area that's been successful investing in was embedded software for these devices.

Ceruzzi: PDA's and phones.

Ross: I invested in a company called MontaVista Software that does embedded software with Linux.

Ceruzzi: Oh, I've heard of that.

Ross: It's Linux, so it's open source and it's free. But if you're going to build a cell phone or whatever you can access it. The guys that founded the company are pioneers in embedded software and it's amazing to me that on these little devices you can have megabytes and mega software.

Ceruzzi: The power of a VAX.

Ross: It's the power of the VAX. So, no longer do the inventor guys need to have the type code, what they really need is a easy to use, so there goes Linux.

Ceruzzi: Is there a single theme to all your venture capital investments?

Ross: No, although it's basically software. I did find that everything I've learned in the software industry, and mostly in enterprise software, applies to all software, even embedded software. I did one company that's software on a chip, and the business issues are the same.

Ceruzzi: Okay. Thank you very much.

Ross: You're welcome.

