Cottrell [00:00:00] Another Nobel Prize winner who was at SLAC for some time, and then went back to Brookhaven, Mel Schwartz.

Deken [00:00:07] Oh, sure.

Cottrell [00:00:08] And I think they founded a company, I think... I'm not sure about this, this may need checking.

Deken [00:00:16] Okay.

Cottrell [00:00:16] But I think they founded a company that was into security and encryption of data.

Melen [00:00:21] Network General?

Cottrell [00:00:22] It could be Network General.

Melen [00:00:24] Was that it?

Cottrell [00:00:25] Yeah, I think it was Network General. Lenny Shustek founded the company that did sniffers. I've forgotten what the name of that company was....

Melen [00:00:34] [unintelligible].

Cottrell [00:00:34] Bob Stewart [?] was at Network General... You might want to get... Lenny Shustek is still around.

Deken [00:00:39] Yeah, he was at The Computer History Museum.

Cottrell [00:00:40] Yeah, that's right. So you might want to get him... Or here's Bob Beach, SLAC Unified Graphics. He was an interesting guy, he.. He was a perfectionist, and his, his software was always perfect, but he, he would never... If the hardware didn't work, he just went over the top, you know, and we got new software, this hardware system from Calicomm [?], which was interfaced to the IBM mainframe, I don't remember if we got version one or what, but he really killed people at Caltech, I mean Calicomm, because it so badly, it didn't do what it was supposed to do, and he had to program around it, yeah.... Oh, Jim Cook!

Deken [00:01:26] Jim Cook, Yeah.

Melen [00:01:26] [unintelligible] Telecomm.

Cottrell [00:01:27] Yeah. Jim Cook was a interesting guy, he was from Texas. Roger Chaffee, yeah. Jim Cook... (They both died of cancer.) Jim Cook was from Texas, and he was very proud of it. He used to smoke like a train. He had an office where, let's see, where what-was-his- name used to be in it: the guy, the last member of what used to be...

Deken [00:01:52] Frank Rothacker?

Cottrell [00:01:53] Yeah: Frank Rothacker. That was his office. And he wrote this Mortran compiler.

Melen [00:02:00] He did Mortran? Mortran was done here?

Cottrell [00:02:00] Oh, yeah.

Melen [00:02:03] I did not know that!

Cottrell [00:02:03] Mortran was brilliant.

Melen [00:02:05] Mortran was a structured Fortran, right?

Cottrell [00:02:07] That's right. That's right. You would write in this language, it was structured with "if," "then," "elf [?]," and you know, "begin," "end," and things like that. And it would generate Fortran and basically the bootstrap consists of a single card, and we were always proud of this, and so you could bootstrap it from one card and we were always trying to keep it working that way because it would slowly grow, you know, from that. But it was used heavily, it was taken to CERN. We used it very heavily in Group A, a lot of our code was written in Mortran, and it was very nice, but it no longer exists, you know. In fact, we wrote a lot of our code in Mortran and then Adam Boyarski had to convert, wanted to upgrade the histogram [histovarian?] package that we worked on together called HPAC, or it's called [?], and he wrote something called.

Melen [00:03:02] HANDYPACK.

Cottrell [00:03:03] HANDYPACK, which was, because there was an HPACK and a DPACK. DPACK was the database...

Melen [00:03:06] Oh, "H" and "D" pack.. Oh, I get it! You know, I never realized...[laughter]

Deken [00:03:09] HPACK And DPACK: HANDYPACK. Oh, okay.

Cottrell [00:03:09] So he had to rewrite all of the code, and he rewrote it but he took it out of Mortran and put it back in Fortran, he didn't like Mortran. So, so it went both ways on that one. And then Roger Chaffee took...

Melen [00:03:31] Universal Graphics.

Cottrell [00:03:33] Took Universal Graphics and wrote a brilliant front-end, TOP DRAWER in particular for that. TOP DRAWER, here, that was that was heavily used at SLAC for creating graphs and it was used in papers, it was publication-quality graphics you would get out of it and you could also use it for other things. I used it for many a year until we got some better tools, until basically we had, you know, things like Excel and things like that to create the graphics. Yeah, okay, Bob Beach.. These are probably the only remaining members.. Oh, Chuck Zahn, yeah, he was around for a long time, yeah, User Manual...

Melen [00:04:10] You can see just back here, so... Jerry suddenly starts to appear here talking about his ...his [multiple voices-unintelligible]

Cottrell [00:04:20] He was at CERN at the same time I was at CERN, so he must have got back from CERN around that time. And Chuck Zahn was at CERN, too, we were all there at about the same time.... Lenny Shustek, oh, the Video Graphics Terminal, VGT ....

Melen [00:04:34] The Internals of ....

Cottrell [00:04:35] Yes... one... one really neat thing on that, which was that you would want to scroll the text.

Deken [00:04:45] Uh-huh.

Cottrell [00:04:45] And so Lenny got hold of a... A trackball that came from the...from John Brown's group who would do bubble chamber scanning, and you could spin it...

Deken [00:05:00] oh, uh-huh.

Cottrell [00:05:00] And you would spin it fast, and the faster you span it the quicker the text would move up the screen. And if you think about a... A smartphone, an iPhone today, we all scroll up, we do this, it was pretty much the same thing...

Deken [00:05:14] The same thing.

Cottrell [00:05:14] Except with this spinning ball...You could stop it, you know, and the thing would stop, and you can start scrolling again. It was big, it was clumsy, but it was very nice. Forest Baskett...

Melen [00:05:23] Here's a Forest Baskett paper...

Cottrell [00:05:23] Oh, the Triplex... Okay. Raj Raffii... I don't... I think his first name is Raj, but I don't remember anything about him, but the name comes back. Yeah. I don't know what that was... SPRINT. Oh, I remember this one...

Melen [00:05:37] SPRINT?

Deken [00:05:40] SPRINT?

Cottrell [00:05:40] Interactive... For printed circuit design...

Melen [00:05:42] I think I know this guy, Bill vanCleemput...

Cottrell [00:05:46] Could be...

Melen [00:05:46] I think I know him from down on campus.

Cottrell [00:05:47] Yeah. Because I remember around this time, actually a bit before that, when I came back from CERN, there was a guy who used to be at the Artificial Intelligence Center up on the Hill.

Melen [00:05:58] SAIL.

Cottrell [00:05:58] SAIL, that's right. Which then...

Deken [00:06:02] S-a-i-l?

Cottrell [00:06:02] S-A-I-L.

Melen [00:06:02] Yes: Stanford Artificial Intelligence Lab...

Cottrell [00:06:06] Was it up in that building? I'm not sure... It was up on the hill up there. Yeah. He had written this is...what do you call it... not PC board, but a wiring board layout program, and we were doing a lot of wire... basically, you'd have a board with lots of holes in it, and pins you stick in the hole, and then you get wire to come along and wire wrap and you connect up a few things on it...

Melen [00:06:30] That's what that was all about at that point...

Cottrell [00:06:32] This was pre-circuits, that's a different one... So, but so, I took his program and got it to run on the IBM mainframe. Joe Zingheim and other people at SLAC would use it for, you know, developing prototypes in wire-wrapping. It worked very well, so we used it for many years, but then of course, printed circuits came along and then we didn't need it anymore... Oh, this is, yeah, this is where he was...

Melen [00:07:00] Shustek's paper on Connecting Computers to WYLBUR...

Cottrell [00:07:00] So, we worked with him on that. So he helped us a lot on that.

Deken [00:07:04] So, Shustek was a graduate student?

Cottrell [00:07:07] He was a graduate student at the time. Yeah. Very, very smart. He... Another, oh yeah, there it is is, WORMON. This was the... alright, I'm not sure if this is the.. He had another thing... Yeah, I think it was. So you were able to take your Fortran program and put it through his stuff and then you would be able to see where all the time is going, and you'd be able to start to optimize your program. Another thing he did...

Melen [00:07:35] Look at this one here...

Cottrell [00:07:35] Was build an interactive debugging, yeah, DEMON, yeah, he wrote that, too. That was really useful. I was using this all the time to debug our programs, and you know. Until this, you know, it was 'well put a print statement in here and we'll see if it gets used,' and then you'd have this and you could actually really start to debug it very nicely. That.. that.. that was probably one of the first interactive debugging systems to ever hit the field.

Melen [00:07:59] He contacted, actually, through Don Lemma, a couple months ago contacted us. He was looking for some of his stuff that would have been on tape, as I recall.

Deken [00:08:08] Yes, yeah: he was looking for some tapes...

Cottrell [00:08:12] Oh...wow...my goodness...

Melen [00:08:12] Well, Jean has a surprising number of tapes in the archives, but we couldn't clearly put our hands on what he was looking for...

Deken [00:08:20] Yeah, we couldn't...we couldn't find anything.

Cottrell [00:08:21] Yeah. I mean to say, these were both major efforts, yeah, and he did do...

Deken [00:08:28] So which two are the major efforts?

Melen [00:08:29] DIVONNE .. oh, DEMON, pardon me...

Cottrell [00:08:33] I'm not sure how heavily this was used...

Melen [00:08:36] And WORMON...

Cottrell [00:08:36] But those, DEMON, WORMON, and then of course his 'Connecting Computers to WYLBUR,' that... We used that heavily. He helped us a lot with that. Too... he and Mark [unintelligible]...

Melen [00:08:46] 1977 was a big year for Len Shustek...

Cottrell [00:08:46] Yeah... I never used this, I don't think...

Melen [00:08:52] ABACUS?

Cottrell [00:08:53] Yeah.

Melen [00:08:54] Did he write the expression evaluator?

Cottrell [00:08:54] There were around at the same time. Forest Baskett...

Melen [00:08:56] Yeah.

Cottrell [00:08:56] I, yeah, I don't think... I'm not sure that's what's-name ever had a paper here...the guy who went and found SUN... I don't think he's in here...

Melen [00:09:00] Andy Bechtolsheim?

Cottrell [00:09:00] Bechtolsheim. I don't see him... 'Stanford PASCAL Compiler'...

Deken [00:09:17] Roger Chaffee?

Cottrell [00:09:18] ... Oh, Henk Wind! Was he..was he here for a year?

Deken [00:09:26] (This is paper 201...)

Cottrell [00:09:27] [unintelligible] cause I met him at CERN... I don't know what that paper was, but he was... He was the ultimate mathematician, you know, and he was head of the [uni's?] principal component analysis, he must have been at SLAC then for a while... Oh, that never happened [CTGM202--cancelled]... OK, Bob Beach... Bob Beach... Bob Beach...

Melen [00:09:45] See, he redid VM/CMS...

Cottrell [00:09:46] Oh, yeah.

Deken [00:09:46] ... MORTRAN...

Cottrell [00:09:47] CalComp Graphics...oh yeah. MORTRAN-3 .. We're getting to the end of MORTRAN, now. And 'What's Wrong with FASTBUS?' Oh...

Melen [00:09:57] From Dave Gustavson.

Cottrell [00:09:58] Yeah, he was big on the FASTBUS.

Melen [00:09:59] FASTBUS, and then he was also big on that interconnect... that low-latency interconnect that Dalton finally picked up?

Cottrell [00:10:07] Oh, SCI.

Melen [00:10:07] SCI, thank you... and he was involved in the standards for SCI...

Cottrell [00:10:11] That's right, yeah.. Oh, so we got up to about 1980, I think. (Laughs). After '80 we got the 3081, we got the 3800, more and more printers out in the field, so eventually the 3800 wasn't needed anymore. Let's see, uh, when did the IBM RS6000's come in? Was that in the 90s?

Melen [00:10:36] Probably the early 90s.

Cottrell [00:10:37] Yeah, I think it was. IBM made us an offer we couldn't refuse, or didn't refuse. We got, we got a lot of RS6000s...

Melen [00:10:46] Which were turned into Unix workstations.

Cottrell [00:10:46] That's right. There were all kinds of committees, not all kinds, there were committees set up for how we're going to move to UNIX. Paul Kunz was heavily involved in that. If you ever get a chance to...you can probably interview Paul.

Deken [00:10:59] Yeah...

Cottrell [00:10:59] Because he has a lot of stuff on the move to Unix, he was heavily involved in that...

Melen [00:11:07] I'm going to have to end this very interesting discussion to go over to a meeting over in the Director's office.

Cottrell [00:11:12] OK, good luck.

Deken [00:11:14] Sorry.

Melen [00:11:15] That's OK.

Deken [00:11:16] Thank you very much.

Melen [00:11:17] We've got lots of other names to follow up on that you may want to use some of them as group interviews, I don't know.

Deken [00:11:23] Yeah, yeah.

Melen [00:11:24] And you get stimulation back and forth.

Deken [00:11:26] Right, right.

Cottrell [00:11:26] ...the names.. Cause I'd forgotten about the Comp Group, yeah. The whole issue there with the Comp Group is interesting. Have you interviewed Jerry?

Deken [00:11:35] I interviewed him about PRIM9 when I was new here. But I haven't interviewed him since.

Cottrell [00:11:40] Oh yes, PRIM9, yep, yep.

Deken [00:11:40] ...About his work on that.

Melen [00:11:45] Okay,Thank you both!

Deken [00:11:45] See you later--Thank you.

Cottrell [00:11:45] Oh, so, where were we? Oh, 1980 and 1990s? Yeah, oh Chuck Dickens retired in about 1995, then I was acting director for a couple of years, and then we hired Richard Mount... Richard Mount, then the new lot came in, but I can't remember when that was -- not so long ago, but there's plenty of people who can tell you when that was...

Deken [00:12:13] Right, right.

Cottrell [00:12:15] And what else was there that was interesting? I'm sure there's other stuff... I should... I should... I mean, I've got lots of talks given in the 80s and the 90s about the computing at SLAC, cause I was in charge of the computing at SLAC, and so there's...you know, one can gather dates from that.

Deken [00:12:37] Okay.

Cottrell [00:12:37] So I could... I mean... I don't use the decks anymore, and I could give them to you...

Deken [00:12:43] I could copy them, or...

Cottrell [00:12:43] I could probably give them to you, because you'll probably keep them much better than I will. I've got a rack full of talks and some of them are quite interesting because they show the state of things at that time.

Deken [00:12:55] At the time, yeah.

Cottrell [00:12:55] So I get you those... And you may have questions, of course, that may open up a whole load of other things which were going on...

Deken [00:13:04] We could do a follow up, maybe, after I've gotten them.

Cottrell [00:13:05] Yeah. I think it would probably be good after you got that, I should do a follow up. I've also got a 37...no... a 36? 7? a 3705 console... I think it was a 3705, which was the console used by which serial linux bases/faces? would connect into the IBM

mainframes. It had a separate box that you would connect into, at speeds up to ninety six hundred, which of course was blindingly fast in those days.

Deken [00:13:36] Yeah.

Cottrell [00:13:37] The original modems that we got at SLAC would run, I think... I don't think we got one of the early ones: the original modems would only run at 70 bits a second, then I think we started around 300 bits a second, and they would have acoustic couplers: you would take the headset, and you'd jam it into...

Deken [00:13:52] Jam it into the rubber cup...

Cottrell [00:13:53] And then you would dial up, and you would make the connection and then you have a few hundred bit per second, so that you could have a quote "portable terminal," which was actually... Came in a box which was about this high -- that by that -- so it'd be about two feet or about four feet...

Deken [00:14:14] And that was considered "portable?"

Cottrell [00:14:16] And you'd put it in this box... It had wheels...

Deken [00:14:21] I see: wheels. I see. [Laughter].

Cottrell [00:14:22] Lift it into the back of your car and you'd take it home, and then you would use it at home with a dial up modem, and you'd be able to get into WYLBUR and you'd be able to do work at home. And what would be interesting, but I can't remember exactly, was the first email system we had...

Deken [00:14:41] Oh, yeah!

Cottrell [00:14:41] And I think it was actually on the 360... 360.. no, 371-68... And I believe it was developed by a guy called Ed Frank. I've lost contact with him. He was a student at the time. Ginger-haired guy. He went to work eventually for SUN. He was heavily involved in the development of Java. He was the hardware side of Java and when Java was developed at SUN, it was developed as a language to run on hardware such as would be controlling TVs... And TV-type devices. Cause he went on.... And so he was heavily...I don't know when this was.. but whenever, in the early days of Java, he was heavily involved with that. But I believe he developed the first email system, writing on it, I believe a 371-68. And then after that, when we got the 360... the thirty eighty one and VM, I believe that George Crane developed the email system...

Deken [00:15:53] Okay...

Cottrell [00:15:53] And then of course, it became a product, you know, and so, you know, so it moved over to Microsoft and stuff like that and some things like that. So we were one of the early people that had email. Oh, the other thing that we had, which was early on... This was before the Internet, well before the Internet struck SLAC. I forget when we got our first connection to the Internet, I'd have to dig back.

Deken [00:16:16] Okay.

Cottrell [00:16:16] It was in the mid 80s, I think. And we got our Internet connection through Stanford. We had another microwave dish on the roof of this building,.

Deken [00:16:26] Okay. Building 50.

Cottrell [00:16:28] Building 50. Which talked to a microwave dish on the -- I don't know how you spell it -- I think it was K-e-c-k, which was the chemistry building on campus...

Deken [00:16:37] Okay.

Cottrell [00:16:37] And provided a ethernet connection from there to here, and hence at their end, to the Internet.

Deken [00:16:46] Oh, okay.

Cottrell [00:16:46] So, that was our first Internet connection. And I remember arguing at the time that 'we needed to do this' and people were saying, 'why do we need anything more than a 9600 baud modem?' And I said, 'eventually, we might, I think.' [Laughter].

Deken [00:16:59] You think! [Laughter].

Cottrell [00:17:03] And so, we did it. And actually it was... It was a ten megabit connection and it was actually a full ethernet connection, so it was way over anything we needed. But it did give us that... Now, prior to that, we had something called BITNET. And BIT stood [for] "Because It's There" and it was based on an IBM protocol...

Deken [00:17:26] Because it's there?

Cottrell [00:17:28] Yep.

Deken [00:17:29] Okay.

Cottrell [00:17:29] And it connected up all the uni.. not all, a lot of the universities. So there were about, you know, 200 universities in the US, and then it migrated to Europe, pushed by IBM, and hooked up many of the universities there and it was the way in which we would send e-mails to everybody. So this was this was after Ed Frank's work, cause Ed Frank's work was basically email, but only on site, and only if you were connected to the same machine, you know, it was very simple email. So then, we had email between the sites. It also had the capability for you to do interactive messaging, so it must have been one of the early interactive messaging things. So you're able to, if somebody else was logged in, you were able to send a message, 'are you there?' And they say, 'yes' and you say 'well, can you help me with this' and they'd say 'yes,' as opposed to doing by email. So that... that we'd probably gone to BITNET probably, I'm guessing 1981, 82. And that opened up, you know, our connections to other labs. We were one of the early labs to be connected to BITNET; we were not the first. I think the first lab to be connected to BITNET... It was something like Argonne...

Deken [00:18:45] Oh, okay.

Cottrell [00:18:45] But I wouldn't swear to that. And..is that true, or were we the first on line? No, I don't think we were the first, and we...we certainly weren't the first lab to be

connected to the internet... I think Brookhaven might have been before us, but I'm not sure of that.

Deken [00:19:01] Okay.

Cottrell [00:19:03] So, that was the other network, and it ran for many years and in the early days, we all had another network, which was just point to point links. We would have a dedicated phone line from, let's say, here to Santa Cruz or from here to the University of Colorado, which we would have modems at both ends and that this would give us a connection between the two. And we extended that idea to China, remember the China connection?

Deken [00:19:27] I remember, yes, I do remember that.

Cottrell [00:19:28] So that... that went.. So, as I say, we extended that idea to China and that's how we got... got them connected to the Internet. That's a whole different topic, which I think you've probably got enough information on that.

Deken [00:19:40] Yeah, I've got a good idea on that.

Cottrell [00:19:43] I... I think that's probably it. I'm sure I'll think of other things....

Deken [00:19:49] All right.

Cottrell [00:19:49] I'll get you the slide...the books on slides, and I don't know what you can do with them, cause, as I say it's about a shelf-full.

Deken [00:19:55] That's all right. We'll take them: I can get you a couple of boxes.

Cottrell [00:19:58] OK, I mean, as I said, they are labeled by year.

Deken [00:20:03] OK.

Cottrell [00:20:03] So you can go back...Now, typically they may address one topic that I was heavy into that year, like light-side[?] computing, but you'll see how it light-side [?] computing happened, and we were selling the idea to the Digital Equipment Corporation at the time, and they were going to fund something, but eventually it all fell through, you know, like a lot of these things.

Deken [00:20:26] I've never heard that term, "light-side computing"...

Cottrell [00:20:27] Oh, okay. It just meant that there were no operaors...

Deken [00:20:28] Without an operator.

Cottrell [00:20:28] ..and if you go to the second floor, there's nobody there; you go to the first floor, there's nobody there. And that was quite novel at the time, I mean, the way computers were run, you had to... you know, the people sitting at the console, watching to see if anything was going wrong, watching a screen. You had another person tearing off paper and then a third person mounting tapes and probably the person doing paper would only tear off the paper once an hour and would be helping with the tapes the rest of the

time. So, as I say, it was a staff of about 20 or 21 people, which was quite expensive. So there was a big saving when that ...went in. So, basically, it paid for the silos.

Deken [00:21:09] Ah: okay.

Cottrell [00:21:09] Because... And it was a continuous saving, as opposed to a one-time cost.

Deken [00:21:12] Sure.

Cottrell [00:21:13] So that's.. That's how we were able to afford the silos...

Deken [00:21:17] Affort the silos. Very cool. OK, well thanks very much.

Cottrell [00:21:20] Well, hang on to this because, this is good because it brings back memories...

Deken [00:21:24] Yes.

Cottrell [00:21:25] Sam Howry didn't leave so long ago...

Deken [00:21:27] Howry?

Cottrell [00:21:27] Howry. Sam was his first name, but I don't know where he went... I don't know who this but I remember...I'm pretty sure his first name was Andy...

Deken [00:21:34] Burfine?

Cottrell [00:21:36] Yeah. I don't know much of... This was John Welsch...I knew him a bit... Bill Miller...Bob Braden... Bob Braden went to, um... He's still around, not at SLAC...he went to UCLA and it was very big in the Internet. And you probably, if you did a Google search on Bob Braden, you would find out he's been heavily involved... He became quite famous. So he, as I say, he started here. I have a feeling that part of his role was managing the operations, and I don't think he liked operations, he was more of a researcher, and I don't think SLAC was too happy with these managing of operations, and I think it was a mutual parting of the ways. But when he went to... Became really research, he became quite famous, and obviously well respected. That's a little bit hearsay. I've seen him since, and I've talked to him, you know, he doesn't know me, but I, you know, I saw him with his thing and I said, oh, you were at SLAC at one time, so we we talked a bit about that. So, I have met him, I have talked to him. But I doubt he knows me from a hole in the wall...

Deken [00:22:54] Okay. All right, well, thank you very much.

Cottrell [00:22:58] Sure.