Deken [00:00:01] This is Jean Deken, I'm going to be interviewing Les Cottrell of the office of the CIO, and Randy Melen, Deputy CIO is going to be assisting in the interview...[pause and restart] So I guess, if we could just start, Les, with you talking about your background, and what you did before you came to SLAC.

Cottrell [00:00:22] Oh, okay. I'm from England, and I did my Bachelor of Science and PhD at Manchester University. The PhD was in nuclear science. I got my degree in two-thousand, oh, I'm sorry, 19...1967 on the 20 -- gosh, I've forgot the date now --I think it was the 23rd of July.

Deken [00:00:56] Oh, in July?

Cottrell [00:00:56] Yeah, that's right. Yeah: and on the 24th of July we got married. I should remember that date because that's my anniversary [laughs]. And then we went off on honeymoon, we camped in Cornwall, and then we came to the US, landed in New York and I think... And then we flew on to, let's see, Montreal for the World Fair, and then we tried to come back and we actually had the paperwork for a green card, but we'd handed that in at New York, so we tried to come back in at Detroit, they gave us a hard time, we almost missed our flight, you know, to fly from there to here. So that was a little bit worrisome. And then we got here, I think about... I think it must have been about August the 6th, but I'm not sure...

Melen [00:01:53] What was your thesis topic?

Cottrell [00:01:55] Thesis topic was...um, what was it now? Ah, ho... It was on Carbon 13, it was ah ... Stripping reactions in Carbon 13 and the optical model. I don't remember the exact title. I have the thesis upstairs somewhere buried in a load of other stuff. It took me five years to get it. Eventually I figured I had to get out: I was having more fun cause I did a lot of programing on fitting the data, too, and so I got involved in computer programing...

Melen [00:02:30] This was at the University of Manchester?

Cottrell [00:02:30] The University of Manchester. They had a supercomputer there then called Atlas, that was one of the first big supercomputers they got...

Melen [00:02:42] This is one that they built themselves...

Cottrell [00:02:43] It was one they built themselves, with the help of Ferranti...

Melen [00:02:47] Ferranti Cartridge [Argus?]? or just Ferranti?

Cottrell [00:02:47] I think it was just Ferranti at the time.

Melen [00:02:51] It was one of the major British computer manufacturers.

Deken [00:02:57] Oh, okay.

Cottrell [00:02:57] So, prior to that I'd written to various places: I wrote to CERN, I wrote to Rolls-Royce, I wrote to various other companies, and had several offers. I actually accepted the one at CERN, but then I got an offer from here, and I'd been to the US before, a couple of times, and every one here said 'you have to see the West Coast.' So I

thought, 'Oh, I'll come here for two years and see the West Coast, and I'll have been at a decent place, so I can get a decent job somewhere else.' So, I came here for two years, and that prediction was a little bit off [laughs].

Deken [00:03:31] [Laughs].

Cottrell [00:03:31] So I stayed a while. So yeah. So we got here and I joined Dick Taylor's group, which was the inelastic...oh, it was End Station A experiments which started out with elastic experiments, elastic electron experiments bouncing off of protons and then went on to do inelastic electron scattering that was expected to be not particularly exciting: they expected to see some resonances and other stuff like that. It was a collaboration between MIT and SLAC, and so there were two professors from MIT, there was, gosh, oh, Henry Kendall... And who was the other guy....

Deken [00:04:22] Friedman, Jerry Friedman.

Cottrell [00:04:26] Friedman, that's right, Jerry Friedman.So we did the experiment, had lots of students, Marty Breidenbach was one of the students at the time. He was... He was getting his Ph.D. and Eric Green had just joined... He joined, kind of like, a few weeks before I did. So he was.. He was... He was good at helping to get around and and there were other, there were other people, there was another English guy called John Litt who was in the group.

Deken [00:04:48] John?

Cottrell [00:04:50] Litt: L-i-t-t. He went back to Rutherford Lab eventually. So, initially I was working on the electronics... Trying to automate setting up the electronics. One of the big problems with that was tuning the photomultiplier tubes to have the right voltage, to get the optimum collection of data. And so what you do is you ramp up the voltage and then you ramp it down and you can see where, where you get the plateau, which gives you the best performance. And Henry Kendall, who had designed this very complex system, which was computer "talkable-to /controllable-from," had set up the system, but no one had ever programed it. So I programmed it. It didn't work very well: the components of the system kept breaking down, so there was an enormous amount of problems getting it working. We used it in a couple of experiments, but in general we tended to do it by hand eventually. But then, eventually, Richter and Taylor got together, and made them do an experiment to actually calibrate the magnets in the spectrometers, so they would know exactly what they were set at. You know, a given character of the magnet would be your current, a given field, which would therefore give you a given bending radius and therefore you would be able to tell what the energy of the particle that you were seeing was. And, at this time, Dick was short on people and he said, 'OK, you can come and help us down here,' so I got to work on experiments at this...you know, work on real...on the real-time side of things. After that, I spent an enormous amount of my time down in the End Station A, in the control room and...

Melen [00:06:36] Were you there when...before End Station A was constructed?

Cottrell [00:06:37] No, End Station A was complete by the time I got here, the experimental halls were both complete, the Beam Switchyard was complete, in fact I think they were completed in late 19...1970..... 1966. And so a lot of the elastic experiments had been done. And so we knew the results from the elastic scattering of electrons onto protons. So we were able to use that to calibrate other things because we knew exactly

where the peak should be, cause you can calculate that from kinematics. So then we went on to the inelastic scattering. Now, when they were doing the elastic scattering, they were involved with Caltech, Barry Barish was one of the leaders. And there was another person who was.. There were two people from there, and they had a group of students from Caltech, which is always a lot of fun. This was about the same time...In the previous year, there'd been a group from UIUC who had been led by a guy called Brown, I've forgotten his first name, anyhow, so he led the group, he was a professor there. And they had come up with this scheme for making the controlling and gathering the data from the spectrometer using what was then an SDS9300 computer, which had a very nice full-track compiler.

Melen [00:08:01] This was Scientific Data Systems, before Xerox bought them...

Cottrell [00:08:02] That's right, yeah. And they became Xerox later on. And, so some of those students were still around. The person who developed it had actually left by this time. And eventually it was canned and not used, because it was taking too much memory. We only had 32...kilobytes...no, kilo-words: a word was three bytes to a word, 24-bit words on the machine. So that system was canned and Adam Boyarsky pretty much put together a system which was really the basis for the system that we used ever after that. I made lots of enhancements to it and, you know, got into the system. And Tony Gromme basically rewrote the operating system. Tony Gromme was a ...um... He was a full time... What we would call a computer research person, worked for...oh, who was the guy who was in charge of computer research?

Melen [00:09:04] Jerry Friedman.

Deken [00:09:04] And it was, ah...I've got it here in my notes. Before Jerry it was.. ah ... Bill...

Cottrell [00:09:07] Bill, that's right....

Deken [00:09:07] Bill...

Cottrell [00:09:11] That's right: He went to..he went to SRI after that, and it was not why...

Deken [00:09:20] I know it's here...Miller: Bill Miller!

Cottrell [00:09:20] Yes, yes. Bill Miller did it. Yes. So he'd been hired by Bill Miller and he was just brilliant. He took a year...

Deken [00:09:38] Tony Gromme?

Cottrell [00:09:38] Tony Gromme: G-r-o-m-m-e. He made a brand new operating system.

Melen [00:09:45] For the SDS machine?

Cottrell [00:09:45] For the SDS machine. And it was way better than the old one. They made one minor modification to the hardware. There was a problem with the old SDS machine because you could have reentrant code because... When data needed to be read, you'd get an interrupt. Which would then stop everything that you were doing, and you would then enter a different subroutine. And so you had to save all the history of what

you were doing, so when that program came in "FINISHED," it would restore the previous one.

Melen [00:10:15] Reentrant code has to be written so that it's not self-modifying, yes. Exactly the way Les is explaining it. I don't know if anybody even talks about reentrant code anymore these days.

Cottrell [00:10:27] I don't think so. So, anyhow, he wrote the system and in the previous system it was very, very complicated. So Tony requested that one minor modification made to be... Made to the system such that..

Melen [00:10:39] To the hardware?

Cottrell [00:10:40] To the hardware.

Melen [00:10:41] Yeah.

Cottrell [00:10:42] So that when the interrupt came in, you had one instruction during which you could do something, and all you did was you disabled interrupts for that one instruction. So no other interrupts could come in, so you couldn't get an interrupt on top of an interrupt.

Deken [00:10:56] Oh...

Cottrell [00:10:56] You could actually, you know, save everything, and then re-enable the interrupts, and that simplified the operating system enormously. And also, he improved the FORTRAN compiler, which at that date was way better than any other compiler on the market. There was, IBM had compilers, [BOSE?] had compilers, CDC had compilers, and this was, without doubt, way out the best FORTRAN compiler that existed at the time. And it was written for...he didn't write the compiler, but he modified the compiler to add a lot of extra new features. And he used his better [reactioncy?] See, he spent a year during which he was kind of sequestered in an office with a pencil and paper and cards and just rewrote the operating system. And it was a brilliant operating system. And not only did he do that, but, as I said, they were limited to 32000 words, but he made it so that you could have ... Um...what's the word? Ah, when you can...have partition... you can bring in other... what's the word when you bring in...

Melen [00:12:06] Swapping?

Cottrell [00:12:08] It wasn't quite swapping. It's a better layer than swapping.

Melen [00:12:11] Paging?

Cottrell [00:12:11] It was basically paging, except it was quite as good as paging: but it was equivalent to paging.

Deken [00:12:17] Sort of a precursor of paging?

Cottrell [00:12:18] Yeah, yeah. And so you could actually...so we would then extend the size of the programs. So if they were laid out, they wouldn't have to fit in the 32 kilobytes... Kilowords. But if, if, if they were all laid out and all present simultaneously it would have been 130 kilowords. So it really enabled us to do a lot more with the machine, it really kind

of gave a long life to the machine. So he did that and we took advantage of it, of course. And then, of course, you know, at the same time, the, we had the 360 91 coming in here, and the 360 91 replaced, I believe, a 360 75, but I couldn't be 100 percent sure of that.

Deken [00:13:08] 360 75?

Cottrell [00:13:09] 75. Which was an interim machine, while they were trying to get the 360 91 delivered. And that was agreed to. I think originally we had a 360 50, but then they were delayed on delivering the 360 91, they brought in the 360 75 and then we upgrade to the 360 91. So then I got involved in the offline stuff, which was all written in IBM's FORTRAN. They had two FORTRAN compilers: FORTRAN G and FORTRAN H. FORTRAN G was written by your alma mater [indicating Randy Melen], otherwise known as Waterloo.

Deken [00:13:45] FORTRAN G, yeah?

Cottrell [00:13:45] Yeah. And FORTRAN H was a very powerful...

Melen [00:13:48] Very optimizing...

Cottrell [00:13:49] Optimizing compiler, but it wasn't as friendly as yours...

Melen [00:13:53] Do you know what FORTRAN H was written in?

Cottrell [00:13:55] FORTRAN H.

Melen [00:13:55] That's right. [Both laugh]

Cottrell [00:13:56] Which was a brilliant idea and it meant that it tested itself. So they wrote that compiler...

Melen [00:14:02] It made some interesting bootstrapping problems to get started, but, yes.

Cottrell [00:14:04] Yeah. So they were late in getting to market with this... which is why they introduced the, provided the FORTRAN G compiler to get started. So, so we then had to take the programs online and convert to offline, which meant converting them from one FORTRAN compiler to another. Of course, we didn't need all the [reentry C ?] and stuff like that, so that didn't hurt. And we had a lot more memory on the... ah... I think we had two megabytes of memory on the 360 91 at the time.

Melen [00:14:43] And I think the 75 was limited to one megabyte.

Cottrell [00:14:45] I think you're right. Yes. So, we rewrote that, and then we also, about that time, started to introduce WYLBUR, which was a very nice text editor. And at that time. this was about 71-72, I decided to introduce these 2741's, which were basically IBM Selectric terminals, which had been modified to have a connection to the mainframe. Prior to this, most of the input had been done by cards, and then at this stage we were able to enter data to the mainframe via.. via typing at the keyboard. At the time we probably had about 20 to 30 keyboards, which were heavily sought, and so that a committee was set up whose main purpose was to allocate who gets a 2741. I mean...

Melen [00:15:38] Was there a public terminal room as well?

Cottrell [00:15:38] There were always public terminal rooms: there were no private terminals. So.. at that time, because, with that many, you couldn't afford, you know, any individual to have one. So, it was the...Everyone was scrambling: Group A, Group B, Group C, the Computer Center itself. They all wanted terminals and you...

Deken [00:15:55] Were they all.. were all the 2741's in this building [Building 50]?...

Cottrell [00:15:56] No, no. Eventually we managed to get them delivered to other buildings, so there were some in ...eh...um..let's see...building...the Central Lab Annex, and building Central Lab, you know, for the first and second floors, there'd be a couple in there, and you'd always be scrambling to get there... I don't think we... I think some people had sign-up sheets, you know, to.. to get on. If you didn't use the terminal you could obviously use punch cards, but it was not as good. As time went on, another thing happened with it, ah.. Dave Gustavson, who went to work for...who left SLAC several years ago and went to...

Melen [00:16:45] He got a faculty postition at the Center for [unintelligible] University, and then he retired.

Cottrell [00:16:46] at [unintelligible] University, yes.

Melen [00:16:46] He comes around every once and a while: we still see him.

Cottrell [00:16:48] He wrote a simulator, which enables you to run on the IBM 360-91 and simulate being on a 9300, so that meant we can write...

Melen [00:17:02] On a 9300?

Cottrell [00:17:02] An SDS 9300.

Melen [00:17:04] Oh!

Cottrell [00:17:05] It's a simulator for an SDS 9300, so we were able to use the editor to develop the code, then put the code into the simulator and check out that it was going to compile, etcetera, on the simulator before we got down to the real SDS 9300.

Melen [00:17:23] We should have Dave come some time and be interviewed about things that he....

Deken [00:17:26] Yeah.

Cottrell [00:17:26] Yeah. Mention that one too. And that was a big advantage because there was only one SDS 9300, and of course, it would be running the previous experiment, so you couldn't get on to it until like three or four weeks before YOUR experiment had to go, so it was always a mad rush to get the code working and debugged and everything else. So this gave us a little bit more flexibility in developing the code. And another thing which we used the simulator for was, they had this wonderful "wireless program." And the wireless program kept track of where all the cables ran and...

Melen [00:17:59] And when you say the "the wireless program" what do you mean?

Cottrell [00:18:00] It was basically a cables program, it would tell you...

Melen [00:18:04] It manadated.. it...

Cottrell [00:18:04] It kept track ... it was a database that kept track...

Melen [00:18:10] ...it was an inventory, basically, of...

Cottrell [00:18:10] ...of all the cables...

Melen [00:18:10] ...of your cabling and wiring, as opposed to what the word "wireless" means nowadays.

Cottrell [00:18:10] Yeah... Oh, I'm sorry. It was called "wireless" but... It was called "Wires."

Deken [00:18:18] It was called "Wires?"

Cottrell [00:18:20] I don't know what it was called. Maybe... It wasn't called "Wireless", yeah, I got the wrong name, thank you for correcting that one, yeah. So...

Deken [00:18:21] So it was an inventory of the cables...?

Cottrell [00:18:21] Of all the cables which were in End Station A...

Deken [00:18:21] Was that CAPTAR?

Cottrell [00:18:21] No, no, it was way before CAPTAR got developed...

Melen [00:18:25] I think it became CAPTAR, though.

Cottrell [00:18:36] Yeah. It was developed by a student, originally, and then he left, and a guy called Ken Johnson used to manage it and it ran on the 9300. We did try... Oh, and then we...so, we tried converting it to run on the IBM, cause it was written in FORTRAN. And it was just a nightmare, because the sorting order between ASCII code and EBCDIC code was a night...was not, was not the same. Of course, it was doing a lot of sorting...

Melen [00:19:00] EBCDIC is E-B-C-D-I-C.

Cottrell [00:19:07] Yeah, that was IBM's internal code for representing...

Melen [00:19:10] Extended Binary Code Decimal...

Cottrell [00:19:13] Interchange Code.

Deken [00:19:17] Okay.

Cottrell [00:19:18] So we never got that to work, but once that Dave Gustavson's simulator came, we just.. We just ran it off the simulator.

Melen [00:19:27] Off the simulator...

Cottrell [00:19:28] And so Ken, Ken Johnson was able to do all his work on the IBM 91, didn't have to go down to the SDS 9300. And the equipment [facilities?] group extended its use to other uses besides what we were doing in End Station A.

Deken [00:19:40] Hmmm...

Cottrell [00:19:42] Another thing which we got for the students in End Station A on the 9300 is "Space War," which...

Deken [00:19:50] I've heard of it, yes...

Cottrell [00:19:50] Originally, you used the keyboard to move things, but of course... And then you used their control panel, which had lots of switches, you know, for turning on histograms, and things like that. And then we used that, and then...then we got some joysticks which came from the Bubble Chamber scanning people: we were able to move it forwards and backwards and click and shoot and go into hyperspace. So whenever...whenever things...There was never much time to play, we were always too busy, but if ever things got really quiet, like the experiment was running fine, but the beam was down, and you knew it was going to be down for six hours, you'd bring up Space Wars (laughs)...

Deken [00:20:30] (laughs).

Cottrell [00:20:30] And, you know, while the night away. So, that was another thing which came out of the students who were down there.

Deken [00:20:34] When you were playing Space Wars, were you playing against yourself? Or were you playing with each other?

Cottrell [00:20:39] You play..two teams are playing.. or two people play. So you could fire at the other team, you turn on gravity or leave it off, you know, there's a lot of things like that. And you could go into hyperspace, in which there became a decreasing reliability you would ever return from hyperspace. (Laughs) So it was kind of a last-ditch effort, if you see he was about to shoot you down, hyperspace and hope you come out. And then that game, I guess, got...went further, because they had those machines in bars and things like that that actually did it. It was one of the early computer games that made it into the industry. Okay, so... so... We did lots of experiments down there, and there was a lot of interest because at that... The big scattering cross-section was very different from what was predicted. And the reason...What was happening was, more particles were being scattered and coming back, so to speak, were being scattered backwards, or into a large angle. So we expected they would just be...you know, go into the cloud of whatever it was, you know, between the... in the proton, and then be slightly deflected. Some of them were coming way back, and so people got very interested in this. People like Bjorken... and there was a guy...a guy.. I can't remember the name...

Deken [00:22:08] Feynman?

Cottrell [00:22:09] No, no. Feynman came... he came along, but before him, there was another person who was very interested in this...

Deken [00:22:18] A theorist?

Cottrell [00:22:19] A theorist. And they would come down at night, and, you know, would sit around saying 'what are the results showing you?' You know? And we would say, you know, 'this is the results rough, you can't publish them yet,' you know, 'but they are coming back as this.. it's more than what you'd expect now off-hand. Now, maybe, we may have a bug in the machine, and it may be bad in the code, maybe our solid angle measurements are wrong, who knows what it is..." And Pief would come down... I mean, you know. Pief was quite amazing because, you know, he'd work a day in his office, then in the evening he would often be down there, sitting, talking with Dick Taylor or with the rest of us seeing, 'how are you doing? how are you getting along?' I think in a large extent Pief mentored Dick Taylor...

Melen [00:23:03] Really?

Cottrell [00:23:03] And you know, so... And Dick was in...was the SLAC person who was in charge of the experiment...

Deken [00:23:08] Right.

Cottrell [00:23:08] And so he [Pief] began and chatting away, and telling, you know, and finding out what was going on, and then next day he'd come back and do his job at the lab, you know. So they were very exciting times. And then other experiments came along where they got more and more complex: you'd wind up with a target which was polarized, so the protons in the target would have a particular spin, and we would change the spin on the target, we would see what the effect was, and then you would get the effects of spin on things. And then we had... we would get the electrons, which were coming down the pipe, would be polarized, and that would be... So the polarized beam experiments were done with LBL, and Owen Chamberlain, who was another Nobel Prize winner, was one of the people....

Deken [00:23:58] What was that name?

Cottrell [00:23:58] Owen Chamberlain.

Deken [00:23:58] Owen Chamberlain.

Cottrell [00:23:58] And he was the leader of the Berkeley team. There were some students in there, Steve Rock was one, who later on became part of SLAC, was on the experiments there. Chuck Moorhouse, who went to work at HP, is another one, and they would be programing the PP8s or whatever... I think was PP8s that were monitoring the target and keeping the target. It had a very good...the person that built the targets, Michel Borghini, and he was from France, actually he was from Monaco..

Melen [00:24:29] From where now?

Cottrell [00:24:29] Monaco. And it was funny: I ran into him at a meeting, it must be about five years ago. I didn't recognize him, and he was very smartly dressed in a suit and everything. And it was at a...it wasn't United Nations' sponsored, it was an IT [?] I think, in Geneva, and he came up and he says, 'hey, Les' and I said 'hey, good to see you again.' I didn't know who who the hell he was, you know. (Laughs).

Deken [00:24:57] (Laughs).

Cottrell [00:24:57] And so he said, 'I'm Michel Borghini.' 'Oh, Michel, how are you doing?' And he was an ambassador...

Deken [00:25:05] Oh, for goodnes sake!

Cottrell [00:25:05] ...to Monaco at the time. (laughs).

Melen [00:25:10] Wow: that is wild!

Cottrell [00:25:10] So I was while he was the designer of the target for Owen Chamberlain's group. And then after that, the people who did the electron polarized beam was a guy called Vernon Hughes...

Deken [00:25:23] Oh, sure.

Cottrell [00:25:23] And his son works at SLAC still.

Deken [00:25:29] Mmm-hmm.

Cottrell [00:25:29] Vernon died a few years ago, actually, so did Owen Chamberlain, he died a few years ago. So their team came in, and we were working with them, and other people joined. So they didn't ...(whistles) ...Let's see...19... Oh, in 1972, I took a year off... And went to CERN, and was working on an experiment there called the 'split field magnet.' I went there with the idea I'd work on the real-time, but ... Ah...it didn't work out too well. So, I joined the offline group there, which was actually a lot more organized. The real-time wasn't... I know it wasn't disorganized, it just... It just seemed like I was on the periphery and not able to do much, you know. So I decided I'd join the real-time group, and the person who kind of invited me was a guy called Adolf Minton, who was a CERN physicist, but when he came to SLAC, he was from Aachen, I think...

Deken [00:26:25] Oh, from Aachen?

Cottrell [00:26:25] ...And so, we had this relationship with Aachen that different professors would come in from Aachen, and so when I got here, Adolph had been here a year, doing his year leave of absence from Aachen here, and so he was...he indoctrinated me when I got here, you know, that what had to be done and things to do and everything like that. So, anyhow, that was in 67, in 72, he invited me to come to CERN, and I spent a year at CERN in his group, working on the split-field magnet. Then in 1980, I'd been... I'd talked to another guy who was at SLAC, working for IBM at the time. David Yount's group has something..an IBM 1800, which was used for real-time data acquisition of the spark chamber data that he was taking. And the person... They had a team from IBM who were working to help him make sure to interface it to the 360 91, and after that the TriPlex. And one of the guys on that team was a guy called Mike Bannister [Bemiston?], who had been a physicist working at Argonne National Laboratories, and then had joined IBM, and so was then working at SLAC for IBM. Anyhow, he had got me in contact with some people at IBM, and they invited me to come to Hursley in England, which is where they have their.. um.. their lab, the UK labs are. And so I spent a year in England working mainly on graphical... graphical front-ends. Actually, it was a micro-processor, a Motorola ...8600, I think it was...

Melen [00:28:14] Not the 60...not the 6800?

Cottrell [00:28:15] No, not the 68..right. Not, not the big...Not 86.

Deken [00:28:15] This, this was a Motorola ...?

Cottrell [00:28:16] A 6800, that's right.

Melen [00:28:22] A 6800.

Cottrell [00:28:23] [together with Melen] Later became the 68000.

Cottrell [00:28:23] Because it had ...what they'd done was they'd taken a 3278 terminal.

Melen [00:28:26] Yes.

Cottrell [00:28:26] ...and replaced the guts of it with a 6800. I think it actually already had a 6800 in it, but you couldn't touch it, you know: it came delivered.

Melen [00:28:37] Right.

Cottrell [00:28:37] So working with IBM, they'd got the capability to modify their 6800, and so its paging store was over the [co-ax link?]. They went to the mainframe, and so, they had a paging store..store there and then they had code in the 6800 itself, which ran the program in a language called... PL68, that was it, which was a high-level PL1-like language...

Melen [00:29:05] Well, PL1 came out of that lab, and it was originally called NPL, as I recall...

Cottrell [00:29:05] It might have been. It came out of that lab, and the guy who developed it for that lab had developed PL68, very nice guy. We got on well, he...

Melen [00:29:18] Only computer language I know that had sterling constants.

Cottrell [00:29:22] [Laughs] Yup. Yeah.

Deken [00:29:23] What do you mean by "Sterling Constants?"

Melen [00:29:24] I mean, pounds, shillings, and pence, etcetera.

Deken [00:29:25] Oh, okay. [general laughter]

Melen [00:29:25] It was the data types.. but then it made the correct conversions...

Deken [00:29:32] OK,.

Melen [00:29:32] You could do arithmetic: sterling arithmetic.

Cottrell [00:29:35] So... So I went there and I worked on this graphics thing and it was, yeah, it was the 6800. It was called... I can't remember...actually, I've forgotten what it was called... Oh, I can dig it out what it was called, anyhow. And it was at the time before the PC existed, so IBM at that time were trying to figure out do 'what are we going to do...'

Deken [00:29:52] This was 1980?

Cottrell [00:29:53] This was 1980.

Melen [00:29:55] Oh, it was? OK.

Cottrell [00:29:55] Yeah.

Melen [00:29:56] So it was just getting close to...

Cottrell [00:29:57] Right!

Melen [00:29:57] Because 1981 was when the PC was announced...

Cottrell [00:30:01] That's right, and at IBM... there were lots of projects within IBM computing for what the next generation would...

Melen [00:30:08] I heard there were like gonna be, like, nine or ten projects all vying to be "the" next ...

Cottrell [00:30:08] ...the next generation. And this...ours was one of them, and ours didn't get accepted [laughs]. It was the one from Boca Raton that got accepted...

Melen [00:30:19] There were folks at Waterloo building a competitor..

Cottrell [00:30:19] Oh, okay.

Melen [00:30:19] ..with the Motrorola 6809.

Cottrell [00:30:19] Oh, okay.

Melen [00:30:19] And there was ...There was a bunch of folks at IBM who did... remember Word processors?

Deken [00:30:29] Oh, sure: Wang and...

Cottrell [00:30:29] Yep, yep.

Melen [00:30:29] That's right. IBM had us download a word processor that they were trying to convert into a competitor of the personal computers...

Cottrell [00:30:37] Oh, okay. So there was a lot of stuff going on and there was a lot of talking between the labs, and everything like this. Anyhow, and so I spent a year doing that. Then I came...Then the job of head of networking became available and SLAC posted it, and somehow I heard of it and I thought, 'that sounds like fun.' By this time I was thinking 'I don't want to run anymore shifts in the middle of the night.,' 'cause... I mean A was a small group, we had about 10 of them, and 12 people. I needed twelve...three people on shift: one to run the electronics, one to do the computing, and one to do the physics. So you had few people on a shift. So with twelve people you were running, you know, for several months, and you didn't really get any time off, not even weekends, and it was awful. And I said, 'I'm fed up with this,' [laughs] so I want out, and this was a way to get out, so I applied for the.... [recording stops]