Oral History of Max D. Hopper

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Gardner Hendrie: We have today with us Max Hopper, who has graciously agreed to do an oral history interview for the Computer History Museum. And I'm Gardner Hendrie, the interviewer. I think maybe a good place to start would be if you could tell us a little bit about the family background, your mother, you father, any brothers or sisters— sort of get some feeling of the environment where you grew up.

Max Hopper: Where I grew up— well, I was born early in the Depression, 1934. My parents, my dad, he had barely— I'm not sure he ever finished high school. My mother had, and they got married when she was fairly young, I think in their early 20s— both were early 20s. It was in a part of Texas— East Texas— that was more Deep South than it was anything else in terms of culture. They were primarily country folks. He had been raised on a small farm. His father was a second family. In fact, his father was in his 50s when he married my grandmother who was in her 30s at the time. And they had at least four children that survived and a small farm that they managed to eke out a little living on. He was in his later years a— I guess a singing schoolteacher would be the right word to describe it in those times. He taught music. My dad and his siblings, there were two girls and two boys, formed a gospel quartet. And so they sang around the countryside as well. And in fact that was my dad's chief, I guess, hobby all the rest of his life, was being involved in gospel music. My mother, she also grew up on a small farm. Her mother died when she was about four years old. My grandfather on that side later remarried, so she was raised to some degree by a stepmother, and I'm not sure that ever really worked as well as it should've. And certainly by the time she was through high school, they had divorced. And so it was a fairly— she had a fairly rough upbringing I think in that sense, fairly hard. But she grew to love education. She had a couple of aunts that did get to college. On my dad's side there was really no one that had gone to college.

Hendrie: Okay. Now what did your dad do for a living?

Hopper: Well, my dad, in those days, he did anything he could from, you know, farming and helping others farm to WPA, the Works Progress Administration, and other things. It was a pretty tough time during those days. We lived in the country outside of a little town called Lufkin, and I attended a— when I started school— it was a little bit of a rural school. I mean people were bussed in and those kinds of things. It was a fairly small school. I don't think we had more than, you know, 30 kids in a class— that kind of thing and so on. Not a lot of extras in those classes in those days, and we were talking a bit at lunch about what did you do if, you know, if you couldn't hold you back, or you now, if you could do the work. And so I ended up doing about four years of work in my first two years of school, which was academically okay but, you know, kind of set you back I think in a lot of other areas over time. The war came along about that time. I guess I should say though in terms of peers I had a younger brother that was two years younger than I was, and we were both best friends and best enemies, as I think brothers sometimes can be. I had a sister that was born but passed away on the same day— Pearl Harbor Day— and then another sister that had been born about a month before. And so the three of us pretty well grew up as a family, you know. For years I— later on when I was away at college— had a younger brother that was also born but wasn't part of the family I grew up with so to speak. In 19, I think, 42— this was about the time the, you know, the war effort was getting under way— we moved to a town south of Houston called Texas City. And it was an industrial town, primarily oil refineries, chemical plants— those kinds of things. And my dad went down initially to work in construction work helping build some of the various industries there they were building up for the oil _____.

Hendrie: Yeah. So that was a job that he could find and could do.

Hopper: That was a job that he could find and did, and so I think I was in— I'd just started the 5th grade, my third year in school there. And I ended up finishing high school there. So I went through— all through school— in Texas City.

Hendrie: Now, maybe a little bit about in high school. Did you have any particular interests, or what sorts of things did you like to do? What sorts of things did you do well? What sorts of things didn't you like to do?

Hopper: Well, interesting, because again the school district there wasn't very big. And so you were kind of rewarded on academics. They did push academics. And I remember getting awards— you could go to— when you graduated elementary school, and there were three elementary schools, you were asked to go to the high school graduation and they called you out. I think I won $25 savings bounds for having the best grades in both English and math. And so I was good in math and English. The same thing happened in high school— I mean in junior high school. And math was something that just came very easy to me, and all flavors and so forth. So that was fine. I was pretty good in music. I was in the band starting about the 7th grade. Sports, I was okay, but since all the kids were two years older than I was, I didn't succeed very often <overlapping conversation>.

Hendrie: You didn't make the first team very often.

Hopper: I didn't make the first team.

Hendrie: But you enjoyed sports.

Hopper: But I enjoyed sports. I was very active, at least in those kinds of things.

Hendrie: What did you play? Football, basketball— ?

Hopper: Everything. Baseball, whatever— primarily softball more than baseball, but still whatever was in season we played and tried to play, track, you know. And it was— like I say, there were a hundred students in my— less than a hundred students in my graduating class. So you knew, you know, almost everybody in school. It was one of those where there weren't any secrets. In fact, a little side story— you said tell a side story— last November I think there were about 20 of us that celebrated our 55th high school reunion. And three of four of my, you know, very old friends— in fact, I'd gone to college with them the first two years and things like that. So it was a fun time.

Hendrie: So even kept up, yeah.

Hopper: Yeah, we've even kept in touch, some of us.

Hendrie: You even kept in touch with some of them.

Hopper: Right. Right.

Hendrie: All right. Well, that's great.

Hopper: So the school years were, I guess to a large degree uneventful. You know, it was a matter, again, I did a lot of reading. You know, I had a wide range of interests. I mean things— I was curious I guess. And other than one bad course in biology where we had a coach who didn't teach— I think—

Hendrie: Oh yes, the coach was also the teacher. Yeah. Is that right or— ?

Hopper: Well, he was— the teacher quit. And so he was the substitute teacher. They couldn't get another teacher. And so he had us read the book as his way of instructing. He didn't know anything about biology, which was for— and I just wasn't mature enough to handle learning on my own that way. I think I was a sophomore. But other than that I think I did pretty good in school.

Hendrie: Did you have any other science courses? Did you have chemistry or physics?

Hopper: Oh yeah, took— oh, physics, chemistry— I did go to the— there was a state— my last year we got involved in something called Number Sense, which was a statewide, I guess, competition. You had a hundred questions, arithmetic questions, and ten minutes to answer them. And then based on your score of rights and wrongs, and I won— I got to go to state. It was my first year, and so at least I think I won the district and was second in region. And I don't know where I was in state, but at least got to the state tournament in that. And so like I say, it was a reasonably good time, graduated at 16.

Hendrie: Did you have any instructors that particularly inspired you?

Hopper: A couple. We had, I think, a great high school group of teachers. There were a couple of English teachers I particularly liked. The math teacher I had that took me to state, again, was a very good teacher. We had a couple of great music teachers, band teachers, that you know, and I think the thing that I got out of most of those was, you know, strong encouragement, willingness to work with you. We had a great civics teacher, and to this day I give her credit for, you know, any interest I have in what goes on in the public sector. Because she, you know, made me quite aware— made all of us quite aware.

Hendrie: And made it interesting.

Hopper: And made it interesting. Yeah. So yeah, I think— when I look back, I had a great group of teachers.

Hendrie: What is the earliest recollection you have of thinking about what you might do when you grow up?

Hopper: Probably in my junior or senior year of high school. And again, I was 15, 16— I wasn't quite sure. But growing up in that town and talking to folks, the encouragement you got if you had good technical skills was, you know, engineer. That was the pinnacle. If you could be, you know, an engineer. So in chemistry and mathematics and everything else— so I kind of got talked into becoming a chemical engineer. And in talking, you know, people around town— I had a couple of part-time jobs and so forth, and I would approach the— one was a little hardware— not a hardware store, but they sold appliances

and tires and batteries and those kinds of things. And that guy kind of, as a businessman, he tried to encourage me to go that way as well. So you know, you had people that kind of pushed you one way or the other.

Hendrie: Yeah, just sort of put the idea in your head.

Hopper: Yeah, put the idea— well, this is what you could do.

Hendrie: Promoted it a little bit.

Hopper: Right. So that's how I ended up deciding I thought I wanted to be a chemical engineer.

Hendrie: Okay. So that's what you thought you wanted to be when you graduated?

Hopper: Right. Right.

Hendrie: So what happens next in your career?

Hopper: Well, I went to start at the University of Texas. And I initially—

Hendrie: Now where was this— where is the University of Texas located?

Hopper: In Austin.

Hendrie: In Austin. Okay. So this is away from home.

Hopper: Oh yeah. And again, having a set of parents who had not been to school and didn't know a lot about it— I mean it was kind of being thrown to the wolves. But nevertheless— and I probably, at the age of 16 and I was working part-time in a bookstore there, and so I had a lot of activities going on. I got involved with a girlfriend early for the first time and probably, looking back on it, the grades weren't the best that they could've been by a long shot.

Hendrie: All right.

Hopper: But there was a lot to life at 16, 17— learning about life as opposed to maybe totally all the book learning and so on. And my mother, who was working as a nurse or assistant nurse— or whatever— and she was, in effect, providing me the funding that I needed outside of, you know, my ability to earn. And as I said, she got pregnant my second year. So I managed to borrow a little money to finish out the year, but then it was a matter of not having finances to go back.

Hendrie: Yeah, you just didn't have the money.

Hopper: And interestingly enough, I had no idea, you know, what to do. And for some reason I went to Shell, and I don't know if anyone told me about it or not— they had their exploration and production research lab there in Houston. And I think, in fact I'm fairly certain, the only reason that they hired me as a lab technician in the chemistry department— because I had at least taken chemistry courses and—

Hendrie: You had taken a couple of years of science courses at college.

Hopper: Right. Right. Yeah, and you know, and so— it was because the IQ test they used at the time— and I don't remember what it was— I scored one of the highest grades, they told me, that they'd ever had. And I think it was all a result of— a good result of that math training I'd had back in high school, because, you know, recognizing sequences and whatever. Anyway, long story short, they were willing to hire me, at— I think I was, well I was 18 I guess at the time.

Hendrie: Okay.

Hopper: And so at least I, you know, had a job and—

Hendrie: Now, you're in Houston. Your parents lived—

Hopper: They'd moved to Houston following my graduation from high school. My dad and mother both had moved to Houston. My mother, like I say, was working in the hospital. And my dad had, at that time, he had gone through a number of jobs. He became a— in Texas City he went to work for Monsanto for a while, and then he became the president of a labor union. And then— one of the local— that he had worked with as contractor— and then became the business agent of the labor union, which was based in Galveston, which is just across the bay. They covered that entire area. And he worked at that for— at least until I got out of high school and then went back to other activities and later became essentially a roofing contractor. And that's what he was doing in Houston. So he became an independent businessman _____.

Hendrie: So yeah, after your couple of years in the University of Texas, and you moved to Houston and they were in Houston. So you lived at home when you moved back there?

Hopper: I did. For the first, again, couple of years, and then I got married. I got married at a fairly young age. And then, looking at what to do next, the GI bill was expiring. I don't know if you remember back then, but in the January of 1955 they were cutting off the World War II GI bill. If you didn't— if you weren't in the service as of then, there was not going to be—

Hendrie: Okay. And the World War II bill had been extended through the Korean War.

Hopper: Through the Korean War, right.

Hendrie: And it was the same bill.

Hopper: Same bill. And Shell had a— which was fortuitous— they had still in place a policy of paying you up to half your salary to make up the difference between your military pay and your total pay. So I made the decision that, you know, it was too good a deal to pass up. So I—

Hendrie: And you're still working as a lab assistant?

Hopper: I'm still working as a lab assistant. Right.

Hendrie: Okay. Well, before you get into the army, just tell me a little bit about what you did as a lab assistant. What does that mean? Or what did that mean at Shell in the research division in the 1950s?

Hopper: Well, we did— what we were doing in those days particularly— it changed a little bit when I went back— was primarily supporting the geologists and really petroleum engineers who were trying to understand the nature of where petroleum came from and what was going to happen to it in the future. In fact, King Hubbard, who is— I don't know if that name rings a bell with you— but he promulgated the theory about the decline of the industry. He was a prominent guy at the lab in those days, and I did a lot of work for his group. But what— we did all types of chemical analysis on everything from the, let's say the basic composition of the materials where they were finding oil or, you know, in various places where they were trying to tie the trail to— we would take the oil itself and fractionalize it, take and break it into its components—

Hendrie: And try to understand all the—

Hopper: — and we would do everything from mass spectrometry work— as host of tests on it to try to— really we were trying to trace the nature of how petroleum was created or gas and where—

Hendrie: Yes. To get insight as to where to look, what's the long-term objectives— <overlapping conversation>.

Hopper: Right. And how to produce fields and the whole bit. So where it was found and how to make it work.

Hendrie: Okay. So this is real research as opposed to, you know, exploration or something? This was pure research, trying to understand the science of the _____.

Hopper: A lot of calculators. Because tying in with computer you had— every, you know, chemical analysis you do you have some form of, you know, computation associated with it. And we were talking about the Marchant calculators and those that preceded it and so forth.

Hendrie: So were there any— you know, what sort of computing devices did they have at this time?

Hopper: In those days, early 50s, none.

Hendrie: None. Just Marchants.

Hopper: Just Marchants—

Hendrie: Calculator.

Hopper: So you know, those early computing devices came along, you know, a little later after I'd gotten out of the service.

Hendrie: Okay. All right. Yeah. So you decide you want the GI bill?

Hopper: And I want in a branch of the army called the Army Security Agency, which was a— the subset of the army— the National Security Agency— communications intelligence.

Hendrie: Oh. All right. So this was fundamentally NSA.

Hopper: Yes.

Hendrie: Okay. Now, did you just go and volunteer, or how did you— how did you manipulate yourself into this, which sounds a little bit more interesting than going out and being a private in an infantry company?

Hopper: Well, when I went down and talked to the army recruiter and—

Hendrie: Did you talk to different recruiters?

Hopper: No. I did not. I just talked to the army. And because army was three years and air force and navy were four. And you got the same GI bill. And so when I talked to the recruiter, I think one of the first things they, again, give you is the equivalent of an IQ test. And so I evidently did well enough there that they were shunting those—

Hendrie: They had instructions that people who did above this level— send them over there.

Hopper: Yeah. Right. Send them over there. And so they talked to me, would I be interested in that. And so I said, "Sure."— and by the way my brother joined and went with me.

Hendrie: Oh. So your brother did okay on the test too?

Hopper: He did okay on the test too. So long story short, we ended up after basic training going to Fort Devins, which is in your neck of the woods for about a six-month school. And the school they assigned us to was essentially a Morse code interception school. So you learned to take Morse code and to take it well and try to— we were trying to gather data. Because in those days there were a lot of communications still using Morse code. And I did well enough in that class to— well, there were several things they asked me to do, and again because of the three years chose not to do. They tried to get me to go to OCS, tried to get me to go to the language school. They tried anything, but—

Hendrie: Well, they said, "Yes, here's some raw talent. You know, if we give him a little bit more training we'll get more use out of him."

Hopper: Well, maybe. But I got at least to choose my— they had a number of open places you could go. And I—

Hendrie: Okay. At your level, which is just— you can take Morse code and—

Hopper: Well, and one of them was just south of Washington, D.C. out in the Virginia hills. And so I chose that location.

Hendrie: Did you have any overseas options?

Hopper: Yes.

Hendrie: Now, was your wife— you were married at this time— did she have any influence on this.

Hopper: Just a major influence. Let's see— Turkey— there was a spot then called Asmara, which was interestingly enough part of— where is it?— it's south of Egypt, Eritrea.

Hendrie: Oh, my goodness.

Hopper: So there was a spot. Let's see, Germany, Panama Canal, Alaska— a lot of great spots.

Hendrie: Every place the NSA had listening posts?

Hopper: Probably.

Hendrie: Yeah, well, at least— there were listening posts in each of the places.

Hopper: But anyway, we went there and were there, had a son that was born in about another year. While I was there I started going to school at the University of Virginia. They had an extension in Arlington, which was— we lived fairly close to there.

Hendrie: You lived— oh, was it Fort Belvoir?

Hopper: No. The place that I was at was a little place called Benhill [ph?] Farms, down near Warrenton. It was just south. But then— what else can I say about the—

Hendrie: So what did you do? I mean, you know, what kind of— you're taking— your fundamental job is to listen and transcribe Morse code. Where are the transmissions coming from? Or is that still top secret and you can't put it on tape.

Hopper: Oh, I doubt that it's that top secret. That's been, how many years exactly? But we— our missions were, you know, whatever the NSA assigned us. And because we were so close to, where is the NSA headquarters?— over in Maryland there.

Hendrie: Yeah, it's right at Fort Meade.

Hopper: Fort Meade. And most of the time— well, let's see, what was going on in those days? Let's see, there was the war in the Suez; there were the early stages of Vietnam.

Hendrie: Now, I should— yeah— clarify me. Were you trying to transcribe live messages off the airwaves, or did they have a system for recording them and then bringing— well, tape recorders and bringing the tapes and you were working from recorded material?

Hopper: We were recording them live.

Hendrie: You were taking them live off the air?

Hopper: Yeah. I'm sure there were circumstances where they—

Hendrie: Where they did it the other way?

Hopper: — they did it the other way.

Hendrie: Yeah, but this was not. So they didn't go collect them one place, bring them here and you— this was— there were antennas that somehow were picking this up.

Hopper: There was a huge antenna field not too far away.

Hendrie: All right.

Hopper: And no, we were taking it live. So you would have essentially a couple of radios or sometimes maybe you could even work up to four if you could do it.

Hendrie: Yes.

Hopper: That so you were trying to catch as many lengths as you could of what was happening. So you could, if it were— particularly a radio net— you wanted to get all those involved. Usually— many of the times it was just two. You would just be capturing what was sent from one place to another.

Hendrie: Okay. So a single stream?

Hopper: Yeah.

Hendrie: But we were capturing, you know, high level and primarily— we were not capturing the low level work I guess. Nothing that was dealing with what was happening in a battlefield, although occasionally we would—

Hendrie: You would hear something. Yeah.

Hopper: You would hear something.

Hendrie: So this was— was all of what you were transcribing encoded? I mean you just got— you just put down the letters and they didn't mean a thing.

Hopper: Most of the time. Yes.

Hendrie: Most of the time. Once in a while they'd be transmitting it clear, but not very often.

Hopper: Yeah, not very often.

Hendrie: Well, obviously if it's high level, I would think the diplomatic transmissions would be a wonderful source of things from that close to Washington.

Hopper: In those days when people were still using Morse code. Yeah. Not necessarily in and out of Washington as much as maybe other part of the world, but you can imagine those were the—

Hendrie: Yeah. Using very high frequencies. Yeah. So you could listen into things that were a long way away.

Hopper: Yeah. Yeah, the antenna fields were good.

Hendrie: Okay. Good. All right.

Hopper: You could capture almost anywhere in the world. Yeah. But anyway those, and I certainly got exposed to some of the cryptography activities. They gave us training in what really were essences of early computing. This would've been mid-to-late '50s. So you can imagine that they were using computers over at Fort Meade, and so stuff was going back and forth. So anyway, you got a sense of that. In the last year I did a lot of other special work. You may remember in 1957 the Soviets did something that—

Hendrie: Sent a little ball somewhere.

Hopper: — little ball up there. And we had a special little room for four or five of us, collected a lot of information and—

Hendrie: Tried to read the telemetry.

Hopper: Well, we captured the telemetry. The folks at Fort Meade I think probably broke it apart. But it was a big scare there for a while.

Hendrie: That's true. Yeah. So far ahead of us, and they just didn't—

Hopper: Well, no one knew what it was doing.

Hendrie: They didn't know what it was or what its purpose was?

Hopper: No.

Hendrie: I see. Well, that would be very scary.

Hopper: So it was a very high priority thing there for a while.

Hendrie: But did it transmit in Morse code at all?

Hopper: Their— it had— I don't— there may have been some Morse, but there were also other signals.

Hendrie: Yeah. I would've thought, yes, a lot of telemetry signals that are encoded in some strange way.

Hopper: You were trying to capture the total signal.

Hendrie: Very interesting. All right.

Hopper: So anyway, it was a reasonably fun time there and it wasn't something where, you know, you were in, I guess a non-learning environment would be the point I would make.

Hendrie: Okay. There were things to learn all the time.

Hopper: Things to learn, both— in looking back on it in terms of basic technology concepts that I think came into play in the computing environment over time. And certainly business environment, because I took— I ended up—

Hendrie: Yeah, what kind of courses did you take?

Hopper: I took a lot of business courses. Because I had all the science courses, and so I took a number of accounting courses and business law and economics and things like that. So I don't know, it—

Hendrie: Yeah. Yeah so this was all fresh new stuff for you.

Hopper: Right. Right.

Hendrie: So that's always very interesting.

Hopper: Yeah. My accounting professor we were talking— tried to recruit me to the CIA.

Hendrie: He also worked at the CIA?

Hopper: He did work at the CIA, and had a very responsible job there. And the CIA, I guess unknown to some, they do a lot of economic analysis of— and use a lot of basic accounting principles on a national and an international and global basis to try to break out. And this is 50— or a lot of years ago. So.

Hendrie: Okay. Very interesting.

Hopper: And the NSA wanted to hire me. But I went back to Shell. I was still following my game plan of going back and finishing my degree—

Hendrie: And becoming a chemical engineer.

Hopper: Well, no I had— I wasn't sure I wanted to become a chemical engineer anymore.

Hendrie: Okay, you had started— okay. This had receded?

Hopper: Yeah. I had taken enough courses in business, and I had— that I knew that I wanted to try to find a way to put together business problem solving more at that level than at a very technical engineering level. I wasn't sure where and how to put them together. So when I went back to Shell, and the University of Houston at that time was offering a lot of coursework nights and weekends. It was one of the sort of commuting schools. And I started talking to the professors out there, and they convinced me I probably ought to go to industrial engineering, that that was, you know, the way that, you know, you could blend a lot of those kinds of things together. So I said well I was happy to do that. And so I started down that path, and in looking at the coursework— and I started taking some courses and got interested in— well, computers started coming in a little bit and I started working with them a little bit at Shell. And operations research technology was coming in and that tied together the mathematics and so forth. So long story short, even though I was officially in the industrial engineering program, I was able to take enough courses to get a mathematics degree as the first degree and then continued, and I took a ton of advanced math courses to support the operations research activities. And I was heading for that Masters program.

Hendrie: Okay. Very good. Can we just take a short break and we'll change the tape?

END OF TAPE 1 / BEGINNING OF TAPE 2

Hendrie: When you went back to Shell what position did you go back in—

Hopper: Well, initially in the same kind of lab I was in before but the mission of the lab had grown. We had engineers. Then we were starting to do offshore kind of things. There was— It was much broader than just the—

Hendrie: Understanding petroleum and—

Hopper: Right, and then more applied- a lot more- some more of the- even looking broader at geology and geophysics to some degree than they had before. Always— They had always had a strong geophysics effort and the technology was early computer based, the math specs. A lot of the technology we had had built-in computing aspects to them and we actually had a couple of early computers, old Univac—I've forgotten the model number—in a little computing lab. Now this would have been '58 or so and so we started all trying to use it and that type of thing.

Hendrie: You had some model that you don't remember but it was some kind of Univac.

Hopper: Yeah. It was a 90 card- 90 hole cards—

Hendrie: It was card-based.

Hopper: Remember the round holes—

Hendrie: Absolutely.

Hopper: But that computing group, they were more interested in applying computing than they were in let's say letting some of the rest of us use it for computing purposes. We were trying to translate some of their Marchant stuff, move it over there.

Hendrie: Of course because it would have stopped us.[ph?]

Hopper: Yeah. Right. Anyway, so- but it was a fun situation because I was going to school and I started playing around on the outside with some friends who had an old Elecom. I mentioned that to you early. It was an Elecom 101. Was that Burroughs that made—

Hendrie: Burroughs made that. That's correct. That's what I remember.

Hopper: Yes, and—

Hendrie: Did they have it outside or did they have it at another company—

Hopper: Well, this was someone that was "teaching you about computers" and I had a good friend of mine who knew these folks and we would go over there on Saturdays and they would teach us how to- the step by step—

Hendrie: How to program—

Hopper: How to program.

Hendrie: —this little plugboard computer.

Hopper: Which— And I was trying to tie that together with the- whatever Univac computer we had so I was trying to put all that together. I ended up getting my degree in- within a couple of years and at that time had to decide what to do within Shell. The—

Hendrie: You were still—

Hopper: I was— Yeah. I was still a lab assistant—

Hendrie: You're still a lab assistant, whatever that is, whatever level.

Hopper: Well, and I was still doing a whole host of chemistry related things, organic and inorganic stuff as well, but- so we were doing- and—

Hendrie: The basic things you were doing were somewhat similar to the things you'd been doing but there was computing in the environment. You were learning something.

Hopper: —and other things. So anyway, I finished my degree- or before I finished it Shell at that time had an exploration production headquarters in Houston, a regional headquarters. They had them in a lot of other places as well. And they were fairly— It was semiautonomous I guess I would call it in those days. This is because they didn't have again ways of tying things together and they had a computing lab or group in that regional office to serve the people there and the—

Hendrie: The engineers and the physicists there.

Hopper: Yeah, and the business problems. They did all the- a lot of the- all the accounting—

Hendrie: They did all the—

Hopper: —all the local accounting for paying out the royalty owners and all the others so it was- this was before computers were big enough to do things totally. So the guy that was running that— They had an old IBM 650 and he was getting—

Hendrie: It wasn't so old—

Hopper: It was two years old—

Hendrie: It was two years old?

Hopper: —I think or maybe four. I forgot.

Hendrie: Yeah, but anyway—

Hopper: A lot of IBM equipment and he was getting a 7070 and he didn't have enough work to fill it up he thought so he had the bright idea if he was going to hire me to come down and work there, and this was downtown and the research lab was out on- in- well, five miles out in the suburbs. It wasn't big in those days. And I was going to provide assistance to the lab because again their computing group was not serving any purpose and it had a smaller computer so my job— I was hired and the first few months I did 650-type work, just learning it and a few minor things, but then the 7070 came and I started selling time, my—

Hendrie: Your time.

Hopper: My time using that computer to solve lab problems.

Hendrie: In the lab— I got it.

Hopper: So that was how I started in the computer business was—

Hendrie: Isn't—

Hopper: —being a- in effect selling services so I worked with a lot of the- all forms of the engineers, helping— Early we had an engineer that I think he had a Ph. D. and he was doing offshore designs, wave platform- wave designs- wave platforms and we did wave designs and models and all those kinds of things. I worked with another engineer who was trying to figure out how to best model producing fields and determine the best way of drilling them and completing them. And so I've started applying a lot of advanced mathematical approaches that we knew a little bit of the math but we didn't have the calculating engines that could do it or the tools that translated it.

Hendrie: It really was a really good fit—

Hopper: Oh, it was. Right.

Hendrie: —all your facility with math and your beginning understanding of how computers work and how to program them and then apply them to- and you could talk to them about the math and you'd understand it.

Hopper: Yeah. So and tying all of those together and then we started on the business problems so—

<crew talk>

Hopper: —but- and then started getting involved in other types of issues with the company as well. Within a year we— Since we had the biggest computer in the- of the E and- exploration and production regions the company at the- and the company was based in New York at the time they wanted to put together a combined what we'd call today capital budget for the oil company in the exploration and production side. They had never been able to aggregate all their expenditures and to prioritize how best to allocate the funds so it was done— This group over here—

Hendrie: Would come with their wish list and—

Hopper: Their wish list and so they devised a concept of doing this and I ended up writing the computer program to bring it together and to enable them to in effect aggregate it, sort it out and so forth, because we did it in the standard way and the standard calculations. Now in those days the first version was fairly static in terms of they had to provide a lot of the raw data in terms of what you would think of as revenues and expenses and so on. They then asked me and an engineer from New Orleans to jointly write a much more advanced version that would automatically take into account— If they would just provide some of the basic frameworks— We'd do all the calculations of all the- we'd- all the production estimates, do all the tax and depletion and all of the- those aspects so in effect we'd model it. It became a modeling program for what you would produce and that would be as safe[ph?] as an oil or gas well but it would also do all of the- since we were doing all the tax work even for other hard assets. You could do those as well. So in using discounted cash flow and various kinds of risk analysis and all kinds of extensions and there are ways of cutting it up and doing all kinds of fun things so it became one of the first industry groups that did that. And then we extended it by reverse modeling it so if you wanted to buy a producing field it was a matter of kind of running it the other way. You give me an ROI you want to achieve and I can tell you how much you can pay for it. You want to bid on an offshore lease, tell me what the parameters are and we can tell you how much you can bid and the first time we did that for a producing property— I've forgotten. In those days it made them a couple of million bucks, which far and away—

Hendrie: Paid for the computer, your salaries, everything.

Hopper: So anyway, those were your fun times. I worked on a number of other— We started digital seismic work at the time. I did a little of that work but primarily it was one of my cohorts that took it on and we ended up creating a whole lab- secondary lab for digital seismic and that's where we used the SDS stuff and—

Hendrie: Going back to the work you were doing, selling the time originally in the '70s, you were basically selling the time and presumably doing the programming to do scientific computations on essentially a machine in IBM's product line that was designed as a character machine to do data processing. It wasn't in the scientific range of binary machines.

Hopper: And it was the biggest one we had in those days.

Hendrie: But you said it was the biggest computer and you could figure out to do anything on any computer if you—

Hopper: And I was- by that time—

Hendrie: The fact that it processed characters and digits as opposed to binary didn't matter at all.

Hopper: And there were a couple of— I was able to hire a couple of people or- that- so I could expand what I was doing and they took on some of the projects as well so—

Hendrie: Do you remember the ones where you actually did the programming? You were programming in Fortran or a higher level language or—

Hopper: Most of the— Very early on— It depended on the machine. The old 650 we started with SOAP and then had a basic Fortransit program, which I learned a little bit of Fortran, and then on the 650- on the 7070 a combination of machine language and Fortran and, in fact, it's one of those strange things. When we got the 7070, there were no systems programmers at the time. IBM— You had one or two of their systems engineers and they didn't know a lot about the machine either. I ended up knowing— I became the in effect *de facto* systems programmer as well as everything else. It was just— I just— It was one of those things—

Hendrie: You—

Hopper: I got immersed in it. I could run it from the- like the— We had what we called the- well, the guys that fixed it—

Hendrie: The customer—

Hopper: CEs [Customer Engineers]. I could run the consoles as well as they could.

Hendrie: You could set it up, start it, write the program, run it.

Hopper: And then Fortran and then some of the big modeling programs we'd move from the 7070 to the 90s- in the—

Hendrie: A much more appropriate machine with floating point—

Hopper: Yeah, but we primarily- still there I think used Fortran more than we did the machine language on that level.

Hendrie: You moved it up a level.

Hopper: I had to— There were times though we could- in some of those modeling programs we could bring it to its knees so I had to go in and take out to speed it up so—

Hendrie: Find where the inner loop was in the calculation and write it in an assembly language.

Hopper: But those were— And based on doing all of that I guess, and I was helping out the— We had the refinery and the chemical plant just outside of town and we were sharing use of an [IBM] 7090 and a 7094 and- as well and from some- I think it was CEIR that furnished timesharing services in those days so—

Hendrie: Over time you progressed to—

Hopper: Over time we were doing—

Hendrie: —7090 but you're still in Houston—

Hopper: Still in Houston.

Hendrie: Even though you're doing some work that is sort of at the behest of corporate in New York, at least doing the turn-on investment and—

Hopper: Yeah. Right. So then they asked me to join them in New York.

Hendrie: Do you remember what year? Where are we now?

Hopper: It was 1964.

Hendrie: You've been out of the army and back at Shell for four years.

Hopper: Six years but four years in the- full time in the computing environment so—

Hendrie: Yes, because you have your degree and as soon as you get your degree then you sort of move into this.

Hopper: Yeah. Shell was very sticky about that so—

Hendrie: You had to have your degree to do engineering work or whatever you called it.

Hopper: To do that kind of work and they didn't want- if you had a degree they didn't want you to do the other kind of work.

Hendrie: You couldn't go work in the lab and do spectroscopy.

Hopper: But it kind of— In those days that was the culture. The research lab was very much a—

Hendrie: Hierarchy?

Hopper: —a hierarchy and from- a lot of Ph. D.'s and so these were the kinds of issues that they thought was the appropriate way to do things. A degree was your ticket and you had to demonstrate that you could do it.

Hendrie: Yeah. Okay.

Hopper: Anyway, computing kind of changed an awful lot of those I think views over time—

Hendrie: You've been doing this fundamentally— You've been doing computing work—

Hopper: I have—

Hendrie: —since you got your degree fundamentally.

Hopper: Right, and whether I was doing it personally or involved but I had, like I say, a couple of- two or three people that had been hired to help me as the—

Hendrie: So you could do more.

Hopper: —so forth. Yeah, I could do more.

Hendrie: Your group could do more.

Hopper: Yeah, and, like I say, then they had a- they were setting up a computer group in New York. It had been in place for about a year to start to coordinate computing across Shell Oil because we not only had the E&P regions, the- we had refineries and each one of them kind of started growing up trying to do similar kind of work across, and then you had some of the- in the credit card side or the marketing side you had credit cards just coming along and so you had all of those. So the central coordinating group was trying to decide the best approach to consolidate computing within Shell so we started setting up regional data centers. Okay?

Hendrie: Theoretically, it would be more efficient.

Hopper: Be more efficient, right, and have there instead of 7070s we were starting to use [IBM] 1410s. Remember the succeeding— The— And then the [IBM] 360s came along not too far after then and so this computing group was, like I say, trying to service all of- the entire company and the- there were a couple of us that had— Our— The biggest assignment I had during those days was trying to figure out where we went in terms of technical computing for the company and I would point out two situations. One was Sabre, 1964, and the other was Project Mac. And so our assignment in effect— I spent a lot of time on that assignment and— Could we take that short break?

Hendrie: Absolutely.

Hendrie: Where did we leave off? You're in New York or have you moved yet?

Hopper: Yeah, I moved—

Hendrie: You've moved and there is a project to try to figure out where Shell is going in computing and I guess maybe paraphrase, come up with a master plan, what you're going to go do.

Hopper: In at least the technical world.

Hendrie: Not the data processing—

Hopper: Not the data processing but— That was a separate project that I did some work on but the major- the fun one for me—

Hendrie: You were—

Hopper: But— And in those— I think I mentioned Project Mac and Sabre. They were the big computer situations and our concept— Long story short, we ended up in a joint endeavor with MIT and Bell Labs in terms of coming together and trying to work with primarily two vendors, IBM and GE and the GE 645 on what would be the successor to back for MIT. Bell Labs was using it. A fellow named there, Vic Vyssochty, if you've ever- again- one of the great pioneers that- and did a lot of the work on the- on Unix and also- I think in later years and also some of the work on their— What was it? The five level switching systems and so forth—

Hendrie: Could you spell his name so we—

Hopper: V-y-s-s-o-c-h-t-y or something like that—

Hendrie: All right. That's close enough.

Hopper: —but anyway, the- so worked on that project. I mentioned the- just- you want a story. We were- had spent a couple of days with IBM up at the Homestead in Poughkeepsie going through the innards of the- what became- what was to become the [IBM System/360 Model] 67 and driving and just leaving Poughkeepsie when we noticed everything was dark and—

Hendrie: Where are you heading?

Hopper: We were heading back toward the city. I lived in northern New Jersey. One of my compatriots lived in- across the river in New York and the other guy lived in- I think in the city and we were heading back and everything was dark. That was the famous blackout.

Hendrie: The northeast blackout.

Hopper: The northeast blackout. Anyway, those are the kinds of things you remember but I worked on that. I left— Before that project was complete, they moved me. They were— The New York data center was there in Rockefeller Plaza as well. They wanted me to go over and take— We moved it a couple of times and I had all the- I guess what you would call the non-application work, the environment, the systems work and everything else. It was a little bit of a training ground—

Hendrie: Before we get into that I'd like to ask a couple more questions about the objectives or at least the direction of this technical computing study that led you to look at Sabre, look at Project Mac. Had you fundamentally concluded that you were going to try to move computing to the desktop through timesharing of the working engineer and essentially bypass a programming staff that was in between the scientist and the computer?

Hopper: Yes. I didn't— I hadn't even thought in those concepts but yeah, that- that's why we were looking. What Sabre offered— It was the first example we had inside a- an organization, a wide organization of a communication based computer, doing specialized work but nevertheless, one, it worked. MIT and Bell Labs, but particularly MIT with Project Mac, had that concept as you know, a more

limited geography so we had that and then you had American with a nationwide geography. So we thought the concepts of those two together and then Bell Labs— They had ideas as well that fit right in there. We thought that blending of ideas, writing an RFP [Request For Proposal] which I think we did, and getting appropriate responses back would lead us into that kind of a world and for Shell the idea was that we had engineers all around the country and literally around the world because Shell- we were Shell U.S. but there was—

Hendrie: Shell everywhere.

Hopper: Shell everywhere else as well so that- yeah, that this was the future way to—

Hendrie: To—

Hopper: —have a—

Hendrie: —essentially a computer utility as opposed to each little group buying a bigger and bigger computer each year.

Hopper: Yes, even though that flew in the face because at that time, mid ‘60s, you were starting to see— Well, I mentioned earlier SDS certainly had—

Hendrie: You’re starting to see many computers—

Hopper: Many computers—

Hendrie: —that are pretty effective—

Hopper: And DEC I think—

Hendrie: DEC had some too.

Hopper: —had some that came out about that time so we were seeing that kind of concern of proliferation, how far you could grow, and our- we did recognize, on the basis of previous stuff that I just mentioned I’d done on a national basis or something for Shell, that having at least common approaches made a lot of sense and we were adopting those same concepts over on the business side and using standards. Even though we had I think it was three or four big data- regional data centers, we were running common programs, the applications.

Hendrie: In each one on common equipment.

Hopper: Right. Yes. So we had seen that and so we were trying to take the same concept—

Hendrie: What happened to this RFP? You apparently became separated from it at some point but I need to hear the rest of the Shell story—

Hopper: As far as I remember, because I got separated in two ways— One, I went over and- as- I got promoted and doing these other things and this was a project that was still being- going on and then I left Shell to go to EDS [Electronic Data Systems]—

Hendrie: You became at least two steps removed.

Hopper: I became two steps removed.

Hendrie: What did you— What—

Hopper: I don't know the— I don't remember if it- to what degree. I think— GE had I think problems in terms of delivering the full capabilities that all the parties wanted. I'm not certain but that's 20, 30 years ago—

Hendrie: It would have been a landmark successful system if it had reached its true promise.

Hopper: But see, I don't think Project Mac went much beyond. I think it— I think all of them— The promise was there but I think, as you brought up the next level— I don't know that computer power ever got to be enough—

Hendrie: To really make it—

Hopper: —to allow it to happen.

Hendrie: —really efficient and effective.

Hopper: Right. I think we were probably 20 years behind—

Hendrie: Where you needed to be.

Hopper: —computing power, where you needed to be.

Hendrie: And there were many computers to—

Hopper: Well, and then—

Hendrie: —solve the problem—

Hopper: I was going to say the- then the other—

Hendrie: The smaller computers.

Hopper: —came into play. Yeah.

Hendrie: You get promoted so now what's your new—

Hopper: My role is to make sure that all the computers in the regional data center worked and that we were keeping current and it was a stepping stone to go to actually Europe and I—

Hendrie: This is a really a— Now—

Hopper: It was a management- pure management, yeah.

Hendrie: This is a pure management job.

Hopper: Yeah. I—

Hendrie: As opposed to—

Hopper: —was not supposed to be doing—

Hendrie: —project manager—

Hopper: I was not supposed to be doing technical work anymore—

Hendrie: No more programming. What were the issues that you faced when you got there? What were the problems and—

Hopper: Well, really—

Hendrie: Why did they need to replace whoever was there?

Hopper: Well, I think it was primarily— As I look back on it now, they had probably half a dozen of us in the company that they were rotating into jobs to position us in the future of computing in Shell and in fact that's what they told me when I left, that- and they had told me that roughly before.

Hendrie: Maybe not in so many words but fundamentally. They wanted to move you and give you a different set of experiences—

Hopper: A whole different set of experiences and so on, yeah.

Hendrie: Were there any particular issues or stories or things that went right or things that went wrong during this—

Hopper: Well, I had to build the staff and I think the one thing that I did that probably was unique— I ended up with almost a total female staff. Now—

Hendrie: Very interesting. In this era that's very—

Hopper: And that's- that was the point and I found that they were easier to attract and perform in- and that was a service group within a service group and that it worked better than having a bunch of egos that were trying to compete over here and it was a lesson I learned that I carried forward by the way so- and- but it was a good learning experience. The first time where you really are managing people that you aren't- like I say, you aren't trying to carry technical work. You're trying to— And so—

Hendrie: These people— Fundamentally their job is to run.

Hopper: Well, they were to provide all of us— Well, we did the planning for all the data center. We moved it twice. We had to— We bought the computers, sized the computers, did the software, did everything other than the day to day operation of them—

Hendrie: You didn't do the day-to-day operation. That was another group.

Hopper: Right.

Hendrie: Who wrote all the applications—

Hopper: Well, we had- as I said, we had a group that kind of supported the corporate— We had a corporate group writing applications and then we had a small group that would modify them or tailor them to the unique needs of that particular center and if indeed there were short term problems with them they would handle those.

Hendrie: They would fix them.

Hopper: Yeah. So we had a data center manager and then essentially the three groups reporting to that data center manager so—

Hendrie: What was Shell buying in those days?

Hopper: Well, in those days it was the- well, the 1410s and I'm trying to think of— Then we started getting the early 360s.

Hendrie: But you had multiple 1410s?

Hopper: Right.

Hendrie: That was an efficient way to go rather than a larger mainframe.

Hopper: Well, that was the largest mainframe we could get other than the 70. I think the 7080's were the other alternative and we didn't particularly go down that path. We saw it as a dead end—

Hendrie: Which it proved to be—

Hopper: And the 1410s were a dead end too but they were— Yeah.

Hendrie: It was at the end of purely character-oriented machines and binary machines as two product lines. The IBM System/360 took care of that.

Hopper: Uh huh.

Hendrie: All right.

Hopper: So on the technology—

Hendrie: How long did you do that?

Hendrie: About a year and a half as I recall, a year to a year and a half. I spent about three years in New York and the first period on the- strictly the planning and then the second year solely in the data center and then I ended up joining EDS.

Hendrie: How did that happen? You're doing very well at Shell. Why in the world do you leave it?

Hopper: Two triggering events: One, EDS had started to recruit me months before and—

Hendrie: How did they know about you?

Hopper: Well, in those days EDS had a group of recruiters that tried to go in to companies and find out who the better people were and recruit them—

Hendrie: They had raiding parties.

Hopper: They had raiding parties and then they had local people that would try to essentially recruit you, the guy running the office and things like that so- and I had- I was, as you say, very happy with Shell and- but they started talking to me about moving to the Hague. I had— By that time I was married, had a son that oh, must have been 8 or 9 and a young daughter that was 2 or 3. It was pretty tough in New York. We didn't have a lot of extra money. In those days they didn't pay you a lot and if you lived in the New York suburbs you- it was—

Hendrie: That was a pretty expensive place to live.

Hopper: It was a pretty expensive place to live—

Hendrie: What town did you live in?

Hopper: I lived in a little town in northern New Jersey called Allendale in Bergen County so- and that was a neat place to live. We got established in the community and church and schools and little leagues and all those kinds of things so a typical suburban lifestyle from that aspect but I- my wife really didn't want to go Europe and I couldn't see where Shell was going to move me next that would— You just knew you were going to move and so you started listening and so a long story short, Ross Perot asked me to come down and talk to him one Saturday and so I flew from New York down to Dallas and met with Ross personally and a couple of his key people and—

Hendrie: How long had Ross been in business—

Hopper: This was 1967 so he'd been in business about 2-1/2, 3 years.

Hendrie: He's just getting started—

Hopper: He had about 150 folks at the time. There weren't that many but the concepts- the business concepts of- were not too dissimilar to the business concepts I'd been used to in Shell in terms of computing being a service as opposed to being- you having to do it for yourself kind of thing, so it made sense to me and so a long story short, that's where I agreed to go and so ended up moving to Dallas.

Hendrie: He sold you.

Hopper: He did and—

Hendrie: Your wife was perfectly happy to—

Hopper: Oh, reasonably happy. I don't think any wife is ever happy to move and this obviously involved a move but I think- from her aspect I don't think she wanted to go to Europe either and I- I'm sure there were other subtleties that came into play in looking back on them. I'm not 100% certain of everything. It worked out but- so we did move, moved to Dallas, and got involved at the time with— EDS was just putting together their first— The program that really put EDS on the map was a Medicare services business where they handled the claims processing for the various- primarily Blue Cross as Medicare Part B was coming into existence. And they had the State of Texas, which was headquartered there in Dallas, as a customer and I ended up kind of taking responsibility for that account and handling it- handling the migration over to the new system. I helped a little bit in the conceptualization of the new system. Interestingly enough, EDS had some people that had worked on the original Sabre system at IBM that were on their staff that understood essentially enough about real-time programming. I had, of course, spent a year or so working on those kinds of projects—

Hendrie: You hadn't actually executed on them but you'd been studying them and learning about them.

Hopper: And had— We had done some work in- well, in at least communications computing and so forth—

Hendrie: Okay. Yeah. All right.

Hopper: —stuff around and so I aided them on that and then handled the migration and those kinds of things.

Hendrie: What was the system originally? When Ross got the contract what was it running on—

Hopper: It was running on an IBM System/360 Model 40 and needed to run on about a Model 65. It had a- something like a hundred-reel tape file that you had processed and when I took responsibility for it it had no checkpoints.

Hendrie: This is totally batch operation too—

Hopper: It was— Yeah, batch operation, and so you'd run it- you couldn't run it every night because you just didn't have enough time to get it done but you ran it as much as you could and of course we were going to a real-time system where the claims would be processed as time went on as they went so it was quite a step forward and—

Hendrie: There was a lot of software you had to write—

Hopper: Well, I didn't have to get it— I only helped in the concepts. I— My job was to get— I— As I said, I took responsibility for the existing system, held it together, ran it. I was- served the customer until we got the new one and then we had a long New Year's week between Christmas and New Year's where we did the actual conversion.

Hendrie: Did the cut-over.

Hopper: Did the cut-over and several sleepless nights and days.

Hendrie: Did that work?

Hopper: Yes.

Hendrie: It was successful.

Hopper: It was.

Hendrie: The people who had written the new system had done enough testing that—

Hopper: Well, we'd tested it before. We did—

Hendrie: You tested it a lot.

Hopper: Yeah. Yes. We went to Kansas City and I've forgotten where all we went to try to get machines big enough, that had enough time, because we had to test them on the bigger machines.

Hendrie: You didn't physically have the bigger machines—

Hopper: No.

Hendrie: —yet. Why are you going to buy the bigger machines until you're going to cut it open—

Hopper: All those other things so— Well, anyway, it was a very stressful few months to get that done and—

Hendrie: But it was—

Hopper: Work?

Hendrie: It was a success.

Hopper: And that—

Hendrie: And Ross got paid.

Hopper: And he got paid and he went on to use that system in I- probably half the states.

Hendrie: Really?

Hopper: Yeah. That's—

Hendrie: Then once he'd done the original work he was able to replicate it.

Hopper: Yeah. That's where EDS made their first major money. A guy that— I don't know if you ever know of Mort Meyerson. Have you— Does that name—

Hendrie: —Okay.

Hopper: The music center in Dallas is named after him, Ross, but Mort later became president of EDS and Perot Systems.

Hendrie: What was Mark's role—

Hopper: Mort was project manager of the- head of the Blue Cross thing- or the- and then took this system and went out and sold it to other Blue Cross—

Hendrie: He was project manager for—

END OF TAPE 2 / BEGINNING OF TAPE 3

Hendrie: Yeah we just talked a little bit about Mark Meyers and this system, so that must have been very profitable for EDS to take something that they'd written and be able to replicate it, you usually can charge more than it cost you the second time, that's a lot more likely to succeed.

Hopper: And they were obviously operating on fixed price contracts and the whole bit so. Anyway EDS, one of the vice presidents was a fellow named Jack Height and Jack had been on Lindon Johnson's staff when he was in the senate, sort of their number 2 guy or something, well connected. Later when to work for IBM and was in the same office with Ross in Dallas. Jack taught sales for IBM, but he also took time off to become the advance person for Mrs. Johnson on the 1960 election and then he became one of IBM's first lobbyists and Mr. Johnson became President. With that kind of background at least as I understand it, he and Ross talked and Jack created something called EDS Federal, which he had ownership, I don't know if it was more than Ross or not.

Hendrie: But he was not just running it, he was also the owner.

Hopper: Yeah and their idea there was to apply some of the same concepts into the federal agencies from and then the still President and when I joined them, I think they had consolidated EDS Federal, back into EDS. I don't know that that venture had been quite as successful, the federal businesses as they had hoped and Jack had a friend who was, he'd also been on I guess Lyndon's staff who was a general counsel at the United Airlines and United Airlines was having a tough time in those days, they had a grand concept of a computer system that would do everything on one system. And so Jack was through his contact, was able to bring a few EDS resources to work on one of the projects, which happened to be associated with the maintenance and engineering activities at the airline.

Hendrie: Okay, they needed help and EDS got a contract.

Hopper: Well we got a contract to help them devise some of the aspects of the system.

Hendrie: This isn't the typical full EDS?

Hopper: Not yet.

Hendrie: Not yet but I'm sure Ross is thinking maybe we can get there.

Hopper: Well I think that probably it was in the back of their minds.

Hendrie: Anyway I think they were probably 3 or 4 of us that initially went out to San Francisco where the maintenance space was up here and they had some internal united employees, they had a couple of other contractors that they had helping them and then we came in. So it was kind of a mixed bag, but they had divided the project up into about a half a dozen major, what you might think of as applications and they called it a material control information system and the idea was conceptually that when you think

about an airplane, it's made up of a bunch of piece parts, you can almost think of the materials. Well these piece parts in many cases in an airline have to be kept track of individually and so their thought was if they could keep track off all the pieces on the airplane, logistically they could figure out how to operate and so it was building, you can think of the major database would be the piece parts on the air flap and so my initial activities there were to figure out how to handle those that had to be what they called rotatable or repairable, parts that came off the airplane, had to be repaired or scrapped and then put back on. But they were either time-controlled, number of hours flown or number of take-offs and landings, the engines would be one or the landing gear, you know, and to figure out a system to make that work.

Hendrie: And of course there are spares and the things come out and they go into spares and spares go back into the airplane and so what's in the airplanes that's constantly changing also.

Hopper: And two points, one I had the graduate work I did in operations research, I never finished my thesis but I had done all the work on it, was in inventory control and I got transferred to New York with Shell and my professor, he left the University of Houston and went into private business so that went apart. At least I know inventory control from a conceptual point of view and they were using Univac computers, which at Shell we had used some of their communications gear in tying into some of our remote locations. So I had a little bit of tie into Univac.

Hendrie: What were they using, 1108s?

Hopper: The plan was 1108s, in fact they had them in Chicago and they had four 1108s and they were going to operate [a] material control system which would be everything dealing from purchasing parts, repairing parts, all the shops, inventorying them around the system and so complete, you know, that side. All the operational systems of the airline, flight planning, flight following, something called message switching, which was really a messaging system, and a number of other operational aspects and then the reservation system.

Hendrie: They were gonna cram all this into these 4 machines?

Hopper: Four machines.

Hendrie: Sounds like they needed a 4 for each of them.

Hopper: They weren't very smart.

Hendrie: Did you figure that out quite early?

Hopper: Well we spent the first 6 months primarily in San Francisco scoping it out, getting it laid out and then they ask us to start to come back to Chicago where they were doing all the other work and start looking at 'em because they were starting to run into some difficulties.

Hendrie: Now were they just doing system design, were they actually coding?

Hopper: They were actually coding.

Hendrie: They were coding and debugging?

Hopper: Yeah on the reservation side, they were ahead of us terms of development.

Hendrie: So they're doing testing.

Hopper: Yeah, the reservations and the operations, and we were probably the tail end in bringing that up. But they started running into problems up here on the reservation side and they got us to Chicago and started asking us to take on bigger and bigger roles.

Hendrie: Over here in the reservations [side].

Hopper: Well in the whole concept, whole what was going on and their testing approaches, their measurement approaches, they were just a huge bunch of things that, you know, that American had failed, I don't know if you remember, American didn't get Sabre out there early, either.

Hendrie: I don't remember that, in fact we'll talk about that in a minute when we get to Sabre, we'll go back to the history of Sabre before you got there.

Hopper: Anyway, so we had a couple of real-time guys that had worked with VAC and we were putting real-time system in for the cross that we brought up to help us.

Hendrie: So you have some people with scar tissue?

Hopper: Yeah and started looking at—- a long story short, it just wasn't gonna work, we told 'em that.

Hendrie: Was it a design problem or a capacity problem or a little of both?

Hopper: Let's start with capacity. The Univac salesmen sold United the fact that in a multi-processor world one equals one and four equals four. I think when we started getting them some measurements, it probably was about 4 equal 2 at most or not much more.

Hendrie: To make 4 equal 3 would be a *tour de force*.

Hopper: So we told 'em, you know, that our initial report and essentially I headed up the group that we had a guy, I kinda worked for on the project but he was more opening an office in Chicago and doing things over here, so I ended up [being] the United guy and it just was not—- we didn't think it'd work, we gave 'em some ideas, how to start measuring it, how to put controls in place, a whole bunch of other things, but we didn't think it would work and so they adopted what we told 'em and then within 6 or 9 months and we were continuing doing the other things and starting programming and all that. It became obvious that it wasn't working, so they ask[ed] us to take a more detailed look and in effect by that time we started, you know, Univac had gotten involved. They were proposing and actually brought in and tested 4 front ends to handle the communications in front of four 1108s.

Hendrie: Not the worst idea yet.

Hopper: That didn't solve the problem.

Hendrie: That wasn't enough capacity.

Hopper: No it wasn't enough and so in effect we told United that this was not going to solve their business problem, they could not do it. I mean this just literally was a failed effort and they had invested millions and millions and there was just no way to get there from here.

Hendrie: Did you tell them that if they separated the pieces that the reservation system might work?

Hopper: We knew then that was a problem, we knew the reservation system would not work.

Hendrie: Even if they took everything else out?

Hopper: Yeah, see that was the problem.

Hendrie: So they were incredibly far off-base in terms of their expectations versus reality?

Hopper: Right, expensive lesson.

Hendrie: Expensive lesson when you can't even take, you know, 3 of the functions out and just one function will work.

Hopper: That one function though was probably 90% of the <inaudible>. That was a problem and their concept of a reservation system was, you know, very advanced over where IBM and the other airlines were, simply because they had built in all the airport processing and various things like that, I mean people that were—- the other guys were doing it incrementally, United tried to bite off the whole thing at once.

Hendrie: What were they using, they were using something up until this point?

Hopper: Well they were using for basic reservations, the second or third generation Bunker Ramo System which gave them inventory control.

Hendrie: So they knew the seats and they knew the name?

Hopper: No they didn't know the names.

Hendrie: Oh they just knew the seats that were sold and weren't.

Hopper: Yeah they kept separate local systems I think were running on RCA batch computers for keeping track of the names and trying to marry 'em up at…

Hendrie: At flight time.

Hopper: Yeah. So in fact that was the way that a lot of the big airlines had done in the '50s and '60s.

Hendrie: Well that's how they got started in automatic systems. First thing they did was put seat control in the computer as opposed to just, I don't know what they used, they must have had some manual system of clipboards or cards.

Hopper: Well they had a combination in the res offices, they had big essentially blackboards and glasses, binoculars.

Hendrie: So now what's EDS gonna do?

Hopper: Well, on one New Year's Day, Jack and I met with the CEO of United and gave him our report and in effect said, you know, there's just no way you can make it work. He asked us to carry on and our alternative was… the only one that was working at the time was Eastern Airlines had a version of PARS [Programmed Airline Reservation System] IBM which was the follow-on 360 version of a reservation system that would work and we recommended that they move down that path, either with us, EDS taking responsibility for it or, you know, IBM or doing it on their own or one of the other _____.

Hendrie: But that's the system they oughta start as they're starting from.

Hopper: And he asked us to immediately find a site for a computer center and take on the project management aspects. About 3 weeks later… I think I still have a copy of the letter of intent that he gave us to do the whole thing, and we helped to find a site in Denver and a whole host of things.

Hendrie: So Ross [Perot] was right, this little "Consulting Thing" led to some big potential?

Hopper: Yeah, and then Ross blew it; EDS had gone public in, oh the fall I think before that, not to much before that, and so now it was a public company and Ross decided that, you know, he was very patriotic and he was, you may recall he chartered Braniff's what was it, the big pumpkin, orange 747 to try to take Christmas presents to the Prisoners of War in Vietnam.

Hendrie: No, I don't remember that, but okay.

Hopper: So he was off involved in that aspect. We were in the final negotiations with United and at that time he had delegated it to the Chief Financial Officer, a guy named Curtis Markus, and Mitch Hart was the President of EDS at the time; Ross kind of came in and out of running things.

Hendrie: Well he got very successful and now he was spending time on other interests, he wasn't laser-focused on it.

Hopper: He was always in and out.

Hendrie: He was always in and out?

Hopper: Well certainly in the latter years, they'll tell you. Anyway Mark came up and he'd had more experience in selling things, you know, for the last year and a half or so he'd been selling to all these guys and Mark and Jack and I and Mitch were there. Mark and Jack went into the room, you know, to handle the specific negotiations, they were kinda holding me out, you know, didn't wanna get my nose bloodied if I was gonna end up running things, and so I was there with Mitch and United, EDS had done nothing but fixed price contracts. United offered us a cost plus 15%, not bad, and we had from a strategy point of view, American and TWA were almost in the same place for different reasons but the same situation, and so we were looking at the possibility of having it all tied together. Mitch ended up having to make the call, he was afraid to say 'yes,' the broker that took us out, was from a little company called Crest Ridge a man whose name you might remember, is name is Ken Lin Gong. He was the senior director on the New York Stock Exchange that handled the compensation for Mr. Grasso.

Hendrie: Yes, now I recognize the name.

Hopper: He also has been on the board, was almost a founding shareholder along with Mitch of Home Depot and has been on the board of GE for many years. But Ken felt at the time, and I was in the room and Mitch and I were on a conference call with him or more less, and posed the question to him, you know, how would the Street react to the news of a cost plus contract? What would it mean? We tried to get a hold of Ross, but he was off on an airplane, there was just no way you could get radio contact and so Mitch says—- they discussed it, we can't go there. Jack and Mark went back in the room and tried to, you know, <inaudible> said "We're going our own way." So they _____ all of our work and we still did work for them in terms of getting the site ready and the whole host of things like that and they contacted IBM, which we had already laid out, you know, here were the alternatives. And IBM and then they also contacted Eastern and what we were gonna do at EDS, we were going to modify the IBM code base. Eastern had already done it for a large airline and they thought they would be further ahead so United decided to go with the Eastern code base and employ IBM to help them install it.

Hendrie: That was an opportunity missed to potentially create a monopoly.

Hopper: Well, as Ross told me later when he came up to see me after he got back, we went out to lunch, he said well he liked football metaphors. He said "You had it on the half yard line and I blew it."

Hendrie: Just wasn't in the right place at the right time. Do you think he would have taken the contract?

Hopper: Oh, I think he would have, I think he would have seen the opportunity.

Hendrie: He would have seen the ongoing opportunity, it doesn't matter whether the stock dips a little bit, it's about a few years.

Hopper: It really knocked him out of the airline game for a long time and they still aren't doing what they should be doing in it. Anyway that part of the story, you know, with that loss because I was going to probably be running the whole thing, would have had to move to Denver, which was okay, you know, a

whole bunch of things. Then I had to decide okay where do I go, do I go back to Dallas and, you know, I had already said that I didn't wanna be a big part of the healthcare thing, that was the other opportunity when I did the airline thing and so Curtis Markus who like I say he was an Executive VP and CFO, he asked me to drop by and see him, he said "Do you think there's anyway to salvage anything out of the Univac thing?" Because based on what we had recommended and a lot of things, they sued the Univac, they had a big lawsuit.

Hendrie: Who?

Hopper: United.

Hendrie: Oh, United had sued Univac?

Hopper: And probably solid ground, they had obviously misrepresented the capacity of the machines. It's pretty obvious when you say 4 equals 4.

Hendrie: You're very stupid or misrepresented.

Hopper: But Univac came back then with an approach to take what they wanted of the hardware and do the operational and the main activities, or a good chunk of those, and a lot of the operational things were already pretty well done and some of the maintenance that when I was particularly responsible for was already largely done and so Curtis said that if you think if we could—- you don't have to worry about the business side of the settlement, do you think this could be made to work and, you know, would we be ahead to take it as opposed to.

Hendrie: With the 1108s yes.

Hopper: And I said "Fine, I don't see any reason" he said "Would you come run it?"

Hendrie: He's still trying to get you to do something for him.

Hopper: So I talked to Ross and I said "I have this opportunity, I don't [know] what I'm gonna do if I come back to EDS," he said "Well, you know, there are all kinds of things." I said "Well I'd really" because we had a contract at EDS, you couldn't go to work for a customer and Ross had strongly enforced that but he said "I'll let you out" and he said "But if you ever wanna come back, you can come back too." So I went to work for United in taking responsibility for, you know, that side of the 1108s and doing in effect over the next year or so implementing most of the stuff that we had done in operational and other _____.

Hendrie: So the other pieces of the thing?

Hopper: Yeah and it, you know, served them well.

Hendrie: And the Eastern system, the parts code?

Hopper: The Eastern system, and we worked with 'em.

Hendrie: Yeah but the parts code, that wasn't a piece of the parts system?

Hopper: No, it was strictly reservations.

Hendrie: It was a pure reservations system.

Hopper: So that's how I ended up at United and going to work full-time in the airline industry.

Hendrie: Now where was the location?

Hopper: This was in Chicago, right outside.

Hendrie: When did you actually move to Chicago?

Hopper: I moved there when we moved the project from San Francisco, I moved there in the summer of 1968 so it was an interesting time in Chicago. The Democratic Convention was held in Chicago that year and so you got a full measure of Chicago politics and Mayor Daley and all of the other things.

Hendrie: All of the unrest.

Hopper: That was a terrible situation there for a while. Now we were like I say 20 miles out in the suburbs.

Hendrie: Watched it on television...

Hopper: That was about what we did. The kids are growing up and again, you know, I think things are—- did all the things at United that we're asked to do. But they got a new, as a result of this fallout, they ended up, the CEO ended up leaving.

Hendrie: It was a big enough deal?

Hopper: Well that was one of the major issues and one of their key—- United had merged with Western Hotels or acquired Western Hotels about that time and the guy that had run Western Hotels ended up kind of forcing out the CEO and becoming chairman and he brought in his own guy to take over at United and Curtis retired. So here was a guy that created a lot of unrest in United, those that were left, weren't exactly friendly toward me.

Hendrie: That's true.

Hopper: So politically I'm in bad shape.

Hendrie: And the person that had asked you to do this.

Hopper: He's retired too.

Hendrie: He's disappeared and there's a hotel executive running things.

Hopper: Yeah, and they had not anointed anyone what you would think of as CIO, we had 3 computing groups, I was running one, reservations were running out in Denver, they had a business group also there at United and Curtis had more or less promised me that, you know, okay you do this.

Hendrie: Your next step would be to run it all.

Hopper: Yeah but, you know, you can't fault Curtis, that was what he thought and he had a different boss. Anyway one of the things I had done and like I say we had done enough work at EDS, Jack and I had. TWA was facing exactly the same situation United had, they had gone to Burroughs as opposed to Univac needing a reservation system, Burroughs had sold them on their computer which was to be a thin-film memory system. It was supposed to be blazingly fast with enough capacity.

Hendrie: You know, I have to chuckle because I smell the story coming.

Hopper: And let's say it didn't work or was not working.

Hendrie: Do you remember what machine this was, was this a?

Hopper: I wanna say it was the 8500 or something like that, I don't remember the exact number, 60, what number it was.

Hendrie: Well I know there was the 5000 series <inaudible>.

Hopper: Well, this was passed the—- the B5000 was a pretty good machine and I think this was one of the successor machines but it was based on thin-film memory which was to give you the speed you need to handle the processing requirements for real-time, and then as I said, I'd been to Burroughs and seen their chip board computers where they had them, you know, running in tandem and were gonna be able to have all those concepts built in. Had a pretty good story.

Hendrie: That is a good story yes.

Hopper: And because before I left EDS to join United, we were starting to work with TWA in helping them investigate where they oughta go so I was doing some parallel—- that's why I knew some of those activities could possibly pay off and another interesting story there about the time I got the letter of intent with United to do the job. We were in TWA's headquarters and meeting with the then president and the Chief Financial Officer talking.

Hendrie: Where's that?

Hopper: In New York, their headquarters is just a walk down the street from where American's were, so [I] called on American too. The business side there though, the CFO said "Well we're just getting ready to replace our CIO that's running our technology" I think it was a guy named Jim Smith if my memory's right and we haven't named him yet but we've got a young man whose been an assistant treasurer and has some, you know, computing background a little bit, his background and is very, you know, we think a lot of him. And so his name is Bob Crandall. So interestingly enough, I knew Bob was gonna get that job before he got it. So that was the first time I'd really heard of Bob but so the potential of TWA, you know, following the lead was also pretty good if we gotten the United deal. As it turned out, Ross made a play for it and Bob had been in the saddle, he had killed the Burroughs project, but he had decided to go with the Eastern System as well, and United and EDS having lost the United bid, well it was difficult to achieve, I mean but that's why I say I think if we had had the United it would have.

Hendrie: Because TWA basically followed the path that United took.

Hopper: And it would have been probably a much lower cost then them doing it independently, but that was another time. American by the way at the time.

Hendrie: Now where was American at the time?

Hopper: They were trying to find a way, Sabre was running out of plastic.

Hendrie: Now Sabre was based on 7090's?

Hopper: Based on 7090's, they had gone so far though as to put a 360 back in on it okay to help and they had laid out a migratory path to actually migrate totally to 360 technology with their own base. But they had worked out an arrangement with Eastern on a parallel basis where they traded Eastern technology and people help in building some aspects of the system, primarily [the] fare system and those kind of things so that Eastern had in effect licensed their technology base to American, so they shared in effect… agreed to end up sharing computer technology. But American had some significant internal battles going on which we'll get into I'm sure to some degree, and so they didn't have any money to spend on computers at the time or didn't have any and so that was an issue there so Jack and I thought we had a pretty good road map laid out that if you get United then you could get TWA and you'd get American and you could really build a system and they all needed help in different ways. So that was the thesis behind what we were trying to do.

Hendrie: And Eastern was running pretty well?

Hopper: And Eastern was, you know, busily doing their own thing.

Hendrie: But they were not in as much trouble by any stretch of the imagination?

Hopper: No because they had paid IBM good money to help them move beyond the basic PARS system into on for large airlines and now United paid them later, you know, they paid them a million bucks or more and TWA did too.

Hendrie: For the code?

Hopper: Yeah.

Hendrie: So that was actually a good investment.

Hopper: Yeah <inaudible> they did very well.

Hendrie: So they had the foresight and modified the PARS code and it worked?

Hopper: Yeah.

END OF TAPE 3 / BEGINNING OF TAPE 4

Hendrie: Let's see what happens next in the story.

Hopper: As I said, the issue at United with all the folks that I had worked for gone and with new management at the senior level in place they decided to put the gentleman in charge who'd run the reservation system, which we'd done a lot of the planning for in terms of total computing. Well I didn't think that that was a—- I would last very long there.

Hendrie: Working for him?

Hopper: Well and like I say when you reflect back on what it was, it was a very natural thing, I mean you know I have one person primarily responsible and I've been had at least influence if not actual responsibility for doing a lot of those things. Well, one of the things I had done was I had sold American when our hold flight following system while I was at United. American needed a flight following system, we migrated our O and off a CDC hardware onto the Univac platform so as I said we did all the things we said we'd do with the Univac platform, moved everything over. So I had sold that to American to use and gotten somewhat acquainted with the guys running American's computers and I knew they were trying to find a way to migrate Sabre from the old system in Briarcliff Manor, New York to their new center in Tulsa. A long story short.

Hendrie: Back up just a little bit, this like following system, had you migrated it to them to run on 1108s or were they?

Hopper: Well, at United flight following was one of the operational systems that we moved to the 1108s.

Hendrie: From CDC.

Hopper: Yeah, in a unified operational and part of the maintenance activities, the roteables and tracking and all those. So it was superfluous then to United so American didn't have one.

Hendrie: So you just took the old one?

Hopper: Took the old one.

Hendrie: Took the old one and sold it to them?

Hopper: Yeah.

Hendrie: And sold them the equipment and everything, I see.

Hopper: I don't remember if we moved the equipment, but we at least sold them the service, I forgotten exactly because they wanted to develop one of their own and they didn't have one and they needed one.

Hendrie: Here's the source code for it.

Hopper: Well I know they kept running it on that machine, I just don't know where the physical machine ended up.

Hendrie: Okay so it was run on a CDC, doesn't matter where it was probably.

Hopper: So a long story short, knowing it's best for me to exit United, in fact I, you know, it was pretty devastating to have to leave, I mean again because it looked like another move and from a family situation…

Hendrie: And you'd done a bunch of really interesting and good stuff.

Hopper: Everything I was supposed to do I'd done and maybe more. So it seemed a little unfair but, you know, I guess that was the one life experience that I did have where I didn't get rewarded for accomplishing what I was supposed to have accomplished. On the other hand you recognize life is not totally fair either and certainly in higher levels of management it's often not based on what you do but the circumstances in which you're, you know, involved. It wouldn't have worked, I don't think I could have worked for the other gentleman in an effective way and our teams, I don't think it would have worked and if they're going to anoint somebody, now a long story short was he didn't succeed very well.

Hendrie: He didn't?

Hopper: He didn't last very long.

Hendrie: So there is another possible ending if you'd stayed and hung on and just stayed out of trouble you might have, you know, you never know do you.

Hopper: You never know but.

Hendrie: Well look at this as an opportunity to go to.

Hopper: Head into American and they regretted it many, many years. So a long story short, the guys at American interviewed me and I decided to join them since I wasn't sure I had a home or very certain I didn't have one at United and went to Tulsa, Oklahoma.

Hendrie: Now were they looking for somebody to run their new center or what was the job they were looking for?

Hopper: Well they had a guy in charge who was, I think, a very bright guy but not necessarily the best computer technical guy around and in fact he was an architect of sorts and they built a new computer center which he was very proud of and he'd spent a lot of effort and his time on that. But he just was not a computer guy and he would not give them a game plan on how to move the system from Briarcliff Manor, New York to Tulsa, Oklahoma, you know, testing was a long way down the road, they'd built the computer center, you know <inaudible>.

Hendrie: What's our cut-over plan?

Hopper: How do we get it done?

Hendrie: So all the planes don't have to stop.

Hopper: And they really weren't very happy with him either for many other reasons I guess it came to find out. So having, you know, at United I'd probably done 3 or 4, maybe half a dozen real-time cut-overs with various operational systems that we had there in the last year, year and a half and so American, cut them over to, you know, that system and had done all their reservation work and I in fact had talked to a couple of them earlier, you know, when I was EDS about, you know, their own reservation work. So it was just one of those things that fit and.

Hendrie: And they really knew who you were, you were well known at this point.

Hopper: Well, at least partially known.

Hendrie: Partially known yes.

Hopper: So anyway I went there to move Sabre, I think I joined 'em in March. The guys were so far along that it was just, you know, ludicrous to, you know, figure it out what to do. Looking back on it I can't imagine that it took me, you know, we set our first cut-over in April.

Hendrie: And you got there when?

Hopper: March. Now American had, you know, going to a system level one thing Sabre had that American they did not have the communications embedded in the application code, so communications handling was outside.

Hendrie: So it was done on auxiliary processors?

Hopper: Done on an auxiliary front-end processor. So when IBM of course in those days the application code included the communications controlling, I mean they had a hardware thing but into the application layer or even the system layer was still embedded in the mainframe. American's engineers had been smart enough not to buy into that, they had built a communications front-end out of the Collins C system. I was gonna ask if you'd ever heard of one of those.

Hendrie: No I haven't, okay so you gotta tell me quickly what that was.

Hopper: Well Collins radio, they made some of the best communications gear in the world for many, many years and maybe still do but they actually built some basic communications computers back in the early 70s and they called it a C system, essentially when you think of it as a wide band with nodes that so the C was the circulation.

Hendrie: All the distributed nodes and wide band back to central.

Hopper: Right and that you could plug into the.

Hendrie: And that you could plug into a channel on an IBM computer.

Hopper: And so what they did, the concept was fairly simple, you switched over the communication's network first to that, you directed traffic back to the old mainframe in New York. Then you moved your database down, brought it up your new location and switch your network over, fairly simple approach.

Hendrie: And you keep a replica of the database while you're in the process of moving them for a short period while you're doing the move of the database you have to keep them synchronized, what then?

Hopper: Well, you shut 'em off.

Hendrie: You shut it off, okay.

Hopper: Now in those days, this was 1972, we chose just two quick stories here. First time I went to New York, I just joined American and my boss was in New York, I was in Tulsa and I go to New York and I get an invitation from—- there was a fella there that was a director in marketing, name of Rod King and I said American had had some internal strife, it actually went back to the days when Sabre was born. I mentioned earlier that American had done, in fact they had a fairly extensive R&D environment in computing that had done the predecessor for the Bunker Ramo computers and way, way back and a couple of generations and.

Hendrie: We'll roll back to that when you've finished these stories.

Hopper: But when C.R. Smith went with IBM to build Sabre in the late 50's he put it under the CFO as opposed to this other group. So the marketing group always.

Hendrie: He moved it from the marketing group to CFO?

Hopper: To the CFO because he thought computers and I'm sure IBM influenced, they were, you know, coming along and that's where all the major companies were putting their computing responsibilities and but the marketing group still retained enough power that the guy that built Sabre was responsible to get it through was guy named Fred Pflugge and Fred later went on to do the Avis system and so it was very.

Hendrie: How do you spell his last name?

Hopper: Pflugge and I think he's retired somewhere if he's still alive between Tulsa and Eastern or Western Arkansas, so he's a very bright guy. Anyway he could not get funding like I say American had plans to be able to take their own system and migrate it over into a full 360 environment, because the customer wouldn't pay for it, wouldn't give them economic justification to do it, it was getting choked that they would not, anyway I will come back and tell you that part of the story a little later but so the first time I went to New York, Rod asked me to stop by his office late in the afternoon, I was staying over and so forth and Rod had a number of responsibilities and about 6 or 8 direct reports and they were all kind of associated with the operation of the airline in terms of marketing .

Hendrie: Things that might be related to marketing.

Hopper: Yeah and, you know, tell time _____ everything you can imagine. So I go into his office it's a round table he's sitting there, he's got all of his peers or all his subordinates around him, there's one chair and in that chair is essentially a life jacket or a life ring or whatever you, a round ring and he says "The reason this is here is you're going to need it when I get through."

Hendrie: Wonderful, well he has a marketing flair, I do see that.

Hopper: He really did, now a couple of stories about Rod, he's been given credit in a lot of respects for designing Eastern Shuttle <inaudible> he had a great belief that airline travel would evolve to what it has, essentially bus travel as opposed to being luxury travel and but his model, so I'll just give you that. Another, I don't know if you ever went through the old Dallas Airport when it was first opened and he had responsibility for those. You may recall American's terminal had these huge flat boards so it had a central seating area with huge flat boards and then a very narrow corridor off to the gates, which was a train station model. Rod also did enough, kept enough of his little technology research that he was—- one of the things that he precluded Fred from doing that I inherited a couple of years later. Well Fred headed Sabre and was in effect the C—- Fred Pflugge until probably 1968 so about 4 or 5 years down the road. When Sabre was installed in the early 60's it used typewriter like terminals, some of 'em became modified for all kinds of purposes but nevertheless the CRT's weren't yet available. Fred had bought about a thousand CRT's, Rod would never let them be installed, I'm just giving you some interesting.

Hendrie: Slightly dysfunctional organization.

Hopper: Slightly dysfunctional, he'd also gone out and bought a few I don't know, couple of hundred at least digital log devices, which were new, they were replacements for the typewriter units but electronic that I mentioned a little earlier, they weren't very reliable among other things. So I'm just trying to give you a little flavor of Rod but what Rod did not believe in was what he called Big Mother, he did not believe in centralized computers, he believed in totally distributed computing. Never mind the database, never the mind the fact that you couldn't keep it synchronized and, you know, he just didn't believe that that was

the right way to do computing. So that was our philosophical debate, we had a long—- I didn't need the <inaudible> I gave him as good as I got and we had a good philosophical debate. But what Rod would not do because like I say American was so close, it was simply a matter of doing final testing, he was responsible for the testing. I went as far as I could take it in terms of the application testing, I made sure that it was done, I checked out everything else. What we were going to do was shut off the computer at midnight on Sunday night or Saturday night, which is a very low volume time for [an] airline. Capture the database, had a private jet sitting there to fly them to Tulsa, we were right on the airport at Tulsa, you know, deliver them over, bring them up and we would, you know, it'd be off the air for maybe 8 hours. Now having typewriters, the people could still handle the reservations even though they might be doing free selling and hold it so that they could then re-enter it for that period of time and that was the way you were going to address.

Hendrie: In what form was the database, on tapes?

Hopper: Yeah, it was on tapes, just I've forgotten how many cartons they had.

Hendrie: There was a number of reels, big number of cartons, big number of reels.

Hopper: Enough to fill the airplane, a little airplane. So like I say it wasn't a very complex mechanism for doing it and how else are you gonna do it anyway? But I told Rod the one thing that I wanted and not only Rod, this President of the airline and senior management. I said "We've gone as far as we can go, I need a volume test." I mean there's one thing in real-time systems you learn that you can never, until you drive them at high volumes you never can be sure that you've wrung everything you can out of it and I said, you know, "I want a volume test." And the proposed approach was for them on some Sunday night to because they captured everything on just re-enter it in the new computer, in other words, put them on the overtime and we'll do a test run, wouldn't pay the overtime, too expensive. So we attempt to cut-over, with fair warning to everyone, flipped the switch at about 9 in the morning and about 3 or 4 in the afternoon, start seeing some degradation and about 6.

Hendrie: <Inaudible>?

Hopper: well what we saw in effect some indexing change, getting lost and so you were losing records and so about 6 we said "Hey we don't think we can fix it, it's too risky to go in to" think we can fix it overnight and go into the week, you know, our fallback plan is that, you know, you re-enter everything for the day because it's all there so you just have to keep people on overtime instead of re-entering it in a test situation, you re-enter lots which we.

Hendrie: Which is what you did?

Hopper: Yeah, so Rod gave me a couple of tests and we cutover about 6 weeks later.

Hendrie: And you found the bugs of course.

Hopper: Yeah, we found them within 2 or 3 days.

Hendrie: You knew something had to be there, just from experience, scar tissue told you that.

Hopper: Yeah and the tape as well. So that was my introduction into American, getting Sabre moved and we did it and that's kinda the first story of that act.

Hendrie: So were the 360s at Tulsa?

Hopper: Yeah.

Hendrie: This is also represented a switch to <inaudible>?

Hopper: Total 360s, moving off the 7090s, Eastern code modified to look like the old Sabre, they threw away the front and back end approach that they had in New York. So we abandoned the approach of American creating an independent, you know, mechanism, we essentially adopted the Eastern code.

Hendrie: Modified for a large airline?

Hopper: Yeah, well Eastern code had been modified for a large airline.

Hendrie: So it's the same Eastern code fundamentally that United.

Hopper: And TWA had. The difference was that we had helped them in some of the extensions into fares and other kinds of things. So we were in a little better situation going forward, now the problem was they had bigger budgets than we did. Again Rod was able to control the budget, so had very limited funding to be able to—- in fact he told me not to put in the pricing function, even though we had the software.

Hendrie: Really?

Hopper: So I just didn't take it out.

Hendrie: So you had your arm wrestling matches with Rod over the years?

Hopper: Yeah well the point and it was—- like I say he never came around to believing that it would change. I guess the next step in the story is there were two things.

<Crew talk>

Hendrie: I wanna roll back and before we get too far into this story and have you just tell us a little bit about you, I know you weren't there but tell us a little bit about the evolution of reservation systems at American and how it got to where you became connected.

Hopper: Well, like I say American had been a pioneer in trying to find automated approaches to handling it, initially with just inventory systems, initially with blackboards and binoculars and call centers or reservation offices. They had movable little almost like little conveyor belts that the agents would write the information down on, put 'em on these conveyor belts and they'd wind their way down and.

Hendrie: This is the blackboards?

Hopper: Well into collection points where they would later key punch 'em and so C.R. Smith during the Second World War ended up being almost in charge of the Air Force Logistics Command and became very intrigued with the use of punched cards and automated equipment.

Hendrie: Data processing yes.

Hopper: So that became a little bit of his trademark, so he brought some of that back into the airline when he came back from the war. I'm not sure the total background of the reservations computer that he allowed to be developed or I think it was like I say at least 2 generations but I do know that it was an old drum systems. These would have been 1970s time frame or 1960s time frame, I'm sorry, 1950s time frame I'm 20 years off and then later on I think the second version they sold a Bunker Ramo; Bunker Ramo took that and made it into a product that they sold to other airlines and, you know, stepped up with better terminals and everything else.

Hendrie: Do you know whether it had a brand name or a product name?

Hopper: I don't, I don't, in fact I'd like to find out and maybe in some of American archives I don't know. But C.R. was on a plane once with IBM salesman also named Smith and so the story goes and I think it's pretty accurate and they got to talking and I'd been told later that Watson was in the back of the plane and anyway long story short they didn't think the technology was good enough then in the early to mid '50s but the guy kept in touch with C.R. and in the late '50s they decided that technology they thought was good enough and so.

Hendrie: Probably was the advent of transistor.

Hopper: Of 7090s.

Hendrie: Yeah they'd gone from 709 in vacuum tubes.

Hopper: And Sage had come along and like I said I/O capacity there with the big channels and the drums and so they felt they could make it work and IBM and American jointly I guess funded it and I know in American as I said earlier, there were people that didn't agree with it and but C.R. made it happen.

Hendrie: <Inaudible>.

Hopper: He did and later on, you know, they were arguing over him buying airplanes because this was the advent of the jets and they could have spent money on jets. His point of view was that if he couldn't control the traffic, all the increased passengers that were coming with the jets, both from the standpoint of

a management approach as well as being able to sell that, you know, he was gonna be in trouble and he had seen that from his days in the Army. So he was quite a visionary in that way and it kinda became his baby and so he oversaw it. Now I think around 1962 they felt they'd gotten it far enough along they had a preliminary implementation and found that they capacity issues which sent em back to the drawing boards… again the 7094 wasn't a very big computer.

Hendrie: So did they move to the 7094 from the 7090?

Hopper: I'm not sure exactly, I think they got the 7094 as fast as they could.

Hendrie: Of course they would.

Hopper: But it took a couple of years to, you know, redo whatever they needed to do and then, you know, implemented it and it was a first like I say live system. In between that and let's say the late '70s they had a plans to carry it forward. They had a PL/1 subset language called Sabre talk, I don't know if you remember that.

Hendrie: No really?

Hopper: And they did build a 360 back end to help support so they were moving into what I would call functional processing even in those days with the idea later they would migrate off of the 94 into the full 360. I can say they didn't get that far and ended up switching approaches.

Hendrie: During this period how was the storage handled, the immense amount of data?

Hopper: Big drums, yeah the Sage drums.

Hendrie: Okay, the Sage drums were what they used?

Hopper: Right.

Hendrie: And would they keep all the inventory on a Sage drum?

Hopper: Well in the early PARS in the what we later—- essentially 11 months. I'm not sure the original Sabre system had a full 11 months.

Hendrie: Well it would be reasonable to have it in real-time online, you know, 3 months and then <inaudible>.

Hopper: Well when PARS came out everything I know did go 11 months, 330 days or whatever and that may have been the original Saber I don't know. Now the old systems, the old Bunker Ramo systems were about 30 days and then they kept extending them, I don't know how far they finally got off them.

Hendrie: I think 330 days is still, it's a magic number.

Hopper: Yeah they haven't taken it any further. They haven't changed the basic architecture much, we tried there a couple of times to try to do it, they never could fund it.

Hendrie: We can now go back to your <inaudible> what happens next?

Hopper: Well, really from [the] airline point of view, they were pretty starved, they had not invested any money. In the early '70s it was a pretty rough time for airlines, I don't know if you remember that.

Hendrie: Okay, the oil crisis.

Hopper: And a whole host of issues.

Hendrie: And deregulation was on it's way.

Hopper: But American had a huge need in the operational area so kind of laid a game plan or my responsibility was all the computing other than the—- we had a data center in Lake Success, New York, where we did essentially the financial accounting stuff and I had the maintenance center in Tulsa and all of the operational.

Hendrie: You had all the things that were supposed to be crammed into those 4 <inaudible>.

Hopper: Way, way back, plus a few others and so I was getting my arms around and laying out a strategy to not only take the reservation system into all the airport processing that was coming along, you know, everything from allowing for tickets to be issued, maybe we had all hand-written tickets for a long, long time so they wanna print tickets, so printers, boarding passes, seat assignments all those, you know, you lay down an extension. But on the operational side, we had an old flight planning system… we had the system I'd sold 'em for flight following that partially communicated but not well, there were huge gaps throughout. Those had to be tied to [the] reservation system to make everything function both ways. So we needed a big road map there and the maintenance area a lot of that wasn't tied together, they didn't have a good tracking system for repairable parts again. So many of the things that I'd lived with at United over the, you know, 4 or 5 years were holes at American as well, so it wasn't too tough.

Hendrie: So there was a lot to do.

Hopper: A lot to do yeah.

Hendrie: It was fairly obvious what you needed to do.

Hopper: Yeah, it was pretty virgin. Other than Rod, there wasn't a lot of resistance [to] doing things if you did them properly and you could justify them, so it was a good time.

Hendrie: When you moved to Tulsa, what model, do you remember what models where in the 360's evolution?

Hopper: We had a [Model] 65.

Hendrie: Now did you have much of them?

Hopper: We only had one.

Hendrie: One 65.

Hopper: You gotta remember in those days you didn't have multi-processor.

Hendrie: And that was enough to do the reservations?

Hopper: Barely.

Hendrie: But you had had a pair of 7090s haven't you or was it all in one 7090?

Hopper: No it was all on.

Hendrie: One 7090 and then one 7094.

Hopper: There was a back up yeah.

Hendrie: So had the hot standby.

Hopper: Yeah the standby.

Hendrie: And you still had that?

Hopper: Yeah.

Hendrie: Yeah, I remember that story but everything was still on drums?

Hopper: No and there we'd moved.

Hendrie: You'd moved to disk files.

Hopper: When we moved it was standard, you know, technology other than we did not use the [IBM] 37xx front ends. We used the C system as our communication.

Hendrie: So you did have still some independent communication systems?

Hopper: Yeah, and like I say we didn't even at the—- you can think of running 2 or 3 layers out there, you know, the physical layer and the control layer, we ran all those layers in the front end as opposed to having anything dealing with communications internally other than the address of the terminal address that the stuff came in on. And I adopted one of the more controversial things, I think: I adopted the same technology for the operational systems that Sabre, the ACP or on control program technology and the thing I learned at United that I applied here was one of the big reasons to move into Tulsa in the first place was communication cost, center of the country and in those days communication costs were terrible and we couldn't afford two networks and the operational aspects of where the planes are and airports and everything else overlapped, you know, where the reservation things are the airport functions so we adopted the same technology even though from a computing point of view, you would not have wanted to use that either operating system or the, you know, the tools to programming tools primarily the assembly language to build new systems.

Hendrie: And it was primarily assembly language?

Hopper: Yeah we had some Sabre talk, a bunch of field 177's.

Hendrie: But PARS had originally been written in?

Hopper: Assembly language.

Hendrie: Did you see any path to escape that?

Hopper: No but, you know, economics, you know, I didn't see any path of solving the—- getting the airline on a common operational system that would tie… where I wouldn't have to build a totally redundant network which I couldn't afford. So, you know, I took the risk that programmers would be more interchangeable and, you know, they can program flight planning as well as they can reservations even though it's got, you know, some technical aspects to it and you have to, you know, maybe because I.

Hendrie: Yes maybe if they wrote it in some, you know, if they wrote it at a higher level language they'd get it done faster and all those things, easier to maintain but.

Hopper: I guess maybe my years at _____ taught me that you could do things on machines <inaudible>.

Hendrie: If you needed to you could still could do it. In real-time programming, the languages just don't work as well in real-time.

Hopper: No you've gotta worry about how they're structured, how you structure the interconnectivity and <inaudible> and all those. So I still think that was the right decision even looking back today and we did all that. The next big thing happened of course about a year after I came to American, less than a year, the CEO of American resigned.

Hendrie: Now this wasn't Smith?

Hopper: Smith had retired, C.R. retired, he became Secretary of Commerce for Johnson in Johnson's last year of the Presidency or last two years. He's sort of capping off his business career what he thought was and there were a couple of candidates to succeed him internally and both of those gentleman ended up, one got cancer and I forgot what happened to the other, a heart attack or something so the gentleman that ended up succeeding him was a man called George Spader who was the legal counsel to American and so the story goes and I think it probably is accurate. In those days _____ were very political, he was approached by a fundraiser for the President to be I think, well I guess he was the President, Mr. Nixon, to contribute that gentleman also happened to be a lobbyist for United and so he didn't think he had much choice but unfortunately they chose a stratagem that later backfired and sending the funds through I don't know some Lebanese airline <inaudible>.

Hendrie: So this was an illegal contribution?

Hopper: Remember Crete, you know, that was one of the political corruption issues back in the early '70s of associated with Nixon's re-election campaign and there were a number of things. Anyway, both the treasurer I think if I remember right and George both decided to, I don't know if they were indicted but they were no longer in the airline. C.R. came back after his absence and while they looked for a successor, he was back for a few months. C.R. had this wonderful thing, he knew almost everybody in the airline when he was there and he had a little typewriter.

END OF TAPE 4 / BEGINNING OF TAPE 5

Hendrie: All right, we ought to roll back and start the C.R. story.

Hopper: I was going to say that C.R. rejoined the airline while they tried to find a successor to run it. And C.R. had his own email system long before there was email. It consisted of his little typewriter, and we had little interoffice envelopes that being an airline, you know, you could send around the system. And so he was notorious for sending you little messages all around the system to people. So not long after he gets back, I get this little envelope, and it says, "drop by and see me the next time you're in new york. c.r."

Hendrie: All in lowercase?

Hopper: All in lowercase. I wish I'd kept it.

Hendrie: Oh, that would have been priceless.

Hopper: So, I did, and you know, here's the CEO, first they're been a gap between— and Spader <ph?> had never really been, you know, that involved, as I told you, he wouldn't even step in when we had that earlier issue to make things happen. But so I did, and he wanted to know how his baby was, because Sabre was his baby, and he had made sure it happened and wanted to know if it was still in good shape, and because we were getting some brickbats thrown at us a little bit by the marketing department. They had some bad summer issues and they were alleging that, you know, the only thing that was different was the new reservation system, so there obviously had to be some problems.

Hendrie: Oh, really?

Hopper: Oh, yeah.

Hendrie: Okay. They were having trouble selling all the seats in the summer. All right.

Hopper: Turned out, you know, investigation showed nothing at all, but you know, even just those kinds of things that goes on in companies and he just wanted to know how things were. And so he kept in touch until he, you know, re-retired when we got a new CEO, and then that new CEO, he needs a CFO, and who does he hire, Bob Crandall. Now Bob had left TWA because he didn't get the CFO job there and I think went with one of the clothing firms for a year or so, which wasn't to his liking.

Hendrie: Yes.

Hopper: The CFO job opened up at American, and Bob leaped at the chance. So now, I end up working for Bob.

Hendrie: How about that?

Hopper: It's interesting how things turn on a lot of circumstances. So one of the first trips down to Tulsa, I showed Bob my 900 CRTs in the basement that Rod won't let me install, and a few other stories. And needless to say, Rod didn't last in the company very long after that. Bob was a little more, you know, take charge and so on.

Hendrie: Make what needs to happen happen.

Hopper: And yeah, Bob of course had run the TWA system and a whole host of things like that.

Hendrie: He really understood.

Hopper: Much more conversant. What the needs were.

Hendrie: TWA had been under him.

Hopper: Yeah, and so. I don't know where that gets us. I guess the next big thing that happened was about a year later—

Hendrie: Do you know what year we're in?

Hopper: This would be 1973 when he joined the airline and about 1974, and I'm running Sabre and essentially all, still all the real-time stuff. The guy that I went to work for when Bob came in and he replaced him with a guy that had run the TWA Res system, so I'm really working for Jim O'Neil <ph?> and Bob, the way Bob ran things and you know, I just kept running things anyway, so it was not—

Hendrie: Not a big change for you?

Hopper: No, not a big change. And Jim was fine, he was much more of a technician than the guy that had been there previously. A guy named Jim Welch <ph?>. And Jim went over to Chemical Bank and then later to American Express Travelers Checks and ran the traveler's checks. But we were approached by a group that wanted to provide an automated solution to travel agents. Now, travel agents in those days probably handled, at least for American and this is pretty well across the industry, about 40 percent of all the airline sales. The airlines handled maybe at that time 20 percent on a direct basis through their res offices, 25, 30. And they had corporate accounts that handled the remainder. So if you were at, well, wherever you were, you had a section there that, you know, handled your travel.

Hendrie: How pervasive were the terminals that you had, they obviously went to your res systems.

Hopper: Good question.

Hendrie: And the ticket offices, presumably, that were American ticket offices.

Hopper: Let me back up just a minute. Even before I joined United and was at EDS, helping United, there were a couple of industry attempts to provide automated solutions to travel agents.

Hendrie: So the travel agent didn't have to pick up the phone and call the res?

Hopper: Right. Dual phone call, if you want to think of it. The first involved a system using Teletype-like terminals and microfiche and those kinds of things that the publishers of the OAG were going to put in place. As you can appreciate, that didn't get very far. That was even old technology by then for the airlines even though some of them hadn't gotten fully conversant yet. There was a second attempt using a basic PARS software, obviously not to dual store everything, but at least an approach to moving down that path. That got a little further but it got political in Washington because UNIVAC and a lot of others started complaining IBM was taking advantage and—

Hendrie: Yes, of course.

Hopper: And economics of that kind of blew apart. Then communications costs were still very high, network was just— one of those things that the combination of politics and everything else wouldn't let it happen. So this is now three or four years later, there'd been one interim approach and people had approached it but couldn't come up with economics or funding to make it go. And these folks had some funding, and thought they had some background, had helped put in several of the systems and so forth. But it was going to be an independent entity and when they came to see me, because like I say I'd been involved at least at United— in fact one of the uses of the UNIVAC system we had thought of was to provide an automated solution to travel agents.

Hendrie: Yes. In this global view.

Hopper: In that global sense. Yes, and the fact that we had excess capacity and we even had, you know, a lot of reservations stuff that we thought might have worked. Never could quite figure out how to pay for that one either, though, in a broad sense. So I listened to their story and it concerns me— at that time Bob had moved out of the running of finance over to running marketing for American.

Hendrie: Essentially he had replaced—

Hopper: Well, he replaced the boss of the guy.

Hendrie: He replaced the boss of the guy who was giving you a hard time.

Hopper: Oh, yeah. He'd already run him out. So I ran into Bob on a street corner, this is a true story, he was going to lunch, and I said, hey, you know, this is what's happened, we do not want someone in-between us and our distribution channel. And, you know, if we don't do something about, you know, they will. I mean, there's a need out there, it's going to be served—

Hendrie: It's going to happen, one way or the other.

Hopper: Yeah. So Bob agreed with me and we met and he called a couple of the other airlines and called, at that time, ASTA, American Society of Travel Agents, was helping sponsor these other guys. The two of them, ASTA was holding a big, they hold an annual convention, sometimes at international sites, this time it was in Buenos Aires, and Bob convinced them that we ought to try to get the airlines and them together again. They agreed; we all went to the Civil Aeronautics Board, in those days, the CAB, to get government blessing to be able to sit down and talk to one another and to put together an effort. They gave that, I think this would have been the end of, must have been '74, '75, I've forgotten the exact year. And Bob then says, "Well, you know, you're going to go run this effort." So we had a number of airlines that agreed to try to sponsor it, you know, to come in, and I got money from others and ASTA participated and so we ran this joint study under the auspices of the CAB overseeing, you know, the combined meetings. I set up a special office in Chicago and brought in people and hired a few consultants to help us and for about six months of day and night effort, I led that effort to determine whether or not it could be accomplished. And we were trying to address three questions: One, was it technically feasible to do it; two, was it economically feasible, in other words, were there economic benefits that would justify it; and then three, could you find a government structure that would, you know, allow it to work. And we thought we answered all three of them fairly conclusively, and I did the draft, and United had been the chief contributor other than American both in terms of money and people, and they had supported us. They were the first one to support us to take this study forward, so Bob thought he owed it to them to, I guess, review the report. He and United threw up on it, they thought it was way too promising, I guess, would be the word, too positive. So I had to tone it down some before we released it to everybody else, but still answered the questions, I think, positively. Then the fun began. This was, this must have been '75, so it must have been late '74. You started seeing a lot of airlines, you know, when we'd go around selling them on the concept, and it was to be jointly funded in effect. It would get the money up front but the airlines would get half the benefits and the travel agents would get half the benefits and they'd pay for the system. I mean, it wasn't a free giveaway or anything else. We showed good economic benefits. But deregulation was right around the corner. There were very few airlines that wanted to spend any money on technology, and we found out that the real reason United was so opposed, because they had invested heavily in their reservation system. They thought they had a three-year lead on us at American, and at least maybe, you know, and a good lead on anyone else in the industry. They thought they'd gone that far, and that if we gave the travel agents what we had promised them and conceived of, that that would be in effect leveling the playing field, and knocking out a huge advantage that they thought they had.

Hendrie: And had paid for.

Hopper: And had paid for.

Hendrie: Okay. Now, do you remember any of the things that they had in their reservation system that they thought were, you know, were particularly, you know, advantageous to them?

Hopper: They had— The biggest— let me cite two. One was they had built a display mechanism, their display mechanism, which served up United's flights, both nonstops and directs and then would serve up competitor's flights in a nonstop, if you wanted to go in and look at competitors, or would show connections favoring United and then show connections with other airlines. It was very much a static system. But they had spent good money on it and it was fairly advanced for the day. Ours was a more dynamic system in that, because we had typewriter terminals so long we had not taken full advantage, again, had had the funding, to explore the display mechanism as far as we would have liked, so we had taken a cost saving approach to ensure that the best flights always appeared in those first, we only had four lines of display early on when we had typewriters, so we had a different mechanism for displaying and the thing was, though, we had only a limited database in terms of cities we served. United's was a far bigger airline, had a much larger database. So there were certainly areas there. They thought they also had maybe a better— well, they actually did in terms of auxiliary, they were selling cars, and to some degree hotels, which we at American were not, maybe in a limited way. And some other things.

Hendrie: Yes, yes, I understand.

Hopper: Good business.

Hendrie: Yes, substantial things. Okay. All right. So now what happens?

Hopper: Well, we're in the last half— I go to Ross, I try to get him to fund me, fund this effort because I'm not getting any other effort from the airlines; he turns me down. And I go to a number of airlines, long story short, about half way through that last half of the year, we see that United is running some tests in Cleveland with corporate accounts providing them their airline system.

Hendrie: Their terminal?

Hopper: Their terminal.

Hendrie: All of the flights, the whole thing.

Hopper: Text _____ out. Didn't take a magician to figure that out. Well, Bob said, you'd better be prepared in case they pull the rug out from under this effort and launch their own system. So we kind of anticipated that might be the likely circumstance. So I went to our board of directors in September of that year and asked for twenty million bucks. Now that would have bought about four or five airplanes and with deregulation happening the next year, it wasn't a very popular internal thing, but with Bob backing it and our CEO backing it, you know, they thought we had to do it as a defensive measure. Really, if you gave the other airlines, particularly as deregulation was occurring, this capability and you didn't offer the capability, you're going to be defeated. So I got the money and then I wasn't going to spend it unless I had to, so I think I only hired one or two people and we were trying to get everybody to go along, but in early January, I guess it would be '76, we had a meeting of the entire group and in effect agreed to

disagree and disbanded the effort. Of course, ASTA wasn't very happy, you know, but you just couldn't get enough of them to go along and we couldn't afford it ourselves. I mean, to do it for the industry as a whole. But we suspected that United— and United got really hammered by the travel press and the travel agents.

Hendrie: Really? Because they blocked this?

Hopper: Because they were considered—

Hendrie: They were penned by the travel press as the bad guy that prevented this from happening?

Hopper: Yes. They and Braniff and others, but primarily them.

Hendrie: Yes, Braniff not so bad.

Hopper: A couple of weeks later some of the bigger travel agents by this time were way on our side, so I was like I had an ear to the industry, told me to expect a big announcement from United at the end of January. I guess they'd had some invitation to something, so we gear up to expect an announcement and have an announcement ready to go the next day, and we anticipate, you know, they're going to—

Hendrie: Yeah, yeah, you anticipate what they're going to say, and you've got your rebuttal.

Hopper: So that's what happened.

Hendrie: And they did?

Hopper: They did.

Hendrie: And you did?

Hopper: And then TWA did, so there were three of us in the fray, and that was really the, you know, taking an internal system and turning it into businesses, is where the next real saga occurred. So to build a team, build an internal company, do all the things you have to do to create a new business operating within a business.

Hendrie: So you launched on, you were going to be in the business and offer this service to travel agents on a terminal, right?

Hopper: Right. And what we're going to offer—

Hendrie: Yes, what were you going to offer and then I'm going to ask you what the economics are, how this works. What's the business model?

Hopper: Well, first of all.

Hendrie: Tell me what you're going to offer first.

Hopper: United decides, I'll give you United's story. "We're going to let you use our internal reservation system." Pretty darn good. Okay? "Got all United flights, maybe it won't have all our competitors flights or maybe worldwide, but you know, it's good enough for what you need. We'll have some ticketing, but not necessarily tied to your world. Down the road, we'll consider on how we could." You got to remember travel agents don't sell tickets the same way airlines do, and they had to report it up through a special corporation that the airlines own that they have to report to, they get their ticket stock, so there was a whole accounting measure that had to be supported. And we'll eventually get around to that. "It's going to be kind of first come, first served, so whoever, you know, wants it, sign on."

Hendrie: Whoever signs up first.

Hopper: "This is January, you know, we'll start installing probably around September, it'll take us that long to kind of gear it up." My story. First of all, we're not going to deliver you our internal system, we're going to deliver you what we promised in the study we just completed, which is a worldwide system, everybody's flights, without exception. And oh, by the way, instead of having only our flights on the first screen, the first flight, the best flight, and in those days we defined it as from time of leaving to time of arriving, minimal time frame, will be on that first screen. So you'll be able to sell something off that first screen, no searching. Not a lot searching. So we're going to give it to you, worldwide display, dynamic, you know, not static, whole things like that. We're going to give you all the auxiliary sales functions, hotels, cars, eventually, you know, other things. We're going to give you an accounting system, ticketing and accounting system so you can automatically report upward if you want to. Okay. We're going to start delivering it in March or April. Not going to have to wait 'til September. Now, not everything's going to be ready day one, but—

Hendrie: But this is what we're going to do, where we're going.

Hopper: And no, we're not going to do it first come, first served. We'll help select. So we did the old Lighthouse <ph?> marketing approach. We identified in about eight major cities, six or eight major cities, who the leading travel agents were. We went to them, made them a deal that they couldn't refuse in a way. Now, you couldn't give them anything in cash, but we said, you know, you work with us because we really need help in finalizing, you know, we've got a 90 percent concept from 80 percent concept, we've got to take it to a 100 to a 110 percent concept. So you work with us for this first year and we'll help fund, you know, you won't have to pay the full boat. But the idea was if you take the biggest agents in San Francisco and L.A. and New York and, you know, Boston, you know, you're going to get-

Hendrie: A lot of people are going to decide they want to follow.

Hopper: Exactly. And so that was our approach. And long story short, we delivered on it, and I had to go back for another twenty million bucks the next year because we thought that would last two years.

Hendrie: Yes, and it didn't.

Hopper: No, our business model was based on agents paying for it, _____ payments. Within less than a year the competition, we were cleaning their clock, and you can imagine what happens is, you know, you don't win the sales pricing—

Hendrie: You lower the price and see if you can still win it.

Hopper: And so that was the difficult time because we had to start matching pricing and do it, and we never gave it away, but we had to create other models or try to find other models to pay for it. Now, the justification for us, economic justification, was primarily to avoid loss of share. We knew that if [the] United system went in and the display mechanism stayed the way it was, you know, they wouldn't find our flights, you know, so it's like taking—

Hendrie: People are going to take the easiest way.

Hopper: Right.

Hendrie: To the travel agent, time is money.

Hopper: Right. So that was the primary economic justification that went to our board. Now, what I did was build a little tweaking mechanism into our display that said that if we had a flight within, I've forgotten, an hour or two of that time, we'd list it maybe ahead of the others. I got accused of— you know, American, you know, of ABC kind of stuff. But so I did come up with a concept of-–

Hendrie: A little—

Hopper: A little bias.

Hendrie: Give a little bit of body English to American flights.

Hopper: Right. Some advantage.

Hendrie: Now, when the pricing was dropped, where were American's costs?

Hopper: Again, we were using shared costs. The pricing dropped but I was able to demonstrate that not only had I not lost the revenue that I might have lost, and I could pretty easily show what had happened in locations where we had been replaced or where we—

Hendrie: Where you didn't have it.

Hopper: Yeah. And in fact, I'll tell you a slightly broader story on that. But we could show that in the ones where Sabre was being used, we'd actually generated more revenue. Now, it was not huge, but, I mean, you could, there was a definite trend there. So there was economics coming from that. All the other economics that we had developed in terms of savings, you know, just by getting rid of all the manual processors and having to do the phone calls and all those kinds of things, they were there as well. But—

Hendrie: So it clearly, it saved in the call centers, not getting the telephone call from the person, because call centers are very expensive.

Hopper: Now, the internal battle though, one of the other things I guess I've learned in my career, it's awfully difficult creating a business within a business. The culture is totally against you. I mean, first of all, just the money itself. Okay. People want it spent on the airlines, and that's why they're there, they're running an airline, they're not there to support a different kind of business. You know, they don't want to hear that it may be good or bad, they just—

Hendrie: Well, they certainly don't want to put any investment in it.

Hopper: They didn't want anything to do with it early on. There are those that are jealous, if, you know, if they see any success. We had to go through annual budget reviews that were probably 10 times as strenuous, you know, the finance department, as any other internal thing. So it was, again, it was not quote popular necessarily in the early days, the first, I think three or four years were extremely difficult to get it off. The people you have on the project early on, you have to beg, borrow and steal people. I mentioned early that I'd learned a lesson. A lot of the early people that I got to work on this project, and because people don't know if it's got a life with it or whatever, were either a female or gay. They were far more willing to take a risk.

Hendrie: Isn't that interesting?

Hopper: And you know, their lifestyle wasn't an issue with me, and in fact, it would have been much more of an issue if it had been known that they were to others, but you know, they were discreet—

Hendrie: It wasn't a culture of coming out of the closet.

Hopper: No. No. But they became, but later on, those people became, or the people that we brought in, became sought after, you know, for other jobs, I mean, it became a great training ground, we promoted a lot of people out of there into other jobs in the airlines. Because they had— then it became a very accepted thing. The ironic thing is that later on, much later on, we were looking, you know, it had just grown too big to continue to exist in the airlines, I spent the last two years trying to find an exit for it, but by then it had been so ingrained that those that hated it—

Hendrie: Originally, they didn't want—

Hopper: Originally, they didn't want to give it up, and the pilots and everybody else, so it became an issue on the other side before they could finally spin it out, get rid of it. It's just a little apocryphal story. And even today when I see people trying to form business units within businesses or maybe even businesses within businesses, you know, it's just one of the hardest things in the world to do. The culture is just totally against it.

Hendrie: Because the objectives, the corporate objectives are all lined up behind the other business.

Hopper: That's right.

Hendrie: So the priorities are all there and the best people want to work there and everything is a problem.

Hopper: And again, it's natural to see, but not everybody sees it. And I think that's why so many, if you look around the valley, and people that buy other little companies and think, you know, we're going to, you know, one and one make two, very often they don't. They just don't assimilate and don't—

Hendrie: There are modern stories like that. U.S. Robotics goes and buys Palm and Palm proceeds then to wither because it isn't the main business of the company or else it becomes the main business and there's a role reversal.

Hopper: Well, anyway, the first couple of years we got probably 45, 40 to 45 percent market share and doing very well. But, you know, as it starts evolving, we have a very narrow footprint in terms of our market, even under early stages of deregulation. Our market space is I think we had maybe 11 percent. United was 16 to 18, and others were there, and they cover much more broader geographic space. We hadn't moved into some parts of the nation.

Hendrie: This is just domestic.

Hopper: Yeah.

Hendrie: American was quite a small airline?

Hopper: Right, and very few international routes.

Hendrie: Okay. Wow. I need one more piece of information, what did you charge initially for the reservation system or how did you charge for it?

Hopper: The initial charges-

Hendrie: Was it action basis or a terminal basis or—

Hopper: No, it was a terminal basis.

Hendrie: —was it a seat basis.

Hooper: Yes, it was a seat basis, in those days. We later on put in all kinds of other measures but the initial was essentially a seat basis.

Hendrie: And how much-

Hopper: It was just, I think it was probably a couple of hundred bucks a month.

Hendrie: Okay. Enough to pay for the terminal and the communications lines.

Hopper: Right. Right.

Hendrie: And cover the costs.

Hopper: Right.

Hendrie: And the travel agent has to believe that-

Hopper: And you could demonstrate to them, you know, the value in time saved and their productivity and other businesses—

Hendrie: And how many more reservations the agent could make with this versus having to call the airline for each reservation. Okay.

Hopper: Yeah. Two major things happened on the way. One was, like I say, because we couldn't cover the entire geography, I came up with the concept of what we call co-host. And that was partners with other airlines that were in those geographic territories. So I offered to let them sponsor travel agents that we wouldn't normally handle because they were out of our— we couldn't see any benefit.

Hendrie: Yeah, they were out of your— you didn't have routes.

Hopper: Yeah. And we weren't paying— the costs now were not being paid for sufficiently from the terminal, I mean, costs had come down on the terminals, so they had to make up this delta difference. Now, what they got for that was that we would tweak the display algorithm, if we weren't in the market, to take our place, okay? So they got a little advantage there, and could see revenue gain, or if we were in the market, then they got a little more than, they got a slightly different than the competitors but not quite where we were. So we're starting to, you know, work with display mechanisms and those kinds of things.

Hendrie: Yes, and tuning it up.

Hopper: Right. The second thing we did was we put in a transaction charge that in locations they sponsored that sold American, I'd pay them, I think it was a quarter in those days; for locations that we sponsored, quote, so let's say Pan Am was a co-host, they were in Western, and I've forgotten who all the others were at that time, they'd pay me. So starting to build in that shared transaction base. So we started that program, and so we could take Sabre essentially national, in a broader, geographically, and the travel agents started assimilating themselves into groups and because we gave them technology and now they could almost share customers, and they could consolidate stuff and even have shared, make shared bids to companies to handle their travel, geographically, and all those corporate travel offices that had existed within companies were now being absorbed by travel agencies.

Hendrie: Or the reverse, or they were absorbed and then the travel agency would put their people on site in the corporation.

Hopper: Oh, that's true. That was sort of a second thing that happened.

Hendrie: Yeah, I remember that happening.

Hopper: So there were a number of probations that came along that changed things as time went on.

Hendrie: Okay, good.

Hopper: But the airlines got greedy. By this time United had changed their display mechanism, they had gotten killed, they adopted primarily all the same approaches that we had, they had to, to stay in business and maintain any market share, and whatever, but they decided they liked bias. And they decided they would charge, started charging airlines for bias on a direct basis.

Hendrie: For where you appeared.

Hopper: Yes. And mine, see, was indirect, to some degree. They had the sponsor agents, and so forth. And United for example, I think, charged Frontier five dollars in Denver, and almost ran them off their display mechanisms. And about this time I left to go to Bank of America, and American even, I think, I wouldn't have, I would never have done it had I stayed there and had anything to do with it, but started doing that as well. So the CAB said, halt. Okay? Had a proceeding, came out with a ruling, have to eliminate all bias, has to be a neutral display, okay? As far as the airlines. But they did go so far as to say, well, if any airline has an interest in these systems, in one system, they have to subscribe to the others, and so that way if Northwest had an interest, and they did later, in the system, they had to at least stay participants in Sabre. And they said to the CRS's, you have to, you know, you can charge a fee to these airlines, but it has to be, you know, reasonably based. So they totally changed the name of the game from what it started. On the other hand, what had happened was that we had expected, I think in those days when I started there were probably fifteen, seventeen thousand travel agents. We thought that within, you know, five years we might get 35 percent, a third of them. That had gone— first of all they'd increased the number of a huge amount.

Hendrie: The number of travel agents?

Hopper: Yeah, the offices, right. And there were a much higher percentage that had adopted, you know, the automation approaches. So.

Hendrie: And also yours?

Hopper: Oh, no, we were still maintaining our forty plus percent market share.

Hendrie: Of the travel agents sets, were yours. But there were just lots more of them.

Hopper: Right.

Hendrie: I think we need to change the tape. END OF INTERVIEW

