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TAPE 1 SIDE 1

Bill
This is an interview we did with Grace Hopper in '79 or '80 - a bit old but perhaps some useful stuff.
Tom McGill
967-4625

GRACE: Is my tie straight

STEVE: Everything looks fine

GRACE: White hair gets on black uniforms

CHRIS: Yeah I know my mother has the same problem

GRACE: And on the edges of paper and things like that everything clings to it.

CHRIS: Well I have just written up a few questions.

GRACE: You should be above doing that

CHRIS: Well my boss makes me do it. Back in history a few years when you working on MARK I and MARK II and all those neat contraptions what were your perceptions of the computer industry back then?

GRACE: None.

CHRIS: You had no perception.

GRACE: You see we started during World War II the whole thing was a war effort and tremendous problems we had solving it with tremendous rush because all of our weapons systems had changed up till then you shot a shell out a gun and it went from there. All of a sudden we had self-propelled weapons rockets, missles of all kinds we had to recompute everything where they were going and what they were going to do. That was one of the basic things that propelled the computer interest plus the A bomb the tremendous amount of computation. We used to have mines and the ship the gear on the mine and it went off. Then we had accoustic mines that listened for ships then we had magnetic mines that listened for metal and till then all those things had to be recomputed of far their influence spread and everything. A whole new weapon systems.

CHRIS: So it was all because of the defense

GRACE: That is where it started in the beginning it was in defense.

CHRIS: When do you think it changed in defense?

GRACE: We in 1947 I think seven ran a primarily experiment to see if we could compute the prudential premiums on Mark I and we used two digits for each character because it was a totally numeric machine. That was the first time we tried to do some data processing but it didn't really begin until Mark I I mean Univac I came out in '51 the real beginning of data processing.

CHRIS: Because that was the commercial computer as opposed to

TRANSCRIPT OF INTERVIEW WITH Captain GRACE MURRAY HOPPER USNR. November 1981.
BOSTON, MASS. INTERVIEWER: CHRISTINE SARKISIAN.

GRACE: That was the first commerical computer it was the first one that went out and did data processing. It was designed for data processing. It was alpha-numeric the others were all numeric. They finally got the alpha into it. And even then while Mr. Watson single out IBM and said there would never be a need for more than 30 of them or 20 I know I guess he said 20 would do all the computing the world would ever need.

CHRIS: 20 computers?

GRACE: That is why he didn't buy it from Mauchley so Univac became a independent company because Remington Rand bought it instead of IBM. Mr. Strauss totalizator the guy that runs the tote made the tote machines for race tracks. He had put up the money that support Eckert and Mauchley to build Univac 1 and he was killed in an airplane accident with his vice president, general manager and everything his hold team. His wife didn't want to keep the computer company so it was put up for sale. They went to IBM and they went to Sperry Rand and Mr. Watson said that they would need more than 20 of them so he didn't buy it Sperry Rand did and that is how it became the Sperry Univac eventually. But that was the first commercial one the Univac 1.

CHRIS: Now did you work on that computer?

GRACE: Oh yes.

CHRIS: Were you working for Univac at that time.

GRACE: I went to them 1 June 1949. That is when went to Harvard to get Navy contact.

CHRIS: And then you went back to the Navy later.

GRACE: In 1 August 1967 but I was in the reserves all the time. See I couldn't be regular so I had to be a half way.

CHRIS: That was really awful for them not to let you in. To think that they thought 40 years old.

GRACE: They decided to let me go in at 60 so that's alright. It came out alright.

CHRIS: Did anyone back then have any vision of what was going to come?

GRACE: No

CHRIS: They didn't know what

GRACE: Nobody fully realized what was going to be. I think as far as the weapons systems is concerned perhaps the Navy did had some idea. And the Air Force had come to use in the airplanes for streamlining and stuff. But I don't think anybody realized what we have today. Certainly nobody everybody dreamed of a chip that was the back in the days of vacuum tubes.

CHRIS: How has the technology moved evidently there was no direction back then but Sperry Univac came out of a commercial computer and it was a big.

GRACE: There was a large influence that most people have forgotten from AT & T when they invented the transistors.

CHRIS: When was that?

GRACE: I don't know just when the invention was it was before it got into the computers or anywheres near and they did develop of course for the telephone system. I guess it was along about '57 '57/8 we began to see the little transistors and the little gold boxes that stuck up from motors.

CHRIS: Were they called printed circuit boards back then.

GRACE: They were printed circuit boards and they had and they had the transistors were in the little gold boxes and they sat up two little connections. But that was tremendous step forward. That of course really came from AT&T it came from Bell Labs Bells Labs I should say not AT&T. And that of course was aimed at the telephone system not computers.

CHRIS: But that technology was transferred into the computer industry. That is interesting I never knew that.

GRACE: But even when the first Bentel 8021 came out which was somewhere in the early 70's that was the first computer on the chips it is a four-byte pragmatical computer. Even then nobody realized what it was going to be. There were a few dreamers and mavericks but most people just didn't know. Some of them don't right now just show them a box and tell them it is a computer and they think that computers are a great big blue box with three letters on it.

CHRIS: I know what those letters are.

GRACE: Yeah there are a whole bunch of generals that live out under a mountain in Colorado and every morning after breakfast they get together around a big round table and they all put there hands together and mutter bigger is better bigger is better and you can hear it all the way to Washington.

CHRIS: You haven't changed their minds yet?

GRACE: No a bunch of Air Force generals.

CHRIS: Oh well that is why.

GRACE: They are about 30 33ish.

CHRIS: That is awful. Do you think we should infiltrate a few Wang people into the Air Force and. Okay do you think that the industry today is going in the right direction?

GRACE: Yes I think it is going in all directions as it should. But I don't think even now that people fully realize what it is going to be. I think there is going to be some more changes and surprises.

FUTURE

CHRIS: Who do you think it is going to be?

GRACE: I don't know. I don't know anymore today than I did when I stood in front of Mark I I couldn't of dreamed of a chip. I look at a chip today I can't figure on what is going to be ahead. A few years ago we had one small computer on a chip 64 bytes today I have got 8 computers on a chip.

CHRIS: How many more I wonder can they get on that little chip?

GRACE: I can see lots more. I can see lots of things that are going to happen and that are going to be used in many more things.

CHRIS: What kinds of things?

GRACE: Anything that works. We have already got them in the washing machines and the cars and microwave ovens they are going to be in everything.

CHRIS: They are in people too.

GRACE: Yeah the prinsetic devies the RM whites, heart things

CHRIS: Heart things pace makers. Okay so thats about?

GRACE: We have alots more in the way of robots.

CHRIS: Do we have any in the United States?

GRACE: Yeah if you go down to see Berndi down in Connecticut they have go lots of robots.

CHRIS: Berndi is that a company?

GRACE: But it is a fascinating thing you know you figure how to do something with robots now they had some nuts that had a rounded top and a flat bottom and they were to be picked up and put on the spindle. Now the way they can do that is they have a great round dish and they shake it and that gets them all flat side down and then they sneak out a little hole and go on to the next thing. Now the idea of trying to pick up something and turn it over with your wrist you see and put it on to something is a fairly complex thing but it has been reduced to that shaking and then dropping through a hole. We need alot more ingenuity. They are good at welding now and painting cars and stuff like that that could be alot smoother.

CHRIS: They are using them in Japan alot.

GRACE: Yeah they are way ahead of us too bad.

MIKE: Is their a natural progression for computer companies to get into the robot end of it?

GRACE: Not so far. There are a couple of robot companies and some of the computer companies particularly the small ones with small computers are beginning to build them into companies, assembly lines and manufacturing. But we are behind.

MIKE: The Japanese do they pose a threat to the American computer industry?

GRACE: No because they are good at taking an idea and exploiting it but they don't come up with a new idea.

MIKE: Is that the American edge?

GRACE: Yeah because we come with the new ideas but Japan doesn't grow mavericks. The guy that thinks up the totally new way of doing something. Once its thought up and worked they can take and develop it into something bigger and better but they don't innovate. Their whole education system and everything doesn't encourage innovation they don't encourage mavericks. And you got to have the wild man who gets the bright ideas and goes around screams at everybody until gets enough money to do it.

CHRIS: So there again is the youth aspect coming in that you mentioned last night.

GRACE: The young people and the fact that we have always had them. We have grown mavericks. It is an American trait I think left over from the pioneer days. On the other hand we don't always spend the money to follow through the way the Japs do. That is one difficulty right now is that we got these developments but in Japan they are totally supported by government and over hear you got to go get venture capital to get started. In back of some of our trouble was that and over management are in building industry all of us seem to think doing us a favor to continue the end of it.

CHRIS: Do you think that you talked last night about managing things and leading people

GRACE: Leading people there is a difference.

CHRIS: Do you think that that has something to do with the way that dispenser of all them?

GRACE: I think that that has a good deal because of the bosses were the only thing he is worrying about is what the bottom line is going to be this quarter and at the end of the year and whether everybody bonus or not. He is not going to pay attention to his people and take care of them because they are getting good hours. That seems to be the course particularly in the armed forces ? and we went overboard on management we forgot about

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leadership. That is the one thing the youngsters need. All those youngsters need now and I asked them for the Cobolt complier on an 8K note everybody in the Pentagon said impossible I just patted them on the back and said of course you can do it. The youngsters need the trust and confidence and then when they do if you have to give them a pat on the back and an a reward of some kind and we don't think enough about that. What they got was a little ribbon the Navy Achievement Award which they will have all their lives long you see.

CHRIS: And that meant alot to them I am sure.

GRACE: It always will. That is why I wish more of the President's things were giving to young people to encourage them.

CHRIS: Instead of people who are established in?

GRACE: All of us that have been around for years we don't need anymore prizes and degrees the youngsters need them.

CHRIS: So that they will be ?

GRACE: A pat on the back you are doing the right things you are doing a great job keep at it and that is what they need encouragement trusting them. I tell them on Monday what I want and get out of town. Now if I were there they could ask me how to do it but if I am not there they have got to get together and work it out themselves which is much better because they usually come up with something new. But you have got to have that faith them I know you can do it. We don't spend enough time taking care of our crew.

MIKE: When you look at them and say generations like my parent's generation and all that as opposed to the youth the specific us types who are just starting out is do you see the same potential on our level and the same drive, same abilities?

GRACE: Yeah

MIKE: Are there differences between

GRACE: All they need is some encouragement to bring them around.

MIKE: You feel the talents is there,

GRACE: His talents are there. Now we had one youngster out in the Pacific Fleet who build a computer so the PR men in his shipped up they said terrific they took a picture of the computer and the sailor and put it in the Navy Times. I would like to coincide so I wrote a letter and congratulated him and instead of sending it through channels we just sent him a letter direct. So the sailor decided that if admiral could write him direct he could write the admiral direct so he did and he thanked the admiral and he pointed out he didn't know admirals

read Navy Times but he was glad they did. Then went on for 10 single spaced pages to tell the admiral exactly what was wrong with the computers in the Pacific Fleet and what ought to be done about it. It was one of the best surveys we ever seen he was a first class petty officer. So the admiral said ET1 is later Pacific Fleet to Norfolk and he gave him three War ETs and a couple DPs programmers and 12,000 dollars and told him to go ahead and build it and he did out of office shop components it took four months. It was the most beautiful thing you ever saw. Three small boxes data base management system and everything. So then they set him up as the mini-micro evaluation crew and anybody in the Navy can go talk to him and they run every mini-micro in the country and all the software. And get advice as to what to get for a particular in the Navy and he knows even three suppliers that can meet the needs. They are now getting people from all over defense that are going over to talk to him because they have become one of the most knowledgeable groups in the country in mini-micro computers. Now there is a kid that if a PR men hadn't put his picture in the Navy Times we might never have found this out. A high school graduated he didn't have enough money to go to college. I am insisting they ought to make him a limited duty officer now they are.

CHRIS: Is that a step above a chief

GRACE: That is an officer and a high school graduate.

CHRIS: You have to have a college degree to be an officer?

GRACE: At present. There are always waivers. There is always a way.

MIKE: Ingenuity.

GRACE: I insist.

CHRIS: To get around it all. I am not going to take your first no for an answer Michael.

GRACE: Never.

CHRIS: Never.

GRACE: Do you know that there really are people I find the accused one way back in during the war as kind of zero ordinance. He always said no to every proposal we sent down there and I finally accused him of always saying no the first time you asked him and he admitted it. See if you wanted it enough and believed it enough to come back again. There are people like that all over business. They do it to test you and to see if you will come back with a slightly better presentation to give them. I never take my first no. I am telling all the youngsters that because it will drive their bosses crazy.

STEVE: We are all going to get canned.

GRACE: I shall enjoy no end.

CHRIS: You talked about the move to distributed little computers as opposed to dinosaurs. Do you see that continuing for a long time?

GRACE: Yes very much so. It is the engineering attitude rather than the mathematics attitude. You ask an engineer to build a missle he doesn't build a whole missle he identifies a nose cone and a payload and a guidance and a motor and fuel and he describes those components and the interfaces between them. Then separate people may work on each of those components and meet the interfaces now this is data processing just the same they never was any reason at all for him to put inventory payroll on the same computer we only did because we could only afford to own one computer. The minute we can afford to have more computers and dedicate that computer to a particular job we will get rid of all the over head. No more operating system no more multi-programming no more any of that stuff you just have one program in there and you have done that job and that job only. And you go much faster and the pressure is going to be on speed not on storage any more. We have bound by storage for so long inside the computer and all that. Now you can buy a computer of the right size and go much faster and then everything is happening in parallel. You do accounts receivable, accounts payroll, inventory, general ledger and payroll all at the same time in parallel and it is bound to be much faster than putting them semi-sequently on the multi-programming on a dinosaur plus the fact that you can defend the data base and protect it better and all the other advantages that go with it. And it also gives people a way to start they can start it with one application then they can bring another application and the system grows. But it needs a network in the smaller computers. I just hate to see anybody get something like a 3033 its a baby. It is horrible the overhead on that thing horrible.

CHRIS: Have you told that to the people at IBM?

GRACE: Oh sure I went up to Yorktown Heights to lecture to them and poor Bill Bradshaw who invited me up there and he nearly collapsed. All those guys reached for mini-seconds it was the top management of IBM. He was just absolutely just looking he didn't have any nano-seconds.

CHRIS: You talked about networking get these all together. What do you think about the networking technology and where it is today?

GRACE: We are at a beginning.

CHRIS: We are beginning

GRACE: Well, of course, I want the optical fibers optical cables seige to be able to listen to. I am concerned with course because national security but there is also people don't realize it there has been a tremendous of factory fraud. In fact the FBI tells we only know about 1/3 of it they know the other 2/3. It is up in the hundreds of millions being stolen every year through computers. And sometimes we don't even know yet that it is being stolen.

CHRIS: And what has been stolen?

GRACE: And there is the protection of personal data there has been blackmailings.

CHRIS: We don't hear about all these things.

GRACE: Stopping people from stealing your computer time.

CHRIS: Oh like the little twelve year old you were talking about.

GRACE: And wiping out data. So you can protect things much better through the system of computers. A computer can refuse to except anything which isn't exactly designed and named for its job. You can make it very difficult for anything else to get in here.

CHRIS: And the optical cables

GRACE: You can't listen to it. If they are only electrical you can listen to it. The microwave, Hautland, telephone lines everything is listed there take all the data off it but you can't listen to light.

CHRIS: No not last time I checked

MIKE: Is that being developed?

GRACE: Yes very much so.

MIKE: Who is doing it?

GRACE: Mostly Bell Labs at the moment there are people doing a little bit. They are beginning to look at it. Because an optical cable will carry many more channels lots more channels to secure. And radiation doesn't effect it. See if you detinated an A Bomb way up in the air somewhere where it didn't even damage anything on the earth it would still wipe out all radar, radio, microwaves type of communications but it doesn't bother light. So I would expect to see things like our ships and planes and everything with optical wiring instead of electrical in due course of time there is more work to be done on it. One of the difficulties is was an electrical where you can tap into of course it is one the reason they tap wire tap. It is not so easy to tap into light you got to have a separate cable if you are going to get the place.

CHRIS: Would that be more expensive?

GRACE: It depends on how fast the price comes down. Right now it will be more expensive but the micro cables have some very good uses.

CHRIS: Because once it gets into usage and manufactured

GRACE: The more use and more of it then it will be like everything else the price will come down.

CHRIS: Now you know about broad band and base band networks. Do you think that neither of those evidently compare with what you will get with optical?

GRACE: I will still go for the optical.

CHRIS: You will still go for optical.

GRACE: All the way.

CHRIS: What about the difference between broad band and base band do you have any preferance?

GRACE: Well I think that they are both developing still. It depends on what you are going to use it for like everything else.

CHRIS: Do you see computers moving out of the office and into the home more?

GRACE: Well I could sure use one except the price hasn't come down far enough yet. I could use one for several reasons in that I have job and I can enter out each check that came along and go on tag it for deduction or contribution or whatever and when it came to income tax the computer could give me all my data automatically nicely lined and everything. I also have a hobby of genealogy I would give anything to have a computer. There is whole magazine now on genealogical computing. It comes out monthly and takes your data and puts it out with charts and things and everything like that. Almost everybody gets into some kind of a hobby even if you are in golf scores or baseball scores. But I think probably the first one you will see there will be the computer the computer will be built into the house and will control energy that is superior. It will be built when you build a house it will monitor the hot water, the heat all of those things control the energy usage and will also have little things on windows and doors and everything in case anybody tampers with it. Then smoke alarms all phases of energy control and its purity. Then if it is there and you can get at it people will start to use it for other things. I think the first thing will be building them into houses.

CHRIS: Now children are playing with things like little professor and things like that do you think that that is good?

GRACE: I think every four or five year old should have the little professor. Every six year old ought to have speak and spell and the seven year old should start learning basic and using the computer.

CHRIS: Six year old

MIKE: Jesus it is a leap from six to seven year old

GRACE: The down at Maxwell on Saturday mornings they have the colonels that come for the controllers course come in and use the computer and the teacher was a Major and he was a little hesitant to tell the colonels that they were doing everything all wrong and they were hesitant to ask his advice so I said bring your son in so he did he brought his seven year old son and left him to play with the computer with the colonels and he invented an airing print cell. The seven year old didn't mind tell the colonel he was doing everything all wrong and the colonels didn't mind asking the seven year old they make the best teachers we ever had. When we had trouble with the nurses out at the Fasted they didn't want to use the terminals I said bring the kids they brought in two seven year olds and eight year old and left them with the nurses. Two weeks later all the nurses could use the terminals. Whether they were ashamed because the kids could or that if the kids could they stopped being afraid of it or that the kids explained better because they used simplier termology not gobly gook they turned out to be the best teachers we ever had. They are good at it. As soon as they know the symbols they can have the little professor. Now my deputy caught his small daughter using his calculator down in his office in the basement to do her homework. Nobody told her how to use it. She knew how to turn things on by the time she was five she knew what plus, minus and equals and so on were. She started doing her homework. Daddy put a stop to it but she had no problems. It is part of their world it is nothing special to them. It is just another gadget they have got gadgets all over the house. So they should all have it. That is their world that they are going to live.

CHRIS: So in addition to that though shouldn't do you believe that they should still learn the basics like one and one are two and multiplications?

GRACE: The funny thing is if you start them with the computer and they watch it happen they learn it better than they ever do by rote.

STEVE: Really you don't feel that they won't become reliant on the computers?

GRACE: No because by the time they do 2x3 it 6 a certain number of times they know it is 2x3 and they see the 6. They learn it better than they do if they learn it by heart they are not seeing it happen. The very curious thing is they seem to absorb it from the computers. They remember it better I don't know why but they do. And if you start them with the games some of the schools are worried about the games. If you start them with those darn games they get bored sooner or later they want to change them. Then they start to learn to programming. They will demand it. Then they will want to invent their own games. The games are no harm at all really. It is hard to realize that that age from four to ten is the most eager grasping for learning than anybody ever goes through. If you

ever watch the little three to four year old in an airport into everything. They want to see everything, talk to everybody and see what is going on. All this wonderful world they got to know all about it. That is the stage to really give them that step. They are so excited about learning. You have to remember it is a great big beautiful brand new to them. I get upset when these parents yank them down and sit them down and be quiet. They ought to be allowed to wander around the airport and look at it. They come over to me I always talk to them tell them about the airplanes and things. I don't discourage they are just trying to find out what the world is like.

CHRIS: What is your message to people, you speak all over the country and evidently around the world, what is your message your main message to everybody?

GRACE: One thing is that we have to begin to look at the data and that is the beginning the value of the data be there are many various characters of data which we have not.

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GRACE: It is later that I meant that specific fleet because he is one of the top programmers in the Navy. I guess ?. Now you can't over look those people. And the sooner we begin to hire them and put them to work and take advantage and also they have a little more 17 or 18 is much more willing to try something new because they haven't got any prestige to lose if it doesn't work. They have to be more ingenius. A little wilder sometimes but an extremely interesting ideas once and a while but it is worth it.

MIKE: They are willing to take the opportunity and the take the risk to do it.

GRACE: Now Slater we expected to loose him when he came up for reenlistment because he had offers from all over the industry by then. He reenlisted because the Navy had given him a chance to do what he wanted to do. So we got him four years more. But the pay he is getting is nothing compared to what it could be.

MIKE: Do you expect him to stay for awhile hoping?

GRACE: We are trying to find some more of them. We know there are more of them out there in the fleet somewhere but we couldn't find them. But if you go around to these computer stores not the one that belong to the companies but the others you will find these high school kids hanging around them and explaining things to people and writing programs for people all sorts of things. ? As of yet they are not liable to apply for jobs because they don't think they can get them but I have seen those places.

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MIKE: So it is as a communications problem for the industry to let these people know that

GRACE: We would like to have of these

MIKE: We would like to have you.

GRACE: One way to do it and we have done it with the Navy in some places. There is a release on some of people you give a Saturday morning or one hour or two hour week course at the high school and they find them.

CHRIS: I guess all those who are interested will flock to the course even though it is Saturday.

GRACE: And then you can get a good look at them and see what they can do. I think industry is going to have to do more though in order to generate the number of people they are going to need. I think industry is going to have to take a greater interest in the high school and school seeing that they get the equipment

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and they are going to have beat school boards over the heads sometimes. Some school boards go out and buy Apple all over the place others won't touch it. And the big block is the teachers.

CHRIS: They don't want them?

GRACE: They are scared to death of them. Not that they don't want them it is they are scared of them they don't understand them. I was up at Edmondton in Calgary and I suggested that the two universities get together and put on a summer course one week let the school boards for it and have all the math teachers come to it and unscare them on the computers so that they can get started. That would be terrific contribution to pull something like that.

MIKE: Did it work?

GRACE: Yeah they did it this last summer I haven't heard all the results yet but I also got them up there in Edmondton I don't know whether you have noticed it but the people on TV are scared to death of computers. The newspaper people by enlarge are the science experts alright but the rest of them aren't. They have had trouble up there with a certain amount of negative publicity really on the computer and I said put on a Saturday seminar after the Sunday gets put to bed and get all the reports all the TV and all the radio local people and have them out for a day and show them what a computer is and let them try it. So they can get over being scared of it. I'm envied, when I am interviewed by the TV I get that question aren't you afraid the computers will take over and run the people. No computer has ever done anything that somebody hasn't been taught to do it and it is very important to get that all across and let them try to start performance. And I still don't think that we have done too much in the companies it hasn't done too much in educating people it is good at advertising but they don't educate them.

MIKE: The Wang approach has been in the six technologies areas human factors is that the right way to go or?

GRACE: Well that is one them.

MIKE: Is it

GRACE: That is one part of it there.

MIKE: It obviously entails more to know?

GRACE: Yeah there is going to have more. For your own sake and your custmer's sake you are going to have begin to develop these high school kids. And of course the computer you meet becomes your favorite. The sooner you get to those youngsters the more Wangs you can sell.

CHRIS: How did they know I am now attached to the system?

GRACE: That happens. And Mark I and Univac I are still my favorites.

CHRIS: Are they still around somewhere?

STEVE: Do you visit them occasionally?

GRACE: They are in the Smithsonian.

STEVE: Is that right

CHRIS: Are they?

GRACE: I begin to feel like a museum myself.

MIKE: I know a few people that feel that way.

CHRIS: No way

STEVE: It is funny that term Univac has become we saw it in cartoons it was on the Univac computer.

GRACE: It was until IBM objected on TV.

STEVE: Generic terms.

GRACE: IBM objected to having them called Univac on TV. They threatened to sue somebody.

STEVE: They were. Just a few simple cartoons.

GRACE: Now everybody says oh IBM I say no Univac.

CHRIS: What about getting all these different kinds of computers to talk to each other. You talk about the standardization of languages?

GRACE: Well we are in the standard protocol. And while it is inconvenient for some of the computers because of the way they are designed you can always put a micro in between and read if you want to. Trouble is that it is old and it was designed by IBM.

CHRIS: Oh that is terrible.

GRACE: Its old it can't keep up with the times. But now when you come to the micros there is a day track all operating system and boss to them that is the way they all are CPM, VS-100 and there is a standard there that has sort of grown on its own.

CHRIS: It is something that people see and say oh yes I would like to have that so?

GRACE: Well you see when the programs were coming out Apple and PRs 80 and those things there had to be something in common for all those people and everybody just wrote for the CP and operating systems they just didn't think. And they counted on having a hundred ES plus. So that became a standard without anybody's doing anything about it. But the protocol for communications there are still problems.

CHRIS: But as long as there are different companies trying to sell their own system do you think there will always be a different basic for IBM and a different one for Wang and?

GRACE: There isn't so much that is there is two or three of them their is the one on the WangNet one on user net then there is IBM. But anyone of them can go to the other if you just put a micro in between if you want.

CHRIS: If you really want it that badly?

GRACE: But almost everybody figures to how to attach to IBM because there are more of them.

CHRIS: Someday there won't be any though right? Not big ones right?

GRACE: I have a sneaking suspicion that IBM is beginning to hurt a little bit. And I think they are having I don't think they can think small. I think they are having a major difficulty building these small computers because they can't think small because they have thought bigger is better so long and that new thing that they put out for the personal computer or small business computer whatever is loaded down with overhead just like the big stuff. Besides which it is overpriced. But that puts a nice umbrella over everybody else. Because everybody can be cheaper than IBM. But you if you noticed there number of computers sold and their profit has been going there isn't the same amount of entries as there used to be.

CHRIS: They are starting to level off.

GRACE: Which is good for them. But they are having difficulties to change from thinking in terms of 3033s and stuff like that down to thinking ?

CHRIS: A whole different world

GRACE: And they didn't I don't think they really believed when it first back when Digital and Wang and all those computers came out I don't think that IBM really believed that they were going to be any problem to them I don't think they believed that they would go as far as they have gone. Because by the numbers today in the Navy the company that has the largest number of computers is DEC.

CHRIS: Really

STEVE: Computers in the field.

GRACE: In the Navy in the government as a matter of fact. And they are losing on the money side because of Univac and Honeywell. But more and more for instance with Honeywell the Univacs and Nardacs we are surrounding them with small stuff which means that over time we are gradually being griped into the small stuff. In our actual building itself we have Wang's and Piggy 31140.

CHRIS: What kind of Wang systems do you have word processing or data processing?

GRACE: My secretary is always telling me to use them.

CHRIS: They ought to get her one for her desk. They don't bolt them down do they?

GRACE: I think she likes to go downstairs where she is away from the telephone and nobody can bother her. They use them for all the directories and all those things that have to be written and rewritten and stuff. And they all live on tape. There are only word processors. There is a curious thing thats happening though the secretary that first learns to use the Wang and is good at it everybody wants her to do it and she becomes a slightly privilige secretary because she can use the Wang.

CHRIS: I think that that is one of the human factors that offices are going to have start considering.

GRACE: The one that can use it and do it well everybody wants her to do their work and she gets to be the most highly paid secretary and she becomes a level above the others. The one that can use the computers.

CHRIS: And then she is the one that fix problems and everyone turns to her.

GRACE: And she gets more raises.

CHRIS: And she is the supervisor between them a new career.

GRACE: Well what used to happen back at Univac my secretaries all turned to be programmers because I hated typing things in so I had gotten all my Cobolt in and never even I let my secretary type them in and see we type directly on tape on the Univac. She was much more accurate than I was pretty soon she was correcting my coding. There was three of them I lost to be programmers. Secretaries make excellent programmers. The same methodiness that a good secretary makes a good programmer.

STEVE: Organization.

GRACE: So that is another source. That is one thing that we did back at Univac it was very good. Every spring we have two courses they were open to anybody in the company who wanted to try it to learn programming. We got them from the janitors crew from operators secretaries anybody that wanted to try it they were allowed to and if they made good they became programmers. It was an excellent source of programmers because everybody knew that there was that up which made everybody feel good.

MIKE: Do you see those types of things happening in the industry today?

GRACE: Yeah.

MIKE: But not at the present time.

GRACE: Not now. I can't image that happening at IBM because that is that is if you are going to start your organizatien see Univac didn't start until after the war was over a much looser organization. It started right after the war when most of the men were coming home and going back to college so it started with a large number of women so that programmers have always been about 50/50. So it is a totally different and I think that anybody in the company can walk into Bob Janos office and ask for an appointment or if he is there and not busy and talk to them now they are all like IBM wide open. So again it depends on the type of company that it is. Of course, we keep loosing our programmers to our customers. That is why we had to constantly build more programmers. Because when a customer came along and he only wanted so and so it was awful hard to say no to a customer.

MIKE: Do you get a chance to tinker as much as you would like?

GRACE: No

MIKE: Too busy with this kind of thing?

GRACE: Trying to schedule talks and get places and the admiral has a little pad of paper it is about this size whatever that size is you know the next size not 3x5 it is 8 by something. It has an admiral flag up in the corner and everything and he has the thick nylon pen Dear Grace what do we think about such and such? Now that means that I put to and get every bit of information that I can about such and such and figure what the Navy ought to think about it and why. That is a big job. That is my primary job. But I get alot the information for that as I go traveling around and talk to people and see whether I can get the answers or not.

MIKE: It is a big job.

GRACE: I am listed as special advisor to the admiral on staff. Then he sends me out to look at installations to see how they are doing and we got a couple of problem Nardacs the Nardas are the Naval Regional Data Centers customers want their data so we go out and fill that form and come back. They send me out to talk on their request to find out what is going on.

CHRIS: So in addition to being able to tell people and give people your message about the industry and all that you listen?

GRACE: I listen.

CHRIS: And you must read an unbelievable amount of material.

GRACE: No we worked out a system on the reading we had to. I don't whether you realize how much comes into anybody's office through magazines and literature. What we did is each one has a speciality one is operating system, one is data base management systems, one is displays that type of thing, and they each scan the magazines for their speciality and if they find a good article in their area they xerox and put it in the black and we all read the black book. So that means we don't all have to look at everything.

STEVE: The garbage.

GRACE: All the garbage we get sifted out that way. And the black book is usually about that thick and you can take one out and xerox and take it home and so on. It makes it much easier to cover all the literature. But you have to get a group that works together to do that but it helps an awful lot. It also means that they develop some expertise in a particular area.

CHRIS: Because they continue to read articles and that.

GRACE: But everybody does read the black book to keep the broad picture.

CHRIS: How many people are on your staff?

GRACE: I have four sailors and two GS-15s that is top ranking civil service and a secretary. But I can call on anybody I want or any number of people I want over in regard to that question. But the sailors are down in the basement with the PDP11 and Univac. They have nice Motorla down there 64K Motorola which makes them very happy. The Nova that we fliperated we had to give the people in Norfolk so we lost that.

CHRIS: The Naval Shipyard there.

GRACE: Yeah. You know the mini-micro thing. We lent it to them but we didn't get it back but we borrowed it to begin with it so that was alright. I borrowed the PDP1140 from DEC and five years later they decided to ? because I was going to give it back and they sold it to the admiral for $2.00. Now we have fights as to who it belongs to I claim I procured it and he says he paid for.

STEVE: You've made a few dollars right.

GRACE: The Motorola I just borrowed from Motorola.

CHRIS: Oh that was nice of them to let you borrow.

GRACE: They are not getting that back. I'll loaned to the counter intelligence in back.

CHRIS: Did you get Dr. Wang to loan you anything?

GRACE: Not so far but I will. Give me time. See we were both at Harvard Laboratories at the same time. He came before I left. As he said last night he was in the basement and I was the elevated area upstairs.

MIKE: Could you spot him as a mover back then?

GRACE: Very brilliant we knew that right at the beginning of the war. That he'd start a whole company and go to the top I didn't see that at the beginning.

STEVE: That is a pretty tough thing to see

MIKE: It is. But he was an outstanding mind at the time.

GRACE: And going into the new stuff. Very aware of the new world. Very bright.

MIKE: Do you consider him a maverick?

GRACE: Oh sure. He didn't wait for anybody to tell him what to do he went and did it. That is what counts.

MIKE: Do you consider yourself a maverick?

GRACE: I am very much one. I am always trying to upset everything. Get rid of those dinosaurs. We had an executive officer who was an absolute nut he was a nitpicker and he would look at a directory which had come for distribution and he would go to look at every comma every period he would look at the addresses and see that they were perfect. 9 times out 10 he would send back for retyping or something had to be done to it. It was holding them up because it had to wait and go to the channel again and get a secretary to do it and all that sort of thing. It would be a months delay if he did that. So I decided we better automate the distribution list. Now you may want to send it directory to all Nardacs all ships of a certain class or all this and that. There are different distribution lists that fit the directory subject. So I told one of my kids give every address a number when the chief asks for all Nardacs you got seven numbers just pull those up and put them out. Either on mailing labels or on a sheet of paper so we automated the addresses for the distribution list it saves us months on the directors and on secretary time and everything else now that is to trival to put on the computer you realize just printing those addresses out. But the amount of time and money that it saved is tremendous compared to what it used. I am a maverick enough to do something like that most people don't think you can't put little problems on the big computers. That was a big money saver and time saver.

MIKE: There is alot of stuff that we are going to get into I can tell.

GRACE: As far as I'm concerned anything you do over again you should have done it with a computer to begin with. One thing that is bothering me right now is asking Dr. Wang about it. There is a board that you can buy that has all the mathematical subroutines on it the only manufacturer that supplies that is Hewlett-Packard. You can buy it for Apple, you can buy it for PRC. The only manufacturer though. You can buy a computer plus all the mathematical subroutines in ROM is Hewlett-Packard. I was wondering why. Univac, Honeywell, IBM come on. You should be able to copy them and write a Fortran program it is riduculous. I used to be part of Nashville at the Naval Post Graduate School and when they were going to hitch their programmable calculator to their big 3033 so that they all of the mathematical subroutines that was about when they through me out. You got them in a hand held calculator why should you be doing this to the computer.

STEVE: It is this thing with pushing isn't it.

GRACE: I think that is why Hewlett-Packard has it because they have real confidence. But there are even things that are extremely obvious like that that haven't been done yet.

MIKE: Maybe sometimes we are just too close to a situation like that to realize that we are getting we are thinking too sophisticated.

GRACE: Yeah it goes something like that. But I think there is a tremendous field we just have to put it on ROM. Which means it goes twice as fast beginning with you don't use many story. That means the government won't let me do that.

STEVE: Grace you don't mind me shooting some more pictures do you?

GRACE: No. I hope some of them turn out to be good.

STEVE: It is the right setting the light is beautiful.

GRACE: Do you have any more questions?

CHRIS: That is all that I have.

GRACE: Do you think you can piece it up together.

CHRIS: I think that we can manage a few paragraphs anyway.

GRACE: I think there are the four elements data, hardware, software and people and we spent an awful lot of time talking about hardware and software and then we spent a little more time on talking about data and people. It no use having hardware and software if you haven't got data to run it on you ain't going to do anything without people. And there are going to be all different kinds.

CHRIS: I think that that is a good message. If we can get a few more people issues.

GRACE: I am really excited about tending youngsters in coming in I really do. If you go to one of these computer stores not the ones that are runned by the company the ones that are small computer stores some guy runs it and look at the high school kids that are hanging around doing flabagasting work that they do. They have little sort of a business on the side they think that it is a great little toy and I met one he was eleven from Birmingham Alabama High School while I was down there at Maxwell he came up to speak to me afterwards he had me on the hook because he asked me questions I couldn't answer and what he was doing was he couldn't hold a job because he was under age so he hung around the computer store and offered to help people and sometimes they gave him a little something and he was saving it up to get his own computer. I guess he was an independent contractor. All of eleven years old, cute as button and those are the ones you want to watch for.

MIKE: Thank you very much this has been great.

GRACE: I don't know if I told you anything new.

MIKE: To hear it you hear it the same.

GRACE: I try to put it in words that

MIKE: Very clearly Grace this interview was great.

GRACE: I wish I could give you all chips the Model Ts.

CHRIS: The Model Ts of the computer industry.

GRACE: Your cadillacs and rolls royces.don't count.

CHRIS: Probably won't be able to see them without a magnifying glass huh?

GRACE: I have to use a magnifying glass to get look at that chip.

CHRIS: It is kind of tiny. It's amazing. How much can you put on here.

GRACE: There will be more on I think there is down two. It is one of the things that I said last night. Dr. Wang says that it will be twice the density as ?. That is about 2,000 bits a chip ?.

CHRIS: It is amazing.

GRACE: Of course the part I love about it is you know that it fixes anything because when I am doing wrong I throw it over board and put a new one in.

STEVE: And put a new one in repair because very simple

GRACE: Oh yeah just put a new one in.

CHRIS: Okay

GRACE: The people that have the cars that have the fuel injection its terrific particularly put in California where they go up and down hills ? you get different degrees of humidity.

STEVE: The computer system built into the ignition and carbueration of the car.

GRACE: And it takes the altitude and the atmospheric pressure and the humidity and everything and gives you the best possible mix.

STEVE: It has to go that way it has to to maximize what we have.

GRACE: In down in Texas they built some of the houses that have both energy and the security controls. As a matter of fact there is one system you can get if you are already in a house that has the things that go on the windows or anything they are little cups you stick in and they are tiny radios that radio to the computer.

STEVE: Draft rates and all that.

GRACE: So you don't have to rewire them. You can pick up your system and move it to another house. That is just beginning.

CHRIS: Yeah. For along while you are going to have to move it from house to house with you. When you think of all the houses it is hard enough automating offices.

GRACE: It will either be build in or you will get one of these portable systems.

STEVE: I think that is one of the fascinating things about living in the world today is that we are in a transition stage you know we really are and it is like 30 years from now you won't see the old homes they just won't be around unless you buy one and fix make it energy efficient.

GRACE: Oh I got me a house up in New Hampshire it was built in 1784 and I never saw such an energy efficient house.

STEVE: Is that right I thought that that was terrible.

GRACE: It was built with boards and then covered and in the inside the split the board lats split boards with the lats on them ? running and between the studs which are dried corn cobs probably the best insulation ever you could get and they were solid beams of course with no leakage.

STEVE: Just a well built house now or ?

GRACE: My nephew put in this electric baseboard heat and very economical to say the least. Because the thing was so out of date because they depended on the fireplaces and stuffing and they didn't have a secure house they were cold.

CHRIS: Did your great grandfather build that or?

GRACE: No I bought it at the rock bottom of the depression for $450 a house and sixty acres of land.

STEVE: What a deal.

GRACE: Nobody wanted it.

-END OF TAPE 1 SIDE 2

GRACE: fill in I told them how much they could get in welfare and food stamps. All the foreign officers in NATO and Norfolk are laughing because the United States are all supported this personal army welfare. That was bad for them.

STEVE: That kind of diplomacy we can do without I think.

GRACE: It is murder for moral.

STEVE: It doesn't make any sense.

GRACE: And of the 32 people that have been through my group since I went back on active duty 21 are still in the Navy. One third class petty officer got an offer of 25K from Westinghouse for a good idea he was getting 600 a month. So we train them an loose them and it has particularly hit nuclear computers radar sonar

STEVE: You are lucky you see some of the ads for the armed services and they advertise that we will train you and then you are going to go it is strictly a start

MIKE: Shop around

STEVE: That is right it is at that type of thing just hoping you will stay.

GRACE: Well we are trying to get more of the brighter ones. The best ones are coming from North and South Dakato, Montana, Idaho, Utah, Tennesee, Missouri where the schools are still good.

STEVE: Where you wouldn't expect that.

GRACE: Prime country where the schools are still strict and they have too learn the schools are still good. Big cities no. The schools have gone to pieces. There are high school graduates that can't read and can't do arithmetic.

STEVE: Well I will tell you that I was ill prepared in our school system was supposedly one of the best ones in the area and no way was I prepared for college.

GRACE: Now we have remedial teaching at Boot Camp.

CHRIS: To try to bring them up to speed.

GRACE: You ought to see an Army manual now a days for any piece of equipment

CHRIS: I would probably are they good?

GRACE: They look like a six year's old comic book.

CHRIS: I would cringe.

GRACE: They are full of pictures and they have an extremely limited vocabulary you can't use any long words. We have a limited vocabulary in the Navy but it is a little better than the Army.

CHRIS: Alright if I ever decide to join one of the services I will come to the Navy.

GRACE: Please do you might like it it is a good career lots of opportunities.

CHRIS: We probably shouldn't be saying this in front of my boss.

GRACE: You can always threaten him with that.

MIKE: I'll go to the Navy.

GRACE: If I can't do this I am going to go join the Navy.

MIKE: I'll say no.

GRACE: Try again.

CHRIS: Sure I'll try again I won't take no.

GRACE: But you know some of the kids do get so coward with that no no no no and they don't come back and they must learn to do it that is why I tell them to do it. Because when you first start out that first no you take it as a real no and they shouldn't. Some bosses are awful unreasonable we have always done it this way it has always been this way and that is worse than an older company and the armed forces. We have people in the Pentagon that drive me nuts and I don't know what is wrong with them. As early as 30 or 35 they stop learning they just don't learn anymore.

IDEA

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Keep Learning

CHRIS: And there are so many like that.

GRACE: And I can't understand how they can live that way.

STEVE: That happens to 80% of the population at that age.

GRACE: It is critical

STEVE: It is critical

GRACE: It must be very boring

STEVE: It is

GRACE: But they are no help in the Pentagon.

CHRIS: Lets hope that we never get like that Mike.

GRACE: And of course it is a major job to fire anybody.

CHRIS: Oh it is difficult

STEVE: It is a major job to do that in industry.

CHRIS: You have to do something really wrong

GRACE: You have to give three warnings and all kinds of justification and go overboard so that the best to do is to transfer them to somebody else. Probably at a slightly higher salary and position and they gradually go the Parkson Law is absolutely true they all reach their peak of their useful

CHRIS: And competence

GRACE: I guess that is why I like the youngsters so much they are so eager to learn and why I resent those 40 years old that sit at great big desks and don't know what they are doing and they have five signatures before you get approval on something and four of them don't know what they are writing reading.

IDEA

CHRIS: I can identify with that. It is called Corporate Red Tape and wasting time and.

GRACE: That is why I have always kept my groups small so that they all work together and know each other and when I put the group together for instance to build a Cobolt all four of them I didn't pick the leader I let the group pick the leader because any group like that will develop a natural leader.

STEVE: Just let it happen.

GRACE: Let it happen. If you picked the leader it may not be the natural leader and then you've got trouble from then on. If you let them work together on the beginning of the project the natural leader will emerge and then you alright naming that person the leader.

STEVE: And everybody will go yeah.

GRACE: I think it is wise. Because they think they made the decision and we should have many new projects we should keep the group small keep as a group until the natural leader appears and let them go ahead.

STEVE: By doing that you are reinforcing the positive all the way around for everyone.

GRACE: That is what you have to do that is part of leadership. I will never forget I had one of my crew was going up to Dartmouth to take the course on compliers and it got to be Friday afternoon and he didn't have his orders and in order to get his advance and his TR for travel he had to have his orders so I went storming up to ? personnel and said where are the orders that are at Admiral so and so office so I went storming up to Admiral so and so office and said where are the orders well

here they are but Admiral such and such has to sign them I said give me and then I went to Admiral such and such office and I walked in the office and over on this side there was a chief and yeoman and there was a commander sitting here at a desk so I walked up to the commander and I said I need the Admiral well what can we do for you I need the Admiral's signature on these orders and he looked at them isn't it a bit unusual for an officer to be expediting an enlisted man's orders and I looked him straight in the face and said that they taught me during World War II it was my job to take care of my crew and he was dead wrong. It was my job to take care of my crew. You should have seen the expression on the chief and the yeoman over hear I knew he was a bastard so he started to put it in the thing he said we will call you oh no I said I am going to wait for it and went over and sat down he could have killed me about then but he was dead wrong he wasn't taken care of a recruit it was my job to get him off and I could do it better than he could poor little sailor wandering around wouldn't get the attention I'd get and we were in a hurry and it was my job to do.

STEVE: That is a good rule to follow through out you career because if you depend somebody else to do it they are just if it doesn't get done it is going to fall back on you anyway.

GRACE: You take care of your crew. Well I am firmly convinced that you get promoted as you are pulled up by the people above and pushed up the people below as much as you are by your own efforts. So you are dependent both on your superior and your crew.

STEVE: That is right there is no where to go if there no position open somebody else has to hold on.

GRACE: I do think we are going to have people problems unless we do things about it right away we are going to be very short. Engineers, programmers, systems designers all of them.

STEVE: I think that Dr. Wang has had some foresight in starting the Institute and seeing that education should integrate with industry.

GRACE: Yes I was congratulating him last night about that because I think that is a terrific job.

STEVE: It is very innovative type of thing.

GRACE: Yeah the companies could do more to help.

STEVE: They used to back in the early 1900's in stuff the industrial revolution they had a big hand in it.

GRACE: Well we have another revolution on right now.

STEVE: We live in the third wave like Alvin did you read that?

GRACE: Yeah except I ain't scared

STEVE: Yeah I put it down to I don't want to read

MIKE: We should be on our way

GRACE: Well I'll see you all again sometime I hope

STEVE: Grace thank you very much.

CHRIS: Well I hope so.

GRACE: When you need me again.

END OF TAPE 2 SIDE 1
ALSO END OF TRANSCRIPTION