Oral History of Dennis Adler

Interviewed by **Mario Juarez** for the Microsoft Alumni Network

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Preface

The following oral history is the result of a recorded interview with Dennis Adler as conducted by Mario Juarez on August 8, 2024, at Microsoft Studios in Redmond, Washington. This interview is part of the Microsoft Alumni Network's Microsoft Alumni Voices initiative. The goal of this project is to record the institutional history of Microsoft through the recollections of its former employees, so that the information may inform and inspire future generations.

Readers are asked to bear in mind that they are reading a transcript of the spoken word captured through video rather than written prose. The content reflects the recollections of the interviewee. The following transcript was edited by the Microsoft Alumni Network, which holds the copyright to this work.

Interview

Dennis Adler: Okay. I'm Dennis Adler. I started at Microsoft in April of 1989 as a program manager in the OS-II group. From there, I worked on BIOS-level technologies for OS-II, got assigned to this funny little thing called typography and TrueType which took up a few years of my life. Worked on Windows 3.1, MSDN, Windows 95, and then spent several years in research learning a bunch and trying to get cool technologies moved to the product team.

Mario Juarez: So we're going to cover the ground here. We're going to go across the bases talking about your experience. I'd really love to go deep and into each of those different aspects of your experience and

then pull out a little bit, talk about the way that Microsoft changed the world in terms of technology. So tell me where you're from. Where were you born? What was your childhood like?

Dennis Adler: So I was born in Los Angeles, California. Spent most of my life there until I came up to Microsoft. One of four children, the second. Discovered computers in junior high school when I was in eighth grade algebra and they brought a CompuCorp programmable calculator which was about the size of a cash register in the grocery store before they were computers. And before I knew it, I was writing machine language in octal and I was just nuts for the thing. And it disappeared and I didn't see it again until high school.

Mario Juarez: That's in eighth grade?

Dennis Adler: Eighth grade, eighth grade algebra, there was a CompuCorp programmable calculator and I was punching out cards with paper clips in octal. I didn't know I was doing machine language, it's just what you needed to do to make the thing go. And the very first program I ever wrote was the calculated the volume of a cylinder. So I went home and said, "Mom, you know how many square inches there are on a dog food can?" And went from there to trying to create games on something that could only print on an adding machine tape.

Mario Juarez: I want to get to that there but let's stick with your childhood. So you were the-

Dennis Adler: Okay.

Mario Juarez: Second of four.

Dennis Adler: Second of four.

Mario Juarez: Second of four, tell me about your parents. Tell me about-

Dennis Adler: My parents were first-generation Americans. Their parents came over from Eastern Europe and they very much believed in discipline. I very much believed in avoiding discipline. I think that came into my work life as well but loved being in southern California. Loved being out in the sun, going to the beach, being in swimming pools and everything. And originally from a very young age, I was going to be a doctor and my heritage is Jewish, so my mother loved that I was going to be a doctor. When I graduated college and said, "I'm not going to do that. So I know how to fix cars and write software, so let's try the software, it's cleaner on the hands." And it worked out pretty well for me.

Mario Juarez: How'd your mother take it?

Dennis Adler: Until I came up to Microsoft and they saw what the stock was doing and I told them they had options, they thought I'd made the biggest mistake in the world. My mother was all set, "My son the doctor," but by the time I came up here and Microsoft's doing so well, they said, "All right. It was probably the right thing to do."

Mario Juarez: What kind of kid were you?

Dennis Adler: What kind of kid was I? I was skinny, not very tall at first, picked on a lot, very bookie. I was a nerd. I remember getting labeled a nerd because I had my calculator on my belt in high school. Really shy, I lost that in college. You couldn't get me to sit in front of a camera and talk back then. And I really wanted to know how things worked. I think that's what got me excited about playing with this computer. Well, how does this thing do it? And seeing I was giving it instructions and it was doing what I said or it was doing what I told it to do even if that's not what I meant, I thought that was really cool.

Mario Juarez: What values were you raised with that stuck that you just woven into you?

Dennis Adler: Values that I was raised with that stuck, my dad was pretty religious. So there was this whole 10 Commandments values, but I did a lot of reading on comparative religions as a teenager and I realized there doesn't have to be someone in the sky telling you you're going to get in trouble, you can just do the right thing because it's the right thing to do and that's what really stuck with me as I grew up. Do unto others as you would have them do unto you, and that's just the right thing in almost every case.

Mario Juarez: That's great. And your brothers?

Dennis Adler: So I have an older brother and a younger brother, my younger brother passed away in 2013.

Mario Juarez: I'm sorry.

Dennis Adler: Yeah, me too. My older brother and younger sister both went into computers, so all three of us made our living in software. My sister and brother are down in San Diego. I was just down there visiting. I go down a few times a year and it's especially in the winter to escape our weather here, but they're all doing well. We all have kids. My sister and I both have grandkids. My brother doesn't yet. I think he's still hoping for them. And I really love having the time now to go out and travel to see family or see the faraway places. All this stuff I said I was going to do when I was working my tail off all those years, now is some day.

Mario Juarez: I love that quote. That's my quote on the day so far.

Dennis Adler: I'm glad to give it.

Mario Juarez: Yeah. Thank you. So you have this, sounds quite stimulating, interesting, idyllic childhood. High school, college, tell me what that phase of your life was like.

Dennis Adler: Well, there was only one college ever wanted to go to, it was UCLA, I don't know why. It's the only place I applied. So this whole idea with my kids where they applied to six different schools was quite foreign to me. I lived at home because UCLA was an hour bus ride away, so I was busing to school or driving once I got my own car. I loved college. What I loved about college is high school didn't really challenge me. I was just goofing off. In college, I got pretty serious about studying and it's what gave me the habits. There's the critical thinking you get from a liberal arts education and my degree is so old that biology was considered a liberal art. I have a BA in biology but that broadened thinking by a liberal arts education, learning to really write an expositive essay. To think and argue logically and listen to other people's points of view and take them in, those were all things that I got much better at in college, and they all served me well in later life, and my degree was really good for shock value.

I'd put it up in my office and they'd say, you got a biology degree. What are you doing here with a biology degree? I said, "What else was I going to do besides medical school and I wasn't going to do that." Back then, microbiology hadn't taken off.

Mario Juarez: But you were interested in computers, yet not enough for that to be a primary focus of your studies?

Dennis Adler: Well, yeah because remember, I was going to be a doctor. I was focused on medical school. I was taking all the courses. I was volunteering in an emergency room. I was doing research and developmental and molecular biology and had a senior paper I wrote. All of this was aimed at getting me into a medical school.

And then I decided I don't want to be a doctor, I want to be an MD PhD. And I thought, "Oh, eight more years of school plus internship. No, we're not going to do that." And that's when I said, "Okay, well..." I started earning a living writing software in college, writing software for professors. I'm paid a lot better than fixing cars or flipping burgers, I got to tell you. When I needed to decide what to do, wasn't going to do medical school and that's what I'd been training for. Well, I need a job. Cars or computers, computers worked out.

Mario Juarez: So tell us about your first job?

Dennis Adler: Oh wow. My very first job out of college was writing C software on a PDP-11 and I'd never used a PDP and I'd never worked in C. So after I got the job, I got Kernighan and Ritchie and started reading crazy and pretty soon was writing OS software on this PDP system. But what I really wanted was a job working for this time-sharing company. Should I explain time-sharing? Time-sharing is this idea where you'd have a big mainframe in this secure room with water coolers and a whopping eight megabytes of memory and 250 megabyte disk packs. That was state of the art. And then you dial in through phone lines to make use of the computer. And this was, APL was an interactive language, so it would be typing on a Selectric. And the fastest lines, the really fast lines were 120 characters per second. So we'd be doing that on our terminals and we'd write the software and customers would then sign into this computer and you get these warnings, "Thunderstorms in D.C., save your work often we might crash."

And I really wanted to work for this company called STSC that did APL as their language because I really liked that, it was a fun language. But I got the C job first, so I took it and then STSC came back and said, "Okay, we'll hire you, but only if you move to Denver for the winter and worked there." So that was my second job, and I worked for that company for five years right through the time PCs came out. And that was all writing custom mainframe software for people to use on a time-sharing system, making it work on a ASCII spin wheel, Daisy wheel printer or typewriter or these really snazzy CRTs we called them. So you could have 25 x 80 screen and everything had to fit on that.

Mario Juarez: Wow. But you loved it?

Dennis Adler: I loved it because to me, programming is an art. I take an idea somebody has. Somebody says, "I want an accounting system." It's, "Well, let's define that a little further." "Oh, well it just keeps the books." "Let's define that a little further." And you extract what they want this system to do through conversation. You write a specification, get them to agree on it, and then you go sit in your little corner and you write a bunch of code and when it works, you get it delivered it to the customer and you fix the bugs and they're happy and they pay the company a bunch of money and the company gives you a bonus. So I got to take... My art was to take an idea and turn it into something that would do what people wanted, transforming thought into an actual implementation. I still write software today for that very reason, I love doing that.

Mario Juarez: That is fantastic. Would you say that's the common thread through much of your career?

Dennis Adler: Well, it was the common thread until I came to Microsoft. It was the first job I had where I wasn't writing software. That wasn't part of my job definition. I still did it but I was a technical program manager, so I was working with developers and testers and turning specifications or creating the specifications for the developers to build against and the testers to test against.

Mario Juarez: Let's get to that in a moment.

Dennis Adler: Sure.

Mario Juarez: Tell me how you found... How did you end up at... So you had had a number of very great professional years under your belt. You were probably an established professional, I imagine. You were probably successful out of the gate, yes?

Dennis Adler: Yes. I was successful out of the gate the whole time. What happened was I stopped working for this first company, STSC because I'd come up with this really cool software package that could do forms on CRTs. This was right after the PC came out and it was all just character-based. So I was creating software at a low level that could make your screen look like an airline screen with all those fields you fill out and that's what people did on mainframes. They'd have their terminals connected to the mainframe and it all used these forms with something called GDDM (graphical data display manager). So I wrote GDDM essentially for PCs and sold about a hundred copies of it and did consulting work. And it was, as

I wrote that, one of the languages I supported was the brand new Microsoft C compiler. So a gentleman named Greg Lobdell was the program manager for the C compiler.

And we had email, I think it was CompuServe email or Prodigy email, the only two ways you could communicate. I had his phone number for really big problems. I'd found some nice bugs and my wife and I were looking to get out of California for a better place to raise our kids. And the Northwest came to mind and I knew two companies in the Northwest. There was a company called Quicksoft that did this really cool, it was a pre-Word word processor. And I used it to write the technical documentation for my software. And I knew someone who worked there and I called him and I said, "Hey, should I come apply?" He said, "Oh, you don't want to work here, this guy's a jerk." And I knew Greg and I saw an ad in Byte magazine that says Microsoft is hiring. So I called Greg and back then calling LA to Seattle was expensive. It was dollars a minute. And I called Greg and talked to him. He said, "Yeah, send me your resume. I'll walk it in." And I got my interview, there was some back and forth and here I was.

Mario Juarez: I remember Quicksoft.

Dennis Adler: Do you?

Mario Juarez: Yeah, I was-

Dennis Adler: Bob Wallace, I think was his name.

Mario Juarez: Yes. I was a wizard on that and it just disappeared.

Dennis Adler: Yeah. So I knew a guy named Todd who was doing development work. He had been a developer at one of the branch offices for STSC where I'd written a bunch of software for their customers. So I called Todd. I said, "Oh, you don't want to work here. Bob's a jerk."

Mario Juarez: That's great.

Dennis Adler: And then I come up here and I tell my recruiter, God, I'm trying to remember her name, I think her first name was Carrie. I tell my recruiter that I've heard that... I read this interview where Bill was walking with a reporter and saw somebody in the hallway and the programmer said, "Bill, another 12 hour day." And Bill said, "Got to cut out these half days, man." So when I was coming up here, I talked to the recruiter. Said, "I have a family, I don't want to work these hours." She said, "Oh, we don't do that anymore." And then I got to work my first day and I told my new coworkers that and they just laughed and said, "Recruiting lies."

Mario Juarez: Do you have a memory of your first encounter with Microsoft Campus? Or talk to me about what memories stick from you about your very first contacts with actually being a Microsoft employee?

Dennis Adler: My first contact with Microsoft was during my interview and I came from a consulting background and when you saw customers who were interviewing, you wore a coat and tie. So I showed up at Microsoft wearing a coat and tie, and one of my interviewers was in a pair of shorts and was like picking his toenails while we talked. And I thought, "Okay, this is different. This is different." Right after I started at Microsoft, I was a program manager on OS/2, 1.2, and you had to always interface with IBM and write these very formal documents for stuff. So I was going to a meeting with an OEM. It might've been compact, but I'm not sure. And this was my first customer meeting as a Microsoft employee, so coat and tie again. And I'm walking past Building 8by the fountain there, and there are some guys on unicycles with plastic helmets, plywood shields, and spears with padded ends, they're just basically long dowels and they're jousting by the fountain.

This is different. I go into this meeting and I introduce myself. I hand out my card, I sit next to the OEM employees. And then Ben Slivka comes in to talk and Ben is going around to everybody saying, "Hi, I'm Ben Slivka from Microsoft," and handing out his card, "I'm Ben Slivka from Microsoft." And he comes around the table and I'm wearing a tie, so he introduces himself to me because I'm new, he didn't remember me. "Hi, I'm Ben Slivka from Microsoft." So just by wearing a tie, he thought I wasn't from Microsoft. I lost the coat and tie after that, unless it was specifically called for like an IBM meeting.

Mario Juarez: And of which there were a number back in those days.

Dennis Adler: There were a number.

Mario Juarez: You were there at near the end of the fruitful marriage with IBM.

Dennis Adler: Yes. I remember the divorce announcement from IBM.

Mario Juarez: Tell us the story.

Dennis Adler: So I remember going to my new hire party at Bill's House in Laurelhurst and really being jazzed looking at this Porsche he had in the garage that he let us all take a look at. And I found Steve and I talked to him. I said, "Why are we doing this Windows 3 thing and this OS/2 thing, it seems like they compete with each other." Steve just kind of rubbed his chin and said, "Well, I figure if something's going to eat our lunch, I want it to be our software and not somebody else's." This guy's smart. And so that was my introduction to the tension between Windows and OS/2 but still OS/2 at this point was our publicly stated position. And so, we were working on OS/2 1.2 and at the same, that was called Sloop, that was the code name and OS/2.0 which Richard Tate was the lead guy on and it was called Cruiser. He had these great sweatshirts printed that showed a guy with a surfboard and it said Cruiser on them.

And the very first things I were given were looking at BIOS, EFI, reconciling file system APIs, really dry technical stuff but I love that. And I was doing, was it called a DSR, a design system... A DCR design change request. You had to fill out these DCRs saying everything you do and then the marketing manager or the product manager would call you in when it was your time to talk with the people in Hurley or Boca from IBM. Hurley in England, Boca in Florida, and make your case to see if it would be approved or not. I

really liked it better when I was working on Windows and it was just you go up the line to your manager or maybe Bill and you get approval like that. You didn't need these silly forms filled out in this crazy printing language called Script. It was very IBM and I never wanted to work for a big company.

Microsoft was the biggest company I'd ever worked at but what I discovered is it was more like a bunch of small companies reporting to Bill and that was fun. If you needed to know something, you'd go to your VP and you'd get it on Bill's calendar and you could resolve things in a week, two weeks and get really direct feedback from the guy at the top which you could never do at IBM or at Xerox or at Bank of America, all places I looked at working.

Mario Juarez: How did the divorce affect you?

Dennis Adler: Well, I still remember the announcement from the divorce. We all went to a local hotel. Steve was on the stage. There were about 800 some odd people in systems then. And the doors were all closed and Steve said, "All right, the news I'm going to tell you makes you all insiders, so you cannot trade in Microsoft stock until this becomes public." And he told us what was going on and he talked about we were going to be wrestling with this big bear and it was going to be this mess, and we wanted to be the bear on top when it was all done. And that stuck with me, and I think we did come out as the bear on top when it was all done. But it was cool knowing that we were focusing it all on software that we could just take in the direction we wanted to go versus negotiating with this mainframe company who didn't want to let go of proprietary stuff.

Mario Juarez: Yeah. I was in that meeting and I remember how breathtaking to me it felt that it was the company making a massive evolutionary step that seemed rather scary. And I remember there were a lot of people who were not happy about it or who didn't necessarily agree with it. That was my feeling of it. So put yourself, try to remember your being in that room and in this mood after, how did it feel to you?

Dennis Adler: Well, the way the whole thing felt to me with the IBM divorce, by that time I was no longer working on OS/2, I had been doing TrueType and I was worried about OS/2 and Windows and how we were going to get it going. And as time went on, it was very clearly focused on Windows because OS/2, IBM wanted to put Type 1, which was Adobe technology in OS/2. And we didn't want to do Type 1 because Adobe wanted an unreasonably high price. So it felt freeing to me that we didn't have to do what IBM wanted to do anymore. We could go out there and try to kick their butt in the open market instead which I think we did a pretty good job of.

Mario Juarez: I would say so. I'd say that turned out pretty well. So talk about those heady days between that divorce and what felt to me like the day the world changed which was the arrival of Windows 3.0, especially 3.1.

Dennis Adler: Mm-hmm.

Mario Juarez: How did that feel to you? What was your experience in that time?

Dennis Adler: Well, I had started working with Windows and Windows 1 and 2 because the software I wrote that would do those forms I talked about, I wanted it to work in a DOS box in Windows. So I had to have a version of Windows to test on. I was not very impressed with Windows 1 and 2 on a 640K PC. And if you remember by the way, if you knew how to twiddle the BIOS, you could throw extra memory in there and get a whopping 704K of RAM to work with. And back in my mainframe days, I had 32K of memory to work with. So it's really exploded, literally and figuratively. But as I got to focus on what we wanted to do with TrueType and how it would work in our applications and how it would work in our operating systems, OS/2 was no longer even talking about putting it in anymore because IBM was all type one.

So, it was going to go into Windows and going through and just figuring out which font technology we wanted because there was this company called Nimbus Q where it's a guy I worked with named Stephen Paul who developed it. There was HP had selected CompuGraphics font technology. There was Adobe's Type 1, Sun had their system called F3. Apple had this thing they were calling TrueType and what did we want to pick? What did we want to use? And a guy named Karl Bauer who was working on printers who was working at Microsoft at the time, told us that we were talking at cross purposes with Apple and if we would just talk to them about the font technology, we could probably agree on it and he was right. And so we wound up licensing TrueType which suddenly threw everything up in the air because there's a developing new font technology, and you need fonts that don't exist yet because this is a brand new font technology, and you need to hint these fonts.

Hinting is programmatic deformation of the outline at different sizes so you get a bitmap that looks right. And that sounds all well and good but it's a really odd form of two-dimensional programming. And creating the fonts while you're creating the technology and you're bolting it into Windows, if something's not working, where's the problem? So that was a really interesting challenge. How do you get this working? How do you make sure it's right? How do you bolt it all in when it's all happening at the same time? The engine, the fonts, and the integration with Windows. That was pretty wild.

Mario Juarez: Yeah.

Dennis Adler: And that was the first time I remember thinking that the decisions I'm driving here are going to affect what tens or hundreds of millions of people can do every day on their computers. If you remember back then if you had a Word document and it was using Times Roman or Helvetica, and you wanted it to look like a point size you didn't have, they were all bloated and scratchy or PowerPoint presentations would be all blocky and then you'd print it on a laser printer that might not have that same font. So the page flow would be different. So what we were doing was going for, remember the term WYSIWYG, what you see is what you get. So we were trying to have the same font on the screen and on the printer so we could make what you saw on the screen be exactly what printed and you knew it would work every time. You didn't have to worry about the font cartridge model. It would work on a dot matrix printer, it would work on a high-end type setter, it would work on a Type 1 printer, an Adobe Type 1 printer.

All of these printers would work with this technology and that was pretty darn cool. But if you stop to think this feature I'm putting in is going to affect what millions or hundreds of millions of people do is a little scary. So don't think about that, just do the right thing because it's what if I make a mistake? And there was also a humbling moment in there, right around when Windows 3.1 shipped, I went on vacation and I had a shirt that it said Windows 3.1 logo on the back and the Microsoft logo, and I get on an airplane to go, I think it was to Belize. And the flight attendant says, "Oh, you work on Windows?" I said, "Yeah, I do." She says, "My husband does too." I said, "Which part?" He says, "Oh, he installs them. He does double pane windows." And I just said, "Oh. Yeah, this is software." And I came back and told that story, "Guys, we got a long way to go before people understand what we mean when we say Windows." And now everybody knows what it is when you say Windows.

Mario Juarez: That's a great story.

Dennis Adler: I wish somebody could have got a picture of the look on my face when she said, "Oh, my husband installs them." I was like, "What?"

Mario Juarez: Device drivers? Help me understand this.

Dennis Adler: No, this is software.

Mario Juarez: Yeah.

Dennis Adler: A software wind... Yeah.

Mario Juarez: What is software?

Dennis Adler: Yeah, exactly.

Mario Juarez: I mean, it was funny how fast that changed and how fast the world... So you are there through that and then you have these other... You took all these interesting detours.

Dennis Adler: Yes.

Mario Juarez: In your career.

Dennis Adler: Yes.

Mario Juarez: Tell us.

Dennis Adler: Well-

Mario Juarez: Give us the tour.

Dennis Adler: So when I was on OS/2, Peter Neupert said, "Drop everything you're doing. You're going to do this font thing." And I thought how hard can this be? It's a bunch of little squiggles on the screen and it ate up three years of my life picking the technology. I got to know a lot of great people. I met Nathan and worked closely with him because he was helping pick Nathan Myhrvold. He was helping pick the font technology. I got there starting to meet all these people at HP and the people on the Windows team. And I was given the goal to make sure IBM picked our technology. And I got that goal revised to say that you can't make do anything. It was if IBM doesn't pick TrueType, it won't be for technology reasons. And so IBM decided to go with Adobe's Type 1 and I had the fonts acquired, they were being hinted.

I was loaned to the Windows 3.1 team to make sure the technology got dropped in and was working. We had to devise all the tests for that and Steve had asked me to keep working on this. After the IBM decision was made, I said, "All right, my work is done. I'm going to go do something else." And Steve came in and talked to me and said, "I'd like you to keep working on this but you got to stick it out and see it through to the end." I said, "Okay." And so as it was wrapping up on Windows 3.1, I asked Steve for a meeting and he came into my office and said, "Dennis, I've been thinking about what I'd like you to do next." And he laid out three things for me. One was working on the C compiler. One was working on this documentation project for developers, and I forget what the third one was.

I thought about it and I said, "I think the C compiler thing sounds more interesting." And Steve says, "Well, I'm not sure if that's the right choice." And I said, "Steve, just stop and tell me what I'm going to do, don't pretend I have a choice." He said, "I want you to do this developer thing." And that's how I became the technology lead on MSDN which was the first time Microsoft tried to collect developer documentation in a form that it could be used on computers. So we were taking Word documents, probably WordPerfect documents, who knew? Whatever format they were in, and trying to turn them into a common searchable format on this newfangled thing called a CD-ROM. And figuring out how to do that, how to proof it, how to get the right articles on, how quickly we could turn it all around, what space could be sustained, nobody done anything like that before.

So we came up with a schedule that said it would be shipped every three months and damn if they didn't keep that schedule for as long as it was published. Now it's all just online but back then-

Mario Juarez: Back then-

Dennis Adler: Getting it on a CD was a big deal.

Mario Juarez: Right. I mean, paint the picture for what the world looked like in terms of information. Of course, today we've got it all compiled, indexed. It's just truly in the air, it's on your phone. But what year are we talking here, '94?

Dennis Adler: Okay, so.

Mario Juarez: So.

Dennis Adler: So the whole thing with MSDN and that project started right after Windows 3.1 Ship. So that was '91, '92-

Mario Juarez: That's true, yeah.

Dennis Adler: Right?

Mario Juarez: Yeah.

Dennis Adler: I actually was pulled from Windows 3.1 After beta three because the fonts were done to go work on MSDN. So I didn't even go to the ship party.

Mario Juarez: You missed the ship party?

Dennis Adler: I missed the ship party because I was working on this MSDN thing.

Mario Juarez: Boy, that is dedication.

Dennis Adler: Well, people ask me what I was and I used to say, "I feel like a smoke jumper. It's I'd get thrown from hot project to hot project, and then once it's done before I can even go out and enjoy a beer with the guys. 'Oh no, there's another fire. Go over here.'" But it was fun, I learned a lot.

Mario Juarez: I bet you did.

Dennis Adler: And so back then, documentation was books. It was all books and I came from the mainframe world. IBM would send out these binders, this thick, three ring binders, and they'd send updates and you had to put the updates in an order because they told you what pages to replace. And so you were just going through and putting all these page changes in there. There was Kernighan and Ritchie for C, Charles Petzold's book for Windows but it was all hard copy. There wasn't easy access to code samples or demo programs. You couldn't get the detailed developer documentation unless Microsoft put it in a book. And that documentation was never quite complete. So the idea behind MSDN is if we gave programmers better information to use when they were writing software, they'd write better software. That was the hope. I think it proved true. I mean, I certainly used MSDN when I was coding for fun and it was really nice to be able to look that stuff up instead of which manual is this in?

And it was updated quarterly. So if things changed, you could send out the new updates. People didn't have to go through three ring binders and refile it. You just kept your CDs in the rack. So the idea

that you could have this disk that held what shelves and shelves of books of use or three ring binders used to hold was pretty darn cool and that you could search it. And we were trying to figure out how to make it searchable. Search as a search indexing didn't exist then. So we were looking for technologies to search this huge 650-megabyte CD ROM. And back then Windows 3.1 Ran in, I forget how many, a megabyte of memory maybe, and a CGA, EGA or VGA video card. Now these days, my iPhone has more power on it than the IBM mainframes I started working with, and certainly more than the PCs that ran Windows 3.1. Hell video cards have more power than the PCs that ran Windows 3.1.

Mario Juarez: Absolutely. What role did MSDN and the compilation and the organization of all that data, all that great information have in establishing Microsoft as a favorite development environment? As Microsoft Tools and the Microsoft option?

Dennis Adler: Okay. So in terms of MSDN and how it made Microsoft a better development platform, I think the thing that made us the choice for development was because Windows was so widespread, and if you wrote software in the days of DOS, you had to include on your software package, what monitor do you need? What printers do we support? And there would be these special driver packages you could get that would work with different printers but you had to have the right stuff, the right hardware. Now you could just have Windows and it allowed developers to write to this graphics model, GDI and user for laying out Windows that you didn't have to worry about what the screen format was. You didn't have to worry about which printer it was. You just wrote to this common API and it worked and developers loved that.

Now, they also loved having Word documentation but sadly, I didn't get to see how that turned out but because before MSDN shipped its final copy, I was asked to go be group program manager on Windows 95. So that was that smoke jumper thing again. So, I didn't get to hang out for that ship party either.

Mario Juarez: Man who missed the ship parties.

Dennis Adler: The Windows 95 ship party was Epic though.

Mario Juarez: Yes.

Dennis Adler: So, I got to get done.

Mario Juarez: Let's talk about Windows 95.

Dennis Adler: All right. What would you like?

Mario Juarez: What year did you join?

Dennis Adler: So I joined Windows 95. It was middle of 1992, I think. Because I was still trying to finish up MSDN and I was asked to join it and I resisted because I wanted to finish something I started for once, but

Paul Maritz convinced me I needed to go do this, so I did. And at the time, it was called Chicago, it wasn't called Windows 95. And I don't know if people know this but Chicago was being developed at the same time as the version of NT codenamed Cairo. And Chicago while it's a great city in the Midwest and jazz, it's also a name of another city on the Nile. Most people didn't know that, I didn't know that. So I came in, it was called Chicago and we thought it would be a 12- to 18-month project. So it was supposed to be done by '93, '94. But it was this huge re-imagination of what Windows could be. Windows initially in the Windows 3 and 3.1 days and 3.1.1, you would boot DOS and then your Autoexec.bat file would start Windows.

So DOS was the underlying operating system that Windows would talk to and it did it through this API called Int-20, Interrupt-20. And everything that was done with the system... Well, not everything, but a lot of the stuff that was done with the system was through those APIs. Now we were going to create this 32-bit instead of 16-bit operating system which meant instead of 64K programming blocks, you could have 2 gigabytes worth of programming memory or 4 gigabytes, it was unbelievably mind-blowing. No longer did you have to segment things in and out of memory, you could have one big program but it changed everything. And I remember one of the first things I looked into when I started was I wanted to know about long file names. Because even the day Windows 95 shipped, I think it was Apple had an ad that had C:\ratchulns.w95. Did an 8.3 Congratulations Windows 95. And when I had started on Windows 95, I asked, "Are we doing long file names?" We looked at it. It's not... We can't get it done. And I thought, "Oh my God-"

Mario Juarez: Explain this. So most people aren't even going to know what that means.

Dennis Adler: Okay. So because Windows ran on top of DOS, MS-DOS had an 8.3 file system which meant you could have eight characters, the dot was implied and you have a three character extension. And the extension told you what file it was. If it was .doc, it was Word, if it was .xls, it was Excel. If it was .com or .exe, it was an executable, .bat was a command script file. And you couldn't have names longer than that. So you'd get really creative with these 8.3 names. And the true type work that I talked about before, all the font tinting was done on a Macintosh because the guy who developed the technology developed the hinting tools on Macintoshes. So I'd been using Macintoshes and I was envious of being able to have 32 or 48 character file names, that was a lot better. And people like that, you could name a file and it could tell you what was in it by the name.

So we were looking at how we could get longer file names. OS/2 had a longer file name system called HPFS, but when we did long file names, this was the burden we had to bear. We couldn't just invent something new. You had to be able to take this Windows in a floppy disk. Remember those? 5.25-inch floppies or 3.5- inch floppies, and you had to be able to put that at a down-level DOS system and they had to be able to operate on that file and put it back in Windows and at the very least, have no system corruption. And that was a huge problem. Nobody could figure out how to do it. So, I convened this meeting with all the file system guys, all the guys who knew about the DOS stuff, program managers, testers, developers, and we're talking about how might you do this? And I was this low-level systems guy, that was the software I wrote.

And I'd done a bunch of poking and written a bunch of system utilities. And when I think it was MS-DOS 2.1 came out but I'm not sure if it was that or three, they allowed you to have volume labels. You could give an 8.3 name to name your disk. So you could say, account ACTTG underscore one, accounting disk one. And the volume label was just this bit that was set. And it just so happened that if that bit was set, the system just took the first one it found with that and it ignored everything else. So our problem was how did we get the long file names into this directory structure that had to work on down-level DOS systems? So I just asked a question of one of the developers in the room, Aaron Reynolds. I said, "We can set the system bit, we can set the hidden bit, we can set the read-only bit but people will still see it. What if we set the volume label bit and always make sure there's a volume label, won't DOS ignore all the other ones?" And that's what did it.

And in fact, that was such a breakthrough that we patented it and back in 2008 when I was no longer at Microsoft, I was called in to be deposed on the long file name patent in a Microsoft Motorola lawsuit. It was still around making a difference, that patent and that technology back then, because the trick wasn't doing long file names, it was doing it in a compatible way and that was this huge burden and advantage of Windows. The burden was you always had to be compatible with what came before. The advantage was if somebody wanted to take over and replace us, they had to be compatible. So that's part of what made us hard to replace.

Mario Juarez: Yeah. And boy, thank you, by the way. That was a brilliant story. I love that whole story and you did such a great job of explaining it. And I have to admit, that's one I did not know. But boy, it feels emblematic of the nature of innovation at Microsoft in that period. And it was a thousand of these little bits of genius.

Dennis Adler: We're not going to do it that way anywhere... It was this whole thing... There's Brad Silverberg, the saying he wanted us to keep in mind is, "My mom needs to be able to use this." So we would ask ourself, "Can Brad's mom figure this out?" So it had to be stuff that was straightforward enough. That the setup was supposed to be easier, the use of the system was supposed to be easier. Windows 95 introduced plug and play which we used to call plug and pray because it still had some bugs. But I don't know if you remember what it was like putting a new networking card into your system in Windows 3.1.1 but you had... It was a nail-biter. And getting networking to work by itself was a nail-biter. So having the system configure itself for all of that was groundbreaking.

Mario Juarez: It was. And Windows 95, what was your Windows 95 experience like? And I'm not talking so much anymore about the myriad problems that had been solved.

Dennis Adler: Mm-hmm.

Mario Juarez: There was a point, I think, where we all realized this is actually happening and it's really big. What was your experience?

Dennis Adler: Well, the lead-up to realizing how big it was going to be is-

Mario Juarez: The lead-up to realizing... Give me a complete statement.

Dennis Adler: Yeah. So the lead-up to realizing how big Windows 95 was going to be for Microsoft and the world when we released it, for me, started when we were going to rewrite the shell, the user interface. The shell from Windows 3.x was called program manager or progman.exe. The shell for Windows 95 was the beginning of that UI we're all used to now with Windows with the Start button and the Taskbar and a decision was made that the shell was going to be our first 32-bit application because we needed to show that we were serious about 32-bit applications. It couldn't be a 16-bit thing ran in what we called compatibility mode. It had to be written for 32-bit and that's how we were going to test it. Windows 95 inside the company really pioneered, in my view, the idea of eating your own dog food because we all ran the latest build and if the latest build broke, we were all dead in the water until it was fixed.

I'm going to digress a little bit here. We started with weekly builds, building a new version every week. And then we had this push to get to daily builds, and it was slogging through frozen quicksand because you'd get like three days and then you try to get to two, and the builds were breaking but we finally got to where it was building every day and we always had a new build of Windows to work with. So we were making the OS its own test bed. So when we decided to make the shell 32 bit, it was clear we were going all in. But then I remember hearing about a meeting where the apps group didn't want to tie Office 95. I think by now we'd picked Windows 95. They didn't want to tie Office 95 to Windows 95. They didn't want to require that because that would limit their use on down level systems.

And Bill said, "You're going to require that because if they're not going to buy Windows 95, they're not going to buy Office 95 anyway. We need to go all in on this." And that's when, "Okay, the

whole company is behind this." I was tracking external deliverables from both outside the company and inside the company. We were getting OLE [Object Linking and Embedding] from the NT team. We were getting common dialogue designs from the Office team. We were getting... Right was being replaced by this thing called WordPad. The apps group was writing WordPad for us. And we also had contracts for a post-script driver for color matching, for... There were 200 or 300 external deliverables my team and I were tracking. And the team just working on core Windows, multimedia networking, and everything else was between 600 and 800 people but company-wide there were a few thousand people all contributing to it, which was more people than were in all of systems when Steve announced the divorce. So it was the biggest thing I'd ever worked on. And it was taking a really long time.

And the beta program, I think the last beta was between 250 and 300,000 beta users. Some products never ship that much. We had a beta with hundreds of thousands of users giving us data back. The last hint of how big it was going to be is we decided we needed to really start testing app compatibility better. And so, one of my program managers, George Moore, went with David Cole in his pickup truck; David Cole was a general manager of WIN 95; to an egghead and they broke the POS system because they were buying one of everything in the store and just throw it in David's pickup truck. And we then put them in the cafeteria and people would sign up for taking home one or two or three apps and you just have this simple checklist from pouty face to big grin on how it was doing. And that's how we got a lot of the compatibility data but that's what it took to do that testing. We couldn't get it enough of that out there even with 350,000 beta users, we needed to get the whole team involved in testing apps regularly.

And it was that level of drive and commitment that people wanted it to really work. They wanted it to be great. And that was the first project of that size I'd ever worked on where that many people were that focused and that committed to making it go. Be it sitting down to figure out long filenames, defining what plug and play means, redoing setup, app compatibility, it was all just this... And performance. David D'Souza was focused on performance and there was a technology out of the research group called LEGO. And they called it LEGO and LEGO sent us a cease and desist letter, so we had to call it something else. But what this did is it looked at an analysis of when you were running which we thought a typical session was and it saw which blocks of memory were the most used. And it reordered your executable, reordered the binary code so that the stuff that was used was there together so you did less swapping.

And when Dave came to us in a war team meeting, war team is what we called all the management group when you were figuring out what you were going to do next and how everyone was doing. Said, "We want to do this." We said, "Are you nuts? You want to rearrange the bytes of the executable and we're going to ship this?" But it's the only way we were able to get all those features working on, I think it was a four-meg system, an eight-meg system with a VGA. It wouldn't have happened otherwise, it would've thrashed. So, there was all this 32-bit shell, Outlook being shipped with it. New version of OLE, LEGO rearranging the basic blocks of the system layout, it was all just bleeding edge stuff and it all came together.

Mario Juarez: Yeah.

Dennis Adler: It was wild.

Mario Juarez: We'll take a break in a moment here, but just give me your best Windows 95 memory, especially I'm thinking about launch arrival of the product.

Dennis Adler: Okay. Well, so my best Windows 95 memory, there's several, but the biggest has to be the ship party. David or somebody using... I don't remember if it was David or who went around but they went to every Costco and bought out every case of Dom Perignon they had. Then we filled the back of David's pickup truck with ice and stuck the bottles in there. And we had boxes of Gold Master CDs of the final product which were printed with a gold face on them and people could take those home and take a few to give the family. And then we had bottles of, I don't know, a cheaper champagne like a Kroger or something, that we were sprawing each other with. So Brad made the toast that we shipped and then we're all spraying each other with champagne and people... I'm getting ice cream sundaes and hot dogs dumped my head.

People are running around, people are riding motorcycles through Building 4 but I missed that because I was trying to pour champagne over a marketing guy's head and he pushed me away and I stumbled, and I had brought a change of clothes because I knew I was going to get doused. So I was wearing flip-flop shorts and a T-shirt, and I tripped and my toe hooked on the leg of a folding chair which hurt but no big deal. So I get up, I didn't spill the Dom Perignon and I'm walking around and my foot burns and I look and there's all this blood coming from my toes. So when the webbing on my foot got stuck, I wound up having to take a cab, smelling like the room of a bar, to the ER caked with champagne, hot dog condiments and ice cream sundaes. And the surgeon said, "What happened?" I said, "Just don't ask, just fix it." They stitched my toe up and sent me home but I missed the finale which was

everybody jumping into the Building 8 fountain. I called my wife from the ER. We got cab vouchers because we knew people would be sloshed.

So I used my cab voucher to get to the ER. So I said, "I had to use my cab voucher to get to the ER." She said, "You what?" I said, "Just come get me, I'll explain it."

Mario Juarez: That's so great.

Dennis Adler: Okay. So when I started at Microsoft, one of my early Bill meetings, somebody was getting yelled at and I learned that it wasn't uncommon, especially if you try to slip something by pretend you knew it and you didn't, you get yelled at pretty thoroughly. And when that would happen to me, I would ring, "No, no, you don't get it. It's all these. It's X, Y, and Z and that's all really important." And that could turn into a two-way shouting match. So on Windows 3.1 with TrueType, a developer, and I still remember his name, Jean-François Peyroux, forgive me, Jean-François if I mispronounced it. And he came up with this really wicked cool idea for downloading fonts to a printer.

In order to get WYSIWYG, you wanted the same font you had on the screen to be on the printer. So Jean-François thought of this really fast way to download just the bitmap sizes we needed for just the characters we needed so the page would print. It was like just-in-time downloads. It was brilliant. So we could print a formatted page on a post-script printer with TrueType faster than post-script could print it using the post-script driver. And we didn't really

announce this, we just had that out there. It worked on that same dynamic download scheme, worked on HP printers, on any printer where you could download a font.

And so, Adobe had done some printing and they said, "What the heck's going on?" So Chuck Geschke, the No. 2 guy at Adobe, called Steve and wanted a meeting. So Steve called me and said, "We're going to talk to Chuck Geschke. Tell me about this dynamic downloading." I'm explaining the technology behind it to Steve and how it's just the stuff we need and it's just these characters just in time. And Steve kind of rubs his chin and looks at me. He says, "I don't know Dennis. This just sounds kind of not all together to me." And I took a deep breath and I was about to go into, "But you don't understand." And I realized, "Wait, Steve is poking at me." If you ever do construction work, and I was just fixing something on my deck, when you want to know if you have dry rot, you poke.

So Steve and Bill were really busy. Well, maybe Bill could and maybe Steve could too, but I don't think they could possibly contain everything in their heads that was being said and going on. So they would poke looking for a soft spot, and it's like dry rot in wood. If they find it, they would dig in and they'd make loud noises and they'd rip it apart and you'd have to go fix that soft spot. So I realized Steve was poking at me to see if I really believed what I was saying. So I took my deep breath and instead of going into my tirade, I said, "Steve, let me start over because I must be doing a poor job explaining. This is the best idea you've heard all month." And Steve just smiled and said, "Let's make the call." That's what he wanted to hear. He wanted to know I was confident. And I was. I knew what we were doing was the right thing, but that was this real ah-ha moment for me where it's don't get mad, just make sure they know you know what you're talking about.

Mario Juarez: Awesome, awesome, awesome. Okay, thank you for that.

Dennis Adler: You bet.

Mario Juarez: Let's move down to the latter stages of your career.

Dennis Adler: Okay.

Mario Juarez: After the glory of Windows 95.

Dennis Adler: So after Windows 95 shipped, I'd been at Microsoft for seven years. I'd been smoke jumping from fire to fire. Some of them took longer to burn or work through than others. And I remember during Windows 95, I would be coming into the office between 7:00 and 8:00 in the morning. And on early days, I would leave at 10:00, and I was working Saturdays too. So my kids I'd come home and sometimes I'd be home at 3:00 in the morning. Everybody would be asleep and I'd be up before they were gone. So I really wanted something where I could pick a position where I'd be around my family more before they forgot who I was. And so, after Windows 95 was wrapped up and the ship party had happened, I sent Steve, Bill, and Paul Maritz, and Mike Maples an email that said, "Can I pick my next job please?'

Because before it was always, "Go do this, go do that." And I did it and it was great stuff and it was agreed that I had earned the right to pick my next job. So I was looking around and I went to talk to Rick Rashid in the [Microsoft] Research group, and they were doing really cool things there. Speech technology, natural language learning graphics, cutting-edge OS work, security work to protect disks. Excuse me. Security work to protect the contents of disks, networking advances, vision technology. And I thought this would be really cool. So I asked to go work for Rick and my goal was going to be to take all my years of product knowledge and use that to help push that research technology back out to the product team so they could use them. At Microsoft, the saying when I started was, "Until you ship your nobody. And after you ship something, you understand why that is."

So I had Windows 3.1 and the whole TrueType thing, MSDN, Windows 95. So I had a few big things under my belt. So I had some street cred if I went to a product team to say, "I think you should look at this." So that's how I started in Research. And I spent the next 10 years of my career until I retired there. The thing that was amazing for me, it was like getting an honorary PhD in computer science. I learned so much. I had no idea about how language models worked or about how you would take the pixels in a video array that were coming onto the screen and turn it, decide what's the outline of the person, where are their eyes, where's their nose? Bitmapping that onto a 3D surface and showing what that projection would look like. Processing natural spoken language and figuring out the parts of speech.

How do you create an operating system where all the drivers are running at ring three, which is unprotected, and the OS is at ring zero. Right now all those things run at ring zero, which is why a bad

driver blue screens things. Although I don't know about Windows 11, my knowledge of the internals of that isn't really there. So I really liked the idea of going into a group where research wasn't hidden. Microsoft research encouraged everyone to publish. We still got patents before we published, but we published. All the companies I'd been at before, you held trade secrets really close. You didn't want to let people know what you were working on. I liked the idea that we were doing all this work and sharing it with the world, trying to advance the state of the art while we advanced own OS, our own products. And that seemed pretty unique. I didn't really see IBM Labs out there publishing everything they found or Intel. Of course, I wasn't going to conferences where Intel was, but I found plenty of bugs in their chips in my time.

Mario Juarez: Talk about what it meant. Take us back to '96 and Microsoft has now ascended really to a preeminent place in people's minds. What did it mean for Microsoft to say, "Now we're going to actually make a significant investment in pure research." Paint that picture please.

Dennis Adler: So when I got to Microsoft Research in late '95, early '96, it was already fairly well established. There was the natural language group, the operating systems group, speech group, the vision group, and I'm probably going to forget some, networking group, security group. They were all looking at state-of-the art and what was there. And I remember in one case there was one researcher, John something, his name escapes me, but he had these ideas for things we ought to do on the internet. And I was looking at that from a product point of view and looking at what was out there and saying, "There's nothing like this out there." And I was trying to get a patent attorney who shall remain nameless to patent this stuff because this was cutting edge, we should patent it and he should

write these papers. And they kept putting me off and putting me off for about a year.

And suddenly I read where, I don't remember if it was Netscape or Sun, somebody else had patented some of these ideas. And back then it was first to file. It wasn't first to file, it was first to invent, but I didn't have anything but thin notes on it. So I just sent this patent attorney email and said, "You blew it." And she said, "Okay, I'm sorry. I owe you a case of scotch." I said, "The scotch I want, you don't want to buy a case, but I'll take two bottles of ..." And I gave her the name of some really nice expensive scotch, well-aged. But that was the first proof to me. This was back in the days when Lycos was the big search engine. Remember Lycos? So that's kind of what showed me that research could have some ideas. It could really move the company forward if you could get the product team to take notice.

I had a personal experience with a research technology that moves stuff forward. In order to ship Windows 95, as I think I had mentioned, Dave D'Souza took this technology called Lego and used it to optimize the executable. This was something where this research project these guys had worked on made it so we could ship Windows 95 so it could work in the memory. So I knew that there were smart people there doing great things, and I wanted to see if I could increase the flow back to the product team.

Mario Juarez: How'd it go?

Dennis Adler: Well, how'd it go? It turns out that what the natural, I was trying to push the natural language technology out to the Word team to use

in the grammar checker, but it turned out that what they had wasn't any better than the statistical models that were being used at the present time. So it turns out that even when something looks really cool and it demos really well, doesn't mean it's all there. Speech technology, XD Huang was the head of the speech group and he's now at Zoom, I think is their CTO and their AI director XD had built this speech technology with a hidden Markov model and he had a fairly strong Chinese accent and I understood him better than he understood me. But of course he ran the team.

And it was funny because you'd be in meetings where you do presentations and speech was always five years away, five years we'll have this and that. And it finally got there. I think it took 15 years, but it was always five years out. So that was kind of a running joke in some meetings. "Yeah, okay, another five years." Some of the first stuff I saw go to product teams was ways to secure CDs with license keys. Do you mind if I take a little sidebar here?

Mario Juarez: Please.

Dennis Adler: I got my start in PCs by just reading the BIOS. That's how I learned assembly language. I read the IBM ROM BIOS manual, and I started poking around in the BIOS and seeing what I could change at the DOS level. And back then, I remember the first viruses were showing up on computer bulletin boards. You download something and it would issue a single INT 13 command, which was the BIOS writes your disk, and it was a single command, format the disk. Put up on the screen, "Ha ha ha, you're screwed." And your disk was being formatted. So I wrote some software to intercept INT 13.

So, if I was running something that I didn't know, I could see if it was going to try and do a format, I could stop it from doing something that would damage my hardware. Then I figured out even further how to make my IBM PC-XT, which had a 10 megabyte hard disk instead of floppies, how I could make it reboot and ignore the hard disk so I could just run off floppies so if I formatted something, it got by, it wasn't going to hit my hard disk. So I played down at that kind of level.

So, when the games group, which was run by Eddie Fries at the time, who had been the development manager on Word, they'd release a new game and you needed to have the CD-ROM to play it. And we just had stuff on the network. So I thought, "Oh, there's got to be a way to fix this." So I came up with some low-level system stuff that I won't go into, but figured out how to tell where the checks for the CD-ROM were. And I would just patch the assembly language in the executable to skip checking for the CD-ROM and wind up with the right thing in memory or in the right register to say that it passed the test. So I bypassed the test.

And I'd send Eddie a diss mail. I'd say like, "Oh, Eddie it took me 20 minutes and three bytes. Come on, you can do better than that." There was one time I changed one byte and it bypassed and said, "Eddie, come on." So I took a sabbatical while my wife got her PhD, and during my sabbatical, Eddie sent me an email saying, "We've got this new technology to protect our CD-ROMs. Tell me if you can make these things copyable." And I spent six weeks of my sabbatical when my kids were in school, I was Mr. mom, so my wife could finish her doctorate hacking away on this thing, just hacking and hacking. And it took six or eight weeks, but I sent Eddie an

executable that said, "Here it is. Here's how I broke it." And it was by replacing a system-level component and figuring out how the security worked on the CD drive and what they were doing and how I could copy all of that.

So when I came into the research team and saw they were working on security to protect stuff, I wanted to talk to them and see what they were doing based on my background or based on my poking around. And it was really cool to see some of the ways they were trying to do stuff just to have these license keys that couldn't be replicated and could be protected. And now of course, we let everybody copy the software on anything they want anyway. We give away Windows, the models changed. But back then we were really worried about protecting our intellectual property and not letting people copy it.

Mario Juarez: Was it based on private key encryption?

Dennis Adler: Which-

Mario Juarez: The disk protection?

Dennis Adler: Okay, so this disk protection that was being used by the games group, the company that did it, they said, "We're going to create a 10 million byte or 10,000 byte key or something, and it'll be unique to your CD and without this key, nobody can run it." So I was like, "Well, what the heck does this mean?" So I just spent time drilling in

and I discovered what they did is they had damaged a thousand sectors on the CD or 10,000 sectors on the CD, I forget the exact number so that if you read them, you'd get a read error. And they would issue hundreds and hundreds and hundreds of CD reads, and only one of these would be the bad sector. And they would keep reading the CD and then they'd go off and do some computations. And if you gave them the right answer on that one CD read, they would continue to decrypt the encryption on the CD and let you run the program.

So, I got underneath them, intercepted the CD calls, and had a list of which ones were bad and let the ones go through that were supposed to go through to return something from memory. But when it was bad, I instantly returned a bad result and boom, it was broken. So with copying, I don't know, like 2K worth of CD sectors and a revamped DLL that sat underneath everything, you put the CD in and ran it and it thought it was okay, even it was an illegitimate copy.

Mario Juarez: So you just figured out that that was what they were going to do. They were intentionally damaging the disk in specific places, which you couldn't see. They knew it. It was part of their thing. And of course this is trade secret for them, but you figured this out.

Dennis Adler: Well, yeah, and not only was this trade secret, but they had all this technology in there to keep you from doing debugging. They would run a section of code that they knew it should run between these, it should run about this fast, and they probably did speed tests up front, and if it took longer than that in microseconds, they knew you were debugging and they sent you off into never

neverland. So I was writing code first to hide that I'd modified their code and then to log what was going on because I couldn't do it in the debugger and see what happened. Then I saw this bunch of C. I was just sniffing around, right? It was-

Mario Juarez: You called yourself a smoke jumper before. I'm wondering if that isn't underselling a little bit because I'm just trying to think. So first of all, congratulations. Thank you again for a really great description and I'm just sort of marveling at how clever this scheme was that they did, but then the fact that you figured it out. What kind of person are you, what kind of person were you that you could do this?

Dennis Adler: What kind of person was I to go and hack into this and figure out what it was? I liked hard problems. One of the things I like about software is you write it and it does what you tell it to, unless there's a bug in the compiler or the OS, but generally it's doing what you tell it to do. You just don't realize you told it to do this thing, especially if you're multi-threading. So debugging is going in and saying, what the hell is going on here? Trying to reproduce it and figure out how you got to this piece of code where you don't think you should be in this situation. And a lot of it is running stuff through, watching the debug screen, seeing behavior, and then going away to think, just letting it percolate in the back of your mind for a while.

One job I had before Microsoft, I was trying to take this program that simulated a card IBM put into their PCs that they charged a fortune for to let you talk to their system 34, 36 and 38, which was like their mini computers at the time, and they wouldn't tell you how it worked. And the company I was at had bought a C program from another company that did this work and they handed it to me

and said, "You're going to own this and maintain it." And I'd never even seen these kinds of things before. So I told the company president, I need an oscilloscope because I was watching signals on the serial line. I needed a hardware debugger. It actually simulated the Intel chip and you could see steps that were happening, but only the last few thousand. I needed to see tens of thousands of steps.

So I had this hardware debugger rolling, and I just sit there with a do not disturb sign on my door watching the oscilloscope, watching this stuff scroll past the screen and I'd hit the break button and see what happened. And by doing that for two weeks, I found the precise piece of code I needed to modify. I don't know how I got there. I don't know how I happened to hit break at the right time, but just the flow on the screen changed. So I zoomed in on it and that was the piece I needed.

And so, it's just letting it percolate and trying to think how could this be? And the last piece of software I wrote, I was trying to get 256-bit AES encryption working through the Bcrypt APIs. Microsoft's documentation on that stuff is terrible. It's terrible. They show you how to encrypt a 16 byte block or a 32 byte block, a 32 byte block, that's it. I want to encrypt whole files of video, random lengths. So I'm searching and searching and looking for stuff on the web and I finally put it all together and get it to work. And I thought, "I'm going to write an article." Because when I find this kind of stuff, I'll go publish a tech article because other people have helped me that way.

And I realized by the time I made the code work, it was too complicated to write a simple article to explain it. I was like, "Okay, maybe this is why the documentation's bad." But that's the kind of guy I am. I like drilling in to figure out how it works, why it works. That's why I liked working on cars. What's wrong with this engine? Why is it misfiring? Isn't this working well, why is the timing off? So why is the flow changing here? Why is this path through the CD-ROM I'm playing with working and that path doesn't, and how do I get around that? How do I mess with it? How do I tweak it so I get what I want? How do I change the code the games group did so it doesn't need a CD anymore? How does it work and how can I futz with it? That's the kind of guy I am.

Mario Juarez: That's awesome. I can see why you did quite well. Let's talk a little, let's shift the focus. Let's talk about legacies.

Dennis Adler: Okay.

Mario Juarez: And lessons. What's your legacy at Microsoft? What would you like to be remembered for?

Dennis Adler: My legacy at Microsoft, I think I'd like to be remembered for the TrueType work. And I mean if I could pick two things, it would be Windows 95 and TrueType. I felt those were the two biggest things I worked on. MSDN was a great thing and it helped people, but it's kind of non sequitur now, it's all on the web. Windows 95, I still have an open product box at home. I have one of those Gold Master CDs signed by Steve, Bill, Mike Maples, Paul Maritz, and Brad Silverberg. I think that was a huge thing, but it's history now.

TrueType I guess was a great success because nobody thinks about typography anymore, nobody. It just works. I guess contributing to the part of Microsoft where people didn't have to think about what do I have to do to make this work at just works. Brad's mom could do it. Right? My mom could do it. My girlfriend could do it. It's all this stuff that makes computers just straightforward to use now. I think that was what Microsoft was trying to do with these releases of Windows and TrueType and Windows 95 and XP, and well we'll skip Vista Windows 7. Right? Windows 10 and 11. I still remember when you had to reboot your computer regularly. I still remember when if you didn't turn your cell phone off every day, the cellular stack would collapse and crash.

So the fact that people only reboot their computers now after Windows Update runs, when you think about where we were 30 years ago, that's freaking amazing that it's that stable and that we can send out updates, they sometimes crash, but we send out updates and for the most part it's seamless. It all just happens. People focus on their work instead of on how they're getting their work done.

Mario Juarez: What do you think Microsoft's legacy is? How did Microsoft change the world?

Dennis Adler: When I started at Microsoft, the Microsoft's vision statement, as I remember, was a computer on every desk top. And then, it got refined to a computer on every desktop running Microsoft software. I'm not sure what the vision statement is, but one of the things we

said we wanted to do in Windows 3.1 was make it easier. And then on Windows 95, we wanted to make it easy. I think Microsoft's legacy is using technology to make whatever it is people want to accomplish easier to do. If it's talking to an iPhone through Outlook to Gmail so you can get your meeting scheduled to come and do a video like this, or working with friends and publishing your schedule so you can see each other. Emailing instant messaging, easier communication, using Copilot as the front end for search, which I think beats the pants off what Google search can do right now. Things like that.

Making information more accessible so people can just do what they do naturally, ask for it, naturally, interact naturally, and get stuff done without thinking about how it happens. That's what I'd like to think of as the legacy of the work we started and that Microsoft continues to do.

Mario Juarez: Awesome. I feel like there's so much more to talk about. I think we're sort of at time, but I want to give a few more minutes. What else? What else?

Dennis Adler: Here's a fun Steve B story. When I had started work on TrueType and had wrapped up the work with IBM and was ready to go do something else, I said, Steve came and talked to me and he convinced me to stay on TrueType. The way this talk went is Steve comes in my office and closed the door and he's got this piece of paper in his hand, and I've heard about this piece of paper. It was his list and he'd have his list and he'd cross off stuff as he did it. And whatever he was done with the end of the day, he put the paper down.

So, Steve and I are talking, it's maybe an hour, and he suddenly, he's walking, he sits in a chair, then he gets down on the floor, puts his butt against the wall and puts his feet up with his shoes off. He's just talking to me like this on his back. I was like, "What the fuck?" And that's how we came to an agreement about I'd keep working on TrueType and who I'd be working for. And then Steve left and he left his list. So, I ran after him and I had to give it to his admin Debbie, but to have Steve come sit and put his feet up on the wall and just yap was wild.

One of the things I loved about Steve is, Bill, you could talk technology and get involved in a tech discussion. Steve always bring it back to tell me what it's about for the customer. And when you were talking to the both of them, you couldn't get away with anything technical or anything that didn't serve the customer because between the two of them, nothing slipped by. It was wild. Steve would act like, "I don't understand." He understood it all. He just wanted you to explain it to him to make sure you did. That was my take.

Mario Juarez: So go back if you would to that first day at Microsoft, imagine ... What building were you in?

Dennis Adler: I was in building two. That's where the OS/2 group was sitting.

Mario Juarez: That's good. And imagine that you had the opportunity to go back and offer wisdom and think in terms of the lens of what you would then also concurrently say to somebody who's walking into the new building today. And this is a question about what is universally true

and especially against the context of a company and an opportunity like Microsoft has. What would be your words?

Dennis Adler: So when I first started at Microsoft, if I could go back and talk to that young man, one of the first things I'd say is you have to understand how important it is to ship a product because you really have no idea what it takes until you do. That's why you were nobody until you shipped. And I thought initially, I've shipped hundreds of products, but not on this scale. Nobody shipped products on the scale that Microsoft wound up doing. So that would be the first thing. The second thing I wish I knew was how to talk to the press without learning the hard way. Hopefully Microsoft does more of this now, but the prep work that was done, there was one interview I did where they were asking me questions and I was answering in a conversational tone. And fortunately, they let me see the transcript first.

And I remember reading Playboy interview articles. I only read Playboy for the interview articles and the jokes. And those interviews were great and incisive, but you read this long answers, "Oh, that guy's evading. He didn't answer the question." I read my answers and what I thought were great conversational answers, it's like, it sounds like I'm evading. So I didn't realize, I should ask, "Is this a conversation or is this a he-said she-said." Because you answer in a different way, you're much more thoughtful. And thank goodness the time I learned that. So it was learn how to talk to the press. They don't need to know everything you're thinking,

Mario Juarez: Did you ever get burned in the press?

Dennis Adler: I got burned once where they took one of my quotes and used some creative ellipsis and made it sound like something completely different. And when they didn't let me pre-review it, I refused to talk to that publication again. It's like, "No, you're not making it up, but you're twisting the truth." I wish I understood better when I started, or I wish I could explain to myself how to properly roll out information about a product when it's still vaporware. When we were rolling out TrueType, we were competing against Adobe Type 1, which was the market leader. And so we'd say everything we had to say and then they would then talk about what they're doing and keep repeating that they really have the technology now.

So you have to learn to be strategic in what you reveal. Like that story with Steve where the interview with Chuck Geschke where we didn't tell them we were doing these dynamic downloads, we just let them find out about it. You roll stuff out slowly and only do the big reveal when you can show them what you really got. That was a hard lesson to learn, but fun to see to completion.

Oh, other things that I wished I understood was how passionate people can be about the products they're working on. I had come from an environment where we talked about ego-less code. You were working in a team. If somebody found something that they wanted to fix in your code, you accepted it. Here people are much more passionate about it, but it was less because, no, your way isn't better. It was more about what's the right way to do it? How do we make this better for our customers? And I had shipped software to customers, but they just took what I gave them. I did my best to do it, but there wasn't the level of feedback that Microsoft got. So understanding the passion and how to channel that, I wish I'd

understood more of that. And the thing I didn't learn until after I retired was better work-life balance.

Even in research, I was working 60-hour weeks, but compared to the 80-hour weeks with Windows 95, that was pretty easy. And I had 20 more hours or 50-hour weeks. Those were pretty easy too. But understanding how important it is no matter what you're working on, to take time to be with the people you care about and love because you never know what's going to happen to them. And fortunately for me, by the time I retired, I was able to spend more time with family before I started losing family members. But that's better work-life balance. I suspect that's present now. But back in the day, back when I was at Microsoft, it was you just worked as long as you had to until you got it done. And my recruiter lied to me about that.

Mario Juarez: All right, anything else?

Dennis Adler: Oh, here's one more great story for you. I told you about the long nights working on Windows 95. I would show up at 7:00 or 8:00 in the morning, sometimes not leave till 2:00 or 3:00, around 10 or 11 o'clock, whoever was around a bottle of scotch would come out and we'd play doing half an hour, an hour of multiplayer Doom while sipping scotch. And somebody had actually hacked a version of Doom or found a mapping version of Doom and built the Doom, you remember Doom with all the flashing lights and the monsters and the BFG and the shotguns and everything else? They made one that looked like Building 4, which is where we were working. So you were going through the halls of Building 4. I don't remember if they had our names on the office doors, but it was

really cool ducking out in and out of Building 4 offices, shooting the BFG down the hall. I think it kept the same.

Mario Juarez: Somebody actually did that?

Dennis Adler: Somebody built a Doom map that looked like one of the old Building 1 through 4 ones. Yeah, I mean [Building]1-6 and then it went to Building 8. So somebody taking the time to do that and we could play Doom that way. That was pretty wild. And we also played a lot of Descent when that came out. You had to do something to keep your brain from exploding when you're working those kind of hours. I never told my wife about that, though.

Mario Juarez: Probably good.

Dennis Adler: Yeah. If she sees this, we're divorced now, so that's okay.

Mario Juarez: Hence the part about work-life balance.

Dennis Adler: Yes.

Mario Juarez: Awesome man, this is fantastic. We could keep talking, but we've got to keep a schedule.

Dennis Adler: No, I'm glad I was able to help.