Computer History Museum

Oral History of Mark Nemenman

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Bochannek: This is Alex Bochannek. I'm a volunteer and former curator at the Computer History Museum interviewing Mark Nemenman for this oral history interview. And today is March 27th, 2018.

Temkin: I am Vadim Temkin. I'm going to assist in translation from Russian and into Russian, if needed.

Hsu: And I am Hansen Hsu. I am a curator here at the Computer History Museum.

Nemenman: And I am Mark Nemenman.

Bochannek: Great, let's get started. Thank you for taking the time to come here for this oral history interview, really appreciate it. Let's start with introducing yourself. What is your full name, and when and where were you born?

Nemenman: Okay, my full name is Mark. My last name is Nemenman. My father's name is Yefim, and full name is Mark Yefimovich Nemenman. So, I was born November 6, 1936 in Minsk, which is right now capital of Belarus, independent country.

Bochannek: Great, can you tell me about your family and about your parents? What did they do? Where did they grow up?

Nemenman: So, <speaking Russian> As was written in biographies in Soviet Union. I was born in a poor Jewish family. So, my father was a <speaking Russian>.

Temkin: Typographic worker.

Nemenman: Typographic worker. So, without some education. My mother was a bookkeeper. And my family was-- has three children. I had two sisters which were older than me. And I was the last of children. We lived in Minsk. Minsk was a small town, maybe two hundred-fifty people-- two hundred-fifty thousand people before the war. The war is Second World War, the war, and so, thirty-five, forty percent Jewish. It was visible on streets. Some people speak Jewish, not--

Temkin: Yiddish.

Nemenman: Yiddish, not Hebrew. So, that's all about my life before the war. When the war started June 22nd of 1941, all my family, so my parents and my sister and me, by foot go from city, go from town. My grandparents left in Minsk. And they left in the Minsk forever in Jewish ghetto. And we go by foot maybe fifty kilometers, and after then, by car, by some train. So, we reach almost river of Volga, Chuvashia.

Temkin: Chuvash republic.

Nemenman: Chuvash is maybe nationality like Tartar, like Mordva , so around Volga. And we lived there maybe in this place maybe four years. And my father go to the war. And after then, in June of 1945th, we come back to Minsk. I start my school years in evacuation in Volga. So, after then, everything was easy.

Temkin: Comparatively.

Nemenman: Yes. So, I finished my high school in 1953, exactly when Stalin died.

Bochannek: So, you left Minsk.

Nemenman: Yes.

Bochannek: During the war, returned at the end of the war, and then lived in Minsk for most of the rest of your life?

Nemenman: Yes.

Bochannek: Until you emigrated to the United States? Did you marry in Belarus?

Nemenman: Yes.

Bochannek: Do you have children yourself?

Nemenman: Yes. I married in-- let me recall, 1974.

Bochannek: Okay, and do you have children?

Nemenman: Yes, I do. I have two sons.

Bochannek: And when were they born?

Nemenman: 1975 and 1976, very quickly.

Bochannek: Great. When you were an early age, when you were a child, when you were in school, were there people in your extended family, were there friends or teachers who were influential that you remember were role models to you?

Nemenman: I can only recall maybe in school couple teachers. One of them is-- was some principal of school, history teacher. And he taught us maybe don't believe everything what you read, think yourself. And it was interesting in that time because it was not common in that time. And second teacher what-- which I remember what is my teacher of German. It was a language which we learned in the school. Maybe this person was very strong and very-- let me start different. In our class, it was a lot of people who was older than me, because they stayed in Minsk during the war and didn't learn. And almost all of them can speak German because after three years under Germany, they understand everything. And only five (maybe) people in class waere like me, small children and never learned something else. And it was hard for this teacher to tell them "schweig." Do you understand what it means, "schweig," in German? "And let me learn these people. You know everything what you need. Read something instead of sprechen" -- I think I'm using German here. "And I will teach them." It was interesting for us because this person, this

teacher, shows us how to be different with different people and how to reach the goal, what saying it. That's all in my childhood.

Bochannek: What topics did you enjoy in school? And which ones did you not enjoy?

Nemenman: Everything was easy for me because I never did homework. I everything did in class immediately once they told. And it was easy for me. I have a lot of-- a lot of time to read something at home.

Bochannek: And you said you graduated from high school in 1953?

Nemenman: Mm-hmm.

Bochannek: Did you serve in the military?

Nemenman: No.

Bochannek: No military, okay. And then you chose to go to the Belarusian State University for mathematics?

Nemenman: Yes, it was-- it was hard for Jewish people to be <speaking Russian>.

Temkin: To get accepted.

Nemenman: To be accepted in some university. But fortunately, Stalin died in this year. And nobody knows what to do with me, because I got the right to go to university without--

Temkin: Examination.

Nemenman: Examination because I got some medal, not gold but silver. But it doesn't matter. And I go to interview, to speak to me in the day when the Beria-- do you understand this family name?

Temkin: You know who Beria was?

Nemenman: Beria was KGBist big-- KGB's--

Temkin: He was the main KGB person on top of--

Nemenman: Before Stalin. And after Stalin, he will pronounce as a British spy?

Temkin: British spy.

Nemenman: Spy and killed after them. And exactly that day what I go to interview, by radio will announcement that Beria is British spy. And nobody knows what will be after this event. And this is the reason why I come in the university easily. I understand this.

Bochannek: You said you got a silver medal. Was that in high school?

Nemenman: Yes.

Bochannek: For what?

Nemenman: At that time in Soviet Union, it was two kind of medal, gold medal for people who has everything A, and silver medal who has maybe one or two B and everything else should be perfect.

Bochannek: But you did not have to do an entrance exam?

Nemenman: Yes.

Bochannek: Okay.

Nemenman: It was not always, but at that time, it was this policy. Maybe later is something changed, but in that time, it was--

Bochannek: And why did you choose mathematics?

Nemenman: Because I like it <laughs>.

Bochannek: Any particular field within math that you enjoyed the most?

Nemenman: No, it was-- no, no. I made choice between physics and mathematics because the faculty was physical mathematics. And because I didn't like to do something with my hand and better preferred to think something about, I choose mathematics is one reason. He is [pointed to Temkin] a physics.

Temkin: I am theoretician. It doesn't matter.

Nemenman: It's almost the same <laughs>.

Temkin: <laughs> It's the same thing, yes.

Bochannek: And you were there until 1958.

Nemenman: Yes, that's five years.

Bochannek: And you graduated with a master degree?

Nemenman: At that time, it was no master degree, no bachelor degree. It was only higher education.

Bochannek: Okay.

Nemenman: And so, if I came in the USA maybe forty years later, so I make an evaluation, it was like a master degree.

Bochannek: It was equivalent to--

Nemenman: To master degree because it's five years.

Temkin: This is pretty standard to everybody who had five-year education, usually claim masters.

Nemenman: Master degree.

Temkin: But Russia wasn't that far off--

Nemenman: To finish with this my student years, I can tell you, so it was Khrushchev <speaking Russian> what this means <speaking Russian>?

Temkin: Thowing

Nemenman: Yes, it's like maybe easier life in after the Stalin, exactly <speaking Russian>.

Temkin: Yeah, the twentieth--

Nemenman: Twentieth Kongress of Communist party, and the Khrushchev about <speaking Russian>, Stalin--

Temkin: The personality cult of Stalin was--

Nemenman: And after then, it was easier to recall something. It were interesting years. And I got Lenin stipendium.

Temkin: The Lenin stipend.

Nemenman: It was very hard for Jewish people because it was not usual. It was an interesting fact.

Bochannek: What fields of mathematics did you study? And were there particular teachers or classes that had the greatest influence on you?

Nemenman: Algebra. So, algebra and-- answer, yes, algebra.

Bochannek: What did you think you wanted to be after you leave school?

Nemenman: It was hard for me to hope to go to PhD program, "aspirantura" in Russian. And but I suppose I will. And so, my professor in university, the name is Suprunenko Dmitry Alekseevich, algebra specialist in abstract algebra not low level algebra. So, if I told to my scientific boss maybe in the one year before choosing the diploma <speaking Russian>-- what should I do to get the diploma? He asked me what do you want? And because at that time, I already had read the book about computers. First book about computers in Russia was <speaking Russian> author Kitov in 1956 printed. And I read that and understand it's interesting for me. And I told my scientific boss let I will do programming algebra. Boss told me "okay, solve this algebra problem, a small problem for any case. And after them, you will explain me what the programming is." And it was my duty to tell the boss what is programming because the word programming in Russia was connected with linear programming not with programming for computer. Linear programming, you know what this means.

Bochannek: Was there even a computer at the university at the time?

Nemenman: No, no, no, no computer in Minsk.

Bochannek: Right.

Nemenman: At that time, no computer in Minsk, not only in the university.

Bochannek: Have you heard about cybernetics at the time?

Nemenman: <speaking Russian>

Temkin: Yeah, the term was-- is bourgeois science of cybernetics-

Nemenman: Not science-- <speaking Russian>

Temkin: Pseudo-science of cybernetics[1].

Nemenman: Of cybernetics. And I was a curious student. In the first year of student, I go to a different faculty to read – to hear something. And the lecture was <speaking Russian>.

Temkin: Okay "Bourgeois Pseudo-science of Cybernetic is a Whore of the--

Nemenman: Of Imperialism, imperialism." And this is-- so, lecturer was a professor of <speaking Russian> [department of] philosophy. And going in after-- on the last my year, I heard the lecture of the same professor. And the name of lecture was "Priority of Russian Scientific in Cybernetics." And the proof was this one. It was Nobel laureate.

Pavlov.

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[1] [Interviewee's note] https://en.wikipedia.org/wiki/Suppressed_research_in_the_Soviet_Union#Cybernetics

Nemenman: Physiolog--

Temkin: Physiologist.

Nemenman: Physiologist Ivan Pavlov, Nobel prize in maybe thirties years[2]. And Pavlov learned about <speaking Russian> reflex, conditional reflection something <speaking Russian>.

Temkin: Learned on dogs.

Nemenman: And as a-- because this philosopher count the drop of saliva it was mathematics. And because he applied this drop of —saliva, these numbers, to physiology, it was mathematics in biology. What this means cybernetics? It's exactly mathematics in biology. So, this is a proof. It was a proof of priority Russian scientific in cybernetics. It is interesting history, I hope.

Bochannek: Thank you. After you graduated, you lectured at the university?

Nemenman: Yes because there is no place in PhD program for me. It was a small place for assistant of calculus – cathedra calculus in the university. And I learn-- I teach some practics. By the way, at that time, a couple of my co-students, students at the same level, so got the <speaking Russian>.

Temkin: The distribution after the graduation, they send people to--

Nemenman: After the graduation, students should-- to work somewhere, not to find work but they sent to work somewhere. And maybe five or six people from my level, from my year, got the direction to the new plant in Minsk, which is exactly the speaking Russian ["zavod Ordzhonikidze"]. So, it was very-- so, this was-- this doesn't work. It only start to produce something. And the first computer what they produced was computer M-3, which is develop-- not developed but--

Temkin: Designed.

Nemenman: Designed in Moscow.

Temkin: Moscow.

Nemenman: In Moscow. So, and this-- my co-students were sent to Moscow or to Penza to learn something about programming. And because I was-- my diploma work was the first diploma in programming, so for me, it was interesting what this means. There was still no computer in Minsk. So, my diploma work was programming of some computer or some algebra problem. And the problem was "calculate determinant degree of N." It was my diploma. It's not-- this program never work.

Temkin: What language was it?

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[2] [Interviewee's note] 1904.

Nemenman: Machine code.

Bochannek: For a hypothetical machine?

Nemenman: For M-20.

Bochannek: M-20? Okay.

Nemenman: M-20 because co-- or sorry, for Strela.

Bochannek: Strela?

Nemenman: For Strela because the system of command of this machine was described in Kitov's book. It never work.

Bochannek: Now, you--

Nemenman: And never debugged.

Bochannek: You said that some of your students of the same year were able to go to the factory.

Nemenman: Yes.

Bochannek: But you were not able to go at that point? You had to wait until 19--

Nemenman: No, no, no, for me, it was-- I hope I will have a place in a PhD program. For me, it was-- it was the reason why I stayed in university instead of going to the plant. And they go-- they go to the plant, the goal was learn them to have program to test computer, nospeak about solving problem, only write down test program to test computer which they start to produce.

Bochannek: When you did calculations as part of your studies, what kind of tools did you use since there were no computers?

Nemenman: Only pencil <speaking Russian>.

Temkin: Were they any numerical calculation you need to-- needed to-- <speaking Russian>?

Nemenman: No.

Temkin: Algebra doesn't need any--

Nemenman: No, no, no, I need only produce the code which will show and explain how end result will be determinant of-- the value of determinant.

Bochannek: In September of 1961, you then joined the factory--

Nemenman: Yes.

Bochannek: In Minsk. What led to the decision to join, and how did you get that position?

Nemenman: The reason was very simple. So, practically-- let me explain. Every three years, every assistant of mathematics, assistants of any <speaking Russian> department in university, should go to attestation. And because I was not so-- <speaking Russian><laughs>

Temkin: He didn't because he wasn't that smart.

Nemenman: <speaking Russian>

Temkin: He actually was so stupid that publicly tells that Jews are not treated well or a proper way.

Nemenman: It was a reason of that. A couple Jewish students, maybe two years-- finished the university two years after me, by distribution, were sent to Penza to computer plant. And they turned them back. They didn't <speaking Russian>

Temkin: So, the state commission and the university sent graduates to Penza factory, and they were sent back because-- because they were Jews.

Nemenman: And after them, in university newspaper about the students were returned, they didn't show up after distribution. It was crime.

Temkin: So, newspaper claimed that they didn't show up at the assigned place, and that's a crime.

Nemenman: After them, I told in public conference why they would try to punish them. They not fault, not their fault. You sent them wrongly. And after them, why you punish them? You should-- don't lie. It was enough for not prolong the--

Temkin: Not to extend the--

Nemenman: Not extend <speaking Russian> [my contract]. And after them, I make a choice where to go. It was one academic[ian] in Academy of Science of Belarus, his name Krylov. By the way, he's a-- so, Nobel prize in economics, Kantorovich, linear programming. And Kantorovich and Krylov were some author of some book in <speaking Russian>, about calculation of integrals. It was very memorable, popular schoolbook.

Temkin: So, Krylov was co-author with--

Nemenman: Co-author with Kantorovich. So, Vladimir Ivanovich Krylov <speaking Russian>.

Temkin: He actually invited him to go to Belarusian Academy of Science.

Nemenman: To like <speaking Russian>-- lower scientific-- scientist-- lower scientist in academy. But because I was interested in computers, I decided to go to plant. And at that time, three years which I worked in the university, I visited them. And we discussed something interesting. And I understand what they are doing. And it was more interesting for me to go to plant instead of academy because I can forget about scientific career.

Bochannek: So, let's talk about the plant. How was it organized? What was the purpose of it? Were there different goals, different products, part of the organization? What was the purpose of the plant?

Nemenman: At that time, the plant only produced one computer, M-3. And so, it was-- so, <speaking Russian>

Temkin: Mechanical.

Nemenman: Mechanical--

Temkin: Mechanical floor.

Nemenman: Floor maybe more-- maybe <speaking Russian>. They produced <speaking Russian>.

Temkin: They produced the boxes .

Nemenman: Not the boxes , but- wardrobes-

Temkin: Well--

Nemenman: <laughs> What is the word for it?

Bochannek: The enclosures?

Temkin: Enclosure, yeah.

Nemenman: Yeah, and they produce-- okay, small <speaking Russian>.

Temkin: They produce all the mechanical not electronic parts for computer.

Nemenman: And so, because the computer was made with radio tubes-- yes it was, some electric part. And people on this part was from radio plant. Radio plant were in Minsk maybe before computers.

Bochannek: So, this was a- this was a new factory that was built?

Nemenman: New factory, yes.

Bochannek: Can you say the full name of the factory and the organization?

Nemenman: <speaking Russian>

Temkin: So, it was plant named after Ordzhonikidze and officially didn't say what--

Nemenman: What they do.

Temkin: What was produced.

Nemenman: The similar plant was in Minsk, <speaking Russian> ["zavod Lenina"]. And they're doing radio.

Temkin: So, there was radio plant.

Nemenman: Only plant of tractors or of auto had the name what they're doing, <speaking Russian>. Plants which doing something not open has only name. For example, optical name has-- optical plant has name Vavilov. Vavilov was physics in optics, and plant Vavilov names right now doing <speaking Russian>.

Temkin: They do night vision goggles-- some devices.

Nemenman: But this is after these years.

Temkin: So, the practice was like the war factories with just numbers.

Nemenman: Or just name.

Temkin: That was kind of the highest secret and plant-- factories with just names without explanation of what they're doing.

Nemenman: What they're doing.

Temkin: And the car factory and tractor factory had like proper names.

Nemenman: It was open for people.

Bochannek: And I understand that plant was under the ministry of the radio?

Nemenman: Yes. But ministry of the radio was later. At that time, it was decentralization of Soviet <speaking Russian>.

Temkin: Industry.

Nemenman: Industry. And all industry in Minsk was <speaking Russian>.

Temkin: Yeah so, there was a period of decentralization. So, the ministries were not in Moscow. But there was like "industry council of the-- Belorussia"

Nemenman: Of this territory.

Temkin: And it was-- was kind of--

Nemenman: And the radio ministry appeared later in maybe sixty-second or   '63.

Temkin: So--

Nemenman: After Khrushchev.

Temkin: Year, 1962 or '64, they return to centralization--

Nemenman: To centralization by kind of industry.

Bochannek: What were you hired for? What was the job that you were hired for?

Nemenman: So, at that time, it's already exists scientific <speaking Russian>--

Temkin: Department.

Nemenman: Department. I'm sorry, "scientific department of machine mathematics." And the boss of this department was Stolyarov, Gennady Konstantinovich Stolyarov, a very active and very-- and people who can explain something to administration.

Temkin: To management.

Nemenman: To management, to speak interestly and <speaking Russian>.

Temkin: With great belief and empathy.

Nemenman: The name of this department was not software, not programming, not-- but scientific and computer mathematics. Word programming not used. And what the reason I got the job, like maybe <speaking Russian> advisor of Stolyarov because so almost all people who work in this department or learned with me together in the university or was my student in this three years. And some exemption there was of that, but most of them knows me. And it was easy for me to speak to them.

Bochannek: So, your first position at the plant was in Stolyarov's department?

Nemenman: Yes, it was a starshij engineer.

Temkin: Senior engineer.

Nemenman: Senior engineer. And senior engineer it was maybe highest position in this department because next position was leading engineer. There was no leading engineer at that time.

Bochannek: So, Stolyarov ran the software.

Nemenman: The word "software" was not exist at that time. And so, let me again tell him something-- something-- in English, hardware and software are maybe equivalent parts, not equivalent but parts of computers, hardware and software are different parts of computer. In Russian, computer is computer and then software is <speaking Russian> ["matematicheskoe obespechenie"] of computer. They're something second role, not the same role.

Temkin: Mathematical service--

Nemenman: Service for computer, this is the reason why the mathematician in plant was the second class, yes, not the first class of people.

Bochannek: Can you talk about Georgii Pavlovich Lopato ?

Nemenman: Georgii Pavlovich Lopato at that time was <inaudible 00:36:07> <speaking Russian> general engineer of special construction bureau, part of plant, engineering part of plant, but not production but some development.

Temkin: So, he was the chief engineering officer we would say here.

Nemenman: Right, yes, yes.

Temkin: Of special construction bureau which was design part of the--

Nemenman: Design part of plant.

Temkin: But by that part, and he was design not in Minsk. But they already opened the design--

Nemenman: So, practically Georgii Pavolovich works in institute in Moscow where his M-3 was--

Temkin: Designed.

Nemenman: Designed. And when M-3-- when the documentation to produce M-3 come to Minsk, a couple engineers from this institute come to Minsk also.

Bochannek: You mentioned earlier places like Penza, for example. What was the relationship with these other plants?

Nemenman: So, plant in Penza might be a couple of years older than Minsk-- than Minsk plant. And some people from Penza come to Minsk because it was maybe capital of Belarus, and Penza is provincial city somewhere in Russia. So, the first one was Przhiyalkovsky, Viktor Vladimirovich, which later became general constructor or ES EVM, of clones of IBMs. So Przhiyalkovsky was chief of design of MINSK-2.

Bochannek: So, would you say it was a collegial relationship? Were people working together, or was there competition?

Nemenman: No, there's no competition because we were friends with them. And we can discuss something if it was interesting at the time but-- so, it was the second plant-- the second plant the same time which appeared was in Yervan and in Kazan. At the same time these plants appeared like in the Minsk, maybe one, two years difference, in Kiev later.

Bochannek: What about the institutes that were militarily funded? Did you have any exposure to the military work that was happening?

Nemenman: Couple years later, in part of plant was closed some doors, and they produced something for military. And we didn't know about it only the name somebody told us, and some people appeared. It was military computers, not military computers, but computer used in military.

Bochannek: What about the institutes in Moscow like Lebedev and the factories there? Was there an exchange of ideas? Were there people who you knew?

Nemenman: At that time, no. Later, yes, but at that time, no because this was not-- at that time, we have some contacts with Moscow University with Computer center or Academy of Science in Moscow. And some people were there. First of all, for example, I can recall conference of computer mathematics in 1959 which was in Moscow University. And at that conference, maybe a couple hundred of people which work at these computers around the USSR, we meet with them. Before that, I can maybe recall mathematical conference number four in St. Petersb-- sorry, Leningrad in 1961, not before, but it was the first section of computer mathematics. And we heard in this section maybe some presentation about ALGOL-60 and ALGOL-58 before that and some Backus normal form of – something interesting for us.

Bochannek: And you were able to attend those conferences?

Nemenman: Yeah, I was able, but it was my personal decision. No money from my work.

Bochannek: What was your first assignment when you started working at the plant? Do you recall the first project you worked on, the first task?

Nemenman: So, they will try, the people in the department try to write down the book about programming for Minsk-1. And because I was a "professor" in university, professor or some like-- and Stolyarov propose me to make a sketch of what should we write, how the book should be with chapters. So, maybe <speaking Russian>.

Temkin: So, he was requested to do outline of--

Nemenman: What in each order should be written in this book. And to make this, I should write down some program for Minsk-1 to understand how it works. And my first problem was count square root of X in this computer.

Bochannek: So, that was on the Minsk-1-- on a Minsk-1 machine. Did you have physical access to these machines?

Nemenman: Yes. On the plant, we had this machine.

Bochannek: Okay. So, the--

Nemenman: It was my first visit to computer.

Bochannek: So, the first program you wrote that ran on an actual machine was square root calculation on a Minsk-1.

Nemenman: Minsk-1, square root of X, yes.

Bochannek: Okay, great. Were you involved in any of the other earlier Minsk machines like the-- there were specialized machines for telemetry and so forth?

Nemenman: No, I only heard about that, about telemetry, about fingerprints. It was some modification of Minsk-1. And it was a unique exemplars, one or two maybe, no more.

Bochannek: So, you then became involved with work on the Minsk-2?

Nemenman: Yes, in Minsk-2, if I came in-- on this place, Minsk-2 was already almost <speaking Russian>.

Temkin: Designed.

Nemenman: Designed.

Temkin: Design or full--

Nemenman: And some easy part, some easy question on this, I can discuss with my friend. He's maybe as my co-worker to do something with-- about this one. So, Minsk-2 was <speaking Russian>.

Temkin: He was-- it was-- the computers were accepted by state commission so the presentation--

Nemenman: It was maybe one year after I came to-- and at that time, I already start to write down something for this.

Bochannek: What were machines like the Minsk-1 and then the Minsk-2 used for?

Nemenman: As sometimes one specialist told-- from the <speaking Russian>[podium] of conference if you stop all computers, which are now working in the Soviet Union at that moment and ask what they are doing, maybe more than fifty percent of them will convert number from ten to two or from two to ten. <speaking Russian>

Temkin: Yeah so, at some conference, somebody said if you do kind of time slice of all the computers in the Soviet Union, at that moment, half of them would be converting from decimal to binary system--

Nemenman: Or backward.

Temkin: Or backward. But <speaking Russian>.

Nemenman: First of all, it was some example in engineering technique. And very seldom, it was economic because on Minsk-1, we already got the salary from computer. It was on <speaking Russian>.

Temkin: The punch tape.

Nemenman: Not punch tape, printed on--

Temkin: The--

Nemenman: Like right now coming home and print it from phone like this one[3].

Temkin: Oh, so there was a print tape like, I don't know, in cashier's--

Nemenman: Without letter, only digits. And by digits, it was like a number and some <speaking Russian>.

Temkin: So, the salary calculation, the payroll calculation, it would be just numbers, the totals, and the taxes--

Nemenman: Taxes and that's all.

Temkin: And that's all and it would get out in the--

Nemenman: From--

Temkin: Narrow tape.

Nemenman: And cuts them and distribute them. It was very seldom. It was big decision.

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[3] Narrow termal paper

Temkin: <speaking Russian>

Nemenman: <speaking Russian>

Temkin: So, there was some engineering calculations and--

Nemenman: By using some formulas in which they count before them by pencils. They count-- the programs is formal and count something scientific. That's all.

Bochannek: So, they were used for both what we would call business and scientific computing.

Nemenman: Not for business, but some economic--

Bochannek: Economic.

Nemenman: Yes, and for science. And because our computer was very slow, not for big science, for small problems, for small separate problems.

Bochannek: Did you ever have interactions with programmers for Minsk-2 or Minsk-22 machines that were not at the plant but at other plants or maybe even in other countries--

Nemenman: For sure.

Bochannek: Where these machines were used?

Nemenman: For sure. It was later because we developed a system of programming, "Autocode Engineer." It was for engineering problem. And maybe I have the <speaking Russian>-- card about these users, maybe three hundred names in this one from all country and sometimes from Europe because our computer go to Prague, to Warsaw, to Budapest, and whatever--

Temkin: Two and twenty-two?

Nemenman: <speaking Russian>

Temkin: Twenty-second, Minsk number--

Nemenman: Not Minsk-1, but Minsk-2 or 22.

Bochannek: Right. And I'm sorry, you had over three hundred users of for Autocode Engineer?

Nemenman: Yes, more than three hundred.

Bochannek: Okay, talk about that programming system.

Nemenman: Okay, that I will. So, if I came to this plant, they start already this project. And so, the leader of that was my co-student Tsagelsky Vladimir Iosiphovich.

Temkin: The prime designer for this was Tsagelsky .

Nemenman: It is so, it was very interesting because we start to develop our own language. And it was a lot of discussion about that. For example, should be in Russian or should be in English? So, how to express numbers, how to write down the program, how to put it in input, what will be output. We tried to look something outside of country and show Fortran, and some-- Fortransit it was or some variant before Fortran. And after then, we finish about that and developed the language first. It was maybe like BASIC, but it was before BASIC. I can show. I have the book about that. I can show how it looks. It looks in Russian, for example "VYCHISLIT'".

Temkin: Calculate.

Nemenman: Calculate or "POVTORIT'"-- repeat.

Temkin: To repeat.

Nemenman: Or "ESLI" - if, and go on. It was like language to speak about, "NAPECHATAT'" - print something, "VVOD" - input and go on.

Bochannek: Was the implementation of that language as a compiler, as an interpreter?

Nemenman: Compiler, again, was discussion what is better, compiler or interpreter. And what-- and how to connect this program with machine code, sometimes how to call the pieces which are written in machine code, how to call standard program and everything this one. It was very new for us at this time and was interesting for us to work with that. And it was like later the people, scientific people, told us it was very in time because they learn about the using of this language they prepared for using Fortran and ALGOL later. It was good for physics, for engineering, and whatever.

Bochannek: And the machines that this was implemented on--

Nemenman: It was Minsk-2.

Bochannek: Minsk-2.

Nemenman: Minsk-2 after the Minsk-22. Minsk-2 and 22, not big difference. And right now, we can say it, you can easy to go from Minsk-2 to Minsk-22. So, connect couple more peripherals and so make memory more bigger, and that's all.

Temkin: So, the architecture of the 22--

Nemenman: Everything was almost same.

Bochannek: Okay but there was no interactive I/O, there were no disk drives?

Nemenman: It was no display, no interactive, it was only teletype. And teletype like maybe example of what to do. And one of way to work with Autocode was work from teletype. It was possible to put from teletype the program. But it was very hard and long. It was only for demonstration how Autocode is working. And so, the best way was to prepare the program on tape and put-- and input this program from the tape.

Bochannek: Did these machines have magnetic tape as well?

Nemenman: Yes, magnetic tape, yes. It was only one kind of external memory after--

Bochannek: And there would be printed output?

Nemenman: Printed outputs in the beginning was small, and after then, big <speaking Russian> one twenty-eight, one twenty-eight characters per line.

Temkin: So, started with narrow tape, numerical tape, and then it was alpha-numeric--

Nemenman: In Minsk-2, there was only numeric. In Minsk-22, it was this one. In Minsk-2, it was possible output on teletype also.

Bochannek: What other languages were you involved in? You said that you looked at Fortran and ALGOL and so forth. What about COBOL?

Nemenman: We learned about COBOL. We start to do something with COBOL and choose some sub COBOL to implement in Minsk-22. And it was done maybe in 1969 or '70.

Temkin: And it was a subset of COBOL?

Nemenman: Sub of-- subset, yes because it's only tapes, no disk. And it's only update only.

Bochannek: How big was the team that did this work?

Nemenman: Autocode for engineering, we work in four maybe five people. COBOL, it was maybe around ten or no more than twelve people.

Bochannek: Were the men, women, different ages?

Nemenman: So, women more than men because programming was women major in the university at that time.

Temkin: And age was rough--?

Nemenman: Age, I was older.

Bochannek: Okay, but you were still a young man at the time.

Nemenman: Yes.

Bochannek: You were in your thirties.

Nemenman: Almost thirty.

Bochannek: Yeah.

Nemenman: But all of them twenty-five years.

Bochannek: Okay so, they're mid-twenties.

Temkin: Twenty-five.

Nemenman: Yes, twenty-two, twenty-five but after university, immediately. Young specialist is official name of this person, this kind of person.

Temkin: Yeah, the new graduate, young specialist.

Nemenman: A young specialist after graduation.

Bochannek: You mentioned earlier that what we would call hardware was seen as maybe a more important, a more respected job. How did that affect compensation and career possibilities?

Nemenman: Okay, first of all, it's effect of salary because all bosses were hard[ware] people not software people. And so, a little bit later when the computers <speaking Russian>.

Temkin: When computers became more popular.

Nemenman: Mm-hmm <speaking Russian>.

Temkin: And people had some places to go.

Nemenman: <speaking Russian>.

Temkin: Then it became a little bit better for the programmer.

Nemenman: Better for the programmer. And so, I remember maybe a couple first years, our goal was to teach bosses that program are more important than hardware. Software is more important than hardware because hardware is changeable. A program having a life to solve something.

Temkin: Did they believe you? Did they believe you?

Nemenman: Not always they believe. By the way, about the terminology, the word mathematical <speaking Russian>.

Temkin: Mathematical services.

Nemenman: Not service. No not service. It's not mathematical service. How to find the correct English word? Mathematical--

Bochannek: We can look it up--

Temkin: Subsistence whatever, it's more like subsistence--

Nemenman: I will find later and send you.

Temkin: It was like subsistence, I would say.

Nemenman: And so, appeared very stran--

Temkin: Strange. The term itself was strange.

Nemenman: Just remember-- so, sometimes, a user of computer sends a letter to us. And so, and one letter ask from some plant can send-- it was in Minsk too. Can you send to us some <speaking Russian>?

Temkin: Some diodes or whatever.

Nemenman: No, not-- to change something, which is-- doesn't work and, by the way, send some program if you-- some mathematical program if you have it. Stolyarov gave me this letter and told me prepare the answer. Tell them we will send you the diode. But sending of-- not sending, but <speaking Russian>.

Temkin: But we don't-- we can send you some hardware pieces, but--

Nemenman: But not mathematics.

Temkin: But we don't do mathematics.

Nemenman: <speaking Russian>.

Temkin: We can't provide mathematics.

Nemenman: Oh, provide.

Temkin: So, like yeah, mathematical providing for the problem, but that's done for--

Nemenman: For computers, yes.

Temkin: <speaking Russian> provide, yeah.

Nemenman: Maybe, I will try to find somewhere.

Bochannek: So, there meanwhile was some research going on in programming languages in places like Novosibirsk. And have you had interactions with the team there, with people like Ershov and how did that develop?

Nemenman: So, let me recall. First time, I met Ershov in 1962. At that time, Novosibirsk Academy of Science department in Siberia only appeared from '59. And Stolyarov decided to go to understand what they doing in computer because name of "Vychislitel'nyj center Sibirskogo otdeleniya" exists at that time.

Temkin: So, there was already name of computing center of Siberian department of Academy of Science, but--

Nemenman: Nobody knows what they're doing. So, Stolyarov and me-- so have the trip to that Novosibirsk and in Academgorodok were they are located -- It was in forest, some couple homes only, and Ershov department was in some <speaking Russian>.

Temkin: In the apartment.

Nemenman: In one apartment. In the kitchen was Ershov cabinet office, and two bedrooms was office of department. And they started ALGOL translator for M-20. It was number three translator. Number one was in TA-1, leader Lavrov in Korolev--

Temkin: Nuclear research--

Nemenman: No, no-- cosmos.

Temkin: Oh, Korolev Space Center.

Nemenman: Space, space-- and second one in institute, Keldysh where is president Keldysh was director. <speaking Russian>[Institute for Applied Mathematics], Shura-Bura, Mikhail Romanovich, and Lyubimskiy, they make TA-2-- TA-1, TA-2 and Alpha was three translator from ALGOL. And it was the first conference about these translators in Kiev in 1963. And this is the first time I meet with Ershov, Shura-Bura, Kurochkin, and a lot of famous computer person[s] in Soviet Union[4]. We can contact with them, but they don't-- they look of us like high person to the-- because they have big computers and their

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[4]   http://www.computer-museum.ru/english/galglory_en/0.htm

calculation was ten times more than our and go on, go on. By the way, more important they can <speaking Russian>.

Temkin: They could have the trips abroad.

Nemenman: Yes, and can have contact with outside of Soviet Union, but we didn't.

Bochannek: That was my next question, how did you learn about developments in the West?

Nemenman: Read the magazines only, only read a couple magazines. If I first time visit museum, I saw the book what I had maybe on my table forty years ago. For example, McCracken--

Bochannek: The Fortran book that was translated into Russian.

Nemenman: Yes, and maybe more. And I still remember the oblozhka.

Temkin: The cover.

Nemenman: Cover of magazine "Did you fly on the plane, which is the debugged like your program? – Would you like to fly on the plane which is debugged as your program? <speaking Russian>.

Temkin: The question is still reasonable.

Nemenman: Good question.

Bochannek: What were the magazines you read?

Nemenman: "Communication of the ACM," first of all.

Bochannek: And how did you get that?

Nemenman: It was very difficult to prove we need them to get dollars for subscribe. It was one exemplar in bibliotech, and we make copy of them.

Temkin: In library.

Nemenman: Library, yes.

Bochannek: So, at that point, we're in circa the mid-1960s now, '64, '65. You moved on to work on the development of the Minsk-32.

Nemenman: A little, yeah.

Bochannek: How did that transition for you personally work? What was your work? And from a technology perspective, how did the Minsk-32 come to--

Nemenman: Okay, it is maybe different questions. So, Minsk-2 and 22 was produced. At that time was produced Minsk-23. Twenty-three was computer like IBM 1401 or 1410, something else, with changeable lengths of words, was symbolic, so no copying, no clone, but ideas from this one. And the Minsk-22 and Minsk-23 are not compatible for sure. And because we maybe partially from, we should prove programs are important, more important than hardware. So, Przhiyalkovskiy, which at that time was a glavnyj engineer [chief of engineering], and Lopato at that time was chief of SKB [special engineering bureau]. It was separately from the plant but connected to the plant. They decided it necessary to prolong the Minsk-22 not only to go with 23 but with-- make some-- couple program-- compatible computers. So, it was-- our department was split on three departments. One of them will go to-- continue with 22, second one with 23, and the smallest is 32. And 32-- and I became the chief of this department. And my goal was so take part in design of Minsk-32. It was 1967, beginning 1967. So, we has a goal, have computer which is compatible with Minsk-22 but more <speaking Russian>.

Temkin: Powerful, more modern.

Nemenman: More modern. So, that's all in the beginning.

Bochannek: And then you worked on a system software for the Minsk-32, the dispatcher. Can you talk about what the function of it was and how that project was organized?

Nemenman: Okay, okay. So, it was just multi-programming first of all. We had four program. We have-- the goal was work at the same time processor and periphery.

Temkin: So, the idea was to be able simultaneously the processor--

Nemenman: Like multi-programming everywhere. So, again, no memory, no external memory <speaking Russian>.

Temkin: There's no memory, only tape.

Nemenman: <speaking Russian>.

Temkin: There's still no memory but the tape.

Nemenman: So, no new periphery, only the same. But <speaking Russian> [peripheral devices] the same as Minsk-23. It's the same interface. So, it was maybe good decision to keep the same printers for both computers. So, we have two limits. One limit the same like Minsk-22, memory. And second, the same like Minsk-23, periphery. It was like short corridor to work for us.

Bochannek: And then the system software, the dispatcher, you said it was a small team that worked on the 32, on the Minsk-32.

Nemenman: So, starting, we had maybe fifteen people. And in the highest period, it was maybe up to hundred. That like this one. But when the computer appeared, it was maybe forty, thirty-five.

Bochannek: So, scaling a system software team like that quickly is very difficult.

Nemenman: It was very difficult to manage all of that, to distribute the work and don't forget to understand what's happened because if you're first time multi-programming and first time modular style of programming, so how to split the program for the pieces and how to combine them later.

Bochannek: How much technical work did you do on this and how much project management personnel worked at--?

Nemenman: I don't-- I didn't have time to write down myself something. I only start to try and give something to explain something and to go to finish.

Bochannek: Where did all these programmers come from? Were they newly brought into the project? Were they already working on other things? How did you get them?

Nemenman: So, first of all, it was our previous team which-- and after then, a little bit more from the-- for example, 22 moved to 32 and new students from university because, at the same time, all of us making some diplom-- students, so learn them.

Temkin: Yes, so the graduate students' last year of graduation--

Nemenman: Mm-hmm like circle work.

Bochannek: Can you talk a little bit about the tools and processes you use to develop the software?

Nemenman: Okay, for sure. We have everything what we did, we did on Minsk-22. And first of all, we did cross-translator which works on Minsk-22 and produced a program for Minsk-32. And after then, it was my maybe duty to understand what should we do first, and what should we do next, and how to start this transfer from 22 to 32. Which part of program do here, which part of program debug here on some-- and interpret new commands which-- and after then, how to move them to Minsk-32. It was--

Bochannek: Did you already have a working Minsk-32 machine to do this on?

Nemenman: No, it was at the same time Minsk-32 machine appeared only at that time. We can't work with this machine before they appeared. And after then-- before then, we work on Minsk-22 making some model of this 32. It was very slow, but it works. It was, I believe, the interesting process, cross-- my PhD dissertation--

Temkin: Thesis.

Nemenman: PhD thesis, what exactly, which method we had use to produce software for computer which is not exist at that time. It was my thesis.

Temkin: So, it was like real interpreter, or--

Nemenman: No, not full.

Temkin: Oh, so it was partial.

Nemenman: Not full.

Bochannek: And this was all in assembly language?

Nemenman: It was in assembly language because first of all, we make cross-translator from assembler for Minsk-32-- working on Minsk-22. So, we designed assembler language for 32, but first compiler was working on 22. And because we can chance to paper tape move from one computer to this one. It was possible.

Bochannek: How did you plan the work? What was the project management technique?

Nemenman: On the paper. <laughs>

Bochannek: Was it all done as one big project? Were there separate smaller projects? Were there small increments?

Nemenman: It was my idea to split it for some pieces and to explain the next level of people what we need to do to make it work together. And that's all.

Temkin: So, you invented modular program request for yourself?

Nemenman: Of course not.

Temkin: You read about this somewhere?

Nemenman: No, so <speaking Russian>.

Temkin: He can't remember where the term "modular programming" came from, but it was kind of an idea which arose--

Nemenman: <speaking Russian> Can I--

Bochannek: We can look at-- yeah, look at it at the end.

Nemenman: Okay, I have avto-referect [synopsis] of my thesis, and it was one of them. It was in "index modulnosti" program, how to measure and how to compare how modular is a program.

Temkin: Part of his thesis was how to measure modularity of the program.

Bochannek: Now, you attended the 1970 all union conference on programming--

Nemenman: Yes.

Bochannek: And I believe there was a paper presented on the Minsk-32 there.

Nemenman: Yes.

Bochannek: But you did not attend the first one in 1968, correct?

Nemenman: No, we attended. But it's exactly maybe one week after we finish Minsk-32. So, in this year, it will be fifty years of Minsk-32, 2nd of November of 1968. And first conference of programming in the USSR open 14 of November in the same year.

Bochannek: So, you attended both conferences, but presented at the second one.

Nemenman: No, presentation of first conference. Presentation of second.

Bochannek: Okay. What was the reception of this system by the other people? Were there other operating system projects going on at the same time? What was the community of system engineers, system programmers, what was their response?

Nemenman: <speaking Russian>

Temkin: When they were leaving[5] Autocode

Nemenman: Engineer for Minsk-2.

Temkin: In '65?

Nemenman: In 1965. Some people from Computer center of Academy of Science in Moscow come to accept this one. And they wonder why-- how close we are to them in their ALGOL implementation. And after then, we got some maybe some <speaking Russian>.

Temkin: They got some respect.

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[5]   presented

Nemenman: Some respect from other computer people in the USSR. So, what is the reason? So, five maybe-- I don't remember exactly, five or four presentation about Minsk-32 was accepted in Novosibirsk in 1970.

Bochannek: And I believe 1970 was also the year when you received the Lenin Komsomol Prize?

Nemenman: Mm-hmm.

Bochannek: What was the prize awarded for?

Nemenman: In 1968[6], so the highest level of our institute, Lopato, Przhiyalkovskiy, Smirnov , Stolyarov, they got <speaking Russian>.

Temkin: The State Prize.

Nemenman: State prize, it was. So, in Soviet Union, they have-- it has two level of prizes, Lenin Prizes, highest state prize. Before that, it was Stalin Prize is next. And Lenin Komsomol Prize is the next level of. And it was some age restriction. You should be not older than thirty-three years to get this prize. And so, first of all, our bosses, Przhiyalkovskiy, Lopato-- and Lopato decided to <speaking Russian>.

Temkin: Decided to present to--

Nemenman: To present to-- to get-- decided to present to get this Lenin [Komsomol Prize] only two people: Pykhtin, Vadim and me.

Temkin: Yeah, so originally, they presented only two people--

Nemenman: Two people to get this prize, so my colleague in hardware and me. My colleague-- the name of the colleague is Pykhtin, Vadim. After then, there komsomol committee that told is not-- no chances to get it. There should be more people. And after then, so we will add a couple people more, one of plant, one of Academy of Science, and a couple from our institute to get the team. And to get the team with <speaking Russian>.

Temkin: With-- title of the prize.

Nemenman: Title of the prize <speaking Russian> for taking part in--

Bochannek: The work for the Minsk computer.

Nemenman: Yeah, to develop-- to design and develop Minsk computer. It was--

Temkin: Without mentioning of Minsk-32, just Minsk?

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6   [Interviewee's note] The correct year was 1970.

Nemenman: No, no, Minsk, only Minsk altogether. One person was from plant. One person was from Academy of Science. And four person from our institute, two of them from Minsk-32. So they decided to give the prize not-- for all Minsk, not for Minsk-32, but Minsk-32 was the popular computer in Soviet Union about 3000 computer for this all together 15,000[7] computer was produced in the Soviet Union but at the time it was the biggest percent .

Bochannek: Do you think that at that point by 1970 that programming was more respected than it was when you first started?

Nemenman: Sure. Sure, more respected. But next level we started to tell data more important than programs, necessary to keep programs, necessary to keep data in good form too, because data we'll use later and program will die but data will, you will need.

Bochannek: As programming becomes more respected, did the people who choose that field change? Do you see a change in who studies programming? Do you see maybe a change-- You said earlier mostly women?

Nemenman: There was more bright, there was more people. It was not only university prepares the programmers. A lot of institutes, a lot of places.

Temkin: When the applied mathematics became separate?

Nemenman: Applied mathematics became separate in 1971.

Bochannek: Between 1970 and '75, you kept working on Minsk-32 projects.

Nemenman: Yes, we <speaks Russian>.

Temkin: So the did updates, and the maintenance, and customer support.

Nemenman: And at that time it was, first of all it was very difficult to explain to plant why is necessary. Why it necessary to send all the customers new versions and go on, go on. No internet. <laughs> No. No, update only.

Bochannek: And at that point you decided to pursue your Ph.D. in 1975.

Nemenman: Yes.

Bochannek: And I believe that was at an institute in Tallinn in Estonia.

Nemenman: Mm-hmm.

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[7]   [Interviewee's note] Out of 7000 computers produced in the USSR before ES line, 3000 were Minsk 32

Bochannek: Did you locate there?

Temkin: <speaks Russian>

Nemenman: Okay. So Ph.D. program in the Soviet Union are different. Sometimes it's possible to have Ph.D. program in the high school. You know, not high school but in the University. Sometimes it's possible to present your thesis without learning in this program. So my Ph.D. thesis, I did by [under] Ershov in Novosibirsk but to find where to the <speaks Russian>.

Temkin: To defend the thesis.

Nemenman: At the <speaks Russian>. That's because it's <speaks Russian>.

Temkin: Yeah, so his scientific advisor was Ershov and he did it with Ershov and to find the place where you can present to defend the thesis it was task for Ershov, not for Mark.

Nemenman: And Ershov chose Tallinn because Minsk-32 number two, so we'll send in Tallinn Institute of Cybernetics and they knew about me because it was first computer and we work very close with them. This is the reason why Ershov decided it will be easy for me to present my thesis in Tallinn and not in Minsk, not in Moscow. <speaks Russian>

Temkin: Mark had it this way because he is Jewish and it's like really hard to-- to do to find the place--

Nemenman: To find-- to find the place who will not pay attention to that.

Bochannek: But you stayed in Minsk during this whole time.

Nemenman: Yes, I stayed, yes. I made my thesis in Minsk only.

Bochannek: Okay. Now after that you started working on the ES, the Ryad series of machines.

Nemenman: Okay, let-- <laughs>

Bochannek: How did you find out about--

Nemenman: No, no, no. Let me tell you.

Bochannek: All right.

Nemenman: In 1969 or maybe '70, when it was decision to make copy of IBM, I was against that. I told it's not necessary. I told this wrong way. Maybe it's good to make the clone but don't stop the own work about designing the computer. And so and I didn't want to work with ES until it was possible. But after '75, it was impossible because in '73, the plants just stop Minsk-32 and so and I work in computer center of institute to make some technology instead of working in development of, in designing of ES computers.

And only in '81, only in 1981, when IBM PC appeared, so it was not only my but a couple people told the bosses, "It's time to make personal computers in Soviet Union." And I turn back to <speaks Russian>.

Temkin: Design?

Nemenman: To design of computer in personal computer pair only. I didn't work with ES in ES 1020, 1030. 10-- ES 1035 was special computer so IBM 370, in which has compatibility with Minsk-32 and a couple of my coworkers from my department go to ES to help them to make this compatibility.

Temkin: When I appeared in his department he still had more than half of the people doing support and--

Nemenman: 32.

Temkin: Of 32 and half of department was doing--

Nemenman: Something for ES.

Temkin: Some work for ES.

Nemenman: Something was what's interesting.

Bochannek: So in the second half of the 1970s after you got your Ph.D. and before the work on personal computers started, the Minsk plan switched over to ES and what were you working on specifically?

Nemenman: We had a real IBM 370 in our computer center and our goal was to adopt this 370 to people who working with it to help them to make compatibility[8] better than and we didn't work in <speaks Russian > in design but we did work in technology.

Temkin: Yeah, so it wasn't system-- he didn't feed it into system design but we did some application level programming through CICS and stuff and actually the real IBM 370, which was imported and supported by IBM for quite a few years, was the responsibility of his department.

Bochannek: And that computer center was part of the plant?

Nemenman: Part of the Institute.

Bochannek: Oh, part of the Institute, okay.

Nemenman: Part of compute-- At this time we were not SKB, already Computer Research Institute NII EVM.

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[8]   [Interviewee's note] Between ES and IBM.

Bochannek: Okay, so but it was the follow on organization.

Nemenman: Yes.

Bochannek: So your employer did not change. You still were in the same organization.

Nemenman: Yes, yes.

Bochannek: But it has changed.

Nemenman: Same table. <laughs> Same table and same chair, different name.

Bochannek: Okay. Great. Now there are a number of different IBM 360 and 370 clones that came out of Minsk, some of them, I believe the ES 1020, the original one was done with a collaboration with a plant in Bulgaria. Were you involved in that at all?

Nemenman: No. I only, well, if they came to us. If they came to us, sometimes they asked me what we're doing about that, but I never can chance to visit them.

Bochannek: And then there's also a later generation, the ES 1037 that--

Nemenman: Mm-hmm, 1037 it was maybe a little bit new computer for not directly copy of some IBM computers. And a little bit I tried to work with them, it was interesting for, because--

Temkin: Yeah, actually--

Nemenman: He knows better. He knows better.

Temkin: I work with the 1037, so.

Nemenman: He knows better. <laughs>

Temkin: So part of his department was still kind of supporting CICS clone and like translation of some original IBM to Russian and--

Nemenman: Mm-hmm.

Temkin: Software into Russian, and whatever, but 1037 was kind of original. It wasn't clone of any specific IBM machine, it was--

Nemenman: It was attempt to make something original, but in the same direction.

Temkin: So it was 370 compatible but there were, like, technical reason why it couldn't be cloned. It was really funny when I [later] came to Amdahl and tried to explain, "We don't have actually RAM. We try to copy RAM into hard drive." Some, they kind of look at me, "What are you talking about?"

Bochannek: So did the 1037, did that ship? Was that installed in production anywhere?

Nemenman: <speaks Russian>

Temkin: There were a few copies but no, not that many.

Bochannek: Okay. It was--

Nemenman: It's already end of '80s.

Bochannek: Okay.

Temkin: Yeah, so, so actually, like, I left in '88, it was still not done.

Nemenman: Not done. It's--

Temkin: By '90, it wasn't --.

Nemenman: No reason to. No reason to produce something after the '91. <laughs>

Bochannek: So during that time it sounds like that you would have preferred if there was a follow on to the Minsk-32 instead of working on the clones. But you also supported applications now, no longer just operating system?

Nemenman: No, we didn't--

Temkin: It's not a big-- It's not <i[ph?] >

Nemenman: We didn't write applications, no. We never write applications.

Temkin: It was application level, but not in--

Nemenman: We never write application for something. So for example, [ph?]

Temkin: The census.

Nemenman: Uh-huh. Well, 1969 <speaks Russian>, 1969 so <speaks Russian>.

Temkin: The census of--

Nemenman: 1969.

Temkin: Of 1969 was done on a Minsk-32.

Nemenman: A Minsk-32. So a lot of computer centers over the USSR had this computer. We didn't write the software for that. It was special institute, but they work in contact with us. And this is only one example because another one example is which <Russian name>.

Temkin: Computer Center of State Planning.

Nemenman: And more important example, which <speaks Russian>.

Temkin: There was Computer Center of—Communist Party Central Committee.

Nemenman: They have two Minsk-32 because somebody in high level decided it's not polite to have not Russian computer in <Russian word> [CPSU CC] and they have two Minsk computers. They connect them to disk of--

Temkin: The hard drive of IBM – hard drive.

Nemenman: And they produced a system for two computers and this hard drive. But in '71, '72, '73, I visited a Central Committee maybe every month. If they have questions about and two <speaks Russian>

Temkin: So the two institutes worked for this--

Nemenman: For this one.

Temkin: Central Committee,

Nemenman: I'm explaining here why we didn't write the application. Because a lot of people over there, sometimes people come to me to some question and I say, I should <speaks Russian>. I should provide them in our building and I should write down the <Russian word>.

Temkin: The application to get into--

Nemenman: The application. They come in. And sometimes I have NIIAA or AANII, two different from different--

Temkin: From different institutes.

Nemenman: From different cities, from different area, but almost the same name. A lot of people came to us to ask questions about Minsk-32.

Temkin: But it was Minsk-32 that they're asking about.

Nemenman: It's Minsk-32.

Temkin: Yeah.

Bochannek: And did you continue to do that for the ES?

Nemenman: No. No. We only helped them to convert from Minsk-32, how to easiest come to ES, because you understand, it was impossible, maybe, ten year's work with the same-- with the same computer, with the same hardware.

Temkin: There was-- we were advising how to convert software from Minsk-32 to Ryad, to ES machine, so--

Nemenman: So it was special deal for people who worked before ES how to--

Temkin: Start for--

Nemenman: Go. How to go to ES.

Bochannek: And then you mentioned in 1981 the IBM PC appears.

Nemenman: Mm-hmm.

Bochannek: How did that affect people's thinking? It's not just that it's a different technology, it's also a much, much smaller machine.

Nemenman: Sure. <laughs> It was very--

Temkin: <speaks Russian>

Nemenman: <speaks Russian> It's not an anecdote, it's real,-- a real fact. So the first Mac without hard disk, only one small-- is 1984, yes? In 1985, I had this Macintosh on my table. Some spy from Paris, not from USA, so got them and send them to Soviet Union. My director Lopato got this computer and it was, you remember what was the first Mac. And keyboard in French – keyboard in French in computer. And some box with disk, with 3 inches disk. So one day I came – and go, so, along the door of my boss. He looked out and, "Oh, Mark Yefimovich, come in." I came. I see some computer and the boss told me, "I don't know what to do with it. Maybe you will try to do something." I go, "Okay." I take the computer come to my desk and try to understand something. I look over the disk, I see some name of the-- My English is very poor. I never learn English, I learn German. But I understand in English maybe "begin", and "start", and "go" and so on.

Temkin: <speaks Russian>

Nemenman: So, so it was I have English in <speaks Russian> in level of operating system.

Temkin: Yeah. Like when you-- Soviet program is level of the English is, like, computer language English.

Nemenman: Then, so I see the disk in Macintosh and I don't know how to--

Temkin: Get it out.

Nemenman: Take it out. I am sitting and I see some small <Russian word>.

Temkin: Very small hole.

Nemenman: And instantly I put some staple and put and the disk came out. Oh, I was lucky. After then I tried to understand what's happened more and in couple steps I understand how to put disk, how to start system and how to take out the disk because exit and-- <laughs>

Temkin: Eject was kind of-- programmatic eject was a new thing.

Nemenman: It was new. And mouse was new and so everything was new. So and a couple of days, maybe in one week, so boss called me, "Do you understand something?" I go, "Yes, I do." And I come with this computer and at that time I prove some program and some program – we – read what I print.

Temkin: Text to voice.

Nemenman: What I print. So I print in Russian, "durak." Durak is "stupid."

Temkin: Stupid.

Nemenman: A computer told "durak." It was so funny. It was funny. I am showing this to the director. The director was so, "Oh," interested in the computer.

Temkin: And it can speak in Russian.

Nemenman: Computer in Russian, speak something. So I decided to make a joke. So I'm telling, so Georgi Pavlovich, computer not only speak in Russian, it understand Russian. And I did this, I put my finger on the mouse. I choose menu "eject". I put the cursor on "eject" and I sitting and I'm telling <speaks Russian>--

Temkin: Give back the disk.

Nemenman: Give back the disk. And nothing. No. <louder>. No. <even louder> And I point the mouse. Disk come out. It was a circus. <laughs> But after them I got this computer for my table maybe for one, two years. It was my--

Temkin: Personal personal computer.

Nemenman: Yes.

Temkin: Which was kind of unheard of.

Nemenman: Yes. <laughs>

Bochannek: So that was in 1985, you said.

Nemenman: Yes, 1985, yes.

Bochannek: So at that point, was the--

Nemenman: So we already almost finished our first clone ES 1840, [of] IBM PC. Not PC XT but IBM PC was out without hard disk.

Bochannek: Now was that designed, the hardware, at the plant there, at the Institute there?

Nemenman: Yes.

Bochannek: What about the software?

Nemenman: We know it should be something in Russian. No Russian version of software.

Temkin: PC Microsoft weren't--

Nemenman: No. No contact with Microsoft, with --. And we decided to choose easiest operating system, CP/M 86, not CP/M 80. And we convert <speaks Russian>.

Temkin: Yeah, so starting with CP/M 86--

Nemenman: 86.

Temkin: It had to be Russified because it's personal computer after all --

Nemenman: Yeah.

Temkin: So it was Russian language comments, Russian--

Nemenman: Not Russian comments, but Russian alphabet.

Temkin: Russian, yeah, so-- So kind of the question how to code-- how to code Russian in ASCII.

Nemenman: How to combine Russian with English. It was before when IBM introduced all languages in operating system in DOS.

Temkin: So what code system for the--

Nemenman: In DOS. So later we make our own version of DOS, but at that time it was possible to contact with Microsoft already, but it was hard for us contact, because contact was in Moscow or not in Minsk. And I, one day I got the chance to say "Hi" to Bill Gates when they come first in Moscow in 19-maybe-89. But we had already a Russian version of DOS.

Bochannek: Where did the software come from, the CP/M 86? How did you get CP/M 86 to Moscow?

Nemenman: We had some Japanese computer and maybe German computers, some clones of IBMs already with software.

Temkin: So was it disassembly?

Nemenman: No. No disassemble. So some people, so working with that understand how to expand it.

Temkin: <speaks Russian>

Nemenman: <speaks Russian>

Temkin: No, we didn't have sources.

Bochannek: Okay.

Nemenman: So it's no source.

Bochannek: There was no agreement with Digital Research on--

Nemenman: No. No agreement--

Bochannek: Okay.

Nemenman: No-- It was illegal, if be honest.

Bochannek: How did the way PCs were made change the way software was made within your organization? Did you-- you mentioned earlier how you thought about the modular aspects of software on the Minsk-32 and then about the transition to the ES and then the PCs, the way software was made, did that change as well?

Nemenman: So it was almost no time to think about that. Because in '85 we started the first computer. In '88, it's already Gorbachev with some import a lot of that and it was very <speaks Russian>.

Temkin: Because it was kind of a short time between the first implementation and the openness which allowed import or whatever, we didn't think there is reason to--

Nemenman: To make something.

Temkin: To make copies of --

Bochannek: Was there a community developing around these machines, maybe not the PC clones but they were more lower end computers available to individuals at the time. Were you aware of a hobbyist community at all?

Nemenman: No.

Temkin: Not in our--

Nemenman: Not at that time.

Temkin: Actually, there was some community, but -- he sent me to learn Unix, because it was community project doing Unix, it was in Moscow by different organization, different people, but it wasn't part of the NII EVM culture, for example.

Bochannek: But the individuals who might have a clone of a Sinclair Spectrum, for example, at home?

Nemenman: Sometimes, yes, but maybe it was not <Russian word>.

Temkin: No, it wasn't something that we in the Institute were aware of, so.

Bochannek: Were you interested in having a computer in your home?

Nemenman: <laughs> Yes, of course, but where I get that, buy?

Temkin: Didn't you take this Mac to your home?

Nemenman: I took – to – sometimes Mac to my home to learn my children-- to show my children how what's happened. <laughs>

Temkin: So when his son came--

Nemenman: For a couple days.

Temkin: When his son came here, I actually get him--

Nemenman: At 18. <laughs>

Temkin: At 18, I actually get him job about a week after they came in. He started to work it--

Nemenman: And he knows already something.

Temkin: Because he knew already, he already played with that at home.

Bochannek: Were there any, like, online resources available that developed at that time? Was there--

Temkin: Online? What was there, what--?

Bochannek: Was there any dial up communities?

Nemenman: Nah. <laughs>

Bochannek: Was anything like that?

Temkin: Dial-ups? FidoNet was I think it's '91, the earliest and he doesn't even know about that.

Bochannek: It was a different community from what you worked on.

Nemenman: Mm-hmm.

Bochannek: Yeah, okay. How did the dissolution of the Soviet Union and the independence of Belarus, you know, change your work and change your life?

Nemenman: Change your life for sure. <laughs>

Temkin: Well, dissolution started in '91.

Nemenman: '91, 1991, yeah.

Temkin: So when they arrested Gorbachev and kept him in Crimea, he was actually here in the United States and it was--

Nemenman: So exactly, so at that time when Gorbachev was in Crim--

Temkin: Crimea.

Nemenman: In Crimea, yes, I was here. I was here in some trip because exactly he and some people more from our organization, so invite me to visit [to see] how they working here and how they living here. And it was maybe '91 it's already, so it was more easy to get passport.

Temkin: The exit visa and passport from Russia.

Nemenman: Yes, to get visa, to get passports were more easy for us. So I came here and life changed quickly but work doesn't change. <laughs> Work changed later because no money to pay.

Bochannek: So my question there is why did you leave Belarus and why did you settle in California?

Nemenman: Oh. So I left the Soviet Union because I had two sons, 18 and 19-years and so it was maybe <speaks Russian>.

Temkin: Yeah, so there were some rumors and actually changes were so quick, that there was a chance for his 18 and 19-year-old sons to be conscripted to army and sent to Afghanistan. So that was the scariest part.

Nemenman: So it was chance to avoid this <speaks Russian>.

Temkin: Yeah, so that was kind of the main reason.

Nemenman: <speaks Russian> So I understood exactly I didn't have the work here in computer area because I was too old, I was already 58 and my English was very, very poor and to go to entry level, I was too old and nobody will so give me the work something higher because I don't have experience here because my experience is not exactly, so I understand in full I will be no job. I will not have a job here. After then maybe a couple in maybe four or five years, I go to college to teach math because in my diploma I have "mathematician, teacher of math of high school" is written on my diploma. I evaluated my Ph.D., I evaluated my diploma and it was enough for me to work part-time in college here and that's all. But I was interested in computers and--

Bochannek: So you moved to the United States in 1994 and then in 1998, I believe you taught at the community college there.

Nemenman: Mm-hmm.

Bochannek: You taught at a number of other places as well in the 1980s, I believe.

Nemenman: I will tell. So if I got Ph.D. and our director Lopato got-- <speaks Russian>

Temkin: Department.

Nemenman: Department in Radio Technical Institute. Radio Technical Institute it was special institute for computer and radio and TV, for electronics. And he got department and he asked me and not only me but a couple people from institute to work in this department and maybe a couple of years learn them how to develop the-- how to design some software, what it means modular programming and what means cross-translation or whatever. And in '92 after Chernobyl, some people and, first of all, Shushkevich, so President-- First President of Belarus, which is from the same university one year before me in Physics-- decided to make institute for Radioecology and they involved--

Temkin: <inaudible 01:55:02>

Nemenman: Sakharov names. And again, so they provide me to teach something in computer science there and I work there.

Bochannek: And you enjoyed teaching.

Nemenman: Yes, yes.

Temkin: He's a really good teacher.

Nemenman: Ah. <laughs>

Bochannek: I have a few more questions just to wrap things up. Just kind of to summarize it, were there major turning points in your career or major changes where you took a different path?

Nemenman: <speaks Russian>

Temkin: <speaks Russian>

Nemenman: No. First of all, there was – so -- finish with dream about mathematics and go to computers, it's after university. And second one, so don't-- I don't like clone. I better will have own part of job but not copy of something. And the last one, <laughs> so drop Soviet Union and come here.

Bochannek: How's your thinking about computing changed over your career?

Nemenman: In 1978, when Ershov department in Novosibirsk has 20 years of existing it was some conference about this event. And so Ershov told: "Let I will-- <speaks Russian>-- choose old programmer to discuss what will be in the future." I was the youngest from old programmers and so Ershov asked, "Tell me, what will be? How do you think what will be in 10, 20 years?" Almost all people tell him it will be no more typewriter. All of the people understand already. I proud, I told it will be no photography chemical, it will be digital. Somebody told it will be no phones, it will be on the computer. But nobody predicted the internet from this one. If I think about what's happened with computers in the 50 years and 60 years when I heard about first computer, 60 years already come, maybe 65 already, never can understand what's happened with computer in this short period. If you compare what's happened with atomic bombs, nothing. <laughs> It was small, it went bigger and that's all. With plane, a little bit. But computer is unbelievable. The revolution in computers is unbelievable.

Bochannek: Are there choices you made that you regret?

Nemenman: So I should choose English in university and not German. <laughs> If I did-- If I had English in the university, maybe my life was different.

Bochannek: What was the most difficult decision you had to make? This could be professional or personal.

Nemenman: Maybe don't try to find job in computer in the USA after coming. It was hard for me to forget about everything what I understand about computers and stop thinking about the work in this area.

Bochannek: And is there a decision that you made that you want to redo or do differently?

Nemenman: No. No. I believe not.

Bochannek: What inspires you?

Temkin: Inspires. <Speaks Russian>

Nemenman: Right now? <laughs>

Bochannek: Throughout your career, right now, however you would like to answer.

Nemenman: If somebody maybe 50 years ago told me in my 82 right now, 81 I do, I will be able to speak to people to <laughs> maybe to tell some jokes or whatever, I didn't believe them. Because if I remember the first new year what I made maybe in 1951, 1951 is half of the century I suppose what will be the century will end? I believe I didn't learn about that, I didn't know about that. It's maybe not for me. But I hope right now I will see what will be in the end of '20s, I hope. <laughs> Please invite me. <laughs>

Bochannek: Of which accomplishments are you proud?

Nemenman: <speaks Russian>

Temkin: <speaks Russian>

Nemenman: Two sons. Two sons. <laughs>

Bochannek: What has given you the most enjoyment in your life?

Nemenman: Friends.

Bochannek: What suggestions can you offer to young people?

Nemenman: Learn better to do something else. Learn.

Bochannek: And just as a last question, how would you summarize what you've done in your life?

Nemenman: I will tell you in a couple years later. <laughs> Not yet. <laughs>

Bochannek: Is there anything else you would like to add? Any other facts? Any other stories? Anything else that you would like to add?

Nemenman: A little bit hard to read something wrong about previous years. If I can explain what I see something wrong in some printed, it will be good for me to tell people, "No, it's lie. It's lie, don't believe them." But it's hard. <laughs>

Bochannek: Great. Hansen, you have anything?

Hsu: No.

Bochannek: Great. Well, thank you very much for your time.

Nemenman: Thank you.

Bochannek: We really appreciate it. Thank you.

Nemenman: Thank you. You had good questions.

Bochannek: Okay. Thank you.

END OF THE INTERVIEW