Oral History of Bruce Ray

Interviewed by:
Ian Walsh

Recorded: June 4, 2008
Mountain View, California

CHM Reference number: X4700.2008

Table of Contents

Bruce Ray

Conducted by Software Industry Special Interest Group

Abstract: Bruce Ray is the president of Wild Hare Computer Systems, Inc. Boulder, Colorado. Established in 1971, Wild Hare has ridden different facets of the computer industry -- software products, custom programming, workstations, PCs, minicomputers and midrange systems -- with a master strategy that Ray simply defines as "for Wild Hare to continuing having fun." A self-confessed computerholic since high school in the 1960s, he took a gift for programming and a natural penchant for solution-oriented thinking and tied it to a new generation of companies arriving in the late 1960s -- in particular, one called Data General. Ray and his constantly shifting, ever adapting coterie of programmers danced on the fringes of Data General's own ups and downs over four decades. They often devised systems, enhancements, and networks that outperformed DG, leading to what Ray terms a love-hate relationship. Wild Hare faced the abyss more than once as the computer industry evolved, platforms came and went, and as companies and products were assimilated. The company sometimes shrank to a handful of consultants, but Ray always managed to step back and retrench and in that way personified many of the smaller entrepreneurs of the day.

Ian Walsh: I am Ian Walsh and I am conducting an oral history with Bruce Ray, who is president of Wild Hare Computer Systems, Incorporated. It is June 4, 2008 and we are here at the Computer History Museum in Mountain View, California. This interview is part of the Software Industry Special Interest Group's oral history project. Tell me about your background and life up to the time you got into computers.

Being a Student Computerholic

Bruce Ray: I first realized I was a "computerholic" in high school, maybe a little bit before then, and even at that time worked with different companies in the Rocky Mountain region. And as I went through high school and college I focused on computers to pretty much the exclusion of all else. Those were exciting times for me personally and for the computer industry in general. You had upstart companies that turned into adolescent companies like DEC, and then there was this new company that was formed in 1968 called Data General. And because I was able to work with a wide range of machines, I enjoyed the Data General architecture and the brashness of the company almost to the exclusion of the other systems that I had access to. So

I started out becoming a computerholic at an early age and that became my career, my hobby and my passion.

Walsh: What kind of systems were you working on back then other than Data General and what was it about the Data General architecture that appealed to you?

Ray: The popular machines at that time were, for example, the [Hewlett-Packard] HP 2114 and 2116 series, [General Automation] SPC machines, [Varian 620s]. DEC had the PDP-8, PDP-12. Those machines were available both at customer sites where I was actually doing consulting work, and also through the sales offices of the different vendors. They would have machines available for demonstration or for playing with after hours or even sometimes during hours. Through the contacts with the different vendors and the university organizations, I got not only a lot of machine time for playing but I got machine time for consulting as well. So the contacts were through vendors primarily and then through users secondarily.

Walsh: Tell me about your first interactions with Data General Systems. How did that happen and what was the appeal to you of it?

Ray: Data General itself was incorporated in 1968. They delivered their first machines in the Denver area in 1969. At that time many vendors in the computer community were more interested in pushing iron than providing total solutions. Nowadays you hear about total cost of ownership. The solution is the answer. In those days, the feel was totally different. It wasn't even immature. It was just starting out and DEC, DG and other vendors were interested in pushing iron. As a result, there was a lot of difference or distance between delivering a piece of computer hardware and actually solving a customer's problem. That's usually where the consultants came in or someone who actually had to do the job to make the machine perform whatever the customer wanted. So with both DEC and DG, you got to know the salespeople and almost anyone who wanted a computer was an opportunity for consulting. So in my personal case and it reflected others at that time, I did work at the [University of Colorado] Bio-Med Research Center on a variety of interesting projects. The range was just incredible. At other places I was doing business systems, even things as mundane as general ledger, payroll, those types of systems, although they weren't as prevalent at that time. But you see there was a big range involved. So we got exposed to a variety of customer levels of sophistication and the range I mentioned. And the DEC and Data General difference at that point wasn't, how do I say, they were both very aggressive but Data General had an attitude of being just a little more cocky, a little more aggressive than DEC and from the technical side, the architecture of the Nova computer was a very clean architecture. It was very simple and understandable and actually a very fast architecture that would be emulated a decade later in something we would call eventually RISC. So it was a more fun machine to program, in my opinion, than say the PDP-8 or the PDP-11, which was its main competitor at the time.

Walsh: Were you a student at this time?

Ray: Yes, I was in high school and then I continued consulting through college. And I went to the University of Utah so, quite by accident, I was working full-time. But I didn't let that get in the way of my computer education.

Walsh: How did you end up coming into the computer world as a professional? What was the transition in terms of how you started making money as a consultant? How did you find assignments? What was the nature of your work at this point in time and how did it get started?

Ray: The consulting was still vendor based. That is, there were a lot of referrals from the vendors, the salespeople. We have a computer system that so-and-so wants to do such and such. We'd like to make the sale. They want a solution. Can you help us out? So it's a win win win situation. Hopefully the customer is happy, certainly the salesman would be happy and I would be happy paying the rent as well. That's how a lot of things worked out and then some projects lasted longer than others, so it was not a strategically planned situation. It was an act of opportunity and it worked out very well and that's how many different companies -- actually individuals -- worked at that time.

Starting Wild Hare Systems

Walsh: So for a few years you worked on a project basis as a consultant and within a period of time, you would go on to more formally start Wild Hare. When did that happen?

Ray: That was in 1973 when it was officially registered, and at that point I was still doing mostly consulting. There was one piece of software that I created as an actual product. It was a PDP-8 emulator, which ran on the Data General Machine since the PDP-8 was a very popular machine at the time and DG was not as well known. There was a lot of software written for the PDP-8 and even I used the PDP-8 on some of my projects. Wouldn't it be nice to run those programs on this new brash young upstart company's hardware? So I wrote the PDP-8 SIM and it was sold as a somewhat successful high priced $100 software product and that actually was the only product that I had. It lasted for about five or six years.

Walsh: Did that come after you officially started the business or did that come during the time when you were still doing consulting work?

Ray: I think that was 1971, so that was before the business was officially registered.

Walsh: At this point, were you still doing work for both DEC and Data General and possibly others?

Ray: Mostly Data General by that point. Throughout the decades we've experimented with and stuck our hands in other vendor's products because the opportunities were there. The interest, the technical challenge is there, but we also focus on our strength, which is Data General.

Walsh: Did DEC express any concerns with you doing that simulation work? How did they feel about that?

Ray: Who? DEC? No, we did not hear any repercussions about that. The introduction of the product was surreptitiously through some Data General salespeople who put it, unbeknownst to many other people, on Data General's FJCC, the Fall Joint Computer Conference, demonstration hardware that was at that conference. So we were running FOCAL from the PDP-8 on the Data General machine during that conference. Even in such a high-profile marketing situation, I don't recall anyone complaining too loudly from DEC.

Walsh: During the early days of your organization, was this a sole proprietorship? Were you working alone?

Ray: I was the organization, yes. And I gained a few pounds or lost a few pounds, just depending on the contracting that month. But it was just a sole proprietorship at that point.

Walsh: What kinds of customers were you working with or services were you offering at this point in time?

Ray: Even at that point, both the services and the paying contracts ranged from educational systems in BASIC to military systems. And again, going back to almost anyplace that DG could put a Data General computer that was an opportunity for both the salesmen and for us. It was a business networking situation. There was not really at that point in DG's corporate structure an Independent Software Program [ISP] that was unified. It was more word of mouth through the various sales people. After all, it was their business and it was their livelihood, so it was a more informal arrangement through the early nineteen-seventies as DG grew. And mirroring DEC, they eventually had independent software organization managers since they recognized the value of selling more machines because more people use them because they provide more solutions for end users.

Walsh: Were there other contractors or consultants or firms cropping up to compete with you or did you find as much business as you wanted? What was the competitive environment like for your business back then?

Ray: Let's see. Functional denial would probably say "not much", but yet almost all my friends were doing similar things. That is, you got to know the different people who were more addicted to computers than school, or nice homes. So I would say it was a very standard way of organizing a business -- or more realistically – one's life. In the Boulder, Colorado, area it was pretty common to have consultants on almost any block.

Walsh: Was your work geographically based or were you working across the country? What was your sort of focus geographically?

Ray: Initially it was regional like Denver or Rocky Mountain region. As DG grew, the opportunity and the geographic locations grew.

The Early Years

Walsh: Talk to me about the early years of your business as a corporation or as an entity. What was that experience like? How did growth affect you? Can you walk me through that experience of growing a business?

Ray: The assumption is that I wanted to grow a business and it's not really that way. If you look at many of the people, the consultants that I knew, let's just be very literal about it: they weren't really growing a business. It was their lifestyle. It was something that they enjoyed doing and they were getting paid to do it and I confess to the same affliction or character flaw. So there wasn't a strategic business plan that this would be the way something would happen or this would be something we would pursue. It was that this is what we enjoyed doing. The business followed. So the more Data General grew, the more opportunities we had. I say we, because there were other consultants, other people who enjoyed doing the software, the applications and the system software. In my case, I enjoyed doing system software more than application software, which would be reflected in our later products.

Walsh: Were you just taking on work just to live?

Ray: To pay the rent.

Walsh: When did things start to change or did you start to expand at some point? Where did your business go during the nineteen-seventies?

Ray: The transition occurred probably around 1975 or 1976. I mentioned I enjoyed the system aspect or system programming for whatever reason. I seemed to find that very appealing. One of the products that I created, not at first as a product but experimenting with it, was to take a single user Data General operating system and make it multiuser. The machine is

dedicated. If you could timeshare that, a term you've probably heard, you could have more productive use of the person's time and share one computer and so I wrote a timesharing system that piggybacked on top of the Data General predominant operating system at that time. People said, "Hey, would you sell that to us?" And so it became not a strategically but a reactively produced marketing plan. That really was a transition from a single person start up/computerholic to a business/computerholic.

Walsh: Did you personally do all of the development in terms of the programming on this timesharing system?

Ray: Yes.

Walsh: Was that still all your work at this point in time?

Ray: Right, I was the technical person and we eventually had marketing people and technical support people, people who would get tapes ready and customer shipments, make sure some of the technical things are all in line for customer shipment.

Cultivating Early Marketing Strategies

Walsh: When did it finally get introduced into the marketplace?

Ray: I think I would say about 1978 is when it had some type of marketing mass. We created ads that we ran in a variety of large magazines at that time. At the time there was no DG specific magazine -- that is, an independent magazine outside of Data General -- that was a user-oriented magazine. There were user groups in the late 1970s, and there were DG support organizations for VARS and ISVs, but there was no focused magazine that one could advertise in that would target the DG marketplace. So we advertised in magazines such as *Kilobaud*, if you remember that, *Datamation*, *ComputerWorld Magazine*, *Computer Decision*, *Data Design, Byte and others*. It was just a shotgun approach and over a year and a half, we figured out that most of it was wasted. It wasn't until about 1980 when DG specific magazines came out.

Walsh: So how did you find customers for this or how did you finally get this product out there to market?

Ray: Well, there was some response to the ads. And, again, Data General salesmen were a key factor because they would want to make sales. Instead of losing a client to a competitor, if they could extend the life of a current system, it would still be to their benefit,

although maybe not the first thing that they would think of. It was certainly a love/hate relationship with Data General. All at once we would enhance their system, but at the same time we would be competing with upgrades that they'd want to sell to a customer for their system, so it was a little tension filled at times. In the 1980s, there were some DG-oriented magazines that came out so that we could more easily target the DG user and there were also the DG salesmen and then word of mouth. Data General user conferences became much more frequent. They were more formal, established with a structured procedure.

Walsh: Did you have much involvement with the DG user groups at this point in time? Was there any kind of direct connections or relationships through that?

Ray: Yes, the early 1980s were good for Data General and for Data General VARs and users because that's when DG really tried to [cultivate these relationships]. It was one of several different ways that DG tried to have a good relationship with its big clients, its volume clients. Its VARS and their ISVs were part of that. So DG did have organizations internally dedicated to supporting these groups and companies, and provided them with sales assistance, with lead generation in some cases, with co-marketing, that is they'd go into a client site, DG and VAR hand in hand. So there was a more formal structure and it was, compared to I'm sure, every other vendor, a love/hate relationship on an individual basis but it was an effective one.

Walsh: When you introduced your timesharing system, did the relationship become more formal? Were you seen more as a corporate partner or as a supplier?

Ray: Yes, I mentioned that DG had a more formal structure. They had an ISV group that was dedicated to keeping ISVs informed as to what was going on and supporting them. So yes, it wasn't perhaps anything that we proactively looked at, but it was just a maturation of both DG and Wild Hare.

Walsh: Tell me a little bit about the experience of becoming a formalized business. Did you grow initially, add people on? How did you start to expand or when you started to expand?

Ray: In the late 1970s again, we looked at hiring salespeople because we were inundated with more sales problems -- that is, getting back to people, getting information to people -- than tech problems because we didn't have as many products out there. So the initial area was the market, the ads. We started putting together a proactive ad campaign. Actually it was the time spent in marketing that I was trying to get away from, so I could continue with my little techie addiction. It was originally the marketing area that we tried to shore up first. Then as the orders came in and you had to have people to fill those orders, then you had to have the people take the time to do that. That's why I mentioned they were like technical support people, both internal and customer support. If a customer had a question they'd be interfacing with the client. So it was pretty easy to find technical people and it was pretty easy to find marketing

people and of course you can always find the best marketing people because they can tell you that.

Walsh: How many people were you adding? What did your organization grow to in the late 1970s, early 1980s?

Ray: It wasn't a vast number, but compared to the number one it was significant. So I think we may have had, in 1978 three people and six, maybe seven people by 1980. So when you are talking about 40 percent growth by year, yes, it may be small numbers but it's a big percentage.

Walsh: It's a big change.

Ray: And the real numbers didn't come until later, until we added more products based on the timesharing system product. That gave us the money and a little breathing space to come out with other products, so through the early 1980s there is more of an introduction, let's say, more strategic planning on product introduction and making sure that I made my mistakes in a consistent, planned fashion.

Evolving the Multi-User Workstation

Walsh: As you started to see some money from the timesharing system, where did you direct your attention? What did you see as the next steps and how did that proceed?

Ray: The timeshare system was a software-only product and sometimes even techies slow down or wake up enough to listen to customer complaints. It's not always about the product. In this specific instance, it was about the speed of their DG machines because we have more than one user now running on the system. The system is slow. What can you do about that? Not much in software, but maybe there is a hardware way of doing it. So by listening to customers or getting beat up by customers who are complaining about their customer systems, we worked out a cache memory system, a high speed disk -- nowadays it would be called a RAM disk -- a disk emulator that speeded up the I/O performance of the disk drives or the disk access on a given customer system. Sometimes it was pretty dramatic like 400 percent increase or so improvement. So that gave a customer the capability to be doing more with their system and doing it at either the same or faster speed, so we covered both aspects. One was a software product. One was a hardware product. We also marketed the hardware product not just as a single entity, but the same piece of hardware was marketed to different subsections or submarkets of the DG arena under different names. So there was a little more sophistication than perhaps a techie would have wanted, but it seemed to work quite well as far as customer brand name recognition.

Walsh: Did your efforts to get into pushing iron create any issues with Data General? Was the work you were doing in anyway incompatible with or in competition with things that were going on with DG at that point in time?

Ray: Let's see, yes, yes, no, yes, no and we weren't really. Being technically driven rather than marketing driven, we -- meaning a couple of us techies -- saw these things called microprocessors, these new things in the early 1980s, which had matured into significantly capable pieces of electronics. Specifically, we focused on the Motorola 68000 microprocessor and said, “Wouldn't it be nice, since this has as much power as the newly introduced Data General 32-bit machines, if we created a timeshare or multiuser system that could fit on a desktop or on a job floor in the back area of a manufacturing facility or almost anyplace else using this kind of power in this kind of small area.” And we looked at off-the-shelf products that were available and created a computer system ourselves using these components from other vendors. There was Herikon, Charles River Data Systems, a small company called Sun that made boards in California, Pacific Data. There were many others.

We decided upon a company called Wicat. We used their CPU boards and some of their software and also chose other disk drives and disks themselves, and floppies, and created an industrial strength cabinet that could actually be dropped and still keep on running. And we integrated this into a product, which would now be called a workstation. But it was a 17-user system that fit on a table top and we called it a Hare Brain, just because it was a pretty good marketing name at the time. And yes, it did compete with Data General, and a lot of other vendors. It competed with some of the DEC gear, but again we were targeting Data General with this. And we also, besides having guaranteed lower cost and higher performance hardware, realized there would have to be some type of software incentive to use this system because of our background in software. So we also created a set of conversion or compatibility tools that would allow current DG users to be able to run or access or connect with these Hare Brains with minimal or no changes whatsoever. So we introduced not only a piece of hardware which competed with Data General, we also introduced about five software products that did anything from completely emulating DG's COBOL system to a product that networked with DG systems which we called Hare Net as well as FORTRAN convertors and some other utilities. This was introduced as a menu from which you could select the tools to best meet your application needs and it was a technical success. In fact, it was used in some very strange and unusual places. It was also very hardy, I mean, one of our demonstrations was having five or six users running on the system. We'd pick the system up and drop it, and everyone kept on running. Although not sold as a militarized system, it was a very rugged environment.

Marketing-wise, no one really cared about our Hare Brain because it was that year that Data General was about to introduce its own brand of new widgets, but it was very secret. This was in 1983. It eventually became the Data General Desktop Generation line, which was still a 16-bit computer and regardless of the technical superiority of almost anyone's hardware, DG had the

name. That was also the time when the name workstation was becoming popular. So in this time period, one year you'd have like three competitors. The next year you had 30 competitors and the next year 300 competitors. Even the small company called Sun stopped making boards and started producing systems. You may have heard of them. So it was a technical success and it was a marketing failure and, I guess, I made some decisions before the rest of the industry at that point.

Competing For and Against Data General

Walsh: That was a pioneering decision in terms of you getting into a workstation marketplace years before others. Why was it a marketing failure? What happened or what was the nature of the problem?

Ray: In our very narrow focus or the narrow market area, competing against DG was probably not the best marketing ploy. But at the same time, this software lessened the cultural impact on any clients. Later on, the software was sold for decades in its own right. It survived any and all of the hardware products that we had but the focusing on the DG was one. Having DG do a preemptive announcement that they were coming out with a system in six months or nine months later and wait until you see how great that is compared to anything else on the marketplace, wink, wink, including Wild Hare. That was a polite but direct reference to our coming out with something and it successfully intimidated or made enough people think twice about just jumping to a different platform at that time. And because of the growth in what was to become the workstation market, I didn't think we could compete in the general marketplace because there was no name recognition. There was nothing that distinguished our promises from anyone else's, regardless of their veracity. So the decision was consciously made to focus on or to market to what we thought we knew best. Perhaps it was a good decision, but perhaps not.

Walsh: As you went through this introduction of this new hardware and software, how did this affect your relationship with Data General? You became a competitor where in the past you were working with them. Did this create any problems for you in terms of working with the company?

Ray: I don't recall anything except minor skirmishes. I think Data General wasn't really looking so much behind at that point. It had resolved its lawsuits with other clone makers. You're probably familiar with the DCC situation, the Fairchild, Digidyne suits, so a lot of that, the concern about cloning or that type of competition, I think, was institutionally behind them. And yes, it did create some friction, but we still sold software and as a result we were part of their different organizations. We had a very high profile in the Data General Independent Software Vendor program and the different conferences. We usually did a lot of promos. So in hindsight, I don't see where that hurt us at the corporate level. Yes, I'm sure there was some at the local

level, if we went into a DG client in completion with the DG salesman. But we sold so few that I don't think it even made it on their radar screen.

Walsh: When you were introducing the workstation, how many people were you up to in the organization?

Ray: You know, we might have been 30 people at that point.

Walsh: How did your specific work change? What were you doing at this time? I'm trying to sort of get at your career.

Ray: I was a techie, so the appropriate managers were hired. They were hired to complement your strengths, you know, hired to your weaknesses. The different philosophies were explored and I was doing mostly technical work on the workstations, and a lot of the software integration. I still tried to concern myself with the technical aspects and let the professionals handle the other aspects of the company.

Walsh: Were you still managing the organization? Were you still in charge? Were you still the primary owner and the CEO of the business?

Ray: Yes. There was a general manager, office manager, sales manager, sales people, technical manager, technicians, et cetera. So we had the official hierarchy involved. But yes I was still, allegedly, running the zoo rather than just being a techie and I guess it was a good learning experience.

Walsh: You said introducing the workstation technology was a sound idea but a marketing failure because you were ahead of your time. What did you mean by that and what was going on in the marketplace that makes you feel like your product was not as received as well as it might have been a few years later.

The Surge in Workstations

Ray: The marketplace at that point for the workstation just blossomed. Of course, it started from nothing and became the workstation marketplace. The growth, it was almost a shift in attitude, the industry buzz. They had a new word, workstation. Workstation, what's that mean? Well it means whatever marketing says. At that point, you've already gone through the 1981 IBM PC announcement. I won't say it legitimized the business, but the PC made people aware of the lower end of the market. The 16 bit microprocessors made it possible. I mean it was finally fast enough for these PCs to do something and then the blossoming of the microprocessor, the 32-bit micro where it enabled almost anyone to start up a company using

almost all off the shelf parts. We started a little bit before that, before that boom and ended after that boom because we found a special niche for our Hare Brains. We were able to sell off our significant inventory, but it certainly was not where we initially intended or in anyone's wildest ideas of any marketing projection. So I guess in answering the question was we started out early. We ended late and we ended up in a place for that specific product in an area that we never expected -- kind of like Columbus being lost with someone else's money and not knowing where you are and no one else has been there.

Walsh: So we were talking about the workstations and you said at one point that you had this big inventory and you ended up selling them somewhere you weren't expecting them to go. Tell me a little bit about that. What was going on with the sales and what client did you end up finding?

Ray: The biggest client was for military applications because we replaced the VAXs in classified applications. The appeal was having a VAX-type processor on a desktop that could be ported or moved around. And with VAXs, you cannot do that with a 780 or even some of the microVAXs to the extent you could with the small factor of the Hare Brain workstations. And the Hare Brain had as much, if not more, power and the operating system was incredibly VAX/VMS like, so we found a great deal of business through the military, replacing VAXs in different applications. The bad news was that it was certainly not what, when or how we expected to sell them, but the good news was that we were able to recover from my mistakes in a very unexpected fashion.

Walsh: Why do you think the market was not receptive to the workstations? What was going on? What were some of the issues you were up against?

Ray: In hindsight, I don't know. Our marketing technique was a little different in that we offered a fixed price for certain capabilities. It was like a 30-day guarantee, something that was also a little higher entry price than others would promise, but we guaranteed it. More people would be enticed by a lower entry price. Let's say, our standard system was around $17,000. Everyone else's may have been $10,000 and we'd say this is a complete seven user system, nothing else to buy. Others would say, “Well, buy more stuff if you need it, but it's $10,000.” In an emerging market this was apparently important. Names were becoming important as well. There was a lot of consolidation. You went from hundreds of vendors down to 17 or 25 main vendors a year later, so it was this great expansion and then implosion or contraction that took place during that time.

Walsh: And when was that all happening?

Ray: That was in the mid nineteen-eighties. I think in almost any of the magazines you see the weight or feel the weight of the magazines, the *Computer Decisions, Electronic Design*,

et cetera. The ads increased the weight and then decreased the weight as the different companies met their fates.

Walsh: Was the mid 1980s the beginning of the open systems technology?

Ray: Right.

Walsh: Data General, DEC and others were still very much proprietary in terms of their architecture and their systems. How was that affecting you? Do you feel like you were ahead of your time in that approach?

Ray: Data General didn't embrace a positive corporate attitude towards open systems, really the UNIX market, until 1989. There was no push back from Data General regarding open systems versus non open. They were there to sell the MVs. They did have a UNIX-like system that they could run on their 32-bit MV machines under and in the place of their famous AOS/VS operating system and I think to a lesser extent that was true with DEC. During this time period, because of things we'll discuss, we did work on different machines because of the software portability of some of our software products. But we didn't see quite the push back when we worked with the DEC salespeople or the DEC situation. I think they introduced, eventually, some mid-space machines, but we saw more ignorance or avoidance from the DEC side and with DG it was denial. So there was a perceptible difference between the two organizations that we worked with. Primarily, we worked with DG, but still I got the sense that there was more push back from the Data General folks than from DEC; and that of course would change 180 degrees in 1989 when DG became a self proclaimed UNIX leader after denying it and pushing back for so many years.

At this time, the software that we created for the Hare Brain was portable. We did put it on everything from PCs to, I think, about 35 different vendors that we supported. Again these were 35 that evolved from just selling boards to being real companies ranging from AT&T to Concurrent Systems to DEC, DG, e*t cetera.* But we evolved into what would be considered today a multi-vendor, independent software vendor. In the 1980s, all of the companies that I remember, whether it's Altos to DG to DEC, *et cetera,* had some type of VAR or Independent Software Vendor program. There seemed to be a common acknowledgement that software vendors were critical to their survival because everyone can buy or anyone can build a machine and everyone can therefore buy from almost any vendor. The only distinguishing feature will be the application software or what can be done for our solution, not how do we do it in the hardware. In a way you were implying open systems. Well, that means it's almost changing from proprietary to commodity, and it was. It was universally recognized that even the smallest company had an ISV program and that they relied on that ISV program to distinguish themselves, or at least make themselves competitive.

Wild Hare's Software Evolution

Walsh: Tell me about the evolution of your software during the 1980s. Tell me more about what software products you were introducing in the 1980s and how those were perceived in the market?

Ray: The Hare Brain fiasco was kind of on a parallel track. We had to get as much as we could for the inventory to handle creditors and the financial situation. At the same time, the focus software-wise was still on the Data General VARS. The tie in with the DG marketplace was still extremely strong with us. The volume of sales through Data General was still through its VARS in either one of two languages, ICOBOL or Business BASIC, so it was COBOL or BASIC that DG had. Both were quite portable across the Data General product lines from the smallest NOVA to the largest MV. We just kind of extended that to any DG hardware product as well as any DG competitor. We created several products, including a compiler and run-time system that allowed Data General users to run their current COBOL programs totally unmodified on any vendor's package, meaning from PC to the largest AT&T 3B computer to HP machines to DEC machines to further on down the list. That was certainly an age where we worked with a large number of vendors. And sometimes the smaller the vendor, the more important we became in their marketing plan, because we had a tie-in that no one else had. We had a tie-in to all of Data General VARS, and Data General VARS constituted a significant portion of Data General's $1 billion revenue.

Walsh: Did these software products enable people to move off of Data General and run on a competitor's products?

Ray: Yes, I guess one could look at it that way.

Walsh: How was your relationship with DG evolving at this point in time? Were you still seen as a Data General ISV?

Ray: I think you could consider it love-hate, pretty similar to what it was ten years prior. Yes, we would be able to move people from DG. At the same time, our products were competitive with DG products, but they were also slightly different. We handled networking differently. So we actually had multi-user peer-to-peer networking before Data General did on its own products. So we still have this love-hate. We have the ability to do things on DG Systems that DG can't do or the customers could do it on machines that aren't DG; so the answer is that we were a little bit of both. Again I don't recall that much official corporate level angst from Data General on it and, if asked, I'm sure I would have given the same answer at that point: If our products are better and the client is happier with this and here are the additional benefits running our software on Data General than running Data General's software on Data General, then it is in the client's

best interest. And DG could say [either], “Well, no that's not our attitude.” and shoot themselves in the foot or say, “Oh, okay, then that's the way we'll carry it.”

Walsh: Were your software products received more favorably in the market than your workstations were?

Ray: Oh yes, yes. In fact we still sell some of those products today, 20 some odd years later.

Walsh: Who were you selling to at this point in time? Who was using your products?

Ray: Well, I'll say Data General VARs and the COBOL applications were typically business-oriented or non-government, non-military oriented. The VARs would have vertical packages ranging from cemetery management systems to steel mill accounting systems to car rentals, hotel management, and sheriff’s office management. To this day, there are counties in California that still run our software for all the court systems, so it's just almost anything that a DG computer could be used for in a business sense. That was the VAR market and hence our market.

Walsh: This is the mid-1980s now?

Ray: Later, we're talking the transition to the 1989 time period where you're seeing DG finally embracing the open systems.

Walsh: When did your COBOL run-time system come out?

Ray: That started in 1981. I think the product officially came out in 1983 when the PC-AT at the low end gave it, as well as almost any other application, enough power to be useful. That is, the IBM PC hinted at the possibilities, but it was slow enough that people would still get frustrated even with applications like word processing and spreadsheets. But the commercial applications needed a little bit more processor power. The IBM AT in 1984 finally delivered on that promise and that's when we saw the significant growth in the PCs. You almost saw it polarized. But the 1984 timeframe was when that whole area of third party COBOL, in our instance, just took off.

Walsh: Can you talk a little bit more about how that market expanded and how your organization was able to succeed in that as those changes took place?

Ray: Imagine people being able to do things on a PC or on a workstation -- and I'm sure that term was blurred by marketing many times -- that usually or previously required a

proprietary system like a VAX or an MV. So there was a great educational period for both software vendors because this was a shift, and to users because they had to learn that they could do things that were previously done on what they considered mainframes, or minicomputers, now could be done on PCs. So from our standpoint the PC was a blessing for us. For the users it was a blessing but it took awhile for that whole shift from a curiosity to actual business tool to take place. I would just guess that took a couple of years because there, as I recall in 1984, were several very large companies that we worked with that were just transitioning from the minicomputer mentality to the PC and I remember how long that took. You know, you have a year of deployment, testing and fixing things and again, this has nothing to do with our software. It's just within the organization, within the insurance company or within the agency, learning how to use these new things, figuring out what this thing called networking really could do or couldn't do.

Walsh: Both DEC and Data General offered products but neither of them were certainly in the front end of that transition. Did that affect the nature of your products? How did your product lines adapt or not adapt to changes that were going on in terms of personal computing?

Ray: We didn't really have to worry about personal computing as a whole, you know, narrowing down just to the DG marketplace and our specific products, our COBOL-oriented products. We announced products and then DG finally came out and announced its own product for a PC with its COBOL, so we were competitors. They followed us about nine months or a year later in the PC marketplace. The Data General PC marketplace, however, was not really a DG PC -- although there are some brilliant exceptions to this statement. But for the most part DG used off-the-shelf Intel machines for its PC product line, so there was nothing glamorous or proprietary about DG's offerings. They offered things in the PC line because they had to or else there'd be one less incentive for a customer to stay with DG. So it was a reactive approach that DG took and it was usually a delayed approach: whatever Intel would be able to send or produce is what DG would sell.

After Downsizing, Refocusing On Software

Walsh: You've described going through the 1980s with some fairly successful software products and some less than successful hardware ventures in workstations. When is this all happening? When are you seeing this failure in workstations and what happened organizationally?

Ray: We strategically downsized.

Walsh: Starting about when?

Ray: I think it was 1985 or 1986. I should be proud to say that was about a year to two years before a lot of these other companies started to because you had that implosion especially in this area, the Bay Area, and the late 1980s was just an interesting time to be here. It was also before the big companies actively pursued the workstation/UNIX marketplace. In DG's case that was officially 1989. We were beta testing and working with Wang also, but they were a late adopter and we've seen what happened to them and DEC was two years earlier than DG. So you see this denial or ignoring the marketplace until they had to do something or hit the brick wall. We went from 25 or 30 people down to four people and then ramped up again. Fortunately the sales of the PCs software, and to a lesser extent the workstations, were carrying us through and helping us pay off all the loans and pay off any of the creditors and re-stabilize around the 1989, 1990 time period.

Walsh: From 1986 to 1990, what things fell by the wayside? Did you drop certain products? Where did you decide to refocus your business as that transition was going?

Ray: That was software, so the strategic corporate direction was to refocus on the initial core strengths of the company. We did software and I tried to be very careful about looking at any hardware options in the future. So far we still have focused mainly on the software aspect of things, so during that time period, no more hardware sales of any kind unless it was an old customer that really had to have one of the boards, which we were still selling maybe one or two a year even for the old 16-bit machines and just making sure software was the business.

Walsh: Give me sort of an inventory of what your primary software products were in 1989.

Ray: By 1989 we had the COBOL Compiler for ICOBOL. We had an ICOBOL Runtime. Now Data General separated those out as two separate products. We also were looking at what was called the VS COBOL marketplace, expanding the capability of both the runtime and the compiler from ICOBOL to handle the VS COBOL. I think there were a few other minor products such as the FORTRAN convertor and I think we had an IDEA system, which was proprietary DG data entry software. Those were very, very minor players. So it's mainly the VAR, DG's VAR languages, which were COBOL and BASIC, and we focused on the COBOL because it was the lion's share. It was the primary language used by DG VARs.

Walsh: At this point were you still selling primarily to the DG marketplace?

Ray: Yes, but remember we were doing the PCs also, so PCs don't mean DG. In retrospect it was almost a ground swell from the PCs up: “Will your stuff work on PCs?” “Yes, it works fine.” “Well maybe we will consider other non-DG larger hardware.” So it's an interesting thought that the PC made the other sales possible. People who were used to being tied to a

specific vendor could see that they could run their applications on other vendors' hardware, run them successfully, and that they now had other options. So we were working with everyone from NCR, AT&T, DG, and DEC, but it was the PCs that were almost the vendor neutral thing. And as long as it could run “standard” PC software, MS/DOS and networking, it was a low enough risk that the clients didn't really care.

Walsh: Did the problems that Data General was facing in the late 1980s - 1990s affect your organization in anyway?

Ray: Yes.

Walsh: Tell me about that.

Ray: The typical press release was “Data General makes $1.3 billion again this year” or DG almost reaches last year's $1.3 billion. The next paragraph is “...but DG losses are” so and so. So it was a stagnant time for Data General. That marketplace affected the VARs more than us because we were a small company and the percentages may have been there. The absolute revenue numbers didn't affect us as much, but it also gave an incentive to the VARs to look elsewhere if the VARs felt threatened or less secure, so the better Data General did the better we could do. The worse Data General did the better we could do because we can either help with or move from Data General, so the VARs saw a way out.

Walsh: Were there bright spots in this market that you could sell into?

Ray: Again, we weren't selling into a computer market. We were selling to VARs. That's the most cohesive thing we can talk about. There was consulting and other things I was doing also but the market, as a collective noun, was really a whole bunch of verticals. So in some cases distribution management systems would see a dramatic drop off, but some other system, maybe freight hauling systems, would see a rise. So we didn't see the drop in revenue that corresponded with the DG marketplace. I'm sure this was also true on the DEC side, but on the DG side, certain VARs would shrivel up and die and others would thrive and we were able to service across the board rather than a specific market. And then finally you say, “Well, we're no longer tied directly to the DG marketplace. These VARs no longer have to rely on DG. They can run on PCs to the largest UNIX machine.

Walsh: Were there lots of changes going on in the world of the VARs? Was there consolidation or firms dropping out at this point in time?

Ray: Yes. Data General itself, when it shifted so swiftly in October of 1989 to UNIX, left a very big gap. They did not have ICOBOL for UNIX or Business BASIC for UNIX or a large

variety of other products or languages that were on their older systems. They weren't available on the RISC-based machines and then again it was that October 1989 conference for the VARs and ISVs that opened a lot of eyes. People were surprised that there wasn't a comprehensive planned way of getting VARs off of one proprietary platform to open systems. That was incredibly good for us and was incredibly bad for DG because they didn't have anything at that point. It would come later because of the screaming by the VARs. But you're asking how did that affect us? It was not bad for us at all.

Walsh: As you get into October 1989, you're hearing DG's now moving into open systems and they're in effect leaving lots of VARs and customers in the lurch in terms of moving on. How did this affect your business in terms of what you decided to do or what direction you went with your software?

Ray: It was good. And yes, at that point I think we hired one new salesperson. There was more business then we could effectively handle timewise, so I had to start staffing up again. The DG response after that 1989 time period was to start cultivating third-party relationships to provide the languages DG didn't have. DG had them on the old systems but not on the new systems. Eventually they did their ICOBOL on the [AviiON] RISC machines and the Business BASIC was covered on the new machine. But for about six months to a year, they had crossed the chasm and they expected the customers to cross it somehow on their own. Actually DG created the chasm and expected the customers to manage: "Well we're DG." So it was a very busy time for us. There was not a great deal of technical change in our software. Our stuff ran on DG's proprietary systems just like it ran on their RISC system just like it ran on everyone else's RISC or open systems. So it was a non-event technically, but it certainly was an event for DG or anyone who had ties directly with DG and only DG.

Forging Through Crisis

Walsh: Before you started doing work on VS COBOL, were you skeptical or concerned about growing fast again? Were there any concerns about bringing people on?

Ray: Yes, there were.

Walsh: How were you thinking at this point in time about where to head or what direction to go in?

Ray: I'm just transported back to 1989 when I hired a salesman and the angst going back to that time and the angst of hiring him. So yes, during all of this previous time period -- and I'll be candid -- there was a lot of concern about whether to liquidate Wild Hare and just declare bankruptcy. And we said no, we're going to pay off everyone and any agreements, and find

everyone else jobs as needed. That's just, I guess, that's the way I was brought up. But it certainly created an even a more conservative attitude, a more cautious or paranoid attitude, for the future. I'm sure I've made similar mistakes, but I hopefully was creative enough to make mostly new mistakes since then. But yes, starting to add people took on a new meaning and we've always thought of them as really a family, not a true corporate situation but a family situation, and usually you want that to work out as much as possible.

Walsh: Into the early 1990s, where did your products go? Where did you put your attention in terms of growing a business and how did this progress for you in those years?

Ray: The ICOBOL of our marketplace was very good. The Data General VS/COBOL -- it was called VS because it ran on their "VS" machines [32-bit Eclipse MVs] and not on other Data General machines -- was a market we really hadn't tapped yet because that required a lot more technical planning. It was a more sophisticated product and it wasn't just the language and the runtime itself. Those applications were typically tied with a specific Data General database, which was a separate product. It was a very big technical challenge, so being the lazy person I am, I decided to tackle that only if and when needed. That also meant that the users couldn't jump over to new platforms. In some cases, in fact, they had to stay with the MV long after the new RISC benefits were well accepted and proved every day. So there was a burgeoning potential market because as RISC machines got faster and better in the 1990s, some people couldn't move and reap the benefits. And the VARs were giving us enough revenue that I hired more people, got more revenue, and we decided to tackle this bigger challenge of the VS/COBOL.

So during the early 1990s we started an actual migration division that did migrations rather than just emulate the Data General COBOL. So we had two parallel divisions internally. One was the VARs or the bit-for-bit compatibility. We can move you from DG to another platform without any problems. The other side is, we would be doing migrations, possibly source level changes to the customer's code, and migrate to a new system probably using our own data emulation tools. Since we had control over them we could modify them as needed. We also did migration to other vendors like RM/COBOL, MF COBOL, if you are familiar with those. But it was a solution and not just a tool that we provided, and that was the parallel division that was emerging in the 1990s. Throughout the 1990s we had quite a bit of success with the migration, but it culminated in the Y2K fiasco. So ten years after the 1989 DG shift, you had another shift where people who'd put things off or put off moving from Data General for so long, they had to do something because of the Y2K impact on their own applications. So they have Data General in decline: "What do you mean Data General might be bought out?" They had this Y2K pressure, real or imagined, but management usually says what are you doing about it and someone will say we have to do something. If DG is going away and we have to change our applications anyway what better time to jump ship from DG. So through the entire decade, it was a good decade for us because there was a lot of angst culminating in a certain date: December 32, 1999. That's

how some people did secure their systems, in fact was through making a December 32nd and a December 33, 1999.

Dancing Again With Data General

Walsh: So let's keep talking about the 1990s. I want to hear a little bit more about the progression there. It sounds like the migration continued through there, but DG was going through some pretty big changes beginning in the 1990s and ultimately ending in the organization being sold to EMC later on. But I just wanted to talk a little bit about whether any of the specific things that happened with DG in the 1990s had any effect on you. In particular, when they did move over to the AViiON platform in the early 1990s, they started off using Motorola 88000 chips and then they made a move later to Intel. I'm wondering if you can talk a little bit about the nature of DG's moving to open systems and its affect on your business in any way, and whether that Motorola-Intel change had any particular ramifications for you.

Ray: No.

Walsh: It didn't?

Ray: <laugh>. When DG went to its official RISC posture, it showed that Motorola 88000 chips were better than the more popular MIPS chip set and instruction set. Since I didn't work for Data General, I can't say whether this is absolutely true or not, but Bob Miller did work for Data General before joining MIPS. There seemed to be quite a bit of animosity in comparing the technical merits of MIPS versus 88K. And I was told by some DGers that that's why the Motorola 88000 was chosen over the MIPS architecture. So DG originally went with the Motorola 88000 for its RISC machines; and then because of the dwindling number of vendors using the Motorola 88000 chips, as you indicated, DG eventually went with the Intel 386 systems, all branded under the AViiON label, which did create confusion. But what was even more confusing to clients was why the Motorola 88000 was good on one day, and then the next day the Motorola 88000 is bad: "It's old and outmoded, and the Intel architecture is good? Last week you were bashing it."

Walsh: Right.

Ray: From our standpoint, we didn't care. The software vendors were pretty savvy. Actually, we were lazy. We wrote in C and it didn't affect us much technically. But it was a bit of jockeying internally within DG, realizing the political and the technical realities of one architecture versus another, one mass market versus another. And so DG went with the Intel 386 and continued that until their last real workstation, around 2000. EMC did continue and

finish, I think, one or two of the workstations that were in design by the time EMC bought out Data General. And from there they dropped it.

Walsh: To go back to your product into the 1990s, where you talked about the VS/COBOL migration work that you were doing? Were there other projects in the queue there, or is that where you were sort of spending most of your time? Or what was Wild Hare up to going through the 1990s?

Ray: The ICOBOL, VS/COBOL and corresponding consulting work kept us extremely busy at that point. We hired contractors rather than employees as the response to added manpower needs. And the people that we hired were extremely fluent in DG COBOL-- DG systems, the proprietary DG database-type or record management systems-- and we were extremely good at customer service too. We had a really, really good team.

Walsh: So going through the 1990s, again, Data General starts to falter and, ultimately, in 1999, gets acquired by EMC. As you say, right around this time companies are starting to get concerned about Y2K compatibility. Tell me about the implications for this, for your work. Let's hear a little bit more about the sort of environment you were facing and how you responded to the growing pressure at that point in time.

Ray: There were more proposals than one could take time for. At the time, there are a lot of people doing it. And there was also more pressure to look outside of Data General for a solution by the corresponding clients' IT people. Also there was big external pressure from companies like Oracle. Oracle can do anything and everything…in three months' time. You just sign on the dotted line. There's a great deal of the FUD (Fear, Uncertainty, Doubt), plus a deadline in a client's IT department, and we did many migrations, both Y2K and off of Data General simultaneously. We also lost many bids. In our bid proposal, or our response to a client's request, we would list what we would do, why we would do it, and the estimated times. We, being techies, said, "Here's what needs to be done; here's how it has to be done. It doesn't have to be us," and, "Here's how long this would take or how many dollars." You have one person do it or four people do it, but a lot of times we found that people didn't believe that, for whatever reason. And it got to be noticeable, even to me, that there is disbelief on moving away from something to something else. And I know that we would not undercut our low-ball prices at that point. It was frustrating everyone, and we eventually closed down that part of the business after 2000 because I guess there wasn't enough business. There wasn't enough closings based on our pricing; and at the same time, when customers came back to us and said, "Well, I guess you were right, but we don't have the money anymore because we wasted it on someone who low-balled us, and we don't have any time, and we don't have any money, and we don't have any solution. Can you help us?" That was not a real good market to get into.

Walsh: Yes.

Ray: So after Y2K, we disbanded the migration side of things. And I think that carries us through the 1990s <laughs>.

Life After the Millennium: Adapting Once Again

Walsh: Yes. So let's talk about the post-DG life at Wild Hare. DG's gone now. You got through Y2K. What's been going on since then? How has your business evolved over the last number of years?

Ray: I'll just say everything DG has wound down. The Y2K was a collective cosmic gasp, or some may have called it a yawn. For most of the IT departments, it was a gasp or choking. But it took about a year for everything to settle down. Annual reports don't have to be done, like, the end of 2000-2001. So there's a lot of -- one would non-technically call it "fudging" -- going on. And it took about a year, a year and a half, for the full impact to dwindle and filter down from the Y2K changes that almost everyone did.

And after that, the migration business that we did dropped off dramatically. The VAR business was okay. But everyone was on contract so essentially we closed down. We closed down the migration division just by not actively pursuing that market. We just accepted sales. Other people went on to other jobs. We have a good support community. Everyone had other jobs-- all of the contractors-- and we kept getting inquiries about how can we move this system from DG. The client would say: "But we still want to get off DG and we have XYZ!" And we'd say, "Well, why haven't you moved yet?" "Well, we can't because our software vendor is no longer around. We have this proprietary database called XYZ." "Well, there's no off-the-shelf way to handle that," We would tell them. "Oh." And so they ask you again in six months. One of the products that we developed in the early 1980s for the Hare Brain was an emulator for the Data General Nova instruction set. So if it emulates a Nova -- or an Eclipse, for that matter -- you really don't care what the application is. So the marketing impetus to enhance those products -- resurrect them back to a full product -- was being able to carry people's applications from a DG machine to a new platform, regardless of what the software is that they're running, regardless of whether they have the source code, whether they have the vendor support, or whatnot. Whatever they're running now runs on the new machine and by the early 1990s RISC processors were fast enough to run the emulator to emulate the DG hardware as fast, if not faster, than on the original machine. So it was kind of a spare-time project to upgrade the old software from just a Nova. We expanded it to the Eclipse; and then, fairly recently, in the last couple of years, a full-blown MV emulator. So what we're doing is emulating Data General hardware on modern systems, just like, I guess, I did with PDP-8 in 1971.

Walsh: Right.

Ray: This allows us to not worry about any coding issues, languages, or almost anything else of the original application. So now, instead of being semi-retired, we're hiring again. We're hiring more consultants again, and we're seeing a large increase in these DG machines appearing all over the world with these very strange applications. And they all have not been able to move [to more modern hardware] yet because of some specific tie-in with Data General, or the software.

Walsh: As you look at where your business is today in 2008, you've been doing this now for, it sounds like, 37 years, something in that vicinity. And your Wild Hare work right now, as you describe it, is very much tied towards helping people get off of legacy and DG systems. Do you foresee that winding down? Do you know the next steps for you? I'm just trying to understand your thinking right now about this business as it's going forward.

Ray: The master strategic plan for Wild Hare is to continue learning, having fun, doing what I like to do. So there's no specific market that I'm looking at. There are plenty of virtual machine or emulation areas that can be explored. But there's no pressing urgent marketing necessity to do so.

Walsh: Okay. You've got plenty of work to keep yourself busy right now.

Ray: It is more than I can handle. So that's why I say I've had to hire people.

Walsh: And why did you stay with this for so long? I mean, you've been through some ups, some downs, some ups again; and I'm curious. As you reflect on this when you first started working on your PDP emulator back in 1971, that 37 years later you'd still be working in this space or that you'd have this company that was still here today. Why have you stayed with it for so long?

Ray: And being a masochist doesn't count?

Walsh: Yes <laugh>.

Ray: Because I enjoy computing. I'm still a computerholic. I've been doing this for almost 40 years, as long as Data General has been around.

Data General Preservation

Walsh: So I'd like to spend our last stretch of time here talking a little bit about your other adventures in preservation, the preservation of Data General equipment and information, actually. Maybe you can talk a little bit about the work you've done, how you got into preserving Data General Systems, what you've done over time, and where that is today.

Ray: How many packrats have you known?

Walsh: Lots <laugh>.

Ray: Yes. Well, I guess that's another anonymous group I should belong to. There are weirdly-obsessed people who enjoy preserving and restoring computers. And the reasons seem to vary because I've met-- in this sub-hobby and in this quest of mine to preserve everything Data General-- people who were not born when Data General was formed. They weren't even born when the MV came about, but yet they, too, have this obsession to preserve equipment. My proclivity is for Data General equipment mostly; and that's mostly due to the fact that I've worked with each of the machines. I enjoy finding and restoring them. That's the same way with the DEC machines that I originally worked with in the 1960s. I do have a DEC PDP-8, et cetera. So some of the first machines I worked on I still have, and it's a hobby and obsession. And it, as we're finding out, has some historical value. I'm sure very little, but it's computer history. Before the Computer History Museum there was and still is a group of self-commiserating people who assist in getting, restoring, and preserving the different computers. And now, with the Computer History Museum, that's elevated it to a new higher profile, fortunately. So in my personal case, I focus on DG. I would like to get one of every major DG machine, and I'd like to get them running. I would also like to run the original software, using the original software tapes. Why? Because we can.

Walsh: How do you go about acquiring this stuff? I mean, obviously, you've got some things you've been working on over the years, but are you actively collecting new pieces? Where do you go to find this kind of stuff?

Ray: They can be found at quite different sites, from decommissioned military bases to salvage yards in the local area. So our obsession focuses on the software, the manuals, and finally, the hardware. We archive anything and everything so that we have the information available to maintain the system after restoring something, both hardware and software-wise.

Walsh: Give me a sense of the scale of this collection of yours.

Ray: Most would say too much. When it pushes out by, I guess, the little Razor scooter in the garage, that's a lot. But I do have everything from original Nova working to a pretty late MV. Even though I primarily consume myself with the 16-bit Nova and the 16-bit Eclipses, we do have some of the 32-bit machines that will soon become classics anyway.

Walsh: Yes. What is your grand plan for all of this? You've got this collection and it's pretty amazing in terms of what you have collected and what you have done with it. Is there a strategic plan for this?

Ray: I'm not sure what the strategic plan is, but the personal plan is to get one of every significant DG machine working and maintain it, so perhaps others could get a glimpse of what it was like before you got carpal tunnel syndrome [from PCs].

Walsh: And is it your intent to keep this as a personal collection, or are you looking to somehow make this publicly available?

Ray: Yes and no. Yes, I plan on keeping a lot of it personally; but at the same time, we work with different institutions or museums or universities around the world, as well as collectors. So we distribute documentation and other things as requested or needed to official organizations like the Computer History Museum or the Charles Babbage Institute. There are some museums in Europe that we work with also. There are private collectors that love and have restored those machines.

Walsh: Yes. Well, I think that's about all that I wanted to cover. Thanks so much for your time.

Ray: Thank you very much. You have been very considerate and gentle.

Additional Material from Bruce Ray

Here are some notes that Bruce has added as of June 2103:

Much has happened since this interview occurred over five (5) years ago.

Wild Hare's Virtual Machine products for the Nova, Eclipse and MV run an increasing number of DG and Rolm applications on modern platforms worldwide. Wild Hare has also introduced new hardware to help embedded and custom systems take advantage of its Virtual Machine technology.

More historically significant, Wild Hare has completed 13 years of secret negotiations with Data General/EMC to become the official legacy archivist for DG software. Likewise, Wild Hare has completed similar agreements with other vendors and entities, such as NADGUG, NanoSeconds, IPT, Point 4, Data Base Monthy, DG Review, and Strobe Data, to be their official archivist.

Wild Hare has expanded its work with the Computer History Museum, Vulcan's Living Computer Museum, other museums in Europe, New Zealand, and elsewhere, plus a growing number of “preservationists” worldwide.

Through these and other efforts, Wild Hare is excited, proud and obsessed to help preserve computer history for future generations