David Craig

From: Steven Weyhrich
Sent: Thursday, December 26, 2002 3:13 PM
To: David Craig
Subject: Fwd: Apple IIe question

Begin forwarded message:

> From: Rick Auricchio <rick@cfcl.com>
> Date: Wed Dec 18, 2002 12:08:09 PM US/Central
> To: Steven Weyhrich <sdweyhrich@mac.com>
> Subject: Re: Apple IIe question
>
>> Do you remember what parts of DOS 3.2.1 and 3.3 you worked on?
>
> DOS 3.2.1 was a patch to fix disk errors. In late '78 and through part of
> '79, Paul Lutus (developer of AppleWriter) had been experiencing I/O errors
> on his dual-floppy system. He was one of the few in the world with one,
> outside of Apple.
>
> One day, while running his test script (thank goodness he had one), I heard
> the "deselected" drive click during a switch from drive 1 to 2 (or 2 to 1,
> it doesn't matter). It turns out the head on that drive was stepping a
> little bit when it shouldn't have, thus positioning itself off-track. I
> don't recall why a recalibrate didn't recover, but it could be because the
> head was 1/2 track off and it got *some* data, but failed to get it all. I
> believe if you could read address mark headers you didn't recalibrate.
>
> I called Woz over, we looked at it, and he found a new capacitor on the
> motor-control board. Shugart had added this to smooth out the power without
> Apple's knowledge; he attached a scope and saw the power stayed up on the
> drive for perhaps 100mSec after it was deselected.
>
> The seek routine immediately began stepping the "new" drive head right
> after turning off the "old" drive. Because the power didn't shut off
> immediately to the old drive, its stepper had enough power to click a
> little bit.
>
> The problem didn't occur on older drives within Apple, because they didn't
> have that capacitor.
>
> Woz and I added a 150mSec delay to the start of the seek, so there was
> enough time for the old drive to really die. This delay was invisible,
> because the seek would still complete before the spindle motor was up to
> speed.
>
> That was DOS 3.2.1.
>
> ---
>

> For DOS 3.3, I integrated Woz's 16-sector disk "core routines."
>
>> Shephardson Microsystems did the majority of the work on the original
>> DOS 3
>
> Apple bought DOS from them.
>
>> Randy Wigginton and Steve Wozniak wrote the RWTS part of it.
>
> Correct. RWTS, Read-Write Track/Sector, was the main entry point of the
> "core routines," the floppy driver code.
>
>> I was also told that Dick Huston did work on modifying DOS 3.x.
>
> Dick maintained DOS in general, fixing bugs. DOS 3.1 had plenty; DOS 3.2
> fixed a lot of them. Dick also knew the core routines, so he perhaps helped
> with those too.
>
>
>> Also, legend had it (at least at one time) that there was no assembly
>> source file for DOS (at least on the Apple II), but that it was patched
>> via the mini-assembler. Is there any truth in that?
>
> Not true, but close. DOS source lived on an S-100 Z80 system, but I forget
> what kind. That's where Dick made the changes. Some time after I got the
> assembler in good shape on the Apple II, DOS got moved there. I don't
> recall who moved it over. Could've been me, could've been Dick, or perhaps
> John Arkley.
>
> GameBasic on the Apple I, predecessor of Integer Basic, was hand-entered in
> hex by Woz at parties. The Mini-Assembler came later than that...
>
>> David Craig told me that there was a secret in the Apple III called
>> "Devil Mode"
>
> "Satan Mode," a name I made up. Andy Hertzfeld discovered that you could
> use the /// as a II with access to the various features, IF you didn't
> require ALL the hardware compatibility that the "Apple II switch" enabled.
>
> Initial attempts to use it were risky, because there were occasional things
> you'd forget about and you'd just crash. He then created a "Satan Mode
> Boot" diskette, which I later used to run the SubLogic FS-1 flight
> simulator at the increased processor speed.
>
> I don't believe anyone bothered to try using bank-switching, extended
> indirect addressing, or 80-column video in Satan Mode; it was a novelty
> that was neat but didn't become very popular.
>
> Once you flipped the /// into II Emulation Mode, you couldn't flip it out
> without a reset, nor could you access any of the advanced features.
>
>> [made floppy driver] "correct", was it an issue of functioning
>> correctly
>
> Yes. It was in ROM so the system could boot. Dick Huston fixed "the last
> bug" and offered a $50 challenge to find another. Two days later I smugly

> handed him about seven bugs! I declined the reward, but he insisted on paying.
>
> One of the bugs caused multiple drives to fail, so I got the task of fixing
> the driver. Dick was beginning on ProDos---the Disk Division was hot to
> sell the 5MB Profile hard drive for the II machines---so it wasn't like
> they took him off the floppy and gave it to me.
>
> I knew how the core routines worked on the II, and the /// was similar, but
> I had not actually done a floppy driver in its entirety. I spent a few
> weeks reading his code, understanding what it had to do (and how it did or
> didn't do the job). A lot of his code, in tight assembly fashion, was
> intertwined. The read and write paths, for example, came through the same
> block of code, with tests all over saying "reading?" or "writing?" to
> branch here and there within the block.
>
> I went so far as to completely flowchart a driver, realizing that it was
> faster and smaller to simply write multiple routines. Then create
> subroutines from the duplicated code. This is straightforward design,
> nothing special.
>
> I then began coding and had the driver operational in a couple of weeks.
> Coding and testing went quickly once problems had been thought-out in the
> design phase. Separating fundamental things like the read and write path
> made it easier to debug; with a common path you can't debug the first write
> when it's going to do loads of reads first!
>
> The ROM-based driver was fine for booting, because it didn't have to handle
> multiple drives, and, if there was a Write bug we wouldn't be doing writes.
> So we kept the ROM as is and made the floppy driver installable. When SOS
> loaded, it had a ram-based floppy driver.
>
>> do you recall if the driver functioned differently from the one in
>> DOS 3.x on the Apple II?
>
> The driver was essentially identical in function, though the /// could have
> four floppy drives connected. The API was different, since SOS used the
> unix-style read/write/open/close/ioctl paradigm. The core routines were
> rewritten, but they were still about the same as those Woz had written in
> the II. They would be considered derivative work if you pushed on the
> copyright, for sure.
>
>> Were you the sole author of SCP [/// system configuration program]?
>
> Yes.
>
> I also did much (or all?) of "Selector," which was a menu-based program
> launcher for the ///. I don't know how much of it I did, but I know I did
> the visual stuff. All that text-based folder-image scrolling and drawing.
>
> Because Thomas Root did a great job with a smart-terminal interface for the
> console, a lot of the animation was done with a stream of control
> characters! I'd just package up viewport-setting controls, scrolling
> operations, and so forth, and the animation would happen in the driver.
>
>> I know that making the changes in the ESC cursor movement code to allow
>> the use of the arrow keys was a BIG improvement for me, as I did a lot

>> of Applesoft programming at the time the IIe came out, and it just made
>> more sense than did the IJKM keys. Also, having the inverse "+" appear
>> (when using the 80-column firmware) to indicate that you were in cursor
>> movement mode was a BIG help also.
>
> I forgot about that stuff. Remember uppercase-restrict? That was something
> that I recalled from the Xerox CP-V timesharing system: if you typed in
> lowercase, the system would upshift it to interpret it. I think that went
> in too.
>
>> Did you see any difference in the corporate culture when you returned
>> for the second time, or for the third time? Was it very different as a
>> (I presume) bigger company? Is there a time of working at Apple that
>> you feel was most enjoyable for you?
>
> My times were: Mar 79-Jan 83, Sep 85-Oct 92, Sep 95-Oct 01.
>
> The first stint was when we had 75 people in Engineering. It was a blast,
> because I'd worked with a friend building a 6502 computer from scratch in
> 1975. I bought my Apple II in 1977, and the learning environment in the
> early Apple days was great.
>
> Andy Hertzfeld joined about six months after I did. He and I had been
> writing articles for Micro Magazine, and we both wrote an article showing
> an ONERR-GOTO patch for Integer Basic. We "recognized" each other from
> that. Alan Watson, who may still be at Apple writing technical manuals,
> also wrote an article on which DRAMs would work in the II. At the time he
> was working for Fairchild or another chip manufacturer (Fairchild?). I
> mentioned the article when we were introduced.
>
> The second stint was after I'd learned UNIX and C. Five of us started the
> A/UX project. There I got to learn unix in great detail, wrote more drivers
> for various Macs around the Mac-II timeframe, and we did lots of good stuff
> with A/UX.
>
> The third stint, after Taligent, was working on the CHRP project. I then
> moved to the Rhapsody project shortly after the Gil Amelio layoff binge.
> There, I worked with former-A/UXers and former-Taligent folks along with
> the NeXT people.
>
> As time went on, more after 1995, you could see the big-corporate changes.
> Benefits became weaker and cost more, even though the employees were older
> with families (when we were young and single, we didn't need all the good
> benefits!)
>
> Corporate bean-counters began cutting expenses as they always do: they cut
> what's easy, but not what really COUNTS.
>
> For example, at one point in the early 90s, someone decided to cut out the
> T-Shirt budget. Why? Because it was an easy-to-spot line item on someone's
> budget. Never mind the morale backlash. That got overturned at some point,
> but not after it had done some morale damage.
>
> You see this all the time in organizations where the finance people are out
> of touch with the organization. They cut a line item without really knowing
> whether it'll make a difference. You have to cut the EXPENSIVE stuff, not a

> little cheap thing.
>
> For example, they'd cut some minor thing that people liked, then the
> Repro/Printing department would print thousands of notices about changing
> out the Xerox machines for another brand. Instead of putting one notice at
> the machine they plastered them all over the building. Waste.
>
> The Telecom people would print thousands of GLOSSY card posters telling us
> they're adding a new prefix for extensions (974-xxxx and now 862-xxxx). BIG
> expense, and for what?
>
> Anyway, I'm rambling...it's just that I see this stupidity all over.
> Someone wants to cut expenses and he begins cutting things without first
> looking at where the money is actually going.
>
> --
> - rick
> -
> ---
> -- -
> Rick Auricchio   rick@cfcl.com http://www.cfcl.com/rick
> Acoustic Legacy Studios   Cambria, CA USA 93428   805-927-7305
> Years ago, I sent my mojo in for repairs. I still don't know if it's
> workin'.

Steven Weyhrich <IX0YE>--<
Apple II History
http://apple2history.org