

Tales from the Bit-Bucket.

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On a Clear Disk you can seek forever...

There are some very clever people about.

(Most of them don't frequent the Bit Bucket, but, after a few Jack Daniels, I find myself in an expansive mood and am very happy to give credit where it's due...)

Take the inventor of the Disk Drive for instance. (No, it wasn't an Italian called Scuzzi...)

Of course, you say, no ONE person invented the complex piece of technology which lies at the heart of modern computing...surely, it was a team, or several teams, researching, honing, modifying, improving, wasn't it?

Well, suppose you had been given the job. The Boss comes in and says:

“Now look here <your name here>, this magnetic tape stuff is all very well for storing large files, but every time I want to find a Phone Number I have to search through miles of it to get the one little piece which is relevant. Then it has to be re-wound before I can search for the next one. What we need is some kind of device that will allow DIRECT access at RANDOM, in no time flat to only the specific bit of data that I want to look at. Get cracking on it and have some preliminary drawings on my desk by Monday.”

How would you go about it?

Slice up pieces of tape into more manageable sizes and put them into plastic boxes?
.....Ridiculous?

One computer company did that in the early nineteen-sixties.

Build huge modules of non-volatile main memory that could be trucked to the computer site and plugged into the existing machine to provide immediate random access to data?

.....Unrealistic?

IBM did it. (They were called LCMs... Large Core Modules. Millions of tiny ferrite doughnuts strung by hand onto wire lattices. The cost was astronomical, even 'though they were produced by cheap labour in Korea...)

Some of the early efforts, viewed with the benefit of hindsight, are really amusing. (Try not to think of those early Flying Machine flickers as you read the following...)

In the early nineteen-sixties NCR stole a march on the computer industry by producing a viable random access device that was nothing short of ingenious. It was called CRAM (Card Random Access Memory) and connected to their famous NCR 315.

The thing that first struck you about the 315 was the fact that it had a typewriter carriage with standard typewriter keys (no golfballs or teletypes) and these keys clacked away as the system typed messages. Tiny solenoids under the keyboard made the keys move up and down as if a ghost was typing on them, and the carriage returned mysteriously of its own accord. It was really spooky to watch.

NCR had solved the random access problem by putting 8 metallic rods across the top of a hopper and hanging 256 mylar cards from the rods. The ends of the cards were notched in a very clever way so that each of the 256 cards was individually “addressable” by turning the rods. Programs sent an instruction to the CRAM unit to address a particular card, the unit caused the correct combination of rods to rotate, and the card was dropped down into the hopper where a vacuum grabbed it and pressed it onto a drum which rotated

under a Read/Write head. This system gave random access within about 200 milliseconds to nearly a megabyte of data (if my memory serves me correctly), and we thought it was fantastic.

Of course, all the computer companies were attempting their own solutions to the random access problem, so, by the late sixties, we were seeing disk drives on the “shop floor” and not just in research laboratories.

A certain computer company, who were very good at sequential processing and had some of the most reliable tape drives in the world, decided it was important to install the “new technology” in their Bureau in Auckland, N.Z.

As this would be the first such installation in Australasia, the whole thing became a bit of a media circus, and the Sales Manager for the entire Region was flown from Australia to officially inaugurate the new computer centre.

The centre had 2 of the new disk drives which could store around 4 million bytes each (and were about the size of a kitchen stove...!) and the disks which they took, which were about 2 feet across and 2 inches thick, with a handle in the middle.

The Great Man duly arrived accompanied by various lackeys all trying to out-adulate each other, and was ushered into the inner sanctum so he could see the new disk drives. We had stopped all the real work and spent the last week writing a program to access the disks so he could get the general idea.

He watched the spinning platforms with the furiously clicking actuators zipping mysteriously across them for a few minutes then turned to the nearest lackey and made the remark which, even now, I can't repeat without blushing for him:

“Bloody dustbin lids.....they'll never sell!”

I can hear all the techos out there laughing and saying, “Typical Bloody Marketing...!”

To balance the record, let me relate the following: It happened on a Burroughs installation (that's the half of Unisys which wasn't Sperry...).

We were expecting the arrival of our “new technology” fixed disk. Most of my team had done the programming course for the new devices and we were producing Assembler and COBOL programs, which had code in them to access a device we had never seen. One member of the team actually coded a COBOL statement to CLOSE the disk WITH REWIND! (And she was one of the better programmers too...)

Is that laughter I hear from the Marketing Department...?

Once the disks were installed and we'd got the hang of it, there was no stopping us. Programmers vied with each other to invent more efficient hashing algorithms and quicker ways to access disk. (Intelligence had not yet been built into the disk controller; (there are those who will tell you that even to this day it has not been built into the majority of programmers...))

Systems which relied on sorting and extracting data were considered “sissy”.

Anything which used magnetic tape was passe. The “State of the Art” was random access. We designed Databases which had all the required reports “chained” together in report sequence so there was no sorting. If the system crashed it was virtually irrecoverable, but it didn't matterall random access, no sorting.

“SORT” was a dirty word in those days because it inevitably took long periods.

Peripherals and processors had nothing like the power that your Pentium has today, and these were mainframe systems.

A friend of mine used to operate an IBM 360-30 equipped with 3 of the “new” 2311 disk drives. Certain stock movement reports required sorts, which ran from 4 to 6 hours. He was working two jobs, so he took advantage of this time to get his head down. He used cotton and an elaborate system of pulleys made from a Meccano set to rig up an alarm. The cotton was connected from the SYSRES disk drive via the pulleys to a bell. When the sort was complete the system would go to the SYSRES drive looking for the next job. The

frantic seeking of the actuator arm caused the drive to shake, this movement was amplified further by the pulleys until it rang a bell, which woke him up!

The device which revolutionised the whole random access business, was the IBM 3330. Now we had a complete intelligent subsystem that relieved us of many of the programming chores associated with disk access. It had a “voice coil” actuator so the access was faster and it could always find the right cylinder. It also had a micro-programmed controller to take care of things like RPS (Rotational Position Sensing), queuing the access addresses and sorting them so they could be serviced in one seek, and automatically carrying out re-tries when data was mis-read. It was connected by a new channel architecture called a Block Mux, which relieved the remainder of the System from congesting its data highways with disk traffic. I believe if it wasn't for the advent of the 3330 we would never have seen many of the time-critical Transaction-driven systems that appeared in the late nineteen seventies.

These were big devices connected to big systems. Today we have it all in the palm of our hand, complete with voice coil actuators, on board cache, and all for a few hundred dollars.

So next time you are installing a new SCSI/IDE 4 millisecond 80 Gigabyte disk in your Notebook machine, spare a thought for the “dustbin lids” of 1967 and the “good keen men (and women)” who burned the midnight oil to make them better.

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