

COMPUTER HISTORY - As I have experienced!

We indeed have come a long way...

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With the fast-paced world of computers and AI, it is hard to believe that my first encounter with computer was in the form of a small minicomputer – only a server unit with paper tape as its input! This was in early 1980s while I was pursuing my engineering. It used to take assembly instructions on a paper tape as input and give its output on the paper tape itself. No display, only few red LEDs blinking very fast to show that some vigorous computing was being done! It was obvious that we lost interest soon enough after trying out a few add/subtract types of programs. However, the final year of engineering turned out to be more interesting since we got to experiment with microprocessors; they were the real introduction to mini-computers and laid the base to try out many things. As a final year project, we developed EPROM programmer using a Zyglo microprocessor kit.

In 1982, I joined IIT Bombay for MTech. There I got a lot more exposure to computing as well as large computers. The computer science department had the EC-1030 Russian computer – 3rd generation LSI technology (equivalent to IBM 360). I still remember that this huge computer used to be in a caged room where only a few privileged people (admins) were allowed to enter. We could hardly see this computer from outside – we were allowed only till the reception room where we used to go submit our card decks as programs (in Fortran). We used to come to know whether the program was successfully compiled and executed only a few days later, as there used to be a long queue. So, it was very important to review the code (punched instructions on the card) carefully so that we would not have to visit many times to get it executed successfully! In fact, we used to feel embarrassed to even visit twice

to execute a program successfully. So were the days, life was tough. It is really astounding that computers have come a long way and gotten converted into laptops, Ipads and realise how much the current generation is lucky to view the programs and outputs.. on a nice GUI..!

After completing MTech, I had a choice to join either software or hardware company. My role model advised me to choose software as he envisioned more opportunities and a successful future in it. Obviously, I joined a software company, with the hope that I would learn both hardware (on my own!) and software. Initial days were hard, not very encouraging because I had to work with the same type of computers with card decks interface. But, once we got allocated into system support group, we had an opportunity to work with sophisticated systems and software. We were using Burroughs computers with DMSII network database and ALGOL as programming language. We were supposed to maintain and enhance ALGOL based generators for report and edit programs. It was an extremely challenging assignment as the generator software in ALGOL and macros ran into 4-5 thousand lines and was tough to understand. But the concept of a specification driven generation was intriguing and that remained my source of inspiration throughout the rest of my software career of 35+ years!

In 1986-87, I got an opportunity to work on the state-of-the-art platform and software. Our team developed a CASE (Computer Aided Software Engineering) tool on IBM 3090 with DB2 – one of the first few commercial relational databases then. In fact, this tool was already developed on Burroughs platform with DMSII network database. Our job was to migrate this to IBM platform and DB2 with many more enhancements. I would say this software was well ahead of its time. It had support for many modelling techniques (Data Modelling, Data Flow diagramming, Extensible modelling framework etc), coupled with reverse engineering modules to create models from legacy code. Later on, this became a foundation for many tools for model driven development, maintenance as well as reverse engineering platforms. In fact, we could see its major utility in resolving Y2K problems during the century turnaround.

In 1990s, personal computers and desktops (on intel 386, 486, Pentiums) came in a big way that shifted power to individual programmers. Object oriented programming, Graphic User Interfaces became a way of developing applications with more complexity at the same time with smooth and easy-to-use user interfaces. I remember that the Super minis/micros (AS400, DEC..) were getting replaced by intel-based PC/Servers with more computing power.

Migrating to Windows, Unix, GUI based applications with C, C++, Java as application programming languages became the main theme for developers around the world. While we continued to enhance meta model-based tools, program generation for Java, GUI, object-relational database access layers, we could see many 3GL, 4GL tools were mushrooming in the market to improve the developer's productivity.

Next 10 years saw a focus on developing large and medium size applications to address most of the domains. Subsequently, the development pace decreased while the focus shifted on maintaining and enhancing existing applications in a robust and consistent way. Huge data centres with all kinds of applications were set up for large organizations. The software services companies started focusing on providing cost effective solutions to manage these centres efficiently and cost effectively.

Meanwhile, parallelly during 1990s, Artificial Intelligence (AI) also emerged as one stream to handle complex reasoning problems. Prolog, Lisp based modules were developed to handle rule-based functionality. Somehow this theme did not catch up fast and remained dormant for some time. But now that the compute capacity is increasing multi-fold... handling of large data (Big Data), associated analytics and reasoning,



using neural networks has become very much possible. AI has picked up significantly and machine learning / deep learning have become state-of-the-art technology now, to resolve problems & recommend solutions in many domains – such as Health / Medicine, Space research, Utilities, Infrastructure, Finance etc. For tackling large data as well as complex rules, parallel processing, GPUs are also being tried by multiple organizations

I had an opportunity to work on a framework in recent times (2015-20) which combines model-based generation, analytics, AI techniques to automate many of the mundane tasks as well as forecast/predict the behaviour issues and recommend appropriate solutions..

Currently, the cloud computing era is in vogue. Organizations are moving towards clouds to have agile, cost effective operations as well as to avail latest tools, software, large data processing capacity etc. Future for computing sees immense possibilities. AI, Data Science, and cloud computing will definitely be in the main stay at least in this decade.

As I look back, I consider myself very lucky to traverse and experience through all types of computing systems, databases, programming techniques and new paradigms such as model driven systems and AI. It has been a very intriguing, interesting, and enlightening journey all along!