

INDUSTRIAL VISIT – CDAC



Date : 25TH September, 2016

Venue : CDAC, Pune.

Faculties in charge :

- Mrs Deepali Kayande
- Miss Priya Kaul
- Mr. Abhishek
- Miss Shafaque Syed

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Mumbai

On 22nd September 2016, 52 students from the second year computer department of Don Bosco Institute of technology visited the Centre for Development of Advanced Computing (CDAC) Pune for an Industrial Visit to learn about supercomputers. They were accompanied by Mrs Deepali Kayande, Miss Priya Kaul, Mr. Abhishek and Miss Shafaque Syed faculty of computers department, DBIT.

We left from DBIT at 8 am by bus. Breakfast was provided to students on the bus. There was a brief halt enroute for refreshments. We reached Pune at 12 pm after which we were provided with lunch. After lunch we left for CDAC and reached there at 2 pm. There we were first shown a presentation on super computers which told us about the history of supercomputing, its working and advantages. We were then shown a model of the “Param Yuva-II” the supercomputer currently present at CDAC and its working was explained to us. We left CDAC at 4pm and arrived back at DBIT at 8pm.

Supercomputers were developed in the year 1960 by US which then went on to dominate the world of supercomputers. They were joined by Japan in 1980. In India CDAC was formed in the year 1988. Their first task was the supercomputer ‘Param 8000’. By the year 1991 the ‘Param 8000’ was completed and it had a 1 G FLOP (Floating Point Operation). This was India’s first supercomputer and the advent of India into the world of supercomputing. After this various other supercomputers were developed for example the ‘Param 10000’ 10 GFLOPS, the ‘Param Yuva’ – 40TFLOPS etc. The word Param is short for parallel computing.

The present supercomputer ‘ParamYuva-II’ is 500 TFLOPS and can perform 10^{12} operations per second. The ‘Param Yuva-II’ consists of more than 300 compute nodes, these nodes help in the breakdown of complex calculations and help in solving them faster. These nodes are connected by the ‘Param Net’ which has a speed of 10 GBPS. Apart from this the ‘Param Yuva-II’ consists of two management servers which consist of Intel made dual socket octa core ie it consists of 16 cores in all. It also has two intel MIC cores. The saffron band we see in the ‘Param Yuva II’ stands for a 56 GBPS network. The white band is for the management network which helps in monitoring the servers. The Blue band is for the ‘Param Net’.

A program in supercomputers work as follows:

- First the user writes the programme using libraries.
- The libraries are part of a global memory i.e they can be accessed from anywhere.
- The messages are passed to the compute nodes using a message passing interface.
- This is possible due to open source programming.

Over more than 75 organisations including the IITs and other technical institutes make use of the ‘Param Yuva II’. To access the facility of the ‘Param Yuva II’ the following steps can be followed:

1. Fill the research form.
2. Account is created.
3. Due to large number of compute nodes to run an application a scheduler is used.
4. A scheduler is used by writing a script. Currently an open scheduler TORR is used.
5. It is very essential to mention the specific amount of compute nodes needed.
6. A wall time is given for the results.
7. After the job is completed, job specification is given.
8. Jobs are tracked using job ids.

A precision AC of 30 ton controls the temperature of the supercomputer. The power used a month ranges from 750KW to 1 MW. The electric bill is about 5 lacs per month. The performance of the super computer is checked using HPL i.e. high performance link pack. Proper security measures are taken to prevent breakage.

Applications of Supercomputers are :

1. Simulation or mathematical modelling.
This enables modelling of real world data.
2. Weather forecasting
3. Molecular Biology
eg. Sequencing of human genome, personalised medicine etc.
4. It is used by architects and civil engineers to check structure strength.
5. Also used by pharmaceutical companies, computer graphics and the government.
6. There are numerous other applications of Supercomputers.

The future will see a large spread of supercomputers in India. Currently CDAC is working on India's first Peta Flop supercomputer which would be able to perform about 10^{15} operations per second. The world's best supercomputer is currently in China and is 90 Petaflop. However, efforts are on to make a Hexa flop supercomputer by the year 2020.

This visit was a great learning experience for the students and we are very grateful to the Computer department of DBIT for organising it. It helped us realize the ongoing current technological advances in the world and it was a very proud feeling to know that India is slowly but surely coming in par with other countries in terms of technology.