

# Cray supercomputer 13835

Technology



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The Cray X-MP/22 manufactured by Cray Research Incorporated (CRI) of Minneapolis, Minnesota was delivered and installed at the U of Toronto this September. The Cray is a well respected computer - mainly for its extremely fast rate of mathematical floating-point calculation. As the university states in its July/August computer magazine " ComputerNews", the Cray's " level of performance should enable researchers with large computational requirements at the university of Toronto and other Ontario universities to compete effectively against the best in the world in their respective fields." The Cray X-MP/22 has two Central Processing Units (CPUs) - the first '2' in the '22'. The Cray operates at a clock rate of 105 MHz (the regular, run-of-the-mill IBMPC has a clock rate of 4. 77 MHz). By quick calculations, you would be led to believe the Cray is only about 20 times faster than the PC. Obviously, this is not the case. The Cray handles data considerably differently than the PC. The Cray's circuits permit an array of data (known as a 'vector') to be processed as a SINGLE entity. So, where the IBMPC may require several clock cycles to multiply two numbers, the Cray performs everything in one clock cycle. This power is measured in Millions of Floating Point Operations Per Second (MFLOPS) - which is to say the rate at which floating-point operations can be performed. The Cray MFLOPS vary as it does many activities, but a rate of up to 210 MFLOPS (per CPU) can be achieved. The second '2' in the X-MP/22 title refers to the two million 64-bit words (16Mb) of shared central memory. This can be expanded to four million words in the future if the need arises. But it doesn't stop there! The Cray can pipe information back and forth between the CPU memory and the Input/Output Subsystem (IOS). The IOS then takes it upon itself to store the information in any of the four storage devices: i) one of the four 1200 Mb

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disk drives (at a rate of 5.9Mb every second), ii) one of two standard 200ips 6250bpi tape drives, iii) a Solid State Storage Device (SSD) (which is much like a 128Mb RAM Disk!), or iv) through to a front-end computer (the U of T uses both the IBM4381 and a DEC VAX). These computers would be programmed (usually in FORTRAN) and the information passed onto the Cray. The results would then be transferred back to the front end computers. The 4 year old Cray was bought used from the California NASA research centre where it was used in aerodynamic calculations. This means less cost to buy it and the assurance that it has been 'burned in'. In case you wanted one for yourself, the U of T was able to purchase the Cray for the low-low price of \$12 million. Over the next five years, the University predicts the total cost will probably be \$25 million when maintenance, staff and other costs are taken into consideration. To help out, the Ontario Government put in \$10 million. By doing this, all other Ontario University researchers are assured of access at a reduced cost. By the way, to buy time on the system, it'll cost you \$2000 per hour. But Ontario researchers only have to pay 7% of that - \$140 per hour. Their first commercial customer is OMNIBUS Graphics of Toronto who plan to use the Cray in the graphic videos. If you saw the movie 'The Last Starfighter', you will have already experienced the graphic capabilities of the Cray (remember the some of the space scenes!). The Cray did all of the calculations required for those scenes and let another graphics computer to do the menial task of drawing the lines and filling with the calculated colour. There is so much to talk about when the word 'Cray' pops to mind! If you are seriously interested in this amazing computer and/or you are interested in purchasing time on the system, please contact the people below: The Centre for Large Scale Computation at the U of T Lloyd Parker, <https://assignbuster.com/cray-supercomputer-13835/>

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