

continued from page 21

## HPC RESOURCES

HPC infrastructure is too expensive for most universities and research groups to afford individually. Canadian HPC research consortia allow for the sharing of an HPC facility by multiple researchers at multiple institutions across multiple disciplines. The major consortia are WestGrid (British Columbia and Alberta, [www.westgrid.ca](http://www.westgrid.ca)), Sharcnet (South-Western Ontario, [www.sharcnet.ca](http://www.sharcnet.ca)), HPCVL (Eastern Ontario, [www.hpcvl.org](http://www.hpcvl.org)), AC3 (Newfoundland, Nova Scotia, New Brunswick, Prince Edward Island), RQCHP (Quebec, [www.rqchp.qc.ca](http://www.rqchp.qc.ca)), and CLUMEQ (Quebec). These consortia allow research groups to join as members to gain access to the available HPC facilities.

Furthermore, due to the rapidly decreasing commodity hardware costs, one can move away from specialized supercomputing platforms to cheaper, general purpose systems consisting of loosely coupled workstations or PCs, otherwise known as clusters. This approach has a number of advantages, as individual workstations are becoming increasingly powerful and network technology is allowing for greater bandwidths and lower latencies. These systems scale well as one can (i) increase the number of nodes by connecting more computers to the network and (ii) enhance the performance of individual nodes by upgrading their components. The two most widely used clusters are Beowulf clusters ([www.beowulf.org](http://www.beowulf.org)) and OpenMosix clusters ([www.openmosix.org](http://www.openmosix.org)).

## CONCLUDING REMARKS

HPC is no longer a technology that's of limited usage, nor is it inaccessible for Canadian researchers and practicing engineers. In fact, HPC has recently opened up new fields of research in which people can innovate. Furthermore, whatever a researcher's field happens to be, HPC can always enhance research productivity and information acquisition and analysis. Just as regular computers were thought of as tools of limited usage in the early years after their conception, researchers will all soon recognize the potential benefits of high performance computing. ■

## HISTORY NOTES / NOTES HISTORIQUES

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## The Sons of Martha Cairn, Churchill, Manitoba

On the Rideau River in eastern Ontario about 65 km south-west of Ottawa, can be found the village of Merrickville. When the Rideau Canal was completed in 1832, the skilled stonemasons turned their talents to the building of many stone residences. The largest of these historic buildings with three floors was in Merrickville. From 1922 until 1961 this was the residence of Harry F. McLean (1883–1961). A self-made man, McLean, originally from Washburn near Bismarck, North Dakota, founded the Dominion Construction Company in 1912. The company was chiefly involved in building railways in Canada's north and was very successful. McLean had a reputation as an eccentric extrovert who would throw \$100 bills out the car window when he felt in a generous mood.

One of Dominion Construction's projects was the Hudson Bay Railway to Churchill, Manitoba. In 1927 it was decided that the Hudson Bay seaport would be located at the mouth of the Churchill River instead of the Nelson. The railway turned north from Gillam for 275 km to Churchill and the construction was completed by 1929. The railway was built on top of the muskeg overlaying the permafrost. The method used was to displace the active layer of muskeg with stone ballast. This construction resulted in a somewhat unstable roadbed when the muskeg was not frozen. The tracks tended to move so a lot of maintenance was required. Trains are limited to 50 km/h to compensate for the often uneven tracks.



THE SONS OF MARTHA PLAQUE



CAIRN

In November 2005 I had the opportunity to observe the cairn that Harry McLean had erected in Churchill in 1930. It is located in the railway yard about two hundred metres north of the railway station. It consists of a stone monument sitting on a concrete base. In 1995 it required work to restore the masonry and to replace two missing plaques. Today, with the restoration complete, it has a bronze plaque on each face. One simply states, "In loving memory of those who worked and died here". This is followed by the complete text of Rudyard Kipling's poem, "The Sons of Martha", two stanzas on each face. There are no credits or explanations which must leave the tourists who visit it a bit perplexed. Harry McLean erected similar cairns at other projects that his company built in Canada.

"The Sons of Martha" was a poem written by Rudyard Kipling based upon the story of Mary and Martha in St. Luke. Kipling (1865–1936) was an English novelist and poet. He lived in India, the United States and England. The Sons of Martha can be interpreted to mean the engineers, contractors and construction workers who design, organize and build the infrastructure which communities across Canada depend upon.

Ralph Crysler, a previous Chair of the CSCE History Committee, working closely with Ken Mackenzie and Peter Hart, got the restoration of the cairn and plaques started in 1995. Residents of Churchill, including Pam Doyle, Louise Lawrie, Rod McKenzie and Lorraine Brandson deserve much credit in getting the restoration realized. The only person that I was able to meet on my recent visit was Louise Lawrie who runs the Aurora Inn where most of our party stayed. This cairn is an important example of our Civil Engineering History and Heritage.