Idle computers offer hope to solve cancer's mysteries through grid computing project

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A biomedical engineering professor at The University of Texas at Austin is using a concept called "grid computing" to allow the average person to donate idle computer time in a global effort to fight cancer.

Muhammad Zaman, assistant professor in biomedical engineering, recently introduced Cellular Environment in Living Systems @Home or CELS@Home for short (http://cels-at-home-dev.dyndns.org/cels/). The program already has more than 1,000 computer users worldwide contributing to the project. And the numbers keep growing.

The idea is based on what is called grid computing. Instead of using local computing resources, which are almost always limited, grid computing allows Internet users worldwide to contribute their idle computer time, creating a "virtual" supercomputer to solve a difficult problem. In this case, the grid computing program is calculating cellular interactions in different environments to help understand the principles of cell migration and cancer cell metastasis, or the spread of cancer from the original tumor to other parts of the body.

"We have launched a global effort to recreate the in vivo (live) environment of cancer cells in a computer model. This allows us to perform virtual experiments and study processes that are too costly or technically very difficult to study," says Zaman, who also directs the Laboratory for Molecular and Cellular Dynamics. "By recreating this whole 'system of processes inside a cancer cell' we will be in a position to fully comprehend the problem and hopefully identify targets that will

one day translate into anti-cancer drugs."

He says only a background program (or screensaver) needs to be downloaded—at no cost to the user—to contribute to the CELS@Home effort. A computational program then runs whenever the screensaver is activated, requiring no effort on the part of the user to run the program or report the computations.

"It's a completely passive approach," Zaman says. "There are no viruses or no spam that can compromise the performance of their machines."

Among the approximate 1,000 users, there have been no instances of computer problems, he says. Users are from countries such as: Argentina, Australia, China, Denmark, France, Israel, Russia, Saudi Arabia, Taiwan and Venezuela.

Zaman emphasizes the project also will stress dialogue and communication with the worldwide users, which he hopes will number 100,000 people someday.

"We'll soon have forums where contributors from all over the world will be able to provide feedback to us about what are some of the most challenging problems in cancer that they would like to study," he says. "Thus, we are making a global effort to solve a global problem."

Already, the program has yielded enough information in just two months for two journal articles.

"What took months can be done now in days or weeks," Zaman says. "It's amazing."

He says CELS@Home goes beyond traditional grid computing to incorporate a multi-scale systems biology approach.

"Instead of studying one molecule or one gene, it is studying a host of problems in cancer," Zaman says. "Cancer, as we know, is not a disease of a single gene or a single cell, but in fact it is a problem that involves thousands of genes, signals and molecular components. Understanding cancer requires understanding the system in its proper context, not just a tiny bit of the problem."

He says computations may take one day, one week or a month to complete, depending on the user's amount of idle time and computer speed. Any amount of idle time is beneficial, Zaman says. Once a computation is completed, the user will receive another computation, and so on. The user can opt out of the program at any time.

Source: University of Texas at Austin