

“Our Greatest Untapped Resource”

Putting unused computer cycles to work for education

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“Our greatest untapped resource is our unused computer cycles.”

This unexpected and insightful comment was made by Mark Anderson, publisher of the well-known (among hi-tech CEOs) newsletter *Strategic News Service* at his annual Future in Review conference in 2004.

I have been thinking ever since about how we might tap into this unused treasure, especially for education.

The *reason* computer processor cycles are an “untapped” resource, for any reader who doesn’t immediately “get it,” is that – like airline seats – computer processor cycles are a non-storable commodity. If not used at the time, they disappear. Whenever we are not actually computing on our computers, whether they are off or on, we are letting potentially productive computing cycles expire. And even when we are *using* our machines there is almost always plenty of room for more computing to be going on – even more unused cycles. Try estimating the number of unused or partly-used cycle-hours on your PC and multiplying this by the 500 million to 1 billion PCs in the world, and you’ll begin to see why this is such a big deal.

Our unused computer cycles are, potentially, like money in the bank collecting interest – they can be working for us even while we sleep.

So what could they potentially be doing for us in education? Let’s look at a model from the sciences. One of the earliest projects to use available computer cycles (this is often called “collective” or “distributed” computing) is UC Berkeley’s *Search For Extraterrestrial Intelligence* “SETI@home” project. The Arecibo radio telescope used by the SETI project generates massive amounts of data that needs to be scanned for possible patterns that could indicate intelligent life. So the project distributes a free “screen saver” to anyone requesting one. The screen saver contains a program that utilizes the idle computer cycles on the volunteers’ PC to continually analyze new “chunks” of the data. The program goes to work whenever the host computer is idle, automatically

downloading data to analyze, performing the analysis, and uploading the results. SETI@home has been distributing its screen savers since May, 1999. As of May 2002, over 3.7 million registered users were participating in SETI@Home, and together they had analyzed over half a billion work units. This translates into roughly 1 million years of CPU processing time (a computer year is the equivalent of one computer working continuously for one year.) The internet site <http://www.aspenleaf.com/distributed/distrib-projects.html> lists 21 additional distributed computing projects currently working on a host of problems amenable to this type of analysis, in science, the life sciences, and encryption.

What about education? Could we benefit from a million additional years of CPU processor time? Are there data and problems in our field that would benefit from this type and extent of analysis?

Certainly.

We could, for example, be analyzing more deeply, in a distributed fashion, the massive amounts of test and demographic data we now collect. Schools, colleges and universities could crunch their grades (anonymously) against demographics, statistics on entering students and alumni's future success and contributions, in much more detail than we do today. Such types of data cuts, both finely-grained and aggregated nationally, would be very helpful in shaping educational policy. Students with computers (i.e. all our college attendees) could be asked – or required – to run screen savers that do this.

Colleges and universities, in fact, are particularly well placed to utilize unused CPU cycles, since it is relatively easy for college IT directors to both require and distribute these types of “idle-cycle-using” applications on student computers. All classes, from the sciences, to the social sciences, to linguistics and literature, could make this resource a part of their studies by providing data and problems amenable to this type of analysis. Professors could use it as well for their research.

And while these types of analyses would be quite helpful, they are only a tiny fraction of what could potentially be accomplished if we fully utilize our unused cycles.

Imagine if we were continually crunching data, 24/7, in real time, about our students' physical conditions, mental states and brain activity, through wireless biometric attachments to their computer? What if we recorded and analyzed our students' thinking patterns, either through their voice or brain waves, as they were doing specific problems? What if we analyzed (authorized) video recordings of our students' entire days, recorded through wearable cameras, to see how students *really* spend their time?

What if every book and article ever written were being continuously cross-checked for plagiarism? What if every textbook were being automatically reviewed and revised so that when ordered it is up-to-date? What if “bots” were constantly doing polls, searches or projects programmed by teachers and classes, with the results available on demand? What if every student programmed his or her own daily morning briefing every on their

classes and personal interests? What if those personal interests were continuously analyzed, aggregated and segmented nationally and globally?

What if schools around the world – imitating modern businesses – passed off parts of their ongoing class projects to schools in time zones still in school, and had their computers continue to support the work of these others while they slept? What if we continuously aggregated student mistakes (e.g. the grammar-and-spell-check-corrected mistakes in Word, and the formula mistakes in Excel) into a database of “most frequent mistakes” in every subject that could be displayed as tips on student’s computer screens?

Henry Kelly, President of the American Federation of Scientists, observed recently that the cookies on his daughter’s computer know more about her likes and preferences than her teachers do. What if we were constantly analyzing (again, anonymously) the data on all our students’ computer “cookies” to better understand their habits, likes and preferences?

All of these things are possible today, and represent but a tiny fraction of the potential ideas for usefully exploiting the vast untapped mine of available computer cycles. All of these ideas, even if done simultaneously, would use only a fraction of the computer cycles now available.

Our PCs are also CCs (Community Computers)

It is time we all began thinking of our powerful and ubiquitous PCs and laptops not just as our personal tools, but rather as having a vast amount of power to be tapped continuously and communally at almost no incremental cost. The sooner we start thinking this way, the faster and better we will begin benefiting from this “great untapped resource.”

Moreover, as important as education and learning is to all of us, it represents only a tiny fraction of the opportunity that unused cycles affords. Whatever your interests or field, vast, free, untapped computing power is out there, potentially for the taking, at your command.

So let your imaginations run wild! Free the million hours! Unused computing power to the people! Vive community computing! Its time has come.

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