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New Computer Algorithms Buck The Energy Barrier

 EMC Contributor (<http://blogs.forbes.com/people/emccontributor/>), EMC

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By Gail Dutton

As computer chips have become faster and tinier, they have improved to the point where they are almost as efficient as they can be, which threatens to bring advances in microprocessors to a standstill. New energy-efficient algorithms aim not only to delay that standstill, but to make computer operations faster and cheaper, giving small machines big capabilities.

As industries embrace big data, the limitations of current microprocessors are becoming more evident. The big problem is heat. In data centers, the [Uptime Institute](http://www.itcrisis.com/pdf/library/Heat_Density1.pdf) (http://www.itcrisis.com/pdf/library/Heat_Density1.pdf) estimates the heat processors generate has increased from 425 watts per square foot in 1992 to 10,000 watts per square foot today. That means big expenses for cooling and also the need for new buildings designed to dissipate such high heat loads to house those data centers. As processors become more dense – stacked and closer together – on computer boards, so much heat is generated that fans can no longer remove it all. For data centers, this means that a traditional raised floor and hot aisle/cold aisle approach to cooling is no longer adequate. In fact, cooling has become the single most limiting factor in data centers today.

(photo credit: iStock)

So far, hardware engineers have been able to develop strategies to dissipate the heat, such as liquid-cooled microprocessors. Now, software engineers are looking at ways for chips to generate less heat in the first place. This approach has the benefit of increasing processing speed and power using existing

equipment, which enables data centers and individual servers to do more without the expense of buying new servers, adding new cooling or retrofitting existing data centers.

The EDGAR (Energy-efficient Data and Graph Algorithms Research) project (<http://crd.lbl.gov/groups-depts/ftg/projects/current-projects/edgar-energy-efficient-data-and-graph-algorithms-research/>) at Lawrence Berkeley National Laboratory, for example, is in the first year of a five-year project, but already has determined where and how chips use the most energy. As Aydin Buluc, principal investigator for EDGAR, explains, “There’s more than two orders of magnitude variation in the energy used to access nearby (memory) caches and the energy used to remove that data from memory. This tells us most of the energy use comes from communications among the processors.”

Based on that insight, Buluc and his team are developing completely new algorithms so that microprocessors communicate with other microprocessors as little as possible. Using this approach, Buluc says chip operations already are six to ten times faster. Keeping as many operations on one chip as possible not only increases speed, but reduces the energy needed for cooling.

“Reducing energy consumption even a bit could make a huge difference in overall energy usage,” says Professor Mohammad Shahidehpour (http://www.iit.edu/engineering/ece/faculty/shahidehpour_mohammad.shtml), an IEEE Fellow at the Illinois Institute of Technology (<http://www.forbes.com/colleges/illinois-institute-of-technology/>). This is particularly important for maintaining energy efficiency while doing large computations that may take hours or days to finish.

Reduced energy usage is particularly important for large data centers, but it affects individual users, too. Increased efficiency will allow chip makers to continue packing more power into ever smaller footprints, effectively extending battery life. It also means that data processing may become less expensive because large data centers will be able to do more with fewer machines, using less cooling for the same amount of computing. And, in the world of large-scale computing and growing data centers, saving cooling saves big bucks.

Gail Dutton is a freelance writer specializing in the intersection of science and business. She regularly covers enterprise computing, biotechnology, logistics and training for AFCOM publications, GEN (Genetic Engineering & Biotechnology News), Life Science Leader, EBD Partnering News, World Trade 100 and Training.

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8 Tips For Keeping Spreadsheets Secure

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By Michael O'Dwyer

For most businesses, spreadsheets offer a simple way to perform key business functions, such as accounting, data analysis or chart creation. But many of the user-friendly advantages of spreadsheets also make them susceptible to data or [security](http://www.forbes.com/security/) errors that can create nightmares for organizations if overlooked.

According to the [European Spreadsheet Risk Interest Group](http://www.eusprig.org/) (EuSpRIG), a global resource for spreadsheet [risk](http://www.forbes.com/risk/) management, spreadsheet errors can have a [tangible impact](http://www.eusprig.org/about.htm) on companies ranging from lost revenue or fraud to poor decision-making or financial failure.

In a recent survey by [Forrester Research](http://www.forrester.com/Market+Update+Office+2013+And+Productivity+Suite+Alternatives/fulltext/-/E-RES102262), only 10 percent of 155 IT decision makers surveyed said they provide an alternative to Microsoft Office. Although Excel is an excellent business tool, it still requires careful auditing, particularly as the complexity of a spreadsheet increases, says Jürgen Schmechel, owner of Capitalise-IT, a Sydney based consultancy specializing in spreadsheet auditing and business

strategies for growing companies. By following best practices for spreadsheet use, whether Microsoft Excel or an alternative, many common problems can be prevented, he says.

(photo credit: iStock)

1. Define parameters for use- “Complex spreadsheets in large enterprises normally involve several departments, and designing an effective template for each process is often necessary,” says Schmechel. By identifying requirements for spreadsheet use up front, companies can avoid common errors such as versioning mistakes or allowing the wrong person access.

2. Perform an audit- Identify the most critical spreadsheets used within your organization and ensure ad hoc sheets are not used for critical processes. “Logical handover processes for spreadsheets are crucial, especially when multiple departments are involved,” says Schmechel.

3. Don't rely on document protections- Security features such as password protection, hiding or protecting sheets and other features are not actually designed to secure information and can be easily bypassed. “Many companies do not consider that software is readily available to crack passwords or are unaware that opening an Excel document on the iPad using a \$10 app called Numbers will remove all perceived protection features such as hidden sheets,” says Schmechel. “The fact that third-party solutions also remove such so-called protection is another issue, with common examples including cloud offerings from [Google \(/companies/google/\)](#) [GOOG -0.02% \(/companies/google/\)](#) and Zoho,” he adds. Preventing this problem can be difficult without taking steps to better manage or secure files.

4. Determine sharing requirements- Make a distinction between spreadsheets designed for internal and external use, ensuring that confidential information or source data is not present in documents designed for third-party review. “Alternatively, use PDF format only for third parties,” says Schmechel.

5. Secure at the file level- Security must be enforced at a file level for true protection. “File or directory-based, read-only or edit permissions for internal spreadsheets is recommended, given the open nature of spreadsheets,” says Schmechel.

6. Utilize document management- Implement an internal document management system that includes file versioning, testing and approval processes before sharing takes place.

7. Don't forget to check the work- Manual data entry and custom formulas must be checked to correct errors just like a spell-check is needed on text documents. [Studies \(http://panko.shidler.hawaii.edu/SSR/Mypapers/whatknow.htm\)](#) indicate that almost 90 percent of spreadsheets contain errors ranging from minor to

severe. “Larger companies often base multimillion-dollar decisions on spreadsheet information that contains errors. If a \$10,000 external audit ensures all data is correct, the expense is worth it,” says Schmechel.

8. Bring your own- With BYOD increasing, companies must also consider spreadsheet security for personal mobile devices and for documents created using software from home or freeware, such as Google Docs. Decide whether employees can send out spreadsheets to third parties or edit them on portable devices using Polaris Office, Kingsoft Office or other solutions. Alternatively, maintain all data on local servers, with remote access granted to approved staff and frequent audits from uninvolved parties.

The ubiquity of spreadsheet use within organizations of all sizes can make it easy to overlook the potential risks they can pose. Companies that follow these simple best practices will ensure they are less vulnerable to errors and security flaws.

Michael O'Dwyer is a freelance writer living in Hong Kong. He spent over 15 years in the electronics industry, managing information technology, process improvement and supply chains. Michael writes for a variety of online portals on IT and related topics.

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