What's New With Operating Systems?

In the light of fast-paced changes on the browser front, are users finding that innovation at the desktop has stagnated? Has it? Or is there a lot brewing 'under the hood' that we're just not aware of, yet take for granted as our user experience improves incrementally?

For most computer users, an operating system is somewhat like the engine under a car's hood. They know how to start and stop the engine, how to drive around, probably how to check oil levels, but beyond that, the knowledge is limited. With a car, that is okay, since we do not really need to know more unless we are hard-core enthusiasts, or working in the automotive industry.

Getting back to operating systems, the beauty of these 'engines' is that they allow users to run their computers and use their favourite applications, while they take care of allocating system resources, handling processes, and so on. Operating systems are far from perfect, but they are remarkable pieces of software for the sheer complexity of tasks that they handle.

We open up the engine and take a look at some of the recent innovations in operating systems.

Splashtop: A fast-booting OS

What do PC users do after they press their PC's power button?

- Go get a cup of coffee
- Stare at the screen and practice meditation
- Chat with colleagues
- Any of the above

Jokes aside, most of us usually spend minutes waiting for the operating system (OS) to boot up. This is especially frustrating when we need to look up something on the Internet quickly, or just have a few minutes to check personal e-mail.

A new operating system called Splashtop allows you to connect to the Internet without booting your main operating system. Splashtop

Splashtop OS, which is currently available only on ASUS motherboards, allows users to connect to the Internet without booting their main operating system

has two components: a core engine that runs out of the BIOS, and an optimised Linux stack that boots rapidly. Splashtop boots out of the BIOS (basic input-output system) on the motherboard of the PC, generally in five seconds or less, according to the website, and provides quick access to certain applications, like the Splashtop Web browser (based on Firefox) and Skype—or offers you the choice of booting your main operating system.

Splashtop is currently available only on ASUS motherboards. When we enquired about how the company plans to make Splashtop available to customers, Andrew Kippen, press and blogger relations manager at DeviceVM (the company that provides Splashtop) revealed, "We spoke about many different ways to release Splashtop, but in the end decided that launching with a partner like ASUS, the world's largest motherboard manufacturer, was the best way to reach consumers. Splashtop-enabled laptops and desktops will be released later this year."

Splashtop uses flash memory on the motherboard to store its applications. Could that be a bottleneck?

Kippen says, "This is not an issue, since we tailor each version of Splashtop to the manufacturer's specifications. If there is a size issue, manufacturers can include a larger flash memory chip, or run Splashtop from a partition on the hard drive."

On issues like vulnerability to attacks and whether it is possible to save attachments or documents, Kippen says, "Like I mentioned earlier, we tailor each version of Splashtop to a manufacturer's specifications, so [the answer to] your question depends on the manufacturer. On current ASUS products, we allow persistent data (like bookmarks and cookies) to be written to memory. However, users cannot save files, for security reasons."

Since Splashtop is Linux-based, it is immune to most of the attacks that plague traditional operating systems. Restricting access to memory, whether flash memory or the hard drive, further ensures that Splashtop always works properly.

Speaking on the reasons for the OS's popularity, Kippen adds, "A major reason for Splashtop's success is that more and more applications are moving to the Web. Users (excluding business users) spend more time with Web-based e-mail, Facebook, MySpace, YouTube, and other websites than on any desktop program. Online applications like Google and Zoho are quickly becoming viable options for most Office-like applications.

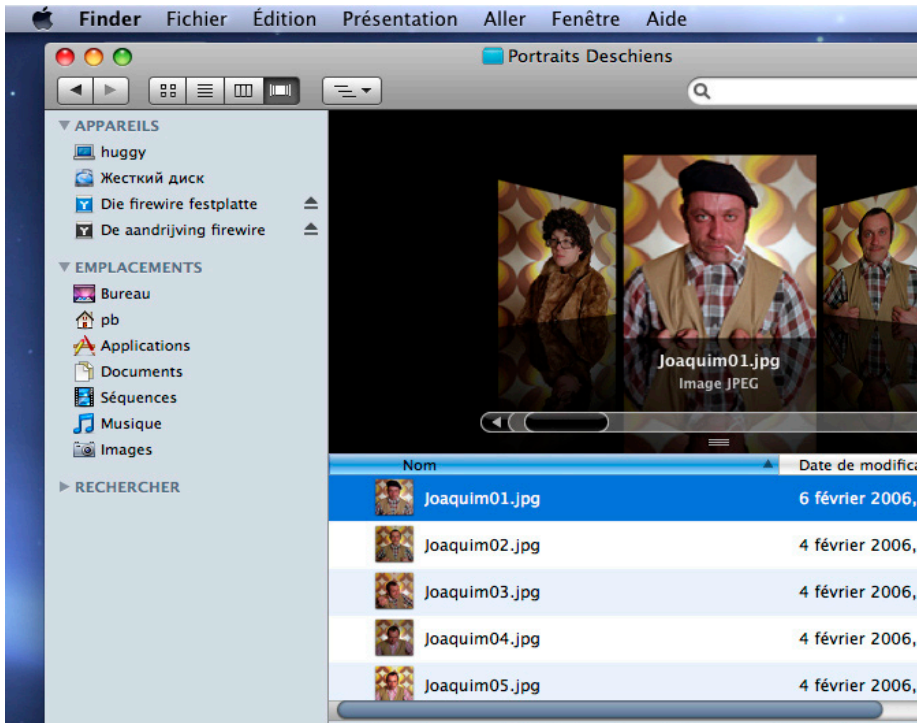
"We are targeting mass-market consumers, i.e., normal people who just want their computer to work without any wait or fuss. We see ourselves as a good complement to the traditional OS, great for lightweight applications like Web browsing and media playback, but not the right fit if you want to do video editing."

Splashtop is not the only company in this space. Phoenix Technologies, a company that makes BIOS software, is developing software called Hyperspace that will launch along with the PC's regular OS. Hyperspace, which is billed as a "compact and secure application environment", will be able to run applications as well as perform systems maintenance (repair, back-up, recovery, etc) and security. Phoenix expects manufacturers to start offering Hyperspace in the latter half of 2008.

Desktop search

While Google is the leader in Web search engines, its dominance in the desktop environment is not so clear-cut. A probable reason for this is that both Apple and Microsoft have included better search capabilities in their operating systems, Mac OS X and Vista.

Leopard, the latest version of Mac OS X, allows you to flip through files just as you would browse album art on iTunes, perform Boolean searches, save searches, and even find files on your network. Vista's search capabilities include tagging, search folders (pre-defined searches), and search integration with different applications.



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About innovations in desktop search, Dr Michael Swift, an assistant professor at the University of Wisconsin-Madison says, "Since the introduction of Apple's OS X 10.4 [Tiger], desktop search has become a predominant way of accessing files. This was followed by Vista's search capabilities. Currently, these capabilities are not completely integrated into the OS, in that they execute as shell extensions, but I see search as becoming the dominant way to access files on a PC."

BumpTop: Real-world desktop metaphors

Take a look at the desk where you work. Do you have piles of books, or maybe papers stacked on it or even strewn about? Most of us tend to organise in stacks—of books, magazines, and papers. What if you could organise your computer's files on your desktop in a similar way?

BumpTop, software developed by Anand Agarwala and Ravin Balakrishnan, aims to do exactly that. The interface uses techniques like shading and animation to drag files with a fluid movement. You can drag, or even toss files into piles. You can view the items in the pile in different ways by using widgets—flipping them like you would flip pages in a book, or viewing them like a deck of cards. Other manipulation techniques let you organise your files in different ways.

BumpTop is in the 'private alpha' stage at the moment, but you can sign up on the website to try it once it is available. You can also view a demo video from the website at http://www.bumptop.com/

It is too early to tell whether BumpTop will change the way in which we organise our desktops. What is clear, though, is that BumpTop's interface is an interesting and innovative concept.

Device driver reliability

Most of us are unaware that device drivers which are required for the different hardware that we use cause many of the crashes we experience with operating systems. Researchers are looking at ways to minimise the effects of device drivers when something goes wrong.

One such effort is the Nooks project, being conducted at the University of Washington by Dr Michael Swift. Nooks (as defined by the researchers) is a reliability sub-system that seeks to enhance OS reliability by isolating the OS from driver failures.

The Nooks project worked on the Linux kernel, since the source code was freely available. According to Dr Swift, "The team also investigated an implementation in the Windows 2000 kernel, even going as far as to implement key portions: object tracking, wrappers, and limited recovery. However, the inability to redistribute code, and the lack of available driver source code for Windows, limited our ability to

Dr Michael Swift, an assistant professor at the University of Wisconsin-Madison

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pursue this work."

About the future of driver protection mechanisms, Dr Swift says, "I would expect that in the future, driver protection mechanisms will come in two formats: user-level drivers and driver protection integrated with virtual machines. Windows Vista added support for the User-Mode Driver Framework (UMDF), which allows certain drivers to be written for user mode. This does not provide the compatibility of Nooks, but does provide similar protection.

"You can see driver protection in Xen [an open source virtual machine monitor], in its ability to run drivers in a separate virtual machine. However, Xen to date has not added recovery support, so it does not tolerate driver failures in the same way as Nooks. I would expect that improved recovery would become part of virtualised drivers."

Making back-up easier

Backing up your computer is like eating healthy—you know you should, but you probably don't actually do it. Since operating systems in the past did not offer easy-to-use solutions, it made the task of backing up onerous. Dr Swift thinks that this will change.

He says, "As people put more of their life online, I think that back-up will be a place that desktop operating systems innovate. Apple has done this already with its Time Machine back-up system, which allows simple time- or date-based access to old versions of files. Microsoft has added back-up capabilities to Vista as well, but not with the same level of UI (user interface) sophistication."

Other areas of innovation

What are the other areas of innovation in the OS space? Dr Swift reveals, "Security continues to play a huge role on the desktop. Both Apple and Microsoft have added extensive new security features to their latest products, in the form of more powerful firewalls and the ability to restrict the permissions of executing code (Sandboxing on Leopard; and User Account Control and Internet Explorer safe mode with mandatory integrity controls on Vista)."

He adds, "As the hardware industry moves from single-processor chips to multi-core chips, desktop operating systems need to invest more in scalability and parallelism, to both reduce the cost of OS activity, and to enable applications to make better use of the multiple cores. Vista introduced several new mechanisms for writing concurrent code, including new types of locks and signalling methods.

"Reliability has become an

Ubuntu: the new face of desktop Linux?

Linux has been around for quite a while now, especially in the server world -- but distributions like Xandros and Mandriva have made installing and using Linux on your desktop much easier. The latest buzz around the desktop Linux world, though, is Ubuntu, which has become a major player since Dell began selling computers with Ubuntu pre-installed, in Europe and the US, in 2007.

Mark Shuttleworth (owner of Canonical Ltd, which sponsors Ubuntu) blogged that while a number of excellent companies like System76 already offer Linux pre-installed, Dell represents "the industry", and it's very important that the industry is now seeing a future for Linux on the desktop.

In other recent high-profile adoptions, the French National Assembly migrated to Ubuntu late last year. France's Gendarmerie National recently announced plans to migrate 70,000 desktops from Windows to Ubuntu. In India, HCL has announced low-price laptops that run Ubuntu.

About Ubuntu's innovations in the OS space, Gerry Carr, marketing manager, Canonical Limited, says: "Ubuntu's innovation is that it 'just works'. Linux was held back for many years by its perceived and actual difficulty." Earlier, people's peripherals would not work, and adding applications would require going to the command line. Ubuntu has changed that; due to the Ubuntu team's efforts, adding drivers is now easy, and hardware compatibility has improved. New users usually have a wonderful experience on the desktop, rarely needing to go "under the hood". Linux has had a lot of the fear that was associated with it taken away by Ubuntu's simple, clean, and effective interface.

This is why it's possible that Ubuntu is going to be the new face of desktop Linux; do keep an eye on the progress of this amazing Linux distribution – and if you haven't tried it yet, maybe it's time you did!

Backing up the back-up!

Apple's Time Machine, released in October 2007 as part of Mac OS X Leopard, lets you do incremental back-ups, and allows you to go back to a specific date and see how a file looked on that date. Windows Vista also allows incremental back-ups, and allows you to back up to a location on a network. Vista's shadow copy lets you recover files that you may have accidentally deleted.

Maybe, someday, we will see operating systems that back up files via the Internet to a data centre.

important place for innovation on the desktop. Vista has more support for detecting and handling application hangs, and a new kernel transaction manager with filesystem transactions. These transactions make it easier to simultaneously update several files, and to handle any failures that occur during the update process."

Microsoft Research's OS team is also working on a research project called Singularity in order "…to build more reliable systems and applications." On whether the research would make its way into newer versions of Windows, a Microsoft spokesperson says, "We are not giving official guidance to the public yet about the next version of Windows. We are currently in the planning stages for Windows 7 and will provide updates when we are ready."

In the case of the One Laptop Per Child (OLPC) project, in addition to its hardware innovation, it has created a laptop with a Linux-based operating system and a radical desktop interface (SUGAR) that was designed for children.

Speaking about OS innovations, Walter Bender, president of Software/Content and COO of the OLPC Foundation, reveals, "From the OLPC perspective, there are a number of metrics we consider paramount in regard to the operating system, which are not mainstream considerations in an era of 'bigger-faster' computing."

"Most important is power management. When you live off the electrical grid, making the most of every watt is critical. We are pushing the concept of power management to new extremes. Memory management is another area of concern: memory costs money, and consumes power. The extent to which we can better manage memory usage is correlated with the extent to which we can manage power usage. A further challenge is the lack of swap space, since we are using flash storage rather than a hard disk. Finally, the culture of free and open source is essential for the viability of a project such as One Laptop Per Child: it is the only way to scale, and at the same time, enable unencumbered local capacity development."

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In short, we may not be able to 'see' all the innovations in the operating systems space, but they are taking place!

What the future holds

If you look back to the days of DOS-based PCs, we have come a long way to our current operating systems. What will the future of PC operating systems be? Will we even have PC operating systems, given that Web-based operating systems are coming up? What about the fast-booting operating systems, embedded on the motherboard?

Dr Swift says, "To date, there have been many attempts to dislodge the dominant operating system vendors, with little success. I have not used the systems you mention [Web operating systems] enough to understand what their value proposition is, but I think they may be most useful as layers above a normal operating system. In this way, they would serve more as an advanced browser than as a full operating system, as they may not provide the complete hardware access and resource scheduling capabilities of Windows, Mac OS, or Linux.

"Fast-booting OS concepts make sense for embedded devices or closed products where devices cannot be attached, but the extensibility of the personal computer makes it unlikely that these products will supplant existing desktop operating systems.

"Regarding Web operating systems, I think they provide some benefit, but people today are comfortable going to individual websites for their content, so I am not sure they add that much value. What may happen instead is that more of people's computing experience will migrate to mobile devices, such as smart phones, so the services that Web-based operating systems offer will be used from mobile devices rather than desktop PCs."

It looks like desktop operating systems are here to stay, albeit in a different *avatar* in the future. IT

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