



Technology Brief...

February, 2009

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From PC to PS (Personal Supercomputer)

Within the next 3-4 years, most users of PCs (both desktop and laptop) will see their machines morph into personal supercomputers. This change will be heralded by the emergence of both multi-core CPUs, but perhaps more importantly by the arrival of massively parallel cores in the GPU (Graphical Processing Units). In fact, we are already seeing the first stages of this transition, with ATI (a division of AMD) and NVidia offering multiple programmable cores in their high end discreet graphics processing platforms. These cores can be programmed to do many parallel processing tasks that dramatically help the display of graphics on the PC screen, and has lead to dramatically better display features and functions for video and especially for gaming. But these platforms currently come with a hefty price premium and often require significantly more power to operate, making them impractical in many laptop designs.

We are seeing the preliminary steps needed to make these high end multi-core and programmable components available to virtually any machine. Vendors are moving to create integrated multi-core platforms, with as many 64 or more specialty cores that can be used in conjunction with the various multi-core CPUs now taking hold in the market. Using the most advanced semiconductor processes and geometries (32 nm and soon 22 nm and beyond) these new class of devices will achieve incredible processing capability. They will also morph from the primarily graphics oriented tasks they currently perform, to include many more tasks associated with business and personal productivity. Early examples of this creativity can be found in two recent reports where heavy-duty graphics processors in machines connected together were used to break the security of the WPA encryption commonly used to secure WiFi connections, and the hacking of the security certificates associated with secure and trusted web sites. The future will bring many more common tasks which are currently regulated to higher end servers and mainframes to individual personal computers, including dramatically improved abilities to extract data from large databases, improved business intelligence calculations, enhanced security capabilities, and improved visualization of all forms of data.

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Leading the technological drive in this regard is Intel whose advantage in semiconductor technology will allow it to achieve such capabilities tightly integrated with its CPU lines. The Larabee platform that it is engineering will be cost effective and integrated with its Core CPU architectures. AMD will also design and produce similar multi-core devices, but they will find it more difficult to stay abreast of Intel's chip process lead, at least for the next few years. We expect AMD to offer a more cost competitive product, similar to their strategy in the current marketplace of offering lower cost CPUs for cost conscious designs.

We expect the biggest loser in this market change to be NVidia. While it makes excellent graphics subsystems now, without a fully compatible i86 CPU core to connect to and integrate its graphics with, and to provide to system vendors as an alternative to integrated Intel and AMD products, it will find a difficult market in all but the highest end graphics subsystems. We expect this discrete graphics market to represent 5%-10% of the market. Intel and AMD will dominate the remainder with their integrated platforms, although we expect Intel to take the majority (75%-85%) of this market.

Bottom Line: Over the next few years, the dramatic expansion of programmable multi-core integrated chips attached to CPUs in desktops and laptops will allow substantial enhancements in data manipulation and presentation. Standard PCs will greatly expand the types and amount of processing available to the individual user. It will take some time for SW to catch up with the new HW, but once it does we can expect a substantial increase in the personal productivity and data manipulation and presentation capabilities of the average PC user.

Microsoft Windows: On the Seventh Version They Rested

Microsoft is readying a new version of Windows to ship within the next year to replace its flagship Vista product which hasn't done as well as expected, especially in the business market. It hopes Windows 7 will quiet many of the disheartened Vista users and is even contemplating a free upgrade to placate many users' irritation with Vista.

However, Windows 7 is not just another upgrade for Microsoft to its existing operating system, something it has done many times in the past. This time around, MSFT is facing some existential threats to its dominance in the PC OS space. These threats include;

- A resurgent Apple which is increasing its market share by targeting all of the bad press about Vista as its major competitive selling point;
- The continuing PR disaster with stories about Vista's lack of performance and user discontent, and an entrenched business community reluctant to move off Windows XP;
- Linux rising as an alternative in increasing numbers of businesses and government agencies together with open source programs often functionally equivalent to Microsoft's and other Windows offerings (e.g., OpenOffice, SugarCRM);
- The arrival of Netbooks which require a stripped down OS with limited functionality that operates on the restricted resources of these machines;
- Mobile devices becoming primary computing platforms, requiring efficient Oses that can optimize performance while extending device battery life;
- SaaS increasingly replacing the traditional thick client application model and allowing a simple, thin OS (often Linux) with browser to run the PC with applications and complex functionality delivered from the cloud;
- An evolving business computing model embracing virtualization and on-demand SW that requires more efficiency in OS and application loads and a higher reliability and lack of "Blue Screening".

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A number of challenges need to be addressed in the next version if MSFT is to maintain its leadership in the OS marketplace and fight back its competitors.

Users will want the following key questions answered.

- Is Windows 7 just another version of the same model that has proved successful in the past but may not be right for the new realities of next generation computing?
- Does Microsoft need to disaggregate all of the components - IE, Windows Media, Windows Live, etc. from the OS so that users and OEMs can choose what components are right for a particular operating environment?
- Does Microsoft finally need to abandon the legacy code that has plagued it for so long with compatibility issues and Blue Screen crashes (not apparently in Windows 7 as compatibility will be included in this version)?

Bottom Line: We expect Windows 7 to be more optimized for lower end machines and substantially improve on Vista's resource-heavy requirements. This will allow sub-versions to effectively power netbooks and other lower end devices. It will also enable better virtualization and server-based application streaming. However, Windows 7 does not fundamentally change the Microsoft OS model, as it incorporates a good deal of legacy functionality that has been problematic in the past. Users will likely have to wait for Azure (2011/12) to get some of this advanced "cloud-based" functionality, but will still need to run a "thick" OS from Microsoft on their PCs (or get an OS from somewhere else).

Intel and Citrix Bring Xen to a Client Near You

Intel and Citrix recently announced a collaboration that will bring client-side virtualization to vPro-enabled PCs in the 2nd half of 2009. Based on Citrix's Xen Virtual Machine (VM) that is being optimized for use with Intel's vPro, this collaboration will move forward the vision of virtualized PCs running multiple instances of potentially different operating systems and/or different instances of application suites. Such capability offers many benefits for greater up-time, better security, and more flexibility in application access. But virtualization at the PC level, unlike its use in servers, has been a relatively slow and difficult technology to deploy. Intel and Citrix hope to change that.

Using vPro as the management and delivery vehicle, Intel and Citrix plan to achieve a complete solution for VM creation, image delivery to the end user machine, maintenance of the VM functions, and retirement of the VM. They will be optimizing this capability for use on mobile platforms, including capability to complete the process over a wireless WAN. This will allow multiple images to be created and configured for a user's needs (e.g., one for personal productivity apps, one for corporate back-office apps). Unlike servers where dozens or even hundreds of individual VMs are run, this version will be optimized for the 2-3 typically needed in a PC environment. By providing a dynamic desktop assembly (e.g., OS, apps,) set by IT policies, a relatively strong isolation can be achieved between each VM instance. This provides better security, enhanced reliability (e.g., one VM crash does not bring down the entire machine), and tighter policy enforcement (e.g., different policies for different VMs running different app types). Interoperation between VMs can be set to allow or exclude data sharing, thereby eliminating potential risks from data contamination and/or malicious programs.

Success of this effort requires overcoming several challenges. Citrix is optimizing Xen for inclusion in the firmware of Centrino 2 and later based systems,

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preventing its use in the large number of older systems still deployed. Intel is configuring vPro, with its secure booting, strong encryption, TPM, etc., to provide a secure boot and delivery mechanism of images to the machines from the data center on boot-up and connection. However for this process to work OEMs must choose to built both Xen and vPro technologies into their machines, although Intel concedes this might work without vPro enablement, but not as well or as securely. Many enterprise class machines are already vPro enabled, but not all. This capability ultimately will be a Citrix-marketed solution so it will have to sign up OEMs, but it has not yet announced any, nor has it announced pricing.

Further, since users will be running multiple machine instances, there is a significant implication to OS licensing that has not yet been addressed. Microsoft would have to cooperate to make this work, or companies would be forced to buy multiple OS licenses per machine to not be in violation of their SW agreements. Finally, IT departments would have to create multiple images for various types/classes of users, which would add to the task of image creation and would dramatically increase the number of images managed in the organization. However this burden could be offset by the benefits of increased security, better reliability and easier deployment of user machines.

Bottom Line: We believe that virtualization at the user device level has many inherent benefits and will become commonplace in the next 2-3 years, as machines become more capable (e.g., multi-core chips and extensive memory capacity). However, we also believe that many companies will avoid VM enabling end user devices due to the complexity involved until easier deployment and image creation facilities are available. While this collaboration between Intel and Citrix is a good step, it is only a first step in the complex path to get to large scale end user client VM deployments.

Recent Research Reports

Contact us if you would like to obtain any of the following research reports:

Major Market Studies

- Enterprise Mobile Applications: A Study of Strategies and Adoption Trends - September 2008 (Complete Report)
- Mobile Business Applications: A Study of Strategies and Adoption Trends - November 2008 (Executive Summary)

Technology Insight Reports

- Can AMD Survive? - What Should Users Do? - Sept 4, 2008
- Intel: SOC it to CE - July 30, 2008
- Andr-ian or Sym-droid? - July 24, 2008
- Nokia Shakes Symbian to its Foundation - June 24, 2008
- iPhone 3G: Still coming Up Short for the Enterprise - June 12, 2008
- Securing Laptops Against Government's Prying Eyes - April 28, 2008

Whitepapers

- Wireless Push Email for the Smaller Business: A Comparison - Aug 08
 - Choosing an Enterprise-Class Wireless Operating System - July 2008
 - 7 Steps to a Highly Effective Mobile Strategy for Your Business
- Others are available by request from our web site*



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