CLABBY ANALYTICS

Research Brief

Closing the 64-bit Windows Application Gap

Introduction

Big changes are underway in the 64-bit computing marketplace:

- Low cost, industry standard, hybrid 32-/64-bit hardware (Intel Xeon and AMD Opteron-based servers and blades) are gaining ground on traditional reduced instruction set computing (RISC) 64-bit servers;
- Multi-core, multi-threading microprocessor architectures are making it possible to deliver computing power at a rate that exceeds the traditional Moore's Law performance curve; and,
- Commodity Windows and Linux 64-bit operating environments are rapidly gaining market-share – at the expense of Unix.

Taken together, these changes are enabling information technology (IT) buyers to buy high-performance, low-cost 64-bit platforms to:

- Run powerful, 64-bit decision support, data warehousing, complex mechanical design/analysis, scientific/research, and business intelligence applications;
- Build executive information systems (EIS) and on-line analytical processing (OLAP) systems; as well as
- Conduct more ad hoc queries on large databases than ever before; generate new types of reports (forecasting, statistical analysis, …); tune and increase Web caching performance; and build new custom applications.

But one major problem is slowing this advance: "where are all of the 64-bit-enabled Windows and Linux applications?" There are an estimated 15,000 to 20,000 discrete applications available on the Unix operating environment. And, there are an estimated 6,000 to 8,000 applications available on Linux. But the number of 64-bit applications available on Windows is estimated to be in the hundreds. Clearly, Windows and Linux have some significant catching-up to do…

In this *Research Brief*, *Clabby Analytics* examines how this "applications gap" will be closed. We start by describing the current state of the 64-bit marketplace. We then examine current Unix-to-Linux and Unix-to-Windows porting practices. What we find is that Unix-to-Linux migration is straightforward, and can be done more-or-less manually. But due to major differences in Unix design versus Windows design (programmatic interfaces, scripting, file systems, etc.) – as well as disparate skill sets – automated migration toolkits have become a necessity when migrating from Unix to Windows. We go on to identify several migration tools. We conclude by providing our summary observations and recommendations for IT buyers and independent software vendors (ISVs) who are considering the migration of their applications into the Windows 64-bit computing world.

64-bit Computing: Definition and Benefits

64-bit computing has been with us for more than fifteen years – initially showing up in MIPS and Digital Equipment central processing units (CPUs) – and ultimately in CPUs offered by Fujitsu, Sun, IBM, Intel and AMD. What 64-bit computing does is allow larger blocks of data to be addressed by main memory – enabling data to be processed in 64-bit "chunks" (as opposed to 32-bit "chunks" at a time). This 64-bit "addressability" enables great leaps in the processing of data-intensive applications such as digital video, scientific computing, and decision support/business intelligence applications. And, because data travels at a high speed between CPU and internal memory, fewer input/output calls are made to disk – again improving performance.

The bottom line is that 64-bit computing enables IT buyers to crunch larger blocks of data more quickly than 32-bit environments. This, in turn, results in tremendous performance increases for data-intensive workloads; increases the scale of data that can be processed; and may yield an increase in the number of users that can be supported.

The State of the 64-bit Market

For 15 years the 64-bit marketplace has been dominated by RISC (reduced instruction set computing) processors from Sun, HP, and IBM. The most popular operating environment on these processors has been Unix (Sun Solaris, HP-UX, IBM AIX, or some other Unix variant). Further, in May, 2001, Intel announced its Itanium microprocessor – a 64-bit processor that uses an approach to processing called EPIC (explicitly parallel instruction computing). These processors comprise the lion's share of today's 64-bit market.

In April, 2002, AMD introduced its Opteron microprocessor – a fast, 32-/64-bit compatible microprocessor that provided Windows and Linux users with an excellent migration path into the 64-bit world. Intel followed in June, 2004 with its Xeon-based Opteron hybrid competitor.

IT buyers are showing strong interest in these new breed "hybrid" microprocessors -- particularly those buyers who are running 32-bit Windows and Linux applications and are looking for an environment that can support existing 32-bit applications while providing a pathway into the 64-bit world. RISC architecture is now being challenged by these hybrid 64-bit contenders.

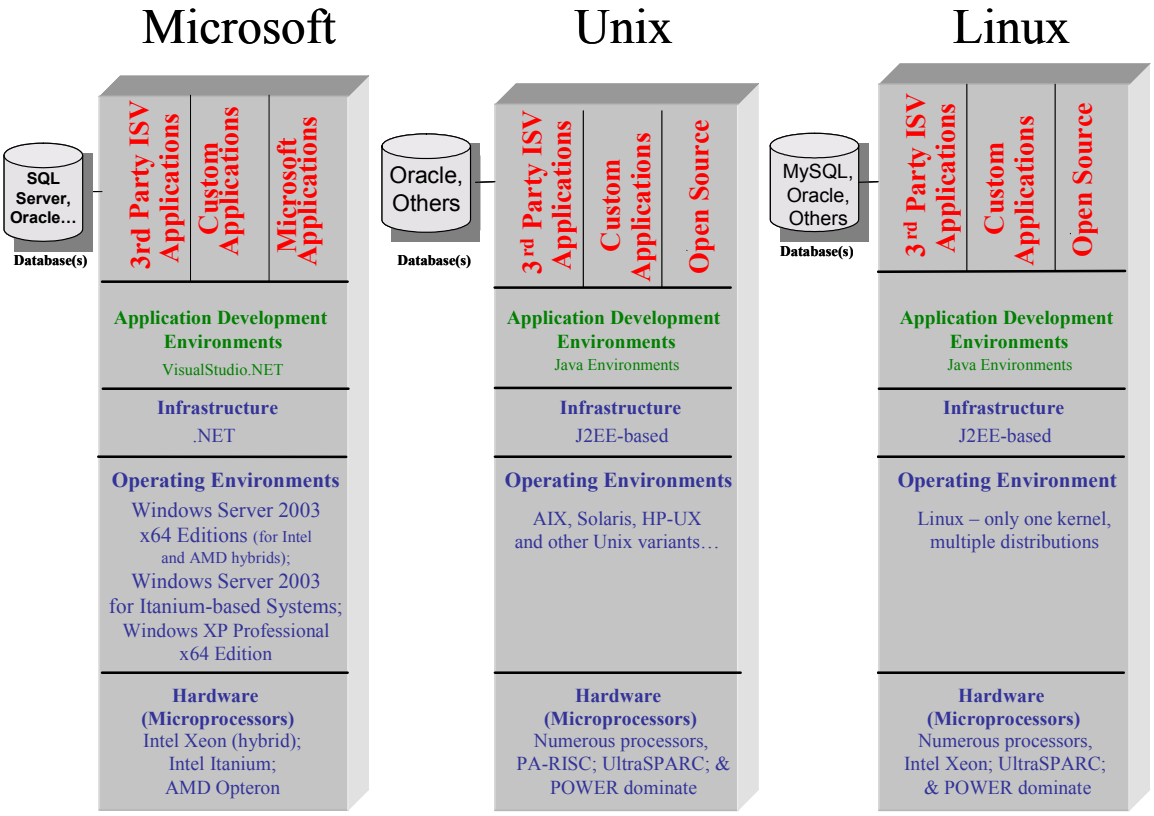
It is important to stress that the "action" on these hybrid platforms is in the Linux and Windows space – not the Unix space (although Sun and a few others offer their Unix operating environments on 32-/64-bit hybrids). What's happening is that IT buyers are:

- Sticking with RISC architecture for Unix (with the occasional exception of those who buy EPIC/Itanium); and/or
- Adopting 32-/64-bit platforms to migrate upward from Linux and Windows 32-bit environments; and/or
- Adopting 32-/64-bit platforms to replace Unix/RISC architectures (for instance, Hewlett-Packard's RISC chips have been discontinued – so now HP customers

need to make a decision about whether to migrate to HP's EPIC/Itanium offering or HP's lower-cost 32-/64-bit hybrid solutions).

Figure 1 shows the positioning of these 64-bit platforms today. What you should notice is that both Unix and Linux use the same J2EE infrastructure – and when combined with the fact that Linux is a Unix derivative – it's easy to understand why porting from Unix to Linux is rather straightforward. On the other hand, Unix and Windows are completely different operating systems – and the infrastructure that resides on Windows (.NET) is also different from Unix J2EE infrastructure. Accordingly, porting from Unix to Windows is a bit more challenging than porting from Unix to Linux.

Figure 1 – The 64-bit Market Today



Source: Clabby Analytics – April, 2006

What is not apparent in Figure 1 is the advantage that Unix and Linux have in the applications arena when contrasted with Microsoft's Windows. As stated previously, Unix has approximately 20,000 applications; Linux has between 6,000 and 8,000 applications; while 64-bit Windows has a few hundred (maybe). Granted, some of the 20,000 Unix applications are 32-bit only – as are some of the Linux applications – but in the end we're still talking a Unix/Linux applications advantage of thousands.

Microsoft is now positioned to compete head-on with Unix and Linux in the 64-bit marketplace – except in one area: applications availability…

Solving the Window 64-bit Applications Availability Problem

How does Microsoft plan to solve the 64-bit application problem? There are three sources of applications in the Microsoft world – and Microsoft is working aggressively to capture applications from each source. They are:

1. 3rd party, ISV partners;
2. Customer custom application environments; and,
3. Microsoft's own 64-bit applications base (including its business and collaborative applications).

3rd Party, ISV Partners

At present, several vendors (including Microsoft) have already ported some of their applications/databases Windows 64-bit compatible, including:

- Database software from Oracle and IBM;
- Management software for 64-bit Windows environments from BMC, Computer Associates, IBM (Tivoli and DB2), Legato, Oracle, and Symantec); and,
- Business software from SAP, SAS, and Siebel (now part of Oracle).

Further, Microsoft is actively seeking partners that are willing to move their 32-bit Windows code to 64-bit environments – as well as partners willing to move their 64-bit Unix/Linux code to 64-bit Windows.

Customer Custom Application Environments

Within its customer base, Microsoft has been working closely with its customers and systems integration partners (especially Avenade) to help port custom code that can exploit its 64-bit SQL server database. This code can be 32-bit code that needs to be modified to exploit 64-bit computing environments; or it can be 64-bit code that customers wish to port from Unix/RISC to 64-bit Windows on the new hybrid architecture.

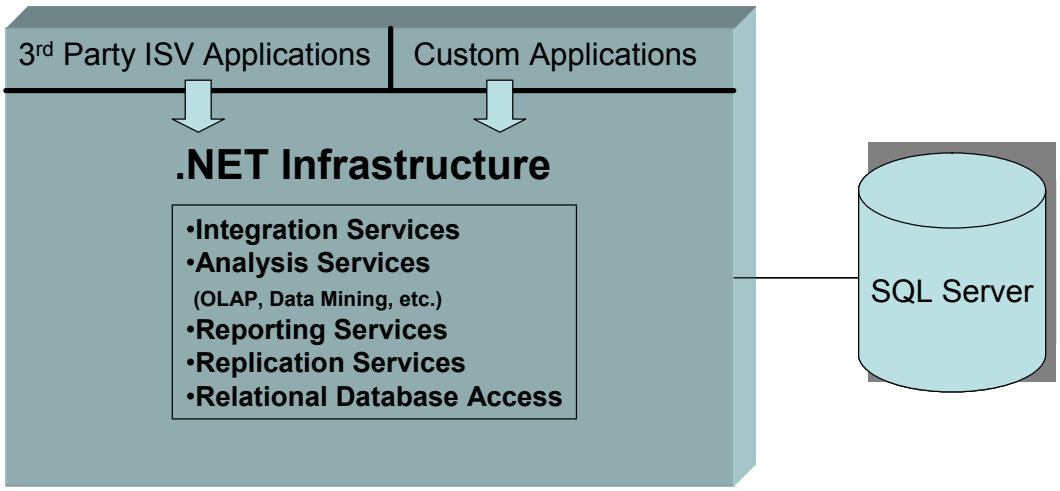
Microsoft and its systems integration partners are also strongly encouraging new custom code development on Window 64-bit platforms (especially custom code that takes advantage of Microsoft's upgraded 64-bit SQL Server database environment).

Microsoft's Own 64-bit Applications Base

Microsoft has started to 64-bit enable several of its own applications (including the forthcoming Exchange 12, Commerce Server, Microsoft Operations Manager, and Virtual Server).

But equally interesting is the effort that Microsoft is putting forward to make pre-configured, pre-tested "platforms" available. These platforms consist of integrated infrastructure and a variety of services upon which ISV and/or custom applications can be easily deployed to solve specific business issues (such as decision support or business intelligence). Microsoft's Business Intelligence Platform is a good example of this phenomenon – it consists of .NET infrastructure components as well as integration, analysis, reporting, and replication services – and a database access module (see Figure 2).

Figure 2: Microsoft's Business Intelligence Platform



Source: Derived from a Microsoft Business Intelligence Slide – April, 2006

Not only is Microsoft porting some of its own 32-bit applications to the 64-bit Windows world, it is also creating integrated 64-bit "platforms" in order to simplify application development and/or application migration. *Clabby Analytics* expects other integrated 64-bit platforms to be packaged by Microsoft over the next few years with the goal of simplifying application development/migration for specific market segments.

Completing the Picture: Automated Application Migration Toolsets

In the previous section you may have noted the paucity of application solutions available on Windows 64-bit operating environments today:

1. 3rd parties are providing a few major databases and business applications (many new applications need to be either developed or ported);
2. Custom code migrations are few and far between (many enterprises have chosen to develop new code rather than migrate existing 32-bit code to 64-bit); and,
3. Microsoft is moving applications that make the most sense to run in 64-bit mode today (but could move or develop several more for 64-bit environments).

This picture could be greatly improved, and the Windows 64-bit applications base could be greatly expanded if 3rd party ISVs and Microsoft's customers were to migrate their 64-bit Unix application bases to Windows 64.

ISV Migration

For ISVs, porting to Windows 64 is a business decision, just as the decision to port to 32-bit UNIX applications to windows was a few years ago. Porting implies not only

development/migration investment, but also quality assurance and testing cost, training costs, sales and marketing costs and so on. An ISV has to believe that migrating to a new platform will yield a significant increase in business – otherwise the costs to migrate can be prohibitive.

There are, however, ways to trim the cost of Unix migration to Windows 64-bit environments. Instead of manually porting Unix code – and dealing with different APIs and operating environment discontinuities – ISVs can use automated porting/migration tools. These tools have been designed to:

1. Significantly lower porting costs when moving applications from Unix to Windows;
2. Greatly improve time-to-market (as contrasted with rewriting existing code);
3. Lower cross-operating environment skills retraining requirements;
4. Reduce support costs (by using a common code base on Unix and Windows); and,
5. Improve application performance (when tuned for new target environments).

ISVs who believe that porting their software to a Windows 64-bit environment can be justified (by providing an opportunity to increase license share and revenue, for instance) should consider using 32-/64-bit porting tools because these tools can greatly simplify the porting effort and lower migration costs.

IT Buyers

For IT buyers who run custom applications on Unix or Linux and wish to migrate to Windows 64, the reasons for migrating include:

- A desire to run their applications on *fewer* platforms in order to reduce operational costs (support, maintenance, training, management, etc.); and,
- A desire for better Windows/Unix compatibility (to improve applications and database integration).

The benefits that IT buyers can expect to see when using automated 64-bit migration tools are very much the same as those ISVs can expect:

1. Significantly lower porting/integration costs (because automated migration toolsets resolve the differences between Windows and Unix);
2. Compressed migration time schedules (due to the simplicity of automated migration tools); and,
3. Reduced support costs (due to a common code base, and a single skill set that can support both environments).

IT buyers looking to run their applications on fewer platforms – or to provide a better degree of interoperability between their Unix/Linux systems and their Windows systems – should definitely evaluate automated migration toolsets.

Where to Turn for 32-/64-bit Migration Toolsets

One of the big surprises in our research on 32-to-64-bit migration toolkits was the shortage of comprehensive 32-bit to 64-bit Windows migration environments available. When searching for companies that offered such tools we found that:

- MKS Software offers a comprehensive 32-/64-bit Unix/Linux/Windows application migration environment called MKS Toolkit 9.0;
- Migratec (an early 32-bit/64-bit migration tool provider) is now defunct;
- Microsoft has discontinued plans to enhance its Services for Unix (SFU) – a Unix environment that run on Windows, now placing its efforts into its subsystem for Unix applications (SUA), a source-compatibility subsystem for compiling and running custom UNIX-based applications on a computer running a Windows server-class operating system.
- Real time profilers (such as Intel's Vtune) only did part of the job.

Of these, MKS Software's *MKS Toolkit for Enterprise Developers 64-bit Edition* captured our attention because it is the most complete 64-bit migration tool environment that we found – and because it has extremely strong Unix/Linux to Windows 64-bit migration capabilities.

A Closer Look at MKS Software's 64-bit Toolkit

MKS Toolkit for Enterprise Developers 64-bit Edition has been designed to simplify the migration of 64-bit UNIX applications to 64-bit Windows. It enables customers to migrate these applications to a variety of Windows environments (including Windows x64) on hybrid 32-/64-bit platforms and native Itanium-based platforms.

This MKS toolkit supports:

- Over 2700 UNIX application program interfaces (APIs);
- C, C++, and Fortran languages;
- UNIX process management including fork(), signals, alarms, and threads;
- Comprehensive UNIX scripting environment for instant Developer productivity;
- File system and security management; and,
- Curses, X, Motif, and OpenGL.

Further, this toolkit offers strong support for Windows APIs – enabling not only solid Unix/Linux/Windows integration and interoperability, but also better Windows 32-/64-bit integration. And it enables IT buyers and ISVs to:

- Run UNIX applications as native Windows programs;
- Run a common code base across UNIX and Windows;
- Cut development time in order to bring projects to completion sooner; and, easily deploy ported applications (by using a built-in packaging wizard and a wide variety of UNIX runtime options).

If you are not ready to migrate to native 64-bit applications yet, MKS has a 32-bit variant called MKS Toolkit for Enterprise DevelopersI that provides a singular migration environment that can be used to easily migrate code to all Windows operating environments with a single binary including Windows 9x, NT, Windows 2000, Windows XP and Windows Vista when available. A single port from Unix or Linux to any of these Windows environments enables ported applications to work on all of these Windows environments (in either 32- or 64-bit mode). These Unix and Linux applications then run as native Windows programs taking full advantage of COM, .NET, and other Windows features. And when you are ready for a pure 64-bit migration, just recompile your code with the MKS Toolkit for Enterprise Developers 64-bit edition.

Summary Observations

A market move toward broader adoption of 64-bit computing is well underway. It is being driven by the availability of hybrid 32-/64-bit servers as well as the availability of commodity Linux and Windows operating environments. But these platforms need significantly more applications if they are to compete head-on with the incumbent leaders in the 64-bit marketplace: Unix/RISC and Unix/Itanium.

To grow the Linux application base, ISVs and IT buyers are manually porting applications from Unix to Unix-variant Linux and are finding migration to be relatively straightforward (primarily because Linux is a derivative of Unix). The real challenge in moving from Unix to Linux is tuning and performance optimizing Linux applications on the new hybrid processors. Automated migration tools can help developers migrate Unix code to Linux more quickly – as well as assist developers in tuning and optimizing their ports for new hardware environments.

Porting applications from Unix/Linux to Windows, however, is significantly more challenging due to significant differences in the way the each operating system is architected. Manual porting requires developers who understand both environments in depth (and people with this skill set can be very expensive). Further, manual porting between Unix and Windows can be time consuming – resulting in projects taking years as opposed to months to complete. Automated Unix-to-Windows migration tools help reduce porting costs while reducing the time it takes to deploy solutions internally, or to bring newly ported software to market.

MKS offers a variety of tools for porting from 32-bit UNIX and 64-bit UNIX environments – and most importantly, for porting from Unix/Linux to Windows 64-bit operating environments. Using these toolkits, ISVs can reduce migration costs as well as the time it takes to port code from Unix/Linux to Windows 64. This, in turn, can open new marketing and sales opportunities by enabling ISVs to expand into high-end, data-intensive enterprise computing markets. For IT buyers, MKS toolkits also presents the opportunity to move existing Unix applications to the Windows operating environment (which can help enterprises achieve greater levels of integration and potentially run applications on fewer platforms). For both groups, MKS Software automated migration toolkits will help to reduce migration costs; help bring projects on-line more quickly; while reducing ongoing cross-platform support costs.

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