QUOCIRCA INSIGHT REPORT

October 2007

Moving to a Blade World

How Blade Computing improves your business

Contacts:

Clive Longbottom
Quocirca Ltd
Tel +44 118 948 3360
Clive.Longbottom@quocirca.com

Dennis Szubert
Quocirca Ltd
Tel +44 118 948 3360
Dennis Szubert@quocirca.com

Richard Phillips
IBM
Tel +44
phillir@uk.ibm.com

REPORT NOTE:
This report has been written independently by Quocirca Ltd to provide an analysis of the benefits of blade computing and how it can be implemented. The report draws on Quocirca's extensive knowledge of the technology and business arenas, and provides advice on the approach that organisations should take to create a more effective and efficient environment for future growth.

The evolution of Blade Computing has moved from mere server consolidation to a way of managing IT assets which brings significant business benefits. This paper aims to explain those benefits to the business and IT manager, and show how blade computing can be implemented to save money and improve the way IT serves the business needs.

- **Blade computing is not just about a new server form factor**
  Blade computing is a new computing architecture, providing a highly dense, scalable and powerful flexible platform to support an organisation's software needs.
- **Business benefits are manifold**
  Blade computing does not only provide the means for more compact centralised data centres, but also increasingly addresses power and cooling concerns, as well as providing a highly flexible, long term platform for an organisation's computing needs
- **The key to blade computing is in the engineering of the total system**
  Each blade has to interact with other blades around it, and this requires specialised chassis with high performance connections ("busses") built in to the system. The chassis also needs to allow for adequate power and cooling provision.
- **Each blade can be focused on a highly specific workload**
  Although general purpose blades are available, specific blades aimed at security, caching, memory, storage and network connectivity are becoming more widely available. Also, each compute blade can run different operating systems, and can be tuned for specific workloads.
- **Blade computing enables high levels of investment protection**
  A blade chassis should be forwards and backwards compatible with the same vendor's blades, so ensuring that new investments will be able to fit alongside existing ones. Also, older investments can be cascaded to support lower importance workloads, extending the lifetime value of individual blade components.
- **The "ilities" are fully catered for with blades**
  Availability, scalability and manageability are all catered for within a blade system. Each component is capable of being replaced with the overall system still running, and as extra scalability is required, new components can be added dynamically to the system.
- **The overall cost of blade computing will be lower**
  Blades make the most of utilising commodity sub-components – standard CPUs, disk drives, network interfaces and so on. Therefore, initial and ongoing costs are lower. Also, vendors at the sub-component and assembly level have worked hard on power requirements, such that the equivalent blade compute power will need a fraction of the power (and therefore the cooling) of a standard server farm. Also, due to the density of the system, data centres can be smaller, driving down the needs for space cooling even further.
- **Blade computing offers a flexible platform for utility computing**
  The dynamic nature of a blade computing platform means that it is ideal for providing the underpinnings for strategic technical approaches such as service oriented architectures (SOAs) or grid computing.

Conclusions
Blade computing creates great opportunities for businesses to optimise existing infrastructures and to prepare for new strategies such as SOA to support the business. The highly modular nature of a blade system means that investment protection will be high, while the flexible nature of the various blade components is well suited to meeting the ongoing dynamic changes within an organisation's business processes.

An independent report by Quocirca Ltd.

www.quocirca.com

Commissioned by IBM and Intel

1. Introduction

As the falling costs of communications and logistics have made historically local organisations capable of carrying out global business, the need for the technology underpinning the business to be flexible has never been greater. The need to introduce new products and services to the markets with ever shortening lifecycles means that the chosen technology has to be seen as a business facilitator, not as a solution in itself.

However, the rapid pace of change in the past has led to technology-led systems that have created an IT environment with 'silos' of different hardware, operating systems, applications and storage. This in itself has led to underutilisation of resources such as CPU and storage, and an over resilience on human resources to manage such complex environments. Although consolidation and rationalisation projects have been carried out in the past, there is still much that can be done.

This non-optimised growth of IT has also led to another problem – that of asset management. Previous Quocirca research has shown that the number of servers and other hardware assets an organisation believes it has can be +/-20% from the actual number. This lack of asset visibility has not only the obvious licence and maintenance issues, but also an impact on the depreciation of capital goods held by the organisation that has to be declared in the corporate accounts.

Further, traditional approaches to computing have either led to inherent issues with reliability and scalability, as the chosen application is specifically dependent on specific hardware resources, or has required the replication of systems to provide the desired reliability, which in turn causes downstream problems when scalability becomes an issue. The addition of extra resources to existing server-based systems soon reaches the limits of the server itself – and then IT has to look to the extra complexity of solutions such as clustering, or a complete forklift replacement of existing hardware.

As we look at the history of computing, there has been a trend to move the server form factor to ever smaller sizes – from the mainframe to the mini-computer, from towers to rack-mounted systems, from multi-U racks to 1 and 2U racks (a "U" describes the height of a rack unit – 1.75 inches, with the rack being 19" wide). For many, blade computing is perceived as just another move down this road; to provide higher densities of servers within the data centre. Indeed, initial blade offerings did major on completely self-contained server units within small enclosures – but evolution has been rapid, and blade computing has weathered early issues to become a new basic architecture to support the needs of the business. Specialised blades are enabling organisations to provide the platform flexibility that is now required to support the dynamics of changing business processes.

When the issues outlined above are further investigated, it becomes apparent that even at a basic level, blade computing can help with these challenges:

- Blade computing can offer significant cost savings in a number of areas:
  - Power savings, including backup power
  - cooling, both direct and data centre air conditioning
  - data centre management – more automation, with less expensive human intervention
  - better long term flexibility through cascade management of assets
- it can help the business more quickly and easily respond to market challenges by enabling faster response to business demands and more flexible compute power that can be provisioned dynamically to manage different workloads
- it can enable IT to introduce new capabilities more quickly and with less disruption than traditional architectures
- it brings inherent resilience and business continuity aspects to the fore

Blade computing is far more than just 'servers in a different form factor'. This paper explains why and how blade can create a platform for ongoing flexibility.

2. Business Challenges

Main Findings:

- Business imperatives drive a need for increased flexibility
- Server farms and decentralised computing no longer meet the requirements of the business

The way organisation's approach technology is of necessity going through a major change. Historically, the main drivers for change have primarily been technical issues such as speed of response and availability, with the business needs often taking second place. However, as the business has become far more dependent on the underlying technology, the need to demonstrate far greater responsiveness to the business has become apparent. This is driving organisations to look towards different computing architectures, such as service oriented architectures at the software level, and to utility computing approaches at the hardware level.

Alongside standard business drivers, governments and consumers are now applying increasing pressure on businesses to be seen to 'go green', and IT is seen as a major area where power savings can be made. Existing computer architectures are poorly engineered around power utilisation and heat management, and underutilisation of the hardware assets just exacerbates the problem further.

The main business and external drivers that Quocirca has identified that are causing the need to review the technology approach include:

- The need for the business to be far more responsive in its markets, requiring more flexible business processes supported by technologies that can be repurposed on the fly

- The need for the IT function to be available at all time, from all locations
- The need for organisations to respond to governance and audit demands, and to be able to monitor and demonstrate compliance as required to both internal and external parties
- The numerous (and continuing) increases in the cost of power, and uncertainties around the costs in the future
- The inability to provide sufficient backup power for the complete data centre
- The growing impact of the green movement on an organisation, and how this affects the IT infrastructure
- The growing cost of buying and maintaining real estate, driving the move towards premises consolidation and more centralised computing
- The move to gain greater control of IT budgets, transitioning from 70-80% expenditure being on maintenance and fire fighting to greater than 50% on functional investment
- The need to maximise ongoing investments in IT, through longer lifecycles for components
- The move to a more commodity approach with cost effective, disposable components and a full business continuity capability

Many of these business drivers point towards the need for a new approach to a technology platform, one which blade computing is ideally placed to provide.

3. The Evolution of Blade Computing

Main Findings:

- Initial blade offerings tended to be an advanced server form factor
- Today's blade architectures are fully engineered, highly flexible platforms aimed at fully supporting an organisation's software needs

What is Blade Computing?

Blade computing is a completely different approach to providing a platform for an organisation's computing environment. Although it is possible to purchase blades that are essentially completely self contained servers in a highly dense format, this is not the main reason to look to blade computing. The idea of blade computing is to leverage economies of scale on the utilisation of basic componentry at the CPU and chipset level, at the peripheral levels of graphics controllers and network controllers, along with standardised sub-systems utilised with storage and other more specialised blades.

As a basic definition of what is meant by blade computing, the following will be used:

"Blade computing is a technical architecture where specific systems based on easily sourced commodity components are held together within an architected chassis/enclosure to provide a flexible platform for an organisation's software services needs."

To meet this definition, blade computing should meet the following requirements:

- The chassis has to be specifically engineered for a blade system – this is no standard 19" rack
- The blade computing environment has to be highly configurable, so that it can support different workloads
- It must be a highly virtualised compute and storage environment to provide the dynamic environment required
- It must be easily managed to indicate and deal with issues within the various components of the overall system
- It must be highly available – components must be capable of being changed as necessary while the system is still running
- It must provide a high degree of investment protection, through the capability to utilise new components within an existing chassis, and to cascade existing components into older chassis

  Whereas existing computer systems, based on a server-focused view, lead to a requirement to replace hardware on a 2-5 year basis, blade computing can extend the useful lifetime of individual components through the use of such cascade techniques. Here, today's fast blades can be utilised as second tier units down the line as newer, more powerful blade components become available in the future.

Today's blade systems are highly specialised environments that provide such flexibility. However, there is some perception in the markets based around early blade offerings, which needs to be addressed.

How has blade computing evolved?

Initial views of blade computing were still based around the concept of a "server in a box", with all required components held within the one blade – cpu, supporting chipset, base memory, base disk storage, simple graphics, network interfaces and so on. Other parts of the system, such as storage, were provided through other specialised systems, such as an external storage area network (SAN). Although this could lead to major space savings within the data centre, the lack of early understanding of the heat profiles caused by massively high densities of servers running at high utilisations meant that many data centres struggled to keep up with cooling requirements, and some blade systems would suffer unacceptable failure rates due to high localised temperatures.

However, blade evolution has been rapid. Not only have there been great steps forward in the development of lower power chips and other components, but also in the design of assemblies to better spread heat and to distribute it to the edges of the blade chassis so that it can be dealt with more effectively. Also, chassis design now takes into account more the need for cooling across the whole system, with most designs including full cooling capabilities to maintain temperatures for a fully populated chassis within specified limits.

Alongside this has been the move to a more specialised view of blades themselves. Each blade is now far more specific in its function than was the view with initial offerings. Although many blades are still essentially fully contained servers, many are now highly specialised workload engines, with minimum amounts of on-board storage, memory and networking capabilities. Through the use of high bandwidth functional blade interconnect ("bus") technologies, each blade can interoperate with other blades within the same chassis, and through equally powerful external interconnects, can also interoperate across chassis.

With the advent of multi-core CPUs, the density of blades for a given workload has increased yet further, and with silicon manufacturers now putting a much greater focus on power and heat profiles, this increased density can still be easily managed within the standard power and cooling configurations found within the majority of data centres.

As an example of power savings at the chip level, Intel's dual core 2.33GHz Xeon chip gives close to twice the performance per Watt when used as part of a file server, and over 2.5 times the performance per Watt when used as part of a web server, when compared to a similarly powerful single core system. When combined with advanced heat profiling, heat dissipation and forced cooling technologies, the potential performance per unit of heat output is far in excess of what could be expected through standard high-density computing approaches.

With the new generation of blades, the major benefits can therefore be grouped under the following:

- Less power required per unit of compute power
- Higher densities, resulting in the need for less real estate
- Better heat profiles architected across the whole system requiring less forced internal and external cooling
- Storage specific blades providing better resilience for data, and higher data throughput speeds when compared to other storage approaches
- High speed busses for better I/O capabilities and improved interaction between blades within and across chassis
- Better configurability and flexibility to enable blades to be set up dynamically for specific workloads
- Greater investment protection through the use of cascade strategies

A blade chassis will typically consist of more than one type of blade, with the main options being as follows.

Blade types

As blade computing has evolved, there has emerged the concept of highly specialised blades, which focus on specific tasks and workloads within an overall blade architecture. The main types available today are:

- **Compute blade**

  The compute blade holds the main CPU and support chipset, and deals with the main "number crunching" aspects of dealing with data within the blade architecture. Each blade may have multiple CPUs, and each CPU may have multiple cores. The blade will generally have some local storage (based on level 1 and 2 cache, along with memory and possibly some disk-based storage), but as time goes on, it is envisaged that such storage will be minimised to fulfil the needs for booting the blade and for direct cache memory only, with all other storage being shared through other blades

- **Storage blade**

  The storage blade is where the main data storage for the blade computing system is carried out. Initially seen as replacing the need for direct attached storage (DAS) within the blades themselves, storage blades have evolved to offer higher levels of capability. Often replacing or complementing existing storage area networking (SAN) systems, storage blades can interact with compute blades at high speeds, due to the capabilities of the proprietary chassis bus, or the high-speed interconnects used between chassis

- **Memory blade**

  The price of high-speed memory has been dropping, but decentralised computing is still highly inefficient in usage, and overall memory costs are still high for an organisation. Due to the high transport rates available across blade chassis busses, it is possible to abstract the memory from any one specific blade and make it available as a shared resource across multiple compute blades, so maximising utilisation. Also, through the use of memory virtualisation, failure in any single memory component will have minimal impact on the running of the blade system overall

- **Switching/Routing blade**

  Data being transported around a network will generally hit multiple switches and routers once it leaves the server. A great deal of the functionality can be brought closer to the centre through the utilisation of special blades within the overall blade system

- **Network interface blade**

  Many compute blades come with network interfaces built in, or are built in to the chassis, but the move is towards specialised network interface blades that can dedicate processing power to dealing with the requirements for moving data through at the highest possible rates

- **Security blade**

Information security is a major focus for organisations today, and a means of inspecting and taking action on data packets at line-speed is becoming more important. Blades are coming to the market that specialise in deep packet inspection, in content filtering, VPN end points and so on that can be tuned to deal with such needs specifically. Although a general purpose blade could be utilised for this purpose, such specific blades can be hardened using specialised operating systems and also specialised support chipsets, such as application specific integrated circuits (ASICs) or field programmable gate arrays (FPGAs)

- **Power blade**

Due to the power requirements of such high density blade systems, specialised power systems are also required. The majority of power supplies for blades are built in to the chassis itself, with redundancy provided and the supplies being hot swappable themselves. However, there is scope for a power blade, in areas such as the provision of power over Ethernet injectors, or for powering specific devices within the chassis.

- **PC Blade**

As organisations strive to centralise corporate computing to enhance control and security, many organisations are looking to how the inherently inefficient and insecure desktop PC can be replaced. Historically, thin-client computing would be utilised, serving many users from a single server. However, a new blade is emerging in the form of the PC blade. Here, a single user is served by the compute power of a single blade, but memory, storage and security can all be shared through the in-built capabilities of the blade architecture. Such a centralised approach provides higher security and control levels to an organisation.

Around all of this is the need for the highly engineered chassis, with greater built-in resilience through specific power configurations, use of chassis-specific bus technologies to create consolidated, yet resilient, network access points, optimised heat management, in-built wiring management and so on.

4. Technical Aspects of Blade Computing

Main Findings:

- Blade computing has a high level of complexity – but this complexity should be well hidden from the user
- Although certain subsystems within a blade system may be proprietary, this is unlikely to impact the overall value of a blade system to an organisation

Blade computing requires a highly complex environment to produce on its promise. However, the vast majority of this complexity should be hidden from the user through the design of the blades, the chassis and in the provision of management software to monitor and control the total environment.

However, it is worth noting certain aspects of blade technology, so that points can be raised when talking with a blade computing vendor.

- **The chassis**

The chassis is the core to blade computing. The chassis provides all the needed connections between the blades, while also housing the power and cooling required to maintain the system within running tolerances. In general, the connections within the chassis will be high-speed specialised busses, and in many cases, these busses will be proprietary in order to maximise performance. Although this means that blades from different vendors cannot be mixed within a single chassis, this will not be a problem to users, who will want consistency of product and provider.

- **Interconnects**

Blade chassis need to interact with each other, and this requires high speed interconnects between each chassis. These interconnects are generally based on open standard connectors, such as InfiniBand, Fibre Channel, Fast Ethernet, iSCSI or Serial Attached SCSI (SAS). This means that standard skills already available within the organisation can be leveraged, and enables standard extension techniques to be utilised for areas such as system mirroring and other business continuity strategies.

- **Load-specific blades**

A blade can theoretically be built around any CPU, but the market is being predominantly built around standard x86-64 CPUs. However, vendors such as IBM also provide blades built around its own CPUs, such as the IBM Cell Broadband Engine and the PowerPC CPU. These blades can be intermixed within the main chassis to provide a highly flexible environment for supporting different types of workload for an organisation. Blades can be selected to deal with specific types of compute need, but can still interact with each other through the chassis, the interconnects and via virtualisation.

- **Virtualisation**

A blade system is made up of multiple different components, and yet all of this needs to be made available to software and services as a single resource pool. This has to be carried out through the use of advanced virtualisation services, providing pools of compute power, of memory, of storage and so on. The blade system should be capable of being easily virtualised, and any blade management system should be able to manage not only the physical assets, but any virtual assets as well.

- **N+N reliability**

Blade systems create a built-in reliability capability, due to their virtualised nature. In general, should any one component of a blade environment fail, the rest of the blade will absorb the load, and there should be minimal impact on the business.

At the chassis level, power supplies and cooling fans will at least be provided at the N+1 level, as will network connections. Also, all components should be hot-swappable to minimise downtime. This leads to a highly resilient platform for maintaining capabilities to support the business.

- **Multi-core CPUs**

It is now rare to find blades that utilise single core CPUs, and dual core systems are now being complemented by quad core systems. This approach should not be confused with multi-CPU systems – multi-core provides additional benefits around data latency and utilisation of cache that cannot be found within standard multi-CPU approaches. However, further density improvements can be obtained using multi-CPU, multi-core blades. Combined with enhanced virtualisation capabilities, multi-core CPUs will offer a far more flexible, highly dense environment that can be easily provisioned and deprovisioned to mange disparate workloads.

- **Software provisioning and deprovisioning**

Blade systems are an ideal platform for supporting dynamic computing requirements. However, for this to be practical, it is necessary for software and services to be made available rapidly to meet variable loads. With one of the main plus points for blades being overall utilisation rates, it is not useful to provision an application or a service to meet its peak workload needs. By provisioning sufficient resources to meet just above average workload needs, the overall utilisation of the blade system is optimised. However, when the workload rises, extra capabilities must be made transparently available to the existing resources to meet the needs. This may mean providing more compute or storage resource to an existing application or service, or it may mean the provisioning of a new instance of the application or service elsewhere within the blade system. All this needs to be carried out simply and effectively, and is dependent on the blade management software.

- **Blade system management**

Blade systems are inherently complex, and are made up of many disparate components, each of which is a dynamic part of a larger virtual system. Blade management systems must be capable of managing each asset as an individual item, yet providing the capabilities to manage the blade system as a whole. Wherever possible, insipient failures should be identified, enabling users to plan for replacement before the failure takes place. Any component replacement must be able to be carried out without shutting down the system, as should software and service updates.

5. Moving to a Blade Architecture

Main Findings:

- Blade computing should not be regarded as a "rip and replace" project, but as an evolution of existing environments
- Focused, project-based implementations can be integrated with little effort as time progresses

Blade computing offers so much, and yet the move from a silo-based, application-centric, server-focused starting point can appear to be daunting to many organisations. However, Quocirca recommends that blade computing be introduced as a set of basic projects, each addressing specific business issues. As time goes on, these implementations of blade computing can be brought together simply through the use of basic blade interconnects. The IT department should ensure that replication of function is kept to a minimum wherever possible, to ensure that such integrations move towards the highest possible levels of overall utilisation as required.

The main changes within an organisation where blade computing can bring the biggest benefits include:

- **Consolidation**

Many organisations are looking to re-centralise their IT function, with the main drivers being ease of control, need for security, the requirement for easier access to information and the pressures of audit, compliance and governance. When looking to such projects, blade computing provides an ideal means of minimising the requirements for real estate, for power and for cooling

- **Rationalisation**

Where an organisation finds itself with multiple instances of the same application (such as Microsoft Exchange, SAP or Oracle) and wants to centralise on one instance, or where it sees the need to minimise the number of file and print or web servers, blade computing provides a great means of providing a flexible and on-going scalable platform

- **Major upgrades**

When a major upgrade is due to an existing application, it may make sense to review the underlying hardware architecture at the same time, so as to provide a longer-term, flexible environment for the future. With the in-built flexibility of a blade architecture, many such projects may find that this provides the ideal platform for a new application version

- **New projects**

If an organisation is looking to the implementation of a brand new system, then a blade computing architecture should be investigated as a means of providing a key platform for the future.

- **New architectural directions**

As organisations look to service oriented architectures and utility computing, blade computing provides the ideal platform from which to build such new architectures. Wherever possible, Quocirca believes that organisations should look to a blade computing system to support such directions.

Blade computing need not be a rip and replace approach – the introduction of blades alongside existing servers that are still managing to fulfil requirements still makes sense. Indeed, the virtualised nature of a blade system can provide extra resources to existing applications and servers that can make use of virtualised pools of resources, providing further investment protection opportunities.

6. The Application of Blade Computing

This section sets out a number of user case scenarios where blade computing brings business benefits. It sets out specific savings or business benefits where appropriate.

Scenario 1: Space constraints

A UK local authority, St Helen's Council had 89 physical servers within its data centre, supporting over 8,000 staff and providing services to a population of over 176,000. The data centre was close to capacity, and expansion would necessitate a move to a new building, with the associated costs and impact to ongoing support of the Council's activities.

Working with systems integrator Triangle, an IBM premier Business Partner, VMware Enterprise Partner and Microsoft Gold Partner, an approach was designed that would provide an environment which would be far more flexible, raise utilisation rates, and would minimise the space required on an ongoing basis.

Through moving to a consolidated server environment based on 4 IBM System x3850 Intel servers alongside a blade approach, based on IBM's BladeCenter HS20 technology utilising Intel Xeon technology, existing needs were served via far smaller physical footprint. Not only did this provide room for further growth in-situ, but also provided a far more flexible environment for the Council. Through the use of VMware for virtualisation, new applications can now be hosted on a virtual partition of the new environment, rather than having to buy a new server each time.

Scenario 2: Power and cooling constraints

Admiral Insurance, a UK-based insurance company, was struggling with the rate of growth of servers within its data centre. Although space was becoming an issue, the main issue was the lack of available power to the building, and any extra cooling that was required to keep all the servers within their operating limits would only push power requirements further. With power costs also increasing rapidly, the cost of powering and cooling the data centre was also becoming a major issue.

Apex, an IBM and Cisco Premier Partner, as well as being a Microsoft Gold Partner and a VMware Enterprise Partner, worked with Admiral's IT team to come up with a suitable approach to a data centre refresh.

The solution chosen was based around 2 IBM BladeCenters attached to an IBM DS4500 SAN, with a separate BladeCenter and SAN at a remote site for business continuity.

The approach has lowered the number of servers being managed from 60 physical machines to 18, with VMware virtualisation providing the capabilities for partitioning some of the servers to support dynamic needs.

As well as meeting the needs of the basic brief in lowering power and cooling requirements, the new system is far easier to manage and is far faster in provisioning new functionality, with functionality that would have taken up to three weeks now being provided within 30 minutes.

Scenario 3: Multi-user hosted games platform

Codemasters, a world-wide developer and publisher of world class video games, needed a suitable platform to host its new games, "RF Online" and "Archlord". Already being users of IBM Blades, the system was seen as an ideal platform for such compute-intensive games.

Reliability was a key concern, as Codemasters run geographically dispersed remote data centres, with little on-site technical capability. This also meant that remote manageability had to be a strong point in any solution.

Further, Codemasters realise that different games create different workloads, and the range of Blade portfolio from IBM meant that it would be able to choose not only from a range of CPU options, but also on interconnects such as Ethernet, fibre and Infiniband.

The use of multi-processor, multi-core Blades has provided Codemasters with the capacity to host far more concurrent players per Blade, and the density of Blades within a single cabinet along with low power and cooling requirements means that Codemasters have been able to minimise the space and electricity needed to support its growing player base.

7. Conclusions and Recommendations

Main Findings:

- Blade computing is a new architecture for supporting the software an organisation requires to meet its process requirements
- Blade computing needs not be rip and replace – starting small and growing over time provides the best long term benefits

The challenges for business and for IT remain acute. Organisations are having to respond to market issues far faster than they had to in the past, and IT has become a gating factor to such flexibility for many organisations. That upwards of 70% of an organisation's IT budget is often spent purely on keeping the IT environment running is a state that cannot be maintained – IT has to become more flexible, more manageable and more responsive to the business's needs.

This requires a major change in approach, moving away from the silos of the past, to an underpinning hardware infrastructure that is highly flexible, dynamic, manageable and responsive to change, while providing greater investment protection and up-time to the business. Existing application and server-based approaches need to be reviewed, looking to virtualised pools of resource, at the compute power, storage, memory and networking levels, along with a move to service oriented software constructs, looking to support business processes at the functional level.

Blade computing is such a platform for the future – yet must be regarded as a journey, rather than a one-stop, major project. A rip and replace approach may well result in failure, but introducing blades through specific projects around consolidation and rationalisation, along with using blades to underpin new projects and architectural approaches, will rapidly lead to a fully shared, responsive, utility-based infrastructure.

Blade computing also addresses multiple business issues – from the need to cut costs in maintaining and managing the IT function, through the minimising of power and cooling costs, to the capability of meeting peak demands of workloads without the need to over-engineer initial solutions.

Blade computing also helps to address an organisation's green issues, lowering power utilisation and the needs for cooling.

Blade computing will continue to evolve. However, through the correct choice of vendor, with the provision of on-going investment protection through the future and backwards compatibility of chassis and blades, such evolution can be easily managed, with the business gaining further benefits through extra functionality and compute power improvements without any impact on the capabilities for the organisation to carry on transacting its business.

About IBM

At IBM, we strive to lead in the invention, development and manufacture of the industry's most advanced information technologies, including computer systems, software, storage systems and microelectronics. We translate these advanced technologies into value for our customers through our professional solutions, services and consulting businesses worldwide.

IBM UK
IBM UK has a long-standing business, technological and social heritage in the UK. We are committed to innovation and helping clients to seize competitive advantage by transforming themselves into on demand enterprises. In addition, we are proud to be a progressive employer.

UK Head Office

IBM United Kingdom Limited
PO Box 41
North Harbour
Portsmouth
Hampshire, PO6 3AU.

To find out more about our Hardware, Software, Services & Finance offerings please visit **ibm**.com/ibm/uk

About Intel

Intel, the world leader in silicon innovation, develops technologies, products and initiatives to continually advance how people work and live. Additional information about Intel is available at www.intel.com/pressroom and http://blogs.intel.com.

-- --

Intel, the Intel logo, Intel Core and Intel vPro are trademarks or registered trademarks of Intel Corporation or its subsidiaries in the United States and other countries.

About Quocirca

Quocirca is a primary research and analysis company specialising in the business impact of information technology and communications (ITC). With world-wide, native language reach, Quocirca provides in-depth insights into the views of buyers and influencers in large, mid-sized and small organisations. Its analyst team is made up of real-world practitioners with first hand experience of ITC delivery who continuously research and track the industry in the following key areas:

- Business process evolution and enablement
- Enterprise solutions and integration
- Business intelligence and reporting
- Communications, collaboration and mobility
- Infrastructure and IT systems management
- Systems security and end-point management
- Utility computing and delivery of IT as a service
- IT delivery channels and practices
- IT investment activity, behaviour and planning
- Public sector technology adoption and issues
- Integrated print management

Through researching perceptions, Quocirca uncovers the real hurdles to technology adoption – the personal and political aspects of an organisation's environment and the pressures of the need for demonstrable business value in any implementation. This capability to uncover and report back on the end-user perceptions in the market enables Quocirca to advise on the realities of technology adoption, not the promises.

Quocirca research is always pragmatic, business orientated and conducted in the context of the bigger picture. ITC has the ability to transform businesses and the processes that drive them, but often fails to do so. Quocirca's mission is to help organisations improve their success rate in process enablement through better levels of understanding and the adoption of the correct technologies at the correct time.

Quocirca has a pro-active primary research programme, regularly surveying users, purchasers and resellers of ITC products and services on emerging, evolving and maturing technologies. Over time, Quocirca has built a picture of long term investment trends, providing invaluable information for the whole of the ITC community.

Quocirca works with global and local providers of ITC products and services to help them deliver on the promise that ITC holds for business. Quocirca's clients include Oracle, Microsoft, IBM, Dell, T-Mobile, Vodafone, EMC, Symantec and Cisco, along with other large and medium sized vendors, service providers and more specialist firms.

Sponsorship of specific studies by such organisations allows much of Quocirca's research to be placed into the public domain at no cost. Quocirca's reach is great – through a network of media partners, Quocirca publishes its research to a possible audience measured in the millions.

Quocirca's independent culture and the real-world experience of Quocirca's analysts ensure that our research and analysis is always objective, accurate, actionable and challenging.

Quocirca reports are freely available to everyone and may be dowloaded via www.quocirca.com.

Contact:
Quocirca Ltd
Mountbatten House
Fairacres
Windsor
Berkshire
SL4 4LE
United Kingdom
Tel +44 1753 754 838