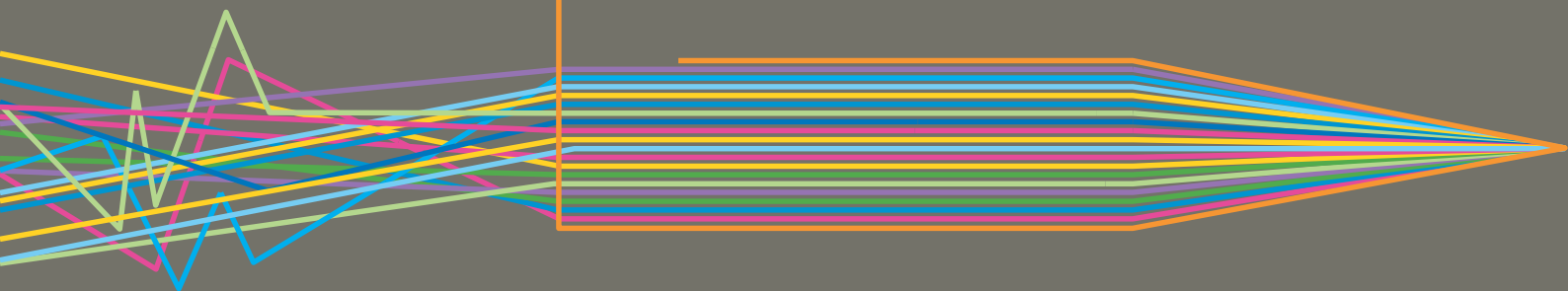


Virtualisation



Virtualisation.

Virtualisation offers the opportunity to simplify the management of large estates of servers, PCs and storage platforms.

Virtualisation improves the utilisation of IT resources, reduces unnecessary duplication of devices and saves on operational costs.

Virtualisation also allows you to control and manage remote offices and mobile workers who create security, management and maintenance issues.

Virtualisation means you can consolidate and centralise IT resources using high performance networks and acceleration technologies.

Virtualisation reduces the number of servers, storage arrays and other systems devices with a smaller footprint to deliver significant 'green' benefits such as power and cooling savings.

CAE maintains an ecosystem of key vendors that means you only have one place to go in order to deliver all these benefits.

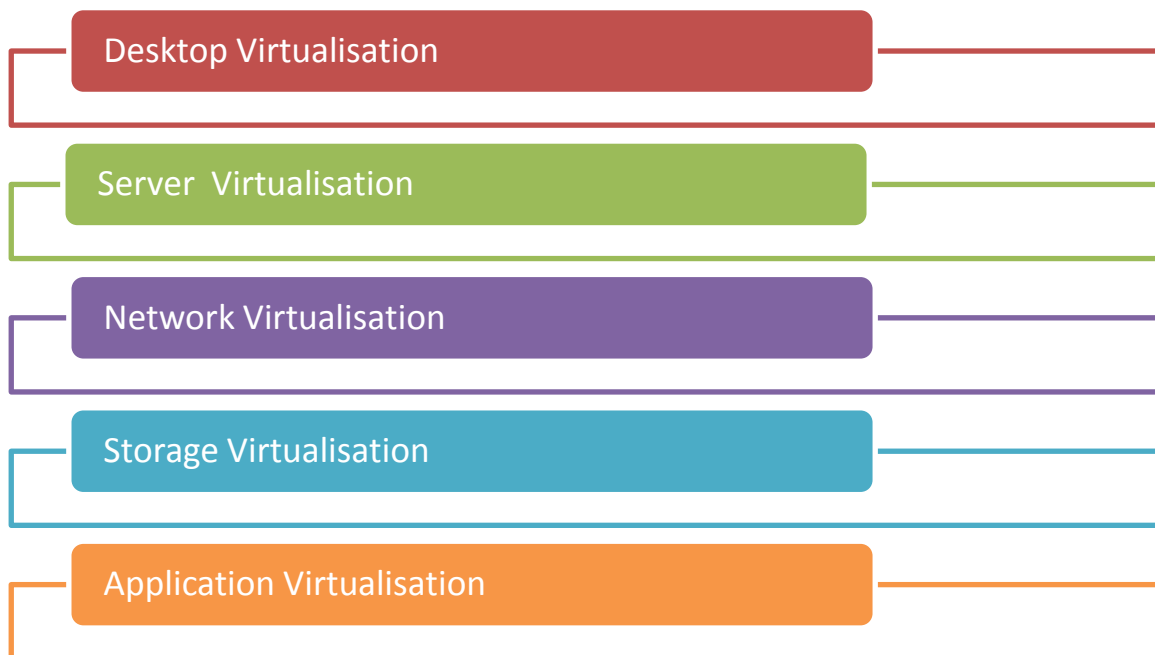


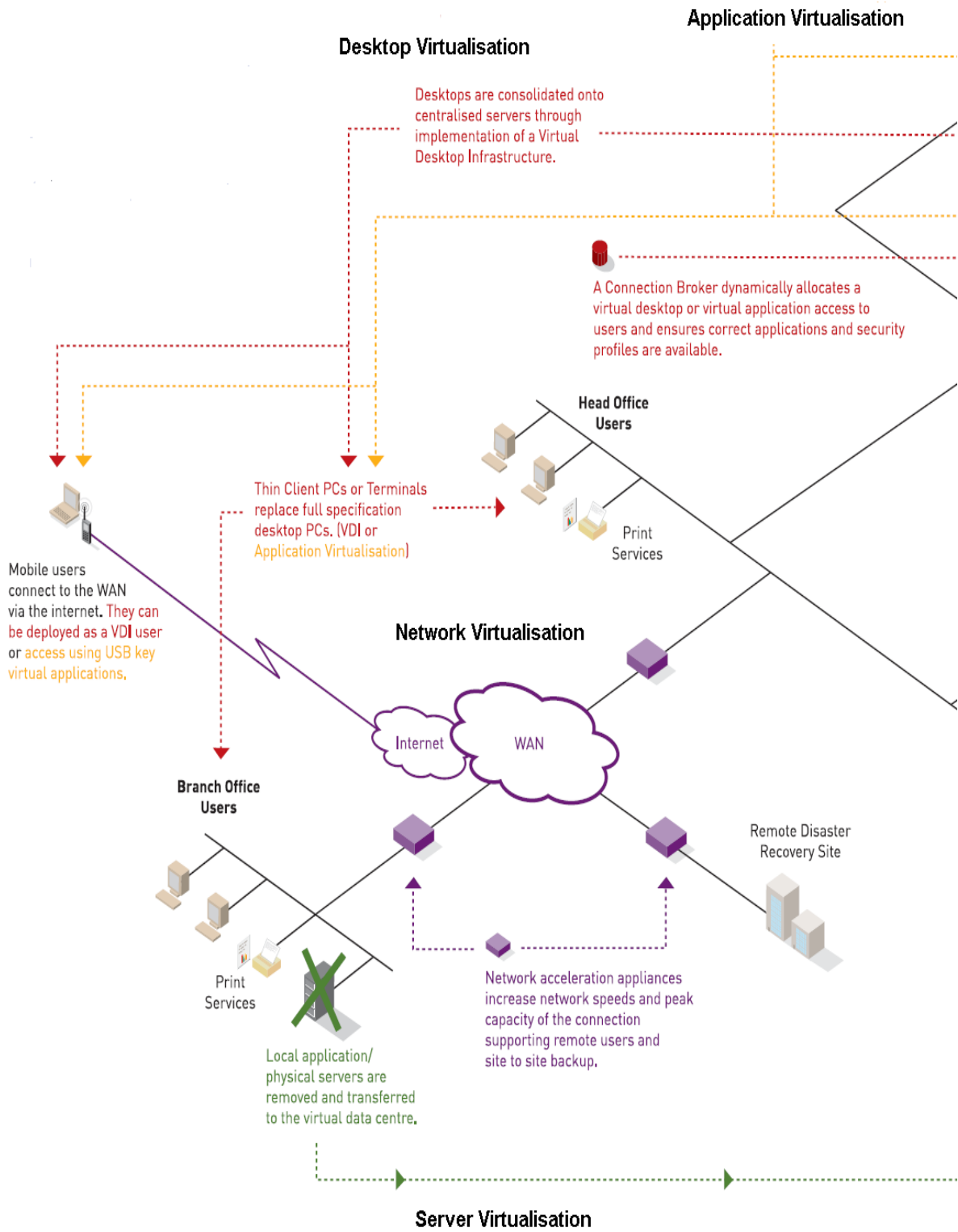
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The 5 levels of Virtualisation

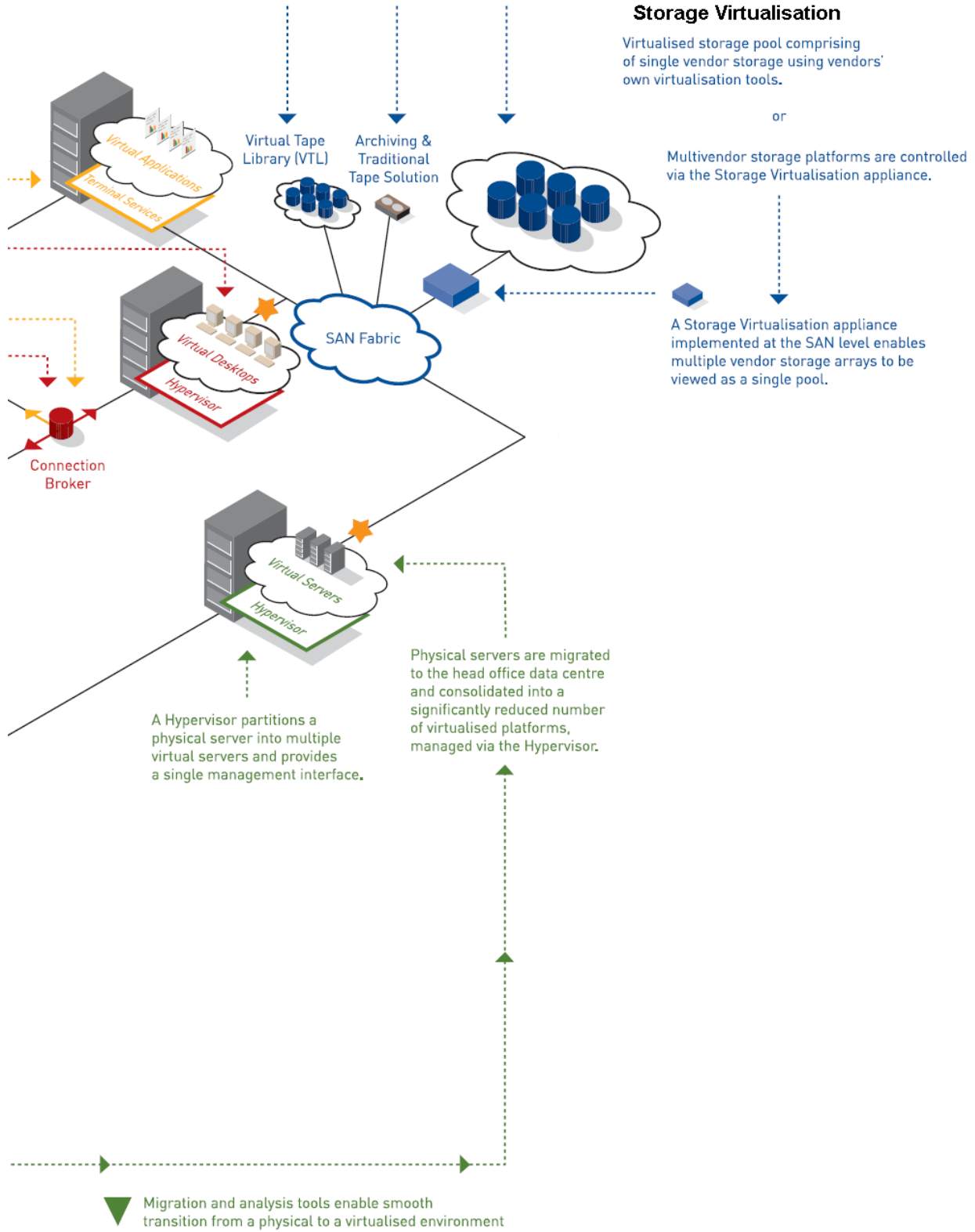
Businesses are demanding a better return from their investment in computing systems, whilst still delivering secure and continuous business operations. Virtualisation technologies are being implemented across all layers of the system architecture. This enables the consolidation and sharing of IT resources through a single, easy to deploy management interface.





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Desktop Virtualisation (VDI).

Cost-effective control and management of the desktop estate

Provisioning and managing the corporate desktop PC estate represents a massive cost within the IT budget and can be a huge headache for IT administrators. Just keeping track of hundreds, or thousands, of PCs is a time-consuming job. Added to this is the challenge of ensuring that every employee has a fully functioning desktop, regularly coordinating rollouts of software updates, and carrying out major operating system migrations.

Understanding the true cost of providing these desktop services to the end user and ensuring an acceptable return on investment (ROI) with effective controls must be a business priority but it can also create an opportunity to save money.

- ✓ VDI provides a framework to manage and control the desktop estate more effectively.
- ✓ VDI will significantly reduce operational costs, leading to lower expenditure on desktop hardware, licenses and storage.
- ✓ Power savings alone can be substantial enough to justify the change, especially with power availability becoming a serious issue.
- ✓ Management and backup of the desktop estate will be centralised, faster, easier and more efficient.
- ✓ VDI will provide a basis for consolidation and sharing storage thereby releasing idle capacity and reducing storage spend.
- ✓ Risk of data loss and the impact of viruses will be reduced.
- ✓ Updates, profiling and version control can be centrally managed.

Virtual Desktop infrastructure (VDI) consolidates large estates of desktop PCs onto a centralised server farm where every user has their own 'Virtual' PC. Instead of users having an expensive, dedicated, fully loaded PC on their desk, they all access a full version of the operating system (Windows, Linux...) environment, including desktop applications, located remotely on the server.

They do this from much lower cost 'thin client' PC's or terminals. Revisions, updates licensing, security, user-specific profiles and changes are all implemented on the server farm – all controlled through a central management console.



Your Issues	The Impact on your Business	Benefits of deploying VDI
Spend on desktop hardware escalating.	A significant proportion of the IT budget is spent on desktop hardware and maintenance.	A VDI – based infrastructure will cost less to buy, manage, maintain and power.
The IT team spend too much time updating and upgrading PCs.	Valuable technical skills are diverted from strategic responsibilities.	New software can be quickly, easily and consistently rolled out.
Users customise their PCs to suit their personal preference.	It is hard to share resources or re-assign a PC to another member of staff.	The Business owns the look and feel of a PC, and hot - desking becomes a possibility.
Users are downloading inappropriate content or applications.	A real risk of illegal material crossing corporate networks, lost productivity and malware entering via the internet.	The business is protected from malicious or accidental abuse.
Storage is going to waste on PCs, while the company is running out of central storage for corporate data.	Business use exceeds the usable available capacity – more storage than is really needed is bought, draining the IT budget.	Storage becomes a centralised, shared and cost – effective resource, with more desktop storage being purchased only when absolutely necessary.
Users fail to comply with corporate policy on reducing energy waste by leaving PCs switched on.	Energy wastage has a huge impact on the profitability.	Thin client/virtual PCs use less power per user and can be centrally shut down when not in use.
It has become almost impossible to track licenses.	The business may not fulfil its obligations or may pay non-existent licences and users.	Licenses match usage exactly – no more, no less.

Server Virtualisation.

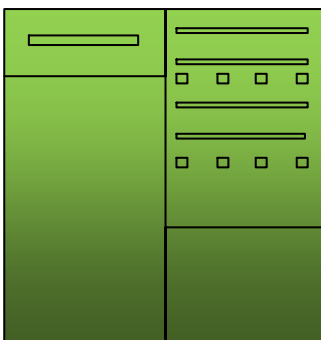
Simplifying and streamlining server ownership and management through virtualisation.

Most organisations have large numbers of servers spread across multiple locations and departments, each typically running a single application. This results in expensive duplication of resources, inefficiency, management complexity and unnecessary IT hardware and software spend.

The true cost of delivering server infrastructure to the business is almost impossible to estimate but undoubtedly it represents a substantial part of the IT budget. This is an area where potential savings and improved return on investment (ROI) can be significant.

- ✓ Server virtualisation offers the opportunity to adopt a more innovative approach to deploying and managing servers.
- ✓ It will provide a strategic framework for consolidating, simplifying and centralising servers and other key IT resources.
- ✓ Power consumption and cooling will be dramatically reduced. These savings alone could cover the cost of deploying virtualisation.
- ✓ More flexibility to roll out extra capacity and the ability to react more quickly to the demands of the business.
- ✓ It will substantially reduce the number of physical servers, thereby significantly improving utilisation per server and more efficient use of storage.
- ✓ Centralising servers in a single location enables targeting and deployment of key IT skills more effectively and control standards across the organisation.
- ✓ Business continuity processes and technologies will be easier to deploy, while virtual servers enable rapid failover in the event of a crash.

Server virtualisation dramatically reduces the number of physical servers in an organisation by enabling multiple 'virtual servers' to be run on a single or reduced number of shared machines. These are typically located in a centralised data centre facility, where the



management, control and security of the server infrastructure can be more easily managed and supported.

Each virtual server has its own operating system, applications will run as normal, and users have access via the network as usual. Multiple virtual servers are managed via a single management layer, or 'hypervisor.'

The number of servers can be reduced by a ratio of between 5 and 15:1, while the associated savings in hardware, licenses, management, storage and particularly power consumption are enormous. ROI is extremely fast.

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Your Issues	The impact on your Business	Benefits of deploying server virtualisation
Operating a rigid model of 'one application to one server', resulting in unnecessary sprawl and poor utilisation of resources.	Servers are not being used to the maximum - processing power lies idle and cannot be deployed on other applications. Software may be licensed per seat rather than by usage.	Virtualisation leads to significantly higher resource utilisation by sharing hardware and common infrastructure – everything is reduced, simplified and shared. Licenses are provisioned for concurrent, not physical users.
Servers have proliferated across the business, often in remote hard-to-manage branches.	The server population and footprint are expanding. Physical infrastructure costs escalate without perceptible improvement in ROI	Virtualisation cuts the number of servers and related IT hardware, reducing expensive space, power and cooling requirements-this significantly lowers IT costs.
Server management and support constantly demand more time and attention just to keep the infrastructure on a even keel.	IT administrators' time is consumed by repetitive tasks such as provisioning configuration, monitoring, maintenance and licensing	Improved operational flexibility and responsiveness: virtualisation offers a new, streamlined way of managing IT infrastructure.
Isolated, stand-alone servers are vulnerable in the face of disaster or other unplanned outages.	At best, applications become frustratingly unavailable – at worst, business continuity is threatened.	Being able to securely backup and migrate entire virtual environments with no interruption in service eliminates planned downtime and enables quick recovery from unplanned outages.
Spend on power and utility costs are escalating and out of control. The power and utility in the data centre is struggling to cope with demand.	Utility and power spend is 'off balance sheet' but an increasingly expensive cost to the business which directly impacts the P&L. The business will come under increasing legislative and 'green' pressure to control this spiralling cost. Your customer may not be able to get enough for the data centre at the current rate of expansion.	Reducing the number of physical servers directly reduces power and cooling consumption and related emissions. Businesses save hard cash to take control of their ' green' agenda

Network Virtualisation.

Network acceleration to enhance support for remote branch office workers in a virtualised environment.

Wide area networks are constantly under pressure, with increasing numbers of applications contending for bandwidth and more users working remotely. Implementing server, storage or desktop virtualisation also inevitably means consolidating and moving these users who are at risk of experiencing unacceptable service if the network cannot handle the demands placed upon it.

- ✓ The deployment of network acceleration will enable you to confidently restructure your infrastructure and consolidate IT resources centrally.
- ✓ Network acceleration will improve network speeds and ensure network service levels are maintained at branch sites
- ✓ In almost every case, network acceleration will be cheaper and more efficient than increasing the size of the pipe, especially if the problem only occurs at peak periods.
- ✓ You will be able to do offsite backups between the branch site and the data centre site more efficiently and quickly and improve business continuity.

Through network virtualisation, you can give your remote offices and employees speedy, easy access to data files and applications. Users experience reliable service delivery. A dedicated 'acceleration appliance' is deployed at each end of a network connection. This increases data transfer speed and the capacity of the connection without the expense of adding extra telecommunication bandwidth. This ensures that users in remote offices are not disadvantaged or suffer from reduced service levels due to network restriction. At the same time, the business avoids having to buy more bandwidth capacity just to service peak-time activity and fluctuating demand. Network acceleration underpins wider virtualisation strategies, enhances remote backup and disaster recovery performance whilst improving large file transfers and the overall user experience.



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Your Issues	The Impact on Your Business	Benefits of deploying network virtualisation
Slow response accessing files and services across the WAN – increasing user complaints. Large file transfers and peak-time congestion restrict activity.	Impacts productivity and user satisfaction among remote office staff.	LAN – like performance at the remote site improves productivity. Better data traffic management throughout will eliminate bottlenecks without increasing bandwidth.
Large volumes and silos of data reside outside the data centre because the network is too slow to move it elsewhere.	Corporate data at risk; data is not being shared for the benefit of the business. Duplication of files increases storage speed.	Valuable enterprise key data can be centrally stored and managed, eliminating duplication or corporate data whilst improving access to important information.
Deploying new applications is expensive and time-consuming.	Users do not have access to the latest tools which will help them to do their job.	New applications can be quickly rolled out.
Lack of IT skills at the remote offices.	Escalating cost of support, especially as branch office kit proliferates and adds to complexity.	Centralised management of all IT functions within the remote environment.
Remote backups are not completing successfully due to slow network speeds.	Compliance and continuity issues.	Increased speed and capacity enable affective offsite backup.
Business continuity and disaster recovery plans often don't often extend to include remote offices.	Compliance and continuity issues.	Consistent provisioning for business continuity and disaster recovery managed within the data centre.
Escalating costs of multiple servers with storage deployed on each remote site.	Inefficient use of the corporate storage assets.	Supports a move to a more effective and efficient virtualised pool of storage.
Escalating WAN costs.	Bandwidth 'hikes' do not resolve latency issues.	Reduced bandwidth leads to reduced costs and latency is reduced.
You are planning to virtualise your servers and storage.	Risk of large investment being needed to increase bandwidth.	More capacity from the existing bandwidth, greatly reducing costs.

Storage Virtualisation.

Simplifying and streamlining data storage through consolidation and sharing of resources.

Huge year-on-year growth in data volumes, along with regulatory pressure to preserve and protect data within a tightening legal framework, is fuelling the need for more data storage capacity at an unprecedented rate.

IT managers are constantly balancing the risk of running out of storage with tightening budgets. Yet, typically, huge amounts of storage capacity lie idle across underutilised servers and disparate storage arrays around the business.

To make matters worse, requirements fluctuate daily and not all data is the same. Some data is crucial to the business, much of it is unstructured, and significant proportions should be discarded.

- ✓ Storage virtualisation will enable you to share and significantly improve your utilisation of storage resources. This will lead to less wastage and lower management overheads.
- ✓ Storage virtualisation allocates storage as it is required, up to any maximum limit set for a user or application. Fewer devices are needed, delivering reduced spend, improved centralised management, faster deployment of storage, increased security and enhanced disaster recovery.
- ✓ Storage virtualisation can be deployed on traditional servers or virtualised server, and, therefore it can be implemented in conjunction with a wider virtualisation strategy, before or after.
- ✓ With fewer devices and less data, backups will be quicker and more frequent after virtualisation.
- ✓ Disks consume significant infrastructure that will enable you to apply more sophisticated data management tools such as data duplication, classification and archiving. There will be less data – and it will be better managed.

With storage virtualisation, storage capacity is removed from the individual user or server and is instead deployed in single or shared pools. Storage capacity is allocated to and accessed by the user or server via the network and can be adjusted to meet actual demand at any given time. Proactively managed by the IT team, disk space can be fully utilised without importance, backup and restore and peak-time balancing all become easier.

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There are two basic levels of storage virtualisation:

- **Storage Array Virtualisation** – data shared, virtualised and managed on a specific array of storage using the storage vendor's own virtualisation and management software.
- **SAN Virtualisation** – the storage pool may comprise more than one array, possibly from multiple vendors, and the virtualisation is implemented via a third – party platform – independent technology amended in the SAN fabric.

Your Issues	The impact on your Business	Benefits of deploying storage virtualisation
Complexity: multiple/diverse storage devices are largely attached directly to the server or to the users, with a variety of management interfaces.	Poor utilisation of storage, wasted disk space and ineffective management control of resources.	Dramatically reduces the number of storage devices – fewer physical disks, same useable capacity. Better allocation and matching of capacity to user demand.
One type of (expensive) disk fits all data.	Low value of aged data is stored on expensive devices.	Opportunity implement cost – effective tiered storage and de-duplication of data.
Investments in storage are always higher and ahead of usage because idle, spare capacity is not accessible to those who most need it, when they need it.	Capacity planning and meeting demand at peak times can be challenging. Physical spend on disks is ahead of actual need.	Easier deployment of extra capacity when required, less wastage and idle disk space. Spending is deferred, reduced overall it will leverage and complement existing investments in storage.
High energy consumption for powering cooling, with creeping demand for space.	Energy and space costs may be hidden but have a real impact on the bottom line.	Significantly reduced power, footprint, energy and spare costs.
Diverse backup and business continuity policies increase business vulnerability to disaster and unplanned outages.	At best, data becomes difficult to access at worst, business continuity is threatened.	Being able to rapidly and regularly backup storage means quick recovery from unplanned outages and protection of critical data.

Application Virtualisation.

Application virtualisation consolidates core desktop applications onto a centralised server farm where they can be more easily managed, updated and shared.

There is no need to run dedicated PC-based applications, numerous departmental servers and 'one application to one server' model. Instead multiple applications can be run on a single server, maximising the utilisation of the available systems.

Expensive PCs can be replaced by low cost terminals and thin client software connects the user to the centralised applications.

Revisions, updates, licensing, security and user specific profiles, and changes to all these, are implemented on the server and controlled through a central management console.

- ✓ Application virtualisation will provide a strategic framework for consolidating, simplifying and centralising desktop applications and other key IT resources.
- ✓ PCs are replaced with thin client terminals, substantially reducing the number of expensive PCs and associated hardware, licenses and maintenance charges.
- ✓ Power consumption will be dramatically reduced – these savings alone could cover a significant percentage of the cost of deploying application virtualisation.
- ✓ Centralising desktop applications in a single location will enable you to target and deploy key IT skills more effectively and control standards across the organisation.
- ✓ You will have more flexibility to roll out new applications and updates, and the ability to react more quickly to the demands of the business.
- ✓ Business continuity processes and technologies will be easier to deploy, while virtual servers enable rapid fail-over in the event of a crash.

Application virtualisation dramatically reduces the number of physical servers and desktop PCs in an organisation by enabling multiple applications to be run on a single, or a reduced number of servers, contained within a dedicated server farm.

Applications share system resources such as operating system, memory and processing power, with workloads balanced to ensure optimum performance. The objective is to reduce the number of physical servers deployed by using all of the available capacity rather than have idle and under-utilised resources.

Application virtualisation also provides a similar but alternative and lower cost approach to VDI (Virtual Desktop Infrastructure) and can provide a basis for removing dedicated PCs and replacing them with lower cost terminals.

Your Issues	The Impact on Your Business	Benefits of deploying Application Virtualisation
You're business operates a rigid model of 'one application to one server.'	Servers are not being used to the maximum – processing power lies idle yet cannot be deployed on other applications; software may be licensed per seat rather than by usage.	Virtualisation leads to significantly higher resources utilisation by sharing hardware and common infrastructure – everything is reduced, simplified and shared. Licenses are provisioned for concurrent, not physical users.
Desktop PCs have proliferated across the business, often in remote hard-to-manage branches.	The desktop population and footprint are expanding and physical infrastructure costs escalating, without perceptible improvement in ROI.	Application Virtualisation cuts the number of servers and related IT hardware, reducing expensive space, power and cooling requirements – this significantly lowers IT costs.
Server and desktop management support constantly demand more time and attention just to keep the infrastructure on an even keel.	IT administrators' time is consumed by repetitive tasks such as provisioning, configuration, monitoring, maintenance and licensing.	Improved operational flexibility and responsiveness: virtualisation offers a new, streamlined way if managing IT infrastructure.
Isolated, stand alone servers are vulnerable in the face of disaster or other unplanned outages.	At best, applications become frustratingly unavailable; at worst, business continuity is threatened.	Being able to securely backup and migrate entire virtual environments with no interruption in service eliminates planned downtime and enables quick recovery from unplanned outages.
Spend on power and utility costs are escalating and getting out of control. The power infrastructure in the data centre is struggling to cope with demand.	Utility and power spend is 'off balance sheet' but an increasingly expensive cost to the business which directly impacts the P&L. The business will come under increasing legislative and 'green' pressure to control this spiralling cost. You may not be able to get enough power for the data centre at the current rate of expansion.	Reducing the number of physical servers directly reduces power and cooling consumption and related emissions. Business save hard cash and take control of their energy-efficiency agenda.

For a complete virtualisation assessment contact CAE immediately and start realising the benefits of a virtualised world

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