Running Complex SAP® Landscapes in a Virtualized Datacenter

Unisys Real-Time Infrastructure on Microsoft Technology with SAP NetWeaver® Adaptive Computing Controller 7.11

White Paper
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The purpose of this white paper is to describe technical and business considerations when deploying a virtual datacenter for SAP® landscapes using Microsoft and Unisys RTI technology based on the SAP NetWeaver® Adaptive Computing Controller.

While this document will address a variety of key considerations for virtual SAP infrastructure, it will specifically address example deployment options for the major layers of the infrastructure.

SAP, Unisys and Microsoft started a joint initiative within the Unisys Microsoft partnership on datacenter management to work on datacenter modernization and transformation. Customers can move from static data processing to a more dynamic one that allows them to adopt easily on changes within their business applications.

Today enterprises and datacenters are facing a variety of challenges: Spanning from Green IT to business-centric data processing, compliance
and the move towards real time datacenter management of business critical applications that cover multiple enterprises. Web-centric applications are key, cloud computing is a topic, and virtualization is on the agenda of many companies.

Use cases for SAP will be introduced based on SAP, Microsoft and Unisys virtualization technologies including:

- Microsoft Operating Systems
- Microsoft HyperV and System Center
- Microsoft SQL Server 2008 Database
- SAP NetWeaver Adaptive Computing Controller and Solution Management
- Unisys IMS suite around datacenter transformation
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Challenges in Datacenters

SAP project teams and IT executive management face continuous changes within their SAP system landscape, whether it is from expiring product support or a requirement to implement new functionality offered with the SAP NetWeaver platform and SAP Business Suite. Customers would like to move to a more dynamic data processing of SAP landscapes to allow a more flexible way of resource allocation. Virtualization is the key in that approach but nevertheless virtualization in a SAP environment has special requirements.

They are also looking for new ways to address performance and capacity issues, manage integration and business consistency, avoid downtime, automate data copying, replicate on-demand and ensure that their business critical information is protected and on the most effective platform.

In short, they are looking for better ways to manage their SAP landscape throughout the application lifecycle – implementation, migrations, consolidations, upgrades and on-going maintenance. SAP has taken notice on that issue and started the Run SAP program (http://service.sap.com/runsap).

Additionally, with growing SAP landscapes, infrastructure challenges are compounded by constraints for power, cooling, and floor space within data centers and the continual corporate acquisitions introducing heterogeneous platforms.

The result is that many organizations are looking to realize transformative cost savings to lower TCO with virtualized IT infrastructures that enable effective use of budget resources and help decrease operational costs while delivering on:

- Increased operational flexibility and efficiency (proactive resource management)

Dynamic Computing and Virtualization as the Basis for Service-Oriented Data Processing

Service orientation is certainly a paradigm of continuous importance. Marking the end of the Client/Server shelf-life, and embodying the safeguarding of current IT investment, service orientation, utilization of web services and open standards are the building blocks to define the new Application environment within a SAP business process scenario.

Composite applications in SAP consist of services that build new business applications.

This approach obviously needs another computing technology than residing in dedicated silos. It needs a decoupling of IT and applications to allow dynamic allocation of IT resources to services. Virtualization of applications and infrastructure is the core model to allow such a new processing model.

The model maps IT infrastructure and the business requirement into a consistent service model. So the application view and the IT view need to be linked into the model. SAP Composite applications deliver the building blocks of new business services that can be generated upon existing ones.
The defining characteristic of Composite Applications of SAP is that they “run across applications and systems.” To build them, you need to look at all the participants in a business scenario and from an end-to-end perspective – as our customers would view them. SAP refers to this as the “outside-in” approach. It is an approach that does not come from the data, but from top down, from the business side. It is driven by business requirements and the benefits it provides to the customer.

Event-driven Automation and orchestration of IT resources is a key prerequisite in this service-oriented model. In this architecture it is important to store and collect IT resource data to deliver enough resources at any time the service is requested. Automation orchestrates the service components from the application layer to the IT layer. This paradigm of orchestration gets more important in a real time environment such as a Web application scenario where real time user requests need to be synchronized and orchestrated with other application components that build the business process.

Unisys Real Time Infrastructure (RTI) is based on this paradigm and allows the open integration of business applications and IT technology. RTI links the business layer and the IT layer using Unisys Methodology on Business Blueprinting. RTI automatically meets Business demands and allocates IT resources dynamically at the right time: right resource for the right reason. It adheres to security policies and regulatory compliance requirements.

The Unisys/SAP solution combines the SAP application layer virtualization by linking the SAP controller to the RTI stack of Unisys including Microsoft database, operating system and virtualization engine. In the following picture the SAP NetWeaver Adaptive Computing Controller 7.11 building blocks are put together. The components allow the integration from the application layer/logic into the underlying IT components. The objective is to orchestrate application-centric IT components to allow efficient and optimized resource allocation.

In the adaptive computing concept we talk about starting, stopping and relocating services. The SAP tool is a major component in the new SAP future datacenter concept which is shown in the picture below.

Application-Oriented Datacenter Management

Applications consume and represent services that allocate resources at execution time and free up resources after having done the job. This simple model is the basis for a service-oriented data processing approach that SAP introduced in the SOA architecture.

The future is a service orientation based on WEB services that allow for integration of business process scenarios and end-to-end process integration. At a deeper level, the individual services employed to build Composite Applications can, in essence, be derived from the functionality of those systems.

Any system that exposes its functionality as “services” is defined as a service-oriented architecture (SOA).
SAP refers to SOA as being equal to the sum of Enterprise Services and SOA i.e. that ESA adds business semantics and logic to the premise of services-orientation and moves beyond component or individual web services toward incorporating entire business processes as “Enterprise Services”.

With Enterprise Services being composed of, for instance, a number of individual or component web services, that like any other system functionality generates load and draws on infrastructure capacity, customers will need to consider scheduling and services automation through an automation infrastructure tool.

Service-oriented architecture (SOA) customers require access to the granularity of individual component services in order to troubleshoot and provide performance analysis. Further, they will need to retrieve, report on and react to service related metrics from across the composite environment (including non-SAP systems) Consequently, individual services require start / stop mechanisms.

From a Datacenter point of view a new model is needed how data centers are managing the business applications to keep the service level agreement that are in place with end users. A shift from a technical service level to a business-centric service level is obvious.

Key management capabilities:
- Provide adaptive IT in response to new business models and processes
  - Realize promise of SOA for enterprise application landscape
  - Enable and manage SOA with service-oriented infrastructure (SOI)
- Maintain performance and service levels at the right cost to the business
  - Business Continuity
- Protect corporate and business assets
  - Regulatory exposure
  - Information compromise
  - Performance optimization and high availability production environment need to be adopted and business metrics need to be linked with IT metrics to visualize the impact from the application / business process logic into the IT components.
  - Improve on SLA’s with lower acquisition, deployment and management cost for SAP IT resources
  - Maintain and improve on performance and optimization of SAP infrastructure
  - Maintain business continuity and high availability for planned and unplanned downtime
  - As a major driver and prerequisite for successful driving and hosting SOA landscapes, the SOI must be build in a very early stage of the SOA project. Many failed SOA projects from the past show that SOI was completely phased-out.

The Datacenter Challenge Running SAP in a Virtualized Environment

A while ago SAP initiated a program to support SAP users and datacenters to optimize their IT infrastructure. It was set up to enable a transition from the legacy data processing model to the service-led approach. Virtualization has become the important focus in datacenter operations managing SAP system landscapes.

Additionally, with growing SAP landscapes, infrastructure challenges are compounded by constraints for power, cooling, and floor space within
data centers. Moreover, there are continual corporate acquisitions introducing heterogeneous platforms into the corporate architecture.

As a result organizations are trying to save transformative cost to lower TCO with virtualized IT infrastructures. They enable effective use of budget resources and help decrease operational costs while delivering on:

- Increased operational flexibility and efficiency
- Minimized risk and enhanced IT service levels
- Optimize IT environments

Several types of virtualization options and products are available to the data center, namely server, network, and storage virtualization. These virtualization products can be used together or in isolation to better manage portions of a data center, depending on particular needs. For example, server virtualization encapsulates and isolates an application and its environment from the host server. Network virtualization allows logical partitioning of common network hardware to support disparate and secure use by logically isolating a sub-network and/or encrypting data flowing across a public network. File virtualization provides a transparent, non-disruptive file system migration across NAS systems. Block storage virtualization supports transparent, non-disruptive cross-subsystem LUN migration and configuration in heterogeneous environments. There are different virtualization architectures available for each layer of IT infrastructure.

SAP deployments can generate significant server sprawl primarily due to the need to provide separate systems for development (DEV), quality assurance/test (QAS) and production (PRD) environments. Each SAP solution typically has its own system landscape containing at minimum a DEV, QAS and PRD environment.

SAP Enterprise environments can also contain multiple layers in the application architecture, including database, application server, and web server layers. Given a typical deployment, every layer of the environment is hosted on dedicated physical systems that are not fully utilized at all times. Almost more than 50% of SAP implementations run on the Microsoft Windows platform. These implementations have an average application server CPU utilization rate of 15-50%. That is what we learned from SAP users in workshops we did over the time. The results from datacenter consolidation projects done in the past confirmed that. Nevertheless the factor of resource optimization will vary from customer to customer. TCO optimization is a complex task and needs deeper analysis.

Virtualization technology fights this server sprawl by running SAP application layers in virtual machines consolidated onto fewer enterprise-class servers, resulting in increased server utilization. Virtualization must be planned in advance to its introduction and needs a management layer similar to those of physical machines.

Key benefits:

- Provide all developers with dedicated and isolated SAP environments containing multiple tiers of the application, consolidated to run on a single physical system.
- Achieve consolidation and lower total cost of ownership (TCO) by running multiple SAP enterprise applications on the same physical system.
- Eliminate the need for dedicated hardware and provide for interoperability with multiple operating system and SAP versions running on the same physical machine.
• Eliminate the need for dedicated test systems with multiple test environments sharing same physical system.

With storage growth at an annual rate of 50-60%, IT organizations are seeking ways to improve productivity and asset utilization, lower costs, and increase service levels. Many IT organizations leverage a tiered storage strategy to provide the right levels of performance, availability, recoverability, and cost points for a range of applications. While tiring of the storage infrastructure helps optimize resources, the ability to move data without impacting application availability becomes a challenge. The requirement to migrate data as part of a technology refresh can consume significant time and resources for both planning and execution.

Storage Virtualization addresses these challenges but also introduces new challenges like increased monitoring on infrastructure components and systems because a breakdown in a virtual environment now involves more than one system.

It enables technology refreshes to occur efficiently while applications remain online. It also provides a means for tuning performance or optimizing costs by non-disruptively moving data to the right tier of storage at the right time. Storage virtualization works by creating an abstraction layer between the physical hardware and the way it is logically presented to applications. This abstraction layer enables changes to be made to the underlying hardware without disrupting the application, resulting in the ability to move, expand, or change the storage infrastructure while the application remains online.

Key benefits of storage virtualization include the following:

• Reduces time and cost associated with moving data
• Improves management of heterogeneous storage assets
• More flexible and cost effective data protection and copy services
• Increases return on storage investment and ongoing operational savings

Storage Virtualization also provides a common means for storage management across heterogeneous storage platforms. This simplifies management and provides replication services that enable data protection and disaster recovery across heterogeneous assets. IT organizations, who deploy storage virtualization, realize savings by simplifying storage management and reducing the time and resources required for planning and performing data migrations.

The following items need to be observed critically in a virtualized environment:

• Service Levels and accounting/billing
• IT Provisioning / De provisioning
• Business Continuity and Availability Management
• Change Management
• Compliancy and Access Control
• Security
• Patch Management
• Virtual Machine Management

In the following pages the above mentioned items are discussed in more detail using Unisys Real Time Infrastructure Methodology and best practices.
Real Time Infrastructure Enabled Data Center Transformation

RTI is a future state where IT resources (Servers, Storage and Networks) are pooled and shared across the business, with dynamic capacity management, where priorities are assigned based upon the business need. The benefits of RTI are improved quality of service, agility, and reduced costs. Hence an RTI enabled Data Center is one whose operational, financial management and organizational structure are optimized and fully compliant with ITIL.

Architecture:
Figure 1 shows the high level architecture of RTI enabled Data Center.

The architecture is based on the following:
- Pooled and shared physical resources
- Virtualization technologies
- Fully automated and integrated workflow management
- Automation/Orchestration & IT Operations

Even though most applications can be run on virtual servers and storage, there will still be some applications that will require dedicated servers and storage. RTI enablement provides the ability to make smart choices and allocate appropriate resources to various applications based on business requirements. The brain of RTI enabled Data Center resides in the business activity monitoring and the business performance management systems.

A fully automated workflow management integrates with infrastructure management frameworks to harvest and correlate events from the infrastructure with the business process events. If a particular business processes activity increases and the application supporting requires more resources the workflow management will send that message to an Automation/Orchestration system that will provision more resources for that particular application and at the same time update the CMDB.

Figure 2 shows the Automation/Orchestration system in use at Unisys datacenters.

Automation/Orchestration System
Unisys views RTI as a way to achieve the ultimate objective of the business; namely, the Real-Time Enterprise – an idealized state that will enable a business to predict, sense, and respond to business opportunities and threats automatically.

Unisys delivers the capability to look at the business process and the IT infrastructure as a whole and
create a full business lifecycle management using methods such as business activity monitoring and policy based prioritization to enable intelligent IT workload management – automatically and instantaneously.

RTI is based on a shared resource model which provides real advances in terms of optimized asset utilization and flexibility. The benefits are: firstly, the IT infrastructure “understands” and responds to business requirements, creating that all-important link between IT and the business. Secondly, because the resource is shared, none of it is wasted. Currently most IT servers are not shared, and because of this, they each need to be able to sustain a service level individually, regardless of the load. The result is massive over-provisioning, to the point where figures of 8 - 15% utilization are not unusual. Creating a shared environment overcomes this issue. Servers can collaborate to support service levels.

Automated governance is needed to ensure that IT resources are marshaled in line with business priorities. This is what RTI provides, and it is this that allows one to raise asset utilization from 8 -15% right up to around 80%, providing huge potential savings while at the same time guaranteeing service levels in line with business priorities.

Our approach to the real-time infrastructure creates a blueprint of the current and future state for both the infrastructure and the business processes. Unisys unique 3D blueprinting delivers greater predictability of both the investment and the result by reducing the risk of change and the cycle time for implementation. Unisys provides 2-Way visibility so you can see and connect the business view of IT and the IT view of the business – including their dependencies and relationships. Through visibility and modeling, we enable informed choices so you can act with confidence to transform IT. Our simulation tools help to produce the business case for change. We see that this journey to an RTI is one that is inclusive of the technology platforms, the people who manage and use the facilities, and the interactions in the delivery of IT to the business.

The blueprint data will then give both of us the opportunity to understand the individual projects that need to be undertaken and these can be prioritized by you in terms of business need. We understand that organizational and cultural issues can be the biggest barriers to rapid progress when you are considering IT transformation. By involving the business units in the planning process and creating consensus and ownership of the initiatives for change in the initial stage, you can rely on their support and sponsorship during the business justification phase.

The current Unisys RTI portfolio consists of the following solutions:

Visible Enterprise Services
This solution includes the Visibility Transformation Service; IT Service Management Consulting Services including process design, process implementation and ITSM tools implementation; and IT Consolidation services.

Enterprise Virtualization
This solution includes services and technologies that accelerate the deployment and improve the management of virtualization technologies in your data centers. We pay attention to server, network, storage and application virtualization to provide an holistic approach to gaining value from virtualization initiatives.

Intelligent Automation
This solution uses Business Activity Monitoring technologies, Unisys 3D Blueprinting and process models, and Enterprise Orchestration solutions to monitor business process health and then provision virtualized IT assets in real time to rapidly meet dynamic changes in business application capacity requirements for your critical business processes.
Business Continuance and Disaster Recovery
This solution combines IT Service Continuity Management Consulting services with the deployment of technology solutions that rapid Disaster Recovery within a specified timeframe across widely separated data centers.

Utility Computing
This solution area encompasses Utility Storage, Metered Storage (where you pay for storage usage in units of GB-months) and Utility Computing, a form of Capacity on Demand.

Unisys has a vision for the RTI enabled Data Center. We are developing solutions for critical parts of the RTI enabled DC, we understand today’s problems, and we can help you navigate your way to value-creation for the business while at the same time optimizing the infrastructure and preparing for the next phase of developments. The bottom line is that Unisys RTI Solutions enable increased ROI today and lead the transformation to next-generation, “sense and respond” environments that support the full business lifecycle. We deliver secure business operations so you can reach competitive advantage and business achievement.

The SAP View on Virtualization and the SAP Adaptive Computing Concept

The main difference using the SAP Adaptive Computing Concept in a comparison to other application virtualization is that the SAP tool helps manage not only virtual systems but also non-virtualized systems. The advantage is, that the SAP tool "knows" the application environment out of a SAP business scenario viewpoint. It allocates the right resource at the right time, the right sequence and right quantity. This is a big difference to managing applications out of an IT viewpoint. Optimizing IT resource allocation and workload distribution is more effective in that way done by the SAP controller. In addition, there is no resource overhead for a Hypervisor layer if you virtualize systems in a physical environment.

The SAP NetWeaver Adaptive Computing Controller 7.1 provides a central point of control for system management of all SAP systems in your landscape. The tool is free of charge for SAP customers holding an Enterprise or a SAP NetWeaver license, is easily implemented and the benefits are quickly realized, especially in midsize and grown system landscapes. The SAP controller hides the complexity of the system landscape and therefore makes system administration task easier.

To use the SAP NetWeaver Adaptive Computing Controller for system administration tasks monitoring, start and stop of systems or instances, requires very little preparation and installation effort and the benefits are achieved quickly. Additional dialog instances can be started to handle performance peaks and a mass shutdown of all systems can be made with a click of a button using the mass operation function. The integrated task planner lets you schedule the start and stop of additional application servers and instances, e.g. by automatically shutting down your training systems over the weekends and starting additional application servers to power the batch operation processing at night or to handle increased workload on demand.

In order to gain the full benefit of the Adaptive Computing Concept you can choose to install the managed systems on virtual hostnames and use the concept of a central storage. This will break the otherwise fixed boundary between the SAP systems and the underlying operating system and make relocations of systems between different servers possible. This helps you to quickly react on performance or server availability issues in your system landscape and makes you more flexible since
you can move SAP systems around different servers. It also allows a very flexible scaling and replacement of outdated hardware and move of instances to high performance hardware that fits the growing demands of your applications. Once the performance demands have decreased again, you can move back systems to hardware that is fitting the applications demands exactly, shut down empty servers due to instance consolidation and thus decrease the TCO.

The SAP controller uses a well known software virtualization concept, used in clustered environments for years, by installing services on virtual hostnames. The main advantage with the SAP tool is that the instances run directly on the OS, hence, there is no additional OS virtualization (e.g. hypervisor) or management layer that reduces the system performance. The SAP controller can, however, not replace a cluster since a relocation of a system always includes a short downtime.

SAP NetWeaver Adaptive Computing Controller is fully integrated into the SAP monitoring infrastructure around Solution Manager and the SOA concept. What is missing is the direct access to underlying IT infrastructure components such as Server provisioning, Storage provisioning (tiered) and reconfiguration of IT infrastructure (repurposing and orchestration).

How to jump-start adaptive computing

The shift from a traditionally managed SAP system landscape to an adaptive computing managed landscape can require implementation and configuration efforts. You need to virtualize the instances running on physical host names, enter all your computing nodes into the SAP controller, and prepare for central OS deployment.

Perhaps you want to start small, become experienced with the concept, and then expand it slowly throughout your system landscape.
Recommendation:
1. Integrate your existing dialog instances (DIs) in the SAP tool by installing new ones on virtual host names for your adaptive computing landscape
2. Move the application data and the components onto NFS, and integrate the new DIs into the SAP controller
3. Use logon groups to push your users to the new instances. After you have relocated all your users to the new instances, you can delete the old ones. This is a small move and presents no danger of an interruption in operations
4. After you become accustomed to configuring and moving application servers and managing them with the SAP tool, start to virtualise the central instances (CIs) of the new installations and attach them to the tool.
5. Move existing CIs to virtual host names
6. Integrate the database (DB) instances.

Strategically Aligning IT to Business Needs
The Unisys / SAP initiative for Microsoft technology links the SAP application logic and the SAP NetWeaver Adaptive Computing Controller into the context of IT management in a dynamical way. This allows optimal resource allocation, an efficient use from a green IT and cost perspective. It links governance and compliancy into the workflow and in the end supports clients in a transformation process to a service- oriented data processing with Real Time Infrastructure.

The traditional view of a business’ technology infrastructure as a cost center is becoming outmoded as IT increasingly plays a major role in supporting business processes. Organizations that continue to view IT as a cost center will soon find themselves at a competitive disadvantage to organizations that have transformed their infrastructures into a business asset through strategic investment in this area.

Retaining a strategic advantage in any business requires an organization to be able to anticipate and meet the needs of its customers more quickly than its competitors. As markets evolve, so must business processes and as technology increasingly plays a role in all business process, the need for IT to respond quickly to evolving business needs has never been as important as today.

In order to effectively perform as a strategic asset, IT must be able to support requests from the business quickly, efficiently, and reliably. The proposed RTI solutions will help to meet these requirements and strategically align IT to business requirements by improving operational efficiency, enabling growth, and reducing risk.

Improving Operational Efficiency
The proposed RTI solutions will create a flexible infrastructure with automated self-management features that will reduce the number of manual configuration change events IT performs regularly. Through the Unisys infrastructure management suite customers can achieve total automation of configuration change processes. We can also automate many of the broader management and auditing processes that are associated with change management in our technology infrastructure. The business value of this additional layer of automation is significant.

Many automation solutions focus on making the task of provisioning resources more efficient. In reality, the time required to perform a particular task is minimal, on the order of a few minutes or even seconds. Waiting time for approval is often the largest contributing factor to the time required to commission a new environment.
With the proposed RTI solutions, we can automate many of these approval tasks by creating a set of rules for different roles. Users will only have access to the parts of the infrastructure that are appropriate for their given role because the RTI software will grant or deny access to resources based on the rules associated with each defined role. Automating infrastructure management tasks will reduce the time required to provision resources for new environments, thereby reducing the time-to-market of new applications or updates to existing applications.

**Enabling Growth**

Cost effectively managing a complex, multi-vendor technology infrastructure can be a critical inhibitor to scalability. As customers grow or acquire other business, the complexity of our infrastructure will increase, as will the cost and time requirements to manage this infrastructure. By automating infrastructure change and change management tasks, providing real-time access to inventory discovery and compliance audits, and enforcing standards through rule-based policy automation, the proposed RTI solutions will allow customers to grow cost-effectively.

**Reducing Risk**

**Technical Risk**

Technical risk refers to whether technology in our data center infrastructure works the way we expect it to or not. A substantial percentage of our current exposure to technical risk is due to the likelihood of human error in manual configuration processes. Automating these processes with a set of policy-driven standards will virtually eliminate the risk of network downtime caused by configuration problems due to human error and ensure that the design of our infrastructure always complies with best practices.

**Compliance Risk**

Increasing infrastructure complexity broadens our exposure to risk of regulatory compliance violations. Because it is difficult to know what specific regulatory requirements we will be forced to comply with in the future, it is important that we maintain enough control over our infrastructure to quickly bring it into compliance with new requirements as they arise. With the proposed RTI solution, we will have complete visibility into the makeup of our technology infrastructure foundational hardware and software in real-time. Not only will these features drive down the cost of compliance, they will help ensure the customer does not fall victim to regulatory non-compliance fees.

In addition, the same capabilities that allow us to easily maintain regulatory compliance will also help us maintain policy compliance, improving the speed, quality, efficiency, and reliability of our technology infrastructure and the IT solutions it supports.

**Business Risk**

As businesses increasingly seek to transform their IT infrastructures from cost centers to strategic assets, organizations that do not begin this process of transformation may soon find themselves at a competitive disadvantage to their peers, hampered by operational inefficiency, lack of flexibility and agility, and increasing cost of ownership. The proposed RTI solution is the most efficient way to begin this transformative process at Company-name because it allows us to move towards the ideal of a real-time infrastructure using our current infrastructure resources. The proposed RTI solutions will help use reduce capital and operational spending considerably, while delivering the flexibility and agility IT needs to support ever changing business requirements in a timely manner.
The Unisys Real Time Infrastructure

The Unisys Infrastructure Management Suite

The IMS Suite is a critical component of the overall Unisys RTI solution and personifies the best-of-breed approach referred to above mentioned concepts. IMS is a key component in the Unisys portfolio of the Real Time Enterprise and consists of an open standard that allows open integration of application scenarios into IT technology.

Linking business into IT operations is the vision and mission of Unisys new positioning as an independent Software integrator on Gartner’s RTI Model.

It provides the framework that enables the:

- Supply and demand of IT resources to be managed in real time based on rules determined by business managers
- Identification and automatic fixing of problems
- Management of physical and virtual resources

Key solutions include:

- Virtual Orchestration
- Test & Development Infrastructure Automation
- Disaster Recovery Automation & Repurposing/High Availability
- Automation & Efficiency for Production Infrastructure
- Servers as a Utility
- Data Center Migration

Supported by software technologies for:

- IT service governance
- IT process automation
- Server repurposing
- Server provisioning
- IT resource utilization

Technical Solution Overview

The following scenario represents the basis of our solution stack for managing complex SAP application landscapes in a virtualized Microsoft environment. The technical concept is the integration of the SAP acc controller environment into Microsoft systems architecture including MS System Center, Hyper-V, and SQL Server Database. The advantage of this solution is a homogeneous Microsoft centric architecture that links the SAP application layer to the underlying open platform. This solution delivers specific operational and financial benefits, Its value is derived from the integration of all these components.
into a solution that provides a foundation for a real-time infrastructure using a current multi-vendor infrastructure.

This scenario is the basis to consolidate SAP application and IT components to reduce IT operational costs and to improve service availability.

**Other use cases that are under considerations**

- Test Data Migration
- Disaster Recovery Processes / Business Continuity
- Infrastructure Refresh
- High Availability
- Automatic Failover
- Workload Manager
- Idling-Management
- PI Management / Shutdown
- Consistent SAP Landscape Shutdown
- Hidden App Server Provisioning
- TDMS Workload Management

**Virtual Orchestration for SAP Infrastructures**

The scenario represents a SAP landscape that raises during execution time an event to allocate more resources for the application processing. The application is passing the request to the RTI engine that orchestrates additional IT resources. RTI manages a resource pool consisting of virtualized and non virtualized components, links Server, Network, Storage and profiles. After finishing the execution resources are freed up again and can be repurposed for other usage.

The SAP NetWeaver Adaptive Computing Controller is the central instance for managing the SAP internal Start, Stop and Relocation of SAP application scenarios. RTI handles the underlying IT pool to synchronize the orchestration process.

**Typical Situations at Datacenters Running SAP**

- Uncontrolled server sprawl – DC out of space
- Energy costs rising
• Too many different architectures
  – 1xs, 2x, 4xs, 8xs, 12xs, 16xs
  – Windows, Unix, Linux, VMs
• Over-provisioned servers and erratic utilization
  – Low utilization on average per server
  – Low flexibility to assign resources to systems at the right time (reaction instead of pro-action)
  – Licensing issues since license is still bound to the underlying hardware with HW key
  – Very static assignment (one server one system)

What is Virtual Orchestration for SAP Infrastructures?
• As SAP server consolidation through virtualization undergoes explosive growth, IT finds itself with a larger and more flexible infrastructure to manage. Virtual Orchestration addresses one of the largest infrastructure issues facing IT organizations today – reducing the operational expense associated with repetitive and time consuming tasks while improving flexibility and efficiency.
• Virtual Orchestration automates IT workflows and orchestrates the multitude of virtualization platforms. It significantly reduces the administrative burden of managing requested virtual machines in dynamic, virtualized environments and addresses significant challenges in the areas of IT service delivery automation, service-level performance improvement, and optimizing IT efficiencies and cost containment. Virtual Orchestration positions our clients to seize opportunities in achieving higher levels of customer retention, improved business agility, and lower IT TCO by allowing businesses to effectively address increased demand and IT to respond proactively in delivering the services when and where the business requires.
• Part of the Unisys Infrastructure Management Suite (IMS) of solutions, Unisys uOrchestrate in combination with Microsoft System Center Virtual Machine Manager 2008 (SCVMM) provides optimal resource allocation and operational process automation – reducing risk and cost, while improving quality of service.
• More, the Unisys ES7000 family of servers offer a pool of server resource to deliver ‘just in time’ capacity to meet business demands.

The Unisys Virtual Orchestration Demo consists of leading-edge virtualization & automation technologies designed to help clients begin to reduce their dependency on over provisioned and underutilized servers, minimize multiple server technologies, and reduce the complexity of managing a diverse infrastructure.

The Unisys Virtual Orchestration Demo for SAP Infrastructures consists of key deliverables:
• Unisys uOrchestrate Software
• Microsoft System Center Virtual Machine Manager 2008 (SCVMM)
- Microsoft Hyper-V
- Unisys ES7000/ES3000 family of servers

**Software**

- Unisys uOrchestrate
  - uOrchestrate provides a powerful solution to the increased complexity of the data center by automating repetitive scripted or manual tasks. uOrchestrate automates the management and control of complex IT processes, providing a powerful distributed workflow platform in which to design and deploy IT operations workflows.

- Microsoft SCVMM
  - System Center Virtual Machine Manager 2008 is a unified, multi-vendor management solution for the virtualized data center that helps enable centralized administration of physical and virtual assets.

- Microsoft Hyper-V
  - Hyper-V is a hypervisor-based server virtualization technology and an integral feature of Windows Server 2008. Hyper-V allows to consolidate virtual machines (VMs) running on a single physical machine and also efficiently run multiple different operating systems—Windows, Linux, and others.

- All SAP Solutions based on SAP NetWeaver 2004s technology platform or higher & SQL-Server 2005
  - This runbook can be used to manage any extensible Application infrastructure. In this case SAP Netweaver 2004s and SQL-Server 2005 is installed.

**Hardware**

- Virtual Machine Host / e.g. Unisys ES7000 Server
  - Server to consolidate Application Infrastructure via Virtual Machines.

- The ES7000 family of servers offers enterprise-class computing solutions based on industry-standard technology. Whether you’re looking for a powerhouse virtualization platform or best-in-class database and online transaction processing capabilities, we’ve got the server to deliver the results your business needs.

- Management Host(s) / e.g. Unisys ES3000 Server
  - Server(s) to run SCVMM and uOrchestrate Management Suites
  - The ES3000 family of midrange servers features four different models providing performance, energy efficiency, and cost-effectiveness in your choice of form-factor. Utilizing the latest in Intel processor technology, these servers are well suited to a wide range of datacenter needs from webhosting to virtualization.

**Benefits:**
- Respond quickly to business demands
- Decrease capital and operational expenses
- React rapidly to resource demands with full control
- Increase service level integrity
- Reduce human error through automation
- Mitigate risk
Summary

Adaptive computing is part of SAP’s Run SAP initiative, which helps to set up the solution landscape and operate it in the most efficient way in order to manage today’s SAP-centric business application landscapes from an end-to-end-perspective with minimized risk and effort. The initiative started at the end of 2007, and the next SAP Solution Manager Support package will include its initial concepts (http://service.sap.com/runsap).

SAP has completely rewritten the new SAP NetWeaver Adapting Computing Controller 7.1. It’s now based on Web services. With the Microsoft Unisys RTI technology the SAP tool is expanded to end-to-end management of data center operations including virtualization technologies. The solution RTI / SAP NetWeaver Adaptive Computing Controller gives the opportunity to decouple SAP applications from their underlying hardware. It can react to changing needs within minutes by starting additional application servers on free hardware or moving a system if the underlying hardware is broken or needs to be fixed.

The solution presents enhanced availability for the SAP solutions. Improve the server utilization by starting additional application instances on any free servers and shutting down systems not needed over the weekend to use the freed resources to start additional application instances that support other systems with batch work processes.

It becomes easy to set up and integrate new hardware into your existing infrastructure, supports consolidation and migration of SAP landscapes. Reduces carbon footprint and increases availability.

High availability typically requires additional expensive hardware and increases complexity. With the SAP controller, an increased availability is fundamentally included. Use computing power and storage as shared resources for growing, dynamic business needs.