



WHITE PAPER

Considering Cisco UCS as a Preferred Platform for SAP HANA

Sponsored by: Cisco Systems

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IDC OPINION

As analytic and business application systems grow ever more sophisticated, and their operational platform requirements become more complex, enterprise IT is turning to integrated systems to reduce the complexity, risk, and cost of managing datacenter infrastructure for such applications. SAP has responded to this market need by developing SAP HANA, a comprehensive in-memory data management-based software system that is delivered on platforms built to SAP specifications by select system partners.

As one of those partners, Cisco offers an SAP HANA integrated system built on the Cisco Unified Computing System (UCS) along with the associated Cisco networking technologies. This platform is worthy of special consideration for the following reasons:

- The demands placed on the network by SAP HANA clusters are well satisfied by the Cisco Nexus technology built into Cisco UCS.
- Of all the vendors offering SAP HANA integrated systems, Cisco is the only one that does not require a specific storage platform as part of the package.
- As the system scales and more nodes are added, latency and management complexity do not change.
- The Cisco UCS technology allows customers to add additional blades on the fly without shutting down the application; this has the potential to have a positive effect on SAP user productivity.

SITUATION OVERVIEW

Compute and Network Infrastructure Challenges for SAP HANA Deployment

IDC is observing that real-time data analytics functionality (the immediate availability of analytics that includes current operational data) is increasingly becoming one of the top IT priorities for major enterprise organizations. IDC describes Big Data and data analytics as a new generation of technologies and

architectures designed to economically extract *value* from very large *volumes* of a wide *variety* of data by enabling high-*velocity* capture, discovery, and/or analysis. To gain a competitive advantage in their marketplace, businesses are seeking to leverage the ability to make data-driven decisions more quickly. In data analytics, a critical factor is not just the access to information but also the speed to analyze data that can create a competitive advantage for companies. Companies that can exploit analytics via advanced modeling and in-memory platforms to make better decisions at the point of action will achieve greater business efficiency and competitiveness while reducing risk.

A complete data analytics platform includes both hardware and software elements. The software includes applications for discovery and analytics to support real-time analysis and automated transaction decision making. The hardware includes optimized infrastructure that includes servers, storage, and networking, with centralized management for all hardware elements.

SAP HANA is an in-memory data management software platform built on an optimized hardware platform to serve both analytic and transactional workloads. It is the SAP preferred platform for both SAP BusinessObjects and SAP Business Suite applications. SAP partners with, and certifies, its leading platform server partners to ensure that optimal performance criteria are met. All of the required software, including firmware, storage software, operating system, and the HANA platform, is preloaded by the hardware vendor. Key design characteristics of this architecture include the following:

- Enhanced memory to access and process data
- High-speed networking I/O components to ensure maximum performance
- Redundant components for failover

SAP HANA is largely a self-contained system that requires an environment tailored to SAP's exact specifications. Cisco is one of only a few vendors chosen by SAP to build and deliver such an environment.

Despite the fact that each of the vendors chosen offers a system tailored to SAP's specifications, these platforms are not exactly alike and differ in design architecture, scalability, component selection, and management complexity. This white paper considers how Cisco UCS offers advantages to SAP HANA customers that are distinct from the offerings of other system providers.

Cisco UCS and SAP HANA

Cisco UCS Drives Integrated Infrastructure

Since entering the server market in 2009, Cisco has achieved top 5 vendor ranking status, according to IDC's Worldwide Quarterly Server Tracker. Within the blade segment, Cisco UCS currently ranks second in terms of vendor market share. Cisco designed UCS as a platform that combines x86 compute with the appropriate networking elements to deliver an optimized system to run highly virtualized workloads and I/O-intensive applications while simultaneously reducing IT operating costs. Since the initial launch of UCS, Cisco has created partnerships with multiple storage companies to offer integrated systems, which optimize the deployment and management of server, storage, and network infrastructure.

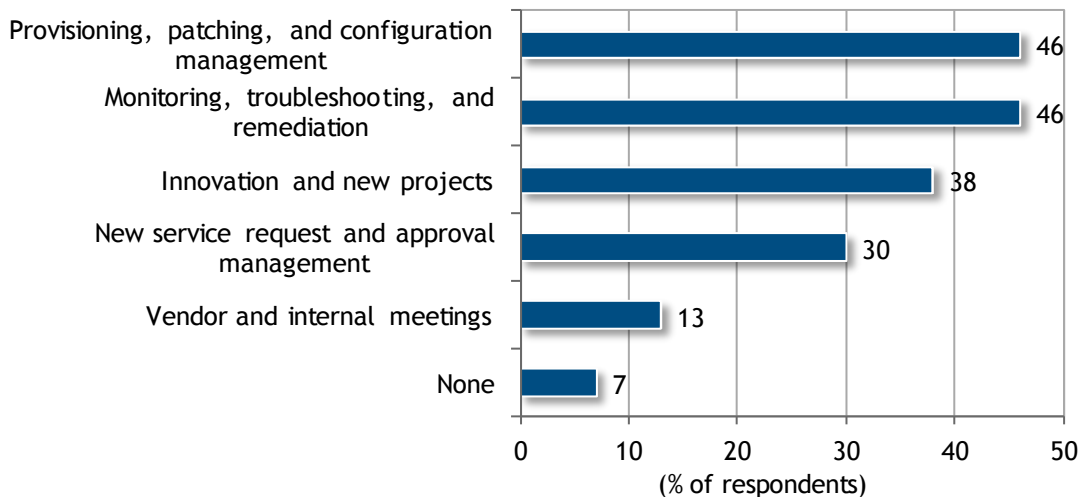
IDC believes that integrated systems adoption is rapidly moving from evaluation to mainstream use, with customers increasingly deploying tier 1 applications. Progressive companies view integrated systems as a means to optimize their IT environments so that IT services can better leverage the business units to increase workforce productivity, drive revenue opportunities, and connect with their customers.

Given the competitive pressures in the market, improving IT efficiency is a critical success factor for businesses. IDC surveys indicate that only 20% of IT staff time is spent on innovation and new projects, and the other 80% of IT staff time is spent on maintenance (or "just keeping the lights on"). In order not to fall behind the competition, companies are finding it imperative to find methods to flip this ratio. Many customers have identified integrated systems as a solution to increase the efficiency and flexibility of their IT environments. Figure 1 shows how IT decision makers and administrators view integrated systems as a means to increase time to value by reducing the time allocated to provisioning and configuration as well as monitoring and troubleshooting while speeding time to deliver new services.

FIGURE 1

Integrated Systems Deliver IT Efficiency

Q. Of these five tasks, which, if any, do you expect will be conducted more efficiently in a converged or integrated systems environment?



n = 308

Source: IDC's *Converged and Integrated Systems End-User Survey*, July 2013

Delivering Integrated Hardware and Software Solutions

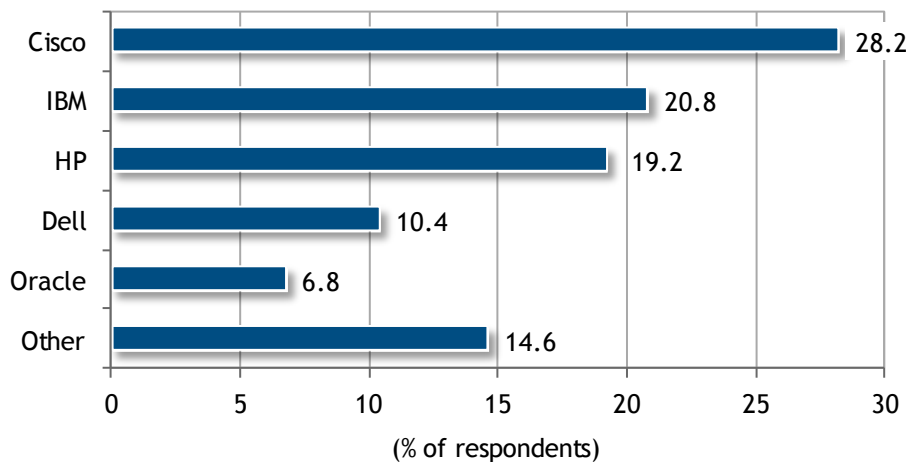
Because of the benefits, organizations spent over \$3.3 billion on integrated systems in 2012 and were expected to spend over \$4 billion in 2013. This represents more than 20% growth for integrated infrastructure compared with the traditional server market that has remained essentially flat. Even though integrated systems are relatively new to the market, early customers view them as a stable platform with the reliability to run tier 1 business-critical applications. Business processing (ERP, CRM, OLTP) and decision support (database) rank high on customers' lists of workloads moving to integrated systems in the near future.

Given that business processing and database are higher-end workloads, the conversation on integrated systems quickly moves from combining the hardware elements to how the integrated hardware (infrastructure) is optimized for particular applications. Enterprise customers are evaluating vendors on their ability to deliver a complete solution that meets their demands. In a recent IDC survey, respondents identified Cisco as the market leader in integrated systems based on the UCS platform (see Figure 2).

FIGURE 2

Leadership in Integrated Systems

Q. Which converged or integrated systems vendor do you see as being the market leader for the next two to three years?



n = 308

Source: IDC's *Converged and Integrated Systems End-User Survey*, July 2013

An Optimized Platform for SAP HANA

Cisco and SAP have partnered to deliver a UCS architecture for running SAP HANA, which provides fast transaction processing with real-time insights. UCS draws on Cisco's proven expertise in networking, leveraging Cisco Nexus to enable high-bandwidth and low-latency connectivity between SAP HANA nodes and the persistency layer; this also allows SAP HANA deployments to scale more easily and transparently. In addition, the Cisco UCS technology allows customers to add additional blades on the fly without shutting down the application; in turn, this can have a positive effect on SAP user productivity.

Running SAP HANA on the Cisco UCS server platform offers the opportunity to reduce the hardware and maintenance costs associated with running multiple data warehouses, operational systems, and analytical systems.

A principal design element of UCS is to break away from old static IT datacenter models and deliver on a new IT model that pools server, storage, and networking resources into a flexible virtualized environment that can be provisioned (or reprovisioned) as workload and business demands require. SAP is piloting a multi-instance model as of the date of this paper, and it should be ready for a production environment in the near future. UCS stands poised and ready to embrace this model upon its release by SAP. Old models that are hardwired are too often complex, inefficient, and difficult to manage.

In-Memory Computing and Persistency

Running a database completely in memory will improve the response time for data reads significantly. However, it is the combination with the so-called column store that accelerates typical reports by a factor of 1,000. Because SAP HANA is based on in-memory data management, it seems less dependent on storage than other application systems. Nonetheless, it depends on storage as a persistency layer because the memory in a computer is volatile when power goes down.

To make sure that no mission-critical data gets lost, transactions are still written to disk. In addition, HANA flashes the complete memory to disk by default every five minutes, and log files are created between these memory captures to ensure that if a HANA node fails, a hot-standby node can take over on the fly by flushing the memory content of the failed node to the new one.

This operation generates tremendous I/O traffic, which must be transmitted between the HANA compute nodes and the persistency layer with extreme low latency. Bottlenecks on the network or at the storage devices are not acceptable.

Other authorized SAP HANA application providers have their own storage bundled in. Selecting Cisco UCS allows customers their choice of storage vendor as Cisco is the only SAP HANA server platform that has been certified with both EMC and NetApp storage solutions (and other storage like Hitachi in a so-called "tailored datacenter integration" mode); therefore, customers that have an enterprisewide storage management strategy based on one of these two leading storage vendors need not abrogate that strategy to use SAP HANA on the Cisco UCS platform.

For analytical loads, the HANA architecture enables scale-out configurations where the data is distributed over a large number of nodes. But similar to the connections between compute nodes and the

persistence layer, the interconnection between the compute nodes must also provide extreme low latency and high throughput at the same time, which is provided by the Cisco Nexus networking platform.

Service Profiles

A UCS Service Profile is a software definition of a server and the associated LAN and SAN connections. The server characteristics are abstracted from the physical node hardware and reside in Cisco UCS Manager. The predefined images, with server, storage, and networking characteristics, speed deployment as UCS Manager automates the configuration of compute, fabric extenders, and interconnects to match the specified Service Profile. Cisco notes that provision times can be reduced from days to minutes utilizing Service Profiles on top of the UCS platform.

The datacenter environment also becomes more flexible as administrators are able to quickly adapt to rapidly changing business demands. System maintenance is more efficient for customers as management and operational changes are simplified with predefined, preprovisioned server identities and LAN/SAN settings. Relieved from many of the traditional mundane tasks, IT staffs are now able to focus on new and strategic initiatives.

The Service Profile not only makes the extension of SAP HANA scale-out solutions on the fly much easier but also allows for DR architectures where the second datacenter takes over the identity of the HANA nodes in the first datacenter in case of a disaster. This failover works transparently to end users without complex scripts to change IP addresses, hostnames, etc.

System Management

Cisco UCS Manager provides centralized system management and administration of UCS hardware elements. UCS Manager utilizes policy-based management to automate maintenance tasks, saving valuable staff time. The automation also helps increase operational agility while reducing risks and errors associated with manual tasks.

The auto-discovery capability allows the UCS Manager to detect and inventory any system components added or changed. Dynamic pooling enables policy-based, automatic grouping of servers into dynamic pools based on capacity, scale, or performance as the servers are discovered. UCS Manager can manage up to 160 servers across multiple chassis, enabling the platform to scale to the demands of large database workloads.

SAP IT Process Automation by Cisco

IT experts are charged with optimizing IT operations with a focus on minimizing the impact of operational issues on business. The SAP IT Process Automation application by Cisco helps standardize, unify, and automate best practices for IT processes across both SAP and non-SAP applications. By automating the end-to-end IT service operational process across the entire IT landscape, SAP IT Process Automation supports maximum uptime and optimal resource usage, allowing organizations to increase operational efficiency and promote service-level success while minimizing IT upkeep effort.

Business objectives are as follows:

- Meet increasing service demand while stretching IT budgets.
- Eliminate isolated processes and institute overall governance.
- Assess changing business contexts and prioritize responses.
- Resolve systemic operational issues that repeatedly cause unplanned downtime.
- Streamline operations and leverage best practices from day one.

SAP HANA Tailored Datacenter Integration

One innovation that has been made with Cisco UCS is the ability to share storage and network resources for SAP HANA environments. Traditionally, every instance of SAP HANA required its own individual appliance or hardware platform. Adding another instance would require the customer to deploy a whole new system – a costly scenario for the customer. The new SAP HANA Tailored Datacenter Integration (TDI) allows the sharing of resources for SAP HANA instances. Customers now have the option of running SAP HANA on Cisco UCS and plugging into their existing enterprise storage environment (if certified by the storage vendor for TDI). Even further, the secure Shared Network concept allows multiple instances of SAP HANA to run on the same UCS platform sharing a single redundant network infrastructure. This new feature allows customers to reduce costs and improve the flexibility and utilization of their application IT assets.

For customers looking for an entry point into SAP HANA, Cisco offers the SAP Scale-Out Starter System. This economical option offers 1-2TB in a single Cisco UCS server platform chassis consisting of 2-4 productive HANA nodes, with two hot spares. The Cisco Starter Solution for SAP HANA with EMC Storage combines the innovative Cisco UCS platform with EMC VNX series unified storage to deliver a cost-effective infrastructure for analytical applications on SAP HANA.

The solution is ideal for:

- Departmental deployment that needs modest scalability
- Commercial environments that need to scale and be highly available
- Test and development environments that are used to create large-scale SAP HANA applications
- Pilot programs that are designed to test the waters of a new solution
- Proof-of-concept (POC) projects that can help you evaluate the technology

CHALLENGES/OPPORTUNITIES

IDC sees opportunities for Cisco to help customers with SAP HANA deployments on UCS. However, there are also some challenges for Cisco to get there.

Challenges

- **Cultural change:** Cisco is well established in the market as a trusted source for networking systems. Now Cisco seeks to be seen as facilitating the role of IT as partner and collaborator with application development teams and as a trusted source for server technology as well. Cisco's challenge is communicating to customers that its compute platform has the same investment protection as its networking equipment, allowing it to compete for deployments of mission-critical workloads.
- **Demonstrating the ROI of the solution:** Implementing these new technologies will require new capital expenditures for many enterprises and may have an effect on ongoing operational expenditures as well. SAP will have to demonstrate how the benefits and savings to the broader business will yield an attractive ROI to make the change worthwhile.

Opportunities

- **For customers:** There is a real choice in platforms for HANA; the advantages of Cisco UCS for flexible deployment should be considered. Further, given the significant market presence of Cisco networking solutions, customers can leverage in-house Cisco networking expertise to build on the capabilities of the IT team.
- **For Cisco:** Offering a platform for SAP HANA creates significant opportunity for Cisco to deliver compute and networking systems with a specific business value proposition that gives them inroads versus server incumbents.

CONCLUSION

SAP has changed the game for enterprise applications by providing SAP HANA as the preferred platform for both analytic and ERP applications. This move is in line with a general trend that IDC has identified through end-user survey research toward the implementation of key IT assets using integrated systems. The nature of SAP HANA, with its in-memory data management and clustered scalability, presents interesting challenges to the hardware partners building its system platforms.

Cisco has stepped up to the plate to meet those challenges with the Cisco UCS server platform, a product that leverages a highly flexible and efficient memory management model combined with the sophisticated network management capability of Cisco Nexus. Although SAP's specifications for the SAP HANA platform are the same for all platform providers, these platforms should not be considered alike. Customers considering integrated systems for SAP HANA deployments should think about the following:

- The memory-intensive nature of SAP HANA calls for efficient and flexible memory management capability such as that provided by Cisco UCS.

- The use of clustering and cooperative processing across nodes to achieve scalability by SAP HANA suggests a need for the kind of flexible and scalable network infrastructure offered by Cisco Nexus as a part of Cisco UCS.
- The Cisco UCS Service Profiles reduce time to deployment from days to minutes.

Customers concerned with maintaining a uniform storage management strategy should consider that, of the SAP HANA integrated systems available, only Cisco UCS offers a choice of storage platforms.

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