SAP White Paper

mySAP™ TECHNOLOGY

IT LANDSCAPES: ARCHITECTURE AND LIFE-CYCLE MANAGEMENT OF DISTRIBUTED ENVIRONMENTS

VERSION 1.1

Design: SAP Communications Media

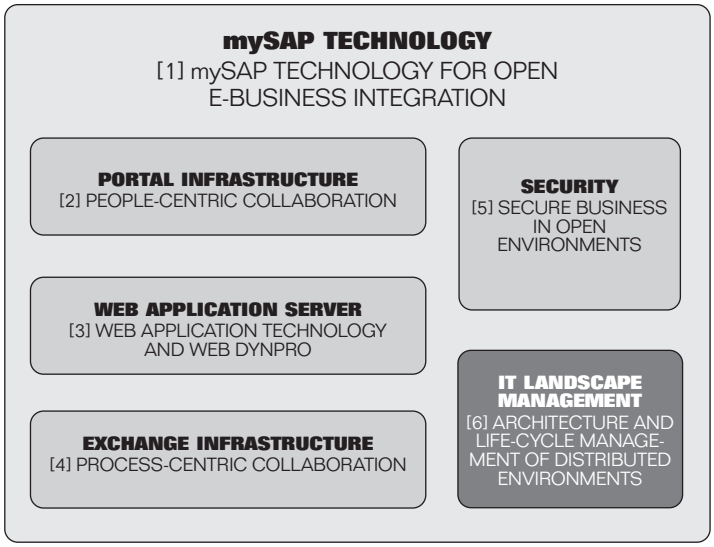
CONTENTS

mySAP TECHNOLOGY FOR OPEN E-BUSINESS INTEGRATION

To gain a new, sustainable competitive advantage, companies need to drive collaborative business. And in order to implement collaborative business, companies need to integrate their existing heterogeneous IT landscape and extend this integration to other organizations like business partners, customers, or suppliers. As they do so, mySAP Technology enables companies to manage heterogeneity. It does so for several reasons:

- mySAP Technology is a **native Web** infrastructure based on **open standards** for reliable e-business solutions. It is designed to operate in heterogeneous environments, integrating any application from any vendor based on any technology.
- mySAP Technology powers enterprise and collaborative business processes based on **one common, message-based infrastructure** for integration within and beyond company boundaries.
- It features **syndication of Web services**, allowing for user-centric and process-centric collaboration using **shared collaboration knowledge**.

And it does all this while protecting existing investments and achieving the lowest possible cost of ownership. mySAP Technology is the foundation of all mySAP.com solutions. With mySAP Technology, SAP sets out to solve the integration challenge from a business perspective.



mySAP TECHNOLOGY: BUILDING BLOCKS AND REFERENCES

The key building blocks of mySAP Technology are:

- **Portal infrastructure** for user-centric collaboration empowering the individual
- **Web Application Server** for application components providing Web services based on open standards
- **Exchange infrastructure** for process-centric collaboration driving end-to-end business processes
- Infrastructure services, including **security** and **IT landscape management**

This white paper is part of a series of six white papers detailing mySAP Technology architecture and vision. This white paper details the support of mySAP Technology for mastering heterogeneity and reducing the cost of ownership of IT landscapes.

1. EXECUTIVE SUMMARY

One of the main goals of IT is to properly support business processes. Business processes consist of a set of Web services, which are provided by applications running on different components from multiple vendors. The IT landscape combines all components and the integration infrastructure used within a company.

Heterogeneity and distributed locations will become common in future IT landscapes. In order to ensure the reliability, availability, openness, and scalability of IT solutions, it is crucial that IT landscapes provide a flexible architecture for enabling corporate agility. Besides flexibility, cost is also important. The cost for managing IT landscapes has to be minimized during the complete life cycle – discovery, evaluation, implementation, operation, and continuous improvement.

This white paper describes how SAP helps to master heterogeneity and to lower the cost of ownership. The flexible and open architecture of mySAP Technology supports companies that want to minimize IT investments and companies that require high availability and very high throughput for mission-critical applications. A variety of tools and services help to improve manageability and to reduce the total cost of ownership.

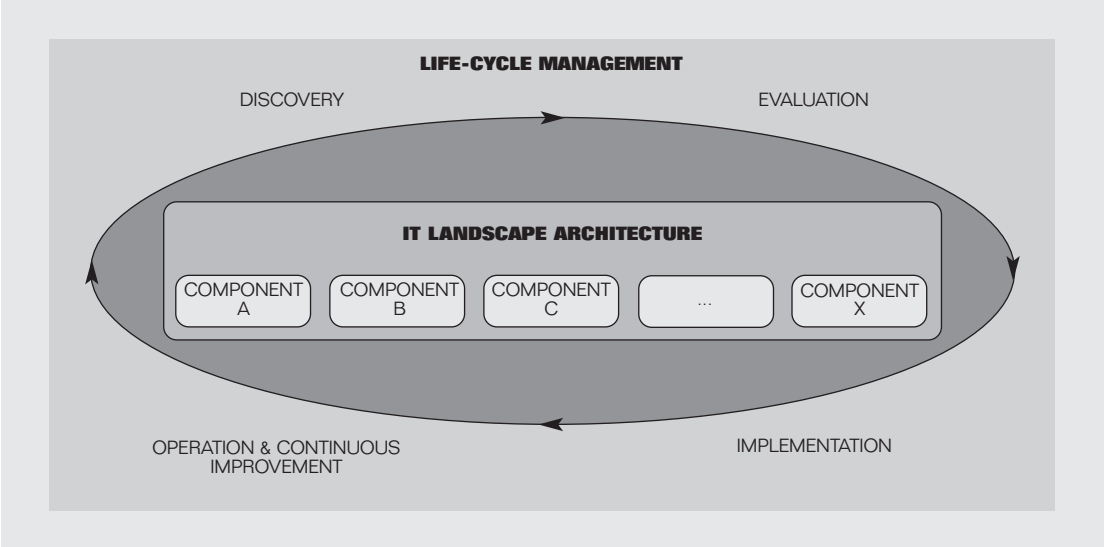


FIGURE 1: ARCHITECTURE AND LIFE-CYCLE MANAGEMENT OF DISTRIBUTED ENVIRONMENTS

2. THE ARCHITECTURE OF DISTRIBUTED IT LANDSCAPES

In the *new*, New Economy, closed solutions are being replaced by open IT architectures in which end-to-end business processes combine multiple Web services running on multiple distributed application components. Each of the components is specialized for providing particular Web services. This best-of-breed approach enables optimal support of the business, but it leads to even more diverse IT landscapes.

It is crucial that the IT architecture supports reliable, cost-efficient operation of distributed IT landscapes, but is still able to adapt the IT landscape to the possibly changing business requirements of the company. Openness and flexibility of the architecture are necessary for fulfilling these requirements.

2.1 INDUSTRY STANDARDS FOR IT LANDSCAPES

Evolving industry standards are greatly improving the manageability of distributed system landscapes. The major benefit of using standards in this field is the given interoperability of all management resources and management applications that comply with the standards. Adapters or connectors are no longer required, except for legacy systems. Resources can be managed by any authorized management application, regardless of its manufacturer.

SAP supports industry standards for IT landscapes. These standards allow the development of one common infrastructure for internal and external integration. Table 1 lists the goals and integration benefits of some standards.

Goal	Industry Standard	Integration Benefit
Common model of the managed objects	Common Information Model (CIM)	Harmonization of data models
Standard access to information and methods for information distribution	Web-Based Enterprise Management (WBEM), WindowsManagement Instrumentation (WMI)	Interoperability of management applications
Standard management interfaces and provider infrastructure	Java Management Extensions (JMX), Windows Management Instrumentation (WMI)	Integration of arbitrarily managed resources

TABLE 1: GOALS AND INTEGRATION BENEFITS OF INDUSTRY STANDARDS

2.1.1 Common Information Model (CIM)

The harmonization of the data models for IT landscapes is the foundation of all management services. SAP uses the Common Information Model (CIM) to describe the IT landscape. The implementation of CIM-based landscape services consists of two parts: components in the Integration Repository and the system landscape in the Integration Directory.

Information on components is stored in the Integration Repository of the exchange infrastructure. It describes component types as building blocks of solutions and their possible combinations and dependencies, and it corresponds to the application model in CIM. The various types of dependencies between building blocks play an important role in landscape implementation, change management, and validation.

The Integration Directory of the exchange infrastructure keeps track of the landscape that has been actually installed. It provides an exact picture of the installed system landscape, including the connections between the various landscape components. It corresponds to the core and systems model in CIM.

Information about components is provided in the Integration Repository. This information can be refreshed on the customer side using a Web connection. The landscape information in the Integration Directory is automatically created during landscape implementation, and it is maintained throughout the whole software life cycle.

2.1.2 Standard Access Methods

Besides the data model, the accessibility of the component and landscape information contained in the Integration Repository and the Integration Directory are critical factors for the overall success of this generic approach. To be open to other implementations, mySAP Technology supports the Web-Based Enterprise

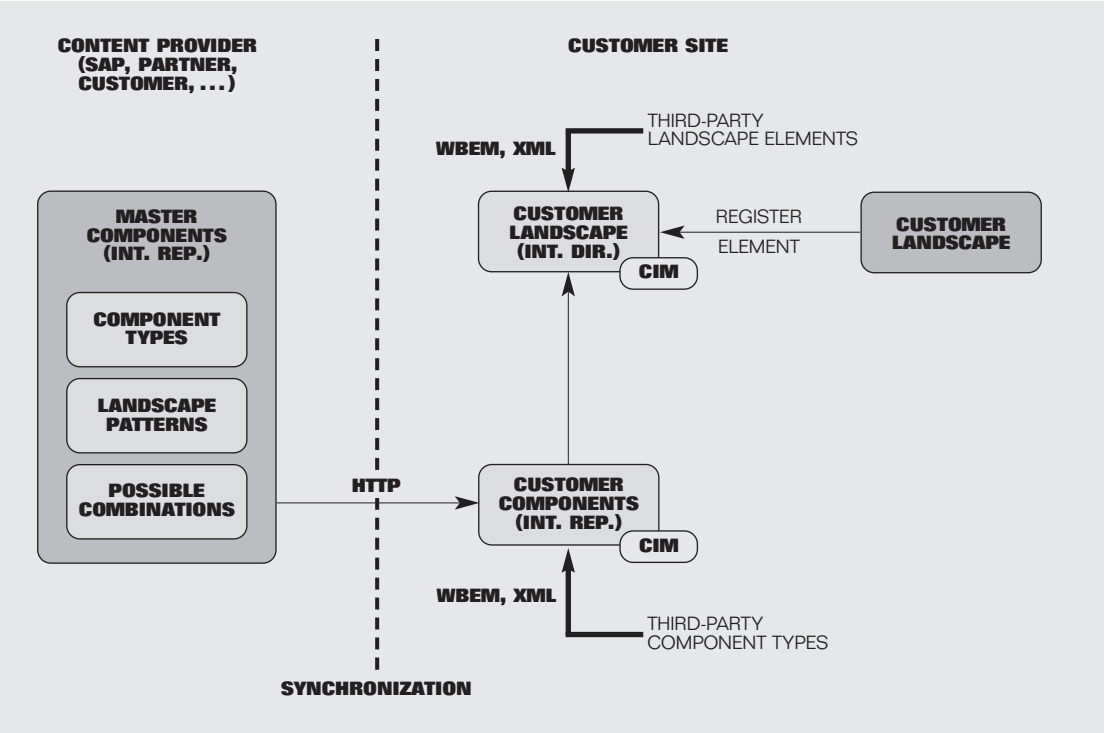


FIGURE 2: FLOW OF COMPONENT AND LANDSCAPE INFORMATION IN THE INTEGRATION REPOSITORY AND THE INTEGRATION DIRECTORY

Management (WBEM) standard, including access through HyperText Transfer Protocol (HTTP). Event notification of CIM clients is used for caching data in runtime-critical application processes.

2.1.3 Standard Management Interfaces

The Integration Repository and the Integration Directory form the foundation for the next generation of landscape design and management tools, as well as for the exchange infrastructure. Because they rely on proven standards, other management tools can benefit from the landscape data as well. Frameworks for such management services are specified and implemented by the Java Management Extensions (JMX) and the Windows Management Instrumentation (WMI). These standards are the basis for new system management developments. When combined with WBEM and CIM, a powerful instrumentation set is created – a large step toward a plug-and-manage scenario.

Industry standards for system management often focus on technical aspects of the acting landscape elements, but problems like insufficient response times are typically seen at the application level. Based on SAP's extensive experience in system management, mySAP Technology builds a bridge between IT landscape handling and application-oriented system handling. (SAP brings this experience to those industry organizations developing the standards mentioned above.)

2.2 LANDSCAPE ALTERNATIVES AND SCALABILITY

With mySAP Technology, IT infrastructure options range from compact, single-host and one database installations to highly available, scalable, and secure configurations for mission-critical applications. The optimal technical infrastructure for a given business requirement is determined by several factors, such as landscape type (development, consolidation, production environment), core business processes, transaction volume, security, and availability.

To ensure that availability, performance, and total cost of ownership meet the highest standards in the industry, mySAP Technology contains key features like:

- Multicomponent architecture
  - Component-specific infrastructure
  - Component-specific upgrade, tuning, and availability strategies
- Platform independence of mySAP.com components
  - Component-specific performance tuning and scalability
  - Protection of existing hardware, software, and skill investments
- Platform topology options that range from maximum consolidation (single server, one database) to maximum distribution (multiple servers, multiple databases on different platforms)
- Migration tools to support platform changes
- Comprehensive system management tools

A key factor for the lowest total cost of ownership throughout the entire life cycle of an e-business solution is the ability to provide the optimal IT infrastructure in each stage and to adjust the configuration to changing business needs. mySAP Technology provides tools for design, implementation, operation, and maintenance. Predefined landscape patterns are directly usable and contain the accumulated knowledge from SAP development, consulting, and support. Companies can customize them to meet specific business requirements.

The following section describes three typical landscape scenarios to illustrate landscape alternatives and their impact on availability, performance, scalability, and total cost of ownership.

2.2.1 Sample Configuration: Development, Project, or Test Landscape

Figure 3 illustrates a basic, recommended configuration for an organization looking to minimize IT investment and the number of technical platforms, for example, for a development or project landscape.

Several mySAP.com components are installed to provide the full functional scope of a complete e-business solution. Each of them is based on a Web Application Server and provides client access via HTTP. To minimize IT investment and maintenance, all mySAP.com components use one common database. mySAP Technology allows multiple components to be installed in the same database under different database schemas. However, components can still be upgraded and maintained separately. Other Web services, such as catalogs or portal applications, reside in a separate Web Application Server on the same host. Its runtime environment allows for any type of changes without affecting the other components. No specific firewall or security measures are used because the landscape is intranet based and does not have productive status.

This setup is suited for development and test systems, for example, in implementation projects or for testing and training purposes. Hardware requirements are minimal and may scale down to a small server or even PCs or laptops (depending on the number and size of the component systems). The option to run multiple components on one database keeps infrastructure require-

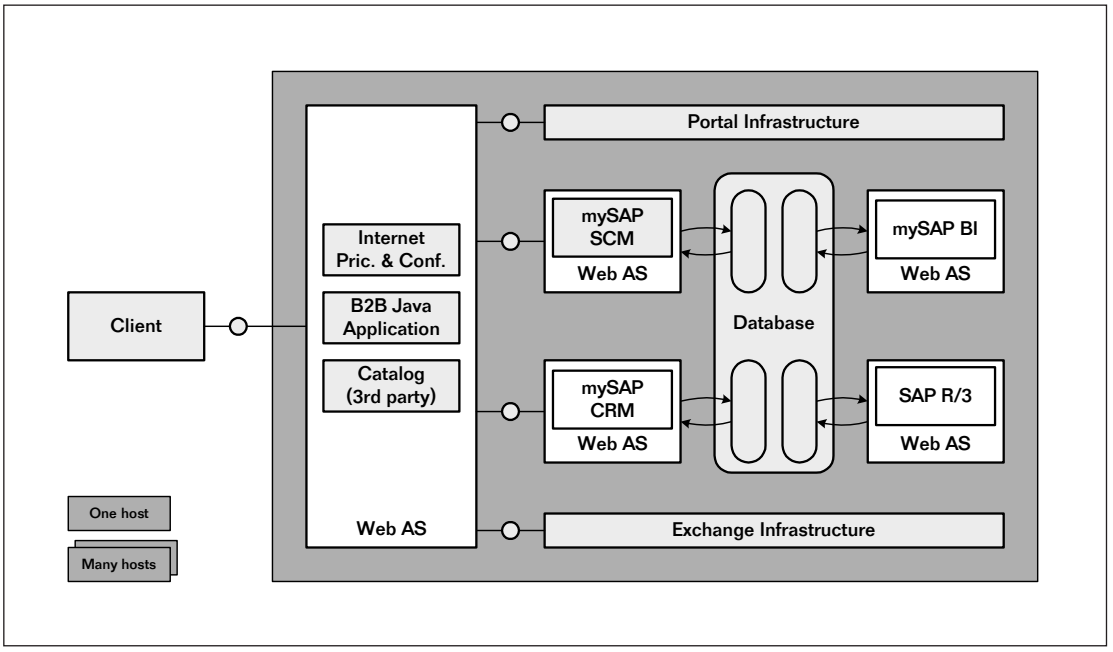


FIGURE 3: SAMPLE CONFIGURATION: DEVELOPMENT, PROJECT, OR TEST LANDSCAPE

ments as low as possible. Companies are free to choose from all supported database platforms, thus making use of their existing database know-how and investments.

Independent component upgrades, as well as the addition of more distributed Web services running on existing or new platforms, are possible. In the case of increasing IT infrastructure requirements, companies can use migration tools to change the platform of one or more components as needed.

2.2.2 Sample Configuration: Internet Sales and Procurement
Figure 4 shows a sample Internet sales and procurement scenario based on mySAP Customer Relationship Management (mySAP CRM) for customer relationship management, Internet sales, and Internet procurement, including SAP R/3 or a third-party enterprise resource planning (ERP) component for financials and logistics (like order fulfillment).

mySAP CRM and the ERP system are installed separately to ensure optimal performance and adequate platform selection. The separation of Web services from the other components provides higher performance and scalability. A dedicated Web Application Server provides the runtime environment for these Web services and handles the HTTP requests to e-business scenarios. A firewall separates the internal components from the external Web server, which is accessible via the Internet over HTTP. Therefore, the business systems are protected from potential outside attacks.

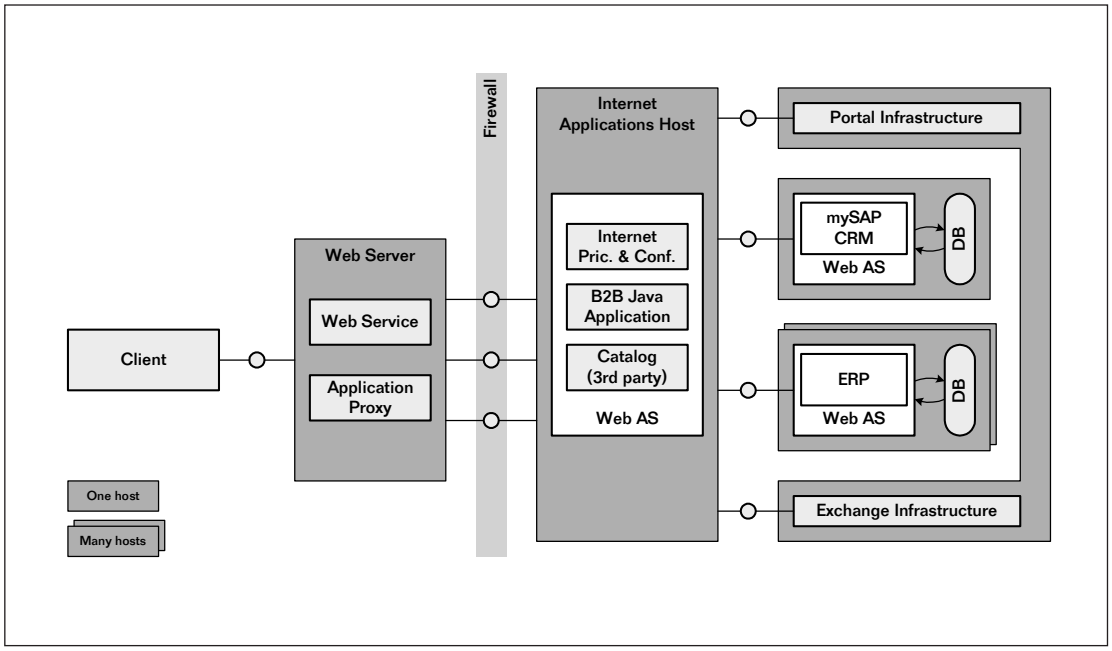


FIGURE 4: SAMPLE CONFIGURATION: INTERNET SALES AND PROCUREMENT

Each of the four physical server platforms can be scaled independently, and companies can deploy redundancy and high-availability measures separately for each of the hosts, databases, and software components. While the entire e-business solution is running on distributed servers and potentially different operating system and database platforms, the exchange infrastructure of mySAP Technology delivers system connectivity. This strict distinction between application and technical platforms ensures that companies can change and enhance the platform without affecting overall functional integration.

This setup is suitable for production systems with up to several thousand intranet and Internet users, such as a business-to-business (B2B) Internet sales scenario.

2.2.3 Sample Configuration: Complete E-Business Solution

In the sample scenario shown in Figure 5, the e-business solution consists of a CRM component, supply chain management (SCM) component, ERP component, and business intelligence (BI) component. E-business is mission critical for this enterprise because Internet sales, as well as collaborative supply chain planning and Internet procurement, are core business processes. The number of intranet and Internet users is very large, leading to a high transaction volume and throughput requirements. Security must meet the highest possible standards.

Each of the components is running on dedicated platforms that can be independently scaled and optimized for performance. Existing infrastructure, such as a mainframe as the central database host or specific high-performance servers and storage subsystems, can be used to guarantee optimal performance for each of the distributed Web services.

Redundancy is implemented for each of the components and their connections to avoid single points of failure. The back-end systems use the exchange infrastructure and multiple application servers. The redundant Web services are accessed through an application proxy that detects failures and redirects requests to available services. Industry-standard Web load-balancing or hardware devices accomplish the same objective at the Internet access point. All of the above redundancy mechanisms allow for dynamic load balancing so that the redundant components provide consistent overall performance as well.

Because mySAP Technology is platform-independent, companies can apply the full range of fail-over mechanisms like identity takeover (standby host), virtual IP address takeover, or other cluster-based fail-over solutions. Typically, fault-tolerant storage solutions store the application data.

The Web Application Server technology, in combination with the portal infrastructure, provides the central front-end interface for business processes regardless of the components used. Other distributed Web services, such as Web services based on Java 2 Enterprise Edition (J2EE), can use the runtime environment provided by the Web Application Server.

All servers are divided into different security zones to meet the highest security requirements. Firewalls protect the Web services in the different zones. Network and transport layer packet filtering and application-level security, such as Secure Sockets Layer (SSL) or Secure Network Communications (SNC), ensure maximum security.

This setup is suited for high-volume production systems with thousands of internal and Internet users. The built-in scalability of every mySAP.com component allows for adjustment to increasing numbers of users and transactions.

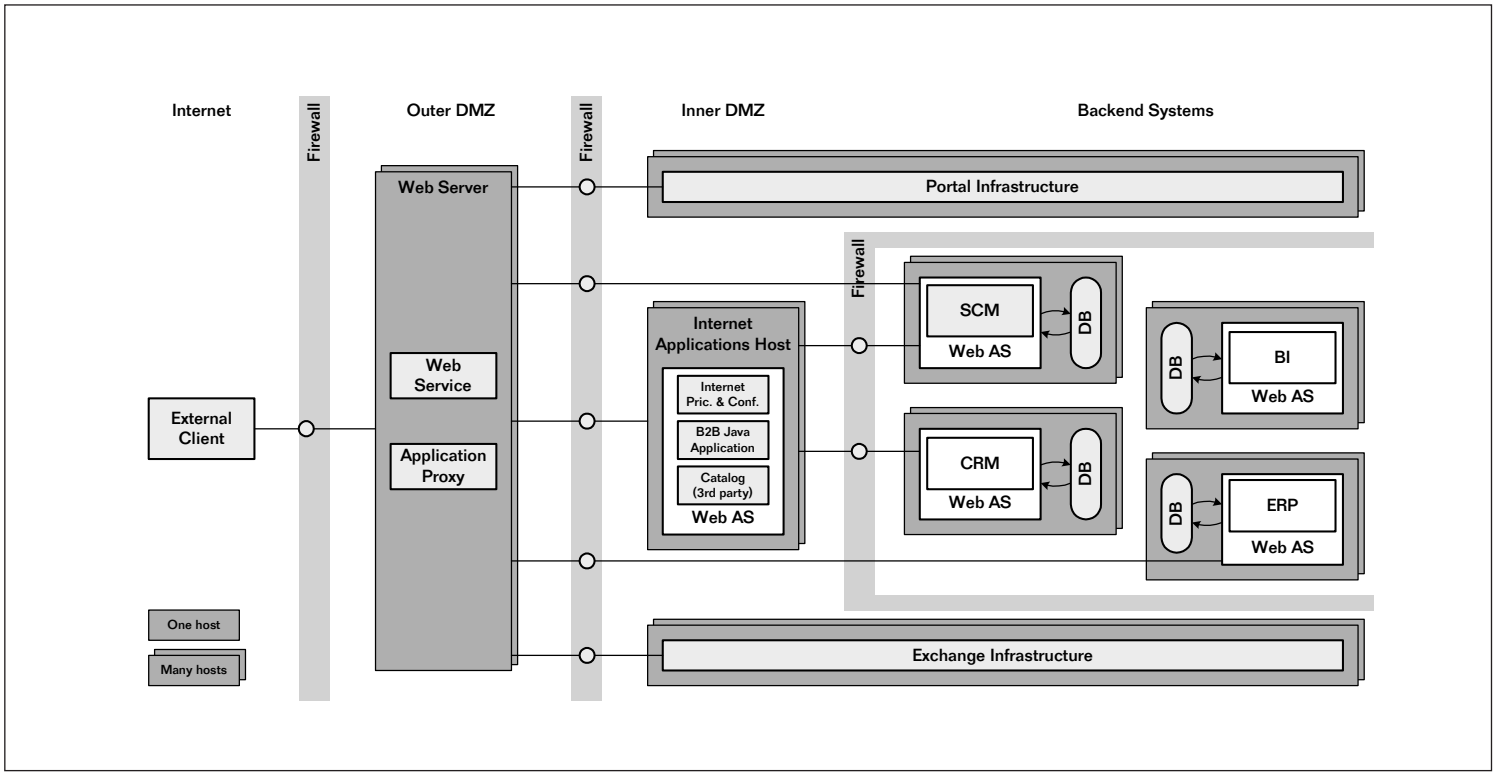


FIGURE 5: SAMPLE CONFIGURATION: A COMPLETE E-BUSINESS SOLUTION

3. LIFE-CYCLE MANAGEMENT OF DISTRIBUTED IT LANDSCAPES

Distributed Web services require more systems than closed solutions. IT landscapes grow, and the cost of ownership for these expanding landscapes becomes an important factor. This requires managing the IT landscape throughout the whole life cycle. Going live is not the ultimate goal or even the most important one. Instead, precisely defining the right solution before implementing it and continually improving the solution after implementation are equally important considerations. The primary goal is to continuously generate value throughout the entire life-cycle of the solution. SAP provides a large set of tools for supporting the life cycle of IT landscapes.

3.1 MANAGING SOLUTION PORTFOLIOS

A solution portfolio consists of SAP and third-party software applications that a company uses to support its business. Customers have to manage this solution portfolio to drive collaborative end-to-end business processes in a heterogeneous system landscape. Different roles are involved in this. Solution architects evaluate, implement, and adapt solutions to changing conditions. Solution managers implement the operations infrastructure and operate the solutions. SAP offers encapsulated business expertise in terms of tools, methodologies, technical and business documentation, and aligned services to support these roles.

Solution Architect	Solution Manager
■ Business case ■ Solution design ■ Business blueprint ■ Solution deployment – Implementation – Upgrade – Roll-out – Validation ■ Testing	■ System monitoring ■ Business process monitoring ■ Application monitoring ■ Service-level management ■ Proactive and predictive services ■ Support desk

TABLE 2: THE SOLUTION ARCHITECT AND SOLUTION MANAGER ROLES

Tools and methodologies help companies evaluate and implement the solution. Automated monitoring tools and practical procedures simplify and assist in efficient daily operations of IT, and they enhance the relationship between IT and end users. Timely and informative reports provide the knowledge required for effective planning. Proactive and system-optimizing services ensure smooth operations. An effective management of the solution portfolio enables IT professionals to operate efficiently on a day-to-day basis and to plan for the organization's needs in the future.

For solution architects, there are tools and business content to build a customer-specific value proposition and customer-specific solution design. Collaborative Business Maps are used to describe and visualize state-of-the-art business processes. Best Practices for mySAP.com offers a package consisting of a pragmatic methodology, extensive business documentation, and preconfiguration to evaluate, implement, and extend e-business solutions. The AcceleratedSAP implementation methodology provides end-to-end support for implementation projects. Implementation tools, such as business configuration sets, and an implementation guide assist with implementing and adapting solutions.

SAP provides tools that support solution managers during project start, technical implementation, and ongoing optimization of mySAP.com solutions. These tools help solution managers with such tasks as system monitoring, business process monitoring, service-level management reporting, and running proactive and predictive services for optimization and maintenance. For example, the involvement of third-party systems is mapped in the individual steps of the core business processes, which helps companies avoid interface problems. Customer-specific services that are specially defined for mySAP.com solutions are automatically generated, taking into account all system elements and configurations. This way, SAP simplifies such tasks as backups, archiving, and upgrades.

Solution architects and solution managers can access SAP and partner services over the Internet so they can collaborate within the SAP community. They can search and access detailed information about SAP and partner services, and a growing number of services can be ordered and delivered online. The primary tools for searching, accessing, ordering, and receiving services are the Service Catalog, Software Catalog, Training Catalog, Knowledge Shop, and Partner Directory. SAP Service Marketplace offers a single channel for searching, selecting, accessing, and executing SAP and partner services.

3.2 DESIGN OF IT LANDSCAPES

Landscape design is the process of creating or modifying a mySAP.com solution landscape, which in general contains SAP and third-party elements. Design includes adding systems or software components to an existing landscape, as well as creating a new landscape from scratch.

3.2.1 A Pattern-Based Design Process

The design of an IT landscape depends on a variety of different requirements, such as the type of the business process, security, and high-availability considerations, integration constraints, and so on. The full set of conditions is condensed during development into landscape patterns, which serve as templates for landscape design. Landscape patterns are a part of the Integration Repository (see section 2.1).

Starting with the existing landscape, contained in the active layer of the landscape directory, the future landscape is developed in the design layer. At the end, the landscape design tool automatically generates scripts to install and upgrade the affected components.

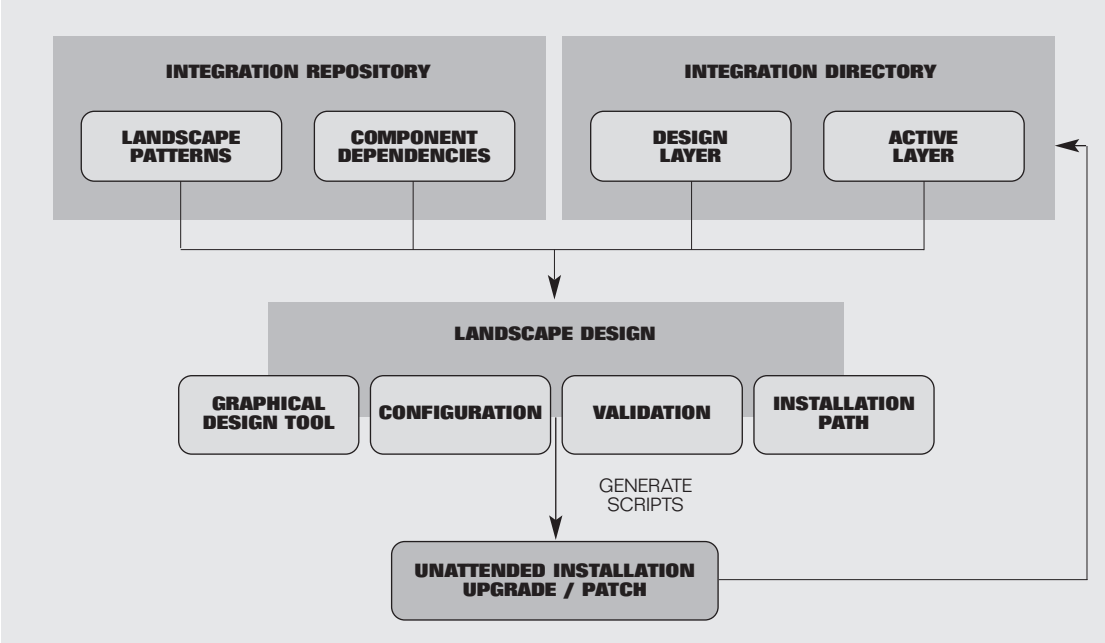


FIGURE 6: STEPS, SOURCES, AND RESULTS OF THE LANDSCAPE DESIGN PROCESS

3.2.2 Sizing Distributed IT Landscapes

After the landscape has been designed, the next step is to determine the required size of the components, as well as the size of the exchange and portal infrastructures. Sizing means determining the hardware requirements, such as network bandwidth, physical memory, CPU power, and I/O capacity. Both business and technological factors influence hardware sizing. This means that the number of users of the various application components and the data load they put on the network must be taken into account.

These factors also might vary over time. To work with an adequate average utilization, the system landscape must be capable of handling peak loads without creating a bottleneck.
There are three different and independent sizing models, each with advantages and disadvantages:

- **User-based sizing:** This approach distinguishes three types of active users who work with the system to varying degrees. Just counting users is easy. The disadvantage is that this estimation is quite rough because it says very little about the actual throughput these users produce.
- **Throughput-based sizing:** This model is quite thorough because it relies on actual or on actually expected throughput. However, this model relies on a number of assumptions in business terms (for example, the number of order line items per year) that need to be cross-checked against the individual installation.
- **Customer performance test:** Tests are run on a system loaded with data, delivering reliable and very predictable sizing data. The disadvantage is that conducting these tests requires considerable time and money.

The sizing results are used to determine the necessary hardware and network requirements. The IT landscape derived from functional aspects is finally influenced by these results, and a blueprint for the IT landscape can be drawn up.

3.3 INSTALLING THE IT LANDSCAPE

In heterogeneous distributed environments, the technical implementation of a solution is normally time-consuming and costly. To meet the new challenges, SAP's approach goes beyond the traditional understanding of installation. mySAP Technology supports more than just the installation of single components. It also covers the whole process of technical infrastructure planning, installing complete solution landscapes (consisting of multiple components), and implementing technical default configurations.

For planning, the installation of an IT landscape has to be allocated to servers and some central parameters for the landscape can be set. As a result of this planning, the related components of the solution landscape have to be installed or upgraded. The essential requirements for these activities are quite simple to specify: minimum user interaction and minimal downtime (if existing components have to be upgraded). User interaction has to be restricted to error conditions and the reintegration of customer modifications.

The goal of the installation process is to have a working runtime environment right after the process is finished. With mySAP Technology, this goal is achieved with an unattended landscape installation that applies preconfigured settings generated by the planning tool. This includes the technical default configuration for all involved components, the connectivity between the landscape elements, and the technical configuration needed for the Best Practices business solutions (see the next section).

Heterogeneous system landscapes need open tools for change management. The integration of third-party products becomes more and more important to set up and manage the installation as a whole. For this purpose, mySAP Technology offers an API that other installation frameworks can use. In addition, the installer of mySAP Technology itself can configure and use third-party installers. Such "wrapped" installations may include Windows setups, Java deployment, database installations, and application upgrades.

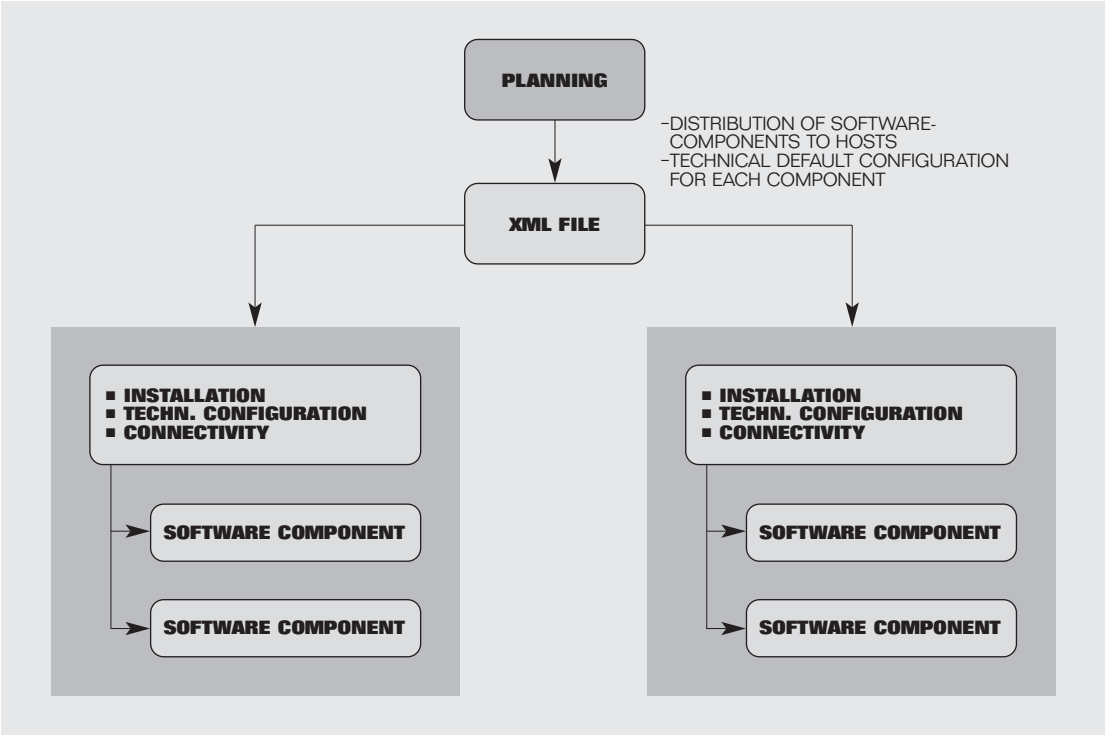


FIGURE 7: TECHNICAL INSTALLATION OF IT LANDSCAPES

3.4 IMPLEMENTATION

During the implementation of mySAP.com solutions, business requirements must be mapped to the technical software components. Business processes are structured from the solution down to the process level – from a business perspective down to an exact definition of which process step is executed in which component. Even non-SAP components can be included in this mapping process. Companies can precisely describe and document the flow of business processes through a heterogeneous system landscape. In the implementation phase, the different components are configured to provide optimal business support. This is accompanied by continuous testing. The possibilities for documenting configuration settings and test results provide the required support for revision control. Besides the implementation of end-to-end business processes, operations has to be set up as well, for ensuring the availability, reliability, and performance of the solutions.

3.4.1 Configuration

Best Practices for mySAP.com can significantly accelerate the configuration of mySAP.com solutions. They offer best-in-class, preconfigured business content for selected scenarios. IT professionals can rapidly create evaluation systems and tailor them to meet business needs, and they can continuously enhance and tailor this first configuration to optimally fit a company's business requirements.

Central access is available to all implementation activities, which can be performed in any mySAP.com component. Third-party components can be reached via a URL. The configuration activities are documented, and this information is available across the complete solution life-cycle, including upgrades.

In addition, any configuration change in the mySAP.com components is tracked. That means companies can analyze which configuration changes the business processes went through.

IT landscapes consist of various components that have their own (independent) customizing tables (technical point of view). However, components need some common customizing (semantic point of view) to ensure the uninterrupted flow of the business processes across the components. This common customizing obviously needs to remain in sync if business processes are changed. For example, if the configuration of the SAP R/3 core system changes, then the configuration of other components like SAP Advanced Planner & Optimizer (SAP APO), SAP Customer Relationship Management (SAP CRM), or third-party components may have to be adjusted. Common customizing objects in different components can be compared. This is based on a predefined list of customizing objects for selected system components that must be kept synchronized during the comparison process. The comparison helps to synchronize the customized settings during an implementation or a system landscape change.

Best Practices for Solution Management help with the configuration of operations. They simplify and guide through the complex issues in the implementation and management of IT landscapes. Examples are central system monitoring, service-level management, high availability, performance, network planning, or backup and recovery.

All configuration settings are integrated into the software distribution for transportation within the landscape from a development system to test or production systems.

3.4.2 Testing

During the implementation of a mySAP.com solution, tests are necessary after each implementation cycle. Besides the test tools available in all mySAP.com components, mySAP Technology creates a framework for cross-component regression testing. Based on a central test system, the tests can also include remote systems. All relevant program and user interfaces are supported. The framework offers interfaces for non-SAP test tools as well.

Organizing tests requires the creation and administration of manual and automatic test cases that can involve multiple components. Project leaders are supported by creating test catalogs, generating test plans based on one or more test catalogs, assigning test packages (selected test cases) to individual testers, and monitoring project progress by calling the status of tests or examining the test documentation.

3.5 OPERATIONS

In today's world, system management faces an ever-increasing, two-fold problem. On one hand, system landscapes are increasing in complexity. On the other hand, business processes are increasingly distributed over multiple, heterogeneous hardware and software systems. Proper management of the IT landscape operations is essential for achieving availability, reliability, and performance. This includes not only technical control of the systems, but also tasks like job scheduling, output management, or user management and authorizations.

Both semantic knowledge of the business process and landscape information for the systems that are part of this process is collected at one central point. The management application always provides this information. Monitors, in combination with thresholds, help to control service-level agreements.

3.5.1 Administration

SAP reduces the complexity of the landscape and avoids the need for multiple consoles by running centralized administration from only one point in the whole environment. Administration is possible from all over the world via Web access. The system uses industry standards to manage multiple systems from different vendors. mySAP Technology uses the Common Information Model (CIM) standard from the Distributed Management Task Force group with Web-Based Enterprise Management (WBEM) as the access protocol. For Java applications, SAP follows the standards defined by Java Management Extensions (JMX).

3.5.2 Monitoring

mySAP Technology takes a centralized approach for monitoring purposes. SAP's strategy is to use both systems information and business semantics as data sources. This goal is achieved by using statistical records that are created for each user interaction and are available in every system used by this interaction. Information can be collected and correlated in the central system by using a generic key for each interaction.

Using this mechanism, companies can achieve all major monitoring goals – from examining single user interactions on the low end to painting an application-level view to monitoring key business processes, their workflow, impact on performance, and so on.

Companies can optimize both business processes and available resources with this mechanism, clearly reducing the total cost of ownership. All required information is available at one central point.

The use of standard interfaces enables companies to collect monitoring information from third-party systems, as well as integrate mySAP.com components into other monitoring frameworks.

3.6 CHANGE MANAGEMENT

Application requirements within the IT landscape change over time as companies institute business or organizational changes, as they implement additional functions, or as SAP provides improvements for mySAP.com components. To adapt applications to changing requirements, some configuration settings in the applications must be changed or some SAP software components must be migrated to a newer release. However, these changes should not be made immediately in the productive environment. The new configuration must be tested to guarantee uninterrupted production operation. To enable these tests, SAP recommends separating configuration, quality assurance, and production.

To benefit from the newest SAP software development, SAP has an excellent proven offering with three levels of software delivery: Upgrades, Support Packages, and single corrections applied using the Note Assistant. Upgrades utilize the new System Switch technology, requiring only a very small downtime window for the system. This is achieved by running a temporary new instance on the system to be upgraded that takes on the majority of the upgrade tasks while the production system is still live.

Support Packages contain collections of improvements for a software component, whereas single corrections fix single problems within a software component. Both packages are available online and can be directly imported into a system.

All methods take customer-specific modifications into account. Modifications are adjusted under complete change control by the system.

SAP also offers the Software Delivery Manager as an extendable software delivery framework for systems that are not based on the Web Application Server. Besides pure software archives, the Software Delivery Manager handles database schema definitions and database data transports. Through the extendable deployment framework, it is easy to integrate new software formats like Java archives and Microsoft .NET archives. The delivery-managing engine supports company-specific modifications of the archives and includes collision detection between deliveries and modifications. It also supports the resolution of intersystem dependencies, automatically extracting dependency information from the archives to be installed and comparing them against actual system states.

Another issue of continuous change in IT landscapes is the management of intersystem dependencies. A change in one component might require adaptations in another component. SAP is developing a new global software distribution engine, which creates, triggers, and monitors valid sequences of software distributions for an entire system landscape. It uses all available dependency information from the different sources to validate software deliveries before they are distributed over the system landscape, possibly adding more packages if required by the dependencies.

The software distribution engine is based on the information on components available in the Integration Repository and the Integration Directory (see section 2.1). The Integration Repository also contains dependency information between installable software components, whereas the landscape information in the Integration Directory represents a mirror of the actual customer systems and their software states. Additional dependency information may be contained within the delivered software archives.

4. CONCLUSION

Dealing with complex and widely distributed systems is part of the daily routine in most IT organizations. The integration of new landscapes, new organizational units, or the rollout of new solutions while simultaneously supporting already existing applications, safeguarding investments, the continuous implementation of business issues, and the targeted introduction of required new applications are some reasons for this.

Therefore, it's even more important to make the landscapes fit current requirements and to use current standards. An open exchange infrastructure, which integrates existing applications from various sources, is a prerequisite for company-specific planning. The description of the components and their interfaces in suitable repositories are imperative requirements for overviews, planning, and implementation.

Landscape sizing is based on the requirements of the business venture and is oriented on the available metrics. Using the existing equipment and landscapes helps to minimize costs. The flexibility of using various components allows for subsequent adaptation to changing requirements.

Companies can only optimize the total cost of ownership by maintaining continuity of the processes over the whole life cycle of the IT landscape, from planning to change management. Tools that have been adapted for the landscape are a vital part of organizations that support widely distributed systems. Ready-made scenarios that have been built using building blocks minimize the effort during model preparation and speed up not only the implementation of new constituents, but also business-oriented process changes.

SAP offers adapted tools for each individual phase of the life-cycle – tools that fulfill all the requirements of continuity and flexibility. Based on the integration provided by the exchange infrastructure and portal infrastructure of mySAP Technology, the customer-oriented development and operation of the IT landscape is easily fulfilled. mySAP Technology supports current and future standards. An essential component of a mySAP Technology infrastructure is the integrated support, the tools, and the multiplicity of services offered by SAP and its partners.

All of the above measures lead to reduced cost of ownership for the whole life cycle of the IT landscape.

5. GLOSSARY

application: An application is a set of functions or Web services that is typically delivered as one component.

business process: A business process is the execution of one or several Web services in a controlled way, driven by one or several individuals or events.

Common Information Model (CIM): A model for describing overall management information in a network or enterprise environment. For more information, go to http://www.dmtf.org/standards/standard_cim.php.

component: Components represent software that provide application functionality and Web services. Components can be shipped and deployed independently, and they have their own release cycle.

directory: Directories are used to store and look up shared information. Typically, directories are optimized for read access. In this context, directory is mainly used for information at configuration time.

Java 2 Platform, Enterprise Edition (J2EE): J2EE defines the standard for developing multitier enterprise applications based on Java. This standard has been defined by an open community, including SAP, and is driven by Sun Microsystems Inc. For more information, go to http://java.sun.com.

Microsoft .NET: Microsoft .NET is a platform from Microsoft for XML Web services. It includes tools to develop and deploy Web-based applications. For more information, go to www.microsoft.com/net.

repository: Repositories are used to store and look up shared metadata and information. In this context, a repository is mainly used for information at design time.

Secure Sockets Layer (SSL): SSL is a standard protocol for transmitting secure messages over the Internet using public- and private-key encryption.

Web-Based Enterprise Management (WBEM): A set of management and Internet standard technologies developed to unify the management of enterprise computing environments. For more information, go to http://www.dmtf.org/standards/standard_wbem.php.

Web service: A Web service is a self-contained, modularized functionality, which can be published, discovered, and accessed across a network using open standards. It is the implementation of an interface by a component. It represents an executable entity. For the caller or sender, a service is a black box that may require input and delivers a result. Web services cover services provision for integration within an enterprise as well as cross enterprises on top of any communication technology stack, whether asynchronous or synchronous, in any format.

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