SAP White Paper

mySAP™ TECHNOLOGY

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

VERSION 1.2

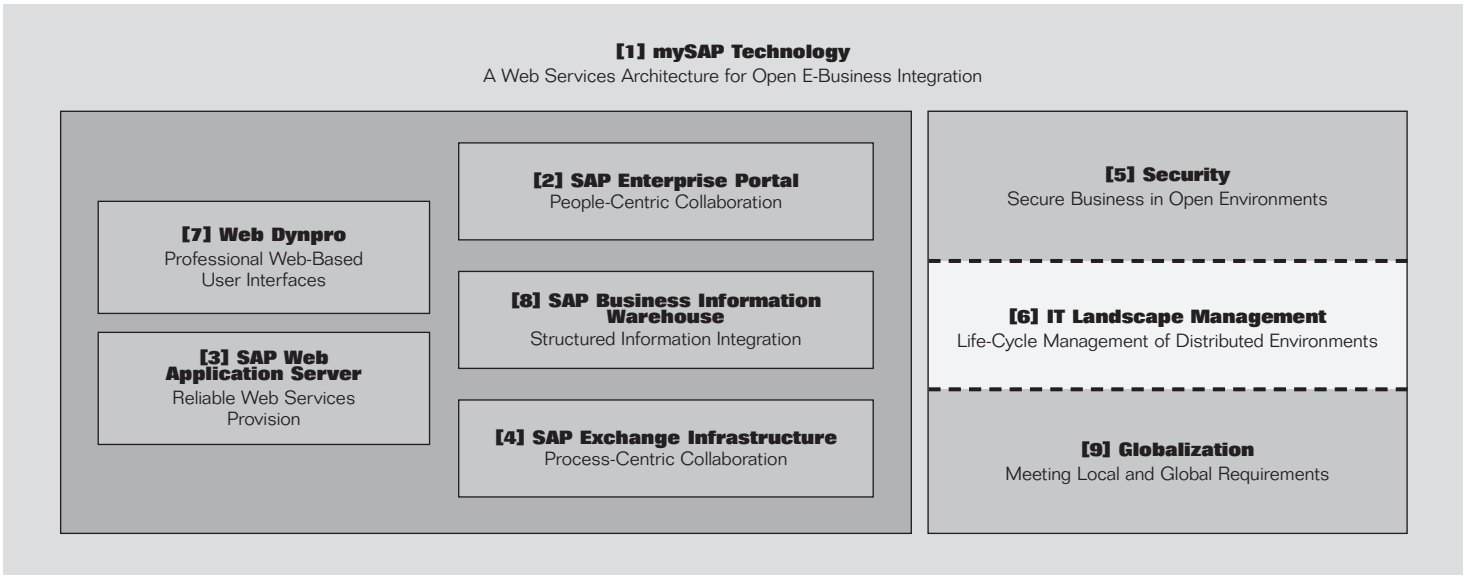
CONTENTS

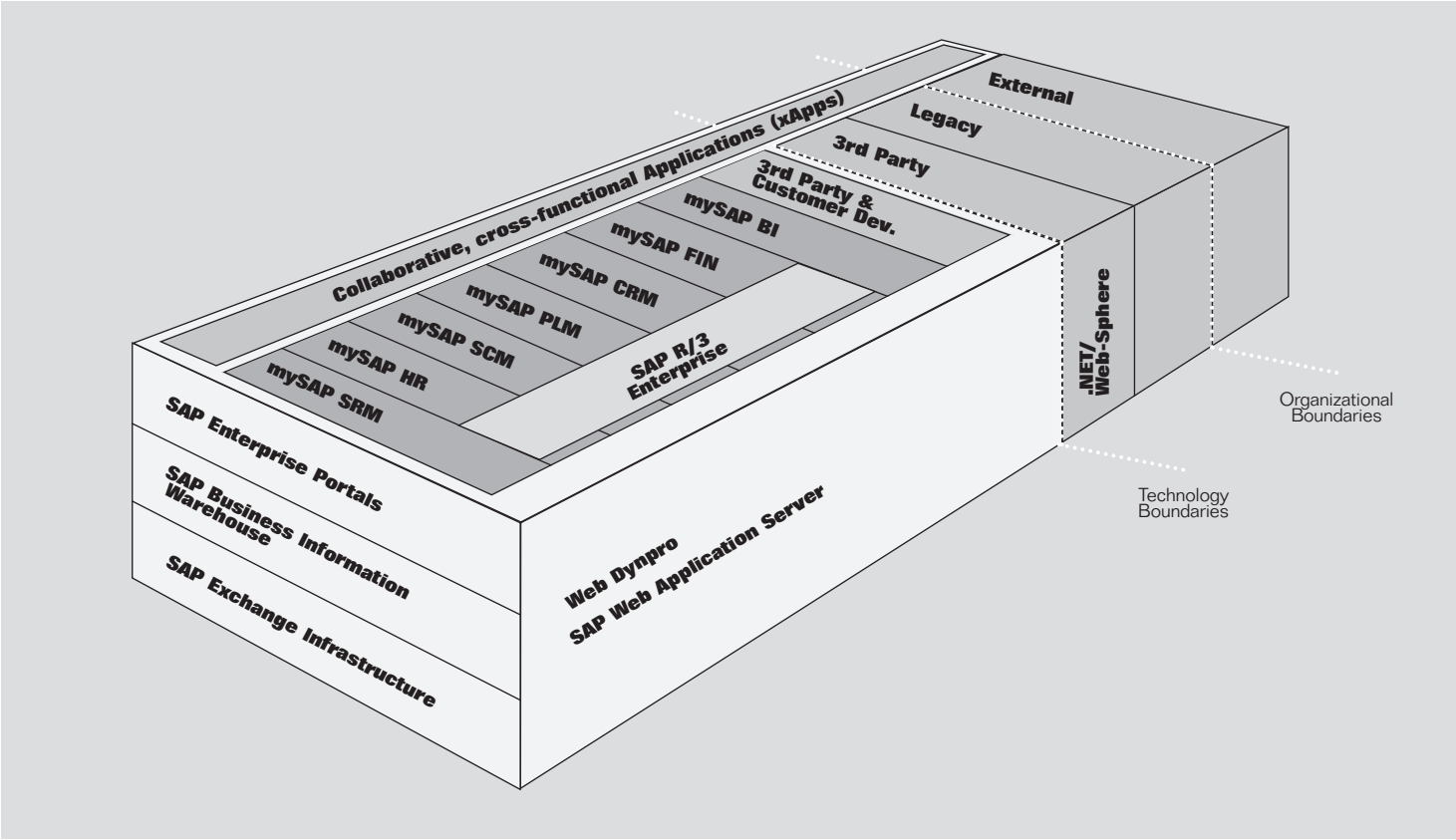
mySAP™ TECHNOLOGY FOR OPEN E-BUSINESS INTEGRATION

To gain a sustainable competitive advantage, companies need to drive collaborative business. And to implement collaborative business, companies need to integrate their existing heterogeneous IT landscapes and extend this integration to their business partners, customers, and suppliers. This integration will then create an open platform that provides existing applications as Web services and enables cross-applications – a new type of application that combines existing and new Web services that cross functional, technical, and organizational boundaries. As companies implement collaborative business, mySAP™ Technology enables them to manage heterogeneity and powers collaborative solutions. 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, cross-boundary applications, and collaborative business processes based on **one common infrastructure** for integration within and beyond company boundaries.
- mySAP Technology features **syndicated Web service**s, allowing for the integration of people, processes, and information based on **shared collaboration knowledge**.

And mySAP Technology does all this while protecting existing investments and achieving the lowest possible cost of ownership. mySAP Technology is the foundation of SAP® R/3® Enterprise, all mySAP.com® solutions, and cross-applications. With mySAP Technology, SAP solves the integration challenge from a business perspective.





The key building blocks of mySAP Technology are:

- **SAP® Enterprise Portal:** Integrating people and unstructured information to empower individuals
- **SAP® Business Information Warehouse:** Integrating structured information to make smarter decisions
- **SAP® Exchange Infrastructure:** Integrating processes to drive end-to-end collaborative business processes
- **SAP® Web Application Server:** A reliable infrastructure for portals, warehouses, exchanges, and all application components, providing Web services in Java 2 Platform, Enterprise Edition (J2EE), and ABAP through open standards
- **Web Dynpro:** To design and operate powerful presentation logic for professional, highly interactive user interfaces
- **Infrastructure services:** Powerful and integrated services, including security, IT landscape management, and globalization

This white paper is part of a series of nine white papers explaining the architecture and vision of mySAP Technology. This white paper details the support of mySAP Technology for mastering heterogeneity and reducing the cost of ownership of IT landscapes. The figure on the previous page lists all nine white papers.

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. 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 companies master heterogeneity and lowers 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.

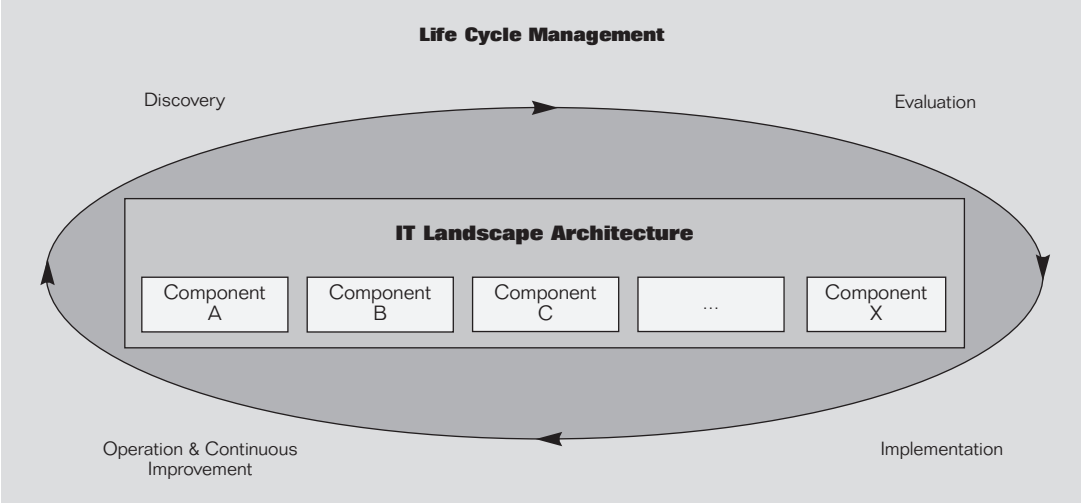


Figure 1: Architecture and Life-Cycle Management of Distributed Environments

THE ARCHITECTURE OF DISTRIBUTED IT LANDSCAPES

In the Internet age of collaborative business, 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. The use of several different components 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 still allows companies to adapt the IT landscape to changing business requirements. Openness and flexibility are necessary for the architecture to fulfill these requirements.

LANDSCAPE ALTERNATIVES AND SCALABILITY

With mySAP Technology, IT infrastructure options range from compact, single-host and single-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 investments in hardware, software, and skills
- Platform topology options that range from maximum consolidation (single server, one database) to maximum distribution (multiple servers, multiple databases on different platforms)
- The ability to run multiple logical systems (clients) in parallel on one physical system. This is particularly important for application service providers (ASPs) that want to support multiple independent customers on one single component.
- 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 designing, implementing, operating, and maintaining IT landscapes. Predefined landscape patterns describe possible IT landscape configurations. They contain the accumulated experience of SAP development, consulting, and support. Companies can use them as templates to design their IT landscapes and 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.

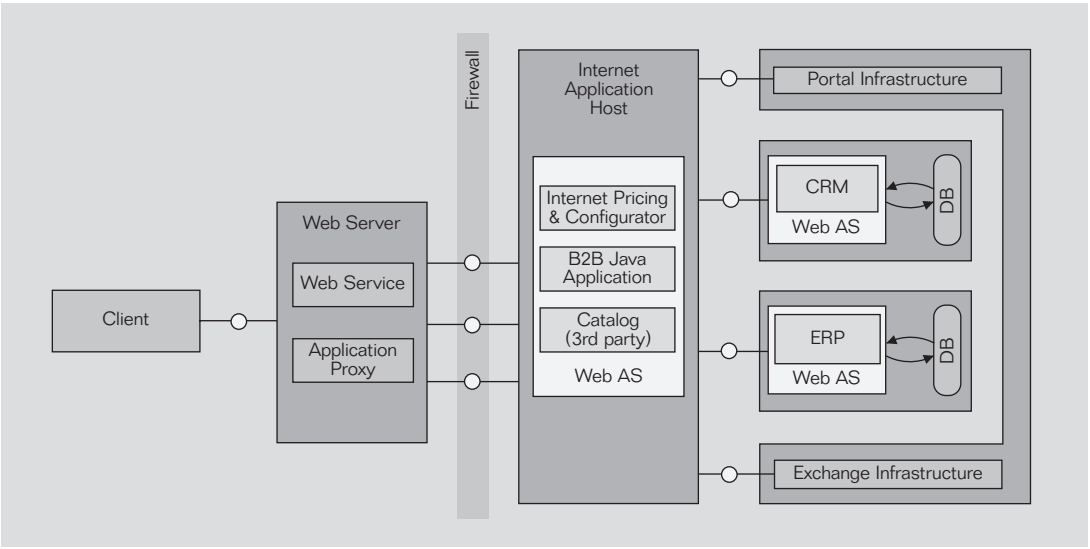


Figure 2: Sample Configuration: Internet Sales and Procurement

Sample Configuration: Internet Sales and Procurement
Figure 2 shows a sample Internet sales and procurement scenario based on mySAP™ Customer Relationship Management (mySAP™ CRM) for customer relationship management (CRM), 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).

The CRM and ERP systems 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 Hypertext Transfer Protocol (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.

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. The entire e-business solution runs on distributed servers and potentially different operating system and database platforms, whereas SAP® Exchange Infrastructure , which is part 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.

Sample Configuration: Development, Project, or Test Landscape

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

In this example, all technical components are installed on the same server. SAP R/3 and SAP CRM even use one common database to minimize IT investment and maintenance. mySAP Technology allows multiple components to be installed in the same database using 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 change 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.

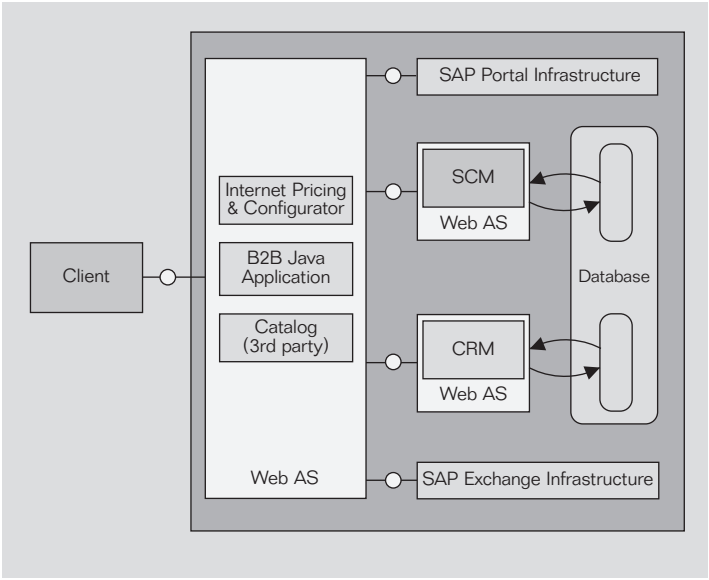


Figure 3: Sample Configuration: Development, Project, or Test Landscape

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 be scaled 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 in one database keeps infrastructure requirements 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 are possible, as well as the addition of more distributed Web services running on existing or new platforms. If IT infrastructure requirements increase, companies can use migration tools to change the platform of one or more components as needed.

Sample Configuration: Complete E-Business Solution

In the sample scenario shown in Figure 4, the e-business solution consists of a CRM component, a supply chain management (SCM) component, an ERP component, and a business intelligence (BI) component. E-business is mission critical for this enterprise because Internet sales, 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 runs on dedicated platforms that can be independently scaled and optimized for performance. The 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.

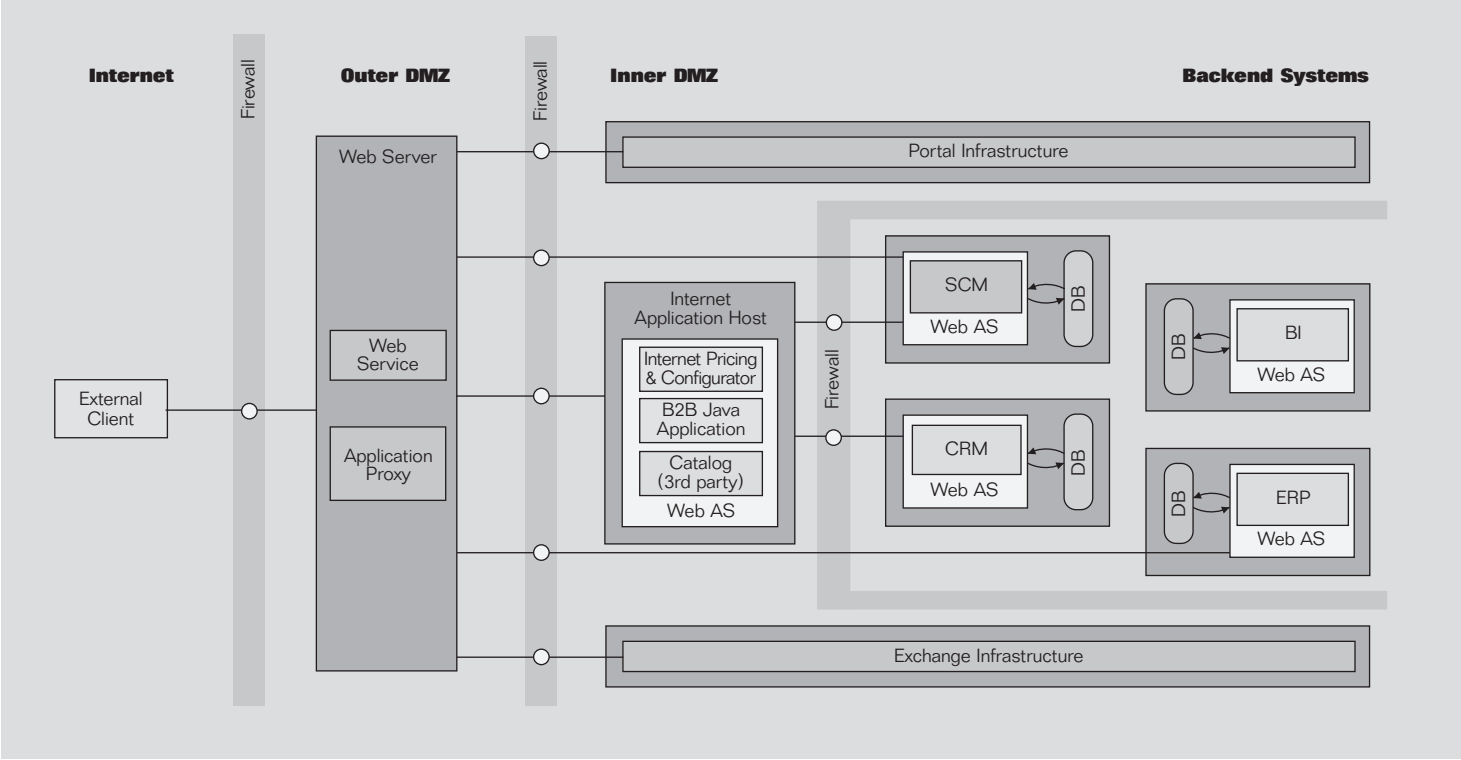


Figure 4: Sample Configuration: A Complete E-Business Solution

Redundancy is implemented for each of the components and their connections to avoid single points of failure. The back-end systems use SAP Exchange Infrastructure and multiple application servers. 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 these redundancy mechanisms allow for dynamic load balancing so that the redundant components provide consistent overall performance.

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

SAP® Web Application Server, in combination with SAP® Enterprise Portal, 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 Platform, Enterprise Edition (J2EE) or Microsoft .NET, can use the runtime environment provided by SAP 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.

INDUSTRY STANDARDS FOR IT LANDSCAPES

The flexibility of the architecture allows companies to integrate multiple components from different vendors based on different technologies within the IT landscape. But to completely gain the advantages of the flexibility, it is crucial to ease the management of heterogeneous systems. 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. Any authorized management application – regardless of its manufacturer – can manage resources.

SAP supports industry standards for managing 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.

SHARED COLLABORATION KNOWLEDGE

The harmonization of the data models for IT landscapes is the foundation of all landscape 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: Software components in the integration repository and the system landscape in the integration directory.

Information on components is stored in the integration repository of SAP Exchange Infrastructure. The integration repository 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 SAP Exchange Infrastructure keeps track of the landscape that is actually installed. It provides an exact picture of the installed IT landscape, including the connections between the various components. It corresponds to the core systems model in CIM.

The information about components is provided in the integration repository and can be refreshed on the customer side using a Web connection. The landscape information in the integration directory is automatically created during landscape implementation.

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), Windows Management 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

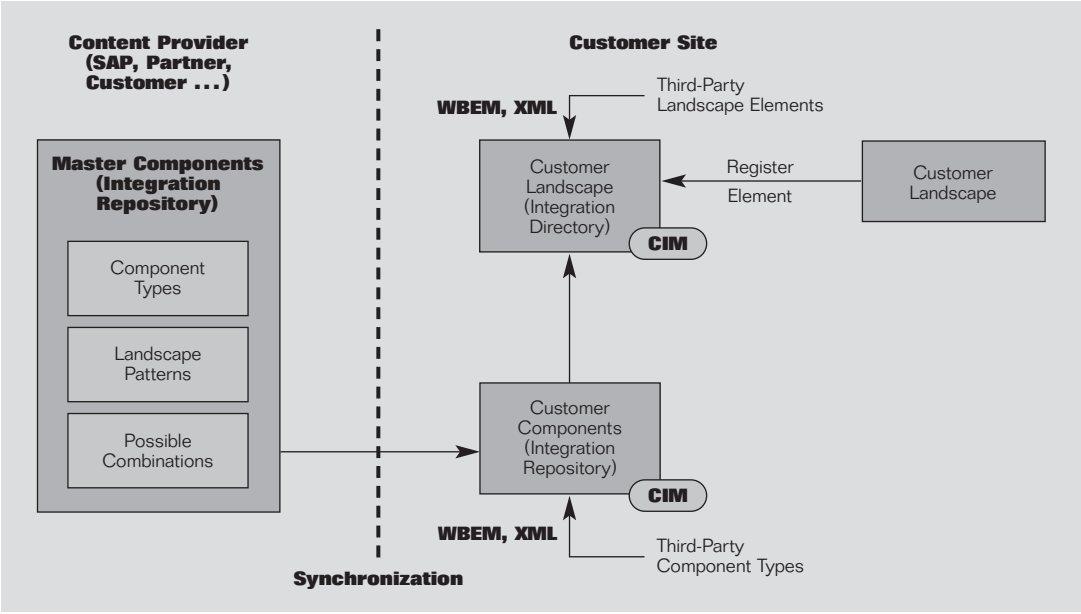


Figure 5: The Flow of Component and Landscape Information in the Integration Repository and the Integration Directory

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 Management (WBEM) standard (including access through HTTP).

The integration repository and the integration directory form the foundation for the next generation of landscape design and management tools, as well as for SAP Exchange Infrastructure. Because they rely on proven standards, other management tools can benefit from the landscape data as well. The Java Management Extensions (JMX) and Windows Management Instrumentation (WMI) protocols specify and implement frameworks for these management services. These standards are the basis for new system management developments.

Combining these standards with WBEM and CIM creates powerful instrumentation – a huge 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 management and application-oriented system management. (SAP brings this experience to those industry organizations developing the standards mentioned above.)

The collaboration knowledge embedded in the integration repository and the integration directory is available for all components within the IT landscape. This knowledge provides a foundation for the tools and services used for the life-cycle management of the IT landscape.

LIFE-CYCLE MANAGEMENT OF DISTRIBUTED IT LANDSCAPES

Distributed Web services require more systems than closed solutions. As IT landscapes grow, the cost of ownership for these expanding landscapes becomes an important factor. To reduce the cost of ownership, companies must manage the IT landscape throughout its entire 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 that support the life cycle of IT landscapes.

IT LANDSCAPE DESIGN

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

A Pattern-Based Design Process

The design of an IT landscape is mainly driven by the business scenarios that it must support. Each company adapts its IT landscape to its own business requirements. Other issues have to be taken into account as well, such as the security strategy, high-availability considerations, integration constraints, and so on. The design determines which parts of the business process will be executed on which technical component and on which servers the technical components will be installed. SAP provides guides and landscape patterns that describe the potential landscape designs for different variants of business processes. The landscape patterns are a part of the integration repository. (For more information see the section entitled "Shared Collaboration Knowledge.") SAP will successively increase the number of supported scenarios.

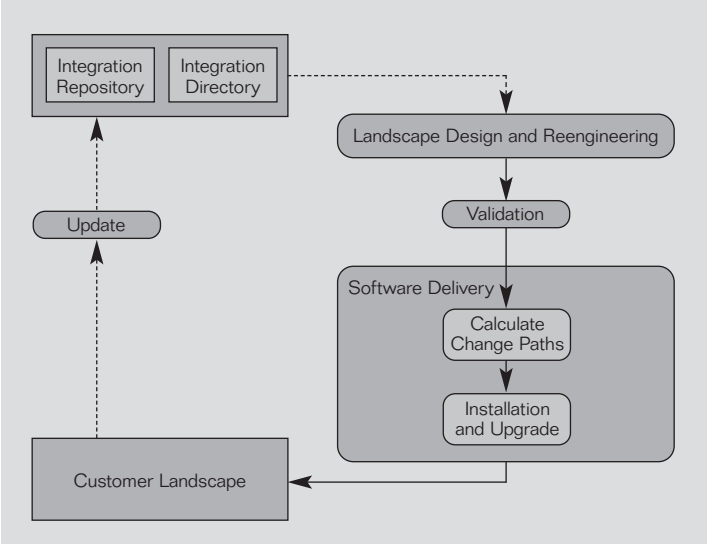


Figure 6: The Landscape Design Process

Guides and landscape patterns serve as templates for the design process. Templates must be adapted to the existing landscape that is described in the integration directory. The result is a list of all required new installations and changes. The next step determines the appropriate sequence of installations and changes. These steps are accompanied by a validation of the results against the existing landscape and dependencies among the involved components. Tools and information about the relevant actions and dependencies help to automate the design process. The result is input for the later installation and adaptation of the IT landscape.

Sizing Distributed IT Landscapes

After the required components have been identified, the next step is to determine the required size of the components and the size of SAP Enterprise Portal and SAP Exchange Infrastructure. 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 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 testing
  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.

INSTALLING THE IT LANDSCAPE

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

After the design phase, 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 automate the technical installation process as far as possible. The installation tools execute scripts that are generated in the design process (see the section entitled "A Pattern-Based Design Process"). This includes technical default configurations for the involved components, connectivity between the landscape elements, and technical configurations needed for the Best Practices for mySAP.com business solutions (see the next section). In addition, the installed components are automatically registered in the integration directory. However, some changes cannot be automated. For example, it might be necessary to change a running business process on an existing component. mySAP Technology provides descriptions of the required steps and check lists for these changes.

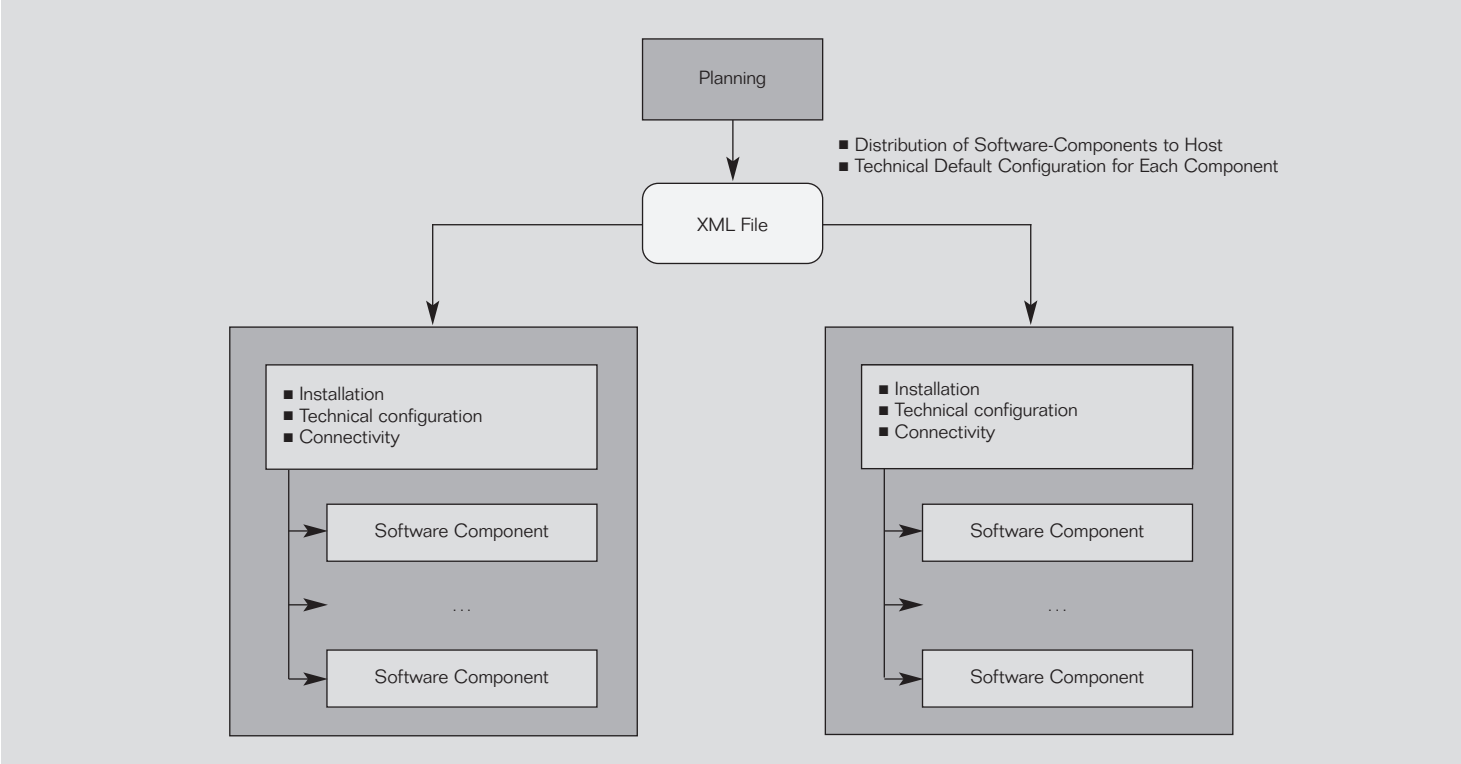


Figure 7: Technical Installation of IT Landscapes

Heterogeneous system landscapes need open tools for installation and 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 application programming interface (API) that other installation frameworks can use. In addition, the installer of mySAP Technology can configure and use third-party installers. Such "wrapped" installations may include Microsoft Windows setup, Java deployment, database installations, and application upgrades.

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. This mapping process can even include non-SAP components. 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

includes both new and existing components, as well as their integration. Continuous testing occurs during configuration. 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 have to be set up to ensure the availability, reliability, and performance of the solutions.

Configuration
Best Practices for mySAP.com can significantly accelerate the configuration of mySAP.com solutions. The Best Practices solutions 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 the first configuration to optimally fit 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, such as 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 helps with the configuration of operations. The solution simplifies and guides users through the complex issues involved in implementing and managing IT landscapes. Examples include central system monitoring, service-level management, high availability, performance, network planning, and 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.

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 also offers interfaces for non-SAP test tools.

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

OPERATIONS

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 IT landscape operations is essential for achieving availability, reliability, and performance. The system management infrastructure of mySAP Technology provides centralized, end-to-end monitoring and management across the entire landscape from front ends to databases. It offers an integrated suite of tools for system and performance management, high availability, database and archive administration, workload management, and output management. This includes not only technical control of the systems, but also tasks like job scheduling, backup and recovery, and 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 centrally in the integration repository and integration directory. The management applications are based on this information. Monitors, in combination with established thresholds, help to control service-level agreements.

SAP reduces the complexity of the landscape and avoids the need for multiple consoles by running centralized monitoring and administration functions from only one point in the whole environment. Access is possible from all over the world via the Internet. The system uses industry standards to manage multiple systems from different vendors. mySAP Technology uses the CIM standard with WBEM as the access protocol. For Java applications, SAP follows the standards defined by JMX.

SAP's monitoring 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.

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 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 SAP Note corrections applied using Note Assistant. Upgrades utilize the new system switch technology of SAP, requiring only a very small down-

time 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 quality 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 Web Application Server offers extensions of SAP's change management services. Software logistics for Java provides central control of the development that is done on clients with local development environments. It also supports the delivery of Java software, database schemas, and data content. Standard deployments, Support Packages, and corrections and upgrades for J2EE applications are possible. A central source repository will coordinate the local developments and the deployment and software distribution and provides a persistency layer for version control. Additional central change management services are the determination of distribution routes, scheduling and propagation of software transports, distribution tracking, and import control. Through the extendable deployment framework, it is also possible to integrate new software formats.

The software distribution services are based on the information on components available in the integration repository and the integration directory (see the section entitled "Shared Collaboration Knowledge"). The integration repository also contains dependency information between installable software components, whereas the landscape information in the integration directory mirrors actual systems and their software states. Delivered software archives may contain additional dependency information.

SERVICE AND SUPPORT TECHNOLOGY

In addition to the tools of mySAP Technology, SAP provides support and services to manage the IT landscape and to drive collaborative end-to-end business processes in a heterogeneous environment. Encapsulated business expertise is offered in terms of tools, methodologies, technical and business documentation, and aligned services. SAP® Solution Manager is an integrated platform that integrates the content, tools, and methodologies that project managers, project teams, system administrators, and consultants need to implement, support, and operate the solution in the IT landscape. The main focus is to provide support during the whole solution life cycle.

As an example, the following tasks can be performed:

- Project preparation phase
  Define the project and system landscape, then install a preconfigured evaluation system
- Business Blueprint phase
  Evaluate business processes and define a Business Blueprint
- Realization phase
  Set up a development system, configure, check configuration consistency, assign authorizations, load master data, set up a test system, and organize tests
- Final preparation phase
  Set up a production system for the subsequent go-live
- Operations phase
  Real-time system and business process monitoring, service-level management (SLM) reporting, access Best Practices for Solution Management via a link to SAP® Service Marketplace, proactive and predictive services for optimization and maintenance over the entire solution life cycle, providing user support through a support desk with integrated messaging functions, obtain remote support using Microsoft NetMeeting via SAProuter

SAP Solution Manager provides access to the tools, content, and methodology needed to implement and optimize the solution. These include:

- Road maps describing how to organize and to run an implementation project – both from a functional and a technical perspective
- Project management for organizing planning periods, personnel resources, and other project data
- Best Practices solutions as described in the section entitled "Implementation"
- Comparison of customizing in various components in the IT landscape
- Management and execution of testing after a project phase or customizing cycle

A wide variety of services can be accessed through the operations section. These services include remote services, self-services, on-site services, and Best Practices documents. They are triggered dynamically depending on the solution configuration and status. The section gives a clear overview of all customer-specific service recommendations, and the results of each service are available in the form of clearly structured reports, which are archived in the operations section.

SAP Solution Manager is the mandatory delivery platform for all services delivered as part of the maintenance agreement with SAP.

SAP's proactive and predictive services safeguard the entire customer life cycle. Feasibility studies focus on integration, operation, and risk management, and they lead to a smooth implementation and operation. During technical implementation, SAP® GoingLive Check helps to support and audit the start of operations, whereas SAP® EarlyWatch Services assure continuous operation and optimization of the mySAP.com solution. Predictive and proactive services can be delivered remotely, on site, or as a self-service procedure.

Situations can be unique to one company and require special solutions. With years of experience in such situations, SAP has developed services for continuous improvement. These services are delivered by experienced SAP consultants and help to identify potential problems. For example, SAP consultants analyze core business processes and identify issues that affect the normal flow of the implemented core business processes.

Solution monitoring covers system monitoring and addresses business process monitoring and service-level management to help monitor and administer the entire solution. Core business processes are traced through different systems and interfaces. Alerts appear in the graphic of the IT landscape at exactly the component where the problem has occurred and detailed information about the problem and hints and services on how to handle it are available.

The support section of this platform offers a complete infrastructure for organizing and operating a help desk that covers the entire solution in the IT landscape. It provides message handling and access to the SAP Notes database, as well as other SAP Service Marketplace information. The support section integrates support tools, such as Microsoft NetMeeting, enabling application sharing between a user, the customer help desk, and SAP Support.

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 and portal infrastructure, which integrate 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 SAP Exchange Infrastructure and SAP Enterprise Portal of mySAP Technology, companies can easily develop and operate an IT landscape that meets their specific needs. mySAP Technology supports current and future standards. Integrated support, tools, and the multiplicity of services offered by SAP and its partners are essential elements of a mySAP Technology infrastructure.

All of the above measures help to reduce the cost of ownership over the whole life cycle of the IT landscape.

GLOSSARY

adapter: A component that eases the integration of existing applications with other applications or the infrastructure. An adapter provides technical connectivity and necessary business logic.

ABAP™: SAP's object-oriented programming language and environment for developing, deploying, and operating mySAP.com application components.

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

application programming interface (API): An interface that applications use to offer Web services and to communicate with each other.

Audit Information System (AIS): An SAP auditing tool that improves the quality of system and business audits. AIS consists of an audit reporting tree and is a structured, preconfigured collection of SAP standard programs.

authentication: The process of identifying a person or system component, usually as a prerequisite for allowing the person or component access to a system.

biometrics: Automated method of verifying or recognizing the identity of users of digital devices on the basis of certain physiological characteristics, such as a fingerprint or iris pattern, or aspects of behavior, such as handwriting or keystroke patterns.

Business Application Programming Interfaces (BAPI®): Open, stable, object-oriented interfaces through which the capabilities of mySAP.com applications can be accessed. BAPIs are independent of the technical realization.

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

Business Process Modeling Language (BPML): A specification for the management of business processes that span multiple applications, corporate departments, or business partners and that go behind the firewall and over the Internet. For more information, go to http://www.bpmi.org.

business scenario: A business process. In a business scenario, more than one component provides Web services, more than one person is involved, or business process control resides outside a single, service-providing component.

cascading style sheets (CSS): A simple mechanism for adding style (for example, fonts, colors, or spacing) to Web documents, typically in HTML.

channel: Collections of iViews that can be built into role-related work sets defined by the administrator. End users can drag the iViews contained in channels onto portal pages to personalize the portal.

container-managed persistence (CMP): Simplifies the task of writing entity beans because the container generates the code to access the data source and manages the persistent state of the bean.

code page: Defines the mapping between a character set and a sequence of one or more bytes. The code page determines the characters that can be used in programs and that can be displayed on output devices (for example, printers and terminals).

collaboration: Joint work and communication among people and systems of a company – including business partners, suppliers, and customers – to achieve a common business goal.

collaboration knowledge: Describes how collaboration works by detailing process descriptions, business rules, Web services, interfaces, roles, and so on.

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

Common Object Request Broker Architecture (CORBA): An open protocol for communication between distributed objects.

Component Object Model+ (COM+): A component model from Microsoft for communication between distributed objects.

component: Software that provides application functions and Web services. Components can be shipped and deployed independently, and they have their own release cycle.

demilitarized zone (DMZ): Security zone that exists between two networks. It allows connections between the networks while preventing unauthorized access to the systems located within the networks.

digital certificate: Digital document that acts as a user's digital identification card on the Internet. Digital certificates are used for authentication and for verifying digital signatures.

digital signatures: Security mechanism for protecting digital data. The digital signature serves the same function for the processing of digital data as a handwritten signature serves for paper documents. It is based on public-key cryptography.

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

double-byte code page: Defines the mapping between a set of characters and a sequence of one or more bytes. Some languages, such as Japanese, use more than 256 characters so the complete character set for these languages cannot be mapped using a single-byte code page. In a double-byte code page, a character can be either one or two bytes long. For example, in the Japanese code page (SJIS), if the first byte has a value between 0x81 and 0x9F, then the second byte is also part of the representation of the current character. Otherwise, only one byte is used to identify a character.

Drag&Relate™: Trademarked name for the user operation that reaps the benefit of unification. Drag&Relate is a user drag-and-drop action.

Dynamic Program (Dynpro): Screens elements of SAP transactions. Dynpros are the combination of the screen and its accompanying flow logic.

Eclipse: An open-source, extensible IDE platform for developing and debugging applications. Written entirely in Java, Eclipse is designed to be a unified development environment, including testing, performance tuning, and debugging in multiple programming languages.

Electronic Business XML (ebXML): Framework for an open, XML-based infrastructure that enables the global use of electronic business information in an interoperable, secure, and consistent manner by all parties. It is sponsored by OASIS and other groups. For more information, go to http://www.ebxml.org.

electronic data interchange (EDI): A family of standards that facilitate the electronic exchange of information among different companies.

engine: Provides the runtime environment for dedicated functions and Web services. Engines are part of components.

enterprise portal: A single point of entry to all information, applications, and services that people need to do their jobs according to their roles. Enterprise portals provide a way for suppliers, customers, partners, and employees to access all relevant content easily and securely and to participate in all types of business processes.

eventing: The automatic passing of parameters from one iView to one or more related iViews.

eXtensible Business Reporting Language (XBRL): An open specification that uses XML-based data tags to describe financial statements for both public and private companies. For more information, go to http://www.xbrl.org.

Extensible Markup Language (XML): The universal format for structured documents and data on the Web, XML is increasingly becoming the general standard document format of structured data. For more information, go to http://www.w3c.org/XML.

Extensible Stylesheet Language Transformations (XSLT): A specification for transforming XML documents into HTML or other types of documents. For more information, go to http://www.w3.org/Style/XSL.

Fast Common Gateway Interface (FastCGI): A standard for interfacing external applications with information servers, such as HTTP or Web servers. FastCGI is a language-independent, scalable, open extension to the CGI specification that provides high performance without the limitations of server-specific APIs.

File Transfer Protocol (FTP): An open protocol for exchanging files.

Generic Security Services-Application Programming Interface (GSS-API): Application-level interface (an API) to network security systems. GSS-API allows the integration of security functions that are available from external security products, such as strong authentication or encryption.

globalization: Strategy that addresses all of the enterprise issues associated with making a company truly global. Globalizing products and service involves integrating all of the internal and external business functions with marketing, sales, and customer support in the world market.

HR-XML: An independent, nonprofit organization dedicated to developing and promoting standardized XML vocabularies for human resources. For more information, go to http://www.hr-xml.org.

HyperRelational Navigation Protocol (HRNP): A naming protocol tunneled through HTTP. HRNP manifests itself as a link behind data represented to users. This HRNP link contains metadata about the source it is being dragged from and how it relates to the target it is being related to by the user.

HyperRelational technology: Technology that leverages unification to pass data and context to the portal through HRNP.

Hypertext Markup Language (HTML): The standard document format for display in Web browsers.

Hypertext Transfer Protocol (HTTP): The open Internet standard protocol that is used to exchange documents.

Hypertext Transfer Protocol with Secure Sockets Layer (HTTPS): The secure variant of HTTP using Secure Sockets Layer (SSL).

integrated development environment (IDE): A development environment with easy integration into the development and deployment process for applications. The Java IDE is used for Java development.

Intermediate Document (IDoc): SAP document standard for electronic document exchange.

impersonation: Acting on behalf of a user. A component accesses another component, and the accessed component assumes the access comes from a specific user.

Interactive Financial Exchange (IFX) Forum: A family of global business requirements and specifications that result in an open and interoperable foundation for online financial services. For more information, go to http://www.ifxforum.org.

interface: An abstract definition of Web services. Interfaces allow Web services that comply with these interfaces to be accessed. The interface defines which information and data must be provided to use a Web service and how the result of the Web service will be made available.

internationalization: Provides the technical foundation to enable programs to support multiple scripts and languages without redesign or modification. Once a user has selected a language environment, all programs transparently alter their runtime behavior to meet the expectations of the user.

Internet standards: A common set of open standards used for communication and integration over the Internet. Examples of Internet standards are HTTP, XML, and WSDL.

iView: A self-contained, XML-based presentation element. A well-defined set of interfaces displays content and the personalization of the content elements presented as part of a portal page.

Java 2 Platform, Enterprise Edition (J2EE): 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.

J2EE Connector Architecture (JCA): Defines standard Java interfaces for simplifying the integration of enterprise applications with J2EE-based Java applications. With these interfaces, Java developers can access existing databases, e-business applications, and legacy systems.

Java Message Service (JMS): Provides a consistent set of APIs that gives developers access to the common features of different messaging system products.

Java Management Extensions (JMX): A universal, open technology for managing the adapted legacy systems, implementing new management solutions, and plugging into those of the future. JMX provides the tools for building distributed, Web-based, modular, and dynamic solutions for managing Java-based devices, applications, and service-driven networks.

JavaScript: A basic scripting language that allows Web authors to create dynamic pages that react to user interaction.

Java Database Connectivity (JDBC): Provides uniform access to relational databases like DB2, Oracle, Microsoft SQL Server, and SAP DB.

Java Data Objects (JDO): An API for transparent database access. Developers can write code in the Java programming language that transparently accesses the underlying data store without using database-specific code.

JavaServer Pages (JSP): Allows Web developers and designers to rapidly develop and easily maintain information-rich, dynamic Web pages. JSP technology separates the user interface from content generation, enabling designers to change the overall page layout without altering the underlying dynamic content.

Kerberos: An authentication system that uses symmetric cryptography to provide protection. For more information, go to http://web.mit.edu/kerberos/www/.

Lightweight Directory Access Protocol (LDAP): A standard protocol for accessing directory services. It is typically used to retrieve organizational and user data, as well as other resources, such as files and devices, in both the public Internet and corporate intranets.

localization: Making a product linguistically and culturally appropriate to the target locale (country or region and language) where it will be used and sold.

marketplace: Connect business communities and enhance business processes by providing collaborative functions, streamlining operations, and improving efficiencies. Private marketplaces are also called private exchanges.

messaging: Exchanging documents. Messaging is the transfer of information among Web services that are provided by separate components.

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

model-view-controller (MVC): A design pattern for successfully and efficiently relating the user interface to underlying data models. It is widely used by developers as a useful pattern to reuse object code. It significantly reduces the time required to develop applications with user interfaces.

nonrepudiation: The inability to deny having performed an action. For example, a nonrepudiation service can prove that a person sent a message to another person. In electronic business, this can be achieved by using public-key technology.

NT LAN Manager (NTLM): The authentication protocol that Windows NT uses to pass authentication information between the client and server when logging on.

Object Linking and Embedding (OLE) Database (DB): A low-level application programming interface for access to different data sources. OLE DB provides SQL-based access and other types of access to different data sources.

online analytical processing (OLAP): Enables users to easily and selectively extract and view data from different points of view. To facilitate this kind of analysis, OLAP data is stored in a multidimensional database.

Online Certificate Status Protocol (OCSP): Standard used by client applications to check whether digital certificates are valid at the time of a given transaction. OCSP enables rapid verification of the revocation status of digital certificates.

Organization for the Advancement of Structured Information Standards (OASIS): A nonprofit, international consortium that creates interoperable industry specifications based on public standards like XML and SGML. For more information, go to http://www.oasis-open.org.

personal digital assistant (PDA): A handheld information appliance that offers multiple communication features, including address book, personal information manager, cellular phone, calendar, and networking capabilities. PDAs use several different types of input technologies, including stylus, voice, and keyboard.

public-key infrastructure (PKI): System that manages the trust relationships involved with using public-key technology. The role of the public-key infrastructure is to make sure that digital certificates and certification authorities can be validated and trusted.

Remote Function Call (RFC): An SAP standard protocol for remote execution of functions and remote invocation of methods of business objects. RFC is available on most operating systems and programming languages.

repository: A storage area for shared metadata and information. In this context, a repository is mainly used for information at design time.

role: A collection of content that users need to access to do their jobs. Roles are specific to individual groups of internal and external users, and they match their specific tasks with information or service needs.

RosettaNet: A consortium of high-tech companies working to create and implement industrywide, open, e-business process standards. For more information, go to http://www.rosettanet.org.

SAP® GUI: A universal client for accessing SAP functionality. SAP GUI works like a browser. It gets information from the SAP server like "what, where, when, and how" to display content in its window.

SAP® GUI for HTML: SAP client that dynamically emulates the screen elements of SAP transactions in a Web browser by automatically mapping them to HTML.

Secure Network Communication (SNC): SAP interface that links SAP systems to third-party security products for authentication and encryption.

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

Security Assertion Markup Language (SAML): An XML security standard for exchanging authentication and authorization information. For more information, go to http://www.oasis-open.org/cover/saml.html.

Simple Mail Transfer Protocol (SMTP): An open protocol for exchanging electronic mail.

single-byte code page: Defines the mapping between a set of characters and a sequence of one or more bytes. In a single-byte code page (for example, ISO 8859x), each character is mapped to a single byte. Therefore, a single-byte code page can only contain a maximum of 255 characters. In ASCII-based code pages, the first part of a code page table (0x20 Ox7F) contains printable characters of the 7-bit ASCII character set (English alphabet). The second half contains language-specific characters (for example, German umlauts or Greek characters).

single sign-on (SSO): Mechanism that eliminates the need for users to enter passwords for every system that they log on to. Single sign-on allows users to authenticate themselves once and then log on to all the systems that operate in the single sign-on environment without further intervention.

SOAP: A lightweight protocol for exchanging information in a decentralized, distributed environment. It is an XML-based protocol that is typically used with HTTP. SOAP includes conventions to represent method calls of objects or function calls and the respective responses, as well as conventions to represent standardized data types. For more information, go to http://www.w3.org/TR/SOAP.

SQL-J: A technology that enables a Java program to access a database using embedded Structured Query Language (SQL) statements.

time stamp: Time and date of an event converted from local time to Coordinated Universal Time (UTC). UTC corresponds to Greenwich mean time (GMT).

time zone: Set of rules that dictate the offset of the user's local time from Coordinated Universal Time. The local time of a particular user depends on the user's location. The offset of a location from UTC depends on geography, region, or country and the use of daylight saving time (DST).

Unicode: An international standard (see ISO/IEC 10646) that assigns characters from virtually every language and script a unique Unicode scalar value. Unicode currently defines more than 90,000 characters, with room for more than one million characters. Unicode includes all characters used in business-relevant languages, as well as other symbols and icons. For more information, go to http://www.unicode.org.

unification: Permits user-centric integration of data sources. Using Drag&Relate, users can understand how information in one unified source correlates to information in another unified source.

unifiers: Leverages the application architecture, user interfaces, security, and all customization inherent in an application while surfacing the application with HyperRelational technology.

Universal Description, Discovery, and Integration (UDDI): A sweeping industry initiative to create a platform-independent, open framework for describing Web services, discovering businesses, and integrating business services using the Internet. Its purpose is to create an operational registry, which is available today. For more information, go to http://www.uddi.org.

virtual private network (VPN): A private data network that uses the public telecommunication infrastructure while maintaining privacy through security protocols.

Web-Based Distributed Authoring and Versioning (WebDAV): An extension of the HTTP protocol that allows file sharing over the Internet. It provides locking, property management, and remote file management capabilities, and it makes Web resources work like standard, local file sharing.

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 self-contained, modularized function, that can be published, discovered, and accessed across a network using open standards. It is the implementation of an interface by a component, as well as an executable entity. To the caller or sender, a Web service is a black box that may require input and delivers a result. Web services provide integration within and across enterprises on top of any communication technology stack (asynchronous or synchronous) and in any format.

Web Service Choreography Interface (WSCI): XML-based interface to deliver automated, application-to-application collaboration by describing the flow of messages exchanged by a Web service in a particular process.

Web Services Description Language (WSDL): A specification for describing Web services as a set of end points operating on messages. For more information, go to http://www.w3.org/TR/wsdl.

Web Services Interoperability Organization (WS-I): Open industry organization chartered to promote Web services interoperability across platforms, operating systems, and programming languages.

Windows Message Instrumentation (WMI): An implementation of the DMTF WBEM initiative for Microsoft Windows.

Wireless Application Protocol (WAP): A standard defined by the WAP Forum, an industry consortium with such members as Openwave, Ericsson, Nokia, Motorola, and Siemens. The purpose of the standard is to enable wireless access to the Internet and advanced telephony services. For more information, go to http://www.wapforum.org.

Wireless Markup Language (WML): Part of the application development environment of WAP. It is a markup language, similar to HTML, for wireless devices like mobile phones.

work set: A collection of application screens and iViews on a page or series of pages that allows users to better perform tasks defined in their roles.

XML Common Business Library (xCBL): A cross-industry XML component library for business-to-business e-commerce. It was originally developed by Commerce One Inc. For more information, go to http://www.xcbl.org.

XML Schema Definition Language (XSDL): A language to express a shared vocabulary. It provides a way to define the structure, content, and semantics of XML documents.

X.509: Widely used standard for digital certificates. The format requires certain standard information (for example, an e-mail address) to identify the owner and the issuer of the certificate.

DOCUMENT HISTORY

VERSION 1.2

The following changes have been made to this white paper:

- **Landscape Alternatives and Scalability** and **Industry Standards for IT Landscapes**
  - The sequence has been changed to improve readability.
- **A Pattern-Based Design Process**
  - This section now contains a more detailed explanation of the pattern-based design process.
- **Change Management**
  - This section has been clarified.
- **Service and Support Technology**
  - This section has been changed and renamed. It was formerly called “Managing Solution Portfolios.”

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SAP AG
Neurottstraße 16
69190 Walldorf
Germany
T +49/1805 /34 34 24*
F +49/1805 /34 34 20*
* Subject to charge
www.sap.com

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