

Technical Whitepaper

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Contents

Introduction.....	3
General.....	3
Supplementary ePages Documentation	3
ePages System Architecture.....	4
General.....	4
Web server.....	4
Application server.....	5
Request router and pools	5
Database server	5
Sybase High Availability and Replication Server (Merchant Enterprise and above	6
File server	6
Set Up & possible Configurations.....	7
Set Up aT ePages Hosting partners.....	7
Hardware requirements.....	7
Installation	7
Set Up at ePages Merchant partners.....	8
Hardware requirements.....	8
Installation	8
Minimal Configuration	9
Distributed Installations.....	9
Single Database server	9
Multi-shared Web and Application servers	10
Multiple Separate Web and Application server	11
Adding a Database Cluster.....	11
Distribution of Databases on Multiple Database Servers	12
Security Mechanisms	13
Independent Logical Modules	13
Password Protection	14
Access Rights	15
Session Security	15
Request Verification.....	16
Encryption	16
Communication with other Systems	17
Extending ePages 6.....	18

Introduction

General

This document provides an overview of the ePages architecture, its security mechanisms, and recommendations about specific hardware configurations based upon site load.

The following ePages features are explained in this guide:

- Increased security via independent logical modules working with a granular permission system
- High performance
- Scalability
- High Availability
- Low “Total Cost of Ownership” (TCO)

Information in this document is based upon experience and test results. Suggestions contained here provide the best balance of excellent performance and minimal hardware costs – two of the most important technical goals for B2B and B2C applications. In addition to these example scenarios, we will also gladly provide specific hardware recommendations for your system. Questions for our consulting department to: consulting@epages.de

Supplementary ePages Documentation

The following documentation exists to assist in working with ePages software:

- [1] „ePages 6 White Paper“
- [2] „ePages 6 Merchant User Guide“

The installation and management of an ePages system are described in the following documents:

- [3] „ePages 6 Installation Guide“
- [4] „ePages 6 Business Administration Guide“
- [5] „ePages 6 Technical Administration Guide“
- [6] „ePages 6 Developer Guide“
- [7] „ePages 6 and Search Engines“

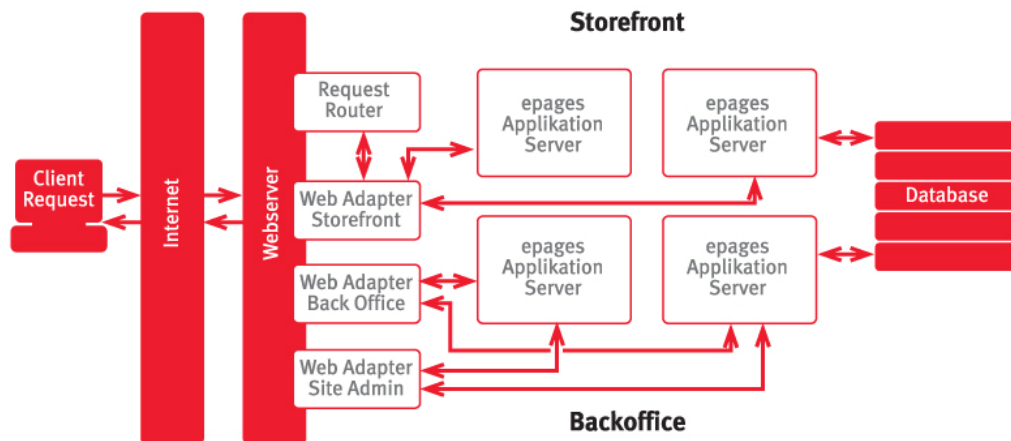
ePages System Architecture

General

ePages software consists of the following components:

- Web server
- Applications server
- Database server
- File server

The following Figure shows the architectural structure and request processing for the system:



System Request Process

The user opens a page in the shop storefront. This request is transferred through the Web server. The request router forwards the request to an available application server. The application server tests whether the page has previously been requested by a user. If the File is already on the File server, it is forwarded to the Web server and from there is forwarded to the user through the Internet. If the requested page is not pre-compiled, the application server retrieves the requested data from the database, creates the page, and forwards it to the store front via the Web server.

Web server

Which Web server you use will depend upon your operating system. ePages offers its products for the following operating systems:

- MS Windows Server 2008
- Linux Red Hat Enterprise 5 (32- und 64-bit)
- Linux SuSE Enterprise 10 (32- und 64-bit)

ePages recommends MS-IIS for Windows and Apache (included in the distribution) for Linux.

It is possible to run multiple Web servers in parallel.

Application server

The ePages application server has been developed by ePages and is programmed in the standard Web language PERL. PERL 5.10 is used in programming ePages 6. This version supports modern technologies such as Web services.

Multiple application server instances can exist on each physical machine, although the exact quantity is limited by the installed RAM and available CPUs. The larger the number of application servers installed, the more requests the installation can handle per second.

You can also have multiple application server machines running simultaneously within one ePages installation.

ePages 6 was developed so that the main system load is on the application server, because this is the component that is easiest to scale. All of the business logic is on the application server. Frequently requested data is cached there as well. This helps reduce load on the database server.

Request router and pools

The request router (RR) is especially important. It distributes incoming requests to the existing application servers.

RR can be distributed over multiple machines to enable high availability. Multiple RR will then manage incoming requests.

For very large installations with many shops, “pools” can be created. For this, databases and application server instances are grouped into “pools”. This allows parts of the application to be dedicated to individual shops or groups of shops to balance out performance and to manage various ePages subversions.

Furthermore, certain types of requests, e.g. access via Web Services, can be grouped into pools to facilitate load control.

Database server

ePages uses Sybase ASE (Adaptive Server Enterprise) Version 15.0 as its integrated database. This has proven to be very robust, high-performance, and reliable.

Requests from the application server are executed via SQL instructions.

With ePages 6 Merchant, you can run several database server machines in parallel; a cluster is required for a single database.

With the ePages 6 Hosting product, several databases (each with multiple shops) can be combined to create a single system. In this case, each individual database can have its own physical machine.

A distributed installation is unfortunately not possible regarding a dedicated solution from ePages 6.

Sybase High Availability and Replication Server (Merchant Enterprise and above)

The ePages Hosting, Merchant Enterprise, and Merchant Corporate versions are equipped with Sybase's Replication Server and offer high availability. These functions are especially appropriate for large-scale shop installations and large shops with above-average requirements for performance and availability. High availability allows you to redundantly back up a database on multiple servers within a cluster architecture to ensure database access even if a computer breaks down. Should this occur, a second server immediately begins executing all current database processes.

The Sybase Replication Server simplifies the delivery and synchronization of data at the corporate level. You can create redundant disaster-recovery sites and synchronize data via heterogeneous database platforms (Sybase ASE, Oracle, IBM DB2, and Microsoft SQL Server). This results in tremendous benefits for your customers, as the data and other applications which are managed in centralised application storage devices can be retrieved from anywhere at any time and supplied for use.

File server

Images and other multimedia files as well as static pages are not stored in the database for performance reasons. They are instead in the file system, typically on the application, database or web server. Only a reference to this file is stored in the database. The file server also centrally manages configuration files, all templates, and CSS (Cascading Style Sheet) files, which are required for designing the storefront and back office.

The file server usually is not installed on a separate machine, but rather operated on the web or application server in most cases — under certain circumstances on the database server. In the case of large installations, filers and Network Attached Storage (NAS) or Storage Area Networks (SAN) can naturally be utilized.

Set Up & possible Configurations

Set Up at ePages Hosting partners

Hardware requirements

Because no two hosting platforms are the same, there is no uniform solution with regard to suitable hardware configurations. Our Consulting Department will help you generate a customised requirements profile for your project and advise you on the system.

To give you an idea of what is required, please examine the following realistic example.

The following hardware configuration is recommended for the use of ePages 6:

- Network Load Balancer (NLB)
- failsafe NFS file sharing in backend device (ideal: NetApp Filer due to the snapshot capabilities)
- Database server with the following configuration:
1 x Quad core AMD Opteron, 3.20 GHz, 8 GByte RAM,
4 x 146 GB HD as 2 x RAID1
RH Linux Enterprise 5, 64 Bit or SuSe Enterprise 10, 64 Bit
- Web/Application server with the following configuration:
1 x Quad-Core XEON, 3.20 GHz, 16 GB RAM,
2 x 73 GB HD as RAID1
RH Linux Enterprise 5, 64 Bit or SuSe Enterprise 10, 64 Bit
- Test system:
1 x Quad-Core XEON, 3.20 GHz, 8 GB RAM,
146 GB HD
RH Linux Enterprise 5, 64 Bit or SuSe Enterprise 10, 64 Bit

The number of servers required depends on the anticipated number of shops. At least 2 web/application servers and 2 database servers (1 live, 1 stand-by) are needed to ensure system operability. This table specifies hardware recommendations as per the number of shops:

Number of Shops	Web- /Application servers	Database server	NFS memory
2.000	2	2	150 GB
4.000	4	2	250 GB
8.000	8	4	500 GB

Installation

ePages 6 is completely integrated in Parallels Operation Automation (POA). By means of POA, ePages hosting partners can manage ePages installations concerning provisioning. This includes the creation, upgrading, closing, and deleting of shops in a large-scale shop environment. As a provider, you can use different types of shops and

combine ePages shops with other products (e.g. web space) in hosting packages. Communication between ePages and Parallels occurs via Web Services.

Of course, ePages can also be installed by conventional means. Our Consulting Department can provide details about installation with regard to a specific instance.

Set Up at ePages Merchant partners

Hardware requirements

It is worth emphasizing that no two projects are the same. The minimum requirements for a single ePages installation are:

- 1 CPU
- 1 GB available RAM
- 10 GB available on hard-disk drive

It is advisable, however, to rely on a more powerful hardware profile to ensure a high-performance system. For a small Merchant Starter project, for example, we recommend:

- 3 CPUs (2 application servers, 1 database server)
- 2 GB RAM available RAM

For projects based on Merchant Pro with 12 application servers, we propose the following configuration:

- 6 CPUs (4 application servers, 2 database server)
- 8 GB available RAM

In addition, a sufficient number of gigabytes must be available on a hard-disk drive (as per the number of products, customers, images, content, etc.).

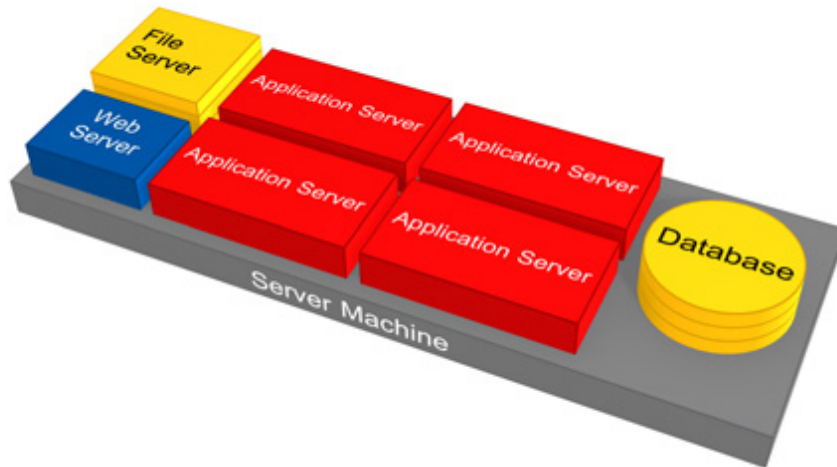
Please note that the aforementioned examples are solely for informational purposes. Because many parameters play a role, it is a complex process to determine what hardware is required for your particular project. Let ePages help you compile a suitable requirements profile.

Installation

Please consult the ePages installation guide or contact ePages Support for information concerning installation on one or more machines in a non-hosted environment

Minimal Configuration

The simplest configuration consists of installing all components on one machine.

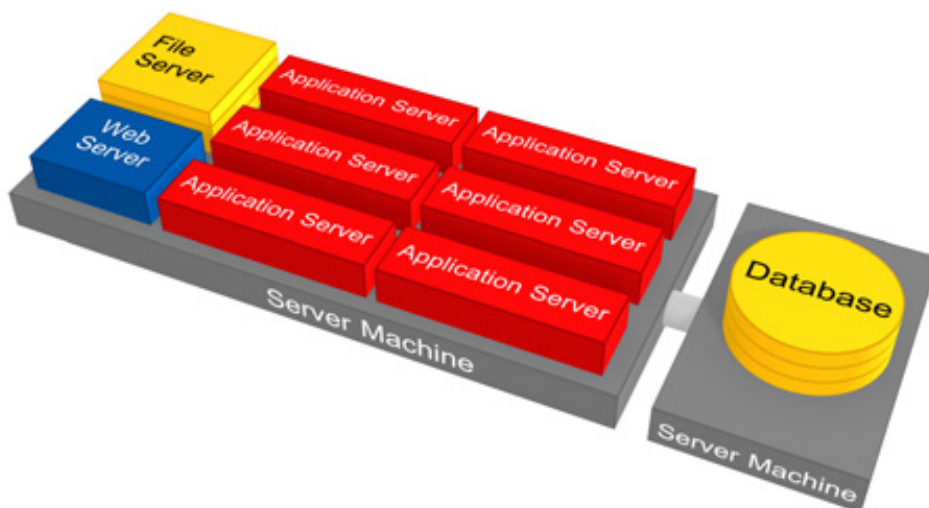


As the image shows, the standard ePages routine installs four application servers.

Distributed Installations

Single Database server

Performance can often be increased through separating the database server. This allows data-base processes to run independently of static File requests and application server processes.

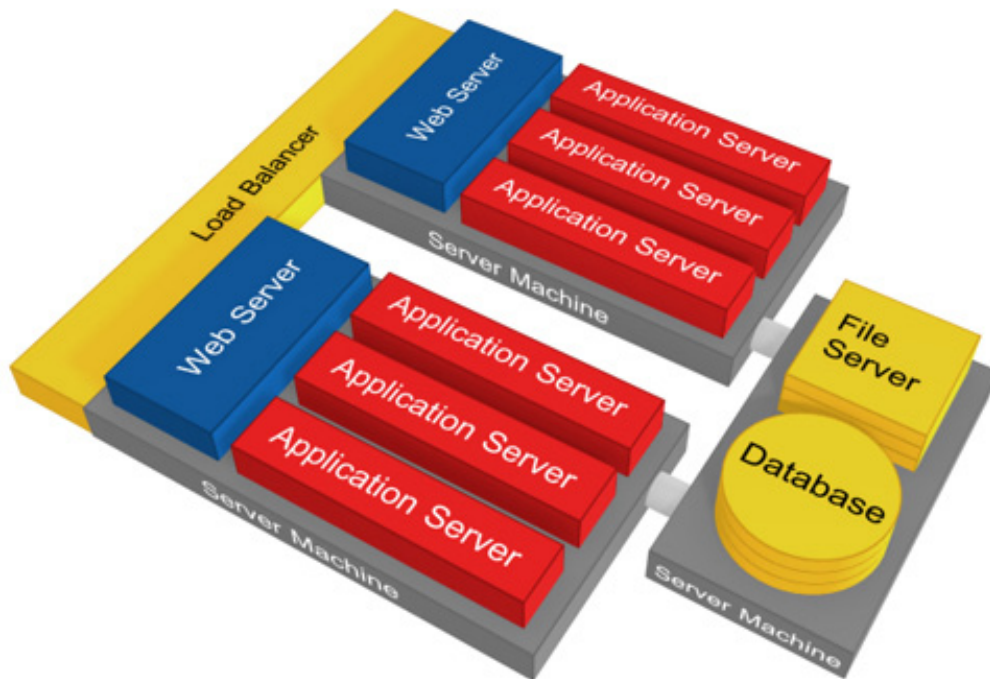


In addition, the number of application server instances is increased to provide a greater capability for handling requests.

Multi-shared Web and Application servers

A further increase in performance is achieved by running multiple Web and application servers. This configuration is beneficial for two reasons:

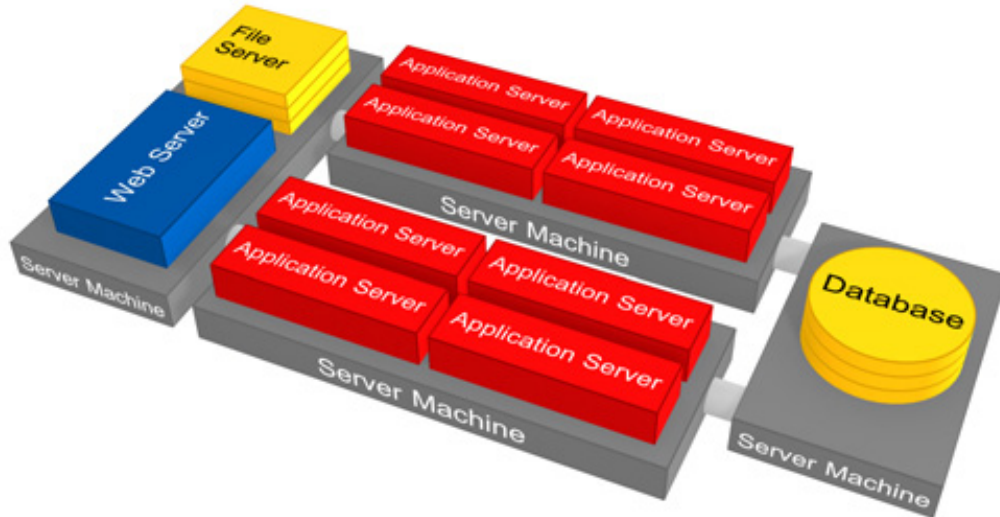
- High Availability: If a machine fails, the other machine takes over the complete operation of the site. This variation requires a load balancer (not included with ePages 6).
- Dedicated assignment of certain shops (URLs): In a multi-hosting environment, it is possible to dedicate each machine to an individual shop.



An unlimited number of Web and application servers can be added in this scenario

Multiple Separate Web and Application server

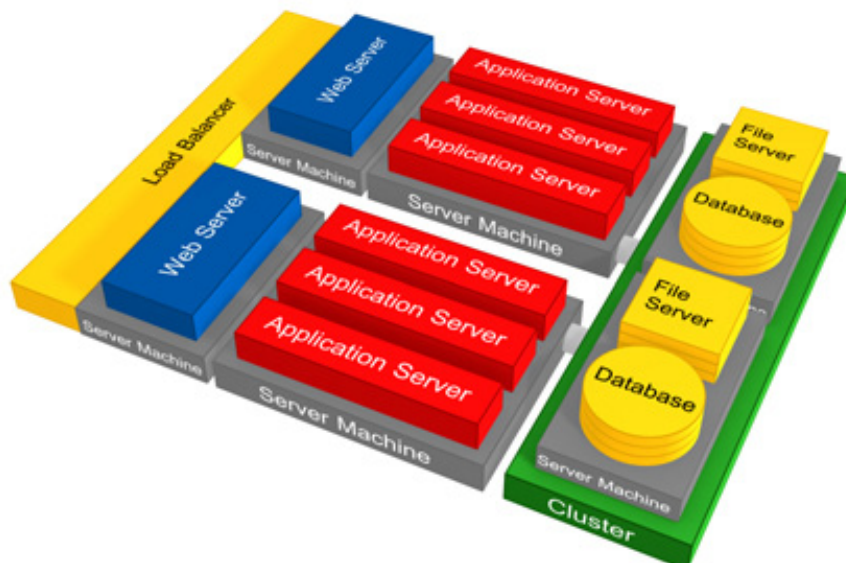
You can move the Web server to a separate machine to relieve the application server from having to manage a large amount of data (images, large pages, and so forth). Performance is significantly improved when the File server is moved to the Web Server and they are separated from the application server layer.



An unlimited number of Web and application servers can be added in this scenario.

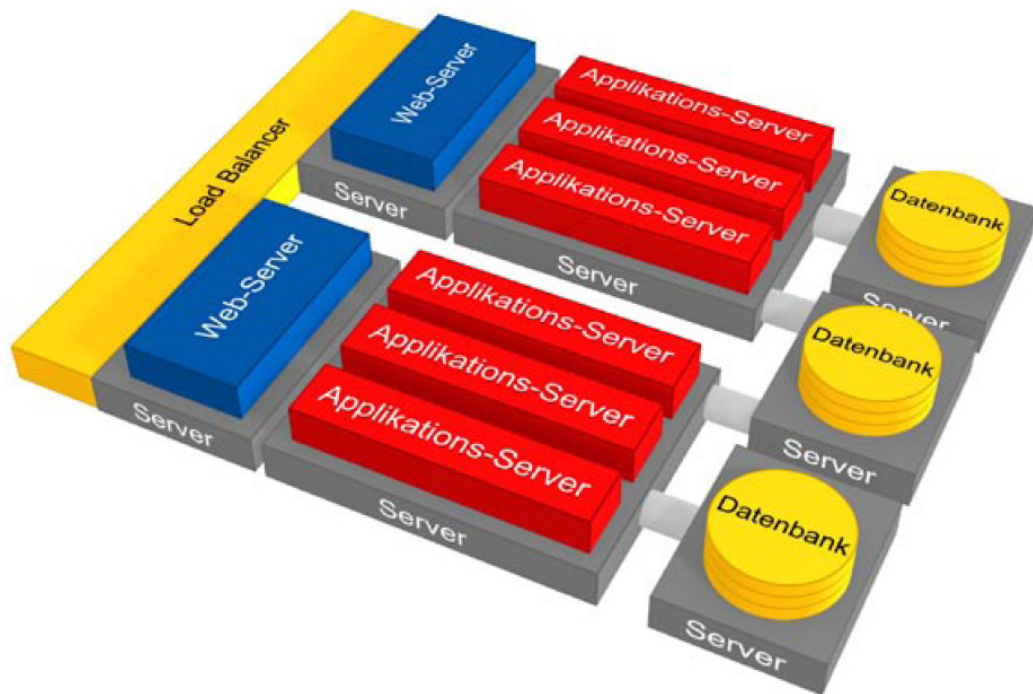
Adding a Database Cluster

To improve availability, two database servers can be used. These are run in a so-called “cluster”. The data contained on both servers is always kept consistent. If one database server fails, the remaining database server takes over operation and guarantees continued availability of the application. For this reason, one database server is active and the other is on “standby”. To prevent the “standby” server from remaining unused as long as both machines run error-free, it can be used as File server.



Distribution of Databases on Multiple Database Servers

If the ePages 6 Hosting edition is run with multiple databases, each database can have its own machine. Database processes are distributed and the performance of the database layer is thereby improved.



A “site database” is required for ePages 6. Site databases are usually used in a hosting environment to manage individual shops. This database can also be moved to a separate machine for security or performance reasons.

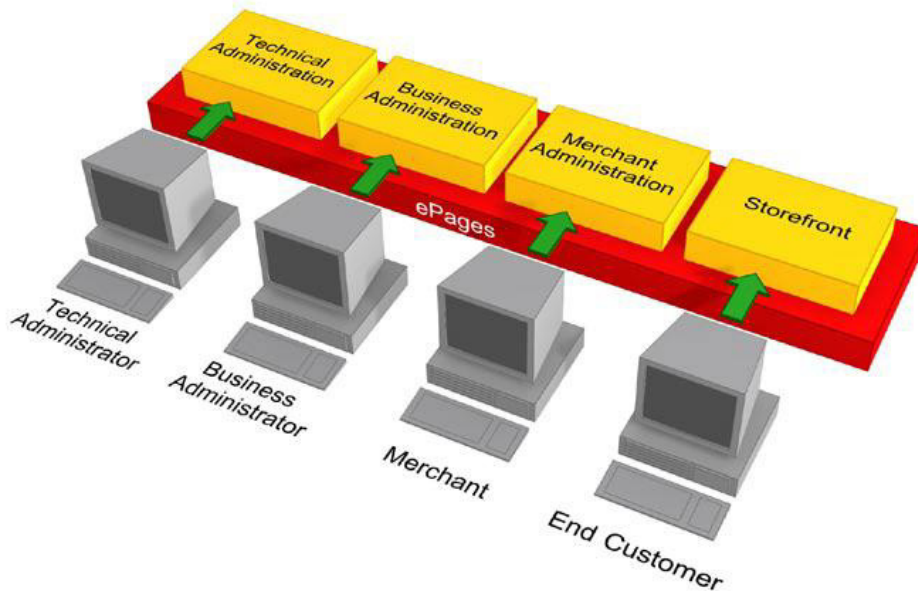
Security Mechanisms

Independent Logical Modules

ePages 6 is divided into individual modules for

- Technical Administration
- Business Administration
- Administration by the merchant and
- The Frontend

The modules are separated from one another and each is tailored and designed for its own specific purpose. Through such separation and isolation of administration, the system is protected from unauthorized access.



Due to the special access rights required to gain entry to each individual module, access is only possible for users with the required permissions. For example, the merchant cannot access functions or data in the business administration areas. Each module is accessed via its own URL.

Only the technical administrator can assign databases and perform installation procedures.

The technical administrator supplies data to the business administrator, allowing the latter to define types of shops or websites and to obtain an overview of the websites and shops. However, the business administrator can access neither a shop's product/order data nor a website's content.

Merchants manage their shops by means of seven modules, which facilitate the handling of orders, products, customers, et cetera; fewer functions are correspondingly necessary for a website's operator. However, merchants cannot influence the functional scope provided by the business administrator.

End customers can browse in storefronts, perform searches, place orders in shops, and make reservations on websites. Naturally, they cannot alter content, product descriptions, prices, discounts, and the like.

The shop system passed inspection by the *TÜV Rheinland* (Rhineland Inspection Authority) in 2006.

Password Protection

Each administration module, as with access to the personal data of registered customers (“My Account”), is protected by a unique login and password. The structure and design of ePages 6 prevents access to information “behind” the login page



Welcome!
Please sign in.



User name

Password

Forgot your password?
▶ [Request password](#)



All password data is encrypted before being saved in the database. The encryption is irreversible. This means that a saved password cannot be seen by any user. Forgotten passwords can be reset after authentication - a new password is then generated by the system.

When selecting a password, certain rules should be followed. Passwords should contain:

- At least one capital letter
- At least one lowercase letter
- At least one digit
- At least one special character

Passwords should never:

- Consist of single words that are found in a dictionary (of any language)
- Consist of single words that are found in a dictionary (of any language) and that contain a numeric prefix or suffix, such as house13 or 12dogs
- Be names of real or fictitious persons, house pets, boats, cars, products, and so forth.
- Contain more than one repeating character (for example, AAA1111)
- Contain characters or digits sequentially (for example, ABC1234)
- Contain more than two characters of a keyboard sequence (for example, QWErt46)
- Be the same as the user name

Access Rights

Permissions are managed for each module independently. Permissions that allow access to data and specific functions can be set in detail, either

- Coarsely (per module) or
- Fine-grained, meaning for each command or action

After logging into a module using a login and password combination, the role of the user is clearly defined and with it, his or her permissions. For example, a merchant has access to all order and customer data within his or her shop. This allows the merchant, for example, to change an incorrect customer address. The registered end customer can access his or her own orders using “My Account”. However, the customer can only view them and cannot change them.

Gaining access to functions that are not assigned for a particular user is impossible, even if the user creates a new URL or copies an existing Web form.

Additional protection exists in ePages 6 because access to the database is restricted to another (internal) user. Even if someone has illicitly acquired a merchant password, external access to the database is impossible since the database is behind a Firewall, and the interface for database access (the database port) is only open to the chosen database administrator.

Session Security

Session ID

A session is a series of related requests made to the ePages system. Each system request from a particular user must always be assigned to this user. ePages6 generates a session ID to enable authentication of user requests to the server. The session information must be available to both the server and client (the user who sends requests to ePages 6). If a new request arrives with the identical session ID, the server is able to correctly assign it and can handle the request accordingly. This makes it possible, for instance, to assign a filled shopping basket to a specific session, meaning that it “belongs” to a specific user. Further products that are placed in the basket by the user will be placed in this exact basket.

Session Cookie

ePages 6 works through so called “session cookies”. Session information is saved to a small File which only exists in the system memory of the client computer. Session information is not saved on the hard drive and is lost when the browser window is closed.

This guarantees a high level of security because session information does not appear in the URL and therefore cannot end up in the wrong hands. In addition, a URL without a session ID considerably enhances search-engine friendliness (see [7]).

Session cookies are allowed by Internet browsers with even very restrictive security settings, and as such do not create any obstacles for the user in shopping on an ePages storefront.

This combination of security logic and independence of individual modules prevents unauthorized access to data, or unwanted tampering with functions.

Request Verification

Another security feature is the verification of all requests. In addition to requiring the correct session ID, only “valid” or “recognized” requests are processed. Invalid parameters, such as the opening of a back office function by a storefront user, are ignored. Even if the user has the requisite permissions to access the back office, he or she is only able to access the functions assigned to him or her in the back office. Example: Even if an administrator has access to the back office, he or she cannot make any changes to a basket to which a customer is adding products in the storefront.

Additionally, the system can be configured so that requests from the administration levels (technical and business administrators) must arrive from specific IP addresses. The prerequisite for this is a separate Web server for these areas

Encryption

Naturally, ePages 6 supports encryption of pages and transferred data. ePages recommends that all administrative pages as well as all pages in the storefront where customer information is entered (such as address or payment information) should be encrypted.

Communication with other Systems

Special requirements exist for other systems to communicate with ePages 6. For example, during payment via electronic systems, encrypted communication is mandatory (see above). In most payment systems (for example, PayPal), credit card data is not entered into the ePages system. ePages 6 only transfers the purchase total and currency data of the order to the e-payment system via secure channels. The end customer enters credit card information here and authorizes charges for the transaction. ePages 6 and the merchant only receive a confirmation to inform them of the success or failure of the transaction, but they do not receive the credit card data itself. Security is therefore improved by reducing transfer of this sensitive data between systems. The shop database is thereby not required to manage or store this sensitive data.

Web Services

Web Services provide another secure communication method with other systems. This technology, which requires a special protocol (SOAP) and uses XML structures as data containers, is used to facilitate communication between ePages 6 and systems such as enterprise resource planning (ERP) applications, or with customer relationship management (CRM) or logistics systems. Access via Web Services should be encrypted (unless both systems are connected through an internal, secure network) and secured through logins with user names and passwords.

The security of data between applications and the authorization of function calls should be carefully considered during any integration between ePages 6 and other systems.

Extending ePages 6

ePages 6 can be enhanced in two ways: You can add functionality to the shop itself, or integrate the system into other applications. These customizations can be made in a number of ways. In order to standardize all proprietary developments in design, database extension and Perl coding, any proprietary developments are added to the system in the form of “cartridges”. Cartridges have to conform to certain ePages 6 standards and, therefore, have the following advantages:

- They can be easily installed and uninstalled.
- They recognize permissions and rights.
- They can use all functions of the standard ePages API

To assist in the development of cartridges, ePages provides a cartridge development toolbox. It contains helpful and regularly used scripts, detailed documentation with code examples and database models, and two reference cartridges built by the ePages development team.

Finally, a diagnostics cartridge is provided that gives a detailed overview of your ePages system and any proprietary developments installed on the platform.



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