



Database Conversion between all the most popular DBMSs: MS[®] Access[®], MS[®] SQL[®], MS[®] FoxPro[®], MySQL[®], and PostgreSQL[®]

Today many companies determine to publish their data on the Internet trying to expand their business and make their information more accessible. The IT industry proposes a wide range of original solutions for resolving data inconsistency problems that publishers inescapably face when exporting their data as they need to properly access, process and interchange large amounts of information mainly through the web.

Database design is considered to be the most opportune manner to arrange data on the web in an organized way so that both you and your clients can easily access them. Data are made accessible online with a web server as its front-end and a database server at its backend.

Software products market abounds with various tools providing different solutions. That's why it's very difficult to choose a suitable product that must meet the demands described in this whitepaper. Often publishers face the challenge how to select a conversion tool which can reliably migrate data from one database format to another. Hopefully, this white paper will help evaluate a tool you may need when you have a task to transform data.

A variety of database management systems are developed to rationalize the process. Let us talk about the basic database applications. But firstly we would like to clarify some definitions such as 'database' and 'database management system'.

Database is a systematized collection of data that can be accessed instantly and handled by a data-processing system for a particular design. One or more files kept in the mass storage can compose the structure of the database.

It is significant to know how the database application of your choice stores the information on your computer since this has aftereffects if you want to migrate the database to another platform.

It is significant to know how the database application of your choice stores the information on your computer since this has aftereffects if you want to copy the database to another machine.

A database management system (DBMS) is a computer program developed for the design of managing databases. In other words, DBMS is an application that provides creating, storing, updating and searching of the information in databases with advanced data-query language as well as managing of security and data integrity. By means of transactions procedure current DBMSs support simultaneous multi-user access to the data including the ability to influence the results obtaining by different users.

Talking about databases we firstly need to talk about how databases are organized and represented. A *hierarchical* database structure is how many enterprises and departments are arranged.



Another structure is called a *network* structure (not to be messed with a computer network). In this case, reciprocal relationship between the data are more easily represented, which enables for dependencies to be altered depending on the specific software.

Presently the most popular structure is the *relational*. In this concept, tables are used to represent the data. Each table has a name and is called a relation. Many relations can be created in one database. Such commercial databases as Microsoft's Access and Borland's Paradox are examples of relational databases. Because of the popularity of relational databases, we will clear up the most important advantages for this structure.

Also all DBMSs are divided into multi-user and single-user types. **Single-user DBMS** is a system in which access restricted to a single user. It can't be communicated with from outside applications. It is a single-connection and single-threaded system.

Multuser DBMS as a standalone database can support as many connections as needed capable of being used by several people at once. A multuser DBMS, as its name means, must enable

Examples of systems that could be classified as single-user DBMSs are MS Access and MS FoxPro. MySQL, MS SQL, and PostgreSQL are examples of multiple user DBMSs.

multiple users to access the database simultaneously. This is necessary if data for multiple applications has to be integrated and supported in a single database. The DBMS must include multiprocessing control software to guarantee that several users trying to update the identical data do so under control so that the outcome of the updates is correct. A primary role of multuser DBMS software is to provide that multitasking transactions that

must operate correctly.

Usually mainframe and network DBMS systems are multi-user systems, while the desktop DBMS is considered to be single-user.

The most popular applications are MS Access, MS SQL, MS FoxPro, MySQL, PostgreSQL since they do not require extensive computer knowledge and advanced skills to deal with. These are DBMSs that provide an efficient set of tools that make accessing, organizing, and sharing information easier than ever. They are reliable, fast, and easy to use, with secure and flexible password system that enables host-based verification. DBMSs were primarily designed to manage vast databases at a much faster speed than the solutions that formerly existed.

One of the most influential and widely spread open source database applications that manipulates large databases and can be accessed over the Web is MySQL database server.



MySQL is a relational database management system (RDBMS) which runs as a service providing multiple user access to several databases. MySQL is popular for web applications and operates with the database elements for the BAMP, MAMP, LAMP, and WAMP platforms (Linux/BSD/Mac/Windows-Apache-MySQL-PHP/Perl/Python).



MySQL popularity for use with web applications is closely associated to the popularity of PHP which is often connected with MySQL. Many high-traffic web sites use MySQL for its data warehouse and logon user data access.

Ability to connect to MySQL database servers located on all Windows and Unix-like machines can be also regarded as one of the main advantages for a conversion product you may select.

Along with actual advantages MS Access has storage management limitations so it is usually used as an individual or single-user application. Because of these restrictions, many companies wish to extend their business to assist more customers and users to migrate their data to a storage manager with greater capabilities.

For ensuring security MySQL Server uses SQL authentication or NT authentication to grant permissions to database objects so you needn't to worry about your data safety.



PostgreSQL is an object-relational database management system (ORDBMS).

PostgreSQL is principally used for worldwide mission critical applications. The .info and .org domain name registries use it as their primary data store, as do many financial institutions and large companies.



Microsoft Office Access is a relational database management system that combines software development tools and the relational Microsoft Jet Database Engine with GUI.

Access can use data stored in Access/Jet, Oracle, Microsoft SQL Server, or any ODBC data container (including PostgreSQL and MySQL).

MS Access is used by small businesses, within branches of large corporations, and by pastime programmers to design special customized desktop systems for manipulating the creation and management of data.



Microsoft SQL Server is a relational database management system (RDBMS). Its primary query languages and types accordingly are T-SQL and MS-SQL.

The basic unit of data storage is a database, which is a set of tables with typified columns. SQL Server supports various data types, including primary types such as *Float*, *Decimal*, *Integer*, *Char* (including character strings), *Varchar*, binary (for flat binary large objects of data), and *Text* (for textual data).



Although **FoxPro** is a Database Management System and it does support relationships between tables, it is not regarded as RDBMS due to missing transactional processing.

Visual FoxPro, generally abbreviated as VFP, is closely integrated with its own relational database engine, which broadens FoxPro's xBase capabilities to maintain SQL inquiry and data manipulation. Unlike most DBMSs, Visual FoxPro is a full-function, dynamic programming



language that does not demand the use of an additional universal programming environment. It can be used to write not just conventional "thick client" applications, but also web application programs and middleware.

The operating systems the RDBMSs MySQL and PostgreSQL can run on are Windows, Mac OS X, Linux, UNIX while Microsoft Access, Microsoft Visual Foxpro and Microsoft SQL Server runs only under Windows. Although the requirements for DBConvert products are specified for Windows OS the tools also support connection with servers located on Unix-like systems.

Getting round the access limitations

Having put your data in MS Access you can find out that it is not possible to update the data in MySQL base as you have no direct access to it. To gain access to a MySQL base you usually need to obtain the permission for connection from your Web hosting provider. Database administrator can deny your access being concerned in protecting the information and avoiding insecure connections (for example in the case you use dialup internet connection your MySQL server administration can reject giving you a direct access to db as your IP is not static and changes each time you get online). In this situation saving data of MS Access database in a dump file comes into play. Thus the ability to store data into a dump file is the best way to present deferred conversion, gain more control over the conversion process and resolve the access problem. The contents of the source database will be stored into a local dump file instead of sending it to the server directly. This file will be delivered to the server where the work with particular database is executed and using this dump file the server administrator will add data to your base. Thus, you will be able to create Dumps and PHP scripts for indirect data uploading on MS SQL, MySQL, and PostgreSQL thereby going a workaround way to possible server restrictions.

Working with data a trustworthy tool must establish stable connection between platforms and provide secure tunnel for safe and quick data running with optional configurations.

Two-way conversion

Being informed with the most popular database applications you can get benefit from their abilities but firstly we need to discuss a few crucial issues. Data conversion is one of them.

The chief purpose of every conversion application is to convert one database into another one. When setting your choice on an efficient application that will be responsible for your database conversion you'd better select a tool that is able to implement two-way data transfer. It will give you an additional opportunity to take more control over your conversion process and will create prosperous conditions for managing.

You can benefit from the ability to save data to a dump file (e.g. PHP Script or SQL Access file) that enable you to get through the limitations of the direct access to your databases if any.

Selecting a tool for database conversion is a rather difficult thing if you make your decision after scrupulous examination. There are certain issues to be taken into consideration when making the decision.

Usually, data conversion means the process of converting data stored in one format to another format. In other words data conversion is a data migration process from one DBMS to another one without a loss of accuracy.

The result of conversion is identity of the data: all data from the table in source database must be fully duplicated the table in destination database. Due to the lack of time to learn database technology the life of database publisher can be relieved by many useful tools

accessible on the market this time.

Synchronization

If you need to keep your database updated make sure that a conversion tool you'd like to purchase accomplishes synchronization option that will enable your data to be reflected and regularly synchronized through the Internet. It is a common practice for organizations to have similar or identical databases in many systems.

Synchronization process includes data uploading or mirroring between two or more databases. It would be better to update only the tables that have been changed since the last synchronization without converting the entire database in order to minimize the bulk of data that will have to pass through the network.

The converters from Database Conversion Product Line provide with three types of synchronization: *insert synchronization*, *update synchronization*, and *drop synchronization*. The result of the insert synchronization is the added records from a source to a destination if there are no coincident records in the last one. Update synchronization allows keeping all your data updated. Drop synchronization enables data coincidence between source and destination databases. Insert synchronization, update synchronization and drop synchronization all together allow you to perfectly accomplish full synchronization when destination database completely matches the source database.

Database synchronization is not only a business requirement but also a competitive privilege as long as synchronization makes it easier for your clients to do business with you providing ultimate convenience for optimal results. It allows you to effectively manage interactions with the online community.

Preverification of possible conversion errors

Any conversion process is difficult to imagine without any possible data collisions due to the peculiarity of your database structure and its types. Sometimes, it may happen that the general rules of database design are not observed in view of particular requirements. In this case, it is essential to be notified about the program behavior beforehand. As the saying goes, to be warned is to be armed.



It's quite possible that some errors that could bring to the conflict on a destination database are easy to eliminate by a small redesigning of a source database in one touch.

DBConvert provides preverification step to estimate the conversion process and performs a list of possible errors and warnings which usually appear during data conversion. All these issues are covered in the well-stated Help that is supplied along with each DBConvert product.

Automation of the process with built-in Scheduler

If scheduling function is available it gives you an opportunity to launch the conversion process on a user required schedule that implies that you can run a program without user participation. Built-in scheduler enables you to automatically synchronize or convert data regularly without supplementary settings and with the smallest effort.

Comprehensive scheduling functionality (creating a scheduled task to run once only as well as daily, weekly, monthly, or at certain times e.g. when a user logs on, modifying the schedule and customizing how a task runs at a scheduled time) is supposed to bring extra flexibility to your business thus you can focus extra efforts on more important activity.

Using sessions and batch files as parameters the scheduled tasks will automatically work as services in background mode giving you an opportunity to keep them unattended at anytime after having scheduled it once. DBConvert built-in scheduler works on the basis of the standard Windows scheduler thus making customization easier as you can specify settings by analogy with the familiar task planner.

Comprehensive scheduling functionality brings extra flexibility to your business thus you can focus additional efforts on the activity which couldn't be kept without your first-hand participation.

Data Filtering

Data filtering is the additional feature which performs the most advanced method to export definite data. Applying filters user can set complex conditions and as a result receive complete information according to specific criteria separating all the rest records from a table. The purpose of data filtering is to assist the user in conversion of only needed range of information.

You can get a full control over the migration process with customizing integrated data filters which allow users to split large amounts of data and to retrieve only specific data according to defined filtering criteria.

It is possible to create new filters on the base of query and easily modify existing queries by adding your own conditions manually. Enabling filters in your conversion process you can reduce time required for migration of all info and retrieve only needed.

Taking into consideration the information above it would be better for you to find a tool that provides easy-to-use data filtering assignment that can be applied to all

tables in MySQL, MS SQL, MS Access, PostgreSQL and FoxPro databases for partial conversion. You can simultaneously determine multiple criteria for a table.

Filtering seems to be especially useful when you need to process tables with large bulk of data. Using filters, it is possible to handle only the records that meet your precise criteria in a second.

Data Mapping

In general, data mapping is the process of creating data element mappings between two distinct data models. Data mapping is usually used as an additional ability for data population. In other words, data mapping is a compatible data types' assignment for a destination database that makes your conversion more flexible.

With integrated Data Mapping feature you can easily match one data type to its closest and relative equivalent in target fields.

Just choose data types you need for the target fields or the most appropriate data types for the source type and a reliable tool you prefer will automatically transform types from one specific format to another.

Secure Shell (SSH) Support

The need for data safety sets the additional requirements to a conversion tool. Thus, a tool of high quality must support secure shell (SSH), a program that allows a user to log into another computer remotely across the Internet, while maintaining complete security. It's a packet-based binary protocol that provides encrypted connections to remote hosts or servers via a secure channel. The encryption used by SSH guarantees privacy and data integrity over an insecure network as the Internet.

SSH tunneling feature is firstly useful for accessing PostgreSQL and MS SQL servers supporting remote connections.

SSH is used for port tunneling or forwarding, often as an alternative to a full-blown VPN. What SSH tunneling enables you to do is to transmit all your traffic to the server via your SSH connection.

An insecure TCP/IP connection of a front-end application is forwarded to the SSH program (server or client), which redirects it to the other SSH party (client or server), which in turn redirects the connection to the needed destination host. The redirected connection is encoded and protected on the path between the SSH client and server solely. One of the uses of SSH port forwarding is accessing database servers.

SSH tunneling feature is firstly useful for accessing PostgreSQL and MS SQL servers connected remotely.

Database Schemes Support



In the case you want to keep your database safe and secure make sure that a conversion tool you'd like to buy supports database schemes. The application must operate with schemes which exist in a certain database.

Schemes are necessary for data security, data partitioning, and data access separation.

The scheme of a database system is its structure defined in a program language supported by the database management system. In RDBMS, the schema defines the tables, the fields in each table, and the relationships between tables and fields.

Usually schemas are stored in a data dictionary. Although a schema is described in text database language, the term is often used to mean an iconic representation of the database structure.

Database schemes are one of the most popular methods used by MS SQL and PostgreSQL administrators for dividing access rights to the information stored on a server. This method is very popular among database administrators because it shifts the burden of account management to the network administration staff and it provides the ease of a single sign-on to the end user. For MS SQL there are such schemes types as SA, DBO, DBOO, Database User, etc. Creating database schemes types in PostgreSQL is considered to be the prerogative of the administrator.

Conclusion

Now that you're more familiar with problem, what's the solution? That isn't always a simple answer. Just keep in mind that you have to cautiously consider all the factors that affect the choosing a conversion tool that will serve your business in long term period. When come to your decision, make certain of that all your urgent needs are met.

In case you consider using specialized data conversion software such as DBConvert applications you have a good chance to combine your computer's ability to gather and sort vast amounts of data - and the Internet's ability to distribute it globally.

DBConvert product line due to its user-friendly intuitive design and first-class technology presents beneficial complex solution enabling you to accomplish scheduled conversion and synchronization with maximum simplicity and convenience. DBConvert products are easy to maintain and upgrade.

Regularly benchmark tests show that DBConvert products obviously stand out from the crowd of similar data conversion tools with its unique features and improved general functionality along with high speed of conversion and stability of the software.

*DMSoft Technologies has plenty of practical experience in data conversion industry and presents **DBConvert** product line that performs two-way conversion with synchronizing, scheduling, data mapping, data filtering, and preverification functions.*



Along with the basic DBConvert tools DMSoft Technologies recently designed two new products having no matches in this sphere. These are **DBForms product line** and **DBConvert for MS Excel & MySQL tool**.

Due to the unique **DBForms** tool you can easily transform Access forms and their parts to .aspx pages. Converting forms (Single Form, Continuous Forms, Datasheet), and their elements to Web page and filling form fields with data from the fields of your Access tables is not a problem any more. During the conversion, controls' position, colour pallet and fields type are accurately converted. You have the opportunity to place your forms on a Web page directly through FTP connection or save your forms to a local folder on your computer for future uploading to FTP.

Unlike the other similar tools that commonly perform only one-way conversion, **DBConvert for MS Excel & MySQL** is an incomparable application which allows you to easily convert .xls (Microsoft Excel) files to MySQL databases in both directions. DBConvert for MS Excel & MySQL makes it easy to operate with a whole database or select only needed tables, fields, sheets, indexes and foreign keys to proceed. Even using a single Excel sheet you can easily build as many tables as you need to convert. It can be possible due to integrated **Data Selector with edit-in-place capability** relevant only to Excel data.



Comparative overview of all DBConvert product line tools. They include **DBConvert**, **DBSync**, and **DBForms Series**.

Features	DBConvert	DBSync	DBForms
Interactive (GUI) mode / command line mode	✓	✓	✓
Preverification of possible conversion errors	✓	✓	✓
Feature to replace symbols in names of tables and fields	✓	✓	✓
High speed data conversion	✓	✓	✓
High speed data synchronization	—	✓	—
Saving data to local dump file	✓	—	✓
Saving data to PHP script file	✓	—	✓
Saving data to SQL Access file	✓	—	✓
Unicode Support/Connection character sets support	✓	✓	✓
Primary keys and indexes support	✓	✓	✓
Foreign keys support	✓	✓	✓
Advanced customization options	✓	✓	✓
Sessions support	✓	✓	✓
Built-in scheduler	✓	✓	—
Data mapping	✓	✓	—
Data filtering	✓	✓	—
SSH support	✓	✓	—
Forms conversion	—	—	✓
Database schemes support	✓	✓	—
Skins support	✓	✓	✓
Multilanguage support & 1-year free upgrades	✓	✓	✓