



MAGEC™ RAD LAMP

Description

The MAGEC Rapid Application Development system for the LAMP stack is a very powerful, easy-to-use, automated, **data-driven** application development system that produces PHP/MySQL programs that run on an internet server and can be accessed from any device that can connect to the internet. MAGEC applications can be deployed on a variety of platforms; but the primary target configuration is the **Open Source** Linux-Apache-MySQL-PHP (LAMP) stack. They do not create dependencies on non-open source libraries.

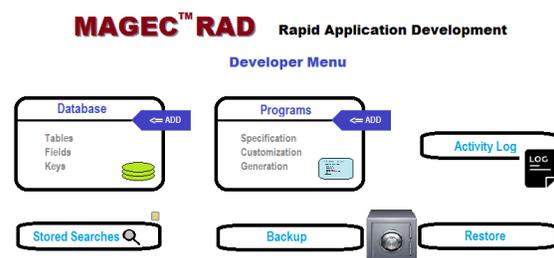
History

Al Lee & Associates, Inc., a pioneer in **data-driven application development**, created and marketed the MAGEC™ Rapid Application Development system for mainframe environments decades ago. The system is still in active use in large companies and government organizations. It is a data dictionary-driven application generator that produces very powerful and full-featured online applications from specifications and data definitions with very little effort required by the developer. The new LAMP implementation is based on the same proven principles; but is an entirely new product that takes advantage of the many powerful and user-friendly features that modern **cloud-based** computer technology offers. It is even easier for a developer to produce *and maintain* working applications and the applications are even more robust than was possible in the older environment.

Architecture

Applications consist of two major components: the database and the programs. A developer can define database tables and fields via MAGEC online functions. If the tables do not already exist, they can generate them immediately. If the tables do already exist, MAGEC will auto-populate its data definition from the MySQL schema. Then they can generate fully-functional programs by simply specifying which tables they wish to access.

The generated programs are ready to use immediately with no customization required. They include thorough data validation and formatting to protect against bad data being updated to the database. They also include very powerful scan and search capabilities, logical joins of records from multiple tables, audit trails of database updates, login security control, data encryption, data compression, online help for every screen and every field, and many more features even without any customization—but, MAGEC also includes the ability to do virtually unlimited customization that will be saved in MAGEC’s repository so the developer can iteratively modify, re-generate, modify further, re-generate, and so on without losing previous work.



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If changes need to be made to the database definition, they can be made online to the MAGEC repository, then sync'd to the MySQL schema at the touch of a button. Then, the programs can be re-generated to reflect the changed database definition at the touch of another button. All this can happen in minutes, or even seconds!

Currency

One type of problem that often plagues application developers is a mismatch of versions of programs and database definitions. It is easy to modify the database definition, perhaps to add a few fields to a table, then to forget to update *every* program that accesses that table, whether as its primary table or as a joined table, so it will properly handle the new definitions.



MAGEC maintains a timestamp of all relevant activities, such as modifications to data definitions, synchronization with MySQL schema, alterations to program specifications or customization, generation of programs, and so forth. When a developer makes any changes it immediately knows what needs to be synchronized with the MySQL server definition and what programs need to be re-generated. It presents highlighted messages to the developer that include buttons they can click to do all needed tasks to bring all components current.

Consistency

Consistency and standardization are key factors in the power of MAGEC. Consistent screen behavior, functionality, and exception handling make MAGEC applications both easier to learn to use and easier to maintain. In keeping with that, MAGEC even encourages the developer to use uniform data names and formats from table to table and program to program by searching for and reporting inconsistencies. It will, for example, alert the developer if they define an *EmpNo* as a 9-digit numeric field in one table and as a character (not necessarily numeric) field in another. It allows the developer to allow the inconsistency if they wish to; but we believe that these inconsistencies are most often mistakes.

Consistent data names and definitions help MAGEC to automate even more processes; for example, MAGEC can assume that it can use the *CustomerNumber* in the *Invoice* table to automatically generate join logic to access the *Customer* table, or vice-versa. Of course, the developer can override that assumption via customization; but most of the time the assumption will be correct, eliminating the need for customization coding, if consistent names are used.

Debugging Tools

If errors in programs do occur, the programmer has a suite of tools to help quickly find and correct them. They include error logs, colorized code analysis, and the ability to try “what-if” scenarios and to instantly undo changes if desired. A comprehensive error log Control Panel helps the programmer quickly find and correct problems.

Database Audit

An automated audit of the database definitions and programs detects errors or exceptions that might cause system malperformance or compromise of security and guides the developer or security officer to

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the affected object. It detects conditions that could have resulted from human error, hardware or software error, or malicious attack, and prevents execution of any system functions that are in a questionable state until integrity is validated by an authorized security officer or development manager. MAGEC is able to detect even sophisticated side-channel attacks and to prevent them from accessing or corrupting database data.

Stored Searches

The powerful search capability of MAGEC is the result of adding some intrinsic PHP features to the already powerful SQL capabilities and then adding some MAGEC enhancements on top of that. MAGEC also includes the ability to store search parameters for later re-use. The results of any search can be displayed to the screen, printed to paper or to a PDF file, or exported as a CSV file to be loaded into your spreadsheet software (Excel or any other), or imported into any other software product that accepts CSV input (most software does).

Stored searches can obviate the need for **report** or **extract** programs in many cases.

Audit Trails

MAGEC maintains a log of all database updates and also, as a standard, maintains a time stamp for every record in the database. These features can help you to recover from errors, hardware crashes, or malicious invasion. A user using any standard MAGEC-generated application can see a history of updates to any record by just clicking on a button.

All program errors or potential security compromises are also logged.

Backup & Restore

MAGEC also includes an integrated **Backup and Restore** feature that keeps backup files in an organized directory and lets you do complete or partial restores at any time. It also will automatically download both database backups and zip-compressed backups of programs and other files to a local computer drive on demand. Backup statuses and all backup and restore operations are managed, monitored, and controlled via a comprehensive **Control Panel**.



Updates to programs and data definitions are logged and timestamped and a backup of any table including its **definition and contents** is automatically taken before changes are applied to the MySQL schema. Even massive mistakes can be undone in a flash by simply restoring.

The system automatically monitors for currency of backups and notifies designated managers and security officers if a backup is overdue.

This same capability applies to the applications you develop with MAGEC as well as to the MAGEC development applications. MAGEC makes it easy to UNDO damage done because of user error, programmer error, hardware failure, or any other type of disaster.

Backup and activity logging are “security-aware” and will not reveal encrypted data!

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Other Features

MAGEC-generated applications can take advantage of a long list of features available via APIs, including Google maps, speech recognition, image geo-tagging, GPS geo-location, embedded videos, RSS news feeds, dynamic charts and graphs, and much more.

Helpful Online Help

All MAGEC-developed functions include online help for the screen, for every data field on the screen, and for the powerful search and export features that are built in. Error messages are explicit and meaningful and the error fields are highlighted in red.

Of course, since the developer functions are actually MAGEC-generated applications themselves, all this is true for every MAGEC development function as well as for every application you produce with MAGEC.

Automatic Data Validation

A fundamental principle of MAGEC is that data that is posted to the database should be thoroughly validated.

Because MAGEC's development is driven by the data definitions, a host of validation and formatting features is automatically generated for every data field on the screen.

Any field that is a date, for example, will automatically have a calendar date picker so the operator does not have to type in a date; but can point to it on a calendar. Currency fields are automatically formatted. So are phone numbers and numeric fields. Fields that have a finite list of valid values will present as either radio buttons or a drop-down selection list, as specified by the developer. Fields that are a VIN or NPI number are automatically checked for valid format and checksums, zip codes and email addresses are checked for validity. State codes automatically provide a drop-down list, and more.

MAGEC will even generate validation for a range of values automatically. The value range can even reference another data field, for example: the expiration date may not be less than the effective date.

Data Compression

MAGEC allows you to specify data compression on a field-by-field basis and automatically handles compression and decompression seamlessly for your applications. Space savings of up to 75% are common for large text data elements.

Security

MAGEC automatically provides online security for all functions, along with audit trails recording who (and when and from where) added or modified any data in the database.

Users can specify their own password plus a duress password that triggers a security alert if used. This allows a user to appear to be logging in normally if under duress—useful for law enforcement, military, or high-value industrial applications. When a user is logged on using their duress password the system will appear to be working normally, but no updates to the database will actually work and security alerts will be issued to the designated security officers.



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Data encryption using the worldwide standard **AES** algorithms (using 128- to 256-bit keys plus nonces or initialization vectors, where appropriate) is built in to MAGEC and can be specified on a field-by-field basis with no programming work required.

MAGEC also includes a secure messaging facility that enables users to send encrypted messages among themselves that cannot be read by anyone but the intended recipients, not even by the engineers who designed the system! MAGEC defeats almost any type of side-channel attack!

Summation

The MAGEC RAD system enables the fast development of large-scale applications that once were the domain of expensive mainframe computer systems, in a modern web/cloud-based environment. MAGEC-generated applications have all of the benefits of their mainframe counterparts *plus* they are able to take advantage of all of the capabilities of the LAMP stack environment.

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