

Acro \TeX Software Development Team

Acro \TeX eDucation Bundle
The **eq2db** Package

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1. Introduction

This package is meant to be used with the `exerquiz` package, one of the components of the **AcroTeX eEducation Bundle**. This package is used to customize `exerquiz` to save results of the `quiz` environment to a database.

The `eq2db` Package has five options:

1. `eqRecord`: Save quiz data to a database, such as Microsoft Access.
2. `eqEmail`: Email quiz data to the instructor.
3. `eqText`: Save quiz data to a tab-delimited text file. Can then be opened and analyzed using Microsoft Excel.
4. `custom`: A hook for developers to use `eq2db` with their own script.
5. `tagged`: Write quiz data in an XML-like data stream.

The package itself redefines the ‘End Quiz’ button appropriately so that when the user clicks on it, the results will be sent to server-side script. The package also provides some commands for easily creating hidden text fields that are used to send information to the server-side script.

Accompanying each of the first three options listed above is server-side script. These are ASP pages, Microsoft IIS is required.

2. What’s New

In version 1.3, I’ve added the `eqEmail` and `eqText` server options and added a `tagged` option that can be used in combination with any of the server options.

3. The Distribution and Requirements

The `eq2db` Package is distributed with the following files:

1. `eq2dbman.pdf`: This document, the documentation for the L^AT_EX package `eq2db` and its related files.
2. `eq2db.dtx` and `eq2db.ins`: The L^AT_EX package with its installation file.
3. `eqRecord.asp`: An ASP script for saving `exerquiz` quizzes to a database.
4. `eqEmail.asp`: An ASP script for forwarding `exerquiz` quizzes via e-mail.
5. `eqText.asp`: An ASP script for saving `exerquiz` quizzes to a tab-delimited file.
6. `quiz1.tex`, `quiz2.tex`, `quiz3.tex`, `quiz4.tex` (quizzes 1 and 2 demo the `eqRecord` option; `quiz3` demos `eqEmail`, and `quiz4` demos `eqText`.)
7. `eqQuiz.mdb`: A Microsoft Access 2000 database used with the demo files `quiz1.tex`, `quiz2.tex`.

The `eq2db` Package requires the `exerquiz` package to create online quizzes and to create supporting buttons and text fields. The `exerquiz` package, in turn, assumes a number of packages; a listing of these can be found in the documentation for the AcroTeX eEducation Bundle.

4. The eqRecord option

In this section we describe how to create an online quiz that is to be submitted to the server-side script `eqRecord.asp`¹. For this option, quiz results are saved to a database.

► `quiz1.tex` and `quiz2.tex` are the demo files for this option.

The steps to create a quiz to be submitted to `eqRecord` are simple enough. First, the preamble of your document should look something like this:

```
\documentclass{article}
\usepackage[designi]{web}
\usepackage{exerquiz}
\usepackage{eqRecord}{eq2db}
```

You may have other packages loaded, as well as other options for `web` and `exerquiz`. The `eq2db` package was designed to be seamless in the following sense: If the `eq2db` package is not loaded, then an `exerquiz` quiz is self-contained, that is, it is not submitted to a server-side script; if `eq2db` package is loaded, then the quizzes are submitted to a server-side script.

Next, you write your `exerquiz` quiz:

```
\eqSubmit{http://localhost/scripts/eqRecord.asp\#FDF}{QuizIt}{Math101}
\begin{quiz}*{Quiz1} Answer each of the following. Passing is 100%.
\begin{questions}
\item ...
...
...
\item
\end{questions}
\end{quiz}\quad\ScoreField\currQuiz\eqButton\currQuiz
```

Preceding the quiz is the `\eqSubmit` command, defined in the `exerquiz`.

```
\eqSubmit{<URL to script>}{<dbName>}{<dbTable>}
```

The first parameter is the URL to the server-side script, in the example above, we have `http://localhost/scripts/eqRecord.asp#FDF` (note the suffix of `#FDF`); the second parameter is the database, my test examples use ODBC, with `QuizIt` as the DSN (data source name); the third parameter is the name of the table into which the data record is to be inserted (this is `Math101` in my example).

There is another parameter of importance. The first argument of the `quiz` environment is the `quizName` of the quiz, this is `Quiz1` in the above example.

Assuming `eqRecord.asp` is installed on your web server, and the `FDFToolkit` has also been installed (see Section 4.4), we are ready to submit the quiz.

4.1. Field Values Processed by eqRecord.asp

The `eqRecord` script processes two classifications of field data: certain “hard-wired” field data; and field data having a hierarchical name with a root of either `<dbName>` or `IdInfo`, e.g., `Quiz1.numQuestions` or `IdInfo.Name.Last`. Details of each of these follow.

¹The script `eqRecord.asp` comes with absolutely *no guarantees*. Extensive testing should be made on your own system to assure yourself script is reliable enough to use in practice. Feel free to modify the script to suite your needs. If your improvements are noteworthy, please allow me to incorporate them into the basic `eqRecord.asp` for others to use.

- **“Hard-wired” Fields**

When you compile your source document using the package eq2db with the eqRecord option, the package creates three hidden text fields, with field titles of dbName, dbTable and quizName. These hidden fields are created under the ‘End Quiz’ button. At submit time, these fields are populated and submitted. Below is an enumerated list of these three fields with a brief description of each:

1. **dbName:** The name of the database to which the data is to be saved. (I’ve been using ODBC to reference the database.)
2. **dbTable:** The name of the table within dbName where the data is to be stored.
3. **quizName:** The name of the quiz or test. Name would uniquely characterize the quiz/test the student has taken.

Exerquiz has the \eqSubmit command to acquire two of the three above mentioned items. \eqSubmit takes three parameters:

```
\eqSubmit{<URL to script>}{<dbName>}{<dbTable>}
```

For example,

```
\eqSubmit{http://localhost/scripts/eqRecord.asp\#FDF}{QuizIt}{Math101}
```

The first is the URL to the server-side script, the second parameter is dbName (QuizIt, in this case), and dbTable (Math101). The three arguments of \eqSubmit are used to define the values of \db@Name, \db@Table and \eq@CGI, respectively, the values of which are used to populate the hidden fields.

The third piece of data, quizName, is obtained from the first required argument of the quiz environment. The following is a skeleton example of a quiz:

```
\eqSubmit{http://localhost/scripts/eqRecord.asp\#FDF}{QuizIt}{Math101}
\begin{quiz}*{Quiz1}
  \begin{questions}
    \item ...
    \item ...
    . . .
    . . .
    \item ...
  \end{questions}
\end{quiz}
```

This argument is assigned as the value of the text macro \curr@quiz, also seen below.

- **Fields with Hierarchal Names**

Other than the fields described in “Hard-wired” Fields, eqRecord.asp processes only fields with hierarchal names that have a root name of <quizName> (see “Hard-wired” Fields) or a root name of IdInfo.

quizName: quizName is the field title of one of the hidden fields, its value is picked up as the first argument of the quiz environment; the value is stored in the text macro `\curr@quiz`.

In addition to the “hard-wired” hidden fields described earlier, there are actually three more hidden fields (under the ‘End Quiz’ button) with root name `<quizName>`. These are

- `\curr@quiz.numQuestions`: The number of questions in the quiz
- `\curr@quiz.numCorrect`: The number of correct questions
- `\curr@quiz.Responses`: a list of all the responses of the user

The values of these fields are also sent to `eqRecord.asp`. There is a mechanism for creating more hidden fields the values of which are sent to the script. The technique for doing this will be discussed later.

IdInfo: As mentioned earlier, `eqRecord.asp` processes fields that use a hierarchal naming convention, with root name of `<quizName>` or `IdInfo`. Fields whose root name is `IdInfo` are meant to hold information about the person taking the quiz: first name, last name, student number, etc.

For example, you can create fields the user fills in for self-identification. In the preamble, you can define new commands:

```
% User's First Name
\newcommand\FirstName[2]{\textField{IdInfo.Name.First}{#1}{#2}}

% User's Last Name
\newcommand\LastName[2]{\textField{IdInfo.Name.Last}{#1}{#2}}

% User's SSN
\newcommand\SSN[2]{\textField[\MaxLen{11}
  \AA{\AAKeystroke{AFSpecial_Keystroke(3);}
  \AAFormat{AFSpecial_Format(3);}
  ]}{IdInfo.SSN}{#1}{#2}}
```

Note that I’ve defined these fields so that their names follow a hierarchal name structure, with a root of `IdInfo`. The two required arguments are the dimensions of the text field being constructed. For example `\FirstName{100pt}{10pt}` creates a text field with a title of `IdInfo.Name.First` which is 100bp wide and 10bp high.

► See the demo file `quiz1.tex` for examples.

Additional `IdInfo` fields can be constructed.

4.2. Mapping PDF Field Names onto DB Field Names

`eqRecord.asp` is a quasi-general script for mapping the values of PDF fields into corresponding fields in a database. The way `eqRecord` is set up, the DB field name is derived from the PDF field name. For example, the value of the PDF field `Quiz1.numQuestions` is stored in the DB under the DB field name of `numQuestions`.

For field names such as `IdInfo.Name.Last`, we can’t map this into the DB field name `Name.Last` because for some databases (notably, Microsoft Access) database field names containing a ‘dot’ are not legal. As a work around, `eqRecord.asp` strips all dots from the field name, and replaces them with the value of the VB Script variable `dotReplace`. The definition of `dotReplace` in `eqRecord.asp` is

```
Dim dotReplace : dotReplace = "_"
```

That is, a ‘dot’(.) is replaced by an ‘underscore’ (_).

The table below illustrates the mapping of PDF field name onto database field names. Suppose the quizName is Quiz1:

PDF Field Name	DB Field Name	Required
quizName (e.g. Quiz1)	quizName	Yes
Quiz1.numQuestions	numQuestions	Yes
Quiz1.numCorrect	numCorrect	Yes
Quiz1.Responses	Responses	Yes
IdInfo.Name.Last	Name_Last	No
IdInfo.Name.First	Name_First	No
IdInfo.SSN	SSN	No
N/A	TimeOfQuiz	Yes

The last entry needs comment: eqRecord.asp generates a time stamp when a quiz is processed. This time stamp is stored in a field with a name of TimeOfQuiz. This is a required field in your database.

4.3. Adding more Hidden Fields

When you add fields with a hierarchal name with a root of <quizName> or IdInfo—whether hidden or not—the values of these fields will be submitted and processed by eqRecord.asp. When you add fields in your document, there should be a corresponding DB field to receive this data (see Section 4.2 for naming conventions). You can also add hidden fields to transmit information about the quiz that the user does not need to see.

Example. Suppose you want to a point value to each question, and report the point score (rather than the number missed). In this case, you would use the \PointsField field instead of the \ScoreField (though you could use both).

\PointsField has a hierarchal name, but its root does not begin with <quizName>; consequently, the value of this field is not submitted to eqRecord.asp. (The value of this field is a string what is meant to be read by the user; it reads, for example, “Score: 16 out of 20”; we don’t want this string submitted anyway, we would want the point score (20) and the total points (20) submitted.) We want to transmit the points scored and the total number of points to the server-side script.

The eq2db package defines two helper commands for creating hidden fields (these hidden fields are hidden under the ‘End Quiz’ button); these are \addHiddenField and \populateHiddenField.

Suppose we had a quiz, Quiz1, in which we wanted to report points scored and total points. First, we need to add two hidden fields, we’ll call them Quiz1.ptScore and Quiz1.nPointTotal; we create the hidden fields using \addHiddenField:

```
\addHiddenTextField{Quiz1.ptScore}{}
\addHiddenTextField{Quiz1.nPointTotal}{\theeqpointvalue}
```

The first parameter is the title (name) of the field, the second parameter is the default value. For the first line, no default value is given; for the second line, a default value of `\theeqpointvalue` is given. The counter `\eqpointvalue` contains the total number of points for the quiz so we can insert that value at `latex` compile-time.

The value of the first field added, `Quiz1.ptScore`, is not known until a user takes a quiz and submits results. The `eq2db` command `\populateHiddenField` inserts the necessary JavaScript that would populate the specified field. For example,

```
\populateHiddenField{Quiz1.ptScore}{ptScore}
```

The first parameter is the field name, the second is the value the field is to hold when the user clicks on ‘End Quiz’. The command `\populateHiddenField{fieldname}{fieldvalue}` expands to

```
this.getField("fieldname").value = fieldvalue;
```

which is the JavaScript for populating the field, is inserted into the code just prior to the submission of the data.

► See second quiz in the sample file `quiz1.tex` for a complete example of creating a quiz with weight set for each question, and for reporting the point score and total points. ◀

The table below lists some variables (both `LATEX` and JavaScript) that might be useful in extracting desired information from quiz for submittal.

Variable	Description
Score	Score of the user with one point per problem. This value is always reported in the hidden text field <code>quizName.numCorrect</code> . This is a JavaScript variable known when the user finishes the quiz. This value is always reported in <code>quizName.numQuestions</code> , the hidden text field.
<code>\thequestionno</code>	The number of questions in the current quiz. A <code>L^AT_EX</code> macro; known at compile-time.
Responses	A comma-delimited list of all responses of the user. A JavaScript variable known when the user finishes the quiz. Always reported in the hidden field <code>quizName.Responses</code>
ptScore	The point score of the user’s quiz. A JavaScript variable, known when the user finishes quiz.
<code>\theeqpointvalue</code>	The total number of points in the current quiz. A <code>L^AT_EX</code> macro, known at compile-time.
pcScore	The score expressed as a percent. A JavaScript variable known when the user finishes the quiz.

Variable	Description
QuizGrade	The letter grade of the user's quiz. A JavaScript variable, known at "run-time".
\eqGradeScale	The grade scale for the quiz. A L ^A T _E X macro, known at "compile-time".

► Other useful variables—perhaps at developers request—will be added in the future. ◀

4.4. Setting Up

In this section, we briefly discuss configuring your server and setting up the demo files that accompany this distribution.

• Configuring the Server

On the server side, in order for `eqRecord.asp` to run correctly, Microsoft Internet Information Server (IIS), version 4.0 or greater, is needed. The script `eqRecord.asp` needs to be placed where ASP scripts have execute permissions.

The `eqRecord.asp` uses the *Acrobat FDF Toolkit*², version 6.0. Follow the directions for installation contained in the accompanying documentation.

Install `eqRecord.asp` in a folder (perhaps called `Scripts`) designated to execute scripts. If you don't have such a folder, then the following steps explain how to create a virtual directory through IIS that points to this folder.

1. Create a new folder on the system (`Scripts`, for example). Its recommended location is inside the `Inetpub` folder.
2. Place `eqRecord.asp` in this newly created folder.
3. In the MMC snap-in for IIS, create a virtual directory by right-clicking on the Default Web Site and selecting `New > Virtual Directory`.
4. Type "Scripts" (or whatever the name of the folder you created in Step 1) as the alias for the virtual directory, and then link it to the physical directory you created in Step 1.
5. Make sure that "Script execution" privileges are enabled. If not, enable them.

• Set Up the Demo Files

Place the Access 2000 database, `QuizIt.mdb`, in a folder that is accessible by the server, such as the root level of your web server, or perhaps, a folder dedicated to database files. Register the database with the ODBC Data Source Administrator as a System DSN under the System Data Source Name of "QuizIt".

Modify the first parameter of `\eqSubmit` in `quiz1.tex` and compile (`latex`), then create `quiz1.pdf` using Acrobat Distiller, `pdftex` or `dvipdfm`, and place it on your server. Test by opening `quiz1.pdf` in your web browser and taking a sample test. Good luck, I hope it works!

²Currently located at the Acrobat Family Developer Center.

- **Comments on Demo Files**

quiz1.tex: This file has two quizzes, **Quiz1** and **Quiz2**. **Quiz1** has no frills, the user enters his/her name and SSN, takes the quiz, and results are saved to the **eqQuiz.mdb** Access database. **Quiz2** is a bit more interesting as it demonstrates how to assign points to each question, and how to report the results. The techniques used in this quiz were discussed in Section 4.3.

quiz2.tex: The quizzes of **quiz1.tex** did not check whether the user is enrolled in the class, and as such, is allowed to take the quiz. The demo file **quiz2.tex** demonstrates how to...

1. check whether the user has entered a valid SSN, that is, the SSN of someone enrolled in the class, or is permitted to take the quiz
2. set a deadline date to take the quiz
3. set a time limit to take the quiz

Other variations are possible.

4.5. Accessing Results in the DB

The database that is to hold quiz results is placed on a web-server and consequently, is not easily accessible by the instructor. The ASP script **GenericDB**³ developed by Eli Robillard, is a tool that can be used to access the database through your web browser. Using **GenericDB**, you can view, edit, update, add new and delete database records—and it's free! Check it out!

5. The eqEmail Option

In this section we describe how to create an online quiz that is to be submitted to the server-side script **eqEmail.asp**⁴. For this option, quiz results are e-mailed to the instructor.

► **quiz3.tex** is the demo file for this option.

The steps to create a quiz to be submitted to **eqEmail** are simple enough. First, the preamble of your document should look something like this:

```
\documentclass{article}
\usepackage[designi]{web}
\usepackage{exerquiz}
\usepackage[eqEmail]{eq2db}
```

You may have other packages loaded, as well as other options for **web** and **exerquiz**. The **eq2db** package was designed to be seamless in the following sense: If the **eq2db** package is not loaded, then an **exerquiz** quiz is self-contained, that is, it is not submitted to a server-side script; if **eq2db** package is loaded, then the quizzes are submitted to a server-side script.

Next, you write your **exerquiz** quiz:

³<http://www.genericdb.com/>

⁴The script **eqEmail.asp** comes with absolutely *no guarantees*. Extensive testing should be made on your own system to assure yourself script is reliable enough to use in practice. Feel free to modify the script to suite your needs. If your improvements are noteworthy, please allow me to incorporate them into the basic **eqEmail.asp** for others to use.

```

\eqSubmit{http://localhost/scripts/eqEmail.asp\#FDF}
      {dpstory@uakron.edu}{Math101}
\begin{quiz}*{Quiz1} Answer each of the following. Passing is 100%.
\begin{questions}
\item ...
...
...
\item
\end{questions}
\end{quiz}\quad\ScoreField\currQuiz\eqButton\currQuiz

```

Preceding the quiz is the `\eqSubmit` command, defined in the `exerquiz`.

```

\eqSubmit{<URL to script>}{<instr@someedu.edu>}{<courseName>}

```

The first parameter is the URL to the server-side script, in the example above, we have `http://localhost/scripts/eqEmail.asp#FDF` (note the suffix of `#FDF`); the second parameter is the e-mail address of the person to receive the quiz results; the third parameter is the course name. In the above example, the course name is `Math101`.

► If `instr@someedu.edu` is a comma delimited list of e-mail addresses, then `eqEmail.asp` will parse the list, and use the first e-mail in the list in the `From` field of the e-mail. ◀

There is another parameter of importance. The first argument of the `quiz` environment is the `quizName` of the quiz, this is `Quiz1` in the above example.

Assuming `eqEmail.asp` is installed on your web server, and the *FDFToolkit* has also been installed (see Section 4.4), we are ready to submit the quiz. Below is the body of one of my test e-mails I made using `quiz3.pdf`:

```

Course Information
  Course Name: Math101
  Quiz: Quiz1
  TimeOfQuiz: 8/23/2003 8:12:40 PM

Student Results
  Name_First: Don
  Name_Last: Story
  SSN: 121212121
  Responses: Leibniz,2x e^(x^2),-1,-cos(x)
  numCorrect: 4
  numQuestions: 4

```

If you add more fields that processed, as described in Section 4.3, this information should be appended to the body of the e-mail.

5.1. Field Values processed by eqEmail.asp

Actually, `eqEmail.asp` is a variation of `eqRecord.asp` and many of the details of this section are the same Section 4.1.

The “hard-wired” fields are `mailto`, `courseName` and `quizName`. These fields are hidden under the “End Quiz” button, and are populated at submit time. As in the `eqRecord` option, the value of the `quizName` field comes from the argument of the `quiz` environment:

```

\eqSubmit{http://localhost/scripts/eqEmail.asp\#FDF}
      {dpstory@uakron.edu}{Math101}
\begin{quiz}*{Quiz1} Answer each of the following. Passing is 100\%.
\begin{questions}
\item ...
...
...
\item
\end{questions}
\end{quiz}\quad\ScoreField\currQuiz\eqButton\currQuiz

```

In this quiz, the field with name `quizName` will have a value of `Quiz1`.

See paragraph “Fields with Hierarchal Names”, page 5, as well as Section 4.3 on page 7 for the `eqRecord` option, the details are the same.

5.2. Setting up and Modifying the Script

On the server side, in order for `eqEmail.asp` to run correctly, Microsoft Internet Information Server (IIS), version 4.0 or greater, is needed. The script `eqEmail.asp` should be placed where ASP scripts have execute permissions. There are two methods of sending e-mail:

1. **CDONTS:** This method (which is commented out by default) can be used on an NT server. Uncomment if you want to use CDONTS, and comment out the CDOSYS code lines that follow.
2. **CDOSYS:** This can be run on a Win2000 or WinXP server.

The script needs to be modified appropriate to your server, in particular, search down in `eqEmail.asp` for the configuration line

```

eqMail.Configuration.Fields.Item
  ("http://schemas.microsoft.com/cdo/configuration/smtpserver")
  = "mySMTP"

```

replace `mySMTP` with your SMTP server.

The subject heading of the returning e-mail has the following format: `Quiz Results: Quiz1 of Math101`. If you want another subject format, modify `eqMail.Subject` as desired.

• References

The following links were used as a reference in the development of the `Email.asp` script.

- **CDOSYS:**
 - Invision Portal Tutorial: CDOSYS email tutorial
 - MSDN: CDO for Windows 2000. The IMessage Interface. (Use MIE to view this page.)
 - ASP 101 Sending Email Via an External SMTP Server Using CDO
- **CDONTS**
 - Juicy Studio The ASP CDONTS Component
 - DevASP Sending Mail from ASP with CDONTS.NewMail Object


```

</question>
<question n=2 type="math" points=4 correct=0>
  <value>2x</value>
</question>
<question n=3 type="math" points=3 correct=1>
  <value>-1</value>
</question>
<question n=4 type="math" points=5 correct=1>
  <value>-cos(x)</value>
</question>
</results>

```

This string packs more information in it than the default string. If you inspect this string, you'll see the name of the quiz is "Quiz1", from the file "quiz1.pdf" and there are four questions. The first question was a text fill-in type, worth 3 points, the student missed that one when s/he entered an answer of D. P. Story. The second question was a math fill-in worth 4 points, this person got this one wrong as well when s/he enter 2x as the answer. And so on.

8. The custom Option

This option allows a script developer to utilize the macros of the eq2db Package to prepare an AcroTeX document to submit to a custom script. Simple create a file named eq2dbcus.def and include any custom creation of fields you may need for your script. When you then take the custom option,

```

\documentclass{article}
\usepackage[designi]{web}
\usepackage{exerquiz}
\usepackage[custom]{eq2db}

```

the command definitions of eq2db are read, followed by the inputting of eq2dbcus.def.

► That's all for now! Hope you find the package useful. Now I really must get back to work. 