

User Manual for datatooltk version 1.7

Nicola L. C. Talbot
www.dickimaw-books.com

2018-01-20

Contents

1	Introduction	3
1.1	What it isn't	8
1.2	File Extensions	9
1.3	Verbatim	10
1.4	Null Values	12
2	Graphical Mode	13
2.1	Cell Editor	14
2.2	Header Dialog	15
3	Tools	17
3.1	Sorting the Data	17
3.2	Shuffling the Data	20
3.3	Sorting and Shuffling	25
3.4	Plugins	29
3.4.1	The people Plugin	30
3.4.2	The datagidx Plugin	31
3.4.3	Comparison of glossaries and datagidx	39
4	Importing Data	45
4.1	Import CSV Data	45
4.2	Import Spreadsheet Data	46
4.3	Import SQL Data	47
4.4	Import probsoln Data	48
5	Templates	52
5.1	Writing a Template File	52
6	Application Properties	55
7	Licence	63
	Glossary	79
	Abbreviations	80
	Index	81

1 Introduction

The L^AT_EX datatool package is able to save databases in its own internal format to allow for rapid loading (using `\DTLsaverawdb` or `\DTLprotectedsaverawdb`). Files in this format are difficult to edit and only a T_EXpert should attempt it, but they are by far the fastest way of loading a datatool database in L^AT_EX. The `datatooltk` application provides a graphical user interface (GUI) making it easier to edit these files. It can also import data from comma-separated values (CSV) files, from Excel `.xls` (but not `.xlsx`) or Open Document `.ods` spreadsheets, from structured query language (SQL) databases and from probsoln databases. This manual assumes the user has some knowledge of the datatool package. Please ensure you have at least version 2.15 of datatool installed in your T_EX distribution. (Although the latest version is recommended.)

The `datatooltk` application can be run in either batch mode (default) or GUI mode (see chapter 2). Command line invocation:

```
datatooltk [<options>]
```

Available options are listed below. Note that some of the default values may be changed through the GUI.

--gui (or -g) Invoke `datatooltk` in GUI mode. The command line invocation

```
datatooltk-gui [<options>]
```

is equivalent to

```
datatooltk --gui [<options>]
```

but additionally has a splash screen.

--batch (or -b) Invoke `datatooltk` in batch mode (default).

--output *<filename>* (or -o *<filename>*) Save the database to *<filename>* (batch mode only). To guard against accidentally overwriting a document file, `datatooltk` now forbids the `.tex` extension for output files.

--in *<datatool file>* (or -i *<datatool file>*) Load *<datatool file>*. The switch `--in` (or `-i`) is optional, so `datatooltk <file>` is equivalent to `datatooltk --in <file>`.

--tex-encoding *<encoding>* Set the encoding for the T_EX (`.tex` and `.dbtex`) files to *<encoding>*. The *<encoding>* may be the keyword `default` or an empty string to indicate the default file encoding. Make sure that your L^AT_EX document matches the given *<encoding>*. The encoding of **CSV** files is independent of the T_EX (`.dbtex`) encoding and is set through **--csv-encoding**.

When loading a `.dbtex` file, `datatooltk` assumes the `.dbtex` file is in the format created by `\DTLsaverawdb` and will try parsing the file according to that format. If this fails, `datatooltk` will retry using the T_EX Parser Library, which has some limited understanding of T_EX syntax and `datatool` commands. This is more sophisticated than a simple pattern match, but it's slower. For example, suppose the file contains:

```
\DTLnewdb{testdata}
\DTLnewrow{testdata}
\DTLnewdbentry{testdata}{Info}{sample}
\DTLnewdbentry{testdata}{Value}{1.23}
\DTLnewrow{testdata}
\DTLnewdbentry{testdata}{Info}{another sample}
\DTLnewdbentry{testdata}{Value}{3.75}
```

This doesn't match the raw `.dbtex` format, so `datatooltk` will switch to using the T_EX Parser Library, which can interpret these commands, but note that if the file is subsequently saved **it will be saved in the `.dbtex` format**. Since this is potentially dangerous, as there's a possibility that you might accidentally load your document `.tex` file, if the T_EX Parser Library is used to load the file then, in **GUI** mode, the filename for that database will be unset, which will trigger the **Save As** dialog if you try to save the database.

--name *<name>* If used with **--in**, **--csv**, **--sql**, **--xls**, **--ods** or **--probsoln**, sets the database label to *<name>*. (See [section 1.2](#).)

--version (or **-v**) Print the version details to STDOUT and exit.

--help (or **-h**) Print a brief summary of available options to STDOUT and exit.

--debug Enable debug mode.

--nodebug Disable debug mode. (Default.)

--compat *<level>* Set the compatibility level. The argument may be `latest` (no backward compatibility required) or `1.6` (compatible with version 1.6 and below). The **--compat 1.6** setting only affects **--shuffle** and is provided for old documents.

--owner-only Set read/write permissions when saving `.dbtex` files to owner only. (Has no effect on some operating systems.)

--noowner-only Don't change read/write permissions when saving `.dbtex` files.

--map-tex-specials Map T_EX special characters when importing data from **CSV** or **SQL**.

--nomap-tex-specials Don't map T_EX special characters when importing data from **CSV** or **SQL**. (Default.)

--seed *<number>* Set the random generator seed to *<number>* or clear it if *<number>* is `""`. (See [section 3.2](#).)

--shuffle Shuffle the database. (Shuffle is always performed after sort, regardless of the option order.)

--noshuffle Don't shuffle the database. (Default.)

--sort [*<prefix>*]*<field>* Sort the database according to the column whose label is *<field>*. Optionally, *<prefix>* may be `+` (ascending order) or `-` (descending order). If *<prefix>* is omitted, ascending is assumed. (See [section 3.1](#).)

--sort-locale *<value>* If the *<value>* is the keyword **none** use letter-sorting for strings. That is, compare the Unicode values of each character. Otherwise *<value>* should be a valid [internet engineering task force \(IETF\)](#) language tag that identifies a locale. Strings will then be sorted according to that locale's alphabetical order. Note that **datatooltk** can't interpret L^AT_EX commands. (If you need that ability, you might want to consider using **bib2gls** with **glossaries-extra** instead.) The default setting is to use a letter-sort for strings.

--sort-case-sensitive Use case-sensitive comparison when letter-sorting strings. (Ignored with locale-sensitive comparisons.)

--sort-case-insensitive Use case-insensitive comparison when letter-sorting strings. This compares the lower case versions of the strings using a character code comparison. (Default.)

--truncate *<n>* Truncate the database to the first *<n>* rows. (Has no effect if *<n>* is greater than or equal to the total number of rows.) Truncation is always performed last. (After any sorting, shuffling and filtering.)

--filter *<key>* *<operator>* *<value>* Adds the given filter. This filter returns true if the value in the column whose label is given by *<key>* matches the operation *<operator>* *<value>* where *<operator>* may be one of: **eq** (equals *<value>*), **ne** (does not equal *<value>*), **le** (less than or equal to *<value>*), **lt** (less than *<value>*), **ge** (greater than or equal to *<value>*), **gt** (greater than *<value>*), **regex** (matches the regular expression *<value>*). Multiple filters may be used. The regular expression should be in the format used by [java.util.regex.Pattern](#). Filtering is always performed after sorting and shuffling. Numerical comparisons are used for columns that are identified as either integer or real data types otherwise string comparisons are used, except in the case of **regex** where the data type is disregarded and all values are

assumed to be strings. (If the column type is identified as having an integer or real data type but $\langle value \rangle$ is not a number, a string comparison will be used.) For example: `--filter Level eq 3` means that the filter should return true if the value in the column whose label is `Level` is equal to 3. If there isn't a column with the label $\langle key \rangle$, a warning is printed on the standard error stream and the filter is ignored.

- `--filter-or` Use OR operator when filtering. (Default.) This has no effect if you only supply one filter.
- `--filter-and` Use AND operator when filtering. This has no effect if you only supply one filter.
- `--filter-include` When filtering, discard rows that don't match the filter (and keep those that do match). This is the default action.
- `--filter-exclude` When filtering, discard rows that match the filter (and keep those that don't match).
- `--merge $\langle key \rangle$ $\langle db\ file \rangle$` Merges the input or imported database with the database stored in the given $\langle db\ file \rangle$. Each row in $\langle db\ file \rangle$ is merged with the row that has a matching value in the column whose label is given by $\langle key \rangle$. Both databases must contain a column with that label. (Each entry in that column should ideally be unique.) If no matching row is found, a new row is added. If both databases share additional columns, the values in $\langle db\ file \rangle$ override those in the original database. If $\langle db\ file \rangle$ doesn't exist, a warning is issued and the option is ignored. This option is always implemented before any sorting, shuffling, filtering or truncating. Only one of the merge options is permitted.
- `--csv $\langle csv\ file \rangle$` Import data from the given **CSV** file. (See [section 4.1](#).)
- `--merge-csv $\langle key \rangle$ $\langle csv\ file \rangle$` As `--merge` but the data to be merged is imported from the given **CSV** file.
- `--csv-sep $\langle character \rangle$` Specify the character used to separate values in the **CSV** file. (Defaults to a comma. Synonym: `--sep $\langle character \rangle$` .)
- `--csv-delim $\langle character \rangle$` Specify the character used to delimit values in the **CSV** file. (Defaults to a double quote. Synonym: `--delim $\langle character \rangle$` .)
- `--csv-encoding $\langle encoding \rangle$` Set the encoding for the CSV files to $\langle encoding \rangle$. The $\langle encoding \rangle$ may be the keyword `default` or an empty string to indicate the default. (Synonym: `--csvencoding $\langle encoding \rangle$` .) The encoding of the **T_EX** (`.dbtex`) file is independent of the **CSV** encoding and is set through `--tex-encoding`.
- `--csv-header` The **CSV** file has a header row. (Default. Synonym: `--csvheader`.)
- `--nocsv-header` The **CSV** file doesn't have a header row. (Synonym: `--nocsvheader`.)

--csv-escape *<character>* Set the **CSV** file escape character to *<character>*. (Synonym: **--csvescape** *<character>*) If your data includes the delimiter character, you need to escape that character to prevent it from being mistaken for the delimiter. For example, if the delimiter is the double-quote character and the escape character is the `\` character, then a row of data may appear as:

```
12345,"A \"sample\" entry."
```

(This won't actually render properly in \LaTeX as won't produce the typographically correct double quotes.) By default the **CSV** escape character is the backslash character `\` (as in the above example) which means that you must double the backslash if you have any (La)TeX commands within the file. To avoid this, you can set the escape character to something else that doesn't occur in your data.

--nocsv-escape Don't have an escape character for your **CSV** file. (Synonym: **--nocsvescape**.) This means that you can use (La)TeX commands without having to use a double-backslash `\\` but the data can't include the delimiter character.

--xls *<xls file>* Import data from the given Excel `.xls` file. (See [section 4.2](#).)

--merge-xls *<key>* *<xls file>* As **--merge** but the data to be merged is imported from the given Excel `.xls` file.

--ods *<ods file>* Import data from the given Open Document Spreadsheet `.ods` file. (See [section 4.2](#).)

--merge-ods *<key>* *<ods file>* As **--merge** but the data to be merged is imported from the given Open Document Spreadsheet `.ods` file.

--sheet *<sheet id>* The sheet to select from the Excel workbook or Open Document Spreadsheet. This may either be an index (starting from 0) or the name of the sheet. If this option is omitted, the first sheet is assumed.

--sql *<statement>* Import data from an **SQL** database where *<statement>* is an **SQL** `SELECT` statement. (See [section 4.3](#).)

--merge-sql *<key>* *<statement>* As **--merge** but the data to be merged is imported using the given **SQL** `SELECT` statement.

--sqldb *<name>* The **SQL** database name.

--sqlprefix *<prefix>* The Java **SQL** prefix. (Default: `"jdbc:mysql://"`.) Currently, only **MySQL** is supported. Additional libraries will be required for other **SQL** databases.

--sqlport *<port>* The **SQL** port number. (Default: 3306.)

--sqlhost *<host>* The **SQL** host. (Default: `"localhost"`.)

--sqluser *<user name>* The **SQL** user name.

--sqlpassword *<password>* The **SQL** password (insecure). If omitted, you will be prompted for a password if you try to import data from an **SQL** database.

--wipepassword For extra security, wipe the password from memory as soon as it has been used to connect to an **SQL** database. (Default.)

--nowipepassword Don't wipe the password from memory as soon as it has been used to connect to an **SQL** database.

--noconsole-action *<action>* If in batch mode and a SQL password is required and **--sqlpassword** hasn't been used, the default action is for **datatooltk** to request a password via the console. If there is no console available the action is determined by *<action>* which may be one of:

- **error** — issue an error;
- **stdin** — request the password via the standard input stream (less secure than using a console, and can produce an annoying flicker);
- **gui** — display a dialog box in which to enter the password (default).

--probsoln *<filename>* Import probsoln data from *<filename>*. (See [section 4.4](#).)

--merge-probsoln *<key>* *<filename>* As **--merge** but the data to be merged is imported from the given probsoln data set file.

You can't combine any of the load/import options: **--in**, **--csv**, **--xls**, **--ods**, **--sql**, **--probsoln**. You also can't combine any of the merge options: **--merge**, **--merge-csv**, **--merge-xls**, **--merge-ods**, **--merge-sql**, **--merge-probsoln**. The merge import options use the same settings as the import options. If you want to merge, for example, sheet 1 and sheet 2 from the same spreadsheet, you will have to first import one or both of them to a **.dbtex** file and then perform the merge. With the exception of **--merge-sql**, all the merge options will ignore a missing file and just print a warning to **STDERR**.

The import functions are one-way. You can't export back to any of those formats.

1.1 What it isn't

The **datatooltk** application isn't intended to have the full functionality of a spreadsheet. Its purpose is to allow you to edit **datatool** databases with multilined entries. If your data just consists of numbers or short single-lined text, then you'll probably be better off just using a spreadsheet to input the data and use **datatooltk** in batch mode to convert from **CSV** to a **datatool** file.

1.2 File Extensions

The `datatool` database files loaded and saved by `datatooltk` are just \LaTeX files, so they could simply have the standard `.tex` extension, but to help differentiate the database files from other files containing \TeX / \LaTeX code (such as picture-drawing code), `datatooltk` assumes a default extension of `.dbtex`. If you use this extension, remember to include it in the argument of `\input` or `\DTLloaddbtex`. **To guard against accidentally overwriting a document file, `datatooltk` now forbids the `.tex` extension for output files.**

Note that the database label (as used in commands like `\DTLnewdb`) is independent of the file name (although when importing data, it defaults to the file base name). The database label can be changed using `Edit→Edit Database Name` in **GUI** mode or via the command line option `--name <label>`.

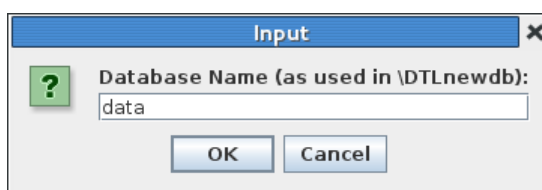


Figure 1.1: Setting the Database Name

Example 1.

Suppose you have a database file called `my-data.dbtex` and you have set the database label to just “data” (as shown in **Figure 1.1**). Then you can load and display the data using:

```
\documentclass{article}
\usepackage{datatool}% remember to load the datatool package

\input{my-data.dbtex}% load the database from file 'my-data.dbtex'

\begin{document}

\DTLdisplaydb{data}% Display the database identified by the name 'data'

\end{document}
```

If you can't remember the name you assigned to the database, you can access it using `\dtllastloadeddb`.

```
\documentclass{article}
```

```

\usepackage{datatool}% remember to load the datatool package

\input{my-data.dbtex}% load the database from file 'my-data.dbtex'

\begin{document}

\DTLdisplaydb{\dtllastloadeddb}% Display the last loaded database

\end{document}

```

Alternatively, as from datatool version 2.20, use `\DTLloaddbtex` instead of `\input`.

```

\documentclass{article}
\usepackage{datatool}% remember to load the datatool package

\DTLloaddbtex{\mydata}{my-data.dbtex}% load the database from file 'my-data.dbtex'

\begin{document}

\DTLdisplaydb{\mydata}% Display the database

\end{document}

```

1.3 Verbatim

Since the contents of the database are stored in a TeX token register, and assigned to control sequences via commands like `\DTLforeach`, verbatim text is not permitted. This is a common problem when attempting to use verbatim text within a command and is covered in the UK List of TeX Frequently Asked Questions ([Why doesn't verbatim work within...?](#)). The `datatooltk` application checks for verbatim text¹ when you load a database or import data (unless the “map TeX special characters” property is set for **CSV** or **SQL** imports). Also, `datatooltk` checks for verbatim text when you edit the contents of a cell. If it detects any, it will give a warning. If you ignore the warning, TeX will give an error if you then attempt to load the database into a document.

If you just have a short fragment of inline verbatim text, consider one of the alternatives listed in [the FAQ](#). If on the other hand you have a block of verbatim text you'll have to put the verbatim text in a separate file and load it using `\verbatiminput` (from the `verbatim` package) or `\lstinputlisting` (from the `listings` package). For example, in [Figure 1.2](#) I have used `\lstinputlisting`.

That database requires two files: `HelloWorld.java`

¹More specifically, it checks for any occurrences of `\verb`, `\lstinline` or the beginning of the `verbatim`, `lstlisting` or `alltt` environments.

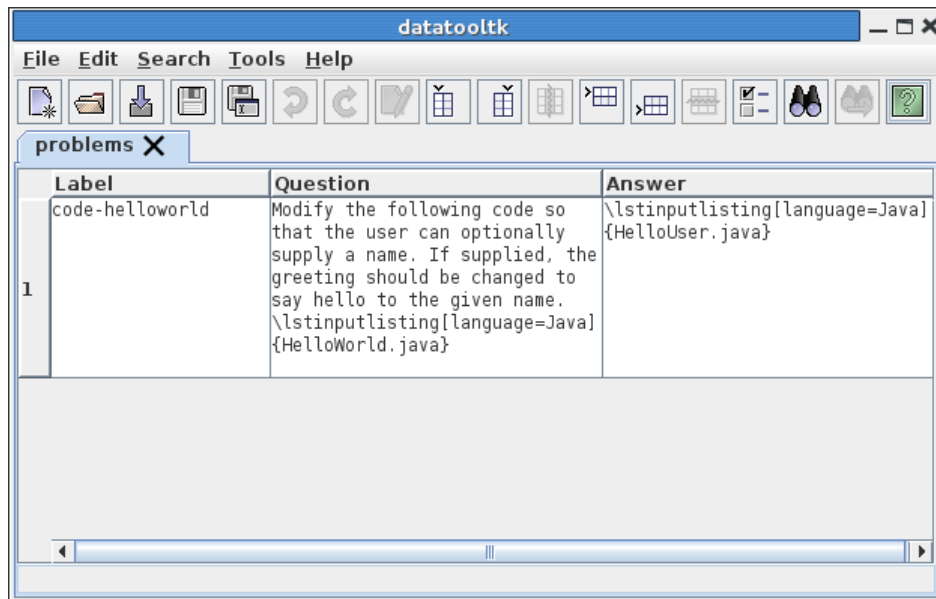


Figure 1.2: Verbatim Blocks Need to be in Separate Files

```
public class HelloWorld
{
    public static void main(String[] args)
    {
        System.out.println("Hello World!");
    }
}
```

and HelloUser.java:

```
public class HelloUser
{
    public static void main(String[] args)
    {
        System.out.println("Hello "
            + (args.length==0? "anon" : args[0])+"!");
    }
}
```

Assuming that I've saved my database in a file called `prob-verb.dbtex` with database label "problems", here's a sample document:

```
\documentclass{article}
```

```

\usepackage{etoolbox}
\usepackage{datatool}
\usepackage{listings}

\newtoggle{showanswers}
\toggletrue{showanswers}

\input{prob-verb.dbtex}

\begin{document}

\begin{enumerate}
  \DTLforeach*{problems}{\Question=Question,\Answer=Answer}%
  {%
    \item \Question

    \iftoggle{showanswers}{Answer: \Answer}{}
  }
\end{enumerate}

\end{document}

```

See also:

- [Shuffling the Data](#)
- [Sorting and Shuffling](#)
- [Import probsoln Data](#)

1.4 Null Values

Empty entries aren't the same as null entries. If you want a null entry, set the entry to `\@dtlnovalue`. A convenient way to do this is to select the cell and use **Edit→Set Cell to Null**. Alternatively, you can set all entries in a selected column to null with **Edit→Column→Nullify Column** and similarly for a selected row with **Edit→Row→Nullify Row**.

In your \LaTeX document, you can check for null values using `datatool`'s `\DTLifnull` command. To check for empty values you can use one of `etoolbox`'s commands, such as `\ifdefempty`.

2 Graphical Mode

To run `datatooltk` in graphical mode you must invoke it with either `datatooltk-gui` or `datatooltk --gui`. The main window is shown in [Figure 2.1](#). Each database is in a tabbed pane, with the name of the database in the tab. Note that the name corresponds to the database's identifying label, as used in commands like `\DTLnewdb`. This is not necessarily the same as the filename (see [section 1.2](#)). Since this name is used as a label, it shouldn't contain any of TeX's special characters or any other active characters that could cause problems. An asterisk `*` following the label in the tab indicates that the database has been modified. If you move the mouse over the tab, you will see the full pathname appear in a tooltip, if the database has been saved to a `datatool` file, and the filename (without the path) will be shown in the title bar.

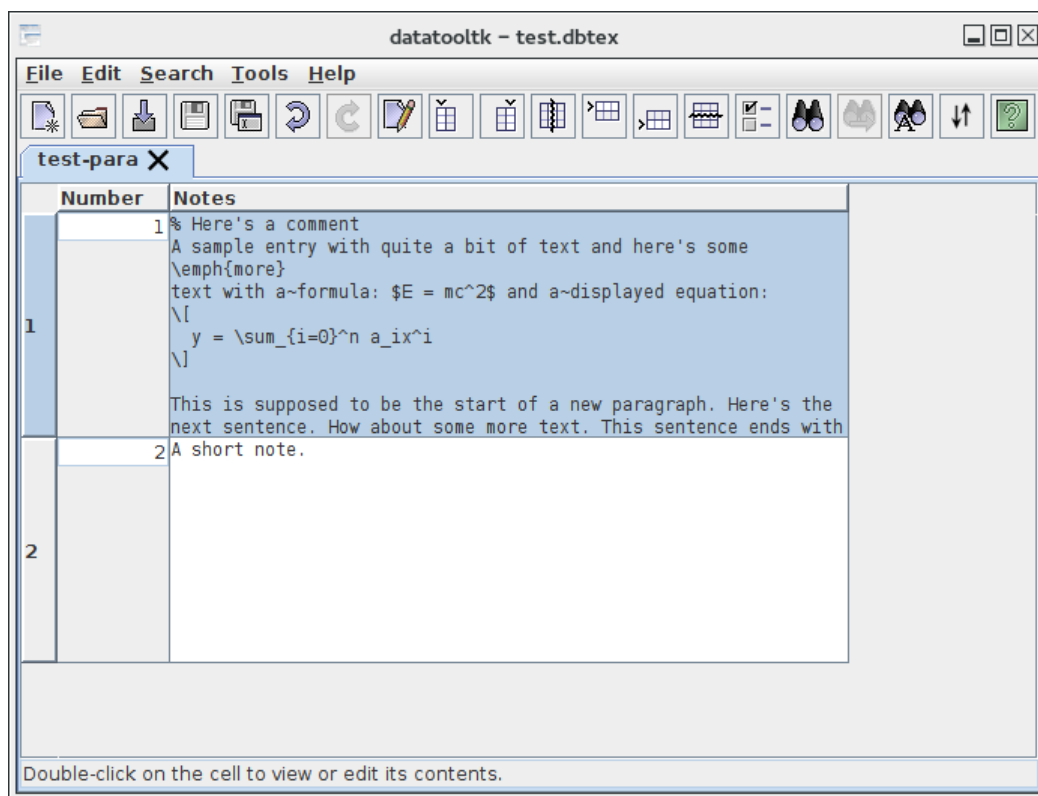


Figure 2.1: Main Window

You can use the File menu to create a new database, load an existing database or import data (see [chapter 4](#)). To load an existing database, use File→Open. These database files contain L^AT_EX code in a specific format. The `datatooltk` application assumes a `.dbtex` file extension (see [section 1.2](#)). You can load these files into a L^AT_EX document using `\input` or `\DTLloaddbtex`, but remember to specify the `.dbtex` extension. (Also remember to load the `datatool` package.)

Each column has a corresponding data type: string, integer, real or currency. The type is automatically detected from the column data, but can be changed, as described in [section 2.2](#).

Non-string entries can be edited by double-clicking on the relevant cell, or you can select the relevant cell and use Edit→Edit Cell. In the first case, a cursor will appear in the cell and you can edit the numerical value and press “Enter” to finish editing. In the second case, the cell editor dialog box will open, see [section 2.1](#).

Only the first few lines of a string entry are visible in the main window. If an entry has more than that number of lines, you will need to use the cell editor dialog box to view the entire contents of that cell. The default row height can be changed in the Preferences dialog box (see [chapter 6](#)). Columns set to integer or real data types have single-lined cells with no line wrap. Columns set to currency data type may wrap, but using “Enter” will finish editing the cell (unless you’re using the cell editor dialog box). If you insert a newline character in the cell edit dialog box (for any data type), the type for that column will be converted to “string”.

To edit or view an entry in a column with the “string” data type, double-click on the relevant cell or select the cell and use Edit→Edit Cell to open the cell editor dialog box (see [section 2.1](#)). You can now scroll through the cell contents.

2.1 Cell Editor

To open the cell editor dialog box (see [Figure 2.2](#)) double-click on the required cell, which must be in a column with a string data type. Alternatively, select the cell (of any type) and use Edit→Edit Cell.

Remember that the contents of the cell should be L^AT_EX code, so be careful if you use any of T_EX’s special characters. Also, see the section on verbatim text ([section 1.3](#)) if you haven’t already read it. Once you have made your edits, click on **Okay** to update the database. To discard the edits, click **Cancel**.

If you’ve used `datatool`, you will probably know that if you want a paragraph break in your cell entries you need to use `\DTLpar`, but with `datatooltk` you don’t need to worry about it as blank lines in an entry will automatically be converted behind the scenes. Note that redundant blank lines will be removed.

Important: if you use `datatool`’s `\DTLsaverawdb` or `\DTLprotectedsaverawdb` commands to overwrite your file, you will lose any pretty-printing spaces or comments in your code.

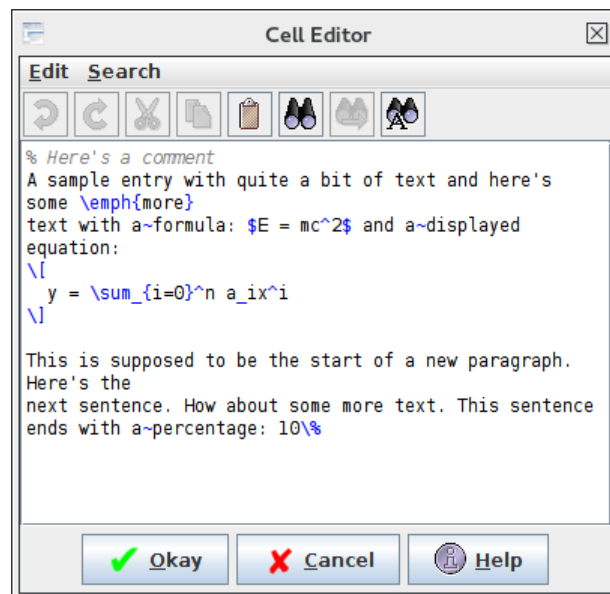


Figure 2.2: Cell Editor Dialog

2.2 Header Dialog

Each column has a title, a uniquely identifying label and an associated type. The type can be one of: **String**, **Integer**, **Real** or **Currency**. The type is automatically detected from the column data, but can be changed using the `Edit→Column→Edit Header` menu item or by double-clicking on the column header which opens the header dialog box (see [Figure 2.3](#)). The label corresponds to the label used to identify the column in commands such as `\DTLforeach`. The title is used in commands like `\DTLdisplaydb`. See [chapter 6](#) for currency mappings.

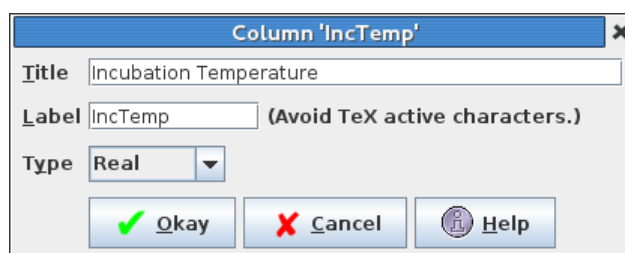


Figure 2.3: Header Dialog

In **GUI** mode, column headers show the title. If you move the mouse over the column header, you will see the label and type displayed in a tooltip (see [Figure 2.4](#)).

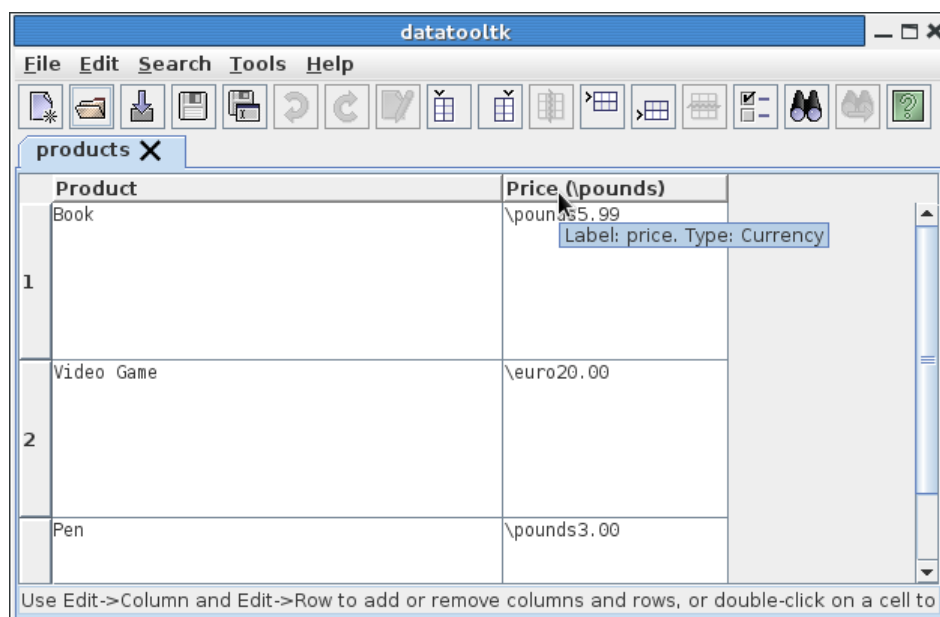


Figure 2.4: Header Details Shown in Tooltip

3 Tools

There are currently two tools available: `sort` (see [section 3.1](#)) and `shuffle` (see [section 3.2](#)). These both reorder the rows of the database and can be invoked either from the Tools menu or from the command line (as long as you have also loaded a database using `--in` or one of the import options). If you use both `--sort` and `--shuffle` in the command line invocation, `sort` will always be performed first, regardless of the option order.

3.1 Sorting the Data

Although you can sort data in `datatool` using `\DTLsort`, it's far more efficient to sort it in `datatooltk`.¹ So instead of doing, say,

```
\input{mydata.dbtex}% loads database labelled 'data' from file 'mydata.dbtex'
\DTLsortdb{Surname}{data}% sort data on 'Surname' field
% Later in the document:
\DTLdisplaydb{data}% display data in tabular environment
```

It's better to run, say,

```
datatooltk --in mydata.dbtex --sort Surname --output mydata-sorted.dbtex
```

(Remember that this defaults to letter sorting for strings. Use `--sort-locale` to sort according to a locale.) Then in the document, just load `mydata-sorted.dbtex`:

```
\input{mydata-sorted.dbtex}
% Later in the document:
\DTLdisplaydb{data}% display data in tabular environment
```

or, if you have shell escape enabled you can use \TeX 's `\write18` mechanism:

```
\immediate\write18{datatooltk --in mydata.dbtex --sort Surname
--output mydata-sorted.dbtex}
```

```
\input{mydata-sorted.dbtex}
% Later in the document:
\DTLdisplaydb{data}% display data in tabular environment
```

¹If the original data is in an [SQL](#) database, it's even more efficient to do the sorting in the `SELECT` statement when you import the data (see [section 4.3](#)).

If you have `arara` version 4.0, there's a rule for `datatooltk`:

```
% arara: datatooltk: {input: mydata.dbtex, sort: Surname,  
% arara: --> output: mydata-sorted.dbtex}  
% arara: pdflatex
```

A database can be sorted according to a particular column in either ascending or descending order. In batch mode, this is done with the `--sort` option, as shown above, where the sort column is identified by the column's unique label. If the label is preceded by `-` then descending order is used (for example, `--sort -Surname`). If the label is preceded by `+` (or has no prefix) then ascending order is used. When comparing strings there are two modes: letter (compare character codes) or locale-sensitive (use the alphabet for the given locale). For letter comparisons you can also use `--sort-case-sensitive` for case-sensitive comparisons and `--sort-case-insensitive` for case-insensitive comparisons. The default is case-insensitive. The locale comparisons are typically case-insensitive. The treatment of accented characters depends on the locale's rule.

In **GUI** mode, sorting is done using the **Tools**→**Sort** menu item which opens the **Sort Database** dialog box (see [Figure 3.1](#)).

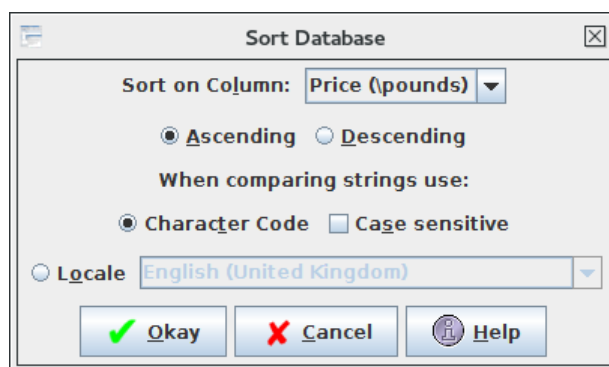


Figure 3.1: Sort Dialog

Select the column you wish to sort by from the drop-down list of column titles, and check the appropriate radio button for ascending or descending sort. If the column has the string data type, you also need to specify what type of comparison you want to use. For a letter (character code) comparison, select the **Character Code** box, which will enable the **Case sensitive** box. For a locale comparison, select the **Locale** box, which will enable the locale selector.

If the column type has a numerical type, the entries will be sorted via a numerical comparison (10 is greater than 2) and the string options are ignored. If the column type is a string type, any numerical entries will be sorted via a character comparison (“10” comes before “2”).

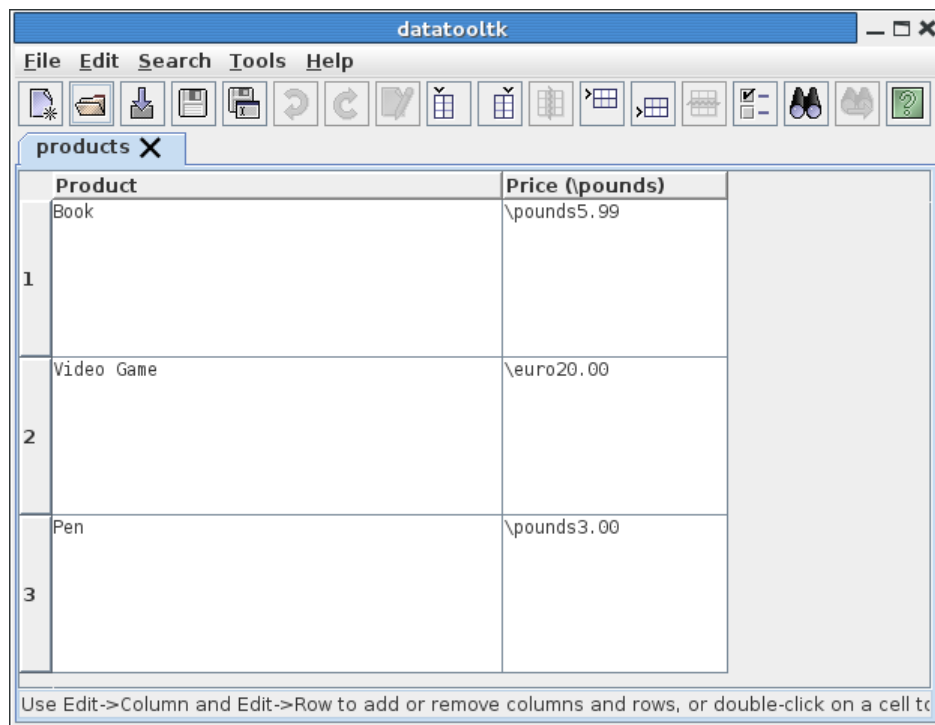
Example 2.

Consider the data shown in [Figure 3.2](#) and reproduced in [Table 3.1](#).

Table 3.1: Original Data

Book	\pounds5.99
Video Game	\euro20.00
Pen	\pounds3.00

The first column has a string data type and the second has a currency data type. Sorting in ascending order on the second column, will sort numerically on just the number. The currency symbol is ignored (see [Table 3.2](#)). If the type of the second column is changed from currency to string, and the sort is redone, the order is now based on a string comparison that includes the currency symbol (see [Table 3.3](#)).



products X	
Product	Price (\pounds)
1 Book	\pounds5.99
2 Video Game	\euro20.00
3 Pen	\pounds3.00

Use Edit->Column and Edit->Row to add or remove columns and rows, or double-click on a cell to...

Figure 3.2: Original Data

Remember that `datatooltk` doesn't have any knowledge of currency conversions. In this example it would be better to have a column of real numbers containing the price in a single base currency. (In fact, it would be better to store the original data in a spreadsheet or database and just use `datatooltk` in batch mode.)

Table 3.2: Data Sorted on Second Column (Currency Comparison)

Pen	\pounds3.00
Book	\pounds5.99
Video Game	\euro20.00

Table 3.3: Data Sorted on Second Column (String Comparison)

Video Game	\euro20.00
Pen	\pounds3.00
Book	\pounds5.99

3.2 Shuffling the Data

Shuffling involves randomly changing the order of the rows. This can be performed either by the `--shuffle` command line option or the **Tools**→**Shuffle** menu item. You can change the seed used by the random number generator with `--seed` or through the Preferences dialog box (see [chapter 6](#)). The method used to shuffle data has changed since version 1.6. If you need to use the old method (for example, if you have set a seed with an existing document), then use `--compat 1.6` when invoking `datatooltk`. For example

```
datatooltk --compat 1.6 --seed 2000 --shuffle infile.dbtex -o outfile.dbtex
```

The newer version is more efficient.

Example 3.

Consider the database shown in [Figure 3.3](#). This database has three columns. The first is a question, the second is the corresponding answer (optional) and the third is a number indicating the question level. For example, 1 could correspond to easy and 2 could correspond to medium difficulty.

Now suppose I want to write an assignment sheet that has one randomly selected question of level 1 and two randomly selected questions of level 2. Let's suppose the file name is `data.dbtex` and the database label is “`problems`”. Then I can run `datatooltk` in batch mode using:

```
datatooltk --shuffle --in data.dbtex --output data-shuffled.dbtex
```

Remember to use `--seed` if you don't want a different ordering every time you run that command. For example:

```
datatooltk --seed 2013 --shuffle --in data.dbtex --output data-shuffled.dbtex
```

datatooltk		
File Edit Search Tools Help		
problems X		
Question	Answer	Level
1 Describe what is meant by object-oriented programming.		1
2 Describe what is meant by the term <code>\emph{inheritance}</code> in object-oriented programming. Use examples.		1
3 A coin is weighted so that heads is four times as likely as tails. Find the probability that: <code>\begin{inparaenum}</code> <code>\item</code> tails appears, <code>\item</code> heads appears <code>\end{inparaenum}</code>	Let $p=P(T)$, then $P(H)=4p$. We require $P(H)+P(T)=1$, so $4p+p=1$, hence $p=\frac{1}{5}$. Therefore: <code>\begin{inparaenum}</code> <code>\item</code> $P(T)=\frac{1}{5}$, <code>\item</code> $P(H)=\frac{4}{5}$ <code>\end{inparaenum}</code>	2
4 Under which of the following functions does $S=\{a_1, a_2\}$ become a probability space? <code>\begin{inparaenum}</code> <code>\begin{tabular}{ll}</code> <code>\item</code> $P(a_1)=\frac{1}{3}$, <code>\end{tabular}</code> <code>\end{inparaenum}</code>	<code>\ref{validprobspacescorrect1}</code> and <code>\ref{validprobspacescorrect2}</code>	2
5 <code>\label{ex:digraph}</code> Identify, if any, the sinks and sources of the digraph shown in Figure~ <code>\ref{fig:digraph}</code> . <code>\begin{figure}[tbb]\centering\begin{tikzpicture}</code>	A is a source and C is a sink.	2

Use Edit->Column and Edit->Row to add or remove columns and rows, or double-click on a cell to edit it.

Figure 3.3: Shuffle Example

This shuffled database can now be loaded in my document:

```
\documentclass{article}

\usepackage{etoolbox}
\usepackage{datatool}

% Used by some of the questions:
\usepackage{paralist}
\usepackage{tikz}

\newtoggle{showanswers}
\toggletrue{showanswers}

\input{data-shuffled.dbtex}

% Number to select from level 1
\newcounter{maxleveli}
\setcounter{maxleveli}{1}

% Number to select from level 2
\newcounter{maxlevelii}
\setcounter{maxlevelii}{2}

% Counter to keep track of level 1 questions
\newcounter{leveli}

% Counter to keep track of level 2 questions
\newcounter{levelii}

\begin{document}

\begin{enumerate}
\DTLforeach*{problems}%
{\Question=Question,\Answer=Answer,\Level=Level}%
{%
% Increment counter for this level
\stepcounter{level\romannumeral\Level}%
% Have we reached the maximum for this level?
\ifnumgreater
{\value{level\romannumeral\Level}}%
{\value{maxlevel\romannumeral\Level}}%
}% reached maximum, do nothing
{\item \Question}
```

```

\ifdefempty\Answer
{}% no answer
{% do answer if this is the solution sheet
  \iftoggle{showanswers}{Answer: \Answer}{}%
}%
}%
% do we need to continue or have we got everything?
\ifboolexpr
{%
  test{\ifnumgreater{\value{leveli}}{\value{maxleveli}}}
  and
  test{\ifnumgreater{\value{levelii}}{\value{maxlevelii}}}
}%
{\dtlbreak}{}%
}
\end{enumerate}

\end{document}

```

What if I want all the easy questions listed first? This requires some modifications to the code as shown below:

```

\documentclass{article}

\usepackage{etoolbox}
\usepackage{datatool}

% Used by some of the questions:
\usepackage{paralist}
\usepackage{tikz}

\newtoggle{showanswers}
\toggletrue{showanswers}

\input{data-shuffled.dbtex}

% Number to select from level 1
\newcounter{maxleveli}
\setcounter{maxleveli}{1}

% Number to select from level 2
\newcounter{maxlevelii}
\setcounter{maxlevelii}{2}

```

```

% Counter to keep track of level 1 questions
\newcounter{leveli}

% Counter to keep track of level 2 questions
\newcounter{levelii}

% List of level 1 questions
\newcommand*{\listleveli}{}

% List of level 2 questions
\newcommand*{\listlevelii}{}

\begin{document}

\DTLforeach*{problems}%
{\Question=Question,\Answer=Answer,\Level=Level}%
{%
  % Increment counter for this level
  \stepcounter{level\romannumeral\Level}%
  % Have we reached the maximum for this level?
  \ifnumgreater
    {\value{level\romannumeral\Level}}%
    {\value{maxlevel\romannumeral\Level}}%
  {}% reached maximum, do nothing
  % Add row number to the appropriate list
  \listcsxadd{listlevel\romannumeral\Level}{\DTLcurrentindex}%
}%
% do we need to continue or have we got everything?
\ifboolexpr
{%
  test{\ifnumgreater{\value{leveli}}{\value{maxleveli}}}
  and
  test{\ifnumgreater{\value{levelii}}{\value{maxlevelii}}}
}%
{\dtlbreak}{}%
}

\renewcommand{\do}[1]{%
  \dtlgetrow{problems}{#1}%
  \dtlgetentryfromcurrentrow{\Question}{\dtlcolumnindex{problems}{Question}}%
  \dtlgetentryfromcurrentrow{\Answer}{\dtlcolumnindex{problems}{Answer}}%
  \item \Question

```



```

\ifdefempty\Answer
{}% no answer
{% do answer if this is the solution sheet
  \iftoggle{showanswers}{Answer: \Answer}{}%
}%
}

\begin{enumerate}

% do easy questions
\dolistloop{\listleveli}

% do medium level questions
\dolistloop{\listlevelii}

\end{enumerate}
\end{document}

```

Now, the `\DTLforeach` loop just stores the row numbers of the required questions in two lists, corresponding to the two different levels. Then each list is iterated through and the corresponding row is fetched using `\dtlgetrow`. Extending this example to accommodate an arbitrary number of levels is left as an exercise for the reader.

Remember that if you have shell escape enabled when you run `LATEX` you can invoke `datatooltk` in your document *before* you load the database:

```

\immediate\write18{datatooltk --in data.dbtex --seed 2013 --shuffle
--output data-shuffled.dbtex}

\input{data-shuffled.dbtex}

```

3.3 Sorting and Shuffling

As mentioned earlier, if you specify both `--sort` and `--shuffle`, the sorting will always be performed first, regardless of the option order, but why would you want to sort the data if you're going to shuffle it? Consider the command invocation:

```
datatooltk --shuffle --in <in-file> --output <out-file>
```

Every time you run this command, you will get a different ordering. If, however, you set a seed for the random generator, for example:

```
datatooltk --seed 2013 --shuffle --in <in-file> --output <out-file>
```

You will always get the same random ordering *provided the original data in $\langle in-file \rangle$ has remained unchanged*. If you want to modify the shuffled data in your document and save it to the original file $\langle in-file \rangle$ using `\DTLsaverawdb`, the ordering in that file will change, so the next time you shuffle it, you'll get a different ordering, even if you use the same seed. If you sort first on a unique label, that will ensure the shuffle has the same starting point (unless you add or remove rows).

Example 4.

Suppose you have a database of exam questions and you want to keep track of the year in which each question was last used. (To make life easier, let's identify the academic year "2012/13" as 2013, the academic year "2013/14" as 2014, etc.) Let's further suppose the database of questions is in a file called `mth-101.dbtex` and the database label is "problems" (see [Figure 3.4](#)). The database contains a column with the label "Label", which uniquely identifies an exam question, a column with the label "Question" that contains the exam question, a column with the label "Answer" that contains the answer and an integer column with the label "Year" that contains the exam year in which that question was last used. (A zero entry means the question hasn't been used.)

Now suppose the exam requires five questions to be randomly selected from this database, but must not include any question used in the past three years. So the exam \LaTeX document needs to load in a shuffled version of `mth-101.dbtex`, use the first five questions that don't have a year set in the past three year range, set the year for the selected questions to the current exam year, display the questions (and optionally the answers for the solution sheet), and at the end of the document, overwrite `mth-101.dbtex` so that it now has a record of this year's exam questions.

There are two problems. Firstly, if the process is to be automated with a call to `datatooltk --shuffle` followed by a \LaTeX call, a different set of problems will be selected on each run, even with the same seed. To overcome this, a sort on the `Label` column needs to be done before the shuffle:

```
datatooltk --sort Label --seed 2013 --shuffle --in mth-101.dbtex
--output mth-101-shuffled.dbtex ↵
```

(The symbol
continuesymbol

above indicates a line wrap. Don't insert a line break at that point.) This way the shuffle always starts from the same ordering.

The second problem occurs if you edit the database such that you add or remove rows. This will change the initial conditions, even with the sort. If you add or remove rows, you need to accept that the document may well end up with a different selection of questions, which is okay if you haven't finalised the exam, but it means that some of the questions will be identified as having been used in that exam year from a previous run but are now no longer selected. In order to make them available for the next year, if they haven't been selected but have had the year set to this year, the year needs to be cleared.

datatooltk				
File Edit Search Tools Help				
problems X				
	Label	Question	Answer	Year
1	tan	$y = \tan x$	$\begin{aligned} y &= \tan x \\ \frac{dy}{dx} &= \frac{\sin x}{\cos x} \\ \frac{dy}{dx} &= \frac{\sin x}{\cos x} + \sin x \times \frac{-1}{\cos^2 x} \\ \frac{dy}{dx} &= \sec^2 x \end{aligned}$	0
2	cosxsqsinx	$y = \cos(x^2)\sin x$	$\frac{dy}{dx} = -\sin(x^2)2x\sin x + \cos(x^2)\cos x$	0
3	exp3x+2	$y = \exp(3x+2)$	$\frac{dy}{dx} = 3\exp(3x+2)$	0
4	cubic	$y = x^3 + 4x^2 - x + 3$	$\frac{dy}{dx} = 3x^2 + 8x - 1$	0
5	xlnx	$y = (x+1)\ln(x+1)$	$\begin{aligned} \frac{dy}{dx} &= \ln(x+1) + \frac{x+1}{x+1} \\ \frac{dy}{dx} &= 1 + \ln(x+1) \end{aligned}$	0

Figure 3.4: Sort and Shuffle Example

To solve this, once you have selected the maximum required number of questions, don't break out of the loop, as was done earlier (see [section 3.2](#)). Instead, for the rest of the loop, if the exam year is set to the current year, clear it.

```
% arara: pdflatex: {shell: on}
\documentclass{article}

\usepackage{etoolbox}
\usepackage{datatool}
\usepackage{listings}
%
\newtoggle{showanswers}
\togglefalse{showanswers}

\newcommand{\examy}{2013}
\newcommand{\maxquestions}{5}
\newcounter{question}

\immediate\write18{datatooltk --sort Label --seed \examy\space
--shuffle --in mth-101.dbtex --output mth-101-shuffled.dbtex}

\input{mth-101-shuffled.dbtex}

\begin{document}

\begin{enumerate}
\DTLforeach{problems}{\Question=Question,\Answer=Answer,\Year=Year}%
{%
% If year hasn't been specified, set it to 0 to
% allow numeric comparisons
\ifdefempty{\Year}{\def\Year{0}}%
{% check for null as well, just in case
\DTLifnull{\Year}{\def\Year{0}}{}
\DTLappendtorow{Year}{0}%
}%
\ifnumgreater{\value{question}}{\maxquestions}
{%
% Finished selecting questions, unset any year
% equal to this exam year
\ifnumequal{\Year}{\examy}
{%
% unset year
\DTLreplaceentryforrow{Year}{0}%
}%
}%
}
```

```

        {}%
    }%
    {%
        % Still selecting questions.
        % Check the year
        \ifboolexpr
        {%
            test{\ifnumequal{\Year}{\examyyear}}
            or
            test{\ifnumless{\Year}{\examyyear-3}}
        }
        {% select this question
            \stepcounter{question}%
            \item \Question

            \iftoggle{showanswers}{Answer: \Answer}{}%
            % update year
            \DTLreplaceentryforrow{Year}{\examyyear}%
        }%
        {% skip this question, it was used in the past 3 years
        }%
    }%
}
\end{enumerate}

% update database file
\DTLprotectedsaverawdb{problems}{mth-101.dbtex}
\end{document}

```

Note: since this overwrites the `datatool` file, you will lose any pretty-printing spaces or comments you may have done in `datatooltk`'s cell editor dialog.

3.4 Plugins

Plugins are usually associated with a particular template (see [chapter 5](#)) and provide a convenient way of adding a row of data to the currently selected database. Typically when a plugin is run it will add a new row of data if no row is selected, otherwise it will allow you to edit the selected row. **Note:** you must have Perl installed to use the plugins (see [chapter 6](#)). **Really Important Note:** the plugin is sent the database information when you start each instance of the plugin, so if you change the database in `datatooltk` while a plugin is running there may be unexpected results. Wait until the plugin has finished (usually by clicking on **Okay** or **Cancel**) before you make any further edits to the database.

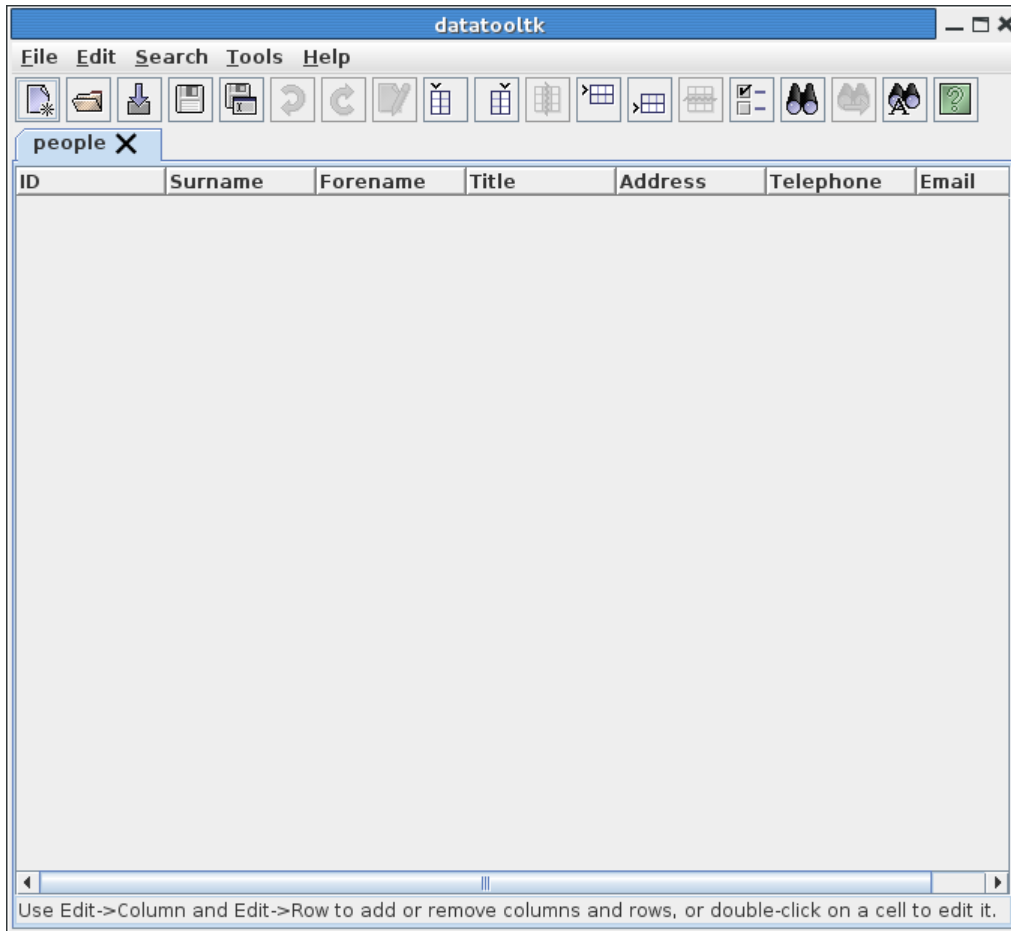


Figure 3.5: Database Created From people Template

3.4.1 The people Plugin

The `people` plugin is designed for use with databases created using the `people` template.

Example 5.

Suppose you create a new database using the `people` template. This creates a database with the following fields: ID, Title, Surname, Forename, Address, Telephone and Email, as illustrated in [Figure 3.5](#).

Having created this database, I can just use the `Edit→Row` menu to insert rows and then edit each entry, but suppose I want to automatically increment the associated ID for each person. I can do this using the `people` plugin that corresponds to this template via the `Tools→Plugins` menu.

If a row is currently selected, this plugin will allow you to edit the data for that row. Otherwise, it will allow you to insert a new row. For a new row of data, the `people`

plugin will open the dialog box shown in [Figure 3.6](#).

After entering the data, I can click on **Okay** and a new row of data is added to the database (see [Figure 3.7](#)). Note that the plugin has converted newline characters in the address into `\\`. The ID has automatically been inserted.

Since the **people** plugin only adds or modifies a single row at a time, if you no longer require an entry, you can delete the unwanted row using **Edit→Row→Delete Row**.

3.4.2 The **datagidx** Plugin

The **datagidx** package creates its own custom database to store terms, symbols and acronyms. The **datagidx** template will create a database that contains **datagidx**'s required fields. There are a lot of fields, some of which are reserved for **datagidx**'s private use. The **datagidx** plugin, available via the **Tools→Plugins** menu, provides a convenient interface to add or edit entries. If no row is selected, the plugin will create a new row. If a row is selected, the plugin will allow you to edit or remove the row. Since the **datagidx** plugin can modify other rows at the same time (for example, if you set a parent entry or cross-reference) it's recommended that you use the **datagidx** plugin to remove an entry (via the **Remove Entry** button) rather than using **Edit→Row→Delete Row**.

Example 6.

The new database (created via **File→New From Template**) is shown in [Figure 3.8](#). The default name of the database is "index". You can change it as required, but don't call it "datagidx" as the **datagidx** package creates a database with that name for its private use. Once this database has been created, the **datagidx** plugin will open the dialog box shown in [Figure 3.9](#).

Since many of the fields are often duplicated (for example, the **Name** field is often the same as the **Text** field) if you first enter the name in the **Name** field, when you move the focus to another field, default entries will be added to most of the empty fields. For example, in [Figure 3.10](#) I typed "bird" in the **Name** field and then moved the cursor to the **Description** field. This automatically filled in default values for the **Label**, **Sort**, **Text**, **Short**, **Long**, **Plural**, **Short Plural** and **Long Plural** fields. Since this is the first entry, there are no options for the **Parent**, **See** and **See Also** fields. (The last two are hidden in [Figure 3.10](#) as the **Cross-Reference** button is unchecked.)

When I click on **Okay**, a new row is added to the database (see [Figure 3.11](#)). Note that I didn't specify a parent for this entry so the parent has been given the value `\@dtlnvalue`, which ensures it will work correctly when the **datagidx** package tests if the parent entry is null.

If I use the **datagidx** plugin to create a new row, there are now options available in the **Parent**, **See** and **See Also** fields (see [Figure 3.12](#)).

In [Figure 3.12](#) I have set the parent to **bird**. When the new row is added, the plugin automatically adjusts the **bird** entry to include the new **duck** label as one of its children (see [Figure 3.13](#)).

It's also possible to cross-reference another entry. There are two ways of cross-referencing an entry: (1) using **See** which redirects the reader to a synonym that has the

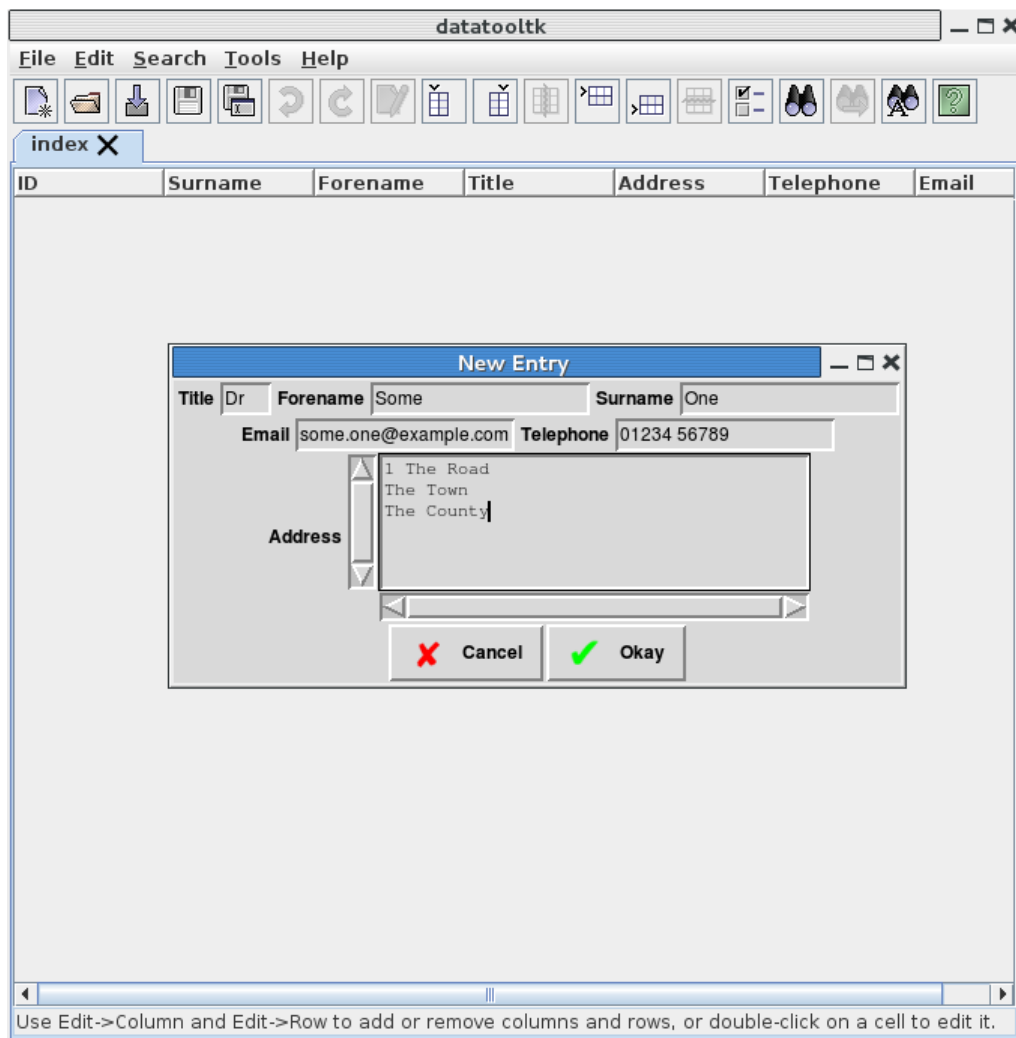


Figure 3.6: The people Plugin Dialog

The screenshot shows a window titled "datatooltk" with a menu bar (File, Edit, Search, Tools, Help) and a toolbar with various icons. Below the toolbar is a tab labeled "people * X". The main area contains a table with the following data:

ID	Surname	Forename	Title	Address	Telephone	Email
1	One	Some	Dr	1 The Road\\ The Town\\ The County	01234 56789	some.one@example.com

The table is displayed in a grid-like format with a light gray background. The first row is highlighted, and the ID column shows the value "1".

Figure 3.7: A New Row of Data

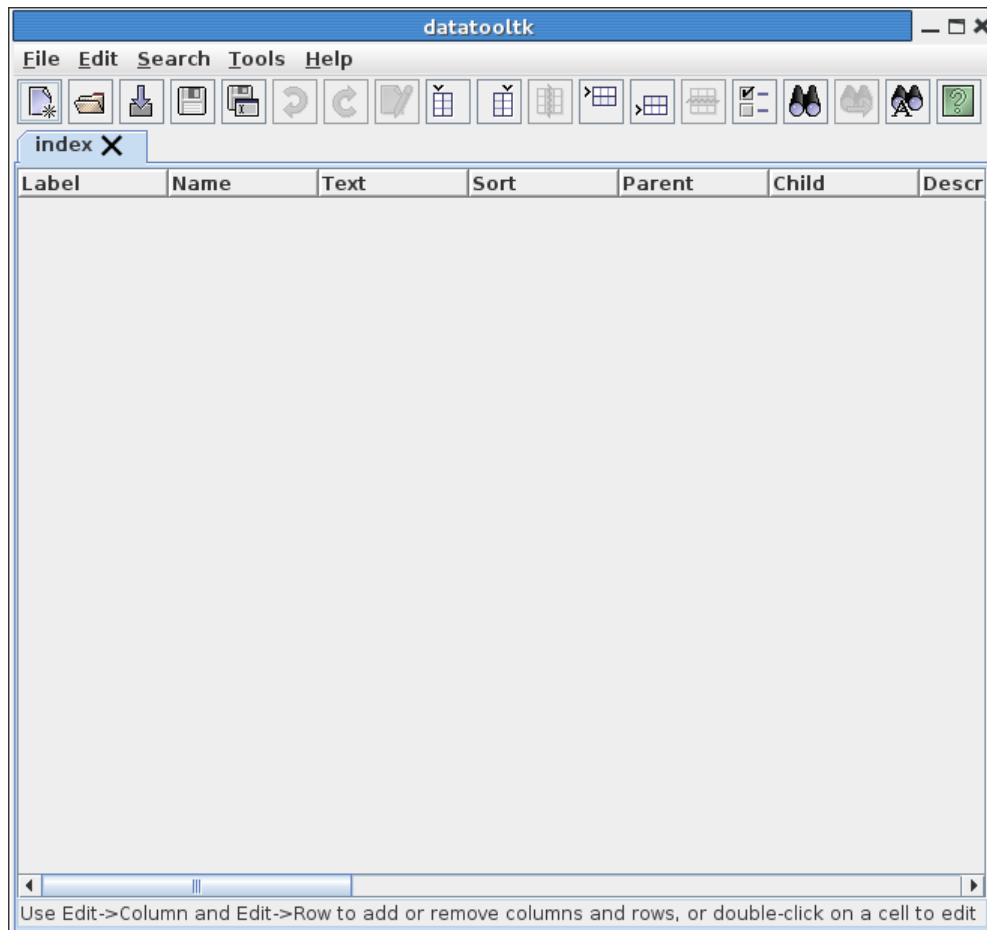


Figure 3.8: A Database Created From the datagidx Template

Figure 3.9: The datagidx Plugin Dialog

Figure 3.10: Most Fields Are Auto-Filled From the Name Field

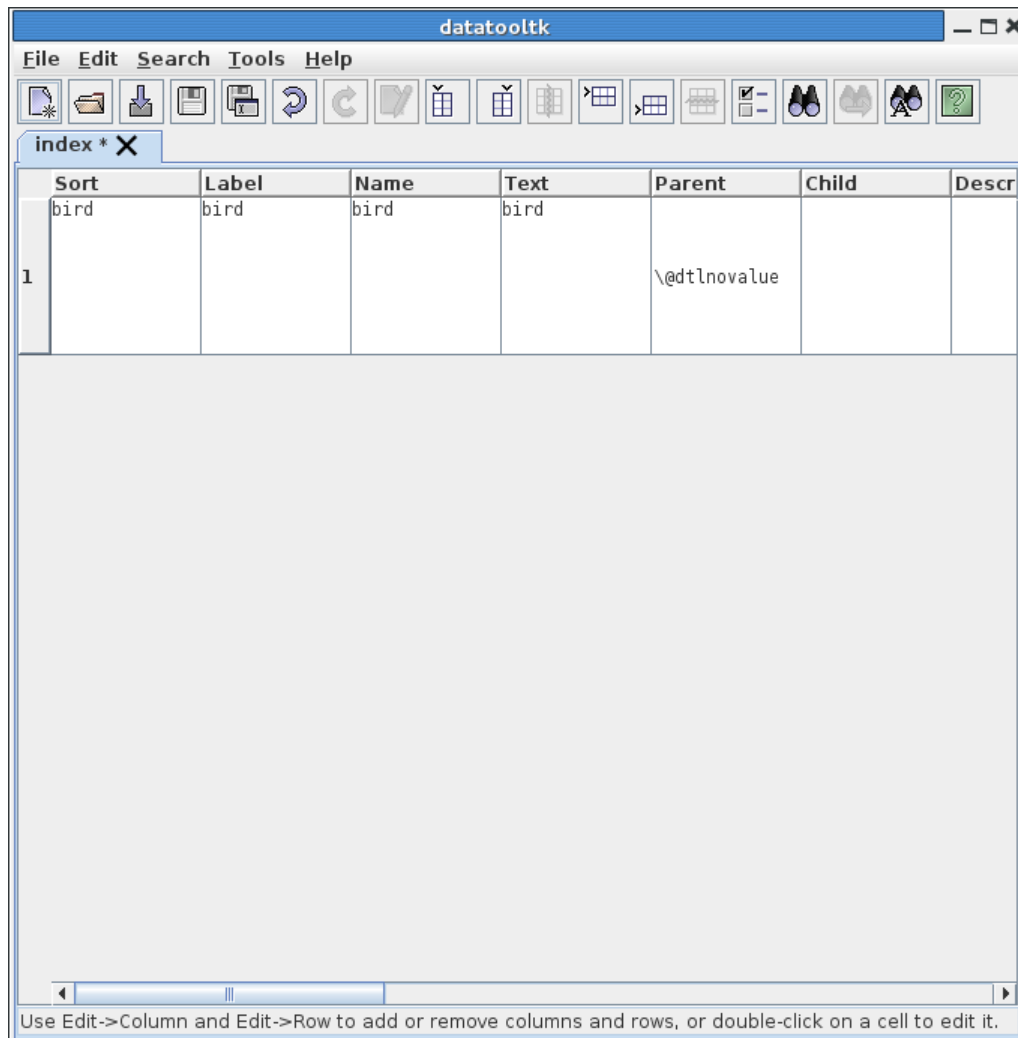


Figure 3.11: New Row Added to the Database

Figure 3.12: Parent Field Lists Other Entry Labels

location list; (2) using **See Also** which in addition to the location list refers the reader to one or more related topics. (See the `datagidx` section of the `datatool` user manual for further details.) To enable either form of cross-referencing, make sure the **Cross-Reference** button is selected. This will display extra options, shown in [Figure 3.14](#).

Either select the **See** button and choose the synonym from the drop-down box next to it, or select the **See Also** button and select the related cross-reference from the drop-down box to the right and either click on **Add "See Also" Entry** to append it to the **See Also** list or click on **Remove "See Also" Entry** to remove it from the list. For example, in [Figure 3.14](#) I've added the `chicken` and `turkey` entries to the **See Also** list. (Assuming I've already added the `chicken` and `turkey` entries before defining this new entry.)

Once I've enter all my terms, I can sort the data according to the **Sort** column. (Recall [section 3.1](#).) Now let's suppose I save this sorted database to a file called `datagidx-test.dbtex`. I can now load it into a L^AT_EX document as follows²:

```
\documentclass{article}

\usepackage{datagidx}

\loadgidx{datagidx-test.dbtex}{Index}

\begin{document}

Reference some terms: \gls{duck}, \gls{bird}, \gls{parrot},
\gls{crocodile}, \gls{caiman}, \gls{alligator}.
```

²Ensure you have at least version 2.15 of the `datatool` bundle.

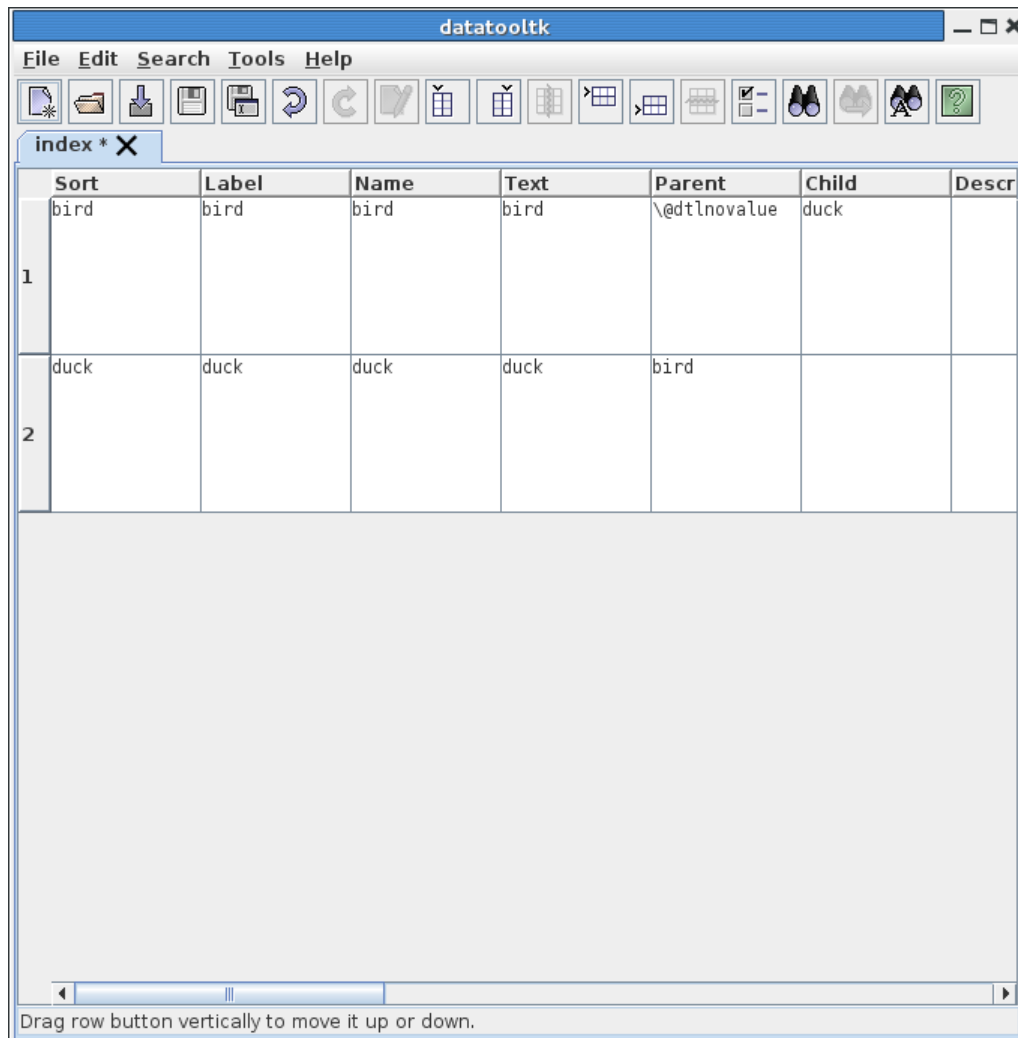


Figure 3.13: Child Entry Automatically Adjusted For Parent Entry

Figure 3.14: Cross-Referencing Entries

```
\printterms[columns=1]

\end{document}
```

3.4.3 Comparison of glossaries and datagidx

If you're interested in the comparative efficiency between using glossaries and datagidx, I performed a test with 100 entries randomly selected from a dictionary. The entries were listed in a file called `entries` in the form:

```
\newterm{minnow}
\newterm{running board}
\newterm{diamant\'e}
```

First, let's look at a document that uses datagidx with \newgidx:

```
% arara: clean: {extensions: ['aux']}
% arara: pdflatex
% arara: pdflatex
\documentclass{report}

\usepackage{datagidx}

\newgidx{index}{Index}

\input{entries}
```

```

\begin{document}

\tableofcontents

\chapter{Sample}
\glsaddall{index}

\printterms[postheading={\addcontentsline{toc}{chapter}{Index}}]

\end{document}

```

In general you need three L^AT_EX runs to compile a `datagidx` document. In this case, you actually only need to do it twice since there are no location lists.

Now let's test a `datagidx` document where `datatooltk` does the sorting. First, we need to generate a `.dbtex` file that corresponds the same set of entries. This can be done with the following document:

```

\documentclass{article}

\usepackage{datagidx}

\newgidx{index}{Index}

\input{entries}

\begin{document}

\DTLprotectedsaverawdb{index}{index.dbtex}

\mbox{}\newpage

\end{document}

```

This just converts the entries listed in `entries.tex` into the appropriate database file, simulating having entered the terms using `datatooltk`'s `datagidx` plugin. The file is saved as `index.dbtex`. Remember that this data only needs to be sorted when you add a term. This can either be done in `datatooltk`'s **GUI** mode or it can be done in batch mode:

```
datatooltk --in index.dbtex --sort Sort --output index-sorted.dbtex
```

This creates a file called `index-sorted.dbtex`. This file can be loaded into a document as follows (NB there's a bug in `\glsaddall`, which is patched using the `\setkeys` line. This will be fixed in the next version of `datagidx`):


```

% arara: clean: {extensions: ['aux']}
% arara: pdflatex
% arara: pdflatex
\documentclass{report}

\usepackage{datagidx}

\loadgidx{index-sorted.dbtex}{Index}

\begin{document}

\tableofcontents

\chapter{Sample}

\setkeys{newterm}{database=index}% patch for \glsaddall bug
\glsaddall{index}

\printterms[postheading={\addcontentsline{toc}{chapter}{Index}}]

\end{document}

```

Now let's look at the `glossaries` package. Since the terms have been defined using `\newterm`, I've defined a command that will convert this into an equivalent `\newglossaryentry`. Some of the entries have accents in their name, which `datagidx` automatically strips when generating the default label, so I've added a quick way of generating an analogous accent-free label and sort key that can be used with `\newglossaryentry`. Here's the document:

```

% arara: clean: {extensions: ['aux', 'gls']}
% arara: pdflatex
% arara: makeglossaries
% arara: pdflatex
\documentclass{report}

\usepackage[nonumberlist,nogroupskip,toc]{glossaries}
\usepackage{glossary-mcols}

\makeglossaries
\renewcommand{\glossaryname}{Index}
\renewcommand{\glsnamefont}[1]{\textmd{#1}}

\newcommand{\newterm}[1]{%
  \bgroup
  \def\c##1{##1}%

```

```

\let\'\c
\xdef\thislabel{#1}%
\egroup
\def\thisname{#1}%
\edef\donewgloss{%
  \noexpand\newglossaryentry{\thislabel}%
  {name={\expandonce\thisname},%
    sort={\thislabel},%
    description={\noexpand\nopostdesc}}}%
}%
\donewgloss
}

\input{entries}

\begin{document}
\tableofcontents

\chapter{Sample}
\glsaddall

\printglossary[style=mcolindex]

\end{document}

```

In order to compare them, I used `arara` with the Linux `time` command. In each case, the `clean` directive is used at the start to ensure the tests start without any auxiliary files. Since there are no location lists, only two \LaTeX calls are used on each example. If there were location lists, the `datagidx` examples would both need a third \LaTeX call.³ Remember that with the example that uses `index-sorted.dbtex`, `datatooltk` needs to sort the database whenever a new entry is added to the database. Assuming that all possible required entries have been added to the database, we just need one sort operation:

```
datatooltk --in index.dbtex --sort Sort --output index-sorted.dbtex
```

Invoking this with the Linux `time` command gives:

```

real 0m0.296s
user 0m0.466s
sys 0m0.033s

```

³The `datagidx` package doesn't generate a location with `\glsadd` or `\glsaddall`, whereas `glossaries` does. I've suppressed the location list in the `glossaries` example to produce an equivalent document.

Now `arara` can be run on each of the three test documents (via the `time` command). The result from the first test that uses `datagidx` and `\newgidx`. The results are:

```
real 0m13.801s
user 0m13.925s
sys 0m0.076s
```

`arara` records the total time taken as 13.39 seconds.

The next test uses `datagidx` and `\loadgidx`. The result is:

```
real 0m2.643s
user 0m2.775s
sys 0m0.065s
```

`arara` records the total time taken as 2.23 seconds.

The third test uses `glossaries`. The result is:

```
real 0m1.156s
user 0m1.307s
sys 0m0.069s
```

`arara` records the total time taken as 0.75 seconds.

Using `glossaries` is clearly faster than using `datagidx`. In the case of `\loadgidx`, `glossaries` is approximately three times faster. In the case of `\newgidx`, `glossaries` is approximately 18 times faster. If a third \LaTeX run was required for the location lists with `\newgidx`, using `glossaries` would be approximately 27 times faster (with only two \LaTeX runs and one `makeglossaries` run).

If you're interested to know how this compares with `\makenoidxglossaries` instead of `\makeglossaries`, here's the revised `glossaries` code:

```
% arara: clean: {extensions: ['aux']}
% arara: pdflatex
% arara: pdflatex
\documentclass{report}

\usepackage[nonumberlist,nogroupskip,toc]{glossaries}
\usepackage{glossary-mcols}

\makenoidxglossaries

\renewcommand{\glossaryname}{Index}
\renewcommand{\glsnamefont}[1]{\textmd{#1}}

\newcommand{\newterm}[1]{%
  \bgroup
```

```

\def\c##1{##1}%
\let\'\c
\xdef\thislabel{#1}%
\egroup
\def\thisname{#1}%
\edef\donewgloss{%
  \noexpand\newglossaryentry{\thislabel}%
  {name={\expandonce\thisname},%
    sort={\thislabel},%
    description={\noexpand\nopostdesc}}}%
}%
\donewgloss
}

\input{entries}

\begin{document}
\tableofcontents

\chapter{Sample}
\glsaddall

\printnoidxglossary[style=mcolindex]

\end{document}

```

The result is:

```

real 0m2.463s
user 0m2.596s
sys 0m0.065s

```

`arara` records the total time taken as 2.06 seconds. This is slightly quicker than the second `datagidx` test.

4 Importing Data

Data can be imported from **CSV** files (see [section 4.1](#)), **SQL** databases (see [section 4.3](#)) or from files that can be imported with the `probsoln` package's `\loadallproblems` command (see [section 4.4](#)). In the case of the first two, `datatooltk` can automatically convert \TeX 's special characters if the `--map-tex-specials` command line option is used or the **Map \TeX characters when importing data from CSV or SQL** option has been selected in the Preferences dialog box (see [chapter 6](#)).

Note that data can't be exported back to any of those formats.

4.1 Import CSV Data

Data can be imported from a **CSV** file using the `--csv` command line option or (in **GUI** mode) using the File→Import→Import CSV menu item. The default separator is a comma and the default delimiter is the double-quote character. These can be changed using the `--sep` and `--delim` command line options or in the Preferences dialog box (see [chapter 6](#)). Unlike `datatool`'s `\DTLloaddb` command, `datatooltk` can import data with multilined entries (via the Open CSV library <http://opencsv.sourceforge.net/>). Multiple blank lines within entries are automatically converted to `\DTLpar` (although you won't see this in **GUI** mode).

If the **CSV** file has a header row, you must make sure the `--csvheader` option is used or the **Has Header Row** option is checked in the Preferences dialog box. If the **CSV** file has no header row, you must make sure the `--nocsvheader` option is used or the **Has Header Row** option is unchecked in the Preferences dialog box.

Make sure that the **CSV** file encoding is correctly set before importing. This can be done from the `--csv-encoding` command line option or in the Preferences dialog box. The encoding of the \TeX (`.dbtex`) file is independent of the **CSV** encoding.

Example 7.

Consider the **CSV** file shown below:

```
Number,Notes
1,"A sample entry with several lines of text and here's some more
text.
```

```
This is supposed to be the start of a new paragraph. Here's the
next sentence."
```

```
2,A short note.
```

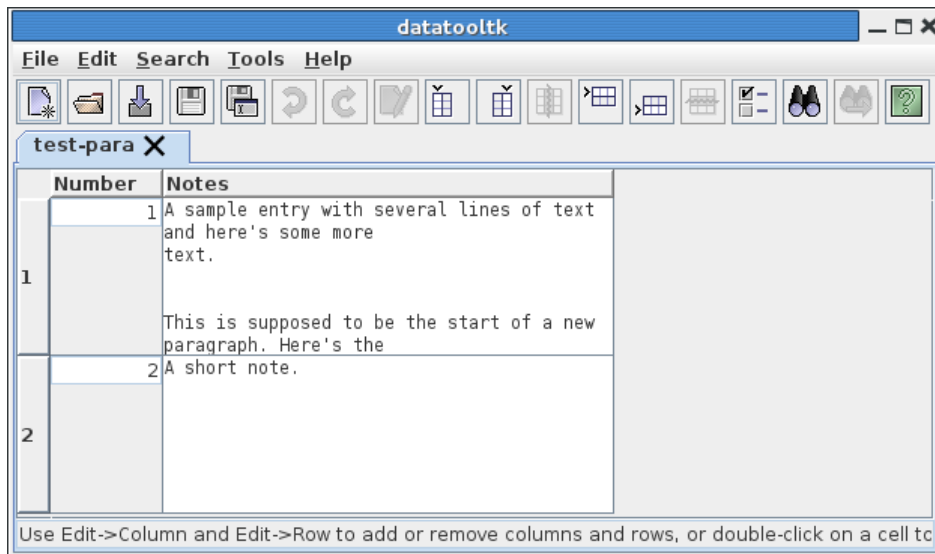


Figure 4.1: Paragraph Breaks Appear as a Single Blank Line

This has a cell with multiple lines. When it's imported into `datatooltk`, the paragraph break is converted to `\DTLpar`. However, this isn't visible when you look at the file in **GUI** mode (see [Figure 4.1](#)).

Note that the redundant second blank line in the **CSV** file has gone as multiple blank lines are replaced by a single `\DTLpar`.

4.2 Import Spreadsheet Data

Data can be imported from an Excel `.xls` file (via the Apache POI library <http://poi.apache.org/>) or an Open Document Spreadsheet (via the jOpenDocument Library <http://www.jopendocument.org/>) using the `--xls` or `--ods` command line options, respectively. Alternatively, in **GUI** mode you can use the **File**→**Import**→**Import Spreadsheet** menu item. Note that the `.xlsx` is currently unsupported.

When using the command line, you additionally need to specify the sheet index (starting from 0) or the sheet name using the `--sheet` command line option. If you are using the **GUI**, after you've selected the spreadsheet file from the file selector dialog, you need to select the required sheet name.

Importing data from a spreadsheet uses the same header row option and \TeX mapping settings as the import **CSV** function. So if the sheet doesn't have a header row, you need to use `--nocsvheader` or uncheck the **Has Header Row** button in the Preferences dialog box. Note that `.xlsx` files aren't supported.

Note: no formatting information is read when importing data from an Excel spreadsheet. It's up to you to explicitly add \LaTeX font commands when you include the data

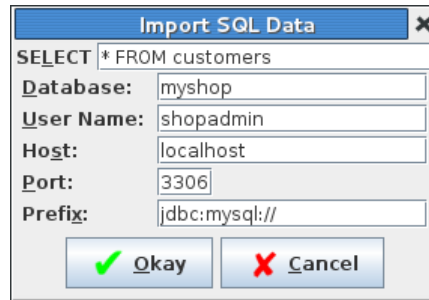


Figure 4.2: SQL Import Dialog Box

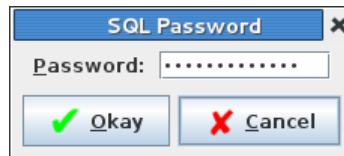


Figure 4.3: Password Dialog Box

in your document.

4.3 Import SQL Data

Data can be imported from an **SQL** database using the `--sql` command line option or the **File**→**Import**→**Import SQL** menu item. You additionally need to supply the database, port, prefix, host, user name and password. In batch mode, you can use the command line options `--sqldb`, `--sqlport`, `--sqlprefix`, `--sqlhost` and `--sqluser`. You can specify the password with `--sqlpassword`, but that isn't secure. If you don't use that, you will be prompted for the password, where the text you enter won't be visible. Note that in batch mode, the default action is to use the console to request the password. If there's no console available, you need to use the `--noconsole-action` to determine what action to perform. See [chapter 1](#) for more details about command line options.

In **GUI** mode, when you use **File**→**Import**→**Import SQL** the dialog box shown in [Figure 4.2](#) will be displayed, where you can enter the settings. In addition to the above named settings, you must also specify the **SQL** **SELECT** statement that identifies the required data to import. (This manual assumes that if you have data in an **SQL** database, then you have a basic knowledge of **SQL** syntax.)

For example, in [Figure 4.2](#) I want to import all data from the table called **customers** in the **MySQL** database called **myshop**. (I've created a user called **shopadmin** with **SELECT** privileges for this database.) Once I've entered this information, I then click on **Okay** and the password dialog box will appear (see [Figure 4.3](#)).

Alternatively, I can use batch mode to import and save the data from the command prompt:

```
datatooltk --output customers.dbtex --sql "SELECT * FROM customers"
--sqldb myshop --sqluser shopadmin
Password:
```

(The symbol
continuesymbol
above indicates a line wrap. Don't insert a line break at that point.) The password should be entered at the **Password** prompt. Remember that it's more efficient to get the **SQL** database to do any sorting. For example (assuming the table has a column called Surname):

```
datatooltk --output customers.dbtex --sql "SELECT * FROM customers ORDER BY
Surname" --sqldb myshop --sqluser shopadmin
Password:
```

4.4 Import probsoln Data

The `probsoln` package allows you to define problems (and optionally their solutions) using `\newproblem` or the `defproblem` environment. `datatooltk` can load a file containing these definitions and convert the `probsoln` data into a `datatool` database containing three or four columns with keys: `Label`, `Question` and `Answer`. If the imported data contains multiple `probsoln` data sets, the fourth column has the key `Data Set` and contains the dataset label. You can import one of these files using the `--probsoln` command line option or (in **GUI** mode) using the `File→Import→Import probsoln File` menu item. If you have a large number of problems, you can speed things up by setting the initial capacity to that number. (If the initial capacity is smaller than the total number of problems, the hash map used to store the data will have to be enlarged whenever the current capacity is exceeded.)

`TeX` is a difficult language to parse, so `datatooltk` uses the `texparserlib` library to help gather the data from the imported file. Earlier versions of `datatooltk` used `LaTeX` but this is no longer required. This import function is governed by the `TeX` file encoding and the **Strip solution environment from probsoln problems** settings (see [chapter 6](#)).

Note: if any problems require arguments the default values will be used.

Example 8.

Consider the file called `prob-mixed.tex` that contains the following:

```
\newproblem*{oop}{%
% This is an essay style question.
Describe what is meant by object-oriented programming.%
```



```

}

\begin{defproblem}{inheritance}
  % This is an essay style question.
  Describe what is meant by the term \emph{inheritance} in
  object-oriented programming. Use examples.
\end{defproblem}

\newproblem{weightedcoin}%
{%
  A coin is weighted so that heads is four times as likely
  as tails. Find the probability that:
  \begin{textenum}
    \item tails appears,
    \item heads appears
  \end{textenum}%
}%
{%
  Let  $p=P(T)$ , then  $P(H)=4p$ . We require  $P(H)+P(T)=1$ ,
  so  $4p+p=1$ , hence  $p=\frac{1}{5}$ . Therefore:
  \begin{textenum}
    \item  $P(T)=\frac{1}{5}$ ,
    \item  $P(H)=\frac{4}{5}$ 
  \end{textenum}
}

\begin{defproblem}{validprobspaces}
\begin{onlyproblem}%
Under which of the following functions does
 $S=\{a_1, a_2\}$  become a probability space?
\par
\begin{textenum}
\begin{tabular}{ll}
\item  $P(a_1)=\frac{1}{3}$ ,  $P(a_2)=\frac{1}{2}$ 
&
\item\label{validprobspacescorrect1}  $P(a_1)=\frac{3}{4}$ ,
 $P(a_2)=\frac{1}{4}$ 
\\
\item\label{validprobspacescorrect2}  $P(a_1)=1$ ,  $P(a_2)=0$ 
&
\item  $P(a_1)=\frac{5}{4}$ ,  $P(a_2)=-\frac{1}{4}$ 
\end{tabular}
\end{textenum}
\end{onlyproblem}%

```

```

\begin{onlysolution}%
\ref{validprobspacescorrect1} and \ref{validprobspacescorrect2}%
\end{onlysolution}
\end{defproblem}

\begin{defproblem}{digraph}
% This problem requires the tikz package
\begin{onlyproblem}\label{ex:digraph}
Identify, if any, the sinks and sources of the digraph shown
in Figure~\ref{fig:digraph}.

\begin{figure}[tbh]
\centering
\begin{tikzpicture}[every node/.style={draw,circle}]
\path (0,0) node (A) {$A$}
      (1,0) node (B) {$B$}
      (0,1) node (C) {$C$};
\draw[->] (A) -- (B);
\draw[->] (B) -- (C);
\draw[->] (A) -- (C);
\end{tikzpicture}
\par
\caption{Digraph for Question~\ref{ex:digraph}}
\label{fig:digraph}
\end{figure}
\end{onlyproblem}
\begin{onlysolution}
$A$ is a source and $C$ is a sink.
\end{onlysolution}
\end{defproblem}

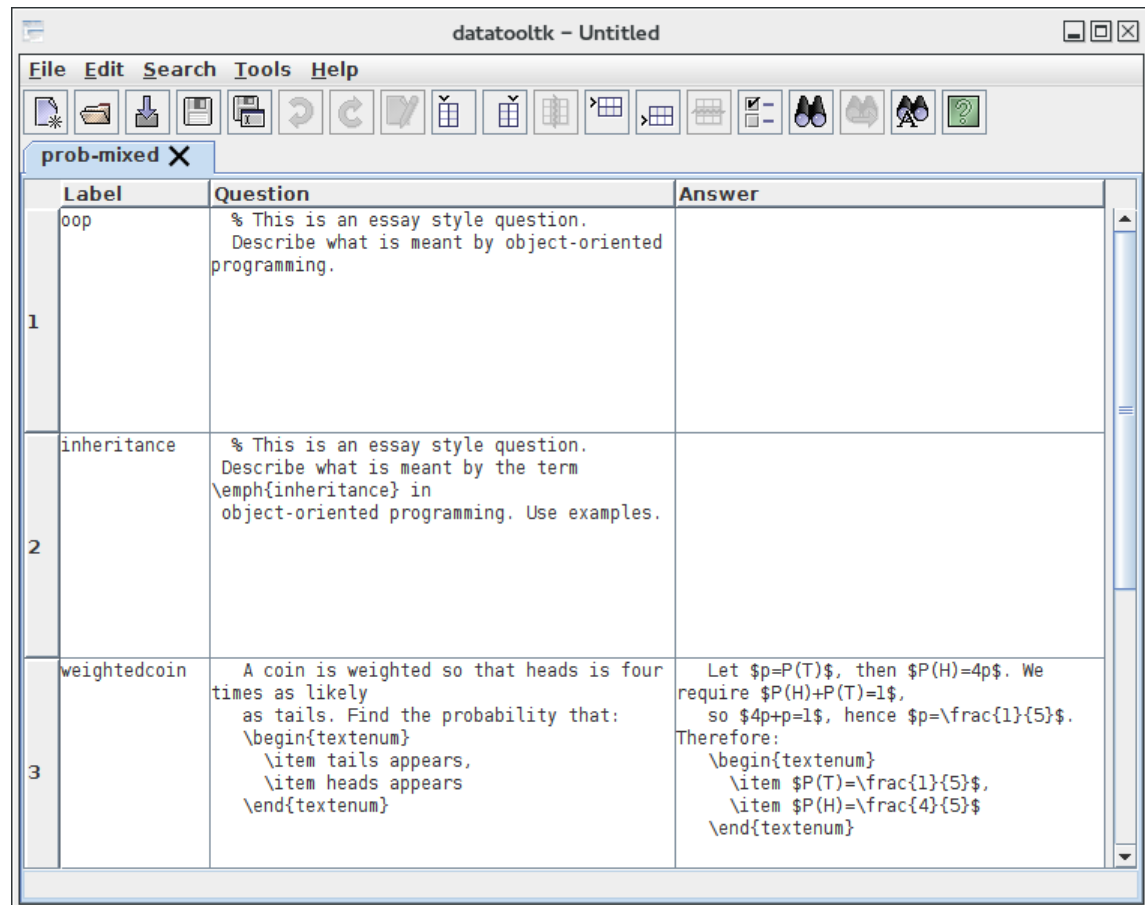
```

This contains a mixture of `\newproblem` and `defproblem`. It also has comments and spaces to make the code more readable. As can be seen in [Figure 4.4](#) these are now still in the import (whereas in older versions they were lost).

The problem defined with the unstarred version of `\newproblem` has a different result depending on whether or not the **Strip solution environment from probsoln problems** setting is on. The normal definition of this command (as provided by `probsoln`) wraps the solution (given in the final argument) in the `solution` environment. This is stripped when the setting is on, otherwise it's included in the “Answer” column.

See also:

- [Shuffling the Data](#)
- [Sorting and Shuffling](#)



	Label	Question	Answer
1	oop	% This is an essay style question. Describe what is meant by object-oriented programming.	
2	inheritance	% This is an essay style question. Describe what is meant by the term <code>\emph{inheritance}</code> in object-oriented programming. Use examples.	
3	weightedcoin	A coin is weighted so that heads is four times as likely as tails. Find the probability that: $\begin{array}{l} \text{\texttt{\textbackslash begin\{textenum\}}} \\ \text{\texttt{\textbackslash item tails appears,}} \\ \text{\texttt{\textbackslash item heads appears}} \\ \text{\texttt{\textbackslash end\{textenum\}}} \end{array}$	Let $p=P(T)$, then $P(H)=4p$. We require $P(H)+P(T)=1$, so $4p+p=1$, hence $p=\frac{1}{5}$. Therefore: $\begin{array}{l} \text{\texttt{\textbackslash begin\{textenum\}}} \\ \text{\texttt{\textbackslash item } }P(T)=\frac{1}{5}\text{,}} \\ \text{\texttt{\textbackslash item } }P(H)=\frac{4}{5}\text{}} \\ \text{\texttt{\textbackslash end\{textenum\}}} \end{array}$

Figure 4.4: Pretty Printing and Comments are No Longer Lost When Importing Data from probsoln

5 Templates

Templates that come with `datatooltk` are located in the `resources/templates` subdirectory of the `datatooltk` installation directory. You can also write your own templates and store them in the user templates directory (see [section 5.1](#)). Each template defines a set of column headers. To create a new database with a particular set of column headers, use the `File→New From Template` menu item, which opens the dialog box shown in [Figure 5.1](#).

The `datatooltk` application comes with the following templates: `datagidx` (creates a database with the same structure as used by the `datagidx` package) and `people` (creates a database suitable for storing records about people, including columns for forenames, a surname, title and address.) For example, [Figure 5.2](#) shows a database created from the `people` template.

Rows can now be added to this database using the `Edit→Row` menu or via corresponding plugins (see [section 3.4](#)).

5.1 Writing a Template File

If you want to write your own template, you need to create an XML file and store it in a subdirectory of the `datatooltk` user properties directory (see [chapter 6](#)) called `templates`. You will need to create this directory, if it doesn't already exist. For example, on a UNIX-like system, the user template directory will be `~/.datatooltk/templates/`. The template file must have the extension `.xml` for it to be listed in the “New From Template” dialog box. (The base name of the file is used in the list.)

The template file must have one `<datatooltktemplate>` element. This element may contain one or more `<header>` elements. Each `<header>` element must contain one `<label>` element and optionally one `<title>` and/or one `<type>` element.

The `<label>` element contains the uniquely identifying header label. The `<title>` element contains the header title. If omitted, the title is set to the label, unless there is

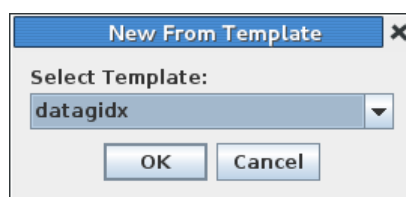


Figure 5.1: New From Template Dialog

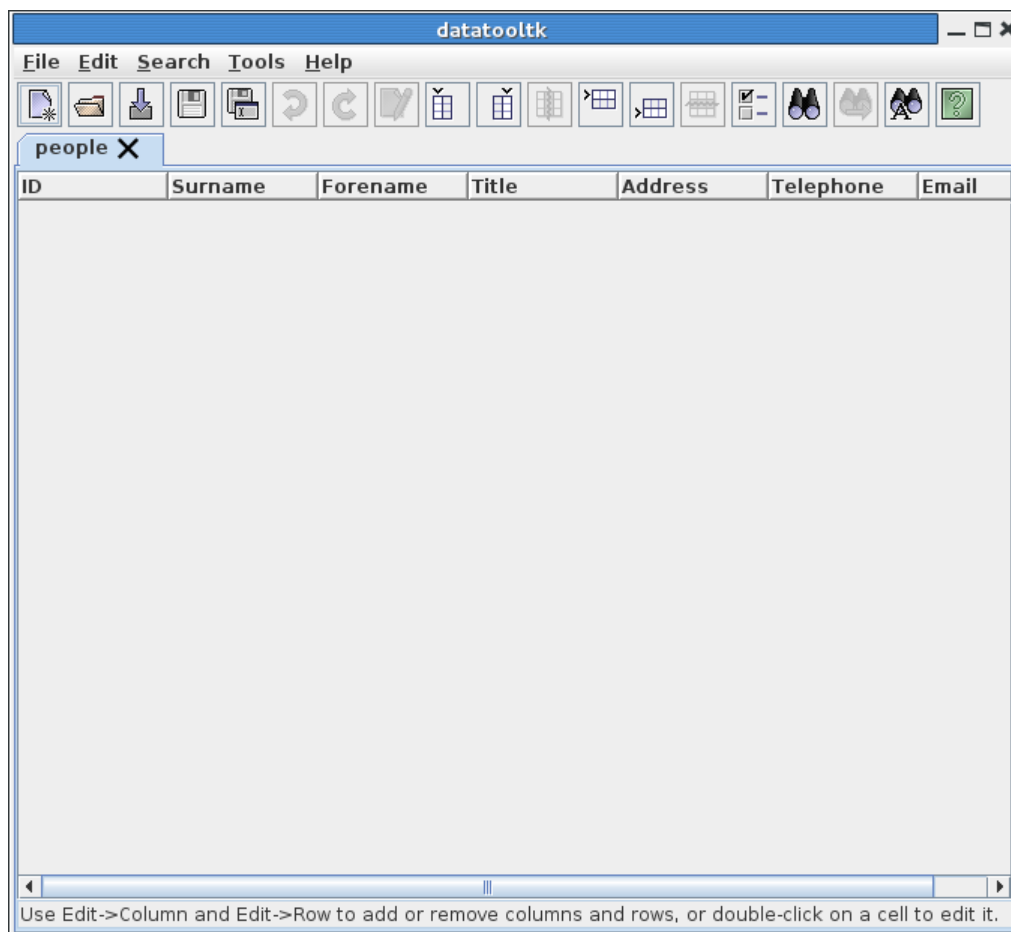


Figure 5.2: New Database Created from people Template

an entry in the resource dictionary file that matches `plugin.<template name>.<label>`, in which case that property is used. The `<type>` element must be one of: -1 (unknown type), 0 (string type), 1 (integer type), 2 (real type) or 3 (currency type). If omitted the type is set to -1.

Example 9.

Suppose I want to write a template to create a database for a list of products. The database needs three columns: one for the product name, one for the product code and one for the product price. The name should be a string, the price column could either be set to “real” if you don’t need to worry about the currency unit or “currency” if you need a currency unit for each product. Let’s suppose that the code must be an integer. Here’s a template file (the price column is set to “real” rather than “currency”):

```
<datatooltktemplate>
  <header>
    <label>Name</label>
    <type>0</type>
  </header>
  <header>
    <label>Code</label>
    <type>1</type>
  </header>
  <header>
    <label>Price</label>
    <type>2</type>
  </header>
</datatooltktemplate>
```

6 Application Properties

When `datatooltk` is run, either in batch or **GUI** mode, the application settings are read in from the user properties file, if it exists. Any command line options override those settings. If `datatooltk` is run in **GUI** mode, the application properties are saved on exit. They are not saved in batch mode.

The user properties directory depends on the operating system. On Windows, it is a folder called `datatooltk-settings` in the folder given by the Java system property `user.home`. This is usually the user's home folder but in some versions of Java this can be `%userprofile%`. On other operating systems, the user properties directory is called `.datatooltk` and is in the user's home directory.

Alternatively, set the environment variable `DATATOOLTK` to the directory of your choice.

In **GUI** mode, the settings can be changed using `Edit→Edit Preferences`. This opens the **Preferences** dialog box, which has the following tabs:

General (Figure 6.1)

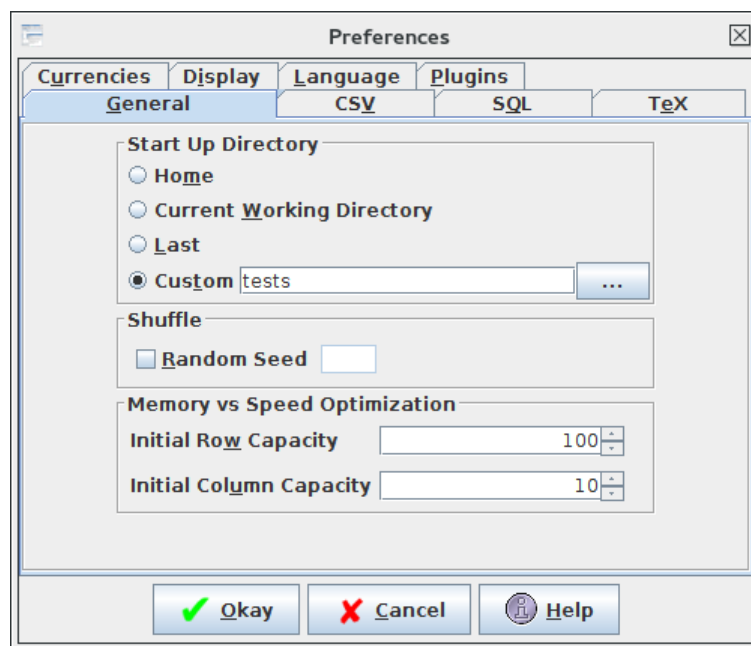


Figure 6.1: General Tab

In this tab you can specify the start up directory. (The default directory when

you first load, save or import data via the File menu.) You can set this to your home directory, the **current working directory**, the directory you last used on the previous run of **datatooltk** or you can specify a directory of your choice.

In this tab you can also specify the seed for the random number generator (equivalent to `--seed`).

The initial capacity can be increased to speed up loading or importing. Ideally it's best to keep it around the typical size of your databases. If it's too big you can run out of memory. If it's too small, the storage has to be enlarged every time the current capacity is exceeded. The minimum allowed value is 10.

CSV (Figure 6.2)

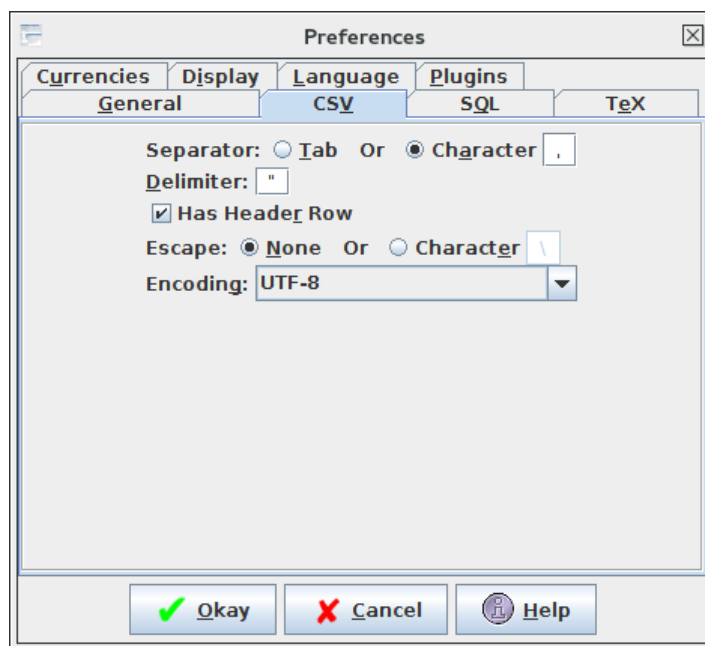


Figure 6.2: CSV Tab

In this tab you can specify the **CSV** settings. If the separator is a tab character, select the **Tab** radio button. Otherwise select the **(Separator) Character** radio button and enter the character in the neighbouring text box. Set the delimiter in the **Delimiter** field. Check the **Has Header Row** button if your **CSV** files have a header row otherwise uncheck it. You can also specify the escape character. This character can be used to escape the delimiter character if it occurs in any of the fields. Since the escape character is a backslash `\` by default, this means that if the data contains any (La)TeX commands the backslash will need to be doubled. This conflict can be avoided by changing the **CSV** escape character to something else (that doesn't occur in your data). To change it, select the **(Escape) Character**

button and enter the character in the neighbouring text box. Alternatively, you can suppress the **CSV** escape character, in which case the delimiter character can't occur within the data. To do this, select the **None** button. The character encoding can be changed through the **Encoding** drop-down box.

SQL (Figure 6.3)

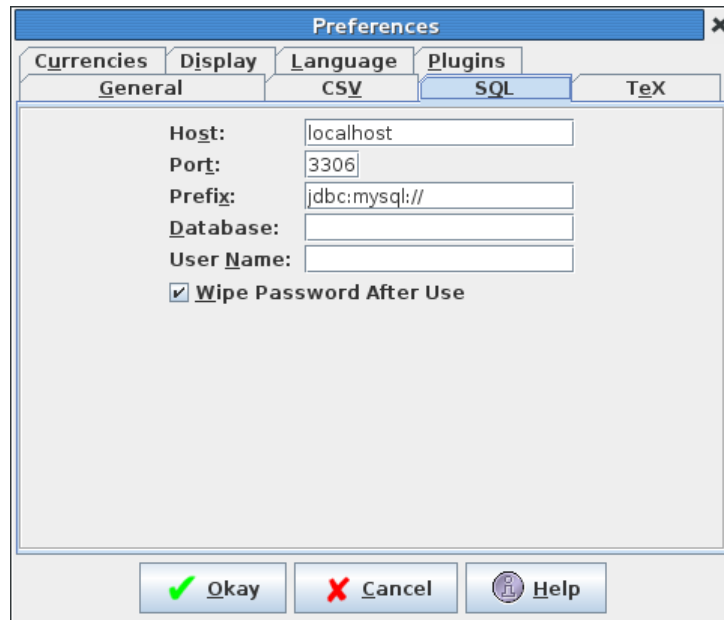


Figure 6.3: SQL Tab

In this tab, you can specify the **SQL** connection information. Enter the host name and port number the **SQL** server is running on in the **Host** and **Port** fields. Currently, the only available prefix is “jdbc:mysql://”, which is the JDBC driver for **MySQL**. If you are using another driver or **SQL** database, you'll have to add the relevant library to the `lib` directory and add it to the class path used by `datatooltk.jar`. Enter the name of the database you want to connect to in the **Database** field and the associated user name in the **User Name** field. If you want the password wiped from memory as soon as a connection has been made, make sure the **Wipe Password After Use** box has been selected.

TeX (Figure 6.4)

LaTeX is no longer used to help `datatooltk` import data from a `probsoln` dataset. Instead the `texparserlib` library is used to parse `.tex` files. The file encoding for **TeX** files (including `.dbtex` files read and saved by `datatooltk`) is set in this tab in the **Encoding** dropdown list.

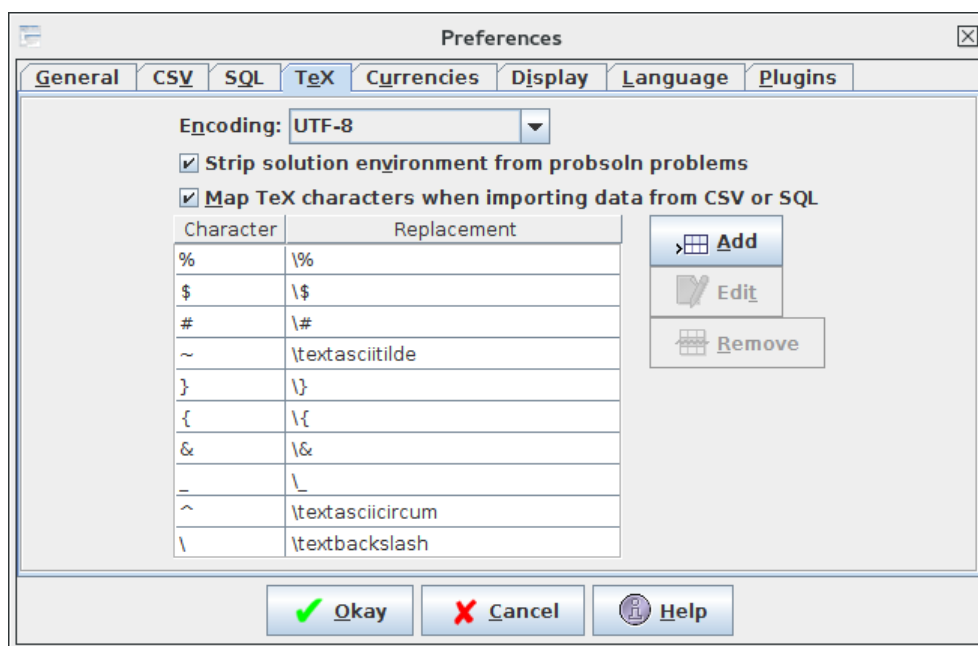


Figure 6.4: TeX Tab

When importing `probsoln` data, you may find it more convenient to strip any instances of the solution environment, particularly the implicit use of this environment by the unstarred version of `\newproblem`. You can now choose whether or not to omit `\begin{solution}` and `\end{solution}` by selecting the **Strip solution environment from probsoln problems** button. If checked, any instances of solution contained within definitions (provided by `\newproblem` or `defproblem`) will be removed.

In this tab you can also specify whether or not to map TeX special characters when you import data from **CSV** or **SQL**. If you want the mapping, make sure the **Map TeX characters when importing data from CSV or SQL** box is checked. The mapping table and buttons are hidden if **Map TeX characters when importing data from CSV or SQL** is unchecked. If it is checked, the performed mappings are listed in the table in the tab. To add another mapping, click on the **Add** button, which opens the dialog box shown in [Figure 6.5](#).

To remove a mapping, select the unwanted mapping and click on **Remove**. To edit a mapping, select the mapping and click on **Edit**.

Currencies ([Figure 6.6](#))

If you want to identify a column as a currency type, you must make sure that `datatooltk` recognises the L^AT_EX command to typeset your currency. Known currency commands are listed in the **Currencies** tab. If you add any currencies to the

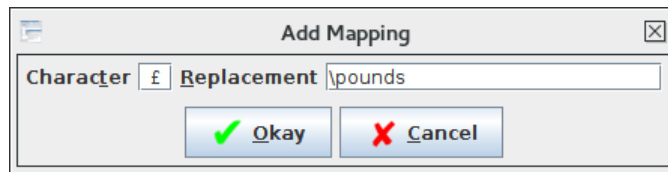


Figure 6.5: Add Mapping Dialog

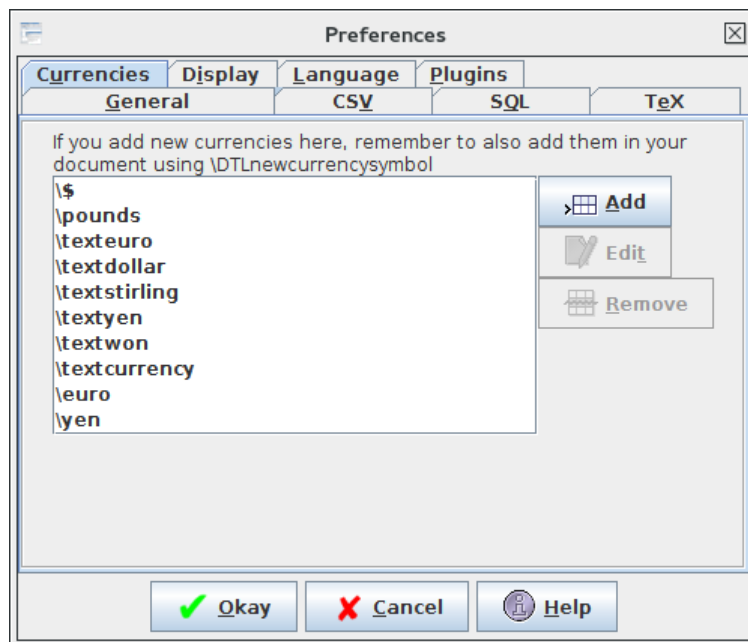


Figure 6.6: Currencies Tab

list, remember to add them in your document as well with `\DTLnewcurrencysymbol`.

Display (Figure 6.7)

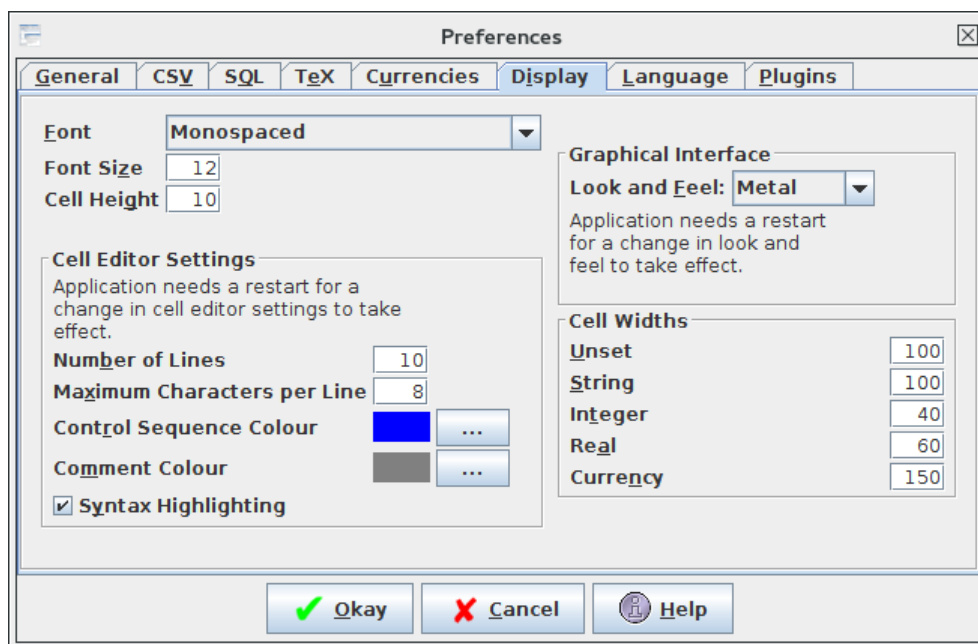


Figure 6.7: Display Tab

The default font used in cell entries is a monospaced font. This can be changed using the **Font** drop-down menu. You can also set the font size in the **Font Size** field. By default, each string cell has a maximum of four lines visible in the main window. (Real and integer columns only have a single line visible.) This number can be changed in the **Cell Height** field. Each column has a default width that depends on the data type for that column. The values are listed in the **Cell Widths** area. These can be changed as required.

The “Look And Feel” refers to the way the graphical interface is rendered. You can use the drop-down menu to select a different look and feel, but you need to restart `datatooltk` for the change to take effect. For example, Figure 6.7 shows the “Metal” look and feel whereas Figure 6.7 shows the same window but with the “Nimbus” look and feel.

Language (Figure 6.8)

The language used by the manual accessed via **Help**→**Manual** can be set from the **Manual Language** drop-down list. The language used in the messages, menu items, buttons and GUI labels can be set from the **GUI Language** drop-down list. Note that you have to restart `datatooltk` for these changes to take effect.

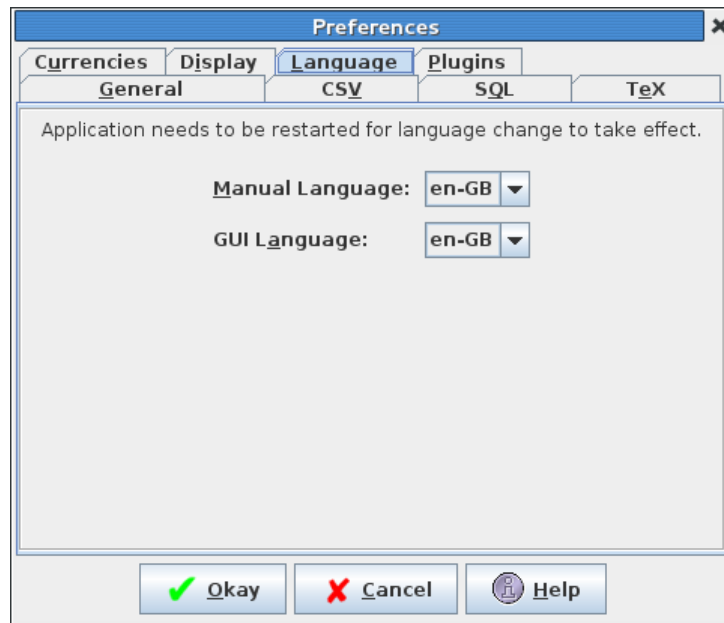


Figure 6.8: Language Tab

Plugins (Figure 6.9)

In order to use `datatooltk` plugins, you must have Perl installed (and the Perl Tk module). If the Perl executable is on your path, you can just specify it as `perl` in the **Perl** field of the Plugins tab. If it's not on your path, you will have to specify the full path name in this tab. You can use the ellipsis button to browse your filing system.

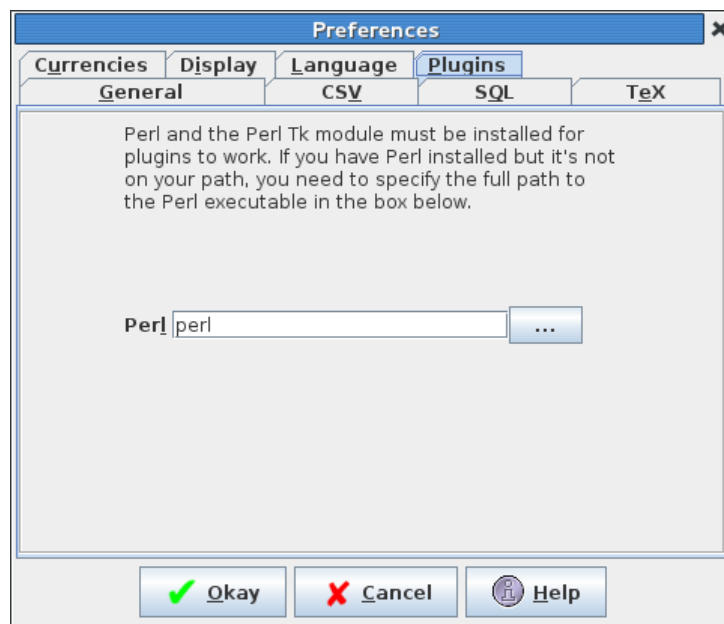


Figure 6.9: Plugins Tab

7 Licence

`datatooltk` is licensed under the terms of the GNU General Public License. `datatooltk` depends on the following third party libraries whose jar files are in the `lib` directory: Java Help (<https://javahelp.java.net/>), Open CSV (<http://opencsv.sourceforge.net/>), MySQL connector (<http://dev.mysql.com/downloads/connector/j/>) and the Java Look and Feel Graphics Repository (<http://www.oracle.com/technetwork/java/index-138612.html>).

GNU GENERAL PUBLIC LICENSE Version 3, 29 June 2007

Copyright (C) 2007 Free Software Foundation, Inc. <<http://fsf.org/>>
Everyone is permitted to copy and distribute verbatim copies
of this license document, but changing it is not allowed.

Preamble

The GNU General Public License is a free, copyleft license for software and other kinds of works.

The licenses for most software and other practical works are designed to take away your freedom to share and change the works. By contrast, the GNU General Public License is intended to guarantee your freedom to share and change all versions of a program--to make sure it remains free software for all its users. We, the Free Software Foundation, use the GNU General Public License for most of our software; it applies also to any other work released this way by its authors. You can apply it to your programs, too.

When we speak of free software, we are referring to freedom, not price. Our General Public Licenses are designed to make sure that you have the freedom to distribute copies of free software (and charge for them if you wish), that you receive source code or can get it if you want it, that you can change the software or use pieces of it in new free programs, and that you know you can do these things.

To protect your rights, we need to prevent others from denying you these rights or asking you to surrender the rights. Therefore, you have

certain responsibilities if you distribute copies of the software, or if you modify it: responsibilities to respect the freedom of others.

For example, if you distribute copies of such a program, whether gratis or for a fee, you must pass on to the recipients the same freedoms that you received. You must make sure that they, too, receive or can get the source code. And you must show them these terms so they know their rights.

Developers that use the GNU GPL protect your rights with two steps: (1) assert copyright on the software, and (2) offer you this License giving you legal permission to copy, distribute and/or modify it.

For the developers' and authors' protection, the GPL clearly explains that there is no warranty for this free software. For both users' and authors' sake, the GPL requires that modified versions be marked as changed, so that their problems will not be attributed erroneously to authors of previous versions.

Some devices are designed to deny users access to install or run modified versions of the software inside them, although the manufacturer can do so. This is fundamentally incompatible with the aim of protecting users' freedom to change the software. The systematic pattern of such abuse occurs in the area of products for individuals to use, which is precisely where it is most unacceptable. Therefore, we have designed this version of the GPL to prohibit the practice for those products. If such problems arise substantially in other domains, we stand ready to extend this provision to those domains in future versions of the GPL, as needed to protect the freedom of users.

Finally, every program is threatened constantly by software patents. States should not allow patents to restrict development and use of software on general-purpose computers, but in those that do, we wish to avoid the special danger that patents applied to a free program could make it effectively proprietary. To prevent this, the GPL assures that patents cannot be used to render the program non-free.

The precise terms and conditions for copying, distribution and modification follow.

TERMS AND CONDITIONS

0. Definitions.

"This License" refers to version 3 of the GNU General Public License.

"Copyright" also means copyright-like laws that apply to other kinds of works, such as semiconductor masks.

"The Program" refers to any copyrightable work licensed under this License. Each licensee is addressed as "you". "Licensees" and "recipients" may be individuals or organizations.

To "modify" a work means to copy from or adapt all or part of the work in a fashion requiring copyright permission, other than the making of an exact copy. The resulting work is called a "modified version" of the earlier work or a work "based on" the earlier work.

A "covered work" means either the unmodified Program or a work based on the Program.

To "propagate" a work means to do anything with it that, without permission, would make you directly or secondarily liable for infringement under applicable copyright law, except executing it on a computer or modifying a private copy. Propagation includes copying, distribution (with or without modification), making available to the public, and in some countries other activities as well.

To "convey" a work means any kind of propagation that enables other parties to make or receive copies. Mere interaction with a user through a computer network, with no transfer of a copy, is not conveying.

An interactive user interface displays "Appropriate Legal Notices" to the extent that it includes a convenient and prominently visible feature that (1) displays an appropriate copyright notice, and (2) tells the user that there is no warranty for the work (except to the extent that warranties are provided), that licensees may convey the work under this License, and how to view a copy of this License. If the interface presents a list of user commands or options, such as a menu, a prominent item in the list meets this criterion.

1. Source Code.

The "source code" for a work means the preferred form of the work for making modifications to it. "Object code" means any non-source form of a work.

A "Standard Interface" means an interface that either is an official

standard defined by a recognized standards body, or, in the case of interfaces specified for a particular programming language, one that is widely used among developers working in that language.

The "System Libraries" of an executable work include anything, other than the work as a whole, that (a) is included in the normal form of packaging a Major Component, but which is not part of that Major Component, and (b) serves only to enable use of the work with that Major Component, or to implement a Standard Interface for which an implementation is available to the public in source code form. A "Major Component", in this context, means a major essential component (kernel, window system, and so on) of the specific operating system (if any) on which the executable work runs, or a compiler used to produce the work, or an object code interpreter used to run it.

The "Corresponding Source" for a work in object code form means all the source code needed to generate, install, and (for an executable work) run the object code and to modify the work, including scripts to control those activities. However, it does not include the work's System Libraries, or general-purpose tools or generally available free programs which are used unmodified in performing those activities but which are not part of the work. For example, Corresponding Source includes interface definition files associated with source files for the work, and the source code for shared libraries and dynamically linked subprograms that the work is specifically designed to require, such as by intimate data communication or control flow between those subprograms and other parts of the work.

The Corresponding Source need not include anything that users can regenerate automatically from other parts of the Corresponding Source.

The Corresponding Source for a work in source code form is that same work.

2. Basic Permissions.

All rights granted under this License are granted for the term of copyright on the Program, and are irrevocable provided the stated conditions are met. This License explicitly affirms your unlimited permission to run the unmodified Program. The output from running a covered work is covered by this License only if the output, given its content, constitutes a covered work. This License acknowledges your rights of fair use or other equivalent, as provided by copyright law.

You may make, run and propagate covered works that you do not convey, without conditions so long as your license otherwise remains in force. You may convey covered works to others for the sole purpose of having them make modifications exclusively for you, or provide you with facilities for running those works, provided that you comply with the terms of this License in conveying all material for which you do not control copyright. Those thus making or running the covered works for you must do so exclusively on your behalf, under your direction and control, on terms that prohibit them from making any copies of your copyrighted material outside their relationship with you.

Conveying under any other circumstances is permitted solely under the conditions stated below. Sublicensing is not allowed; section 10 makes it unnecessary.

3. Protecting Users' Legal Rights From Anti-Circumvention Law.

No covered work shall be deemed part of an effective technological measure under any applicable law fulfilling obligations under article 11 of the WIPO copyright treaty adopted on 20 December 1996, or similar laws prohibiting or restricting circumvention of such measures.

When you convey a covered work, you waive any legal power to forbid circumvention of technological measures to the extent such circumvention is effected by exercising rights under this License with respect to the covered work, and you disclaim any intention to limit operation or modification of the work as a means of enforcing, against the work's users, your or third parties' legal rights to forbid circumvention of technological measures.

4. Conveying Verbatim Copies.

You may convey verbatim copies of the Program's source code as you receive it, in any medium, provided that you conspicuously and appropriately publish on each copy an appropriate copyright notice; keep intact all notices stating that this License and any non-permissive terms added in accord with section 7 apply to the code; keep intact all notices of the absence of any warranty; and give all recipients a copy of this License along with the Program.

You may charge any price or no price for each copy that you convey, and you may offer support or warranty protection for a fee.

5. Conveying Modified Source Versions.

You may convey a work based on the Program, or the modifications to produce it from the Program, in the form of source code under the terms of section 4, provided that you also meet all of these conditions:

- a) The work must carry prominent notices stating that you modified it, and giving a relevant date.
- b) The work must carry prominent notices stating that it is released under this License and any conditions added under section 7. This requirement modifies the requirement in section 4 to "keep intact all notices".
- c) You must license the entire work, as a whole, under this License to anyone who comes into possession of a copy. This License will therefore apply, along with any applicable section 7 additional terms, to the whole of the work, and all its parts, regardless of how they are packaged. This License gives no permission to license the work in any other way, but it does not invalidate such permission if you have separately received it.
- d) If the work has interactive user interfaces, each must display Appropriate Legal Notices; however, if the Program has interactive interfaces that do not display Appropriate Legal Notices, your work need not make them do so.

A compilation of a covered work with other separate and independent works, which are not by their nature extensions of the covered work, and which are not combined with it such as to form a larger program, in or on a volume of a storage or distribution medium, is called an "aggregate" if the compilation and its resulting copyright are not used to limit the access or legal rights of the compilation's users beyond what the individual works permit. Inclusion of a covered work in an aggregate does not cause this License to apply to the other parts of the aggregate.

6. Conveying Non-Source Forms.

You may convey a covered work in object code form under the terms of sections 4 and 5, provided that you also convey the machine-readable Corresponding Source under the terms of this License, in one of these ways:

a) Convey the object code in, or embodied in, a physical product (including a physical distribution medium), accompanied by the Corresponding Source fixed on a durable physical medium customarily used for software interchange.

b) Convey the object code in, or embodied in, a physical product (including a physical distribution medium), accompanied by a written offer, valid for at least three years and valid for as long as you offer spare parts or customer support for that product model, to give anyone who possesses the object code either (1) a copy of the Corresponding Source for all the software in the product that is covered by this License, on a durable physical medium customarily used for software interchange, for a price no more than your reasonable cost of physically performing this conveying of source, or (2) access to copy the Corresponding Source from a network server at no charge.

c) Convey individual copies of the object code with a copy of the written offer to provide the Corresponding Source. This alternative is allowed only occasionally and noncommercially, and only if you received the object code with such an offer, in accord with subsection 6b.

d) Convey the object code by offering access from a designated place (gratis or for a charge), and offer equivalent access to the Corresponding Source in the same way through the same place at no further charge. You need not require recipients to copy the Corresponding Source along with the object code. If the place to copy the object code is a network server, the Corresponding Source may be on a different server (operated by you or a third party) that supports equivalent copying facilities, provided you maintain clear directions next to the object code saying where to find the Corresponding Source. Regardless of what server hosts the Corresponding Source, you remain obligated to ensure that it is available for as long as needed to satisfy these requirements.

e) Convey the object code using peer-to-peer transmission, provided you inform other peers where the object code and Corresponding Source of the work are being offered to the general public at no charge under subsection 6d.

A separable portion of the object code, whose source code is excluded from the Corresponding Source as a System Library, need not be

included in conveying the object code work.

A "User Product" is either (1) a "consumer product", which means any tangible personal property which is normally used for personal, family, or household purposes, or (2) anything designed or sold for incorporation into a dwelling. In determining whether a product is a consumer product, doubtful cases shall be resolved in favor of coverage. For a particular product received by a particular user, "normally used" refers to a typical or common use of that class of product, regardless of the status of the particular user or of the way in which the particular user actually uses, or expects or is expected to use, the product. A product is a consumer product regardless of whether the product has substantial commercial, industrial or non-consumer uses, unless such uses represent the only significant mode of use of the product.

"Installation Information" for a User Product means any methods, procedures, authorization keys, or other information required to install and execute modified versions of a covered work in that User Product from a modified version of its Corresponding Source. The information must suffice to ensure that the continued functioning of the modified object code is in no case prevented or interfered with solely because modification has been made.

If you convey an object code work under this section in, or with, or specifically for use in, a User Product, and the conveying occurs as part of a transaction in which the right of possession and use of the User Product is transferred to the recipient in perpetuity or for a fixed term (regardless of how the transaction is characterized), the Corresponding Source conveyed under this section must be accompanied by the Installation Information. But this requirement does not apply if neither you nor any third party retains the ability to install modified object code on the User Product (for example, the work has been installed in ROM).

The requirement to provide Installation Information does not include a requirement to continue to provide support service, warranty, or updates for a work that has been modified or installed by the recipient, or for the User Product in which it has been modified or installed. Access to a network may be denied when the modification itself materially and adversely affects the operation of the network or violates the rules and protocols for communication across the network.

Corresponding Source conveyed, and Installation Information provided, in accord with this section must be in a format that is publicly

documented (and with an implementation available to the public in source code form), and must require no special password or key for unpacking, reading or copying.

7. Additional Terms.

"Additional permissions" are terms that supplement the terms of this License by making exceptions from one or more of its conditions. Additional permissions that are applicable to the entire Program shall be treated as though they were included in this License, to the extent that they are valid under applicable law. If additional permissions apply only to part of the Program, that part may be used separately under those permissions, but the entire Program remains governed by this License without regard to the additional permissions.

When you convey a copy of a covered work, you may at your option remove any additional permissions from that copy, or from any part of it. (Additional permissions may be written to require their own removal in certain cases when you modify the work.) You may place additional permissions on material, added by you to a covered work, for which you have or can give appropriate copyright permission.

Notwithstanding any other provision of this License, for material you add to a covered work, you may (if authorized by the copyright holders of that material) supplement the terms of this License with terms:

- a) Disclaiming warranty or limiting liability differently from the terms of sections 15 and 16 of this License; or
- b) Requiring preservation of specified reasonable legal notices or author attributions in that material or in the Appropriate Legal Notices displayed by works containing it; or
- c) Prohibiting misrepresentation of the origin of that material, or requiring that modified versions of such material be marked in reasonable ways as different from the original version; or
- d) Limiting the use for publicity purposes of names of licensors or authors of the material; or
- e) Declining to grant rights under trademark law for use of some trade names, trademarks, or service marks; or
- f) Requiring indemnification of licensors and authors of that

material by anyone who conveys the material (or modified versions of it) with contractual assumptions of liability to the recipient, for any liability that these contractual assumptions directly impose on those licensors and authors.

All other non-permissive additional terms are considered "further restrictions" within the meaning of section 10. If the Program as you received it, or any part of it, contains a notice stating that it is governed by this License along with a term that is a further restriction, you may remove that term. If a license document contains a further restriction but permits relicensing or conveying under this License, you may add to a covered work material governed by the terms of that license document, provided that the further restriction does not survive such relicensing or conveying.

If you add terms to a covered work in accord with this section, you must place, in the relevant source files, a statement of the additional terms that apply to those files, or a notice indicating where to find the applicable terms.

Additional terms, permissive or non-permissive, may be stated in the form of a separately written license, or stated as exceptions; the above requirements apply either way.

8. Termination.

You may not propagate or modify a covered work except as expressly provided under this License. Any attempt otherwise to propagate or modify it is void, and will automatically terminate your rights under this License (including any patent licenses granted under the third paragraph of section 11).

However, if you cease all violation of this License, then your license from a particular copyright holder is reinstated (a) provisionally, unless and until the copyright holder explicitly and finally terminates your license, and (b) permanently, if the copyright holder fails to notify you of the violation by some reasonable means prior to 60 days after the cessation.

Moreover, your license from a particular copyright holder is reinstated permanently if the copyright holder notifies you of the violation by some reasonable means, this is the first time you have received notice of violation of this License (for any work) from that copyright holder, and you cure the violation prior to 30 days after

your receipt of the notice.

Termination of your rights under this section does not terminate the licenses of parties who have received copies or rights from you under this License. If your rights have been terminated and not permanently reinstated, you do not qualify to receive new licenses for the same material under section 10.

9. Acceptance Not Required for Having Copies.

You are not required to accept this License in order to receive or run a copy of the Program. Ancillary propagation of a covered work occurring solely as a consequence of using peer-to-peer transmission to receive a copy likewise does not require acceptance. However, nothing other than this License grants you permission to propagate or modify any covered work. These actions infringe copyright if you do not accept this License. Therefore, by modifying or propagating a covered work, you indicate your acceptance of this License to do so.

10. Automatic Licensing of Downstream Recipients.

Each time you convey a covered work, the recipient automatically receives a license from the original licensors, to run, modify and propagate that work, subject to this License. You are not responsible for enforcing compliance by third parties with this License.

An "entity transaction" is a transaction transferring control of an organization, or substantially all assets of one, or subdividing an organization, or merging organizations. If propagation of a covered work results from an entity transaction, each party to that transaction who receives a copy of the work also receives whatever licenses to the work the party's predecessor in interest had or could give under the previous paragraph, plus a right to possession of the Corresponding Source of the work from the predecessor in interest, if the predecessor has it or can get it with reasonable efforts.

You may not impose any further restrictions on the exercise of the rights granted or affirmed under this License. For example, you may not impose a license fee, royalty, or other charge for exercise of rights granted under this License, and you may not initiate litigation (including a cross-claim or counterclaim in a lawsuit) alleging that any patent claim is infringed by making, using, selling, offering for sale, or importing the Program or any portion of it.

11. Patents.

A "contributor" is a copyright holder who authorizes use under this License of the Program or a work on which the Program is based. The work thus licensed is called the contributor's "contributor version".

A contributor's "essential patent claims" are all patent claims owned or controlled by the contributor, whether already acquired or hereafter acquired, that would be infringed by some manner, permitted by this License, of making, using, or selling its contributor version, but do not include claims that would be infringed only as a consequence of further modification of the contributor version. For purposes of this definition, "control" includes the right to grant patent sublicenses in a manner consistent with the requirements of this License.

Each contributor grants you a non-exclusive, worldwide, royalty-free patent license under the contributor's essential patent claims, to make, use, sell, offer for sale, import and otherwise run, modify and propagate the contents of its contributor version.

In the following three paragraphs, a "patent license" is any express agreement or commitment, however denominated, not to enforce a patent (such as an express permission to practice a patent or covenant not to sue for patent infringement). To "grant" such a patent license to a party means to make such an agreement or commitment not to enforce a patent against the party.

If you convey a covered work, knowingly relying on a patent license, and the Corresponding Source of the work is not available for anyone to copy, free of charge and under the terms of this License, through a publicly available network server or other readily accessible means, then you must either (1) cause the Corresponding Source to be so available, or (2) arrange to deprive yourself of the benefit of the patent license for this particular work, or (3) arrange, in a manner consistent with the requirements of this License, to extend the patent license to downstream recipients. "Knowingly relying" means you have actual knowledge that, but for the patent license, your conveying the covered work in a country, or your recipient's use of the covered work in a country, would infringe one or more identifiable patents in that country that you have reason to believe are valid.

If, pursuant to or in connection with a single transaction or arrangement, you convey, or propagate by procuring conveyance of, a

covered work, and grant a patent license to some of the parties receiving the covered work authorizing them to use, propagate, modify or convey a specific copy of the covered work, then the patent license you grant is automatically extended to all recipients of the covered work and works based on it.

A patent license is "discriminatory" if it does not include within the scope of its coverage, prohibits the exercise of, or is conditioned on the non-exercise of one or more of the rights that are specifically granted under this License. You may not convey a covered work if you are a party to an arrangement with a third party that is in the business of distributing software, under which you make payment to the third party based on the extent of your activity of conveying the work, and under which the third party grants, to any of the parties who would receive the covered work from you, a discriminatory patent license (a) in connection with copies of the covered work conveyed by you (or copies made from those copies), or (b) primarily for and in connection with specific products or compilations that contain the covered work, unless you entered into that arrangement, or that patent license was granted, prior to 28 March 2007.

Nothing in this License shall be construed as excluding or limiting any implied license or other defenses to infringement that may otherwise be available to you under applicable patent law.

12. No Surrender of Others' Freedom.

If conditions are imposed on you (whether by court order, agreement or otherwise) that contradict the conditions of this License, they do not excuse you from the conditions of this License. If you cannot convey a covered work so as to satisfy simultaneously your obligations under this License and any other pertinent obligations, then as a consequence you may not convey it at all. For example, if you agree to terms that obligate you to collect a royalty for further conveying from those to whom you convey the Program, the only way you could satisfy both those terms and this License would be to refrain entirely from conveying the Program.

13. Use with the GNU Affero General Public License.

Notwithstanding any other provision of this License, you have permission to link or combine any covered work with a work licensed under version 3 of the GNU Affero General Public License into a single combined work, and to convey the resulting work. The terms of this License will continue to apply to the part which is the covered work,

but the special requirements of the GNU Affero General Public License, section 13, concerning interaction through a network will apply to the combination as such.

14. Revised Versions of this License.

The Free Software Foundation may publish revised and/or new versions of the GNU General Public License from time to time. Such new versions will be similar in spirit to the present version, but may differ in detail to address new problems or concerns.

Each version is given a distinguishing version number. If the Program specifies that a certain numbered version of the GNU General Public License "or any later version" applies to it, you have the option of following the terms and conditions either of that numbered version or of any later version published by the Free Software Foundation. If the Program does not specify a version number of the GNU General Public License, you may choose any version ever published by the Free Software Foundation.

If the Program specifies that a proxy can decide which future versions of the GNU General Public License can be used, that proxy's public statement of acceptance of a version permanently authorizes you to choose that version for the Program.

Later license versions may give you additional or different permissions. However, no additional obligations are imposed on any author or copyright holder as a result of your choosing to follow a later version.

15. Disclaimer of Warranty.

THERE IS NO WARRANTY FOR THE PROGRAM, TO THE EXTENT PERMITTED BY APPLICABLE LAW. EXCEPT WHEN OTHERWISE STATED IN WRITING THE COPYRIGHT HOLDERS AND/OR OTHER PARTIES PROVIDE THE PROGRAM "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THE ENTIRE RISK AS TO THE QUALITY AND PERFORMANCE OF THE PROGRAM IS WITH YOU. SHOULD THE PROGRAM PROVE DEFECTIVE, YOU ASSUME THE COST OF ALL NECESSARY SERVICING, REPAIR OR CORRECTION.

16. Limitation of Liability.

IN NO EVENT UNLESS REQUIRED BY APPLICABLE LAW OR AGREED TO IN WRITING

WILL ANY COPYRIGHT HOLDER, OR ANY OTHER PARTY WHO MODIFIES AND/OR CONVEYS THE PROGRAM AS PERMITTED ABOVE, BE LIABLE TO YOU FOR DAMAGES, INCLUDING ANY GENERAL, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OR INABILITY TO USE THE PROGRAM (INCLUDING BUT NOT LIMITED TO LOSS OF DATA OR DATA BEING RENDERED INACCURATE OR LOSSES SUSTAINED BY YOU OR THIRD PARTIES OR A FAILURE OF THE PROGRAM TO OPERATE WITH ANY OTHER PROGRAMS), EVEN IF SUCH HOLDER OR OTHER PARTY HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

17. Interpretation of Sections 15 and 16.

If the disclaimer of warranty and limitation of liability provided above cannot be given local legal effect according to their terms, reviewing courts shall apply local law that most closely approximates an absolute waiver of all civil liability in connection with the Program, unless a warranty or assumption of liability accompanies a copy of the Program in return for a fee.

END OF TERMS AND CONDITIONS

How to Apply These Terms to Your New Programs

If you develop a new program, and you want it to be of the greatest possible use to the public, the best way to achieve this is to make it free software which everyone can redistribute and change under these terms.

To do so, attach the following notices to the program. It is safest to attach them to the start of each source file to most effectively state the exclusion of warranty; and each file should have at least the "copyright" line and a pointer to where the full notice is found.

```
<one line to give the program's name and a brief idea of what it does.>
Copyright (C) <year>  <name of author>
```

```
This program is free software: you can redistribute it and/or modify
it under the terms of the GNU General Public License as published by
the Free Software Foundation, either version 3 of the License, or
(at your option) any later version.
```

```
This program is distributed in the hope that it will be useful,
but WITHOUT ANY WARRANTY; without even the implied warranty of
MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.  See the
GNU General Public License for more details.
```

You should have received a copy of the GNU General Public License along with this program. If not, see [<http://www.gnu.org/licenses/>](http://www.gnu.org/licenses/).

Also add information on how to contact you by electronic and paper mail.

If the program does terminal interaction, make it output a short notice like this when it starts in an interactive mode:

```
<program> Copyright (C) <year> <name of author>
This program comes with ABSOLUTELY NO WARRANTY; for details type 'show w'.
This is free software, and you are welcome to redistribute it
under certain conditions; type 'show c' for details.
```

The hypothetical commands 'show w' and 'show c' should show the appropriate parts of the General Public License. Of course, your program's commands might be different; for a GUI interface, you would use an "about box".

You should also get your employer (if you work as a programmer) or school, if any, to sign a "copyright disclaimer" for the program, if necessary. For more information on this, and how to apply and follow the GNU GPL, see [<http://www.gnu.org/licenses/>](http://www.gnu.org/licenses/).

The GNU General Public License does not permit incorporating your program into proprietary programs. If your program is a subroutine library, you may consider it more useful to permit linking proprietary applications with the library. If this is what you want to do, use the GNU Lesser General Public License instead of this License. But first, please read [<http://www.gnu.org/philosophy/why-not-lgpl.html>](http://www.gnu.org/philosophy/why-not-lgpl.html).

Glossary

current working directory The directory in which the application was started. [56](#)

MySQL An open source SQL database. [7](#), [47](#), [57](#)

Abbreviations

CSV comma-separated values. 3–8, 10, 45, 46, 56–58

GUI graphical user interface. 3, 4, 9, 15, 18, 40, 45–48, 55, 60

IETF internet engineering task force. 5

SQL structured query language. 3, 5, 7, 8, 10, 17, 45, 47, 48, 57, 58

Index

--batch, 3
--compat, 4, 20
--csv, 4, 6, 8, 45
--csv-delim, 6
--csv-encoding, 4, 6, 45
--csv-escape, 7
--csv-header, 6
--csv-sep, 6
--csvencoding, 6
--csvescape, 7
--csvheader, 6, 45
--debug, 4
--delim, 6, 45
--filter, 5, 6
--filter-and, 6
--filter-exclude, 6
--filter-include, 6
--filter-or, 6
--gui, 3, 13
--help, 4
--in, 3, 4, 8, 17, 25, 26
--map-tex-specials, 5, 45
--merge, 6–8
--merge-csv, 6, 8
--merge-ods, 7, 8
--merge-probsoln, 8
--merge-sql, 7, 8
--merge-xls, 7, 8
--name, 4, 9
--noconsole-action, 8, 47
--nocsv-escape, 7
--nocsv-header, 6
--nocsvescape, 7
--nocsvheader, 6, 45, 46
--nodebug, 4
--nomap-tex-specials, 5
--noowner-only, 4
--noshuffle, 5
--nowipepassword, 8
--ods, 4, 7, 8, 46
--output, 3, 25, 26
--owner-only, 4
--probsoln, 4, 8, 48
--seed, 5, 20, 25, 26, 56
--sep, 6, 45
--sheet, 7, 46
--shuffle, 4, 5, 17, 20, 25, 26
--sort, 5, 17, 18, 25, 26
--sort-case-insensitive, 5, 18
--sort-case-sensitive, 5, 18
--sort-locale, 5, 17
--sql, 4, 7, 8, 47
--sqldb, 7, 47
--sqlhost, 7, 47
--sqlpassword, 8, 47
--sqlport, 7, 47
--sqlprefix, 7, 47
--sqluser, 8, 47
--tex-encoding, 4, 6
--truncate, 5
--version, 4
--wipepassword, 8
--xls, 4, 7, 8, 46
\\, 7, 31
alltt environment, 10
database, 3
datagidx package, 31, 37, 39–44, 52
datatool package, 3, 4, 8–10, 12–14, 17,
29, 37, 45, 48
defproblem environment, 48, 50, 58

- \DTLdisplaydb, 15
- \DTLforeach, 10, 15, 25
- \dtlgetrow, 25
- \DTLifnull, 12
- \dtllastloadeddb, 9
- \DTLloaddb, 45
- \DTLloaddbtex, 9, 10, 14
- \DTLnewcurrencysymbol, 60
- \DTLnewdb, 9, 13
- \DTLpar, 14, 45, 46
- \DTLprotectedsaverawdb, 3, 14
- \DTLsaverawdb, 3, 4, 14, 26
- \DTLsort, 17

Edit

- Column
 - Edit Header, 15
 - Nullify Column, 12
- Edit Cell, 14
- Edit Database Name, 9
- Edit Preferences, 55
- Row, 30, 52
 - Delete Row, 31
 - Nullify Row, 12
- Set Cell to Null, 12
- etoolbox package, 12
- \euro, 19, 20

File, 14, 56

- Import
 - Import CSV, 45
 - Import probsoln File, 48
 - Import Spreadsheet, 46
 - Import SQL, 47
- New From Template, 31, 52
- Open, 14

glossaries package, 39, 41–43

glossaries-extra package, 5

\glsadd, 42

\glsaddall, 40, 42

Help

- Manual, 60

\ifdefempty, 12

\input, 9, 10, 14

listings package, 10

\loadallproblems, 45

\loadgidx, 43

\lstinline, 10

\lstinputlisting, 10

lstlisting environment, 10

\makeglossaries, 43

\makenoidxglossaries, 43

\newgidx, 39, 43

\newglossaryentry, 41

\newproblem, 48, 50, 58

\newterm, 39, 41

\pounds, 19, 20

probsoln package, 3, 8, 45, 48, 50, 57, 58

\setkeys, 40

solution environment, 50, 58

Tools, 17

- Plugins, 30, 31

- Shuffle, 20

- Sort, 18

\verb, 10

verbatim environment, 10

verbatim package, 10

\verbatiminput, 10

\write18, 17