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a addition arectory is lugin after ill be function as a linux. esides the hich representation are now	to the instals a sub-directrinstallation of the citional. The ion files and exercise regular releasents code immediate for weady to ready	llation directory, story named "plugh, all you need to do other directory is is located in C:\D eases we create a modifications madeedback to bug-fixun SQuirreL.	SQuirreL uses two directins". This is where all do is to unpack the plus created when SQuirrection occuments and Setting "snapshot" release eade during that week.	l of the code for the plagin in the plagins dire eL runs for the first tin s\ <username>\.squirre</username>	need to know about. Within the installation agins is located. If you download a new ctory and restart SQuirreL, and the plugin ne. It contains various history and el-sql on Windows and \$HOME/.squirrel-sql so of an IzPack installer and source archive napshots are to provide a way for end-users
etting you Get the Get the Define hese are referenced the more very time river for the country of the next streating the endor used elp by including the stablish the stablish the stablish the country of the country of the country of the stablish the stablish the stablish the country of the	ne JDBC .jar of a link to a second to a second "Drivers will need to be a link to a second to be a link to	nected to your da containing the ap specific database is defining the "Driver" configuration started it opens to blue check mark in that you need to get the driver frindow) where to findow) where to find the an Alias (figure will need to enter format, and some int" in the URL field (e.g machine name).	propriate driver and to on a specific machine river" and creating an on. The Driver and the Alia next to each of the driver use has a red 'X' next rom your database ventiond it. You can also act the URL for the database options (such as port ld that identifies the syne, port number, user it.	"Alias", where the "Alias" windows on the desk vers that is currently avers to it, you will need to dedor and load it onto you do not need to a connection to a specific case. This is usually the numbers) may be unity on the ename, password etc.) in the connection to a specific numbers with the ename, password etc.)	
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SQuirreL, a Universal SQL Client

SQuirreL

SQL

by Gerd Wagner and Glenn Griffin

When the problem involves complex data relationships, the SQL tab view can be used to enter SQL queries. The query can include any standard and vendor-specific SQL that your database engine will handle. If you need to repeat a query or make a request similar to a previous one you can grab one or more lines from the SQL history, edit them as needed and then execute the new query. If the result comes from a single table in the database, the data can be edited on the screen and the table updated immediately. To make simple corrections you can switch to the Object tab, or you can stay in the SQL tab to make more complex updates using the full SQL capabilities. Complex tasks that are repeated (nightly or monthly cleanup, periodic re-loading tables of product descriptions, etc.) can be automated using the SQL Scripts plugin. All of SQuirreL's tables allow you to selectively copy data as either a space-separated list or as HTML format which can be pasted into documents or web pages. Software developers, maintainers, and Testers When writing software or testing an application, you need to be able to exercise specific functions and to test error paths. The most important ways that SQuirreL supports software developers these efforts are:

1. Setting up data before running a test, checking the data after running a test, and fixing data that was corrupted during

4. Providing a nice environment for figuring out what should be in an SQL statement, making it easy to create/edit existing

Many of these tasks are very similar to those needed by an application administrator, requiring exploring and adjusting data in the database, so the descriptions in the Application Administrator section are relevant here as well. The main difference is that

The Syntax plugin does syntax highlighting and allows you to create user defined abbreviations and auto corrections. Together

Quite often developers need to test SQL strings from program code in an SQL tool, or an SQL statement was written and tested

Another common problem for developers is to analyze SQL strings from traces or debugging output. Quite often these strings come without any formatting, e.g. a long string with no line feeds. The Edit Extras plugin provides easy formatting of SOL statements. Insert statements are formatted in such a way that column names are placed above their values. The plugin will

Many applications make use of Views or Stored Procedures. Views and Stored Procedures may be executed in SQuirreL, but there is no SQL standard for storing them. Since the method for reading and editing them is product dependent, you will need

As a side note, developers of JDBC drivers should find that SQuirreL is a convenient test bed. Not only are drivers easy to add and replace, but SQuirreL exercises all aspects of a JDBC driver and provides the results in easy-to-read tables, so developers

For Database administrators SQuirrel provides easy and consistent access to all of the local and remote machines they are

Compared to other user groups database administrators more often have to deal with product specific quirks of databases. Because they are non-standard, those quirks cannot be supported by SQuirreL's main code. On the other hand, SQuirreL's plugin API is sophisticated enough that it can even support critical database functions. Since the plugin is Java code, it has the ability to start a separate process, so even when a function is not available through a vendor's API, the plugin may still be able to perform it by calling the vendor's tools. The advantage of doing it this way would be to relieve the administrator of knowing

There are already several product-specific plugins. Nonetheless we would like to urge database administrators who are

interested in Java programming to have a look at the 'Programming plugins' section and to write product specific plugins for SQuirreL. If you have to administer more than one database product you will appreciate a client that unifies standard features

For someone who is just starting to learn SQL, the SQL Bookmarks plugin provides code templates for many common SQL and

The Syntax plugin does an on the fly SQL syntax check and flags errors using colored text. If the mouse pointer is placed on an

SQuirreL's Graph plugin (figure 6) generates a graphical view of the tables and the foreign keys in the database and thus gives

For students it is important to understand that all relational databases follow common principles that are vendor independent.

When joining an existing project it takes time to understand how the database is organized. SQuirreL's Graph plugin can help by allowing you to see the tables and their relationships arranged visually in one or more graphs. The graphs can be saved under user-defined names and are reopened when the session is opened next time. Also graphs may be scaled arbitrarily and

Writing SQL statements can be difficult when you are not familiar with the table and column names. The Code Completion plugin can auto-complete SOL and DDL code, much in the way that IDEs help with code completion. The completion pop up window for columns (figure 7) shows the column names as well as their most important properties. In case those properties are not enough you may place the cursor on a table or view name and the use the right mouse menu to jump to its definition in the

We actively encourage people to write plugins for SQuirreL. Since plugins are independent of the core SQuirreL code, we pretty much let people do what they want. On the other hand, if you think you would like to build one, it is a good idea to get in touch with us first. For one thing, someone else may be working on that same feature already. Another reason is that you may need an enhancement to the plugin API. If you are building a feature that you need, then it will probably be useful to other people as well. We would like to work with you to make your plugin available under the same LGPL license as SQuirreL, but if that is not possible you can still count on our support. You can reach us through the squirrel-sql-develop mail list under Mailing Lists on the

We will explain plugin programming by creating a simple example that displays the definition of a View or Stored Procedure. It does this by copying the definition of the View or Stored Procedure to the SQL editor, though any changes made there do not cause changes in the database. To change Views or Stored Procedures the user would have to run the usual DDL commands himself. SQuirreL needs to use a plugin to access those definitions because each database vendor stores and retrieves those

While the code in the example is specific to IBM's DB2 database, it can used as a template for creating plugins that work with

information needed to check out the module. The example code will be in the plugins/example/ subdirectory of your checkout

To make SQuirrel work with a plugin the complied class files of the plugin need to be packed to a Jar file. The Jar file must be copied to the plugins directory of your SQuirreL installation. During startup SQuirreL loads the plugin Jar files and searches each Jar for an implementation of the IPlugin interface. This implementation is the central class of a plugin. In our example this class is named ExamplePlugin. ExamplePlugin is derived from DefaultSessionPlugin which then implements IPlugin. The central methods

of ExamplePlugin are initialize() and sessionStarted(), see listing 1. To check if SQuirreL correctly loaded a plugin you may

The initialize() method is called once during SQuirreL's startup. In our implementation of initialize() the resources e.g. the file example properties is loaded. This file contains the labels of the menu items we are going to add to the Object tree's context

The sessionStarted() method will be called when a Session is opened. In our example sessionStarted() implementation we first check if the Session is for a DB2 database. If not the plugin will remain inactive. If it is an DB2 database we add the menu items to the context menu of the Object tree's view and stored procedure nodes. If for example the user selects the '(DB2) Script View'

In the actionPerformed() method of ScriptDB2ViewAction we first gather the objects selected in the tree. Further down we need the 'simple name' attribute of these objects. The simple names are nothing but the names of the views. Then follows the product specific code: We access the IBM DB2 specific system table 'SYSIBM.SYSVIEWS'. The rest of the code is needed to output the

The code to script stored procedures is very similar to the view scripting code and will not be presented here.

The complete example code is available in the sgl12 module of SQuirreL's CVS repository. At www.squirrelsgl.org you can find all

students an easy overview of the relational structures. The scripting functions of graphs allow the user to re-translate the

Because SQuirreL allows unified access to almost all relational databases it particularly points out these principles.

a product-specific plugin to provide that ability. Several of these exist, but you may need to create one for your database

3. Giving simple, consistent remote access to multiple machines, eg: such as unit test, system test and production.

developers and testers must frequently wipe out old data and restore a known set of test data. The SQL Script plugin

with the user defined Code templates introduced by the SQL-Bookmarks plugin, SQuirreL is a powerful code generator.

in an SQL tool and now needs to be put into the program code. In these situations string delimiters need to be added to or

2. Quickly looking at and fixing data in a System Test or Production environment

mentioned in the previous section can aid that task.

SQL, tweak data to support the SQL test if needed, run the SQL and examine the results.

The Code Completion plugin provides completion of SQL and DDL code and generates SQL join syntax.

removed from the statement. With the help of the Edit Extras plugin this can be done with one mouse click.

also format Timestamp/Date/Time values in the standard JDBC syntax with a single mouse click.

responsible for. They can use SQuirreL to examine parameters in databases or check table sizes.

engine. We will show how easy that is in the 'Programming plugins' section.

DDL statements. The plugin also allows you to define your own templates.

visual representation back into abstract DDL code and thus clarify the connection of both.

HTML format which can be pasted into documents or web pages.

Database administrators

the details of those tools.

People Learning or Teaching SQL

as well as handling product-specific variations.

error, an error message tool tip is shown.

Understanding an existing database

be printed over several paper pages.

Object tree.

Programming plugins

www.squirrelsql.org home page.

definitions in a proprietary manner.

choose the menu item "Plugins" --> "Summary".

view definition to the SQL editor.

_resources = new PluginResources

* Called when a session is opened.

String driverName =

return null;

// ...

try

Listing 2 ScriptDB2ViewAction:

private ISession _session;

super(app, rsrc); _session = session;

Statement stat =

String sql =

res.next();

res.close();

//

stat.close();

catch (Exception e)

* suitable line feeds.

"SELECT TEXT " +

sessMainFrm.getSQLPanelAPI().

sessMainFrm.getSessionPanel().

throw new RuntimeException(e);

private String getStatementSeparator()

statementSeparator += "\n";

(1 < statementSeparator.length())</pre>

String statementSeparator =

return statementSeparator;

squirrel-sql-develop@lists.sourceforge.net.

Conclusion

"FROM SYSIBM.SYSVIEWS " +

// to use the plugin.

// nodes in the Object tree.

ScriptDB2ViewAction viewAct =

ScriptDB2ProcedureAction procAct =

IObjectTreeAPI otApi =

* The menu items are added are added here.

session The started Session.

public PluginSessionCallback sessionStarted(ISession session)

Listing 1 ExamplePlugin:

/**

* @param

try

menus. The labels are '(DB2) Script View' and '(DB2) Script Procedure'.

public synchronized void initialize() throws PluginException

// Initializing the resources in example.properties.

// example.properties contains the labels for the menu items.

("net.sourceforge.squirrel_sql.plugins.example.example", this);

Connection con = session.getSQLConnection().getConnection();

// The plugin only knows how to script views and stored // procedures for the IBM DB2 database. So if this is

session.getSessionInternalFrame().getObjectTreeAPI();

_resources, session);

> _resources, session);

con.getMetaData().getDriverName().toUpperCase();

if(false == driverName.startsWith("IBM DB2 JDBC"))

// not an DB2 Session we tell SQuirreL not

// Add entries to the view and stored procedure

new ScriptDB2ViewAction(getApplication(),

otApi.addToPopup(DatabaseObjectType.VIEW, viewAct);

new ScriptDB2ProcedureAction(getApplication(),

public class ScriptDB2ViewAction extends SQuirreLAction

public ScriptDB2ViewAction(IApplication app,

public void actionPerformed(ActionEvent evt)

SessionInternalFrame sessMainFrm =

sessMainFrm.getObjectTreeAPI(). getSelectedDatabaseObjects();

IDatabaseObjectInfo[] dbObjs =

_session.getSessionInternalFrame();

StringBuffer script = new StringBuffer(); for (int i = 0; i < dbObjs.length; i++)</pre>

ITableInfo ti = (ITableInfo) db0bjs[i];

ResultSet res = stat.executeQuery(sql);

script.append(res.getString("TEXT")); script.append(getStatementSeparator());

appendSQLScript(script.toString());

* Returns the user defined statement separator with

_session.getProperties().getSQLStatementSeparator();

statementSeparator = "\n" + statementSeparator + "\n";

through the plugin architecture. New features can also be guickly added by creating new plugins.

to use Java to create extremely flexible applications. We invite you to join us. You can reach us at

SQuirreL provides a single, uniform interface that works with all relational databases. The user interface provides features similar to modern IDEs and makes it easy to access and modify databases, understand database structure, and work with and learn SQL. SQuirreL emphasizes the things that all databases have in common while being able to handle product-specific quirks

source for ideas for improvement. Anyone with a suggestion can contact us at squirrel-sql-users@lists.sourceforge.net.

SQuirreL is helping people to be more productive in many different environments every day. The users of SQuirreL are our best

Finally, a word to software developers. SQuirreL developers are motivated both by the fun of programming and the desire to add functions that they need. It is interesting to explore the world of relational databases using Java, and it is a real kick to see a feature that you have built being used by people around the world. Working with the SQuirreL code is a great way to learn how

selectMainTab(ISession.IMainPanelTabIndexes.SQL_TAB);

// IBM DB 2 specific code to read view definitions.

"WHERE NAME = '" + ti.getSimpleName() + "'";

otApi.addToPopup(DatabaseObjectType.PROCEDURE, procAct);

Resources rsrc, ISession session)

_session.getSQLConnection().createStatement();

item the actionPerformed() method of class ScriptDB2ViewAction is called, see listing 2.

other vendors' products.

directory.