

GNU Enterprise : GDA Quick Hackers Guide

Reinhard Müller

GNU: Enterprise Core Development Team

Edited by

Derek Neighbors

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by Reinhard Müller

by

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Chapter 1. Introduction

Why It Came About

Some days ago, I have spent several hours digging through the code of GDA before I could understand the structure of GDA deeper than that it consists of a server part and a client part. With this experience in mind, it was no surprise for me to hear from others, that they find the code hard to understand.

In my personal opinion, the code is very clear, when you only have recognized the structure how the different functions, objects and libraries work together.

As I think, that GDA is a good set of libraries, that more people should work on it and that even more people should use it, I decided to write this "quick hacker's guide".

Intended Audience

This document addresses people that want to understand how the code of gda works. After reading this document, you will not understand it, but there will be chances that you find it much easier to hack through the code than before.

You should read this document after having understood the basic concepts and goals of gda (I intend you just read the introduction on <http://www.gnome.org/gnome-db>) and having realized that gda is the non-visual part of gnome-db which can be used by any application.

A point specially regarded in this document is dependency on gtk/gnome, as that dependency can lead to problems when using gda with non-gnome applications.

This document is (read: should be) consistent with gnome-db.0.0.96.

Suggestions

If you think this document is good, please feel free to read it as often as you like and give copies of it to as many people you like.

Editors Note: You have to love Reinhard's attitude towards free software. :) It even carries into his documentation!

If you think this document could be improved, please feel free to let me know what I could improve or - even better - improve it yourself. Please let me know if you have made changes, so I can merge them.

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Reinhard Müller reinhard.mueller@bitSMART.com reinhard@gNUE.org

Chapter 2. About Objects

In the following, the term "objects" means not objects like in C++, but rather a data structure plus a set of functions that deal with this structure.

GDA has very much an object-oriented approach, in the sense that the internals of the data structure are virtually not known to the "user" of the structure, but he rather uses the functions to access them, in the sense of encapsulation.

Chapter 3. General Structure of GDA

GDA is made up of several pieces as laid out below.

```
Application
|
| (calls directly)
|
gda-* objects \
| \
| (calls directly) > libgda-client (directory gda-clnt)
| /
gda-stubs objects /
|
| (calls via ORBIT)
|
gda-server-impl objects \
| \
| (calls) > libgda-server (directory gda-srv)
| /
gda-server objects /
|
| (calls via callback functions)
|
gda-??? implementations libgda-??? (directories gda-*-server)
|
| (calls directly)
|
Database Backend
```

Chapter 4. GDA Server Library

GDA_Server Helper Objects

The following objects are absolute low-level helper objects designed to ease the development of gda server implementations:

function prefix	data structure	source file
<code>gda_server_error</code>	<code>Gda_ServerError</code>	<code>gda-server-error.c</code>
<code>gda_server_field</code>	<code>Gda_ServerField</code>	<code>gda-server-field.c</code>

This code is dependent from nothing but glib and some typedefs from gda.h

GDA_Server Objects

The following objects build the base of the gda providers:

function prefix	data structure	source file
<code>gda_server_command</code>	<code>Gda_ServerCommand</code>	<code>gda-server-command.c</code>
<code>gda_server_connection</code>	<code>Gda_ServerConnection</code>	<code>gda-server-connection.c</code>
<code>gda_server_recordset</code>	<code>Gda_ServerRecordset</code>	<code>gda-server-recordset.c</code>

The code of these objects is really neither gnome nor gtk dependent. CORBA dependency is only because they use some types defined in the idl.

Unfortunately, the header file `gda-server-impl.h` is very general (it's used by all sources in the `gda-srv` directory) and thus contains much stuff that wouldn't be needed by these files. So you can't even compile the above sources without gnome or gtk although the code itself wouldn't need it.

These objects can very much be regarded as "abstract" objects. Each provider must "overload" certain functions. This happens by providing a list of functions when starting the server code, from where the `gda_server_*` objects take the functions to really call.

Each of these objects provide a member "user_data" that can be used by the specific provider code to store backend specific data structures.

GDA_Server_Impl Objects

Around the gda-server objects, another layer is built to match the complete idl of gda.

function prefix	data structure	source file
<code>impl_GDA_Parameter</code>	<code>impl_POA_GDA_Parameter</code>	<code>gda-server-impl-command.c</code>
<code>impl_GDA_Command</code>	<code>impl_POA_GDA_Command</code>	<code>gda-server-impl-command.c</code>
<code>impl_GDA_Connection</code>	<code>impl_POA_GDA_Connection</code>	<code>gda-server-impl-connection.c</code>
<code>impl_GDA_Recordset</code>	<code>impl_POA_GDA_Recordset</code>	<code>gda-server-impl-recordset.c</code>

These objects are neither gnome nor gtk dependent. But they make up complete CORBA-enabled objects matching `gda.idl`.

One could regard these objects as "wrappers" around the gda-server objects to make them match CORBA specifications.

There is no gda_server_parameter yet as none of the methods of gda_server_parameter are yet implemented :)

GDA_Server_Impl

Unfortunately there is an own object called gda-server-impl which has nothing to do with the gda-server-impl-* objects.

function prefix	data structure	source file
gda_server_impl	Gda_ServerImpl	gda-server-impl.c
impl_GDA_ConnectionFactory	impl_POA_GDA_ConnectionFactory	
gda-server-factory.c		

gda_server_impl is a gtk object that represents an instance of a running server. It is used for tasks like registering the server into the system, creating the factory etc.

GDA_ConnectionFactory is a CORBA object that is able to create new GDA_Connection CORBA objects. It's gnome dependent.

These two objects are really gtk and gnome dependent. The dependency results from the way how CORBA servers are registered into the system so that clients have a convenient way to find the server they want.

Hopefully these dependencies will be removed when OAF is used.

Chapter 5. GDA Server Implementations

The actual server implementation just implements the missing functions mentioned under "gda_server object".

These functions are implemented in gda-???-command.c, gda-???-connection.c and gda-???-recordset.c. The main-???c source contains the main() routine for the server executable, which does nothing but initialize corba, create a gda_server_impl object and pass to it the list of function implementations. The main() function thus is gnome-dependent, the rest of the code isn't.

All of these functions use the field user_data from the corresponding gda_server_* object to store native data structures of the database.

Some GDA servers also implement a configuration tool, which is named gda-???-config and has absolutely nothing to do with the implementation of the server, as it's a totally high-level application.

Chapter 6. GDA Client Library

GDA_* Objects

The following objects are very much real objects in the sense that they are currently implemented as real GtkObjects, which will soon be changed into GObject to make them all Gtk independent.

function prefix	data structure	source file
gda_batch	Gda_Batch	gda-batch.c
gda_command	Gda_Command	gda-command.c
gda_connection	Gda_Connection	gda-connection.c
gda_connection_pool	Gda_ConnectionPool	gda-connection-pool.c
gda_error	Gda_Error	gda-error.c
gda_field	Gda_Field	gda-field.c
gda_recordset	Gda_Recordset	gda-recordset.c

GDA Sub Objects

The code for the stub implementation is generated by orbit-idl automatically. Anyway, as it is its own layer, and the functions are called by the above gda_* objects, they are listed below:

function prefix	data structure	source file
GDA_Fieldx	GDA_Fieldx	gda-stubs.c
GDA_Parameter	GDA_Parameter	gda-stubs.c
GDA_Command	GDA_Command	gda-stubs.c
GDA_Connection	GDA_Connection	gda-stubs.c
GDA_Recordset	GDA_Recordset	gda-stubs.c

The GDA_Fieldx stub seems to be neither used from the gda-client library nor implemented by the gda-server library.

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