

# **Database Independent Abstraction Layer for C**

**libdbi Driver Author's Guide (OUTDATED SEE  
README!)**

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**Database Independent Abstraction Layer for C: libdbi Driver Author's Guide (OUTDATED SEE README!)**  
by David A. Parker

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libdbi implements a database-independent abstraction layer in C, similar to the DBI/DBD layer in Perl. Writing one generic set of code, programmers can leverage the power of multiple databases and multiple simultaneous database connections by using this framework.

This guide explains the internal DBD interface for libdbi drivers, and provides a reference for all available driver helper functions.

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# Chapter 1. Introduction

## 1.1. Description

libdbi provides application developers with a database independent abstraction layer for C. It handles the database-specific implementations for each type of database, so that you can use the same exact code with any type of database server that libdbi supports. You can initiate and use multiple database connections simultaneously, regardless of the types of database servers you are connecting to. The plugin architecture allows for new database drivers to be easily added dynamically by a third party.

## 1.2. libdbi Concepts and Terminology

In this guide, the terms “author” and “programmer” are used interchangeably, since the target audience is the software developer writing a driver for libdbi.

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## 1.4. Contact Info

Please email us with any bugs, ideas, feature requests, or questions. The libdbi website has the latest version of this documentation and the libdbi software, as well as a central database of third-party drivers.

- <http://libdbi.sourceforge.net>
- David Parker <david@neongoat.com>
- Mark Tobenkin <mark@brentwoodradio.com>

# Chapter 2. Driver Functions

## 2.1. Driver Infrastructure Functions

### 2.1.1. dbd\_register\_driver

```
void dbd_register_driver(const dbi_info_t **_driver_info, const char ***_custom_functions, const char ***_reserved_words)
```

This is the first function called after the driver module is loaded into memory. It passes back meta-information back to libdbi through the pointers passed as arguments.

#### *Arguments*

`_driver_info`: A pointer used to link to the driver's information struct.

`_custom_functions`: A pointer used to link to the driver's string array of custom database-specific functions.

`_reserved_words`: A pointer used to link to the driver's string array of reserved words.

### 2.1.2. dbd\_initialize

```
int dbd_initialize(dbi_driver_t *driver)
```

Performs any database-specific server initialization. This is called right after `dbd_register_driver()`.

#### *Arguments*

`driver`: The driver's pointer.

#### *Returns*

-1 on error, 0 on success. If -1 is returned, the driver will not be added to the list of available drivers.

### 2.1.3. dbd\_connect

```
int dbd_connect(dbi_conn_t *conn)
```

Connects to the database, setting the connection's DB-specific connection handle and current database name. Connection parameters are already filled through the connection's option settings. The standard options that all drivers must recognize (if applicable) are: host, username, password, dbname, and port. Any driver-specific functions must be prefixed with the name of the driver and an underscore, such as "mysql\_compression".

#### *Arguments*

`conn`: The target connection instance of the driver.

### *Returns*

-1 on error, 0 on success.

## **2.1.4. dbd\_disconnect**

```
int dbd_disconnect(dbi_conn_t *conn)
```

Disconnects from the database server.

### *Arguments*

conn: The target connection instance of the driver.

### *Returns*

-1 on error, 0 on success.

## **2.1.5. dbd\_quote\_string**

```
int dbd_quote_string(dbi_driver_t *driver, const char *orig, char *dest)
```

Given a string, wrap quotes around that string and escape any characters that the database server needs escaped.

### *Arguments*

driver: A pointer to the driver itself, which may be useful in weird cases.

orig: The string to quote and escape.

dest: The destination for the new string, which is already allocated as  $(\text{strlen}(\text{orig}) * 2) + 4 + 1$ . In the worst case, each character will need to be escaped, with two quote characters at both the beginning and end of the string, plus one for the terminating NULL.

### *Returns*

The length of the new string.

## **2.1.6. dbd\_geterror**

```
int dbd_geterror(dbi_conn_t *conn, int *errno, char **errstr)
```

Retrieves and stores error information, in numeric and/or string format.

### *Arguments*

conn: The target connection.

errno: The int variable to hold the error number.

errstr: The string to hold the error description.

### *Returns*

0 if there was an error, 1 if errno was filled, 2 if errstr was filled, 3 if both errno and errstr were filled.

## **2.2. Database Query Functions**

### **2.2.1. dbd\_fetch\_row**

```
int dbd_fetch_row(dbi_result_t *result, unsigned int rownum)
```

Fetches the target row, retrieving one-time field information if necessary. Also see the `_dbd_row_allocate` and `_dbd_row_finalize` helper functions.

### *Arguments*

`result`: The target result object.  
`rownum`: The row number to fetch.

### *Returns*

0 on error, 1 on successful fetch.

### **2.2.2. dbd\_free\_query**

```
int dbd_free_query(dbi_result_t *result)
```

Frees the target result handle.

### *Arguments*

`result`: The target result handle.

### *Returns*

0 on success (this should be changed)

### **2.2.3. dbd\_goto\_row**

```
int dbd_goto_row(dbi_result_t *result, unsigned int row)
```

Jumps to the specified row in the result set.

#### *Arguments*

result: The target result handle.

row: The target row number.

#### *Returns*

1 on success, 0 on error.

### **2.2.4. dbd\_list\_dbs**

```
dbi_result_t *dbd_list_dbs(dbi_conn_t *conn)
```

Performs a query that retrieves the list of databases, with the database name as the first column in the result set.

#### *Arguments*

conn: The target connection.

#### *Returns*

A DBI result object.

### **2.2.5. dbd\_list\_tables**

```
dbi_result_t *dbd_list_tables(dbi_conn_t *conn, const char *db)
```

Performs a query that retrieves the list of tables in the specified database, with the table name as the first column in the result set.

#### *Arguments*

conn: The target connection.

db: The name of the database where tables should be looked for.

#### *Returns*

A DBI result object.

### **2.2.6. dbd\_query**

```
dbi_result_t *dbd_query(dbi_conn_t *conn, const char *statement)
```

Performs a query and keeps track of meta-information about the query. Also see the `_dbd_result_create` helper function.



### *Arguments*

conn: The target connection.

statement: The query string to execute.

### *Returns*

A DBI result object, or NULL on error.

## **2.2.7. dbd\_select\_db**

```
char *dbd_select_db(dbi_conn_t *conn, const char *db)
```

Selects a new database on the server.

### *Arguments*

conn: The target connection.

db: The name of the database to switch to.

### *Returns*

The database name on success, "" on error, or NULL if the operation is not supported by the database server.

## **2.3. DBD Helper Functions**

### **2.3.1. \_dbd\_result\_create**

```
dbi_result_t *_dbd_result_create(dbi_conn_t *conn, void *handle, unsigned int numrows_matched, unsigned int numrows_affected)
```

Allocates a new dbi\_result\_t, filling the number of rows matched and affected, storing the database-specific result handle, and allocating room for rows to be stored.

### *Arguments*

conn: The target connection.

handle: The database-specific result handle used internally by the driver.

numrows\_matched: The number of rows matched by the query.

numrows\_affected: The number of rows affected by the query.

### *Returns*

A new DBI result object.

### 2.3.2. `_dbd_result_set_numfields`

```
void _dbd_result_set_numfields(dbi_result_t *result, unsigned int numfields)
```

Sets a result's number of fields and allocates room for field information to be stored.

#### *Arguments*

`result`: The target result.

`numfields`: The number of fields in the result set.

### 2.3.3. `_dbd_result_add_field`

```
void _dbd_result_add_field(dbi_result_t *result, unsigned int idx, char *name, unsigned short type, u
```

Stores information about the target field into the result set.

#### *Arguments*

`result`: The target result.

`idx`: The numeric field index.

`name`: The name of the field.

`type`: The datatype of the field.

`attrs`: The attributes of the field.

### 2.3.4. `_dbd_row_allocate`

```
dbi_row_t *_dbd_row_allocate(unsigned int numfields)
```

Allocates a new row, ready to be filled with data.

#### *Arguments*

`numfields`: The number of fields in the result set.

#### *Returns*

A new DBI row, or NULL on error.

### 2.3.5. `_dbd_row_finalize`

```
void _dbd_row_finalize(dbi_result_t *result, dbi_row_t *row, unsigned int idx)
```

Associates and stores the row with the result set, once the row's data has been filled.

#### *Arguments*

`result`: The target result set.

`row`: The target row object.

`idx`: The index of the row.

### 2.3.6. `_dbd_internal_error_handler`

```
void _dbd_internal_error_handler(dbi_conn_t *conn, const char *errmsg, const int errno)
```

Saves error message information generated by libdbi (rather than by the database or its API). If an old error message string exists, it will be freed.

#### *Arguments*

`conn`: The target connection.

`errmsg`: The error message to store. This will be strdup'd by libdbi so it has its own copy.

`errno`: The error number to store.

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