

HAMPEL SOFTWARE ENGINEERING

hse-db

HAMPEL SOFTWARE ENGINEERING

Version 1.3.0 (2022-12-02)

TABLE OF CONTENTS

1. State Machines	2
2. Calling Dependency Diagrams	3
2.1. Overview	3
2.2. Callers	3
2.3. Listeners	3
Appendix A: DQMH	5
A.1. DB_CONNECTOR.lvlib	5
Appendix B: Libraries	10
B.1. hse-config.lvlib	10
B.2. hse-dqmh-dynamicrequesters.lvlib	10
B.3. hse-dqmh.lvlib	12
B.4. hse-misc.lvlib	14
B.5. hse-db-ado.lvlib	19
B.6. ADO-DB-Driver.lvlib	19
B.7. hse-db-mysql.lvlib	21
B.8. hse-db-sqlite.lvlib	21
B.9. hse-db.lvlib	22
Appendix C: Classes	23
C.1. Classes overview	23
C.2. hse-application.lvclass	24
C.3. hse-config-ini.lvclass	27
C.4. hse-configuration.lvclass	29
C.5. config-base.lvclass	31
C.6. config-ini.lvclass	32
C.7. Loop Timer.lvclass	33
C.8. DB-ADO.lvclass	34
C.9. DB-MySQL.lvclass	36
C.10. DB-SQLite.lvclass	37
C.11. DB-Interface.lvclass	39
Appendix D: Custom Errors	41
D.1. Custom errors	41
Glossary	42



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This document was created fully automated from the actual LabVIEW Source Code of this project using the [Release Automation Tools](#) of [Hampel Software Engineering](#).

The Release Automation Tools (RAT) help automate the validating, testing, documenting, building, packaging and publishing of your projects. Built-in support for Git lets you trigger our tools from your repository, via GitLab CI/CD or Azure DevOps amongst others.

For a more detailed overview of what these tools do, see <https://rat.hampel-soft.com/>, where you can find information on the available tools, how we automate them using GitLab CI, when the next scheduled webinars are on, and how you can run those tools on your own servers using a commercial license for RAT.

1. STATE MACHINES



No state machines found.

HSE offers a robust, parsable, free open-source State Machine Template! You can find out more about it at <https://dokuwiki.hampel-soft.com/code/dqmh/hse-module-templates/state-machine>.

2. CALLING DEPENDENCY DIAGRAMS

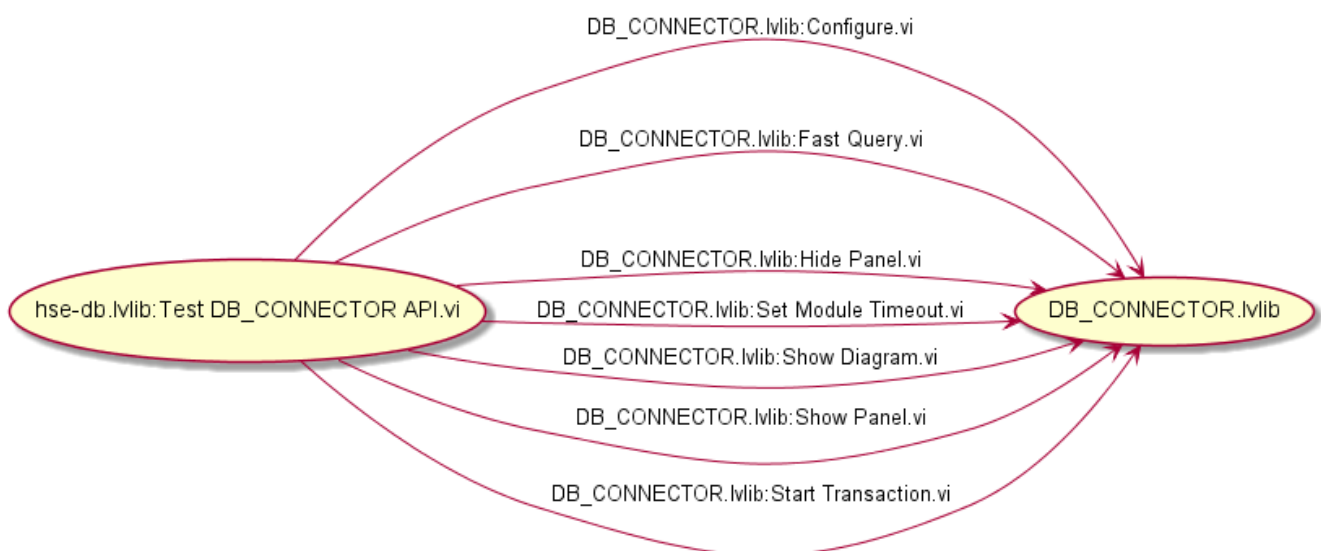
2.1. OVERVIEW

2.1.1. PROJECT



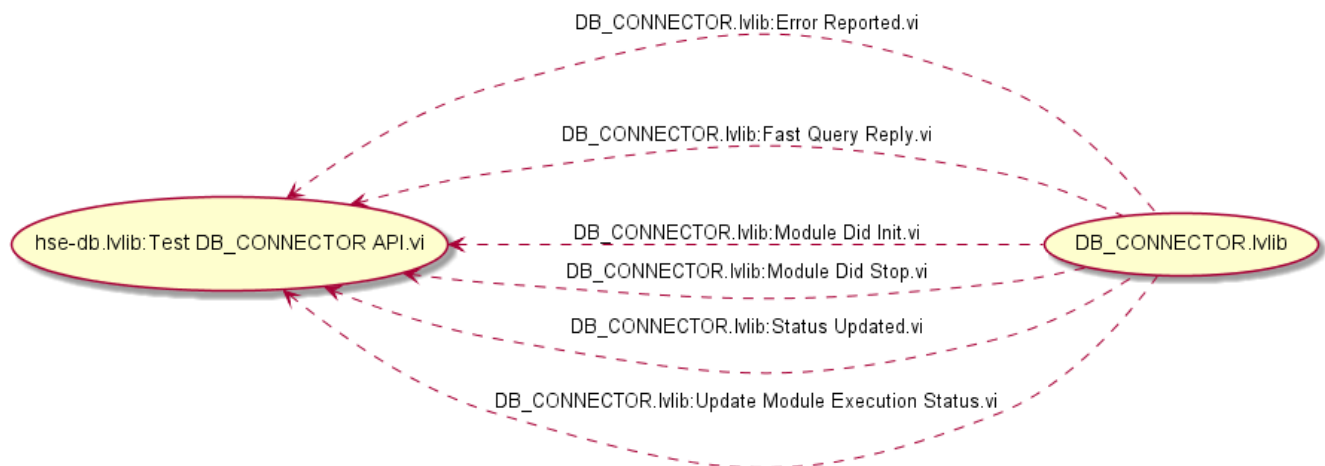
2.2. CALLERS

2.2.1. DB_CONNECTOR.LVLIB



2.3. LISTENERS

2.3.1. DB_CONNECTOR.LVLIB



APPENDIX A: DQMH

DQMH modules documentation

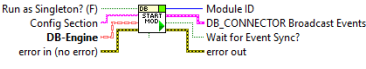
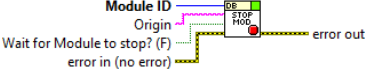
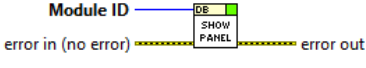
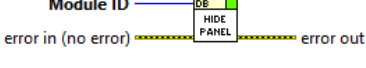
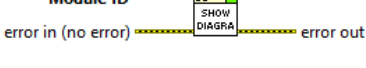
A.1. DB_CONNECTOR.LVLIB




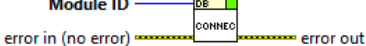

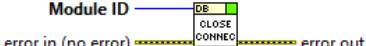

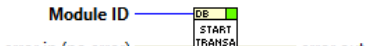



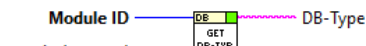





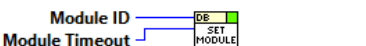



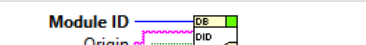



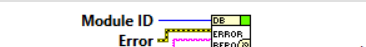

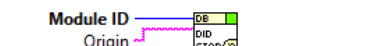
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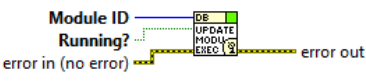

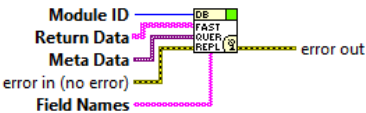
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A.1.1. EVENT LIST

Table 1. Events



Name	Type	Connector pane	Description	S.	R.	I.
Start Module			Launches the Module Main.vi.			
Stop Module			<p>Send the Stop request to the Module's Main.vi. If Wait for Module to stop? is TRUE, then this VI will not complete execution until the Module Main VI has stopped running.</p> <p>Note: If the cloneable module is running as singleton, then the 'Wait for Module to stop?' input is ignored... this VI will always wait until a cloneable Main VI running as singleton has stopped running.</p> <p>Note: This VI was modified by the Validate DQMH Module tool to upgrade it to the DQMH 5.1 approach to poll the execution state of a cloneable module running as singleton to know when the module has gone idle.</p> <p>Note: This VI was modified by the Validate DQMH Module tool to upgrade it to the DQMH 5.0 approach to destroying cloneable module event references.</p>			
Show Panel	→		Send the Show Panel request to the Module's Main.vi.			
Hide Panel	→		Send the Hide Panel request to the Module's Main.vi.			
Show Diagram	→		This VI tells the Module to show its block diagram to facilitate troubleshooting (add probes, breakpoints, highlight execution, etc).			

Name	Type	Connector pane	Description	S.	R.	I.
Configure			Triggers the auto-configuration of the module			
Connect			Connect to database.			
Close Connection			Close connection to the database.			
Start Transaction			Start a transaction to get sure all following SQL commands get executed or none.			
Fast Query			An asynchronous query to the DB. This request does not block and has no reply. To receive the db response register to the corresponding broadcast.			
Get DB-Type			Returns the type of the database in DB-Type			
Query			Send a SQL-Query to the database.			
Commit Transaction			Commit a transaction. Either all SQL-commands get committed or, in case of an error, all get rejected.			
Set Module Timeout			Overrides the DQMH internal Module Timeout with the specified value (must be greater than 0)			
Rollback Transaction			Rollback the active transaction.			
Module Did Init			Send the Module Did Init event to any VI registered to listen to this module's broadcast events.			
Status Updated			Send the Status Updated event to any VI registered to listen to events from the owning module.			
Error Reported			Note: This VI was modified by the Validate DQMH Module tool to parse additional information tags out of the incoming error source string.			
Module Did Stop			Send the Module Did Stop event to any VI registered to listen to this module's broadcast events.			

Name	Type	Connector pane	Description	S.	R.	I.
Update Module Execution Status			Fire the Get Module Execution Status request.			
Fast Query Reply			The database reply from a (asynchronous) "Fast Query".			

Type:  → Request |  → Request and Wait for Reply |  → Broadcast

Scope:  → Protected |  → Community

Reentrancy:  → Preallocated reentrancy |  → Shared reentrancy

Inlining:  → Inlined

A.1.2. MODULE RELATIONSHIP

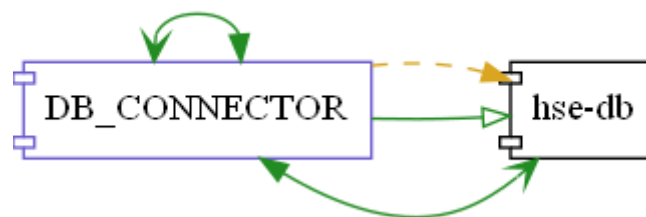


Table 2. Requests callers

Request Name	Callers
DB_CONNECTOR.lvlib:Close Connection	
DB_CONNECTOR.lvlib:Commit Transaction	hse-db.lvlib:Test DB_CONNECTOR API.vi
DB_CONNECTOR.lvlib:Configure	hse-db.lvlib:Test DB_CONNECTOR API.vi
DB_CONNECTOR.lvlib:Connect	
DB_CONNECTOR.lvlib:Fast Query	hse-db.lvlib:Test DB_CONNECTOR API.vi
DB_CONNECTOR.lvlib:Get DB-Type	hse-db.lvlib:Test DB_CONNECTOR API.vi
DB_CONNECTOR.lvlib:Hide Panel	hse-db.lvlib:Test DB_CONNECTOR API.vi
DB_CONNECTOR.lvlib:Query	DB_CONNECTOR.lvlib:Query - DBL - 1D.vi DB_CONNECTOR.lvlib:Query - DBL - 2D.vi DB_CONNECTOR.lvlib:Query - DBL - Scalar.vi DB_CONNECTOR.lvlib:Query - Int64 - 1D.vi DB_CONNECTOR.lvlib:Query - Int64 - 2D.vi DB_CONNECTOR.lvlib:Query - Int64 - Scalar.vi DB_CONNECTOR.lvlib:Query - String - 1D.vi DB_CONNECTOR.lvlib:Query - String - 2D.vi DB_CONNECTOR.lvlib:Query - String - Scalar.vi
DB_CONNECTOR.lvlib:Rollback Transaction	hse-db.lvlib:Test DB_CONNECTOR API.vi
DB_CONNECTOR.lvlib:Set Module Timeout	hse-db.lvlib:Test DB_CONNECTOR API.vi

Request Name	Callers
DB_CONNECTOR.lvlib:Show Diagram	hse-db.lvlib:Test DB_CONNECTOR API.vi
DB_CONNECTOR.lvlib:Show Panel	hse-db.lvlib:Test DB_CONNECTOR API.vi
DB_CONNECTOR.lvlib:Start Transaction	hse-db.lvlib:Test DB_CONNECTOR API.vi

Table 3. Broadcasts Listeners

Broadcast Name	Listeners
DB_CONNECTOR.lvlib:Error Reported	hse-db.lvlib:Test DB_CONNECTOR API.vi
DB_CONNECTOR.lvlib:Fast Query Reply	hse-db.lvlib:Test DB_CONNECTOR API.vi
DB_CONNECTOR.lvlib:Module Did Init	hse-db.lvlib:Test DB_CONNECTOR API.vi
DB_CONNECTOR.lvlib:Module Did Stop	hse-db.lvlib:Test DB_CONNECTOR API.vi
DB_CONNECTOR.lvlib:Status Updated	hse-db.lvlib:Test DB_CONNECTOR API.vi
DB_CONNECTOR.lvlib:Update Module Execution Status	hse-db.lvlib:Test DB_CONNECTOR API.vi

Table 4. Used requests

Module	Requests
hse-db.lvlib	DB_CONNECTOR.lvlib:Stop Module.vi

Table 5. Registered broadcast

Module	Broadcasts
☒—☒	☒—☒

A.1.3. MODULE START/STOP CALLS

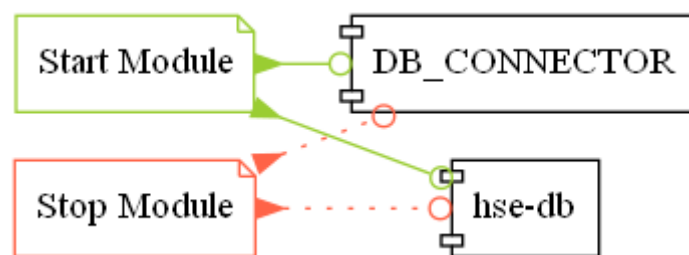


Table 6. Start and Stop module callers

Function	Callers
Start Module	DB_CONNECTOR.lvlib:Load Module.vi hse-db.lvlib:Test DB_CONNECTOR API.vi
Stop Module	DB_CONNECTOR.lvlib:Handle Exit.vi hse-db.lvlib:Test DB_CONNECTOR API.vi

A.1.4. MODULE CUSTOM ERRORS



Custom errors are added to the module via vi named `*--error.vi`.

Module DB_CONNECTOR.lvlib use the following custom errors:

Table 7. Custom errors

Name	Code	Description
Module Running as Singleton	403680	The "%s" module is currently running as singleton, but the Start Module VI was called with 'Run as Singleton' specified as FALSE.
Module Not Stopped	403682	%s Module did not finish clean up on exit.
Module Not Synced	403683	%s Module was unable to synchronize events.
Module Not Running	403684	Not a single instance of "%s" Module running.
Module Running as Cloneable	403685	The "%s" module is currently running as cloneable, but the Start Module VI was called with 'Run as Singleton' specified as TRUE.
Request Timed Out	403686	The reply for the request "%s" of the "%s" Module timed out.
Request and Wait for Reply Timeout	403686	%s
Master Reference Not Closed	403687	The "%s" module cannot be run as singleton because the Master Reference is still open from a prior run as cloneable. If you plan on running this module as both singleton and cloneable, consider changing your Main VI to wire a value of TRUE to the 'Close Master Reference' input of Init Module.vi.

APPENDIX B: LIBRARIES

Misc. reuse libraries

B.1. HSE-CONFIG.LVLIB

Responsibility: No description found (add content in lvlib description)

Version: 1.0.0.0

Table 8. Nested libraries

Name	Type
[config-base.lvclass]	LVClass
[config-ini.lvclass]	LVClass

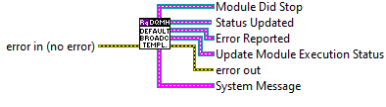
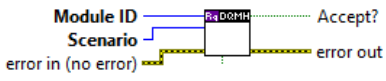
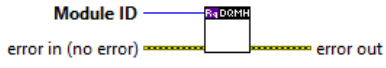
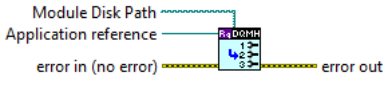
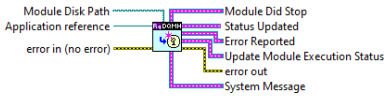
This library has no functions set to non private scope.

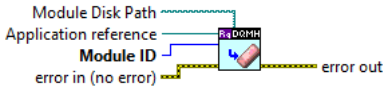
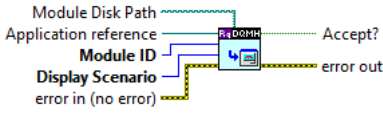
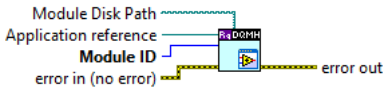
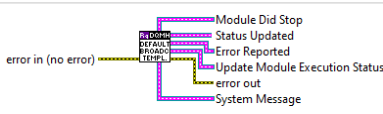
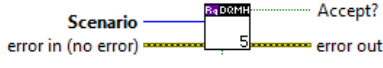

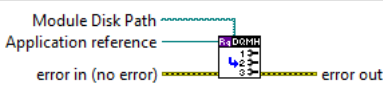
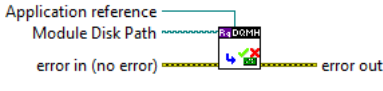
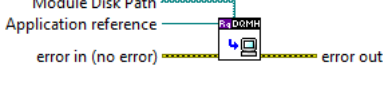
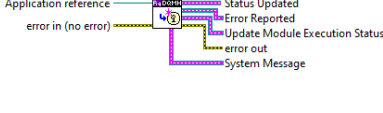
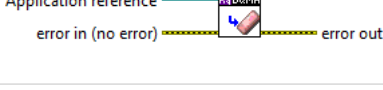
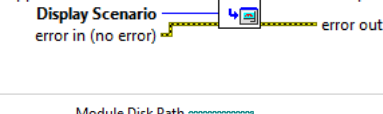
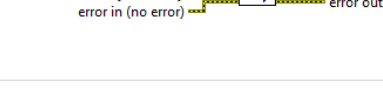
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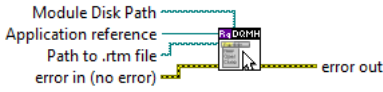
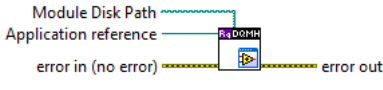
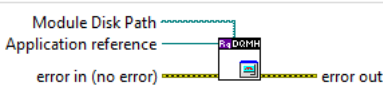
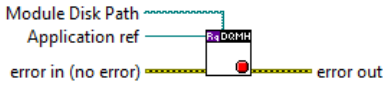
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Version: 1.0.0.0


Table 9. Functions (non private scope only)

Name	Connector pane	Description	S.	R.	I.
Default Broadcast (Cloneable)--template					
Request UI Display (Cloneable)--template		No description found (add content in vi description)			
Show Diagram (Cloneable)--template		No description found (add content in vi description)			
DQMH Configure (Cloneable)		Calls the "Configure" request VI of the module in path			
DQMH Obtain Default Broadcast Events (Cloneable)		Calls the "Obtain Default Broadcast Events" request VI of the module in path			

Name	Connector pane	Description	S.	R.	I.
DQMH Prepare (Cloneable)		Calls the "Prepare" request VI of the module in path			
DQMH Request UI Display (Cloneable)		Calls the "Request UI Display" request VI of the module in Path to module directory . Hands over the Module ID and the Display Scenario .			
DQMH Show Diagram (Cloneable)		Calls the "Request UI Display" request VI of the module in Path to module directory . Hands over the Module ID and the Display Scenario .			
Default Broadcast—template					
Request UI Display—template		No description found (add content in vi description)			
Set Modules—template		No description found (add content in vi description)			
DQMH Configure		Calls the "Configure" request VI of the module in path			
DQMH Load API Tester		Calls the "Load Module" request VI of the module in path			
DQMH Load Module		Calls the "Load Module" request VI of the module in path			
DQMH Obtain Default Broadcast Events		Calls the "Obtain Default Broadcast Events" request VI of the module in path			
DQMH Prepare		Calls the "Prepare" request VI of the module in path			
DQMH Request UI Display		Calls the "Request UI Display" request VI of the module in Path to module directory . Hands over the Module Name and the Display Scenario .			
DQMH Set Modules		Calls the "Set Modules" request VI of the module in Path to module directory . Hands over paths to all dynamically loaded modules in modules to load dynamically .			

Name	Connector pane	Description	S.	R.	I.
DQMH Set Runtime Menu		Calls the "Set Runtime Menu" request VI of the module in Path to module directory. Hands over the Path to .rtm file.			
DQMH Show Diagram		Calls the "Request UI Display" request VI of the module in Path to module directory. Hands over the Module Name and the Display Scenario.			
DQMH Show Panel		Calls the "Show Panel" request VI of the module in Path to module directory			
DQMH Stop Module		Calls the "Stop Module" request VI of the module in Path to module directory			

Scope:  → Protected |  → Community

Reentrancy:  → Preallocated reentrancy |  → Shared reentrancy

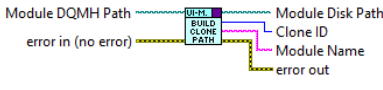
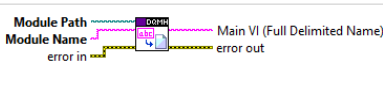

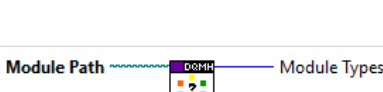

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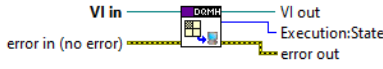

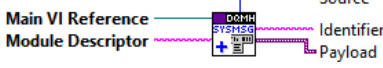

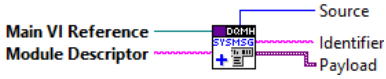

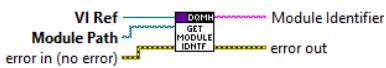

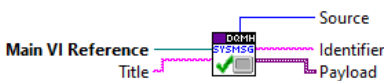

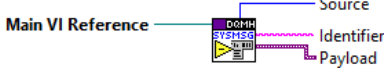

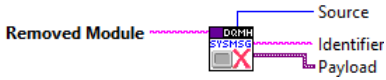


B.3. HSE-DQMH.LVLIB


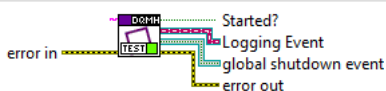
Responsibility: No description found (add content in lplib description)

Version: 1.0.0.0

Table 10. Functions (non private scope only)

Name	Connector pane	Description	S.	R.	I.
DQMH Build Module Disk Path From DQMH Path		Parses the Instance Name for the Clone ID and returns the full path to the module's directory, the Clone ID and the module's name			
DQMH Get Fully Delimited Instance Name from Module Name		Parses the fully delimited VI name from the module path and the module name. For cloneables, the clone ID is appended to the VI name.			
DQMH Get Module Type		Returns the type (singleton or cloneable) of the module in Module Path			

Name	Connector pane	Description	S.	R.	I.
DQMH Load Main VI Reference		<p>Loads the VI reference to a Singleton DQMH module's main.vi. On Linux RT in Runtime Environment, the main.vi is loaded reentrant in order to circumvent a bug in LabVIEW.</p> <p>Details: On Linux RT with Embedded UI enabled running a startup.exe, a VI server invoke method (Control Value.set) doesn't work. This is possibly related to / covered by CAR 514879 (see https://forums.ni.com/t5/Delacor-Toolkits-Discussions/Deploy-and-run-at-Startup-for-RT-systems/m-p/3620339/highlight/true#M256).</p> <p>In order for this VI to work, you need to: 1. set the DQMH module's main.vi execution setting to "preallocated clone reentrant execution" 2. set the DQMH module's main.vi scope to "community" 3. add the hse-dqmh.lvlib as a friend in the DQMH module's .lvlib Friends properties</p>			
DQMH Request Reply Timed Out—error		No description found (add content in vi description)			
DQMH System Message - Add to Run-Time Menu		Sends the modul's Path and Module Descriptor via the "Add to Run-Time Menu" System Message broadcast. The UI Manager inserts the module into the relevant locations in the run-time menu.			
DQMH System Message - Get Module Identifier		No description found (add content in vi description)			
DQMH System Message - Ready for Display		No description found (add content in vi description)			
DQMH System Message - Remove from Run-Time Menu		No description found (add content in vi description)			
DQMH System Message - Removed from Subpanel		No description found (add content in vi description)			
DQMH Tester Cleanup hse-appl		If the hse-application object was instantiated and the hse-logger was initialized when starting the Tester, this VI cleans up both objects.			

Name	Connector pane	Description	S.	R.	I.
DQMH Tester Prepare hse-appl - Get Name and Path		<p>Returns APP-NAME as Project Name and /APP-NAME_Source as Project Path</p> <p>HSE projects follow this folder structure: /APP-NAME_Config Configuration Files /APP-NAME_Data Measured and Other Data /APP-NAME_Source LabVIEW Sources /APP-NAME Compiled Application</p> <p>REAL-TIME: As the configuration directory on real-time systems always needs to reside at "C:\<Project Name>_Config\", and as it tedious (embedded UI) or impossible (no embedded UI) to enter the path, it can be supplied via the optional Real-Time App Name string input.</p>			
DQMH Tester Prepare hse-appl		<p>If the hse-application class is not running, queries the user for the path of the containing application and instantiates the hse-appl class. Returns if it did load the class.</p> <p>HSE projects follow this folder structure: /APP-NAME_Config Configuration Files /APP-NAME_Data Measured and Other Data /APP-NAME_Source LabVIEW Sources /APP-NAME Compiled Application</p> <p>The hse-application:ApplicationInit.VI expects the "APP-NAME_Source" folder and the "application name", and processes these to automatically find the "_Config" and "_Data" directories.</p> <p>REAL-TIME: As the configuration directory on real-time systems always needs to reside at "C:\<Project Name>_Config\", and as it tedious (embedded UI) or impossible (no embedded UI) to enter the path, it can be supplied via the optional Real-Time App Name string input.</p> <p>If this VI is used outside of the normal application scope (e.g. in a unit test with a separate LV project) you can provide the absolute path to the app source folder to "RT App Name or Path".</p>			

Scope:  → Protected |  → Community

Reentrancy:  → Preallocated reentrancy |  → Shared reentrancy

Inlining:  → Inlined

B.4. HSE-MISC.LVLIB

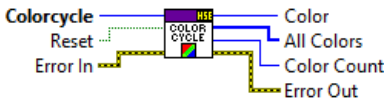













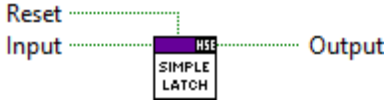


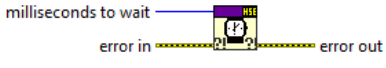

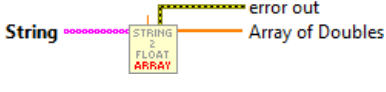

Responsibility: source code password: bowman-tyro-kickback-besides



Version: 1.0.0.0

Table 11. Nested libraries



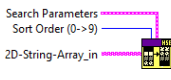

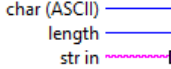



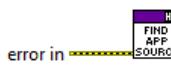
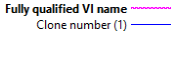


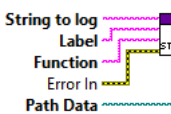

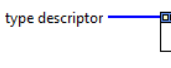


Name	Type
Loop Timer.lvclass	LVClass




Table 12. Functions (non private scope only)

Name	Connector pane	Description	S.	R.	I.
ColorCycle		With every call, this VI returns a color from a color pallet. If the last color from a pallet is reached, the VI continues with the first color. This Vi is useful to give plots and graphs better looking colors. The color sets are inspired by a subset of the colormaps from the Python plotting library Matplotlib.			
Get Enum Details from Type String		No description found (add content in vi description)			
Get Multiple Attributes from Variant		No description found (add content in vi description)			
Graph Scale Axis		Calculates usefull values for the Graph scaling (Minimum, Maximum) that go 10% over the min/max-values and include zero.			
Set Multiple Attributes to Variant		Set multiple attributes (key-values-pairs) to a variant.			
Simple Edge Detection (Falling)		Returns True if a falling edge (True -> False) occures. (This VI is inlined.)			
Simple Edge Detection (Rising)		Returns True if a rising edge (False -> True) occures. (This VI is inlined.)			
Simple Latch		A simple boolean latch with reset functionality.			
Wait_ErrorCluster		Simple wrapper for the Wait function that allows for data flow.			
ConvertStringToFloat_Array-1D		converts array of string values to floating point values			



Name	Connector pane	Description	S.	R.	I.
ConvertStringToFloat_Array-2D		converts array of string values to floating point values			
ConvertStringToFloat_Scalar		converts single string value to floating point value			
Filename Sanitizer		Removes all characters that are not supported in filenames (/ \ : * ? " < >) and replaces it with "Replace String" (default is "_").			
Find Data Type		No description found (add content in vi description)			
Represent Boolean		No description found (add content in vi description)			
Text to UTF-8 Wrapper		Converts LabVIEW text to UTF-8.			
UTF-8 to Text Wrapper		Converts UTF-8 text to text encoded in the specified system.			
U8-Array to U64		Convert an array of Bytes (U8) to an array of U64.			
U64-Array to U8		Convert an array of U64 to an array of Bytes (U8).			
Variant_BuildClusterFromElementArray		From the LabVIEW Open Source project DataManipulation library v1.4.0 by Francois Normandin (https://github.com/LabVIEW-Open-Source/DataManipulation).			
Variant_Empty Cluster		From the LabVIEW Open Source project DataManipulation library v1.4.0 by Francois Normandin (https://github.com/LabVIEW-Open-Source/DataManipulation).			
Delimited String to 1D Array		Converts a delimited string (e.g. "A, B, C") to an 1D array of strings (e.g. ["A", "B", "C"]). Removes whitespace around the elements.			
LV Timestamp to Unix Epoch		Convert a LabView Timestamp (UTC Timezone) to a Unix Epoch Timestamp (C time_t).			
Seconds to Time		Convert a time range (in seconds) to a time string in the format "hh:mm:ss". E.g. 3680s -> "01:01:20".			
Unix Epoch to LV Timestamp		Convert a Unix Epoch Timestamp (C time_t) to a LabView Timestamp (UTC Timezone).			
Error_AddAdditionalInformation		Adds Additional Info to the source of Error In			

Name	Connector pane	Description	S.	R.	I.
Error_AppendErrorsToSource		Takes the first element of errors in and concatenates all other elements' code and source into the source of the first error.			
Error_Clear		Clears the error in error in			
Error_Helper_BuildCluster		Builds an error cluster from Code and Additional Info			
Error_Helper_OverwriteCluster		If Error In is true, overwrites the error cluster information with Code and Additional Info .			
Error_Helper_RaiseError		If Raise? is true, puts the error in Error To Raise on the error output and adds Additional Info to the source of the error.			
Error_Helper_RaiseErrorFromLabel		If Raise? is true, sets an error with code set by Error Labels and source by Additional Info			
Error_LogToFile		If error in is true, writes the error to the file identified by path and clears the error.			
Event_CloseRegistrationRef		Unregisters the given event registration from the HSE-Event			
Event_Generate		Generates an HSE-Event and sends Name , Parameter and Data as event data.			
Event_GetRefAndReg		Gets the HSE-Event refnum and a new event registration refnum for it.			
Event_LoadOrCreateRefs		Returns the refnum of the HSE-Event			
Hash Core					
Hash					

Name	Connector pane	Description	S.	R.	I.
Delete Duplicates From 1D-Array (String)		(v0.2.1b; 2017-08-14 16:44)			
Sort 2D-Array		Sorts a 2D string array by the column declared in Search parameters and by Sort Order .			
String_PadWithCharacters		Adds char (ASCII) characters to str in until it is length characters long. Common ASCII characters: 0x09 ... tab 0x20 ... space 0x2E ... dot (.)			
String_StripNullValues		Removes all NULL values from a string			
Search for App Source Folder		Search for the application source folder down the folder hierarchy, starting at the current project path. Finds the app source folder if it is in one of the folders down the hierarchy (e.g. when using the hse project structure).			
Generate Clone Name		<p>Given the fully qualified name of a VI (meaning the name includes any library namespace prefixes), this VI returns the name of a clone of the VI. By default, it returns the name of the first clone that gets created, but you can request the Nth clone by supplying the "Clone number" input.</p> <p>USE WITH CAUTION. The name returned by this VI can be used with the "Open VI Reference" function to open a VI reference to a clone VI. This is an unsupported feature of LabVIEW (i.e. opening an additional reference to a clone VI was never intended to work but someone forgot to disable it when clones were added to LabVIEW). Opening extra references beyond the one used to create the clone (i.e. the clone's "this VI" reference) is known to cause instabilities, including crashes, in some situations. However, such refnums are critical for writing certain debugging tools. Be careful.</p>			
ShowRunningVIs		Returns a list of VIs in memory			
StringLogger		Simple helper VI for writing data to a log file. Path Data and Label form the folder structure, and Function is part of the file name.			
TypeDescriptor_GetName		From the LabVIEW Open Source project DataManipulation library v1.4.0 by Francois Normandin (https://github.com/LabVIEW-Open-Source/DataManipulation).			

Name	Connector pane	Description	S.	R.	I.
TypeDescriptor_GetPString		From the LabVIEW Open Source project DataManipulation library v1.4.0 by Francois Normandin (https://github.com/LabVIEW-Open-Source/DataManipulation).			

Scope:  → Protected |  → Community

Reentrancy:  → Preallocated reentrancy |  → Shared reentrancy

Inlining:  → Inlined

B.5. HSE-DB-ADO.LVLIB

Responsibility: No description found (add content in lvlib description)

Version: 1.0.0.0

Table 13. Nested libraries

Name	Type
DB-ADO.lvclass	LVClass
ADO-DB-Driver.lvlib	Library

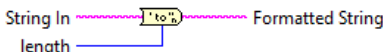

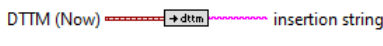


This library has no functions set to non private scope.

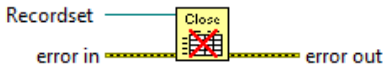
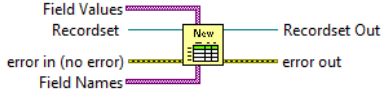
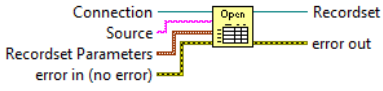
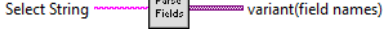
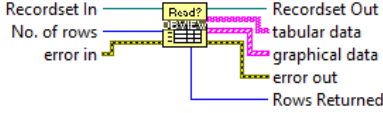
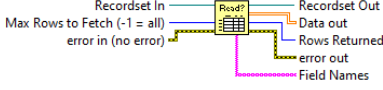
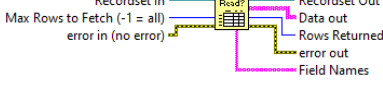
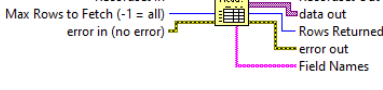
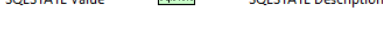


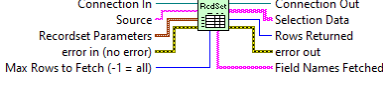
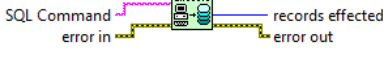

B.6. ADO-DB-DRIVER.LVLIB


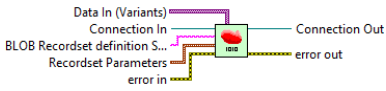
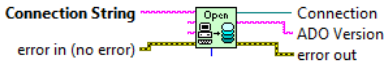
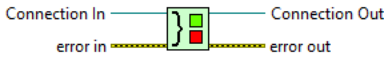
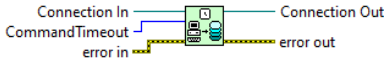
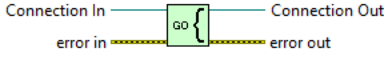
Responsibility: ADO-DB driver.



Version: 1.0.0.0



Table 14. Functions (non private scope only)

Name	Connector pane	Description	S.	R.	I.
convert " to NULL		Convert an empty string (two quotes) to NULL			
Convert from date-first Timestamp		Convert "MM/DD/YYYY HH:MM:SS" to timestamp			
Convert to date-first Timestamp		Convert timestamp to "MM/DD/YYYY HH:MM:SS"			
format floats for database		Format float for database (either engineering format or NULL)			
format floats[] for database		Format array of float for database (either engineering format or NULL)			

Name	Connector pane	Description	S.	R.	I.
Close Recordset+		Close the recordset			
Create New Record in Recordset		Create new recordset			
Open Recordset+		Open a recordset			
parse field names from SELECT statement		Parse a select statement into an array of variant fields			
Read Recordset (DBVIEW)		Read a recordset and return an array of DBVIEW			
Read Recordset (DOUBLE)		Read a recordset and return an array of double			
Read Recordset (STRING)		Read a recordset and return an array of string			
Read Recordset (VARIANT)		Read a recordset and return an array of variants			
SQLSTATE Lookup		Look up a SQL State code			
_Database Driver Catalog		This VI contains a list of available API functions			
Close Connection+		Close the connection			
Create and Read Recordset		Create and read a recordset			
Execute SQL Command (no data returned)		Execute a SQL command without returning any data			
Get Database Errors		Get database errors			

Name	Connector pane	Description	S.	R.	I.
Get Table Info		Get table info			
Insert BLOB data		Insert BLOB data			
Open Connection+		Open a connection to the database			
Rollback Transaction on Error		Rollback the transaction			
Set Command Timeout		Set the command timeout			
Start Transaction		Start a transaction			

Scope:  → Protected |  → Community

Reentrancy:  → Preallocated reentrancy |  → Shared reentrancy

Inlining:  → Inlined

B.7. HSE-DB-MYSQL.LVLIB

Responsibility: No description found (add content in lvlib description)

Version: 1.0.0.0

Table 15. Nested libraries

Name	Type
DB-MySQL.lvclass	LVClass

This library has no functions set to non private scope.

B.8. HSE-DB-SQLITE.LVLIB

Responsibility: No description found (add content in lvlib description)

Version: 1.0.0.0

Table 16. Nested libraries

Name	Type
DB-SQLite.lvclass	LVClass

This library has no functions set to non private scope.

B.9. HSE-DB.LVLIB

Responsibility: No description found (add content in lvlib description)

Version: 1.0.0.0



Table 17. Nested libraries

Name	Type
DB-Interface.lvclass	LVClass
DB_CONNECTOR.lvlib	Library
[VI Reference Management.lvlib]	Library
[Clone Registration.lvlib]	Library

Table 18. Functions (non private scope only)

Name	Connector pane	Description	S.	R.	I.
Test DB_CONNECTOR API		DB_CONNECTOR API Tester.			

Scope:  → Protected |  → Community

Reentrancy:  → Preallocated reentrancy |  → Shared reentrancy

Inlining:  → Inlined

APPENDIX C: CLASSES

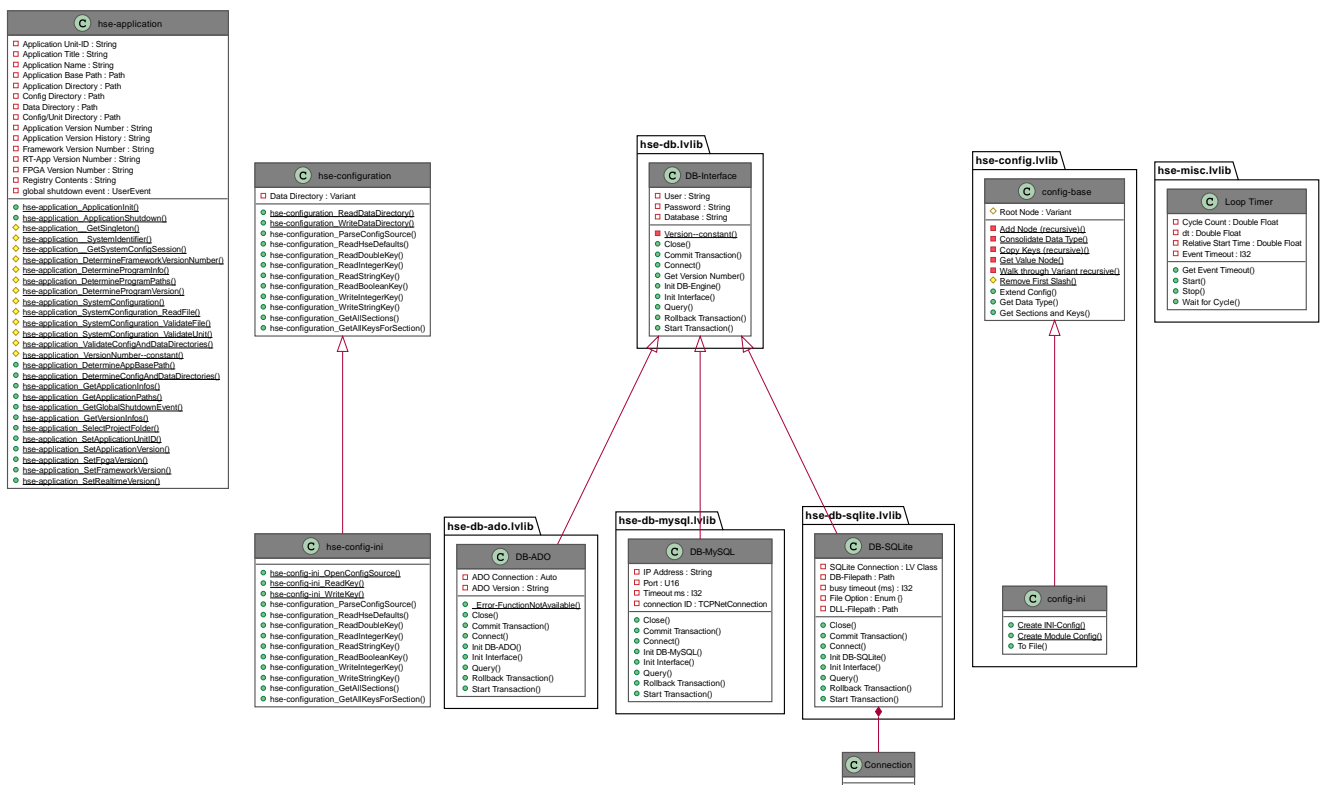
LabVIEW Classes

C.1. CLASSES OVERVIEW

This project contains 10 classes and 0 interface.

Table 19. Classes list

Classes	Interfaces
[hse-application.lvclass]	
[hse-config-ini.lvclass]	
[hse-configuration.lvclass]	
[config-base.lvclass]	
[config-ini.lvclass]	
Loop Timer.lvclass	
DB-ADO.lvclass	
DB-MySQL.lvclass	
DB-SQLite.lvclass	
DB-Interface.lvclass	




C.2. HSE-APPLICATION.LVCLASS


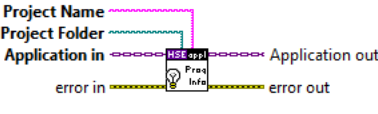



Responsibility: No description found (add content in lvclass description)

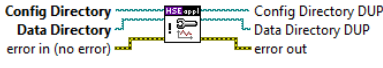

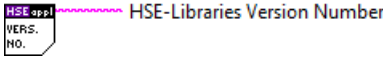






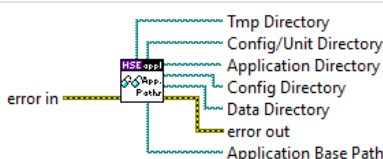





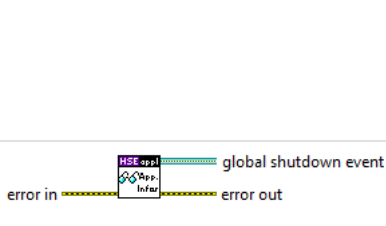

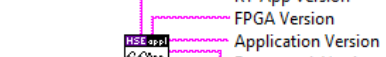
Version: 1.0.0.4


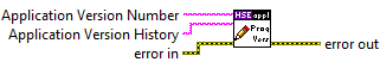
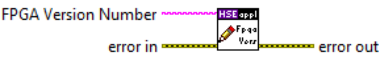
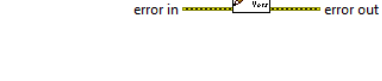
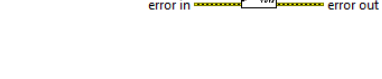
C hse-application	
<ul style="list-style-type: none"> □ Application Unit-ID : String □ Application Title : String □ Application Name : String □ Application Base Path : Path □ Application Directory : Path □ Config Directory : Path □ Data Directory : Path □ Config/Unit Directory : Path □ Application Version Number : String □ Application Version History : String □ Framework Version Number : String □ RT-App Version Number : String □ FPGA Version Number : String □ Registry Contents : String □ global shutdown event : UserEvent 	
<ul style="list-style-type: none"> ● hse-application_ApplicationInit() ● hse-application_ApplicationShutdown() ◆ hse-application_GetSingleton() ◆ hse-application_SystemIdentifier() ◆ hse-application_GetSystemConfigSession() ◆ hse-application_DetermineFrameworkVersionNumber() ◆ hse-application_DetermineProgramInfo() ◆ hse-application_DetermineProgramPaths() ◆ hse-application_DetermineProgramVersion() ◆ hse-application_SystemConfiguration() ◆ hse-application_SystemConfiguration_ReadFile() ◆ hse-application_SystemConfiguration_ValidateFile() ◆ hse-application_SystemConfiguration_ValidateUnit() ◆ hse-application_ValidateConfigAndDataDirectories() ◆ hse-application_VersionNumber--constant() ● hse-application_DetermineAppBasePath() ● hse-application_DetermineConfigAndDataDirectories() ● hse-application_GetApplicationInfos() ● hse-application_GetApplicationPaths() ● hse-application_GetGlobalShutdownEvent() ● hse-application_GetVersionInfos() ● hse-application_SelectProjectFolder() ● hse-application_SetApplicationUnitID() ● hse-application_SetApplicationVersion() ● hse-application_SetFpgaVersion() ● hse-application_SetFrameworkVersion() ● hse-application_SetRealtimeVersion() 	

Table 20. Functions (non private scope only)


Name	Connector pane	Description	S.	R.	I.
hse-application_ApplicationInit		Initializes the HSE Application and its configuration variables with names, paths, version strings and other information.			

Name	Connector pane	Description	S.	R.	I.
hse-application_ApplicationShutdown		Stops and frees all hse resources.			
hse-application_GetSingleton	[hse-application.lvclass:hse-applicationGetSingleton.vi]	Contains the DVR to the HSE ApplicationClass object.	key		
hse-application_SystemIdentifier	[hse-application.lvclass:hse-applicationSystemIdentifier.vi]		key		
hse-application_GetSystemConfigSession	[hse-application.lvclass:hse-applicationGetSystemConfigSession.vi]	Tries 10 times to create a System Configuration session reference	key		
hse-application_DetermineFrameworkVersionNumber		Sets the version of the framework used for the application.	key		
hse-application_DetermineProgramInfo			key		
hse-application_DetermineProgramPaths		Determines the Application Base, Configuration and Data paths.	key		
hse-application_DetermineProgramVersion			key		
hse-application_SystemConfiguration		Reads global (system-wide) configuration parameters from the config.ini file or creates it if it couldn't be found.	key		
hse-application_SystemConfiguration_ReadFile		Reads configuration parameters from the Config File.	key		
hse-application_SystemConfiguration_ValidateFile		Check if Config File exists. If it can't be read, try and copy config.ini.default over to config. ini and show a message. If that also doesn't work, throw an error and show a message.	key		
hse-application_SystemConfiguration_ValidateUnit		Check if Unit Directory exists.	key		

Name	Connector pane	Description	S.	R.	I.
hse-application_ValidateConfigAndDataDirectories	 <p>Config Directory Data Directory error in (no error) HSE-app! Config Directory DUP Data Directory DUP error out</p>	No description found (add content in vi description)			
hse-application_VersionNumber—constant	 <p>HSE-app! VERS. NO. HSE-Libraries Version Number</p>	No description found (add content in vi description)			
hse-application_DetermineAppBasePath	 <p>Application Directory error in (no error) HSE-app! App Base Path Application Directory DUP error out</p>	Determines the "Root" path of the application: - When running from the development environment, this is identical to the application directory. - When running from the run-time environment, this includes the name of the .exe			
hse-application_DetermineConfigAndDataDirectories	 <p>Application Name Application Directory error in (no error) HSE-app! Config Directory Data Directory error out</p>	Determines the paths of the _Config and _Data directories: - either by reading from the [HSE] section of <%APPNAME%>.ini in the application directory - or by defining them to live parallel to the application directory (this is HSE default)			
hse-application_GetApplicationInfos	 <p>error in HSE-app! Application Title Application Unit-ID Application Name error out</p>	Returns information on the application itself for display, logging, ...			
hse-application_GetApplicationPaths	 <p>error in HSE-app! Tmp Directory Config/Unit Directory Application Directory Config Directory Data Directory error out Application Base Path</p>	<p>Returns the various paths of the hse-lib based application's folder structure: - Application Directory (the folder on disk the startup.vi or the .exe is stored in) - Config Directory (the folder containing all the configuration files) - Data Directory (the folder designed to hold data generated by the application) - Config/Unit Directory (the folder holding the configuration for this unit - see config.ini file) - Tmp Directory (the system-specific temporary location)</p> <p>The Application Base Path points to the root of the call chain. In the development environment, this path is identical to the Application Directory. In a built .exe, this path points to the .exe itself.</p>			
hse-application_GetGlobalShutdownEvent	 <p>error in HSE-app! global shutdown event error out</p>	Returns information on the application itself for display, logging, ...			
hse-application_GetVersionInfos	 <p>error in HSE-app! RT-App Version FPGA Version Application Version Framework Version HSE-LIB Version error out</p>	Returns the various stored version numbers: Application Version: This project (the built application) Framework Version: The HSE UI-Framework (Windows Application Template) HSE-LIB Version: The hse-libraries			
hse-application_SelectProjectFolder	 <p>Start path error in HSE-app! PROJECT Name PROJECT Folder error out</p>	Opens a file dialog to select the folder in which the project file and the startup.vi are located.			

Name	Connector pane	Description	S.	R.	I.
hse-application_SetApplicationUnitID		Manually set the application "Unit ID".			
hse-application_SetApplicationVersion		Stores the version number of the application for later usage (display, logging, ...).			
hse-application_SetFpgaVersion		Stores the version number of the FPGA bitfile (if any) for later usage (display, logging, ...).			
hse-application_SetFrameworkVersion		Stores the version number of the framework for later usage (display, logging, ...).			
hse-application_SetRealtimeVersion		Stores the version number of the connected Real-Time application (if any).			

Scope:  → Protected |  → Community

Reentrancy:  → Preallocated reentrancy |  → Shared reentrancy

Inlining:  → Inlined

C.3. HSE-CONFIG-INI.LVCLASS

Responsibility: No description found (add content in lvclass description)

Version: 1.0.0.1

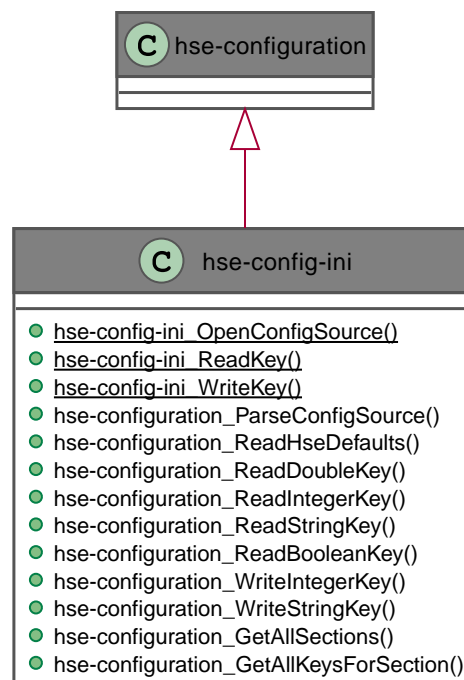



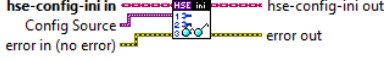

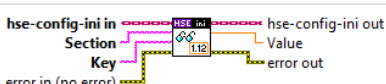
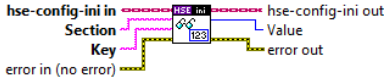


Table 21. Functions (non private scope only)

Name	Connector pane	Description	S.	R.	I.
hse-config-ini_OpenConfigSource		Finds the path to the Name.ini file inside the config/unit directory			
hse-config-ini_ReadKey		No description found (add content in vi description)			
hse-config-ini_WriteKey		No description found (add content in vi description)			
hse-configuration_ParseConfigSource		Reads the contents of the configuration file and keeps them in memory			
hse-configuration_ReadHseDefaults		Reads HSE specific configuration values: [globals].descriptor (used as a configurable label for DQMH modules)			
hse-configuration_ReadDoubleKey		Reads the numeric configuration value (I32) identified by section and key from the configuration object			
hse-configuration_ReadIntegerKey		Reads the numeric configuration value (I32) identified by section and key from the configuration object			

Name	Connector pane	Description	S.	R.	I.
hse-configuration_ReadStringKey		Reads the string configuration value identified by section and key from the configuration object			
hse-configuration_ReadBooleanKey		Reads the numeric configuration value (I32) identified by section and key from the configuration object			
hse-configuration_WriteIntegerKey		Writes the string configuration value identified by section and key to the configuration object and the config source			
hse-configuration_WriteStringKey		Writes the string configuration value identified by section and key to the configuration object and the config source			
hse-configuration_GetAllSections		Reads the numeric configuration value (DOUBLE) identified by section and key from the configuration object			
hse-configuration_GetAllKeysForSection		Reads the numeric configuration value (DOUBLE) identified by section and key from the configuration object			

Scope: → Protected | → Community

Reentrancy: → Preallocated reentrancy | → Shared reentrancy

Inlining: → Inlined










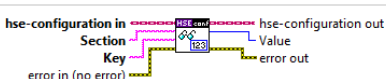








C.4. HSE-CONFIGURATION.LVCLASS

Responsibility: No description found (add content in lvclass description)

Version: 1.0.0.1

hse-configuration
Data Directory : Variant
<ul style="list-style-type: none"> hse-configuration_ReadDataDirectory() hse-configuration_WriteDataDirectory() hse-configuration_ParseConfigSource() hse-configuration_ReadHseDefaults() hse-configuration_ReadDoubleKey() hse-configuration_ReadIntegerKey() hse-configuration_ReadStringKey() hse-configuration_ReadBooleanKey() hse-configuration_WriteIntegerKey() hse-configuration_WriteStringKey() hse-configuration_GetAllSections() hse-configuration_GetAllKeysForSection()

Table 22. Functions (non private scope only)

Name	Connector pane	Description	S.	R.	I.
hse-configuration_ReadDataDirectory		No description found (add content in vi description)			
hse-configuration_WriteDataDirectory		No description found (add content in vi description)			
hse-configuration_ParseConfigSource		Parses the configuration source and stores the contents in memory for future use.			
hse-configuration_ReadHseDefaults		Reads HSE specific configuration values: [globals].descriptor (used as a configurable label for DQMH modules)			
hse-configuration_ReadDoubleKey		Reads the numeric configuration value (DOUBLE) identified by section and key from the configuration object			
hse-configuration_ReadIntegerKey		Reads the numeric configuration value (I32) identified by section and key from the configuration object			
hse-configuration_ReadStringKey		Reads the string configuration value identified by section and key from the configuration object			
hse-configuration_ReadBooleanKey		Reads the numeric configuration value (DOUBLE) identified by section and key from the configuration object			
hse-configuration_WriteIntegerKey		Writes the string configuration value identified by section and key to the configuration object and the config source			
hse-configuration_WriteStringKey		Writes the string configuration value identified by section and key to the configuration object and the config source			
hse-configuration_GetAllSections		Reads the numeric configuration value (DOUBLE) identified by section and key from the configuration object			
hse-configuration_GetAllKeysForSection		Reads the numeric configuration value (DOUBLE) identified by section and key from the configuration object			

Scope:  → Protected |  → CommunityReentrancy:  → Preallocated reentrancy |  → Shared reentrancy

Inlining:  → Inlined

C.5. CONFIG-BASE.LVCLASS

Responsibility: Base class for the hse-configuration.

Version: 1.0.0.0

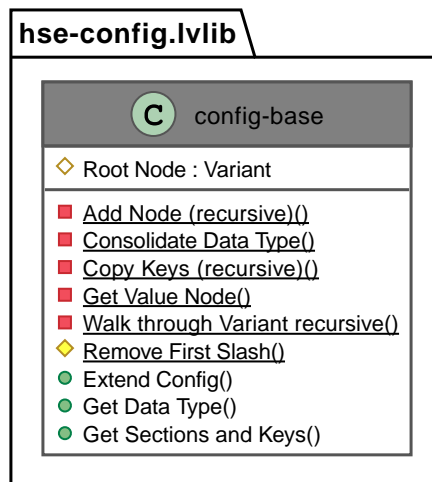









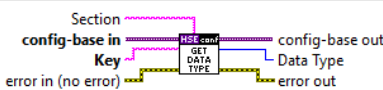
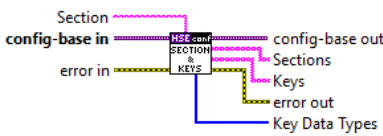











Table 23. Functions (non private scope only)

Name	Connector pane	Description	S.	R.	I.
Read Root Node		No description found (add content in vi description)			
Write Root Node		No description found (add content in vi description)			
Remove First Slash		The "String to Array" can't handle a separation character (slash) as first element. This function removes a leading slash ("/") in "String In".			
Extend Config		Adds or replaces own config keys and sections with the content from "Additional Config".			
Get Data Type		Returns the data type of a key.			
Get Sections and Keys		Returns all sub-sections, keys and the data types of the keys in a section.			
Read Boolean		Returns a boolean config key.			

Name	Connector pane	Description	S.	R.	I.
Read Cluster		Returns a cluster of config values (can be nested) of the same type as "Type in". Use the "Variant to Data" function to convert the Variant back to the cluster type.			
Read Float		Returns a float (double) config key.			
Read Integer		Returns a integer (I64) config key.			
Read String		Returns a string config key.			
Write Boolean		Set a boolean config key.			
Write Cluster		Set a cluster of config keys, can be nested. The cluster labels correspond to sections in the config-oject.			
Write Float		Set a float config key.			
Write Integer		Set a integer config key.			
Write String		Set a string config key.			

Scope:  → Protected |  → Community

Reentrancy:  → Preallocated reentrancy |  → Shared reentrancy

Inlining:  → Inlined

C.6. CONFIG-INI.LVCLASS

Responsibility: Read and write INI-configuration files.

Version: 1.0.0.1

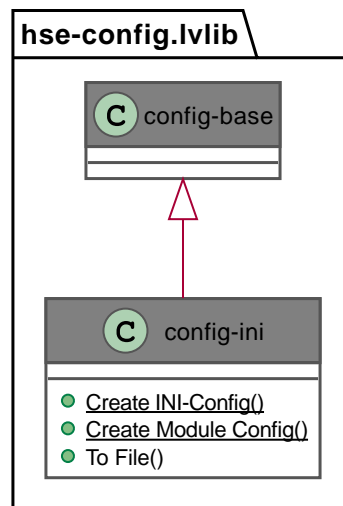


Table 24. Functions (non private scope only)

Name	Connector pane	Description	S.	R.	I.
Create INI-Config		Creates a new "config-ini" object based on the INI-file given.			
Create Module Config		Loads the INI-file of an (HSE) DQMH module.			
To File		Writes the config-ini object to an INI-file.			

Scope: → Protected | → Community

Reentrancy: → Preallocated reentrancy | → Shared reentrancy

Inlining: → Inlined

C.7. LOOP TIMER.LVCLASS

Responsibility: No description found (add content in lvclass description)

Version: 1.0.0.0

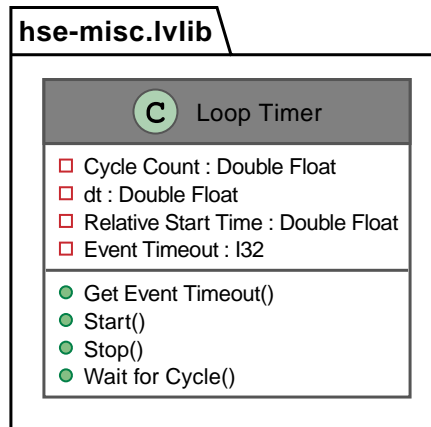



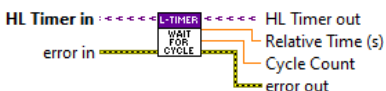




Table 25. Functions (non private scope only)

Name	Connector pane	Description	S.	R.	I.
Get Event Timeout		No description found (add content in vi description)			
Start		Start the timed loop by setting the event timeout to "0". The first iteration is executed immediately.			
Stop		Stop the timed loop by setting the event timeout to "-1".			
Wait for Cycle		Waits until the next time cycle is reached.			

Scope:  → Protected |  → Community

Reentrancy:  → Preallocated reentrancy |  → Shared reentrancy

Inlining:  → Inlined

C.8. DB-ADO.LVCLASS

Responsibility: ADO-Driver subclass.

Version: 1.0.0.2

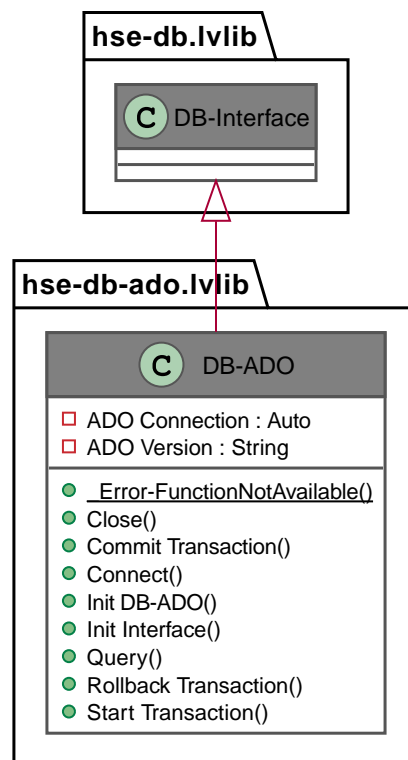
































Table 26. Functions (non private scope only)

Name	Connector pane	Description	S.	R.	I.
_Error-FunctionNotAvailable	 error out	No description found (add content in vi description)			
Close	DB-ADO in  DB-ADO out error in  error out	Close the ADO connection.			
Commit Transaction	DB-ADO in  DB-ADO out error in  error out	Commit a transaction. Either all SQL-commands get committed or, in case of an error, all get rejected.			
Connect	DB-ADO in  DB-ADO out error in  error out	Connect to a ADO database.			
Init DB-ADO	DB-ADO in  DB-ADO out Authentication  error in  error out	Init a new ADO DB object.			
Init Interface	DB-ADO  DB-ADO hse-config  error out Config Section  error in  error out	No description found (add content in vi description)			
Query	DB-ADO in  DB-ADO out Query  Return Data error in  Packed Metadata  Field Names	Send a SQL-query and return the answer. Return data is a 2D-array of strings wrapped in variants.			

Name	Connector pane	Description	S.	R.	I.
Rollback Transaction		Rollback the active transaction.			
Start Transaction		Start a transaction to get sure all following SQL commands get executed or none.			

Scope:  → Protected |  → Community

Reentrancy:  → Preallocated reentrancy |  → Shared reentrancy

Inlining:  → Inlined

C.9. DB-MYSQL.LVCLASS

Responsibility: No description found (add content in lvclass description)

Version: 1.0.0.0

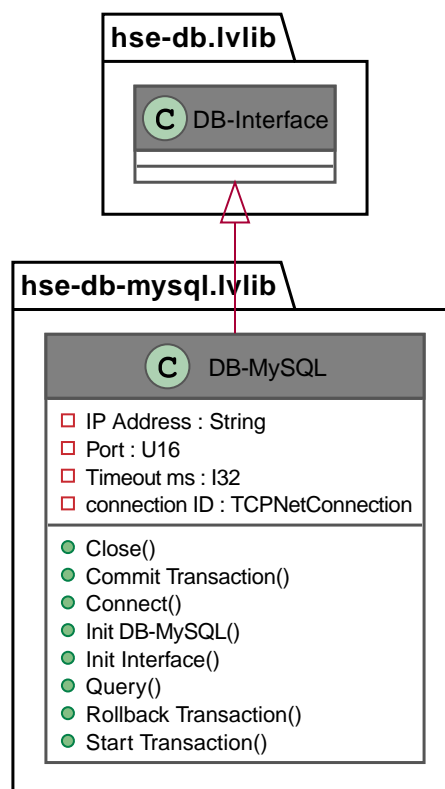
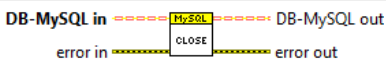





Table 27. Functions (non private scope only)

Name	Connector pane	Description	S.	R.	I.
Close		No description found (add content in vi description)			
Commit Transaction		Commit a transaction. Either all SQL-commands get committed or, in case of an error, all get rejected.			

Name	Connector pane	Description	S.	R.	I.
Connect		No description found (add content in vi description)			
Init DB-MySQL		No description found (add content in vi description)			
Init Interface		No description found (add content in vi description)			
Query		No description found (add content in vi description)			
Rollback Transaction		Rollback the active transaction.			
Start Transaction		Start a transaction to get sure all following SQL commands get executed or none.			

Scope: → Protected | → Community

Reentrancy: → Preallocated reentrancy | → Shared reentrancy

Inlining: → Inlined

C.10. DB-SQLITE.LVCLASS

Responsibility: No description found (add content in lvclass description)

Version: 1.0.0.0

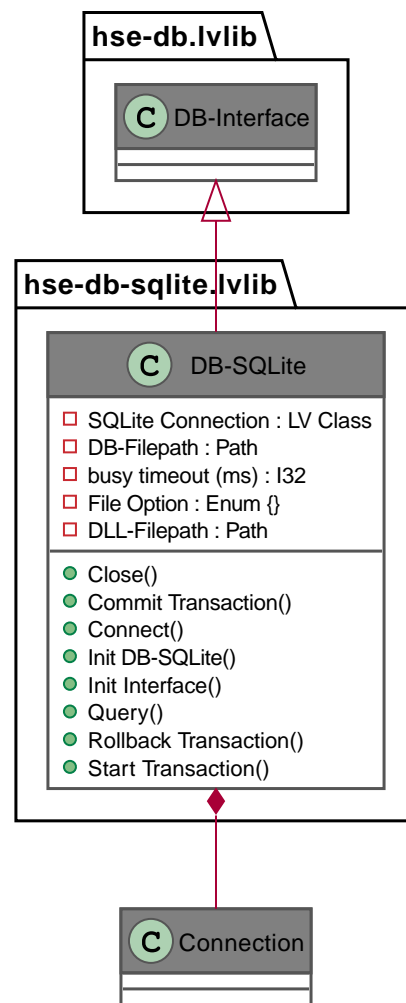
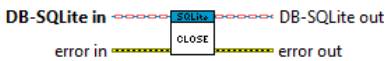





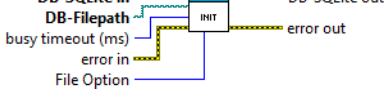

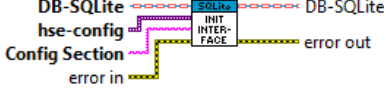



Table 28. Functions (non private scope only)

Name	Connector pane	Description	S.	R.	I.
Close		No description found (add content in vi description)			
Commit Transaction		No description found (add content in vi description)			
Connect		No description found (add content in vi description)			
Init DB-SQLite		No description found (add content in vi description)			
Init Interface		No description found (add content in vi description)			

Name	Connector pane	Description	S.	R.	I.
Query		No description found (add content in vi description)			
Rollback Transaction		Rollback the active transaction.			
Start Transaction		No description found (add content in vi description)			

Scope: → Protected | → Community

Reentrancy: → Preallocated reentrancy | → Shared reentrancy

Inlining: → Inlined

C.11. DB-INTERFACE.LVCLASS

Responsibility: No description found (add content in lvclass description)

Version: 1.0.0.0

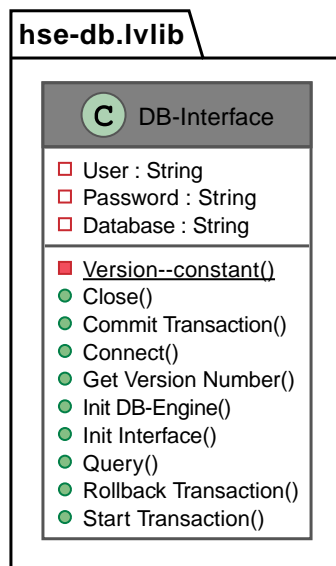


Table 29. Functions (non private scope only)

Name	Connector pane	Description	S.	R.	I.
Close		Close connection. -- This Method is just a prototype --			
Commit Transaction		Commit a transaction. Either all SQL-commands get committed or, in case of an error, all get rejected.			

Name	Connector pane	Description	S.	R.	I.
Connect		Connect. -- This method is just a prototype --			
Get Version Number		No description found (add content in vi description)			
Init DB-Engine		Initialize the class.			
Init Interface		No description found (add content in vi description)			
Query		No description found (add content in vi description)			
Read Authentication		Returns the authentication data.			
Rollback Transaction		No description found (add content in vi description)			
Start Transaction		No description found (add content in vi description)			

Scope:  → Protected |  → Community

Reentrancy:  → Preallocated reentrancy |  → Shared reentrancy

Inlining:  → Inlined

APPENDIX D: CUSTOM ERRORS

List of Custom Error VIs

D.1. CUSTOM ERRORS



Custom errors are added via vi named `*--error.vi`.

Table 30. Custom errors

Name	Code	Description	Owned by
DB_CONNECTOR.lvlib:Module Running as Singleton	403680	The "%s" module is currently running as singleton, but the Start Module VI was called with 'Run as Singleton' specified as FALSE.	[hse-db.lvlib]
DB_CONNECTOR.lvlib:Module Not Stopped	403682	%s Module did not finish clean up on exit.	[hse-db.lvlib]
DB_CONNECTOR.lvlib:Module Not Synced	403683	%s Module was unable to synchronize events.	[hse-db.lvlib]
DB_CONNECTOR.lvlib:Module Not Running	403684	Not a single instance of "%s" Module running.	[hse-db.lvlib]
DB_CONNECTOR.lvlib:Module Running as Cloneable	403685	The "%s" module is currently running as cloneable, but the Start Module VI was called with 'Run as Singleton' specified as TRUE.	[hse-db.lvlib]
DB_CONNECTOR.lvlib:Request Timed Out	403686	The reply for the request "%s" of the "%s" Module timed out.	[hse-db.lvlib]
DB_CONNECTOR.lvlib:Request and Wait for Reply Timeout	403686	%s	[hse-db.lvlib]
DQMH Request Reply Timed Out	403686	The '%s' request for the %s module timed out.	[hse-dqmh.lvlib]
DB_CONNECTOR.lvlib:Master Reference Not Closed	403687	The "%s" module cannot be run as singleton because the Master Reference is still open from a prior run as cloneable. If you plan on running this module as both singleton and cloneable, consider changing your Main VI to wire a value of TRUE to the 'Close Master Reference' input of Init Module.vi.	[hse-db.lvlib]

GLOSSARY

The rat-documentr tool facilitates the following LabVIEW-related tools and libraries:

- Antidoc by Wovalab
- AsciiDoc Toolkit by Wovalab
- Graph Builder by C. Gambini
- Classy by T. Boyé
- DQMH® by Delacor

Furthermore, it relies on the following tools and libraries:

- Ruby
- AsciiDoctor
- Java
- GraphViz