QA C 7.0 Release Notes

March 2007

Contents

1. OVERVIEW

The principle features of QAC 7.0 include the following:

- Introduction of a new system for message suppression based on code annotation in comments.
- Full rich naming convention checking is included in the base product, implemented as a secondary analysis process.
- A number of improvements to the message browser.
- 3 new CMA messages have been introduced.
- Support for direct access from a function structure diagram to the precise location within the source code.
- The release includes fixes for a number of significant parsing/analysis bugs but no significant changes to primary analysis capability.

2. Message suppression through code annotations

In QAC 7.0 a new and more comprehensive method of message suppression has been implemented based on annotations within comments. The new system incorporates a number of significant benefits over the existing #pragma system:

- Messages can be suppressed in a single statement by appending a simple comment to the end of the line.
- Comments are invisible to compilers
- Comment based annotations may be used to suppress messages originating from secondary or CMA analysis.

3. Message browser enhancements

- **Customizable colours**

The colours used within the annotated source pane of the message browser are now customizable.

- **Suppressions**

Separate message counts are now presented for the total number of messages and the total number of un-suppressed messages.

- **Find facility**

There is now a tool to search within the currently displayed text in the annotated source pane. The find tool includes common search features such as match-case, whole words only, auto wrap, regular expressions and highlight all instances.

- **External editor**

The message browser now includes the ability to edit the current source file with an external editor. The edit program can be invoked either through OLE Automation (currently only Microsoft Visual Studio) or by specifying the external editor through command line options where %F %L %C are used to specify the filename, line number and column respectively.

The auto-update option will automatically update the editor when a new message instance has been selected. Note that this feature may not work with simple editors that open multiple instances/windows, e.g. Notepad.

- **Pre-processed source code**

If generated, the pre-processed source code can now be opened within the specified external editor allowing easier diagnosis of problems arising within macros.

4. Naming convention enforcement

Identifiers can be checked to determine whether they comply with a naming convention:

- functions
- objects
- typedefs
- tags
- macros
- structure/union members

The required format of each type of identifier can be specified using a regular expression. Identifiers that fail to conform are identified using a standard message or a message that is custom defined.

5. Message Changes

5.1. New messages

Msg	Message text	CR
1531	The object '%1s' is referenced in only one translation unit - but not the one in which it is defined.	11061
1532	The function '%1s' is only referenced in one translation unit - but not the one in which it is defined.	11061
1533	The object '%1s' is only referenced by function '%2s'.	11061
4800	The identifier '%1s' does not conform to the name rule.	11468
4810	The identifier '%1s' does not conform to the name rule	1710
4811	Invalid annotation: tag '%1s' is not defined subsequently in this file.	1710
4812	The start of the range '%1s', starts and ends at the same location.	1710
4820	'%1s' not allowed here.	1710
4821	Annotation kind is expected.	1710
4822	Colon is expected.	1710
4823	Tag name is expected.	1710
4824	Annotation syntax error.	1710
4824	Invalid character in tag name.	1710
4825	Unexpected character.	1710
4826	Message specification is incomplete or missing.	1710
4827	Tag name is not allowed in the message specification of continuous suppression annotation.	1710
4828	Invalid usage of predefined location tag.	1710

5.2. Messages with changed functionality

The implementation of some existing messages has been modified. In general, every effort is made to avoid changing functionality; however there are some situations in which it has been found necessary to amend the specification of existing messages in order to promote improved clarity, enhancement of the message specification or a reduction in the generation of false positives. Sometimes it is necessary for the functionality of an existing message to be split between two or more messages in order to provide further granularity in identifying specific code constructs.

Msg	Message text	CR
0604	[E] Declarations must appear before statements in a compound statement to conform to ISO-C90.	923
1504	The object '%1s' is only referenced in the translation unit where it is defined.	11061
1505	The function '%1s' is only referenced in the translation unit where it is defined.	11061
1514	The object '%1s' is only referenced by function '%2s', in the translation unit where it is defined	11061
1526	Object with no linkage has same identifier as another object/function with external linkage.	11458
1528	Object with no linkage has same identifier as another object/function with internal linkage.	11458

5.3. Removed messages

A number of messages have been removed from the message file in QAC 7.0. Most of these messages refer to internal system problems in QAC rather than coding issues and they are no longer generated.

Msg	Message Text
1	Filename expected.
2	Warning previous output filename overridden.
3	Illegal macro value in -D option (%s).
4	Illegal macro name in -D option (%s).
5	Unknown directive.
8	Invalid filename.
12	Parameter too long - truncated.
15	Filename too long, truncated to %d chars.
16	Comment exceeds line.
17	Extra characters after the comment.
18	Extra characters after number/bad characters in number.
19	Parameter much too large.
20	Illegal number format.
28	unable to open configuration file.
29	Unexpected end of configuration file.
30	Maximum line length exceeded in config file.
31	Expected section '%s'.
32	Extra characters after number in config file.
33	String in config file too long : truncated.
34	Characters truncated from filename '%s'.
39	Output path too long - ignoring it.
98	Unrecoverable error! Occurred at or near '%s'. Analysis aborted!
100	unable to open the via file.
101	read past end of file.
102	disk full.
103	could not open input file.
104	could not open output file.
105	could not open map file.
106	could not open the log/listing file.
107	could not open the control file.
108	file error reading hierarchy control file.
109	file error writing hierarchy file.
433	[C] Argument should be compatible type.
950	Unable to create intermediate code file.
951	Unable to write intermediate code file.
952	Unable to read intermediate code file.
953	Unable to seek on intermediate code file.
960	Unable to create listing file.
961	Unable to write listing file.
999	Internal error: Please contact Programming Research Technical Support quoting the following: internal error reference: %s.
1997	Unable to open interface definition file '%s'.
1998	Unable to open reference description file '%s'.
1999	An interface definition file already exists for the external identifier '%s'.

6. CR Summary

The following table lists summarises the change requests (CRs) that have been implemented in QAC 7.0.

CRs have been categorised into 3 types (column "T"):

C – A significant change has been implemented to existing behaviour.

F – A fix of a bug or problem feature.

N – New functionality has been introduced.

Some CRs are associated with more than one category and in some cases, the distinction between categories is a little indistinct. The classification should therefore be treated as a guide only.

CR	T	Resolution
923	C	Object and function declarations may now be preceded by statements in a compound statement - as permitted in C99 and C++. Message 0604 has been reclassified as a Language Extension message (Level 6) rather than a hard syntax error (Level 9). *0604: [E] Declarations must appear before statements in a compound statement to conform to C90.*
1710	N	Implementation of comment based message suppression system
1723	N	Message browser is now able to access the source code, preprocessed code and annotated source code corresponding to the current highlighted message.
10997	N	CTLGN records are now included in met file to support direct access to control flow nodes within the source code from the function structure diagram.
11005	N	Implementation of Find dialog in message browser
11007	F	Resolution of GUI problem on HP-UX platforms.
11029	F	Resolution of parsing problem associated with expansion of nested macros using octal constants
11061-1	C N	*1504: The object '%1s' is only referenced in one translation unit.* *1505: The function '%1s' is only referenced in one translation unit.* The functionality of messages 1504 and 1505 has been split. In previous versions of QAC, these messages identified situations where an external object/function was only referenced in one translation unit; however no attempt was made to distinguish whether that translation unit was the translation unit containing the definition or a different one. In future these 2 messages are only generated where an object/function with external linkage is referenced only in the translation unit in which it is defined. The messages have been reworded as follows: *1504: The object '%1s' is only referenced in the translation unit where it is defined.* *1505: The function '%1s' is only referenced in the translation unit where it is defined.* 2 new messages have been implemented which specifically identify the situation where an object/function is referenced in only one translation unit which is not the one in which it is defined: *1531: The object '%1s' is referenced in only one translation unit - but not the one in which it is defined.* *1532: The function '%1s' is only referenced in one translation unit - but not the one in which it is defined.*

CR	T	Resolution
11061-2	C N	*1514: The object '%1s' is defined with external linkage but is only used in function '%2s'.* The functionality of messages 1514 has been split. In previous versions of QAC, this message identified situations where an external object was only referenced in one function in one translation unit; however no attempt was made to distinguish whether that translation unit was the translation unit containing the object definition or a different one. In future this message is only generated where an object with external linkage is referenced only in one function in the translation unit in which it is defined. The message has been reworded as follows: *1514: The object '%1s' is only referenced by function '%2s', in the translation unit where it is defined.* A new message has been implemented which specifically identifies the situation where an object is referenced in only one function in one translation unit which is not the one in which it is defined: *1533: The object '%1s' is only referenced by function '%2s'.*
11065	F	Resolution of Unix GUI problem related to the “Fold plain char” option.
11148	F	Resolution of problem in calculation of project based metric STNEA.
11175	F	Resolution of CMA analysis problem associated with large projects.
11176	N	Implementation of a new message browser option to control auto expansion of the message tree
11179	F	Resolution of message browser problem whereby CMA analysis caused extra files to be included in the message browser display other than those selected.
11191	F	Resolution of problem in Unix GUI causing failure of metrics browser
11227	F	Resolution of problem in parsing variadic macros.
11251	F	Resolution of problem in message browser when -tab option set to 0.
11280	N	The message browser now allows configuration of colours.
11282	F	Problem in parsing ## preprocessor directives.
11334	F	A #elif directive without an expression resulted in a parsing failure without issuing a message.
11362	F	Message 0675 was incorrectly generated when initialising the first element of a structure or union type with a non-constant expression. *0675: [U] Initializer for 'struct' or 'union' does not have compatible type.*
11370	F	Resolution of problem associated with bad ordering of EXTV records in the met file.
11381	F	A number of messages which were not generated in previous versions have now been removed from the message file.
11398	F	Resolution of parsing failure occurring when a character string literal was defined with more than 256 characters.
11400	F	Filenames containing spaces not correctly enclosed in quotes in the met-file on Unix systems.
11401	F	Macros were not expanded correctly when an argument was defined by another macro which expanded to nothing.
11449	N	The Unix GUI now generates meaningful messages when the environment variables QACOUTPATH and QACTEMPFILES are invalid.
11458	F	CMA Messages 1526 & 1528 were not generated for objects declared with no linkage but with static storage duration. *1526: Object with no linkage has same identifier as another object/function with external linkage.* *1528: Object with no linkage has same identifier as another object/function with internal linkage.*
11468	N	Internal support for naming checks
11538	F	Parsing failure associated with processing of an @ character derived from a macro definition.
11540	F	Resolution of value analysis problem resulting in generation of message 0097 (Recoverable dataflow problem).
11558	F	Value analysis problem associated with nested structures and unions.
11623	F	Value analysis problem causes parsing failure.
11625	F	Parsing failure on illegal code causes parser to crash.
11678	F	Value analysis problem causes parsing failure.
11792	F	Value analysis problem associated with loops analysis.
11890	F	Value analysis problem on invalid code involving comparison of a float with a pointer.