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Achieving MISRA C 2004 & 2012 Compliance with the Synopsys Software Integrity Platform

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Software is eating the world.

Many industries that traditionally rely on mechanical, electronic and analog control systems are now increasingly replaced by software-driven systems. The average car is expected to contain 300 million lines of code in the next decade, up from 100 million lines of code in today's cars.

On the other hand, the growth of software introduces the possibility of software defects. Often, defects in these systems manifest themselves physically and tangibly – with life-threatening consequences in the worst scenarios. Perhaps more importantly, malicious actors are now able to deliberately trigger failures for their own purposes.

Highly complex industries involve many vendors and suppliers, simultaneously contributing to the software that goes into the final product. With this so-called "software supply chain", it is useful for every participant to reach consensus on – for example – coding standards, defect reporting structures, and so on.

The confluence of these two factors: increasing complexity in software systems, and the establishment of long software supply chains; creates the demand for new tools.

Synopsys provides a comprehensive solution for MISRA standard compliance, that is scalable from individual developers all the way to complex software supply chains.
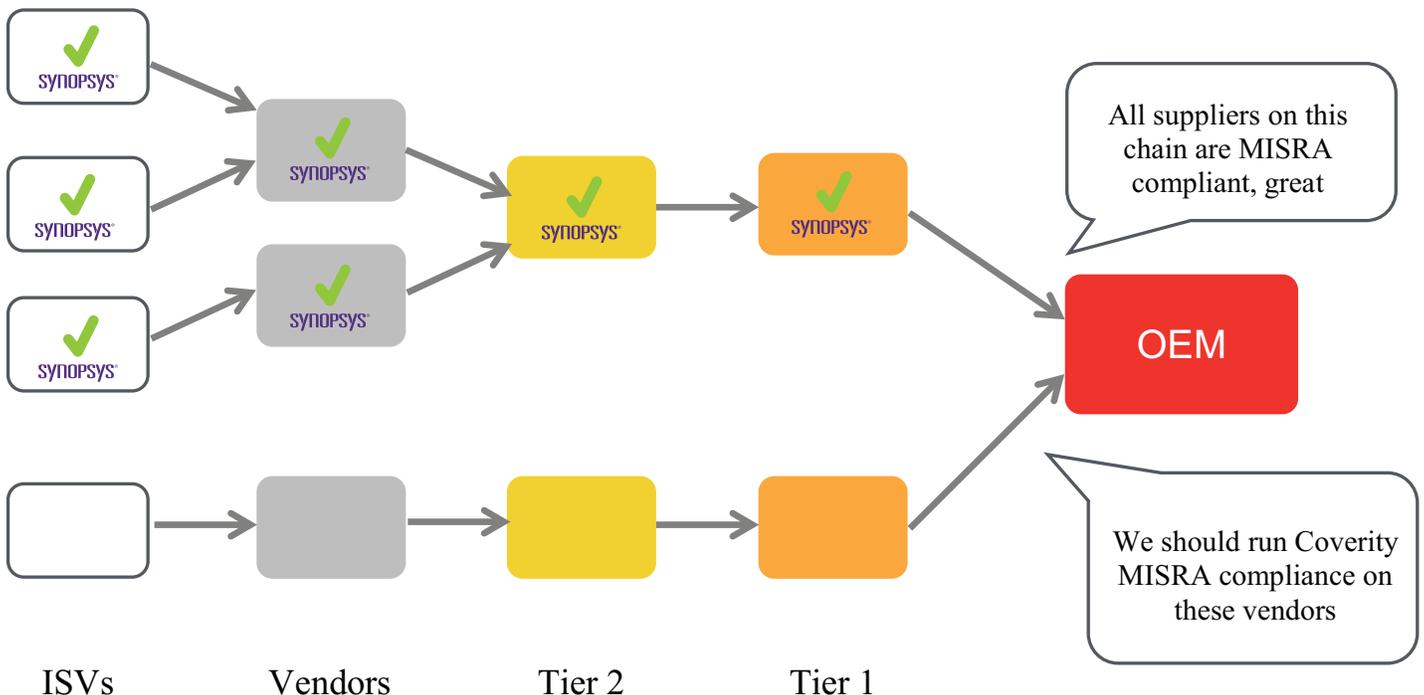

Diagram 1: Coverity enables MISRA compliance across the entire software supply chain

MISRA C 2004

The MISRA C coding standard is widely used in safety critical industries, such as automotive, medical, military, and aerospace. The standard provides a set of best practices for writing C code, facilitating the authorship of safe, secure, and portable code. It supports the C90 language specifications.

MISRA C 2004 was first released in 2004, consisting of 142 rules, of which 122 belong to the "Required" category, the other 20 belonging to the "Advisory" category.

Coverity, the static analysis solution by Synopsys, covers the entire MISRA C 2004 standard[1].

	Supported	All	% Coverage
All	131	142	92.3%
Required	115	123	93.5%
Advisory	16	19	84.2%

[1] All rules that can be checked by static analysis are supported. MISRA C 2004 contains 11 rules that are not statically checkable, so a total of 131 is implemented (out of 142).

MISRA Rule	Category	Supported	Notes
Rule 1.1	Required	Yes	
Rule 1.2	Required	Yes	
Rule 1.3	Required	No	This rule is not statically verifiable
Rule 1.4	Required	No	This rule is not statically verifiable
Rule 1.5	Required	No	This rule is not statically verifiable
Rule 2.1	Required	Yes	
Rule 2.2	Required	Yes	
Rule 2.3	Required	Yes	
Rule 2.4	Advisory	Yes	
Rule 3.1	Advisory	No	This rule is not statically verifiable
Rule 3.2	Advisory	No	This rule is not statically verifiable
Rule 3.3	Advisory	No	This rule is not statically verifiable
Rule 3.4	Required	No	This rule is not statically verifiable
Rule 3.5	Required	No	This rule is not statically verifiable
Rule 3.6	Required	No	This rule is not statically verifiable
Rule 4.1	Required	Yes	
Rule 4.2	Required	Yes	
Rule 5.1	Required	Yes	
Rule 5.2	Required	Yes	
Rule 5.3	Required	Yes	
Rule 5.4	Required	Yes	
Rule 5.5	Advisory	Yes	
Rule 5.6	Advisory	Yes	
Rule 5.7	Advisory	Yes	
Rule 6.1	Required	Yes	
Rule 6.2	Required	Yes	
Rule 6.3	Advisory	Yes	
Rule 6.4	Required	Yes	
Rule 6.5	Required	Yes	

MISRA Rule	Category	Supported	Notes
Rule 7.1	Required	Yes	
Rule 8.1	Required	Yes	
Rule 8.2	Required	Yes	
Rule 8.3	Required	Yes	
Rule 8.4	Required	Yes	
Rule 8.5	Required	Yes	
Rule 8.6	Required	Yes	
Rule 8.7	Required	Yes	
Rule 8.8	Required	Yes	
Rule 8.9	Required	Yes	
Rule 8.10	Required	Yes	
Rule 8.11	Required	Yes	
Rule 8.12	Required	Yes	
Rule 9.1	Required	Yes	
Rule 9.2	Required	Yes	
Rule 9.3	Required	Yes	
Rule 10.1	Required	Yes	
Rule 10.2	Required	Yes	
Rule 10.3	Required	Yes	
Rule 10.4	Required	Yes	
Rule 10.5	Required	Yes	
Rule 10.6	Required	Yes	
Rule 11.1	Required	Yes	
Rule 11.2	Required	Yes	
Rule 11.3	Advisory	Yes	
Rule 11.4	Advisory	Yes	
Rule 11.5	Required	Yes	
Rule 12.1	Advisory	Yes	
Rule 12.2	Required	Yes	

MISRA Rule	Category	Supported	Notes
Rule 12.3	Required	Yes	
Rule 12.4	Required	Yes	
Rule 12.5	Required	Yes	
Rule 12.6	Advisory	Yes	
Rule 12.7	Required	Yes	
Rule 12.8	Required	Yes	
Rule 12.9	Required	Yes	
Rule 12.10	Required	Yes	
Rule 12.11	Advisory	Yes	
Rule 12.12	Required	Yes	
Rule 12.13	Advisory	Yes	
Rule 13.1	Required	Yes	
Rule 13.2	Advisory	Yes	
Rule 13.3	Required	Yes	
Rule 13.4	Required	Yes	
Rule 13.5	Required	Yes	
Rule 13.6	Required	Yes	
Rule 13.7	Required	Yes	
Rule 14.1	Required	Yes	
Rule 14.2	Required	Yes	
Rule 14.3	Required	Yes	
Rule 14.4	Required	Yes	
Rule 14.5	Required	Yes	
Rule 14.6	Required	Yes	
Rule 14.7	Required	Yes	
Rule 14.8	Required	Yes	
Rule 14.9	Required	Yes	
Rule 14.10	Required	Yes	
Rule 15.0	Required	Yes	

MISRA Rule	Category	Supported	Notes
Rule 15.1	Required	Yes	
Rule 15.2	Required	Yes	
Rule 15.3	Required	Yes	
Rule 15.4	Required	Yes	
Rule 15.5	Required	Yes	
Rule 16.1	Required	Yes	
Rule 16.2	Required	Yes	
Rule 16.3	Required	Yes	
Rule 16.4	Required	Yes	
Rule 16.5	Required	Yes	
Rule 16.6	Required	Yes	
Rule 16.7	Required	Yes	
Rule 16.8	Required	Yes	
Rule 16.9	Required	Yes	
Rule 16.10	Required	Yes	
Rule 17.1	Required	Yes	
Rule 17.2	Required	Yes	
Rule 17.3	Required	Yes	
Rule 17.4	Required	Yes	
Rule 17.5	Required	Yes	
Rule 17.6	Required	Yes	
Rule 18.1	Required	Yes	
Rule 18.2	Required	Yes	
Rule 18.3	Required	No	This rule is not statically verifiable
Rule 18.4	Required	Yes	
Rule 19.1	Advisory	Yes	
Rule 19.2	Advisory	Yes	
Rule 19.3	Required	Yes	
Rule 19.4	Required	Yes	

MISRA Rule	Category	Supported	Notes
Rule 19.5	Required	Yes	
Rule 19.6	Required	Yes	
Rule 19.7	Advisory	Yes	
Rule 19.8	Required	Yes	
Rule 19.9	Required	Yes	
Rule 19.10	Required	Yes	
Rule 19.11	Required	Yes	
Rule 19.12	Required	Yes	
Rule 19.13	Advisory	Yes	
Rule 19.14	Required	Yes	
Rule 19.15	Required	Yes	
Rule 19.16	Required	Yes	
Rule 19.17	Required	Yes	
Rule 20.1	Required	Yes	
Rule 20.2	Required	Yes	
Rule 20.3	Required	Yes	
Rule 20.4	Required	Yes	
Rule 20.5	Required	Yes	
Rule 20.6	Required	Yes	
Rule 20.7	Required	Yes	
Rule 20.8	Required	Yes	
Rule 20.9	Required	Yes	
Rule 20.10	Required	Yes	
Rule 20.11	Required	Yes	
Rule 20.12	Required	Yes	
Rule 21.1	Required	No	No checker but successful analysis run confirms compliance

MISRA C 2012

The MISRA C coding standard is widely used in safety critical industries, such as automotive, medical, military, and aerospace. The standard provides a set of best practices for writing C code, facilitating the authorship of safe, secure, and portable code. It supports the C90 and C99 language specifications.

MISRA C 2012 Amendment 1 was released in 2016, consisting of 156 rules and 17 directives for a total of 173 guidelines.

Coverity, the static analysis solution by Synopsys, covers the entire MISRA C 2012 standard, including Amendment 1[2].

	Decidable		Undecidable		Subtotal		
	Supported	All	Supported	All	Supported	All	% Coverage
All	116	116	40	43	156	159	98.1%
Mandatory	4	4	6	6	10	10	100.0%
Required	84	84	24	26	108	110	98.2%
Advisory	28	28	10	11	38	39	97.4%

[2] All rules that can be checked by static analysis are supported. MISRA C 2012 contains 3 rules that are not statically checkable, so a total of 170 is implemented (out of 173).

MISRA Rule	Category	Decidability	Supported	Notes
Directive 1.1	Required	Undecidable	No	This directive is not statically verifiable
Directive 2.1	Required	Undecidable	Yes	No checker but successful analysis run confirms compliance
Directive 3.1	Required	Undecidable	No	This directive is not statically verifiable
Directive 4.1	Required	Undecidable	Yes	No checker but use of MISRA analysis will assist in minimising run-time failures
Directive 4.2	Advisory	Undecidable	No	This directive is not statically verifiable
Directive 4.3	Required	Undecidable	Yes	
Directive 4.4	Advisory	Undecidable	Yes	
Directive 4.5	Advisory	Undecidable	Yes	
Directive 4.6	Advisory	Undecidable	Yes	
Directive 4.7	Required	Undecidable	Yes	
Directive 4.8	Advisory	Undecidable	Yes	
Directive 4.9	Advisory	Undecidable	Yes	
Directive 4.10	Required	Undecidable	Yes	
Directive 4.11	Required	Undecidable	Yes	
Directive 4.12	Required	Undecidable	Yes	
Directive 4.13	Advisory	Undecidable	Yes	
Rule 1.1	Required	Decidable	Yes	No checker but successful analysis run confirms compliance
Rule 1.2	Advisory	Undecidable	Yes	
Rule 1.3	Required	Undecidable	Yes	
Rule 2.1	Required	Undecidable	Yes	
Rule 2.2	Required	Undecidable	Yes	
Rule 2.3	Advisory	Decidable	Yes	
Rule 2.4	Advisory	Decidable	Yes	
Rule 2.5	Advisory	Decidable	Yes	
Rule 2.6	Advisory	Decidable	Yes	
Rule 2.7	Advisory	Decidable	Yes	

MISRA Rule	Category	Decidability	Supported	Notes
Rule 3.1	Required	Decidable	Yes	
Rule 3.2	Required	Decidable	Yes	
Rule 4.1	Required	Decidable	Yes	
Rule 4.2	Advisory	Decidable	Yes	
Rule 5.1	Required	Decidable	Yes	
Rule 5.2	Required	Decidable	Yes	
Rule 5.3	Required	Decidable	Yes	
Rule 5.4	Required	Decidable	Yes	
Rule 5.5	Required	Decidable	Yes	
Rule 5.6	Required	Decidable	Yes	
Rule 5.7	Required	Decidable	Yes	
Rule 5.8	Required	Decidable	Yes	
Rule 5.9	Advisory	Decidable	Yes	
Rule 6.1	Required	Decidable	Yes	
Rule 6.2	Required	Decidable	Yes	
Rule 7.1	Required	Decidable	Yes	
Rule 7.2	Required	Decidable	Yes	
Rule 7.3	Required	Decidable	Yes	
Rule 7.4	Required	Decidable	Yes	
Rule 8.1	Required	Decidable	Yes	
Rule 8.2	Required	Decidable	Yes	
Rule 8.3	Required	Decidable	Yes	
Rule 8.4	Required	Decidable	Yes	
Rule 8.5	Required	Decidable	Yes	
Rule 8.6	Required	Decidable	Yes	
Rule 8.7	Advisory	Decidable	Yes	

[1] Fast desktop analysis is not supported for Rule 5.7 only

MISRA Rule	Category	Decidability	Supported	Notes
Rule 8.8	Required	Decidable	Yes	
Rule 8.9	Advisory	Decidable	Yes	
Rule 8.10	Required	Decidable	Yes	
Rule 8.11	Advisory	Decidable	Yes	
Rule 8.12	Required	Decidable	Yes	
Rule 8.13	Advisory	Undecidable	Yes	
Rule 8.14	Required	Decidable	Yes	
Rule 9.1	Mandatory	Undecidable	Yes	
Rule 9.2	Required	Decidable	Yes	
Rule 9.3	Required	Decidable	Yes	
Rule 9.4	Required	Decidable	Yes	
Rule 9.5	Required	Decidable	Yes	
Rule 10.1	Required	Decidable	Yes	
Rule 10.2	Required	Decidable	Yes	
Rule 10.3	Required	Decidable	Yes	
Rule 10.4	Required	Decidable	Yes	
Rule 10.5	Advisory	Decidable	Yes	
Rule 10.6	Required	Decidable	Yes	
Rule 10.7	Required	Decidable	Yes	
Rule 10.8	Required	Decidable	Yes	
Rule 11.1	Required	Decidable	Yes	
Rule 11.2	Required	Decidable	Yes	
Rule 11.3	Required	Decidable	Yes	
Rule 11.4	Advisory	Decidable	Yes	
Rule 11.5	Advisory	Decidable	Yes	
Rule 11.6	Required	Decidable	Yes	
Rule 11.7	Required	Decidable	Yes	

MISRA Rule	Category	Decidability	Supported	Notes
Rule 11.8	Required	Decidable	Yes	
Rule 11.9	Required	Decidable	Yes	
Rule 12.1	Advisory	Decidable	Yes	
Rule 12.2	Required	Undecidable	Yes	
Rule 12.3	Advisory	Decidable	Yes	
Rule 12.4	Advisory	Decidable	Yes	
Rule 13.1	Required	Undecidable	Yes	
Rule 13.2	Required	Undecidable	Yes	
Rule 13.3	Advisory	Decidable	Yes	
Rule 13.4	Advisory	Decidable	Yes	
Rule 13.5	Required	Undecidable	Yes	
Rule 13.6	Mandatory	Decidable	Yes	
Rule 14.1	Required	Undecidable	Yes	
Rule 14.2	Required	Undecidable	Yes	
Rule 14.3	Required	Undecidable	Yes	
Rule 14.4	Required	Decidable	Yes	
Rule 15.1	Advisory	Decidable	Yes	
Rule 15.2	Required	Decidable	Yes	
Rule 15.3	Required	Decidable	Yes	
Rule 15.4	Advisory	Decidable	Yes	
Rule 15.5	Advisory	Decidable	Yes	
Rule 15.6	Required	Decidable	Yes	
Rule 15.7	Required	Decidable	Yes	
Rule 16.1	Required	Decidable	Yes	
Rule 16.2	Required	Decidable	Yes	
Rule 16.3	Required	Decidable	Yes	
Rule 16.4	Required	Decidable	Yes	

MISRA Rule	Category	Decidability	Supported	Notes
Rule 16.5	Required	Decidable	Yes	
Rule 16.6	Required	Decidable	Yes	
Rule 16.7	Required	Decidable	Yes	
Rule 17.1	Required	Decidable	Yes	
Rule 17.2	Required	Undecidable	Yes	
Rule 17.3	Mandatory	Decidable	Yes	
Rule 17.4	Mandatory	Decidable	Yes	
Rule 17.5	Advisory	Undecidable	Yes	
Rule 17.6	Mandatory	Decidable	Yes	
Rule 17.7	Required	Decidable	Yes	
Rule 17.8	Advisory	Undecidable	Yes	
Rule 18.1	Required	Undecidable	Yes	
Rule 18.2	Required	Undecidable	Yes	
Rule 18.3	Required	Undecidable	Yes	
Rule 18.4	Advisory	Decidable	Yes	
Rule 18.5	Advisory	Decidable	Yes	
Rule 18.6	Required	Undecidable	Yes	
Rule 18.7	Required	Decidable	Yes	
Rule 18.8	Required	Decidable	Yes	
Rule 19.1	Mandatory	Undecidable	Yes	
Rule 19.2	Advisory	Decidable	Yes	
Rule 20.1	Advisory	Decidable	Yes	
Rule 20.2	Required	Decidable	Yes	
Rule 20.3	Required	Decidable	Yes	
Rule 20.4	Required	Decidable	Yes	
Rule 20.5	Advisory	Decidable	Yes	
Rule 20.6	Required	Decidable	Yes	

MISRA Rule	Category	Decidability	Supported	Notes
Rule 20.7	Required	Decidable	Yes	
Rule 20.8	Required	Decidable	Yes	
Rule 20.9	Required	Decidable	Yes	
Rule 20.10	Advisory	Decidable	Yes	
Rule 20.11	Required	Decidable	Yes	
Rule 20.12	Required	Decidable	Yes	
Rule 20.13	Required	Decidable	Yes	
Rule 20.14	Required	Decidable	Yes	
Rule 21.1	Required	Decidable	Yes	
Rule 21.2	Required	Decidable	Yes	
Rule 21.3	Required	Decidable	Yes	
Rule 21.4	Required	Decidable	Yes	
Rule 21.5	Required	Decidable	Yes	
Rule 21.6	Required	Decidable	Yes	
Rule 21.7	Required	Decidable	Yes	
Rule 21.8	Required	Decidable	Yes	Changed in Amendment 1 (removed "getenv")
Rule 21.9	Required	Decidable	Yes	
Rule 21.10	Required	Decidable	Yes	
Rule 21.11	Required	Decidable	Yes	
Rule 21.12	Advisory	Decidable	Yes	
Rule 22.1	Required	Undecidable	Yes	
Rule 22.2	Mandatory	Undecidable	Yes	
Rule 22.3	Required	Undecidable	Yes	
Rule 22.4	Mandatory	Undecidable	Yes	
Rule 22.5	Mandatory	Undecidable	Yes	
Rule 22.6	Mandatory	Undecidable	Yes	

MISRA Rule	Category	Decidability	Supported
Rule 21.7	Required	Decidable	Yes
Rule 21.8	Required	Decidable	Yes
Rule 21.9	Required	Decidable	Yes
Rule 21.10	Required	Decidable	Yes
Rule 21.11	Required	Decidable	Yes
Rule 21.12	Advisory	Decidable	Yes
Rule 22.1	Required	Undecidable	Yes
Rule 22.2	Mandatory	Undecidable	Yes
Rule 22.3	Required	Undecidable	Yes
Rule 22.4	Mandatory	Undecidable	Yes
Rule 22.5	Mandatory	Undecidable	Yes
Rule 22.6	Mandatory	Undecidable	Yes