

JAAL supplementary: XML and JSON

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Document validation is a standard for XML [14], while the standardisation of JSON Schema at draft stage [39].

Table 1 compares XML and JSON, including their support with 20 most popular programming languages (Assembly and SQL excluded) [38]. There is support for reading, writing and schema validation for both XML and JSON in the following popular programming languages: C, C#, C++, Go, Groovy, Java, JavaScript, Perl, PHP, Python, R, Ruby, and Swift.

Table 1: Comparison of XML and JSON

	XML		JSON	
Language standard	W3C Rec. 26 Nov 2008 [1]		ECMA-404 [32]	
Document validation	XSD (standard) [14]		JSON Schema [27]	
Support in programming languages				
Language	Read & Write	Schema	Read & Write	Schema
C	libxml [43]		several [25]	several [25, 21]
C#	standard library [31]		several [25]	
C++	Apache Xerces [10]		several [25, 21]	
Delphi / Object Pascal	standard library [6, 20]	MSXML [46]	several [25]	–
Go	standard library [47]	xsd [49]	standard library [26]	several [21]
FORTRAN	several [28, 8]	XML-Fortran [28]	several [25]	–
Groovy	standard library [34, 37]		standard library [33]	groovy-schema [17]
Java	Apache Xerces [11]		several [25, 21]	
JavaScript (browser)	builtin via DOM [4]	several [48]	builtin	several [21]
JavaScript (Node.js)	several [45]	several [48]	several [25, 21]	
MATLAB	standard library [41]	Java standard library [42]	several [25]	–
Perl	Apache Xerces [9]		several [36]	several [21]
PHP	standard library [16]		standard library [15]	several [21]
Python	standard library [12], defusedxml [19]	xmlschema [2]	several [25, 21]	

R	xml2 [44]	several [25]	jsonvalidate [7]
Ruby	standard library [35], Nokogiri [3]	several [25]	JSONSchemer [18, 21]
Swift	standard library [23]	standard library [22]	JSONSchema.swift [13]
Visual Basic	standard library [29, 30]	several [25]	–

In general, both XML and JSON are well supported. JSON Schema has no implementation for Delphi, FORTRAN, and MATLAB. However, C++ libraries can be used with Delphi [5], which offers a path for JSON Schema validation by C++. Similarly, a FORTRAN program can call C libraries, and a MATLAB program can call a Java Program [24, 40].

References

- [1] Tim Bray et al. *Extensible Markup Language (XML) 1.0 (Fifth Edition)*. Tech. rep. W3C Recommendation 26 November 2008. n.d.: W3C, 2008. URL: <https://www.w3.org/TR/REC-xml/> (visited on 04/28/2021).
- [2] Davide Brunato. *xmlschema · PyPI*. URL: <https://pypi.org/project/xmlschema/> (visited on 05/11/2021).
- [3] Mike Dalessio. *Nokogiri*. URL: <http://nokogiri.org/> (visited on 05/26/2021).
- [4] Refsnes Data. *XML DOM Tutorial*. URL: https://www.w3schools.com/xml/dom_intro.asp (visited on 05/11/2021).
- [5] Embarcadero. *Mixing Delphi and C++*. URL: <https://blogs.embarcadero.com/mixing-delphi-and-c/> (visited on 05/27/2021).
- [6] Embarcadero. *TXMLDocument use case (Delphi) - RAD Studio Code Examples*. URL: [http://docwiki.embarcadero.com/CodeExamples/Sydney/en/TXMLDocument_use_case_\(Delphi\)](http://docwiki.embarcadero.com/CodeExamples/Sydney/en/TXMLDocument_use_case_(Delphi)) (visited on 05/26/2021).
- [7] Rich FitzJohn et al. *jsonvalidate*. URL: <https://CRAN.R-project.org/package=jsonvalidate> (visited on 05/25/2021).
- [8] *Fortran-FOSS-Programmers/FoXy: Fortran XML parser for poor people*. URL: <https://github.com/Fortran-FOSS-Programmers/FoXy> (visited on 05/27/2021).
- [9] Apache Software Foundation. *Welcome to XML::Xerces*. URL: <http://xerces.apache.org/xerces-p/> (visited on 05/11/2021).
- [10] Apache Software Foundation. *Xerces-C++ XML Parser*. URL: <http://xerces.apache.org/xerces-c/> (visited on 05/11/2021).
- [11] Apache Software Foundation. *Xerces2 Java XML Parser*. URL: <http://xerces.apache.org/xerces2-j/> (visited on 05/11/2021).

- [12] Python Software Foundation. *XML Processing Modules — Python 3.9.5 documentation*. URL: <https://docs.python.org/3/library/xml.html> (visited on 05/11/2021).
- [13] Kyle Fuller. *kylef/JSONSchema.swift: JSON Schema validator in Swift*. URL: <https://github.com/kylef/JSONSchema.swift> (visited on 05/27/2021).
- [14] Shudi Gao et al. *W3C XML Schema Definition Language (XSD) 1.1 Part 1: Structures*. Tech. rep. W3C Recommendation 5 April 2012. n.d.: W3C, 2012. URL: <https://www.w3.org/TR/xmlschema11-1/> (visited on 05/11/2021).
- [15] PHP Group. *PHP: JSON - Manual*. URL: <https://www.php.net/manual/en/book.json.php> (visited on 05/12/2021).
- [16] PHP Group. *PHP: XML Manipulation*. URL: <https://www.php.net/manual/en/refs.xml.php> (visited on 05/12/2021).
- [17] François-Xavier Guillemette. *fxg42/groovyschema: Groovy object validation*. URL: <https://github.com/fxg42/groovyschema> (visited on 05/26/2021).
- [18] David Harsha. *JSONSchemer*. URL: https://github.com/davishmclurg/json_schemer (visited on 05/26/2021).
- [19] Christian Heimes. *defusedxml · PyPI*. URL: <https://pypi.org/project/defusedxml/> (visited on 05/11/2021).
- [20] *how to create xml file in delphi - Stack Overflow*. URL: <https://stackoverflow.com/questions/8354658/how-to-create-xml-file-in-delphi> (visited on 05/26/2021).
- [21] *Implementations — JSON Schema*. URL: <https://json-schema.org/implementations.html> (visited on 05/11/2021).
- [22] Apple Inc. *JSONEncoder — Apple Developer Documentation*. URL: <https://developer.apple.com/documentation/foundation/jsonencoder> (visited on 05/27/2021).
- [23] Apple Inc. *XML Processing and Modeling — Apple Developer Documentation*. URL: https://developer.apple.com/documentation/foundation/archives_and_serialization/xml_processing_and_modeling (visited on 05/27/2021).
- [24] *iso_c_binding in Fortran Wiki*. URL: http://fortranwiki.org/fortran/show/iso_c_binding (visited on 05/26/2021).
- [25] *JSON*. URL: <https://www.json.org/json-en.html> (visited on 05/11/2021).
- [26] *json - The Go Programming Language*. URL: <https://golang.org/pkg/encoding/json/> (visited on 05/26/2021).

- [27] *JSON Schema*. URL: <https://json-schema.org/> (visited on 05/11/2021).
- [28] Arjen Markus. *XML-Fortran page*. URL: <http://xml-fortran.sourceforge.net/> (visited on 05/27/2021).
- [29] Microsoft. *Validate an XML document by using DTD, XDR, or XSD - Visual Basic — Microsoft Docs*. URL: <https://docs.microsoft.com/en-us/troubleshoot/dotnet/visual-basic/validate-xml-document-by-dtd-xdr-xsd> (visited on 05/11/2021).
- [30] Microsoft. *XML - Visual Basic — Microsoft Docs*. URL: <https://docs.microsoft.com/en-us/dotnet/visual-basic/programming-guide/language-features/xml/> (visited on 05/11/2021).
- [31] Microsoft. *XmlDocument Class (System.Xml) — Microsoft Docs*. URL: <https://docs.microsoft.com/en-us/dotnet/api/system.xml.xmldocument?view=net-5.0> (visited on 05/11/2021).
- [32] n.d. *The JSON Data Interchange Syntax*. Tech. rep. ECMA-404. Geneva: Ecma International, 2017. URL: https://www.ecma-international.org/wp-content/uploads/ECMA-404_2nd_edition_december_2017.pdf (visited on 04/28/2021).
- [33] Apache Groovy Project. *The Apache Groovy programming language - Parsing and producing XML*. URL: <https://groovy-lang.org/json.html> (visited on 05/26/2021).
- [34] Apache Groovy Project. *The Apache Groovy programming language - Processing XML*. URL: <https://groovy-lang.org/processing-xml.html> (visited on 05/26/2021).
- [35] Ruby community and James Britt. *rexml: Ruby Standard Library Documentation*. URL: <https://ruby-doc.org/stdlib-3.0.1/libdoc/rexml/rdoc/index.html> (visited on 05/26/2021).
- [36] *Search for "JSON" - metacpan.org*. URL: <https://metacpan.org/search?q=JSON> (visited on 05/12/2021).
- [37] Paul Shields. *Groovy and XML - Validating against an XSD schema - Paul's Blog On Software Development*. URL: <https://automagical2012.wordpress.com/2012/09/21/groovy-and-xml-validating-against-an-xsd-schema/> (visited on 05/11/2021).
- [38] TIOBE Software. *TIOBE Index for May 2021*. URL: <https://www.tiobe.com/tiobe-index/> (visited on 05/11/2021).
- [39] *Specification — JSON Schema*. URL: <https://json-schema.org/specification.html> (visited on 05/26/2021).
- [40] Inc. The MathWorks. *Calling Java from Matlab - MATLAB Answers - MATLAB Central*. URL: <https://se.mathworks.com/matlabcentral/answers/51131-calling-java-from-matlab> (visited on 05/27/2021).

- [41] Inc. The Mathworks. *Structured Data and XML Documents - MATLAB & Simulink - MathWorks Nordic*. URL: <https://se.mathworks.com/help/matlab/xml-documents.html> (visited on 05/11/2021).
- [42] Inc. The Mathworks. *Validate an XML file with a given XSD file - MATLAB Answers - MATLAB Central*. URL: <https://se.mathworks.com/matlabcentral/answers/488345-validate-an-xml-file-with-a-given-xsd-file> (visited on 05/26/2021).
- [43] Daniel Veillard. *The XML C parser and toolkit of Gnome : libxml*. URL: <http://xmlsoft.org/> (visited on 05/11/2021).
- [44] Hadley Wickham et al. *CRAN - Package xml2*. URL: <https://CRAN.R-project.org/package=xml2> (visited on 05/25/2021).
- [45] *xml - npm search*. URL: <https://www.npmjs.com/search?q=xml> (visited on 05/11/2021).
- [46] *xml - schema validation with msxml in delphi - Stack Overflow*. URL: <https://stackoverflow.com/questions/446635/schema-validation-with-msxml-in-delphi/8506203> (visited on 05/26/2021).
- [47] *xml - The Go Programming Language*. URL: <https://golang.org/pkg/encoding/xml/> (visited on 05/26/2021).
- [48] *xsd - npm search*. URL: <https://www.npmjs.com/search?q=xsl>.
- [49] *xsd · pkg.go.dev*. URL: <https://pkg.go.dev/github.com/krolaw/xsd> (visited on 05/26/2021).