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CellML Media Type

Status of this Memo

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Abstract

This document standardises a new media type -- application/cellml+xml -- for use in exchanging mathematical models represented in a CellML Umbrella 1.0 compliant markup language.

1. Introduction

CellML Umbrella format is a standardised markup meta-language for the interchange of mathematical models. CellML Umbrella Format provides a common base which is supported by a number of specific formats used in the interchange of mathematical models. CellML Umbrella Format provides enough information to determine which specific language is used to express the model. The syntax and semantics of the CellML Umbrella format are defined by [CELLML-UMBRELLA].

This document standardises a new media type -- application/cellml+xml -- for use in exchanging mathematical models represented in a specific CellML Umbrella compliant language.

2. Notational Conventions

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in [RFC2119].

The terms "element" and "document element" in this document are to be interpreted as in [XML].

The term "XML namespace" is to be interpreted as in [NAMESPACES].

3. Discussion

CellML Umbrella is an XML-based markup meta-language for the interchange of mathmatical models.

CellML Umbrella format is an actual media format. Although CellML Umbrella documents contain elements in namespaces defined by other specifications such as [RDF] and [MATHML], the information in these namespaces do not contain sufficient information to define a mathematical model, and so CellML provides the information required to interconnect the different CellML components, as well as the information required to link CellML components to their metadata. As such, CellML Umbrella documents are more than just a collection of entities defined elsewhere, and so a new media type is required to identify CellML.

As all well-formed CellML Umbrella documents are also well-formed XML documents, the convention described in Section 7 of [RFC3023] has been observed by use of the +xml suffix.

The information in CellML Umbrella documents cannot be interpreted without understanding the semantics of the XML elements used to mark up the model structure. Therefore, the application top-level type is used instead of the text top-level type.

4. Media Type Registration for CellML Umbrella

MIME media type name: application

MIME subtype name: cellml+xml

Mandatory parameters: none

Optional parameters: charset

The charset parameter of application/cellml+xml is handled in the same fashion as for application/xml, as specified in Section 3.2 of [RFC3023].

Encoding considerations: As per Section 3.2 of [RFC3023].

Security considerations: As per Section 6 of this document.

Interoperability considerations: As per Section 5.1 of this document.

Published specification:

CellML Umbrella Specification[CELLML-UMBRELLA].

Applications which use this media type: As per Section 5.2 of this document.

Additional information:

Magic number(s): None.
XML processing software may identify CellML Umbrella documents as XML documents which contain a document element with local name "model".

File extension(s):
The recommended file extension for CellML Umbrella documents is .xml

Some older software still uses the obsolete file extension .cml

Macintosh File Type Code(s): "TEXT"

Person & email address to contact for further information:
See the Author's Address section of this document.

Intended usage: COMMON

Author/Change controller: The CellML Umbrella 1.0 specification was authored by Andrew Miller.

The CellML Umbrella 1.0 specification itself will not change. However, the umbrella specification defines the process for new specific formats to be registered. The Bioengineering Institute

at The University of Auckland, with input from the CellML Community via the cellml-discussion@cellml.org mailing list, has control over the CellML Umbrella Format Registry.

5. Interoperability and usage

5.1. Interoperability Considerations

The interoperability considerations in Section 3.1 of [RFC3023] also apply to CellML Umbrella documents. CellML Umbrella documents contain XML elements defined by each specific format, all of which are published specifications. In addition to the ability to parse XML, user agents require software support for the semantics of [RDF] and/or part or all of a specific format. As efforts are made to keep the number of specific formats small, user agents SHOULD implement all specific formats listed in the registry at the time they were developed.

5.2. Applications which use CellML Umbrella Format

CellML Umbrella is device-, platform-, and vendor-neutral and is supported by a wide range of CellML processing tools, including those designed to validate, edit, and/or visualise CellML models, extract MathML or RDF, translate to or from other related specifications, evaluate mathematics and ordinary differential equations, fit parameters to models, and serve, archive and annotate models.

6. Security Considerations

As CellML Umbrella is an XML based markup language, all the security considerations presented in section 10 of [RFC3023] also apply to CellML Umbrella.

Some types of CellML Umbrella documents can refer to other Uniform Resource Locators (URLs) in a number of places:

i) References to XML document type definitions or schemas.
ii) References to other models using the import features of some specific formats.
iii) References to other documents embedded in user-defined data.

Some types of CellML processing software may then automatically attempt to access the URL and retrieve the document. This retrieval could have several consequences, specifically,

i) if a CellML document is transferred via e-mail, the fact that the recipient has opened the CellML document could be disclosed to the sender without the recipient's knowledge or consent.

ii) where the recipient of a document transfers the document to another location using the MIME type defined in this document, the original author of the document may be notified of the second address by the attempted retrieval of further documents.

iii) by performing requests on the recipient's behalf, the CellML processing software may cause actions to be performed with privileges granted to the recipient, without the recipient's knowledge or consent.

CellML processing software can mitigate this threat when running in an environment where it is a concern by requiring explicit confirmation from the user before attempting to load any external documents.

7. IANA Considerations

This document specifies a new media type. IANA will add this media type to the media types registry as specified in [RFC4288].

8. References

8.1. Normative References

[CELLML-UMBRELLA] Miller, A.K., "CellML Umbrella Specification 1.0", 20 April 2006, <http://www.cellml.org/specifications/cellml_umbrella_1.0>

[NAMESPACES] Bray, T., et. al., "Namespaces in XML 1.1", 4 February 2004, <http://www.w3.org/TR/xml-names11>

[RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", RFC 2119, BCP 14, March 1997

[RFC3023] Murata, M., Simon, S.L., Kohn, D., "XML Media Types", RFC 3023, January 2001

[XML] Bray, T., et. al., "Extensible Markup Language (XML) 1.0 (Third Edition)", 4 February 2004, <http://www.w3.org/TR/REC-xml/>

8.2. Informative References

[MATHML] Ion, P. and Miner, R.(editors) "Mathematical Markup Language (MathML) 1.01 Specification", 7 July 1999, <http://www.w3.org/TR/REC-MathML/>

[RDF] Beckett, D.(editor) "RDF/XML Syntax Specification (Revised)", 10 February 2004,

[RFC4288] Freed, N. and Klensin, J.C., "Media Type Specifications and Registration Procedures", RFC 4288, BCP 13, December 2005

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