



Document Object Model (DOM) Level 3 Content Models and Load and Save Specification

Version 1.0

W3C Working Draft 19 April 2001

This version:

<http://www.w3.org/TR/2001/WD-DOM-Level-3-CMLS-20010419>
(PostScript file , PDF file , plain text , ZIP file , single HTML file)

Latest version:

<http://www.w3.org/TR/DOM-Level-3-CMLS>

Previous version:

<http://www.w3.org/TR/2001/WD-DOM-Level-3-CMLS-20010209>

Editors:

Ben Chang, *Oracle*
Andy Heninger, *IBM*
Joe Kesselman, *IBM*
Rezaur Rahman, *Intel Corporation*

Copyright ©2001 W3C® (MIT, INRIA, Keio), All Rights Reserved. W3C liability, trademark, document use and software licensing rules apply.

Abstract

This specification defines the Document Object Model Content Models and Load and Save Level 3, a platform- and language-neutral interface that allows programs and scripts to dynamically access and update the content, structure and style of documents. The Document Object Model Content Models and Load and Save Level 3 builds on the Document Object Model Core Level 3.

Status of this document

This section describes the status of this document at the time of its publication. Other documents may supersede this document. The latest status of this document series is maintained at the W3C.

This is a W3C Working Draft for review by W3C members and other interested parties.

It is a draft document and may be updated, replaced or obsoleted by other documents at any time. It is inappropriate to use W3C Working Drafts as reference material or to cite them as other than "work in progress". This is work in progress and does not imply endorsement by, or the consensus of, either W3C or members of the DOM working group.

Comments on this document are invited and are to be sent to the public mailing list www-dom@w3.org. An archive is available at <http://lists.w3.org/Archives/Public/www-dom/>.

This document has been produced as part of the W3C DOM Activity. The authors of this document are the DOM WG members.

A list of current W3C Recommendations and other technical documents can be found at <http://www.w3.org/TR>.

Table of contents

Expanded Table of Contents . . . . .	.3
Copyright Notice . . . . .	.5
Chapter 1: Content Models and Validation . . . . .	.9
Chapter 2: Document Object Model Load and Save	47
Appendix A: IDL Definitions	73
Appendix B: Java Language Binding	81
Appendix C: ECMA Script Language Binding	95
References	109
Index	111

Expanded Table of Contents

Expanded Table of Contents . . . . .	.3
Copyright Notice . . . . .	.5
W3C Document Copyright Notice and License . . . . .	.5
W3C Software Copyright Notice and License . . . . .	.6
Chapter 1: Content Models and Validation . . . . .	.9
1.1. Overview . . . . .	.9
1.1.1. General Characteristics . . . . .	.9
1.1.2. Use Cases and Requirements	10
1.2. Content Model and CM-Editing Interfaces	12
1.3. Validation and Other Interfaces	26
1.4. Document-Editing Interfaces	29
1.5. DOM Error Handler Interfaces	40
1.6. Editing and Generating a Content Model	43
1.7. Content Model-directed Document Manipulation	43
1.8. Validating a Document Against a Content Model	44
1.9. Well-formedness Testing	45
Chapter 2: Document Object Model Load and Save	47
2.1. Load and Save Requirements	47
2.1.1. General Requirements	47
2.1.2. Load Requirements	48
2.1.3. XML Writer Requirements	48
2.1.4. Other Items Under Consideration	49
2.2. Issue List	50
2.2.1. Open Issues	50
2.2.2. Resolved Issues	51
2.3. Interfaces	55
2.3.1. Interface Summary	55
2.3.2. Interfaces	56
Appendix A: IDL Definitions	73
Appendix B: Java Language Binding	81
Appendix C: ECMA Script Language Binding	95
References	109
1. Normative references	109
Index	111

Expanded Table of Contents

Copyright Notice

Copyright © 2001 World Wide Web Consortium, (Massachusetts Institute of Technology, Institut National de Recherche en Informatique et en Automatique, Keio University). All Rights Reserved.

This document is published under the W3C Document Copyright Notice and License [p.5] . The bindings within this document are published under the W3C Software Copyright Notice and License [p.6] . The software license requires "Notice of any changes or modifications to the W3C files, including the date changes were made." Consequently, modified versions of the DOM bindings must document that they do not conform to the W3C standard; in the case of the IDL definitions, the pragma prefix can no longer be 'w3c.org'; in the case of the Java language binding, the package names can no longer be in the 'org.w3c' package.

W3C Document Copyright Notice and License

Note: This section is a copy of the W3C Document Notice and License and could be found at <http://www.w3.org/Consortium/Legal/copyright-documents-19990405>.

Copyright © 1994-2001 World Wide Web Consortium, (Massachusetts Institute of Technology, Institut National de Recherche en Informatique et en Automatique, Keio University). All Rights Reserved.

<http://www.w3.org/Consortium/Legal/>

Public documents on the W3C site are provided by the copyright holders under the following license. The software or Document Type Definitions (DTDs) associated with W3C specifications are governed by the Software Notice. By using and/or copying this document, or the W3C document from which this statement is linked, you (the licensee) agree that you have read, understood, and will comply with the following terms and conditions:

Permission to use, copy, and distribute the contents of this document, or the W3C document from which this statement is linked, in any medium for any purpose and without fee or royalty is hereby granted, provided that you include the following on *ALL* copies of the document, or portions thereof, that you use:

1. A link or URL to the original W3C document.
2. The pre-existing copyright notice of the original author, or if it doesn't exist, a notice of the form: "Copyright © [date-of-document] World Wide Web Consortium, (Massachusetts Institute of Technology, Institut National de Recherche en Informatique et en Automatique, Keio University). All Rights Reserved. <http://www.w3.org/Consortium/Legal/>" (Hypertext is preferred, but a textual representation is permitted.)
3. *If it exists*, the STATUS of the W3C document.

When space permits, inclusion of the full text of this **NOTICE** should be provided. We request that authorship attribution be provided in any software, documents, or other items or products that you create pursuant to the implementation of the contents of this document, or any portion thereof.

No right to create modifications or derivatives of W3C documents is granted pursuant to this license. However, if additional requirements (documented in the Copyright FAQ) are satisfied, the right to create modifications or derivatives is sometimes granted by the W3C to individuals complying with those requirements.

THIS DOCUMENT IS PROVIDED "AS IS," AND COPYRIGHT HOLDERS MAKE NO REPRESENTATIONS OR WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, NON-INFRINGEMENT, OR TITLE; THAT THE CONTENTS OF THE DOCUMENT ARE SUITABLE FOR ANY PURPOSE; NOR THAT THE IMPLEMENTATION OF SUCH CONTENTS WILL NOT INFRINGE ANY THIRD PARTY PATENTS, COPYRIGHTS, TRADEMARKS OR OTHER RIGHTS.

COPYRIGHT HOLDERS WILL NOT BE LIABLE FOR ANY DIRECT, INDIRECT, SPECIAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF ANY USE OF THE DOCUMENT OR THE PERFORMANCE OR IMPLEMENTATION OF THE CONTENTS THEREOF.

The name and trademarks of copyright holders may NOT be used in advertising or publicity pertaining to this document or its contents without specific, written prior permission. Title to copyright in this document will at all times remain with copyright holders.

W3C Software Copyright Notice and License

Note: This section is a copy of the W3C Software Copyright Notice and License and could be found at <http://www.w3.org/Consortium/Legal/copyright-software-19980720>

Copyright © 1994-2001 World Wide Web Consortium, (Massachusetts Institute of Technology, Institut National de Recherche en Informatique et en Automatique, Keio University). All Rights Reserved.

<http://www.w3.org/Consortium/Legal/>

This W3C work (including software, documents, or other related items) is being provided by the copyright holders under the following license. By obtaining, using and/or copying this work, you (the licensee) agree that you have read, understood, and will comply with the following terms and conditions:

Permission to use, copy, and modify this software and its documentation, with or without modification, for any purpose and without fee or royalty is hereby granted, provided that you include the following on ALL copies of the software and documentation or portions thereof, including modifications, that you make:

1. The full text of this NOTICE in a location viewable to users of the redistributed or derivative work.
2. Any pre-existing intellectual property disclaimers. If none exist, then a notice of the following form: "Copyright © [Date-of-software] World Wide Web Consortium, (Massachusetts Institute of Technology, Institut National de Recherche en Informatique et en Automatique, Keio University). All Rights Reserved. <http://www.w3.org/Consortium/Legal/>."

3. Notice of any changes or modifications to the W3C files, including the date changes were made. (We recommend you provide URIs to the location from which the code is derived.)

THIS SOFTWARE AND DOCUMENTATION IS PROVIDED "AS IS," AND COPYRIGHT HOLDERS MAKE NO REPRESENTATIONS OR WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO, WARRANTIES OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE OR THAT THE USE OF THE SOFTWARE OR DOCUMENTATION WILL NOT INFRINGE ANY THIRD PARTY PATENTS, COPYRIGHTS, TRADEMARKS OR OTHER RIGHTS.

COPYRIGHT HOLDERS WILL NOT BE LIABLE FOR ANY DIRECT, INDIRECT, SPECIAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF ANY USE OF THE SOFTWARE OR DOCUMENTATION.

The name and trademarks of copyright holders may NOT be used in advertising or publicity pertaining to the software without specific, written prior permission. Title to copyright in this software and any associated documentation will at all times remain with copyright holders.

1. Content Models and Validation

Editors

Ben Chang, Oracle

Joe Kesselman, IBM

Rezaur Rahman, Intel Corporation

1.1. Overview

This chapter describes the optional DOM Level 3 *Content Model (CM)* feature. This module provides a representation for XML content models, e.g., DTDs and XML Schemas, together with operations on the content models, and how such information within the content models could be applied to XML documents used in both the document-editing and CM-editing worlds. It also provides additional tests for well-formedness of XML documents, including Namespace well-formedness. A DOM application can use the `hasFeature` method of the `DOMImplementation` interface to determine whether a given DOM supports these capabilities or not. One feature string for the CM-editing interfaces listed in this section is "CM-EDIT" and another feature string for document-editing interfaces is "CM-DOC".

This chapter interacts strongly with the *Load and Save* chapter, which is also under development in DOM Level 3. Not only will that code serialize/deserialize content models, but it may also wind up defining its well-formedness and validity checks in terms of what is defined in this chapter. In addition, the CM and Load/Save functional areas will share a common error-reporting mechanism allowing user-registered error callbacks. Note that this may not imply that the parser actually calls the DOM's validation code -- it may be able to achieve better performance via its own -- but the appearance to the user should probably be "as if" the DOM has been asked to validate the document, and parsers should probably be able to validate newly loaded documents in terms of a previously loaded DOM CM.

Finally, this chapter will have separate sections to address the needs of the document-editing and CM-editing worlds, along with a section that details overlapping areas such as validation. In this manner, the document-editing world's focuses on editing aspects and usage of information in the CM are made distinct from the CM-editing world's focuses on defining and manipulating the information in the CM.

1.1.1. General Characteristics

In the October 9, 1997 DOM requirements document, the following appeared: "There will be a way to determine the presence of a DTD. There will be a way to add, remove, and change declarations in the underlying DTD (if available). There will be a way to test conformance of all or part of the given document against a DTD (if available)." In later discussions, the following was added, "There will be a way to query element/attribute (and maybe other) declarations in the underlying DTD (if available)," supplementing the primitive support for these in Level 1.

That work was deferred past Level 2, in the hope that XML Schemas would be addressed as well. It is anticipated that lowest common denominator general APIs generated in this chapter can support both DTDs and XML Schemas, and other XML content models down the road.

The kinds of information that a Content Model must make available are mostly self-evident from the definitions of Infoset, DTDs, and XML Schemas. Note that some kinds of information on which the DOM already relies, e.g., default values for attributes, will finally be given a visible representation here, however.

1.1.2. Use Cases and Requirements

The content model referenced in these use cases/requirements is an abstraction and does not refer solely to DTDs or XML Schemas.

For the CM-editing and document-editing worlds, the following use cases and requirements are common to both and could be labeled as the "Validation and Other Common Functionality" section:

Use Cases:

1. CU1. Associating a content model (external and/or internal) with a document, or changing the current association.
2. CU2. Using the same external content model with several documents, without having to reload it.

Requirements:

1. CR1. Validate against the content model.
2. CR2. Retrieve information from content model.
3. CR3. Load an existing content model, perhaps independently from a document.
4. CR4. Being able to determine if a document has a content model associated with it.
5. CR5. Associate a CM with a document and make it the active CM.

Specific to the CM-editing world, the following are use cases and requirements and could be labeled as the "CM-editing" section:

Use Cases:

1. CMU1. Clone/map all or parts of an existing content model to a new or existing content model.
2. CMU2. Save a content model in a separate file. For example, if a DTD can be broken up into reusable pieces, which are then brought in via entity references, these can then be saved in a separate file. Note that the external subset of a DTD, which includes both an internal and external subset, is a special case of dividing a content model into entities.
3. CMU3. Modify an existing content model.
4. CMU4. Create a new content model.
5. CMU5. Partial content model checking. For example, the document need only be validated against a selected portion of the content model.

Requirements:

1. CMR1. View and modify all parts of the content model.
2. CMR2. Validate the content model itself.
3. CMR3. Serialize the content model.

4. CMR4. Clone all or parts of an existing content model.
5. CMR5. Create a new content model object.
6. CMR6. Validate portions of the XML document against the content model.

Specific to the document-editing world, the following are use cases and requirements and could be labeled as the "Document-editing" section:

Use Cases:

1. DU1. For editing documents with an associated content model, provide the guidance necessary so that valid documents can be modified and remain valid.
2. DU2. For editing documents with an associated content model, provide the guidance necessary to transform an invalid document into a valid one.

Requirements:

1. DR1. Be able to determine if the document is well-formed, and if not, be given enough guidance to locate the error.
2. DR2. Be able to determine if the document is namespace well-formed, and if not, be given enough guidance to locate the error.
3. DR3. Be able to determine if the document is valid with respect to its associated content model, and if not, give enough guidance to locate the error.
4. DR4. Be able to determine if specific modifications to a document would make it become invalid.
5. DR5. Retrieve information from all content models. One example might be getting a list of all the defined element names for document editing purposes.

General Issues:

1. I1. Some concerns exist regarding whether a single abstract Content Model structure can successfully represent both namespace-unaware, e.g., DTD, and namespace-aware, e.g., XML Schema, models of document's content. For example, when you ask what elements can be inserted in a specific place, the former will report the element's QName, e.g., `foo:bar`, whereas the latter will report its namespace and local name, e.g., `{http://my.namespace}bar`. We have added the `isNamespaceAware` attribute to the generic CM object to help applications determine which of these fields are important, but we are still analyzing this challenge.
2. I2. An XML document may be associated with multiple CMs. We have decided that only one of these is "active" (for validation and guidance) at a time. DOM applications may switch which CM is active, remove CMs that are no longer relevant, or add CMs to the list. If it becomes necessary to simultaneously consult more than one CM, it should be possible to write a "union" CM which provides that capability within this framework.
3. I3. Content model being able to handle more datatypes than strings. Currently, this functionality is not available and should be dealt with in the future.
4. I4. Round-trippability for include/ignore statements and other constructs such as parameter entities, e.g., "macro-like" constructs, will not be supported since no data representation exists to support these constructs without having to re-parse them.
5. I5. Basic interface for a common error handler for both CM and Load/Save. Agreement has been to utilize user-registered callbacks but other details to be worked out.

1.2. Content Model and CM-Editing Interfaces

A list of the proposed Content Model data structures and functions follow, starting off with the data structures and "CM-editing" methods.

Interface *CMMModel*

CMMModel is an abstract object that could map to a DTD, an XML Schema, a database schema, etc. It's a generalized content model object, that has both an internal and external subset. The internal subset would always exist, even if empty, with the external subset (if present) being represented as by an "active" *CMExternalModel* [p.16]. Many *CMExternalModels* could exist, but only one can be specified as "active"; it is also possible that none are "active". The issue of multiple content models is misleading since in this architecture, only one *CMMModel* exists, with an internal subset that references the external subset. If the external subset changes to another "active" *CMExternalModel*, the internal subset is "fixed up." The *CMMModel* also contains the factory methods needed to create a various types of *CMNodes* like *CMElementDeclaration* [p.20], *CMAttributeDeclaration* [p.23], etc.

IDL Definition

```
interface CMMModel : CMNode {
    readonly attribute boolean          isNamespaceAware;
    attribute CMElementDeclaration    rootElementDecl;
    DOMString                          getLocation();
    nsElement                          getCMNamespace();
    CMNamedNodeMap                    getCMNodes();
    boolean                            removeNode(in CMNode node);
    boolean                            insertBefore(in CMNode newNode,
                                                    in CMNode refNode);
    boolean                            validate();
    CMElementDeclaration createCMElementDeclaration(inout DOMString namespaceURI,
                                                    in DOMString qualifiedElementName,
                                                    in int contentSpec)
        raises(DOMException);
    CMAttributeDeclaration createCMAttributeDeclaration(inout DOMString namespaceURI,
                                                    in DOMString qualifiedName)
        raises(DOMException);
    CMNotationDeclaration createCMNotationDeclaration(in DOMString name,
                                                    in DOMString systemIdentifier,
                                                    inout DOMString publicIdentifier)
        raises(DOMException);
    CMEntityDeclaration createCMEntityDeclaration(in DOMString name)
        raises(DOMException);
    CMChildren          createCMChildren(in unsigned long minOccurs,
                                        in unsigned long maxOccurs,
                                        inout unsigned short operator)
        raises(DOMException);
};
```

Attributes

isNamespaceAware of type boolean, readonly

True if this content model defines the document structure in terms of namespaces and local names; false if the document structure is defined only in terms of QNames.

`rootElementDecl` of type `CMElementDeclaration` [p.20]

The root element declaration for the content model. Although a root element is specified in the document instance, when a content model is generated, a user should be able to chose the root element for editing purpose. This is just a placeholder for that element. It could also be null. For validating an XML document, root element must be defined in its active content model. `CMMModel.rootElementDecl` provides access to that root element declaration. This recommendation does not say how to fill in the `rootElementDecl`. It could be manually done by the user before validating a document, in some cases where possible, the `CMMModel` loader may be able to fill it in etc.

Methods

`createCMAttributeDeclaration`

Creates an attribute declaration. The returned object implements `CMAttributeDeclaration` interface.

Parameters

`namespaceURI` of type `DOMString`

`qualifiedName` of type `DOMString`

The name of the attribute being declared.

Return Value

<code>CMAttributeDeclaration</code> [p.23]	A new <code>CMAttributeDeclaration</code> object with <code>attributeName</code> attribute set to input <code>qualifiedname</code> parameter.
---	---

Exceptions

<code>DOMException</code>	<code>INVALID_CHARACTER_ERR</code> : Raised if the specified name contains an illegal character.
---------------------------	--

`createCMChildren`

Creates a new `CMChildren` object. The `subModels` of the `CMChildren` is build using `CMChildren` interface methods.

Parameters

`minOccurs` of type `unsigned long`

The minimum occurrence for the `subModels` of this `CMChildren`.

`maxOccurs` of type `unsigned long`

The maximum occurrence for the `subModels` of this `CMChildren`.

`operator` of type `unsigned short`

operator of type `CHOICE`, `SEQ` or `NONE`

Return Value

<code>CMChildren</code> [p.22]	A new <code>CMChildren</code> object.
--------------------------------	---------------------------------------

Exceptions

`DOMException` `INVALID_CHARACTER_ERR`: Raised if the specified name contains an illegal character.

`createCMElementDeclaration`

Creates an element declaration for the element type specified. The returned object implements `CMElementDeclaration` interface.

Parameters

`namespaceURI` of type `DOMString`

`qualifiedElementName` of type `DOMString`

The qualified name of the element type being declared.

`contentSpec` of type `int`

Constant for `MIXED`, `EMPTY`, `ANY` and `CHILDREN`.

Return Value

`CMElementDeclaration` [p.20] A new `CMElementDeclaration` object with `name` attribute set to `qualifiedElementName` and the `contentType` set to `contentSpec`. Other attributes of the element declaration are set through `CMElementDeclaration` interface methods.

Exceptions

`DOMException` `INVALID_CHARACTER_ERR`: Raised if the specified name contains an illegal character.

`DUPLICATE_NAME_ERR`: Raised if an element declaration already exists with the same name for a given `CMMModel`.

`createCMEntityDeclaration`

Creates a new entity declaration. The returned object implements `CMEntityDeclaration` interface.

Parameters

`name` of type `DOMString`

The name of the entity being declared.

Return Value

`CMEntityDeclaration` [p.24] A new `CMNotationDeclaration` object with `entityName` attribute set to `name`.

Exceptions

`DOMException` `INVALID_CHARACTER_ERR`: Raised if the specified name contains an illegal character.

`createCMNotationDeclaration`

Creates a new notation declaration. The returned object implements `CMNotationDeclaration` interface.

Parameters

`name` of type `DOMString`

The name of the notation being declared.

`systemIdentifier` of type `DOMString`

The system identifier for the notation declaration.

`publicIdentifier` of type `DOMString`

The public identifier for the notation declaration.

Return Value

`CMNotationDeclaration` [p.25] A new `CMNotationDeclaration` object with `notationName` attribute set to `name`.

Exceptions

`DOMException` `INVALID_CHARACTER_ERR`: Raised if the specified name contains an illegal character.

`DUPLICATE_NAME_ERR`: Raised if a notation declaration already exists with the same name for a given `CMMModel`.

`getCMNamespace`

Determines namespace of `CMMModel`.

Return Value

`nsElement` Namespace of `CMMModel`.

No Parameters

No Exceptions

`getCMNodes`

Returns `CMNode` [p.17] list of all the constituent nodes in the content model.

Return Value

`CMNamedNodeMap` [p.18] List of all `CMNodes` [p.17] of the content model.

No Parameters

No Exceptions

`getLocation`

Location of the document describing the content model defined in this `CMMModel`.

Return Value

`DOMString` This method returns a `DOMString` defining the absolute location from which this document is retrieved including the document name.

No Parameters

No Exceptions

`insertBefore`

Insert `CMNode` [p.17] .

Parameters

`newNode` of type `CMNode` [p.17]

`CMNode` to be inserted.

`refNode` of type `CMNode`

`CMNode` to be inserted before.

Return Value

`boolean` Success or failure..

No Exceptions

`removeNode`

Removes the specified `CMNode` [p.17] .

Parameters

`node` of type `CMNode` [p.17]

`CMNode` to be removed.

Return Value

`boolean` Success or failure..

No Exceptions

`validate`

Determines if a `CMMModel` and `CMExternalModel` itself is valid, i.e., confirming that it's well-formed and valid per its own formal grammar. Note that within a `CMMModel`, a pointer to a `CMExternalModel` can exist.

Return Value

`boolean` Is the CM valid?

No Parameters

No Exceptions

Interface *CMExternalModel*

`CMExternalModel` is an abstract object that could map to a DTD, an XML Schema, a database schema, etc. It's a generalized content model object that is not bound to a particular XML document.

IDL Definition


```
interface CMExternalModel : CMMModel {
};
```

Interface *CMNode*

CMNode is analogous to a *Node* in the Core DOM, e.g., an element declaration. This can exist for both *CMExternalModel* [p.16] and *CMMModel* [p.12]. It should be able to handle constructs such as comments and processing instructions.

Opaque.

IDL Definition

```
interface CMNode {
    const unsigned short    CM_ELEMENT_DECLARATION        = 1;
    const unsigned short    CM_ATTRIBUTE_DECLARATION      = 2;
    const unsigned short    CM_NOTATION_DECLARATION      = 3;
    const unsigned short    CM_ENTITY_DECLARATION        = 4;
    const unsigned short    CM_CHILDREN                  = 5;
    const unsigned short    CM_MODEL                      = 6;
    const unsigned short    CM_EXTERNALMODEL             = 7;
    readonly attribute unsigned short    cmNodeType;
    attribute CMMModel            ownerCMMModel;
    attribute DOMString           nodeName;
    attribute DOMString           prefix;
    attribute DOMString           localName;
    attribute DOMString           namespaceURI;
    CMNode                        clone();
};
```

Constant *CM_ELEMENT_DECLARATION*

The node is an *CMElementDeclaration* [p.20].

Constant *CM_ATTRIBUTE_DECLARATION*

The node is an *CMAttributeDeclaration* [p.23].

Constant *CM_NOTATION_DECLARATION*

The node is a *CMNotationDeclaration* [p.25].

Constant *CM_ENTITY_DECLARATION*

The node is an *CMEntityDeclaration* [p.24].

Constant *CM_CHILDREN*

The node is a *CMChildren* [p.22].

Constant *CM_MODEL*

The node is a *CMMModel* [p.12].

Constant *CM_EXTERNALMODEL*

The node is a *CMExternalModel* [p.16].

Attributes

cmNodeType of type unsigned short, readonly

A code representing the underlying object as defined above.

localName of type DOMString

Returns the local part of the qualified name of this *CMNode*.

namespaceURI of type DOMString

The namespace URI of this node, or null if it is unspecified.

nodeName of type DOMString

The qualified name of this CMNode depending on the CMNode type.

ownerCMMModel of type CMMModel [p.12]

The CMMModel [p.12] object associated with this CMNode. For a node of type CM_MODEL, this is null.

prefix of type DOMString

The namespace prefix of this node, or null if it is unspecified.

Methods

clone

Creates a copy of CMNode.

Return Value

CMNode [p.17] Cloned CMNode.

No Parameters

No Exceptions

Interface *CMNodeList*

CMNodeList is the CM analogue to NodeList; the document order is meaningful, as opposed to CMNamedNodeMap [p.18].

IDL Definition

```
interface CMNodeList {
};
```

Interface *CMNamedNodeMap*

CMNamedNodeMap is the CM analogue to NamedNodeMap. The order is not meaningful.

IDL Definition

```
interface CMNamedNodeMap {
};
```

Interface *CMDataType*

The primitive datatypes supported by base DOM CM implementation is: `string` type only.

IDL Definition

```
interface CMDataType {
  const short                    STRING_DATATYPE                    = 1;
  short                          getCMPrimitiveType();
};
```

Constant *STRING_DATATYPE*

code representing the `string` data type as defined in XML Schema Datatypes.

Methods

`getCMPrimitiveType`

Returns one of the enumerated code representing the primitive data type.

Return Value

`short` code representing the primitive type of the attached data item.

No Parameters**No Exceptions****Interface *CMPrimitiveType***

The primitive types supported by optional DOM CM implementations. A DOM application can use the `hasFeature` method of the `DOMImplementation` interface to determine whether this interface is supported or not. The feature string for all the interfaces listed in this section is "CMPTYPES" and the version is "3.0".

IDL Definition

```
interface CMPrimitiveType : CMDataType {
    const short    BOOLEAN_DATATYPE        = 2;
    const short    FLOAT_DATATYPE          = 3;
    const short    DOUBLE_DATATYPE         = 4;
    const short    DECIMAL_DATATYPE        = 5;
    const short    HEXBINARY_DATATYPE      = 6;
    const short    BASE64BINARY_DATATYPE   = 7;
    const short    ANYURI_DATATYPE         = 8;
    const short    QNAME_DATATYPE          = 9;
    const short    DURATION_DATATYPE       = 10;
    const short    DATETIME_DATATYPE       = 11;
    const short    DATE_DATATYPE           = 12;
    const short    TIME_DATATYPE           = 13;
    const short    YEARMONTH_DATATYPE      = 14;
    const short    YEAR_DATATYPE           = 15;
    const short    MONTHDAY_DATATYPE       = 16;
    const short    DAY_DATATYPE            = 17;
    const short    MONTH_DATATYPE          = 18;
    const short    NOTATION_DATATYPE       = 19;
    attribute decimal    lowValue;
    attribute decimal    highValue;
};
```

Constant *BOOLEAN_DATATYPE*

code representing the `boolean` data type as defined in XML Schema Datatypes.

Constant *FLOAT_DATATYPE*

code representing the `float` data type as defined in XML Schema Datatypes.

Constant *DOUBLE_DATATYPE*

code representing the `double` data type as defined in XML Schema Datatypes.

Constant *DECIMAL_DATATYPE*

code representing a `decimal` data type as defined in XML Schema Datatypes.

Constant *HEXBINARY_DATATYPE*

code representing a `hexbinary` data type as defined in XML Schema Datatypes.

Constant *BASE64BINARY_DATATYPE*

code representing a `base64binary` data type as defined in XML Schema Datatypes.

Constant *ANYURI_DATATYPE*

code representing an `uri` reference data type as defined in XML Schema Datatypes.

Note: `@@uriReference` is no longer part of the XML Schema PR draft.

Constant *QNAME_DATATYPE*

code representing an XML `qualified name` data type as defined in XML Schema Datatypes.

Constant *DURATION_DATATYPE*

code representing a `duration` data type as defined in XML Schema Datatypes.

Constant *DATETIME_DATATYPE*

code representing a `datetime` data type as defined in XML Schema Datatypes.

Constant *DATE_DATATYPE*

code representing a `date` data type as defined in XML Schema Datatypes.

Constant *TIME_DATATYPE*

code representing a `time` data type as defined in XML Schema Datatypes.

Constant *YEARMONTH_DATATYPE*

code representing a `yearmonth` data type as defined in XML Schema Datatypes.

Constant *YEAR_DATATYPE*

code representing a `year` data type as defined in XML Schema Datatypes.

Constant *MONTHDAY_DATATYPE*

code representing a `monthday` data type as defined in XML Schema Datatypes.

Constant *DAY_DATATYPE*

code representing a `day` data type as defined in XML Schema Datatypes.

Constant *MONTH_DATATYPE*

code representing a `month` data type as defined in XML Schema Datatypes.

Constant *NOTATION_DATATYPE*

code representing a `NOTATION` data type as defined in XML Schema Datatypes.

Attributes

`highValue` of type `decimal`

The high value for a primitive `DECIMAL_DATATYPE` in the value range.

`lowValue` of type `decimal`

The low value for a primitive `DECIMAL_DATATYPE` in the value range.

Interface *CMElementDeclaration*

The element name along with the content specification in the context of a `CMNode` [p.17] .

IDL Definition

```

interface CMElementDeclaration : CMNode {
    attribute CMDDataType      elementType;
    readonly attribute boolean isPCDataOnly;
    attribute DOMString       tagName;
    int                       getContent();
    CMChildren                getCMChildren();
    CMNamedNodeMap           getCMAttributes();
    CMNamedNodeMap           getCMGrandChildren();
};

```

Attributes

elementType of type CMDDataType [p.18]

Datatype of the element.

isPCDataOnly of type boolean, readonly

Boolean defining whether the element type contains child elements and PCDATA or PCDATA only for mixed element types. True if the element is of type PCDATA only. Relevant only for mixed content type elements.

tagName of type DOMString

tagName of the element being declared.

Methods

getCMAttributes

Returns a CMNamedNodeMap [p.18] containing CMAttributeDeclarations [p.23] for all the attributes that can appear on this type of element.

Return Value

CMNamedNodeMap [p.18] Attributes list for this CMNode [p.17] .

No Parameters**No Exceptions**

getCMChildren

Gets content model of element.

Return Value

CMChildren [p.22] Content model of element.

No Parameters**No Exceptions**

getCMGrandChildren

Returns a CMNamedNodeMap [p.18] containing CMElementDeclarations for all the Elements that can appear as children of this type of element. Note that which ones can actually appear, and in what order, is defined by the CMChildren [p.22] .

Return Value

CMNamedNodeMap [p.18] Children list for this CMNode [p.17] .

No Parameters**No Exceptions**

getContentTypes

Gets content type, e.g., empty, any, mixed, elements, PCDATA, of an element.

Return Value

int Content type constant.

No Parameters**No Exceptions****Interface CMChildren**

The content model of a declared element.

IDL Definition

```

interface CMChildren : CMNode {
    const unsigned long      UNBOUNDED          = MAX_LONG;
    const unsigned short    NONE                = 0;
    const unsigned short    SEQUENCE           = 1;
    const unsigned short    CHOICE             = 2;
        attribute unsigned short listOperator;
        attribute unsigned long  minOccurs;
        attribute unsigned long  maxOccurs;
        attribute CMNodeList     subModels;
    CMNode removeCMNode(in unsigned long nodeIndex);
    int    insertCMNode(in unsigned long nodeIndex,
                       in CMNode newNode);
    int    appendCMNode(in CMNode newNode);
};

```

Constant UNBOUNDED

Signifies unbounded upper limit. The MAX_LONG value is the maximum value of an unsigned long integer for a given language binding.

Constant NONE

No operators defined on the subModels. This is usually the case where the subModels contain a single element declaration.

Constant SEQUENCE

This constant value signifies a sequence operator ",".

Constant CHOICE

This constant value signifies a choice operator "|".

Attributes

listOperator of type unsigned short

One of CHOICE or SEQUENCE. The operator is applied to all the components(CMNodes) in the the subModels. For example, if the list operator is CHOICE and the components in subModels are a, b and c then the content model for the element being declared is (a|b|c)

maxOccurs of type unsigned long

maximum occurrence for this content particle. Valid values are from 0 to UNBOUNDED.

minOccurs of type unsigned long
 min occurrence for this content particle. Valid values are from 0 to UNBOUNDED.
 subModels of type CMNodeList [p.18]
 Additional CMNode [p.17] s in which the element can be defined.

Methods

appendCMNode
 Appends a new node to the end of the list representing the subModels.

Parameters

newNode of type CMNode [p.17]
 The new node to be appended.

Return Value

int the length of the subModels.

No Exceptions

insertCMNode
 Inserts a new node at a position in the submodel referred to by the nodeIndex. Node already existing in the list is moved as needed.

Parameters

nodeIndex of type unsigned long
 The position of where the newNode is inserted.
 newNode of type CMNode [p.17]
 The new node to be inserted.

Return Value

int The index value at which it is inserted. If the nodeIndex is outside the bound of the subModels list, the item is inserted at the back of the list.

No Exceptions

removeCMNode
 Removes the CMNode at the indicated index position in the submodel.

Parameters

nodeIndex of type unsigned long
 Index of the node being removed.

Return Value

CMNode [p.17] The node removed is returned as a result of this method call. The method returns null if the index is outside the bounds of the subModels list.

No Exceptions

Interface *CMAttributeDeclaration*

An attribute declaration in the context of a CMNode [p.17] .

IDL Definition

```
interface CMAttributeDeclaration : CMNode {
    const short          NO_VALUE_CONSTRAINT          = 0;
    const short          DEFAULT_VALUE_CONSTRAINT     = 1;
    const short          FIXED_VALUE_CONSTRAINT       = 2;
        attribute DOMString      attrName;
        attribute CMDataType     attrType;
        attribute DOMString      attributeValue;
        attribute DOMString      enumAttr;
        attribute CMNodeList     ownerElement;
        attribute short          constraintType;
};
```

Constant *NO_VALUE_CONSTRAINT*

Describes that the attribute does not have any value constraint.

Constant *DEFAULT_VALUE_CONSTRAINT*

Indicates that there is a default value constraint.

Constant *FIXED_VALUE_CONSTRAINT*

Indicates that there is a fixed value constraint for this attribute.

Attributes

attrName of type DOMString

Name of the attribute.

attrType of type CMDataType [p.18]

Datatype of the attribute.

attributeValue of type DOMString

Default value.

constraintType of type short

Constraint type if any for this attribute.

enumAttr of type DOMString

Enumeration of attribute.

ownerElement of type CMNodeList [p.18]

Owner element CMNode of attribute.

Interface *CMEntityDeclaration*

Models a general entity declaration in a content model.

(*ED*: The content model does not handle any parameter entity. It is assumed that the parameter entities are expanded by the implementation as the content model is built.)

IDL Definition


```

interface CMEntityDeclaration : CMNode {
    const short          INTERNAL_ENTITY          = 1;
    const short          EXTERNAL_ENTITY         = 2;
        attribute short      entityType;
        attribute DOMString  entityName;
        attribute DOMString  entityValue;
        attribute DOMString  systemId;
        attribute DOMString  publicId;
        attribute DOMString  notationName;
};

```

Constant *INTERNAL_ENTITY*

constant defining an internal entity.

Constant *EXTERNAL_ENTITY*

constant defining an external entity.

Attributes

entityName of type DOMString

The name of the declared general entity.

entityType of type short

One of the *INTERNAL_ENTITY* or *EXTERNAL_ENTITY*.

entityValue of type DOMString

The replacement text for the internal entity. The entity references within the replacement text is kept intact. For entity of type *EXTERNAL_ENTITY* this is null.

notationName of type DOMString

For unparsed entities, the name of the notation declaration for the entity. For parsed entities, this is null.

publicId of type DOMString

The public identifier associated with the entity, if specified. If the public identifier was not specified, this is null.

systemId of type DOMString

The system identifier associated with the entity, if specified. If the system identifier was not specified, this is null.

Interface *CMNotationDeclaration*

This interface represents a notation declaration.

IDL Definition

```

interface CMNotationDeclaration : CMNode {
    attribute DOMString  notationName;
    attribute DOMString  systemId;
    attribute DOMString  publicId;
};

```

Attributes

notationName of type DOMString

The name of this notation declaration.

publicId of type DOMString

The string representing the public identifier for this notation declaration.

systemId of type DOMString
 the URI representing the system identifier for the notation declaration, if present, null otherwise.

1.3. Validation and Other Interfaces

This section contains "Validation and Other" methods common to both the document-editing and CM-editing worlds (includes Document [p.26], DOMImplementation, and DOMErrorHandler [p.40] methods).

Interface *Document*

The setErrorHandler method is off of the Document interface.

IDL Definition

```
interface Document {
    void                setErrorHandler(in DOMErrorHandler handler);
};
```

Methods

setErrorHandler

Allow an application to register an error event handler.

Parameters

handler of type DOMErrorHandler [p.40]

The error handler

No Return Value

No Exceptions

Interface *DocumentCM*

This interface extends the Document [p.26] interface with additional methods for both document and CM editing.

IDL Definition

```
interface DocumentCM : Document {
    const short                WF_CHECK                = 1;
    const short                NS_WF_CHECK            = 2;
    const short                PARTIAL_VALIDITY_CHECK  = 3;
    const short                STRICT_VALIDITY_CHECK   = 4;
    attribute boolean          continuousValidityChecking;
    attribute short            wfValidityCheckLevel;
    int                        numCMs();
    CMMModel                  getInternalCM();
    CMNodeList                getCMs();
    CMMModel                  getActiveCM();
    void                       addCM(in CMMModel cm);
    void                       removeCM(in CMMModel cm);
    boolean                    activateCM(in CMMModel cm);
};
```

Constant *WF_CHECK*

Check for well-formedness of the document.

Constant *NS_WF_CHECK*

Check for namespace well-formedness includes *WF_CHECK*.

Constant *PARTIAL_VALIDITY_CHECK*

Checks for whether the document is partially valid. It includes *NS_WF_CHECK*.

A document is said to be *partially valid* if it contains elements/attributes for which an element/attribute declaration has not been made in the active content model. However, if the element or the attribute has a declaration in the content model, it must be valid with respect to those declarations.

Constant *STRICT_VALIDITY_CHECK*

Checks for strict validity of the document with respect to active CM which by definition includes *NS_WF_CHECK*.

Attributes

`continuousValidityChecking` of type `boolean`

An attribute specifying whether continuous checking for the validity of the document is enforced or not. When set to true the implementation is free to raise the `VALIDATION_ERR` exception on DOM operations that would make the document invalid with respect to "partial validity". This attribute is false by default.

(*ED*: Add `VALIDATION_ERR` code to the list of constants in `DOMException`.)

`wfValidityCheckLevel` of type `short`

This attribute defines the level at which the validity and wellformedness testing is done by the `isValid` method.

Methods

`activateCM`

Make the given `CModel` [p.12] active. Note that if a user wants to activate one CM to get default attribute values and then activate another to do validation, a user can do that; however, only one CM is active at a time. In case where an attribute is declared in an internal subset and corresponding `ownerElement` points to `CModelDeclaration` [p.20] defined in an external subset, changing active CM will cause the `ownerElement` to be re-computed. If the owner element is not defined in the newly active CM, the `ownerElement` will be an empty node list.

Parameters

`cm` of type `CModel` [p.12]

CM to be active for the document. The `CModel` points to a list of

`CExternalModel` [p.16] s; with this call, only the specified CM will be active.

Return Value

`boolean` True if the `CModel` has already been associated with the document using `addCM()`; false if not.

No Exceptions

`addCM`

Associate a `CModel` [p.12] with a document. Can be invoked multiple times to result in a list of `CExternalModel` [p.16] s. Note that only one sole internal `CModel` is associated with the document, however, and that only one of the possible list of

CMExternalModels is active at any one time.

Parameters

cm of type CModel [p.12]
 CM to be associated with the document.

No Return Value

No Exceptions

getActiveCM

Find the active CMExternalModel [p.16] for a document.

Return Value

CModel [p.12]	CModel with a pointer to the active CMExternalModel [p.16] of document.
------------------	--

No Parameters

No Exceptions

getCMs

Obtains list of CMNodes [p.17] of typeCM_EXTERNALMODELS associated with the document. This list arises when addCM() is invoked.

Return Value

CMNodeList [p.18]	A list of CMExternalModel [p.16] s associated with a document.
----------------------	---

No Parameters

No Exceptions

getInternalCM

Find the sole CModel [p.12] of a document. Only one CModel may be associated with the document.

Return Value

CModel [p.12]	CModel.
---------------	---------

No Parameters

No Exceptions

numCMs

Determines number of CMExternalModel [p.16] s associated with the document. Only one CModel [p.12] can be associated with the document, but it may point to a list of CMExternalModels.

Return Value

int	Non-negative number of external CM objects.
-----	---

No Parameters

No Exceptions

`removeCM`

Removes a CM associated with a document; actually removes a `CMExternalModel` [p.16] . Can be invoked multiple times to remove a number of these in the list of `CMExternalModels`.

Parameters

`cm` of type `CModel` [p.12]
 CM to be removed.

No Return Value

No Exceptions

Interface *DOMImplementationCM*

This interface extends the `DOMImplementation` interface with additional methods.

IDL Definition

```
interface DOMImplementationCM : DOMImplementation {
    CModel          createCM();
    CMExternalModel createExternalCM();
};
```

Methods

`createCM`

Creates a `CModel`.

Return Value

`CModel` [p.12] A NULL return indicates failure.

No Parameters

No Exceptions

`createExternalCM`

Creates a `CMExternalModel`.

Return Value

`CMExternalModel` [p.16] A NULL return indicates failure.

No Parameters

No Exceptions

1.4. Document-Editing Interfaces

This section contains "Document-editing" methods (includes `Node`, `Element`, `Text` and `Document` [p.26] methods).

Interface *NodeCM*

This interface extends the Node interface with additional methods for guided document editing.

IDL Definition

```
interface NodeCM : Node {
    boolean          canInsertBefore(in Node newChild,
                                     in Node refChild)
                                     raises(DOMException);
    boolean          canRemoveChild(in Node oldChild)
                                     raises(DOMException);
    boolean          canReplaceChild(in Node newChild,
                                     in Node oldChild)
                                     raises(DOMException);
    boolean          canAppendChild(in Node newChild)
                                     raises(DOMException);
    boolean          isValid()
                                     raises(DOMException);
};
```

Methods

canAppendChild
Has the same args as AppendChild.

Parameters

newChild of type Node
Node to be appended.

Return Value

boolean Success or failure.

Exceptions

DOMException DOMException.

canInsertBefore

Determines whether the Node::InsertBefore operation would make this document invalid with respect to the currently active CM. ISSUE: Describe "valid" when referring to partially completed documents.

Parameters

newChild of type Node
Node to be inserted.
refChild of type Node
Reference Node.

Return Value

boolean A boolean that is true if the Node::InsertBefore operation is allowed.

Exceptions

`DOMException` `DOMException`.

`canRemoveChild`

Has the same args as `RemoveChild`.

Parameters

`oldChild` of type `Node`

Node to be removed.

Return Value

`boolean` Success or failure.

Exceptions

`DOMException` `DOMException`.

`canReplaceChild`

Has the same args as `ReplaceChild`.

Parameters

`newChild` of type `Node`

New Node.

`oldChild` of type `Node`

Node to be replaced.

Return Value

`boolean` Success or failure.

Exceptions

`DOMException` `DOMException`.

`isValid`

Determines if the `Node` is valid relative to currently active CM.

Return Value

`boolean` True if the node is valid/well-formed in the current context and check level defined by `wfValidityCheckLevel`, false if not.

Exceptions

`DOMException` `NO_CM_AVAILABLE`: Exception is raised if the `DocumentCM` related to this node does not have any activeCM and `wfValidityCheckLevel` is set to `STRICT_VALIDITY_CHECK`.

No Parameters

Interface *ElementCM*

This interface extends the `Element` interface with additional methods for guided document editing.

IDL Definition

```
interface ElementCM : Element, NodeCM {
    int                contentType();
    CMElementDeclaration getElementDeclaration()
                                raises(DOMException);
    boolean            canSetAttribute(in DOMString attrname,
                                       in DOMString attrval);
    boolean            canSetAttributeNode(in Node node);
    boolean            canSetAttributeNodeNS(in Node node);
    boolean            canSetAttributeNS(in DOMString attrname,
                                       in DOMString attrval,
                                       in DOMString namespaceURI,
                                       in DOMString localName);
    boolean            canRemoveAttribute(in DOMString attrname);
    boolean            canRemoveAttributeNS(in DOMString attrname,
                                       inout DOMString namespaceURI);
    boolean            canRemoveAttributeNode(in Node node);
};
```

Methods

`canRemoveAttribute`

Verifies if an attribute by the given name can be removed.

Parameters

`attrname` of type `DOMString`
Name of attribute.

Return Value

`boolean` true or false.

No Exceptions

`canRemoveAttributeNS`

Verifies if an attribute by the given name and namespace can be removed.

Parameters

`attrname` of type `DOMString`
Qualified name of the attribute to be removed.
`namespaceURI` of type `DOMString`
The namespace URI of the attribute to remove.

Return Value

boolean true or false.

No Exceptions

canRemoveAttributeNode

Determines if an attribute node can be removed.

Parameters

node of type Node

The Attr node to remove from the attribute list.

Return Value

boolean true or false.

No Exceptions

canSetAttribute

Determines if the value for specified attribute can be set.

Parameters

attrname of type DOMString

Name of attribute.

attrval of type DOMString

Value to be assigned to the attribute.

Return Value

boolean true or false.

No Exceptions

canSetAttributeNS

Determines if the attribute with given namespace and local name can be created if not already present in the attribute list of the element. If the attribute with same local name and namespaceURI is already present in the elements attribute list it sets the value of the attribute and its prefix to the new value. See DOM core setAttributeNS.

Parameters

attrname of type DOMString

Name of attribute.

attrval of type DOMString

Value to be assigned to the attribute.

namespaceURI of type DOMString

namespaceURI of namespace.

localName of type DOMString

localName of namespace.

Return Value

boolean Success or failure.

No Exceptions

`canSetAttributeNode`

Determines if attribute node can be added.

Parameters

node of type `Node`

Node in which the attribute can possibly be set.

Return Value

`boolean` Success or failure.

No Exceptions

`canSetAttributeNodeNS`

Determines if the attribute node with the given namespace can be added.

Parameters

node of type `Node`

The `Attr` to be added to the attribute list.

Return Value

`boolean` Success or failure.

No Exceptions

`contentType`

Determines element content type.

Return Value

`int` Constant for mixed, empty, any, etc.

No Parameters

No Exceptions

`getElementDeclaration`

gets the CM editing object describing this element

Return Value

`CMElementDeclaration` [p.20] `CMElementDeclaration` object

Exceptions

`DOMException` If no DTD is present raises this exception

No Parameters

Interface *CharacterDataCM*

This interface extends the `CharacterData` interface with additional methods for document editing.

IDL Definition

```
interface CharacterDataCM : Text, NodeCM {
    boolean    isWhitespaceOnly();
    boolean    canSetData(in unsigned long offset,
                        in DOMString arg)
                raises(DOMException);
    boolean    canAppendData(in DOMString arg)
                raises(DOMException);
    boolean    canReplaceData(in unsigned long offset,
                            in unsigned long count,
                            in DOMString arg)
                raises(DOMException);
    boolean    canInsertData(in unsigned long offset,
                            in DOMString arg)
                raises(DOMException);
    boolean    canDeleteData(in unsigned long offset,
                            in DOMString arg)
                raises(DOMException);
};
```

Methods

`canAppendData`

Determines if data can be appended.

Parameters

arg of type `DOMString`

Argument to be appended.

Return Value

boolean Success or failure.

Exceptions

`DOMException` `DOMException`.

`canDeleteData`

Determines if data can be deleted.

Parameters

offset of type `unsigned long`

Offset.

arg of type `DOMString`

Argument to be set.

Return Value

boolean Success or failure.

Exceptions

DOMException DOMException.

canInsertData

Determines if data can be inserted.

Parameters

offset of type unsigned long
Offset.

arg of type DOMString
Argument to be set.

Return Value

boolean Success or failure.

Exceptions

DOMException DOMException.

canReplaceData

Determines if data can be replaced.

Parameters

offset of type unsigned long
Offset.

count of type unsigned long
Replacement.

arg of type DOMString
Argument to be set.

Return Value

boolean Success or failure.

Exceptions

DOMException DOMException.

canSetData

Determines if data can be set.

Parameters

offset of type unsigned long
Offset.

arg of type DOMString
Argument to be set.

Return Value

boolean Success or failure.

Exceptions

DOMException DOMException.

isWhitespaceOnly

Determines if content is only whitespace.

Return Value

boolean True if content only whitespace; false for non-whitespace if it is a text node in element content.

No Parameters

No Exceptions

Interface *DocumentTypeCM*

This interface extends the *DocumentType* interface with additional methods for document editing.

IDL Definition

```
interface DocumentTypeCM : DocumentType, NodeCM {
    boolean isElementDefined(in DOMString elemTypeName);
    boolean isElementDefinedNS(in DOMString elemTypeName,
                               in DOMString namespaceURI,
                               in DOMString localName);
    boolean isAttributeDefined(in DOMString elemTypeName,
                               in DOMString attrName);
    boolean isAttributeDefinedNS(in DOMString elemTypeName,
                                 in DOMString attrName,
                                 in DOMString namespaceURI,
                                 in DOMString localName);
    boolean isEntityDefined(in DOMString entName);
};
```

Methods

isAttributeDefined

Determines if this attribute is defined for this element in the currently active CM.

Parameters

elemTypeName of type DOMString

Name of the element.

attrName of type DOMString

Name of the attribute.

Return Value

boolean Success or failure.

No Exceptions

`isAttributeDefinedNS`

Determines if this attribute's namespace is defined in the currently active CM.

Parameters

`elemTypeName` of type `DOMString`

Name of element.

`attrName` of type `DOMString`

Name of attribute.

`namespaceURI` of type `DOMString`

namespaceURI of namespace.

`localName` of type `DOMString`

localName of namespace.

Return Value

`boolean` Success or failure.

No Exceptions

`isElementDefined`

Determines if this element is defined in the currently active CM.

Parameters

`elemTypeName` of type `DOMString`

Name of element.

Return Value

`boolean` Success or failure.

No Exceptions

`isElementDefinedNS`

Determines if this element's namespace is defined in the currently active CM.

Parameters

`elemTypeName` of type `DOMString`

Name of element.

`namespaceURI` of type `DOMString`

namespaceURI of namespace.

`localName` of type `DOMString`

localName of namespace.

Return Value

`boolean` Success or failure.

No Exceptions

`isEntityDefined`

Determines if an entity is defined in the document.

ISSUE: Should methods be added to the `DocumentTypeCM` for the complete list of defined elements and for a particular element type, the complete list of defined attributes.

These two methods might return a list of strings which is a type not yet described in the DOM spec.

Parameters

entName of type DOMString
 Name of entity.

Return Value

boolean Success or failure.

No Exceptions

Interface *AttributeCM*

This interface extends Attr to provide guided editing of an XML document.

IDL Definition

```
interface AttributeCM : Attr, NodeCM {
    CMAttributeDeclaration getAttributeDeclaration();
    CMNotationDeclaration getNotation()
                                raises(DOMException);
};
```

Methods

getAttributeDeclaration
 returns the corresponding attribute declaration in the content model.

Return Value

CMAttributeDeclaration [p.23]	The attribute declaration corresponding to this attribute
----------------------------------	---

No Parameters

No Exceptions

getNotation
 Returns the notation declaration for the attributes defined of type NOTATION.

Return Value

CMNotationDeclaration [p.25]	Returns the notation declaration for this attribute if the type is of notation type, null otherwise.
---------------------------------	--

Exceptions

DOMException	DOMException
--------------	--------------

No Parameters

1.5. DOM Error Handler Interfaces

This section contains DOM error handling interfaces.

Interface *DOMErrorHandler*

Basic interface for DOM error handlers. If an application needs to implement customized error handling for DOM such as CM or Load/Save, it must implement this interface and then register an instance using the `setErrorHandler` method. All errors and warnings will then be reported through this interface. Application writers can override the methods in a subclass to take user-specified actions.

IDL Definition

```
interface DOMErrorHandler {
    void          warning(in DOMLocator where,
                        in DOMString how,
                        in DOMString why)
                        raises(DOMSystemException);
    void          fatalError(in DOMLocator where,
                            in DOMString how,
                            in DOMString why)
                            raises(DOMSystemException);
    void          error(in DOMLocator where,
                      in DOMString how,
                      in DOMString why)
                      raises(DOMSystemException);
};
```

Methods

`error`

Receive notification of a recoverable error per section 1.2 of the W3C XML 1.0 recommendation. The default behavior if the user doesn't register a handler is to report conditions that are not fatal errors, and allow the calling application to continue processing.

Parameters

`where` of type `DOMLocator` [p.41]

Location of the error, which could be either a source position in the case of loading, or a node reference for later validation. The public ID and system ID for the error location could be some of the information.

`how` of type `DOMString`

How the error occurred.

`why` of type `DOMString`

Why the error occurred.

Exceptions

`DOMSystemException` A subclass of `DOMException`.

No Return Value

fatalError

Report a fatal, non-recoverable CM or Load/Save error per section 1.2 of the W3C XML 1.0 recommendation. The default behavior if the user doesn't register a handler is to throw a `DOMSystemException` and stop all further processing.

Parameters

`where` of type `DOMLocator` [p.41]

Location of the fatal error, which could be either a source position in the case of loading, or a node reference for later validation. The public ID and system ID for the error location could be some of the information.

`how` of type `DOMString`

How the fatal error occurred.

`why` of type `DOMString`

Why the fatal error occurred.

Exceptions

`DOMSystemException` A subclass of `DOMException`.

No Return Value**warning**

Receive notification of a warning per the W3C XML 1.0 recommendation. The default behavior if the user doesn't register a handler is to report conditions that are not errors or fatal errors, and then allow the calling application to continue even after invoking this method.

Parameters

`where` of type `DOMLocator` [p.41]

Location of the warning, which could be either a source position in the case of loading, or a node reference for later validation. The public ID and system ID for the error location could be some of the information.

`how` of type `DOMString`

How the warning occurred.

`why` of type `DOMString`

Why the warning occurred.

Exceptions

`DOMSystemException` A subclass of `DOMException`.

No Return Value**Interface *DOMLocator***

This interface provides document location information and is similar to a SAX locator object.

IDL Definition

```
interface DOMLocator {
    int         getColumnNumber();
    int         getLineNumber();
    DOMString   getPublicID();
    DOMString   getSystemID();
    Node        getNode();
};
```

Methods

getColumnNumber

Return the column number.

Return Value

int The column number, or -1 if none is available.

No Parameters**No Exceptions**

getLineNumber

Return the line number.

Return Value

int The line number, or -1 if none is available.

No Parameters**No Exceptions**

getNode

Return the Node.

Return Value

Node The NODE, or null if none is available.

No Parameters**No Exceptions**

getPublicID

Return the public identifier.

Return Value

DOMString A string containing the public identifier, or null if none is available.

No Parameters**No Exceptions**

getSystemID

Return the system identifier.

Return Value

`DOMString` A string containing the system identifier, or null if none is available.

No Parameters

No Exceptions

1.6. Editing and Generating a Content Model

Editing and generating a content model falls in the CM-editing world. The most obvious requirement for this set of requirements is for tools that author content models, either under user control, i.e., explicitly designed document types, or generated from other representations. The latter class includes transcoding tools, e.g., synthesizing an XML representation to match a database schema.

It's important to note here that a DTD's "internal subset" is part of the Content Model, yet is loaded, stored, and maintained as part of the individual document instance. This implies that even tools which do not want to let users change the definition of the Document Type may need to support editing operations upon this portion of the CM. It also means that our representation of the CM must be aware of where each portion of its content resides, so that when the serializer processes this document it can write out just the internal subset. A similar issue may arise with external parsed entities, or if schemas introduce the ability to reference other schemas. Finally, the internal-subset case suggests that we may want at least a two-level representation of content models, so a single DOM representation of a DTD can be shared among several documents, each potentially also having its own internal subset; it's possible that entity layering may be represented the same way.

The API for altering the content model may also be the CM's official interface with parsers. One of the ongoing problems in the DOM is that there is some information which must currently be created via completely undocumented mechanisms, which limits the ability to mix and match DOMs and parsers. Given that specialized DOMs are going to become more common (sub-classed, or wrappers around other kinds of storage, or optimized for specific tasks), we must avoid that situation and provide a "builder" API. Particular pairs of DOMs and parsers may bypass it, but it's required as a portability mechanism.

Note that several of these applications require that a CM be able to be created, loaded, and manipulated without/before being bound to a specific Document. A related issue is that we'd want to be able to share a single representation of a CM among several documents, both for storage efficiency and so that changes in the CM can quickly be tested by validating it against a set of known-good documents. Similarly, there is a known problem in DOM Level 2 where we assume that the `DocumentType` will be created before the Document, which is fine for newly-constructed documents but not a good match for the order in which an XML parser encounters this data; being able to "rebind" a Document to a new CM, after it has been created may be desirable.

As noted earlier, questions about whether one can alter the content of the CM via its syntax, via higher-level abstractions, or both, exist. It's also worth noting that many of the editing concepts from the Document tree still apply; users should probably be able to clone part of a CM, remove and re-insert parts, and so on.

1.7. Content Model-directed Document Manipulation

In addition to using the content model to validate a document instance, applications would like to be able to use it to guide construction and editing of documents, which falls into the document-editing world. Examples of this sort of guided editing already exist, and are becoming more common. The necessary queries can be phrased in several ways, the most useful of which may be a combination of "what does the DTD allow me to insert here" and "if I insert this here, will the document still be valid". The former is better suited to presentation to humans via a user interface, and when taken together with sub-tree validation may subsume the latter.

It has been proposed that in addition to asking questions about specific parts of the content model, there should be a reasonable way to obtain a list of all the defined symbols of a given type (element, attribute, entity) independent of whether they're valid in a given location; that might be useful in building a list in a user-interface, which could then be updated to reflect which of these are relevant for the program's current state.

Remember that namespaces also weigh in on this issue, in the case of attributes, a "can-this-go-there" may prompt a namespace-well-formedness check and warn you if you're about to conflict with or overwrite another attribute with the same namespaceURI/localName but different prefix... or same nodeName but different namespaceURI.

As mentioned above, we have to deal with the fact that the shortest distance between two valid documents may be through an invalid one. Users may want to know several levels of detail (all the possible children, those which would be valid given what precedes this point, those which would be valid given both preceding and following siblings). Also, once XML Schemas introduce context sensitive validity, we may have to consider the effect of children as well as the individual node being inserted.

1.8. Validating a Document Against a Content Model

The most obvious use for a content model (DTD or XML Schema or any Content Model) is to use it to validate that a given XML document is in fact a properly constructed instance of the document type described by this CM. This again falls into the document-editing world. The XML spec only discusses performing this test at the time the document is loaded into the "processor", which most of us have taken to mean that this check should be performed at parse time. But it is obviously desirable to be able to validate again a document -- or selected subtrees -- at other times. One such case would be validating an edited or newly constructed document before serializing it or otherwise passing it to other users. This issue also arises if the "internal subset" is altered -- or if the whole Content Model changes.

In the past, the DOM has allowed users to create invalid documents, and assumed the serializer would accept the task of detecting problems and announcing/repairing them when the document was written out in XML syntax... or that they would be checked for validity when read back in. We considered adding validity checks to the DOM's existing editing operations to prevent creation of invalid documents, but are currently inclined against this for several reasons. First, it would impose a significant amount of computational overhead to the DOM, which might be unnecessary in many situations, e.g., if the change is occurring in a context where we know the result will be valid. Second, "the shortest distance between two good documents may be through a bad document". Preventing a document from becoming temporarily

invalid may impose a considerable amount of additional work on higher-level code and users. Hence our current plan is to continue to permit editing to produce invalid DOMs, but provide operations which permit a user to check the validity of a node on demand.

Note that validation includes checking that ID attributes are unique, and that IDREFs point to IDs which actually exist.

1.9. Well-formedness Testing

XML defined the "well-formed" (*WF*) state for documents which are parsed without reference to their DTDs. Knowing that a document is well-formed may be useful by itself even when a DTD is available. For example, users may wish to deliberately save an invalid document, perhaps as a checkpoint before further editing. Hence, the CM feature will permit both full validity checking (see previous section) and "lightweight" WF checking, as requested by the caller, as well as processing entity declarations in the CM even if validation is not turned on. This falls within the document-editing world.

While the DOM inherently enforces some of XML's well-formedness conditions (proper nesting of elements, constraints on which children may be placed within each node), there are some checks that are not yet performed. These include:

- Character restrictions for text content and attribute values. Some characters aren't permitted even when expressed as numeric character entities
- The three-character sequence "]]>" in CDATASections.
- The two-character sequence "--" in comments. (Which, be it noted, some XML validators don't currently remember to test...)

In addition, Namespaces introduce their own concepts of well-formedness. Specifically:

- No two attributes on a single Element may have the same combination of namespaceURI and localName, even if their prefixes are different and hence they don't conflict under XML 1.0 rules.
- NamespaceURIs must be legal URI syntax. (Note that once we have this code, it may be reusable for the URI "datatype" in document content; see discussion of datatypes.)
- The mapping of namespace prefixes to their URIs must be declared and consistent. That isn't required during normal DOM operation, since we perform "early binding" and thereafter refer to nodes primarily via their namespaceURIs and localName. But it does become an issue when we want to serialize the DOM to XML syntax, and may be an issue if an application is assuming that all the declarations are present and correct. This may imply that we should provide a `namespaceNormalize` operation, which would create the implied declarations and reconcile conflicts in some reasonably standardized manner. This may be a major undertaking, since some DOMs may be using the namespace to direct subclassing of the nodes or similar special treatment; as with the existing `normalize` method, you may be left with a different-but-equivalent set of node objects.

In the past, the DOM has allowed users to create documents which violate these rules, and assumed the serializer would accept the task of detecting problems and announcing/repairing them when the document was written out in XML syntax. We considered adding WF checks to the DOM's existing editing operations to prevent WF violations from arising, but are currently inclined against this for two reasons.

First, it would impose a significant amount of computational overhead to the DOM, which might be unnecessary in many situations (for example, if the change is occurring in a context where we know the illegal characters have already been prevented from arising). Second, "the shortest distance between two good documents may be through a bad document" -- preventing a document from becoming temporarily ill-formed may impose a considerable amount of additional work on higher-level code and users. (Note possible issue for Serialization: In some applications, being able to save and reload marginally poorly-formed DOMs might be useful -- editor checkpoint files, for example.) Hence our current plan is to continue to permit editing to produce ill-formed DOMs, but provide operations which permit a user to check the well-formedness of a node on demand, and possibly provide some of the primitive (e.g., string-checking) functions directly.

2. Document Object Model Load and Save

Editors

Andy Heninger, IBM

2.1. Load and Save Requirements

DOM Level 3 will provide an API for loading XML source documents into a DOM representation and for saving a DOM representation as a XML document.

Some environments, such as the Java platform or COM, have their own ways to persist objects to streams and to restore them. There is no direct relationship between these mechanisms and the DOM load/save mechanism. This specification defines how to serialize documents only to and from XML format.

2.1.1. General Requirements

Requirements that apply to both loading and saving documents.

2.1.1.1. Document Sources

Documents must be able to be parsed from and saved to the following sources:

- Input and Output Streams
- URIs
- Files

Note that Input and Output streams take care of the in memory case. One point of caution is that a stream doesn't allow a base URI to be defined against which all relative URIs in the document are resolved.

2.1.1.2. Content Model Loading

While creating a new document using the DOM API, a mechanism must be provided to specify that the new document uses a pre-existing Content Model and to cause that Content Model to be loaded.

Note that while DOM Level 2 creation can specify a Content Model when creating a document (public and system IDs for the external subset, and a string for the subset), DOM Level 2 implementations do not process the Content Model's content. For DOM Level 3, the Content Model's content must be read.

2.1.1.3. Content Model Reuse

When processing a series of documents, all of which use the same Content Model, implementations should be able to reuse the already parsed and loaded Content Model rather than parsing it again for each new document.

This feature may not have an explicit DOM API associated with it, but it does require that nothing in this section, or the Content Model section, of this specification block it or make it difficult to implement.

2.1.1.4. Entity Resolution

Some means is required to allow applications to map public and system IDs to the correct document. This facility should provide sufficient capability to allow the implementation of catalogs, but providing catalogs themselves is not a requirement. In addition XML Base needs to be addressed.

2.1.1.5. Error Reporting

Loading a document can cause the generation of errors including:

- I/O Errors, such as the inability to find or open the specified document.
XML well formedness errors.
Validity errors

Saving a document can cause the generation of errors including:

- I/O Errors, such as the inability to write to a specified stream, URL, or file.
Improper constructs, such as '--' in comments, in the DOM that cannot be represented as well formed XML.

This section, as well as the DOM Level 3 Content Model section should use a common error reporting mechanism. Well-formedness and validity checking are in the domain of the Content Model section, even though they may be commonly generated in response to an application asking that a document be loaded.

2.1.2. Load Requirements

The following requirements apply to loading documents.

2.1.2.1. Parser Properties and Options

Parsers may have properties or options that can be set by applications. Examples include:

- Expansion of entity references.
- Creation of entity ref nodes.
- Handling of white space in element content.
- Enabling of namespace handling.
- Enabling of content model validation.

A mechanism to set properties, query the state of properties, and to query the set of properties supported by a particular DOM implementation is required.

2.1.3. XML Writer Requirements

The fundamental requirement is to write a DOM document as XML source. All information to be serialized should be available via the normal DOM API.

2.1.3.1. XML Writer Properties and Options

There are several options that can be defined when saving an XML document. Some of these are:

- Saving to Canonical XML format.
- Pretty Printing.
- Specify the encoding in which a document is written.
- How and when to use character entities.
- Namespace prefix handling.
- Saving of Content Models.
- Handling of external entities.

2.1.3.2. Content Model Saving

Requirement from the Content Model group.

2.1.4. Other Items Under Consideration

The following items are not committed to, but are under consideration. Public feedback on these items is especially requested.

2.1.4.1. Incremental and/or Concurrent Parsing

Provide the ability for a thread that requested the loading of a document to continue execution without blocking while the document is being loaded. This would require some sort of notification or completion event when the loading process was done.

Provide the ability to examine the partial DOM representation before it has been fully loaded.

In one form, a document may be loaded asynchronously while a DOM based application is accessing the document. In another form, the application may explicitly ask for the next incremental portion of a document to be loaded.

2.1.4.2. Filtered Save

Provide the capability to write out only a part of a document. May be able to leverage TreeWalkers, or the Filters associated with TreeWalkers, or Ranges as a means of specifying the portion of the document to be written.

2.1.4.3. Document Fragments

Document fragments, as specified by the XML Fragment specification, should be able to be loaded. This is useful to applications that only need to process some part of a large document. Because the DOM is typically implemented as an in-memory representation of a document, fully loading large documents can require large amounts of memory.

XPath should also be considered as a way to identify XML Document fragments to load.

2.1.4.4. Document Fragments in Context of Existing DOM

Document fragments, as specified by the XML Fragment specification, should be able to be loaded into the context of an existing document at a point specified by a node position, or perhaps a range. This is a separate feature than simply loading document fragments as a new Node.

2.2. Issue List

2.2.1. Open Issues

Issue LS-Issue-10:

Error Reporting. Loading will be reporting well-formedness and validation errors, just like CM. A common error reporting mechanism needs to be developed.

Issue LS-Issue-16:

Loading and saving of content models - DTDs or Schemas - outside of the context of a document is not addressed.

Issue LS-Issue-17:

Loading while validating using an already loaded content model is not addressed. Applications should be able to load a content model (issue 16), and then repeatedly reuse it during the loading of additional documents.

Issue LS-Issue-20:

Action from September f2f to "add issues raised by schema discussion. What were these?"

Issue LS-Issue-22:

What do the bindings for things like InputStream look like in ECMA Script? Tentative resolution - InputStream will map to a binding dependent class or interface. For environments where nothing appropriate exists, a new interface will be created. This question is still being discussed.

Issue LS-Issue-27:

How is validation during document loading handled when there are multiple possible content models associated with the document? How is one selected? The same question exists for documents in general, outside of the context of loading. Resolving the question for loading probably needs to wait until the more general question is understood.

Issue LS-Issue-32:

Mimetypes. If the input being parsed is from http or something else that supplies types, and the type is something other than text/xml, should we parse it anyhow, or should we complain. Should there be an option?

Tentative resolution: always parse, never complain. Reasons: 1. This is what all parsers do now, and no one has ever complained, at least not that I'm aware of. 2. Applications must have a pretty good

reason to suspect that they're getting xml or they wouldn't have invoked the parser. 3. All the test would do is to take something that might have worked (xml that is not known to the server) and turn it into an error. Non-xml is exceptionally unlikely to successfully parse (be well formed.)

Issue LS-Issue-34:

Features 2.1.4.1, 2 - XML Fragment Support. Should these be dropped? (Yes!)

Issue LS-Issue-35:

XPath based document load filter. It would be plausible to have a partial (filtered) document load based on selecting the portion of the document to load with an XPath expression. This facility could be in addition to the node-by-node filtering currently specified. Or we could drop the existing filter. Implementing an XPath based selective load would require that there be an XPath processor present in addition to the parser itself.

2.2.2. Resolved Issues

Issue LS-Issue-1:

Should these methods be in a new interface, or should they be added to the existing DOMImplementation Interface? I think that adding them to the existing interface is cleaner, because it helps avoid an explosion of new interfaces.

The methods are in a separate interface in this description for convenience in preparing the doc, so that I don't need to edit Core to add the methods. (The same argument could perhaps be made for implementations.)

Resolution: The methods are in a separate DOMImplementationLS interface. Because Load/Save is an optional module, we don't want to add its to the core DOMImplementation interface.

Issue LS-Issue-2:

SAX handles the setting of parser attributes differently. Rather than having distinct getters and setters for each attribute, it has a generic setter and getter of named properties, where properties are specified by a URL. This has an advantage in that implementations do not need to extend the interface when providing additional attributes.

If we choose to use strings, their syntax needs to be chosen. URIs would make sense, except for the fact that these are just names that do not refer to any resources. Dereferencing them would be meaningless. Yet the direction of the W3C is that all URIs must be dereferencable, and refer to something on the web.

Resolution: Use strings for properties. Use Java package name syntax for the identifying names. The question was revisited at the July f2f, with the same conclusion. But some discussion of using URLs continues.

This issue was revisited once again at the 9/2000 meeting. Now all DOM properties or features will be short, descriptive names, and we will recommend that all vendor-specific extensions be prefixed to avoid collisions, but will not make specific recommendations for the syntax of the prefix.

Issue LS-Issue-3:

It's not obvious what name to choose for the parser interface. Taking any of the names already in use by parser implementations would create problems when trying to support both the new API and the existing old API. That leaves out DocumentBuilder (Sun) and DOMParser (Xerces).

Resolution: This is issue really just a comment. The "resolution" is in the names appearing in the API.

Issue LS-Issue-4:

Question: should `ResolveEntity` pass a `baseURI` string back to the application, in addition to the `publicId`, `systemId`, and/or stream? Particularly in the case of an input stream.

Resolution: No. `Sax2` explicitly says that the system ID URI must be fully resolved before passing it out to the entity resolve. We will follow SAX's lead on this unless some additional use case surfaces. This is from the 9/2000 f2f, and reverses an earlier decision.

Issue LS-Issue-5:

When parsing a document that contains errors, should the whole document be decreed unusable, or should we say that portions prior to the point where the error was detected are OK?

Resolution: In the case of errors in the XML source, what, if any, document is returned is implementation dependent.

Issue LS-Issue-6:

The relationship between `SAXExceptions` and DOM exceptions seems confusing.

Resolution: This issue goes away because we are no longer using SAX. Any exceptions will be DOM Exceptions.

Issue LS-Issue-7:

Question: In the original Java definition, are the strings returned from the methods `SAXException.toString()` and `SAXException.getMessage()` always the same? If not, we need to add another attribute.

Resolution: No longer an issue because we are no longer using SAX.

Issue LS-Issue-8:

JAXP defines a mechanism, based on Java system properties, by which the Document Builder Factory locates the specific parser implementation to be used. This ability to redirect to different parsers is a key feature of JAXP. How this redirection works in the context of this design may be something that needs to be defined separately for each language binding.

This question was discussed at the July f2f, without resolution. Agreed that the feature is not critical to the rest of the API, and can be postponed.

Resolution: The issue is moving to core, where it is part of the bigger question of where does the DOM implementation come from, and how do multiple implementations coexist. Allowing separate, or mix-and-match, specification of the parser and the rest of the DOM is not generally practical because parsers generally have some degree of private knowledge about their DOMs.

Issue LS-Issue-9:

The use of interfaces from SAX2 raises some questions. The Java bindings for these interfaces need to be exactly the SAX2 definitions, including the original `org.xml.sax` package name.

The IDL presented here for these interfaces is an attempt to map the Java into IDL, but it will certainly not round-trip accurately - Java bindings generated from the IDL will not match the original Java.

The reasons for using the SAX interfaces are that they are well designed, widely implemented and used, and provide what is needed. Designing something new would create confusion for application developers (which should be used?) and make extra work for implementers of the DOM, most of whom probably already provide SAX, all for no real gain.

Resolution: Problem is gone. We are not using SAX2. The design will borrow features and concepts from SAX2 when it makes sense to do so.

Issue LS-Issue-11:

Another Error Reporting Question. We decided at the June f2f that validity errors should not be exceptions. This means that a document load operation could encounter multiple errors. Should these

be collected and delivered as some sort of collection at the (otherwise) successful completion of the load, or should there be some sort of callback? Callbacks are harder for applications to deal with.

Resolution: Provide a callback mechanism. Provide a default error handler that throws an exception and stops further processing. From July f2f.

Issue LS-Issue-12:

Definition of "Non-validating". Exactly how much processing is done by "non-validating" parsers is not fully defined by the XML specification. In particular, they are not required to read any external entities, but are not prohibited from doing so.

Another common user request: a mode that completely ignores DTDs, both and external. Such a parser would not conform to XML 1.0, however.

For the documents produced by a non-validating load to be the same, we need to tie down exactly what processing must be done. The XML Core WG also has question as an open issue .

Some discussion is at <http://lists.w3.org/Archives/Member/w3c-xml-core-wg/2000JanMar/0192.html>

Here is proposal: Have three classes of parsers

- Minimal. No external entities of any type are accessed. DTD subset is processed normally, as required by XML 1.0, including all entity definitions it contains.
- Non-Validating. All external entities are read. Does everything except validation.
- Validating. As defined by XML 1.0 rec.

Resolution: Use the options from SAX2. These provide separate flags for validation, reading of external general entities and reading of external parameter entities.

Issue LS-Issue-13:

Use of System or Language specific types for Input and Output

Loading and Saving requires that one of the possible sources or destinations of the XML data be some sort of stream that can be used with io streams or memory buffers, or anything else that might take or supply data. The type will vary, depending on the language binding.

The question is, what should be put into the IDL interfaces for these? Should we define an XML stream to abstract out the dependency, or use system classes directly in the bindings?

Resolution: Define IDL types for use in the rest of the interface definitions. These types will be mapped directly to system types for each language binding

Issue LS-Issue-14:

Should there be separate DOM modules for browser or scripting style loading

(`document.load("whatever")`) and server style parsers? It's probably easy for the server style parsers to implement the browser style interface, but the reverse may not be true.

Resolution: Yes. A client application style API will be provided.

Issue LS-Issue-15:

System Exceptions. Loading involves file opens and reads, and these can result in a variety of system errors that may already have associated system exceptions. Should these system exceptions pass through as is, or should they be some how wrapped in `DOMExceptions`, or should there be a parallel set `DOM Exceptions`, or what?

Resolution: Introduce a new `DOMSystemException` to standardize the reporting of common I/O errors across different DOM environments. Let it wrap an underlying system exception or error code when appropriate. To be defined in the common `ErrorReporting` module, to be shared with `ContentModel`.

Issue LS-Issue-18:

For the list of parser properties, which must all implementations recognize, which settings must all implementations support, and which are optional?

Resolution: Done

Issue LS-Issue-19:

DOMOutputStream: should this be an interface with methods, or just an opaque type that maps onto an appropriate binding-specific stream type?

If we specify an actual interface with methods, applications can implement it to wrap any arbitrary destination that they may have. If we go with the system type it's simpler to output to that type of stream, but harder otherwise.

Resolution: Opaque.

Issue LS-Issue-21:

Define exceptions. A `DOMSystemException` needs to be defined as part of the error handling module that is to be shared with CM. Common I/O type errors need to be defined for it, so that they can be reported in a uniform way. A way to embed errors or exceptions from the OS or language environment is needed, to provide full information to applications that want it.

Resolution: Duplicate of issue #15

Issue LS-Issue-23:

To Do: Add a method or methods to `DOMBuilder` that will provide information about a parser feature - is the name recognized, which (boolean) values are supported - without throwing exceptions.

Resolution: Done. Added `canSetFeature`.

Issue LS-Issue-24:

Clearly identify which of the parser properties must be recognized, and which of their settings must be supported by all conforming implementations.

Resolution: Done. All must be recognized.

Issue LS-Issue-25:

How does the validation property work in SAX, and how should it work for us? The default value in SAX2 is "true". Non-validating parsers only support a value of false. Does this mean that the default depends on the parser, or that some sort of an error happens if a parse is attempted before resetting the property, or what?

The same question applies to the External Entities properties too.

Resolution: Make the default value for the validation property be false.

Issue LS-Issue-26:

Do we want to rename the "auto-validation" property to "validate-if-cm"? Proposed at f2f. Resolution unclear.

Resolution: Changed the name to "validate-if-cm".

Issue LS-Issue-29:

Should all properties except namespaces default to false? Discussed at f2f. I'm not so sure now.

Some of the properties have somewhat non-standard behavior when false - leaving out ER nodes or whitespace, for example - and support of false will probably not even be required.

Resolution: Not all properties should default to false. But validation should.

Issue LS-Issue-28:

To do: add new parser property "createEntityNodes". default is true. Illegal for it to be false and createEntityReferenceNodes to be true.

Is this really what we want?

Resolution: new feature added.

Issue LS-Issue-30:

Possible additional parser features - option to not create CDATA nodes, and to merge CDATA

contents with adjacent TEXT nodes if they exist. Otherwise just create a TEXT node.

Option to omit Comments.

Resolution: new feature added.

Issue LS-Issue-31:

We now have an option for fixing up name space declarations and prefixes on serialization. Should we specify how this is done, so that the documents from different implementations of serialization will use the same declarations and prefixes, or should we leave the details up to the implementation?

Resolution: The exact form of the name space fixup is implementation dependent. The only requirement is that all elements and attributes end up with the correct name space URI.

Issue LS-Issue-33:

Unicode Character Normalization Problems. It turns out that for some code pages, normalizing a Unicode representation, translating to the code page, then translating back to Unicode can result in un-normalized Unicode. Mark Davis says that this can happen with Vietnamese and maybe with Hebrew.

This means that the suggested W3C model of normalization on serialization (early normalization) may not work, and that the receiver of the data may need to normalize it again, just in case.

Resolution: The scenario described is a quality-of-implementation issue. A transcoder converting from the one of the troublesome code pages to a Unicode representation should be responsible for re-normalizing the output.

2.3. Interfaces

This section defines an API for loading (parsing) XML source documents into a DOM representation and for saving (serializing) a DOM representation as an XML document.

The proposal for loading is influenced by Sun's JAXP API for XML Parsing in Java, <http://java.sun.com/xml/download.html>, and by SAX2, available at <http://www.megginson.com/SAX/index.html>

2.3.1. Interface Summary

Here is a list of each of the interfaces involved with the Loading and Saving XML documents.

- `DOMImplementationLS` [p.56] -- A new `DOMImplementation` interface that provides the factory methods for creating the objects required for loading and saving.
- `DOMBuilder` [p.56] -- A parser interface.
- `DOMInputSource` [p.62] -- Encapsulate information about the source of the XML to be loaded.
- `DOMEntityResolver` [p.63] -- During loading, provides a way for applications to redirect references to external entities.
- `DOMBuilderFilter` [p.65] -- Provide the ability to examine and optionally remove Element nodes as they are being processed during the parsing of a document.
- `DOMWriter` [p.66] -- An interface for writing out or serializing DOM documents.
- `DocumentLS` [p.70] -- Provides a client or browser style interface for loading and saving.
- `ParserErrorEvent` [p.71] -- `ParserErrorEvent` is the event that is fired if there's an error in the XML document being parsed using the methods of `DocumentLS`.

2.3.2. Interfaces

Interface *DOMImplementationLS*

`DOMImplementationLS` contains the factory methods for creating objects implementing the `DOMBuilder` [p.56] (parser) and `DOMWriter` [p.66] interfaces.

An object implementing `DOMImplementationLS` is obtained by casting from `DOMImplementation` to `DOMImplementationLS`, using the customary casting facilities from the programming language in use. Implementations supporting the Load and Save feature must implement the `DOMImplementationLS` interface on whatever object implements the `DOMImplementation` interface.

IDL Definition

```
interface DOMImplementationLS {
    DOMBuilder      createDOMBuilder();
    DOMWriter       createDOMWriter();
};
```

Methods

`createDOMBuilder`

Create a new `DOMBuilder` [p.56]. The newly constructed parser may then be configured by means of its `setFeature()` method, and used to parse documents by means of its `parse()` method.

Return Value

`DOMBuilder` [p.56] The newly created parser object.

No Parameters

No Exceptions

`createDOMWriter`

Create a new `DOMWriter` [p.66] object. `DOMWriters` are used to serialize a DOM tree back into source XML form.

Return Value

`DOMWriter` [p.66] The newly created `DOMWriter` object.

No Parameters

No Exceptions

Interface *DOMBuilder*

A parser interface.

`DOMBuilder` provides an API for parsing XML documents and building the corresponding DOM document tree. A `DOMBuilder` instance is obtained from the `DOMImplementationLS` [p.56] interface by invoking its `createDOMBuilder()` method.

DOMBuilders have a number of named properties that can be queried or set. Here is a list of properties that must be recognized by all implementations.

- **namespaces**
 true: perform Namespace processing.
 false: do not perform name space processing.
 default: true.
 supported values: true: required; false: optional
- **namespace-declarations**
 true: include namespace declarations (xmlns attributes) in the DOM document.
 false: discard all namespace declarations. In either case, namespace prefixes will be retained.
 default: true.
 supported values: true: required; false: optional
- **validation**
 true: report validation errors (setting true also will force the external-general-entities and external-parameter-entities properties to be set true.) Also note that the `validate-if-cm` feature will alter the validation behavior when this feature is set true.
 false: do not report validation errors.
 default: false.
 supported values: true: optional; false: required
- **external-general-entities**
 true: include all external general (text) entities.
 false: do not include external general entities.
 default: true.
 supported values: true: required; false: optional
- **external-parameter-entities**
 true: include all external parameter entities.
 false: do not include external parameter entities.
 default: true.
 supported values: true: required; false: optional
- **validate-if-cm**
 true: when both this feature and validation are true, enable validation only when the document being processed has a content model. Documents without content models are parsed without validation.
 false: the validation feature alone controls whether the document is checked for validity. Documents without content models are not valid.
 default: false.
 supported values: true: optional; false: required
- **create-entity-ref-nodes**
 true: create entity reference nodes in the DOM document. Setting this value true will also set `create-entity-nodes` to be true
 false: omit all entity reference nodes from the DOM document, putting the entity expansions directly in their place.
 default: true.
 supported values: true: required; false: optional
- **entity-nodes**

true: create entity nodes in the DOM document.

false: omit all entity nodes from the DOM document. Setting this value false will also set create-entity-ref-nodes false.

default: true.

supported values: true: required; false: optional

- **white-space-in-element-content**

true: include white space in element content in the DOM document. This is sometimes referred to as ignorable white space

false: omit said white space. Note that white space in element content will only be omitted if it can be identified as such, and not all parsers may be able to do so.

default: true.

supported values: true: required; false: optional

- **CDATA-nodes**

true: Create DOM CDATA nodes in response to the appearance of CDATA sections in the source XML.

false: Do not create CDATA nodes in the DOM document. The content of any CDATA sections in the source XML appears in the DOM as if it had been normal (non-CDATA) content. If a CDATA section is adjacent to other content, the combined content appears in a single TEXT node. The DOM Document produced by the DOMBuilder will not have adjacent TEXT nodes.

default: true

supported values: false: optional; true: required

- **comments**

true: Include XML comments in the DOM document

false: Discard XML comments, do not create Comment nodes in the DOM Document resulting from a parse.

default: true

supported values: false: required; true: required

- **charset-overrides-xml-encoding**

true: If a higher level protocol such as http provides an indication of the character encoding of the input stream being processed, that will override any encoding specified in the XML or TEXT declaration of the XML. Explicitly setting an encoding in the DOMInputSource overrides encodings from the protocol.

false: Any character set encoding information from higher level protocols is ignored by the parser.

default: true

supported values: false: required; true: required

IDL Definition

```
interface DOMBuilder {
    attribute DOMEntityResolver  entityResolver;
    attribute DOMErrorHandler    errorHandler;
    attribute DOMBuilderFilter   filter;
    void setFeature(in DOMString name,
                   in boolean state)
        raises(DOMException);
    boolean supportsFeature(in DOMString name);
    boolean canSetFeature(in DOMString name,
                          in boolean state);
}
```

```

boolean          getFeature(in DOMString name)
                    raises(DOMException);
Document         parseURI(in DOMString uri)
                    raises(DOMException,
                        DOMSystemException);
Document         parseDOMInputSource(in DOMInputSource is)
                    raises(DOMException,
                        DOMSystemException);
};

```

Attributes

`entityResolver` of type `DOMEntityResolver` [p.63]

If a `DOMEntityResolver` [p.63] has been specified, each time a reference to an external entity is encountered the `DOMBuilder` will pass the public and system IDs to the entity resolver, which can then specify the actual source of the entity.

`errorHandler` of type `DOMErrorHandler` [p.40]

In the event that an error is encountered in the XML document being parsed, the `DOMDocumentBuilder` will call back to the `errorHandler` with the error information.

Note: The `DOMErrorHandler` interface is being developed separately, in conjunction with the design of the content model and validation module.

`filter` of type `DOMBuilderFilter` [p.65]

When the application provides a filter, the parser will call out to the filter at the completion of the construction of each `Element` node. The filter implementation can choose to remove the element from the document being constructed or to terminate the parse early.

Methods

`canSetFeature`

query whether setting a feature is supported.

The feature name has the same form as a DOM `hasFeature` string.

It is possible for a `DOMBuilder` to recognize a feature name but to be unable to set its value.

Parameters

`name` of type `DOMString`

The feature name, which is a DOM `has-feature` style string.

`state` of type `boolean`

The requested state of the feature (true or false).

Return Value

`boolean` true if the feature could be successfully set to the specified value, or false if the feature is not recognized or the requested value is not supported. The value of the feature itself is not changed.

No Exceptions

`getFeature`

Look up the value of a feature.

The feature name has the same form as a DOM `hasFeature` string

Parameters

name of type `DOMString`

The feature name, which is a string with DOM has-feature syntax.

Return Value

`boolean` The current state of the feature (true or false).

Exceptions

`DOMException` Raise a `NOT_FOUND_ERR` When the `DOMBuilder` does not recognize the feature name.

`parseDOMInputSource`

Parse an XML document from a location identified by an `DOMInputSource` [p.62] .

Parameters

`is` of type `DOMInputSource` [p.62]

The `DOMInputSource` from which the source document is to be read.

Return Value

`Document` [p.26] The newly created and populated `Document`.

Exceptions

`DOMException` Exceptions raised by `parseDOMInputSource ()` originate with the installed `ErrorHandler`, and thus depend on the implementation of the `DOMErrorHandler` [p.40] interfaces. The default `ErrorHandlers` will raise a `DOMException` if any form of XML validation or well formedness error or warning occurs during the parse, but application defined `errorHandlers` are not required to do so.

`DOMSystemException` Exceptions raised by `parseDOMInputSource ()` originate with the installed `ErrorHandler`, and thus depend on the implementation of the `DOMErrorHandler` [p.40] interfaces. The default `ErrorHandlers` will raise a `DOMSystemException` if any form I/O or other system error occurs during the parse, but application defined `ErrorHandlers` are not required to do so.

`parseURI`

Parse an XML document from a location identified by an URI.

Parameters

uri of type DOMString

The location of the XML document to be read.

Return Value

Document [p.26] The newly created and populated Document.

Exceptions

DOMException Exceptions raised by `parseURI()` originate with the installed ErrorHandler, and thus depend on the implementation of the `DOMErrorHandler` [p.40] interfaces. The default error handlers will raise a `DOMException` if any form of XML validation or well formedness error or warning occurs during the parse, but application defined error handlers are not required to do so.

DOMSystemException Exceptions raised by `parseURI()` originate with the installed ErrorHandler, and thus depend on the implementation of the `DOMErrorHandler` [p.40] interfaces. The default error handlers will raise a `DOMSystemException` if any form I/O or other system error occurs during the parse, but application defined error handlers are not required to do so.

`setFeature`

Set the state of a feature.

The feature name has the same form as a DOM `hasFeature` string.

It is possible for a `DOMBuilder` to recognize a feature name but to be unable to set its value.

Parameters

name of type DOMString

The feature name, which is a DOM has-feature style string.

state of type boolean

The requested state of the feature (true or false).

Exceptions

DOMException Raise a `NOT_SUPPORTED_ERR` exception When the `DOMBuilder` recognizes the feature name but cannot set the requested value.

Raise a `NOT_FOUND_ERR` When the `DOMBuilder` does not recognize the feature name.

No Return Value

`supportsFeature`

query whether the `DOMBuilder` recognizes a feature name.

The feature name has the same form as a DOM `hasFeature` string.

It is possible for a `DOMBuilder` to recognize a feature name but to be unable to set its value. For example, a non-validating parser would recognize the feature "validation", would report that its value was false, and would raise an exception if an attempt was made to enable validation by setting the feature to true.

Parameters

name of type `DOMString`

The feature name, which has the same syntax as a DOM has-feature string.

Return Value

`boolean` true if the feature name is recognized by the `DOMBuilder`. False if the feature name is not recognized.

No Exceptions**Interface *DOMInputSource***

This interface represents a single input source for an XML entity.

This interface allows an application to encapsulate information about an input source in a single object, which may include a public identifier, a system identifier, a byte stream (possibly with a specified encoding), and/or a character stream.

The exact definitions of a byte stream and a character stream are binding dependent.

There are two places that the application will deliver this input source to the parser: as the argument to the `parseDOMInputSource` method, or as the return value of the `DOMEntityResolver.resolveEntity` [p.64] method.

The `DOMBuilder` [p.56] will use the `DOMInputSource` object to determine how to read XML input. If there is a character stream available, the parser will read that stream directly; if not, the parser will use a byte stream, if available; if neither a character stream nor a byte stream is available, the parser will attempt to open a URI connection to the resource identified by the system identifier.

An `DOMInputSource` object belongs to the application: the parser shall never modify it in any way (it may modify a copy if necessary).

IDL Definition

```
interface DOMInputSource {
    attribute DOMInputStream  byteStream;
    attribute DOMReader       characterStream;
    attribute DOMString       encoding;
    attribute DOMString       publicId;
    attribute DOMString       systemId;
};
```

Attributes

`byteStream` of type `DOMInputStream`

An attribute of a language-binding dependent type that represents a stream of bytes.

The parser will ignore this if there is also a character stream specified, but it will use a byte stream in preference to opening a URI connection itself.

If the application knows the character encoding of the byte stream, it should set the encoding property. Setting the encoding in this way will override any encoding specified in the XML declaration itself.

`characterStream` of type `DOMReader`

An attribute of a language-binding dependent type that represents a stream of 16 bit values (utf-16 encoded characters).

If a character stream is specified, the parser will ignore any byte stream and will not attempt to open a URI connection to the system identifier.

`encoding` of type `DOMString`

The character encoding, if known. The encoding must be a string acceptable for an XML encoding declaration (see section 4.3.3 of the XML 1.0 recommendation).

This attribute has no effect when the application provides a character stream. For other sources of input, an encoding specified by means of this attribute will override any encoding specified in the XML or text declaration of the XML, or an encoding obtained from a higher level protocol, such as http.

`publicId` of type `DOMString`

The public identifier for this input source. The public identifier is always optional: if the application writer includes one, it will be provided as part of the location information.

`systemId` of type `DOMString`

The system identifier for this input source. The system identifier is optional if there is a byte stream or a character stream, but it is still useful to provide one, since the application can use it to resolve relative URIs and can include it in error messages and warnings (the parser will attempt to open a connection to the URI only if there is no byte stream or character stream specified).

If the application knows the character encoding of the object pointed to by the system identifier, it can register the encoding by setting the encoding attribute.

If the system ID is a URL, it must be fully resolved.

Interface *DOMEntityResolver*

`DOMEntityResolver` Provides a way for applications to redirect references to external entities.

Applications needing to implement customized handling for external entities must implement this interface and register their implementation by setting the `entityResolver` property of the `DOMBuilder` [p.56] .

The `DOMBuilder` [p.56] will then allow the application to intercept any external entities (including the external DTD subset and external parameter entities) before including them.

Many DOM applications will not need to implement this interface, but it will be especially useful for applications that build XML documents from databases or other specialized input sources, or for applications that use URI types other than URLs.

DOMEntityResolver is based on the SAX2 EntityResolver interface, described at <http://www.megginson.com/SAX/Java/javadoc/org/xml/sax/EntityResolver.html>

IDL Definition

```
interface DOMEntityResolver {
    DOMInputSource    resolveEntity(in DOMString publicId,
                                   in DOMString systemId )
                                   raises(DOMSystemException);
};
```

Methods

`resolveEntity`

Allow the application to resolve external entities.

The `DOMBuilder` [p.56] will call this method before opening any external entity except the top-level document entity (including the external DTD subset, external entities referenced within the DTD, and external entities referenced within the document element); the application may request that the `DOMBuilder` resolve the entity itself, that it use an alternative URI, or that it use an entirely different input source.

Application writers can use this method to redirect external system identifiers to secure and/or local URIs, to look up public identifiers in a catalogue, or to read an entity from a database or other input source (including, for example, a dialog box).

If the system identifier is a URL, the `DOMBuilder` [p.56] must resolve it fully before reporting it to the application through this interface.

Note: See issue #4. An alternative would be to pass the URL out without resolving it, and to provide a base as an additional parameter. SAX resolves URLs first, and does not provide a base.

Parameters

`publicId` of type `DOMString`

The public identifier of the external entity being referenced, or null if none was supplied.

`systemId` of type `DOMString`

The system identifier of the external entity being referenced.

Return Value

`DOMInputSource`
[p.62]

A `DOMInputSource` object describing the new input source, or null to request that the parser open a regular URI connection to the system identifier.

Exceptions

`DOMSystemException`

Any `DOMSystemException`, possibly wrapping another exception.

Interface *DOMBuilderFilter*

`DOMBuilderFilter`s provide applications the ability to examine `Element` nodes as they are being constructed during a parse. As each element is examined, it may be modified or removed, or the entire parse may be terminated early.

At the time any of the filter methods are called by the parser, the owner `Document` and `DOMImplementation` objects exist and are accessible.

All validity checking while reading a document occurs on the source document as it appears on the input stream, not on the DOM document as it is built in memory. With filters, the document in memory may be a subset of the document on the stream, and its validity may have been affected by the filtering.

IDL Definition

```
interface DOMBuilderFilter {
    boolean      startElement(in Element element);
    boolean      endElement(in Element element);
};
```

Methods**endElement**

This method will be called by the parser at the completion of the parse of each element. The element node will exist and be complete, as will all of its children, and their children, recursively. The element's parent node will also exist, although that node may be incomplete, as it may have additional children that have not yet been parsed. From within this method, the new node may be freely modified - children may be added or removed, text nodes modified, etc. This node may also be removed from its parent node, which will prevent it from appearing in the final document at the completion of the parse. Aside from this one operation on the node's parent, the state of the rest of the document outside of this node is not defined, and the affect of any attempt to navigate to or modify any other part of the document is undefined.

For validating parsers, the checks are made on the original document, before any modification by the filter. No validity checks are made on any document modifications made by the filter.

Parameters

`element` of type `Element`

The newly constructed element. At the time this method is called, the element is complete - it has all of its children (and their children, recursively) and attributes, and is attached as a child to its parent.

Return Value

`boolean` return true

No Exceptions

`startElement`

This method will be called by the parser after each Element start tag has been scanned, but before the remainder of the Element is processed. The intent is to allow the element, including any children, to be efficiently skipped.

The element node passed to `startElement` for filtering will include all of the Element's attributes, but none of the children nodes. The Element may not yet be in place in the document being constructed (it may not have a parent node.)

A StartElement filter function may access or change the attributes for the Element. Changing Namespace declarations will have no effect on name space resolution by the parser.

For efficiency, the Element node passed to the filter may not be the same one as is actually placed in the tree if the node is accepted. And the actual node (node object identity) may be reused during the process of reading in and filtering a document.

Parameters

element of type Element

The newly encountered element. At the time this method is called, the element is incomplete - it will have its attributes, but no children.

Return Value

`boolean` return true if this Element should be included in the DOM document being built. Return false if the Element and all of its children should be skipped.

No Exceptions**Interface *DOMWriter***

DOMWriter provides an API for serializing (writing) a DOM document out in the form of a source XML document. The XML data is written to an output stream, the type of which depends on the specific language bindings in use.

Three options are available for the general appearance of the formatted output: As-is, canonical and reformatted.

- As-is formatting leaves all "white space in element content" and new-lines unchanged. If the DOM document originated as XML source, and if all white space was retained, this option will come the closest to recovering the format of the original document. (There may still be differences due to normalization of attribute values and new-line characters or the handling of character references.)
- Canonical formatting writes the document according to the rules specified by W3C Canonical XML Version 1.0. <http://www.w3.org/TR/xml-c14n>
- Reformatted output has white space and newlines adjusted to produce a pretty-printed, indented, human-readable form. The exact form of the transformations is not specified.

DOMWriter accepts any node type for serialization. For nodes of type Document [p.26] or Entity, well formed XML will be created. The serialized output for these node types is either as a Document or an External Entity, respectively, and is acceptable input for an XML parser. For all

other types of nodes the serialized form is not specified, but should be something useful to a human for debugging or diagnostic purposes. Note: rigorously designing an external (source) form for stand-alone node types that don't already have one defined by the XML rec seems a bit much to take on here.

Within a Document or Entity being serialized, Nodes are processed as follows

- Documents are written including an XML declaration and a DTD subset, if one exists in the DOM. Writing a document node serializes the entire document.
- Entity nodes, when written directly by `DOMWriter.writeNode()`, output a Text Decl and the entity expansion. The resulting output will be valid as an external entity. No output is generated for any entity nodes when writing a Document [p.26] .
- Entity References nodes are serializes as an entity reference of the form "`&entityName;`" in the output. Child nodes (the expansion) of the entity reference are ignored.
- CDATA sections containing content characters that can not be represented in the specified output encoding are handled according to the "split-cdata-sections" option. If the option is true, CDATA sections are split, and the unrepresentable characters are serialized as numeric character references in ordinary content. The exact position and number of splits is not specified. If the option is false, unrepresentable characters in a CDATA section are reported as errors. The error is not recoverable - there is no mechanism for supplying alternative characters and continuing with the serialization.
- All other node types (Element, Text, etc.) are serialized to their corresponding XML source form.

Within the character data of a document (outside of markup), any characters that cannot be represented directly are replaced with character references. Occurrences of '`<`' and '`&`' are replaced by the predefined entities `<` and `&`. The other predefined entities (`>`, `'`, etc.) are not used; these characters can be included directly. Any character that can not be represented directly in the output character encoding is serialized as a numeric character reference.

Attributes not containing quotes are serialized in quotes. Attributes containing quotes but no apostrophes are serialized in apostrophes (single quotes). Attributes containing both forms of quotes are serialized in quotes, with quotes within the value represented by the predefined entity `"`. Any character that can not be represented directly in the output character encoding is serialized as a numeric character reference.

Within markup, but outside of attributes, any occurrence of a character that cannot be represented in the output character encoding is reported as an error. An example would be serializing the element `<LaCañada/>` with the encoding=`US-ASCII`

Unicode Character Normalization. When requested by setting the `normalizeCharacters` option on `DOMWriter`, all data to be serialized, both markup and character data, is normalized according to the rules defined by Unicode Canonical Composition, Normalization Form C. The normalization process affects only the data as it is being written; it does not alter the DOM's view of the document after serialization has completed. The W3C character model and normalization are described at <http://www.w3.org/TR/charmod/#TextNormalization>. Unicode normalization forms are described at

<http://www.unicode.org/unicode/reports/tr15/>

Name space checking and fixup during serialization is a user option. When the option is selected, the serialization process will verify that name space declarations, name space prefixes and the name space URIs associated with Elements and Attributes are consistent. If inconsistencies are found, the serialized form of the document will be altered to remove them. The exact form of the alterations are not defined, and are implementation dependent.

Any changes made affect only the name space prefixes and declarations appearing in the serialized data. The DOM's view of the document is not altered by the serialization operation, and does not reflect any changes made to name space declarations or prefixes in the serialized output.

DOMWriters have a number of named properties that can be queried or set. Here is a list of properties that must be recognized by all implementations.

- **normalizeCharacters**
 true: Perform Unicode Normalization of the characters in document as they are written out. Only the characters being written are (potentially) altered. The DOM document itself is unchanged.
 false: do not perform character normalization.
 default: true.
 supported values: true: required; false: required.
- **namespaceFixup**
 true: Check namespace declarations and prefixes for consistency, and fix them in the serialized data if they are inconsistent.
 false: Perform no special checks on name space declarations, prefixes or URIs.
 default: true;
 supported values: true: required; false: required.
- **split-cdata-sections**
 true: Split CDATA sections containing characters that can not be represented in the output encoding, and output the characters using numeric character references.
 false: Signal an error if a CDATA section contains an unrepresentable character.
 supported values: true: required; false: required.

IDL Definition

```
interface DOMWriter {
    attribute DOMString      encoding;
    readonly attribute DOMString lastEncoding;
    attribute unsigned short format;
    // Modified in DOM Level 3:
    attribute DOMString      newLine;
    void writeNode(in DOMOutputStream destination,
                  in Node node)
                raises(DOMSystemException);
};
```

Attributes

encoding of type `DOMString`

The character encoding in which the output will be written.

The encoding to use when writing is determined as follows:

- If the encoding attribute has been set, that value will be used.
- If the encoding attribute is null or empty, but the item to be written includes an encoding declaration, that value will be used.
- If neither of the above provides an encoding name, a default encoding of "utf-8" will be used.

The default value is null.

format of type `unsigned short`

As-is, canonical or reformatted. *Need to add constants for these.*

The default value is as-is.

lastEncoding of type `DOMString`, `readonly`

The actual character encoding that was last used by this formatter. This convenience method allows the encoding that was used when serializing a document to be directly obtained.

newLine of type `DOMString`, modified in **DOM Level 3**

The end-of-line character(s) to be used in the XML being written out. The only permitted values are these:

- null: Use a default end-of-line sequence. DOM implementations should choose the default to match the usual convention for text files in the environment being used. Implementations must choose a default sequence that matches one of those allowed by the XML Recommendation, <http://www.w3.org/TR/REC-xml#sec-line-ends>
- CR
- CR-LF
- LF

The default value for this attribute is null.

Methods

`writeNode`

Write out the specified node as described above in the description of `DOMWriter`. Writing a Document or Entity node produces a serialized form that is well formed XML. Writing other node types produces a fragment of text in a form that is not fully defined by this document, but that should be useful to a human for debugging or diagnostic purposes.

Parameters

destination of type `DOMOutputStream`

The destination for the data to be written.

node of type `Node`

The Document [p.26] or Entity node to be written. For other node types, something sensible should be written, but the exact serialized form is not specified.

Exceptions

- | | |
|---------------------------------|---|
| <code>DOMSystemException</code> | This exception will be raised in response to any sort of IO or system error that occurs while writing to the destination. It may wrap an underlying system exception. |
|---------------------------------|---|

No Return Value**Interface *DocumentLS***

The DocumentLS interface provides a mechanism by which the content of a document can be replaced with the DOM tree produced when loading a URL, or parsing a string. The expectation is that an instance of the DocumentLS interface can be obtained by using binding-specific casting methods on an instance of the Document interface.

IDL Definition

```
interface DocumentLS {
    attribute boolean        async;
    void                    abort();
    boolean                 load(in DOMString url);
    boolean                 loadXML(in DOMString source);
    DOMString               saveXML(in Node node)
                                raises(DOMException);
};
```

Attributes

async of type boolean

Indicates whether the method load should be synchronous or asynchronous. When the async attribute is set to true the load method returns control to the caller before the document has completed loading. The default value of this property is true.

Setting the value of this attribute might throw NOT_SUPPORTED_ERR if the implementation doesn't support the mode the attribute is being set to.

<< ISSUE >> Should the DOM spec define the default value of this property? What if implementing both async and sync IO is impractical in some systems?

Methods

abort

If the document is currently being loaded as a result of the method load() being invoked the loading and parsing is immediately aborted. The possibly partial result of parsing the document is discarded and the document is cleared.

No Parameters

No Return Value

No Exceptions

load

Replaces the content of the document with the result of parsing the given URL. Invoking this method will either block the caller or return to the caller immediately depending on the value of the async attribute. Once the document is fully loaded the document will fire a "load" event that the caller can register as a listener for. If an error occurs the document will fire an "error" event so that the caller knows that the load failed (see `ParserErrorEvent` [p.71]).

Parameters

url of type DOMString

The URL for the XML file to be loaded.

Return Value

`boolean` If `async` is set to `true` `load()` returns `true` if the document load was successfully initiated. If an error occurred when initiating the document load `load()` returns `false`.
 If `async` is set to `false` `load()` returns `true` if the document was successfully loaded and parsed. If an error occurred when either loading or parsing the URL `load()` returns `false`.

No Exceptions`loadXML`

Replace the content of the document with the result of parsing the input string, this method is always synchronous.

Parameters

source of type `DOMString`

A string containing an XML document.

Return Value

`boolean` True if parsing the input string succeeded without errors, otherwise `false`.

No Exceptions`saveXML`

Save the document or the given node to a string (i.e. serialize the document or node).

Parameters

node of type `Node`

Specifies what to serialize, if this parameter is `null` the whole document is serialized, if it's non-`null` the given node is serialized.

Return Value

`DOMString` The serialized document or node.

Exceptions

`DOMException` `DOMException WRONG_DOCUMENT_ERR`: Raised if the node passed in as the node parameter is from an other document.

Interface *ParserErrorEvent*

`ParserErrorEvent` is the event that is fired if there's an error in the XML document being parsed.

IDL Definition

```

interface ParserErrorEvent {
    readonly attribute long          errorCode;
    readonly attribute long          filepos;
    readonly attribute long          line;
    readonly attribute long          linepos;
    readonly attribute DOMString     reason;
    readonly attribute DOMString     srcText;
    readonly attribute DOMString     url;
};

```

Attributes

`errorCode` of type `long`, `readonly`

An non-zero implementation dependent error code describing the error, or 0 if there is no error.

`filepos` of type `long`, `readonly`

The byte position in the file where the error occurred.

`line` of type `long`, `readonly`

The line number where the error occurred.

`linepos` of type `long`, `readonly`

The number of the character on the line where the error occurred.

`reason` of type `DOMString`, `readonly`

An implementation dependent string describing the error, or an empty string if there was no error.

`srcText` of type `DOMString`, `readonly`

The source of the line where the error occurred if available.

`url` of type `DOMString`, `readonly`

The normalized URL of the document where the error occurred.

Appendix A: IDL Definitions

This appendix contains the complete OMG IDL [OMGIDL] for the Level 3 Document Object Model Content Model and Load and Save definitions.

The IDL files are also available as:

<http://www.w3.org/TR/2001/WD-DOM-Level-3-CMLS-20010419/idl.zip>

content-models.idl:

```
// File: content-models.idl

#ifndef _CONTENT-MODELS_IDL_
#define _CONTENT-MODELS_IDL_

#include "dom.idl"

#pragma prefix "dom.w3c.org"
module content-models
{

    typedef dom::DOMString DOMString;
    typedef dom::decimal decimal;
    typedef dom::int int;
    typedef dom::Node Node;
    typedef dom::nsElement nsElement;
    typedef dom::DOMImplementation DOMImplementation;
    typedef dom::Element,NodeCM Element,NodeCM;
    typedef dom::Text,NodeCM Text,NodeCM;
    typedef dom::DocumentType,NodeCM DocumentType,NodeCM;
    typedef dom::Attr,NodeCM Attr,NodeCM;

    interface CModel;
    interface CMChildren;
    interface DOMErrorHandler;
    interface DOMLocator;

    interface CMNode {
        const unsigned short      CM_ELEMENT_DECLARATION          = 1;
        const unsigned short      CM_ATTRIBUTE_DECLARATION        = 2;
        const unsigned short      CM_NOTATION_DECLARATION         = 3;
        const unsigned short      CM_ENTITY_DECLARATION           = 4;
        const unsigned short      CM_CHILDREN                     = 5;
        const unsigned short      CM_MODEL                         = 6;
        const unsigned short      CM_EXTERNALMODEL                = 7;
        readonly attribute unsigned short  cmNodeType;
        attribute CModel            ownerCModel;
        attribute DOMString         nodeName;
        attribute DOMString         prefix;
        attribute DOMString         localName;
        attribute DOMString         namespaceURI;
    };
    CMNode clone();
};
```

```

interface CMNodeList {
};

interface CMNamedNodeMap {
};

interface CMDDataType {
    const short          STRING_DATATYPE          = 1;
    short                getCMPrimitiveType();
};

interface CMPrimitiveType : CMDDataType {
    const short          BOOLEAN_DATATYPE         = 2;
    const short          FLOAT_DATATYPE           = 3;
    const short          DOUBLE_DATATYPE          = 4;
    const short          DECIMAL_DATATYPE         = 5;
    const short          HEXBINARY_DATATYPE       = 6;
    const short          BASE64BINARY_DATATYPE    = 7;
    const short          ANYURI_DATATYPE          = 8;
    const short          QName_DATATYPE           = 9;
    const short          DURATION_DATATYPE        = 10;
    const short          DATETIME_DATATYPE        = 11;
    const short          DATE_DATATYPE            = 12;
    const short          TIME_DATATYPE            = 13;
    const short          YEARMONTH_DATATYPE       = 14;
    const short          YEAR_DATATYPE            = 15;
    const short          MONTHDAY_DATATYPE        = 16;
    const short          DAY_DATATYPE             = 17;
    const short          MONTH_DATATYPE           = 18;
    const short          NOTATION_DATATYPE        = 19;
    attribute decimal    lowValue;
    attribute decimal    highValue;
};

interface CMElementDeclaration : CMNode {
    attribute CMDDataType    elementType;
    readonly attribute boolean isPCDataOnly;
    attribute DOMString      tagName;
    int                      getContentType();
    CMChildren               getCMChildren();
    CMNamedNodeMap          getCMAttributes();
    CMNamedNodeMap          getCMGrandChildren();
};

interface CMChildren : CMNode {
    const unsigned long      UNBOUNDED           = MAX_LONG;
    const unsigned short     NONE                = 0;
    const unsigned short     SEQUENCE            = 1;
    const unsigned short     CHOICE              = 2;
    attribute unsigned short listOperator;
    attribute unsigned long  minOccurs;
    attribute unsigned long  maxOccurs;
    attribute CMNodeList     subModels;
    CMNode                   removeCMNode(in unsigned long nodeIndex);
    int                      insertCMNode(in unsigned long nodeIndex,
                                           in CMNode newNode);
    int                      appendCMNode(in CMNode newNode);
};

```

```

};

interface CMAttributeDeclaration : CMNode {
    const short          NO_VALUE_CONSTRAINT          = 0;
    const short          DEFAULT_VALUE_CONSTRAINT     = 1;
    const short          FIXED_VALUE_CONSTRAINT       = 2;
    attribute DOMString  attrName;
    attribute CMDataType attrType;
    attribute DOMString  attributeValue;
    attribute DOMString  enumAttr;
    attribute CMNodeList ownerElement;
    attribute short      constraintType;
};

interface CMEntityDeclaration : CMNode {
    const short          INTERNAL_ENTITY              = 1;
    const short          EXTERNAL_ENTITY              = 2;
    attribute short      entityType;
    attribute DOMString  entityName;
    attribute DOMString  entityValue;
    attribute DOMString  systemId;
    attribute DOMString  publicId;
    attribute DOMString  notationName;
};

interface CMNotationDeclaration : CMNode {
    attribute DOMString  notationName;
    attribute DOMString  systemId;
    attribute DOMString  publicId;
};

interface Document {
    void      setErrorHandler(in DOMErrorHandler handler);
};

interface DocumentCM : Document {
    const short          WF_CHECK                    = 1;
    const short          NS_WF_CHECK                 = 2;
    const short          PARTIAL_VALIDITY_CHECK      = 3;
    const short          STRICT_VALIDITY_CHECK       = 4;
    attribute boolean    continuousValidityChecking;
    attribute short      wfValidityCheckLevel;

    int      numCMs();
    CMMModel getInternalCM();
    CMNodeList getCMS();
    CMMModel getActiveCM();
    void      addCM(in CMMModel cm);
    void      removeCM(in CMMModel cm);
    boolean   activateCM(in CMMModel cm);
};

interface DOMErrorHandler {
    void      warning(in DOMLocator where,
                    in DOMString how,
                    in DOMString why)
                raises(dom::DOMSystemException);

    void      fatalError(in DOMLocator where,

```

```

        in DOMString how,
        in DOMString why)
        raises(dom::DOMSystemException);
void      error(in DOMLocator where,
               in DOMString how,
               in DOMString why)
               raises(dom::DOMSystemException);
};

interface DOMLocator {
    int      getColumnNumber();
    int      getLineNumber();
    DOMString getPublicID();
    DOMString getSystemID();
    Node     getNode();
};

interface CMModel : CMNode {
    readonly attribute boolean      isNamespaceAware;
    attribute CMElementDeclaration rootElementDecl;
    DOMString getLocation();
    nsElement getCMNamespace();
    CMNamedNodeMap getCMNodes();
    boolean    removeNode(in CMNode node);
    boolean    insertBefore(in CMNode newNode,
                           in CMNode refNode);

    boolean    validate();
    CMElementDeclaration createCMElementDeclaration(inout DOMString namespaceURI,
                                                       in DOMString qualifiedElementName,
                                                       in int contentSpec)
                                                       raises(dom::DOMException);
    CMAttributeDeclaration createCMAttributeDeclaration(inout DOMString namespaceURI,
                                                         in DOMString qualifiedName)
                                                         raises(dom::DOMException);
    CMNotationDeclaration createCMNotationDeclaration(in DOMString name,
                                                       in DOMString systemIdentifier,
                                                       inout DOMString publicIdentifier)
                                                       raises(dom::DOMException);
    CMEntityDeclaration createCMEntityDeclaration(in DOMString name)
                                                       raises(dom::DOMException);
    CMChildren          createCMChildren(in unsigned long minOccurs,
                                         in unsigned long maxOccurs,
                                         inout unsigned short operator)
                                         raises(dom::DOMException);
};

interface CMExternalModel : CMModel {
};

interface DOMImplementationCM : DOMImplementation {
    CMModel      createCM();
    CMExternalModel createExternalCM();
};

interface NodeCM : Node {
    boolean      canInsertBefore(in Node newChild,
                                 in Node refChild)
};

```

```

        raises(dom::DOMException);
boolean    canRemoveChild(in Node oldChild)
        raises(dom::DOMException);
boolean    canReplaceChild(in Node newChild,
        in Node oldChild)
        raises(dom::DOMException);
boolean    canAppendChild(in Node newChild)
        raises(dom::DOMException);
boolean    isValid()
        raises(dom::DOMException);
};

interface ElementCM : Element, NodeCM {
    int     contentType();
    CMElementDeclaration getElementDeclaration()
        raises(dom::DOMException);
boolean    canSetAttribute(in DOMString attrname,
        in DOMString attrval);
boolean    canSetAttributeNode(in Node node);
boolean    canSetAttributeNodeNS(in Node node);
boolean    canSetAttributeNS(in DOMString attrname,
        in DOMString attrval,
        in DOMString namespaceURI,
        in DOMString localName);
boolean    canRemoveAttribute(in DOMString attrname);
boolean    canRemoveAttributeNS(in DOMString attrname,
        inout DOMString namespaceURI);
boolean    canRemoveAttributeNode(in Node node);
};

interface CharacterDataCM : Text, NodeCM {
    boolean    isWhitespaceOnly();
    boolean    canSetData(in unsigned long offset,
        in DOMString arg)
        raises(dom::DOMException);
    boolean    canAppendData(in DOMString arg)
        raises(dom::DOMException);
    boolean    canReplaceData(in unsigned long offset,
        in unsigned long count,
        in DOMString arg)
        raises(dom::DOMException);
    boolean    canInsertData(in unsigned long offset,
        in DOMString arg)
        raises(dom::DOMException);
    boolean    canDeleteData(in unsigned long offset,
        in DOMString arg)
        raises(dom::DOMException);
};

interface DocumentTypeCM : DocumentType, NodeCM {
    boolean    isElementDefined(in DOMString elemTypeName);
    boolean    isElementDefinedNS(in DOMString elemTypeName,
        in DOMString namespaceURI,
        in DOMString localName);
    boolean    isAttributeDefined(in DOMString elemTypeName,
        in DOMString attrName);
    boolean    isAttributeDefinedNS(in DOMString elemTypeName,

```

load-save.idl:

```

                                in DOMString attrName,
                                in DOMString namespaceURI,
                                in DOMString localName);
    boolean                      isEntityDefined(in DOMString entName);
};

interface AttributeCM : Attr,NodeCM {
    CMAttributeDeclaration getAttributeDeclaration();
    CMNotationDeclaration getNotation()
                                raises(dom::DOMException);
};
};

#endif // _CONTENT-MODELS_IDL_
```

load-save.idl:

```
// File: load-save.idl

#ifndef _LOAD-SAVE_IDL_
#define _LOAD-SAVE_IDL_

#include "dom.idl"

#pragma prefix "dom.w3c.org"
module load-save
{

    typedef dom::DOMErrorHandler DOMErrorHandler;
    typedef dom::DOMString DOMString;
    typedef dom::Document Document;
    typedef dom::DOMInputStream DOMInputStream;
    typedef dom::DOMReader DOMReader;
    typedef dom::Element Element;
    typedef dom::DOMOutputStream DOMOutputStream;
    typedef dom::Node Node;

    interface DOMBuilder;
    interface DOMWriter;
    interface DOMEntityResolver;
    interface DOMBuilderFactory;
    interface DOMInputSource;

    interface DOMImplementationLS {
        DOMBuilder          createdOMBuilder();
        DOMWriter           createdOMWriter();
    };

    interface DOMBuilder {
        attribute DOMEntityResolver  entityResolver;
        attribute DOMErrorHandler     errorHandler;
        attribute DOMBuilderFactory  filter;
        void                          setFeature(in DOMString name,
                                                in boolean state)
                                        raises(dom::DOMException);
        boolean                       supportsFeature(in DOMString name);
    };
};
```

```

boolean          canSetFeature(in DOMString name,
                               in boolean state);
boolean          getFeature(in DOMString name)
                raises(dom::DOMException);
Document        parseURI(in DOMString uri)
                raises(dom::DOMException,
                       dom::DOMSystemException);
Document        parseDOMInputSource(in DOMInputSource is)
                raises(dom::DOMException,
                       dom::DOMSystemException);
};

interface DOMInputSource {
    attribute DOMInputStream    byteStream;
    attribute DOMReader        characterStream;
    attribute DOMString        encoding;
    attribute DOMString        publicId;
    attribute DOMString        systemId;
};

interface DOMEntityResolver {
    DOMInputSource    resolveEntity(in DOMString publicId,
                                   in DOMString systemId )
                            raises(dom::DOMSystemException);
};

interface DOMBuilderFilter {
    boolean          startElement(in Element element);
    boolean          endElement(in Element element);
};

interface DOMWriter {
    attribute DOMString        encoding;
    readonly attribute DOMString    lastEncoding;
    attribute unsigned short    format;
    // Modified in DOM Level 3:
    attribute DOMString        newLine;
    void                writeNode(in DOMOutputStream destination,
                                   in Node node)
                            raises(dom::DOMSystemException);
};

interface DocumentLS {
    attribute boolean          async;
    void                abort();
    boolean              load(in DOMString url);
    boolean              loadXML(in DOMString source);
    DOMString            saveXML(in Node node)
                            raises(dom::DOMException);
};

interface ParserErrorEvent {
    readonly attribute long    errorCode;
    readonly attribute long    filepos;
    readonly attribute long    line;
    readonly attribute long    linepos;
    readonly attribute DOMString    reason;
};

```

load-save.idl:

```
    readonly attribute DOMString    srcText;  
    readonly attribute DOMString    url;  
};  
};  
#endif // _LOAD-SAVE_IDL_
```


Appendix B: Java Language Binding

This appendix contains the complete Java [Java] bindings for the Level 3 Document Object Model Content Model and Load and Save.

The Java files are also available as

<http://www.w3.org/TR/2001/WD-DOM-Level-3-CMLS-20010419/java-binding.zip>

org/w3c/dom/contentModel/CMModel.java:

```
package org.w3c.dom.contentModel;

import org.w3c.dom.nsElement;
import org.w3c.dom.DOMException;

public interface CMModel extends CMNode {
    public boolean getIsNamespaceAware();

    public CMElementDeclaration getRootElementDecl();
    public void setRootElementDecl(CMElementDeclaration rootElementDecl);

    public String getLocation();

    public nsElement getCMNamespace();

    public CMNamedNodeMap getCMNodes();

    public boolean removeNode(CMNode node);

    public boolean insertBefore(CMNode newNode,
                               CMNode refNode);

    public boolean validate();

    public CMElementDeclaration createCMElementDeclaration(String namespaceURI,
                                                            String qualifiedElementName,
                                                            int contentSpec)
        throws DOMException;

    public CMAttributeDeclaration createCMAttributeDeclaration(String namespaceURI,
                                                             String qualifiedName)
        throws DOMException;

    public CMNotationDeclaration createCMNotationDeclaration(String name,
                                                            String systemIdentifier,
                                                            String publicIdentifier)
        throws DOMException;

    public CMEntityDeclaration createCMEntityDeclaration(String name)
        throws DOMException;

    public CMChildren createCMChildren(int minOccurs,
                                       int maxOccurs,
```

```
        short operator)
        throws DOMException;
    }
}
```

org/w3c/dom/contentModel/CMExternalModel.java:

```
package org.w3c.dom.contentModel;

public interface CMExternalModel extends CMMModel {
}
```

org/w3c/dom/contentModel/CMNode.java:

```
package org.w3c.dom.contentModel;

public interface CMNode {
    public static final short CM_ELEMENT_DECLARATION      = 1;
    public static final short CM_ATTRIBUTE_DECLARATION   = 2;
    public static final short CM_NOTATION_DECLARATION    = 3;
    public static final short CM_ENTITY_DECLARATION      = 4;
    public static final short CM_CHILDREN               = 5;
    public static final short CM_MODEL                  = 6;
    public static final short CM_EXTERNALMODEL          = 7;
    public short getCmNodeType();

    public CMMModel getOwnerCMMModel();
    public void setOwnerCMMModel(CMMModel ownerCMMModel);

    public String getNodeName();
    public void setNodeName(String nodeName);

    public String getPrefix();
    public void setPrefix(String prefix);

    public String getLocalName();
    public void setLocalName(String localName);

    public String getNamespaceURI();
    public void setNamespaceURI(String namespaceURI);

    public CMNode clone();
}
}
```

org/w3c/dom/contentModel/CMNodeList.java:

```
package org.w3c.dom.contentModel;

public interface CMNodeList {
}
```

org/w3c/dom/contentModel/CMNamedNodeMap.java:

```
package org.w3c.dom.contentModel;

public interface CMNamedNodeMap {
}
```

org/w3c/dom/contentModel/CMDDataType.java:

```
package org.w3c.dom.contentModel;

public interface CMDDataType {
    public static final short STRING_DATATYPE = 1;
    public short getCMPPrimitiveType();
}
```

org/w3c/dom/contentModel/CMPrimitiveType.java:

```
package org.w3c.dom.contentModel;

import org.w3c.dom.decimal;

public interface CMPrimitiveType extends CMDDataType {
    public static final short BOOLEAN_DATATYPE = 2;
    public static final short FLOAT_DATATYPE = 3;
    public static final short DOUBLE_DATATYPE = 4;
    public static final short DECIMAL_DATATYPE = 5;
    public static final short HEXBINARY_DATATYPE = 6;
    public static final short BASE64BINARY_DATATYPE = 7;
    public static final short ANYURI_DATATYPE = 8;
    public static final short QNAME_DATATYPE = 9;
    public static final short DURATION_DATATYPE = 10;
    public static final short DATETIME_DATATYPE = 11;
    public static final short DATE_DATATYPE = 12;
    public static final short TIME_DATATYPE = 13;
    public static final short YEARMONTH_DATATYPE = 14;
    public static final short YEAR_DATATYPE = 15;
    public static final short MONTHDAY_DATATYPE = 16;
    public static final short DAY_DATATYPE = 17;
    public static final short MONTH_DATATYPE = 18;
    public static final short NOTATION_DATATYPE = 19;
    public decimal getLowValue();
    public void setLowValue(decimal lowValue);

    public decimal getHighValue();
    public void setHighValue(decimal highValue);
}
```

org/w3c/dom/contentModel/CMLElementDeclaration.java:

```
package org.w3c.dom.contentModel;

public interface CMElementDeclaration extends CMNode {
    public CMDataType getElementType();
    public void setElementType(CMDataType elementType);

    public boolean getIsPCDataOnly();

    public String getTagName();
    public void setTagName(String tagName);

    public int getContentType();

    public CMChildren getCMChildren();

    public CMNamedNodeMap getCMAttributes();

    public CMNamedNodeMap getCMGrandChildren();
}
```

org/w3c/dom/contentModel/CMChildren.java:

```
package org.w3c.dom.contentModel;

public interface CMChildren extends CMNode {
    public static final int UNBOUNDED           = MAX_LONG;
    public static final short NONE             = 0;
    public static final short SEQUENCE        = 1;
    public static final short CHOICE         = 2;
    public short getListOperator();
    public void setListOperator(short listOperator);

    public int getMinOccurs();
    public void setMinOccurs(int minOccurs);

    public int getMaxOccurs();
    public void setMaxOccurs(int maxOccurs);

    public CMNodeList getSubModels();
    public void setSubModels(CMNodeList subModels);

    public CMNode removeCMNode(int nodeIndex);

    public int insertCMNode(int nodeIndex,
                            CMNode newNode);

    public int appendCMNode(CMNode newNode);
}
```

org/w3c/dom/contentModel/CMAAttributeDeclaration.java:

```
package org.w3c.dom.contentModel;

public interface CMAAttributeDeclaration extends CMNode {
    public static final short NO_VALUE_CONSTRAINT      = 0;
    public static final short DEFAULT_VALUE_CONSTRAINT = 1;
    public static final short FIXED_VALUE_CONSTRAINT   = 2;
    public String getAttrName();
    public void setAttrName(String attrName);

    public CMDataType getAttrType();
    public void setAttrType(CMDataType attrType);

    public String getAttributeValue();
    public void setAttributeValue(String attributeValue);

    public String getEnumAttr();
    public void setEnumAttr(String enumAttr);

    public CMNodeList getOwnerElement();
    public void setOwnerElement(CMNodeList ownerElement);

    public short getConstraintType();
    public void setConstraintType(short constraintType);
}

```

org/w3c/dom/contentModel/CMEntityDeclaration.java:

```
package org.w3c.dom.contentModel;

public interface CMEntityDeclaration extends CMNode {
    public static final short INTERNAL_ENTITY      = 1;
    public static final short EXTERNAL_ENTITY     = 2;
    public short getEntityType();
    public void setEntityType(short entityType);

    public String getEntityName();
    public void setEntityName(String entityName);

    public String getEntityValue();
    public void setEntityValue(String entityValue);

    public String getSystemId();
    public void setSystemId(String systemId);

    public String getPublicId();
    public void setPublicId(String publicId);

    public String getNotationName();
    public void setNotationName(String notationName);
}

```

org/w3c/dom/contentModel/CMNotationDeclaration.java:

```
package org.w3c.dom.contentModel;

public interface CMNotationDeclaration extends CMNode {
    public String getNotationName();
    public void setNotationName(String notationName);

    public String getSystemId();
    public void setSystemId(String systemId);

    public String getPublicId();
    public void setPublicId(String publicId);
}
```

org/w3c/dom/contentModel/Document.java:

```
package org.w3c.dom.contentModel;

public interface Document {
    public void setErrorHandler(DOMErrorHandler handler);
}
```

org/w3c/dom/contentModel/DocumentCM.java:

```
package org.w3c.dom.contentModel;

public interface DocumentCM extends Document {
    public static final short WF_CHECK = 1;
    public static final short NS_WF_CHECK = 2;
    public static final short PARTIAL_VALIDITY_CHECK = 3;
    public static final short STRICT_VALIDITY_CHECK = 4;
    public boolean getContinuousValidityChecking();
    public void setContinuousValidityChecking(boolean continuousValidityChecking);

    public short getWfValidityCheckLevel();
    public void setWfValidityCheckLevel(short wfValidityCheckLevel);

    public int numCMs();

    public CMMModel getInternalCM();

    public CMNodeList getCMs();

    public CMMModel getActiveCM();

    public void addCM(CMMModel cm);

    public void removeCM(CMMModel cm);

    public boolean activateCM(CMMModel cm);
}
```

org/w3c/dom/contentModel/DOMImplementationCM.java:

```
package org.w3c.dom.contentModel;

import org.w3c.dom.DOMImplementation;

public interface DOMImplementationCM extends DOMImplementation {
    public CMMModel createCM();

    public CMExternalModel createExternalCM();
}
```

org/w3c/dom/contentModel/NodeCM.java:

```
package org.w3c.dom.contentModel;

import org.w3c.dom.Node;
import org.w3c.dom.DOMException;

public interface NodeCM extends Node {
    public boolean canInsertBefore(Node newChild,
                                   Node refChild)
        throws DOMException;

    public boolean canRemoveChild(Node oldChild)
        throws DOMException;

    public boolean canReplaceChild(Node newChild,
                                   Node oldChild)
        throws DOMException;

    public boolean canAppendChild(Node newChild)
        throws DOMException;

    public boolean isValid()
        throws DOMException;
}
```

org/w3c/dom/contentModel/ElementCM.java:

```
package org.w3c.dom.contentModel;

import org.w3c.dom.Node;
import org.w3c.dom.Element, NodeCM;
import org.w3c.dom.DOMException;

public interface ElementCM extends Element, NodeCM {
    public int contentType();

    public CMElementDeclaration getElementDeclaration()
        throws DOMException;

    public boolean canSetAttribute(String attrname,
```

org/w3c/dom/contentModel/CharacterDataCM.java:

```
        String attrval);

    public boolean canSetAttributeNode(Node node);

    public boolean canSetAttributeNodeNS(Node node);

    public boolean canSetAttributeNS(String attrname,
        String attrval,
        String namespaceURI,
        String localName);

    public boolean canRemoveAttribute(String attrname);

    public boolean canRemoveAttributeNS(String attrname,
        String namespaceURI);

    public boolean canRemoveAttributeNode(Node node);
}

```

org/w3c/dom/contentModel/CharacterDataCM.java:

```
package org.w3c.dom.contentModel;

import org.w3c.dom.Text,NodeCM;
import org.w3c.dom.DOMException;

public interface CharacterDataCM extends Text,NodeCM {
    public boolean isWhitespaceOnly();

    public boolean canSetData(int offset,
        String arg)
        throws DOMException;

    public boolean canAppendData(String arg)
        throws DOMException;

    public boolean canReplaceData(int offset,
        int count,
        String arg)
        throws DOMException;

    public boolean canInsertData(int offset,
        String arg)
        throws DOMException;

    public boolean canDeleteData(int offset,
        String arg)
        throws DOMException;
}

```


org/w3c/dom/contentModel/DocumentTypeCM.java:

```
package org.w3c.dom.contentModel;

import org.w3c.dom.DocumentType, NodeCM;

public interface DocumentTypeCM extends DocumentType, NodeCM {
    public boolean isElementDefined(String elemTypeName);

    public boolean isElementDefinedNS(String elemTypeName,
                                      String namespaceURI,
                                      String localName);

    public boolean isAttributeDefined(String elemTypeName,
                                      String attrName);

    public boolean isAttributeDefinedNS(String elemTypeName,
                                       String attrName,
                                       String namespaceURI,
                                       String localName);

    public boolean isEntityDefined(String entName);
}
```

org/w3c/dom/contentModel/AttributeCM.java:

```
package org.w3c.dom.contentModel;

import org.w3c.dom.Attr, NodeCM;
import org.w3c.dom.DOMException;

public interface AttributeCM extends Attr, NodeCM {
    public CMAttributeDeclaration getAttributeDeclaration();

    public CMNotationDeclaration getNotation()
        throws DOMException;
}
```

org/w3c/dom/contentModel/DOMErrorHandler.java:

```
package org.w3c.dom.contentModel;

import org.w3c.dom.DOMSystemException;

public interface DOMErrorHandler {
    public void warning(DOMLocator where,
                      String how,
                      String why)
        throws DOMSystemException;

    public void fatalError(DOMLocator where,
                          String how,
                          String why)
}
```

org/w3c/dom/contentModel/DOMLocator.java:

```
        throws DOMSystemException;

    public void error(DOMLocator where,
                     String how,
                     String why)
        throws DOMSystemException;
}
```

org/w3c/dom/contentModel/DOMLocator.java:

```
package org.w3c.dom.contentModel;

import org.w3c.dom.Node;

public interface DOMLocator {
    public int getColumnNumber();

    public int getLineNumber();

    public String getPublicID();

    public String getSystemID();

    public Node getNode();
}
```

org/w3c/dom/loadSave/DOMImplementationLS.java:

```
package org.w3c.dom.loadSave;

public interface DOMImplementationLS {
    public DOMBuilder createDOMBuilder();

    public DOMWriter createDOMWriter();
}
```

org/w3c/dom/loadSave/DOMBuilder.java:

```
package org.w3c.dom.loadSave;

import org.w3c.dom.DOMErrorHandler;
import org.w3c.dom.Document;
import org.w3c.dom.DOMSystemException;
import org.w3c.dom.DOMException;

public interface DOMBuilder {
    public DOMEntityResolver getEntityResolver();
    public void setEntityResolver(DOMEntityResolver entityResolver);

    public DOMErrorHandler getErrorHandler();
    public void setErrorHandler(DOMErrorHandler errorHandler);
}
```

```
public DOMBuilderFilter getFilter();
public void setFilter(DOMBuilderFilter filter);

public void setFeature(String name,
                      boolean state)
    throws DOMException;

public boolean supportsFeature(String name);

public boolean canSetFeature(String name,
                             boolean state);

public boolean getFeature(String name)
    throws DOMException;

public Document parseURI(String uri)
    throws DOMException, DOMSystemException;

public Document parseDOMInputSource(DOMInputSource is)
    throws DOMException, DOMSystemException;
}
```

org/w3c/dom/loadSave/DOMInputSource.java:

```
package org.w3c.dom.loadSave;

public interface DOMInputSource {
    public java.io.InputStream getByteStream();
    public void setByteStream(java.io.InputStream byteStream);

    public java.io.Reader getCharacterStream();
    public void setCharacterStream(java.io.Reader characterStream);

    public String getEncoding();
    public void setEncoding(String encoding);

    public String getPublicId();
    public void setPublicId(String publicId);

    public String getSystemId();
    public void setSystemId(String systemId);
}
```

org/w3c/dom/loadSave/DOMEntityResolver.java:

```
package org.w3c.dom.loadSave;

import org.w3c.dom.DOMSystemException;

public interface DOMEntityResolver {
    public DOMInputSource resolveEntity(String publicId,
```

```
String systemId )  
throws DOMSystemException;  
  
}
```

org/w3c/dom/loadSave/DOMBuilderFilter.java:

```
package org.w3c.dom.loadSave;  
  
import org.w3c.dom.Element;  
  
public interface DOMBuilderFilter {  
    public boolean startElement(Element element);  
  
    public boolean endElement(Element element);  
  
}
```

org/w3c/dom/loadSave/DOMWriter.java:

```
package org.w3c.dom.loadSave;  
  
import org.w3c.dom.Node;  
import org.w3c.dom.DOMSystemException;  
  
public interface DOMWriter {  
    public String getEncoding();  
    public void setEncoding(String encoding);  
  
    public String getLastEncoding();  
  
    public short getFormat();  
    public void setFormat(short format);  
  
    public String getNewLine();  
    public void setNewLine(String newLine);  
  
    public void writeNode(java.io.OutputStream destination,  
                           Node node)  
        throws DOMSystemException;  
  
}
```

org/w3c/dom/loadSave/DocumentLS.java:

```
package org.w3c.dom.loadSave;  
  
import org.w3c.dom.Node;  
import org.w3c.dom.DOMException;  
  
public interface DocumentLS {  
    public boolean getAsync();  
    public void setAsync(boolean async);  
  
    public void abort();  
  
}
```

org/w3c/dom/loadSave/ParserErrorEvent.java:

```
public boolean load(String url);

public boolean loadXML(String source);

public String saveXML(Node node)
    throws DOMException;

}
```

org/w3c/dom/loadSave/ParserErrorEvent.java:

```
package org.w3c.dom.loadSave;

public interface ParserErrorEvent {
    public int getErrorCode();

    public int getFilepos();

    public int getLine();

    public int getLinepos();

    public String getReason();

    public String getSrcText();

    public String getUrl();
}
```

org/w3c/dom/loadSave/ParserErrorEvent.java:

Appendix C: ECMA Script Language Binding

This appendix contains the complete ECMA Script [ECMAScript] binding for the Level 3 Document Object Model Content Model and Load and Save definitions.

Object **CMMModel**

CMMModel has all the properties and methods of the **CMNode** object as well as the properties and methods defined below.

The **CMMModel** object has the following properties:

isNamespaceAware

This read-only property is of type **Boolean**.

rootElementDecl

This property is a **CMElementDeclaration** object.

The **CMMModel** object has the following methods:

getLocation()

This method returns a **String**.

getCMNamespace()

This method returns a **nsElement** object.

getCMNodes()

This method returns a **CMNamedNodeMap** object.

removeNode(node)

This method returns a **Boolean**.

The **node** parameter is a **CMNode** object.

insertBefore(newNode, refNode)

This method returns a **Boolean**.

The **newNode** parameter is a **CMNode** object.

The **refNode** parameter is a **CMNode** object.

validate()

This method returns a **Boolean**.

createCMElementDeclaration(namespaceURI, qualifiedElementName, contentSpec)

This method returns a **CMElementDeclaration** object.

The **namespaceURI** parameter is of type **String**.

The **qualifiedElementName** parameter is of type **String**.

The **contentSpec** parameter is a **int** object.

This method can raise a **DOMException** object.

createCMAAttributeDeclaration(namespaceURI, qualifiedName)

This method returns a **CMAAttributeDeclaration** object.

The **namespaceURI** parameter is of type **String**.

The **qualifiedName** parameter is of type **String**.

This method can raise a **DOMException** object.

createCMNotationDeclaration(name, systemIdentifier, publicIdentifier)

This method returns a **CMNotationDeclaration** object.

The **name** parameter is of type **String**.

The **systemIdentifier** parameter is of type **String**.

The **publicIdentifier** parameter is of type **String**.

This method can raise a **DOMException** object.

createCMEntityDeclaration(name)

This method returns a **CMEntityDeclaration** object.

The **name** parameter is of type **String**.

This method can raise a **DOMException** object.

createCMChildren(minOccurs, maxOccurs, operator)

This method returns a **CMChildren** object.

The **minOccurs** parameter is of type **Number**.

The **maxOccurs** parameter is of type **Number**.

The **operator** parameter is of type **Number**.

This method can raise a **DOMException** object.

Object **CMExternalModel**

CMExternalModel has the all the properties and methods of the **CMMModel** object as well as the properties and methods defined below.

Prototype Object **CMNode**

The **CMNode** class has the following constants:

CMNode.CM_ELEMENT_DECLARATION

This constant is of type **Number** and its value is **1**.

CMNode.CM_ATTRIBUTE_DECLARATION

This constant is of type **Number** and its value is **2**.

CMNode.CM_NOTATION_DECLARATION

This constant is of type **Number** and its value is **3**.

CMNode.CM_ENTITY_DECLARATION

This constant is of type **Number** and its value is **4**.

CMNode.CM_CHILDREN

This constant is of type **Number** and its value is **5**.

CMNode.CM_MODEL

This constant is of type **Number** and its value is **6**.

CMNode.CM_EXTERNALMODEL

This constant is of type **Number** and its value is **7**.

Object **CMNode**

The **CMNode** object has the following properties:

cmNodeType

This read-only property is of type **Number**.

ownerCMMModel

This property is a **CMMModel** object.

nodeName

This property is of type **String**.

prefix

This property is of type **String**.

localName

This property is of type **String**.

namespaceURI

This property is of type **String**.

The **CMNode** object has the following methods:

clone()

This method returns a **CMNode** object.

Object **CMNodeList**

Object **CMNamedNodeMap**

Prototype Object **CMDataType**

The **CMDataType** class has the following constants:

CMDataType.STRING_DATATYPE

This constant is of type **short** and its value is **1**.

Object **CMDataType**

The **CMDataType** object has the following methods:

getCMPrimitiveType()

This method returns a **short** object.

Prototype Object **CMPrimitiveType**

The **CMPrimitiveType** class has the following constants:

CMPrimitiveType.BOOLEAN_DATATYPE

This constant is of type **short** and its value is **2**.

CMPrimitiveType.FLOAT_DATATYPE

This constant is of type **short** and its value is **3**.

CMPrimitiveType.DOUBLE_DATATYPE

This constant is of type **short** and its value is **4**.

CMPrimitiveType.DECIMAL_DATATYPE

This constant is of type **short** and its value is **5**.

CMPrimitiveType.HEXBINARY_DATATYPE

This constant is of type **short** and its value is **6**.

CMPrimitiveType.BASE64BINARY_DATATYPE

This constant is of type **short** and its value is **7**.

CMPrimitiveType.ANYURI_DATATYPE

This constant is of type **short** and its value is **8**.

CMPrimitiveType.QNAME_DATATYPE

This constant is of type **short** and its value is **9**.

CMPrimitiveType.DURATION_DATATYPE

This constant is of type **short** and its value is **10**.

CMPrimitiveType.DATETIME_DATATYPE

This constant is of type **short** and its value is **11**.

CMPrimitiveType.DATE_DATATYPE

This constant is of type **short** and its value is **12**.

CMPrimitiveType.TIME_DATATYPE

This constant is of type **short** and its value is **13**.

CMPrimitiveType.YEARMONTH_DATATYPE

This constant is of type **short** and its value is **14**.

CMPrimitiveType.YEAR_DATATYPE

This constant is of type **short** and its value is **15**.

CMPrimitiveType.MONTHDAY_DATATYPE

This constant is of type **short** and its value is **16**.

CMPrimitiveType.DAY_DATATYPE

This constant is of type **short** and its value is **17**.

CMPrimitiveType.MONTH_DATATYPE

This constant is of type **short** and its value is **18**.

CMPrimitiveType.NOTATION_DATATYPE

This constant is of type **short** and its value is **19**.

Object **CMPrimitiveType**

CMPrimitiveType has the all the properties and methods of the **CMDataType** object as well as the properties and methods defined below.

The **CMPrimitiveType** object has the following properties:

lowValue

This property is a **decimal** object.

highValue

This property is a **decimal** object.

Object **CMElementDeclaration**

CMElementDeclaration has the all the properties and methods of the **CMNode** object as well as the properties and methods defined below.

The **CMElementDeclaration** object has the following properties:

elementType

This property is a **CMDataType** object.

isPCDataOnly

This read-only property is of type **Boolean**.

tagName

This property is of type **String**.

The **CMElementDeclaration** object has the following methods:

getContentTypes()

This method returns a **int** object.

getCMChildren()

This method returns a **CMChildren** object.

getCMAttributes()

This method returns a **CMNamedNodeMap** object.

getCMGrandChildren()

This method returns a **CMNamedNodeMap** object.

Prototype Object **CMChildren**

The **CMChildren** class has the following constants:

CMChildren.UNBOUNDED

This constant is of type **Number** and its value is **MAX_LONG**.

CMChildren.NONE

This constant is of type **Number** and its value is **0**.

CMChildren.SEQUENCE

This constant is of type **Number** and its value is **1**.

CMChildren.CHOICE

This constant is of type **Number** and its value is **2**.

Object **CMChildren**

CMChildren has the all the properties and methods of the **CMNode** object as well as the properties and methods defined below.

The **CMChildren** object has the following properties:

listOperator

This property is of type **Number**.

minOccurs

This property is of type **Number**.

maxOccurs

This property is of type **Number**.

subModels

This property is a **CMNodeList** object.

The **CMChildren** object has the following methods:

removeCMNode(nodeIndex)

This method returns a **CMNode** object.

The **nodeIndex** parameter is of type **Number**.

insertCMNode(nodeIndex, newNode)

This method returns a **int** object.

The **nodeIndex** parameter is of type **Number**.

The **newNode** parameter is a **CMNode** object.

appendCMNode(newNode)

This method returns a **int** object.

The **newNode** parameter is a **CMNode** object.

Prototype Object **CMAAttributeDeclaration**

The **CMAAttributeDeclaration** class has the following constants:

CMAAttributeDeclaration.NO_VALUE_CONSTRAINT

This constant is of type **short** and its value is **0**.

CMAAttributeDeclaration.DEFAULT_VALUE_CONSTRAINT

This constant is of type **short** and its value is **1**.

CMAAttributeDeclaration.FIXED_VALUE_CONSTRAINT

This constant is of type **short** and its value is **2**.

Object **CMAAttributeDeclaration**

CMAAttributeDeclaration has all the properties and methods of the **CMNode** object as well as the properties and methods defined below.

The **CMAAttributeDeclaration** object has the following properties:

attrName

This property is of type **String**.

attrType

This property is a **CMDataType** object.

attributeValue

This property is of type **String**.

enumAttr

This property is of type **String**.

ownerElement

This property is a **CMNodeList** object.

constraintType

This property is a **short** object.

Prototype Object **CMEntityDeclaration**

The **CMEntityDeclaration** class has the following constants:

CMEntityDeclaration.INTERNAL_ENTITY

This constant is of type **short** and its value is **1**.

CMEntityDeclaration.EXTERNAL_ENTITY

This constant is of type **short** and its value is **2**.

Object **CMEntityDeclaration**

CMEntityDeclaration has the all the properties and methods of the **CMNode** object as well as the properties and methods defined below.

The **CMEntityDeclaration** object has the following properties:

entityType

This property is a **short** object.

entityName

This property is of type **String**.

entityValue

This property is of type **String**.

systemId

This property is of type **String**.

publicId

This property is of type **String**.

notationName

This property is of type **String**.

Object **CMNotationDeclaration**

CMNotationDeclaration has the all the properties and methods of the **CMNode** object as well as the properties and methods defined below.

The **CMNotationDeclaration** object has the following properties:

notationName

This property is of type **String**.

systemId

This property is of type **String**.

publicId

This property is of type **String**.

Object **Document**

The **Document** object has the following methods:

setErrorHandler(handler)

This method has no return value.

The **handler** parameter is a **DOMErrorHandler** object.

Prototype Object **DocumentCM**

The **DocumentCM** class has the following constants:

DocumentCM.WF_CHECK

This constant is of type **short** and its value is **1**.

DocumentCM.NS_WF_CHECK

This constant is of type **short** and its value is **2**.

DocumentCM.PARTIAL_VALIDITY_CHECK

This constant is of type **short** and its value is **3**.

DocumentCM.STRICT_VALIDITY_CHECK

This constant is of type **short** and its value is **4**.

Object **DocumentCM**

DocumentCM has the all the properties and methods of the **Document** object as well as the properties and methods defined below.

The **DocumentCM** object has the following properties:

continuousValidityChecking

This property is of type **Boolean**.

wfValidityCheckLevel

This property is a **short** object.

The **DocumentCM** object has the following methods:

numCMs()

This method returns a **int** object.

getInternalCM()

This method returns a **CMMModel** object.

getCMs()

This method returns a **CMNodeList** object.

getActiveCM()

This method returns a **CMMModel** object.

addCM(cm)

This method has no return value.

The **cm** parameter is a **CMMModel** object.

removeCM(cm)

This method has no return value.

The **cm** parameter is a **CMMModel** object.

activateCM(cm)

This method returns a **Boolean**.

The **cm** parameter is a **CMMModel** object.

Object **DOMImplementationCM**

DOMImplementationCM has the all the properties and methods of the **DOMImplementation** object as well as the properties and methods defined below.

The **DOMImplementationCM** object has the following methods:

createCM()

This method returns a **CMMModel** object.

createExternalCM()

This method returns a **CMExternalModel** object.

Object **NodeCM**

NodeCM has the all the properties and methods of the **Node** object as well as the properties and methods defined below.

The **NodeCM** object has the following methods:

canInsertBefore(newChild, refChild)

This method returns a **Boolean**.

The **newChild** parameter is a **Node** object.

The **refChild** parameter is a **Node** object.

This method can raise a **DOMException** object.

canRemoveChild(oldChild)

This method returns a **Boolean**.

The **oldChild** parameter is a **Node** object.

This method can raise a **DOMException** object.

canReplaceChild(newChild, oldChild)

This method returns a **Boolean**.

The **newChild** parameter is a **Node** object.
 The **oldChild** parameter is a **Node** object.
 This method can raise a **DOMException** object.

canAppendChild(newChild)

This method returns a **Boolean**.
 The **newChild** parameter is a **Node** object.
 This method can raise a **DOMException** object.

isValid()

This method returns a **Boolean**.
 This method can raise a **DOMException** object.

Object **ElementCM**

ElementCM has the all the properties and methods of the **Element,NodeCM** object as well as the properties and methods defined below.

The **ElementCM** object has the following methods:

contentType()

This method returns a **int** object.

getElementDeclaration()

This method returns a **CMElementDeclaration** object.
 This method can raise a **DOMException** object.

canSetAttribute(attrname, attrval)

This method returns a **Boolean**.
 The **attrname** parameter is of type **String**.
 The **attrval** parameter is of type **String**.

canSetAttributeNode(node)

This method returns a **Boolean**.
 The **node** parameter is a **Node** object.

canSetAttributeNodeNS(node)

This method returns a **Boolean**.
 The **node** parameter is a **Node** object.

canSetAttributeNS(attrname, attrval, namespaceURI, localName)

This method returns a **Boolean**.
 The **attrname** parameter is of type **String**.
 The **attrval** parameter is of type **String**.
 The **namespaceURI** parameter is of type **String**.
 The **localName** parameter is of type **String**.

canRemoveAttribute(attrname)

This method returns a **Boolean**.
 The **attrname** parameter is of type **String**.

canRemoveAttributeNS(attrname, namespaceURI)

This method returns a **Boolean**.
 The **attrname** parameter is of type **String**.
 The **namespaceURI** parameter is of type **String**.

canRemoveAttributeNode(node)

This method returns a **Boolean**.
 The **node** parameter is a **Node** object.

Object **CharacterDataCM**

CharacterDataCM has the all the properties and methods of the **Text,NodeCM** object as well as the properties and methods defined below.

The **CharacterDataCM** object has the following methods:

isWhitespaceOnly()

This method returns a **Boolean**.

canSetData(offset, arg)

This method returns a **Boolean**.

The **offset** parameter is of type **Number**.

The **arg** parameter is of type **String**.

This method can raise a **DOMException** object.

canAppendData(arg)

This method returns a **Boolean**.

The **arg** parameter is of type **String**.

This method can raise a **DOMException** object.

canReplaceData(offset, count, arg)

This method returns a **Boolean**.

The **offset** parameter is of type **Number**.

The **count** parameter is of type **Number**.

The **arg** parameter is of type **String**.

This method can raise a **DOMException** object.

canInsertData(offset, arg)

This method returns a **Boolean**.

The **offset** parameter is of type **Number**.

The **arg** parameter is of type **String**.

This method can raise a **DOMException** object.

canDeleteData(offset, arg)

This method returns a **Boolean**.

The **offset** parameter is of type **Number**.

The **arg** parameter is of type **String**.

This method can raise a **DOMException** object.

Object **DocumentTypeCM**

DocumentTypeCM has the all the properties and methods of the **DocumentType,NodeCM** object as well as the properties and methods defined below.

The **DocumentTypeCM** object has the following methods:

isElementDefined(elemTypeName)

This method returns a **Boolean**.

The **elemTypeName** parameter is of type **String**.

isElementDefinedNS(elemTypeName, namespaceURI, localName)

This method returns a **Boolean**.

The **elemTypeName** parameter is of type **String**.

The **namespaceURI** parameter is of type **String**.

The **localName** parameter is of type **String**.

isAttributeDefined(elemTypeName, attrName)

This method returns a **Boolean**.

The **elemTypeName** parameter is of type **String**.

The **attrName** parameter is of type **String**.

isAttributeDefinedNS(elemTypeName, attrName, namespaceURI, localName)

This method returns a **Boolean**.

The **elemTypeName** parameter is of type **String**.

The **attrName** parameter is of type **String**.

The **namespaceURI** parameter is of type **String**.

The **localName** parameter is of type **String**.

isEntityDefined(entName)

This method returns a **Boolean**.

The **entName** parameter is of type **String**.

Object **AttributeCM**

AttributeCM has the all the properties and methods of the **Attr,NodeCM** object as well as the properties and methods defined below.

The **AttributeCM** object has the following methods:

getAttributeDeclaration()

This method returns a **CMAttributeDeclaration** object.

getNotation()

This method returns a **CMNotationDeclaration** object.

This method can raise a **DOMException** object.

Object **DOMErrorHandler**

The **DOMErrorHandler** object has the following methods:

warning(when, how, why)

This method has no return value.

The **when** parameter is a **DOMLocator** object.

The **how** parameter is of type **String**.

The **why** parameter is of type **String**.

This method can raise a **DOMSystemException** object.

fatalError(when, how, why)

This method has no return value.

The **when** parameter is a **DOMLocator** object.

The **how** parameter is of type **String**.

The **why** parameter is of type **String**.

This method can raise a **DOMSystemException** object.

error(when, how, why)

This method has no return value.

The **when** parameter is a **DOMLocator** object.

The **how** parameter is of type **String**.

The **why** parameter is of type **String**.

This method can raise a **DOMSystemException** object.

Object **DOMLocator**

The **DOMLocator** object has the following methods:

getColumnNumber()

This method returns a **int** object.

getLineNumber()

This method returns a **int** object.

getPublicID()

This method returns a **String**.

getSystemID()

This method returns a **String**.

getNode()

This method returns a **Node** object.

Object **DOMImplementationLS**

The **DOMImplementationLS** object has the following methods:

createDOMBuilder()

This method returns a **DOMBuilder** object.

createDOMWriter()

This method returns a **DOMWriter** object.

Object **DOMBuilder**

The **DOMBuilder** object has the following properties:

entityResolver

This property is a **DOMEntityResolver** object.

errorHandler

This property is a **DOMErrorHandler** object.

filter

This property is a **DOMBuilderFilter** object.

The **DOMBuilder** object has the following methods:

setFeature(name, state)

This method has no return value.

The **name** parameter is of type **String**.

The **state** parameter is of type **Boolean**.

This method can raise a **DOMException** object.

supportsFeature(name)

This method returns a **Boolean**.

The **name** parameter is of type **String**.

canSetFeature(name, state)

This method returns a **Boolean**.

The **name** parameter is of type **String**.

The **state** parameter is of type **Boolean**.

getFeature(name)

This method returns a **Boolean**.

The **name** parameter is of type **String**.

This method can raise a **DOMException** object.

parseURI(uri)

This method returns a **Document** object.

The **uri** parameter is of type **String**.

This method can raise a **DOMException** object or a **DOMSystemException** object.

parseDOMInputSource(is)

This method returns a **Document** object.

The **is** parameter is a **DOMInputSource** object.

This method can raise a **DOMException** object or a **DOMSystemException** object.

Object **DOMInputSource**

The **DOMInputSource** object has the following properties:

byteStream

This property is a **DOMInputStream** object.

characterStream

This property is a **DOMReader** object.

encoding

This property is of type **String**.

publicId

This property is of type **String**.

systemId

This property is of type **String**.

Object **DOMEntityResolver**

The **DOMEntityResolver** object has the following methods:

resolveEntity(publicId, systemId)

This method returns a **DOMInputSource** object.

The **publicId** parameter is of type **String**.

The **systemId** parameter is of type **String**.

This method can raise a **DOMSystemException** object.

Object **DOMBuilderFilter**

The **DOMBuilderFilter** object has the following methods:

startElement(element)

This method returns a **Boolean**.

The **element** parameter is a **Element** object.

endElement(element)

This method returns a **Boolean**.

The **element** parameter is a **Element** object.

Object **DOMWriter**

The **DOMWriter** object has the following properties:

encoding

This property is of type **String**.

lastEncoding

This read-only property is of type **String**.

format

This property is of type **Number**.

newLine

This property is of type **String**.

The **DOMWriter** object has the following methods:

writeNode(destination, node)

This method has no return value.

The **destination** parameter is a **DOMOutputStream** object.

The **node** parameter is a **Node** object.

This method can raise a **DOMSystemException** object.

Object **DocumentLS**

The **DocumentLS** object has the following properties:

async

This property is of type **Boolean**.

The **DocumentLS** object has the following methods:

abort()

This method has no return value.

load(url)

This method returns a **Boolean**.

The **url** parameter is of type **String**.

loadXML(source)

This method returns a **Boolean**.

The **source** parameter is of type **String**.

saveXML(node)

This method returns a **String**.

The **node** parameter is a **Node** object.

This method can raise a **DOMException** object.

Object **ParserErrorEvent**

The **ParserErrorEvent** object has the following properties:

errorCode

This read-only property is a **long** object.

filepos

This read-only property is a **long** object.

line

This read-only property is a **long** object.

linepos

This read-only property is a **long** object.

reason

This read-only property is of type **String**.

srcText

This read-only property is of type **String**.

url

This read-only property is of type **String**.

References

For the latest version of any W3C specification please consult the list of W3C Technical Reports available at <http://www.w3.org/TR>.

D.1: Normative references

ECMAScript

ECMA (European Computer Manufacturers Association) ECMAScript Language Specification.
Available at <http://www.ecma.ch/ecma1/STAND/ECMA-262.HTM>

Java

Sun Microsystems Inc. The Java Language Specification, James Gosling, Bill Joy, and Guy Steele, September 1996. Available at <http://java.sun.com/docs/books/jls>

OMGIDL

OMG (Object Management Group) IDL (Interface Definition Language) defined in The Common Object Request Broker: Architecture and Specification, version 2.3.1, October 1999. Available from <http://www.omg.org>

D.1: Normative references

Index

abort	activateCM	addCM
ANYURI_DATATYPE	appendCMNode	async
AttributeCM	attributeValue	attrName
attrType		
BASE64BINARY_DATATYPE	BOOLEAN_DATATYPE	byteStream
canAppendChild	canAppendData	canDeleteData
canInsertBefore	canInsertData	canRemoveAttribute
canRemoveAttributeNode	canRemoveAttributeNS	canRemoveChild
canReplaceChild	canReplaceData	canSetAttribute
canSetAttributeNode	canSetAttributeNodeNS	canSetAttributeNS
canSetData	canSetFeature	CharacterDataCM
characterStream	CHOICE	clone
CM_ATTRIBUTE_DECLARATION	CM_CHILDREN	CM_ELEMENT_DECLARATION
CM_ENTITY_DECLARATION	CM_EXTERNALMODEL	CM_MODEL
CM_NOTATION_DECLARATION	CMAttributeDeclaration	CMChildren
CMDataType	CMElementDeclaration	CMEntityDeclaration
CMExternalModel	CMMModel	CMNamedNodeMap
CMNode	CMNodeList	cmNodeType
CMNotationDeclaration	CMPrimitiveType	constraintType
contentType	continuousValidityChecking	createCM
createCMAttributeDeclaration	createCMChildren	createCMElementDeclaration
createCMEntityDeclaration	createCMNotationDeclaration	createDOMBuilder
createDOMWriter	createExternalCM	
DATE_DATATYPE	DATETIME_DATATYPE	DAY_DATATYPE
DECIMAL_DATATYPE	DEFAULT_VALUE_CONSTRAINT	Document
DocumentCM	DocumentLS	DocumentTypeCM
DOMBuilder	DOMBuilderFilter	DOMEntityResolver

Index

DOMErrorHandler	DOMImplementationCM	DOMImplementationLS
DOMInputSource	DOMLocator	DOMWriter
DOUBLE_DATATYPE	DURATION_DATATYPE	
ECMAScript	ElementCM	elementType
encoding 63, 69	endElement	entityName
entityResolver	entityType	entityValue
enumAttr	error	errorCode
errorHandler	EXTERNAL_ENTITY	
fatalError	filepos	filter
FIXED_VALUE_CONSTRAINT	FLOAT_DATATYPE	format
getActiveCM	getAttributeDeclaration	getCMAttributes
getCMChildren	getCMGrandChildren	getCMNamespace
getCMNodes	getCMPrimitiveType	getCMs
getColumnNumber	getContentType	getElementDeclaration
getFeature	getInternalCM	getLineNumber
getLocation	getNode	getNotation
getPublicID	getSystemID	
HEXBINARY_DATATYPE	highValue	
insertBefore	insertCMNode	INTERNAL_ENTITY
isAttributeDefined	isAttributeDefinedNS	isElementDefined
isElementDefinedNS	isEntityDefined	isNamespaceAware
isPCDataOnly	isValid	isWhitespaceOnly
Java		
lastEncoding	line	linepos
listOperator	load	loadXML

localName	lowValue	
maxOccurs	minOccurs	MONTH_DATATYPE
MONTHDAY_DATATYPE		
namespaceURI	newLine	NO_VALUE_CONSTRAINT
NodeCM	nodeName	NONE
NOTATION_DATATYPE	notationName 25, 25	NS_WF_CHECK
numCMs		
OMGIDL	ownerCMModel	ownerElement
parseDOMInputSource	ParserErrorEvent	parseURI
PARTIAL_VALIDITY_CHECK	Partially valid	prefix
publicId 25, 25, 63		
QNAME_DATATYPE		
reason	removeCM	removeCMNode
removeNode	resolveEntity	rootElementDecl
saveXML	SEQUENCE	setErrorHandler
setFeature	srcText	startElement
STRICT_VALIDITY_CHECK	STRING_DATATYPE	subModels
supportsFeature	systemId 25, 26, 63	
tagName	TIME_DATATYPE	
UNBOUNDED	url	
validate		

Index

warning

WF_CHECK

wfValidityCheckLevel

writeNode

YEAR_DATATYPE

YEARMONTH_DATATYPE