Document Object Model (DOM) Level 3 Core Specification

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Abstract

This specification defines the Document Object Model Core 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 Core Level 3 builds on the Document Object Model Core Level 2.

Status of this document

This document is an early release of the Document Object Model Level 3 Core specification. It is expecting to include all of the DOM Level 2 Core content in the future.

It is guaranteed to change; anyone implementing it should realize that we will not allow ourselves to be restricted by experimental implementations of Level 3 when deciding whether to change the specifications.

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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.

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1. Document Object Model Core

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1.1. DOM Level 3 Core

(***ED:*** Although the following defines a set of new interfaces that extend the DOM Level 2 interfaces the current plan is not to actually add any new interfaces but instead to expand the existing ones.)

Issue Level-3-Core-1:
Instead of extending the core interfaces should we define some kind of DOMUtility interface which could be optional?

Type Definition *DOMKey*

A `DOMKey` [p.9] is a unique key generated by the DOM implementation to uniquely identify DOM nodes.

IDL Definition

```
typedef Object DOMKey;
```

Interface *Entity3*

This interface extends the `Entity` interface with additional attributes to provide information on the text declaration of external parsed entities.

IDL Definition

```
interface Entity3 : Entity {
           attribute DOMString        actualEncoding;
           attribute DOMString        encoding;
           attribute DOMString        version;
};
```

Attributes

`actualEncoding` of type `DOMString`
: An attribute specifying the actual encoding of this entity, when it is an external parsed entity. This is `null` otherwise.

`encoding` of type `DOMString`
: An attribute specifying, as part of the text declaration, the encoding of this entity, when it is an external parsed entity. This is `null` otherwise.

`version` of type `DOMString`
: An attribute specifying, as part of the text declaration, the version number of this entity, when it is an external parsed entity. This is `null` otherwise.

Interface *Document3*

This interface extends the `Document` interface with additional attributes and methods.

IDL Definition

```
interface Document3 : Document {
           attribute DOMString        actualEncoding;
           attribute DOMString        encoding;
           attribute boolean          standalone;
           attribute boolean          strictErrorChecking;
           attribute DOMString        version;
  Node               adoptNode(in Node source)
                                        raises(DOMException);
};
```

Attributes

`actualEncoding` of type `DOMString`
: An attribute specifying the actual encoding of this document. This is `null` otherwise.

`encoding` of type `DOMString`
: An attribute specifying, as part of the XML declaration, the encoding of this document. This is `null` when unspecified.

`standalone` of type `boolean`
: An attribute specifying, as part of the XML declaration, whether this document is standalone.

`strictErrorChecking` of type `boolean`
: An attribute specifying whether errors checking is enforced or not. When set to `false`, the implementation is free to not test every possible error case normally defined on DOM operations, and not raise any `DOMException`. In case of error, the behavior is undefined. This attribute is `true` by defaults.

`version` of type `DOMString`
: An attribute specifying, as part of the XML declaration, the version number of this document. This is `null` when unspecified.

Methods

`adoptNode`
: Changes the `ownerDocument` of a node, its children, as well as the attached attribute nodes if there are any. If the node has a parent it is first removed from its parent child list. This effectively allows moving a subtree from one document to another. The following list describes the specifics for each type of node.

  ATTRIBUTE_NODE
  : The `ownerElement` attribute is set to `null` and the `specified` flag is set to `true` on the adopted `Attr`. The descendants of the source `Attr` are recursively adopted.

  DOCUMENT_FRAGMENT_NODE
  : The descendants of the source node are recursively adopted.

  DOCUMENT_NODE
  : `Document` nodes cannot be adopted.

  DOCUMENT_TYPE_NODE
  : `DocumentType` nodes cannot be adopted.

ELEMENT_NODE
Specified attribute nodes of the source element are adopted, and the generated `Attr` nodes. Default attributes are discarded, though if the document being adopted into defines default attributes for this element name, those are assigned. The descendants of the source element are recursively adopted.

ENTITY_NODE
`Entity` nodes cannot be adopted.

ENTITY_REFERENCE_NODE
Only the `EntityReference` node itself is adopted, the descendants are discarded, since the source and destination documents might have defined the entity differently. If the document being imported into provides a definition for this entity name, its value is assigned.

NOTATION_NODE
`Notation` nodes cannot be adopted.

PROCESSING_INSTRUCTION_NODE, TEXT_NODE, CDATA_SECTION_NODE, COMMENT_NODE
These nodes can all be adopted. No specifics.

Issue adoptNode-1:
Should this method simply return null when it fails? How "exceptional" is failure for this method?
Resolution: Stick with raising exceptions only in exceptional circumstances, return null on failure (F2F 19 Jun 2000).

Issue adoptNode-2:
Can an entity node really be adopted?
Resolution: No, neither can Notation nodes (Telcon 13 Dec 2000).

Issue adoptNode-3:
Does this affect keys and hashCode's of the adopted subtree nodes?
If so, what about readonly-ness of key and hashCode?
if not, would appendChild affect keys/hashCodes or would it generate exceptions if key's are duplicate?

Parameters

`source` of type `Node`
The node to move into this document.

Return Value

`Node`	The adopted node, or `null` if this operation fails, such as when the source node comes from a different implementation.

Exceptions

`DOMException`	NOT_SUPPORTED_ERR: Raised if the source node is of type `DOCUMENT`, `DOCUMENT_TYPE`. NO_MODIFICATION_ALLOWED_ERR: Raised when the source node is readonly.

Interface *Node3*

This interface extends the `Node` interface with several new methods. One allows to compare a node against another with regard to document order. Another methode allows to retrieve the content of a node and its descendants as a single DOMString. One allows to test whether two nodes are the same. Two methods provide for searching the namespace URI associated to a given prefix and to ensure the document is "namespace wellformed". Finally, it also provides a new attribute to get the base URI of a node, as defined in the XML Infoset.

Issue namespace-wellformed:

The term *namespace wellformed* needs to be defined.

Resolution: Define it as "being conformant to the Namespaces in XML spec" in the glossary (Telcon 4 Jul 2000).

IDL Definition

```
interface Node3 {
  readonly attribute DOMString        baseURI;

  typedef enum _DocumentOrder {
    DOCUMENT_ORDER_PRECEDING,
    DOCUMENT_ORDER_FOLLOWING,
    DOCUMENT_ORDER_SAME,
    DOCUMENT_ORDER_UNORDERED
  };
 DocumentOrder;
  DocumentOrder      compareDocumentOrder(in Node other)
                                          raises(DOMException);

  typedef enum _TreePosition {
    TREE_POSITION_PRECEDING,
    TREE_POSITION_FOLLOWING,
    TREE_POSITION_ANCESTOR,
    TREE_POSITION_DESCENDANT,
    TREE_POSITION_SAME,
    TREE_POSITION_UNORDERED
  };
 TreePosition;
  TreePosition       compareTreePosition(in Node other)
                                           raises(DOMException);
           attribute DOMString        textContent;
  boolean            isSameNode(in Node other);
  DOMString          lookupNamespacePrefix(in DOMString namespaceURI);
  DOMString          lookupNamespaceURI(in DOMString prefix);
  void               normalizeNS();
  readonly attribute DOMKey           key;
  boolean            equalsNode(in Node arg,
                                in boolean deep);
};
```

Type Definition *DocumentOrder*

A type to hold the document order of a node relative to another node.

Enumeration *_DocumentOrder*

An enumeration of the different orders the node can be in.

Enumerator Values

DOCUMENT_ORDER_PRECEDING	The node preceds the reference node in document order.
DOCUMENT_ORDER_FOLLOWING	The node follows the reference node in document order.
DOCUMENT_ORDER_SAME	The two nodes have the same document order.
DOCUMENT_ORDER_UNORDERED	The two nodes are unordered, they do not have any common ancestor.

Type Definition *TreePosition*

A type to hold the relative tree position of a node with respect to another node.

Enumeration *_TreePosition*

An enumeration of the different orders the node can be in.

Enumerator Values

TREE_POSITION_PRECEDING	The node preceds the reference node.
TREE_POSITION_FOLLOWING	The node follows the reference node.
TREE_POSITION_ANCESTOR	The node is an ancestor of the reference node.
TREE_POSITION_DESCENDANT	The node is a descendant of the reference node.
TREE_POSITION_SAME	The two nodes have the same position.
TREE_POSITION_UNORDERED	The two nodes are unordered, they do not have any common ancestor.

Attributes

`baseURI` of type `DOMString`, readonly

Returns the absolute base URI of this node.

Issue baseURI-1:

How will this be affected by resolution of relative namespace URIs issue?

Issue baseURI-2:

Should this only be on Document, Element, ProcessingInstruction, Entity, and Notation nodes, according to the infoset? If not, what is it equal to on other nodes? Null? An empty string?

Issue baseURI-3:

Should this be read-only and computed or and actual read-write attribute?
Resolution: The former (F2F 19 Jun 2000).

`key` of type `DOMKey` [p.9] , readonly

This attribute returns a unique key identifying this node.

Issue key-1:

What type should this really be?
Resolution: DOMKey, mapped to Object in Java and Number in ECMAScript (Telcon 13 Dec 2000).

Issue key-2:

In what space is this key unique (Document, DOMImplementation)?

Issue key-3:

What is the lifetime of the uniqueness of this key (Node, Document, ...)?

`textContent` of type `DOMString`

This attribute returns the text content of this node and its descendants. When set, any possible children this node may have are removed and replaced by a single `Text` node containing the string this attribute is set to. On getting, no serialization is performed, the returned string does not contain any markup. Similarly, on setting, no parsing is performed either, the input string is taken as pure textual content.
The string returned is made of the text content of this node depending on its type, as defined below:

Node type	Content
ELEMENT_NODE, ENTITY_NODE, ENTITY_REFERENCE_NODE, DOCUMENT_NODE, DOCUMENT_FRAGMENT_NODE	concatenation of the `textContent` attribute value of every child node, excluding COMMENT_NODE and PROCESSING_INSTRUCTION_NODE nodes
ATTRIBUTE_NODE, TEXT_NODE, CDATA_SECTION_NODE, COMMENT_NODE, PROCESSING_INSTRUCTION_NODE	`nodeValue`
DOCUMENT_TYPE_NODE, NOTATION_NODE	*empty string*

Issue textContent-1:
Should any whitespace normalization be performed?
Issue textContent-2:
Should this be two methods instead?
Issue textContent-3:
What about the name?
Issue textContent-4:
Should this be optional? If yes, how do we signal it is not supported?

Methods

`compareDocumentOrder`

Compares a node with this node with regard to document order.
Issue compareOrder-1:
Should an exception be raised when comparing attributes? Entities and notations? An element against an attribute? If yes, which one? HIERARCHY_REQUEST_ERR? Should the enum value "unordered" be killed then?
Resolution: No, return unordered for attributes (F2F 19 Jun 2000).
Issue compareOrder-2:
Should this method be moved to Node and take only one node in argument?
Resolution: Yes (F2F 19 Jun 2000).
Issue compareOrder-3:
Should this method be optional?

Parameters

`other` of type `Node`
The node to compare against this node.

Return Value

`DocumentOrder` [p.12]	Returns how the given node compares with this node in document order.

Exceptions

`DOMException`	WRONG_DOCUMENT_ERR: Raised if the given node does not belong to the same document as this node.

`compareTreePosition`

Compares a node with this node with regard to their position in the tree.
Issue compareTreePosition-1:
Should this method be optional?

Parameters

`other` of type `Node`
The node to compare against this node.

Return Value

`TreePosition` [p.13]	Returns how the given node is positioned relatively to this node.

Exceptions

`DOMException`	WRONG_DOCUMENT_ERR: Raised if the given node does not belong to the same document as this node.

`equalsNode`

Tests whether two nodes are equal.

This method tests for equality of nodes, not sameness (i.e., whether the two nodes are exactly the same object) which can be tested with `Node.isSameNode`. All objects that are the same will also be equal, though the reverse may not be true.

Issue equalsNode-1:

Should this be optional?

Parameters

`arg` of type `Node`

The node to compare equality with.

`deep` of type `boolean`

If `true`, recursively compare the subtrees; if `false`, compare only the nodes themselves (and its attributes, if it is an `Element`).

Return Value

`boolean`	If the nodes, and possibly subtrees are equal, `true` otherwise `false`.

No Exceptions

`isSameNode`

Returns whether this node is the same node as the given one.

Issue isSameNode-1:

Do we really want to make this different from equals?

Resolution: Yes, change name from isIdentical to isSameNode. (Telcon 4 Jul 2000).

Issue isSameNode-2:

Is this really needed if we provide a unique key?

Parameters

`other` of type `Node`

The node to test against.

Return Value

`boolean`	Returns `true` if the nodes are the same, `false` otherwise.

No Exceptions

`lookupNamespacePrefix`

Look up the prefix associated to the given namespace URI, starting from this node.

Issue lookupNamespacePrefix-1:

Should this be optional?

Parameters

`namespaceURI` of type `DOMString`
The namespace URI to look for.

Return Value

`DOMString`	Returns the associated namespace prefix or `null` if none is found.

No Exceptions

`lookupNamespaceURI`
Look up the namespace URI associated to the given prefix, starting from this node.
Issue lookupNamespaceURI-1:
Name? May need to change depending on ending of the relative namespace URI reference nightmare.
Issue lookupNamespaceURI-2:
Should this be optional?

Parameters

`prefix` of type `DOMString`
The prefix to look for.

Return Value

`DOMString`	Returns the associated namespace URI or `null` if none is found.

No Exceptions

`normalizeNS`
This method walks down the tree, starting from this node, and adds namespace declarations where needed so that every namespace being used is properly declared. It also changes or assign prefixes when needed. This effectively makes this node subtree is "namespace wellformed".
What the generated prefixes are and/or how prefixes are changed to achieve this is implementation dependent.
Issue normalizeNS-1:
Any other name?
Issue normalizeNS-2:
How specific should this be? Should we not even specify that this should be done by walking down the tree?
Issue normalizeNS-3:
What does this do on attribute nodes?
Resolution: Doesn't do anything (F2F 1 Aug 2000).
Issue normalizeNS-4:
How does it work with entity reference subtree which may be broken?
Resolution: This doesn't affect entity references which are not visited in this operation (F2F 1 Aug 2000).
Issue normalizeNS-5:
Should this be really be on Node?
Resolution: Yes, but this only works on Document, Element, and DocumentFragment. On other types it is a no-op. (F2F 1 Aug 2000).

Issue normalizeNS-6:
What happens with read-only nodes?
Issue normalizeNS-7:
What/how errors should be reported? Are there any?
Issue normalizeNS-8:
Should this be optional?
No Parameters
No Return Value
No Exceptions

Interface *Text3*

This interface extends the `Text` interface with a new attribute that allows one to find out whether a `Text` node only contains whitespace in element content.

IDL Definition

```
interface Text3 : Text {
  readonly attribute boolean          isWhitespaceInElementContent;
};
```

Attributes

`isWhitespaceInElementContent` of type `boolean`, readonly
Returns whether this text node contains whitespace in element content, often abusively called "ignorable whitespace".

Note: An implementation can only return `true` if, one way or another, it has access to the relevant information (e.g., the DTD or schema).

1.2. DOM Level 3 Java Binding Extension

Because the DOM only defines interfaces, applications have to rely on some "proprietary" API to start from. Typically, a Java application starts with a line of code such as:

```
DOMImplementation impl = org.apache.xerces.dom.DOMImplementationImpl.getDOMImplementation();
```

Since there is no language independent way of "bootstrapping" a DOM implementation, this section describes a solution for Java. Hopefully, similar solutions could be defined for other language bindings.

The following defines a Java class called `DOMImplementationFactory` which provides with a static method to get a reference to a DOMImplementation. The actual class to be returned by `getDOMImplementation` can be specified by the application or the implementation, depending on the context, through the Java system property "org.w3c.dom.DOMImplementation". In addition, an implementation can provide its own version of this class, *with the same class name and package name*, in order to set the default name to the desired value.

```
package org.w3c.dom;

public abstract class DOMImplementationFactory {
```

```
    // The system property to specify the DOMImplementation class name.
    private static String property = "org.w3c.dom.DOMImplementation";

    // The default DOMImplementation class name to use.
    private static String defaultImpl = "NO DEFAULT IMPLEMENTATION SET";

    /**
     * Returns a DOMImplementation
     **/
    public static DOMImplementation getDOMImplementation()
        throws ClassNotFoundException, InstantiationException,
               IllegalAccessException, ClassCastException
    {
        // Retrieve the system property
        String impl;
        try {
            impl = System.getProperty(property, defaultImpl);
        } catch (SecurityException e) {
        // fallback on default implementation in case of security pb
        impl = defaultImpl;
        }

        // Attempt to load, instantiate and return the implementation class
        return (DOMImplementation) Class.forName(impl).newInstance();
    }
}
```

With this, the first line of an application typically becomes something like:

```
DOMImplementation impl = DOMImplementationFactory.getDOMImplementation();
```

Issue Level-3-Java-Bootstrap-1:
Should this provides for handling more than one implementation at a time?

Issue Level-3-Java-Bootstrap-2:
Should this be even simpler and force the implementation to provide this class (and not necessarily rely on any system property)?

Appendix A: IDL Definitions

This appendix contains the complete OMG IDL [OMGIDL] for the Level 3 Document Object Model Core definitions.

The IDL files are also available as:
http://www.w3.org/TR/2001/WD-DOM-Level-3-Core-20010126/idl.zip

dom.idl:

```
// File: dom.idl

#ifndef _DOM_IDL_
#define _DOM_IDL_

#pragma prefix "w3c.org"
module dom
{

  typedef   Object DOMKey;


  interface Node3 {
    readonly attribute DOMString        baseURI;

    typedef enum _DocumentOrder {
      DOCUMENT_ORDER_PRECEDING,
      DOCUMENT_ORDER_FOLLOWING,
      DOCUMENT_ORDER_SAME,
      DOCUMENT_ORDER_UNORDERED
    };
 DocumentOrder;
    DocumentOrder      compareDocumentOrder(in Node other)
                                       raises(DOMException);

    typedef enum _TreePosition {
      TREE_POSITION_PRECEDING,
      TREE_POSITION_FOLLOWING,
      TREE_POSITION_ANCESTOR,
      TREE_POSITION_DESCENDANT,
      TREE_POSITION_SAME,
      TREE_POSITION_UNORDERED
    };
 TreePosition;
    TreePosition       compareTreePosition(in Node other)
                                       raises(DOMException);
             attribute DOMString        textContent;
    boolean            isSameNode(in Node other);
    DOMString          lookupNamespacePrefix(in DOMString namespaceURI);
    DOMString          lookupNamespaceURI(in DOMString prefix);
    void               normalizeNS();
    readonly attribute DOMKey          key;
    boolean            equalsNode(in Node arg,
                                  in boolean deep);
```

```
  };

  interface Entity3 : Entity {
             attribute DOMString        actualEncoding;
             attribute DOMString        encoding;
             attribute DOMString        version;
  };

  interface Document3 : Document {
             attribute DOMString        actualEncoding;
             attribute DOMString        encoding;
             attribute boolean          standalone;
             attribute boolean          strictErrorChecking;
             attribute DOMString        version;
    Node               adoptNode(in Node source)
                                        raises(DOMException);
  };

  interface Text3 : Text {
    readonly attribute boolean          isWhitespaceInElementContent;
  };
};

#endif // _DOM_IDL_
```

Appendix B: Java Language Binding

This appendix contains the complete Java [Java] bindings for the Level 3 Document Object Model Core.

The Java files are also available as
http://www.w3.org/TR/2001/WD-DOM-Level-3-Core-20010126/java-binding.zip

org/w3c/dom/Entity3.java:

```
package org.w3c.dom;


public interface Entity3 extends Entity {
    public String getActualEncoding();
    public void setActualEncoding(String actualEncoding);

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

    public String getVersion();
    public void setVersion(String version);

}
```

org/w3c/dom/Document3.java:

```
package org.w3c.dom;


public interface Document3 extends Document {
    public String getActualEncoding();
    public void setActualEncoding(String actualEncoding);

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

    public boolean getStandalone();
    public void setStandalone(boolean standalone);

    public boolean getStrictErrorChecking();
    public void setStrictErrorChecking(boolean strictErrorChecking);

    public String getVersion();
    public void setVersion(String version);

    public Node adoptNode(Node source)
                          throws DOMException;

}
```

org/w3c/dom/Node3.java:

```
package org.w3c.dom;


public interface Node3 {
    public String getBaseURI();


    public static final int DOCUMENT_ORDER_PRECEDING= 1;
    public static final int DOCUMENT_ORDER_FOLLOWING= 2;
    public static final int DOCUMENT_ORDER_SAME= 3;
    public static final int DOCUMENT_ORDER_UNORDERED= 4;

    public int compareDocumentOrder(Node other)
                                    throws DOMException;


    public static final int TREE_POSITION_PRECEDING= 1;
    public static final int TREE_POSITION_FOLLOWING= 2;
    public static final int TREE_POSITION_ANCESTOR= 3;
    public static final int TREE_POSITION_DESCENDANT= 4;
    public static final int TREE_POSITION_SAME= 5;
    public static final int TREE_POSITION_UNORDERED= 6;

    public int compareTreePosition(Node other)
                                   throws DOMException;

    public String getTextContent();
    public void setTextContent(String textContent);

    public boolean isSameNode(Node other);

    public String lookupNamespacePrefix(String namespaceURI);

    public String lookupNamespaceURI(String prefix);

    public void normalizeNS();

    public Object getKey();

    public boolean equalsNode(Node arg,
                              boolean deep);

}
```

org/w3c/dom/Text3.java:

```
package org.w3c.dom;


public interface Text3 extends Text {
    public boolean getIsWhitespaceInElementContent();

}
```

Appendix C: ECMA Script Language Binding

This appendix contains the complete ECMA Script [ECMAScript] binding for the Level 3 Document Object Model Core definitions.

Object **Entity3**

Entity3 has the all the properties and methods of the **Entity** object as well as the properties and methods defined below.

The **Entity3** object has the following properties:

actualEncoding

This property is of type **String**.

encoding

This property is of type **String**.

version

This property is of type **String**.

Object **Document3**

Document3 has the all the properties and methods of the **Document** object as well as the properties and methods defined below.

The **Document3** object has the following properties:

actualEncoding

This property is of type **String**.

encoding

This property is of type **String**.

standalone

This property is of type **Boolean**.

strictErrorChecking

This property is of type **Boolean**.

version

This property is of type **String**.

The **Document3** object has the following methods:

adoptNode(source)

This method returns a **Node** object.

The **source** parameter is a **Node** object.

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

Object **Node3**

The **Node3** object has the following properties:

baseURI

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

textContent

This property is of type **String**.

key

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

The **Node3** object has the following methods:

compareDocumentOrder(other)

This method returns a **DocumentOrder** object.

The **other** parameter is a **Node** object.

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

compareTreePosition(other)

This method returns a **TreePosition** object.

The **other** parameter is a **Node** object.

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

isSameNode(other)

This method returns a **Boolean**.

The **other** parameter is a **Node** object.

lookupNamespacePrefix(namespaceURI)

This method returns a **String**.

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

lookupNamespaceURI(prefix)

This method returns a **String**.

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

normalizeNS()

This method has no return value.

equalsNode(arg, deep)

This method returns a **Boolean**.

The **arg** parameter is a **Node** object.

The **deep** parameter is of type **Boolean**.

Object **Text3**

Text3 has the all the properties and methods of the **Text** object as well as the properties and methods defined below.

The **Text3** object has the following properties:

isWhitespaceInElementContent

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

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

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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 at http://sisyphus.omg.org/technology/documents/formal/corba_2.htm

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