Document Object Model (DOM) Level 3 XPath Specification

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Abstract

This specification defines the Document Object Model Level 3 XPath. It provides simple functionalities to access a DOM tree using [XPath 1.0]. This module builds on top of the Document Object Model Level 3 Core [DOM Level 3 Core].

Status of this document

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

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Table of contents

Expanded Table of Contents 3
Copyright Notice 5

1. Document Object Model XPath 9

Appendix A: IDL Definitions 21
Appendix B: Java Language Binding 25
Appendix C: ECMAScript Language Binding 29
Appendix D: Acknowledgements 33
Glossary 35
References 37
Index 39

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

1. Document Object Model XPath 9
1.1. Introduction 9
1.2. Mapping DOM to XPath 9
1.2.1. Text Nodes 9
1.2.2. Namespace Nodes 9
1.2.3. Document order 9
1.3. Interfaces 10

Appendix A: IDL Definitions 21
Appendix B: Java Language Binding 25
B.1. Other XPath interfaces 25
Appendix C: ECMAScript Language Binding 29
Appendix D: Acknowledgements 33
D.1. Production Systems 33
Glossary 35
References 37
1. Normative references 37
2. Informative references 37
Index 39

Expanded Table of Contents

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1. Document Object Model XPath

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1.1. Introduction

XPath 1.0 [XPath 1.0] is becoming an important part of a variety of many specifications including XForms, XPointer, XSL, XML Query, and so on. It is also a clear advantage for user applications which use DOM to be able to use XPath expressions to locate nodes automatically and declaratively. But *liveness* [p.35] issues have plagued each attempt to get a list of DOM nodes matching specific criteria, as would be expected for an XPath *API* [p.35] . There have also traditionally been *model* [p.35] mismatches between DOM and XPath. This proposal specifies new interfaces and approaches to resolving these issues.

1.2. Mapping DOM to XPath

This section considers the differences between the Document Object Model [DOM Level 3 Core] and the XPath 1.0 model [XPath 1.0].

1.2.1. Text Nodes

The XPath model relies on the XML Information Set [XML Information set] ands represents *Character Information Items* in a single logical text node where DOM may have multiple fragmented `Text` nodes due to cdata sections, entity references, etc. Instead of returning multiple nodes where XPath sees a single logical text node, only the first non-empty DOM `Text` or `CDATASection` node of any logical XPath text will be returned in the node set. Applications using XPath in an environment with fragmented text nodes must manually gather the text of a single logical text node possibly from multiple nodes beginning with the first `Text` node or `CDATASection` node returned by the implementation.

Note: In an attempt to better implement the XML Information Set, DOM Level 3 Core [DOM Level 3 Core] adds the attribute `wholeText` on the `Text` interface for retrieving the whole text for *logically-adjacent Text nodes* [p.35] and the method `replaceWholeText` for replacing those nodes.

1.2.2. Namespace Nodes

The XPath model expects namespace nodes for each in-scope namespace to be attached to each *element* [p.35] . DOM and certain other W3C Information Set conformant implementations only maintain the declaration of namespaces instead of replicating them on each `Element` where they are in-scope. The DOM implementation of XPath returns a new node of type `XPATH_NAMESPACE_NODE`, defined in the `XPathNamespace` [p.19] interface, to properly preserve identity and ordering. This node type is only visible using the XPath evaluation methods.

1.2.3. Document order

The *document order* [p.35] of nodes in the DOM Core has been defined to be compatible with the *XPath document order*. The XPath DOM is extending the document order of the DOM Core to include the `XPathNamespace` [p.19] nodes. Element nodes occur before their children. The attribute nodes and namespace nodes of an element occur before the children of the element. The namespace nodes are defined to occur before the attribute nodes. The relative order of namespace nodes is implementation-dependent. The relative order of attribute nodes is implementation-dependent. The `compareTreePosition` method on the `Node` interface defined in the DOM Core must compare the `XPathNamespace` nodes using this extending document order if the XPath DOM module is supported.

1.3. Interfaces

A DOM application may use the `hasFeature(feature, version)` method of the `DOMImplementation` interface with parameter values "XPath" and "3.0" (respectively) to determine whether or not the event module is supported by the implementation. In order to fully support this module, an implementation must also support the "Core" feature defined in the DOM Level 3 Core specification [DOM Level 3 Core]. Please, refer to additional information about conformance in the DOM Level 3 Core specification [DOM Level 3 Core].

Exception *XPathException*

A new exception has been created for exceptions specific to these XPath interfaces.

IDL Definition

```
exception XPathException {
  unsigned short   code;
};
// XPathExceptionCode
const unsigned short      INVALID_EXPRESSION_ERR         = 1;
const unsigned short      TYPE_ERR                       = 2;
```

Definition group *XPathExceptionCode*

Defined Constants

`INVALID_EXPRESSION_ERR`

If the expression is not a legal expression according to the rules of the specific `XPathEvaluator` [p.10] . If the `XPathEvaluator` was obtained by casting the document, the expression must be XPath 1.0 with no special extension functions.

`TYPE_ERR`

If the expression cannot be converted to return the specified type.

Interface *XPathEvaluator*

The evaluation of XPath expressions is provided by `XPathEvaluator`, which will provide evaluation of XPath 1.0 expressions with no specialized extension functions or variables. It is expected that the `XPathEvaluator` interface will be implemented on the same object which implements the `Document` interface in an implementation which supports the XPath DOM module. `XPathEvaluator` implementations may be available from other sources that may provide support

for new versions of XPath or special extension functions or variables which are not defined in this specification.

IDL Definition

```
interface XPathEvaluator {
  XPathExpression    createExpression(in DOMString expression,
                                      in XPathNSResolver resolver)
                                        raises(XPathException,
                                               DOMException);
  XPathResult        createResult();
  XPathNSResolver    createNSResolver(in Node nodeResolver);
  XPathResult        evaluate(in DOMString expression,
                              in Node contextNode,
                              in XPathNSResolver resolver,
                              in unsigned short type,
                              in XPathResult result)
                                        raises(XPathException,
                                               DOMException);
};
```

Methods

`createExpression`

Creates a parsed XPath expression with resolved namespaces. This is useful when an expression will be reused in an application since it makes it possible to compile the expression string into a more efficient internal form and preresolve all *namespace prefixes* [p.35] which occur within the expression.

Parameters

`expression` of type `DOMString`

The XPath expression string to be parsed.

`resolver` of type `XPathNSResolver` [p.14]

The `resolver` permits translation of prefixes within the XPath expression into appropriate *namespace URIs* [p.35] . If this is specified as null, any *namespace prefix* [p.35] within the expression will result in `DOMException` being thrown with the code `NAMESPACE_ERR`.

Return Value

`XPathExpression` [p.13]	The compiled form of the XPath expression.

Exceptions

`XPathException` [p.10]	INVALID_EXPRESSION_ERR: Raised if the expression is not legal according to the rules of the `XPathEvaluatori`
`DOMException`	NAMESPACE_ERR: Raised if the expression contains *namespace prefixes* [p.35] which cannot be resolved by the specified `XPathNSResolver` [p.14] .

`createNSResolver`

Adapts any DOM node to resolve namespaces so that an XPath expression can be easily evaluated relative to the context of the node where it appeared within the document. This adapter works by calling the method `lookupNamespacePrefix` on `Node`.

Parameters

`nodeResolver` of type `Node`

The node to be used as a context for namespace resolution.

Return Value

`XPathNSResolver` [p.14]	`XPathNSResolver` which resolves namespaces with respect to the definitions in scope for a specified node.

No Exceptions

`createResult`

Creates an `XPathResult` [p.15] object which may be passed as a parameter to the evaluation methods of this `XPathEvaluator` so that a new one is not created on each call to an evaluation method.

Return Value

`XPathResult` [p.15]	An empty `XPathEvaluator` with type `ANY_TYPE`.

No Parameters

No Exceptions

`evaluate`

Evaluates an XPath expression string and returns a result of the specified type if possible.

Parameters

`expression` of type `DOMString`

The XPath expression string to be parsed and evaluated.

`contextNode` of type `Node`

The `context` is context node for the evaluation of this XPath expression. If the XPathEvaluator was obtained by casting the `Document` then this must be owned by the same document and must be a `Document`, `Element`, `Attribute`, `Text`, `CDATASection`, `Comment`, `ProcessingInstruction`, or `XPathNamespace` [p.19] node. If the context node is a `Text` or a `CDATASection`, then the context is interpreted as the whole logical text node as seen by XPath, unless the node is empty in which case it may not serve as the XPath context.

`resolver` of type `XPathNSResolver` [p.14]

The `resolver` permits translation of prefixes within the XPath expression into appropriate *namespace URIs* [p.35] . If this is specified as null, any *namespace prefix* [p.35] within the expression will result in `DOMException` being thrown with the code `NAMESPACE_ERR`.

`type` of type `unsigned short`

If a specific `type` is specified, then the result will be coerced to return the specified type relying on XPath conversions and fail if the desired coercion is not possible. This

must be one of the type codes of `XPathResult` [p.15] .

`result` of type `XPathResult` [p.15]

The `result` specifies a specific `XPathResult` to be reused and returned by this method. If this is specified as null, a new `XPathResult` will be constructed and returned. Any `XPathResult` which was not created by this `XPathEvaluator` may be ignored as though a null were passed as the parameter.

Return Value

`XPathResult` [p.15]	The result of the evaluation of the XPath expression.

Exceptions

`XPathException` [p.10]	INVALID_EXPRESSION_ERR: Raised if the expression is not legal according to the rules of the `XPathEvaluator`i
	TYPE_ERR: Raised if the result cannot be converted to return the specified type.
`DOMException`	NAMESPACE_ERR: Raised if the expression contains *namespace prefixes* [p.35] which cannot be resolved by the specified `XPathNSResolver` [p.14] .
	WRONG_DOCUMENT_ERR: The Node is from a document that is not supported by this XPathEvaluator.
	NOT_SUPPORTED_ERR: The Node is not a type permitted as an XPath context node.

Interface *XPathExpression*

The `XPathExpression` interface represents a parsed and resolved XPath expression.

IDL Definition

```
interface XPathExpression {
  XPathResult        evaluate(in Node contextNode,
                              in unsigned short type,
                              in XPathResult result)
                                        raises(XPathException,
                                               DOMException);
};
```

Methods

`evaluate`

Evaluates this XPath expression and returns a result.

Parameters

`contextNode` of type `Node`
: The `context` is context node for the evaluation of this XPath expression.
If the XPathEvaluator was obtained by casting the `Document` then this must be owned by the same document and must be a `Document`, `Element`, `Attribute`, `Text`, `CDATASection`, `Comment`, `ProcessingInstruction`, or `XPathNamespace` [p.19] node.
If the context node is a `Text` or a `CDATASection`, then the context is interpreted as the whole logical text node as seen by XPath, unless the node is empty in which case it may not serve as the XPath context.

`type` of type `unsigned short`
: If a specific `type` is specified, then the result will be coerced to return the specified type relying on XPath conversions and fail if the desired coercion is not possible. This must be one of the type codes of `XPathResult` [p.15] .

`result` of type `XPathResult` [p.15]
: The `result` specifies a specific `XPathResult` to be reused and returned by this method. If this is specified as null, a new `XPathResult` will be constructed and returned. Any `XPathResult` which was not created by this `XPathEvaluator` [p.10] may be ignored as though a null were passed as the parameter.

Return Value

`XPathResult` [p.15]	The result of the evaluation of the XPath expression.

Exceptions

`XPathException` [p.10]	TYPE_ERR: Raised if the result cannot be converted to return the specified type.
`DOMException`	WRONG_DOCUMENT_ERR: The Node is from a document that is not supported by the XPathExpression that created this `XPathExpression`. NOT_SUPPORTED_ERR: The Node is not a type permitted as an XPath context node.

Interface *XPathNSResolver*

The `XPathNSResolver` interface permit `prefix` strings in the expression to be properly bound to `namespaceURI` strings. `XPathEvaluator` [p.10] can construct an implementation of `XPathNSResolver` from a node, or the interface may be implemented by any application.

IDL Definition

```
interface XPathNSResolver {
  DOMString          lookupNamespaceURI(in DOMString prefix);
};
```

Methods

`lookupNamespaceURI`

Look up the *namespace URI* [p.35] associated to the given *namespace prefix* [p.35] . The XPath evaluator must never call this with a `null` or empty argument, because the result of doing this is undefined.

Parameters

`prefix` of type `DOMString`

The prefix to look for.

Return Value

`DOMString`	Returns the associated *namespace URI* [p.35] or `null` if none is found.

No Exceptions

Interface *XPathResult*

The `XPathResult` interface represents the result of the evaluation of an XPath expression within the context of a particular node. Since evaluation of an XPath expression can result in various result types, this object makes it possible to discover and manipulate the type and value of the result.

IDL Definition

```
interface XPathResult {

  // XPathResultType
  const unsigned short      ANY_TYPE                      = 0;
  const unsigned short      NUMBER_TYPE                   = 1;
  const unsigned short      STRING_TYPE                   = 2;
  const unsigned short      BOOLEAN_TYPE                  = 3;
  const unsigned short      NODE_SET_TYPE                 = 4;
  const unsigned short      SINGLE_NODE_TYPE              = 5;

  readonly attribute unsigned short  resultType;
  readonly attribute double          numberValue;
                                        // raises(XPathException) on retrieval

  readonly attribute DOMString       stringValue;
                                        // raises(XPathException) on retrieval

  readonly attribute boolean         booleanValue;
                                        // raises(XPathException) on retrieval

  readonly attribute Node            singleNodeValue;
                                        // raises(XPathException) on retrieval

  XPathSetIterator   getSetIterator(in boolean ordered)
                                        raises(XPathException,
                                               DOMException);
  XPathSetSnapshot   getSetSnapshot(in boolean ordered)
                                        raises(XPathException,
                                               DOMException);
};
```

Definition group *XPathResultType*

An integer indicating what type of result this is.

Defined Constants

`ANY_TYPE`
: This code does not represent a specific type. An evaluation of an XPath expression will never produce this type. If this type is requested, then the evaluation must return whatever type naturally results from evaluation of the expression.

`BOOLEAN_TYPE`
: The result is a boolean as defined by XPath 1.0.

`NODE_SET_TYPE`
: The result is a node set as defined by XPath 1.0.

`NUMBER_TYPE`
: The result is a number as defined by XPath 1.0.

`SINGLE_NODE_TYPE`
: The result is a single node, which may be any node of the node set defined by XPath 1.0, or null if the node set is empty. This is a convenience that permits optimization where the caller knows that no more than one such node exists because evaluation can stop after finding the one node of an expression that would otherwise return a node set (of type `NODE_SET_TYPE`).
Where it is possible that multiple nodes may exist and the first node in document order is required, a `NODE_SET_TYPE` should be processed using an ordered iterator, because there is no order guarantee for a single node.

`STRING_TYPE`
: The result is a string as defined by XPath 1.0.

Attributes

`booleanValue` of type `boolean`, readonly
: The value of this boolean result.
Exceptions on retrieval

`XPathException` [p.10]	TYPE_ERR: raised if `resultType` is not `BOOLEAN_TYPE`.

`numberValue` of type `double`, readonly
: The value of this number result.
Exceptions on retrieval

`XPathException` [p.10]	TYPE_ERR: raised if `resultType` is not `NUMBER_TYPE`.

`resultType` of type `unsigned short`, readonly
: A code representing the type of this result, as defined by the type constants.

`singleNodeValue` of type `Node`, readonly
: The value of this single node result, which may be null. This result is not guaranteed to be the first node in document order where the expression evaluates to multiple nodes.

Exceptions on retrieval

`XPathException` [p.10]	TYPE_ERR: raised if `resultType` is not `SINGLE_NODE_TYPE`.

`stringValue` of type `DOMString`, readonly
The value of this string result.
Exceptions on retrieval

`XPathException` [p.10]	TYPE_ERR: raised if `resultType` is not `STRING_TYPE`.

Methods

`getSetIterator`
Creates an `XPathSetIterator` [p.18] which may be used to iterate over the nodes of the set of this result.
Parameters
`ordered` of type `boolean`
The set must be iterated in document order.
Return Value

`XPathSetIterator` [p.18]	An `XPathSetIterator` which may be used to iterate the node set.

Exceptions

`XPathException` [p.10]	TYPE_ERR: raised if `resultType` is not `NODE_SET_TYPE`.
`DOMException`	INVALID_STATE_ERR: The document has been mutated since the result was returned.

`getSetSnapshot`
Creates an `XPathSetSnapshot` [p.18] which lists the nodes of the set of this result. Unlike an iterator, after the snapshot has been requested, document mutation does not invalidate it.
Parameters
`ordered` of type `boolean`
The set must be listed in document order.
Return Value

`XPathSetSnapshot` [p.18]	An `XPathSetSnapshot` which may be used to list the node set.

Exceptions

`XPathException` [p.10]	TYPE_ERR: raised if `resultType` is not NODE_SET_TYPE.
`DOMException`	INVALID_STATE_ERR: The document has been mutated since the result was returned.

Interface *XPathSetIterator*

The `XPathSetIterator` interface iterates the node set resulting from evaluation of an XPath expression.

IDL Definition

```
interface XPathSetIterator {
  Node              nextNode()
                                        raises(DOMException);
};
```

Methods

`nextNode`

Returns the next node from the `XPathResult` [p.15] node set. If there are no more nodes in the set to be returned by the iterator, this method returns `null`.

Return Value

`Node`	Returns the next node.

Exceptions

`DOMException`	INVALID_STATE_ERR: The document has been mutated since the node set result was returned.

No Parameters

Interface *XPathSetSnapshot*

The `XPathSetSnapshot` interface lists the node set resulting from an evaluation of an XPath expression as a static list that is not invalidated or changed by document mutation.

The individual nodes of a `XPathSetSnapshot` may be manipulated in the hierarchy and these changes are seen immediately by users referencing the nodes through the snapshot.

IDL Definition

```
interface XPathSetSnapshot {
  Node              item(in unsigned long index);
  readonly attribute unsigned long   length;
};
```

Attributes

`length` of type `unsigned long`, readonly

The number of nodes in the list. The range of valid child node indices is `0` to `length-1` inclusive.

Methods

`item`

Returns the `index`th item in the collection. If `index` is greater than or equal to the number of nodes in the list, this method returns `null`.

Parameters

`index` of type `unsigned long`

Index into the collection.

Return Value

`Node`	The node at the `index`th position in the `NodeList`, or `null` if that is not a valid index.

No Exceptions

Interface *XPathNamespace*

The `XPathNamespace` interface is returned by `XPathResult` [p.15] interfaces to represent the XPath namespace node type that DOM lacks. There is no public constructor for this node type. Attempts to place it into a hierarchy or a NamedNodeMap result in a `DOMException` with the code `HIERARCHY_REQUEST_ERR`. This node is *read only* [p.36] , so methods or setting of attributes that would mutate the node result in a DOMException with the code `NO_MODIFICATION_ALLOWED_ERR`.

The core specification describes attributes of the `Node` interface that are different for different node node types but does not describe `XPATH_NAMESPACE_NODE`, so here is a description of those attributes for this node type. All attributes of `Node` not described in this section have a `null` or `false` value.

`ownerDocument` matches the `ownerDocument` of the `ownerElement` even if the element is later adopted.

`prefix` is the prefix of the namespace represented by the node.

`NodeName` is the same as `prefix`.

`NodeType` is equal to `XPATH_NAMESPACE_NODE`.

`namespaceURI` is the namespace URI of the namespace represented by the node.

`adoptNode`, `cloneNode`, and `importNode` fail on this node type by raising a `DOMException` with the code `NOT_SUPPORTED_ERR`.

IDL Definition

```
interface XPathNamespace : Node {

  // XPathNodeType
  const unsigned short      XPATH_NAMESPACE_NODE           = 13;

  readonly attribute Element         ownerElement;
};
```

Definition group *XPathNodeType*

An integer indicating which type of node this is.

Note: There is currently only one type of node which is specific to XPath. The numbers in this list must not collide with the values assigned to core node types.

Defined Constants

`XPATH_NAMESPACE_NODE`
: The node is a `Namespace`.

Attributes

`ownerElement` of type `Element`, readonly
: The `Element` on which the namespace was in scope when it was requested. This does not change on a returned namespace node even if the document changes such that the namespace goes out of scope on that *element* [p.35] and this node is no longer found there by XPath.

Appendix A: IDL Definitions

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

The IDL files are also available as:
http://www.w3.org/TR/2001/WD-DOM-Level-3-XPath-20011031/idl.zip

xpath.idl:

```
// File: xpath.idl

#ifndef _XPATH_IDL_
#define _XPATH_IDL_

#include "dom.idl"

#pragma prefix "dom.w3c.org"
module xpath
{

  typedef dom::DOMString DOMString;
  typedef dom::Node Node;
  typedef dom::Element Element;

  interface XPathNSResolver;
  interface XPathResult;
  interface XPathExpression;
  interface XPathSetIterator;
  interface XPathSetSnapshot;

  exception XPathException {
    unsigned short   code;
  };
  // XPathExceptionCode
  const unsigned short      INVALID_EXPRESSION_ERR         = 1;
  const unsigned short      TYPE_ERR                       = 2;


  interface XPathEvaluator {
    XPathExpression    createExpression(in DOMString expression,
                                        in XPathNSResolver resolver)
                                        raises(XPathException,
                                               dom::DOMException);
    XPathResult        createResult();
    XPathNSResolver    createNSResolver(in Node nodeResolver);
    XPathResult        evaluate(in DOMString expression,
                                in Node contextNode,
                                in XPathNSResolver resolver,
                                in unsigned short type,
                                in XPathResult result)
                                        raises(XPathException,
                                               dom::DOMException);
  };
```

xpath.idl:

```
interface XPathExpression {
  XPathResult        evaluate(in Node contextNode,
                              in unsigned short type,
                              in XPathResult result)
                                      raises(XPathException,
                                             dom::DOMException);
};

interface XPathNSResolver {
  DOMString          lookupNamespaceURI(in DOMString prefix);
};

interface XPathResult {

  // XPathResultType
  const unsigned short      ANY_TYPE                      = 0;
  const unsigned short      NUMBER_TYPE                   = 1;
  const unsigned short      STRING_TYPE                   = 2;
  const unsigned short      BOOLEAN_TYPE                  = 3;
  const unsigned short      NODE_SET_TYPE                 = 4;
  const unsigned short      SINGLE_NODE_TYPE              = 5;

  readonly attribute unsigned short  resultType;
  readonly attribute double          numberValue;
                                      // raises(XPathException) on retrieval

  readonly attribute DOMString       stringValue;
                                      // raises(XPathException) on retrieval

  readonly attribute boolean         booleanValue;
                                      // raises(XPathException) on retrieval

  readonly attribute Node            singleNodeValue;
                                      // raises(XPathException) on retrieval

  XPathSetIterator   getSetIterator(in boolean ordered)
                                      raises(XPathException,
                                             dom::DOMException);
  XPathSetSnapshot   getSetSnapshot(in boolean ordered)
                                      raises(XPathException,
                                             dom::DOMException);
};

interface XPathSetIterator {
  Node               nextNode()
                                      raises(dom::DOMException);
};

interface XPathSetSnapshot {
  Node               item(in unsigned long index);
  readonly attribute unsigned long   length;
};

interface XPathNamespace : Node {

  // XPathNodeType
```

```
    const unsigned short      XPATH_NAMESPACE_NODE           = 13;

    readonly attribute Element         ownerElement;
  };
};

#endif // _XPATH_IDL_
```

xpath.idl:

Appendix B: Java Language Binding

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

The Java files are also available as
http://www.w3.org/TR/2001/WD-DOM-Level-3-XPath-20011031/java-binding.zip

B.1: Other XPath interfaces

org/w3c/dom/xpath/XPathException.java:

```
package org.w3c.dom.xpath;

public class XPathException extends RuntimeException {
    public XPathException(short code, String message) {
       super(message);
       this.code = code;
    }
    public short   code;
    // XPathExceptionCode
    public static final short INVALID_EXPRESSION_ERR    = 1;
    public static final short TYPE_ERR                  = 2;

}
```

org/w3c/dom/xpath/XPathEvaluator.java:

```
package org.w3c.dom.xpath;

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

public interface XPathEvaluator {
    public XPathExpression createExpression(String expression,
                                            XPathNSResolver resolver)
                                            throws XPathException, DOMException;

    public XPathResult createResult();

    public XPathNSResolver createNSResolver(Node nodeResolver);

    public XPathResult evaluate(String expression,
                                Node contextNode,
                                XPathNSResolver resolver,
                                short type,
                                XPathResult result)
                                throws XPathException, DOMException;

}
```

org/w3c/dom/xpath/XPathExpression.java:

```
package org.w3c.dom.xpath;

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

public interface XPathExpression {
    public XPathResult evaluate(Node contextNode,
                                short type,
                                XPathResult result)
                                throws XPathException, DOMException;

}
```

org/w3c/dom/xpath/XPathNSResolver.java:

```
package org.w3c.dom.xpath;

public interface XPathNSResolver {
    public String lookupNamespaceURI(String prefix);

}
```

org/w3c/dom/xpath/XPathResult.java:

```
package org.w3c.dom.xpath;

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

public interface XPathResult {
    // XPathResultType
    public static final short ANY_TYPE                 = 0;
    public static final short NUMBER_TYPE              = 1;
    public static final short STRING_TYPE              = 2;
    public static final short BOOLEAN_TYPE             = 3;
    public static final short NODE_SET_TYPE            = 4;
    public static final short SINGLE_NODE_TYPE         = 5;

    public short getResultType();

    public double getNumberValue()
                                    throws XPathException;

    public String getStringValue()
                                    throws XPathException;

    public boolean getBooleanValue()
                                    throws XPathException;

    public Node getSingleNodeValue()
                                    throws XPathException;

    public XPathSetIterator getSetIterator(boolean ordered)
```

```
                                        throws XPathException, DOMException;

    public XPathSetSnapshot getSetSnapshot(boolean ordered)
                                        throws XPathException, DOMException;

}
```

org/w3c/dom/xpath/XPathSetIterator.java:

```
package org.w3c.dom.xpath;

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

public interface XPathSetIterator {
    public Node nextNode()
                        throws DOMException;

}
```

org/w3c/dom/xpath/XPathSetSnapshot.java:

```
package org.w3c.dom.xpath;

import org.w3c.dom.Node;

public interface XPathSetSnapshot {
    public Node item(int index);

    public int getLength();

}
```

org/w3c/dom/xpath/XPathNamespace.java:

```
package org.w3c.dom.xpath;

import org.w3c.dom.Element;
import org.w3c.dom.Node;

public interface XPathNamespace extends Node {
    // XPathNodeType
    public static final short XPATH_NAMESPACE_NODE      = 13;

    public Element getOwnerElement();

}
```

org/w3c/dom/xpath/XPathNamespace.java:

Appendix C: ECMAScript Language Binding

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

Prototype Object **XPathException**

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

XPathException.INVALID_EXPRESSION_ERR

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

XPathException.TYPE_ERR

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

Object **XPathException**

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

code

This property is of type **Number**.

Object **XPathEvaluator**

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

createExpression(expression, resolver)

This method returns a **XPathExpression** object.
The **expression** parameter is of type **String**.
The **resolver** parameter is a **XPathNSResolver** object.
This method can raise a **XPathException** object or a **DOMException** object.

createResult()

This method returns a **XPathResult** object.

createNSResolver(nodeResolver)

This method returns a **XPathNSResolver** object.
The **nodeResolver** parameter is a **Node** object.

evaluate(expression, contextNode, resolver, type, result)

This method returns a **XPathResult** object.
The **expression** parameter is of type **String**.
The **contextNode** parameter is a **Node** object.
The **resolver** parameter is a **XPathNSResolver** object.
The **type** parameter is of type **Number**.
The **result** parameter is a **XPathResult** object.
This method can raise a **XPathException** object or a **DOMException** object.

Object **XPathExpression**

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

evaluate(contextNode, type, result)

This method returns a **XPathResult** object.
The **contextNode** parameter is a **Node** object.
The **type** parameter is of type **Number**.
The **result** parameter is a **XPathResult** object.
This method can raise a **XPathException** object or a **DOMException** object.

Object **XPathNSResolver**

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

lookupNamespaceURI(prefix)

This method returns a **String**.

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

Prototype Object **XPathResult**

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

XPathResult.ANY_TYPE

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

XPathResult.NUMBER_TYPE

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

XPathResult.STRING_TYPE

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

XPathResult.BOOLEAN_TYPE

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

XPathResult.NODE_SET_TYPE

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

XPathResult.SINGLE_NODE_TYPE

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

Object **XPathResult**

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

resultType

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

numberValue

This read-only property is a **double** object and can raise a **XPathException** object on retrieval.

stringValue

This read-only property is of type **String** and can raise a **XPathException** object on retrieval.

booleanValue

This read-only property is of type **Boolean** and can raise a **XPathException** object on retrieval.

singleNodeValue

This read-only property is a **Node** object and can raise a **XPathException** object on retrieval.

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

getSetIterator(ordered)

This method returns a **XPathSetIterator** object.

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

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

getSetSnapshot(ordered)

This method returns a **XPathSetSnapshot** object.

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

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

Object **XPathSetIterator**

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

nextNode()

This method returns a **Node** object.

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

Object **XPathSetSnapshot**

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

length

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

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

item(index)

This method returns a **Node** object.

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

Note: This object can also be dereferenced using square bracket notation (e.g. obj[1]). Dereferencing with an integer **index** is equivalent to invoking the **item** method with that index.

Prototype Object **XPathNamespace**

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

XPathNamespace.XPATH_NAMESPACE_NODE

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

Object **XPathNamespace**

XPathNamespace has the all the properties and methods of the **Node** object as well as the properties and methods defined below.

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

ownerElement

This read-only property is a **Element** object.

Appendix C: ECMAScript Language Binding

Appendix D: Acknowledgements

Many people contributed to the DOM specifications (Level 1, 2 or 3), including members of the DOM Working Group and the DOM Interest Group. We especially thank the following:

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D.1: Production Systems

This specification was written in XML. The HTML, OMG IDL, Java and ECMAScript bindings were all produced automatically.

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Glossary

Editors:
Arnaud Le Hors, W3C
Robert S. Sutor, IBM Research (for DOM Level 1)

Several of the following term definitions have been borrowed or modified from similar definitions in other W3C or standards documents. See the links within the definitions for more information.

API
An *API* is an Application Programming Interface, a set of functions or methods used to access some functionality.

document element
There is only one document element in a `Document`. This element node is a child of the `Document` node. See *Well-Formed XML Documents* in XML [XML].

document order
There is an ordering, *document order*, defined on all the nodes in the document corresponding to the order in which the first character of the XML representation of each node occurs in the XML representation of the document after expansion of general entities. Thus, the *document element* [p.35] node will be the first node. Element nodes occur before their children. Thus, document order orders element nodes in order of the occurrence of their start-tag in the XML (after expansion of entities). The attribute nodes of an element occur after the element and before its children. The relative order of attribute nodes is implementation-dependent.

element
Each document contains one or more elements, the boundaries of which are either delimited by start-tags and end-tags, or, for empty elements by an empty-element tag. Each element has a type, identified by name, and may have a set of attributes. Each attribute has a name and a value. See *Logical Structures* in XML [XML].

logically-adjacent text nodes
Logically-adjacent text nodes are `Text` or `CDataSection` nodes that may be visited sequentially in *document order* [p.35] without entering, exiting, or passing over `Element`, `Comment`, or `ProcessingInstruction` nodes.

live
An object is *live* if any change to the underlying document structure is reflected in the object.

model
A *model* is the actual data representation for the information at hand. Examples are the structural model and the style model representing the parse structure and the style information associated with a document. The model might be a tree, or a directed graph, or something else.

namespace prefix
A *namespace prefix* is a string that associates an element or attribute name with a *namespace URI* in XML. See namespace prefix in Namespaces in XML [XML Namespaces].

namespace URI
A *namespace URI* is a URI that identifies an XML namespace. This is called the namespace name in Namespaces in XML [XML Namespaces].

read only node

A *read only node* is a node that is immutable. This means its list of children, its content, and its attributes, when it is an element, cannot be changed in any way. However, a read only node can possibly be moved, when it is not itself contained in a read only node.

tokenized

The description given to various information items (for example, attribute values of various types, but not including the StringType CDATA) after having been processed by the XML processor. The process includes stripping leading and trailing white space, and replacing multiple space characters by one. See the definition of tokenized type.

well-formed document

A document is *well-formed* if it is tag valid and entities are limited to single elements (i.e., single sub-trees).

References

For the latest version of any W3C specification please consult the list of W3C Technical Reports available at http://www.w3.org/TR.

F.1: Normative references

DOM Level 3 Core
W3C (World Wide Web Consortium) Document Object Model Level 3 Core Specification, September 2001. Available at http://www.w3.org/TR/DOM-Level-3-Core

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Java
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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

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XPath 1.0
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F.2: Informative references

XML
W3C (World Wide Web Consortium) Extensible Markup Language (XML) 1.0, October 2000. Available at http://www.w3.org/TR/2000/REC-xml-20001006

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F.2: Informative references

Index

ANY_TYPE

API 9, 35

BOOLEAN_TYPE

booleanValue

createExpression

createNSResolver

createResult

document element

document order 9, 35

DOM Level 3 Core 9, 9, 10, 37

ECMAScript

element 9, 20, 35

evaluate 12, 13

getSetIterator

getSetSnapshot

INVALID_EXPRESSION_ERR

item

Java

length

live 9, 35

logically-adjacent text nodes 9, 35

lookupNamespaceURI

model 9, 35

namespace prefix 11, 12, 15, 35

namespace URI 11, 12, 15, 35

nextNode

NODE_SET_TYPE

NUMBER_TYPE

numberValue

OMGIDL

ownerElement

read only node 19, 36
resultType

SINGLE_NODE_TYPE
singleNodeValue
STRING_TYPE
stringValue

tokenized
TYPE_ERR

well-formed document

XML 35, 35, 37
XML Information set 9, 37
XML Namespaces 35, 35, 37
XPath 1.0 9, 9, 37
XPATH_NAMESPACE_NODE
XPathEvaluator
XPathException
XPathExpression
XPathNamespace
XPathNSResolver
XPathResult
XPathSetIterator
XPathSetSnapshot