Document Object Model (DOM) Level 3 Events Specification

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Abstract

This specification defines the Document Object Model Events Level 3, a generic platform- and language-neutral event system which allows registration of event handlers, describes event flow through a tree structure, and provides basic contextual information for each event. The Document Object Model Events Level 3 builds on the Document Object Model Events Level 2 [DOM Level 2 Events].

Status of this document

This section describes the status of this document at the time of its publication. Other documents may supersede this document. A list of current W3C publications and the latest revision of this technical report can be found in the W3C technical reports index at http://www.w3.org/TR/.

This document contains the Document Object Model Level 3 Events specification and is a W3C Working Group Note. It is based on the feedback during the Last Call period. The W3C DOM Working Group participants do not expect to provide interoperable implementations of this module. Implementation feedbacks are however welcome and have to be sent to the public mailing list www-dom@w3.org (public archive). Other W3C Working Groups may continue the work and provide implementations of this document.

Individuals or organizations are also invited to send a message to the public mailing list if they intend to produce an implementation of this module.

Publication as a Working Group Note does not imply endorsement by the W3C Membership. This is a draft document and may be updated, replaced or obsoleted by other documents at any time.

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

Patent disclosures relevant to this specification may be found on the DOM Working Group's patent disclosure page.

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1. Document Object Model Events

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1.1 Introduction

DOM Events is designed with two main goals. The first goal is the design of an event [p.101] system which allows registration of event listeners and describes event flow through a tree structure. Additionally, the specification will provide standard modules of events for user interface control and document mutation notifications, including defined contextual information for each of these event modules.

The second goal of the DOM Events is to provide a common subset of the current event systems used in DOM Level 0 [p.101] browsers. This is intended to foster interoperability of existing scripts and content. It is not expected that this goal will be met with full backwards compatibility. However, the specification attempts to achieve this when possible.

The following sections of the specification define both the specification for the DOM Event Model and a number of conformant event modules designed for use within the model. The DOM Event Model consists of:

- The DOM event flow [p.10] , which describe the flow of events in a tree-based structure.
- A set of interfaces to access contextual information on events and to register event listeners.

1.1.1 Event flows

This document specifies an event flow for tree-based structures: DOM event flow [p.10] . While it is expected that HTML and XML applications will follow this event flow, applications might reuse the interfaces defined in this document for non tree-based structures. In that case, it is the responsibility of such applications to define their event flow and how it relates to the DOM event flow [p.10] . An example of such use can be found in [DOM Level 3 Load and Save].

1.1.2 Conformance

An implementation is DOM Level 3 Events conformant if it supports the Core module defined in [DOM Level 2 Core], the DOM event flow [p.10] and the interfaces with their associated semantics defined in Basic interfaces [p.22] . An implementation conforms to a DOM Level 3 Events module if it conforms to DOM Level 3 Events and the event types defined in the module. An implementation conforms to an event type if it conforms to its associated semantics and DOM interfaces. For example, an implementation conforms to the DOM Level 3 User Interface Events module (see User Interface event types [p.35]) if it conforms to DOM Level 3 Events (i.e. implements all the basic interfaces), can generate the event types `{"http://www.w3.org/2001/xml-events", "DOMActivate"}` `{"http://www.w3.org/2001/xml-events", "DOMFocusIn"}` `{"http://www.w3.org/2001/xml-events", "DOMFocusOut"}` accordingly to their semantics, supports the `UIEvent` [p.35] interface, and conforms to the DOM Level 2 Core module.

Note: An implementation which does not conform to an event module can still implement the DOM interfaces associated with it. The DOM application can then create an event object using the `DocumentEvent.createEvent()` [p.33] method and dispatch an event type associated with this interface using the `EventTarget.dispatchEvent()` [p.28] method.

A DOM application may use the `hasFeature(feature, version)` method of the `DOMImplementation` interface with parameter values `"Events"` and `"3.0"` (respectively) to determine whether or not DOM Level 3 Events is supported by the implementation. In order to fully support DOM Level 3 Events, an implementation must also support the "Core" feature defined in the DOM Level 2 Core specification [DOM Level 2 Core] and use the DOM event flow [p.10] . For additional information about *conformance*, please see the DOM Level 3 Core specification [DOM Level 3 Core]. DOM Level 3 Events is built on top of DOM Level 2 Events [DOM Level 2 Events], i.e. a DOM Level 3 Events implementation where `hasFeature("Events", "3.0")` returns `true` must also return `true` when the `version` number is `"2.0"`, `""` or, `null`.

Each event module describes its own feature string in the event module listing.

1.2 DOM event flow

The DOM event flow is the process through which the event [p.101] originates from the DOM Events implementation and is dispatched into a tree. Each event has an event target [p.101] , a targeted node in the case of the DOM Event flow, toward which the event is dispatched by the DOM Events implementation.

1.2.1 Phases

The event is dispatched following a path from the root of the tree to this target node [p.101] . It can then be handled locally at the target node level or from any target's ancestors higher in the tree. The event dispatching (also called event propagation) occurs in three phases and the following order:

1. The capture phase [p.101] : the event is dispatched to the target's ancestors from the root of the tree to the direct parent of the target node [p.101] .
2. The target phase [p.101] : the event is dispatched to the target node [p.101] .
3. The bubbling phase [p.101] : the event is dispatched to the target's ancestors from the direct parent of the target node [p.101] to the root of the tree.

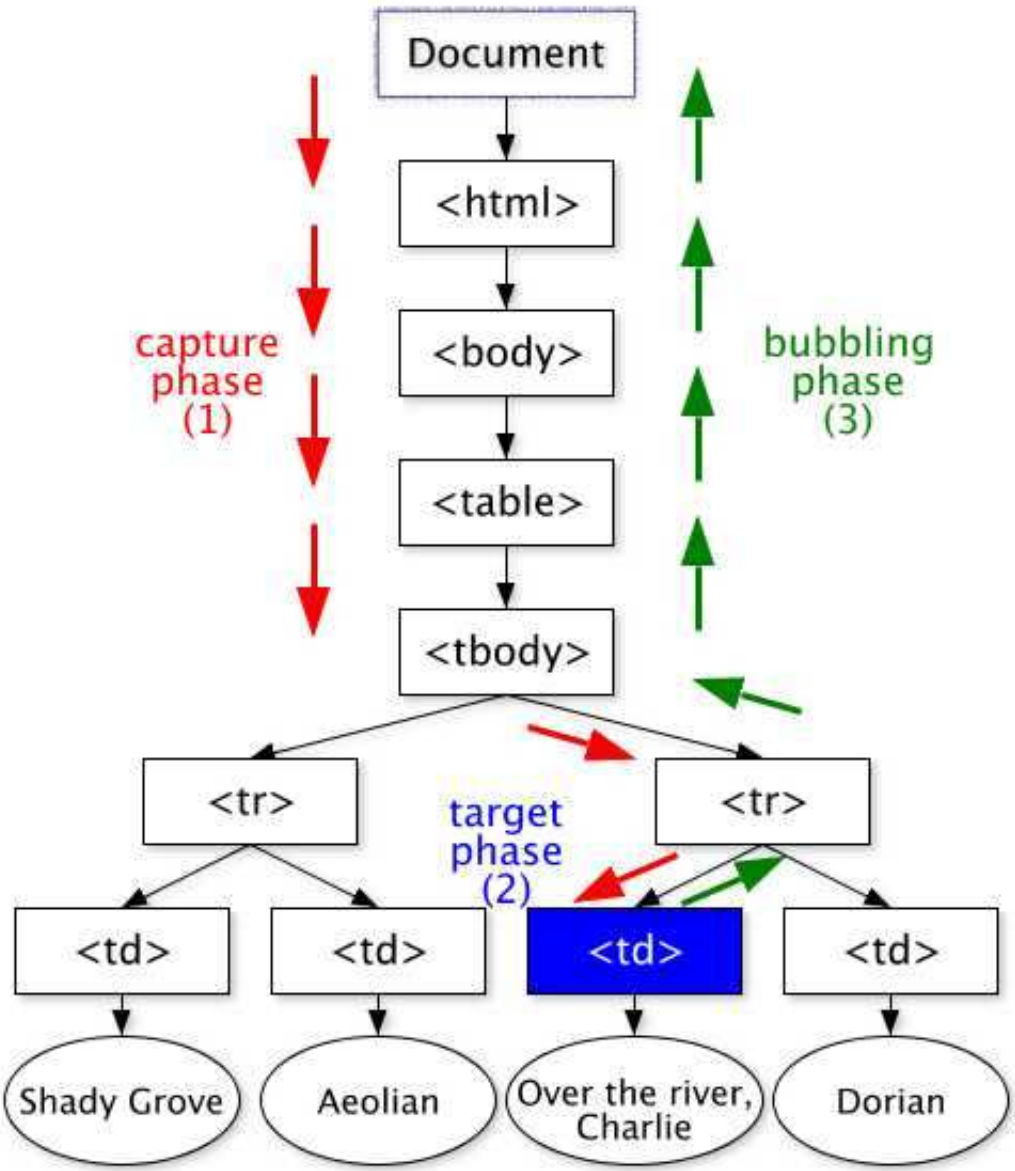

Figure: graphical representation of an event dispatched in a DOM tree using the DOM event flow [SVG 1.0 version]

Note: An SVG 1.0 version of the representation above is also available.

The target's ancestors are determined before the initial dispatch of the event. If the target node is removed during the dispatching, or a target's ancestor is added or removed, the event propagation will always be based on the target node and the target's ancestors determined before the dispatch.

Some events may not necessarily accomplish the three phases of the DOM event flow, e.g. the event could only be defined for one or two phases. As an example, events defined in this specification will always accomplish the capture and target phases but some will not accomplish the bubbling phase ("bubbling

events" versus "non-bubbling events", see also the `Event.bubbles` [p.23] attribute).

1.2.2 Event listeners

Each node encountered during the dispatch of the event may contain event listeners.

1.2.2.1 Registration of event listeners

Event listeners can be registered on all nodes in the tree for a specific type of event (Event types [p.14]) or event category (Event types and event categories [p.14]), phase, and group (Event groups [p.12]).

If the event listener is being registered on a node while an event gets processed on this node, the event listener will not be triggered during the current phase but may be triggered during a later phase in the event flow, i.e. the bubbling phase [p.101] .

1.2.2.2 Event groups

An event listener is always part of a group. It is either explicitly in a group if a group has been specified at the registration or implicitly in the default group if no group has been specified. Within a group, event listeners are ordered in their order of registration. If two event listeners {A1, A2}, which are part of the same group, are registered one after the other (A1, then A2) for the same phase, the DOM event flow guarantees their triggering order (A1, then A2). If the two listeners are not part of the same group, no specification is made as to the order in which they will be triggered.

In general, a DOM application does not need to define and use a separate group unless other event listeners, external to the DOM application, may change the event propagation (e.g. from a concurrent DOM application, from imported functionalities that rely on the event system, etc.).

Note: While this specification does not specify a full ordering (i.e. groups are still unordered), it does specify ordering within a group. This implies that if the event listeners {A1, A2, B1, B2}, with A and B being two different groups, are registered for the same phase in the order A1, A2, B1, and B2, the following triggering orders are possible and conform to the DOM event flow: {A1, A2, B1, B2}, {A1, B1, A2, B2}, {B1, A1, A2, B2}, {A1, B1, B2, A2}, {B1, A1, B2, A2}, {B1, B2, A1, A2}. DOM Events implementations may impose priorities on groups but DOM applications must not rely on it. Unlike this specification, [DOM Level 2 Events] did not specify any triggering order for event listeners.

1.2.2.3 Triggering an event listener

When the event is dispatched through the tree, from node to node, event listeners registered on the node are triggered if the following three conditions are all met:

1. they were registered for the same type of event, or the same category.
2. they were registered for the same phase;
3. the event propagation has not been stopped for the group.

1.2.2.4 Removing an event listener

If an event listener is removed from a node while an event is being processed on the node, it will not be triggered by the current actions. Once removed, the event listener is never invoked again (unless registered again for future processing).

1.2.2.5 Reentrance

It is expected that actions taken by an event listener may cause additional events to be dispatched. Additional events should be handled in a synchronous manner and may cause reentrance into the event model. If an event listener fires a new event using `EventTarget.dispatchEvent()` [p.28] , the event propagation that causes the event listener to be triggered will resume only after the event propagation of the new event is completed.

Since implementations may have restrictions such as stack-usage or other memory requirements, applications should not depend on how many synchronous events may be triggered.

1.2.2.6 Event propagation and event groups

All event listeners are part of a group (see Registration of event listeners [p.12]). An event listener may prevent event listeners that are part of a same group from being triggered. The effect can be:

- immediate: no more event listeners from the same group will be triggered by the event object (see `Event.stopImmediatePropagation()` [p.26]);
- deferred until all event listeners from the same group have been triggered on the current node, i.e. the event listeners of the same group attached on other nodes will not be triggered (see `Event.stopPropagation()` [p.26]).

If two event listeners are registered for two different groups, one cannot prevent the other from being triggered.

1.3 Default actions and cancelable events

Implementations may have a default action associated with an event type. An example is the [HTML 4.01] form element. When the user submits the form (e.g. by pressing on a submit button), the event `{"http://www.w3.org/2001/xml-events", "submit"}` is dispatched to the element and the default action for this event type is generally to send a request to a Web server with the parameters from the form.

The default actions are not part of the DOM Event flow. Before invoking a default action, the implementation must first dispatch the event as described in the DOM event flow [p.10] .

A *cancelable event* is an event associated with a default action which is allowed to be canceled during the DOM event flow. At any phase during the event flow, the triggered event listeners have the option of canceling the default action or allowing the default action to proceed. In the case of the hyperlink in the browser, canceling the action would have the result of not activating the hyperlink. Not all events defined in this specification are cancelable events.

Different implementations will specify their own default actions, if any, associated with each event. The DOM Events specification does not attempt to specify these actions.

This specification does not provide mechanisms for accessing default actions or adding new ones.

Note: Some implementations also provide default actions *before* the dispatch of the event. It is not possible to cancel those default actions and this specification does not address them. An example of such default actions can be found in [DOM Level 2 HTML] on the `HTMLInputElement.checked` attribute.

1.4 Event types

Each event is associated with a type, called *event type*. The event type is composed of a local name [p.101] and a namespace URI [p.101] as used in [DOM Level 3 Core]. All events defined in this specification use the namespace URI `"http://www.w3.org/2001/xml-events"`.

1.4.1 Event types and event categories

An event type could be part of one or more categories. A category is represented using a local name [p.101] and a namespace URI [p.101] as defined in [XML Namespaces]. The event types defined in this specification are not associated with one or more event categories and this specification does not provide methods to associate them. Other specifications may create and associate event categories with event listeners but in such case would need to inform the dispatch mechanism of those event categories. An example of the use of categories is given at Using VoiceXML Events [p.21] .

1.4.2 Complete list of event types

Depending on the level of DOM support, or the devices used for display (e.g. screen) or interaction (e.g. mouse, keyboard, touch screen, voice, ...), these event types can be generated by the implementation. When used with an [XML 1.0] or [HTML 4.01] application, the specifications of those languages may restrict the semantics and scope (in particular the possible target nodes) associated with an event type. For example, `{"http://www.w3.org/2001/xml-events", "click"}` can be targeted to all [XHTML 1.0] elements except applet, base, basefont, bdo, br, font, frame, frameset, head, html, iframe, isindex, meta, param, script, style, and title. Refer to the specification defining the language used in order to find those restrictions or to find event types that are not defined in this document.

The following list defines all event types (with the exception of two event types preserved for backward compatibility with [HTML 4.01], see HTML Events [p.57]) provided in this specification. All event types defined in this specification are bound to the namespace URI `"http://www.w3.org/2001/xml-events"` and the following list only enumerates the local name of the event type.

DOMActivate
: An element is activated, for instance, using a mouse device, a keyboard device, or a voice command.

Note: The activation of an element is device dependent but is also application dependent, e.g. a link in a document can be activated using a mouse click or a mouse double click.

DOMFocusIn
: An event target [p.101] receives focus, for instance via a pointing device being moved onto an element or using keyboard navigation. The focus is given to the element before the dispatch of this event type.

DOMFocusOut
: A event target [p.101] loses focus, for instance via a pointing device being moved out of an element or by tabbing navigation out of the element. The focus is taken from the element before the dispatch of this event type.

textInput
: One or more characters have been entered. The characters can originate from a variety of sources. For example, it could be characters resulting from a key being pressed or released on a keyboard device, characters resulting from the processing of an input method editor [p.63] , or resulting from a voice command. Where a "paste" operation generates a simple sequence of characters, i.e. a text without any structure or style information, this event type should be generated as well.

click
: A pointing device button is clicked over an element. The definition of a click depends on the environment configuration; i.e. may depend on the screen location or the delay between the press and release of the pointing device button. In any case, the target node must be the same between the mousedown, mouseup, and click. The sequence of these events is: `{"http://www.w3.org/2001/xml-events", "mousedown"}`, `{"http://www.w3.org/2001/xml-events", "mouseup"}`, and `{"http://www.w3.org/2001/xml-events", "click"}`. Note that, given the definition of a click, If one or more of the event types `{"http://www.w3.org/2001/xml-events", "mouseover"}`, `{"http://www.w3.org/2001/xml-events", "mousemove"}`, and `{"http://www.w3.org/2001/xml-events", "mouseout"}` occur between the press and release of the pointing device button, the event type `{"http://www.w3.org/2001/xml-events", "click"}` cannot occur. In the case of nested elements, this event type is always targeted at the most deeply nested element.

mousedown
: A pointing device button is pressed over an element. In the case of nested elements, this event type is always targeted at the most deeply nested element.

mouseup
: A pointing device button is released over an element. In the case of nested elements, this event type is always targeted at the most deeply nested element.

mouseover
: A pointing device is moved onto an element. In the case of nested elements, this event type is always targeted at the most deeply nested element.

mousemove
: A pointing device is moved while it is over an element. In the case of nested elements, this event type is always targeted at the most deeply nested element.

mouseout
: A pointing device is moved away from an element. In the case of nested elements, this event type is always targeted at the most deeply nested element.

keydown
: A key is pressed down. This event type is device dependent and relies on the capabilities of the input devices and how they are mapped in the operating system. This event type is generated after the keyboard mapping but before the processing of an input method editor [p.63] . This event should logically happen before the event `{"http://www.w3.org/2001/xml-events", "keyup"}` is produced. Whether a keydown contributes or not to the generation of a text event is implementation dependent.

keyup
: A key is released. This event type is device dependent and relies on the capabilities of the input devices and how they are mapped in the operating system. This event type is generated after the keyboard mapping but before the processing of an input method editor [p.63] . This event should logically happen after the event `{"http://www.w3.org/2001/xml-events", "keydown"}` is produced. Whether a keyup contributes or not to the generation of a text event is implementation dependent.

DOMSubtreeModified
: This is a general event for notification of all changes to the document. It can be used instead of the more specific events listed below. It may be dispatched after a single modification to the document or, at the implementation's discretion, after multiple changes have occurred. The latter use should generally be used to accommodate multiple changes which occur either simultaneously or in rapid succession. The target of this event is the lowest common parent of the changes which have taken place. This event is dispatched after any other events caused by the mutation(s) have occurred.

DOMNodeInserted
: A node has been added as a child [p.101] of another node. This event is dispatched after the insertion has taken place. The target node [p.101] of this event is the node being inserted.

DOMNodeRemoved
: A node is being removed from its parent node. This event is dispatched before the node is removed from the tree. The target node [p.101] of this event is the node being removed.

DOMNodeRemovedFromDocument
: A node is being removed from a document, either through direct removal of the node or removal of a subtree in which it is contained. This event is dispatched before the removal takes place. The target node [p.101] of this event type is the node being removed. If the node is being directly removed, the event type `{"http://www.w3.org/2001/xml-events", "DOMNodeRemoved"}` will fire before this event type.

DOMNodeInsertedIntoDocument
: A node is being inserted into a document, either through direct insertion of the node or insertion of a subtree in which it is contained. This event is dispatched after the insertion has taken place. The target node [p.101] of this event is the node being inserted. If the node is being directly inserted, the event type `{"http://www.w3.org/2001/xml-events", "DOMNodeInserted"}` will fire before this event type.

DOMAttrModified
: Occurs after an `Attr` has been modified on a node. The target node [p.101] of this event is the parent `Element` node whose `Attr` changed. It is expected that string based replacement of an `Attr` value will be viewed as a modification of the `Attr` since its identity does not change. Subsequently replacement of the `Attr` node with a different `Attr` node is viewed as the removal of the first `Attr` node and the addition of the second.

DOMCharacterDataModified
: Occurs after `CharacterData.data` or `ProcessingInstruction.data` have been modified but the node itself has not been inserted or deleted. The target node [p.101] of this event is the `CharacterData` node or the `ProcessingInstruction` node.

DOMElementNameChanged
: Occurs after the `namespaceURI` and/or the `nodeName` of an `Element` node have been modified (e.g., the element was renamed using `Document.renameNode()`). The target of this event is the renamed `Element` node.

DOMAttributeNameChanged
: Occurs after the `namespaceURI` and/or the `nodeName` of a `Attr` node have been modified (e.g., the attribute was renamed using `Document.renameNode`). The target of this event is the parent `Element` node whose `Attr` has been renamed.

load
: The DOM Implementation finishes loading the resource (such as the document) and any dependent resources (such as images, style sheets, or scripts). Dependent resources that fail to load will not prevent this event from firing if the resource that loaded them is still accessible via the DOM. If this event type is dispatched, implementations are required to dispatch this event at least on the `Document` node.

unload
: The DOM implementation removes from the environment the resource (such as the document) or any dependent resources (such as images, style sheets, scripts). The document is unloaded after the dispatch of this event type. If this event type is dispatched, implementations are required to dispatch this event at least on the `Document` node.

abort
: The loading of the document, or a resource linked from it, is stopped before being entirely loaded.

error
: The document, or a resource linked from it, has been loaded but cannot be interpreted according to its semantic, such as an invalid image, a script execution error, or non-well-formed XML.

select
: A user selects some text. DOM Level 3 Events does not provide contextual information to access the selected text. The selection occured before the dispatch of this event type.

change
: A control loses the input focus and its value has been modified since gaining focus.

submit
: A form, such as [HTML 4.01], [XHTML 1.0], or [XForms 1.0] form, is submitted.

reset
: A form, such as [HTML 4.01], [XHTML 1.0], or [XForms 1.0] form, is reset.

resize
: A document view or an element has been resized. The resize occured before the dispatch of this event type.

scroll
: A document view or an element has been scrolled. The scroll occured before the dispatch of this event type.

The following table provides additional information on the event types. All events will accomplish the capture and target phases, but not all of them will accomplish the bubbling phase (see also DOM event flow [p.10]). Some events are not cancelable [p.13] (see Default actions and cancelable events [p.13]). Some events will only be dispatched to a specific set of possible targets, specified using node types. Contextual information related to the event type is accessible using DOM interfaces.

type	Bubbling phase	Cancelable	Target node types	DOM interface
DOMActivate	Yes	Yes	`Element`	`UIEvent` [p.35]
DOMFocusIn	Yes	No	`Element`	`UIEvent` [p.35]
DOMFocusOut	Yes	No	`Element`	`UIEvent` [p.35]
textInput	Yes	Yes	`Element`	`TextEvent` [p.37]
click	Yes	Yes	`Element`	`MouseEvent` [p.39]
mousedown	Yes	Yes	`Element`	`MouseEvent` [p.39]
mouseup	Yes	Yes	`Element`	`MouseEvent` [p.39]
mouseover	Yes	Yes	`Element`	`MouseEvent` [p.39]
mousemove	Yes	Yes	`Element`	`MouseEvent` [p.39]
mouseout	Yes	Yes	`Element`	`MouseEvent` [p.39]
keydown	Yes	Yes	`Element`	`KeyboardEvent` [p.46]
keyup	Yes	Yes	`Element`	`KeyboardEvent` [p.46]
DOMSubtreeModified	Yes	No	`Document`, `DocumentFragment`, `Element`, `Attr`	`MutationEvent` [p.50]
DOMNodeInserted	Yes	No	`Element`, `Attr`, `Text`, `Comment`, `CDATASection`, `DocumentType`, `EntityReference`, `ProcessingInstruction`	`MutationEvent` [p.50]
DOMNodeRemoved	Yes	No	`Element`, `Attr`, `Text`, `Comment`, `CDATASection`, `DocumentType`, `EntityReference`, `ProcessingInstruction`	`MutationEvent` [p.50]
DOMNodeRemovedFromDocument	No	No	`Element`, `Attr`, `Text`, `Comment`, `CDATASection`, `DocumentType`, `EntityReference`, `ProcessingInstruction`	`MutationEvent` [p.50]
DOMNodeInsertedIntoDocument	No	No	`Element`, `Attr`, `Text`, `Comment`, `CDATASection`, `DocumentType`, `EntityReference`, `ProcessingInstruction`	`MutationEvent` [p.50]
DOMAttrModified	Yes	No	`Element`	`MutationEvent` [p.50]

DOMCharacterDataModified	Yes	No	`Text`, `Comment`, `CDATASection`, `ProcessingInstruction`	`MutationEvent` [p.50]
DOMElementNameChanged	Yes	No	`Element`	`MutationNameEvent` [p.54]
DOMAttributeNameChanged	Yes	No	`Element`	`MutationNameEvent` [p.54]
load	No	No	`Document`, `Element`	`Event` [p.22]
unload	No	No	`Document`, `Element`	`Event` [p.22]
abort	Yes	No	`Element`	`Event` [p.22]
error	Yes	No	`Element`	`Event` [p.22]
select	Yes	No	`Element`	`Event` [p.22]
change	Yes	No	`Element`	`Event` [p.22]
submit	Yes	Yes	`Element`	`Event` [p.22]
reset	Yes	Yes	`Element`	`Event` [p.22]
resize	Yes	No	`Document`, `Element`	`UIEvent` [p.35]
scroll	Yes	No	`Document`, `Element`	`UIEvent` [p.35]

As an example, the event `{"http://www.w3.org/2001/xml-events", "load"}` will trigger event listeners attached on `Element` nodes for that event and on the capture and target phases. This event cannot be cancelled. If an event listener for the load event is attached to a node other than `Element` nodes, or if it is attached to the bubbling phase only, this event listener cannot be triggered.

The event objects associated with the event types described above may contain context information. Refer to the description of the DOM interfaces for further information.

1.4.3 Compatibility with DOM Level 2 Events

Namespace URIs [p.101] were only introduced in DOM Level 3 Events and were not part of DOM Level 2 Events. DOM Level 2 Events methods are namespace ignorant and the event type is only represented by an XML name [p.101] , specified in the `Event.type` [p.24] attribute.

Therefore, while it is safe to use these methods when not dealing with namespaces, using them and the new ones at the same time should be avoided. DOM Level 2 Events methods solely identify events by their `Event.type` [p.24] . On the contrary, the namespaces aware DOM Level 3 Events methods, identify attribute nodes by their `Event.namespaceURI` [p.24] and `Event.type`. Because of this fundamental difference, mixing both sets of methods can lead to unpredictable results. For example, using `EventTarget.addEventListenerNS(namespaceURI, type, listener, ...)` [p.28] , two event listeners (or more) could be registered using the same `type` and same `useCapture` values, but different `namespaceURI`s. Calling `EventTarget.removeEventListener(type, listener, ...)` [p.29] with that `type` and `useCapture` could then remove any or none of those event listeners. The result depends on the implementation. The only guarantee in such cases is that all methods which access an event listener by its `namespaceURI` and `type` will access the same event listener. For instance, `EventTarget.removeEventListenerNS(namespaceURI, type, listener, ...)` [p.30] removes the event that `EventTarget.addEventListenerNS(namespaceURI, type, listener, ...)` [p.28] added.

For compatibility reasons, the dispatching of an event will ignore namespace URIs if either the event or the event listener has a `null` namespace URI. If a DOM Level 2 event (i.e. with a `null` namespace URI) is dispatched in the DOM tree, all event listeners that match the `type` will be triggered as described in the DOM event flow [p.10] . If a DOM Level 3 event (i.e. with a namespace URI) is dispatched in the DOM tree, all event listeners with the same type and the same or `null` namespace URI will be triggered as described in the DOM event flow [p.10] .

1.5 Event listener registration

Note: This section is informative.

There are mainly two ways to associate an event listener to a node in the tree:

1. at the programming level using the `EventTarget` [p.26] methods.
2. at the document level using [XML Events] or an ad-hoc syntax, as the ones provided in [XHTML 1.0] or [SVG 1.1].

1.5.1 Using the `EventTarget` methods

The user can attach an event listener using the methods on the `EventTarget` [p.26] interface:

```
myCircle.addEventListenerNS("http://www.w3.org/2001/xml-events",
                            "DOMActivate",
                            myListener,
                            true,
                            null);
```

The methods do not provide the ability to register the same event listener more than once for the same event type and the same phase. It is not possible to register an event listener:

- for only one of the target [p.101] and bubbling [p.101] phases since those phases are coupled during the registration (but the listener itself could ignore events during one of these phases if desired).
- for a specific event category.

To register an event listener, DOM applications must use the methods `EventTarget.addEventListener()` [p.27] and `EventTarget.addEventListenerNS()` [p.28] .

An `EventListener` [p.30] being registered on an `EventTarget` [p.26] may choose to have that `EventListener` triggered during the capture phase by specifying the `useCapture` parameter of the `EventTarget.addEventListener()` [p.27] or `EventTarget.addEventListenerNS()` [p.28] methods to be `true`. If `false`, the `EventListener` will be triggered during the target and bubbling phases.

1.5.2 Using XML Events

In [XML Events], event listeners are attached using elements and attributes:

```
<listener event="DOMActivate" observer="myCircle" handler="#myListener"
          phase="capture" propagate="stop"/>
```

Event listeners can only be registered on `Element` nodes, i.e. other `Node` types are not addressable, and cannot be registered for a specific group either, i.e. they are always attached to the default group. The target phase [p.101] and the bubbling phase [p.101] are coupled during the registration. [XML Events] does not address namespaces in event types. If the value of the `event` attribute of the `listener` element contains a colon (':'), it should be interpreted as a *QName* as defined in [XML Schema Part 2].

1.5.3 Using VoiceXML Events

In [VoiceXML 2.0], event listeners are attached using elements:

```
<form>
  <field>
    <prompt>Please say something</prompt>
    <catch event="error.noauthorization">
     <prompt>You don't have the authorization!</prompt>
    </catch>
    <catch event="connection.disconnect.hangup">
     <prompt>Connection error</prompt>
    </catch>
    <catch event="connection.disconnect">
     <prompt>Connection error</prompt>
    </catch>
  </field>
  <catch event="error">
    <prompt>Unknown error</prompt>
  </catch>
</form>
```

Event listeners can only be registered on `Element` nodes, i.e. other `Node` types are not addressable, and cannot be registered for a specific group either, i.e. they are always attached to the default group. The target phase [p.101] and the bubbling phase [p.101] are coupled during the registration. [VoiceXML 2.0] does not address namespaces in event types but uses the notion of event categories. The event type `"connection.disconnect.hangup"` could be associated to the event categories `{"http://www.example.org/2003/voicexml", "connection"}` and `{"http://www.example.org/2003/voicexml", "connection.disconnect"}`.

1.5.4 Using XML or HTML attributes

In languages such as [HTML 4.01], [XHTML 1.0], or [SVG 1.1], event listeners are specified as attributes:

```
<circle id="myCircle" onactivate="myListener(evt)"
        cx="300" cy="225" r="100" fill="red"/>
```

Since only one attribute with the same name can appear on an element, it is therefore not possible to register more than one event listener on a single `EventTarget` [p.26] for the event type. Also, event listeners can only be registered on `Element` nodes for the target phase [p.101] and bubbling phase [p.101] , i.e. other `Node` types and the capture phase [p.101] are not addressable with these languages. Event listeners cannot be registered for a specific group either, i.e. they are always attached to the default group.

In order to achieve compatibility with those languages, implementors may view the setting of attributes which represent event handlers as the creation and registration of an `EventListener` on the `EventTarget` [p.26] . The value of `useCapture` defaults to `false`. This `EventListener` [p.30] behaves in the same manner as any other `EventListeners` which may be registered on the `EventTarget`. If the attribute representing the event listener is changed, this may be viewed as the removal of the previously registered `EventListener` and the registration of a new one. Furthermore, no specification is made as to the order in which event attributes will receive the event with regards to the other `EventListeners` on the `EventTarget`.

1.6 Basic interfaces

The interfaces described in this section are fundamental to DOM Level 3 Events and must always be supported by the implementation.

Interface *Event* (introduced in **DOM Level 2**)

The `Event` interface is used to provide contextual information about an event to the listener processing the event. An object which implements the `Event` interface is passed as the parameter to an `EventListener` [p.30] . More specific context information is passed to event listeners by deriving additional interfaces from `Event` which contain information directly relating to the type of event they represent. These derived interfaces are also implemented by the object passed to the event listener.

To create an instance of the `Event` interface, use the `DocumentEvent.createEvent("Event")` [p.33] method call.

IDL Definition

```
// Introduced in DOM Level 2:
interface Event {

  // PhaseType
  const unsigned short      CAPTURING_PHASE               = 1;
  const unsigned short      AT_TARGET                     = 2;
  const unsigned short      BUBBLING_PHASE                = 3;

  readonly attribute DOMString       type;
  readonly attribute EventTarget     target;
  readonly attribute EventTarget     currentTarget;
  readonly attribute unsigned short  eventPhase;
  readonly attribute boolean         bubbles;
```

```
  readonly attribute boolean         cancelable;
  readonly attribute DOMTimeStamp    timeStamp;
  void               stopPropagation();
  void               preventDefault();
  void               initEvent(in DOMString eventTypeArg,
                               in boolean canBubbleArg,
                               in boolean cancelableArg);
  // Introduced in DOM Level 3:
  readonly attribute DOMString       namespaceURI;
  // Introduced in DOM Level 3:
  boolean            isCustom();
  // Introduced in DOM Level 3:
  void               stopImmediatePropagation();
  // Introduced in DOM Level 3:
  boolean            isDefaultPrevented();
  // Introduced in DOM Level 3:
  void               initEventNS(in DOMString namespaceURIArg,
                                 in DOMString eventTypeArg,
                                 in boolean canBubbleArg,
                                 in boolean cancelableArg);
};
```

Definition group *PhaseType*

An integer indicating which phase of the event flow is being processed as defined in DOM event flow [p.10] .

Defined Constants

`AT_TARGET`
: The current event is in the target phase [p.101] , i.e. it is being evaluated at the event target [p.101] .

`BUBBLING_PHASE`
: The current event phase is the bubbling phase [p.101] .

`CAPTURING_PHASE`
: The current event phase is the capture phase [p.101] .

Attributes

`bubbles` of type `boolean`, readonly
: Used to indicate whether or not an event is a bubbling event. If the event can bubble the value is `true`, otherwise the value is `false`.

`cancelable` of type `boolean`, readonly
: Used to indicate whether or not an event can have its default action prevented (see also Default actions and cancelable events [p.13]). If the default action can be prevented the value is `true`, otherwise the value is `false`.

`currentTarget` of type `EventTarget` [p.26] , readonly
: Used to indicate the `EventTarget` [p.26] whose `EventListeners` [p.30] are currently being processed. This is particularly useful during the capture and bubbling phases. This attribute could contain the target node [p.101] or a target ancestor when used with the DOM event flow [p.10] .

`eventPhase` of type `unsigned short`, readonly
: Used to indicate which phase of event flow is currently being accomplished.

`namespaceURI` of type `DOMString`, readonly, introduced in **DOM Level 3**

The namespace URI [p.101] associated with this event at creation time, or `null` if it is unspecified.

For events initialized with a DOM Level 2 Events method, such as `Event.initEvent()` [p.24] , this is always `null`.

`target` of type `EventTarget` [p.26] , readonly

Used to indicate the event target [p.101] . This attribute contains the target node [p.101] when used with the DOM event flow [p.10] .

`timeStamp` of type `DOMTimeStamp`, readonly

Used to specify the time (in milliseconds relative to the epoch) at which the event was created. Due to the fact that some systems may not provide this information the value of `timeStamp` may be not available for all events. When not available, a value of `0` will be returned. Examples of epoch time are the time of the system start or 0:0:0 UTC 1st January 1970.

`type` of type `DOMString`, readonly

The name should be an NCName as defined in [XML Namespaces] and is case-sensitive. If the attribute `Event.namespaceURI` [p.24] is different from `null`, this attribute represents a local name [p.101] .

Methods

`initEvent`

The `initEvent` method is used to initialize the value of an `Event` created through the `DocumentEvent.createEvent` [p.33] method. This method may only be called before the `Event` has been dispatched via the `EventTarget.dispatchEvent()` [p.28] method. If the method is called several times before invoking `EventTarget.dispatchEvent` [p.28] , only the final invocation takes precedence. This method has no effect if called after the event has been dispatched. If called from a subclass of the `Event` interface only the values specified in this method are modified, all other attributes are left unchanged.

This method sets the `Event.type` [p.24] attribute to `eventTypeArg`, and `Event.namespaceURI` [p.24] to `null`. To initialize an event with a namespace URI, use the `Event.initEventNS(namespaceURIArg, eventTypeArg, ...)` [p.24] method.

Parameters

`eventTypeArg` of type `DOMString`

Specifies `Event.type` [p.24] .

`canBubbleArg` of type `boolean`

Specifies `Event.bubbles` [p.23] . This parameter overrides the intrinsic bubbling behavior of the event.

`cancelableArg` of type `boolean`

Specifies `Event.cancelable` [p.23] . This parameter overrides the intrinsic cancelable behavior of the event.

No Return Value

No Exceptions

`initEventNS` introduced in **DOM Level 3**

The `initEventNS` method is used to initialize the value of an `Event` object and has the same behavior as `Event.initEvent()` [p.24] .

Parameters

`namespaceURIArg` of type `DOMString`

Specifies `Event.namespaceuRI`, the namespace URI [p.101] associated with this event, or `null` if no namespace.

`eventTypeArg` of type `DOMString`

Specifies `Event.type` [p.24] , the local name [p.101] of the event type.

`canBubbleArg` of type `boolean`

Refer to the `Event.initEvent()` [p.24] method for a description of this parameter.

`cancelableArg` of type `boolean`

Refer to the `Event.initEvent()` [p.24] method for a description of this parameter.

No Return Value

No Exceptions

`isCustom` introduced in **DOM Level 3**

This method will always return `false`, unless the event implements the `CustomEvent` [p.34] interface.

Return Value

`boolean`	`false`, unless the event object implements the `CustomEvent` [p.34] interface.

No Parameters

No Exceptions

`isDefaultPrevented` introduced in **DOM Level 3**

This method will return `true` if the method `Event.preventDefault()` [p.25] has been called for this event, `false` otherwise.

Return Value

`boolean`	`true` if `Event.preventDefault()` [p.25] has been called for this event.

No Parameters

No Exceptions

`preventDefault`

If an event is cancelable, the `preventDefault` method is used to signify that the event is to be canceled, meaning any default action normally taken by the implementation as a result of the event will not occur (see also Default actions and cancelable events [p.13]), and thus independently of event groups. Calling this method for a non-cancelable event has no effect.

Note: This method does not stop the event propagation; use `stopPropagation` or `stopImmediatePropagation` for that effect.

No Parameters
No Return Value
No Exceptions

`stopImmediatePropagation` introduced in **DOM Level 3**

This method is used to prevent event listeners of the same group to be triggered and, unlike `stopPropagation` its effect is immediate (see Event propagation and event groups [p.13]). Once it has been called, further calls to that method have no additional effect.

Note: This method does not prevent the default action from being invoked; use `Event.preventDefault()` [p.25] for that effect.

No Parameters
No Return Value
No Exceptions

`stopPropagation`

This method is used to prevent event listeners of the same group to be triggered but its effect is deferred until all event listeners attached on the `currentTarget` have been triggered (see Event propagation and event groups [p.13]). Once it has been called, further calls to that method have no additional effect.

Note: This method does not prevent the default action from being invoked; use `preventDefault` for that effect.

No Parameters
No Return Value
No Exceptions

Interface *EventTarget* (introduced in **DOM Level 2**)

The `EventTarget` interface is implemented by all the objects which could be event targets [p.101] in an implementation which supports the Event flows [p.9] . The interface allows registration, removal or query of event listeners, and dispatch of events to an event target.

When used with DOM event flow [p.10] , this interface is implemented by all target nodes [p.101] and target ancestors, i.e. all DOM `Nodes` of the tree support this interface when the implementation conforms to DOM Level 3 Events and, therefore, this interface can be obtained by using binding-specific casting methods on an instance of the `Node` interface.

Invoking `addEventListener` or `addEventListenerNS` multiple times on the same `EventTarget` with the same parameters (`namespaceURI`, `type`, `listener`, and `useCapture`) is considered to be a no-op and thus independently of the event group. They do not cause the `EventListener` [p.30] to be called more than once and do not cause a change in the triggering order. In order to guarantee that an event listener will be added to the event target for the specified event group, one needs to invoke `removeEventListener` or `removeEventListenerNS` first.

IDL Definition

```
// Introduced in DOM Level 2:
interface EventTarget {
  void               addEventListener(in DOMString type,
                                      in EventListener listener,
                                      in boolean useCapture);
  void               removeEventListener(in DOMString type,
                                         in EventListener listener,
                                         in boolean useCapture);
  // Modified in DOM Level 3:
  boolean            dispatchEvent(in Event evt)
                                     raises(EventException);
  // Introduced in DOM Level 3:
  void               addEventListenerNS(in DOMString namespaceURI,
                                        in DOMString type,
                                        in EventListener listener,
                                        in boolean useCapture,
                                        in DOMObject evtGroup);
  // Introduced in DOM Level 3:
  void               removeEventListenerNS(in DOMString namespaceURI,
                                           in DOMString type,
                                           in EventListener listener,
                                           in boolean useCapture);
  // Introduced in DOM Level 3:
  boolean            willTriggerNS(in DOMString namespaceURI,
                                   in DOMString type);
  // Introduced in DOM Level 3:
  boolean            hasEventListenerNS(in DOMString namespaceURI,
                                        in DOMString type);
};
```

Methods

`addEventListener`

This method allows the registration of an event listener in the default group and, depending on the `useCapture` parameter, on the capture phase of the DOM event flow or its target and bubbling phases.

Parameters

`type` of type `DOMString`

Specifies the `Event.type` [p.24] associated with the event for which the user is registering.

`listener` of type `EventListener` [p.30]

The `listener` parameter takes an object implemented by the user which implements the `EventListener` interface and contains the method to be called when the event occurs.

`useCapture` of type `boolean`

If true, `useCapture` indicates that the user wishes to add the event listener for the capture phase [p.101] only, i.e. this event listener will not be triggered during the target [p.101] and bubbling [p.101] phases. If `false`, the event listener will only be triggered during the target and bubbling phases.

No Return Value

No Exceptions

`addEventListenerNS` introduced in **DOM Level 3**

This method allows the registration of an event listener in a specified group or the default group and, depending on the `useCapture` parameter, on the capture phase of the DOM event flow or its target and bubbling phases.

Parameters

`namespaceURI` of type `DOMString`

Specifies the `Event.namespaceURI` [p.24] associated with the event for which the user is registering.

`type` of type `DOMString`

Specifies the `Event.type` [p.24] associated with the event for which the user is registering.

`listener` of type `EventListener` [p.30]

The `listener` parameter takes an object implemented by the user which implements the `EventListener` interface and contains the method to be called when the event occurs.

`useCapture` of type `boolean`

If true, `useCapture` indicates that the user wishes to add the event listener for the capture phase [p.101] only, i.e. this event listener will not be triggered during the target [p.101] and bubbling [p.101] phases. If `false`, the event listener will only be triggered during the target and bubbling phases.

`evtGroup` of type `DOMObject`

The object that represents the event group to associate with the `EventListener` (see also Event propagation and event groups [p.13]). Use `null` to attach the event listener to the default group.

No Return Value

No Exceptions

`dispatchEvent` modified in **DOM Level 3**

This method allows the dispatch of events into the implementation's event model. The event target [p.101] of the event is the `EventTarget` object on which `dispatchEvent` is called.

Parameters

`evt` of type `Event` [p.22]

The event to be dispatched.

Return Value

`boolean`	Indicates whether any of the listeners which handled the event called `Event.preventDefault()` [p.25] . If `Event.preventDefault()` [p.25] was called the returned value is `false`, else it is `true`.

Exceptions

`EventException` [p.31]	UNSPECIFIED_EVENT_TYPE_ERR: Raised if the `Event.type` [p.24] was not specified by initializing the event before `dispatchEvent` was called. Specification of the `Event.type` as `null` or an empty string will also trigger this exception. DISPATCH_REQUEST_ERR: Raised if the `Event` [p.22] object is already being dispatched in the tree. NOT_SUPPORTED_ERR: Raised if the `Event` [p.22] object has not been created using `DocumentEvent.createEvent()` [p.33] or does not support the interface `CustomEvent` [p.34] .

`hasEventListenerNS` introduced in **DOM Level 3**

This method allows the DOM application to know if this `EventTarget` contains an event listener registered for the specified event type. This is useful for determining at which nodes within a hierarchy altered handling of specific event types has been introduced, but should not be used to determine whether the specified event type triggers an event listener (see `EventTarget.willTriggerNS()` [p.30]).

Parameters

`namespaceURI` of type `DOMString`

Specifies the `Event.namespaceURI` [p.24] associated with the event.

`type` of type `DOMString`

Specifies the `Event.type` [p.24] associated with the event.

Return Value

`boolean`	`true` if an event listener is registered on this `EventTarget` for the specified event type, `false` otherwise.

No Exceptions

`removeEventListener`

This method allows the removal of event listeners from the default group.

Calling `removeEventListener` with arguments which do not identify any currently registered `EventListener` [p.30] on the `EventTarget` has no effect.

Parameters

`type` of type `DOMString`

Specifies the `Event.type` [p.24] for which the user registered the event listener.

`listener` of type `EventListener` [p.30]

The `EventListener` to be removed.

`useCapture` of type `boolean`

Specifies whether the `EventListener` being removed was registered for the capture phase or not. If a listener was registered twice, once for the capture phase and once for the target and bubbling phases, each must be removed separately. Removal of an event listener registered for the capture phase does not affect the same event listener registered for the target and bubbling phases, and vice versa.

No Return Value

No Exceptions

`removeEventListenerNS` introduced in **DOM Level 3**

This method allows the removal of an event listener, independently of the associated event group.

Calling `removeEventListenerNS` with arguments which do not identify any currently registered `EventListener` [p.30] on the `EventTarget` has no effect.

Parameters

`namespaceURI` of type `DOMString`

Specifies the `Event.namespaceURI` [p.24] associated with the event for which the user registered the event listener.

`type` of type `DOMString`

Specifies the `Event.type` [p.24] associated with the event for which the user registered the event listener.

`listener` of type `EventListener` [p.30]

The `EventListener` parameter indicates the `EventListener` to be removed.

`useCapture` of type `boolean`

Specifies whether the `EventListener` being removed was registered for the capture phase or not. If a listener was registered twice, once for the capture phase and once for the target and bubbling phases, each must be removed separately. Removal of an event listener registered for the capture phase does not affect the same event listener registered for the target and bubbling phases, and vice versa.

No Return Value

No Exceptions

`willTriggerNS` introduced in **DOM Level 3**

This method allows the DOM application to know if an event listener, attached to this `EventTarget` or one of its ancestors, will be triggered by the specified event type during the dispatch of the event to this event target or one of its descendants.

Parameters

`namespaceURI` of type `DOMString`

Specifies the `Event.namespaceURI` [p.24] associated with the event.

`type` of type `DOMString`

Specifies the `Event.type` [p.24] associated with the event.

Return Value

`boolean`	`true` if an event listener will be triggered on the `EventTarget` with the specified event type, `false` otherwise.

No Exceptions

Interface *EventListener* (introduced in **DOM Level 2**)

The `EventListener` interface is the primary way for handling events. Users implement the `EventListener` interface and register their event listener on an `EventTarget` [p.26] . The users should also remove their `EventListener` from its `EventTarget` after they have completed using the listener.

Copying a `Node`, with methods such as `Node.cloneNode` or `Range.cloneContents`, does not copy the event listeners attached to it. Event listeners must be attached to the newly created `Node` afterwards if so desired.

Moving a `Node`, with methods `Document.adoptNode`, `Node.appendChild`, or `Range.extractContents`, does not affect the event listeners attached to it.

IDL Definition

```
// Introduced in DOM Level 2:
interface EventListener {
  void               handleEvent(in Event evt);
};
```

Methods

`handleEvent`

This method is called whenever an event occurs of the event type for which the `EventListener` interface was registered.

Parameters

`evt` of type `Event` [p.22]

The `Event` contains contextual information about the event [p.101] .

No Return Value

No Exceptions

Exception *EventException* introduced in **DOM Level 2**

Event operations may throw an `EventException` [p.31] as specified in their method descriptions.

IDL Definition

```
// Introduced in DOM Level 2:
exception EventException {
  unsigned short   code;
};
// EventExceptionCode
const unsigned short      UNSPECIFIED_EVENT_TYPE_ERR     = 0;
// Introduced in DOM Level 3:
const unsigned short      DISPATCH_REQUEST_ERR           = 1;
```

Definition group *EventExceptionCode*

An integer indicating the type of error generated.

Defined Constants

`DISPATCH_REQUEST_ERR`, introduced in **DOM Level 3**.

If the `Event` [p.22] object is already dispatched in the tree.

`UNSPECIFIED_EVENT_TYPE_ERR`

If the `Event.type` [p.24] was not specified by initializing the event before the method was called. Specification of the `Event.type` as `null` or an empty string will also trigger this exception.

1.6.1 Event creation

In most cases, the events dispatched by the DOM Events implementation are also created by the implementation. It is however possible to simulate events such as mouse events by creating the `Event` [p.22] objects and dispatch them using the DOM Events implementation.

DOM Events provides two ways for creating `Event` [p.22] objects. An application can either create `Event` objects that are known to the implementation, or create its own objects and have them dispatched by the DOM Events implementation.

Creating `Event` [p.22] objects that are known to the DOM Events implementation is done using `DocumentEvent.createEvent()` [p.33] . The application must then initialize the object by calling the appropriate initialization method before invoking `EventTarget.dispatchEvent()` [p.28] . The `Event` objects created must be known by the DOM Events implementation; otherwise an event exception is thrown.

The DOM application might want to create its own `Event` [p.22] objects, in order to change the default `Event` implementation provided by the DOM Events implementation or to generate new event types with specific contextual information. In any case, the application is responsible for creating and initializing the `Event` object. The application can then dispatch the event using the DOM Events implementation by using `EventTarget.dispatchEvent()` [p.28] .

However, the DOM Events implementation requires to have access to two attributes in the `Event` [p.22] object in order to accomplish the dispatch appropriately: `Event.currentTarget` [p.23] and `Event.eventPhase` [p.23] . Those attributes are defined as `readonly` in the `Event` interface since event listeners must not change them and it is the responsibility of the DOM Events implementation to update them during the event flow. Therefore, implementing the `Event` interface when creating its own events is not enough for an application since the DOM Events implementation will not be able to update the current phase and the current node during the dispatch, unless the event object also implements the `CustomEvent` [p.34] interface to give access to the relevant attributes.

Interface *DocumentEvent* (introduced in **DOM Level 2**)

> The `DocumentEvent` interface provides a mechanism by which the user can create an `Event` [p.22] object of a type supported by the implementation. If the feature "Events" is supported by the `Document` object, the `DocumentEvent` interface must be implemented on the same object. If the feature "+Events" is supported by the `Document` object, an object that supports the `DocumentEvent` interface must be returned by invoking the method `Node.getFeature("+Events", "3.0")` on the `Document` object.
> **IDL Definition**

```
// Introduced in DOM Level 2:
interface DocumentEvent {
  Event              createEvent(in DOMString eventType)
                                        raises(DOMException);
  // Introduced in DOM Level 3:
  boolean            canDispatch(in DOMString namespaceURI,
                                 in DOMString type);
};
```

Methods

`canDispatch` introduced in **DOM Level 3**

Test if the implementation can generate events of a specified type.

Parameters

`namespaceURI` of type `DOMString`

Specifies the `Event.namespaceURI` [p.24] of the event.

`type` of type `DOMString`

Specifies the `Event.type` [p.24] of the event.

Return Value

`boolean`	`true` if the implementation can generate and dispatch this event type, `false` otherwise.

No Exceptions

`createEvent`

Parameters

`eventType` of type `DOMString`

The `eventType` parameter specifies the name of the DOM Events interface to be supported by the created event object, e.g. `"Event"`, `"MouseEvent"`, `"MutationEvent"` and so on. If the `Event` [p.22] is to be dispatched via the `EventTarget.dispatchEvent()` [p.28] method the appropriate event init method must be called after creation in order to initialize the `Event`'s values.
As an example, a user wishing to synthesize some kind of `UIEvent` [p.35] would invoke `DocumentEvent.createEvent("UIEvent")` [p.33] . The `UIEvent.initUIEventNS()` [p.36] method could then be called on the newly created `UIEvent` object to set the specific type of user interface event to be dispatched, `{"http://www.w3.org/2001/xml-events", "DOMActivate"}` for example, and set its context information, e.g. `UIEvent.detail` [p.36] in this example.
The `createEvent` method is used in creating `Event` [p.22] s when it is either inconvenient or unnecessary for the user to create an `Event` themselves. In cases where the implementation provided `Event` is insufficient, users may supply their own `Event` implementations for use with the `EventTarget.dispatchEvent()` [p.28] method. However, the DOM implementation needs access to the attributes `Event.currentTarget` [p.23] and `Event.eventPhase` [p.23] to appropriately propagate the event in the DOM tree. Therefore users' `Event` implementations might need to support the `CustomEvent` [p.34] interface for that effect.

Note: For backward compatibility reason, "UIEvents", "MouseEvents", "MutationEvents", and "HTMLEvents" feature names are valid values for the parameter `eventType` and represent respectively the interfaces "UIEvent", "MouseEvent", "MutationEvent", and "Event".

Return Value

`Event` [p.22] The newly created event object.

Exceptions

`DOMException` NOT_SUPPORTED_ERR: Raised if the implementation does not support the `Event` [p.22] interface requested.

Interface *CustomEvent* (introduced in **DOM Level 3**)

The `CustomEvent` interface gives access to the attributes `Event.currentTarget` [p.23] and `Event.eventPhase` [p.23] . It is intended to be used by the DOM Events implementation to access the underlying current target and event phase while dispatching a custom `Event` [p.22] in the tree; it is also intended to be implemented, and *not used*, by DOM applications.

The methods contained in this interface are not intended to be used by a DOM application, especially during the dispatch on the `Event` [p.22] object. Changing the current target or the current phase may result in unpredictable results of the event flow. The DOM Events implementation should ensure that both methods return the appropriate current target and phase before invoking each event listener on the current target to protect DOM applications from malicious event listeners.

Note: If this interface is supported by the event object, `Event.isCustom()` [p.25] must return `true`.

IDL Definition

```
// Introduced in DOM Level 3:
interface CustomEvent : Event {
  void               setDispatchState(in EventTarget target,
                                      in unsigned short phase);
  boolean            isPropagationStopped();
  boolean            isImmediatePropagationStopped();
};
```

Methods

`isImmediatePropagationStopped`

The `isImmediatePropagationStopped` method is used by the DOM Events implementation to know if the method `stopImmediatePropagation()` has been called for this event. It returns `true` if the method has been called, `false` otherwise.

Return Value

`boolean` `true` if the event propagation has been stopped immediately in the current group.

No Parameters

No Exceptions

`isPropagationStopped`
This method will return `true` if the method `stopPropagation()` has been called for this event, `false` in any other cases.
Return Value

`boolean` `true` if the event propagation has been stopped in the current group.

No Parameters
No Exceptions

`setDispatchState`
The `setDispatchState` method is used by the DOM Events implementation to set the values of `Event.currentTarget` [p.23] and `Event.eventPhase` [p.23] . It also reset the states of `isPropagationStopped` and `isImmediatePropagationStopped`.
Parameters
`target` of type `EventTarget` [p.26]
Specifies the new value for the `Event.currentTarget` [p.23] attribute.
`phase` of type `unsigned short`
Specifies the new value for the `Event.eventPhase` [p.23] attribute.
No Return Value
No Exceptions

1.7 Event module definitions

The DOM Event Model allows a DOM implementation to support multiple modules of events. The model has been designed to allow addition of new event modules if required. The DOM will not attempt to define all possible events. For purposes of interoperability, the DOM defines a module of user interface events including lower level device dependent events and a module of document mutation events.

1.7.1 User Interface event types

The User Interface event module contains basic event types associated with user interfaces.

Interface *UIEvent* (introduced in **DOM Level 2**)

The `UIEvent` interface provides specific contextual information associated with User Interface events.

To create an instance of the `UIEvent` interface, use the `DocumentEvent.createEvent("UIEvent")` [p.33] method call.
IDL Definition

```
// Introduced in DOM Level 2:
interface UIEvent : Event {
  readonly attribute views::AbstractView view;
  readonly attribute long            detail;
  void               initUIEvent(in DOMString typeArg,
```

```
                                    in boolean canBubbleArg,
                                    in boolean cancelableArg,
                                    in views::AbstractView viewArg,
                                    in long detailArg);
  // Introduced in DOM Level 3:
  void               initUIEventNS(in DOMString namespaceURI,
                                     in DOMString typeArg,
                                     in boolean canBubbleArg,
                                     in boolean cancelableArg,
                                     in views::AbstractView viewArg,
                                     in long detailArg);
};
```

Attributes

`detail` of type `long`, readonly

Specifies some detail information about the `Event` [p.22] , depending on the type of event.

`view` of type `views::AbstractView`, readonly

The `view` attribute identifies the `AbstractView` from which the event was generated.

Methods

`initUIEvent`

The `initUIEvent` method is used to initialize the value of a `UIEvent` object and has the same behavior as `Event.initEvent()` [p.24] .

Parameters

`typeArg` of type `DOMString`

Refer to the `Event.initEvent()` [p.24] method for a description of this parameter.

`canBubbleArg` of type `boolean`

Refer to the `Event.initEvent()` [p.24] method for a description of this parameter.

`cancelableArg` of type `boolean`

Refer to the `Event.initEvent()` [p.24] method for a description of this parameter.

`viewArg` of type `views::AbstractView`

Specifies `UIEvent.view` [p.36] .

`detailArg` of type `long`

Specifies `UIEvent.detail` [p.36] .

No Return Value

No Exceptions

`initUIEventNS` introduced in **DOM Level 3**

The `initUIEventNS` method is used to initialize the value of a `UIEvent` object and has the same behavior as `Event.initEventNS()` [p.24] .

Parameters

`namespaceURI` of type `DOMString`

Refer to the `Event.initEventNS()` [p.24] method for a description of this parameter.

`typeArg` of type `DOMString`

Refer to the `Event.initEventNS()` [p.24] method for a description of this parameter.

`canBubbleArg` of type `boolean`
: Refer to the `Event.initEventNS()` [p.24] method for a description of this parameter.

`cancelableArg` of type `boolean`
: Refer to the `Event.initEventNS()` [p.24] method for a description of this parameter.

`viewArg` of type `views::AbstractView`
: Refer to the `UIEvent.initUIEvent()` [p.36] method for a description of this parameter.

`detailArg` of type `long`
: Refer to the `UIEvent.initUIEvent()` [p.36] method for a description of this parameter.

No Return Value
No Exceptions

The User Interface event types are listed below. For a full description of the semantics associated with these event types, refer to the Complete list of event types [p.14] . A DOM application may use the `hasFeature(feature, version)` method of the `DOMImplementation` interface with parameter values `"UIEvents"` and `"3.0"` (respectively) to determine whether or not the DOM Level 3 User Interface event types are supported by the implementation. In order to fully support this module, an implementation must also support the `"Events"` feature defined in this specification and the `"Views"` feature defined in the DOM Level 2 Views specification [DOM Level 2 Views]. For additional information about *conformance*, please see the DOM Level 3 Core specification [DOM Level 3 Core]. The DOM Level 3 User Interface Events module is built on top of the DOM Level 2 User Interface Events [DOM Level 2 Events] module, i.e. a DOM Level 3 User Interface Events implementation where `hasFeature("UIEvents", "3.0")` returns `true` must also return `true` when the `version` number is `"2.0"`, `""` or, `null`.

type	Context information
DOMActivate	`UIEvent.view` [p.36] is in use.
DOMFocusIn	(same as above)
DOMFocusOut	(same as above)

1.7.2 Text events types

The text event module originates from the [HTML 4.01] `onkeypress` attribute. Unlike this attribute, the event type `{"http://www.w3.org/2001/xml-events", "textInput"}` applies only to characters and is designed for use with any text input devices, not just keyboards. Refer to Appendix A, "Keyboard events and key identifiers [p.61] ", for examples on how text events are used in combination with keyboard events.

Interface *TextEvent* (introduced in **DOM Level 3**)

The `TextEvent` interface provides specific contextual information associated with Text Events.

To create an instance of the `TextEvent` interface, use the `DocumentEvent.createEvent("TextEvent")` [p.33] method call.

IDL Definition

```
// Introduced in DOM Level 3:
interface TextEvent : UIEvent {
  readonly attribute DOMString       data;
  void               initTextEvent(in DOMString typeArg,
                                   in boolean canBubbleArg,
                                   in boolean cancelableArg,
                                   in views::AbstractView viewArg,
                                   in DOMString dataArg);
  void               initTextEventNS(in DOMString namespaceURI,
                                     in DOMString type,
                                     in boolean canBubbleArg,
                                     in boolean cancelableArg,
                                     in views::AbstractView viewArg,
                                     in DOMString dataArg);
};
```

Attributes

`data` of type `DOMString`, readonly

`data` holds the value of the characters generated by the character device. This may be a single Unicode character or a non-empty sequence of Unicode characters [Unicode]. Characters should be normalized as defined by the Unicode normalization form *NFC*, defined in [UTR #15]. This attribute cannot be null or contain the empty string.

Methods

`initTextEvent`

The `initTextEvent` method is used to initialize the value of a `TextEvent` object and has the same behavior as `UIEvent.initUIEvent()` [p.36] . The value of `UIEvent.detail` [p.36] remains undefined.

Parameters

`typeArg` of type `DOMString`

Refer to the `UIEvent.initUIEvent()` [p.36] method for a description of this parameter.

`canBubbleArg` of type `boolean`

Refer to the `UIEvent.initUIEvent()` [p.36] method for a description of this parameter.

`cancelableArg` of type `boolean`

Refer to the `UIEvent.initUIEvent()` [p.36] method for a description of this parameter.

`viewArg` of type `views::AbstractView`

Refer to the `UIEvent.initUIEvent()` [p.36] method for a description of this parameter.

`dataArg` of type `DOMString`

Specifies `TextEvent.data` [p.38] .

No Return Value

No Exceptions

`initTextEventNS`

The `initTextEventNS` method is used to initialize the value of a `TextEvent` object and has the same behavior as `UIEvent.initUIEventNS()` [p.36] . The value of `UIEvent.detail` [p.36] remains undefined.

Parameters

`namespaceURI` of type `DOMString`

Refer to the `UIEvent.initUIEventNS()` [p.36] method for a description of this parameter.

`type` of type `DOMString`

Refer to the `UIEvent.initUIEventNS()` [p.36] method for a description of this parameter.

`canBubbleArg` of type `boolean`

Refer to the `UIEvent.initUIEventNS()` [p.36] method for a description of this parameter.

`cancelableArg` of type `boolean`

Refer to the `UIEvent.initUIEventNS()` [p.36] method for a description of this parameter.

`viewArg` of type `views::AbstractView`

Refer to the `UIEvent.initUIEventNS()` [p.36] method for a description of this parameter.

`dataArg` of type `DOMString`

Refer to the `TextEvent.initTextEvent()` [p.38] method for a description of this parameter.

No Return Value

No Exceptions

The text event type is listed below. For a full description of the semantics associated with this event type, refer to the Complete list of event types [p.14] . A DOM application may use the `hasFeature(feature, version)` method of the `DOMImplementation` interface with parameter values `"TextEvents"` and `"3.0"` (respectively) to determine whether or not the Text event module is supported by the implementation. In order to fully support this module, an implementation must also support the `"UIEvents"` feature defined in this specification. For additional information about *conformance*, please see the DOM Level 3 Core specification [DOM Level 3 Core].

type	Context information
textInput	`UIEvent.view` [p.36] and `TextEvent.data` [p.38] are in use.

1.7.3 Mouse event types

The Mouse event module originates from the [HTML 4.01] `onclick`, `ondblclick`, `onmousedown`, `onmouseup`, `onmouseover`, `onmousemove`, and `onmouseout` attributes. This event module is specifically designed for use with pointing input devices, such as a mouse or a trackball.

Interface *MouseEvent* (introduced in **DOM Level 2**)

The `MouseEvent` interface provides specific contextual information associated with Mouse events.

In the case of nested elements mouse events are always targeted at the most deeply nested element. Ancestors of the targeted element may use bubbling to obtain notification of mouse events which occur within theirs descendent elements.

To create an instance of the `MouseEvent` interface, use the `DocumentEvent.createEvent("MouseEvent")` [p.33] method call.

Note: When initializing `MouseEvent` objects using `initMouseEvent` or `initMouseEventNS`, implementations should use the client coordinates `clientX` and `clientY` for calculation of other coordinates (such as target coordinates exposed by DOM Level 0 [p.101] implementations).

IDL Definition

```
// Introduced in DOM Level 2:
interface MouseEvent : UIEvent {
  readonly attribute long            screenX;
  readonly attribute long            screenY;
  readonly attribute long            clientX;
  readonly attribute long            clientY;
  readonly attribute boolean         ctrlKey;
  readonly attribute boolean         shiftKey;
  readonly attribute boolean         altKey;
  readonly attribute boolean         metaKey;
  readonly attribute unsigned short  button;
  readonly attribute EventTarget     relatedTarget;
  void               initMouseEvent(in DOMString typeArg,
                                    in boolean canBubbleArg,
                                    in boolean cancelableArg,
                                    in views::AbstractView viewArg,
                                    in long detailArg,
                                    in long screenXArg,
                                    in long screenYArg,
                                    in long clientXArg,
                                    in long clientYArg,
                                    in boolean ctrlKeyArg,
                                    in boolean altKeyArg,
                                    in boolean shiftKeyArg,
                                    in boolean metaKeyArg,
                                    in unsigned short buttonArg,
                                    in EventTarget relatedTargetArg);
  // Introduced in DOM Level 3:
  boolean            getModifierState(in DOMString keyIdentifierArg);
  // Introduced in DOM Level 3:
  void               initMouseEventNS(in DOMString namespaceURI,
                                      in DOMString typeArg,
                                      in boolean canBubbleArg,
                                      in boolean cancelableArg,
                                      in views::AbstractView viewArg,
                                      in long detailArg,
                                      in long screenXArg,
                                      in long screenYArg,
```

```
                                        in long clientXArg,
                                        in long clientYArg,
                                        in unsigned short buttonArg,
                                        in EventTarget relatedTargetArg,
                                        in DOMString modifiersList);
};
```

Attributes

`altKey` of type `boolean`, readonly
: `true` if the alt (alternative) key modifier is activated.

  Note: The Option key modifier on Macintosh systems must be represented using this key modifier.

`button` of type `unsigned short`, readonly
: During mouse events caused by the depression or release of a mouse button, `button` is used to indicate which mouse button changed state. `0` indicates the normal button of the mouse (in general on the left or the one button on Macintosh mice, used to activate a button or select text). `2` indicates the contextual property (in general on the right, used to display a context menu) button of the mouse if present. `1` indicates the extra (in general in the middle and often combined with the mouse wheel) button. Some mice may provide or simulate more buttons, and values higher than `2` can be used to represent such buttons.

`clientX` of type `long`, readonly
: The horizontal coordinate at which the event occurred relative to the DOM implementation's client area.

`clientY` of type `long`, readonly
: The vertical coordinate at which the event occurred relative to the DOM implementation's client area.

`ctrlKey` of type `boolean`, readonly
: `true` if the control (Ctrl) key modifier is activated.

`metaKey` of type `boolean`, readonly
: `true` if the meta (Meta) key modifier is activated.

  Note: The Command key modifier on Macintosh system must be represented using this meta key.

`relatedTarget` of type `EventTarget` [p.26] , readonly
: Used to identify a secondary `EventTarget` [p.26] related to a UI event. Currently this attribute is used with the mouseover event to indicate the `EventTarget` which the pointing device exited and with the mouseout event to indicate the `EventTarget` which the pointing device entered.

`screenX` of type `long`, readonly
: The horizontal coordinate at which the event occurred relative to the origin of the screen coordinate system.

`screenY` of type `long`, readonly
: The vertical coordinate at which the event occurred relative to the origin of the screen coordinate system.

`shiftKey` of type `boolean`, readonly
: `true` if the shift (Shift) key modifier is activated.

Methods

`getModifierState` introduced in **DOM Level 3**
: This methods queries the state of a modifier using a key identifier. See also Modifier keys [p.62] .

Parameters

`keyIdentifierArg` of type `DOMString`
: A modifier key identifier, as defined by the `KeyboardEvent.keyIdentifier` [p.47] attribute. Common modifier keys are `"Alt"`, `"AltGraph"`, `"CapsLock"`, `"Control"`, `"Meta"`, `"NumLock"`, `"Scroll"`, or `"Shift"`.

Note: If an application wishes to distinguish between right and left modifiers, this information could be deduced using keyboard events and `KeyboardEvent.keyLocation` [p.47] .

Return Value

`boolean`	`true` if it is modifier key and the modifier is activated, `false` otherwise.

No Exceptions

`initMouseEvent`
: The `initMouseEvent` method is used to initialize the value of a `MouseEvent` object and has the same behavior as `UIEvent.initUIEvent()` [p.36] .

Parameters

`typeArg` of type `DOMString`
: Refer to the `UIEvent.initUIEvent()` [p.36] method for a description of this parameter.

`canBubbleArg` of type `boolean`
: Refer to the `UIEvent.initUIEvent()` [p.36] method for a description of this parameter.

`cancelableArg` of type `boolean`
: Refer to the `UIEvent.initUIEvent()` [p.36] method for a description of this parameter.

`viewArg` of type `views::AbstractView`
: Refer to the `UIEvent.initUIEvent()` [p.36] method for a description of this parameter.

`detailArg` of type `long`
: Refer to the `UIEvent.initUIEvent()` [p.36] method for a description of this parameter.

`screenXArg` of type `long`
: Specifies `MouseEvent.screenX` [p.41] .

`screenYArg` of type `long`
: Specifies `MouseEvent.screenY` [p.41] .

`clientXArg` of type `long`
: Specifies `MouseEvent.clientX` [p.41] .

`clientYArg` of type `long`
: Specifies `MouseEvent.clientY` [p.41] .

`ctrlKeyArg` of type `boolean`
: Specifies `MouseEvent.ctrlKey` [p.41] .

`altKeyArg` of type `boolean`
: Specifies `MouseEvent.altKey` [p.41] .

`shiftKeyArg` of type `boolean`
: Specifies `MouseEvent.shiftKey` [p.42] .

`metaKeyArg` of type `boolean`
: Specifies `MouseEvent.metaKey` [p.41] .

`buttonArg` of type `unsigned short`
: Specifies `MouseEvent.button` [p.41] .

`relatedTargetArg` of type `EventTarget` [p.26]
: Specifies `MouseEvent.relatedTarget` [p.41] .

No Return Value

No Exceptions

`initMouseEventNS` introduced in **DOM Level 3**

The `initMouseEventNS` method is used to initialize the value of a `MouseEvent` object and has the same behavior as `UIEvent.initUIEventNS()` [p.36] .

Parameters

`namespaceURI` of type `DOMString`
: Refer to the `UIEvent.initUIEventNS()` [p.36] method for a description of this parameter.

`typeArg` of type `DOMString`
: Refer to the `UIEvent.initUIEventNS()` [p.36] method for a description of this parameter.

`canBubbleArg` of type `boolean`
: Refer to the `UIEvent.initUIEventNS()` [p.36] method for a description of this parameter.

`cancelableArg` of type `boolean`
: Refer to the `UIEvent.initUIEventNS()` [p.36] method for a description of this parameter.

`viewArg` of type `views::AbstractView`
: Refer to the `UIEvent.initUIEventNS()` [p.36] method for a description of this parameter.

`detailArg` of type `long`
: Refer to the `UIEvent.initUIEventNS()` [p.36] method for a description of this parameter.

`screenXArg` of type `long`
: Refer to the `MouseEvent.initMouseEvent()` [p.42] method for a description of this parameter.

`screenYArg` of type `long`
: Refer to the `MouseEvent.initMouseEvent()` [p.42] method for a description of this parameter.

`clientXArg` of type `long`
: Refer to the `MouseEvent.initMouseEvent()` [p.42] method for a description of this parameter.

`clientYArg` of type `long`
: Refer to the `MouseEvent.initMouseEvent()` [p.42] method for a description of this parameter.

`buttonArg` of type `unsigned short`
: Refer to the `MouseEvent.initMouseEvent()` [p.42] method for a description of this parameter.

`relatedTargetArg` of type `EventTarget` [p.26]
: Refer to the `MouseEvent.initMouseEvent()` [p.42] method for a description of this parameter.

`modifiersList` of type `DOMString`
: A *white space* separated list of modifier key identifiers to be activated on this object. As an example, `"Control Alt"` will activated the control and alt modifiers.

No Return Value
No Exceptions

The Mouse event types are listed below. For a full description of the semantics associated with these event types, refer to the Complete list of event types [p.14] . In the case of nested elements, mouse event types are always targeted at the most deeply nested element. Ancestors of the targeted element may use bubbling to obtain notification of mouse events which occur within its descendent elements.

A DOM application may use the `hasFeature(feature, version)` method of the `DOMImplementation` interface with parameter values `"MouseEvents"` and `"3.0"` (respectively) to determine whether or not the Mouse event module is supported by the implementation. In order to fully support this module, an implementation must also support the "UIEvents" feature defined in this specification. For additional information about *conformance*, please see the DOM Level 3 Core specification [DOM Level 3 Core]. The DOM Level 3 Mouse Events module is built on top of the DOM Level 2 Mouse Events [DOM Level 2 Events] module, i.e. a DOM Level 3 Mouse Events implementation where `hasFeature("MouseEvents", "3.0")` returns `true` must also return `true` when the `version` number is `"2.0"`, `""` or, `null`.

type	Context information
click	`MouseEvent.screenX` [p.41] , `MouseEvent.screenY` [p.41] , `MouseEvent.clientX` [p.41] , `MouseEvent.clientY` [p.41] , `MouseEvent.altKey` [p.41] , `MouseEvent.ctrlKey` [p.41] , `MouseEvent.shiftKey` [p.42] , `MouseEvent.metaKey` [p.41] , `MouseEvent.altGraphKey`, `MouseEvent.button` [p.41] , and `UIEvent.view` [p.36] are in use. The `UIEvent.detail` [p.36] attribute indicates the number of consecutive clicks of a pointing device button during a user action. The attribute value is `1` when the user begins this action and increments by `1` for each click. The notion of consecutive clicks depends on the environment configuration. For example, a "double click" will not happen if there is a long delay between the two clicks, even if the pointing device did not move.

mousedown	`MouseEvent.screenX` [p.41] , `MouseEvent.screenY` [p.41] , `MouseEvent.clientX` [p.41] , `MouseEvent.clientY` [p.41] , `MouseEvent.altKey` [p.41] , `MouseEvent.ctrlKey` [p.41] , `MouseEvent.shiftKey` [p.42] , `MouseEvent.metaKey` [p.41] , `MouseEvent.altGraphKey`, `MouseEvent.button` [p.41] , and `UIEvent.view` [p.36] are in use. The `UIEvent.detail` [p.36] attribute indicates the number of consecutive clicks, incremented by one, of a pointing device button during a user action. For example, if no click happened before the mousedown, `UIEvent.detail` will contain the value `1`.
mouseup	`MouseEvent.screenX` [p.41] , `MouseEvent.screenY` [p.41] , `MouseEvent.clientX` [p.41] , `MouseEvent.clientY` [p.41] , `MouseEvent.altKey` [p.41] , `MouseEvent.ctrlKey` [p.41] , `MouseEvent.shiftKey` [p.42] , `MouseEvent.metaKey` [p.41] , `MouseEvent.altGraphKey`, `MouseEvent.button` [p.41] , and `UIEvent.view` [p.36] are in use. The `UIEvent.detail` [p.36] attribute indicates the number of consecutive clicks, incremented by one, of a pointing device button during a user action.
mouseover	`MouseEvent.screenX` [p.41] , `MouseEvent.screenY` [p.41] , `MouseEvent.clientX` [p.41] , `MouseEvent.clientY` [p.41] , `MouseEvent.altKey` [p.41] , `MouseEvent.ctrlKey` [p.41] , `MouseEvent.shiftKey` [p.42] , `MouseEvent.metaKey` [p.41] , `MouseEvent.altGraphKey`, and `UIEvent.view` [p.36] are in use. `MouseEvent.relatedTarget` [p.41] indicates the event target [p.101] a pointing device is exiting.
mousemove	`MouseEvent.screenX` [p.41] , `MouseEvent.screenY` [p.41] , `MouseEvent.clientX` [p.41] , `MouseEvent.clientY` [p.41] , `MouseEvent.altKey` [p.41] , `MouseEvent.ctrlKey` [p.41] , `MouseEvent.shiftKey` [p.42] , `MouseEvent.metaKey` [p.41] , `MouseEvent.altGraphKey`, and `UIEvent.view` [p.36] are in use.
mouseout	`MouseEvent.screenX` [p.41] , `MouseEvent.screenY` [p.41] , `MouseEvent.clientX` [p.41] , `MouseEvent.clientY` [p.41] , `MouseEvent.altKey` [p.41] , `MouseEvent.ctrlKey` [p.41] , `MouseEvent.shiftKey` [p.42] , `MouseEvent.metaKey` [p.41] , `MouseEvent.altGraphKey`, and `UIEvent.view` [p.36] are in use. `MouseEvent.relatedTarget` [p.41] indicates the event target [p.101] a pointing device is entering.

As an example, a "double-click" on a mouse device will produce the following events (the value of `UIEvent.detail` [p.36] is indicated in parenthesis):

1. `{"http://www.w3.org/2001/xml-events", "mousedown"}` (1)
2. `{"http://www.w3.org/2001/xml-events", "mouseup"}` (1)
3. `{"http://www.w3.org/2001/xml-events", "click"}` (1)
4. `{"http://www.w3.org/2001/xml-events", "mousedown"}` (2)
5. `{"http://www.w3.org/2001/xml-events", "mouseup"}` (2)
6. `{"http://www.w3.org/2001/xml-events", "click"}` (2)

1.7.4 Keyboard event types

Keyboard events are device dependent, i.e. they rely on the capabilities of the input devices and how they are mapped in the operating systems. It is therefore highly recommended to rely on Text events types [p.37] when dealing with character input.

Interface *KeyboardEvent* (introduced in **DOM Level 3**)

The `KeyboardEvent` interface provides specific contextual information associated with keyboard devices. Each keyboard event references a key using an identifier. Keyboard events are commonly directed at the element that has the focus.

The `KeyboardEvent` interface provides convenient attributes for some common modifiers keys: `KeyboardEvent.ctrlKey` [p.47] , `KeyboardEvent.shiftKey` [p.48] , `KeyboardEvent.altKey` [p.47] , `KeyboardEvent.metaKey` [p.47] . These attributes are equivalent to use the method `KeyboardEvent.getModifierState(keyIdentifierArg)` [p.48] with "Control", "Shift", "Alt", or "Meta" respectively.

To create an instance of the `KeyboardEvent` interface, use the `DocumentEvent.createEvent("KeyboardEvent")` [p.33] method call.
IDL Definition

```
// Introduced in DOM Level 3:
interface KeyboardEvent : UIEvent {

  // KeyLocationCode
  const unsigned long       DOM_KEY_LOCATION_STANDARD      = 0x00;
  const unsigned long       DOM_KEY_LOCATION_LEFT          = 0x01;
  const unsigned long       DOM_KEY_LOCATION_RIGHT         = 0x02;
  const unsigned long       DOM_KEY_LOCATION_NUMPAD        = 0x03;

  readonly attribute DOMString       keyIdentifier;
  readonly attribute unsigned long   keyLocation;
  readonly attribute boolean         ctrlKey;
  readonly attribute boolean         shiftKey;
  readonly attribute boolean         altKey;
  readonly attribute boolean         metaKey;
  boolean            getModifierState(in DOMString keyIdentifierArg);
  void               initKeyboardEvent(in DOMString typeArg,
                                       in boolean canBubbleArg,
                                       in boolean cancelableArg,
                                       in views::AbstractView viewArg,
                                       in DOMString keyIdentifierArg,
                                       in unsigned long keyLocationArg,
                                       in DOMString modifiersList);
  void               initKeyboardEventNS(in DOMString namespaceURI,
                                         in DOMString typeArg,
                                         in boolean canBubbleArg,
                                         in boolean cancelableArg,
                                         in views::AbstractView viewArg,
```

```
                                                in DOMString keyIdentifierArg,
                                                in unsigned long keyLocationArg,
                                                in DOMString modifiersList);
};
```

Definition group *KeyLocationCode*

This set of constants is used to indicate the location of a key on the device. In case a DOM implementation wishes to provide a new location information, a value different from the following constant values must be used.

Defined Constants

`DOM_KEY_LOCATION_LEFT`
: The key activated is in the left key location (there is more than one possible location for this key). Example: the left Shift key on a PC 101 Key US keyboard.

`DOM_KEY_LOCATION_NUMPAD`
: The key activation originated on the numeric keypad or with a virtual key corresponding to the numeric keypad. Example: the '1' key on a PC 101 Key US keyboard located on the numeric pad.

`DOM_KEY_LOCATION_RIGHT`
: The key activation is in the right key location (there is more than one possible location for this key). Example: the right Shift key on a PC 101 Key US keyboard.

`DOM_KEY_LOCATION_STANDARD`
: The key activation is not distinguished as the left or right version of the key, and did not originate from the numeric keypad (or did not originate with a virtual key corresponding to the numeric keypad). Example: the 'Q' key on a PC 101 Key US keyboard.

Attributes

`altKey` of type `boolean`, readonly
: `true` if the alternative (Alt) key modifier is activated.

  Note: The Option key modifier on Macintosh systems must be represented using this key modifier.

`ctrlKey` of type `boolean`, readonly
: `true` if the control (Ctrl) key modifier is activated.

`keyIdentifier` of type `DOMString`, readonly
: `keyIdentifier` holds the identifier of the key. The key identifiers are defined in Appendix A.2 "Key identifiers set [p.64] ". Implementations that are unable to identify a key must use the key identifier `"Unidentified"`.

`keyLocation` of type `unsigned long`, readonly
: The `keyLocation` attribute contains an indication of the location of they key on the device, as described in Keyboard event types [p.47] .

`metaKey` of type `boolean`, readonly
: `true` if the meta (Meta) key modifier is activated.

  Note: The Command key modifier on Macintosh systems must be represented using this key modifier.

`shiftKey` of type `boolean`, readonly
: `true` if the shift (Shift) key modifier is activated.

Methods

`getModifierState`
: This methods queries the state of a modifier using a key identifier. See also Modifier keys [p.62] .

Parameters

`keyIdentifierArg` of type `DOMString`
: A modifier key identifier. Common modifier keys are `"Alt"`, `"AltGraph"`, `"CapsLock"`, `"Control"`, `"Meta"`, `"NumLock"`, `"Scroll"`, or `"Shift"`.

Note: If an application wishes to distinguish between right and left modifiers, this information could be deduced using keyboard events and `KeyboardEvent.keyLocation` [p.47] .

Return Value

`boolean`	`true` if it is modifier key and the modifier is activated, `false` otherwise.

No Exceptions

`initKeyboardEvent`
: The `initKeyboardEvent` method is used to initialize the value of a `KeyboardEvent` object and has the same behavior as `UIEvent.initUIEvent()` [p.36] . The value of `UIEvent.detail` [p.36] remains undefined.

Parameters

`typeArg` of type `DOMString`
: Refer to the `UIEvent.initUIEvent()` [p.36] method for a description of this parameter.

`canBubbleArg` of type `boolean`
: Refer to the `UIEvent.initUIEvent()` [p.36] method for a description of this parameter.

`cancelableArg` of type `boolean`
: Refer to the `UIEvent.initUIEvent()` [p.36] method for a description of this parameter.

`viewArg` of type `views::AbstractView`
: Refer to the `UIEvent.initUIEvent()` [p.36] method for a description of this parameter.

`keyIdentifierArg` of type `DOMString`
: Specifies `KeyboardEvent.keyIdentifier` [p.47] .

`keyLocationArg` of type `unsigned long`
: Specifies `KeyboardEvent.keyLocation` [p.47] .

`modifiersList` of type `DOMString`
: A *white space* separated list of modifier key identifiers to be activated on this object.

No Return Value

No Exceptions

`initKeyboardEventNS`

The `initKeyboardEventNS` method is used to initialize the value of a `KeyboardEvent` object and has the same behavior as `UIEvent.initUIEventNS()` [p.36] . The value of `UIEvent.detail` [p.36] remains undefined.

Parameters

`namespaceURI` of type `DOMString`

Refer to the `UIEvent.initUIEventNS()` [p.36] method for a description of this parameter.

`typeArg` of type `DOMString`

Refer to the `UIEvent.initUIEventNS()` [p.36] method for a description of this parameter.

`canBubbleArg` of type `boolean`

Refer to the `UIEvent.initUIEventNS()` [p.36] method for a description of this parameter.

`cancelableArg` of type `boolean`

Refer to the `UIEvent.initUIEventNS()` [p.36] method for a description of this parameter.

`viewArg` of type `views::AbstractView`

Refer to the `UIEvent.initUIEventNS()` [p.36] method for a description of this parameter.

`keyIdentifierArg` of type `DOMString`

Refer to the `KeyboardEvent.initKeyboardEvent()` [p.48] method for a description of this parameter.

`keyLocationArg` of type `unsigned long`

Refer to the `KeyboardEvent.initKeyboardEvent()` [p.48] method for a description of this parameter.

`modifiersList` of type `DOMString`

A *white space* separated list of modifier key identifiers to be activated on this object. As an example, `"Control Alt"` will activated the control and alt modifiers.

No Return Value

No Exceptions

Depending on the character generation device, keyboard events may or may not be generated.

The keyboard event types are listed below. For a full description of the semantics associated with these event types, refer to the Complete list of event types [p.14] . A DOM application may use the `hasFeature(feature, version)` method of the `DOMImplementation` interface with parameter values `"KeyboardEvents"` and `"3.0"` (respectively) to determine whether or not the Keyboard event module is supported by the implementation. In order to fully support this module, an implementation must also support the `"UIEvents"` feature defined in this specification. For additional information about *conformance*, please see the DOM Level 3 Core specification [DOM Level 3 Core].

type	Context information
keydown	`UIEvent.view` [p.36] , `KeyboardEvent.keyIdentifier` [p.47] , `KeyboardEvent.location`, `KeyboardEvent.altKey` [p.47] , `KeyboardEvent.altGraphKey`, `KeyboardEvent.shiftKey` [p.48] , `KeyboardEvent.ctrlKey` [p.47] , and `KeyboardEvent.metaKey` [p.47] are in use.
keyup	`UIEvent.view` [p.36] , `KeyboardEvent.keyIdentifier` [p.47] , and `KeyboardEvent.location` are in use. `KeyboardEvent.altKey` [p.47] , `KeyboardEvent.altGraphKey`, `KeyboardEvent.shiftKey` [p.48] , `KeyboardEvent.ctrlKey` [p.47] , and `KeyboardEvent.metaKey` [p.47] are in use unless the `Keyboard.keyIdentifier` corresponds to the key modifier itself.

1.7.5 Mutation and mutation name event types

The mutation and mutation name event modules are designed to allow notification of any changes to the structure of a document, including attribute, text, or name modifications. It may be noted that none of the event types associated with the modules are designated as cancelable. This stems from the fact that it is very difficult to make use of existing DOM interfaces which cause document modifications if any change to the document might or might not take place due to cancelation of the resulting event. Although this is still a desired capability, it was decided that it would be better left until the addition of transactions into the DOM.

Many single modifications of the tree can cause multiple mutation events to be dispatched. Rather than attempt to specify the ordering of mutation events due to every possible modification of the tree, the ordering of these events is left to the implementation.

Interface *MutationEvent* (introduced in **DOM Level 2**)

The `MutationEvent` interface provides specific contextual information associated with Mutation events.

To create an instance of the `MutationEvent` interface, use the `DocumentEvent.createEvent("MutationEvent")` [p.33] method call.

IDL Definition

```
// Introduced in DOM Level 2:
interface MutationEvent : Event {

  // attrChangeType
  const unsigned short      MODIFICATION                    = 1;
  const unsigned short      ADDITION                        = 2;
  const unsigned short      REMOVAL                         = 3;

  readonly attribute Node            relatedNode;
  readonly attribute DOMString       prevValue;
  readonly attribute DOMString       newValue;
  readonly attribute DOMString       attrName;
  readonly attribute unsigned short  attrChange;
  void               initMutationEvent(in DOMString typeArg,
                                       in boolean canBubbleArg,
                                       in boolean cancelableArg,
```

```
                                        in Node relatedNodeArg,
                                        in DOMString prevValueArg,
                                        in DOMString newValueArg,
                                        in DOMString attrNameArg,
                                        in unsigned short attrChangeArg);
  // Introduced in DOM Level 3:
  void               initMutationEventNS(in DOMString namespaceURI,
                                         in DOMString typeArg,
                                         in boolean canBubbleArg,
                                         in boolean cancelableArg,
                                         in Node relatedNodeArg,
                                         in DOMString prevValueArg,
                                         in DOMString newValueArg,
                                         in DOMString attrNameArg,
                                         in unsigned short attrChangeArg);
};
```

Definition group *attrChangeType*

An integer indicating in which way the `Attr` was changed.

Defined Constants

`ADDITION`
: The `Attr` was just added.

`MODIFICATION`
: The `Attr` was modified in place.

`REMOVAL`
: The `Attr` was just removed.

Attributes

`attrChange` of type `unsigned short`, readonly
: `attrChange` indicates the type of change which triggered the `{"http://www.w3.org/2001/xml-events", "DOMAttrModified"}` event. The values can be `MODIFICATION`, `ADDITION`, or `REMOVAL`.

`attrName` of type `DOMString`, readonly
: `attrName` indicates the name of the changed `Attr` node in a `{"http://www.w3.org/2001/xml-events", "DOMAttrModified"}` event.

`newValue` of type `DOMString`, readonly
: `newValue` indicates the new value of the `Attr` node in `{"http://www.w3.org/2001/xml-events", "DOMAttrModified"}` events, and of the `CharacterData` node in `{"http://www.w3.org/2001/xml-events", "DOMCharacterDataModified"}` events.

`prevValue` of type `DOMString`, readonly
: `prevValue` indicates the previous value of the `Attr` node in `{"http://www.w3.org/2001/xml-events", "DOMAttrModified"}` events, and of the `CharacterData` node in `{"http://www.w3.org/2001/xml-events", "DOMCharacterDataModified"}` events.

`relatedNode` of type `Node`, readonly
: `relatedNode` is used to identify a secondary node related to a mutation event. For example, if a mutation event is dispatched to a node indicating that its parent has changed,

the `relatedNode` is the changed parent. If an event is instead dispatched to a subtree indicating a node was changed within it, the `relatedNode` is the changed node. In the case of the `{"http://www.w3.org/2001/xml-events", "DOMAttrModified"}` event it indicates the `Attr` node which was modified, added, or removed.

Methods

`initMutationEvent`

The `initMutationEvent` method is used to initialize the value of a `MutationEvent` object and has the same behavior as `Event.initEvent()` [p.24] .

Parameters

`typeArg` of type `DOMString`

Refer to the `Event.initEvent()` [p.24] method for a description of this parameter.

`canBubbleArg` of type `boolean`

Refer to the `Event.initEvent()` [p.24] method for a description of this parameter.

`cancelableArg` of type `boolean`

Refer to the `Event.initEvent()` [p.24] method for a description of this parameter.

`relatedNodeArg` of type `Node`

Specifies `MutationEvent.relatedNode` [p.51] .

`prevValueArg` of type `DOMString`

Specifies `MutationEvent.prevValue` [p.51] . This value may be null.

`newValueArg` of type `DOMString`

Specifies `MutationEvent.newValue` [p.51] . This value may be null.

`attrNameArg` of type `DOMString`

Specifies `MutationEvent.attrname`. This value may be null.

`attrChangeArg` of type `unsigned short`

Specifies `MutationEvent.attrChange` [p.51] . This value may be null.

No Return Value

No Exceptions

`initMutationEventNS` introduced in **DOM Level 3**

The `initMutationEventNS` method is used to initialize the value of a `MutationEvent` object and has the same behavior as `Event.initEventNS()` [p.24] .

Parameters

`namespaceURI` of type `DOMString`

Refer to the `Event.initEventNS()` [p.24] method for a description of this parameter.

`typeArg` of type `DOMString`

Refer to the `Event.initEventNS()` [p.24] method for a description of this parameter.

`canBubbleArg` of type `boolean`

Refer to the `Event.initEventNS()` [p.24] method for a description of this parameter.

`cancelableArg` of type `boolean`
: Refer to the `Event.initEventNS()` [p.24] method for a description of this parameter.

`relatedNodeArg` of type `Node`
: Refer to the `MutationEvent.initMutationEvent()` [p.52] method for a description of this parameter.

`prevValueArg` of type `DOMString`
: Refer to the `MutationEvent.initMutationEvent()` [p.52] method for a description of this parameter.

`newValueArg` of type `DOMString`
: Refer to the `MutationEvent.initMutationEvent()` [p.52] method for a description of this parameter.

`attrNameArg` of type `DOMString`
: Refer to the `MutationEvent.initMutationEvent()` [p.52] method for a description of this parameter.

`attrChangeArg` of type `unsigned short`
: Refer to the `MutationEvent.initMutationEvent()` [p.52] method for a description of this parameter.

No Return Value
No Exceptions

The mutation event types are listed below. For a full description of the semantics associated with these event types, refer to the Complete list of event types [p.14] . A DOM application may use the `hasFeature(feature, version)` method of the `DOMImplementation` interface with parameter values `"MutationEvents"` and `"3.0"` (respectively) to determine whether or not the `MutationEvent` [p.50] is supported by the implementation. In order to fully support this module, an implementation must also support the `"Events"` feature defined in this specification. For additional information about *conformance*, please see the DOM Level 3 Core specification [DOM Level 3 Core]. This `MutationEvent` interface is built on top of the DOM Level 2 Mutation Events [DOM Level 2 Events] module, i.e. a DOM Level 3 `MutationEvent` interface implementation where `hasFeature("MutationEvents","3.0")` returns `true` must also return `true` when the `version` number is `"2.0"`, `""` or, `null`.

type	Context information
DOMSubtreeModified	None
DOMNodeInserted	`MutationEvent.relatedNode` [p.51] holds the parent node of the node being inserted.
DOMNodeRemoved	`MutationEvent.relatedNode` [p.51] holds the parent node of the node being removed.
DOMNodeRemovedFromDocument	None
DOMNodeInsertedIntoDocument	None
DOMAttrModified	`MutationEvent.attrName` [p.51] is in use. The value of `MutationEvent.relatedNode` [p.51] indicates the `Attr` node whose value has been affected. The value of `MutationEvent.attrChange` [p.51] indicates whether the `Attr` was modified, added, or removed. If the `Attr` node is being added, `MutationEvent.newValue` [p.51] is in use. If the `Attr` node is being removed, `MutationEvent.prevValue` [p.51] is in value. If the `Attr` node is being modified, `MutationEvent.newValue` and `MutationEvent.prevValue` are in use.
DOMCharacterDataModified	`MutationEvent.prevValue` [p.51] , and `MutationEvent.newValue` [p.51] are in use.

Interface *MutationNameEvent* (introduced in **DOM Level 3**)

The `MutationNameEvent` interface provides specific contextual information associated with Mutation name event types.

To create an instance of the `MutationNameEvent` interface, use the `Document.createEvent("MutationNameEvent")` method call.

IDL Definition

```
// Introduced in DOM Level 3:
interface MutationNameEvent : MutationEvent {
  readonly attribute DOMString       prevNamespaceURI;
  readonly attribute DOMString       prevNodeName;
  // Introduced in DOM Level 3:
  void               initMutationNameEvent(in DOMString typeArg,
                                           in boolean canBubbleArg,
                                           in boolean cancelableArg,
                                           in Node relatedNodeArg,
                                           in DOMString prevNamespaceURIArg,
                                           in DOMString prevNodeNameArg);
  // Introduced in DOM Level 3:
  void               initMutationNameEventNS(in DOMString namespaceURI,
                                             in DOMString typeArg,
                                             in boolean canBubbleArg,
                                             in boolean cancelableArg,
                                             in Node relatedNodeArg,
                                             in DOMString prevNamespaceURIArg,
                                             in DOMString prevNodeNameArg);
};
```

Attributes

`prevNamespaceURI` of type `DOMString`, readonly

The previous value of the `relatedNode`'s `namespaceURI`.

`prevNodeName` of type `DOMString`, readonly

The previous value of the `relatedNode`'s `nodeName`.

Methods

`initMutationNameEvent` introduced in **DOM Level 3**

The `initMutationNameEvent` method is used to initialize the value of a `MutationNameEvent` object and has the same behavior as `MutationEvent.initMutationEvent()` [p.52] .

Parameters

`typeArg` of type `DOMString`

Refer to the `MutationEvent.initMutationEvent()` [p.52] method for a description of this parameter.

`canBubbleArg` of type `boolean`

Refer to the `MutationEvent.initMutationEvent()` [p.52] method for a description of this parameter.

`cancelableArg` of type `boolean`

Refer to the `MutationEvent.initMutationEvent()` [p.52] method for a description of this parameter.

`relatedNodeArg` of type `Node`

Refer to the `MutationEvent.initMutationEvent()` [p.52] method for a description of this parameter.

`prevNamespaceURIArg` of type `DOMString`

Specifies `MutationNameEvent.prevNamespaceURI` [p.55] . This value may be `null`.

`prevNodeNameArg` of type `DOMString`

Specifies `MutationNameEvent.prevNodeName` [p.55] .

No Return Value

No Exceptions

`initMutationNameEventNS` introduced in **DOM Level 3**

The `initMutationNameEventNS` method is used to initialize the value of a `MutationNameEvent` object and has the same behavior as `MutationEvent.initMutationEventNS()` [p.52] .

Parameters

`namespaceURI` of type `DOMString`

Refer to the `MutationEvent.initMutationEventNS()` [p.52] method for a description of this parameter.

`typeArg` of type `DOMString`

Refer to the `MutationEvent.initMutationEventNS()` [p.52] method for a description of this parameter.

`canBubbleArg` of type `boolean`

Refer to the `MutationEvent.initMutationEventNS()` [p.52] method for a description of this parameter.

`cancelableArg` of type `boolean`
: Refer to the `MutationEvent.initMutationEventNS()` [p.52] method for a description of this parameter.

`relatedNodeArg` of type `Node`
: Refer to the `MutationEvent.initMutationEventNS()` [p.52] method for a description of this parameter.

`prevNamespaceURIArg` of type `DOMString`
: Refer to the `MutationEvent.initMutationEvent()` [p.52] method for a description of this parameter.

`prevNodeNameArg` of type `DOMString`
: Refer to the `MutationEvent.initMutationEvent()` [p.52] method for a description of this parameter.

No Return Value
No Exceptions

The mutation name event types are listed below. For a full description of the semantics associated with these event types, refer to the Complete list of event types [p.14] . A DOM application may use the `hasFeature(feature, version)` method of the `DOMImplementation` interface with parameter values "MutationNameEvents" and "3.0" (respectively) to determine whether or not the `MutationNameEvent` [p.54] is supported by the implementation. In order to fully support this module, an implementation must also support the `"MutationEvents"` feature defined in this specification and the `"Core"` feature defined in the DOM Level 3 Core specification [DOM Level 3 Core]. For additional information about *conformance*, please see the DOM Level 3 Core specification [DOM Level 3 Core].

type	Context information
DOMElementNameChanged	`MutationNameEvent.prevNamespaceURI` [p.55] , and `MutationNameEvent.prevNodeName` [p.55] are in use.
DOMAttributeNameChanged	`MutationNameEvent.prevNamespaceURI` [p.55] , and `MutationNameEvent.prevNodeName` [p.55] are in use. The value of `MutationEvent.relatedNode` [p.51] contains the renamed `Attr` node.

1.7.6 Basic event types

This event module contains basic event types associated with document manipulation.

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

The basic event types are listed below. For a full description of the semantics associated with these event types, refer to the Complete list of event types [p.14] .

The event types `{"http://www.w3.org/2001/xml-events", "resize"}` and `{"http://www.w3.org/2001/xml-events", "scroll"}` implement the `UIEvent` [p.35] interface. All other HTML event types implement at least the basic `Event` [p.22] interface. However, they may be generated from a user interface; in that case, the event objects also implements the `UIEvent` interface and `UIEvent.view` [p.36] is in use.

type	Context information
load	`UIEvent.view` [p.36] may be in use.
unload	(same as above)
abort	(same as above)
error	(same as above)
select	(same as above)
change	(same as above)
submit	(same as above)
reset	(same as above)
resize	`UIEvent.view` [p.36] is in use.
scroll	`UIEvent.view` [p.36] is in use.

1.7.7 HTML Events

The HTML event module is composed of events listed in [HTML 4.01] and additional events which are supported in DOM Level 0 [p.101] browsers. It refines the semantics and scope of the basic event types and provides two new event types. This event module is only applicable if the `Document` supports the [DOM Level 2 HTML] specification. Use `Node.isSupported(feature, version)` with the parameter values "HTML" and "2.0" (respectively) to determine whether or not the `Document` node supports the HTML module.

A DOM application may use the `hasFeature(feature, version)` method of the `DOMImplementation` interface with parameter values `"HTMLEvents"` and `"3.0"` (respectively) to determine whether or not the HTML event module is supported by the implementation. In order to fully support this module, an implementation must also support the `"BasicEvents"` feature defined in this specification and the `"HTML"` feature defined in [DOM Level 2 HTML]. For additional information about *conformance*, please see the DOM Level 3 Core specification [DOM Level 3 Core]. The DOM Level 3 HTML Events module is built on top of the DOM Level 2 HTML Events [DOM Level 2 Events] module, i.e. a DOM Level 3 HTML Events implementation where `hasFeature("HTMLEvents", "3.0")` returns `true` must also return `true` when the `version` number is `"2.0"`, `""` or, `null`.

The following descriptions of event types are refinements of the general descriptions provided in Complete list of event types [p.14] , with the addition of the events `{"http://www.w3.org/2001/xml-events", "focus"}` and `{"http://www.w3.org/2001/xml-events", "blur"}`. All events types are bound to the namespace URI `"http://www.w3.org/2001/xml-events"` and the following list only enumerates the local name of the event type.

load
: The DOM implementation finishes loading all content within the BODY element, all frames within a FRAMESET, or any resource linked from the document.

unload
: The DOM implementation removes a document from a window or frame. This event is valid for BODY and FRAMESET elements.

abort
: The page loading is stopped before an image has been allowed to completely load. This event applies to OBJECT elements.

error
: An image does not load properly or when an error occurs during script execution. This event is valid for OBJECT elements, BODY elements, and FRAMESET element.

select
: A user selects some text in a text field either via the user interface or via attributes defined in [DOM Level 2 HTML]. This event is valid for INPUT and TEXTAREA elements.

change
: A control loses the input focus and its value has been modified since gaining focus. This event can occur either via a user interface manipulation or the `focus()` methods and the attributes defined in [DOM Level 2 HTML]. This event is valid for INPUT, SELECT, and TEXTAREA element.

submit
: A form is submitted either via a button. This event only applies to the FORM element. Note that the `HTMLFormElement.submit()` method defined in [DOM Level 2 HTML] does not fire this event type.

reset
: A form is reset either via a button, or the `HTMLFormElement.reset()` method defined in [DOM Level 2 HTML]. This event only applies to the FORM element.

resize
: see resize [p.17] in Complete list of event types [p.14] .

scroll
: see scroll [p.17] in Complete list of event types [p.14] .

focus
: An element receives focus either via a pointing device, the `focus()` methods defined in [DOM Level 2 HTML], or by tabbing navigation. This event is only valid for the following elements: A, AREA, LABEL, INPUT, SELECT, TEXTAREA, and BUTTON. This event type is dispatched after the event type {`"http://www.w3.org/2001/xml-events", "DOMFocusIn"`}.

blur
: An element loses focus either via a pointing device, the `blur()` methods defined in [DOM Level 2 HTML], or by tabbing navigation. This event is only valid for the following elements: A, AREA, LABEL, INPUT, SELECT, TEXTAREA, and BUTTON. This event type is dispatched after the event type {`"http://www.w3.org/2001/xml-events", "DOMFocusOut"`}.

The following table provides refinements or additional information on the event types. Some events will only be dispatched to a specific set of possible targets, specified using HTML node types.

type	Bubbling phase	Cancelable	Target node types	DOM interface
load	[no changes]	[no changes]	`HTMLDocument`, `HTMLBodyElement`, `HTMLFrameSetElement`, `HTMLObjectElement`, `HTMLLinkElement`, `HTMLMetaElement`, `HTMLScriptElement`, `HTMLFrameElement`, `HTMLIFrameElement`, `HTMLImageElement`	[no changes]
unload	[no changes]	[no changes]	`HTMLDocument`, `HTMLBodyElement`, `HTMLFrameSetElement`	[no changes]
abort	[no changes]	[no changes]	`HTMLObjectElement`	[no changes]
error	[no changes]	[no changes]	`HTMLObjectElement`, `HTMLBodyElement`, `HTMLFrameSetElement`	[no changes]
select	[no changes]	[no changes]	`HTMLInputElement`, `HTMLTextAreaElement`	[no changes]
change	[no changes]	[no changes]	`HTMLInputElement`, `HTMLSelectElement`, `HTMLTextAreaElement`	[no changes]
submit	[no changes]	[no changes]	`HTMLFormElement`	[no changes]
reset	[no changes]	[no changes]	`HTMLFormElement`	[no changes]
resize	[no changes]	[no changes]	`HTMLDocument`, `HTMLElement`	[no changes]
scroll	[no changes]	[no changes]	`HTMLDocument`, `HTMLElement`	[no changes]
focus	No	No	`HTMLAnchorElement`, `HTMLAreaElement`, `HTMLLabelElement`, `HTMLInputElement`, `HTMLSelectElement`, `HTMLtextAreaElement`, `HTMLButtonElement`.	`Event` [p.22]
blur	No	No	`HTMLAnchorElement`, `HTMLAreaElement`, `HTMLLabelElement`, `HTMLInputElement`, `HTMLSelectElement`, `HTMLtextAreaElement`, `HTMLButtonElement`.	`Event` [p.22]

The event types `{"http://www.w3.org/2001/xml-events", "focus"}` and `{"http://www.w3.org/2001/xml-events", "blur"}` may be generated from a user interface; in that case, the event objects also implements the `UIEvent` [p.35] interface and `UIEvent.view` [p.36] is in use.

1.7.7.1 Activation and default actions

The concept of activation (`{"http://www.w3.org/2001/xml-events", "DOMActivate"}`) was introduced in [DOM Level 2 Events] to separate generic actions from the devices used to activate them. For example, an hyperlink can be activated using a mouse or a keyboard, and the activation will force the user agent to follow the link. It is expected that the action of following the link is done using a default action attached to the hyperlink element. In such case, the default action of the device event type is

to trigger the event type `{"http://www.w3.org/2001/xml-events", "DOMActivate"}`. Preventing the default action of a mouse click when the target node is an hyperlink will prevent the activation. The same approach is made for control elements.

Implementations could react to an event before dispatching it and do changes on the display and the DOM tree. In such case, if a DOM attribute is changed before the event is fired, cancelling the device event type will also reverse the change. A good example is the attribute `HTMLInputElement.checked`: As described in [DOM Level 2 HTML], the value of this property may be changed before the dispatch of the event; the user clicks on the radio button, the radio button is being checked (or unchecked) on the display, the attribute `HTMLInputElement.checked` is changed as well, and then the device event type `{"http://www.w3.org/2001/xml-events", "click"}` is being dispatched. If the default action of the device event type is prevented, or if the default action attached to the `{"http://www.w3.org/2001/xml-events", "DOMActivate"}` event type is prevented, the property `HTMLInputElement.checked` will need to be changed back to its original value.

Appendix A: Keyboard events and key identifiers

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This section contains necessary information regarding keyboard events:

- Relations between keys, such as dead keys or modifiers keys.
- Relations between keyboard events, their default actions, and text events.
- The set of key identifiers, and guidelines on how to extend this set.

Note: This section uses serbian and kanji characters which are not always available (or are misrepresented) in the alternative versions or printed versions of this specification.

A.1 Introduction

Each keyboard event references a key using a `DOMString` key identifier. The set contained in this appendix is based on the sets of keycodes from:

- the interface `java.awt.event.KeyEvent` of the Java 2 Platform v1.4 [KeyEvent for Java];
- the enumeration `System.Windows.Forms.Keys` of the Microsoft .NET Framework 1.0 [Keys enumeration for .Net].

While implementations are recommended to use the most relevant identifier for a key independently of the platform or keyboard layout mappings, DOM applications should not make assumption on the ability of keyboard devices to generate them. When using keyboard events, *"consider using numbers and function keys (F4, F5, and so on) instead of letters in shortcut-key combinations"* ([DWW95]) given that most keyboard layouts will provide keys for those.

`"U+0000"`, `"U+0001"`, ..., `"U+FFFFFF"` are Unicode based key identifiers ([Unicode]). When a key cannot be mapped to Unicode, a specific identifier is used (see also Guidelines for defining key identifiers [p.64]). In any case, no assumption should be made between the sequence of keyboard events and the text events. The following three examples illustrate the concept of keyboard layout mappings and its relation with keyboard events (following the Guidelines for defining key identifiers [p.64] , the ’Q’ key is mapped to the Latin Capital Letter Q key).

The keystroke `"U+0051"` (Latin Capital Letter Q key) will produce (on a PC/AT US keyboard using a US keyboard layout mapping and without any modifier activated) the Unicode character `q` (Latin Small Letter Q):

1. `{"http://www.w3.org/2001/xml-events", "keydown"}: "U+0051"` (Latin Capital Letter Q key)
2. `{"http://www.w3.org/2001/xml-events", "textInput"}: "q"`
3. `{"http://www.w3.org/2001/xml-events", "keyup"}: "U+0051"`

If the keyboard layout mapping is switched to a french mapping, pressing the same key will produce:

1. `{"http://www.w3.org/2001/xml-events", "keydown"}: "U+0041"` (Latin Capital Letter A key)
2. `{"http://www.w3.org/2001/xml-events", "textInput"}: "a"`
3. `{"http://www.w3.org/2001/xml-events", "keyup"}: "U+0041"`

If the keyboard layout mapping is switched to a serbian (cyrillic) mapping, pressing the same key will produce:

1. `{"http://www.w3.org/2001/xml-events", "keydown"}: "U+0409"` (Cyrillic Capital Letter LJE)
2. `{"http://www.w3.org/2001/xml-events", "textInput"}: "љ"`
3. `{"http://www.w3.org/2001/xml-events", "keyup"}: "U+0409"`

Note: The order between the text event and keyboard events may differ depending on the keyboard devices.

A.1.1 Modifier keys

Keyboard input uses modifier keys to change the normal behavior of a key. Keys associated with modifiers generate, like other keys, "keydown" and "keyup" events as shown in the example below. Some modifiers are activated while the key is being pressed down or maintained pressed such as `"Alt"`, `"Control"`, `"Shift"`, `"AltGraph"`, or `"Meta"`. Others modifiers are activated depending on their state such as `"CapsLock"`, `"NumLock"`, or `"Scroll"`. Change in the state happens when the modifier key is being pressed down. The `KeyboardEvent` [p.46] interface provides convenient attributes for some common modifiers keys: `KeyboardEvent.ctrlKey` [p.47] , `KeyboardEvent.shiftKey` [p.48] , `KeyboardEvent.altKey` [p.47] , `KeyboardEvent.metaKey` [p.47] . Some operating systems simulate the `"AltGraph"` modifier key with the combination of the `"Alt` and `"Control"` modifier keys. Implementations are encouraged to use the `"AltGraph"` modifier key.

The following example describes a possible sequence of keys to generate the Unicode character Q (Latin Capital Letter Q) on a PC/AT US keyboard using a US mapping:

1. `{"http://www.w3.org/2001/xml-events", "keydown"}: "Shift"`, shiftKey
2. `{"http://www.w3.org/2001/xml-events", "keydown"}: "U+0051"` (Latin Capital Letter Q key), shiftKey
3. `{"http://www.w3.org/2001/xml-events", "textInput"}: "Q"`
4. `{"http://www.w3.org/2001/xml-events", "keyup"}: "U+0051"`, shiftKey
5. `{"http://www.w3.org/2001/xml-events", "keyup"}: "Shift"`

The following example describes a possible sequence of keys that does not generate a Unicode character (using the same configuration):

1. `{"http://www.w3.org/2001/xml-events", "keydown"}:"Control"`, ctrlKey
2. `{"http://www.w3.org/2001/xml-events", "keydown"}:"U+0056"` (Latin Capital Letter V key), ctrlKey
3. `{"http://www.w3.org/2001/xml-events", "keyup"}:"U+0056"`, ctrlKey
4. `{"http://www.w3.org/2001/xml-events", "keyup"}:"Control"`

Preventing a keydown or keyup event with a modifier does affect the subsequent

A.1.2 Dead keys

Keyboard input uses dead keys for the input of composed character sequences. Unlike the handwriting sequence, in which users enter the base character first, keyboard input requires to enter a special state when a dead key is pressed and emit the character(s) only when one of a limited number of "legal" base character is entered.

The dead keys are represented in the key identifiers set using combining diacritical marks. The sequence of keystrokes "U+0302" (Combining Circumflex Accent key) and "U+0045" (Latin Capital Letter E key) will likely produce (on a PC/AT french keyboard using a french mapping and without any modifier activated) the Unicode character ê (Latin Small Letter E With Circumflex), as preferred by the Unicode Normalization Form *NFC*:

1. `{"http://www.w3.org/2001/xml-events", "keydown"}:"U+0302"` (Combining Circumflex Accent key)
2. `{"http://www.w3.org/2001/xml-events", "keyup"}:"U+0302"`
3. `{"http://www.w3.org/2001/xml-events", "keydown"}:"U+0045"` (Latin Capital Letter E key)
4. `{"http://www.w3.org/2001/xml-events", "textInput"}:"é"`
5. `{"http://www.w3.org/2001/xml-events", "keyup"}:"U+0045"`

A.1.3 Input Method Editors

Also known as *front end processor*, an *input method editor* (IME) is an application that performs the conversion between keystrokes and ideographs or other characters, usually by user-guided dictionary lookup.

This specification does not provide a representation of the input method editor (IME) events, e.g. representing the input context, i.e. the IME's functions are not represented in this set. As an example, receiving a keydown for the "Accept" key identifier does not necessarily imply that the text currently selected in the IME is being accepted. It only indicates that a keystroke happened, disconnected from the IME Accept functionality. Depending on the device in use, the IME Accept functionality can be obtain using the Accept key or the Return key. Keyboard events cannot be used to determine the current state of the input method editor.

Keyboard events correspond to the events generated by the input device after the keyboard layout mapping but before the processing of the input method editor.

The following example describes a possible sequence of keys to generate the Unicode character 市 (Kanji character, part of CJK Unified Ideographs) using Japanese input methods. This example assumes that the input method editor is activated and in the Japanese-Romaji input mode. The keys `"Convert"` and `"Accept"` may be replaced by others depending on the input device in use and the configuration of the IME, e.g. it could be respectively "U+0020" (Space key) and "Enter".

1. `{"http://www.w3.org/2001/xml-events", "keydown"}:"U+0053"` (Latin Capital Letter S key)
2. `{"http://www.w3.org/2001/xml-events", "keyup"}:"U+0053"` (Latin Capital Letter S key)
3. `{"http://www.w3.org/2001/xml-events", "keydown"}:"U+0049"` (Latin Capital Letter I key)
4. `{"http://www.w3.org/2001/xml-events", "keyup"}:"U+0049"` (Latin Capital Letter I key)
5. `{"http://www.w3.org/2001/xml-events", "keydown"}:"Convert"`
6. `{"http://www.w3.org/2001/xml-events", "keyup"}:"Convert"`
7. `{"http://www.w3.org/2001/xml-events", "keydown"}:"Accept"`
8. `{"http://www.w3.org/2001/xml-events", "textInput"}:"市"`
9. `{"http://www.w3.org/2001/xml-events", "keyup"}:"Accept"`

A.1.4 Guidelines for defining key identifiers

Note: This section is informative.

The list of key identifiers contained in this appendix is not exhaustive and input devices may have to define their own key identifiers. Here is a algorithm to determine which key identifier to use:

1. Determine a representation for the key by looking at the keyboard layout mapping in use (and not the keyboard device in use). This representation should be unique, as human friendly as possible, platform independent, and consistent. For example, on PC/AT US keyboards with a US mapping, the ’Q’ key is mapped to the key identifier "U+0051" (Latin Capital Letter Q key), the ’1/!’ key is mapped to the key identifier "U+0031" (Digit One key), the key ’‘/~’ is mapped to the key identifier "U+0060" (Grave Accent key), and the ’Enter’ key is mapped to the key identifier "Enter".
2. Find an appropriate mapping in the Unicode character set. There might not always be an appropriate and obvious mapping: the Unicode set contains characters and symbols, the key might generate different characters depending on the operating system, ... In general, unless the representation of the key can be mapped to a unique Unicode character, it is better to create a new one.
3. If no appropriate mapping was found, create a key identifier as human friendly as possible. The key identifier must not contain white spaces. As an example, the Enter key is mapped to the key identifier "Enter" and not to "U+000A" (Line Feed), given that this key generates the character 00000A on Unix operating systems and the characters 00000D and 00000A on Windows operating systems.

A.2 Key identifiers set

Note: The keycodes `Multiply`, `Add`, `Substract`, `Decimal`, `Separator`, `Divide`, `NumPad0`, `NumPad1`, `NumPad2`, `NumPad3`, `NumPad4`, `NumPad5`, `NumPad6`, `NumPad7`, `NumPad8`, and `NumPad9` are not part of this set. Use `KeyBoard.keyLocation` to know if a key originated from the numeric keypad.

"Accept"
: The Accept (Commit) key.

"Again"
: The Again key.

"AllCandidates"
: The All Candidates key.

"Alphanumeric"
: The Alphanumeric key.

"Alt"
: The Alt (Menu) key.

"AltGraph"
: The Alt-Graph key.

"Apps"
: The Application key.

"Attn"
: The ATTN key.

"BrowserBack"
: The Browser Back key.

"BrowserFavorites"
: The Browser Favorites key.

"BrowserForward"
: The Browser Forward key.

"BrowserHome"
: The Browser Home key.

"BrowserRefresh"
: The Browser Refresh key.

"BrowserSearch"
: The Browser Search key.

"BrowserStop"
: The Browser Stop key.

"CapsLock"
: The Caps Lock (Capital) key.

"Clear"
: The Clear key.

"CodeInput"
: The Code Input key.

"Compose"
: The Compose key.

"Control"
: The Control (Ctrl) key.

"Crsel"
: The Crsel key.

"Convert"
: The Convert key.

"Copy"
: The Copy key.

"Cut"
: The Cut key.

"Down"
: The Down Arrow key.

"End"
: The End key.

"Enter"
: The Enter key.

  Note: This key identifier is also used for the Return (Macintosh numpad) key.

"EraseEof"
: The Erase EOF key.

"Execute"
: The Execute key.

"Exsel"
: The Exsel key.

"F1"
: The F1 key.

"F2"
: The F2 key.

"F3"
: The F3 key.

"F4"
: The F4 key.

"F5"
: The F5 key.

"F6"
: The F6 key.

"F7"
: The F7 key.

"F8"
: The F8 key.

"F9"
: The F9 key.

"F10"
: The F10 key.

"F11"
: The F11 key.

"F12"
: The F12 key.

"F13"
: The F13 key.

"F14"
: The F14 key.

"F15"
: The F15 key.

"F16"
: The F16 key.

"F17"
: The F17 key.

"F18"
: The F18 key.

"F19"
: The F19 key.

"F20"
: The F20 key.

"F21"
: The F21 key.

"F22"
: The F22 key.

"F23"
: The F23 key.

"F24"
: The F24 key.

"FinalMode"
: The Final Mode (Final) key used on some asian keyboards.

"Find"
: The Find key.

"FullWidth"
: The Full-Width Characters key.

"HalfWidth"
: The Half-Width Characters key.

"HangulMode"
: The Hangul (Korean characters) Mode key.

"HanjaMode"
: The Hanja (Korean characters) Mode key.

"Help"
: The Help key.

"Hiragana"
: The Hiragana (Japanese Kana characters) key.

"Home"
: The Home key.

"Insert"
: The Insert (Ins) key.

"JapaneseHiragana"
: The Japanese-Hiragana key.

"JapaneseKatakana"
: The Japanese-Katakana key.

"JapaneseRomaji"
: The Japanese-Romaji key.

"JunjaMode"
: The Junja Mode key.

"KanaMode"
: The Kana Mode (Kana Lock) key.

"KanjiMode"
: The Kanji (Japanese name for ideographic characters of Chinese origin) Mode key.

"Katakana"
: The Katakana (Japanese Kana characters) key.

"LaunchApplication1"
: The Start Application One key.

"LaunchApplication2"
: The Start Application Two key.

"LaunchMail"
: The Start Mail key.

"Left"
: The Left Arrow key.

"Meta"
: The Meta key.

"MediaNextTrack"
: The Media Next Track key.

"MediaPlayPause"
: The Media Play Pause key.

"MediaPreviousTrack"
: The Media Previous Track key.

"MediaStop"
: The Media Stok key.

"ModeChange"
: The Mode Change key.

"Nonconvert"
: The Nonconvert (Don’t Convert) key.

"NumLock"
: The Num Lock key.

"PageDown"
: The Page Down (Next) key.

"PageUp"
: The Page Up key.

"Paste"
: The Paste key.

"Pause"
: The Pause key.

"Play"
: The Play key.

"PreviousCandidate"
: The Previous Candidate function key.

"PrintScreen"
: The Print Screen (PrintScrn, SnapShot) key.

"Process"
: The Process key.

"Props"
: The Props key.

"Right"
: The Right Arrow key.

"RomanCharacters"
: The Roman Characters function key.

"Scroll"
: The Scroll Lock key.

"Select"
: The Select key.

"SelectMedia"
: The Select Media key.

"Shift"
: The Shift key.

"Stop"
: The Stop key.

"Up"
: The Up Arrow key.

"Undo"
: The Undo key.

"VolumeDown"
: The Volume Down key.

"VolumeMute"
: The Volume Mute key.

"VolumeUp"
: The Volume Up key.

"Win"
: The Windows Logo key.

"Zoom"
: The Zoom key.

"U+0008"
: The Backspace (Back) key.

"U+0009"
: The Horizontal Tabulation (Tab) key.

"U+0018"
: The Cancel key.

"U+001B"
: The Escape (Esc) key.

"U+0020"
: The Space (Spacebar) key.

"U+0021"
: The Exclamation Mark (Factorial, Bang) key (!).

"U+0022"
: The Quotation Mark (Quote Double) key (").

"U+0023"
: The Number Sign (Pound Sign, Hash, Crosshatch, Octothorpe) key (#).

"U+0024"
: The Dollar Sign (milreis, escudo) key ($).

"U+0026"
: The Ampersand key (&).

"U+0027"
: The Apostrophe (Apostrophe-Quote, APL Quote) key (’).

"U+0028"
: The Left Parenthesis (Opening Parenthesis) key (().

"U+0029"
: The Right Parenthesis (Closing Parenthesis) key ()).

"U+002A"
: The Asterix (Star) key (*).

"U+002B"
: The Plus Sign (Plus) key (+).

"U+002C"
: The Comma (decimal separator) sign key (,).

"U+002D"
: The Hyphen-minus (hyphen or minus sign) key (-).

"U+002E"
: The Full Stop (period, dot, decimal point) key (.).

"U+002F"
: The Solidus (slash, virgule, shilling) key (/).

"U+0030"
: The Digit Zero key (0).

"U+0031"
: The Digit One key (1).

"U+0032"
: The Digit Two key (2).

"U+0033"
: The Digit Three key (3).

"U+0034"
: The Digit Four key (4).

"U+0035"
: The Digit Five key (5).

"U+0036"
: The Digit Six key (6).

"U+0037"
: The Digit Seven key (7).

"U+0038"
: The Digit Eight key (8).

"U+0039"
: The Digit Nine key (9).

"U+003A"
: The Colon key (:).

"U+003B"
: The Semicolon key (;).

"U+003C"
: The Less-Than Sign key (<).

"U+003D"
: The Equals Sign key (=).

"U+003E"
: The Greater-Than Sign key (>).

"U+003F"
: The Question Mark key (?).

"U+0040"
: The Commercial At (@) key.

"U+0041"
: The Latin Capital Letter A key (A).

"U+0042"
: The Latin Capital Letter B key (B).

"U+0043"
: The Latin Capital Letter C key (C).

"U+0044"
: The Latin Capital Letter D key (D).

"U+0045"
: The Latin Capital Letter E key (E).

"U+0046"
: The Latin Capital Letter F key (F).

"U+0047"
: The Latin Capital Letter G key (G).

"U+0048"
: The Latin Capital Letter H key (H).

"U+0049"
: The Latin Capital Letter I key (I).

"U+004A"
: The Latin Capital Letter J key (J).

"U+004B"
: The Latin Capital Letter K key (K).

"U+004C"
: The Latin Capital Letter L key (L).

"U+004D"
: The Latin Capital Letter M key (M).

"U+004E"
The Latin Capital Letter N key (N).
"U+004F"
The Latin Capital Letter O key (O).
"U+0050"
The Latin Capital Letter P key (P).
"U+0051"
The Latin Capital Letter Q key (Q).
"U+0052"
The Latin Capital Letter R key (R).
"U+0053"
The Latin Capital Letter S key (S).
"U+0054"
The Latin Capital Letter T key (T).
"U+0055"
The Latin Capital Letter U key (U).
"U+0056"
The Latin Capital Letter V key (V).
"U+0057"
The Latin Capital Letter W key (W).
"U+0058"
The Latin Capital Letter X key (X).
"U+0059"
The Latin Capital Letter Y key (Y).
"U+005A"
The Latin Capital Letter Z key (Z).
"U+005B"
The Left Square Bracket (Opening Square Bracket) key ([).
"U+005C"
The Reverse Solidus (Backslash) key (\).
"U+005D"
The Right Square Bracket (Closing Square Bracket) key (]).
"U+005E"
The Circumflex Accent key (^).
"U+005F"
The Low Sign (Spacing Underscore, Underscore) key (_).
"U+0060"
The Grave Accent (Back Quote) key (‘).
"U+007B"
The Left Curly Bracket (Opening Curly Bracket, Opening Brace, Brace Left) key ({).
"U+007C"
The Vertical Line (Vertical Bar, Pipe) key (|).
"U+007D"
The Right Curly Bracket (Closing Curly Bracket, Closing Brace, Brace Right) key (}).
"U+007F"
The Delete (Del) Key.

"U+00A1"
The Inverted Exclamation Mark key (¡).
"U+0300"
The Combining Grave Accent (Greek Varia, Dead Grave) key.
"U+0301"
The Combining Acute Accent (Stress Mark, Greek Oxia, Tonos, Dead Eacute) key.
"U+0302"
The Combining Circumflex Accent (Hat, Dead Circumflex) key.
"U+0303"
The Combining Tilde (Dead Tilde) key.
"U+0304"
The Combining Macron (Long, Dead Macron) key.
"U+0306"
The Combining Breve (Short, Dead Breve) key.
"U+0307"
The Combining Dot Above (Derivative, Dead Above Dot) key.
"U+0308"
The Combining Diaeresis (Double Dot Abode, Umlaut, Greek Dialytika, Double Derivative, Dead Diaeresis) key.
"U+030A"
The Combining Ring Above (Dead Above Ring) key.
"U+030B"
The Combining Double Acute Accent (Dead Doubleacute) key.
"U+030C"
The Combining Caron (Hacek, V Above, Dead Caron) key.
"U+0327"
The Combining Cedilla (Dead Cedilla) key.
"U+0328"
The Combining Ogonek (Nasal Hook, Dead Ogonek) key.
"U+0345"
The Combining Greek Ypogegrammeni (Greek Non-Spacing Iota Below, Iota Subscript, Dead Iota) key.
"U+20AC"
The Euro Currency Sign key (€).
"U+3099"
The Combining Katakana-Hiragana Voiced Sound Mark (Dead Voiced Sound) key.
"U+309A"
The Combining Katakana-Hiragana Semi-Voiced Sound Mark (Dead Semivoiced Sound) key.

A.2 Key identifiers set

Appendix B: Changes

Editor:
Philippe Le Hégaret, W3C

B.1 Changes between DOM Level 2 Events and DOM Level 3 Events

This new specification provides a better separation between the DOM event flow, the event types, and the DOM interfaces.

B.1.1 Changes to DOM Level 2 event flow

This new specification introduced two new concepts in the event flow:

- event groups: unlike DOM Level 2 Events, `Event.stopPropagation()` [p.26] does no longer stop the event propagation entirely. It only stops it for a given event group.
- partial ordering of event listeners: within an event group, event listeners are now ordered while ordering was unspecified in DOM Level 2 Events.

B.1.2 Changes to DOM Level 2 event types

Lots of clarifications have been made on the event types. The conformance is now explicitly defined against the event types, and not only in terms of interfaces required by the event types. Support for namespaces and the features `"BasicEvents"`, `"TextEvents"`, `"KeyboardEvents"`, and `"MutationNameEvents"` have been introduced.

The DOM Level 2 Event `load` event type can now be dispatched to more [HTML 4.01] elements. `blur` and `focus` have been clarified and restricted to [HTML 4.01] applications only.

B.1.3 Changes to DOM Level 2 Events interfaces

Interface `Event` [p.22]
: The `Event` [p.22] interface has a new attribute `Event.namespaceURI` [p.24] , and a four new methods: `Event.isCustom()` [p.25] , `Event.stopImmediatePropagation()` [p.26] , `Event.isDefaultPrevented()` [p.25] , and `Event.initEventNS` [p.24] .

Interface `EventTarget` [p.26]
: The `EventTarget` [p.26] interface has four new methods: `EventTarget.addEventListenerNS(namespaceURI, type, listener, useCapture, evtGroup)` [p.28] , `EventTarget.removeEventListenerNS(namespaceURI, type, listener, useCapture)` [p.30] , `EventTarget.willTriggerNS(namespaceURI, type)` [p.30] , `EventTarget.hasEventListenerNS(namespaceURI, type)` [p.29] . The method `EventTarget.dispatchEvent(evt)` [p.28] was modified.

Interface `DocumentEvent` [p.32]
: The `DocumentEvent` [p.32] interface has one new method:
`DocumentEvent.canDispatch(namespaceURI, type)` [p.33] .

Interface `UIEvent` [p.35]
: The `UIEvent` [p.35] interface has a new method `UIEvent.initUIEventNS(...)` [p.36] .

Interface `MouseEvent` [p.39]
: The `MouseEvent` [p.39] interface has two new methods
`MouseEvent.getModifierState(keyIdentifierArg)` [p.42] and
`MouseEvent.initMouseEventNS(...)` [p.43] .

Interface `MutationEvent` [p.50]
: The `MutationEvent` [p.50] interface has a new method
`MutationEvent.initMutationEventNS(...)` [p.52] .

Exception `EventException` [p.31]
: The `DISPATCH_REQUEST_ERR` [p.31] constant has been added.

B.1.4 New Interfaces

The interfaces `CustomEvent` [p.34] , `TextEvent` [p.37] , `KeyboardEvent` [p.46] , and `MutationNameEvent` [p.54] were added to the Events module.

Appendix C: IDL Definitions

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

The IDL files are also available as:
http://www.w3.org/TR/2003/NOTE-DOM-Level-3-Events-20031107/idl.zip

events.idl:

```
// File: events.idl

#ifndef _EVENTS_IDL_
#define _EVENTS_IDL_

#include "dom.idl"
#include "views.idl"

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

  typedef dom::DOMString DOMString;
  typedef dom::DOMTimeStamp DOMTimeStamp;
  typedef dom::DOMObject DOMObject;
  typedef dom::Node Node;

  interface EventTarget;
  interface EventListener;

  // Introduced in DOM Level 2:
  exception EventException {
    unsigned short   code;
  };
  // EventExceptionCode
  const unsigned short      UNSPECIFIED_EVENT_TYPE_ERR     = 0;
  // Introduced in DOM Level 3:
  const unsigned short      DISPATCH_REQUEST_ERR           = 1;


  // Introduced in DOM Level 2:
  interface Event {

    // PhaseType
    const unsigned short      CAPTURING_PHASE               = 1;
    const unsigned short      AT_TARGET                     = 2;
    const unsigned short      BUBBLING_PHASE                = 3;

    readonly attribute DOMString       type;
    readonly attribute EventTarget     target;
    readonly attribute EventTarget     currentTarget;
    readonly attribute unsigned short  eventPhase;
    readonly attribute boolean         bubbles;
    readonly attribute boolean         cancelable;
```

```
  readonly attribute DOMTimeStamp    timeStamp;
  void               stopPropagation();
  void               preventDefault();
  void               initEvent(in DOMString eventTypeArg,
                               in boolean canBubbleArg,
                               in boolean cancelableArg);
  // Introduced in DOM Level 3:
  readonly attribute DOMString       namespaceURI;
  // Introduced in DOM Level 3:
  boolean            isCustom();
  // Introduced in DOM Level 3:
  void               stopImmediatePropagation();
  // Introduced in DOM Level 3:
  boolean            isDefaultPrevented();
  // Introduced in DOM Level 3:
  void               initEventNS(in DOMString namespaceURIArg,
                                 in DOMString eventTypeArg,
                                 in boolean canBubbleArg,
                                 in boolean cancelableArg);
};

// Introduced in DOM Level 2:
interface EventTarget {
  void               addEventListener(in DOMString type,
                                      in EventListener listener,
                                      in boolean useCapture);
  void               removeEventListener(in DOMString type,
                                         in EventListener listener,
                                         in boolean useCapture);
  // Modified in DOM Level 3:
  boolean            dispatchEvent(in Event evt)
                                      raises(EventException);
  // Introduced in DOM Level 3:
  void               addEventListenerNS(in DOMString namespaceURI,
                                        in DOMString type,
                                        in EventListener listener,
                                        in boolean useCapture,
                                        in DOMObject evtGroup);
  // Introduced in DOM Level 3:
  void               removeEventListenerNS(in DOMString namespaceURI,
                                           in DOMString type,
                                           in EventListener listener,
                                           in boolean useCapture);
  // Introduced in DOM Level 3:
  boolean            willTriggerNS(in DOMString namespaceURI,
                                   in DOMString type);
  // Introduced in DOM Level 3:
  boolean            hasEventListenerNS(in DOMString namespaceURI,
                                        in DOMString type);
};

// Introduced in DOM Level 2:
interface EventListener {
  void               handleEvent(in Event evt);
};

// Introduced in DOM Level 2:
```

```
interface DocumentEvent {
  Event               createEvent(in DOMString eventType)
                                  raises(dom::DOMException);
  // Introduced in DOM Level 3:
  boolean             canDispatch(in DOMString namespaceURI,
                                  in DOMString type);
};

// Introduced in DOM Level 3:
interface CustomEvent : Event {
  void                setDispatchState(in EventTarget target,
                                       in unsigned short phase);
  boolean             isPropagationStopped();
  boolean             isImmediatePropagationStopped();
};

// Introduced in DOM Level 2:
interface UIEvent : Event {
  readonly attribute views::AbstractView view;
  readonly attribute long             detail;
  void                initUIEvent(in DOMString typeArg,
                                  in boolean canBubbleArg,
                                  in boolean cancelableArg,
                                  in views::AbstractView viewArg,
                                  in long detailArg);
  // Introduced in DOM Level 3:
  void                initUIEventNS(in DOMString namespaceURI,
                                    in DOMString typeArg,
                                    in boolean canBubbleArg,
                                    in boolean cancelableArg,
                                    in views::AbstractView viewArg,
                                    in long detailArg);
};

// Introduced in DOM Level 3:
interface TextEvent : UIEvent {
  readonly attribute DOMString       data;
  void                initTextEvent(in DOMString typeArg,
                                    in boolean canBubbleArg,
                                    in boolean cancelableArg,
                                    in views::AbstractView viewArg,
                                    in DOMString dataArg);
  void                initTextEventNS(in DOMString namespaceURI,
                                      in DOMString type,
                                      in boolean canBubbleArg,
                                      in boolean cancelableArg,
                                      in views::AbstractView viewArg,
                                      in DOMString dataArg);
};

// Introduced in DOM Level 2:
interface MouseEvent : UIEvent {
  readonly attribute long             screenX;
  readonly attribute long             screenY;
  readonly attribute long             clientX;
  readonly attribute long             clientY;
  readonly attribute boolean          ctrlKey;
```

```
  readonly attribute boolean         shiftKey;
  readonly attribute boolean         altKey;
  readonly attribute boolean         metaKey;
  readonly attribute unsigned short  button;
  readonly attribute EventTarget     relatedTarget;
  void               initMouseEvent(in DOMString typeArg,
                                    in boolean canBubbleArg,
                                    in boolean cancelableArg,
                                    in views::AbstractView viewArg,
                                    in long detailArg,
                                    in long screenXArg,
                                    in long screenYArg,
                                    in long clientXArg,
                                    in long clientYArg,
                                    in boolean ctrlKeyArg,
                                    in boolean altKeyArg,
                                    in boolean shiftKeyArg,
                                    in boolean metaKeyArg,
                                    in unsigned short buttonArg,
                                    in EventTarget relatedTargetArg);
  // Introduced in DOM Level 3:
  boolean            getModifierState(in DOMString keyIdentifierArg);
  // Introduced in DOM Level 3:
  void               initMouseEventNS(in DOMString namespaceURI,
                                      in DOMString typeArg,
                                      in boolean canBubbleArg,
                                      in boolean cancelableArg,
                                      in views::AbstractView viewArg,
                                      in long detailArg,
                                      in long screenXArg,
                                      in long screenYArg,
                                      in long clientXArg,
                                      in long clientYArg,
                                      in unsigned short buttonArg,
                                      in EventTarget relatedTargetArg,
                                      in DOMString modifiersList);
};

// Introduced in DOM Level 3:
interface KeyboardEvent : UIEvent {

  // KeyLocationCode
  const unsigned long       DOM_KEY_LOCATION_STANDARD      = 0x00;
  const unsigned long       DOM_KEY_LOCATION_LEFT          = 0x01;
  const unsigned long       DOM_KEY_LOCATION_RIGHT         = 0x02;
  const unsigned long       DOM_KEY_LOCATION_NUMPAD        = 0x03;

  readonly attribute DOMString       keyIdentifier;
  readonly attribute unsigned long   keyLocation;
  readonly attribute boolean         ctrlKey;
  readonly attribute boolean         shiftKey;
  readonly attribute boolean         altKey;
  readonly attribute boolean         metaKey;
  boolean            getModifierState(in DOMString keyIdentifierArg);
  void               initKeyboardEvent(in DOMString typeArg,
                                       in boolean canBubbleArg,
                                       in boolean cancelableArg,
```

```
                                        in views::AbstractView viewArg,
                                        in DOMString keyIdentifierArg,
                                        in unsigned long keyLocationArg,
                                        in DOMString modifiersList);
  void               initKeyboardEventNS(in DOMString namespaceURI,
                                         in DOMString typeArg,
                                         in boolean canBubbleArg,
                                         in boolean cancelableArg,
                                         in views::AbstractView viewArg,
                                         in DOMString keyIdentifierArg,
                                         in unsigned long keyLocationArg,
                                         in DOMString modifiersList);
};

// Introduced in DOM Level 2:
interface MutationEvent : Event {

  // attrChangeType
  const unsigned short      MODIFICATION                  = 1;
  const unsigned short      ADDITION                      = 2;
  const unsigned short      REMOVAL                       = 3;

  readonly attribute Node            relatedNode;
  readonly attribute DOMString       prevValue;
  readonly attribute DOMString       newValue;
  readonly attribute DOMString       attrName;
  readonly attribute unsigned short  attrChange;
  void               initMutationEvent(in DOMString typeArg,
                                       in boolean canBubbleArg,
                                       in boolean cancelableArg,
                                       in Node relatedNodeArg,
                                       in DOMString prevValueArg,
                                       in DOMString newValueArg,
                                       in DOMString attrNameArg,
                                       in unsigned short attrChangeArg);
  // Introduced in DOM Level 3:
  void               initMutationEventNS(in DOMString namespaceURI,
                                         in DOMString typeArg,
                                         in boolean canBubbleArg,
                                         in boolean cancelableArg,
                                         in Node relatedNodeArg,
                                         in DOMString prevValueArg,
                                         in DOMString newValueArg,
                                         in DOMString attrNameArg,
                                         in unsigned short attrChangeArg);
};

// Introduced in DOM Level 3:
interface MutationNameEvent : MutationEvent {
  readonly attribute DOMString       prevNamespaceURI;
  readonly attribute DOMString       prevNodeName;
  // Introduced in DOM Level 3:
  void               initMutationNameEvent(in DOMString typeArg,
                                           in boolean canBubbleArg,
                                           in boolean cancelableArg,
                                           in Node relatedNodeArg,
                                           in DOMString prevNamespaceURIArg,
```

```
                                                in DOMString prevNodeNameArg);
    // Introduced in DOM Level 3:
    void               initMutationNameEventNS(in DOMString namespaceURI,
                                                 in DOMString typeArg,
                                                 in boolean canBubbleArg,
                                                 in boolean cancelableArg,
                                                 in Node relatedNodeArg,
                                                 in DOMString prevNamespaceURIArg,
                                                 in DOMString prevNodeNameArg);
  };
};

#endif // _EVENTS_IDL_
```

Appendix D: Java Language Binding

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

The Java files are also available as
http://www.w3.org/TR/2003/NOTE-DOM-Level-3-Events-20031107/java-binding.zip

org/w3c/dom/events/EventException.java:

```
package org.w3c.dom.events;

public class EventException extends RuntimeException {
    public EventException(short code, String message) {
       super(message);
       this.code = code;
    }
    public short   code;
    // EventExceptionCode
    public static final short UNSPECIFIED_EVENT_TYPE_ERR = 0;
    public static final short DISPATCH_REQUEST_ERR      = 1;

}
```

org/w3c/dom/events/Event.java:

```
package org.w3c.dom.events;

public interface Event {
    // PhaseType
    public static final short CAPTURING_PHASE           = 1;
    public static final short AT_TARGET                 = 2;
    public static final short BUBBLING_PHASE            = 3;

    public String getType();

    public EventTarget getTarget();

    public EventTarget getCurrentTarget();

    public short getEventPhase();

    public boolean getBubbles();

    public boolean getCancelable();

    public long getTimeStamp();

    public void stopPropagation();

    public void preventDefault();

    public void initEvent(String eventTypeArg,
                          boolean canBubbleArg,
                          boolean cancelableArg);
```

```
    public String getNamespaceURI();

    public boolean isCustom();

    public void stopImmediatePropagation();

    public boolean isDefaultPrevented();

    public void initEventNS(String namespaceURIArg,
                            String eventTypeArg,
                            boolean canBubbleArg,
                            boolean cancelableArg);

}
```

org/w3c/dom/events/EventTarget.java:

```
package org.w3c.dom.events;

public interface EventTarget {
    public void addEventListener(String type,
                                 EventListener listener,
                                 boolean useCapture);

    public void removeEventListener(String type,
                                    EventListener listener,
                                    boolean useCapture);

    public boolean dispatchEvent(Event evt)
                                 throws EventException;

    public void addEventListenerNS(String namespaceURI,
                                   String type,
                                   EventListener listener,
                                   boolean useCapture,
                                   Object evtGroup);

    public void removeEventListenerNS(String namespaceURI,
                                      String type,
                                      EventListener listener,
                                      boolean useCapture);

    public boolean willTriggerNS(String namespaceURI,
                                 String type);

    public boolean hasEventListenerNS(String namespaceURI,
                                      String type);

}
```

org/w3c/dom/events/EventListener.java:

```
package org.w3c.dom.events;

public interface EventListener {
    public void handleEvent(Event evt);

}
```

org/w3c/dom/events/DocumentEvent.java:

```
package org.w3c.dom.events;

import org.w3c.dom.DOMException;

public interface DocumentEvent {
    public Event createEvent(String eventType)
                             throws DOMException;

    public boolean canDispatch(String namespaceURI,
                               String type);

}
```

org/w3c/dom/events/CustomEvent.java:

```
package org.w3c.dom.events;

public interface CustomEvent extends Event {
    public void setDispatchState(EventTarget target,
                                 short phase);

    public boolean isPropagationStopped();

    public boolean isImmediatePropagationStopped();

}
```

org/w3c/dom/events/UIEvent.java:

```
package org.w3c.dom.events;

import org.w3c.dom.views.AbstractView;

public interface UIEvent extends Event {
    public AbstractView getView();

    public int getDetail();

    public void initUIEvent(String typeArg,
                            boolean canBubbleArg,
                            boolean cancelableArg,
                            AbstractView viewArg,
                            int detailArg);
```

```
    public void initUIEventNS(String namespaceURI,
                              String typeArg,
                              boolean canBubbleArg,
                              boolean cancelableArg,
                              AbstractView viewArg,
                              int detailArg);

}
```

org/w3c/dom/events/TextEvent.java:

```
package org.w3c.dom.events;

import org.w3c.dom.views.AbstractView;

public interface TextEvent extends UIEvent {
    public String getData();

    public void initTextEvent(String typeArg,
                              boolean canBubbleArg,
                              boolean cancelableArg,
                              AbstractView viewArg,
                              String dataArg);

    public void initTextEventNS(String namespaceURI,
                                String type,
                                boolean canBubbleArg,
                                boolean cancelableArg,
                                AbstractView viewArg,
                                String dataArg);

}
```

org/w3c/dom/events/MouseEvent.java:

```
package org.w3c.dom.events;

import org.w3c.dom.views.AbstractView;

public interface MouseEvent extends UIEvent {
    public int getScreenX();

    public int getScreenY();

    public int getClientX();

    public int getClientY();

    public boolean getCtrlKey();

    public boolean getShiftKey();

    public boolean getAltKey();

    public boolean getMetaKey();
```

```
    public short getButton();

    public EventTarget getRelatedTarget();

    public void initMouseEvent(String typeArg,
                               boolean canBubbleArg,
                               boolean cancelableArg,
                               AbstractView viewArg,
                               int detailArg,
                               int screenXArg,
                               int screenYArg,
                               int clientXArg,
                               int clientYArg,
                               boolean ctrlKeyArg,
                               boolean altKeyArg,
                               boolean shiftKeyArg,
                               boolean metaKeyArg,
                               short buttonArg,
                               EventTarget relatedTargetArg);

    public boolean getModifierState(String keyIdentifierArg);

    public void initMouseEventNS(String namespaceURI,
                                 String typeArg,
                                 boolean canBubbleArg,
                                 boolean cancelableArg,
                                 AbstractView viewArg,
                                 int detailArg,
                                 int screenXArg,
                                 int screenYArg,
                                 int clientXArg,
                                 int clientYArg,
                                 short buttonArg,
                                 EventTarget relatedTargetArg,
                                 String modifiersList);

}
```

org/w3c/dom/events/KeyboardEvent.java:

```
package org.w3c.dom.events;

import org.w3c.dom.views.AbstractView;

public interface KeyboardEvent extends UIEvent {
    // KeyLocationCode
    public static final int DOM_KEY_LOCATION_STANDARD = 0x00;
    public static final int DOM_KEY_LOCATION_LEFT     = 0x01;
    public static final int DOM_KEY_LOCATION_RIGHT    = 0x02;
    public static final int DOM_KEY_LOCATION_NUMPAD   = 0x03;

    public String getKeyIdentifier();

    public int getKeyLocation();

    public boolean getCtrlKey();
```

```
    public boolean getShiftKey();

    public boolean getAltKey();

    public boolean getMetaKey();

    public boolean getModifierState(String keyIdentifierArg);

    public void initKeyboardEvent(String typeArg,
                                  boolean canBubbleArg,
                                  boolean cancelableArg,
                                  AbstractView viewArg,
                                  String keyIdentifierArg,
                                  int keyLocationArg,
                                  String modifiersList);

    public void initKeyboardEventNS(String namespaceURI,
                                    String typeArg,
                                    boolean canBubbleArg,
                                    boolean cancelableArg,
                                    AbstractView viewArg,
                                    String keyIdentifierArg,
                                    int keyLocationArg,
                                    String modifiersList);

}
```

org/w3c/dom/events/MutationEvent.java:

```
package org.w3c.dom.events;

import org.w3c.dom.Node;

public interface MutationEvent extends Event {
    // attrChangeType
    public static final short MODIFICATION             = 1;
    public static final short ADDITION                 = 2;
    public static final short REMOVAL                  = 3;

    public Node getRelatedNode();

    public String getPrevValue();

    public String getNewValue();

    public String getAttrName();

    public short getAttrChange();

    public void initMutationEvent(String typeArg,
                                  boolean canBubbleArg,
                                  boolean cancelableArg,
                                  Node relatedNodeArg,
                                  String prevValueArg,
                                  String newValueArg,
```

```
                                    String attrNameArg,
                                    short attrChangeArg);

    public void initMutationEventNS(String namespaceURI,
                                      String typeArg,
                                      boolean canBubbleArg,
                                      boolean cancelableArg,
                                      Node relatedNodeArg,
                                      String prevValueArg,
                                      String newValueArg,
                                      String attrNameArg,
                                      short attrChangeArg);

}
```

org/w3c/dom/events/MutationNameEvent.java:

```
package org.w3c.dom.events;

import org.w3c.dom.Node;

public interface MutationNameEvent extends MutationEvent {
    public String getPrevNamespaceURI();

    public String getPrevNodeName();

    public void initMutationNameEvent(String typeArg,
                                      boolean canBubbleArg,
                                      boolean cancelableArg,
                                      Node relatedNodeArg,
                                      String prevNamespaceURIArg,
                                      String prevNodeNameArg);

    public void initMutationNameEventNS(String namespaceURI,
                                        String typeArg,
                                        boolean canBubbleArg,
                                        boolean cancelableArg,
                                        Node relatedNodeArg,
                                        String prevNamespaceURIArg,
                                        String prevNodeNameArg);

}
```

org/w3c/dom/events/MutationNameEvent.java:

Appendix E: ECMAScript Language Binding

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

Properties of the **Event** Constructor function:

Event.CAPTURING_PHASE

The value of the constant **Event.CAPTURING_PHASE** is **1**.

Event.AT_TARGET

The value of the constant **Event.AT_TARGET** is **2**.

Event.BUBBLING_PHASE

The value of the constant **Event.BUBBLING_PHASE** is **3**.

Objects that implement the **Event** interface:

Properties of objects that implement the **Event** interface:

type

This read-only property is a **String**.

target

This read-only property is an object that implements the **EventTarget** interface.

currentTarget

This read-only property is an object that implements the **EventTarget** interface.

eventPhase

This read-only property is a **Number**.

bubbles

This read-only property is a **Boolean**.

cancelable

This read-only property is a **Boolean**.

timeStamp

This read-only property is an object that implements the **Date** interface.

namespaceURI

This read-only property is a **String**.

Functions of objects that implement the **Event** interface:

stopPropagation()

This function has no return value.

preventDefault()

This function has no return value.

initEvent(eventTypeArg, canBubbleArg, cancelableArg)

This function has no return value.

The **eventTypeArg** parameter is a **String**.

The **canBubbleArg** parameter is a **Boolean**.

The **cancelableArg** parameter is a **Boolean**.

isCustom()

This function returns a **Boolean**.

stopImmediatePropagation()

This function has no return value.

isDefaultPrevented()
This function returns a **Boolean**.
initEventNS(namespaceURIArg, eventTypeArg, canBubbleArg, cancelableArg)
This function has no return value.
The **namespaceURIArg** parameter is a **String**.
The **eventTypeArg** parameter is a **String**.
The **canBubbleArg** parameter is a **Boolean**.
The **cancelableArg** parameter is a **Boolean**.

Objects that implement the **EventTarget** interface:

Functions of objects that implement the **EventTarget** interface:

addEventListener(type, listener, useCapture)
This function has no return value.
The **type** parameter is a **String**.
The **listener** parameter is an object that implements the **EventListener** interface.
The **useCapture** parameter is a **Boolean**.
removeEventListener(type, listener, useCapture)
This function has no return value.
The **type** parameter is a **String**.
The **listener** parameter is an object that implements the **EventListener** interface.
The **useCapture** parameter is a **Boolean**.
dispatchEvent(evt)
This function returns a **Boolean**.
The **evt** parameter is an object that implements the **Event** interface.
This function can raise an object that implements the **EventException** interface.
addEventListenerNS(namespaceURI, type, listener, useCapture, evtGroup)
This function has no return value.
The **namespaceURI** parameter is a **String**.
The **type** parameter is a **String**.
The **listener** parameter is an object that implements the **EventListener** interface.
The **useCapture** parameter is a **Boolean**.
The **evtGroup** parameter is an object that implements the **Object** interface.
removeEventListenerNS(namespaceURI, type, listener, useCapture)
This function has no return value.
The **namespaceURI** parameter is a **String**.
The **type** parameter is a **String**.
The **listener** parameter is an object that implements the **EventListener** interface.
The **useCapture** parameter is a **Boolean**.
willTriggerNS(namespaceURI, type)
This function returns a **Boolean**.
The **namespaceURI** parameter is a **String**.
The **type** parameter is a **String**.
hasEventListenerNS(namespaceURI, type)
This function returns a **Boolean**.
The **namespaceURI** parameter is a **String**.
The **type** parameter is a **String**.

EventListener function:

This function has no return value. The parameter is an object that implements the **Event** interface.

Properties of the **EventException** Constructor function:

EventException.UNSPECIFIED_EVENT_TYPE_ERR

The value of the constant **EventException.UNSPECIFIED_EVENT_TYPE_ERR** is **0**.

EventException.DISPATCH_REQUEST_ERR

The value of the constant **EventException.DISPATCH_REQUEST_ERR** is **1**.

Objects that implement the **EventException** interface:

Properties of objects that implement the **EventException** interface:

code

This property is a **Number**.

Objects that implement the **DocumentEvent** interface:

Functions of objects that implement the **DocumentEvent** interface:

createEvent(eventType)

This function returns an object that implements the **Event** interface.

The **eventType** parameter is a **String**.

This function can raise an object that implements the **DOMException** interface.

canDispatch(namespaceURI, type)

This function returns a **Boolean**.

The **namespaceURI** parameter is a **String**.

The **type** parameter is a **String**.

Objects that implement the **CustomEvent** interface:

Objects that implement the **CustomEvent** interface have all properties and functions of the **Event** interface as well as the properties and functions defined below.

Functions of objects that implement the **CustomEvent** interface:

setDispatchState(target, phase)

This function has no return value.

The **target** parameter is an object that implements the **EventTarget** interface.

The **phase** parameter is a **Number**.

isPropagationStopped()

This function returns a **Boolean**.

isImmediatePropagationStopped()

This function returns a **Boolean**.

Objects that implement the **UIEvent** interface:

Objects that implement the **UIEvent** interface have all properties and functions of the **Event** interface as well as the properties and functions defined below.

Properties of objects that implement the **UIEvent** interface:

view

This read-only property is an object that implements the **AbstractView** interface.

detail

This read-only property is a **Number**.

Functions of objects that implement the **UIEvent** interface:

initUIEvent(typeArg, canBubbleArg, cancelableArg, viewArg, detailArg)

This function has no return value.

The **typeArg** parameter is a **String**.

The **canBubbleArg** parameter is a **Boolean**.

The **cancelableArg** parameter is a **Boolean**.
The **viewArg** parameter is an object that implements the **AbstractView** interface.
The **detailArg** parameter is a **Number**.

initUIEventNS(namespaceURI, typeArg, canBubbleArg, cancelableArg, viewArg, detailArg)

This function has no return value.
The **namespaceURI** parameter is a **String**.
The **typeArg** parameter is a **String**.
The **canBubbleArg** parameter is a **Boolean**.
The **cancelableArg** parameter is a **Boolean**.
The **viewArg** parameter is an object that implements the **AbstractView** interface.
The **detailArg** parameter is a **Number**.

Objects that implement the **TextEvent** interface:

Objects that implement the **TextEvent** interface have all properties and functions of the **UIEvent** interface as well as the properties and functions defined below.

Properties of objects that implement the **TextEvent** interface:

data

This read-only property is a **String**.

Functions of objects that implement the **TextEvent** interface:

initTextEvent(typeArg, canBubbleArg, cancelableArg, viewArg, dataArg)

This function has no return value.
The **typeArg** parameter is a **String**.
The **canBubbleArg** parameter is a **Boolean**.
The **cancelableArg** parameter is a **Boolean**.
The **viewArg** parameter is an object that implements the **AbstractView** interface.
The **dataArg** parameter is a **String**.

initTextEventNS(namespaceURI, type, canBubbleArg, cancelableArg, viewArg, dataArg)

This function has no return value.
The **namespaceURI** parameter is a **String**.
The **type** parameter is a **String**.
The **canBubbleArg** parameter is a **Boolean**.
The **cancelableArg** parameter is a **Boolean**.
The **viewArg** parameter is an object that implements the **AbstractView** interface.
The **dataArg** parameter is a **String**.

Objects that implement the **MouseEvent** interface:

Objects that implement the **MouseEvent** interface have all properties and functions of the **UIEvent** interface as well as the properties and functions defined below.

Properties of objects that implement the **MouseEvent** interface:

screenX

This read-only property is a **Number**.

screenY

This read-only property is a **Number**.

clientX

This read-only property is a **Number**.

clientY

This read-only property is a **Number**.

ctrlKey
This read-only property is a **Boolean**.
shiftKey
This read-only property is a **Boolean**.
altKey
This read-only property is a **Boolean**.
metaKey
This read-only property is a **Boolean**.
button
This read-only property is a **Number**.
relatedTarget
This read-only property is an object that implements the **EventTarget** interface.

Functions of objects that implement the **MouseEvent** interface:

initMouseEvent(typeArg, canBubbleArg, cancelableArg, viewArg, detailArg, screenXArg, screenYArg, clientXArg, clientYArg, ctrlKeyArg, altKeyArg, shiftKeyArg, metaKeyArg, buttonArg, relatedTargetArg)
This function has no return value.
The **typeArg** parameter is a **String**.
The **canBubbleArg** parameter is a **Boolean**.
The **cancelableArg** parameter is a **Boolean**.
The **viewArg** parameter is an object that implements the **AbstractView** interface.
The **detailArg** parameter is a **Number**.
The **screenXArg** parameter is a **Number**.
The **screenYArg** parameter is a **Number**.
The **clientXArg** parameter is a **Number**.
The **clientYArg** parameter is a **Number**.
The **ctrlKeyArg** parameter is a **Boolean**.
The **altKeyArg** parameter is a **Boolean**.
The **shiftKeyArg** parameter is a **Boolean**.
The **metaKeyArg** parameter is a **Boolean**.
The **buttonArg** parameter is a **Number**.
The **relatedTargetArg** parameter is an object that implements the **EventTarget** interface.

getModifierState(keyIdentifierArg)
This function returns a **Boolean**.
The **keyIdentifierArg** parameter is a **String**.

initMouseEventNS(namespaceURI, typeArg, canBubbleArg, cancelableArg, viewArg, detailArg, screenXArg, screenYArg, clientXArg, clientYArg, buttonArg, relatedTargetArg, modifiersList)
This function has no return value.
The **namespaceURI** parameter is a **String**.
The **typeArg** parameter is a **String**.
The **canBubbleArg** parameter is a **Boolean**.
The **cancelableArg** parameter is a **Boolean**.
The **viewArg** parameter is an object that implements the **AbstractView** interface.
The **detailArg** parameter is a **Number**.
The **screenXArg** parameter is a **Number**.

The **screenYArg** parameter is a **Number**.
The **clientXArg** parameter is a **Number**.
The **clientYArg** parameter is a **Number**.
The **buttonArg** parameter is a **Number**.
The **relatedTargetArg** parameter is an object that implements the **EventTarget** interface.
The **modifiersList** parameter is a **String**.

Properties of the **KeyboardEvent** Constructor function:

KeyboardEvent.DOM_KEY_LOCATION_STANDARD
The value of the constant **KeyboardEvent.DOM_KEY_LOCATION_STANDARD** is **0x00**.

KeyboardEvent.DOM_KEY_LOCATION_LEFT
The value of the constant **KeyboardEvent.DOM_KEY_LOCATION_LEFT** is **0x01**.

KeyboardEvent.DOM_KEY_LOCATION_RIGHT
The value of the constant **KeyboardEvent.DOM_KEY_LOCATION_RIGHT** is **0x02**.

KeyboardEvent.DOM_KEY_LOCATION_NUMPAD
The value of the constant **KeyboardEvent.DOM_KEY_LOCATION_NUMPAD** is **0x03**.

Objects that implement the **KeyboardEvent** interface:

Objects that implement the **KeyboardEvent** interface have all properties and functions of the **UIEvent** interface as well as the properties and functions defined below.

Properties of objects that implement the **KeyboardEvent** interface:

keyIdentifier
This read-only property is a **String**.

keyLocation
This read-only property is a **Number**.

ctrlKey
This read-only property is a **Boolean**.

shiftKey
This read-only property is a **Boolean**.

altKey
This read-only property is a **Boolean**.

metaKey
This read-only property is a **Boolean**.

Functions of objects that implement the **KeyboardEvent** interface:

getModifierState(keyIdentifierArg)
This function returns a **Boolean**.
The **keyIdentifierArg** parameter is a **String**.

initKeyboardEvent(typeArg, canBubbleArg, cancelableArg, viewArg, keyIdentifierArg, keyLocationArg, modifiersList)
This function has no return value.
The **typeArg** parameter is a **String**.
The **canBubbleArg** parameter is a **Boolean**.
The **cancelableArg** parameter is a **Boolean**.
The **viewArg** parameter is an object that implements the **AbstractView** interface.
The **keyIdentifierArg** parameter is a **String**.
The **keyLocationArg** parameter is a **Number**.
The **modifiersList** parameter is a **String**.

initKeyboardEventNS(namespaceURI, typeArg, canBubbleArg, cancelableArg, viewArg, keyIdentifierArg, keyLocationArg, modifiersList)

This function has no return value.
The **namespaceURI** parameter is a **String**.
The **typeArg** parameter is a **String**.
The **canBubbleArg** parameter is a **Boolean**.
The **cancelableArg** parameter is a **Boolean**.
The **viewArg** parameter is an object that implements the **AbstractView** interface.
The **keyIdentifierArg** parameter is a **String**.
The **keyLocationArg** parameter is a **Number**.
The **modifiersList** parameter is a **String**.

Properties of the **MutationEvent** Constructor function:

MutationEvent.MODIFICATION

The value of the constant **MutationEvent.MODIFICATION** is **1**.

MutationEvent.ADDITION

The value of the constant **MutationEvent.ADDITION** is **2**.

MutationEvent.REMOVAL

The value of the constant **MutationEvent.REMOVAL** is **3**.

Objects that implement the **MutationEvent** interface:

Objects that implement the **MutationEvent** interface have all properties and functions of the **Event** interface as well as the properties and functions defined below.

Properties of objects that implement the **MutationEvent** interface:

relatedNode

This read-only property is an object that implements the **Node** interface.

prevValue

This read-only property is a **String**.

newValue

This read-only property is a **String**.

attrName

This read-only property is a **String**.

attrChange

This read-only property is a **Number**.

Functions of objects that implement the **MutationEvent** interface:

initMutationEvent(typeArg, canBubbleArg, cancelableArg, relatedNodeArg, prevValueArg, newValueArg, attrNameArg, attrChangeArg)

This function has no return value.
The **typeArg** parameter is a **String**.
The **canBubbleArg** parameter is a **Boolean**.
The **cancelableArg** parameter is a **Boolean**.
The **relatedNodeArg** parameter is an object that implements the **Node** interface.
The **prevValueArg** parameter is a **String**.
The **newValueArg** parameter is a **String**.
The **attrNameArg** parameter is a **String**.
The **attrChangeArg** parameter is a **Number**.

initMutationEventNS(namespaceURI, typeArg, canBubbleArg, cancelableArg, relatedNodeArg, prevValueArg, newValueArg, attrNameArg, attrChangeArg)

This function has no return value.
The **namespaceURI** parameter is a **String**.
The **typeArg** parameter is a **String**.
The **canBubbleArg** parameter is a **Boolean**.
The **cancelableArg** parameter is a **Boolean**.
The **relatedNodeArg** parameter is an object that implements the **Node** interface.
The **prevValueArg** parameter is a **String**.
The **newValueArg** parameter is a **String**.
The **attrNameArg** parameter is a **String**.
The **attrChangeArg** parameter is a **Number**.

Objects that implement the **MutationNameEvent** interface:

Objects that implement the **MutationNameEvent** interface have all properties and functions of the **MutationEvent** interface as well as the properties and functions defined below.

Properties of objects that implement the **MutationNameEvent** interface:

prevNamespaceURI

This read-only property is a **String**.

prevNodeName

This read-only property is a **String**.

Functions of objects that implement the **MutationNameEvent** interface:

initMutationNameEvent(typeArg, canBubbleArg, cancelableArg, relatedNodeArg, prevNamespaceURIArg, prevNodeNameArg)

This function has no return value.
The **typeArg** parameter is a **String**.
The **canBubbleArg** parameter is a **Boolean**.
The **cancelableArg** parameter is a **Boolean**.
The **relatedNodeArg** parameter is an object that implements the **Node** interface.
The **prevNamespaceURIArg** parameter is a **String**.
The **prevNodeNameArg** parameter is a **String**.

initMutationNameEventNS(namespaceURI, typeArg, canBubbleArg, cancelableArg, relatedNodeArg, prevNamespaceURIArg, prevNodeNameArg)

This function has no return value.
The **namespaceURI** parameter is a **String**.
The **typeArg** parameter is a **String**.
The **canBubbleArg** parameter is a **Boolean**.
The **cancelableArg** parameter is a **Boolean**.
The **relatedNodeArg** parameter is an object that implements the **Node** interface.
The **prevNamespaceURIArg** parameter is a **String**.
The **prevNodeNameArg** parameter is a **String**.

Appendix F: Acknowledgements

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

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F.1 Production Systems

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

Thanks to Joe English, author of cost, which was used as the basis for producing DOM Level 1. Thanks also to Gavin Nicol, who wrote the scripts which run on top of cost. Arnaud Le Hors and Philippe Le Hégaret maintained the scripts.

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Glossary

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

Some 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.

bubbling phase
The process by which an event [p.101] can be handled by one of the target ancestors after being handled by the target node [p.101] .

capture phase
The process by which an event [p.101] can be handled by one of the target ancestors before being handled by the target node [p.101] .

child
A *child* is an immediate descendant node of a node.

DOM Level 0
The term "DOM Level 0" refers to a mix (not formally specified) of HTML document functionalities offered by Netscape Navigator version 3.0 and Microsoft Internet Explorer version 3.0. In some cases, attributes or methods have been included for reasons of backward compatibility with "DOM Level 0".

event
An event is the representation of some asynchronous occurrence (such as a mouse click on the presentation of the element, or the removal of child node from an element, or any of unthinkably many other possibilities) that gets associated with an event target [p.101] .

event target
The object to which an event [p.101] is targeted.

local name
A *local name* is the local part of a *qualified name*. This is called the local part 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]. See also sections 1.3.2 "*DOM URIs*" and 1.3.3 "*XML Namespaces*" regarding URIs and namespace URIs handling and comparison in the DOM APIs.

target node
The target node is the node representing the event target [p.101] to which an event [p.101] is targeted using the DOM event flow.

target phase
The process by which an event [p.101] can be handled by the event target [p.101] .

XML name
See *XML name* in the XML specification ([XML 1.0]).

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

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