HTML

Living Standard — Last Updated 17 October 2018

3 Semantics, structure, and APIs of HTML documents §

3.1 Documents §

Every XML and HTML document in an HTML UA is represented by a Document object. [DOM]

The Document object's **URL** is defined in the WHATWG DOM standard. It is initially set when the Document object is created, but can change during the lifetime of the Document object; for example, it changes when the user navigates to a fragment on the page and when the pushState() method is called with a new URL. [DOM]

⚠Warning!

Interactive user agents typically expose the Document object's URL in their user interface. This is the primary mechanism by which a user can tell if a site is attempting to impersonate another.

When a Document is created by a script using the createDocument() or createHTMLDocument() the Document is both ready for post-load tasks and completely loaded immediately.

The document's referrer is a string (representing a URL) that can be set when the Document is created. If it is not explicitly set, then its value is the empty string.

3.1.1 The Document object §

The WHATWG DOM standard defines a Document interface, which this specification extends significantly.

IDL

```
enum DocumentReadyState { "loading", "interactive", "complete" };
typedef (HTMLScriptElement or SVGScriptElement) HTMLOrSVGScriptElement;

[OverrideBuiltins]
partial interface Document {
  // resource metadata management
  [PutForwards=href, Unforgeable] readonly attribute Location? location;
  attribute USVString domain;
  readonly attribute USVString referrer;
  attribute USVString cookie;
  readonly attribute DOMString lastModified;
  readonly attribute DocumentReadyState readyState;

  // DOM tree accessors
  getter object (DOMString name);
  [CEReactions] attribute DOMString title;
  [CEReactions] attribute DOMString dir;
  [CEReactions] attribute HTMLElement? body;
  readonly attribute HTMLHeadElement? head;
  [SameObject] readonly attribute HTMLCollection images;
  [SameObject] readonly attribute HTMLCollection embeds;
  [SameObject] readonly attribute HTMLCollection plugins;
  [SameObject] readonly attribute HTMLCollection links;
  [SameObject] readonly attribute HTMLCollection forms;
  [SameObject] readonly attribute HTMLCollection scripts;
  NodeList getElementsByName(DOMString elementName);
  readonly attribute HTMLOrSVGScriptElement? currentScript; // classic scripts in a document tree only

  // dynamic markup insertion
  [CEReactions] Document open(optional DOMString unused1, optional DOMString unused2); // both arguments are ignored
  WindowProxy? open(USVString url, DOMString name, DOMString features);
  [CEReactions] void close();
  [CEReactions] void write(DOMString... text);
  [CEReactions] void writeln(DOMString... text);

  // user interaction
  readonly attribute WindowProxy? defaultView;
  readonly attribute Element? activeElement;
  boolean hasFocus();
  [CEReactions] attribute DOMString designMode;
  [CEReactions] boolean execCommand(DOMString commandId, optional boolean showUI = false, optional DOMString value = "");
  boolean queryCommandEnabled(DOMString commandId);
  boolean queryCommandIndeterm(DOMString commandId);
  boolean queryCommandState(DOMString commandId);
  boolean queryCommandSupported(DOMString commandId);
  DOMString queryCommandValue(DOMString commandId);

  // special event handler IDL attributes that only apply to Document objects
  [LenientThis] attribute EventHandler onreadystatechange;
};
Document includes GlobalEventHandlers;
Document includes DocumentAndElementEventHandlers;
```

The Document has an **HTTPS state** (an HTTPS state value), initially "none", which represents the security properties of the network channel used to deliver the Document's data.

The Document has a **referrer policy** (a referrer policy), initially the empty string, which represents the default referrer policy used by fetches initiated by the Document.

The Document has a **CSP list**, which is a CSP list containing all of the Content Security Policy objects active for the document. The list is empty unless otherwise specified.

The Document has a **feature policy**, which is a feature policy, which is initially empty.

The Document has a **module map**, which is a module map, initially empty.

3.1.2 Resource metadata management §

For web developers (non-normative)

***document*. referrer**

Returns the URL of the Document from which the user navigated to this one, unless it was blocked or there was no such document, in which case it returns the empty string.

The noreferrer link type can be used to block the referrer.

The **referrer** attribute must return the document's referrer.

For web developers (non-normative)

***document*. cookie [= *value*]**

Returns the HTTP cookies that apply to the Document. If there are no cookies or cookies can't be applied to this resource, the empty string will be returned.

Can be set, to add a new cookie to the element's set of HTTP cookies.

If the contents are sandboxed into a unique origin (e.g. in an iframe with the sandbox attribute), a "SecurityError" DOMException will be thrown on getting and setting.

The **cookie** attribute represents the cookies of the resource identified by the document's URL.

A Document object that falls into one of the following conditions is a **cookie-averse Document object**:

- A Document that has no browsing context.
- A Document whose URL's scheme is not a network scheme.

On getting, if the document is a cookie-averse Document object, then the user agent must return the empty string. Otherwise, if the Document's origin is an opaque origin, the user agent must throw a "SecurityError" DOMException. Otherwise, the user agent must return the cookie-string for the document's URL for a "non-HTTP" API, decoded using UTF-8 decode without BOM. [COOKIES]

On setting, if the document is a cookie-averse Document object, then the user agent must do nothing. Otherwise, if the Document's origin is an opaque origin, the user agent must throw a "SecurityError" DOMException. Otherwise, the user agent must act as it would when receiving a set-cookie-string for the document's URL via a "non-HTTP" API, consisting of the new value encoded as UTF-8. [COOKIES] [ENCODING]

Note

Since the cookie attribute is accessible across frames, the path restrictions on cookies are only a tool to help manage which cookies are sent to which parts of the site, and are not in any way a security feature.

⚠Warning!

The cookie attribute's getter and setter synchronously access shared state. Since there is no locking mechanism, other browsing contexts in a multiprocess user agent can modify cookies while scripts are running. A site could, for instance, try to read a cookie, increment its value, then write it back out, using the new value of the cookie as a unique identifier for the session; if the site does this twice in two different browser windows at the same time, it might end up using the same "unique" identifier for both sessions, with potentially disastrous effects.

For web developers (non-normative)

***document*. lastModified**

Returns the date of the last modification to the document, as reported by the server, in the form "MM/DD/YYYY hh:mm:ss", in the user's local time zone.

If the last modification date is not known, the current time is returned instead.

The **lastModified** attribute, on getting, must return the date and time of the Document's source file's last modification, in the user's local time zone, in the following format:

1. The month component of the date.
2. A U+002F SOLIDUS character (/).
3. The day component of the date.
4. A U+002F SOLIDUS character (/).
5. The year component of the date.
6. A U+0020 SPACE character.
7. The hours component of the time.
8. A U+003A COLON character (:).
9. The minutes component of the time.
10. A U+003A COLON character (:).
11. The seconds component of the time.

All the numeric components above, other than the year, must be given as two ASCII digits representing the number in base ten, zero-padded if necessary. The year must be given as the shortest possible string of four or more ASCII digits representing the number in base ten, zero-padded if necessary.

The Document's source file's last modification date and time must be derived from relevant features of the networking protocols used, e.g. from the value of the HTTP `Last-Modified` header of the document, or from metadata in the file system for local files. If the last modification date and time are not known, the attribute must return the current date and time in the above format.

For web developers (non-normative)

***document* . readyState**

Returns "loading" while the Document is loading, "interactive" once it is finished parsing but still loading subresources, and "complete" once it has loaded.

The readystatechange event fires on the Document object when this value changes.

The DOMContentLoaded event fires after the transition to "interactive" but before the transition to "complete", at the point where all subresources apart from async script elements have loaded.

Each document has a **current document readiness**. When a Document object is created, it must have its current document readiness set to the string "loading" if the document is associated with an HTML parser, an XML parser, or an XSLT processor, and to the string "complete" otherwise. Various algorithms during page loading affect this value. When the value is set, the user agent must fire an event named readystatechange at the Document object.

A Document is said to have an **active parser** if it is associated with an HTML parser or an XML parser that has not yet been stopped or aborted.

The **readyState** IDL attribute must, on getting, return the current document readiness.

3.1.3 DOM tree accessors §

The html element of a document is its document element, if it's an html element, and null otherwise.

For web developers (non-normative)

***document* . head**

Returns the head element.

The head element of a document is the first head element that is a child of the html element, if there is one, or null otherwise.

The **head** attribute, on getting, must return the head element of the document (a head element or null).

For web developers (non-normative)

***document* . title [= *value*]**

Returns the document's title, as given by the title element for HTML and as given by the SVG title element for SVG.

Can be set, to update the document's title. If there is no appropriate element to update, the new value is ignored.

The title element of a document is the first title element in the document (in tree order), if there is one, or null otherwise.

The **title** attribute must, on getting, run the following algorithm:

1. If the document element is an SVG svg element, then let *value* be the child text content of the first SVG title element that is a child of the document element.
2. Otherwise, let *value* be the child text content of the title element, or the empty string if the title element is null.
3. Strip and collapse ASCII whitespace in *value*.
4. Return *value*.

On setting, the steps corresponding to the first matching condition in the following list must be run:

↪ **If the document element is an SVG svg element**

1. If there is an SVG title element that is a child of the document element, let *element* be the first such element.
2. Otherwise:
    1. Let *element* be the result of creating an element given the document element's node document, title, and the SVG namespace.
    2. Insert *element* as the first child of the document element.
3. Act as if the textContent IDL attribute of *element* was set to the new value being assigned.

↪ **If the document element is in the HTML namespace**

1. If the title element is null and the head element is null, then return.
2. If the title element is non-null, let *element* be the title element.
3. Otherwise:
    1. Let *element* be the result of creating an element given the document element's node document, title, and the HTML namespace.
    2. Append *element* to the head element.
4. Act as if the textContent IDL attribute of *element* was set to the new value being assigned.

↪ **Otherwise**

Do nothing.

For web developers (non-normative)

***document* . body [= *value*]**

Returns the body element.

Can be set, to replace the body element.

If the new value is not a body or frameset element, this will throw a "HierarchyRequestError" DOMException.

The body element of a document is the first of the html element's children that is either a body element or a frameset element, or null if there is no such element.

The body attribute, on getting, must return the body element of the document (either a body element, a frameset element, or null). On setting, the following algorithm must be run:

1. If the new value is not a body or frameset element, then throw a "HierarchyRequestError" DOMException.
2. Otherwise, if the new value is the same as the body element, return.
3. Otherwise, if the body element is not null, then replace the body element with the new value within the body element's parent and return.
4. Otherwise, if there is no document element, throw a "HierarchyRequestError" DOMException.
5. Otherwise, the body element is null, but there's a document element. Append the new value to the document element.

Note

The value returned by the body getter is not always the one passed to the setter.

Example

In this example, the setter successfully inserts a body element (though this is non-conforming since SVG does not allow a body as child of SVG svg). However the getter will return null because the document element is not html.

```
<svg xmlns="http://www.w3.org/2000/svg">
 <script>
  document.body = document.createElementNS("http://www.w3.org/1999/xhtml", "body");
  console.assert(document.body === null);
 </script>
</svg>
```

For web developers (non-normative)

***document* . images**

Returns an HTMLCollection of the img elements in the Document.

***document* . embeds**

***document* . plugins**

Return an HTMLCollection of the embed elements in the Document.

***document* . links**

Returns an HTMLCollection of the a and area elements in the Document that have href attributes.

***document* . forms**

Return an HTMLCollection of the form elements in the Document.

***document* . scripts**

Return an HTMLCollection of the script elements in the Document.

The **images** attribute must return an HTMLCollection rooted at the Document node, whose filter matches only img elements.

The **embeds** attribute must return an HTMLCollection rooted at the Document node, whose filter matches only embed elements.

The **plugins** attribute must return the same object as that returned by the embeds attribute.

The **links** attribute must return an HTMLCollection rooted at the Document node, whose filter matches only a elements with href attributes and area elements with href attributes.

The **forms** attribute must return an HTMLCollection rooted at the Document node, whose filter matches only form elements.

The **scripts** attribute must return an HTMLCollection rooted at the Document node, whose filter matches only script elements.

For web developers (non-normative)

***collection* = *document* . getElementsByName(*name*)**

Returns a NodeList of elements in the Document that have a name attribute with the value *name*.

The `getElementsByName(name)` method takes a string *name*, and must return a live `NodeList` containing all the HTML elements in that document that have a `name` attribute whose value is equal to the *name* argument (in a case-sensitive manner), in tree order. When the method is invoked on a `Document` object again with the same argument, the user agent may return the same as the object returned by the earlier call. In other cases, a new `NodeList` object must be returned.

For web developers (non-normative)

***document*.currentScript**

Returns the `script` element, or the SVG `script` element, that is currently executing, as long as the element represents a classic script. In the case of reentrant script execution, returns the one that most recently started executing amongst those that have not yet finished executing.

Returns null if the `Document` is not currently executing a `script` or SVG `script` element (e.g., because the running script is an event handler, or a timeout), or if the currently executing `script` or SVG `script` element represents a module script.

The `currentScript` attribute, on getting, must return the value to which it was most recently set. When the `Document` is created, the `currentScript` must be initialized to null.

Note

This API has fallen out of favor in the implementer and standards community, as it globally exposes `script` or SVG `script` elements. As such, it is not available in newer contexts, such as when running module scripts or when running scripts in a shadow tree. We are looking into creating a new solution for identifying the running script in such contexts, which does not make it globally available: see issue #1013.

The `Document` interface supports named properties. The supported property names of a `Document` object *document* at any moment consist of the following, in tree order according to the element that contributed them, ignoring later duplicates, and with values from `id` attributes coming before values from `name` attributes when the same element contributes both:

- the value of the `name` content attribute for all exposed `embed`, `form`, `iframe`, `img`, and exposed `object` elements that have a non-empty `name` content attribute and are in a document tree with *document* as their root;
- the value of the `id` content attribute for all exposed `object` elements that have a non-empty `id` content attribute and are in a document tree with *document* as their root; and
- the value of the `id` content attribute for all `img` elements that have both a non-empty `id` content attribute and a non-empty `name` content attribute, and are in a document tree with *document* as their root.

To determine the value of a named property *name* for a `Document`, the user agent must return the value obtained using the following steps:

1. Let *elements* be the list of named elements with the name *name* that are in a document tree with the `Document` as their root.

   Note

   There will be at least one such element, by definition.

2. If *elements* has only one element, and that element is an `iframe` element, and that `iframe` element's nested browsing context is not null, then return the `WindowProxy` object of the element's nested browsing context.
3. Otherwise, if *elements* has only one element, return that element.
4. Otherwise return an `HTMLCollection` rooted at the `Document` node, whose filter matches only named elements with the name *name*.

Named elements with the name *name*, for the purposes of the above algorithm, are those that are either:

- Exposed `embed`, `form`, `iframe`, `img`, or exposed `object` elements that have a `name` content attribute whose value is *name*, or
- Exposed `object` elements that have an `id` content attribute whose value is *name*, or
- `img` elements that have an `id` content attribute whose value is *name*, and that have a non-empty `name` content attribute present also.

An `embed` or `object` element is said to be **exposed** if it has no exposed `object` ancestor, and, for `object` elements, is additionally either not showing its fallback content or has no `object` or `embed` descendants.

Note

The `dir` attribute on the `Document` interface is defined along with the `dir` content attribute.

3.2 Elements §

3.2.1 Semantics §

Elements, attributes, and attribute values in HTML are defined (by this specification) to have certain meanings (semantics). For example, the `ol` element represents an ordered list, and the `lang` attribute represents the language of the content.

These definitions allow HTML processors, such as Web browsers or search engines, to present and use documents and applications in a wide variety of contexts that the author might not have considered.

Example

As a simple example, consider a Web page written by an author who only considered desktop computer Web browsers:

```
<!DOCTYPE HTML>
<html lang="en">
 <head>
  <title>My Page</title>
 </head>
 <body>
  <h1>My page</h1>
```

```
  <p>I like cars and lorries and have a big Jeep!</p>
  <h2>Where I live</h2>
  <p>I live in a small hut on a mountain!</p>
 </body>
</html>
```

Because HTML conveys *meaning*, rather than presentation, the same page can also be used by a small browser on a mobile phone, without any change to the page. Instead of headings being in large letters as on the desktop, for example, the browser on the mobile phone might use the same size text for the whole page, but with the headings in bold.

But it goes further than just differences in screen size: the same page could equally be used by a blind user using a browser based around speech synthesis, which instead of displaying the page on a screen, reads the page to the user, e.g. using headphones. Instead of large text for the headings, the speech browser might use a different volume or a slower voice.

That's not all, either. Since the browsers know which parts of the page are the headings, they can create a document outline that the user can use to quickly navigate around the document, using keys for "jump to next heading" or "jump to previous heading". Such features are especially common with speech browsers, where users would otherwise find quickly navigating a page quite difficult.

Even beyond browsers, software can make use of this information. Search engines can use the headings to more effectively index a page, or to provide quick links to subsections of the page from their results. Tools can use the headings to create a table of contents (that is in fact how this very specification's table of contents is generated).

This example has focused on headings, but the same principle applies to all of the semantics in HTML.

Authors must not use elements, attributes, or attribute values for purposes other than their appropriate intended semantic purpose, as doing so prevents software from correctly processing the page.

Example

For example, the following snippet, intended to represent the heading of a corporate site, is non-conforming because the second line is not intended to be a heading of a subsection, but merely a subheading or subtitle (a subordinate heading for the same section).

```
<body>
 <h1>ACME Corporation</h1>
 <h2>The leaders in arbitrary fast delivery since 1920</h2>
 ...
```

The hgroup element is intended for these kinds of situations:

```
<body>
 <hgroup>
  <h1>ACME Corporation</h1>
  <h2>The leaders in arbitrary fast delivery since 1920</h2>
 </hgroup>
 ...
```

Example

The document in this next example is similarly non-conforming, despite being syntactically correct, because the data placed in the cells is clearly not tabular data, and the cite element mis-used:

```
<!DOCTYPE HTML>
<html lang="en-GB">
 <head> <title> Demonstration </title> </head>
 <body>
  <table>
   <tr> <td> My favourite animal is the cat. </td> </tr>
   <tr>
    <td>
     —<a href="https://example.org/~ernest/"><cite>Ernest</cite></a>,
     in an essay from 1992
    </td>
   </tr>
  </table>
 </body>
</html>
```

This would make software that relies on these semantics fail: for example, a speech browser that allowed a blind user to navigate tables in the document would report the quote above as a table, confusing the user; similarly, a tool that extracted titles of works from pages would extract "Ernest" as the title of a work, even though it's actually a person's name, not a title.

A corrected version of this document might be:

```
<!DOCTYPE HTML>
<html lang="en-GB">
 <head> <title> Demonstration </title> </head>
 <body>
  <blockquote>
   <p> My favourite animal is the cat. </p>
  </blockquote>
  <p>
   —<a href="https://example.org/~ernest/">Ernest</a>,
   in an essay from 1992
  </p>
 </body>
</html>
```

Authors must not use elements, attributes, or attribute values that are not permitted by this specification or other applicable specifications, as doing so makes it significantly harder for the language to be extended in the future.

Example

In the next example, there is a non-conforming attribute value ("carpet") and a non-conforming attribute ("texture"), which is not permitted by this specification:

```
<label>Carpet: <input type="carpet" name="c" texture="deep pile"></label>
```

Here would be an alternative and correct way to mark this up:

```
<label>Carpet: <input type="text" class="carpet" name="c" data-texture="deep pile"></label>
```

DOM nodes whose node document does not have a browsing context are exempt from all document conformance requirements other than the HTML syntax requirements and XML syntax requirements.

Example

In particular, the `template` element's template contents's node document does not have a browsing context. For example, the content model requirements and attribute value microsyntax requirements do not apply to a `template` element's template contents. In this example an `img` element has attribute values that are placeholders that would be invalid outside a `template` element.

```
<template>
 <article>
  <img src="{{src}}" alt="{{alt}}">
  <h1></h1>
 </article>
</template>
```

However, if the above markup were to omit the `</h1>` end tag, that would be a violation of the HTML syntax, and would thus be flagged as an error by conformance checkers.

Through scripting and using other mechanisms, the values of attributes, text, and indeed the entire structure of the document may change dynamically while a user agent is processing it. The semantics of a document at an instant in time are those represented by the state of the document at that instant in time, and the semantics of a document can therefore change over time. User agents must update their presentation of the document as this occurs.

Example

HTML has a `progress` element that describes a progress bar. If its "value" attribute is dynamically updated by a script, the UA would update the rendering to show the progress changing.

3.2.2 Elements in the DOM §

The nodes representing HTML elements in the DOM must implement, and expose to scripts, the interfaces listed for them in the relevant sections of this specification. This includes HTML elements in XML documents, even when those documents are in another context (e.g. inside an XSLT transform).

Elements in the DOM **represent** things; that is, they have intrinsic *meaning*, also known as semantics.

Example

For example, an `ol` element represents an ordered list.

Elements can be **referenced** (referred to) in some way, either explicitly or implicitly. One way that an element in the DOM can be explicitly referenced is by giving an `id` attribute to the element, and then creating a hyperlink with that `id` attribute's value as the fragment for the hyperlink's `href` attribute value. Hyperlinks are not necessary for a reference, however; any manner of referring to the element in question will suffice.

Example

Consider the following `figure` element, which is given an `id` attribute:

```
<figure id="module-script-graph">
  <img src="module-script-graph.svg"
       alt="Module A depends on module B, which depends
            on modules C and D.">
  <figcaption>Figure 27: a simple module graph</figcaption>
</figure>
```

A hyperlink-based reference could be created using the `a` element, like so:

```
As we can see in <a href="#module-script-graph">figure 27</a>, ...
```

However, there are many other ways of referencing the `figure` element, such as:

- "As depicted in the figure of modules A, B, C, and D..."
- "In Figure 27..." (without a hyperlink)
- "From the contents of the 'simple module graph' figure..."
- "In the figure below..." (but this is discouraged)

The basic interface, from which all the HTML elements' interfaces inherit, and which must be used by elements that have no additional requirements, is the `HTMLElement` interface.

IDL

```
[Exposed=Window,
 HTMLConstructor]
interface HTMLElement : Element {
  // metadata attributes
  [CEReactions] attribute DOMString title;
  [CEReactions] attribute DOMString lang;
  [CEReactions] attribute boolean translate;
  [CEReactions] attribute DOMString dir;
```

```
  // user interaction
  [CEReactions] attribute boolean hidden;
  void click();
  [CEReactions] attribute DOMString accessKey;
  readonly attribute DOMString accessKeyLabel;
  [CEReactions] attribute boolean draggable;
  [CEReactions] attribute boolean spellcheck;
  [CEReactions] attribute DOMString autocapitalize;

  [CEReactions] attribute [TreatNullAs=EmptyString] DOMString innerText;
};

HTMLElement includes GlobalEventHandlers;
HTMLElement includes DocumentAndElementEventHandlers;
HTMLElement includes ElementContentEditable;
HTMLElement includes HTMLOrSVGElement;

// Note: intentionally not [HTMLConstructor]
[Exposed=Window]
interface HTMLUnknownElement : HTMLElement { };
```

The `HTMLElement` interface holds methods and attributes related to a number of disparate features, and the members of this interface are therefore described in various different sections of this specification.

The element interface for an element with name *name* in the HTML namespace is determined as follows:

1. If *name* is `applet`, `bgsound`, `blink`, `isindex`, `keygen`, `multicol`, `nextid`, or `spacer`, then return `HTMLUnknownElement`.
2. If *name* is `acronym`, `basefont`, `big`, `center`, `nobr`, `noembed`, `noframes`, `plaintext`, `rb`, `rtc`, `strike`, or `tt`, then return `HTMLElement`.
3. If *name* is `listing` or `xmp`, then return `HTMLPreElement`.
4. Otherwise, if this specification defines an interface appropriate for the element type corresponding to the local name *name*, then return that interface.
5. If other applicable specifications define an appropriate interface for *name*, then return the interface they define.
6. If *name* is a valid custom element name, then return `HTMLElement`.
7. Return `HTMLUnknownElement`.

Note

The use of `HTMLElement` instead of `HTMLUnknownElement` in the case of valid custom element names is done to ensure that any potential future upgrades only cause a linear transition of the element's prototype chain, from `HTMLElement` to a subclass, instead of a lateral one, from `HTMLUnknownElement` to an unrelated subclass.

Features shared between HTML and SVG elements use the `HTMLOrSVGElement` interface mixin: [SVG]

IDL
```
interface mixin HTMLOrSVGElement {
  [SameObject] readonly attribute DOMStringMap dataset;
  attribute DOMString nonce; // intentionally no [CEReactions]

  [CEReactions] attribute long tabIndex;
  void focus(optional FocusOptions options);
  void blur();
};
```

3.2.3 HTML element constructors §

To support the custom elements feature, all HTML elements have special constructor behavior. This is indicated via the **`[HTMLConstructor]`** IDL extended attribute. It indicates that the interface object for the given interface will have a specific behavior when called, as defined in detail below.

The `[HTMLConstructor]` extended attribute must take no arguments, and must not appear on anything other than an interface. It must appear only once on an interface, and the interface must not be annotated with the `[Constructor]` or `[NoInterfaceObject]` extended attributes. (However, the interface may be annotated with `[NamedConstructor]`; there is no conflict there.) It must not be used on a callback interface.

Interface objects for interfaces annotated with the `[HTMLConstructor]` extended attribute must run the following steps as the function body behavior for both [[Call]] and [[Construct]] invocations of the corresponding JavaScript function object. When invoked with [[Call]], the NewTarget value is undefined, and so the algorithm below will immediately throw. When invoked with [[Construct]], the [[Construct]] *newTarget* parameter provides the NewTarget value.

1. Let *registry* be the current global object's `CustomElementRegistry` object.
2. If NewTarget is equal to the active function object, then throw a `TypeError`.

Example

This can occur when a custom element is defined using an element interface as its constructor:

```
customElements.define("bad-1", HTMLButtonElement);
new HTMLButtonElement();          // (1)
document.createElement("bad-1");  // (2)
```

In this case, during the execution of `HTMLButtonElement` (either explicitly, as in (1), or implicitly, as in (2)), both the active function object and NewTarget are `HTMLButtonElement`. If this check was not present, it would be possible to create an instance of `HTMLButtonElement` whose local name was `bad-1`.

File an issue about the selected text

3. Look up *registry* with constructor equal to NewTarget. If there is no such definition, then throw a `TypeError`.

Note

Since there can be no entry in registry *with a constructor of undefined, this step also prevents HTML element constructors from being called as functions (since in that case NewTarget will be undefined).*

4. Let *is value* be null.
5. If *definition*'s local name is equal to *definition*'s name (i.e., *definition* is for an autonomous custom element), then:
    1. If the active function object is not `HTMLElement`, then throw a `TypeError`.

    Example

    This can occur when a custom element is defined to not extend any local names, but inherits from a non-`HTMLElement` class:

    ```
    customElements.define("bad-2", class Bad2 extends HTMLParagraphElement {});
    ```

    In this case, during the (implicit) `super()` call that occurs when constructing an instance of `Bad2`, the active function object is `HTMLParagraphElement`, not `HTMLElement`.

6. Otherwise (i.e., if *definition* is for a customized built-in element):
    1. Let *valid local names* be the list of local names for elements defined in this specification or in other applicable specifications that use the active function object as their element interface.
    2. If *valid local names* does not contain *definition*'s local name, then throw a `TypeError`.

    Example

    This can occur when a custom element is defined to extend a given local name but inherits from the wrong class:

    ```
    customElements.define("bad-3", class Bad3 extends HTMLQuoteElement {}, { extends: "p" });
    ```

    In this case, during the (implicit) `super()` call that occurs when constructing an instance of `Bad3`, *valid local names* is the list containing `q` and `blockquote`, but *definition*'s local name is `p`, which is not in that list.

    3. Set *is value* to *definition*'s name.
7. Let *prototype* be Get(NewTarget, "prototype"). Rethrow any exceptions.
8. If Type(*prototype*) is not Object, then:
    1. Let *realm* be GetFunctionRealm(NewTarget).
    2. Set *prototype* to the interface prototype object of *realm* whose interface is the same as the interface of the active function object.

Note

The realm of the active function object might not be realm*, so we are using the more general concept of "the same interface" across realms; we are not looking for equality of interface objects. This fallback behavior, including using the realm of NewTarget and looking up the appropriate prototype there, is designed to match analogous behavior for the JavaScript built-ins.*

9. If *definition*'s construction stack is empty, then:
    1. Let *element* be a new element that implements the interface to which the active function object corresponds, with no attributes, namespace set to the HTML namespace, local name set to *definition*'s local name, and node document set to the current global object's associated `Document`.
    2. Perform *element*.[[SetPrototypeOf]](*prototype*). Rethrow any exceptions.
    3. Set *element*'s custom element state to "`custom`".
    4. Set *element*'s custom element definition to *definition*.
    5. Set *element*'s `is` value to *is value*.
    6. Return *element*.

Note

This occurs when author script constructs a new custom element directly, e.g. via `new MyCustomElement()`.

10. Let *element* be the last entry in *definition*'s construction stack.
11. If *element* is an *already constructed* marker, then throw an "`InvalidStateError`" `DOMException`.

Example

This can occur when the author code inside the custom element constructor non-conformantly creates another instance of the class being constructed, before calling `super()`:

```
let doSillyThing = false;

class DontDoThis extends HTMLElement {
  constructor() {
    if (doSillyThing) {
      doSillyThing = false;
      new DontDoThis();
      // Now the construction stack will contain an already constructed marker.
    }

    // This will then fail with an "InvalidStateError" DOMException:
    super();
  }
}
```

Example

This can also occur when author code inside the custom element constructor non-conformantly calls `super()` twice, since per the JavaScript specification, this actually executes the superclass constructor (i.e. this algorithm) twice, before throwing an error:

```
class DontDoThisEither extends HTMLElement {
  constructor() {
    super();

    // This will throw, but not until it has already called into the HTMLElement constructor
    super();
  }
}
```

12. Perform *element*.[[SetPrototypeOf]](*prototype*). Rethrow any exceptions.
13. Replace the last entry in *definition*'s construction stack with an *already constructed* marker.
14. Return *element*.

Note

*This step is normally reached when upgrading a custom element; the existing element is returned, so that the `super()` call inside the custom element constructor assigns that existing element to **this**.*

In addition to the constructor behavior implied by `[HTMLConstructor]`, some elements also have named constructors (which are really factory functions with a modified `prototype` property).

Example

Named constructors for HTML elements can also be used in an `extends` clause when defining a custom element constructor:

```
class AutoEmbiggenedImage extends Image {
  constructor(width, height) {
    super(width * 10, height * 10);
  }
}

customElements.define("auto-embiggened", AutoEmbiggenedImage, { extends: "img" });

const image = new AutoEmbiggenedImage(15, 20);
console.assert(image.width === 150);
console.assert(image.height === 200);
```

3.2.4 Element definitions §

Each element in this specification has a definition that includes the following information:

Categories

A list of categories to which the element belongs. These are used when defining the content models for each element.

Contexts in which this element can be used

A *non-normative* description of where the element can be used. This information is redundant with the content models of elements that allow this one as a child, and is provided only as a convenience.

Note

For simplicity, only the most specific expectations are listed. For example, an element that is both flow content and phrasing content can be used anywhere that either flow content or phrasing content is expected, but since anywhere that flow content is expected, phrasing content is also expected (since all phrasing content is flow content), only "where phrasing content is expected" will be listed.

Content model

A normative description of what content must be included as children and descendants of the element.

Tag omission in text/html

A *non-normative* description of whether, in the `text/html` syntax, the start and end tags can be omitted. This information is redundant with the normative requirements given in the optional tags section, and is provided in the element definitions only as a convenience.

Content attributes

A normative list of attributes that may be specified on the element (except where otherwise disallowed), along with non-normative descriptions of those attributes. (The content to the left of the dash is normative, the content to the right of the dash is not.)

DOM interface

A normative definition of a DOM interface that such elements must implement.

This is then followed by a description of what the element represents, along with any additional normative conformance criteria that may apply to authors and implementations. Examples are sometimes also included.

3.2.4.1 Attributes §

An attribute value is a string. Except where otherwise specified, attribute values on HTML elements may be any string value, including the empty string, and there is no restriction on what text can be specified in such attribute values.

3.2.5 Content models §

Each element defined in this specification has a content model: a description of the element's expected contents. An HTML element must have contents that match the requirements described in the element's content model. The **contents** of an element are its children in the DOM.

ASCII whitespace is always allowed between elements. User agents represent these characters between elements in the source markup as `Text` nodes in the DOM. Empty `Text` nodes and `Text` nodes consisting of just sequences of those characters are considered **inter-element whitespace**.

Inter-element whitespace, comment nodes, and processing instruction nodes must be ignored when establishing whether an element's contents match the element's content model or not, and must be ignored when following algorithms that define document and element semantics.

Note

Thus, an element A *is said to be* preceded or followed *by a second element* B *if* A *and* B *have the same parent node and there are no other element nodes or `Text` nodes (other than inter-element whitespace) between them. Similarly, a node is the* only child *of an element if that element contains no other nodes other than inter-element whitespace, comment nodes, and processing instruction nodes.*

Authors must not use HTML elements anywhere except where they are explicitly allowed, as defined for each element, or as explicitly required by other specifications. For XML compound documents, these contexts could be inside elements from other namespaces, if those elements are defined as providing the relevant contexts.

Example

For example, the Atom specification defines a `content` element. When its `type` attribute has the value `xhtml`, the Atom specification requires that it contain a single HTML `div` element. Thus, a `div` element is allowed in that context, even though this is not explicitly normatively stated by this specification. [ATOM]

In addition, HTML elements may be orphan nodes (i.e. without a parent node).

Example

For example, creating a `td` element and storing it in a global variable in a script is conforming, even though `td` elements are otherwise only supposed to be used inside `tr` elements.

```
var data = {
  name: "Banana",
  cell: document.createElement('td'),
};
```

3.2.5.1 The "nothing" content model §

When an element's content model is **nothing**, the element must contain no `Text` nodes (other than inter-element whitespace) and no element nodes.

Note

Most HTML elements whose content model is "nothing" are also, for convenience, void elements (elements that have no end tag in the HTML syntax). However, these are entirely separate concepts.

3.2.5.2 Kinds of content §

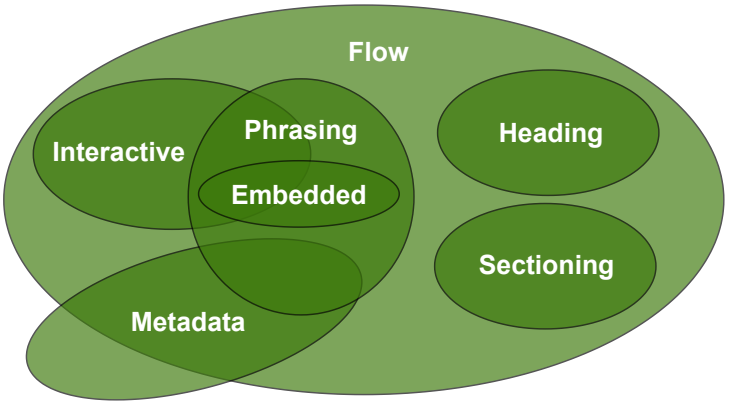
Each element in HTML falls into zero or more **categories** that group elements with similar characteristics together. The following broad categories are used in this specification:

- Metadata content
- Flow content
- Sectioning content
- Heading content
- Phrasing content
- Embedded content
- Interactive content

Note

Some elements also fall into other categories, which are defined in other parts of this specification.

These categories are related as follows:



Sectioning content, heading content, phrasing content, embedded content, and interactive content are all types of flow content. Metadata is sometimes flow content. Metadata and interactive content are sometimes phrasing content. Embedded content is also a type of phrasing content, and sometimes is interactive content.

Other categories are also used for specific purposes, e.g. form controls are specified using a number of categories to define common requirements. Some elements have unique requirements and do not fit into any particular category.

3.2.5.2.1 Metadata content §

Metadata content is content that sets up the presentation or behavior of the rest of the content, or that sets up the relationship of the document with other documents, or that conveys other "out of band" information.

⇒ base, link, meta, noscript, script, style, template, title

Elements from other namespaces whose semantics are primarily metadata-related (e.g. RDF) are also metadata content.

Example

Thus, in the XML serialization, one can use RDF, like this:

```
<html xmlns="http://www.w3.org/1999/xhtml"
      xmlns:r="http://www.w3.org/1999/02/22-rdf-syntax-ns#" xml:lang="en">
 <head>
  <title>Hedral's Home Page</title>
  <r:RDF>
   <Person xmlns="http://www.w3.org/2000/10/swap/pim/contact#"
           r:about="https://hedral.example.com/#">
    <fullName>Cat Hedral</fullName>
    <mailbox r:resource="mailto:hedral@damowmow.com"/>
    <personalTitle>Sir</personalTitle>
   </Person>
  </r:RDF>
 </head>
 <body>
  <h1>My home page</h1>
  <p>I like playing with string, I guess. Sister says squirrels are fun
  too so sometimes I follow her to play with them.</p>
 </body>
</html>
```

This isn't possible in the HTML serialization, however.

3.2.5.2.2 Flow content §

Most elements that are used in the body of documents and applications are categorized as **flow content**.

⇒ a, abbr, address, area (if it is a descendant of a map element), article, aside, audio, b, bdi, bdo, blockquote, br, button, canvas, cite, code, data, datalist, del, details, dfn, dialog, div, dl, em, embed, fieldset, figure, footer, form, h1, h2, h3, h4, h5, h6, header, hgroup, hr, i, iframe, img, input, ins, kbd, label, link (if it is allowed in the body), main (if it is a hierarchically correct main element), map, mark, MathML math, menu, meta (if the itemprop attribute is present), meter, nav, noscript, object, ol, output, p, picture, pre, progress, q, ruby, s, samp, script, section, select, slot, small, span, strong, sub, sup, SVG svg, table, template, textarea, time, u, ul, var, video, wbr, autonomous custom elements, text

3.2.5.2.3 Sectioning content §

Sectioning content is content that defines the scope of headings and footers.

⇒ article, aside, nav, section

Each sectioning content element potentially has a heading and an outline. See the section on headings and sections for further details.

Note

There are also certain elements that are sectioning roots. These are distinct from sectioning content, but they can also have an outline.

3.2.5.2.4 Heading content §

Heading content defines the header of a section (whether explicitly marked up using sectioning content elements, or implied by the heading content itself).

⇒ h1, h2, h3, h4, h5, h6, hgroup

3.2.5.2.5 Phrasing content §

Phrasing content is the text of the document, as well as elements that mark up that text at the intra-paragraph level. Runs of phrasing content form paragraphs.

⇒ a, abbr, area (if it is a descendant of a map element), audio, b, bdi, bdo, br, button, canvas, cite, code, data, datalist, del, dfn, em, embed, i, iframe, img, input, ins, kbd, label, link (if it is allowed in the body), map, mark, MathML math, meta (if the itemprop attribute is present), meter, noscript, object, output, picture, progress, q, ruby, s, samp, script, select, slot, small, span, strong, sub, sup, SVG svg, template, textarea, time, u, var, video, wbr, autonomous custom elements, text

Note

Most elements that are categorized as phrasing content can only contain elements that are themselves categorized as phrasing content, not any flow content.

Text, in the context of content models, means either nothing, or Text nodes. Text is sometimes used as a content model on its own, but is also phrasing content, and can be inter-element whitespace (if the Text nodes are empty or contain just ASCII whitespace).

Text nodes and attribute values must consist of scalar values, excluding noncharacters, and controls other than ASCII whitespace. This specification includes extra constraints on the exact value of Text nodes and attribute values depending on their precise context.

3.2.5.2.6 Embedded content §

Embedded content is content that imports another resource into the document, or content from another vocabulary that is inserted into the document.

⇒ audio, canvas, embed, iframe, img, MathML math, object, picture, SVG svg, video

Elements that are from namespaces other than the HTML namespace and that convey content but not metadata, are embedded content for the purposes of the content models defined in this specification. (For example, MathML, or SVG.)

Some embedded content elements can have **fallback content**: content that is to be used when the external resource cannot be used (e.g. because it is of an unsupported format). The element definitions state what the fallback is, if any.

3.2.5.2.7 Interactive content §

Interactive content is content that is specifically intended for user interaction.

⇒ a (if the href attribute is present), audio (if the controls attribute is present), button, details, embed, iframe, img (if the usemap attribute is present), input (if the type attribute is *not* in the Hidden state), label, object (if the usemap attribute is present), select, textarea, video (if the controls attribute is present)

The tabindex attribute can also make any element into interactive content.

3.2.5.2.8 Palpable content §

As a general rule, elements whose content model allows any flow content or phrasing content should have at least one node in its contents that is **palpable content** and that does not have the hidden attribute specified.

Note

Palpable content makes an element non-empty by providing either some descendant non-empty text, or else something users can hear (audio elements) or view (video or img or canvas elements) or otherwise interact with (for example, interactive form controls).

This requirement is not a hard requirement, however, as there are many cases where an element can be empty legitimately, for example when it is used as a placeholder which will later be filled in by a script, or when the element is part of a template and would on most pages be filled in but on some pages is not relevant.

Conformance checkers are encouraged to provide a mechanism for authors to find elements that fail to fulfill this requirement, as an authoring aid.

The following elements are palpable content:

⇒ a, abbr, address, article, aside, audio (if the controls attribute is present), b, bdi, bdo, blockquote, button, canvas, cite, code, data, details, dfn, div, dl (if the element's children include at least one name-value group), em, embed, fieldset, figure, footer, form, h1, h2, h3, h4, h5, h6, header, hgroup, i, iframe, img, input (if the type attribute is *not* in the Hidden state), ins, kbd, label, main, map, mark, MathML math, menu (if the element's children include at least one li element), meter, nav, object, ol (if the element's children include at least one li element), output, p, pre, progress, q, ruby, s, samp, section, select, small, span, strong, sub, sup, SVG svg, table, textarea, time, u, ul (if the element's children include at least one li element), var, video, autonomous custom elements, text that is not inter-element whitespace

3.2.5.2.9 Script-supporting elements §

Script-supporting elements are those that do not represent anything themselves (i.e. they are not rendered), but are used to support scripts, e.g. to provide functionality for the user.

The following elements are script-supporting elements:

⇒ script, template

3.2.5.3 Transparent content models §

Some elements are described as **transparent**; they have "transparent" in the description of their content model. The content model of a transparent element is derived from the content model of its parent element: the elements required in the part of the content model that is "transparent" are the same elements as required in the part of the content model of the parent of the transparent element in which the transparent element finds itself.

Example

For instance, an ins element inside a ruby element cannot contain an rt element, because the part of the ruby element's content model that allows ins elements is the part that allows phrasing content, and the rt element is not phrasing content.

Note

In some cases, where transparent elements are nested in each other, the process has to be applied iteratively.

Example

Consider the following markup fragment:

```
<p><object><param><ins><map><a href="/">Apples</a></map></ins></object></p>
```

To check whether "Apples" is allowed inside the a element, the content models are examined. The a element's content model is transparent, as is the map element's, as is the ins element's, as is the part of the object element's in which the ins element is found. The object element is found in the p element, whose content model is phrasing content. Thus, "Apples" is allowed, as text is phrasing content.

When a transparent element has no parent, then the part of its content model that is "transparent" must instead be treated as accepting any flow content.

3.2.5.4 Paragraphs §

Note

The term paragraph as defined in this section is used for more than just the definition of the p element. The paragraph concept defined here is used to describe how to interpret documents. The p element is merely one of several ways of marking up a paragraph.

A **paragraph** is typically a run of phrasing content that forms a block of text with one or more sentences that discuss a particular topic, as in typography, but can also be used for more general thematic grouping. For instance, an address is also a paragraph, as is a part of a form, a byline, or a stanza in a poem.

Example

In the following example, there are two paragraphs in a section. There is also a heading, which contains phrasing content that is not a paragraph. Note how the comments and inter-element whitespace do not form paragraphs.

```
<section>
  <h1>Example of paragraphs</h1>
  This is the <em>first</em> paragraph in this example.
  <p>This is the second.</p>
  <!-- This is not a paragraph. -->
</section>
```

Paragraphs in flow content are defined relative to what the document looks like without the a, ins, del, and map elements complicating matters, since those elements, with their hybrid content models, can straddle paragraph boundaries, as shown in the first two examples below.

Note

Generally, having elements straddle paragraph boundaries is best avoided. Maintaining such markup can be difficult.

Example

The following example takes the markup from the earlier example and puts ins and del elements around some of the markup to show that the text was changed (though in this case, the changes admittedly don't make much sense). Notice how this example has exactly the same paragraphs as the previous one, despite the ins and del elements — the ins element straddles the heading and the first paragraph, and the del element straddles the boundary between the two paragraphs.

```
<section>
  <ins><h1>Example of paragraphs</h1>
  This is the <em>first</em> paragraph in</ins> this example<del>.
  <p>This is the second.</p></del>
  <!-- This is not a paragraph. -->
</section>
```

Let *view* be a view of the DOM that replaces all a, ins, del, and map elements in the document with their contents. Then, in *view*, for each run of sibling phrasing content nodes uninterrupted by other types of content, in an element that accepts content other than phrasing content as well as phrasing content, let *first* be the first node of the run, and let *last* be the last node of the run. For each such run that consists of at least one node that is neither embedded content nor inter-element whitespace, a paragraph exists in the original DOM from immediately before *first* to immediately after *last*. (Paragraphs can thus span across a, ins, del, and map elements.)

Conformance checkers may warn authors of cases where they have paragraphs that overlap each other (this can happen with object, video, audio, and canvas elements, and indirectly through elements in other namespaces that allow HTML to be further embedded therein, like SVG svg or MathML math).

A paragraph is also formed explicitly by p elements.

Note

The p element can be used to wrap individual paragraphs when there would otherwise not be any content other than phrasing content to separate the paragraphs from each other.

Example

In the following example, the link spans half of the first paragraph, all of the heading separating the two paragraphs, and half of the second paragraph. It straddles the paragraphs and the heading.

```
<header>
 Welcome!
 <a href="about.html">
  This is home of...
  <h1>The Falcons!</h1>
  The Lockheed Martin multirole jet fighter aircraft!
 </a>
 This page discusses the F-16 Fighting Falcon's innermost secrets.
</header>
```

Here is another way of marking this up, this time showing the paragraphs explicitly, and splitting the one link element into three:

```
<header>
 <p>Welcome! <a href="about.html">This is home of...</a></p>
 <h1><a href="about.html">The Falcons!</a></h1>
 <p><a href="about.html">The Lockheed Martin multirole jet
 fighter aircraft!</a> This page discusses the F-16 Fighting
 Falcon's innermost secrets.</p>
</header>
```

Example

It is possible for paragraphs to overlap when using certain elements that define fallback content. For example, in the following section:

```
<section>
 <h1>My Cats</h1>
 You can play with my cat simulator.
 <object data="cats.sim">
  imulator, use one of the following links:
```

```
  <ul>
   <li><a href="cats.sim">Download simulator file</a>
   <li><a href="https://sims.example.com/watch?v=LYds5xY4INU">Use online simulator</a>
  </ul>
  Alternatively, upgrade to the Mellblom Browser.
 </object>
 I'm quite proud of it.
</section>
```

There are five paragraphs:

1. The paragraph that says "You can play with my cat simulator. *object* I'm quite proud of it.", where *object* is the `object` element.
2. The paragraph that says "To see the cat simulator, use one of the following links:".
3. The paragraph that says "Download simulator file".
4. The paragraph that says "Use online simulator".
5. The paragraph that says "Alternatively, upgrade to the Mellblom Browser.".

The first paragraph is overlapped by the other four. A user agent that supports the "cats.sim" resource will only show the first one, but a user agent that shows the fallback will confusingly show the first sentence of the first paragraph as if it was in the same paragraph as the second one, and will show the last paragraph as if it was at the start of the second sentence of the first paragraph.

To avoid this confusion, explicit `p` elements can be used. For example:

```
<section>
 <h1>My Cats</h1>
 <p>You can play with my cat simulator.</p>
 <object data="cats.sim">
  <p>To see the cat simulator, use one of the following links:</p>
  <ul>
   <li><a href="cats.sim">Download simulator file</a>
   <li><a href="https://sims.example.com/watch?v=LYds5xY4INU">Use online simulator</a>
  </ul>
  <p>Alternatively, upgrade to the Mellblom Browser.</p>
 </object>
 <p>I'm quite proud of it.</p>
</section>
```

3.2.6 Global attributes §

The following attributes are common to and may be specified on all HTML elements (even those not defined in this specification):

- `accesskey`
- `autocapitalize`
- `contenteditable`
- `dir`
- `draggable`
- `enterkeyhint`
- `hidden`
- `inputmode`
- `is`
- `itemid`
- `itemprop`
- `itemref`
- `itemscope`
- `itemtype`
- `lang`
- `nonce`
- `spellcheck`
- `style`
- `tabindex`
- `title`
- `translate`

These attributes are only defined by this specification as attributes for HTML elements. When this specification refers to elements having these attributes, elements from namespaces that are not defined as having these attributes must not be considered as being elements with these attributes.

Example

For example, in the following XML fragment, the "`bogus`" element does not have a `dir` attribute as defined in this specification, despite having an attribute with the literal name "`dir`". Thus, the directionality of the inner-most `span` element is '`rtl`', inherited from the `div` element indirectly through the "`bogus`" element.

```
<div xmlns="http://www.w3.org/1999/xhtml" dir="rtl">
 <bogus xmlns="https://example.net/ns" dir="ltr">
  <span xmlns="http://www.w3.org/1999/xhtml">
  </span>
 </bogus>
</div>
```

The WHATWG DOM standard defines the user agent requirements for the `class`, `id`, and `slot` attributes for any element in any namespace. [DOM]

The `class`, `id`, and `slot` attributes may be specified on all HTML elements.

When specified on HTML elements, the `class` attribute must have a value that is a set of space-separated tokens representing the various classes that the element belongs to.

Note

Assigning classes to an element affects class matching in selectors in CSS, the `getElementsByClassName()` method in the DOM, and other such features.

There are no additional restrictions on the tokens authors can use in the `class` attribute, but authors are encouraged to use values that describe the nature of the content, rather than values that describe the desired presentation of the content.

When specified on HTML elements, the `id` attribute value must be unique amongst all the IDs in the element's tree and must contain at least one character. The value must not contain any ASCII whitespace.

Note

The `id` attribute specifies its element's unique identifier (ID).

There are no other restrictions on what form an ID can take; in particular, IDs can consist of just digits, start with a digit, start with an underscore, consist of just punctuation, etc.

An element's unique identifier can be used for a variety of purposes, most notably as a way to link to specific parts of a document using fragments, as a way to target an element when scripting, and as a way to style a specific element from CSS.

Identifiers are opaque strings. Particular meanings should not be derived from the value of the `id` attribute.

There are no conformance requirements for the `slot` attribute specific to HTML elements.

Note

The `slot` attribute is used to assign a slot to an element: an element with a `slot` attribute is assigned to the slot created by the `slot` element whose name attribute's value matches that `slot` attribute's value — but only if that `slot` element finds itself in the shadow tree whose root's host has the corresponding `slot` attribute value.

To enable assistive technology products to expose a more fine-grained interface than is otherwise possible with HTML elements and attributes, a set of annotations for assistive technology products can be specified (the ARIA `role` and `aria-*` attributes). [ARIA]

The following event handler content attributes may be specified on any HTML element:

- `onabort`
- `onauxclick`
- `onblur`*
- `oncancel`
- `oncanplay`
- `oncanplaythrough`
- `onchange`
- `onclick`
- `onclose`
- `oncontextmenu`
- `oncuechange`
- `ondblclick`
- `ondrag`
- `ondragend`
- `ondragenter`
- `ondragexit`
- `ondragleave`
- `ondragover`
- `ondragstart`
- `ondrop`
- `ondurationchange`
- `onemptied`
- `onended`
- `onerror`*
- `onfocus`*
- `oninput`
- `oninvalid`
- `onkeydown`
- `onkeypress`
- `onkeyup`
- `onload`*
- `onloadeddata`
- `onloadedmetadata`
- `onloadend`
- `onloadstart`
- `onmousedown`
- `onmouseenter`
- `onmouseleave`
- `onmousemove`
- `onmouseout`
- `onmouseover`
- `onmouseup`
- `onwheel`
- `onpause`
- `onplay`
- `onplaying`
- `onprogress`
- `onratechange`
- `onreset`
- `onresize`*
- `onscroll`*
- `onsecuritypolicyviolation`
- `onseeked`
- `onseeking`
- `onselect`
- `onstalled`
- `onsubmit`
- `onsuspend`
- `ontimeupdate`
- `ontoggle`
- `onvolumechange`
- `onwaiting`

Note

The attributes marked with an asterisk have a different meaning when specified on `body` elements as those elements expose event handlers of the `Window` object with the same names.

Note

While these attributes apply to all elements, they are not useful on all elements. For example, only media elements will ever receive a `volumechange` event fired by the user agent.

Custom data attributes (e.g. `data-foldername` or `data-msgid`) can be specified on any HTML element, to store custom data, state, annotations, and similar, specific to the page.

In HTML documents, elements in the HTML namespace may have an `xmlns` attribute specified, if, and only if, it has the exact value "`http://www.w3.org/1999/xhtml`". This does not apply to XML documents.

Note

In HTML, the `xmlns` attribute has absolutely no effect. It is basically a talisman. It is allowed merely to make migration to and from XML mildly easier. When parsed by an HTML parser, the attribute ends up in no namespace, not the "`http://www.w3.org/2000/xmlns/`" namespace like namespace declaration attributes in XML do.

Note

In XML, an `xmlns` attribute is part of the namespace declaration mechanism, and an element cannot actually have an `xmlns` attribute in no namespace specified.

The XML specification also allows the use of the `xml:space` attribute in the XML namespace on any element in an XML document. This attribute has no effect on HTML elements, as the default behavior in HTML is to preserve whitespace. [XML]

Note

There is no way to serialize the `xml:space` attribute on HTML elements in the `text/html` syntax.

3.2.6.1 The `title` attribute §

The **`title`** attribute represents advisory information for the element, such as would be appropriate for a tooltip. On a link, this could be the title or a description of the target resource; on an image, it could be the image credit or a description of the image; on a paragraph, it could be a footnote or commentary on the text; on a citation, it could be further information about the source; on interactive content, it could be a label for, or instructions for, use of the element; and so forth. The value is text.

Note

Relying on the `title` attribute is currently discouraged as many user agents do not expose the attribute in an accessible manner as required by this specification (e.g., requiring a pointing device such as a mouse to cause a tooltip to appear, which excludes keyboard-only users and touch-only users, such as anyone with a modern phone or tablet).

If this attribute is omitted from an element, then it implies that the `title` attribute of the nearest ancestor HTML element with a `title` attribute set is also relevant to this element. Setting the attribute overrides this, explicitly stating that the advisory information of any ancestors is not relevant to this element. Setting the attribute to the empty string indicates that the element has no advisory information.

If the `title` attribute's value contains U+000A LINE FEED (LF) characters, the content is split into multiple lines. Each U+000A LINE FEED (LF) character represents a line break.

Example

Caution is advised with respect to the use of newlines in `title` attributes.

For instance, the following snippet actually defines an abbreviation's expansion *with a line break in it*:

```
<p>My logs show that there was some interest in <abbr title="Hypertext
Transport Protocol">HTTP</abbr> today.</p>
```

Some elements, such as `link`, `abbr`, and `input`, define additional semantics for the `title` attribute beyond the semantics described above.

The **advisory information** of an element is the value that the following algorithm returns, with the algorithm being aborted once a value is returned. When the algorithm returns the empty string, then there is no advisory information.

1. If the element has a `title` attribute, then return its value.
2. If the element has a parent element, then return the parent element's advisory information.
3. Return the empty string.

User agents should inform the user when elements have advisory information, otherwise the information would not be discoverable.

The **`title`** IDL attribute must reflect the `title` content attribute.

3.2.6.2 The `lang` and `xml:lang` attributes §

The **`lang`** attribute (in no namespace) specifies the primary language for the element's contents and for any of the element's attributes that contain text. Its value must be a valid BCP 47 language tag, or the empty string. Setting the attribute to the empty string indicates that the primary language is unknown. [BCP47]

The **`lang`** attribute in the XML namespace is defined in XML. [XML]

If these attributes are omitted from an element, then the language of this element is the same as the language of its parent element, if any.

The `lang` attribute in no namespace may be used on any HTML element.

The `lang` attribute in the XML namespace may be used on HTML elements in XML documents, as well as elements in other namespaces if the relevant specifications allow it (in particular, MathML and SVG allow `lang` attributes in the XML namespace to be specified on their elements). If both the `lang` attribute in no namespace and the `lang` attribute in the XML namespace are specified on the same element, they must have exactly the same value when compared in an ASCII case-insensitive manner.

Authors must not use the `lang` attribute in the XML namespace on HTML elements in HTML documents. To ease migration to and from XML, authors may specify an attribute in no namespace with no prefix and with the literal localname "`xml:lang`" on HTML elements in HTML documents, but such attributes must only be specified if a `lang` attribute in no namespace is also specified, and both attributes must have the

an ASCII case-insensitive manner.

Note

The attribute in no namespace with no prefix and with the literal localname "`xml:Lang`" has no effect on language processing.

To determine the **language** of a node, user agents must look at the nearest ancestor element (including the element itself if the node is an element) that has a `lang` attribute in the XML namespace set or is an HTML element and has a `lang` in no namespace attribute set. That attribute specifies the language of the node (regardless of its value).

If both the `lang` attribute in no namespace and the `lang` attribute in the XML namespace are set on an element, user agents must use the `lang` attribute in the XML namespace, and the `lang` attribute in no namespace must be ignored for the purposes of determining the element's language.

If node's inclusive ancestors do not have either attribute set, but there is a pragma-set default language set, then that is the language of the node. If there is no pragma-set default language set, then language information from a higher-level protocol (such as HTTP), if any, must be used as the final fallback language instead. In the absence of any such language information, and in cases where the higher-level protocol reports multiple languages, the language of the node is unknown, and the corresponding language tag is the empty string.

If the resulting value is not a recognized language tag, then it must be treated as an unknown language having the given language tag, distinct from all other languages. For the purposes of round-tripping or communicating with other services that expect language tags, user agents should pass unknown language tags through unmodified, and tagged as being BCP 47 language tags, so that subsequent services do not interpret the data as another type of language description. [BCP47]

Example

Thus, for instance, an element with `lang="xyzzy"` would be matched by the selector `:lang(xyzzy)` (e.g. in CSS), but it would not be matched by `:lang(abcde)`, even though both are equally invalid. Similarly, if a Web browser and screen reader working in unison communicated about the language of the element, the browser would tell the screen reader that the language was "xyzzy", even if it knew it was invalid, just in case the screen reader actually supported a language with that tag after all. Even if the screen reader supported both BCP 47 and another syntax for encoding language names, and in that other syntax the string "xyzzy" was a way to denote the Belarusian language, it would be *incorrect* for the screen reader to then start treating text as Belarusian, because "xyzzy" is not how Belarusian is described in BCP 47 codes (BCP 47 uses the code "be" for Belarusian).

If the resulting value is the empty string, then it must be interpreted as meaning that the language of the node is explicitly unknown.

User agents may use the element's language to determine proper processing or rendering (e.g. in the selection of appropriate fonts or pronunciations, for dictionary selection, or for the user interfaces of form controls such as date pickers).

The **`lang`** IDL attribute must reflect the `lang` content attribute in no namespace.

3.2.6.3 The `translate` attribute §

The **`translate`** attribute is an enumerated attribute that is used to specify whether an element's attribute values and the values of its `Text` node children are to be translated when the page is localized, or whether to leave them unchanged.

The attribute's keywords are the empty string, `yes`, and `no`. The empty string and the `yes` keyword map to the *yes* state. The `no` keyword maps to the *no* state. In addition, there is a third state, the *inherit* state, which is the *missing value default* and the *invalid value default*.

Each element (even non-HTML elements) has a **translation mode**, which is in either the translate-enabled state or the no-translate state. If an HTML element's `translate` attribute is in the *yes* state, then the element's translation mode is in the translate-enabled state; otherwise, if the element's `translate` attribute is in the *no* state, then the element's translation mode is in the no-translate state. Otherwise, either the element's `translate` attribute is in the *inherit* state, or the element is not an HTML element and thus does not have a `translate` attribute; in either case, the element's translation mode is in the same state as its parent element's, if any, or in the translate-enabled state, if the element is a document element.

When an element is in the **translate-enabled** state, the element's translatable attributes and the values of its `Text` node children are to be translated when the page is localized.

When an element is in the **no-translate** state, the element's attribute values and the values of its `Text` node children are to be left as-is when the page is localized, e.g. because the element contains a person's name or a name of a computer program.

The following attributes are **translatable attributes**:

- `abbr` on `th` elements
- `alt` on `area`, `img`, and `input` elements
- `content` on `meta` elements, if the `name` attribute specifies a metadata name whose value is known to be translatable
- `download` on `a` and `area` elements
- `label` on `optgroup`, `option`, and `track` elements
- `lang` on HTML elements; must be "translated" to match the language used in the translation
- `placeholder` on `input` and `textarea` elements
- `srcdoc` on `iframe` elements; must be parsed and recursively processed
- `style` on HTML elements; must be parsed and recursively processed (e.g. for the values of 'content' properties)
- `title` on all HTML elements
- `value` on `input` elements with a `type` attribute in the Button state or the Reset Button state

Other specifications may define other attributes that are also translatable attributes. For example, ARIA would define the `aria-label` attribute as translatable.

The **`translate`** IDL attribute must, on getting, return true if the element's translation mode is translate-enabled, and false otherwise. On setting, it must set the content attribute's value to "`yes`" if the new value is true, and set the content attribute's value to "`no`" otherwise.

Example

In this example, everything in the document is to be translated when the page is localized, except the sample keyboard input and sample program output:

```
<!DOCTYPE HTML>
<html lang=en> <!-- default on the document element is translate=yes -->
 <head>
  <title>The Bee Game</title> <!-- implied translate=yes inherited from ancestors -->
```

```
  </head>
  <body>
   <p>The Bee Game is a text adventure game in English.</p>
   <p>When the game launches, the first thing you should do is type
   <kbd translate=no>eat honey</kbd>. The game will respond with:</p>
   <pre><samp translate=no>Yum yum! That was some good honey!</samp></pre>
  </body>
 </html>
```

3.2.6.4 The `dir` attribute §

The `dir` attribute specifies the element's text directionality. The attribute is an enumerated attribute with the following keywords and states:

The `ltr` keyword, which maps to the *ltr* state
Indicates that the contents of the element are explicitly directionally isolated left-to-right text.

The `rtl` keyword, which maps to the *rtl* state
Indicates that the contents of the element are explicitly directionally isolated right-to-left text.

The `auto` keyword, which maps to the *auto* state
Indicates that the contents of the element are explicitly directionally isolated text, but that the direction is to be determined programmatically using the contents of the element (as described below).

Note

The heuristic used by this state is very crude (it just looks at the first character with a strong directionality, in a manner analogous to the Paragraph Level determination in the bidirectional algorithm). Authors are urged to only use this value as a last resort when the direction of the text is truly unknown and no better server-side heuristic can be applied. [BIDI]

Note

For `textarea` and `pre` elements, the heuristic is applied on a per-paragraph level.

The attribute has no *invalid value default* and no *missing value default*.

The directionality of an element (any element, not just an HTML element) is either '**ltr**' or '**rtl**', and is determined as per the first appropriate set of steps from the following list:

↪ **If the element's `dir` attribute is in the ltr state**

↪ **If the element is a document element and the `dir` attribute is not in a defined state (i.e. it is not present or has an invalid value)**

↪ **If the element is an `input` element whose `type` attribute is in the Telephone state, and the `dir` attribute is not in a defined state (i.e. it is not present or has an invalid value)**
The directionality of the element is 'ltr'.

↪ **If the element's `dir` attribute is in the rtl state**
The directionality of the element is 'rtl'.

↪ **If the element is an `input` element whose `type` attribute is in the Text, Search, Telephone, URL, or E-mail state, and the `dir` attribute is in the auto state**

↪ **If the element is a `textarea` element and the `dir` attribute is in the auto state**
If the element's value contains a character of bidirectional character type AL or R, and there is no character of bidirectional character type L anywhere before it in the element's value, then the directionality of the element is 'rtl'. [BIDI]

Otherwise, if the element's value is not the empty string, or if the element is a document element, the directionality of the element is 'ltr'.

Otherwise, the directionality of the element is the same as the element's parent element's directionality.

↪ **If the element's `dir` attribute is in the auto state**

↪ **If the element is a `bdi` element and the `dir` attribute is not in a defined state (i.e. it is not present or has an invalid value)**
Find the first character in tree order that matches the following criteria:

- The character is from a `Text` node that is a descendant of the element whose directionality is being determined.
- The character is of bidirectional character type L, AL, or R. [BIDI]
- The character is not in a `Text` node that has an ancestor element that is a descendant of the element whose directionality is being determined and that is either:
  - A `bdi` element.
  - A `script` element.
  - A `style` element.
  - A `textarea` element.
  - An element with a `dir` attribute in a defined state.

If such a character is found and it is of bidirectional character type AL or R, the directionality of the element is 'rtl'.

If such a character is found and it is of bidirectional character type L, the directionality of the element is 'ltr'.

Otherwise, if the element is a document element, the directionality of the element is 'ltr'.

Otherwise, the directionality of the element is the same as the element's parent element's directionality.

↪ **If the element has a parent element and the `dir` attribute is not in a defined state (i.e. it is not present or has an invalid value)**
The directionality of the element is the same as the element's parent element's directionality.

Note

Since the `dir` attribute is only defined for HTML elements, it cannot be present on elements from other namespaces. Thus, elements from other namespaces always just inherit their directionality from their parent element, or, if they don't have one, default to 'ltr'.

Note

File an issue about the selected text *equirements involving the bidirectional algorithm*.

The **directionality of an attribute** of an HTML element, which is used when the text of that attribute is to be included in the rendering in some manner, is determined as per the first appropriate set of steps from the following list:

↪ **If the attribute is a directionality-capable attribute and the element's `dir` attribute is in the auto state**

Find the first character (in logical order) of the attribute's value that is of bidirectional character type L, AL, or R. [BIDI]

If such a character is found and it is of bidirectional character type AL or R, the directionality of the attribute is 'rtl'.

Otherwise, the directionality of the attribute is 'ltr'.

↪ **Otherwise**

The directionality of the attribute is the same as the element's directionality.

The following attributes are **directionality-capable attributes**:

- `abbr` on `th` elements
- `alt` on `area`, `img`, and `input` elements
- `content` on `meta` elements, if the `name` attribute specifies a metadata name whose value is primarily intended to be human-readable rather than machine-readable
- `label` on `optgroup`, `option`, and `track` elements
- `placeholder` on `input` and `textarea` elements
- `title` on all HTML elements

For web developers (non-normative)

***document* . `dir` [= *value*]**

Returns the `html` element's `dir` attribute's value, if any.

Can be set, to either "`ltr`", "`rtl`", or "`auto`" to replace the `html` element's `dir` attribute's value.

If there is no `html` element, returns the empty string and ignores new values.

The `dir` IDL attribute on an element must reflect the `dir` content attribute of that element, limited to only known values.

The `dir` IDL attribute on `Document` objects must reflect the `dir` content attribute of the `html` element, if any, limited to only known values. If there is no such element, then the attribute must return the empty string and do nothing on setting.

Note

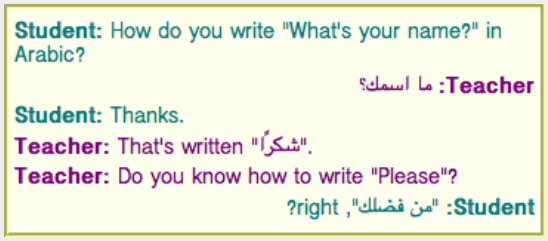
Authors are strongly encouraged to use the `dir` attribute to indicate text direction rather than using CSS, since that way their documents will continue to render correctly even in the absence of CSS (e.g. as interpreted by search engines).

Example

This markup fragment is of an IM conversation.

```
<p dir=auto class="u1"><b><bdi>Student</bdi>:</b> How do you write "What's your name?" in Arabic?</p>
<p dir=auto class="u2"><b><bdi>Teacher</bdi>:</b> ما اسمك؟</p>
<p dir=auto class="u1"><b><bdi>Student</bdi>:</b> Thanks.</p>
<p dir=auto class="u2"><b><bdi>Teacher</bdi>:</b> That's written "شكرًا".</p>
<p dir=auto class="u2"><b><bdi>Teacher</bdi>:</b> Do you know how to write "Please"?</p>
<p dir=auto class="u1"><b><bdi>Student</bdi>:</b> "من فضلك", right?</p>
```

Given a suitable style sheet and the default alignment styles for the `p` element, namely to align the text to the *start edge* of the paragraph, the resulting rendering could be as follows:



As noted earlier, the `auto` value is not a panacea. The final paragraph in this example is misinterpreted as being right-to-left text, since it begins with an Arabic character, which causes the "right?" to be to the left of the Arabic text.

3.2.6.5 The `style` attribute §

All HTML elements may have the `style` content attribute set. This is a style attribute as defined by the *CSS Style Attributes* specification. [CSSATTR]

In user agents that support CSS, the attribute's value must be parsed when the attribute is added or has its value changed, according to the rules given for style attributes. [CSSATTR]

However, if the Should element's inline behavior be blocked by Content Security Policy? algorithm returns "`Blocked`" when executed upon the attribute's element, "`style attribute`", and the attribute's value, then the style rules defined in the attribute's value must not be applied to the element. [CSP]

Documents that use `style` attributes on any of their elements must still be comprehensible and usable if those attributes were removed.

Note

In particular, using the `style` attribute to hide and show content, or to convey meaning that is otherwise not included in the document, is non-conforming. (To hide and show content, use the `hidden` attribute.)

For web developers (non-normative)

***element* . `style`**

Returns a `CSSStyleDeclaration` object for the element's `style` attribute.

The `style` IDL attribute is defined in the CSS Object Model (CSSOM) specification. [CSSOM]

Example

In the following example, the words that refer to colors are marked up using the `span` element and the `style` attribute to make those words show up in the relevant colors in visual media.

```
<p>My sweat suit is <span style="color: green; background:
transparent">green</span> and my eyes are <span style="color: blue;
background: transparent">blue</span>.</p>
```

3.2.6.6 Embedding custom non-visible data with the `data-*` attributes §

A **custom data attribute** is an attribute in no namespace whose name starts with the string "`data-`", has at least one character after the hyphen, is XML-compatible, and contains no ASCII upper alphas.

Note

All attribute names on HTML elements in HTML documents get ASCII-lowercased automatically, so the restriction on ASCII uppercase letters doesn't affect such documents.

Custom data attributes are intended to store custom data, state, annotations, and similar, private to the page or application, for which there are no more appropriate attributes or elements.

These attributes are not intended for use by software that is not known to the administrators of the site that uses the attributes. For generic extensions that are to be used by multiple independent tools, either this specification should be extended to provide the feature explicitly, or a technology like microdata should be used (with a standardized vocabulary).

Example

For instance, a site about music could annotate list items representing tracks in an album with custom data attributes containing the length of each track. This information could then be used by the site itself to allow the user to sort the list by track length, or to filter the list for tracks of certain lengths.

```
<ol>
 <li data-length="2m11s">Beyond The Sea</li>
 ...
</ol>
```

It would be inappropriate, however, for the user to use generic software not associated with that music site to search for tracks of a certain length by looking at this data.

This is because these attributes are intended for use by the site's own scripts, and are not a generic extension mechanism for publicly-usable metadata.

Example

Similarly, a page author could write markup that provides information for a translation tool that they are intending to use:

```
<p>The third <span data-mytrans-de="Anspruch">claim</span> covers the case of <span
translate="no">HTML</span> markup.</p>
```

In this example, the "`data-mytrans-de`" attribute gives specific text for the MyTrans product to use when translating the phrase "claim" to German. However, the standard `translate` attribute is used to tell it that in all languages, "HTML" is to remain unchanged. When a standard attribute is available, there is no need for a custom data attribute to be used.

Example

In this example, custom data attributes are used to store the result of a feature detection for `PaymentRequest`, which could be used in CSS to style a checkout page differently.

```
<script>
 if ('PaymentRequest' in window) {
   document.documentElement.dataset.hasPaymentRequest = '';
 }
</script>
```

Here, the `data-has-payment-request` attribute is effectively being used as a boolean attribute; it is enough to check the presence of the attribute. However, if the author so wishes, it could later be populated with some value, maybe to indicate limited functionality of the feature.

Every HTML element may have any number of custom data attributes specified, with any value.

Authors should carefully design such extensions so that when the attributes are ignored and any associated CSS dropped, the page is still usable.

User agents must not derive any implementation behavior from these attributes or values. Specifications intended for user agents must not define these attributes to have any meaningful values.

JavaScript libraries may use the custom data attributes, as they are considered to be part of the page on which they are used. Authors of libraries that are reused by many authors are encouraged to include their name in the attribute names, to reduce the risk of clashes. Where it makes sense, library authors are also encouraged to make the exact name used in the attribute names customizable, so that libraries whose

authors unknowingly picked the same name can be used on the same page, and so that multiple versions of a particular library can be used on the same page even when those versions are not mutually compatible.

Example

For example, a library called "DoQuery" could use attribute names like `data-doquery-range`, and a library called "jJo" could use attributes names like `data-jjo-range`. The jJo library could also provide an API to set which prefix to use (e.g. `J.setDataPrefix('j2')`, making the attributes have names like `data-j2-range`).

For web developers (non-normative)

***element* . dataset**

Returns a DOMStringMap object for the element's data-* attributes.

Hyphenated names become camel-cased. For example, `data-foo-bar=""` becomes `element.dataset.fooBar`.

The **dataset** IDL attribute provides convenient accessors for all the data-* attributes on an element. On getting, the dataset IDL attribute must return a DOMStringMap whose associated element is this element.

The DOMStringMap interface is used for the dataset attribute. Each DOMStringMap has an **associated element**.

IDL

```
[Exposed=Window,
 OverrideBuiltins]
interface DOMStringMap {
  getter DOMString (DOMString name);
  [CEReactions] setter void (DOMString name, DOMString value);
  [CEReactions] deleter void (DOMString name);
};
```

To **get a DOMStringMap's name-value pairs**, run the following algorithm:

1. Let *list* be an empty list of name-value pairs.
2. For each content attribute on the DOMStringMap's associated element whose first five characters are the string "`data-`" and whose remaining characters (if any) do not include any ASCII upper alphas, in the order that those attributes are listed in the element's attribute list, add a name-value pair to *list* whose name is the attribute's name with the first five characters removed and whose value is the attribute's value.
3. For each name in *list*, for each U+002D HYPHEN-MINUS character (-) in the name that is followed by an ASCII lower alpha, remove the U+002D HYPHEN-MINUS character (-) and replace the character that followed it by the same character converted to ASCII uppercase.
4. Return *list*.

The supported property names on a DOMStringMap object at any instant are the names of each pair returned from getting the DOMStringMap's name-value pairs at that instant, in the order returned.

To determine the value of a named property *name* for a DOMStringMap, return the value component of the name-value pair whose name component is *name* in the list returned from getting the DOMStringMap's name-value pairs.

To set the value of a new named property or set the value of an existing named property for a DOMStringMap, given a property name *name* and a new value *value*, run the following steps:

1. If *name* contains a U+002D HYPHEN-MINUS character (-) followed by an ASCII lower alpha, then throw a "SyntaxError" DOMException.
2. For each ASCII upper alpha in *name*, insert a U+002D HYPHEN-MINUS character (-) before the character and replace the character with the same character converted to ASCII lowercase.
3. Insert the string `data-` at the front of *name*.
4. If *name* does not match the XML Name production, throw an "InvalidCharacterError" DOMException.
5. Set an attribute value for the DOMStringMap's associated element using *name* and *value*.

To delete an existing named property *name* for a DOMStringMap, run the following steps:

1. For each ASCII upper alpha in *name*, insert a U+002D HYPHEN-MINUS character (-) before the character and replace the character with the same character converted to ASCII lowercase.
2. Insert the string `data-` at the front of *name*.
3. Remove an attribute by name given *name* and the DOMStringMap's associated element.

Note

This algorithm will only get invoked by the Web IDL specification for names that are given by the earlier algorithm for getting the DOMStringMap's name-value pairs. [WEBIDL]

Example

If a Web page wanted an element to represent a space ship, e.g. as part of a game, it would have to use the class attribute along with data-* attributes:

```
<div class="spaceship" data-ship-id="92432"
     data-weapons="laser 2" data-shields="50%"
     data-x="30" data-y="10" data-z="90">
 <button class="fire"
         onclick="spaceships[this.parentNode.dataset.shipId].fire()">
  Fire
 </button>
</div>
```

Notice how the hyphenated attribute name becomes camel-cased in the API.

Given the following fragment and elements with similar constructions:

```
<img class="tower" id="tower5" data-x="12" data-y="5"
     data-ai="robotarget" data-hp="46" data-ability="flames"
     src="towers/rocket.png" alt="Rocket Tower">
```

...one could imagine a function `splashDamage()` that takes some arguments, the first of which is the element to process:

```
function splashDamage(node, x, y, damage) {
  if (node.classList.contains('tower') && // checking the 'class' attribute
      node.dataset.x == x && // reading the 'data-x' attribute
      node.dataset.y == y) { // reading the 'data-y' attribute
    var hp = parseInt(node.dataset.hp); // reading the 'data-hp' attribute
    hp = hp - damage;
    if (hp < 0) {
      hp = 0;
      node.dataset.ai = 'dead'; // setting the 'data-ai' attribute
      delete node.dataset.ability; // removing the 'data-ability' attribute
    }
    node.dataset.hp = hp; // setting the 'data-hp' attribute
  }
}
```

3.2.7 The `innerText` IDL attribute §

For web developers (non-normative)

***element* . `innerText` [= *value*]**

Returns the element's text content "as rendered".

Can be set, to replace the element's children with the given value, but with line breaks converted to `br` elements.

On getting, the `innerText` attribute must follow these steps:

1. If this element is not being rendered, or if the user agent is a non-CSS user agent, then return the same value as the `textContent` IDL attribute on this element.

   Note

   This step can produce surprising results, as when the `innerText` attribute is accessed on an element not being rendered, its text contents are returned, but when accessed on an element that is being rendered, all of its children that are not being rendered have their text contents ignored.

2. Let *results* be the list resulting in running the inner text collection steps with this element. Each item in *results* will either be a JavaScript string or a positive integer (a *required line break count*).

   Note

   Intuitively, a required line break count *item means that a certain number of line breaks appear at that point, but they can be collapsed with the line breaks induced by adjacent* required line break count *items, reminiscent to CSS margin-collapsing.*

3. Remove any items from *results* that are the empty string.

4. Remove any runs of consecutive *required line break count* items at the start or end of *results*.

5. Replace each remaining run of consecutive *required line break count* items with a string consisting of as many U+000A LINE FEED (LF) characters as the maximum of the values in the *required line break count* items.

6. Return the concatenation of the string items in *results*.

The **inner text collection steps**, given a node *node*, are as follows:

1. Let *items* be the result of running the inner text collection steps with each child node of *node* in tree order, and then concatenating the results to a single list.

2. If *node*'s computed value of 'visibility' is not 'visible', then return *items*.

3. If *node* is not being rendered, then return *items*. For the purpose of this step, the following elements must act as described if the computed value of the 'display' property is not 'none':

   - `select` elements have an associated non-replaced inline CSS box whose child boxes include only those of `optgroup` and `option` element child nodes;
   - `optgroup` elements have an associated non-replaced block-level CSS box whose child boxes include only those of `option` element child nodes; and
   - `option` element have an associated non-replaced block-level CSS box whose child boxes are as normal for non-replaced block-level CSS boxes.

   Note

   items *can be non-empty due to 'display:contents'.*

4. If *node* is a `Text` node, then for each CSS text box produced by *node*, in content order, compute the text of the box after application of the CSS 'white-space' processing rules and 'text-transform' rules, set *items* to the list of the resulting strings, and return *items*. The CSS 'white-space' processing rules are slightly modified: collapsible spaces at the end of lines are always collapsed, but they are only removed if the line is the last line of the block, or it ends with a `br` element. Soft hyphens should be preserved. [CSSTEXT]

5. If *node* is a `br` element, then append a string containing a single U+000A LINE FEED (LF) character to *items*.

6. If *node*'s computed value of 'display' is 'table-cell', and *node*'s CSS box is not the last 'table-cell' box of its enclosing 'table-row' box, then append a string containing a single U+0009 CHARACTER TABULATION (tab) character to *items*.

7. If *node*'s computed value of 'display' is 'table-row', and *node*'s CSS box is not the last 'table-row' box of the nearest ancestor 'table' box, then append a string containing a single U+000A LINE FEED (LF) character to *items*.

8. If *node* is a `p` element, then append 2 (a *required line break count*) at the beginning and end of *items*.

9. If *node*'s used value of 'display' is block-level or 'table-caption', then append 1 (a *required line break count*) at the beginning and end of *items*. [CSSDISPLAY]

Note

Floats and absolutely-positioned elements fall into this category.

10. Return *items*.

Note

Note that descendant nodes of most replaced elements (e.g., `textarea`, `input`, and `video` — but not `button`) are not rendered by CSS, strictly speaking, and therefore have no CSS boxes for the purposes of this algorithm.

This algorithm is amenable to being generalized to work on ranges. Then we can use it as the basis for `Selection`'s stringifier and maybe expose it directly on ranges. See Bugzilla bug 10583.

On setting, the `innerText` attribute must follow these steps:

1. Let *document* be this element's node document.
2. Let *fragment* be a new `DocumentFragment` object whose node document is *document*.
3. Let *input* be the given value.
4. Let *position* be a pointer into *input*, initially pointing at the start of the string.
5. Let *text* be the empty string.
6. While *position* is not past the end of *input*:
    1. Collect a sequence of code points that are not U+000A LINE FEED (LF) or U+000D CARRIAGE RETURN (CR) characters from *input* given *position*. Set *text* to the collected characters.
    2. If *text* is not the empty string, then append a new `Text` node whose data is *text* and node document is *document* to *fragment*.
    3. While *position* is not past the end of *input*, and the character at *position* is either a U+000A LINE FEED (LF) or U+000D CARRIAGE RETURN (CR) character:
        1. If the character at *position* is a U+000D CARRIAGE RETURN (CR) character and the next character is a U+000A LINE FEED (LF) character, then advance *position* to the next character in *input*.
        2. Advance *position* to the next character in *input*.
        3. Append the result of creating an element given *document*, `br`, and the HTML namespace to *fragment*.
7. Replace all with *fragment* within this element.

3.2.8 Requirements relating to the bidirectional algorithm §

3.2.8.1 Authoring conformance criteria for bidirectional-algorithm formatting characters §

Text content in HTML elements with `Text` nodes in their contents, and text in attributes of HTML elements that allow free-form text, may contain characters in the ranges U+202A to U+202E and U+2066 to U+2069 (the bidirectional-algorithm formatting characters). [BIDI]

Note

Authors are encouraged to use the `dir` attribute, the `bdo` element, and the `bdi` element, rather than maintaining the bidirectional-algorithm formatting characters manually. The bidirectional-algorithm formatting characters interact poorly with CSS.

3.2.8.2 User agent conformance criteria §

User agents must implement the Unicode bidirectional algorithm to determine the proper ordering of characters when rendering documents and parts of documents. [BIDI]

The mapping of HTML to the Unicode bidirectional algorithm must be done in one of three ways. Either the user agent must implement CSS, including in particular the CSS 'unicode-bidi', 'direction', and 'content' properties, and must have, in its user agent style sheet, the rules using those properties given in this specification's rendering section, or, alternatively, the user agent must act as if it implemented just the aforementioned properties and had a user agent style sheet that included all the aforementioned rules, but without letting style sheets specified in documents override them, or, alternatively, the user agent must implement another styling language with equivalent semantics. [CSSGC]

The following elements and attributes have requirements defined by the rendering section that, due to the requirements in this section, are requirements on all user agents (not just those that support the suggested default rendering):

- `dir` attribute
- `bdi` element
- `bdo` element
- `br` element
- `pre` element
- `textarea` element
- `wbr` element

3.2.9 Requirements related to ARIA and to platform accessibility APIs §

User agent requirements for implementing Accessibility API semantics on HTML elements are defined in *HTML Accessibility API Mappings*. [HTMLAAM]

Conformance checker requirements for checking use of ARIA `role` and `aria-*` attributes on HTML elements are defined in *ARIA in HTML*. [ARIAHTML]