Selectors Level 3

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Abstract

Selectors are patterns that match against elements in a tree, and as such form one of several technologies that can be used to select nodes in an XML document. Selectors have been optimized for use with HTML and XML, and are designed to be usable in performance-critical code.

CSS (Cascading Style Sheets) is a language for describing the rendering of HTML and XML documents on screen, on paper, in speech, etc. CSS uses Selectors for binding style properties to elements in the document.

This document describes the selectors that already exist in CSS1 [CSS1] and CSS2 [CSS21], and

further introduces new selectors for CSS3 and other languages that may need them.

Selectors define the following function:

```
expression * element → boolean
```

That is, given an element and a selector, this specification defines whether that element matches the selector.

These expressions can also be used, for instance, to select a set of elements, or a single element from a set of elements, by evaluating the expression across all the elements in a subtree. STTS (Simple Tree Transformation Sheets), a language for transforming XML trees, uses this mechanism. [STTS3]

Status of this document

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

This W3C Recommendation is identical to the 11 September 2018 Proposed Recommendation except that the status and boilerplate are updated for W3C Recommendation.

This document has been reviewed by W3C Members, by software developers, and by other W3C groups and interested parties, and is endorsed by the Director as a W3C Recommendation. It is a stable document and may be used as reference material or cited from another document. W3C's role in making the Recommendation is to draw attention to the specification and to promote its widespread deployment. This enhances the functionality and interoperability of the Web.

This document was produced by the CSS Working Group as a W3C Recommendation.

A Proposed Recommendation is a document that has been widely reviewed and is ready for implementation. W3C encourages everybody to implement this specification and return comments as GitHub issues by 11 October 2018. All issues and comments are archived, and there is also a historical archive.

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This document is governed by the 1 February 2018 W3C Process Document.

A separate test suite and implementation report is available.

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1. Introduction

Selectors Level 1 and Selectors Level 2 are defined as the subsets of selector functionality defined in the CSS1 and CSS2.1 specifications, respectively.

1.1. Dependencies

Some features of this specification are specific to CSS, or have particular limitations or rules specific to CSS. In this specification, these have been described in terms of CSS2.1. [CSS21]

1.2. Terminology

All of the text of this specification is normative except examples, notes, and sections explicitly marked as non-normative.

Additional terminology is defined in the Definitions section of [CSS21]. Examples of document source code and fragments are given in XML [XML10] or HTML [HTML401][HTML5] syntax.

1.3. Changes from CSS2

This section is non-normative.

The main differences between the selectors in CSS2 and those in Selectors are:

- the list of basic definitions (selector, group of selectors, simple selector, etc.) has been changed; in particular, what was referred to in CSS2 as a simple selector is now called a sequence of simple selectors, and the term "simple selector" is now used for the components of this sequence
- an optional namespace component is now allowed in element type selectors, the universal selector and attribute selectors
- a new combinator has been introduced
- new simple selectors including substring matching attribute selectors, and new pseudo-classes
- new pseudo-elements, and introduction of the "::" convention for pseudo-elements

- the grammar has been rewritten
- profiles to be added to specifications integrating Selectors and defining the set of selectors which is actually supported by each specification
- Selectors are now a CSS3 Module and an independent specification; other specifications can now refer to this document independently of CSS
- the specification now has its own test suite

2. Selectors

This section is non-normative, as it merely summarizes the following sections.

A Selector represents a structure. This structure can be used as a condition (e.g. in a CSS rule) that determines which elements a selector matches in the document tree, or as a flat description of the HTML or XML fragment corresponding to that structure.

Selectors may range from simple element names to rich contextual representations.

The following table summarizes the Selector syntax:

Pattern	Represents	Description	Level
*	any element	Universal selector	2
E	an element of type E	Type selector	1
E[foo]	an E element with a "foo" attribute	Attribute selectors	2
E[foo="bar"]	an E element whose "foo" attribute value is exactly equal to "bar"	Attribute selectors	2
E[foo~="bar"]	an E element whose "foo" attribute value is a list of whitespace-separated values, one of which is exactly equal to "bar"	Attribute selectors	2
E[foo^="bar"]	an E element whose "foo" attribute value begins exactly with the string "bar"	Attribute selectors	3
E[foo$="bar"]	an E element whose "foo" attribute value ends exactly with the string "bar"	Attribute selectors	3
E[foo*="bar"]	an E element whose "foo" attribute value contains the substring "bar"	Attribute selectors	3
E[foo|="en"]	an E element whose "foo" attribute has a hyphen-separated list of values beginning (from the left) with "en"	Attribute selectors	2
E:root	an E element, root of the document	Structural pseudo-classes	3

Pattern	Represents	Description	Level
E:nth-child(n)	an E element, the n-th child of its parent	Structural pseudo-classes	3
E:nth-last-child(n)	an E element, the n-th child of its parent, counting from the last one	Structural pseudo-classes	3
E:nth-of-type(n)	an E element, the n-th sibling of its type	Structural pseudo-classes	3
E:nth-last-of-type(n)	an E element, the n-th sibling of its type, counting from the last one	Structural pseudo-classes	3
E:first-child	an E element, first child of its parent	Structural pseudo-classes	2
E:last-child	an E element, last child of its parent	Structural pseudo-classes	3
E:first-of-type	an E element, first sibling of its type	Structural pseudo-classes	3
E:last-of-type	an E element, last sibling of its type	Structural pseudo-classes	3
E:only-child	an E element, only child of its parent	Structural pseudo-classes	3
E:only-of-type	an E element, only sibling of its type	Structural pseudo-classes	3
E:empty	an E element that has no children (including text nodes)	Structural pseudo-classes	3
E:link E:visited	an E element being the source anchor of a hyperlink of which the target is not yet visited (:link) or already visited (:visited)	The link pseudo-classes	1
E:active E:hover E:focus	an E element during certain user actions	The user action pseudo-classes	1 and 2
E:target	an E element being the target of the referring URI	The target pseudo-class	3
E:lang(fr)	an element of type E in language "fr" (the document language specifies how language is determined)	The :lang() pseudo-class	2
E:enabled E:disabled	a user interface element E which is enabled or disabled	The UI element states pseudo-classes	3
E:checked	a user interface element E which is checked (for instance a radio-button or checkbox)	The UI element states pseudo-classes	3

Pattern	Represents	Description	Level
E::first-line	the first formatted line of an E element	The ::first-line pseudo-element	1
E::first-letter	the first formatted letter of an E element	The ::first-letter pseudo-element	1
E::before	generated content before an E element	The ::before pseudo-element	2
E::after	generated content after an E element	The ::after pseudo-element	2
E.warning	an E element whose class is "warning" (the document language specifies how class is determined).	Class selectors	1
E#myid	an E element with ID equal to "myid".	ID selectors	1
E:not(s)	an E element that does not match simple selector s	Negation pseudo-class	3
E F	an F element descendant of an E element	Descendant combinator	1
E > F	an F element child of an E element	Child combinator	2
E + F	an F element immediately preceded by an E element	Next-sibling combinator	2
E ~ F	an F element preceded by an E element	Subsequent-sibling combinator	3

3. Case sensitivity

All Selectors syntax is case-insensitive within the ASCII range (i.e. [a-z] and [A-Z] are equivalent), except for parts that are not under the control of Selectors. The case sensitivity of document language element names, attribute names, and attribute values in selectors depends on the document language. For example, in HTML, element names are case-insensitive, but in XML, they are case-sensitive. Case sensitivity of namespace prefixes is defined in [CSS3NAMESPACE].

4. Selector syntax

A ***selector*** is a chain of one or more sequences of simple selectors separated by combinators. One pseudo-element may be appended to the last sequence of simple selectors in a selector.

A ***sequence of simple selectors*** is a chain of simple selectors that are not separated by a combinator. It always begins with a type selector or a universal selector. No other type selector or

universal selector is allowed in the sequence.

A ***simple selector*** is either a type selector, universal selector, attribute selector, class selector, ID selector, or pseudo-class.

Combinators are: whitespace, "greater-than sign" (U+003E, >), "plus sign" (U+002B, +) and "tilde" (U+007E, ~). White space may appear between a combinator and the simple selectors around it. Only the characters "space" (U+0020), "tab" (U+0009), "line feed" (U+000A), "carriage return" (U+000D), and "form feed" (U+000C) can occur in whitespace. Other space-like characters, such as "em-space" (U+2003) and "ideographic space" (U+3000), are never part of whitespace.

The elements of a document tree that are represented by a selector are the ***subjects of the selector***. A selector consisting of a single sequence of simple selectors represents any element satisfying its requirements. Prepending another sequence of simple selectors and a combinator to a sequence imposes additional matching constraints, so the subjects of a selector are always a subset of the elements represented by the last sequence of simple selectors.

An empty selector, containing no sequence of simple selectors and no pseudo-element, is an invalid selector.

Characters in Selectors can be escaped with a backslash according to the same escaping rules as CSS. [CSS21].

Certain selectors support namespace prefixes. The mechanism by which namespace prefixes are ***declared*** should be specified by the language that uses Selectors. If the language does not specify a namespace prefix declaration mechanism, then no prefixes are declared. In CSS, namespace prefixes are declared with the `@namespace` rule. [CSS3NAMESPACE]

5. Groups of selectors

A comma-separated list of selectors represents the union of all elements selected by each of the individual selectors in the list. (A comma is U+002C.) For example, in CSS when several selectors share the same declarations, they may be grouped into a comma-separated list. White space may appear before and/or after the comma.

> CSS example:
>
> In this example, we condense three rules with identical declarations into one. Thus,
>
> ```
> h1 { font-family: sans-serif }
> h2 { font-family: sans-serif }
> h3 { font-family: sans-serif }
> ```
>
> is equivalent to:
>
> ```
> h1, h2, h3 { font-family: sans-serif }
> ```

Warning: the equivalence is true in this example because all the selectors are valid selectors. If just one of these selectors were invalid, the entire group of selectors would be invalid. This would invalidate the rule for all three heading elements, whereas in the former case only one of the three individual heading rules would be invalidated.

> Invalid CSS example:
>
> ```
> h1 { font-family: sans-serif }
> h2..foo { font-family: sans-serif }
> h3 { font-family: sans-serif }
> ```
>
> is not equivalent to:
>
> ```
> h1, h2..foo, h3 { font-family: sans-serif }
> ```
>
> because the above selector (`h1, h2..foo, h3`) is entirely invalid and the entire style rule is dropped. (When the selectors are not grouped, only the rule for `h2..foo` is dropped.)

6. Simple selectors

6.1. Type selector

A ***type selector*** is the name of a document language element type written using the syntax of CSS qualified names [CSS3NAMESPACE]. A type selector represents an instance of the element type in the document tree.

> Example:
>
> The following selector represents an `h1` element in the document tree:
>
> ```
> h1
> ```

6.1.1. Type selectors and namespaces

Type selectors allow an optional namespace component: a namespace prefix that has been previously declared may be prepended to the element name separated by the namespace separator "vertical bar" (U+007C, `|`). (See, e.g., [XML-NAMES] for the use of namespaces in XML.)

The namespace component may be left empty (no prefix before the namespace separator) to indicate that the selector is only to represent elements with no namespace.

An asterisk may be used for the namespace prefix, indicating that the selector represents elements in any namespace (including elements with no namespace).

Element type selectors that have no namespace component (no namespace separator) represent elements without regard to the element's namespace (equivalent to "`*|`") unless a default namespace has been declared for namespaced selectors (e.g. in CSS, in the style sheet). If a default namespace has been declared, such selectors will represent only elements in the default namespace.

A type selector containing a namespace prefix that has not been previously declared for namespaced selectors is an invalid selector.

In a namespace-aware client, the name part of element type selectors (the part after the namespace separator, if it is present) will only match against the local part of the element's qualified name.

In summary:

`ns|E`
: elements with name E in namespace ns

`*|E`
: elements with name E in any namespace, including those without a namespace

`|E`
: elements with name E without a namespace

`E`
: if no default namespace has been declared for selectors, this is equivalent to *|E. Otherwise it is equivalent to ns|E where ns is the default namespace.

CSS examples:

```
@namespace foo url(http://www.example.com);
 foo|h1 { color: blue }  /* first rule */
 foo|* { color: yellow } /* second rule */
 |h1 { color: red }      /* ...*/
 *|h1 { color: green }
 h1 { color: green }
```

The first rule (not counting the `@namespace` at-rule) will match only `h1` elements in the "http://www.example.com" namespace.

The second rule will match all elements in the "http://www.example.com" namespace.

The third rule will match only `h1` elements with no namespace.

The fourth rule will match `h1` elements in any namespace (including those without any namespace).

The last rule is equivalent to the fourth rule because no default namespace has been defined.

6.2. Universal selector

The ***universal selector***, written as a CSS qualified name [CSS3NAMESPACE] with an asterisk (***** U+002A) as the local name, represents the qualified name of any element type. It represents any single element in the document tree in any namespace (including those without a namespace) if no default namespace has been specified for selectors. If a default namespace has been specified, see Universal selector and Namespaces below.

If a universal selector represented by * (i.e. without a namespace prefix) is not the only component of a sequence of simple selectors selectors or is immediately followed by a pseudo-element, then the * may be omitted and the universal selector's presence implied.

Examples:

- `*[hreflang|=en]` and `[hreflang|=en]` are equivalent,
- `*.warning` and `.warning` are equivalent,
- `*#myid` and `#myid` are equivalent.

> **Note:** it is recommended that the * not be omitted, because it decreases the potential confusion between, for example, `div :first-child` and `div:first-child`. Here, `div *:first-child` is more readable.

6.2.1. Universal selector and namespaces

The universal selector allows an optional namespace component. It is used as follows:

ns|*
: all elements in namespace ns

|
: all elements

|*
: all elements without a namespace

***
: if no default namespace has been specified, this is equivalent to *|*. Otherwise it is equivalent to ns|* where ns is the default namespace.

A universal selector containing a namespace prefix that has not been previously declared is an invalid selector.

6.3. Attribute selectors

Selectors allow the representation of an element's attributes. When a selector is used as an expression to match against an element, attribute selectors must be considered to match an element if that element has an attribute that matches the attribute represented by the attribute selector.

6.3.1. Attribute presence and value selectors

CSS2 introduced four attribute selectors:

[att]
: Represents an element with the `att` attribute, whatever the value of the attribute.

[att=val]
: Represents an element with the `att` attribute whose value is exactly "val".

[att~=val]
: Represents an element with the `att` attribute whose value is a whitespace-separated list of words, one of which is exactly "val". If "val" contains whitespace, it will never represent anything (since the words are *separated* by spaces). Also if "val" is the empty string, it will

never represent anything.

[att|=val]

Represents an element with the `att` attribute, its value either being exactly "val" or beginning with "val" immediately followed by "-" (U+002D). This is primarily intended to allow language subcode matches (e.g., the `hreflang` attribute on the `a` element in HTML) as described in BCP 47 ([BCP47]) or its successor. For `lang` (or `xml:lang`) language subcode matching, please see the `:lang` pseudo-class.

Attribute values must be CSS identifiers or strings. [CSS21] The case-sensitivity of attribute names and values in selectors depends on the document language.

Examples:

The following attribute selector represents an `h1` element that carries the `title` attribute, whatever its value:

```
h1[title]
```

In the following example, the selector represents a `span` element whose `class` attribute has exactly the value "example":

```
span[class="example"]
```

Multiple attribute selectors can be used to represent several attributes of an element, or several conditions on the same attribute. Here, the selector represents a `span` element whose `hello` attribute has exactly the value "Cleveland" and whose `goodbye` attribute has exactly the value "Columbus":

```
span[hello="Cleveland"][goodbye="Columbus"]
```

The following CSS rules illustrate the differences between "=" and "~=". The first selector would match, for example, an `a` element with the value "copyright copyleft copyeditor" on a `rel` attribute. The second selector would only match an `a` element with an `href` attribute having the exact value "http://www.w3.org/".

```
a[rel~="copyright"] { ... }
a[href="http://www.w3.org/"] { ... }
```

The following selector represents an `a` element whose `hreflang` attribute is exactly "fr".

```
a[hreflang=fr]
```

The following selector represents an `a` element for which the value of the `hreflang` attribute begins with "en", including "en", "en-US", and "en-scouse":

```
a[hreflang|="en"]
```

The following selectors represent a `DIALOGUE` element whenever it has one of two different values for an attribute `character`:

```
DIALOGUE[character=romeo]
DIALOGUE[character=juliet]
```

6.3.2. Substring matching attribute selectors

Three additional attribute selectors are provided for matching substrings in the value of an attribute:

`[att^=val]`
: Represents an element with the `att` attribute whose value begins with the prefix "val". If "val" is the empty string then the selector does not represent anything.

`[att$=val]`
: Represents an element with the `att` attribute whose value ends with the suffix "val". If "val" is the empty string then the selector does not represent anything.

`[att*=val]`
: Represents an element with the `att` attribute whose value contains at least one instance of the substring "val". If "val" is the empty string then the selector does not represent anything.

Attribute values must be CSS identifiers or strings. [CSS21] The case-sensitivity of attribute names in selectors depends on the document language.

> Examples:
>
> The following selector represents an HTML `object`, referencing an image:
>
> ```
> object[type^="image/"]
> ```
>
> The following selector represents an HTML anchor `a` with an `href` attribute whose value ends with ".html".
>
> ```
> a[href$=".html"]
> ```
>
> The following selector represents an HTML paragraph with a `title` attribute whose value contains the substring "hello"
>
> ```
> p[title*="hello"]
> ```

6.3.3. Attribute selectors and namespaces

The attribute name in an attribute selector is given as a CSS qualified name: a namespace prefix that has been previously declared may be prepended to the attribute name separated by the namespace separator "vertical bar" (`|`). In keeping with the Namespaces in the XML recommendation, default namespaces do not apply to attributes, therefore attribute selectors without a namespace component apply only to attributes that have no namespace (equivalent to "`|attr`"). An asterisk may be used for the namespace prefix indicating that the selector is to match all attribute names without regard to the attribute's namespace.

An attribute selector with an attribute name containing a namespace prefix that has not been previously declared is an invalid selector.

CSS examples:

```
@namespace foo "http://www.example.com";
[foo|att=val] { color: blue }
[*|att] { color: yellow }
[|att] { color: green }
[att] { color: green }
```

The first rule will match only elements with the attribute `att` in the "http://www.example.com" namespace with the value "val".

The second rule will match only elements with the attribute `att` regardless of the namespace of the attribute (including no namespace).

The last two rules are equivalent and will match only elements with the attribute `att` where the attribute is not in a namespace.

6.3.4. Default attribute values in DTDs

Attribute selectors represent attribute values in the document tree. How that document tree is constructed is outside the scope of Selectors. In some document formats default attribute values can be defined in a DTD or elsewhere, but these can only be selected by attribute selectors if they appear in the document tree. Selectors should be designed so that they work whether or not the default values are included in the document tree.

For example, a XML UA may, but is *not* required to read an "external subset" of the DTD but *is* required to look for default attribute values in the document's "internal subset." (See, e.g., [XML10] for definitions of these subsets.) Depending on the UA, a default attribute value defined in the external subset of the DTD might or might not appear in the document tree.

A UA that recognizes an XML namespace may, but is not required to use its knowledge of that namespace to treat default attribute values as if they were present in the document. (For example, an XHTML UA is not required to use its built-in knowledge of the XHTML DTD. See, e.g., [XML-NAMES] for details on namespaces in XML 1.0.)

Note: Typically, implementations choose to ignore external subsets. This corresponds to the behaviour of non-validating processors as defined by the XML specification.

Example:

Consider an element `EXAMPLE` with an attribute `radix` that has a default value of `"decimal"`. The DTD fragment might be

```
<!ATTLIST EXAMPLE radix (decimal,octal) "decimal">
```

If the style sheet contains the rules

```
EXAMPLE[radix=decimal] { /*... default property settings ...*/ }
EXAMPLE[radix=octal]   { /*... other settings...*/ }
```

the first rule might not match elements whose `radix` attribute is set by default, i.e. not set explicitly. To catch all cases, the attribute selector for the default value must be dropped:

```
EXAMPLE                { /*... default property settings ...*/ }
EXAMPLE[radix=octal]   { /*... other settings...*/ }
```

Here, because the selector `EXAMPLE[radix=octal]` is more specific than the type selector alone, the style declarations in the second rule will override those in the first for elements that have a `radix` attribute value of `"octal"`. Care has to be taken that all property declarations that are to apply only to the default case are overridden in the non-default cases' style rules.

6.4. Class selectors

Working with HTML, authors may use the "period" notation (also known as "full stop", U+002E, `.`) as an alternative to the `~=` notation when representing the `class` attribute. Thus, for HTML, `div.value` and `div[class~=value]` have the same meaning. The attribute value must immediately follow the full stop (`.`).

UAs may apply selectors using the period (.) notation in XML documents if the UA has namespace-specific knowledge that allows it to determine which attribute is the "class" attribute for the respective namespace. One such example of namespace-specific knowledge is the prose in the specification for a particular namespace (e.g. SVG 1.1 [SVG11] describes the SVG `class` attribute and how a UA should interpret it, and similarly MathML [MATHML3] describes the MathML `class` attribute.)

CSS examples:

We can assign style information to all elements with `class~="pastoral"` as follows:

```
*.pastoral { color: green }  /* all elements with class~=pastoral */
```

or just

```
.pastoral { color: green }  /* all elements with class~=pastoral */
```

The following assigns style only to H1 elements with `class~="pastoral"`:

```
H1.pastoral { color: green }  /* H1 elements with class~=pastoral */
```

Given these rules, the first `H1` instance below would not have green text, while the second would:

```
<H1>Not green</H1>
<H1 class="pastoral">Very green</H1>
```

The following rule matches any `P` element whose `class` attribute has been assigned a list of whitespace-separated values that includes both `pastoral` and `marine`:

```
p.pastoral.marine { color: green }
```

This rule matches when `class="pastoral blue aqua marine"` but does not match for `class="pastoral blue"`.

Note: Because CSS gives considerable power to the "class" attribute, authors could conceivably design their own "document language" based on elements with almost no associated presentation (such as `DIV` and `SPAN` in HTML) and assigning style information through the "class" attribute. Authors should avoid this practice since the structural elements of a document language often have recognized and accepted meanings and author-defined classes may not.

Note: If an element has multiple class attributes, their values must be concatenated with spaces between the values before searching for the class. As of this time the working group is not aware of any manner in which this situation can be reached, however, so this behavior is explicitly non-normative in this specification.

6.5. ID selectors

Document languages may contain attributes that are declared to be of type ID. What makes attributes of type ID special is that no two such attributes can have the same value in a conformant document, regardless of the type of the elements that carry them; whatever the document language, an ID typed attribute can be used to uniquely identify its element. In HTML all ID attributes are named "id"; XML applications may name ID attributes differently, but the same restriction applies.

An ID-typed attribute of a document language allows authors to assign an identifier to one element instance in the document tree. An ID selector contains a "number sign" (U+0023, #) immediately followed by the ID value, which must be an CSS identifiers. An ID selector represents an element instance that has an identifier that matches the identifier in the ID selector.

Selectors does not specify how a UA knows the ID-typed attribute of an element. The UA may, e.g., read a document's DTD, have the information hard-coded or ask the user.

Examples:

The following ID selector represents an `h1` element whose ID-typed attribute has the value "chapter1":

```
h1#chapter1
```

The following ID selector represents any element whose ID-typed attribute has the value "chapter1":

```
#chapter1
```

The following selector represents any element whose ID-typed attribute has the value "z98y".

```
*#z98y
```

Note: In XML 1.0 [XML10], the information about which attribute contains an element's IDs is contained in a DTD or a schema. When parsing XML, UAs do not always read the DTD, and thus may not know what the ID of an element is (though a UA may have namespace-specific knowledge that allows it to determine which attribute is the ID attribute for that namespace). If a style sheet author knows or suspects that a UA may not know what the ID of an element is, he should use normal attribute selectors instead: `[name=p371]` instead of `#p371`.

If an element has multiple ID attributes, all of them must be treated as IDs for that element for the purposes of the ID selector. Such a situation could be reached using mixtures of xml:id, DOM, XML DTDs, and namespace-specific knowledge.

6.6. Pseudo-classes

The pseudo-class concept is introduced to permit selection based on information that lies outside of the document tree or that cannot be expressed using the other simple selectors.

A pseudo-class always consists of a "colon" (`:`) followed by the name of the pseudo-class and optionally by a value between parentheses.

Pseudo-classes are allowed in all sequences of simple selectors contained in a selector. Pseudo-classes are allowed anywhere in sequences of simple selectors, after the leading type selector or universal selector (possibly omitted). Pseudo-class names are case-insensitive. Some pseudo-classes are mutually exclusive, while others can be applied simultaneously to the same element. Pseudo-classes may be dynamic, in the sense that an element may acquire or lose a pseudo-class while a user interacts with the document.

6.6.1. Dynamic pseudo-classes

Dynamic pseudo-classes classify elements on characteristics other than their name, attributes, or content, in principle characteristics that cannot be deduced from the document tree.

Dynamic pseudo-classes do not appear in the document source or document tree.

6.6.1.1. The link pseudo-classes: :link and :visited

User agents commonly display unvisited links differently from previously visited ones. Selectors provides the pseudo-classes ***:link*** and ***:visited*** to distinguish them:

- The `:link` pseudo-class applies to links that have not yet been visited.
- The `:visited` pseudo-class applies once the link has been visited by the user.

After some amount of time, user agents may choose to return a visited link to the (unvisited) '`:link`' state.

The two states are mutually exclusive.

> Example:
>
> The following selector represents links carrying class `external` and already visited:
>
> ```
> a.external:visited
> ```

> **Note:** It is possible for style sheet authors to abuse the :link and :visited pseudo-classes to determine which sites a user has visited without the user's consent.

UAs may therefore treat all links as unvisited links, or implement other measures to preserve the user's privacy while rendering visited and unvisited links differently.

6.6.1.2. The user action pseudo-classes :hover, :active, and :focus

Interactive user agents sometimes change the rendering in response to user actions. Selectors provides three pseudo-classes for the selection of an element the user is acting on.

- The ***:hover*** pseudo-class applies while the user designates an element with a pointing device, but does not necessarily activate it. For example, a visual user agent could apply this pseudo-class when the cursor (mouse pointer) hovers over a box generated by the element. User agents that do not support interactive media do not have to support this pseudo-class. Some conforming user agents that support interactive media may not be able to support this pseudo-class (e.g., a pen device that does not detect hovering).
- The ***:active*** pseudo-class applies while an element is being activated by the user. For example, between the times the user presses the mouse button and releases it. On systems with more than one mouse button, `:active` applies only to the primary or primary activation button (typically the "left" mouse button), and any aliases thereof.
- The ***:focus*** pseudo-class applies while an element has the focus (accepts keyboard or mouse events, or other forms of input).

There may be document language or implementation specific limits on which elements can become `:active` or acquire `:focus`.

These pseudo-classes are not mutually exclusive. An element may match several pseudo-classes at the same time.

Selectors doesn't define if the parent of an element that is '`:active`' or '`:hover`' is also in that state.

> **Note:** If the '`:hover`' state applies to an element because its child is designated by a pointing device, then it's possible for '`:hover`' to apply to an element that is not underneath the pointing device.

Examples:

```
a:link    /* unvisited links */
a:visited /* visited links */
a:hover   /* user hovers */
a:active  /* active links */
```

An example of combining dynamic pseudo-classes:

```
a:focus
a:focus:hover
```

The last selector matches `a` elements that are in the pseudo-class :focus and in the pseudo-class :hover.

Note: An element can be both '`:visited`' and '`:active`' (or '`:link`' and '`:active`').

6.6.2. The target pseudo-class :target

Some URIs refer to a location within a resource. This kind of URI ends with a "number sign" (#) followed by an anchor identifier (called the fragment identifier).

URIs with fragment identifiers link to a certain element within the document, known as the target element. For instance, here is a URI pointing to an anchor named `section_2` in an HTML document:

```
http://example.com/html/top.html#section_2
```

A target element can be represented by the ***:target*** pseudo-class. If the document's URI has no fragment identifier, then the document has no target element.

Example:

```
p.note:target
```

This selector represents a `p` element of class `note` that is the target element of the referring URI.

CSS example:

Here, the `:target` pseudo-class is used to make the target element red and place an image before it, if there is one:

```
*:target { color : red }
*:target::before { content : url(target.png) }
```

6.6.3. The language pseudo-class :lang

If the document language specifies how the human language of an element is determined, it is possible to write selectors that represent an element based on its language. For example, in HTML [HTML401], the language is determined by a combination of the `lang` attribute and possibly information from the `meta` elements or the protocol (such as HTTP headers). XML uses an attribute called `xml:lang`, and there may be other document language-specific methods for determining the language.

The pseudo-class ***:lang(C)*** represents an element that is in language C. Whether an element is represented by a `:lang()` selector is based solely on the element's language value (normalized to BCP 47 syntax if necessary) being equal to the identifier C, or beginning with the identifier C immediately followed by "-" (U+002D). The matching of C against the element's language value is performed case-insensitively within the ASCII range. The identifier C does not have to be a valid language name.

C must be a valid CSS identifier [CSS21] and must not be empty. (Otherwise, the selector is invalid.)

Note: It is recommended that documents and protocols indicate language using codes from BCP 47 [BCP47] or its successor, and by means of "xml:lang" attributes in the case of XML-based documents [XML10]. See "FAQ: Two-letter or three-letter language codes."

Examples:

The two following selectors represent an HTML document that is in Belgian French or German. The two next selectors represent `q` quotations in an arbitrary element in Belgian French or German.

```
html:lang(fr-be)
html:lang(de)
:lang(fr-be) > q
:lang(de) > q
```

The difference between `:lang(C)` and the '`|=`' operator is that the '`|=`' operator only performs a comparison against a given attribute on the element, while the `:lang(C)` pseudo-class uses the UAs knowledge of the document's semantics to perform the comparison.

In this HTML example, only the BODY matches `[lang|=fr]` (because it has a LANG attribute) but both the BODY and the P match `:lang(fr)` (because both are in French). The P does not match the `[lang|=fr]` because it does not have a LANG attribute.

```
<body lang=fr>
  <p>Je suis français.</p>
</body>
```

6.6.4. The UI element states pseudo-classes

6.6.4.1. The :enabled and :disabled pseudo-classes

The ***:enabled*** pseudo-class represents user interface elements that are in an enabled state; such elements have a corresponding disabled state.

Conversely, the ***:disabled*** pseudo-class represents user interface elements that are in a disabled state; such elements have a corresponding enabled state.

What constitutes an enabled state, a disabled state, and a user interface element is language-dependent. In a typical document most elements will be neither `:enabled` nor `:disabled`.

Note: CSS properties that might affect a user's ability to interact with a given user interface element do not affect whether it matches `:enabled` or `:disabled`; e.g., the `display` and `visibility` properties have no effect on the enabled/disabled state of an element.

6.6.4.2. The :checked pseudo-class

Radio and checkbox elements can be toggled by the user. Some menu items are "checked" when the user selects them. When such elements are toggled "on" the ***:checked*** pseudo-class applies. While the `:checked` pseudo-class is dynamic in nature, and can altered by user action, since it can also be based on the presence of semantic attributes in the document, it applies to all media. For example, the `:checked` pseudo-class initially applies to such elements that have the HTML4 `selected` and `checked` attributes as described in Section 17.2.1 of HTML4, but of course the user can toggle "off" such elements in which case the `:checked` pseudo-class would no longer apply.

6.6.4.3. The :indeterminate pseudo-class

> **Note:** Radio and checkbox elements can be toggled by the user, but are sometimes in an indeterminate state, neither checked nor unchecked. This can be due to an element attribute, or DOM manipulation.
>
> A future version of this specification may introduce an `:indeterminate` pseudo-class that applies to such elements.

6.6.5. Structural pseudo-classes

Selectors introduces the concept of ***structural pseudo-classes*** to permit selection based on extra information that lies in the document tree but cannot be represented by other simple selectors or combinators.

Standalone text and other non-element nodes are not counted when calculating the position of an element in its list of siblings; index numbering starts at 1.

6.6.5.1. :root pseudo-class

The ***:root*** pseudo-class represents an element that is the root of the document. In HTML 4, this is always the `HTML` element.

6.6.5.2. :nth-child() pseudo-class

The ***:nth-child(*****a*****n+*****b*****)*** pseudo-class notation represents an element that has *a*`n`+*b*-1 siblings **before** it in the document tree, for any positive integer or zero value of `n`. It is not required to have a parent. For values of *a* and *b* greater than zero, this effectively divides the element's children into

groups of *a* elements (the last group taking the remainder), and selecting the *b*th element of each group. For example, this allows the selectors to address every other row in a table, and could be used to alternate the color of paragraph text in a cycle of four. The *a* and *b* values must be integers (positive, negative, or zero). The index of the first child of an element is 1.

In addition to this, `:nth-child()` can take '`odd`' and '`even`' as arguments instead. '`odd`' has the same signification as `2n+1`, and '`even`' has the same signification as `2n`.

The argument to `:nth-child()` must match the grammar below, where `INTEGER` matches the token `[0-9]+` and the rest of the tokenization is given by the Lexical scanner in section 10.2:

```
nth
  : S* [ ['-'|'+']? INTEGER? {N} [ S* ['-'|'+'] S* INTEGER ]? |
         ['-'|'+']? INTEGER | {O}{D}{D} | {E}{V}{E}{N} ] S*
  ;
```

Examples:

```
tr:nth-child(2n+1) /* represents every odd row of an HTML table */
tr:nth-child(odd)  /* same */
tr:nth-child(2n+0) /* represents every even row of an HTML table */
tr:nth-child(even) /* same */

/* Alternate paragraph colours in CSS */
p:nth-child(4n+1) { color: navy; }
p:nth-child(4n+2) { color: green; }
p:nth-child(4n+3) { color: maroon; }
p:nth-child(4n+4) { color: purple; }
```

When the value *b* is preceded by a negative sign, the "+" character in the expression must be removed (it is effectively replaced by the "-" character indicating the negative value of *b*).

Examples:

```
:nth-child(10n-1)  /* represents the 9th, 19th, 29th, etc, element */
:nth-child(10n+9)  /* Same */
:nth-child(10n+-1) /* Syntactically invalid, and would be ignored */
```

When *a*=0, the *a*n part need not be included (unless the *b* part is already omitted). When *a*n is not included and *b* is non-negative, the + sign before *b* (when allowed) may also be omitted. In this case the syntax simplifies to `:nth-child(b)`.

Examples:

```
foo:nth-child(0n+5)   /* represents an element foo that is the 5th child
                         of its parent element */
foo:nth-child(5)      /* same */
```

When *a*=1, or *a*=-1, the `1` may be omitted from the rule.

Examples:

The following selectors are therefore equivalent:

```
bar:nth-child(1n+0)   /* represents all bar elements, specificity (0,1,1) */
bar:nth-child(n+0)    /* same */
bar:nth-child(n)      /* same */
bar                   /* same but lower specificity (0,0,1) */
```

If *b*=0, then every *a*th element is picked. In such a case, the +*b* (or -*b*) part may be omitted unless the *a* part is already omitted.

Examples:

```
tr:nth-child(2n+0) /* represents every even row of an HTML table */
tr:nth-child(2n) /* same */
```

Whitespace is permitted after the "(", before the ")", and on either side of the "+" or "-" that separates the *a*n and *b* parts when both are present.

Valid Examples with white space:

```
:nth-child( 3n + 1 )
:nth-child( +3n - 2 )
:nth-child( -n+ 6)
:nth-child( +6 )
```

Invalid Examples with white space:

```
:nth-child(3 n)
:nth-child(+ 2n)
:nth-child(+ 2)
```

If both *a* and *b* are equal to zero, the pseudo-class represents no element in the document tree.

The value *a* can be negative, but only the positive values of *a*n+*b*, for n≥0, may represent an element in the document tree.

> Example:
>
> ```
> html|tr:nth-child(-n+6)  /* represents the 6 first rows of XHTML tables */
> ```

6.6.5.3. :nth-last-child() pseudo-class

The ***:nth-last-child(an+b)*** pseudo-class notation represents an element that has *a*n+*b*-1 siblings **after** it in the document tree, for any positive integer or zero value of n. It is not required to have a parent. See `:nth-child()` pseudo-class for the syntax of its argument. It also accepts the 'even' and 'odd' values as arguments.

> Examples:
>
> ```
> tr:nth-last-child(-n+2)    /* represents the two last rows of an HTML table */
>
> foo:nth-last-child(odd)    /* represents all odd foo elements in their parent
>                               counting from the last one */
> ```

6.6.5.4. :nth-of-type() pseudo-class

The ***:nth-of-type(an+b)*** pseudo-class notation represents an element that has *a*n+*b*-1 siblings with the same expanded element name **before** it in the document tree, for any zero or positive integer value of n. It is not required to have a parent. See `:nth-child()` pseudo-class for the syntax of its argument. It also accepts the 'even' and 'odd' values.

> CSS example:
>
> This allows an author to alternate the position of floated images:
>
> ```
> img:nth-of-type(2n+1) { float: right; }
> img:nth-of-type(2n) { float: left; }
> ```

6.6.5.5. :nth-last-of-type() pseudo-class

The ***:nth-last-of-type(*an*+*b*)*** pseudo-class notation represents an element that has *a*n+*b*-1 siblings with the same expanded element name **after** it in the document tree, for any zero or positive integer value of n. It is not required to have a parent. See `:nth-child()` pseudo-class for the syntax of its argument. It also accepts the '`even`' and '`odd`' values.

> Example:
>
> To represent all `h2` children of an XHTML `body` except the first and last, one could use the following selector:
>
> ```
> body > h2:nth-of-type(n+2):nth-last-of-type(n+2)
> ```
>
> In this case, one could also use `:not()`, although the selector ends up being just as long:
>
> ```
> body > h2:not(:first-of-type):not(:last-of-type)
> ```

6.6.5.6. :first-child pseudo-class

Same as `:nth-child(1)`. The ***:first-child*** pseudo-class represents an element that is first in a list of siblings.

Examples:

The following selector represents a `p` element that is the first child of a `div` element:

```
div > p:first-child
```

This selector can represent the `p` inside the `div` of the following fragment:

```
<p> The last P before the note.</p>
<div class="note">
   <p> The first P inside the note.</p>
</div>
```

but cannot represent the second `p` in the following fragment:

```
<p> The last P before the note.</p>
<div class="note">
   <h2> Note </h2>
   <p> The first P inside the note.</p>
</div>
```

The following two selectors are usually equivalent:

```
* > a:first-child /* a is first child of any element */
a:first-child /* Same (assuming a is not the root element) */
```

6.6.5.7. :last-child pseudo-class

Same as `:nth-last-child(1)`. The ***:last-child*** pseudo-class represents an element that is last in a list of siblings.

Example:

The following selector represents a list item `li` that is the last child of an ordered list `ol`.

```
ol > li:last-child
```

6.6.5.8. :first-of-type pseudo-class

Same as `:nth-of-type(1)`. The ***:first-of-type*** pseudo-class represents an element that is the first sibling of its type.

> Example:
>
> The following selector represents a definition title `dt` inside a definition list `dl`, this `dt` being the first of its type in the list of children of its parent element.
>
> ```
> dl dt:first-of-type
> ```
>
> It is a valid description for the first two `dt` elements in the following example but not for the third one:
>
> ```
> <dl>
>  <dt>gigogne</dt>
>  <dd>
>   <dl>
>    <dt>fusée</dt>
>    <dd>multistage rocket</dd>
>    <dt>table</dt>
>    <dd>nest of tables</dd>
>   </dl>
>  </dd>
> </dl>
> ```

6.6.5.9. :last-of-type pseudo-class

Same as `:nth-last-of-type(1)`. The ***:last-of-type*** pseudo-class represents an element that is the last sibling of its type.

> Example:
>
> The following selector represents the last data cell `td` of a table row `tr`.
>
> ```
> tr > td:last-of-type
> ```

6.6.5.10. :only-child pseudo-class

The ***:only-child*** pseudo-class represents an element that has no siblings. Same as `:first-child:last-child` or `:nth-child(1):nth-last-child(1)`, but with a lower specificity.

6.6.5.11. :only-of-type pseudo-class

The ***:only-of-type*** pseudo-class represents an element that has no siblings with the same expanded element name. Same as `:first-of-type:last-of-type` or `:nth-of-type(1):nth-last-of-type(1)`, but with a lower specificity.

6.6.5.12. :empty pseudo-class

The ***:empty*** pseudo-class represents an element that has no children at all. In terms of the document tree, only element nodes and content nodes (such as DOM [DOM-LEVEL-3-CORE] text nodes, CDATA nodes, and entity references) whose data has a non-zero length must be considered as affecting emptiness; comments, processing instructions, and other nodes must not affect whether an element is considered empty or not.

> Examples:
>
> `p:empty` is a valid representation of the following fragment:
>
> ```
> 
> ```
>
> `foo:empty` is not a valid representation for the following fragments:
>
> ```
> <foo>bar</foo>
> ```
>
> ```
> <foo><bar>bla</bar></foo>
> ```
>
> ```
> <foo>this is not <bar>:empty</bar></foo>
> ```

6.6.6. Blank

This section intentionally left blank. (This section previously defined a `:contains()` pseudo-class.)

6.6.7. The negation pseudo-class

The negation pseudo-class, ***:not(X)***, is a functional notation taking a simple selector (excluding the negation pseudo-class itself) as an argument. It represents an element that is not represented by its argument.

Negations may not be nested; `:not(:not(...))` is invalid. Note also that since pseudo-elements are not simple selectors, they are not a valid argument to `:not()`.

Examples:

The following selector matches all `button` elements in an HTML document that are not disabled.

```
button:not([DISABLED])
```

The following selector represents all but `FOO` elements.

```
*:not(FOO)
```

The following group of selectors represents all HTML elements except links.

```
html|*:not(:link):not(:visited)
```

Default namespace declarations do not affect the argument of the negation pseudo-class unless the argument is a universal selector or a type selector.

Examples:

Assuming that the default namespace is bound to "http://example.com/", the following selector represents all elements that are not in that namespace:

```
*|*:not(*)
```

The following selector matches any element that is not being hovered, regardless of its namespace. In particular, it is not limited to only matching elements in the default namespace that are not being hovered, and elements not in the default namespace don't match the rule when they *are* being hovered.

```
*|*:not(:hover)
```

Note: the :not() pseudo allows useless selectors to be written. For instance `:not(*|*)`, which represents no element at all, or `foo:not(bar)`, which is equivalent to `foo` but with a higher specificity.

7. Pseudo-elements

Pseudo-elements create abstractions about the document tree beyond those specified by the document language. For instance, document languages do not offer mechanisms to access the first letter or first line of an element’s content. Pseudo-elements allow authors to refer to this otherwise

inaccessible information. Pseudo-elements may also provide authors a way to refer to content that does not exist in the source document (e.g., the `::before` and `::after` pseudo-elements give access to generated content).

A pseudo-element is made of two colons (`::`) followed by the name of the pseudo-element.

This `::` notation is introduced by the current document in order to establish a discrimination between pseudo-classes and pseudo-elements. For compatibility with existing style sheets, user agents must also accept the previous one-colon notation for pseudo-elements introduced in CSS levels 1 and 2 (namely, `:first-line`, `:first-letter`, `:before` and `:after`). This compatibility is not allowed for the new pseudo-elements introduced in this specification.

Only one pseudo-element may appear per selector, and if present it must appear after the sequence of simple selectors that represents the subjects of the selector. **Note:** A future version of this specification may allow multiple pseudo-elements per selector.

7.1. The ::first-line pseudo-element

The ***::first-line*** pseudo-element describes the contents of the first formatted line of an element.

> CSS example:
>
> ```
> p::first-line { text-transform: uppercase }
> ```
>
> The above rule means "change the letters of the first line of every `p` element to uppercase".
>
> The selector `p::first-line` does not match any real document element. It does match a pseudo-element that conforming user agents will insert at the beginning of every `p` element.

Note that the length of the first line depends on a number of factors, including the width of the page, the font size, etc. Thus, an ordinary HTML paragraph such as:

```
<P>This is a somewhat long HTML
paragraph that will be broken into several
lines. The first line will be identified
by a fictional tag sequence. The other lines
will be treated as ordinary lines in the
paragraph.</P>
```

the lines of which happen to be broken as follows:

```
THIS IS A SOMEWHAT LONG HTML PARAGRAPH THAT
will be broken into several lines. The first
```

```
line will be identified by a fictional tag
sequence. The other lines will be treated as
ordinary lines in the paragraph.
```

This paragraph might be "rewritten" by user agents to include the *fictional tag sequence* for `::first-line`. This fictional tag sequence helps to show how properties are inherited.

```
<P><P::first-line> This is a somewhat long HTML
paragraph that </P::first-line> will be broken into several
lines. The first line will be identified
by a fictional tag sequence. The other lines
will be treated as ordinary lines in the
paragraph.</P>
```

If a pseudo-element breaks up a real element, the desired effect can often be described by a fictional tag sequence that closes and then re-opens the element. Thus, if we mark up the previous paragraph with a `span` element:

```
<P><SPAN class="test"> This is a somewhat long HTML
paragraph that will be broken into several
lines.</SPAN> The first line will be identified
by a fictional tag sequence. The other lines
will be treated as ordinary lines in the
paragraph.</P>
```

the user agent could simulate start and end tags for `span` when inserting the fictional tag sequence for `::first-line`.

```
<P><P::first-line><SPAN class="test"> This is a
somewhat long HTML
paragraph that will </SPAN></P::first-line><SPAN class="test"> be
broken into several
lines.</SPAN> The first line will be identified
by a fictional tag sequence. The other lines
will be treated as ordinary lines in the
paragraph.</P>
```

7.1.1. First formatted line definition in CSS

In CSS, the `::first-line` pseudo-element can only have an effect when attached to a block-like container such as a block box, inline-block, table-caption, or table-cell. In such a case, it refers to the ***first formatted line*** of that container.

The first formatted line of an element may occur inside a block-level descendant in the same flow (i.e., a block-level descendant that is not out-of-flow due to floating or positioning). For example,

the first line of the DIV in <DIV><P>This line...</P></DIV> is the first line of the P (assuming that both P and DIV are block-level).

The first line of a table-cell or inline-block cannot be the first formatted line of an ancestor element. Thus, in <DIV><P STYLE="display: inline-block">Hello
Goodbye</P> etcetera</DIV> the first formatted line of the DIV is not the line "Hello".

> **Note:** Note that the first line of the p in this fragment: <p>
First... doesn't contain any letters (assuming the default style for br in HTML 4). The word "First" is not on the first formatted line.

A UA should act as if the fictional start tags of the ::first-line pseudo-elements were nested just inside the innermost enclosing block-level element. (Since CSS1 and CSS2 were silent on this case, authors should not rely on this behavior.) For example, the fictional tag sequence for

```
<DIV>
  <P>First paragraph</P>
  <P>Second paragraph</P>
</DIV>
```

is

```
<DIV>
  <P><DIV::first-line><P::first-line>First paragraph</P::first-line></DIV::first-
  <P><P::first-line>Second paragraph</P::first-line></P>
</DIV>
```

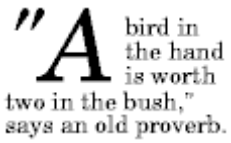
The ::first-line pseudo-element is similar to an inline-level element, but with certain restrictions. The following CSS properties apply to a ::first-line pseudo-element: font properties, color property, background properties, ‘word-spacing’, ‘letter-spacing’, ‘text-decoration’, ‘text-transform’, ‘line-height’. UAs may apply other properties as well.

During CSS inheritance, the portion of a child element that occurs on the first line only inherits properties applicable to the ::first-line pseudo-element from the ::first-line pseudo-element. For all other properties inheritence is from the non-pseudo-element parent of the first line pseudo element. (The portion of a child element that does not occur on the first line always inherits from the parent of that child.)

7.2. The ::first-letter pseudo-element

The ***::first-letter*** pseudo-element represents the first letter of an element, if it is not preceded by any other content (such as images or inline tables) on its line. The ::first-letter pseudo-element may be used for "initial caps" and "drop caps", which are common typographical effects.

Punctuation (i.e, characters defined in Unicode in the "open" (Ps), "close" (Pe), "initial" (Pi). "final" (Pf) and "other" (Po) punctuation classes), that precedes or follows the first letter should be included. [UNICODE]



The `::first-letter` also applies if the first letter is in fact a digit, e.g., the "6" in "67 million dollars is a lot of money."

> **Note:** In some cases the `::first-letter` pseudo-element should include more than just the first non-punctuation character on a line. For example, combining characters must be kept with their base character. Additionally, some languages may have specific rules about how to treat certain letter combinations. The UA definition of `::first-letter` should include at least the default grapheme cluster as defined by UAX29 and may include more than that as appropriate. In Dutch, for example, if the letter combination "ij" appears at the beginning of an element, both letters should be considered within the `::first-letter` pseudo-element. [UAX29]

If the letters that would form the `::first-letter` are not in the same element, such as "‘T" in `<p>‘<em>T...`, the UA may create a `::first-letter` pseudo-element from one of the elements, both elements, or simply not create a pseudo-element.

Similarly, if the first letter(s) of the block are not at the start of the line (for example due to bidirectional reordering), then the UA need not create the pseudo-element(s).

Example:

The following CSS and HTML example illustrates how overlapping pseudo-elements may interact. The first letter of each P element will be green with a font size of '24pt'. The rest of the first formatted line will be 'blue' while the rest of the paragraph will be 'red'.

```
p { color: red; font-size: 12pt }
p::first-letter { color: green; font-size: 200% }
p::first-line { color: blue }

<P>Some text that ends up on two lines</P>
```

Assuming that a line break will occur before the word "ends", the fictional tag sequence for this fragment might be:

```
<P>
<P::first-line>
<P::first-letter>
S
</P::first-letter>ome text that
</P::first-line>
ends up on two lines
</P>
```

Note that the `::first-letter` element is inside the `::first-line` element. Properties set on `::first-line` are inherited by `::first-letter`, but are overridden if the same property is set on `::first-letter`.

The first letter must occur on the first formatted line. For example, in this HTML fragment: `<p><br>First...` the first line doesn't contain any letters and `::first-letter` doesn't match anything (assuming the default style for `br` in HTML 4). In particular, it does not match the "F" of "First."

7.2.1. Application in CSS

In CSS, the `::first-letter` pseudo-element applies to block-like containers such as block, list-item, table-cell, table-caption, and inline-block elements. **Note:** A future version of this specification may allow this pseudo-element to apply to more display types.

The `::first-letter` pseudo-element can be used with all such elements that contain text, or that have a descendant in the same flow that contains text. A UA should act as if the fictional start tag of the ::first-letter pseudo-element is just before the first text of the element, even if that first text is

in a descendant.

> Example:
>
> The fictional tag sequence for this HTML fragment:
>
> ```
> 
> <p>The first text.
> ```
>
> is:
>
> ```
> 
> <p><div::first-letter><p::first-letter>T</...></...>he first text.
> ```

In CSS the first letter of a table-cell or inline-block cannot be the first letter of an ancestor element. Thus, in `<DIV><P STYLE="display: inline-block">Hello<BR>Goodbye</P> etcetera</DIV>` the first letter of the `DIV` is not the letter "H". In fact, the `DIV` doesn't have a first letter.

If an element is a list item (‘`display: list-item`’), the `::first-letter` applies to the first letter in the principal box after the marker. UAs may ignore `::first-letter` on list items with ‘`list-style-position: inside`’. If an element has `::before` or `::after` content, the `::first-letter` applies to the first letter of the element *including* that content.

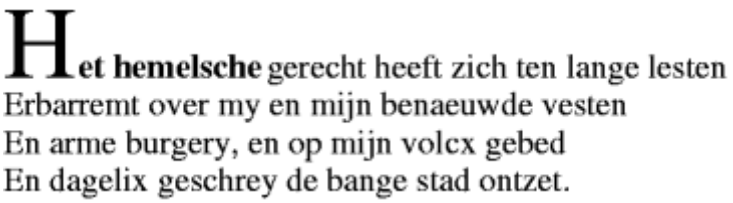
> Example:
>
> After the rule `p::before {content: "Note: "}`, the selector `p::first-letter` matches the "N" of "Note".

In CSS a ::first-line pseudo-element is similar to an inline-level element if its ‘`float`’ property is ‘`none`’; otherwise, it is similar to a floated element. The following properties that apply to `::first-letter` pseudo-elements: font properties, ‘`text-decoration`’, ‘`text-transform`’, ‘`letter-spacing`’, ‘`word-spacing`’ (when appropriate), ‘`line-height`’, ‘`float`’, ‘`vertical-align`’ (only if ‘`float`’ is ‘`none`’), margin properties, padding properties, border properties, color property, background properties. UAs may apply other properties as well. To allow UAs to render a typographically correct drop cap or initial cap, the UA may choose a line-height, width and height based on the shape of the letter, unlike for normal elements.

Example:

This CSS and HTML example shows a possible rendering of an initial cap. Note that the '`line-height`' that is inherited by the `::first-letter` pseudo-element is 1.1, but the UA in this example has computed the height of the first letter differently, so that it doesn't cause any unnecessary space between the first two lines. Also note that the fictional start tag of the first letter is inside the span, and thus the font weight of the first letter is normal, not bold as the span:

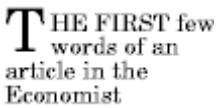
```
p { line-height: 1.1 }
p::first-letter { font-size: 3em; font-weight: normal }
span { font-weight: bold }
...
<p><span>Het hemelsche</span> gerecht heeft zich ten lange lesten<br>
Erbarremt over my en mijn benaeuwde vesten<br>
En arme burgery, en op mijn volcx gebed<br>
En dagelix geschrey de bange stad ontzet.
```



The following CSS will make a drop cap initial letter span about two lines:

```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.01//EN">
<HTML>
 <HEAD>
  <TITLE>Drop cap initial letter</TITLE>
  <STYLE type="text/css">
   P               { font-size: 12pt; line-height: 1.2 }
   P::first-letter { font-size: 200%; font-weight: bold; float: left }
   SPAN            { text-transform: uppercase }
  </STYLE>
 </HEAD>
 <BODY>
  <P><SPAN>The first</SPAN> few words of an article
    in The Economist.</P>
 </BODY>
</HTML>
```

This example might be formatted as follows:



The fictional tag sequence is:

```
<P>
<SPAN>
<P::first-letter>
T
</P::first-letter>he first
</SPAN>
few words of an article in the Economist.
</P>
```

Note that the `::first-letter` pseudo-element tags abut the content (i.e., the initial character), while the ::first-line pseudo-element start tag is inserted right after the start tag of the block element.

In order to achieve traditional drop caps formatting, user agents may approximate font sizes, for example to align baselines. Also, the glyph outline may be taken into account when formatting.

7.3. Blank

This section intentionally left blank. (This section previously defined a `::selection` pseudo-element.)

7.4. The ::before and ::after pseudo-elements

The ***::before*** and ***::after*** pseudo-elements can be used to describe generated content before or after an element's content. They are explained in CSS 2.1 [CSS21].

When the `::first-letter` and `::first-line` pseudo-elements are applied to an element having content generated using `::before` or `::after`, they apply to the first letter or line of the element including the generated content.

8. Combinators

8.1. Descendant combinator

At times, authors may want selectors to describe an element that is the descendant of another element in the document tree (e.g., "an `EM` element that is contained within an `H1` element"). Descendant combinators express such a relationship. A descendant combinator is whitespace that separates two sequences of simple selectors. A selector of the form "`A B`" represents an element `B` that is an arbitrary descendant of some ancestor element `A`.

Examples:

For example, consider the following selector:

```
h1 em
```

It represents an `em` element being the descendant of an `h1` element. It is a correct and valid, but partial, description of the following fragment:

```
<h1>This <span class="myclass">headline
is <em>very</em> important</span></h1>
```

The following selector:

```
div * p
```

represents a `p` element that is a grandchild or later descendant of a `div` element. Note the whitespace on either side of the "*" is not part of the universal selector; the whitespace is a combinator indicating that the `div` must be the ancestor of some element, and that that element must be an ancestor of the `p`.

The following selector, which combines descendant combinators and attribute selectors, represents an element that (1) has the `href` attribute set and (2) is inside a `p` that is itself inside a `div`:

```
div p *[href]
```

8.2. Child combinators

A ***child combinator*** describes a childhood relationship between two elements. A child combinator is made of the "greater-than sign" (U+003E, >) character and separates two sequences of simple selectors.

Examples:

The following selector represents a `p` element that is child of `body`:

```
body > p
```

The following example combines descendant combinators and child combinators.

```
div ol>li p
```

It represents a `p` element that is a descendant of an `li` element; the `li` element must be the child of an `ol` element; the `ol` element must be a descendant of a `div`. Notice that the optional white space around the ">" combinator has been left out.

For information on selecting the first child of an element, please see the section on the `:first-child` pseudo-class above.

8.3. Sibling combinators

There are two different sibling combinators: the next-sibling combinator and the subsequent-sibling combinator. In both cases, non-element nodes (e.g. text between elements) are ignored when considering adjacency of elements.

8.3.1. Next-sibling combinator

The ***next-sibling combinator*** is made of the "plus sign" (U+002B, **+**) character that separates two sequences of simple selectors. The elements represented by the two sequences share the same parent in the document tree and the element represented by the first sequence immediately precedes the element represented by the second one.

Examples:

The following selector represents a `p` element immediately following a `math` element:

```
math + p
```

The following selector is conceptually similar to the one in the previous example, except that it adds an attribute selector — it adds a constraint to the `h1` element, that it must have `class="opener"`:

```
h1.opener + h2
```

8.3.2. Subsequent-sibling combinator

The ***subsequent-sibling combinator*** is made of the "tilde" (U+007E, ~) character that separates two sequences of simple selectors. The elements represented by the two sequences share the same parent in the document tree and the element represented by the first sequence precedes (not necessarily immediately) the element represented by the second one.

Example:

```
h1 ~ pre
```

represents a `pre` element following an `h1`. It is a correct and valid, but partial, description of:

```
<h1>Definition of the function a</h1>
<p>Function a(x) has to be applied to all figures in the table.</p>
<pre>function a(x) = 12x/13.5</pre>
```

9. Calculating a selector's specificity

A selector's specificity is calculated as follows:

- count the number of ID selectors in the selector (= a)
- count the number of class selectors, attributes selectors, and pseudo-classes in the selector (= b)
- count the number of type selectors and pseudo-elements in the selector (= c)
- ignore the universal selector

Selectors inside the negation pseudo-class are counted like any other, but the negation itself does not count as a pseudo-class.

Concatenating the three numbers a-b-c (in a number system with a large base) gives the specificity.

Examples:

```
*               /* a=0 b=0 c=0 -> specificity =   0 */
LI              /* a=0 b=0 c=1 -> specificity =   1 */
UL LI           /* a=0 b=0 c=2 -> specificity =   2 */
UL OL+LI        /* a=0 b=0 c=3 -> specificity =   3 */
H1 + *[REL=up]  /* a=0 b=1 c=1 -> specificity =  11 */
UL OL LI.red    /* a=0 b=1 c=3 -> specificity =  13 */
LI.red.level    /* a=0 b=2 c=1 -> specificity =  21 */
#x34y           /* a=1 b=0 c=0 -> specificity = 100 */
#s12:not(FOO)   /* a=1 b=0 c=1 -> specificity = 101 */
```

Note: Repeated occurrences of the same simple selector are allowed and do increase specificity.

Note: the specificity of the styles specified in an HTML `style` attribute is described in CSS 2.1. [CSS21].

10. The grammar of Selectors

10.1. Grammar

The grammar below defines the syntax of Selectors. It is globally LL(1) and can be locally LL(2) (but note that most UAs should not use it directly, since it doesn't express the parsing conventions). The format of the productions is optimized for human consumption and some shorthand notations beyond Yacc (see [YACC]) are used:

- *****: 0 or more
- **+**: 1 or more
- **?**: 0 or 1
- **|**: separates alternatives
- **[ ]**: grouping

The productions are:

```
selectors_group
  : selector [ COMMA S* selector ]*
  ;

selector
  : simple_selector_sequence [ combinator simple_selector_sequence ]*
  ;

combinator
  /* combinators can be surrounded by whitespace */
  : PLUS S* | GREATER S* | TILDE S* | S+
  ;

simple_selector_sequence
  : [ type_selector | universal ]
    [ HASH | class | attrib | pseudo | negation ]*
  | [ HASH | class | attrib | pseudo | negation ]+
  ;

type_selector
  : [ namespace_prefix ]? element_name
  ;

namespace_prefix
  : [ IDENT | '*' ]? '|'
  ;

element_name
  : IDENT
  ;

universal
  : [ namespace_prefix ]? '*'
  ;

class
  : '.' IDENT
  ;

attrib
  : '[' S* [ namespace_prefix ]? IDENT S*
        [ [ PREFIXMATCH |
            SUFFIXMATCH |
            SUBSTRINGMATCH |
            '=' |
            INCLUDES |
```

```
            DASHMATCH ] S* [ IDENT | STRING ] S*
        ]? ']'
  ;

pseudo
  /* '::' starts a pseudo-element, ':' a pseudo-class */
  /* Exceptions: :first-line, :first-letter, :before and :after. */
  /* Note that pseudo-elements are restricted to one per selector and */
  /* occur only in the last simple_selector_sequence. */
  : ':' ':'? [ IDENT | functional_pseudo ]
  ;

functional_pseudo
  : FUNCTION S* expression ')'
  ;

expression
  /* In CSS3, the expressions are identifiers, strings, */
  /* or of the form "an+b" */
  : [ [ PLUS | '-' | DIMENSION | NUMBER | STRING | IDENT ] S* ]+
  ;

negation
  : NOT S* negation_arg S* ')'
  ;

negation_arg
  : type_selector | universal | HASH | class | attrib | pseudo
  ;
```

10.2. Lexical scanner

The following is the tokenizer, written in Flex (see [FLEX]) notation. The tokenizer is case-insensitive.

The two occurrences of "\377" represent the highest character number that current versions of Flex can deal with (decimal 255). They should be read as "\4177777" (decimal 1114111), which is the highest possible code point in Unicode/ISO-10646. [UNICODE]

```
%option case-insensitive

ident     [-]?{nmstart}{nmchar}*
name      {nmchar}+
nmstart   [_a-z]|{nonascii}|{escape}
nonascii  [^\0-\177]
```

```
unicode   \\[0-9a-f]{1,6}(\r\n|[ \n\r\t\f])?
escape    {unicode}|\\[^\n\r\f0-9a-f]
nmchar    [_a-z0-9-]|{nonascii}|{escape}
num       [0-9]+|[0-9]*\.[0-9]+
string    {string1}|{string2}
string1   \"([^\n\r\f\\"]|\\{nl}|{nonascii}|{escape})*\"
string2   \'([^\n\r\f\\']|\\{nl}|{nonascii}|{escape})*\'
invalid   {invalid1}|{invalid2}
invalid1  \"([^\n\r\f\\"]|\\{nl}|{nonascii}|{escape})*
invalid2  \'([^\n\r\f\\']|\\{nl}|{nonascii}|{escape})*
nl        \n|\r\n|\r|\f
w         [ \t\r\n\f]*

D         d|\\0{0,4}(44|64)(\r\n|[ \t\r\n\f])?
E         e|\\0{0,4}(45|65)(\r\n|[ \t\r\n\f])?
N         n|\\0{0,4}(4e|6e)(\r\n|[ \t\r\n\f])?|\\n
O         o|\\0{0,4}(4f|6f)(\r\n|[ \t\r\n\f])?|\\o
T         t|\\0{0,4}(54|74)(\r\n|[ \t\r\n\f])?|\\t
V         v|\\0{0,4}(58|78)(\r\n|[ \t\r\n\f])?|\\v

%%

[ \t\r\n\f]+     return S;

"~="             return INCLUDES;
"|="             return DASHMATCH;
"^="             return PREFIXMATCH;
"$="             return SUFFIXMATCH;
"*="             return SUBSTRINGMATCH;
{ident}          return IDENT;
{string}         return STRING;
{ident}"("       return FUNCTION;
{num}            return NUMBER;
"#"{name}        return HASH;
{w}"+"           return PLUS;
{w}">"           return GREATER;
{w}","           return COMMA;
{w}"~"           return TILDE;
":"{N}{O}{T}"("  return NOT;
@{ident}         return ATKEYWORD;
{invalid}        return INVALID;
{num}%           return PERCENTAGE;
{num}{ident}     return DIMENSION;
"<!--"           return CDO;
"-->"            return CDC;
```

```
\/\*[^*]*\*+([^/*][^*]*\*+)*\/                  /* ignore comments */

.                 return *yytext;
```

11. Profiles

Each specification using Selectors must define the subset of Selectors it allows and excludes, and describe the local meaning of all the components of that subset.

Non normative examples:

Selectors profile	
Specification	CSS level 1
Accepts	type selectors class selectors ID selectors :link, :visited and :active pseudo-classes descendant combinator ::first-line and ::first-letter pseudo-elements
Excludes	universal selector attribute selectors :hover and :focus pseudo-classes :target pseudo-class :lang() pseudo-class all UI element states pseudo-classes all structural pseudo-classes negation pseudo-class ::before and ::after pseudo-elements child combinators sibling combinators namespaces

Extra constraints only one class selector allowed per sequence of simple selectors

Selectors profile	
Specification	CSS level 2
Accepts	type selectors universal selector

	attribute presence and values selectors class selectors ID selectors :link, :visited, :active, :hover, :focus, :lang() and :first-child pseudo-classes descendant combinator child combinator next-sibling combinator ::first-line and ::first-letter pseudo-elements ::before and ::after pseudo-elements
Excludes	substring matching attribute selectors :target pseudo-classes all UI element states pseudo-classes all structural pseudo-classes other than :first-child negation pseudo-class subsequent-sibling combinators
	namespaces
Extra constraints	more than one class selector per sequence of simple selectors (CSS1 constraint) allowed

In CSS, selectors express pattern matching rules that determine which style rules apply to elements in the document tree.

The following selector (CSS level 2) will **match** all anchors `a` with attribute `name` set inside a section 1 header `h1`:

```
h1 a[name]
```

All CSS declarations attached to such a selector are applied to elements matching it.

Selectors profile	
Specification	STTS 3

Accepts	type selectors universal selectors attribute selectors class selectors ID selectors all structural pseudo-classes all combinators namespaces
Excludes	non-accepted pseudo-classes pseudo-elements
Extra constraints	some selectors and combinators are not allowed in fragment descriptions on the right side of STTS declarations.

Selectors can be used in STTS 3 in two different manners:

1. a selection mechanism equivalent to CSS selection mechanism: declarations attached to a given selector are applied to elements matching that selector,
2. fragment descriptions that appear on the right side of declarations.

12. Conformance and requirements

This section defines conformance with the present specification only.

The inability of a user agent to implement part of this specification due to the limitations of a particular device (e.g., non interactive user agents will probably not implement dynamic pseudo-classes because they make no sense without interactivity) does not imply non-conformance.

All specifications reusing Selectors must contain a Profile listing the subset of Selectors it accepts or excludes, and describing the constraints it adds to the current specification.

Invalidity is caused by a parsing error, e.g. an unrecognized token or a token which is not allowed at the current parsing point.

User agents must observe the rules for handling parsing errors:

- a simple selector containing an undeclared namespace prefix is invalid
- a selector containing an invalid simple selector, an invalid combinator or an invalid token is invalid.
- a group of selectors containing an invalid selector is invalid.

Specifications reusing Selectors must define how to handle parsing errors. (In the case of CSS, the entire rule in which the selector is used is dropped.)

13. Tests

This specification has a test suite allowing user agents to verify their basic conformance to the specification. This test suite does not pretend to be exhaustive and does not cover all possible combined cases of Selectors.

14. Acknowledgements

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15. References

15.1. Normative References

[CSS21]
Bert Bos; et al. *Cascading Style Sheets Level 2 Revision 1 (CSS 2.1) Specification.* 7 June 2011. W3C Recommendation. URL: http://www.w3.org/TR/2011/REC-CSS2-20110607

[CSS3NAMESPACE]
Elika J. Etemad. *CSS Namespaces Module Level 3.* 29 September 2011. W3C Recommendation. URL: http://www.w3.org/TR/2014/REC-css-namespaces-3-20140320/

[FLEX]
Flex: The Lexical Scanner Generator. Version 2.3.7, ISBN 1882114213

[UNICODE]
The Unicode Consortium. *The Unicode Standard.* 2012. Defined by: The Unicode Standard, Version 6.2.0 (Mountain View, CA: The Unicode Consortium, 2012. ISBN 978-1-936213-07-8), as updated from time to time by the publication of new versions URL: http://www.unicode.org/standard/versions/enumeratedversions.html

[YACC]
S. C. Johnson. *YACC - Yet another compiler compiler.* Murray Hill. 1975. Technical Report.

15.2. Informative References

[BCP47]

A. Phillips; M. Davis. *Tags for Identifying Languages.* September 2009. 47. BCP. Currently represented by RFC 5646. URL: ftp://ftp.rfc-editor.org/in-notes/bcp/bcp47.txt

[CSS1]

Håkon Wium Lie; Bert Bos. *Cascading Style Sheets (CSS1) Level 1 Specification.* 11 April 2008. W3C Recommendation. URL: http://www.w3.org/TR/2008/REC-CSS1-20080411

[DOM-LEVEL-3-CORE]

Gavin Nicol; et al. *Document Object Model (DOM) Level 3 Core Specification.* 7 April 2004. W3C Recommendation. URL: http://www.w3.org/TR/2004/REC-DOM-Level-3-Core-20040407

[HTML401]

Dave Raggett; Arnaud Le Hors; Ian Jacobs. *HTML 4.01 Specification.* 24 December 1999. W3C Recommendation. URL: http://www.w3.org/TR/1999/REC-html401-19991224

[HTML5]

Ian Hickson; et al. *HTML5.* 28 October 2014. W3C Recommendation. URL: http://www.w3.org/TR/2014/REC-html5-20141028/

[MATHML3]

David Carlisle; Patrick Ion; Robert Miner. *Mathematical Markup Language (MathML) Version 3.0 2nd Edition.* 10 April 2014. W3C Recommendation. URL: http://www.w3.org/TR/2014/REC-MathML3-20140410/

[STTS3]

Daniel Glazman. *Simple Tree Transformation Sheets 3.* Electricité de France. 11 November 1998. Submission to the W3C. URL: http://www.w3.org/TR/NOTE-STTS3

[SVG11]

Erik Dahlström; et al. *Scalable Vector Graphics (SVG) 1.1 (Second Edition).* 16 August 2011. W3C Recommendation. URL: http://www.w3.org/TR/2011/REC-SVG11-20110816/

[UAX29]

Mark Davis. *Unicode Text Segmentation.* 12 September 2012. Unicode Standard Annex #29. URL: http://www.unicode.org/reports/tr29/

[XML-NAMES]

Tim Bray; et al. *Namespaces in XML 1.0 (Third Edition).* 8 December 2009. W3C Recommendation. URL: http://www.w3.org/TR/2009/REC-xml-names-20091208/

[XML10]

C. M. Sperberg-McQueen; et al. *Extensible Markup Language (XML) 1.0 (Fifth Edition).* 26 November 2008. W3C Recommendation. URL: http://www.w3.org/TR/2008/REC-xml-20081126/

15.3. Changes

Substantive since the previous Recommendation are:

- Allowing the Structural pseudo-classes to match the root element. See minutes and results of a testcase.

↥