CSS Table Module Level 3

Editor's Draft, 18 September 2020

▶ **Specification Metadata**

▼ **Not Ready For Implementation**

This spec is not yet ready for implementation. It exists in this repository to record the ideas and promote discussion.

Before attempting to implement this spec, please contact the CSSWG at www-style@w3.org.

Abstract

This CSS module defines a two-dimensional grid-based layout system, optimized for tabular data rendering. In the table layout model, each display node is assigned to an intersection between a set of consecutive rows and a set of consecutive columns, themselves generated from the table structure and sized according to their content.

CSS is a language for describing the rendering of structured documents (such as HTML and XML) on screen, on paper, etc.

Status of this document

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Please send feedback by filing issues in GitHub (preferred), including the spec code "css-tables" in the title, like this: "[css-tables] ...*summary of comment*...". All issues and comments are archived. Alternately, feedback can be sent to the (archived) public mailing list www-style@w3.org.

This document is governed by the 15 September 2020 W3C Process Document.

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§ 1. Introduction

This section is not normative

Many types of information (ex: weather readings collected over the past year) are best visually represented in a two-axis grid where rows represent one item of the list (ex: a date, and the various weather properties measured during that day), and where columns represent the successive values of an item's property (ex: the temperatures measured over the past year).

Sometimes, to make the representation easier to understand, some cells of the grid are used to represent a description or summary of their parent row/column, instead of actual data. This happens

more frequently for the cells found on the first row and/or column (called headers) or the cells found on the last row and/or column (called footers).

This kind of tabular data representation is usually known as tables. Tables layout can be abused to render other grid-like representations like calendars or timelines, though authors should prefer other layout modes when the information being represented does not make sense as a data table.

The rendering of tables in HTML has been defined for a long time in the HTML specification. However, its interactions with features defined in CSS remained for a long time undefined. The goal of this specification is to define the expected behavior of user agents supporting both HTML tables and CSS.

Please be aware that some behaviors defined in this document will not be the most logical or useful way of solving the problem they aim to solve, but such behaviors are often the result of compatibility requirements and not a deliberate choice of the editors of this specification. Authors wishing to use more complex layouts are encouraged to rely on more modern CSS modules such as CSS Grid.

§ 1.1. Value Definitions

This specification follows the CSS property definition conventions from [CSS2] using the value definition syntax from [CSS-VALUES-3]. Value types not defined in this specification are defined in CSS Values & Units [CSS-VALUES-3]. Combination with other CSS modules may expand the definitions of these value types.

In addition to the property-specific values listed in their definitions, all properties defined in this specification also accept the CSS-wide keywords as their property value. For readability they have not been repeated explicitly.

§ 2. Content Model

§ 2.1. Table Structure

The CSS table model is based on the HTML4 table model, in which the structure of a table closely parallels the visual layout of the table. In this model, a table consists of an optional caption and any number of rows of cells.

In addition, adjacent rows and columns may be grouped structurally and this grouping can be reflected in presentation (e.g., a border may be drawn around a group of rows).

The table model is said to be "row primary" since authors specify rows, not columns, explicitly in the document language. Columns are derived once all the rows have been specified: the first cell of the first row belongs to the first column and as many other columns as spanning requires (and it creates them if needed), and the following cells of that row each belong to the next available column and as many other columns as spanning requires (creating those if needed); the cells of the following rows each belong to the next available column for that row (taking rowspan into account) and as many other columns as spanning requires (creating those if needed). (see § 3.3 Dimensioning the row/column grid).

To summarize, an instance of the table model consists of:

- Its table-root containing:
  - Zero, one or more table rows, optionally in row groups,
    - Each of them contaning one or more table cells
  - Optionally: one or more table columns, optionally in column groups
  - Optionally: one or more table caption.

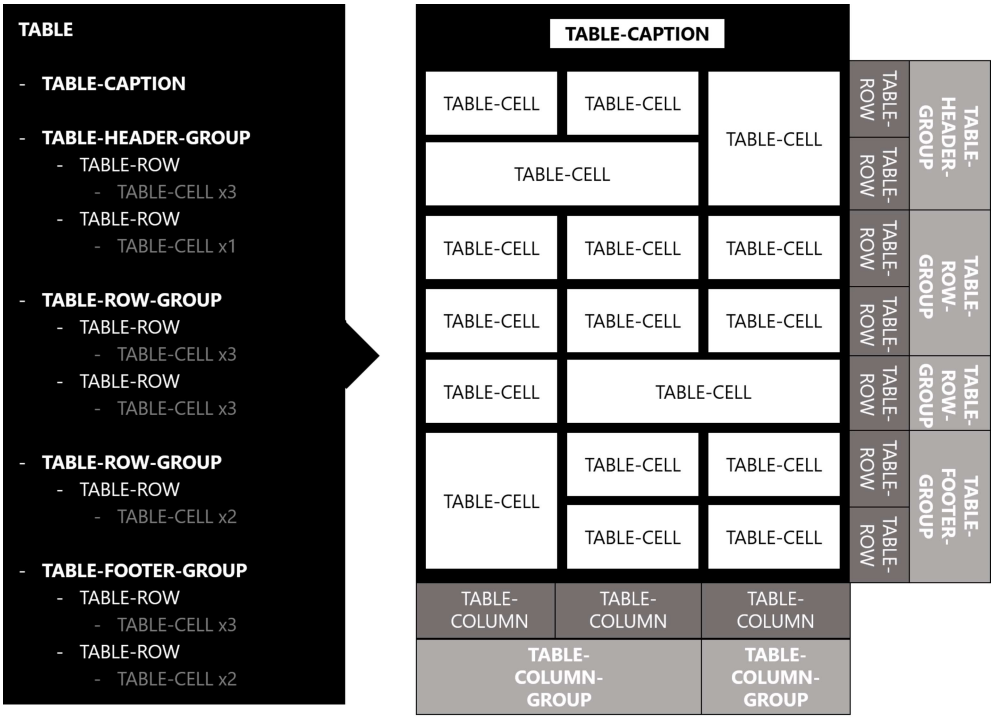


Figure 1 *Two representations of the structure of a table (tree vs layout)*

The CSS model does not require that the document language include elements that correspond to each of these components. For document languages (such as XML applications) that do not have pre-defined table elements, authors must map document language elements to table elements. This is done with the 'display' property.

The following 'display' values assign table formatting rules to an arbitrary element:

***table* (equivalent to HTML: <table>)**
Specifies that an element defines a table that is block-level when placed in flow layout.

***inline-table* (equivalent to HTML: <table>)**
Specifies that an element defines a table that is inline-level when placed in flow layout.

***table-row* (equivalent to HTML: <tr>)**
Specifies that an element is a row of cells.

***table-row-group* (equivalent to HTML: <tbody>)**
Specifies that an element groups some amount of rows.
Unless explicitly mentioned otherwise, mentions of table-row-groups in this spec also encompass the specialized table-header-groups and table-footer-groups.

***table-header-group* (equivalent to HTML: <thead>)**
Like table-row-group but, for layout purposes, the first such row group is always displayed before all other rows and row groups.

> If a table owns multiple `display: table-header-group` boxes, only the first is treated as a header; the others are treated as if they had `display: table-row-group`.

***table-footer-group* (equivalent to HTML: <tfoot>)**
Like table-row-group but, for layout purposes, the fist such row group is always displayed after all other rows and row groups.

> If a table owns multiple `display: table-footer-group` boxes, only the first is treated as a footer; the others are treated as if they had `display: table-row-group`.

***table-column* (equivalent to HTML: <col>)**
Specifies that an element describes a column of cells.

***table-column-group* (equivalent to HTML: <colgroup>)**
Specifies that an element groups one or more columns.

***table-cell* (equivalent to HTML: <td> or <th>)**
Specifies that an element represents a table cell.

***table-caption* (equivalent to HTML: <caption>)**
Specifies a caption for the table. Table captions are positioned between the table margins and its borders.

Authors should not assign a display type from the previous list to replaced elements (eg: input fields or images). When the 'display' property of a replaced element computes to one of these values, it is handled instead as though the author had declared either `block` (for table display) or `inline` (for all other values). Whitespace collapsing and box generation must happen around those replaced elements like if they never had any table-internal display value applied to them, and had always been block or inline.

ISSUE 1 This is a breaking change from css 2.1 but matches implementations <https://github.com/w3c/csswg-drafts/issues/508>

§ 2.1.1. Terminology

In addition to the table structure display types, the following wording is also being used in this spec:

table wrapper box
: A block container box generated around table grid boxes to account for any space occupied by each table-caption it owns.

table grid box
: A block-level box containing the table-internal boxes, excluding its captions.

***table-root* element**
: An element whose inner display type is 'table'.

***table-non-root* box or element**
: A proper table child, or a table-cell box.

***table-track* box or element**
: A table-row, or table-column box.

***table-track-group* box or element**
: A table-row-group, or table-column-group box.

***proper table child* box or element**
: A table-track-group, table-track, or table-caption box.

***proper table-row parent* box or element**
: A table-root or a table-row-group box.

***table-internal* box or element**
: A table-cell, table-track or table-track-group box.

tabular container
: A table-row or proper table-row parent box.

***consecutive* boxes**

Two sibling boxes are consecutive if they have no intervening siblings other than, optionally, an anonymous inline containing only white spaces. A sequence of sibling boxes is consecutive if each box in the sequence is consecutive to the one before it in the sequence.

table grid

A matrix containing as many ***rows*** and ***columns*** as needed to describe the position of all the table-rows and table-cells of a table-root, as determined by the grid-dimensioning algorithm.

Each row of the grid might correspond to a table-row, and each column to a table-column.

***slot* of the table grid**

A slot `(r,c)` is an available space created by the intersection of a row `r` and a column `c` in the table grid.

Each slot of the table grid is covered by at least one table-cell (some of them anonymous), and at most two. Each table-cell of a table-root covers at least one slot.

Table-cells which cover more than one slot do so densely, meaning the set of slots they cover can always be described as a set of four strictly-positive integers `(rowStart, colStart, rowSpan, colSpan)` such that a slot `(r,c)` is covered by the table-cell if and only if `r` lies in the interval between `rowStart` (included) and `rowStart+rowSpan` (exculded), and `c` lies in the interval between `colStart` (included) and `colStart+colSpan` (exculded);

Such table-cell is said to ***originate*** from row `rowStart` and column `colStart`. Also:

- A table-cell is said to originate a table-row *(resp. table-column)* if it originates its corresponding row *(resp. column)*
- A table-cell is said to originate a table-row-group *(resp. table-column-group)* if the group contains the cell's originating row *(resp. column)*

Such table-cell is said to ***span*** all rows `r` and columns `c` matching the above condition. Also:

- A table-cell is said to span a table-row *(resp. table-column)* if it spans its corresponding row *(resp. column)*
- A table-row *(resp. table-column)* corresponding to a row *(resp. column)* is said to span this row *(resp. column)*
- A table-row *(resp. table-column)* is said to span all columns of the grid *(resp. row)*
- A table-row-group *(resp. table-column)* containing a row *(resp. column)* is said to span the row *(resp. column)*
- A table-row-group *(resp. table-column)* is said to span all columns of the grid *(resp. row)*

§ 2.2. Fixup

Document languages other than HTML may not contain all the elements in the CSS 2.1 table model. In these cases, the "missing" elements must be assumed in order for the table model to work.

Any table-internal element will automatically generate necessary anonymous table objects around itself, if necessary. Any descendant of a table-root that is not table-internal must have a set of ancestors in the table consisting of at least three nested objects corresponding to a table/inline-table, a table-row, and a table-cell. Missing boxes cause the generation of anonymous boxes according to the following rules:

§ 2.2.1. Fixup Algorithm

For the purposes of these rules, out-of-flow elements are represented as inline elements of zero width and height. Their containing blocks are chosen accordingly.

The following steps are performed in three stages:

1. **Remove irrelevant boxes:**
   The following boxes are discarded as if they were `display:none`:
   1. Children of a table-column.
   2. Children of a table-column-group which are not a table-column.
   3. Anonymous inline boxes which contain only white space and are between two immediate siblings each of which is a table-non-root box.
   4. Anonymous inline boxes which meet all of the following criteria:
      - they contain only white space
      - they are the first and/or last child of a tabular container
      - whose immediate sibling, if any, is a table-non-root box
2. **Generate missing child wrappers:**
   1. An anonymous table-row box must be generated around each sequence of consecutive children of a table-root box which are not proper table child boxes. !!Testcase
   2. An anonymous table-row box must be generated around each sequence of consecutive children of a table-row-group box which are not table-row boxes. !Testcase
   3. An anonymous table-cell box must be generated around each sequence of consecutive children of a table-row box which are not table-cell boxes. !Testcase
3. **Generate missing parents:**

1. An anonymous table-row box must be generated around each sequence of consecutive table cell boxes whose parent is not a table-row. Testcase
2. An anonymous table or inline-table box must be generated around each sequence of consecutive proper table child boxes which are misparented. If the box's parent is an inline, run-in, or ruby box (or any box that would perform inlinification of its children), then an inline-table box must be generated; otherwise it must be a table box.
   - A table-row is misparented if its parent is neither a table-row-group nor a table-root box.
   - A table-column box is misparented if its parent is neither a table-column-group box nor a table-root box.
   - A table-row-group, table-column-group, or table-caption box is misparented if its parent is not a table-root box.

   Testcase Testcase !Testcase
3. An anonymous table-wrapper box must be generated around each table-root. Its display type is `inline-block` for inline-table boxes and block for table boxes. The table wrapper box establishes a block formatting context. The table-root box (not the table-wrapper box) is used when doing baseline vertical alignment for an inline-table. The width of the table-wrapper box is the border-edge width of the table grid box inside it. Percentages which would depend on the 'width' and 'height' on the table-wrapper box's size are relative to the table-wrapper box's containing block instead, not the table-wrapper box itself.

Please note that some layout modes such as flexbox and grid override the display type of their children. These transformations happen before the table fixup.

Please note that the 'float' and 'position' properties sometimes affect the computed value of 'display'. When those properties are used on what should have been table internal boxes, they switch to `block` instead. This transformation happen before the table fixup.

We have modified the text of this section from CSS 2.2 to make it easier to read. If you find any mistakes due to these changes please file an issue

§ 2.2.2. Characteristics of fixup boxes

Beside their display type, the anonymous boxes created for fixup purposes do not receive any specific or default styling, except where otherwise mentioned by this specification.

This means in particular that their computed background is “transparent”, their computed padding is “0px”, their computed border-style is “none”.

It is also woth reminding that an anonymous box inherits property values through the box tree.

§ 2.2.3. Examples

EXAMPLE 1

```
<div class="row">
  <div class="cell">George</div>
  <div class="cell">4287</div>
  <div class="cell">1998</div>
</div>
```

Here is the associated styles:

```
.row { display: table-row }
.cell { display: table-cell }
```

After fixup, this will produce layout boxes as though this was the initial HTML:

```
<table>
  <tr>
    <td>George</td>
    <td>4287</td>
    <td>1998</td>
  </tr>
</table>
```

EXAMPLE 2

In this example, three table-cell anonymous boxes are assumed to contain the text in the rows. The text inside of the divs with a `display: table-row` are encapsulated in anonymous inline boxes, as explained in visual formatting model:

```
<div class="inline-table">
  <div class="row">This is the top row.</div>
  <div class="row">This is the middle row.</div>
  <div class="row">This is the bottom row.</div>
</div>


.inline-table { display: inline-table; }
.row { display: table-row; }
```

This will produce layout boxes as though this was the initial HTML:

```
<table>
  <tr>
    <td>This is the top row.</td>
  </tr>
  <tr>
    <td>This is the middle row.</td>
  </tr>
  <tr>
    <td>This is the bottom row.</td>
  </tr>
</table>
```

§ 3. Layout

§ 3.1. Core layout principles

Unlike other block-level boxes, tables do not fill their containing block by default. When their 'width' computes to `auto`, they behave as if they had `fit-content` specified instead. This is different from most block-level boxes, which behave as if they had `stretch` instead.

The ***min-content width of a table*** is the width required to fit all of its columns min-content widths and its undistributable spaces.

The ***max-content width of a table*** is the width required to fit all of its columns max-content widths and its undistributable spaces.

If the width assigned to a table is larger than its min-content width, the Available Width Distribution algorithm will adjust column widths in consequence.

This section overrides the general-purpose rules that apply to calculating widths described in other specifications. In particular, if the margins of a table are set to `0` and the width to `auto`, the table will not automatically size to fill its containing block. However, once the used value of `width` for the table is found (using the algorithms given below) then the other parts of those rules do apply. Therefore, a table can be centered using left and right `auto` margins, for instance.

§ 3.2. Table layout algorithm

To layout a table, user agents must apply the following actions:

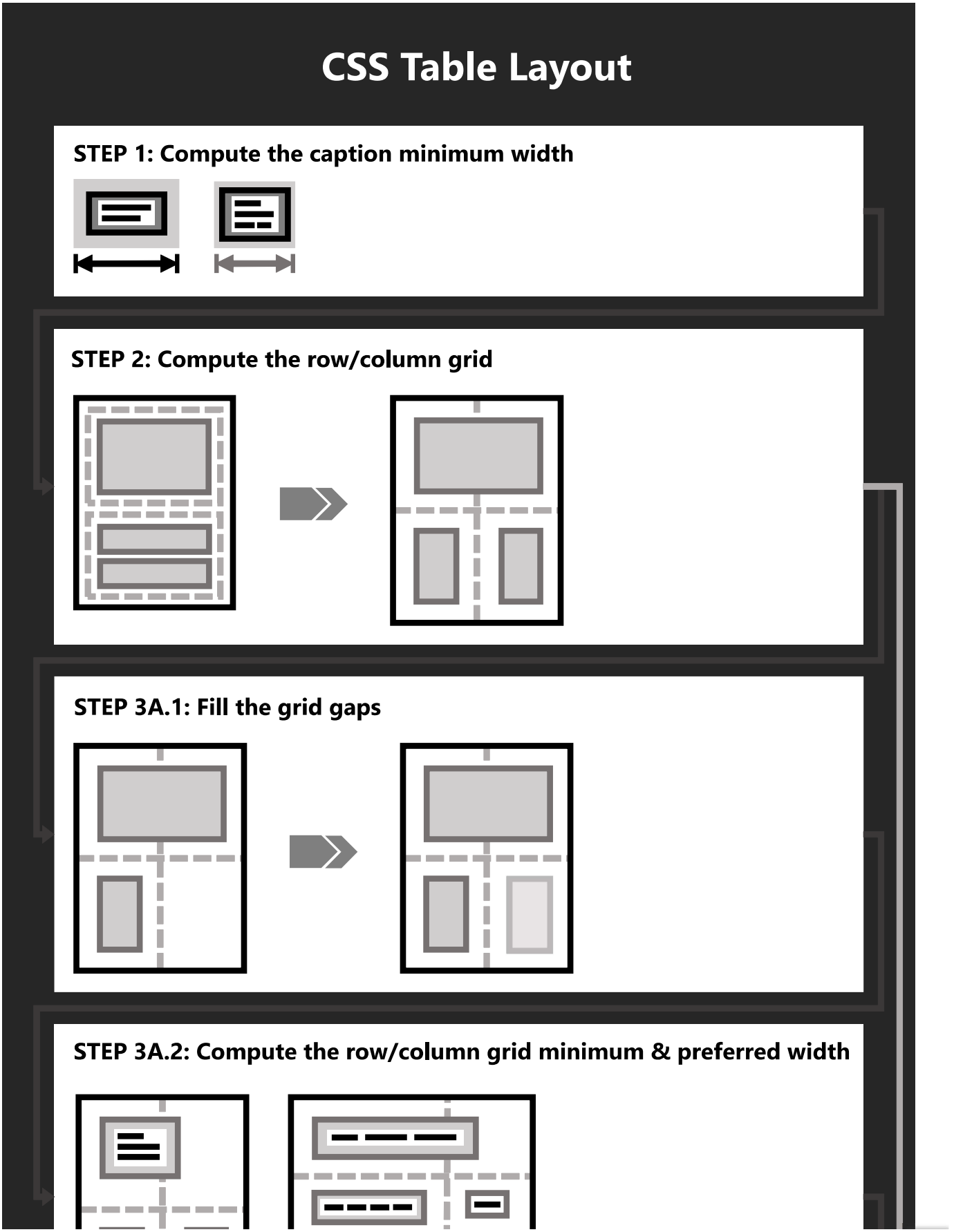
1. **Determine the number of rows/columns the table requires.**
   This is done by executing the steps described in § 3.3 Dimensioning the row/column grid.
2. **[A] If the row/column grid has at least one slot:**
   1. **Ensure each cell slot is occupied by at least one cell.**
      This is done by executing the steps described in § 3.4 Missing cells fixup.
   2. **Compute the minimum width of each column.**
      This is done by executing the steps described in § 3.8 Computing table measures.
   3. **Compute the width of the table.**
      This is done by executing the steps described in § 3.9.1 Computing the table width.
   4. **Distribute the width of the table among columns.**
      This is done by executing the steps described in § 3.9.3 Distribution algorithm.
   5. **Compute the height of the table.**
      This is done by executing the steps described in § 3.10.1 Computing the table height.
   6. **Distribute the height of the table among rows.**
      This is done by executing the steps described in § 3.10.5 Distribution algorithm.

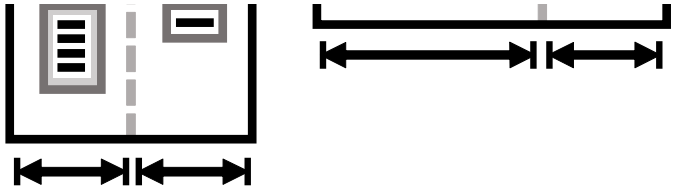
[B] Else, an *empty table* is laid out:

1. **Compute the width of the table.**
   This is done by returning the largest value of CAPMIN and the computed width of the table grid box (including borders and paddings) if it is definite (use zero otherwise).
2. **Compute the height of the table.**
   This is done by returning the sum of all table-caption heights (their width being set to the table width, with margins taken into consideration appropriately) and the computed height of the table grid box (including borders and paddings) if it is definite (use zero otherwise).

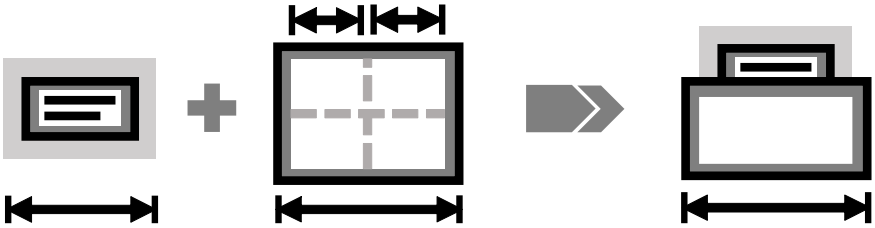
3. **Assign to each table-caption and table-cell their position and size.**
   This is done by running the steps of § 3.11 Positioning of cells, captions and other internal table boxes.

The following schema describes the algorithm in a different way, to make it easier to understand.

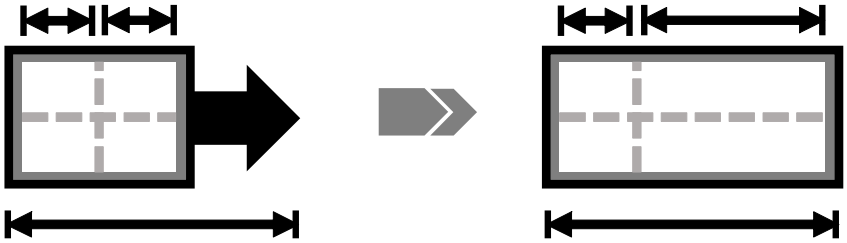




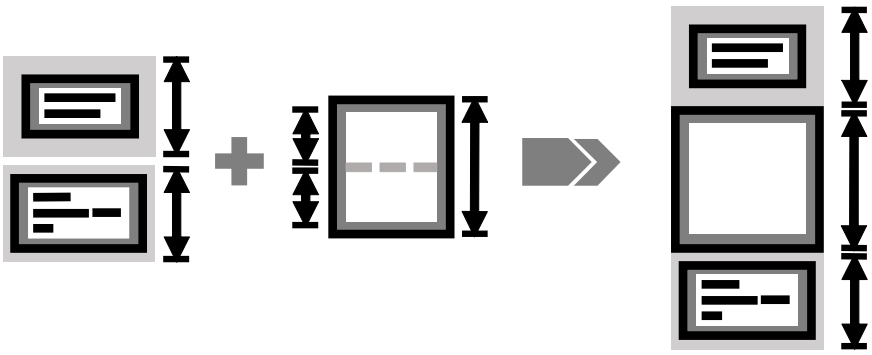
STEP 3A.3: Compute the table width



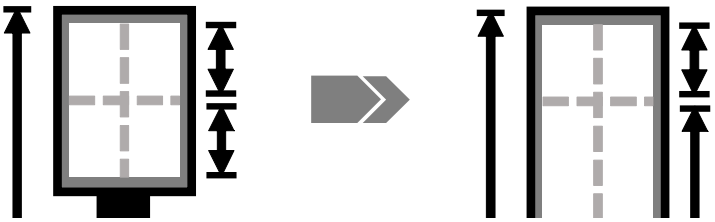
STEP 3A.4: Distribute the table width to columns



STEP 3A.5: Compute the table height



STEP 3A.6: Distribute the table height to rows



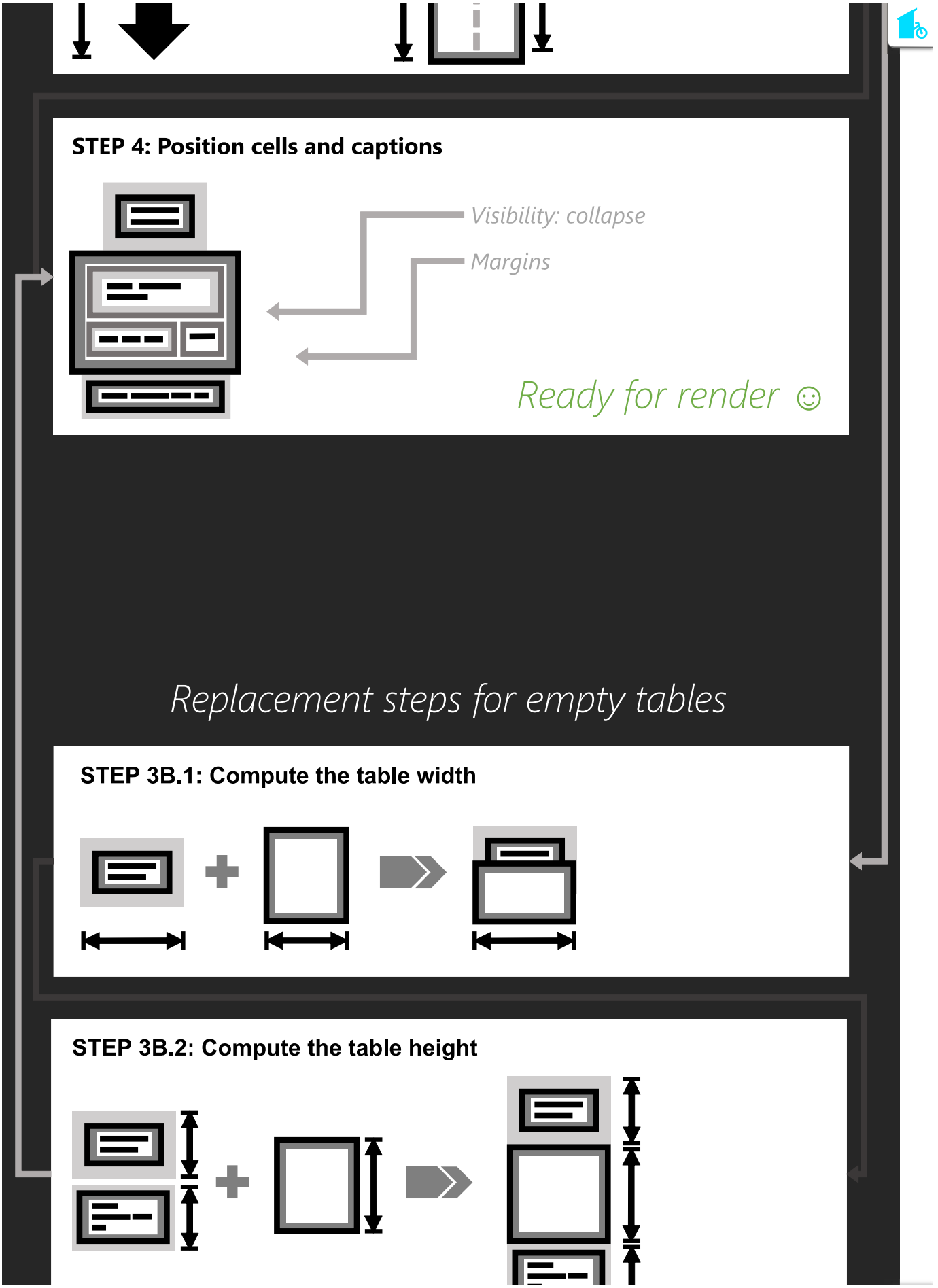

STEP 4: Position cells and captions
Visibility: collapse
Margins
Ready for render ☺
Replacement steps for empty tables
STEP 3B.1: Compute the table width
STEP 3B.2: Compute the table height

Figure 2 *Overview of the table layout algorithm. Not normative.*

§ 3.3. Dimensioning the row/column grid

Like mentioned in the Table structure section, how many rows and columns a table has can be determined from the table structure. Both dimensioning the row/column grid and assigning table-cells their slot(s) in that grid do require running the HTML Algorithms for tables.

§ 3.3.1. HTML Algorithm

> CSS Boxes that do not originate from an HTML table element equivalent to their display type need to be converted to their HTML equivalent before we can apply this algorithm, see below. There is no way to specify the span of a cell in css only in this level of the spec, the use of an HTML td element is required to do so.

Apply the HTML5 Table Formatting algorithm, where boxes act like the HTML element equivalent to their display type, and use the attributes of their originating element if and only if it is an HTML element of the same type (otherwise, they act like if they didn't have any attribute).

EXAMPLE 3

```
<ul class="table">
  <li><b>One</b><i>1</i></li>
  <li><b>Two</b><i>2</i></li>
  <li><b>Three</b><i>3</i></li>
</ul>
<style>
  ul.table { display: table; }
  ul.table > li { display: table-row; }
  ul.table > li > * { display: table-cell; }
</style>
```

produces the same row/column grid as

```
<table><tbody>
  <tr>
    <td></td>
    <td></td>
  </tr>
  <tr>
    <td></td>
    <td></td>
  </tr>
  <tr>
    <td></td>
    <td></td>
  </tr>
</tbody></table>
```

EXAMPLE 4

```
<!-- built using dom api, as this would be fixed by the html parser -->
<grid style="display: table">
  <row style="display: table-row">
    <th rowspan="2">1</th>
    <colgroup style="display: table-cell" span="2" colspan="2">2</colgroup>
  </row>
  <tr>
    <td>A</td>
    <td>B</td>
    <td>C</td>
  </tr>
</grid>
```

produces the same row/column grid as

```
<table>
  <tr>
    <th rowspan="2">1</th>
    <td>2</td>
  </tr>
  <tr>
    <td>A</td>
    <td>B</td>
    <td>C</td>
  </tr>
</table>
```

Note how the second cell of the first row doesn't have ```colspan=2``` applied, because its originating element is not an HTML TD element.

Testcase. !!Testcase. !Test case. !!Test case. !!Test case.

§ 3.3.2. Track merging

> The HTML Table Formatting algorithm sometimes generates more tracks than necessary to layout the table properly. Those tracks have historically been ignored by user agents, so the next step just gets rid of them entirely to avoid dealing with them as exceptions later in the spec. We have tried to maintain the functionality with this change, but if you happen to find any issues due to this change please file an issue.

Modify iteratively the obtained grid by merging consecutive tracks as follows: As long as there exists an eligible track in the obtained row/column grid such that there is no table-column/table-row box defining the said track explicitly, and both the said track and the previous one are spanned by the exact same set of cells, those two tracks must be merged into one single track for the purpose of computing the layout of the table. Reduce the span of the cells that spanned the deleted track by one to compensate, and shift similarly the tracks from which cells originate when needed. (see spanning-ghost-rows test cases)

For tables in auto mode, every track is an ***eligible track*** for the purpose of the track-merging algorithm. For tables in fixed mode, only rows are eligible to be merged that way; which means that every column is preserved.

Finally, assign to the table-root grid its correct number of rows and columns (from its mapped element), and to each table-cell its accurate rowStart/colStart/rowSpan/colSpan (from its mapped element).

§ 3.4. Missing cells fixup

> The following section clarifies and extends the CSS 2.1 statement saying that missing cells are rendered as if an anonymous table-cell box occupied their position in the grid (a "missing cell" is a slot in the row/column grid that is not covered yet by any table-cell box).

Once the amount of columns in a table is known, any table-row box must be modified such that it owns enough cells to fill all the columns of the table, when taking spans into account. New table-cell anonymous boxes must be appended to its rows content until this condition is met.

§ 3.5. Table layout modes

This section covers the flags which modify the way tables are being laid out. There are three major flags for table layout: ‘table-layout’, ‘border-collapse’, and ‘caption-side’. The ‘border-collapse’ flag has an optional ‘border-spacing’ parameter.

§ 3.5.1. The Table-Layout property

Name:	***'table-layout'***
Value:	auto | fixed
Initial:	auto
Applies to:	table grid boxes
Inherited:	no
Percentages:	n/a
Computed value:	specified keyword
Canonical order:	per grammar
Animation type:	discrete

A table-root is said to be laid out ***in fixed mode*** whenever the computed value of the 'table-layout' property is equal to `fixed`, and the specified width of the table root is either a `<length-percentage>`, `min-content` or `fit-content`. When the specified width is not one of those values, or if the computed value of the 'table-layout' property is `auto`, then the table-root is said to be laid out ***in auto mode***.

When a table-root is laid out in fixed mode, the content of its table-cells is ignored for the purpose of width computation, the aggregation algorithm for column sizing considers only table-cells belonging to the first row track, such that layout only depends on the values explicitly specified for the table-columns or cells of the first row of the table; columns with indefinite widths are attributed their fair share of the remaining space after the columns with a definite width have been considered, or 0px if there is no remaining space (see § 3.8.3 Computing Column Measures).

§ 3.5.2. The Border-Collapse property

Name:	***'border-collapse'***
Value:	separate | collapse

Initial:	separate
Applies to:	table grid boxes
Inherited:	yes
Percentages:	n/a
Computed value:	specified keyword
Canonical order:	per grammar
Animation type:	discrete

When the 'border-collapse' property has `collapse` as its value, the borders of adjacent cells are merged together such that each cell draws only half of the shared border. As a result, some other properties like 'border-spacing' will not applied in this case (see § 3.6.2 Overrides applying in collapsed-borders mode), (see § 3.7 Border-collapsing).

A table-root is said to be laid out ***in collapsed-borders mode*** in this case. Otherwhise, the table-root is said to be laid out ***in separated-borders mode***.

§ *3.5.2.1. The Border-Spacing property*

Name:	***'border-spacing'***
Value:	<length>{1,2}
Initial:	0px 0px
Applies to:	table grid boxes when 'border-collapse' is 'separate'
Inherited:	yes
Percentages:	n/a
Computed	two absolute lengths

value:	
Canonical order:	per grammar
Animation type:	by computed value

The lengths specify the distance that separates adjoining cell borders in separated-borders mode, and must not be strictly negative.

If one length is specified, it gives both the horizontal and vertical spacing. If two are specified, the first gives the horizontal spacing and the second the vertical spacing.

See § 3.8.1 Computing Undistributable Space for details on how this affects the table layout.

§ 3.5.3. The Caption-Side property

Name:	***'caption-side'***
Value:	top | bottom
Initial:	top
Applies to:	table-caption boxes
Inherited:	yes
Percentages:	n/a
Computed value:	specified keyword
Canonical order:	per grammar
Animation type:	discrete

This property specifies the position of the caption box with respect to the table grid box. Values have the following meanings:

top
Positions the caption box above the table grid box.

bottom
Positions the caption box below the table grid box.

CSS2 described a different width and horizontal alignment behavior. That behavior was supposed to be introduced in CSS3 using the values `top-outside` and `bottom-outside`. #REF

Gecko also supports the "left" and "right" values, but currently this specification is not attempting to define their implementation of said values.

Gecko has a bug when dealing with multiple captions. !Testcase

EXAMPLE 5

To align caption content horizontally within the caption box, use the 'text-align' property.

In this example, the 'caption-side' property places captions below tables. The caption will be as wide as the parent of the table, and caption text will be left-justified.

```
caption {
  caption-side: bottom;
    width: auto;
    text-align: left
}
```

§ 3.6. Style overrides

Some css properties behave differently inside css tables. The following sections list the exceptions and their effects.

§ 3.6.1. Overrides applying in all modes

The following rules apply to all tables, irrespective of the layout mode in use.

- The computed values of properties ‘position’, ‘float’, ‘margin’-*, ‘top’, ‘right’, ‘bottom’, and ‘left’ on the table are used on the table-wrapper box and not the table grid box; the same holds true for the properties whose use could force the used value of ‘transform-style’ to `flat` (see list) and their shorthands/longhands relatives: this list currently includes ‘overflow’, ‘opacity’, ‘filter’, ‘clip’, ‘clip-path’, ‘isolation’, ‘mask’-*, ‘mix-blend-mode’, ‘transform’-* and ‘perspective’. Where the specified values are not applied on the table grid and/or wrapper boxes, the unset values are used instead for that box (inherit or initial, depending on the property).
- The ‘overflow’ property on the table-root and table-wrapper box, when its value is not either `visible` or `hidden`, is ignored and treated as if its value was `visible`.
- All css properties of table-column and table-column-group boxes are ignored, except when explicitly specified by this specification.
- The ‘margin’, ‘padding’, ‘overflow’ and ‘z-index’ of table-track and table-track-group are ignored.
- The ‘margin’ of table-cell boxes is ignored (as if it was set to 0px).
- The ‘background’ of table-cell boxes are painted using a special background painting algorithm described in § 5.3.2 Drawing cell backgrounds.

§ 3.6.2. Overrides applying in collapsed-borders mode

When a table is laid out in collapsed-borders mode, the following rules apply:

- The ‘padding’ of the table-root is ignored (as if it was set to 0px).
- The ‘border-spacing’ of the table-root is ignored (as if it was set to 0px).
- The ‘border-radius’ of both table-root and table-non-root boxes is ignored (as it it was set to 0px).
- The values used for the layout and rendering of the borders of the table-root and the table-cell boxes it owns are determined using a special conflict resolution algorithm described in § 3.7 Border-collapsing.

§ 3.7. Border-collapsing

This entire section is a proposal to make the rendering of collapsed borders sane. As implementations diverge very visibly, it is expected to require more discussion than some other parts. Since browsers handle this so differently, convergence cannot happen without reimplementation. A major concern for this proposal was to support as many cases as possible, and yet keep the effort required for a new implementation of tables as low as possible.

Background: CSS+HTML allow unprecedented combinations of border modes for table junctions, and it makes it difficult to support all cases properly; in fact some combinations are not well-posed problems, so no rendering algorithm could be optimal.

Because they grew from something simple (HTML) to something very complex (HTML+CSS), the current table rendering models (backgrounds and borders) used by web browsers are insane (in the sense they are buggy, not interoperable and not CSSish at all). Many usual CSS assumptions are broken, and renderings diverge widely.

This proposal aims at fixing this situation.

ISSUE 2 border-collapsing breaking change from 2.1 <https://github.com/w3c/csswg-drafts/issues/604>

§ 3.7.1. Conflict Resolution for Collapsed Borders

When they are laid out in collapsed-borders mode, table-root and table-cell boxes sharing a border attempt to unify their borders so that they render using the same style, width, and color (whenever this is possible). This is accomplished by running the following algorithm.

§ *3.7.1.1. Conflict Resolution Algorithm for Collapsed Borders*

For the purpose of this algorithm, “harmonizing” a set of borders means applying the “Harmonization Algorithm for Collapsed Borders” on the given set of borders, and set those borders' used values to the value resulting from the algorithm, except for cells having a ‘border-image-source’ different from none: those keep their initial values.

For any table-cell C° of a table-root:

- Resolve conflicts with border-right:

0. Let S be an ordered set of table-cell border styles, sorted by cell in RowStart/ColumnStart order; initially, let S contain only C°'s border-right style
1. Add to the set S the border-left style of all cells sharing a section of their left border with C°'s right border
2. Repeat the following two instructions, until no new border style is added to S:
   - For all newly-added left borders from cell C_i having a rowspan greater than one, add to the set S the border-right style of all cells sharing a section of their border-right with C_i's border-left
   - For all newly-added right borders from cell C_i having a rowspan greater than one, add to the set S the border-left style of all cells sharing a section of their border-left with C_i's border-right
3. Harmonize the conflicting borders of S

- Resolve conflicts with border-bottom:
  0. Let S be an ordered set of table-cell border styles, sorted by cell in RowStart/ColumnStart order; initially, let S contain only C°'s border-bottom style
  1. Add to the set S the border-top style of all cells sharing a section of their top border with C°'s bottom border
  2. Repeat the following two instructions, until no new border style is added to S:
     - For all newly-added top borders from cell C_i having a rowspan greater than one, add to the set S the border-bottom style of all cells sharing a section of their bottom border with C_i's top border
     - For all newly-added bottom borders from cell C_i having a rowspan greater than one, add to the set S the border-top style of all cells sharing a section of their top border with C_i's bottom border
  3. Harmonize the conflicting borders of S
- Divide the used width of all borders by two.

> This effect will be compensated at rendering time wherever needed, but is required for layout correctness. (see § 5.3.3.1 Changes in collapsed-borders mode)

Then, for that table-root:

- Harmonize the table-root border-{top,bottom,left,right} with the corresponding border of all cells forming the border of the table (indenpendently), without actually modifying the border properties of the table-root.

If the table and the cell border styles have the same specificity, keep the cell border style. Once this is done, set the table-root border-{…}-width to half the maximum width found during the harmonization processes for that border, then set border-{…}-style to solid, and border-{…}-color to transparent.

Implementations may of course choose to skip some of the steps of the previous algorithm, provided they can prove those have no visible impact on the final results; certain borders are harmonized more than once using the previous steps, but preventing this would make the spec harder to read.

EXAMPLE 6
To help the reader get a better idea of what this algorithm is doing, the main steps of applying the previous algorithm over a sample table have been outlined here:

https://jsfiddle.net/bn3d1sm4/
https://jsfiddle.net/bn3d1sm4/1/
https://jsfiddle.net/bn3d1sm4/2/
…
https://jsfiddle.net/bn3d1sm4/15/

§ *3.7.1.2. Harmonization Algorithm for Collapsed Borders*

For the purpose of this algorithm, “considering” a border’s properties means that “if its properties are more specific than CurrentlyWinningBorderProperties, set CurrentlyWinningBorderProperties to its properties”.

ISSUE 3 Change specificity in harmonization of collapsed borders? <https://github.com/w3c/csswg-drafts/issues/606>

Given an ordered set of border styles (BC_1, BC_2, … located in cells C_1, C_2, …) execute the following algorithm to determine the used value of the border properties for those conflicting borders.

- Set CurrentlyWinningBorderProperties to “border: 0px none transparent”
- For each border BC_i:

- Consider the BC_i border's properties

- If the border separates two columns:
  - For each border BC_i: For each table-column spanned by the C_i cell, if any. Consider the border's properties of any border of the table-column that would be drawn contiguously to BC_i.
  - For each border BC_i: For each table-column-group containing a column spanned by the C_i cell, if any. Consider the border's properties of any border of the table-column-group that would be drawn contiguously to BC_i.
- If the border separates two rows:
  - For each border BC_i: For each table-row spanned by the C_i cell, if any. Consider the border's properties of any border of the table-column that would be drawn contiguously to BC_i.
  - For each border BC_i: For each table-row-group containing a column spanned by the C_i cell, if any. Consider the border's properties of any border of the table-row-group that would be drawn contiguously to BC_i.
- Return CurrentlyWinningBorderProperties

§ *3.7.1.3. Specificity of a border style*

Given two borders styles, the border style having the most specificity is the border style which…

1. … has the value "hidden" as 'border-style', if only one does
2. … has the biggest 'border-width', once converted into css pixels
3. … has the 'border-style' which comes first in the following list:

```
double, solid, dashed, dotted, ridge, outset, groove, inset, none
```

If none of these criterion matches, then both borders share the same specificity.

§ 3.8. Computing table measures

§ 3.8.1. Computing Undistributable Space

The ***undistributable space*** of the table is the sum of the distances between the borders of consecutive table-cells (and between the border of the table-root and the table-cells).

The distance between the borders of two consecutive table-cells is the 'border-spacing', if any.

The distance between the table border and the borders of the cells on the edge of the table is the table's padding for that side, plus the relevant border spacing distance (if any).

> EXAMPLE 7
> For example, on the right hand side, the distance is padding-right + horizontal border-spacing.

§ 3.8.2. Computing Cell Measures

The following terms are parameters of tables or table cells. These parameters encapsulate the differences between tables with different values of 'border-collapse' (separate or collapse) so that the remaining subsections of this section do not need to refer to them differently.

cell intrinsic offsets

The cell intrinsic offsets is a term to capture the parts of padding and border of a table cell that are relevant to intrinsic width calculation. It is a set of computed values for border-left-width, padding-left, padding-right, and border-right-width (along with zero values for margin-left and margin-right) defined as follows:

- In separated-borders mode: the computed horizontal padding and border of the table-cell
- In collapsed-borders mode: the computed horizontal padding of the cell and, for border values, the used border-width values of the cell (half the winning border-width)

table intrinsic offsets

The table intrinsic offsets capture the parts of the padding and border of a table that are relevant to intrinsic width calculation. It is a set of computed values for border-left-width, padding-left, padding-right, and border-right-width (along with zero values for margin-left and margin-right) defined as follows:

- In separated-borders mode: the computed horizontal padding and border of the table-root
- In collapsed-borders mode: the used border-width values of the cell (half the winning border-width)

> The margins are not included in the table intrinsic offsets because handling of margins depends on the 'caption-side' property.

ISSUE 4 Handling of intrinsic offsets when in border collapsing mode <https://github.com/w3c/csswg-drafts/issues/608>

total horizontal border spacing

The total horizontal border spacing is defined for each table:

- For tables laid out in separated-borders mode containing at least one column, the horizontal component of the computed value of the border-spacing property times one plus the number of columns in the table
- Otherwise, 0

offsets-adjusted min-width, width, and max-width

- For table-track and table-track-group boxes, the offsets-adjusted value of width properties is their computed value, irrespective of the value of 'box-sizing' applied on the element.
- For table-cell boxes, the offsets-adjusted value of width properties is their computed value from which the cell's border-{left|right}-width and/or padding-{left|right} have eventually been deduced, depending on the value of 'box-sizing'.

  When the table is laid out in collapsed-borders mode, the border value to deduce is half the value of the winning border value on each side (see conflict resolution explaination note)

Testcase. Testcase. Testcase.

***outer min-content* and *outer max-content* widths**

The outer min-content and max-content widths are defined for table cells, columns, and column groups. The 'width', 'min-width', and 'max-width' values used in these definitions are the offsets-adjusted values defined above:

- The **outer min-content width** of a table-cell is `max('min-width', min-content width)` adjusted by the cell intrinsic offsets.
- The **outer min-content width** of a table-column or table-column-group is `max('min-width', 'width')`.
- The **outer max-content width** of a table-cell in a non-constrained column is `max('min-width', 'width', min-content width, min('max-width', max-content width))` adjusted by the cell intrinsic offsets.
- The **outer max-content width** of a table-cell in a constrained column is `max('min-width', 'width', min-content width, min('max-width', 'width'))` adjusted by the cell intrinsic offsets.

- The **outer max-content width** of a table-column or table-column-group is `max(‘min-width’, min(‘max-width’, ‘width’))`.

percentage contributions

The percentage contribution of a table cell, column, or column group is defined in terms of the computed values of ‘width’ and ‘max-width’ that have computed values that are percentages:

`min(percentage ‘width’, percentage ‘max-width’)`.

If the computed values are not percentages, then `0%` is used for ‘width’, and an `infinite` percentage is used for ‘max-width’.

> Please note that ‘min-width’ is not included in this computation. As a result, a percentage ‘min-width’ is ignored. Since ‘width’ functions like a ‘min-width’ in table layout and column sizing cannot be both length-based and percent-based, authors should not use ‘min-width’ on table-internal boxes and prefer to rely on ‘width’ only instead.

§ 3.8.3. Computing Column Measures

This subsection defines three important values associated with each column of a table: their min-content width (the smallest possible width attributed to this column), their max-content width (the width that would be attributed to the column if no other constraint applied), their intrinsic percentage width (the percentage of the table width the column desires to get, and could end up overriding its max-content width).

> To compute these values, an iterative algorithm is used. First, these values are computed ignoring any cell spanning more than one column. Then, these values are updated by taking into account cells spanning incrementally more columns. When cells that spanned all columns of the table have been considered, this algorithm ends and the values are then finalized.

> For the purpose of measuring a column when laid out in fixed mode, only cells which originate in the first row of the table (after reordering the header and footer) will be considered, if any. In addition, the min-content and max-content width of cells is considered zero unless they are directly specified as a length-percentage, in which case they are resolved based on the table width (if it is definite, otherwise use 0).

For the purpose of calculating the outer min-content width of cells, descendants of table cells whose width depends on percentages of their parent cell' width are considered to have an auto width. Testcase Testcase

min-content width of a column based on cells of span up to 1

The largest of:

- the width specified for the column:
  - the outer min-content width of its corresponding table-column, if any (and not auto)
  - the outer min-content width of its corresponding table-column-group, if any
  - or 0, if there is none
- the outer min-content width of each cell that spans the column whose colSpan is 1 (or just the one in the first row in fixed mode) or 0 if there is none

max-content width of a column based on cells of span up to 1

The largest of:

- the outer max-content width of its corresponding table-column-group, if any
- the outer max-content width of its corresponding table-column, if any
- the outer max-content width of each cell that spans the column whose colSpan is 1 (or just the one in the first row if in fixed mode) or 0 if there is no such cell

intrinsic percentage width of a column based on cells of span up to 1

The largest of the percentage contributions of each cell that spans the column whose colSpan is 1, of its corresponding table-column (if any), and of its corresponding table-column-group (if any)

min-content width of a column based on cells of span up to N (N > 1)

the largest of the min-content width of the column based on cells of span up to N-1 and the contributions of the cells in the column whose colSpan is N, where the contribution of a cell is the result of taking the following steps:

1. Define the baseline min-content width as the sum of the max-content widths based on cells of span up to N-1 of all columns that the cell spans.
2. Define the baseline border spacing as the sum of the horizontal border-spacing for any columns spanned by the cell, other than the one in which the cell originates.
3. The contribution of the cell is the sum of:
   - the min-content width of the column based on cells of span up to N-1
   - the product of:
     - the ratio of:

- the max-content width of the column based on cells of span up to N-1 o the column minus the min-content width of the column based on cells of span up to N-1 of the column, to
- the baseline max-content width minus the baseline min-content width

or zero if this ratio is undefined, and

- the outer min-content width of the cell minus the baseline min-content width and the baseline border spacing, clamped to be at least 0 and at most the difference between the baseline max-content width and the baseline min-content width

- the product of:
  - the ratio of the max-content width based on cells of span up to N-1 of the column to the baseline max-content width
  - the outer min-content width of the cell minus the baseline max-content width and baseline border spacing, or 0 if this is negative

max-content width of a column based on cells of span up to N (N > 1)

The largest of the max-content width based on cells of span up to N-1 and the contributions of the cells in the column whose colSpan is N, where the contribution of a cell is the result of taking the following steps:

1. Define the baseline max-content width as the sum of the max-content widths based on cells of span up to N-1 of all columns that the cell spans.
2. Define the baseline border spacing as the sum of the horizontal border-spacing for any columns spanned by the cell, other than the one in which the cell originates.
3. The contribution of the cell is the sum of:
   - the max-content width of the column based on cells of span up to N-1
   - the product of:
     - the ratio of the max-content width based on cells of span up to N-1 of the column to the baseline max-content width
     - the outer max-content width of the cell minus the baseline max-content width and the baseline border spacing, or 0 if this is negative

intrinsic percentage width of a column based on cells of span up to N (N > 1)

If the intrinsic percentage width of a column based on cells of span up to N-1 is greater than 0%, then the intrinsic percentage width of the column based on cells of span up to N is the same as the intrinsic percentage width of the column based on cells of span up to N-1.

Otherwise, it is the largest of the contributions of the cells in the column whose colSpan is N, where the contribution of a cell is the result of taking the following steps:

1. Start with the percentage contribution of the cell.
2. Subtract the intrinsic percentage width of the column based on cells of span up to N-1 of all columns that the cell spans. If this gives a negative result, change it to 0%.
3. Multiply by the ratio of
   - the column's non-spanning max-content width to
   - the sum of the non-spanning max-content widths of all columns spanned by the cell that have an intrinsic percentage width of the column based on cells of span up to N-1 equal to 0%.

   However, if this ratio is undefined because the denominator is zero, instead use the 1 divided by the number of columns spanned by the cell that have an intrinsic percentage width of the column based on cells of span up to N-1 equal to zero.

min-content width of a column

the min-content width of the column based on cells of span up to N, where N is the number of columns in the table

max-content width of a column

the max-content width of the column based on cells of span up to N, where N is the number of columns in the table

intrinsic percentage width of a column

the smaller of:

- the intrinsic percentage width of the column based on cells of span up to N, where N is the number of columns in the table
- 100% minus the sum of the intrinsic percentage width of all prior columns in the table (further left when direction is "ltr" (right for "rtl")) Testcase

> The clamping of the total of the intrinsic percentage widths of columns to a maximum of 100% means that the table layout algorithm is not invariant under switching of columns.

constrainedness

A column is constrained if its corresponding table-column-group (if any), its corresponding table-column (if any), or any of the cells spanning only that column has a computed 'width' that is not "auto", and is not a percentage.

In a future revision of this specification, this algorithm will need to account for character-alignment of cells ('<string>' values of the 'text-align' property). This requires (based on the 9 March 2011 editor's draft of css3-text) separately tracking max-content widths for the part of the column before the center of the alignment string and the part of the column after the center of the alignment string. For tracking min-content widths, there are two options: either not track them, or track three values: two values as for max-content widths for any cells that do not have break points in them, and a fourth value for any cells that do have break points in them (and to which character alignment is therefore not mandatory).

ISSUE 5 EDITORIAL. The way this describes distribution of widths from colspanning cells is wrong. For min-content and max-content widths it should refer to the rules for distributing excess width to columns for intrinsic width calculation.

§ 3.9. Available Width Distribution

§ 3.9.1. Computing the table width

Before deciding on the final width of all columns, it is necessary to compute the width of the table itself.

As noted before, this would usually be the sum of preferred width of all columns, plus any extra. In this case, the width distribution will result in giving each column its preferred width. There are however a few cases where the author asks for some other width explicitly, as well as a few cases where the table cannot be given the width it requires.

The ***caption width minimum (CAPMIN)*** is the largest of the table captions min-content contribution.

The ***row/column-grid width minimum (GRIDMIN)*** width is the sum of the min-content width of all the columns plus cell spacing or borders.

The ***row/column-grid width maximum (GRIDMAX)*** width is the sum of the max-content width of all the columns plus cell spacing or borders.

The ***used min-width of a table*** is the greater of the resolved 'min-width', CAPMIN, and GRIDMIN.

The ***used width of a table*** depends on the columns and captions widths as follows:

- If the table-root's 'width' property has a computed value (resolving to ***resolved-table-width***) other than `auto`, the used width is the greater of resolved-table-width, and the used min-width of the table.

  > If the used width is greater than GRIDMIN, the extra width should be distributed over the columns. See § 3.9 Available Width Distribution.

- If the table-root has 'width: auto', the used width is the greater of min(GRIDMAX, the table's containing block width), the used min-width of the table.

The ***assignable table width*** is the used width of the table minus the total horizontal border spacing (if any). This is the width that we will be able to allocate to the columns.

> In this algorithm, rows (and row groups) and columns (and column groups) both constrain and are constrained by the dimensions of the cells they contain. Setting the width of a column might indirectly influence the height of a row, and vice versa.

§ 3.9.2. Core distribution principles

This section is not normative.

§ *3.9.2.1. Rules*

Ideally, each column should get its preferred width (usually its max-content width). However, the assignable table width calculated before could be either too big or too small to achieve this result, in which case the user agent must assign adhoc widths to columns as described in the width distribution algorithm.

This algorithm follows three rules when determining a column's used width:

Rule 0: In fixed mode, auto and percentages columns are assigned a minimum width of zero pixels, and percentage resolution follows a different set of rules, whose goal is to ensure pixel columns always get assigned their preferred width.

Rule 1: When assigning preferred widths, specified percent columns have a higher priority than specified unit value columns, which have a higher priority than auto columns.

Rule 2: Columns using the same sizing type (percent columns, pixel columns, or auto columns) follow the same distribution method. For example, they all get their min-

content width or they all get their max-content width.

> There is one exception to this rule. When giving its preferred percent width to a percent-column, if that would result in a size smaller than its min-content width, the column will be assigned its min-content width instead though the percent-columns group as a whole is still regarded as being assigned the preferred percent widths.

Rule 3: The sum of width assgined to all columns should be equal to the assignable table width.

§ *3.9.2.2. Available sizings*

All three types of columns have the following possible used widths.

1. min-content width:
   The size required to fit the content of the column
2. min-content width + delta:
   A value between the min-content and preferred widths
3. preferred width:
   The size specified for the column, or the size required to fit the content of the column without breaking
4. preferred width + delta
   A value larger than the preferred width

The distribution algorithm defines those values and explains when to use them.

§ **3.9.3. Distribution algorithm**

When a table is laid out at a given used width, the used width of each column must be determined as follows, eventually after considering the changes to this algorithm applied in fixed mode.

First, each column of the table is assigned a ***sizing type***:

- ***percent-column***:
  a column whose any constraint is defined to use a percentage only (with a value different from 0%)

- ***pixel-column***:
  column whose any constraint is defined to use a defined length only (and is not a percent-column)
- ***auto-column***:
  any other column

Then, valid sizing methods are to be assigned to the columns by sizing type, yielding the following sizing-guesses:

1. The ***min-content sizing-guess*** is the set of column width assignments where each column is assigned its min-content width.
2. The ***min-content-percentage sizing-guess*** is the set of column width assignments where:
   - each percent-column is assigned the larger of:
     - its intrinsic percentage width times the assignable width and
     - its min-content width.
   - all other columns are assigned their min-content width.
3. The ***min-content-specified sizing-guess*** is the set of column width assignments where:
   - each percent-column is assigned the larger of:
     - its intrinsic percentage width times the assignable width and
     - its min-content width
   - any other column that is constrained is assigned its max-content width
   - all other columns are assigned their min-content width.
4. The ***max-content sizing-guess*** is the set of column width assignments where:
   - each percent-column is assigned the larger of:
     - its intrinsic percentage width times the assignable width and
     - its min-content width
   - all other columns are assigned their max-content width.

> Note that:
>
> - The assignable table width is always greater than or equal to the table width resulting from the min-content sizing-guess.
> - The widths for each column in the four sizing-guesses (min-content, min-content-percentage, min-content-specified, and max-content) are in nondecreasing order.

If the assignable table width is less than or equal to the max-content sizing-guess, the used width of the columns must be the linear combination (with weights adding to 1) of the two consecutive sizing-guesses whose width sums bound the available width.

Otherwise, the used widths of the columns are the result of starting from the max-content sizing-guess and distributing the excess width to the columns of the table according to the rules for distributing excess width to columns (for used width).

The following schema describes the algorithm in a different way, to make it easier to understand.

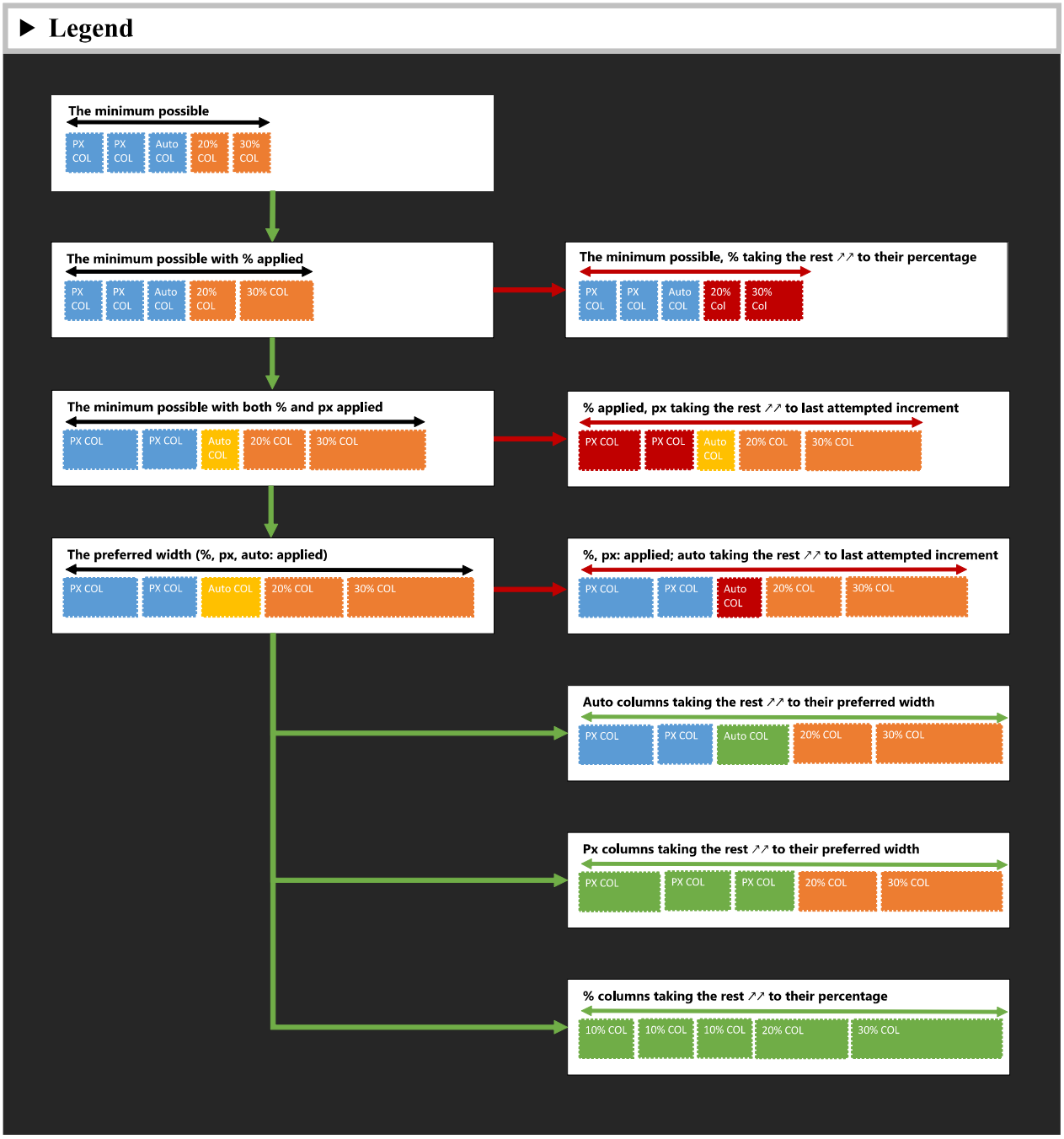


Figure 3 *Overview of the width distribution algorithm. Not normative.*

§ *3.9.3.1. Changes to width distribution in fixed mode*

The following changes to previous algorithm apply in fixed mode:

- The min-content width of percent-columns and auto-columns is considered to be zero

- Cells ignore their border and padding size if their width is a percentage ('box-sizing' is ignored)
- If, when percentages are resolved based on the assignable table width, the sum of columns widths based on this resolution would exceed the assignable table width, they are instead to be resolved relative to their percentage value such that the sum of columns width meets the assignable table width exactly.
- Columns whose size is computed as a sum of a percentage and a pixel length must be sized as if they counted as two columns, one with the pixel value, the other with the percentage value. This is different from resolving the percentage away, because of how width distribution works for percentage-based columns.

§ *3.9.3.2. Distributing excess width to columns*

The rules for ***distributing excess width to columns*** can be invoked in two ways:

- for distributing the excess width of a table to its columns during the computation of the used widths of those columns (for used width calculation), or
- for distributing the excess max-content or min-content width of a cell spanning more than one column to the max-content or min-content widths of the columns it spans (for intrinsic width calculation).

The rules for these two cases are largely the same, but there are slight differences.

The remainder of this section uses the term ***distributed width*** to refer to the one of these widths that is being distributed, and the ***excess width*** is used to refer to the amount by which the width being distributed exceeds the sum of the distributed widths of the columns it is being distributed to.

1. If there are non-constrained columns that have originating cells with intrinsic percentage width of 0% and with nonzero max-content width *(aka the columns allowed to grow by this rule)*, the distributed widths of the columns allowed to grow by this rule are increased in proportion to max-content width so the total increase adds to the excess width.
2. Otherwise, if there are non-constrained columns that have originating cells with intrinsic percentage width of 0% *(aka the columns allowed to grow by this rule, which thanks to the previous rule must have zero max-content width)*, the distributed widths of the columns allowed to grow by this rule are increased by equal amounts so the total increase adds to the excess width.

3. Otherwise, if there are constrained columns with intrinsic percentage width of 0% and with nonzero max-content width *(aka the columns allowed to grow by this rule, which, due to other rules, must have originating cells)*, the distributed widths of the columns allowed to grow by this rule are increased in proportion to max-content width so the total increase adds to the excess width.
4. Otherwise, if there are columns with intrinsic percentage width greater than 0% *(aka the columns allowed to grow by this rule, which, due to other rules, must have originating cells)*, the distributed widths of the columns allowed to grow by this rule are increased in proportion to intrinsic percentage width so the total increase adds to the excess width.
5. Otherwise, if there is any such column, the distributed widths of all columns that have originating cells are increased by equal amounts so the total increase adds to the excess width.
6. Otherwise, the distributed widths of all columns are increased by equal amounts so the total increase adds to the excess width.

These rules do not apply when the table is laid out in fixed mode. In this case, the simpler rules that follow apply instead:

- If there are any columns with no width specified, the excess width is distributed in equally to such columns
- otherwise, if there are columns with non-zero length widths from the base assignment, the excess width is distributed proportionally to width among those columns
- otherwise, if there are columns with non-zero percentage widths from the base assignment, the excess width is distributed proportionally to percentage width among those columns
- otherwise, the excess width is distributed equally to the zero-sized columns

§ 3.10. Available Height Distribution

§ 3.10.1. Computing the table height

?Testcase ?Testcase ?Testcase

The **height of a table** is the sum of the row heights plus any cell spacing or borders. If the table has a 'height' property with a value other than auto, it is treated as a minimum height for the table grid, and will eventually be distributed to the height of the rows if their collective minimum

height ends up smaller than this number. If their collective size ends up being greater than the specified 'height', the specified 'height' will have no effect.

The **minimum height of a row** is the maximum of:

- the computed 'height' (if definite, percentages being considered 0px) of its corresponding table-row (if nay)
- the computed 'height' of each cell spanning the current row exclusively (if definite, percentages being treated as 0px), and
- the minimum height (ROWMIN) required by the cells spanning the row.

ROWMIN is defined as the sum of the minimum height of the rows after a first row layout pass.

To compute the **height of a table**, it is therefore necessary to perform a first-pass layout on all its rows, compute the sum of all minimum row heights plus spacings/borders, and return the greater of either that value or the table-root specified 'height' (min-height).

Once the table height has been determined, rows will usually get a second layout pass (where their cells' heights are no longer considered auto), then height distribution will happen to adjust their heights to collectively meet the table height, then table-cell descendants might get a second layout (where their percentage heights are resolved).

§ 3.10.2. Row layout (first pass)

The **minimum height of a row** (without spanning-related height distribution) is defined as the height of an hypothetical linebox containing the cells originating in the row and where cells spanning multiple rows are considered having a height of 0px (but their correct baseline). In this hypothetical linebox, cell heights are considered auto, their width (including borders and paddings) is forced to the widths and inner spacings of the columns they span, but their other properties are conserved.

For the purpose of calculating this height, descendants of table cells whose height depends on percentages of their parent cell' height (see section below) are considered to have an auto height if they have 'overflow' set to `visible` or `hidden` or if they are replaced elements, and a 0px height if they have not. Testcase !!Testcase

> For table-cell descendants whose percentage height was ignored as a result of the above, a second layout pass of the table-cell content will happen once height distribution has concluded to attempt to properly take this sizing into account (see section below)

The ***baseline of a cell*** is defined as the baseline of the first in-flow line box in the cell, or the firs in-flow table-row in the cell, whichever comes first. If there is no such line box or table-row, the baseline is the bottom of content edge of the cell box.

EXAMPLE 8

Here is how this works out in practice:

```
td { vertical-align: baseline; outline: 3px solid silver; }
img { float: left; clear: left; width: 32px; height: 32px; }
img[title] { float: none; }

<table><tr>
  <td>Baseline</td>
  <td>Baseline<table><tr><td>After</td></tr></table></td>
  <td><table><tr><td>Baseline</td></tr></table>After</td>
  <td><table align=right><tr><td>Before</td></tr></table><p>Baseline</p></td
  <td><img src="http://w3.org/favicon.ico" /><p>Baseline</p></td>
  <td><img src="http://w3.org/favicon.ico" title="Baseline"/><br/><img src="h
  <td><img src="http://w3.org/favicon.ico" /><img src="http://w3.org/favicon
</tr></table>
```

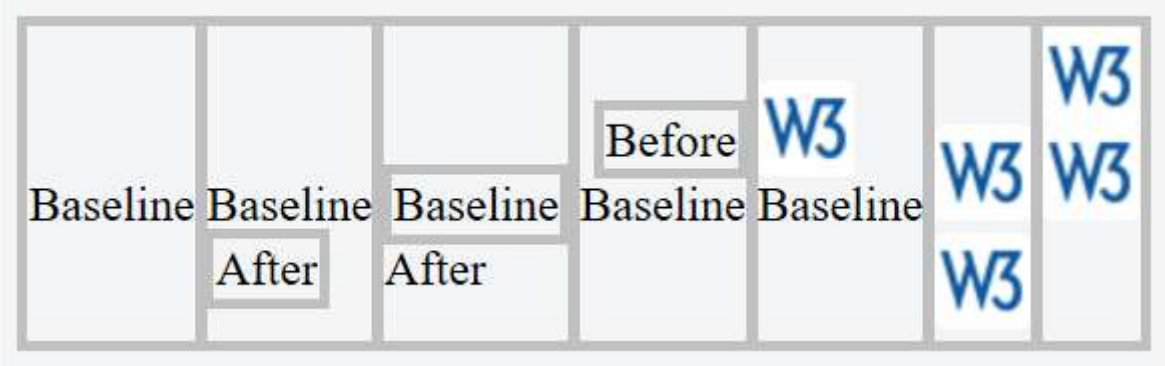


Figure 4 *Rendering of this example in a compliant browser*

For the purposes of finding a baseline, in-flow boxes with a scrolling mechanisms (see the 'overflow' property) must be considered as if scrolled to their origin position.

The baseline of a cell may end up below its bottom border, see the example below.

EXAMPLE 9

The cell in this example has a baseline below its bottom border:

```
div { height: 0; overflow: hidden; }

<table>
<tr>
<td>
<div> Test </div>
</td>
</tr>
</table>
```

The ‘vertical-align’ property of each table cell determines its alignment within the row. Each cell’s content has a baseline, a top, a middle, and a bottom, as does the row itself.

In the context of table cells, values for ‘vertical-align’ have the following meanings:

baseline	The baseline of the cell is aligned with the baseline of the other cells of the first row it spans (see the definition of baselines of cells and rows).
top	The top of the cell box is aligned with the top of the first row it spans.
bottom	The bottom of the cell box is aligned with the bottom of the last row it spans.
middle	The center of the cell is aligned with the center of the rows it spans.
...	Other values do not apply to cells; the cell is aligned at the baseline instead.

The maximum distance between the top of the cell box and the baseline over all cells that have 'vertical-align: baseline' is used to set the ***baseline of the row***. If a row doesn’t have any cell that has 'vertical-align: baseline', the baseline of that row is the bottom content edge of the lowest cell in the row.

The ***baseline of a table-root*** is the baseline of its first row, if any. Otherwise, it is the bottom content edge of the table-root.

Testcase !!Testcase

To avoid ambiguous situations, the alignment of cells proceeds in the following order:

- First the cells that are aligned on their baseline are positioned. This will establish the baseline of the row.
- Next the cells with 'vertical-align: top' are positioned. The row now has a top, possibly a baseline, and a provisional height, which is the distance from the top to the lowest bottom of the cells positioned so far.
- If any of the remaining cells, those aligned at the bottom or the middle, have a height that is larger than the current height of the row, the height of the row will be increased to the maximum of those cells, by lowering the bottom.
- Finally, assign their position to the remaining cells.

EXAMPLE 10

Example showing how the previous algorithm creates the various alignment lines of a row.

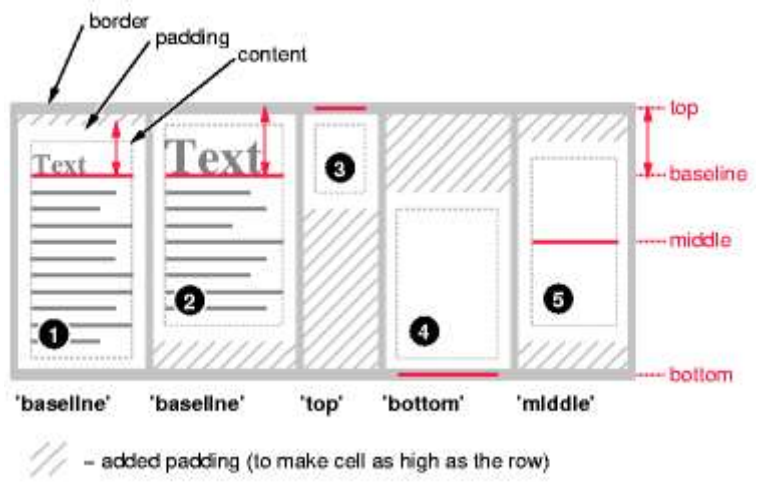


Figure 5 *Diagram showing the effect of various values of 'vertical-align' on table cells. Cell boxes 1 and 2 are aligned at their baselines. Cell box 2 has the largest height above the baseline, so that determines the baseline of the row.*

Since during row layout the specified heights of cells in the row were ignored and cells that were spanning more than one rows have not been sized correctly, their height will need to be eventually distributed to the set of rows they spanned. This is done by running the same algorithm as the column measurement, with the span=1 value being initialized (for min-content) with the largest of the resulting height of the previous row layout, the height specified on the

corresponding table-row (if any), and the largest height specified on cells that span this row only (the algorithm starts by considering cells of span 2 on top of that assignment).

ISSUE 6 EDITORIAL. Import the relevant section of § 3.8.3 Computing Column Measures here.

Rows that see their size increase as a result of applying these steps adjust by lowering their bottom.

The cells whose position depended on the bottom of any updated row must be positioned correctly again in their respective rows.

At this point, cell boxes that are smaller than the collective height of the rows they span receive extra top and/or bottom padding such that their content does not move vertically but their top/bottom edges meet the ones of the first/last row they span.

Please note that heights being defined on row groups are being ignored by this algorithm

§ 3.10.3. Row layout (second pass)

Once the table height has been determined, a second row layout pass will be performed, if necessary, to assign the correct minimum height to table rows, by taking percentages used in rows/cells specified 'height' into account. Other than that, all instructions for the first-pass row layout apply (see above).

Please note that this second-pass minimum height therefore still treats percentage heights of table-cell descendants as advised for the first pass (see above). For this reason, it is not required to relayout the content of table-cells to compute the new row minimum height. If necessary, table-cell content will undergo a relayout later, after table height distribution has concluded (see below).

Then, if the sum of the new heights of the table rows after this second pass is different from what is needed to fill the table height previously determined, the height distribution algorithm defined below is applied (either to shrink rows by sizing them intermediately between their first-pass minimum height and their second-pass one, or to increase the heights of all rows beyond their

second-pass minimum height to fill the available space; in neither case, this will have an impact on the baseline of the rows).

§ 3.10.4. Core distribution principles

ISSUE 7 EDITORIAL. TODO. For current proposal, skip to § 3.10.5 Distribution algorithm.

▶ **Investigations on height distribution**

§ 3.10.5. Distribution algorithm

The first step is to attribute to each row its base size and its reference size.

Its **base size** is the size it would have got if the table didn't have a specified height (the one it was assigned when ROWMIN was evaluated).

Its **reference size** is the largest of

- its initial base height and
- its new base height (the one evaluated during the second layout pass, where percentages used in rowgroups/rows/cells' specified heights were resolved according to the table height, instead of being ignored as 0px).

The second step is to compute the final height of each row based on those sizes.

If the table height is equal or smaller than sum of reference sizes, the final height assigned to each row will be the weighted mean of the base and the reference size that yields the correct total height.

Else, if the table owns any "auto-height" row (a row whose size is only determined by its content size and none of the specified heights), each non-auto-height row receives its reference height and auto-height rows receive their reference size plus some increment which is equal to the height missing to amount to the specified table height divided by the amount of such rows.

Else, all rows receive their reference size plus some increment which is equal to the height missing to amount to the specified table height divided by the amount of rows.

The cells whose position depended on the bottom of any updated row must be positioned correctly again in their respective rows.

At this point, cell boxes that are smaller than the collective height of the rows they span receive extra top and/or bottom padding such that their content does not move vertically but their top/bottom edges meet the ones of the first/last row they span.

§ 3.10.6. Table-cell content layout (second pass)

Once table-height distribution has concluded, and the sum of row heights plus spacing/border is equal to the table height, the content of table-cells which contained descendants whose percentage heights were ignored or treated as 0px by the first-pass row layout rules (see above) must undergo a second layout pass, as defined below.

Note that this means UAs are either required to keep track of the usage of percentages in the properties of any direct child of the table-cell including (but not limited to) the 'height' and 'min-height' properties for horizontal flows and the 'width' and 'min-width' properties for vertical flows, or else required to perform this second layout pass on table-cell content in all cases.

Resolve percentage heights in table-cell content: Once the final size of the table and the rows has been determined, after height distribution has concluded, the content of the table-cells must also go through a second layout pass, where, if appropriate, percentage-based heights are this time resolved against their parent cell used height.

It is appropriate to resolve percentage heights on direct children of a table-cell if the cell is considered to have its height specified explicitly or the child is absolutely positioned, see CSS 2.

For compat reasons, it is further clarified that a cell is considered to have its height specified explicitly if the computed height of the cell is a length, or if the computed height of its table-root ancestor is a length or percentage, regardless of whether that percentage does behave as auto or not.

EXAMPLE 11

To clarify the preceding statements, here is a table of the resulting "A" div height based on the value being used:

```
<section style="height: var(--wrapper-height)">
  <table style="height: var(--table-height)">
    <tr>
      <td style="height: var(--table-cell-height)">

        <div style="height:100%; background:yellow">A</div>

      </td>
      <td style="height: var(--other-table-cell-height)">

        B<br>C

      </td>
    </tr>
  </table>
</section>
```

--table-cell-height	--table-height	result
<length>	*<any>*	
<any>	<length>	
<any>	<percentage>	
auto	auto	
<percentage>	auto	

Note that neither `--other-table-cell-height` nor `--wrapper-height` do influence the algorithm's outcome.

A previous version of this specification incorrectly stated that `--wrapper-height` was taken into account when the table had a percentage height, but compat issues appeared when an implementation landed, and the behavior was then special-cased.

It is possible that this second layout pass (where height percentages are being resolved) will make some cell contents overflow their parent cell, for instance if the sum of all percentages used is superior to 100%. This is by design.

§ 3.11. Positioning of cells, captions and other internal table boxes

ISSUE 8 We need a resolution on what visibility:collapse does. <https://github.com/w3c/csswg-drafts/issues/478>

Once the width of each column and the height of each row of the table grid has been determined, the final step of algorithm is to assign to each table-internal box its final position.

The width/height/left/top calculated below define the dimensions of the CSS Layout Box, which means that they are accessible via the offset* properties defined in CSSOM-VIEW, (currently limited to css boxes for which you can obtain a corresponding HTMLElement reference).

The table-wrapper box is then sized such that it contains the margin box of all table-non-root boxes as well as the table-root border-box.

The position defined here is the position of the children inside the space reserved for the table-wrapper, which excludes only its margins. This is because the captions of the table are located outside the border-box area of the table-root.

The **position of any table-caption having "top" as 'caption-side'** within the table is defined as the rectangle whose:

- width/height is:
  - the width/height assigned to the caption during layout
- top location is the sum of:
  - the height reserved for previous top captions (including margins), if any
  - any necessary extra top margin remaining after collapsing margins with the previous caption, if any.
- left location is the sum of:
  - the margin left of the caption
  - half of (the table width minus the width of caption and its total horizontal margin).

The **position of any table-cell, table-track, or table-track-group box** within the table is defined as the rectangle whose:

- width/height is the sum of:
  - the widths/heights of all spanned visible columns/rows
  - the horizontal/vertical 'border-spacing' times the amount of spanned visible columns/rows minus one
- left/top location is the sum of:
  - for top: the height reserved for top captions (including margins), if any
  - the padding-left/padding-top and border-left-width/border-top-width of the table

- the widths/heights of all previous visible columns/rows
- the horizontal/vertical 'border-spacing' times the amount of previous visible columns/rows plus one

Reminder: For table-track and table-track-group boxes, all tracks of the opposite direction to the grouping are considered spanned. For instance, a table-header-group is considered to span all the columns, and a table-column-group is considered to span all the rows.

The above formula take in account 'border-spacing', and it might not be directly obvious what the effect of these mean, so here are a couple of properties of those formula:

- the border-spacing before the first track or after the last track in a direction is not included in any track's or track-group's breadth.
- the border-spacing between tracks is not included in any track's breadth, but is included in the breadth of track-groups spanning both tracks.

The **position of any table-caption having "bottom" as 'caption-side'** within the table is defined as the rectangle whose:

- width/height is:
  - the width/height assigned to the caption during layout
- top location is the sum of:
  - the height reserved for top captions (including margins), if any
  - padding-top and border-top-width of the table
  - the height of all visible rows
  - padding-bottom and border-bottom-width of the table
  - the height reserved for previous bottom captions (including margins), if any
  - any necessary extra top margin remaining after collapsing margins with the previous bottom caption, if any.
- left location is the sum of:
  - the margin left of the caption
  - half of (the table width minus the width of caption and its total horizontal margin).

Cell overflow: If the table is laid out in fixed mode, if the content of some cell has grown more than the cell during its second layout pass or if some tracks spanned by visible cells are deemed not visible, the content of some cells may exceed the available space, and cause an overflow. Such overflow should behave exactly like if the cell was an absolutely positioned display:block box with the appropriate alignment in place to keep its content in place relative to its inline-start block-start corner (usually top left). !Testcase !Testcase Testcase

Visible tracks: For the purpose of this algorithm, a column or row is considered a ***visible track*** if neither its corresponding table-track nor its table-track-group parent (if any) have 'visibility' set to `collapse`.

EXAMPLE 12

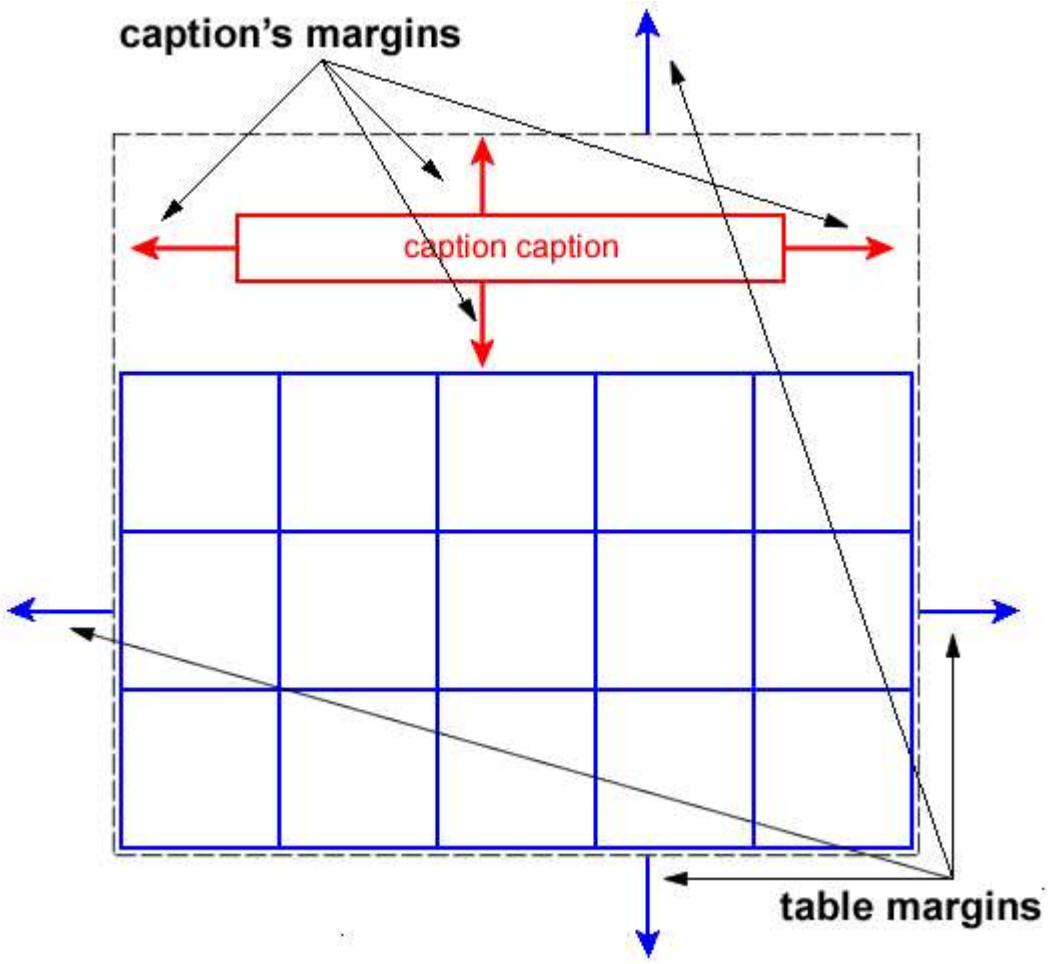


Figure 6 *Diagram of a table with a caption above it.*

~Testcase !!Testcase !!Testcase !!Testcase Testcase

§ 4. Absolute Positioning

§ 4.1. With a table-root as containing block

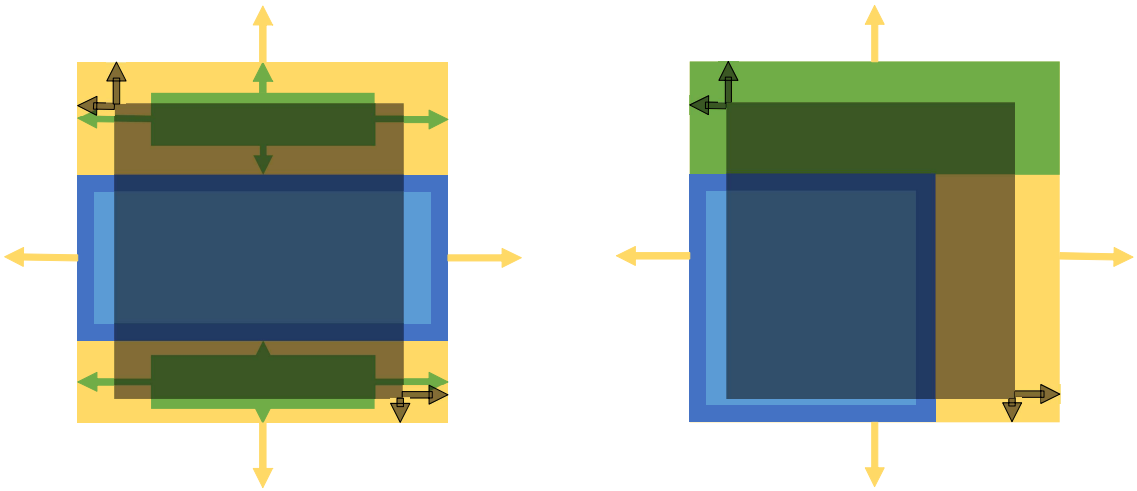
If an absolutely positioned element's containing block is generated by a table-wrapper box, the containing block corresponds to the area around which the table margins are applied, including the area where the table border is drawn and the margin area of any table-caption. The offset properties ('top'/'right'/'bottom'/'left') then indicate offsets inwards from the corresponding edges of this containing block, as normal.

Absolute positioning occurs after layout of the table and its in-flow contents, and does not contribute to the sizing of any table grid tracks or affect the size/configuration of the table grid in any way.

EXAMPLE 13

Figure 7 The figure below shows how a box absolutely-positioned relative to a table should be rendred.

The **yellow** area is the table content edge, yellow arrows the table margins.
The **green** area is the table caption, green arrows the caption margins.
The **blue** area is the table background area, and the darker blue area where the table border area.
The **black** area is the descendant positioned relative to the table, the arrows represent the top/left/bottom/right displacements.



§ 4.2. With a table-internal as containing block

If an absolutely positioned element's containing block is generated by a table-internal, the containing block corresponds to the area starting at the top left corner of the the area that would be assigned to the box during layout but whose size is computed to be the one of the area that would be assigned to the box during layout if all tracks were considered visible (irrespective of 'visibility' being set co collapse on some boxes), not including borders and paddings as appropriate.

This is done so that hiding column does not trigger a layout in the absolutely-positioned boxes, and the content being clipped doesn't seem to be moving. !!Testcase !!Testcase

The offset properties ('top'/'right'/'bottom'/'left') then indicate offsets inwards from the corresponding edges of this containing block, as normal.

ISSUE 9 This only works in Firefox. It would make it easier to implement position:sticky in the future, though. [Chrome bug] [Interop risk: Firefox bug] <https://github.com/w3c/csswg-drafts/issues/858>

§ 4.3. With a table-internal box as non-containing block parent

The only influence of non-containing block parent of an absolutely-positioned box is to define its static position, in case both top+bottom and/or left+right end up being auto.

For table-cells, the absolutely-positioned content is positioned follows the rules for block layout as usual.

Due to table fixup, it is not possible to create an absolutely-positioned box that is the child of a table-internal box that is not a table-cell (see note about float and position for more details).

§ 5. Rendering

§ 5.1. Paint order of cells

Table cells are painted in a table-root in DOM order as usual, independently of where cells end up actually being drawn.

§ 5.2. Empty cell rendering (separated-borders mode)

Name:	***'empty-cells'***
Value:	show | hide
Initial:	show
Applies to:	table-cell boxes

Inherited:	yes
Percentages:	n/a
Computed value:	specified keyword
Canonical order:	per grammar
Animation type:	discrete

In collapsed-borders mode, this property has no effect.

In separated-borders mode, when this property has the value `hide`, no borders or backgrounds are drawn around/behind empty cells.

An ***empty cell*** is a table-cell containing neither:

- floating content, nor
- in-flow content (other than white space that has been collapsed away by the 'white-space' property handling).

ISSUE 10 Can we simplify empty-cells:hide? <https://github.com/w3c/csswg-drafts/issues/605>

EXAMPLE 14

For example, take the following markup and css:

```
<table>
  <td><span></span></td>
  <td></td>
  <td><span></span></td>
</table>
```

```
table {
  width: 500px; height: 300px;
  empty-cells: hide;
}

table { background: black; border: 10px solid black; }
td { background: white; }

table { border-spacing: 0px; }
td { padding: 0; }
```

The correct rendering of this code snippet is depicted here:

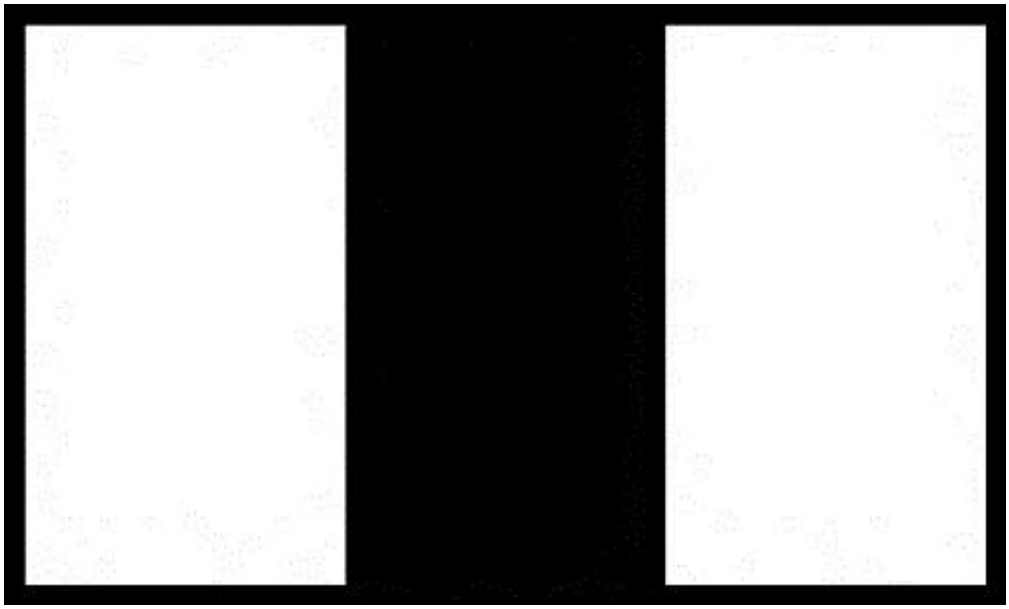


Figure 8 *Rendering of three columns whose middle one is hidden by empty-cells:hide*

§ 5.3. Drawing backgrounds and borders

§ 5.3.1. Drawing table backgrounds and borders

Unlike other boxes types, table and inline-table boxes do not paint their background and borders around their entire client rect. Indeed, the table captions are to be visually positioned between the table margins and its borders, which means the drawing areas of various effects applied to the table-root need to be modified.

Painting areas:

- Backgrounds, borders and outlines painted relative to the content-box of a table-root are painted relative to the rectangular area occupied by the table grid and its border spacings.
- Backgrounds, borders and outlines painted relative to the padding-box of a table-root are painted relative to the rectangular area occupied by the table grid and its border spacings, extended on each side by the table-root padding.
- Backgrounds, borders and outlines painted relative to the border-box of a table-root are painted relative to the rectangular area occuped by the table grid and its border spacings, extended on each side by the table-root padding and border-width.

> This does not affect other uses of these concepts, like absolute positioning.

!Testcase

§ *5.3.1.1. Changes in collapsed-borders mode*

When a table is laid out in collapsed-borders mode, the rendering of its borders on and those of its table-cells is modified. The following rules describe in which way.

> The rules for background and borders painting defined in § 5.3 Drawing backgrounds and borders still apply if they are not overriden.

Borders of a non-empty table-root are not painted in collapsed-borders mode, except if the 'border-image' property is set.

In this latter case, the border is drawn as if the table border was twice as big as its used value specify, and as if that excess was rendered inside the padding area of the table-root.

Even if they are not drawn by the table, the table borders still occupy their space in the layout. Cells will render those shared borders.

§ 5.3.2. Drawing cell backgrounds

Anonymous table-cells added by the missing cells fixup step do not render any of their backgrounds.

In addition to its own 'background', table-cell boxes also render the backgrounds of the table-track and table-track-group boxes in which they belong. This is actually different from simply inheriting their background because the 'background-origin' and 'background-size' computations will actually be done on the bounds of the grouping boxes, and not on those of the cell.

For the purposes of finding the background of each table cell, the different table boxes may be thought of as being on six superimposed layers. The background set in one of the layers will only be visible if the layers above it have a transparent background.

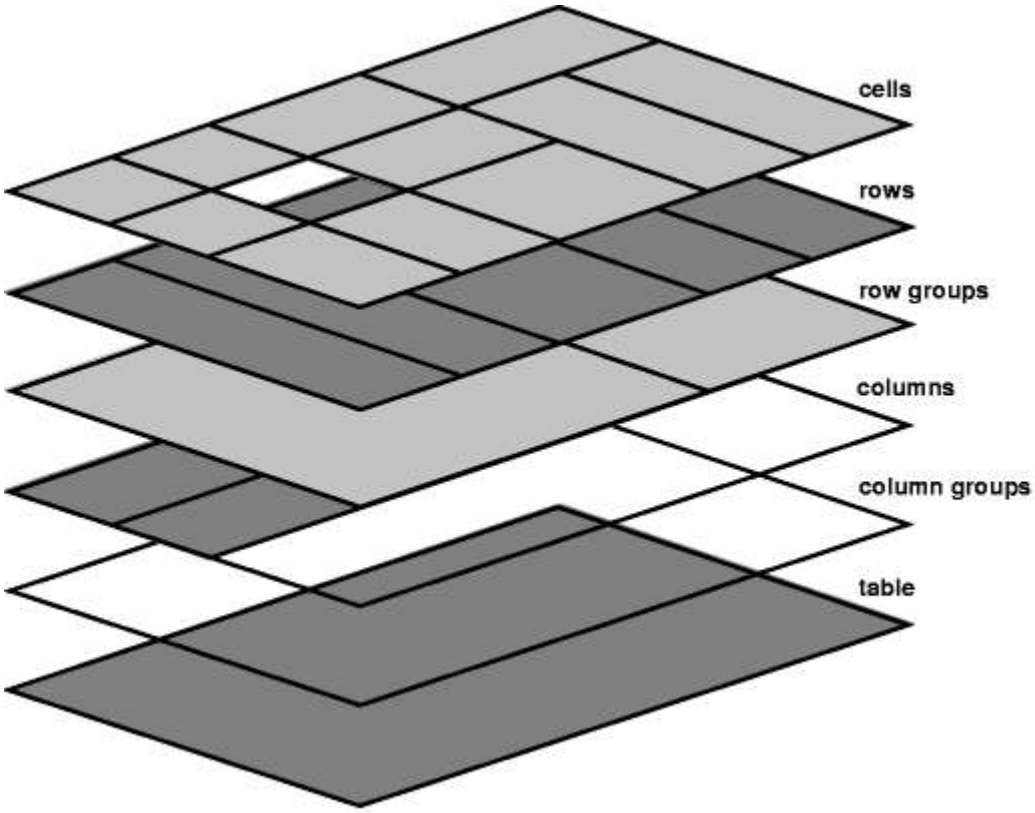


Figure 9 *Schema of table layers.*

0. The table background is being rendered by the table, and does not affect the cell backgroun
1. The first background drawn by a cell is the background of its originating table-column-group (if any). For the purpose of background-positioning, it is expected that a column group occupies the largest possible area a single cell could occupy in the row/column grid while originating in the column group and not entering any column not part of the column group.
2. The second background drawn by a cell is the background of its originating table-column (if any). For the purpose of background-positioning, it is expected that a column occupies the largest possible area a single cell could occupy in the row/column grid while originating in the column and not entering any other column.
3. The third background drawn by a cell is the background of its originating table-row-group (if any). For the purpose of background-positioning, it is expected that a row group occupies the largest possible area a single cell could occupy in the row/column grid while originating in the row group and not entering any row not part of the row group.
4. The fourth background drawn by a cell is the background of its originating table-row (if any). For the purpose of background-positioning, it is expected that a row occupies the largest possible area a single cell could occupy in the row/column grid while originating in the row and not entering any other row.
5. The fifth background drawn by a cell is its own background. This is the one that appears on top once all backgrounds have been rendered.

As the figure above shows, although all rows contain the same number of cells, not every cell may have specified content. In separated-borders mode, if the value of their ‘empty-cells’ property is `hide`, these empty cells are not rendered at all, as if `visibility: hidden` was specified on them, letting the table background show through.

§ 5.3.3. Drawing cell borders

In separated-borders mode, borders of table cells are rendered as usual.

§ *5.3.3.1. Changes in collapsed-borders mode*

Borders of a table-cell are rendered in collapsed-borders mode as if the cell border was twice as big as its used value specify, and as if that excess was rendered in the margin area of the cell, with the added constraint that for each side of the border which isn’t located at one of the table edges, the border is actually clipped to the border-box drawing area as its real used value define except if the ‘border-image’ property is set.

If applying the previously-mentioned clipping behavior results in clipping a border over a non-integer amount of device pixels, browsers may decide to snap the clipping area to a device pixel instead by ceiling the x- and y-values of the clipping area. Ceiling the values ensures that in a normal writing mode, the cell which gets the contested pixels between multiple cells is actually the most top left one, which has a greater specificity than the other ones according to this spec. See § 5.1 Paint order of cells and § 3.7.1.1 Conflict Resolution Algorithm for Collapsed Borders.

§ 5.3.4. Border styles (collapsed-borders mode)

Some of the values of the 'border-style' have different meanings for tables in collapsed-borders mode than usual. Those definitions override the default behavior for 'border-style' values.

hidden
: Same as `none`, but also inhibits any other border (see § 3.7.1.3 Specificity of a border style).

inset
: Same as `ridge`.

outset
: Same as `groove`.

§ 5.4. Rendering for visibility: collapse

When a table part has visibility: collapse set, the rendering is handled differently depending if it is on a table-cell, spanning table-cell, or a table-track/table-track-group.

§ 5.4.1. Rendering a visibility: collapse table cell

As stated in CSS 2.2, if a table-cell has its visibility set to that of collapse, it is rendered the same as if it had visibility: hidden set.

> This happens when you set visibility:collapse on a table-row that contains a table-cell. If you want to hide a row but continue to display its cells that span other rows, set visibility:visible on those cells to prevent them from inheriting their value.

If the table-cell is spanning more than one table-track, and at least one of those table-track is set to visibility: collapse then clip the content to the table-cell's border-box. This means that the top left (top right in rtl) content of the cell will continue to show, regardless of which of the tracks the cell spans has been collapsed.

§ 5.4.2. Rendering a visibility: collapse table-track or table-track-group

When a table-track or table-track-group has visibility: collapse, all the backgrounds, borders or outlines that are contributed by the cells within the given table-track or table-track-group will continue to be painted on cells that have not been fully collapsed (because they spanned multiple tracks).

§ 6. Fragmentation

§ 6.1. Breaking across fragmentainers

When fragmenting a table, user agents must attempt to preserve the table rows unfragmented if the cells spanning the row do not span any subsequent row, and their height is at least twice smaller than both the fragmentainer height and width. Other rows are said ***freely fragmentable***.

When a table doesn't fit entirely in a fragmentainer, at least one row did fit entirely in the fragmentainer, and the first row that does not fit in the fragmentainer is not freely fragmentable. the user agent has to insert some vertical gap between the rows located before and at the overflow point such that the two rows end up separated in sibling fragmentainers. If the fragmentation requires repeating headers and footers, and the footer is repeated, then the footer must come directly after the last row in the fragmentainer and the vertical gap must be inserted after the repeated footer.

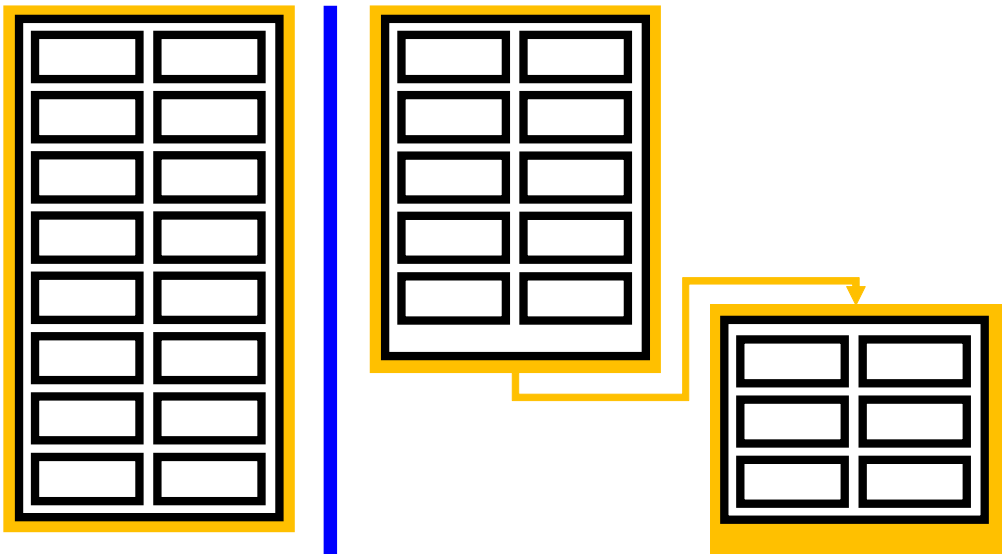


Figure 10 *Expected rendering of table fragmented across two pages*

When there is no row fitting entirely in the current fragmentainer or when the first row that does not fit in the fragmentainer is freely fragmentable, user agents must attribute all the remaining height in the fragmentainer to the cells of that row, and fit as much content as it can in each of the cells independently, then break to the next fragment and start the content of each cell where it was stopped in its previous fragment (top borders must not be repainted in continuation fragments).

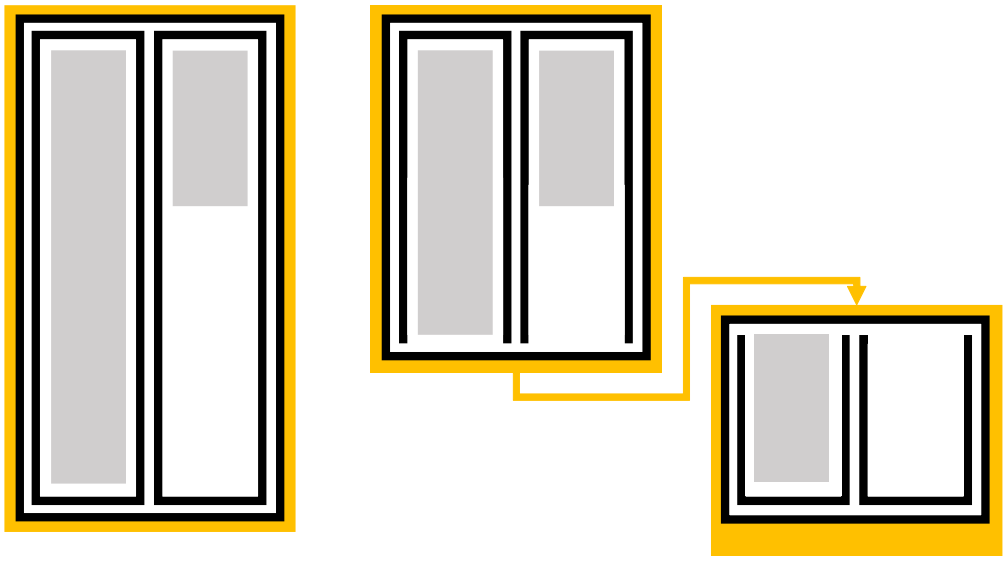


Figure 11 *Expected rendering of table containing a tall row fragmented across two pages*

When 'break-before' or 'break-after' is applied to a table-row-group or a table-row box, the user agent has to insert some vertical gap between the rows located before and after the breaking point such that the two rows end up separated in sibling fragmentainers as required by the property value. If the fragmentation requires repeating headers and footers, and the footer is repeated, then the footer must come directly after the last row in the fragmentainer and the vertical gap must be inserted after the repeated footer.

§ 6.2. Repeating headers across pages

When rendering the document into a paged media, user agents must repeat header rows and footer rows on each page spanned by a table if the page is the table's fragmentainer, if the header/footer has avoid 'break-inside' applied to it, if the height required to do so is inferior to two quarters of the page height (up to one quarter for header rows, and up to one quarter for footer rows), and if that doesn't cause a row to be displayed twice on that page.

When the header rows are being repeated, user agents must leave room and if needed render the table top border. The same applies for footer rows and the table bottom border.

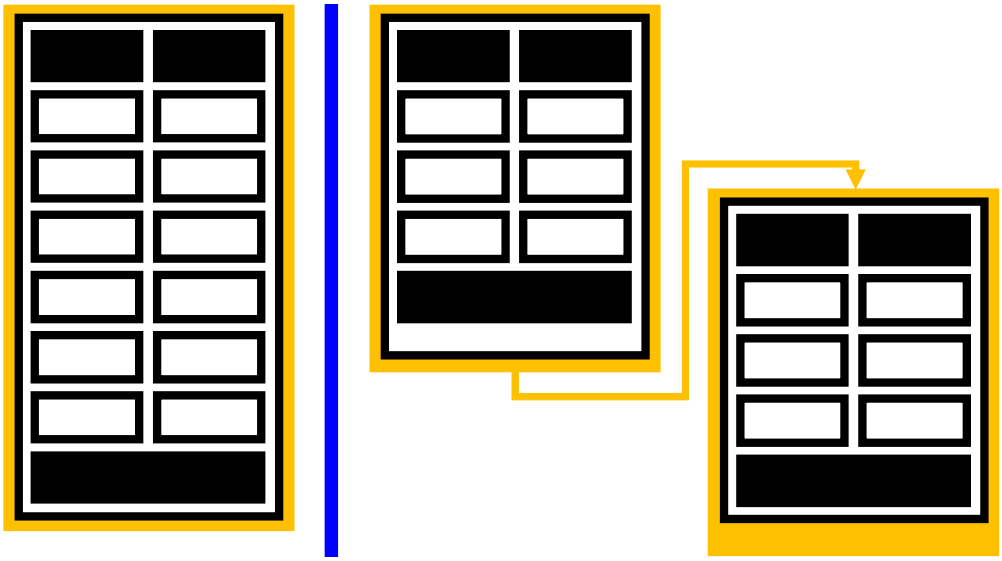


Figure 12 *Expected rendering of table with headers and footers fragmented across two pages*

> User agents may decide to extend this behavior to more fragmentation contexts, for instance repeat headers/rows across columns in addition to pages. User-agents that are rendering static documents are more likely to adopt this behavior, though this is not required per spec.

§ 7. Security Considerations

Using CSS Tables does not incur any security risk to mitigate.

§ 8. Privacy Considerations

Using CSS Tables does not incur any privacy risk to mitigate.

§ 9. List of bugs being tracked

This section is not normative.

- **Align=center attribute overrides css margins in Edge**
- **Chrome applies nowrap quirks mode fix in DOCTYPE documents too**
- **Edge does not account for widths of spanned cells**

- **Chrome and Gecko do not apply display:table-cell on <button>**
- **Edge's table-cell width unexplainably low due to percentage-max-width on content and colspan**
- **Table wrapper boxes should be wide enough to contain the caption**
- **Tables containing no row cannot have height in Chrome, but can in Edge/Firefox**
- **Table-layout:fixed causes different width distribution in Chrome**
- **Chrome distributes the height to each row differently then IE and firefox**
- **Height of rows which can overflow varies in Chrome vs Edge (percentage heights during min-height computation)**
- **Height specified on row groups is not interoperable**
- **Min-Height specified on rows is not interoperable**
- **Table with interleaved td[rowspan] rendered wrong in IE (145069)**
- **Row with explicit 'visibility:visible' lose background color when parent table has 'visibility: hidden'**

§ 10. Appendices

§ 10.1. Mapping between CSS & HTML attributes

The default style sheet for HTML4 illustrates how its model maps to css properties and values:

> Some extensions to CSS have been used for contraints not mappable to current CSS constructs

```
table    { display: table }
thead    { display: table-header-group }
tbody    { display: table-row-group }
tfoot    { display: table-footer-group }
```

```
tr       { display: table-row }
td, th   { display: table-cell }
colgroup { display: table-column-group }
col      { display: table-column }
caption  { display: table-caption }
table, thead, tbody, tfoot, tr, td, th, colgroup, col, caption { box-sizing: b
thead, tfoot { break-inside: avoid }

table {
  box-sizing: border-box;
  border-spacing: 2px;
  border-collapse: separate;
  text-indent: initial;
}

thead, tbody, tfoot, table > tr { vertical-align: middle; }
tr, td, th { vertical-align: inherit; }

td, th { padding: 1px; }
th { font-weight: bold;  }

table, td, th { border-color: gray; }
thead, tbody, tfoot, tr { border-color: inherit; }



table[frame=box i], table[frame=border i], table[frame=hsides i], table[frame=
  border: 1px solid inset;
}


table:is([rules=all i], [rules=rows i], [rules=cols i], [rules=groups i], [ru
  border-collapse: collapse;
  border-style: hidden;
}

table:is([rules=all i], [rules=rows i], [rules=cols i], [rules=groups i], [ru
table:is([rules=all i], [rules=rows i], [rules=cols i], [rules=groups i], [ru
  border-color: black;
}

table[border=$border] /* if(parseInt($border) > 0) */ {
  border: /*(parseInt($border) * 1px)*/ outset rgb(128, 128, 128);
}
```

```
table[border=$border] > :is(thead,tbody,tfoot) > tr > :is(th,td) /* if(parse
  border: 1px inset rgb(128, 128, 128);
}

table[rules=all i] > :is(thead,tbody,tfoot) > tr > :is(th,td) {
  border: 1px solid grey;
}
table[rules=rows i] > :is(thead,tbody,tfoot) > tr > :is(th,td) {
  border: 1px solid grey;
  border-left: none;
  border-right: none;
}
table[rules=cols i] > :is(thead,tbody,tfoot) > tr > :is(th,td) {
  border: 1px solid grey;
  border-top: none;
  border-bottom: none;
}
table[rules=none i] > :is(thead,tbody,tfoot) > tr > :is(th,td) {
  border: none;
}

table[rules=groups i] > :is(thead,tbody,tfoot) {
  border-top-width: 1px; border-top-style: solid;
  border-bottom-width: 1px; border-bottom-style: solid;
}
table[rules=groups i] > colgroup {
  border-left-width: 1px; border-left-style: solid;
  border-right-width: 1px; border-right-style: solid;
}

table[frame=box i], table[frame=border i], table[frame=hsides i], table[frame=
  border-style: outset;
}
table[frame=below i], table[frame=vsides i], table[frame=lhs i], table[frame=r
  border-top-style: hidden;
}
table[frame=above i], table[frame=vsides i], table[frame=lhs i], table[frame=r
  border-bottom-style: hidden;
}
table[frame=hsides i], table[frame=above i], table[frame=below i], table[frame
  border-left-style: hidden;
}
table[frame=hsides i], table[frame=above i], table[frame=below i], table[frame
  border-right-style: hidden;
```

```
}

table[cellpadding=$x] > :is(thead,tbody,tfoot) > tr > :is(th,td) /* if(parseIr
  padding: /*(parseInt($x) * 1px)*/;
}
table[cellspacing=$x] /* if(parseInt($x)>0) */ {
  border-spacing: /*(parseInt($x) * 1px)*/;
}


table[width=$w] /* if(parseInt($w) > 0) */ {
  width: /*(parseInt($w) * 1px)*/;
}
table[width=$w] /* if($w matches /(+|-|)([0-9]+([.][0-9]+|)|([.][0-9]+))[%]/)
  width: /*(parseInt($w) * 1px)*/;
}
table[height=$h] /* if(parseInt($h) > 0) {
  height: /*(parseInt($h) * 1px)*/;
}
table[height=$h] /* if($h matches /(+|-|)([0-9]+([.][0-9]+|)|([.][0-9]+))[%]/)
  height: /*(parseInt($h) * 1px)*/;
}


table[bordercolor=$color] {
  border-color: /*parseHTMLColor($color)*/;
}
table[bordercolor] > :is(tbody, thead, tfoot, tr, colgroup, col),
table[bordercolor] > :is(tbody, thead, tfoot) > tr,
table[bordercolor] > :is(tbody, thead, tfoot) > tr > :is(td, th),
table[bordercolor] > tr > :is(td, th)
table[bordercolor] > colgroup > col
) {
  border-color: inherit;
}
table[bgcolor=$color] {
  background-color: /*parseHTMLColor($color)*/;
}
table[align=left i] {
  float: left;
}
table[align=right i] {
  float: right;
}
```

```
table[align=center i] {
  margin-left: auto;
  margin-right: auto;
}

caption[align=bottom i] { caption-side: bottom; }
:is(thead,tbody,tfoot,tr,td,th)[valign=top i] {
  vertical-align: top;
}
:is(thead,tbody,tfoot,tr,td,th)[valign=middle i] {
  vertical-align: middle;
}
:is(thead,tbody,tfoot,tr,td,th)[valign=bottom i] {
  vertical-align: bottom;
}
:is(thead,tbody,tfoot,tr,td,th)[valign=baseline i] {
  vertical-align: baseline;
}

:is(thead,tbody,tfoot,tr,td,th)[align=absmiddle i] {
  text-align: center;
}

:is(colgroup,col,thead,tbody,tfoot,tr,td,th)[hidden] {
  visibility: collapse;
}

:is(td,th)[nowrap] { white-space: nowrap; }
:is(td,th)[nowrap][width=$w] /* if(quirksMode && parseInt($w) > 0) */ {
  white-space: normal;
}
```

Some of the content here came from the WHATWG spec on the HTML to CSS mapping of tables. However, since they include things which are not true in most browsers, this is not a simple copy. Investigations are therefore required for each and any merge being made from one source to another!

§ 11. (link here for missing sections)

§ Conformance

§ Document conventions

Conformance requirements are expressed with a combination of descriptive assertions and RFC 2119 terminology. The key words “MUST”, “MUST NOT”, “REQUIRED”, “SHALL”, “SHALL NOT”, “SHOULD”, “SHOULD NOT”, “RECOMMENDED”, “MAY”, and “OPTIONAL” in the normative parts of this document are to be interpreted as described in RFC 2119. However, for readability, these words do not appear in all uppercase letters in this specification.

All of the text of this specification is normative except sections explicitly marked as non-normative, examples, and notes. [RFC2119]

Examples in this specification are introduced with the words “for example” or are set apart from the normative text with `class="example"`, like this:

> EXAMPLE 15
>
> This is an example of an informative example.

Informative notes begin with the word “Note” and are set apart from the normative text with `class="note"`, like this:

> Note, this is an informative note.

Advisements are normative sections styled to evoke special attention and are set apart from other normative text with `<strong class="advisement">`, like this:

> **UAs MUST provide an accessible alternative.**

§ Conformance classes

Conformance to this specification is defined for three conformance classes:

style sheet
: A CSS style sheet.

renderer
: A UA that interprets the semantics of a style sheet and renders documents that use them.

authoring tool

A UA that writes a style sheet.

A style sheet is conformant to this specification if all of its statements that use syntax defined in this module are valid according to the generic CSS grammar and the individual grammars of each feature defined in this module.

A renderer is conformant to this specification if, in addition to interpreting the style sheet as defined by the appropriate specifications, it supports all the features defined by this specification by parsing them correctly and rendering the document accordingly. However, the inability of a UA to correctly render a document due to limitations of the device does not make the UA non-conformant. (For example, a UA is not required to render color on a monochrome monitor.)

An authoring tool is conformant to this specification if it writes style sheets that are syntactically correct according to the generic CSS grammar and the individual grammars of each feature in this module, and meet all other conformance requirements of style sheets as described in this module.

§ Partial implementations

So that authors can exploit the forward-compatible parsing rules to assign fallback values, CSS renderers **must** treat as invalid (and ignore as appropriate) any at-rules, properties, property values, keywords, and other syntactic constructs for which they have no usable level of support. In particular, user agents **must not** selectively ignore unsupported component values and honor supported values in a single multi-value property declaration: if any value is considered invalid (as unsupported values must be), CSS requires that the entire declaration be ignored.

§ Implementations of Unstable and Proprietary Features

To avoid clashes with future stable CSS features, the CSSWG recommends following best practices for the implementation of unstable features and proprietary extensions to CSS.

§ Non-experimental implementations

Once a specification reaches the Candidate Recommendation stage, non-experimental implementations are possible, and implementors should release an unprefixed implementation of any CR-level feature they can demonstrate to be correctly implemented according to spec.

To establish and maintain the interoperability of CSS across implementations, the CSS Working Group requests that non-experimental CSS renderers submit an implementation report (and, if necessary, the

testcases used for that implementation report) to the W3C before releasing an unprefixed implementation of any CSS features. Testcases submitted to W3C are subject to review and correction by the CSS Working Group.

Further information on submitting testcases and implementation reports can be found from on the CSS Working Group's website at http://www.w3.org/Style/CSS/Test/. Questions should be directed to the public-css-testsuite@w3.org mailing list.

§ Index

§ Terms defined by this specification

undistributable space, in §3.8.1

used min-width of a table, in §3.9.1

used width of a table, in §3.9.1

visible track, in §3.11

§ Terms defined by reference

[compositing-2] defines the following terms:

- isolation
- mix-blend-mode

[css-backgrounds-3] defines the following terms:

- background
- background-origin
- background-size
- border-image
- border-image-source
- border-radius
- border-style
- border-width

[css-box-4] defines the following terms:

- margin
- padding

[css-break-3] defines the following terms:

- break-after
- break-before
- break-inside

[css-color-4] defines the following terms:

- opacity

[css-display-3] defines the following terms:

- anonymous box
- block-level
- containing block
- display
- flow layout
- inline-level
- inner display type
- table

[css-grid-2] defines the following terms:

- grid

[css-inline-3] defines the following terms:

- vertical-align

[css-masking-1] defines the following terms:

- clip
- clip-path
- mask

[css-overflow-3] defines the following terms:

- overflow

[css-position-3] defines the following terms:

- left
- position

[css-sizing-3] defines the following terms:

- behave as auto
- box-sizing
- height
- max-width
- min-content contribution
- min-height
- min-width
- width

[css-text-3] defines the following terms:

- text-align

[css-text-4] defines the following terms:

- white-space

[css-transforms-1] defines the following terms:

- transform

[css-transforms-2] defines the following terms:

- perspective
- transform-style

[CSS-VALUES-3] defines the following terms

- <string>

[css-values-4] defines the following terms:

- css-wide keywords
- {a,b}
- |

[CSS2] defines the following terms:

- bottom
- float
- right
- separate
- top
- visibility
- z-index

[filter-effects-1] defines the following terms:

- filter

[mediaqueries-5] defines the following terms:

- paged media

§ References

§ Normative References

[COMPOSITING-2]
Compositing and Blending Level 2 URL: https://drafts.fxtf.org/compositing-2/

[CSS-BACKGROUNDS-3]
Bert Bos; Elika Etemad; Brad Kemper. CSS Backgrounds and Borders Module Level 3. 22 December 2020. CR. URL: https://www.w3.org/TR/css-backgrounds-3/

[CSS-BOX-4]
Elika Etemad. CSS Box Model Module Level 4. 21 April 2020. WD. URL: https://www.w3.org/TR/css-box-4/

[CSS-BREAK-3]
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[CSS-COLOR-4]

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[CSS-DISPLAY-3]
Tab Atkins Jr.; Elika Etemad. CSS Display Module Level 3. 18 December 2020. CR. URL: https://www.w3.org/TR/css-display-3/

[CSS-GRID-2]
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[CSS-INLINE-3]
Dave Cramer; Elika Etemad; Steve Zilles. CSS Inline Layout Module Level 3. 27 August 2020. WD. URL: https://www.w3.org/TR/css-inline-3/

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[CSS-POSITION-3]
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[CSS-SIZING-3]
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[CSS-TEXT-4]
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[CSS-TRANSFORMS-2]
Tab Atkins Jr.; et al. CSS Transforms Module Level 2. 3 March 2020. WD. URL: https://www.w3.org/TR/css-transforms-2/

[CSS-VALUES-3]
Tab Atkins Jr.; Elika Etemad. CSS Values and Units Module Level 3. 6 June 2019. CR. URL: https://www.w3.org/TR/css-values-3/

[CSS-VALUES-4]

Tab Atkins Jr.; Elika Etemad. CSS Values and Units Module Level 4. 11 November 2020. WD. URL: https://www.w3.org/TR/css-values-4/

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

[FILTER-EFFECTS-1]
Dirk Schulze; Dean Jackson. Filter Effects Module Level 1. 18 December 2018. WD. URL: https://www.w3.org/TR/filter-effects-1/

[MEDIAQUERIES-5]
Dean Jackson; Florian Rivoal; Tab Atkins Jr.. Media Queries Level 5. 31 July 2020. WD. URL: https://www.w3.org/TR/mediaqueries-5/

[RFC2119]
S. Bradner. Key words for use in RFCs to Indicate Requirement Levels. March 1997. Best Current Practice. URL: https://tools.ietf.org/html/rfc2119

§ Informative References

[CSS-TEXT-3]
Elika Etemad; Koji Ishii; Florian Rivoal. CSS Text Module Level 3. 22 December 2020. CR. URL: https://www.w3.org/TR/css-text-3/

§ Property Index

Name	Value	Initial	Applies to	Inh.	%ages	Anim-ation type	Canonical order	Com-puted value
'border-collapse'	separate | collapse	separate	table grid boxes	yes	n/a	discrete	per grammar	specified keyword
'border-spacing'	<length> {1,2}	0px 0px	table grid boxes when border-collapse is separate	yes	n/a	by computed value	per grammar	two absolute lengths
'caption-side'	top | bottom	top	table-caption boxes	yes	n/a	discrete	per grammar	specified keyword
'empty-cells'	show | hide	show	table-cell boxes	yes	n/a	discrete	per grammar	specified keyword
'table-layout'	auto | fixed	auto	table grid boxes	no	n/a	discrete	per grammar	specified keyword

§ Issues Index

ISSUE 1 This is a breaking change from css 2.1 but matches implementations <https://github.com/w3c/csswg-drafts/issues/508> ↲

ISSUE 2 border-collapsing breaking change from 2.1 <https://github.com/w3c/csswg-drafts/issues/604> ↲

ISSUE 3 Change specificity in harmonization of collapsed borders? <https://github.com/w3c/csswg-drafts/issues/606> ↲

ISSUE 4 Handling of intrinsic offsets when in border collapsing mode <https://github.com/w3c/csswg-drafts/issues/608> ↲

ISSUE 5 EDITORIAL. The way this describes distribution of widths from colspanning cells is wrong. For min-content and max-content widths it should refer to the rules for distributing excess width to columns for intrinsic width calculation. ↲

ISSUE 6 EDITORIAL. Import the relevant section of § 3.8.3 Computing Column Measures here. ↲

ISSUE 7 EDITORIAL. TODO. For current proposal, skip to § 3.10.5 Distribution algorithm. ↲

ISSUE 8 We need a resolution on what visibility:collapse does. <https://github.com/w3c/csswg-drafts/issues/478> ↲

ISSUE 9 This only works in Firefox. It would make it easier to implement position:sticky in the future, though. [Chrome bug] [Interop risk: Firefox bug] <https://github.com/w3c/csswg-drafts/issues/858> ↲

ISSUE 10 Can we simplify empty-cells:hide? <https://github.com/w3c/csswg-drafts/issues/605> ↲

ISSUE 11 Should we hide the row-group background by saying cells only draw the backgrounds of visibility:visible grouping elements? ↲