

ALMcSS

A JavaScript Implementation of the CSS Template Layout Module

César Acebal (Universidad de Oviedo)

Bert Bos (W3C)

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Juan Manuel Cueva (Universidad de Oviedo)

Paper presented at ACM Symposium on Document Engineering (DocEng 2012), Sept. 4-7, París (France)

Structure

- **Who we are**

- *Members of the W3C CSS Working Group*

- **What the problem is**

- *The lack of true layout mechanisms in CSS 2.1*

- **The proposed solution**

- *The CSS3 Template Layout Module*
(from which both Bert Bos and me are coauthors)

- **An implementation of that solution**

- *The ALMcSS JavaScript prototype (demo)*

About us

A short story that explains the path followed until being today here in front of you presenting a W3C CSS Working Draft and the prototype that implements it.

CursoCSS
CURSO DE EXTENSIÓN UNIVERSITARIA 2º CUAT. MIERES 18h UNIVERSIDAD DE OVIEDO

CREACIÓN DE SITIOS WEB MEDIANTE HOJAS DE ESTILO

CREACIÓN DE SITIOS WEB MEDIANTE HOJAS DE ESTILO

PROGRAMA DE LOS ALUMNOS PROFESORADO MATERIAL TRABAJOS

RESULTADOS DE LA ENCUESTA

CEFA cesaracoba.com

CURSO DE EXTENSIÓN UNIVERSITARIA

CURSOCSS 2005



The image shows the exterior of a multi-story building with a yellow facade and a red-tiled roof. The building has several windows with dark frames. The text "ESCUELA DE INGENIERIA INFORMÁTICA" is written in large, blue, capital letters across the middle of the building's facade. The sky is blue with some clouds.

ESCUELA DE INGENIERIA INFORMÁTICA

Where I work

*Teacher at Escuela de Ingeniería Informática
(Computer Science Department, University of
Oviedo), in Asturias (Spain)*



CREACIÓN DE SITIOS WEB
MEDIANTE
**HOJAS DE
ESTILO**

PROGRAMA
DE LOS ALUMNOS

PROFESORADO
RESULTADOS DE LA ENCUESTA

MATERIAL

TRABAJOS



cesaracebal.com

```
<body>
  <h1>Curso CSS</h1>

  <ul id="menu">
    <li><a href="programa/" title="Programa del
curso">Programa</a></li>
    <li><a href="profesorado/" title="Director y profesores
que imparten clase en el curso">Profesorado</a></li>
    <li><a href="material/" ... >Material</a></li>
    ...
  </ul>

  <div class="content">...</div>
  <div class="footer">...</div>
</body>
```

But...

UNIVERSITARIA

CREACIÓN DE SIT

PROGRAMA

PROFESORADO

MATERIAL TRABAJOS DE

LOS ALUMNOS RESULTADOS

DE LA ENCUESTA

CEFA
CFACEBAL



DE LA ENCUESTA

LOS ALUMNOS RESULTADOS

CEFA
CFACEBAL

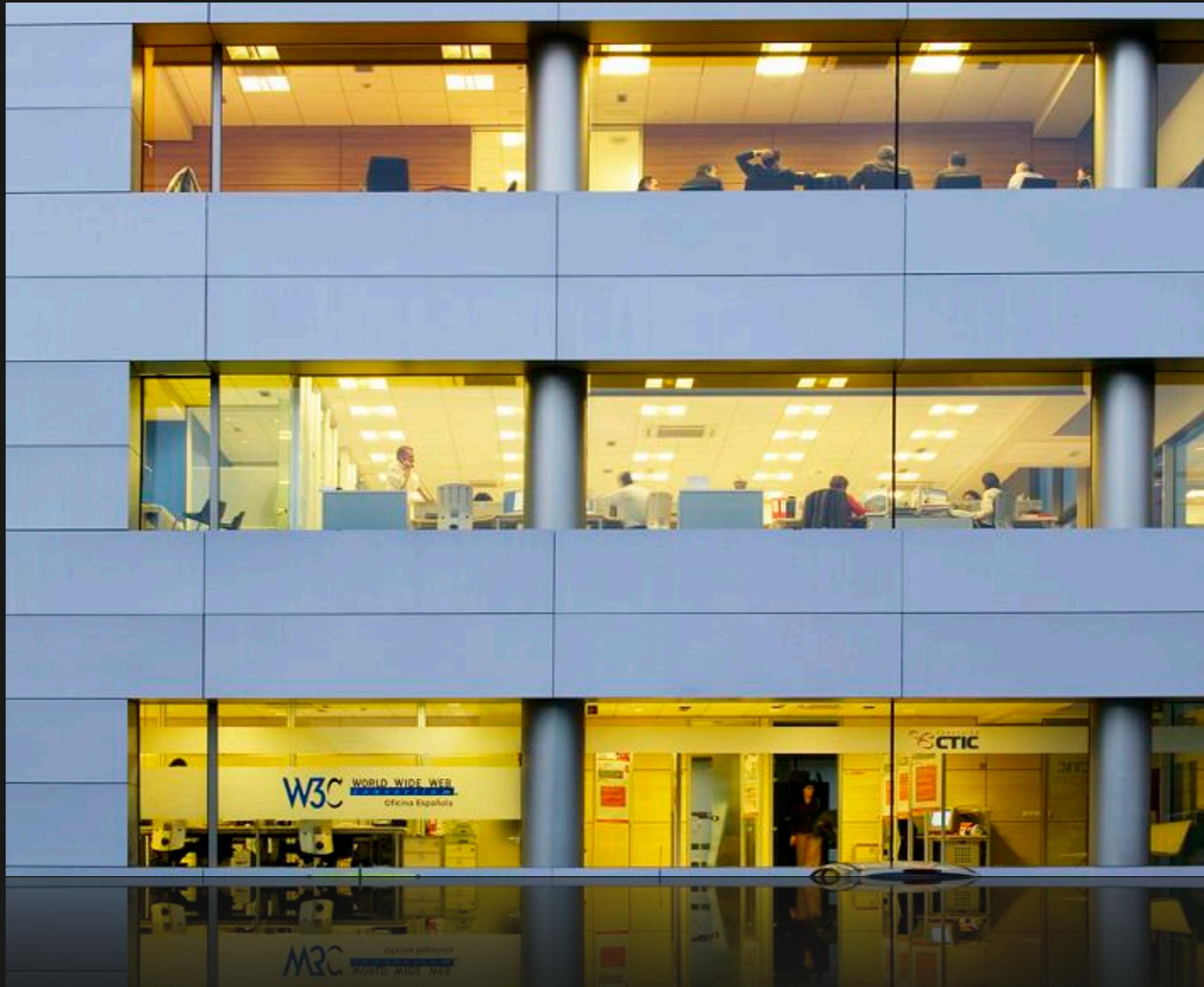


What if we had something like this?

```
#menu {  
  position: footer;  
}
```

That is, some sort of content reordering mechanism

W3C Spanish Office (CTIC Foundation)



Bert Bos

- ◎ **Co-inventor of CSS (with Håkon Wium Lie), in 1996**
- ◎ **Member of the W3C Staff**
- ◎ **During many years, chair of the W3C CSS Working Group and currently leading its Style Activity**

Something that the Device Independence WG is very interested in (and I as well) is to specify something like a “design grid” for a page or a site, using CSS. The idea is that a set of page templates is created for different types of devices, each of which describes the layout at a high level, e.g., 3 columns with a navigation bar at the top, two columns one of which has two rows, three columns of which one is twice as wide as the others, etc.

[...]

My idea is that it is possible to define a CSS property, that defines for each element (typically for the root element) what the design grid for that element is. With some, hopefully simple, syntax, it describes the rows, columns, the spaces in between and the constraints on their sizes. All the other elements are then styled normally, but in addition, they are assigned to a slot in the grid: the menu goes in the menu slot, the logo goes in the logo slot, etc.

—Bert Bos (2005)

(private communication)

CSS WORKING GROUP MEMBERS

so I joined the W3C CSS Working Group (dec 2005)

MEMBERS

The CSS WG is group [32061](#).

Name	Affiliation
Cesar Acebal	Universidad de Oviedo
Yasuhiro Anan	Microsoft Corporation
Tab Atkins Jr.	Google, Inc.
David Baron	Mozilla Foundation
Bert Bos	W3C/ERCIM
Tantek Çelik	W3C Invited Experts
Giorgi Chavchanidze	Opera Software
John Daggett	Mozilla Foundation
Beth Dakin	Apple, Inc.
Arron Eicholz	Microsoft Corporation
Elika Etemad	W3C Invited Experts
Simon Fraser	Apple, Inc.
Sylvain Galineau	Microsoft Corporation
Daniel Glazman	Disruptive Innovations
Tona Henderson	Rochester Institute of Technology



Members

Mailing list

Edit group [restricted]

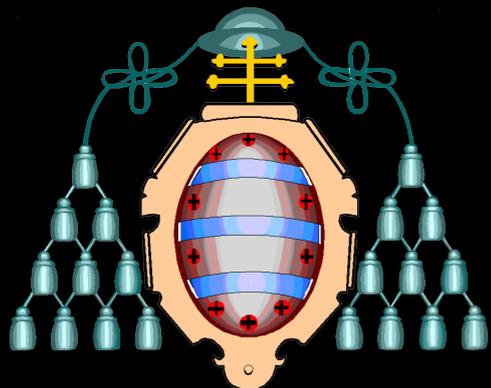
Edit person



CSS-WG at W3C Technical Plenary 2006
Mandelieu la Napoule, France

And I ended up
doing a PhD
Thesis about CSS:

ALMcSS: Separation
between Structure and
Presentation on the
Web with CSS
Advanced Layout



Universidad de Oviedo
Departamento de Informática

Tesis Doctoral

César
Acebal

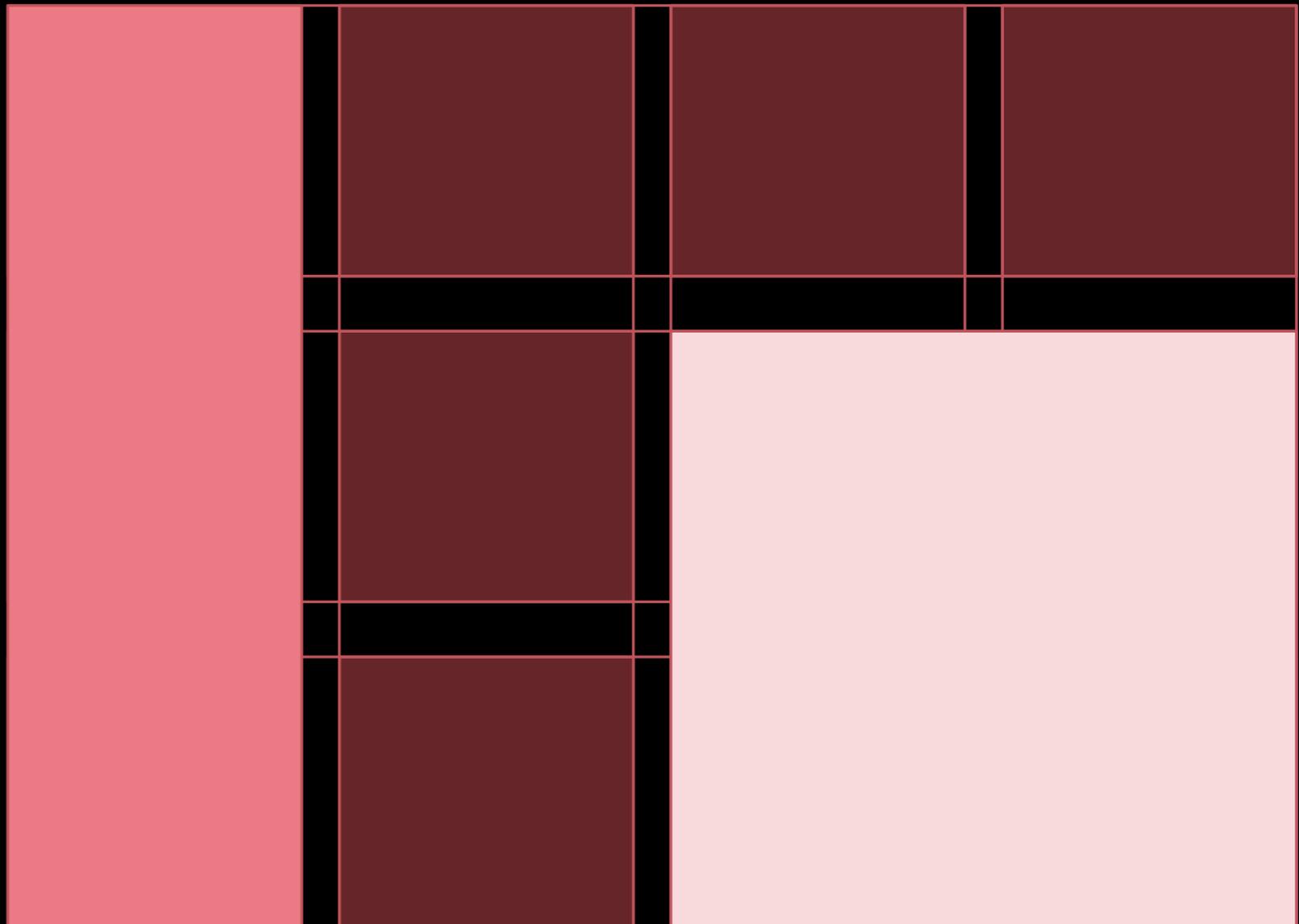
ALMcSS: Separación de estructura y presentación en
la web mediante posicionamiento avanzado en CSS

ALMcSS: Separación de estructura
y presentación en la web mediante
posicionamiento avanzado en CSS

César Fernández Acebal



<http://di002.edv.uniovi.es/~acebal/phd/dissertation.pdf>



A view from a window looking out onto a modern office building complex in Sophia Antipolis, France. The building has a white facade and large glass windows. The surrounding area is lush with green trees and shrubs. In the background, there are rolling hills and mountains under a blue sky with light clouds. The view is framed by dark window blinds at the top and bottom.

W3C European Office at INRIA/ERCIM
Sophia Antipolis, France

Introduction

Two bold statements to start with...

**CSS is not a
layout language**

**Separation between
presentation and
content is not true**

The problem with CSS

("it's not a layout language", remember?)

1

Content order dependency



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Another example

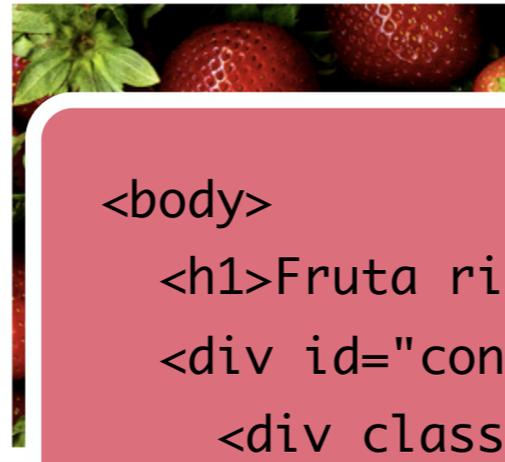
Multicolum layouts

fruta rica

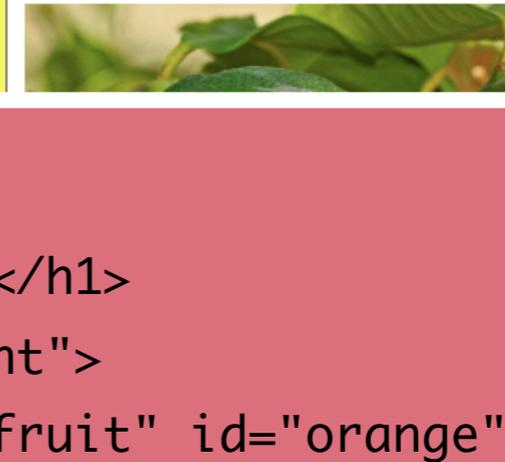


The Valencia Orange is an orange first created by the Californian agronomist William Wolfskill, on his farm in Santa Ana. Its name comes from the Spanish city of Valencia, widely known for its excellent orange trees. The orange was later sold to the Irvine Company, who would dedicate their land to its cultivation. This crop in Southern California led to the naming of Orange County. The company's Valencia operation ceased by the mid-1990s due to property costs, which drove the remaining of the Southern California orange industry into Florida.

Primarily grown for processing production, Valencia oranges vary in number from zero. However, its excellent taste and make it desirable for the fresh. The fruit has an average diameter of 70 - 76 mm. After bloom, it carries two crops on the tree, one new. The commercial harvest in Florida runs from March to June. Valencia oranges are prized as the only variety of orange in season during summer.



Fra
of
Ro
for
use
wh



```
<body>
  <h1>Fruta rica</h1>
  <div id="content">
    <div class="fruit" id="orange">
      
      <p>The Valencia Orange is...</p>
    </div>
```

```
.fruit {
  width: 33%;
  float: left;
}
#orange { width: 34%; }
#footer { clear: both; }
```

```
  <div id="strawberry">...</div>
  <div id="footer">...</div>
```

n the
greater
mons
while
and are



This demonstration page by César Acebal for his PhD Thesis is licensed under a Creative Commons Attribution 3.0 License. Photos by cobalt123, *clairity* and MasterTaker. Text is from Wikipedia.

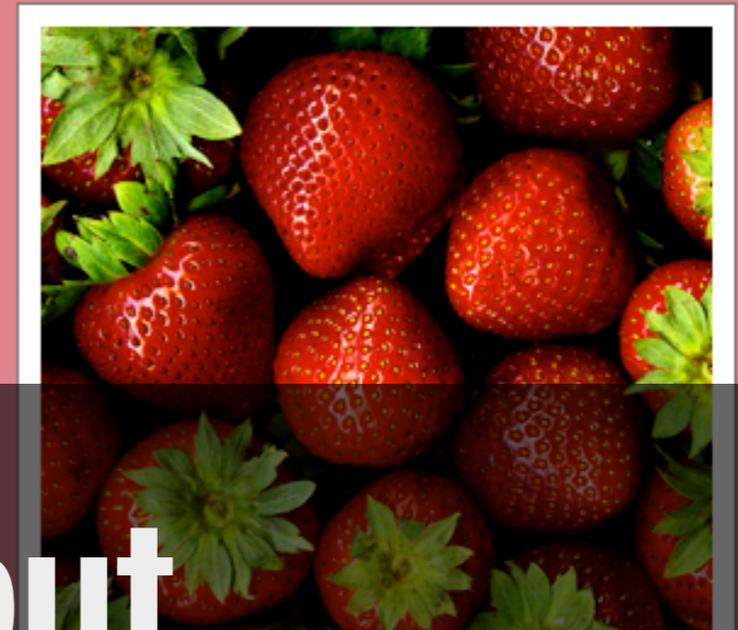


This demonstration page by César Acebal for his PhD Thesis is licensed under a Creative Commons Attribution 3.0 License. Photos by cobalt123, *clairity* and MasterTaker. Text is from Wikipedia.

Multicolumn layouts with floats

- ◎ Other layouts, like 3-2-1, or 2-3-1, would still be possible
- ◎ But not so 3-1-2, for example
 - (Due to the complex rules that govern float behaviour)

fruta rica



One True Layout

Lime is a term referring to a number of different fruits, both species and hybrids, citruses, which have their origin in the Himalayan region of India and which are typically round, green to yellow in color, 3–6 cm in diameter, and containing sour and acidic pulp. Limes are often used to accent the flavours of foods and beverages. They are usually smaller than lemons, and a source of vitamin C. Limes are grown all year round and are usually sweeter than lemons.

Limes are a small citrus fruit, *Citrus aurantifolia*, whose skin and flesh are green in colour and which have an oval or round shape with a diameter between one to two inches. Limes can either be sour or sweet,

inches. Limes can either be sour or sweet, shape with a diameter between one to two in colour and which have an oval or round

The Valencia Orange is an orange first created by the Californian agronomist William Wolfskill, on his farm in Santa Ana. Its name is derived from the Spanish city of Valencia, widely known for its excellent orange trees. The orange was later sold to the Irvine Company, who would dedicate nearly half of their land to its cultivation. The success of this crop in Southern California likely led to the naming of Orange County. The Irvine Company's Valencia operation later split from the company and became Sunkist. Cultivation of the Valencia in Orange County had all but ceased by the mid-1990s due to rising property costs, which drove most of what remained of the Southern California juice orange industry into Florida.

California juice orange industry into Florida, most of what remained of the southern due to rising property costs, which drove

Fragaria (pronounced /frəˈɡeəriə/) is a genus of flowering plants in the rose family, Rosaceae, commonly known as strawberries for their edible fruits. Originally straw was used as a mulch in cultivating the plants, which may have led to its name. There are more than 20 described species and many hybrids and cultivars. The most common strawberries grown commercially are cultivars of the Garden strawberry (*Fragaria ×ananassa*). Strawberries have a taste that varies by cultivar, and ranges from quite sweet to rather tart. Strawberries are an important commercial fruit crop, widely grown in all temperate regions of the world.

temperate regions of the world, common, and which widely grown in all

But...

(there's always a "but" with CSS)

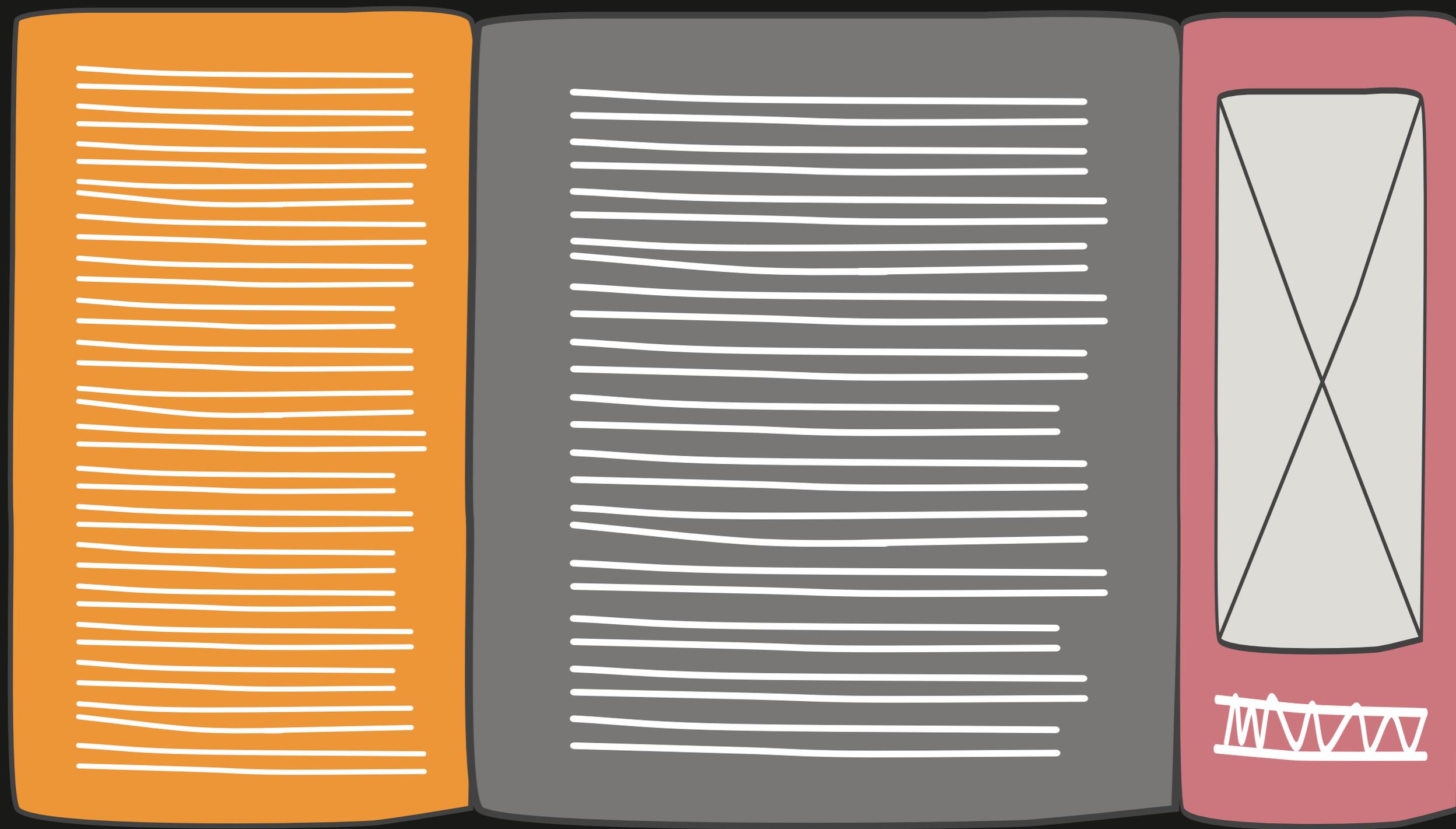
**Mixing units is
not possible**

(while achieving any-order columns)

12em

liquid

220px



**And we are
pushing CSS
to its limits!**

2

Complexity

Who knows
CSS?



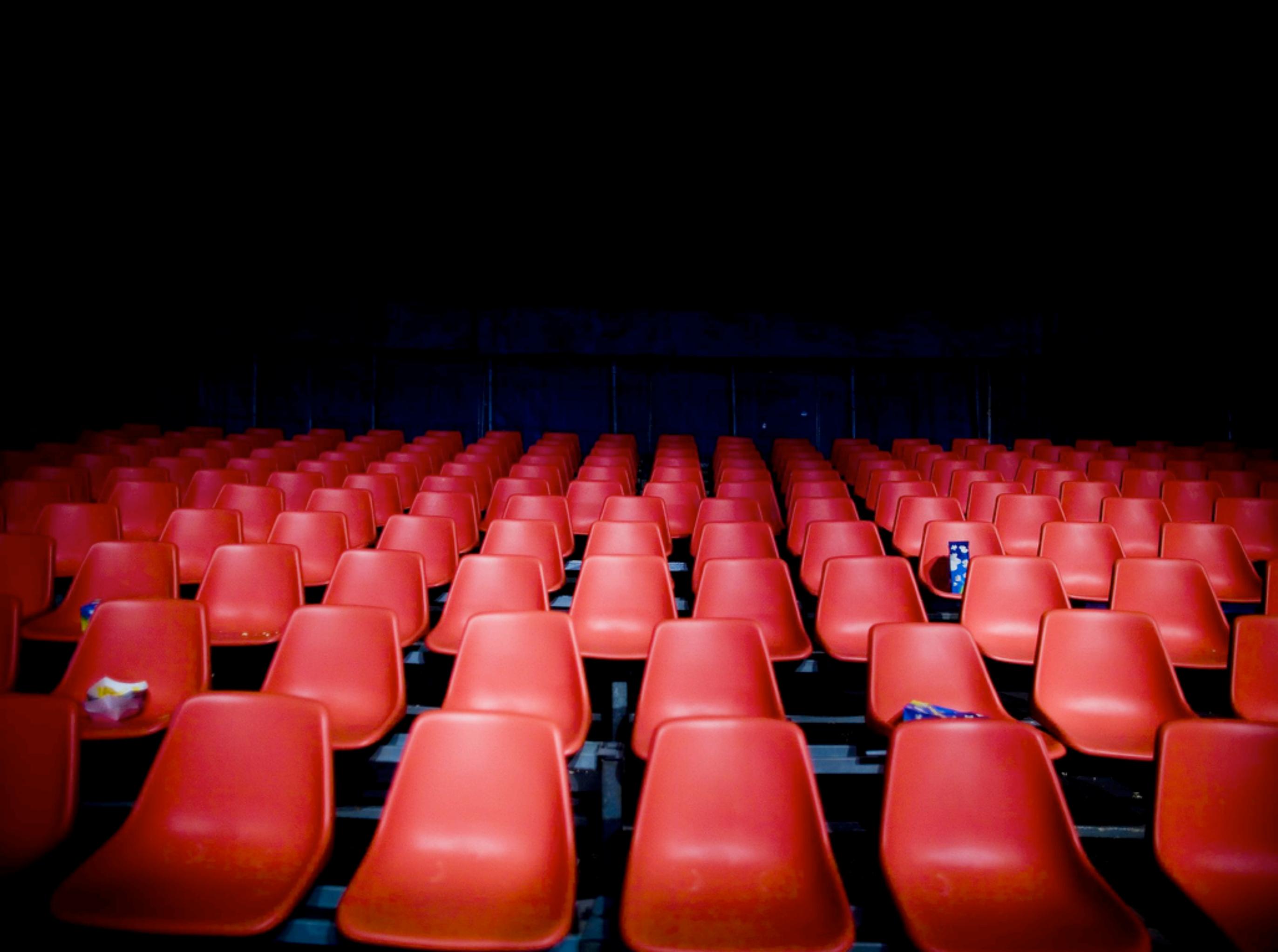
(actually)

Who knows

CSS 2.1

specification







While techniques like one true layout try to reduce these tradeoffs (although still generally sacrificing some quality of layout, in this case by using percentages), these techniques are extremely complex, fragile, and hard for authors to write. Authors should be able to get the layout concepts they want with the semantic markup that they choose without this complexity.

—*David Baron* (2006)

3

**Extra markup is
usually needed**

```
<body class="mt-main-index layout-wt">
  <div id="aptureD"></div>
  <div id="container">
    <div id="container-inner">
      <div id="headercont">
        <div id="content">
          <div id="content-inner">
            <div class="section top ormSlider">
              <div id="alpha">
                <div id="alpha-inner">
                  <div class="section">
                    <div class="section">
                      <h3>
                        <div id="entry-39143" class="entry-asset asset">
                          <div id="entry-38927" class="entry-asset asset">
                            <div id="entry-39134" class="entry-asset asset">
                              <div id="entry-39271" class="entry-asset asset">
                                <div class="asset-header">
                                  <h2 class="asset-name">
                                    <div class="asset-meta">
                                      <div class="byline">
                                        <div class="meta">
                                  </div>
                                  <div class="bookmark-this" style="float: left; clear: right;">
                                </div>
                              <div class="asset-content">
                                <div class="asset-excerpt">
                                  <div>
                                  <div class="ap_r_front">
                This excerpt is from Flex 4 in Action, by Tariq Ahmed, Dan Orlando, John C. Bland II, and Joel Hooks. This excerpt is published with permission. Principles of User Experience Design User Experience Design, often abbreviated as UXD or...
                <a href="http://www.insideria.com/2010/04/principles-of-user-experience.html"></a>
```

*Look, mom,
without tables!*

4

**Redesign is not
possible**

Is not possible?



Zen Garden

The Beauty of CSS Design



A demonstration of what can be accomplished visually through CSS-based design. Select any

The Road to Enlightenment

Littering a dark and dreary road lay the past relics of browser-specific tags, incompatible DOMs, and broken CSS support.

Today, we must clear the mind of past practices. Web enlightenment has been achieved thanks to the tireless efforts of folk like the W3C, WaSP and the major browser creators.

style sheet from the list to load it into this page.

Download the sample [html file](#) and [css file](#)

The css Zen Garden invites you to relax and meditate on the important lessons of the masters. Begin to see with clarity. Learn to use the (yet to be) time-honored techniques in new and invigorating fashion. Become one with the web.

So What is This About?

There is clearly a need for CSS to be taken seriously by graphic artists. The Zen Garden aims to excite, inspire, and encourage participation. To begin, view some of the existing designs in the list. Clicking on any one will load the style sheet into this very page. The code remains the same, the only thing that has changed is the external .css file. Yes, really.

CSS allows complete and total control over the style of a hypertext document. The only way this can be illustrated in a way that gets people excited is by demonstrating what it can truly be, where the reins are placed in the hands of those able to reach beauty from structure. To date, most examples of neat tricks and hacks have been demonstrated by architects and coders. Designers have yet to make their mark. This needs to change.

Participation

Graphic artists only please. You are modifying this page, so strong CSS skills are necessary, but the example files are commented well enough that even CSS novices can use them as starting points. Please see the [CSS Resource Guide](#) for advanced tutorials and tips on working with CSS.

You may modify the style sheet in any way you wish, but not the HTML. This may seem daunting at first if you've never worked this way before, but follow the listed links to learn more, and use the sample files as a guide.

Download the sample [html file](#) and [css file](#) to work on a copy locally. Once you have completed your masterpiece (and please, don't submit half-finished work) upload your .css file to a web server under your control. [Send us a link](#) to the file and if we choose to use

What about CSS Zen Garden?

select a design:

[Under the Sea!](#) by Eric Stoltz

[Make 'em Proud](#) by Michael McAghon and Scotty Kershner

[Orchid Beauty](#) by Kevin Addison

[Oceanscape](#) by Justin Gray

[CSS Co., Ltd.](#) by Benjamin Klemm

[Sakura](#) by Tatsuya Uchida

[Kyoto Forest](#) by John Politowski

[A Walk in the Garden](#) by Simon Van Hauwermeiren

archives:

[next designs >>](#)

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resources:

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[CSS Resources](#)

[FAQ](#)

[Submit a Design](#)

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css Zen Garden

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Download the sample [html file](#) and [css file](#) to work on a copy locally. Once you have completed your masterpiece (and please, don't submit half-finished work) upload your .css file to a web server under your control. [Send us a link](#) to the file and if we choose to use it, we will spider the associated images. Final submissions will be placed on our server.

Benefits

Why participate? For recognition, inspiration, and a resource we can all refer to when making the case for CSS-based design. This is sorely needed, even today. More and more major sites are taking the leap, but not enough have. One day this gallery will be a historical curiosity; that day is not today.

Requirements

We would like to see as much CSS1 as possible. CSS2 should be limited to widely-supported elements only. The css Zen Garden is about functional, practical CSS and not the latest bleeding-edge tricks viewable by 2% of the browsing public. The only real requirement we have is that your CSS validates.

Unfortunately, designing this way highlights the flaws in the various implementations of CSS. Different browsers display differently, even completely valid CSS at times, and this becomes maddening when a fix for one leads to breakage in another. View the [Resources](#) page for information on some of the fixes available. Full browser compliance is still sometimes a pipe dream, and we do not expect you to come up with pixel-perfect code across every platform. But do test in as many as you can. If your design doesn't work in at least IE5+/Win and Mozilla (run by over 90% of the population), chances are we won't accept it.

We ask that you submit original artwork. Please respect copyright laws. Please keep objectionable material to a minimum; tasteful nudity is acceptable, outright pornography will be rejected.

This is a learning exercise as well as a demonstration. You retain full copyright on your graphics (with limited exceptions, see [submission guidelines](#)), but we ask you release your CSS under a Creative Commons license identical to the [one on this site](#) so that others may learn from your work.

Bandwidth graciously donated by [DreamFire Studios](#)

[html](#) [css](#) [cc](#) [508](#) [aaa](#)

Select a Design:

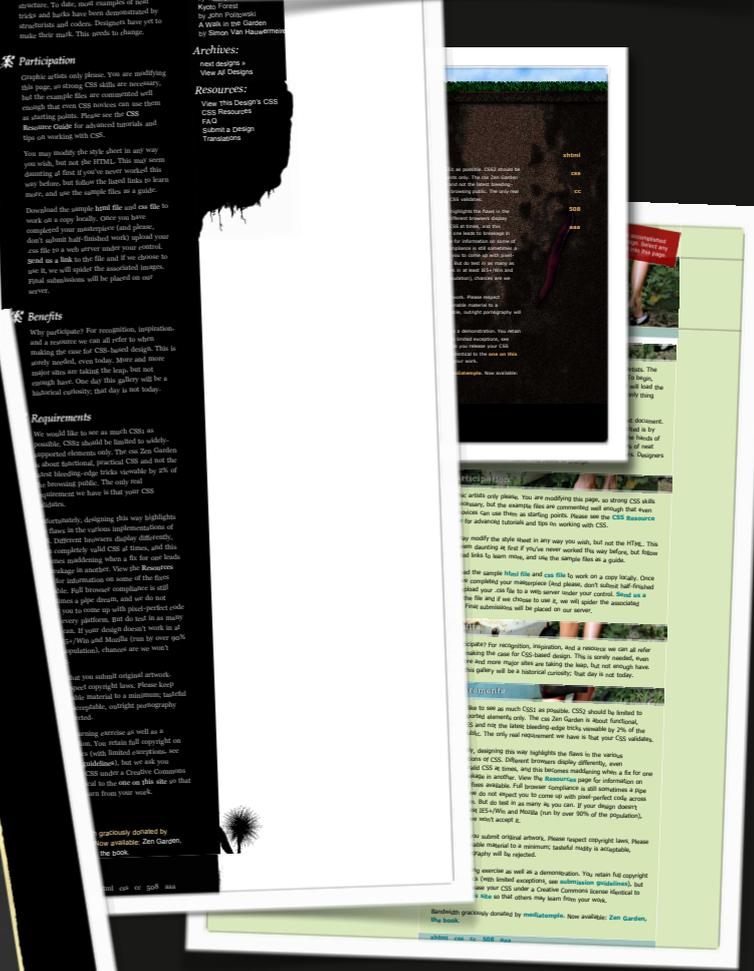
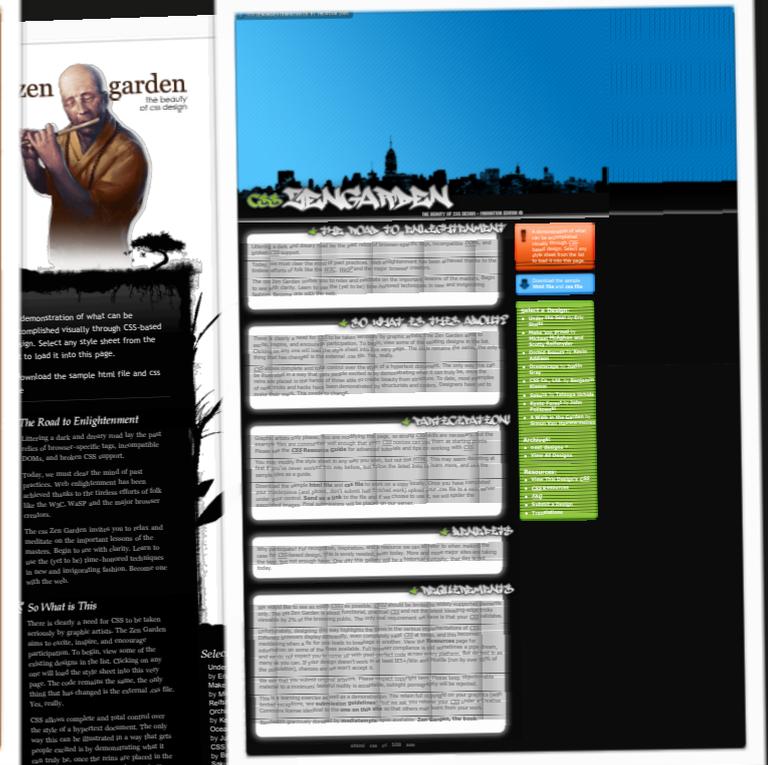
- [Sample #1](#) by [Dave Shea](#)
- [Sample #2](#) by [Dave Shea](#)
- [Sample #3](#) by [Dave Shea](#)
- [Sample #4](#) by [Dave Shea](#)
- [Sample #5](#) by [Dave Shea](#)
- [Sample #6](#) by [Dave Shea](#)
- [Sample #7](#) by [Dave Shea](#)
- [Sample #8](#) by [Dave Shea](#)

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In sum...

Cascading style sheets (CSS) are an elegantly designed extension to the Web and one of the greatest hopes for recapturing the Web's ideal of separation of presentation and content.

Jakob Nielsen (1997)



conclusion

Current CSS layout mechanisms —namely, floats and absolute positioning— prevent a true separation between presentation and content, or, more specifically, between structure and layout.

CSS

is not

A LAYOUT

LANGUAGE

CRISIS COUNSELING

**THERE IS HOPE
MAKE THE CALL**

**THE CONSEQUENCES OF
JUMPING FROM THIS
BRIDGE ARE FATAL
AND TRAGIC.**

Proposed solution

*The CSS3 Template
Layout Module*



CSS Template Layout Module

W3C Working Draft 29 November 2011

This version:

<http://www.w3.org/TR/2011/WD-css3-layout-20111129/>

Latest version:

<http://www.w3.org/TR/css3-layout/>

Previous version:

<http://www.w3.org/TR/2010/WD-css3-layout-20100429/>

Editors:

Bert Bos (W3C) bert@w3.org

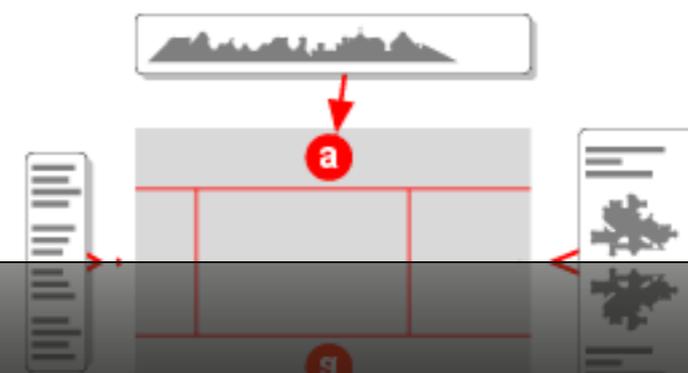
César Acebal (University of Oviedo)

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Abstract

CSS is a simple, declarative language for creating style sheets that specify the rendering of HTML and other structured documents. This module contains CSS features to describe layouts at a high level, meant for tasks such as the positioning and alignment of “widgets” in a graphical user

positioning and alignment of “widgets” in a graphical user
describe layouts at a high level, meant for tasks such as the



COLUMNS



are vertical containers that hold type or images. The width and number of columns on a page or screen can vary, depending on the content.

MODULES

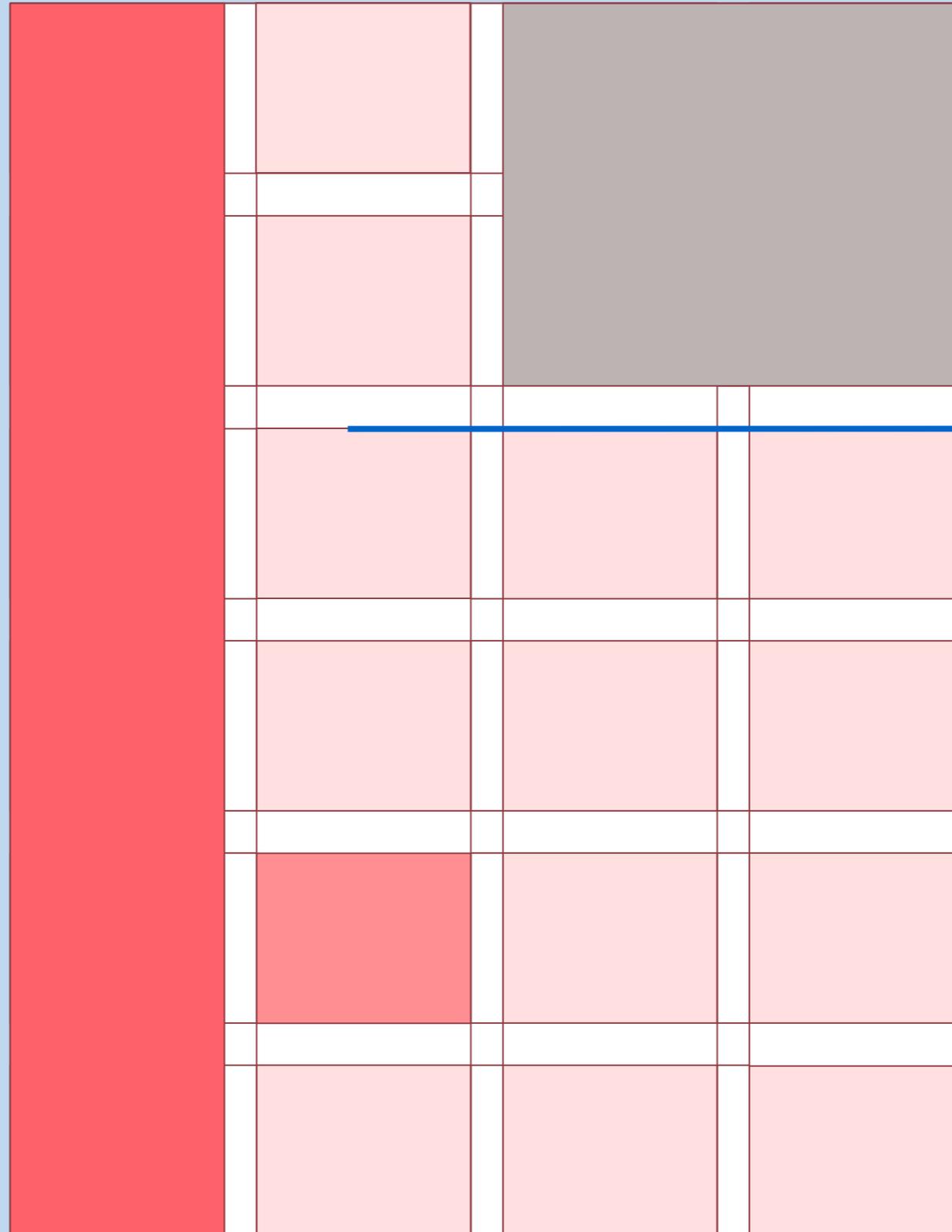


are individual divisions separated by consistent space, providing a repeating, ordered grid. Combining modules can create columns and rows of varying sizes.

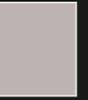
MARGINS



are buffer zones. They represent the amount of space between the trim size, including gutter, and the page content. Margins can also house secondary information, such as notes and captions.



SPATIAL ZONES



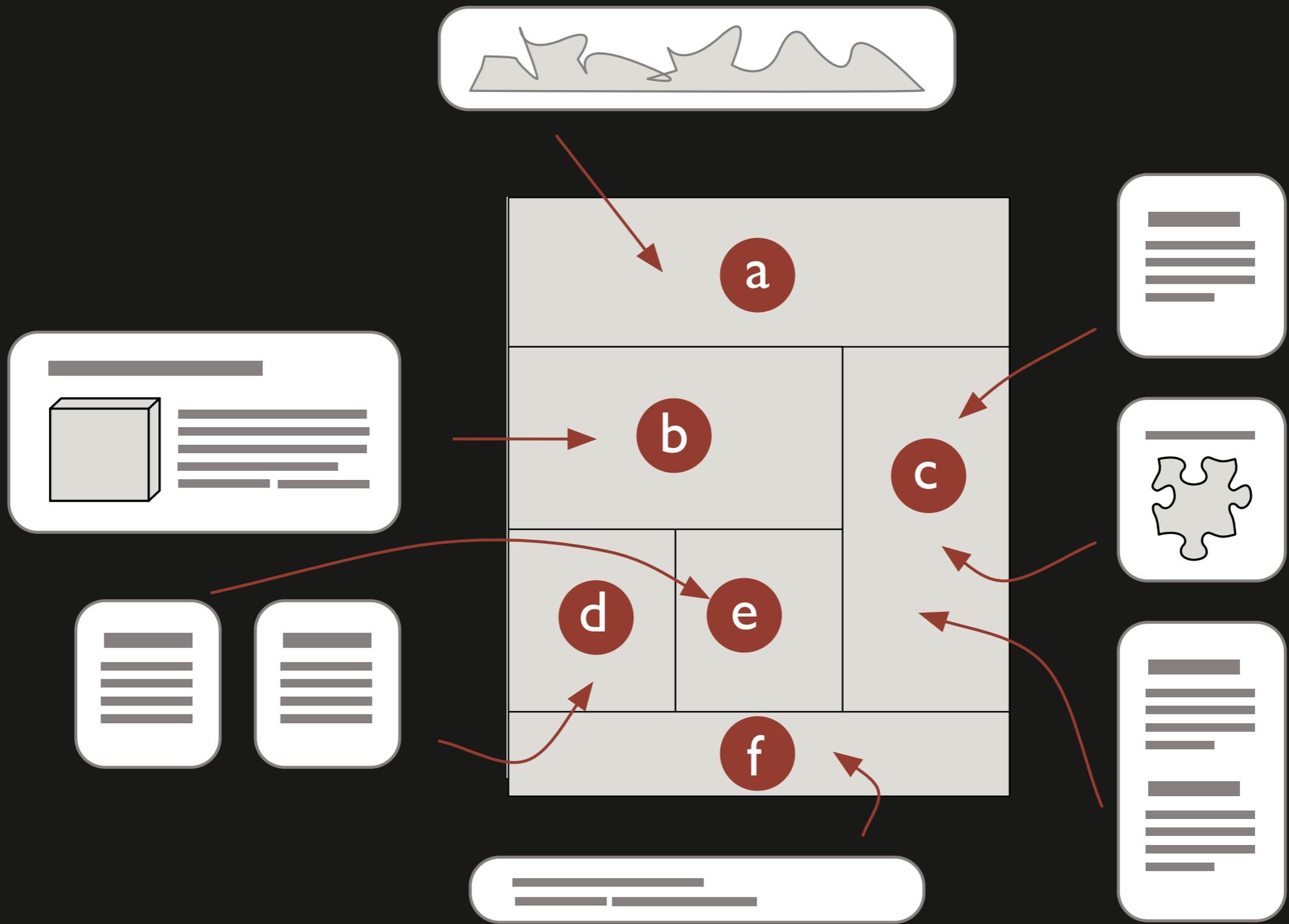
are groups of modules or columns that can form specific areas for type, ads, images, or other information.

FLOWLINES

are alignments that break space into horizontal bands. Not actual lines, flowlines are a method for using space and elements to guide a reader across a page.

MARKERS

help a reader navigate a document. Indicating placement for material that appears in the same location, markers include page numbers, running heads and feet (headers and footers), and icons.



Template definition

- ◎ Positioning is based on templates
- ◎ They are two-dimensional matrix in which the contents are distributed

display:

```
125px fit-content 12em
```

```
".ab" 280px
```

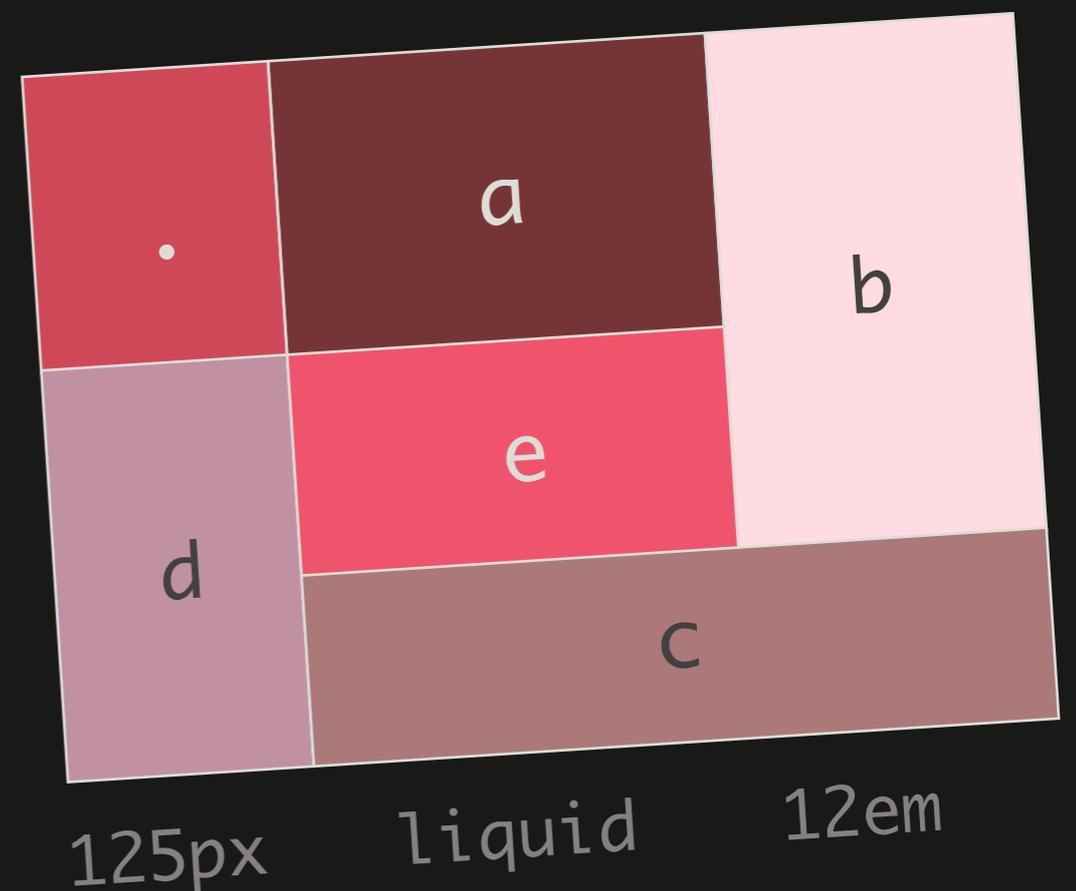
```
"deb" 195px
```

```
"dcc" 205px;
```

280px

195px

205px



Slots

- ◎ **a letter**
 - slot for content
- ◎ **@**
 - default slot for content
- ◎ **.(dot)**
 - empty slot

Row heights

- ◎ **<length>**
 - an explicit height for that row
- ◎ **auto**
 - row height is determined by its contents
- ◎ *** (asterisk)**
 - all rows with an asterisk will be of equal height

Column widths

- ◎ `<length>`
 - an explicit width for that column
- ◎ `max-content`, `min-content`
- ◎ `minmax(p,q)`
- ◎ `fit-content`
- ◎ equivalent to `'minmax(min-content, max-content)'`

Positioning content into slots

- © The remapping is done with the **position** property:

```
#menu { position: f; }
```

ALMcSS

*A JavaScript implementation
of Template Layout Module*

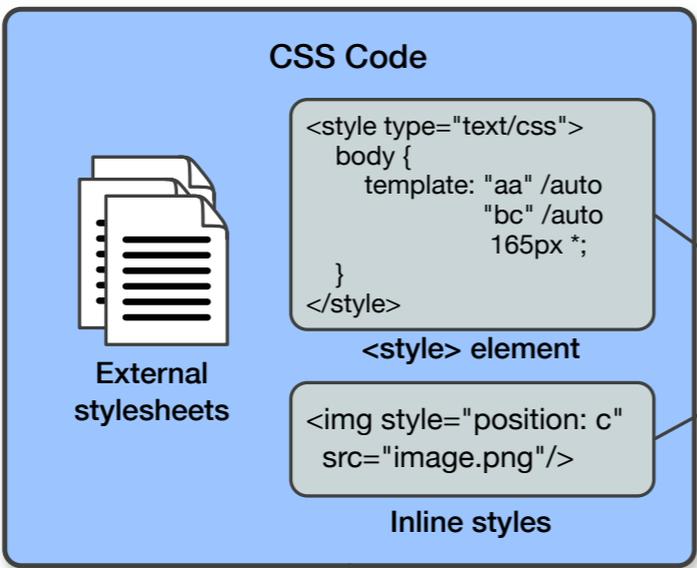
ALMcSS

- ◎ **Research project funded by Fundación CTIC**
 - From July 2005 to June 2006
 - Developers: María Rodríguez & Miguel García
- ◎ **Later refactored by Enrique José Cabal (2009)**
- ◎ **Has now been completely reimplemented from the scratch by me**

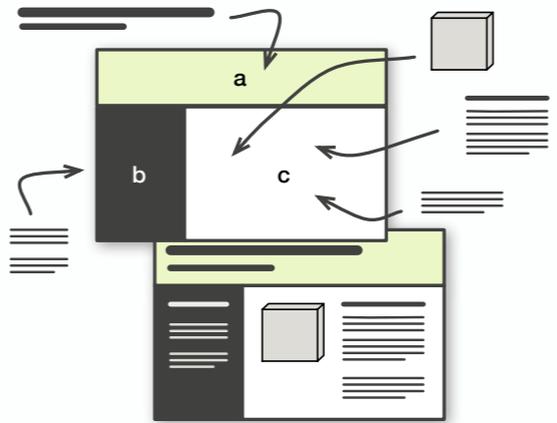
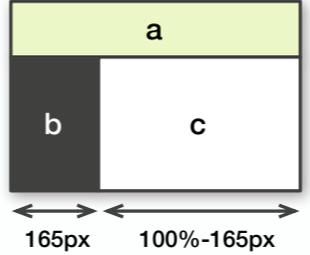
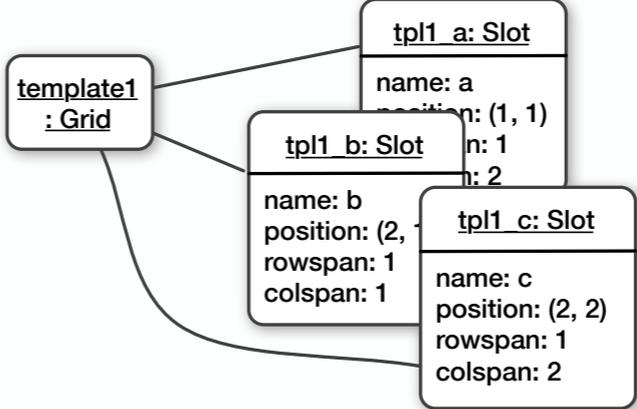
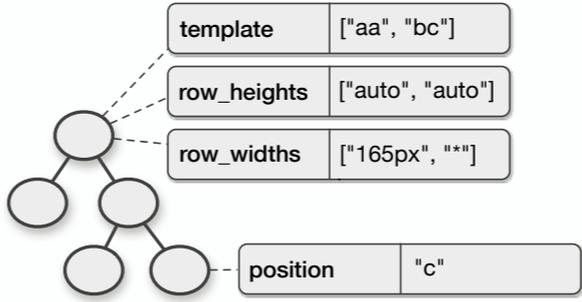
Design of the prototype

Rendering process

1. Parsing the style sheet
2. Decorating the DOM
3. Parsing the templates and creating the object structure
4. Computing the dimensions of templates and slots
5. Positioning the elements into slots



HTML



Example

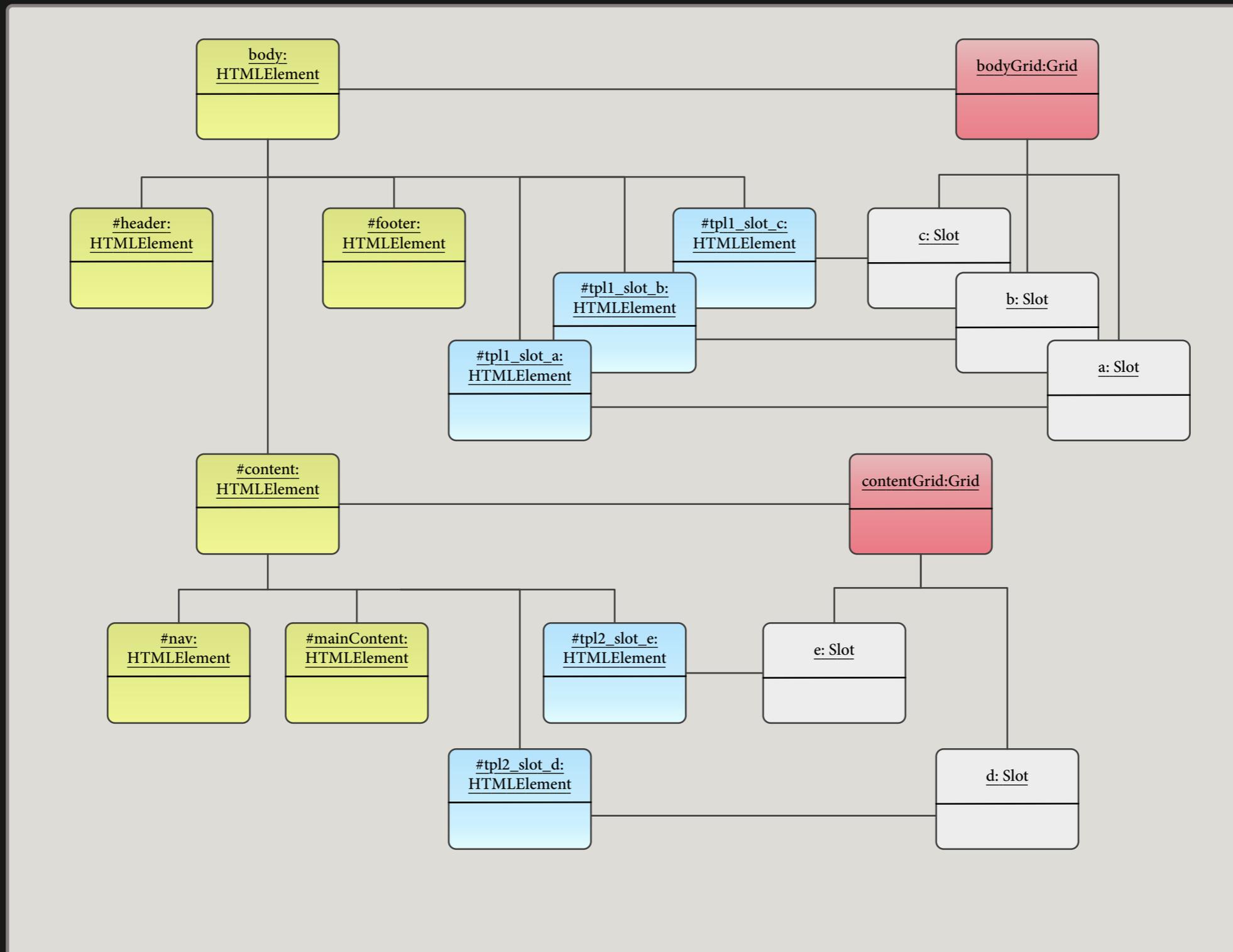
CSS code

```
body {  
  display: "a"  
        "b"  
        "c";  
}  
#header { position: a; }  
#content {  
  position: b;  
  display: "de";  
}  
#footer { position: c; }
```

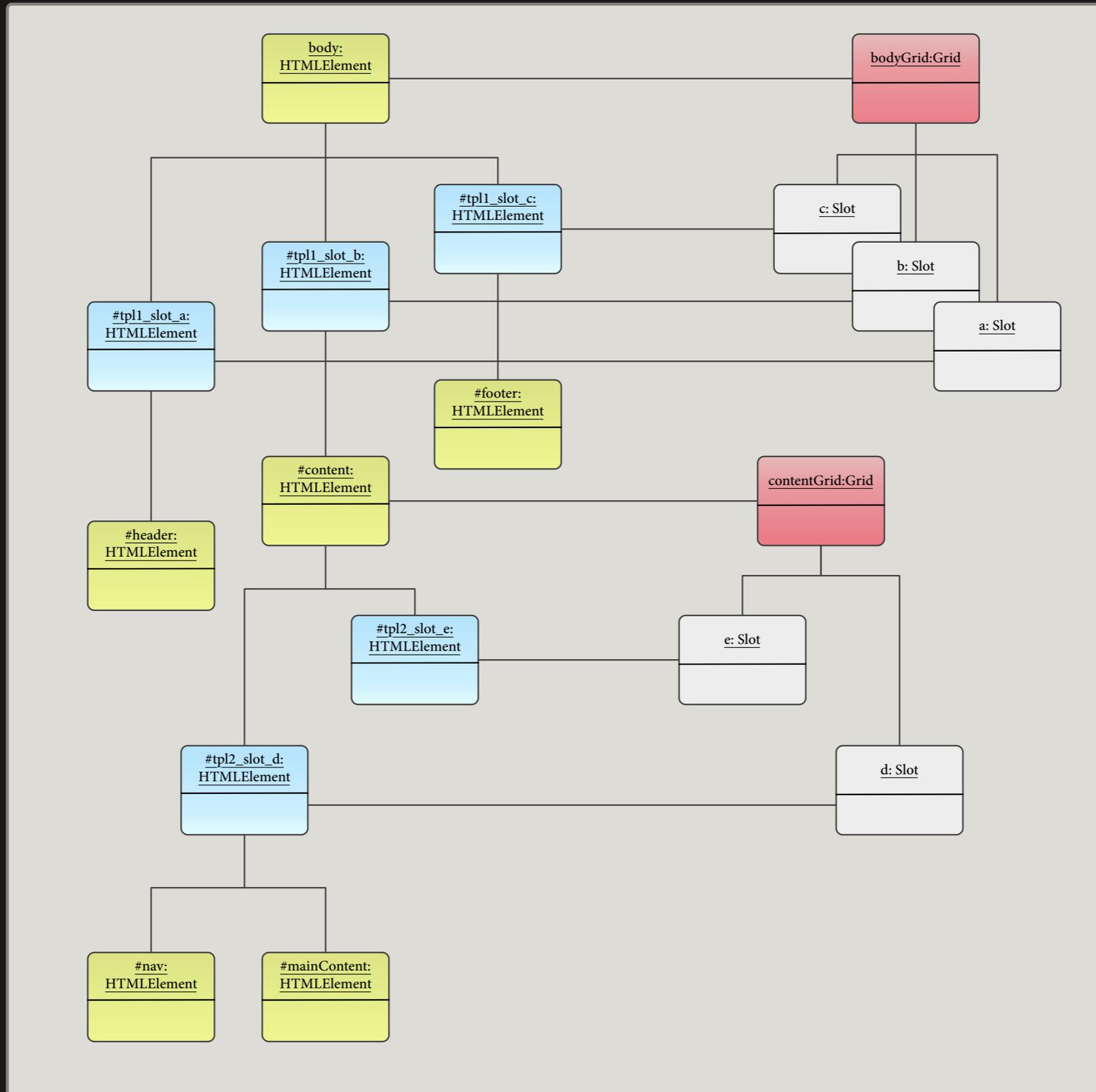
Original HTML code

```
<div id="header">...</div> <div id="content">  
<div id="nav">...</div>  
<div id="mainContent">...</div> </div>  
<div id="footer">...</div>
```

Object structure of grids, slots, and HTML elements



After moving the elements



DEMO

Columns

Three

This is a really long paragraph.

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Two



One

This is a short list:

- First element
- Second element
- More elements would go here...

Columns

Three

This is a really long paragraph.

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Two



One

This is a short list:

- First element
- Second element

This is a short list:

One

The Masthead

03

It is intended to be read but have no meaning. A sample of actual copy in a natural surround.

14



25

It is intended to be read but have no meaning. A sample of actual copy in a natural surround.

36



This is the headline

It is intended to be read but have no meaning. A sample of actual copy in a natural surround.

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Mauris id dolor mi. Vestibulum sollicitudin lobortis quam, ultricies semper nisl imperdiet a. Aenean purus ligula, luctus euismod accumsan sed, laoreet vitae nisl. Pellentesque porttitor, lacus ut vestibulum blandit, nunc velit imperdiet nisl, in porta tortor libero in felis. Integer dolor nisi, bibendum sed iaculis sed, consequat eget massa. Fusce tristique rhoncus posuere.

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The Masthead

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Conclusions

Conclusions

- ◎ **Implicit vs. explicit layout**
- ◎ **Cascading style sheets calls for a distinction between presentation and layout**
- ◎ **Requirements of CSS Layout**
 - **It has to provide a content reordering mechanism**
 - **Layout has to be explicitly defined**

Conclusions (cont.)

- ◎ **An innovative layout mechanism is proposed**
- ◎ **ALMCSS: the first implementation of the CSS3 Template Layout Module**

ALMcSS is available at github.com/acebal/ALMcSS3 under the W3C Software License

The screenshot shows the GitHub interface for the repository `acebal/ALMcSS3`. The page is public and has 0 stars and 0 forks. The repository is currently on the `master` branch. The latest commit is titled "Licensed." and was authored by `acebal` a minute ago. The commit message is "Licensed." and the commit hash is `59ad4f63d7`. The commit history table shows the following entries:

name	age	message	history
<code>css</code>	5 days ago	Now working everything, without margin collapsing, even on resize (un... [acebal])	
<code>examples</code>	5 days ago	Now working everything, without margin collapsing, even on resize (un... [acebal])	
<code>js</code>	2 minutes ago	Licensed. [acebal]	
<code>tests</code>	5 days ago	Now working everything, without margin collapsing, even on resize (un... [acebal])	
<code>LICENSE</code>			
<code>tests</code>	5 days ago	Now working everything, without margin collapsing, even on resize (un... [acebal])	
<code>js</code>	2 minutes ago	Licensed. [acebal]	

Colophon

Funded projects, students' undergraduate theses, etcetera, about ALMcss.

Research projects

- © **Extensión del estándar CSS3 que permita la adaptación multidispositivo de contenidos web. Research project funded by CTIC Foundation (project code FUIO-EM-115-05) (Acebal, C., Rodríguez, M., García, M., Cueva, J. M. & Labra, J. E., 2006)**

Awards

- © I Premios Sociedad Información en Asturias (First Asturias Information Society Awards), promoted by the regional government of the Principality of Asturias.

Related students' works

- ◎ Cabal, E. J. (2006). Adaptación de los estándares web para dispositivos móviles. (Undergraduate thesis, Escuela Universitaria de Ingeniería Técnica en Informática de Oviedo (EUITIO), University of Oviedo)
- ◎ Rodríguez, M. (2007). Implementación de un prototipo visualizador multinavegador para dar soporte al modelo de maquetación avanzado CSS3. (Undergraduate thesis, Escuela Universitaria de Ingeniería Técnica en Informática de Gijón (EUITIG), University of Oviedo)
- ◎ Cabal, E. J. (2009). Extensión en JavaScript que incorpora el Advanced Layout Module de CSS3 a los navegadores web actuales. (Master's thesis, Escuela Politécnica Superior de Ingenieros de Gijón (EPSIG), University of Oviedo)
- ◎ Abella, P. (2009). Generador de plantillas del módulo Template Layout de CSS3. (Undergraduate thesis, Escuela Universitaria de Ingeniería Técnica en Informática de Oviedo (EUITIO), University of Oviedo)
- ◎ Escalada, P. (2012). Posicionamiento avanzado en CSS mediante plantillas. (Undergraduate thesis, Escuela de Ingeniería Informática, University of Oviedo)

The End



Image Credits



The CSS Working Group

Kevin Lawver

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Crisis counseling

acebal

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Manos Arriba

::: M @ X :::

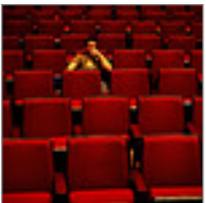
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The Calm After the Show

Thomas Hawk

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329/365 - empty house.

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