Introduction to CSS

Grid Layout

Rachel Andrew
Fluent, April 2015
CSS in 2015 is amazing.
The trouble with CSS layout

• Floats and clearfix hacks
• Absolute positioning means elements are taken out of document flow and risk overlaps
• Redundant markup and positioning oddities with display: table
• White space issues with inline-block
Seeing Flexbox as the silver bullet for layout issues is likely to lead us down another path of layout hacks.
The cost of taming layout methods

- Developer hours spent learning non-obvious concepts.
- Compromises in terms of document semantics in order to achieve responsive layouts.
- Needing to lean on frameworks to help with complex math.
- Adding markup to create grids
- Using preprocessors to abstract layout hacks
We need a designed for purpose layout system for the sites and applications we develop today.
CSS Grid Layout Module Level 1

W3C Working Draft, 17 March 2015

This version:
http://www.w3.org/TR/2015/WD-css-grid-1-20150317/

Latest version:
http://www.w3.org/TR/css-grid-1/

Editor’s Draft:
http://dev.w3.org/csswg/css-grid/

Previous Versions:
http://www.w3.org/TR/2014/WD-css-grid-1-20140513/
http://www.w3.org/TR/2014/WD-css-grid-1-20140123/
http://www.w3.org/TR/2013/WD-css3-grid-layout-20130402/
http://www.w3.org/TR/2012/WD-css3-grid-layout-20121106/

Feedback:
www-style@w3.org with subject line "[css-grid] _ message topic _" (archives)
Our HTML consists of a div with a class of wrapper and six child elements.

```html
<div class="wrapper">
  <div class="a">A</div>
  <div class="b">B</div>
  <div class="c">C</div>
  <div class="d">D</div>
  <div class="e">E</div>
  <div class="f">F</div>
</div>
```
To create a grid we use a new value of the display property.

display: grid

.wrapper {
    display: grid;
}

}
We describe the grid using the new properties:

```
.grid-

template-columns

grid-template-rows

.wrapper {
  display: grid;
  grid-template-columns: 100px 10px 100px 10px 100px;
  grid-template-rows: auto 10px auto;
}
```
We position items using the new properties:

grid-column-start
grid-column-end
grid-row-start
grid-row-end

```
.a {
  grid-column-start: 1;
  grid-column-end: 2;
  grid-row-start: 1;
  grid-row-end: 2;
}
```
To position an item bottom centre, I start at column line 3, this is the line after the gutter track.

.b {
  grid-column-start: 3;
  grid-column-end: 4;
  grid-row-start: 3;
  grid-row-end: 4;
}
To span more tracks we just change the end row or column line.

.b {
    grid-column-start: 3;
    grid-column-end: 6;
    grid-row-start: 3;
    grid-row-end: 4;
}
The longhand for line-based placement means up to 4 properties to position each element.

```css
.a {
    grid-column-start: 1;
    grid-column-end: 2;
    grid-row-start: 1;
    grid-row-end: 2;
}

.b {
    grid-column-start: 3;
    grid-column-end: 4;
    grid-row-start: 3;
    grid-row-end: 4;
}
```
Declare start and end values with grid-column and grid-row.

Values are separated by a / symbol.

```css
.a {
    grid-column: 1 / 2;
    grid-row: 1 / 2;
}

.b {
    grid-column: 3 / 6;
    grid-row: 3 / 4;
}
```
Declare all 4 values using the grid-area property.

```
.a {
    grid-area: 1 / 1 / 2 / 2;
}

.b {
    grid-area: 3 / 3 / 4 / 6;
}
```
Grid Terminology
Grid Lines

Lines can be horizontal or vertical. They are referred to by number and can be named.

Highlighted is Column Line 2.
A Grid Track is the space between two Grid Lines. Tracks can be horizontal or vertical (rows or columns).

The highlighted Grid Track is between Row Lines 2 and 3.
Grid Cell

The smallest unit on our grid, a Grid Cell is the space between four Grid Lines. It’s just like a table cell.

The highlighted Grid Cell is between row lines 2 and 3 and column lines 2 and 3.
Grid Area

Any area of the Grid bound by 4 Grid Lines. It can contain many Grid Cells.

The highlighted Grid Area is between row lines 1 and 3, column lines 2 and 4.
Grid by Example simple usage examples for the CSS3 Grid Layout Module

I have been writing and speaking about the CSS Grid Layout Module for some time now. In order to learn how Grid works I’ve put together lots of small examples, and I am publishing them here as a resource for anyone else interested in this emerging specification.

Grid Examples

Line based placement spanning cells

Line based placement named lines with span

Grid auto flow with a positioned element

Explore all the examples

Examples of layout with Grid

Two column responsive layout with footer

Skeleton 12 column grid experiments

Auto placement example

Line-based placement
The First Balloon Ascent in England

Following his own account, Lunardi's first act on finding himself fairly above the town was to fortify himself with some glasses of wine, and to devour the leg of a chicken. He describes the city as a vast beehive, St. Paul's and other churches standing out prominently: the

By this time he found his balloon, which had been only two-thirds full at starting, to be so distended that he was obliged to unite the mouth to release the strain. He also found that the condensed moisture round the neck had frozen. These two statements point to his having reached a considerable altitude, which is intelligible enough. It is, however, difficult to believe his further assertion that by the use of his single ear he succeeded in working himself down to within a few hundred feet of the earth. The descent of the balloon must, in point of fact, have been due to a copious outrush of gas at his former altitude. Had his ear really been effective in working the balloon down it would not have needed the discharge of ballast presently spoken of to cause it to reascend. Anyhow, he found himself sufficiently near the earth to land a passenger who was anxious to get out. His cat had not been comfortable in the cold upper regions, and now at its urgent appeal was deposited in a corn field, which was the point of first contact with the earth. It was carefully received by a country-woman, who promptly sold it to a gentleman on the other side of the hedge, who had been pursuing the balloon.
The various areas of my page are child elements of a div with a class of wrapper.

```html
<div class="wrapper">
  <header class="mainheader"></header>
  <div class="panel"></div>
  <div class="content"></div>
</div>
```
Chapter listing

- The Dawn of Aeronautics
- The Invention of the Balloon
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- Some Famous Early Voyagers
- Charles Green and the Nassau Balloon
- John Wise - The American Aeronaut
- The Balloon in the Service of Science
- Some Noteworthy Ascents
- The Highest Ascent on Record

The First Balloon Ascent in England

Following his own account, Lunard's first act on finding himself fairly above the town was to fortify himself with some glasses of wine, and to devour the leg of a chicken. He describes the city as a vast beehive. St. Paul's and other churches standing out prominently; the streets shrunk to lines, and all humanity apparently transfixed and watching him. A little later he is equally struck with the view of the open country, and his ecstasy is pardonable in a novice. The verdant pastures eclipsed the visions of his own lands. The precision of boundaries impressed him with a sense of law and order, and of good administration in the country where he was a sojourner.

By this time he found his balloon, which had been only two-thirds full at starting, to be so distended that he was obliged to untie the mouth to release the strain. He also found that the condensed moisture round the neck had frozen. These two statements point to his having reached a considerable altitude, which is intelligible enough. It is, however, difficult to believe his further assertion that by the use of his single oar he succeeded in working himself down to within a few hundred feet of the earth. The descent of the balloon must, in point of fact, have been due to a copious outrush of gas at his former altitude. Had his oar really been effective in working the balloon down it would not have needed the discharge of ballast presently spoken of to cause it to reascend. Anyhow, he found himself sufficiently near the earth to land a passenger who
Declaring a grid on wrapper.

The grid has three columns, and four rows.

.wrapper {
  width: 100%;
  max-width: 960px;
  margin: 0 auto;
  display: grid;
  grid-template-columns: 30% 5% 65%;
  grid-template-rows: 40px auto 20px auto;
}
The First Balloon Ascent in England

Excerpts from the book by J.M. Bacon

Following his own account, Lunardi’s first act on finding himself fairly above the town was to fortify himself with some glasses of wine, and to devour the leg of a chicken. He describes the city as a vast beehive, St. Paul’s and other churches standing out prominently; the streets shrank to lines, and all humanity apparently transfixed and watching him. A little later he is equally struck with the view of the open country, and his ecstasy is pardonable in a novice. The verdant pastures eclipsed the visions of his own lands. The precision of boundaries impressed him with a sense of law and order, and of good administration in the country where he was a sojourner.

By this time he found his balloon, which had been only two-thirds full at starting, to be so by his Assertion that he was obliged to untie the mouth to release the strain. He also found that the condensed moisture round the neck had frozen. These two statements point to his having reached a considerable altitude, which is intelligible enough. It is, however, difficult to believe his further assertion that by the use of his single car he succeeded in working himself down to within a few hundred feet of the earth. The descent of the balloon must, in point of fact, have been due to a copious outrush of gas at his former altitude. Had his car really been effective in working the balloon down it would not have needed the discharge of ballast presently spoken of to cause it to reascend. Anyhow, he found himself sufficiently near the earth to land a passenger who was anxious to get out. His car had not been comfortable in the cold upper regions, and now at its urgent appeal was deposited in a cornfield, which was the point of first contact with the earth. It was carefully received by a country-woman, who promptly sold it to a gentleman on the other side of the hedge, who had been pursuing the balloon.
Positioning our elements using the grid-column and grid-row shorthand.

This is all we need to do to create our layout.

```css
.mainheader {
    grid-column: 1 / 4;
    grid-row: 2 / 3;
}

.panel {
    grid-column: 1 / 2;
    grid-row: 4 / 5;
}

.content {
    grid-column: 3 / 4;
    grid-row: 4 / 5;
}
```
The First Balloon Ascent in England

Following his own account, Lunardi’s first act on finding himself fairly above the town was to fortify himself with some glasses of wine, and to devour the leg of a chicken. He describes the city as a vast beehive, St. Paul’s and other churches standing out prominently; the streets shrunk to lines, and all humanity apparently transfixed and watching him. A little later he is equally struck with the view of the open country, and his ecstasy is pardonable in a novice. The verdant pastures eclipsed the visions of his own lands. The precision of boundaries impressed him with a sense of law and order, and of good administration in the country where he was a sojourner.

By this time he found his balloon, which had been only two-thirds full at starting, to be so distended that he was obliged to untie the mouth to release the strain. He also found that the condensed moisture round the neck had frozen. These two statements point to his having reached a considerable altitude, which is intelligible enough. It is, however, difficult to believe his further assertion that by the use of his single ear he succeeded in working himself down to within a few hundred feet of the earth. The descent of the balloon must, in point of fact, have been due to a copious outrush of gas at his former altitude. Had his ear really been effective in working the balloon down it would not have needed the discharge of ballast presently spoken of to cause it to reascend. Anyhow, he found himself sufficiently near the earth to land a passenger who was anxious to get out. His cat had not been comfortable in the cold upper regions, and now at its urgent appeal was deposited in a corn field, which was the point of first contact with the earth. It was carefully received by a country-woman, who promptly sold it to a gentleman on the other side of the hedge, who had been pursuing the balloon.
The Dominion of the Air
The Story of Aerial Navigation
Excerpts from the book by J.M. Bacon

Chapter listing
- The Dawn of Aeronautics
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The First Balloon Ascent in England

Following his own account, Lunardi’s first act on finding himself fairly above the town was to fortify himself with some glasses of wine, and to devour the leg of a chicken. He describes the city as a vast beehive, St. Paul’s and other churches standing out prominently; the streets shrunk to lines, and all humanity apparently transfixed and watching him. A little later he is equally struck with the view of the open country, and his ecstasy is pardonable in a novice. The verdant pastures eclipsed the visions of his own lands. The precision of boundaries impressed him with a sense of law and order, and of good administration in the country where he was a sojourner.

By this time he found his balloon, which had been only two-thirds full at starting, to be so distended that he was obliged to unte the mouth to release the strain. He also found that the condensed moisture round the neck had frozen. These two statements point to his having reached a considerable altitude, which is intelligible enough. It is, however, difficult to believe his further assertion that by the use of his single ear he succeeded in working himself down to within a few hundred feet of the earth. The descent of the balloon must, in point of fact, have been due to a copious outrush of gas at his former altitude. Had his ear really been effective in working the balloon down it would not have needed the discharge of ballast presently spoken of to cause it to reascend. Anyhow, he found himself sufficiently near the earth to land a passenger who was anxious to get out. His cat had not been comfortable in the cold upper regions, and now at its urgent appeal was deposited in a corn field, which was the point of first contact with the earth. It was carefully received by a country-woman, who promptly sold it to a gentleman on the other side of the hedge, who had been pursuing the balloon.
I can add a footer to this layout - and it doesn’t matter in which unusual place I want to add the markup.

```html
<div class="wrapper">
  <header class="mainheader"></header>
  <footer class="mainfooter"></footer>
  <div class="panel"></div>
  <div class="content"></div>
</div>
```
Positioning the footer between row lines five and six.

```
.mainfooter {
    grid-column: 1 / 4;
    grid-row: 5 / 6;
}
```
The First Balloon Ascent in England

Following his own account, Lunardi’s first act on finding himself fairly above the town was to fortify himself with some glasses of wine, and to devour the leg of a chicken. He describes the city as a vast beehive, St. Paul’s and other churches standing out prominently; the streets shrunk to lines, and all humanity apparently transfixed and watching him. A little later he is equally struck with the view of the open country, and his ecstasy is pardonable in a novice. The verdant pastures eclipsed the visions of his own lands. The precision of boundaries impressed him with a sense of law and order, and of good administration in the country where he was a sojourner.

By this time he found his balloon, which had been only two-thirds full at starting, to be so distended that he was obliged to untie the mouth to release the strain. He also found that the condensed moisture round the neck had frozen. These two statements point to his having reached a considerable altitude, which is intelligible enough. It is, however, difficult to believe his further assertion that by the use of his single car he succeeded in working himself down to within a few hundred feet of the earth. The descent of the balloon must, in point of fact, have been due to a copious outbreak of gas at his former altitude. Had his car really been effective in working the balloon down it would not have needed the discharge of ballast presently spoken of to cause it to reascend. Anyhow, he found himself sufficiently near the earth to land a passenger who was anxious to get out. His cat had not been comfortable in the cold upper regions, and now at its urgent appeal was deposited in a corn field, which was the point of first contact with the earth. It was carefully received by a country-woman, who promptly sold it to a gentleman on the other side of the hedge, who had been pursuing the balloon.
Our grid only has 5 row lines specified - yet we placed an item between row lines 5 and 6.

Grid creates an implicit grid line for us.
Grid lines can be explicit or implicit

- Explicit grid lines are those that you specify and give sizing information.

- Implicit lines are created when you place something into a row or column you have not specified with grid-template-rows or grid-template-columns.
Grid is “table like” however ...

• Unlike a table for layout Grid does not rely on your content being a particular order in the source.

• Being entirely described in CSS we can move things around the Grid at different breakpoints, introduce or redefine a Grid for any breakpoint.
Using Grid to order the page elements in a single column for narrow screen widths.

```css
.wrapper {
    display: grid;
    grid-template-rows:
        10px auto 10px auto 10px auto 10px auto;
}

.mainheader {
    grid-row: 2 / 3;
}

.content {
    grid-row: 4 / 5;
}

.panel {
    grid-row: 6 / 7;
}

.mainfooter {
    grid-row: 8 / 9;
}
```
The Dominion of the Air
The Story of Aerial Navigation

Excerpts from the book by J.M. Bacon

The First Balloon Ascent in England

Following his own account, Lunardi's first trial on finding himself fairly aloft the town was to fortify himself with some glasses of wine, and to décor the leg of a chicken. He describes the city as a seat of delight. St. Paul's and other churches standing out prominently, the streets shrouded in haze, and all humanity apparently transfixed and watching him. A little later he is equally afloat with the view of the open country, and his estate is inordinately in a notice. The verdant pastures displayed the visions of his own lands. The precision of boundaries impressed him with a sense of law and order, and of good administration in the country where he was a countryman.

By this time he found his balloon, which had been only two thirds full at starting, to be so disorganized that he was obliged to wring the mouth to release the strain. He also found that the condensed moisture round the neck had frozen. These two statements point to his having reached a considerable altitude, which is really big enough. It is, however, difficult to believe his further assertion that the use of his single ear he succeeded in working himself down to within a few hundred feet of the earth. The descent of the balloon must, in fact, have been due to a copious outflow of gas at his former altitude. Had he ever really been effective in working the balloon down it would not have yielded the discharge of ballast presently spoken of (so that it is to be reasoned. Anyhow, he found himself sufficiently near the earth to send a passenger who was anxious to get out. He had not been comfortably in the cold upper regions, and now at his urgent appeal was deposited in a corn field, which was the point of first contact with the earth. It was carefully received by a countrywoman, who promptly aided it to a gentleman on the other side of the hedge, who had been pursuing the balloon.

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- The Highest Ascent on Record

This book is available to read in full on the Project Gutenberg website.
Redefine the Grid at min-width 550 pixels.

Position items as in the earlier example.

```
@media (min-width: 550px) {
  .wrapper {
    grid-template-columns: 30% 5% 65%;
    grid-template-rows: 40px auto 20px auto 20px auto;
  }
  .mainheader {
    grid-column: 1 / 4;
    grid-row: 2 / 3;
  }
  .panel {
    grid-column: 1 / 2;
    grid-row: 4 / 5;
  }
  .content {
    grid-column: 3 / 4;
    grid-row: 4 / 5;
  }
  .mainfooter {
    grid-column: 1 / 4;
    grid-row: 6 / 7;
  }
}
```
Named Grid Lines
The Dominion of the Air
The Story of Aerial Navigation
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Chapter listing
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The First Balloon Ascent in England

Following his own account, Lunardi’s first act on finding himself fairly above the town was to fortify himself with some glasses of wine, and to devour the leg of a chicken. He describes the city as a vast beehive, St. Paul’s and other churches standing out prominently; the streets shrunk to lines, and all humanity apparently transfixed and watching him. A little later he saw tickets sold with the view of elevating him. This incident had led to the

http://gridbyexample.com/examples/code/layout10.html

By this time he found his balloon, which had been only two-thirds full at starting, to be so distended that he was obliged to unile the mouth to release the strain. He also found that the condensed moisture round the neck had frozen. These two statements point to his having reached a considerable altitude, which is intelligible enough. It is, however, difficult to believe his further assertion that by the use of his single car he succeeded in working himself down to within a few hundred feet of the earth. The descent of the balloon must, in point of fact, have been due to a copious outrush of gas at his former altitude. Had his car really been effective in working the balloon down it would not have needed the discharge of ballast presently spoken of to cause it to reascend. Anyhow, he found himself sufficiently near the earth to land a passenger who was anxious to get out. His car had not been comfortable in the cold upper regions, and now at its urgent appeal was deposited in a corn field, which was the point of first contact with the earth. It was carefully received by a country-woman, who promptly led it to a gentleman on the other side of the hedge, who had been pursuing the balloon.

This book is available to read in full on the Project Gutenberg website.
Name lines with the name in parenthesis.

Remember we name grid lines and not grid tracks.

```css
.wrapper {
  display: grid;
  grid-template-rows:
    10px (row-header-start) auto (row-header-end)
    10px (row-content-start) auto (row-content-end)
    10px (row-panel-start) auto (row-panel-end)
    10px (row-footer-start) auto (row-footer-end);
}
```
Here we are positioning based on line numbers.

```css
.mainheader {
    grid-row: 2 / 3;
}

.content {
    grid-row: 4 / 5;
}

.panel {
    grid-row: 6 / 7;
}

.mainfooter {
    grid-row: 8 / 9;
}
```
Here we are positioning by named lines.

```css
.mainheader {
    grid-row: row-header-start / row-header-end;
}

.content {
    grid-row: row-content-start / row-content-end;
}

.panel {
    grid-row: row-panel-start / row-panel-end;
}

.mainfooter {
    grid-row: row-footer-start / row-footer-end;
}
```
Grid Template Areas
The Dominion of the Air
The Story of Aerial Navigation

Excerpts from the book by J.M. Bacon

Chapter listing

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The First Balloon Ascent in England

Following his own account, Lunardi’s first act on finding himself fairly above the town was to fortify himself with some glasses of wine, and to devour the leg of a chicken. He describes the city as a vast beehive, St. Paul’s and other churches standing out prominently; the streets shrunk to lines, and all humanity apparently transfixed and watching him. A little later he described the flight of thousands of birds, whose cackling and whose hue had

By this time he had his balloon, which had been only two-thirds full at starting, so distended that he was obliged to unite the mouth to release the strain. He also found that the condensed moisture round the neck had frozen. These two statements point to his having reached a considerable altitude, which is intelligible enough. It is, however, difficult to believe his further assertion that by the use of his single car he succeeded in working himself down to within a few hundred feet of the earth. The descent of the balloon must, in point of fact, have been due to a copious outbreak of gas at his former altitude. Had he not been effective in working the balloon down it would not have needed the discharge of ballast presently spoken of to cause it to reascend. Anyhow, he found himself sufficiently near the earth to land a passenger who was anxious to get out. His cat had not been comfortable in the cold upper regions, and now at its urgent appeal was deposited in a corn field, which was the point of first contact with the earth. It was carefully received by a country-woman, who promptly led it to a gentleman on the other side of the hedge, who had been pursuing the balloon.

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We assign a name to the elements on our page.

I am doing this outside of any Media Queries.

```css
.mainheader {
  grid-area: header;
}

.content {
  grid-area: content;
}

.panel {
  grid-area: sidebar;
}

.mainfooter {
  grid-area: footer;
}
```
Describe the layout on the parent element using the grid-template-areas property.

A period “.” indicates that this grid cell is empty.

```css
.wrapper {
  display: grid;
  grid-template-rows: 10px auto 10px auto 10px auto 10px auto;
  grid-template-areas:
    "." "header" "." "content" "." "sidebar" "." "footer";
}
```
The First Balloon Ascent in England

Following his own account, Lunardi's first aid on finding himself fairly alone the town was to fortify himself with some glasses of wine, and to devour the leg of a chicken. He describes the city as a vast beehive. St. Paul's and other churches standing out prominently, the streets shrank to lines, and all humanity apparently transfixed and watching him. A little later he is equally absorbed with the view of his open country, and his estates as paradisal in a novel. The verdant pastures eclipsed the visions of his own lands. The precision of boundaries impressed him with a sense of law and order, and of good administration in the country where he was a squatter.

By this time he found his balloon, which had been only two-thirds full at starting, to be so deteriorated that he was obliged to flute the mouth to release the strain. He also found that the condensed moisture round the neck had frozen. These two statements point to his having reached a considerable altitude, which is negligibly enough. It is, however, difficult to believe his further assertion that by the use of his single ear he succeeded in working himself down to within a few hundred feet of the earth. The descent of the balloon must, in fact, have been due to a copious outpour of gas at his former altitude. Had his ear really been effective in working the balloon down it would not have needed the discharge of ballast presently asserted of to cause it to descend. Anyhow, he found himself sufficiently near the earth to land a passenger who was anxious to get out. He ate not had not been contemplative in the cold upper regions, and now at urgent appeal was deposited in a corn field, which was the point of first contact with the earth. It was carefully received by a countrywoman, who promptly added it a gentleman on the other side of the hedge, who had been pursuing the balloon.

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- Some Noteworthy Ascents
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The First Balloon Ascent in England

Following his own account, Lunardi’s first aid on finding himself fairly above the town was to satisfy himself with some glasses of wine, and to devour the leg of a chicken. He describes the city as a seat of destitution. St. Paul’s and other churches standing out prominently, the streets are unkempt. Still, all humanity apparently transfixed and watching him. A little later he is equally astounded with the view of the open country, and his awe is pardonable in a novice. The verdant pasture, the visions of his own lands. The precision of boundaries impressed him with a sense of law and order, and of good administration in the country where he was a squatter.

My chin, to iron, my two thick, half at anything, girl out, the under the mouth to raise the dress. He also found that the condensed moisture round the neck had frozen. These two statements point to his having reacted a considerable attitude, which is intelligible enough. It is, however, difficult to believe his further assertion that by the use of his single ear he succeeded in wakening himself down to within a few hundred feet of the earth. The descent of the balloon must, in point of fact, have been due to a copious outrush of gas at his former attitude. Had his ear really been effective in wakening the balloon, he would have realized the discharge of that presence would of cause it to descend. Anyway, he found himself sufficiently near the earth to assist a passenger who was anxious to get out. He felt not have been comfortable in the cold upper regions, and now at the urgent appeal was deposited in a corn field, which was the point of first contact with the earth. It was carefully received by a country woman, who promptly said it is a gentleman on the other side of the hedge, who had been pursuing the balloon.
Redefining the template areas for the wider layout.

```css
@media (min-width: 550px) {
    .wrapper {
        grid-template-columns: 30% 5% 65%;
        grid-template-rows: 2em auto 1em auto 1em auto;
        grid-template-areas: 
            " . . . "
            "header header header"
            " . . . "
            "sidebar . content"
            " . . . "
            "footer footer footer"
    }
}
```
The Dominion of the Air
The Story of Aerial Navigation

Excerpts from the book by J.M. Bacon

Chapter listing
- The Dawn of Aeronautics
- The Invention of the Balloon
- The First Balloon Ascent in England
- The Development of Balloon Philosophy
- Some Famous Early Voyagers
- Charles Green and the Neasau Balloon
- John Wise - The American Aeronaut
- The Balloon in the Service of Science
- Some Noteworthy Ascents
- The Highest Ascent on Record

The First Balloon Ascent in England

Following his own account, Lunardi's first act on finding himself fairly above the town was to fortify himself with some glasses of wine, and to devour the leg of a chicken. He describes the city as a vast beehive, St. Paul's and other churches standing out prominently; the streets shrunk to lines, and all humanity apparently transfixed and watching him. A little later he is equally struck with the view of the open country, and his ecstasy is pardonable in a novice. The verdant pastures eclipsed the visions of his own lands. The precision of boundaries impressed him with a sense of law and order, and of good administration in the country where he was a sojourner.

By this time he found his balloon, which had been only two-thirds full at starting, to be so distended that he was obliged to untie the mouth to release the strain. He also found that the condensed moisture round the neck had frozen. These two statements point to his having reached a considerable altitude, which is intelligible enough. It is, however, difficult to believe his further assertion that by the use of his single car he succeeded in working himself down to within a few hundred feet of the earth. The descent of the balloon must, in point of fact, have been due to a copious outbreak of gas at his former altitude. Had his car really been effective in working the balloon down it would not have needed the discharge of ballast presently spoken of to cause it to reascend. Anyhow, he found himself sufficiently near the earth to land a passenger who was anxious to get out. His cat had not been comfortable in the cold upper regions, and now at its urgent appeal was deposited in a corn field, which was the point of first contact with the earth. It was carefully received by a country-woman, who promptly sold it to a gentleman on the other side of the hedge, who had been pursuing the balloon.
The First Balloon Ascent in England

Following his own account, Lunardi's first act on finding himself fairly above the town was to fortify himself with some glasses of wine, and to devour the leg of a chicken. He describes the city as a vast beehive, St. Paul's and other churches standing out prominently; the streets shrunken to lines, and all humanity apparently transfixed and watching him. A little later he is equally struck with the view of the open country, and his ecstasy is pardonable in a novice. The verdant pastures eclipsed the visions of his own lands. The precision of boundaries impressed him with a sense of law and order, and of good administration in the country where he was a sojourner.

By this time he had reached a considerable altitude, which is intelligible enough. It is, however, difficult to believe his further assertion that by the use of his single ear he succeeded in working himself down to within a few hundred feet of the earth. The descent of the balloon must, in point of fact, have been due to a copious outrush of gas at his former altitude. Had his ears really been effective in working the balloon down it would not have needed the discharge of ballast presently spoken of to cause it to reascend. Anyhow, he found himself sufficiently near the earth to land a passenger who was anxious to get out. His cat had not been comfortable in the cold upper regions, and now at its urgent appeal was deposited in a corn field, which was the point of first contact with the earth. It was carefully received by a country-woman, who promptly sold it to a gentleman on the other side of the hedge, who had been pursuing the balloon.
A 12 column, flexible grid
THE GRID

The grid is a 12-column fluid grid with a max width of 980px that shrinks with the browser/device at smaller sizes. The max width can be changed with one line of CSS and all columns will resize accordingly. The syntax is simple and it makes coding responsive much easier. Go ahead, resize the browser.
You can use the `repeat` keyword to repeat all or part of the grid definition.

This would create 4 200 pixel wide tracks, separated by a 20 pixel wide gutter track.

```css
grid-template-columns: repeat(4, 200px 20px);
```
The fr unit is a flexible length that represents a fraction of the available space in the grid container.

```
grid-template-columns: 5fr 1fr 10fr 1fr 5fr;
```
We can give multiple grid lines the same name.

This means we can use the span keyword to span n number of lines, rather than specifying a specific grid line.

```
.wrapper {
  grid-template-columns:
    repeat(4, (col) 200px (gutter) 20px);
}

.content {
  grid-column: col 2 / span gutter 2;
}
```
The markup used to create the Grid using the Skeleton framework.

Like the Bootstrap Grid and other similar frameworks it requires classes that describe the grid to be added to the markup.

```html
<div class="container">
<h1>Skeleton Grid</h1>
<div class="example-grid">
  <div class="row">
    <div class="four columns">Four columns</div>
    <div class="four columns">Four columns</div>
    <div class="four columns">Four columns</div>
  </div>
  <div class="row">
    <div class="eight columns">Eight columns</div>
    <div class="four columns">Four columns</div>
  </div>
  <div class="row">
    <div class="three columns">Three columns</div>
    <div class="three columns">Three columns</div>
    <div class="three columns">Three columns</div>
    <div class="three columns">Three columns</div>
  </div>
  <div class="row">
    <div class="six columns">Six columns</div>
    <div class="six columns">Six columns</div>
  </div>
</div>
</div>
```
When using CSS Grid Layout we have no need to describe our grid in markup.

```html
<div class="wrapper skeleton">
  <h1 class="header">CSS Grid Layout Version</h1>
  <div class="box1">Four columns</div>
  <div class="box2">Four columns</div>
  <div class="box3">Four columns</div>
  <div class="box4">Eight columns</div>
  <div class="box5">Four columns</div>
  <div class="box6">Three columns</div>
  <div class="box7">Three columns</div>
  <div class="box8">Three columns</div>
  <div class="box9">Three columns</div>
  <div class="box10">Six columns</div>
  <div class="box11">Six columns</div>
</div>
```
Defining the 12 column grid.

The repeat keyword repeats the pattern of columns or rows the number of times specified before the comma.
Placing box1 on the grid.

Multiple lines have the same name. This means we can use the span keyword. Here I place box1 starting at the first line named col, spanning to the 4th line named gutter.

In the first row named row, spanning to the first line named gutter.

```css
.box1 {
  grid-column: col / span gutter 4;
  grid-row: row / span gutter;
}
```
Placing box8 on the grid.

Starting on column line 7, spanning 3 gutter lines.

In the 3rd row named row, spanning 1 gutter line.

```css
.box8 {
  grid-column: col 7 / span gutter 3;
  grid-row: row 3 / span gutter;
}
```
### Skeleton Grid

<table>
<thead>
<tr>
<th>FOUR_COLUMNS</th>
<th>FOUR_COLUMNS</th>
<th>FOUR_COLUMNS</th>
</tr>
</thead>
<tbody>
<tr>
<td>EIGHT_COLUMNS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>THREE_COLUMNS</td>
<td>THREE_COLUMNS</td>
<td>THREE_COLUMNS</td>
</tr>
<tr>
<td>SIX_COLUMNS</td>
<td></td>
<td>SIX_COLUMNS</td>
</tr>
</tbody>
</table>

### CSS Grid Layout Version

<table>
<thead>
<tr>
<th>FOUR_COLUMNS</th>
<th>FOUR_COLUMNS</th>
<th>FOUR_COLUMNS</th>
</tr>
</thead>
<tbody>
<tr>
<td>EIGHT_COLUMNS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>THREE_COLUMNS</td>
<td>THREE_COLUMNS</td>
<td>THREE_COLUMNS</td>
</tr>
<tr>
<td>SIX_COLUMNS</td>
<td></td>
<td>SIX_COLUMNS</td>
</tr>
</tbody>
</table>
With Grid Layout we can easily span rows just like columns.

```
.box1b {
  grid-column: col / span gutter 4;
  grid-row: row / span gutter 2;
}

.box2b {
  grid-column: col 5 / span gutter 4;
  grid-row: row / span gutter 3;
}
```
Skeleton Grid

CSS Grid Layout Version


... and we can do this
Browser Support

All my examples work in Chrome and Opera unprefixed - you need to enable the Experimental Web Platform Features flag.

You can also use Webkit nightlies, with the -webkit prefix.

The work in Blink and Webkit is being done by Igalia, sponsored by Bloomberg.

IE10 and up has support for the old syntax, with an -ms prefix.

Mozilla are currently implementing Grid in Firefox.

There is a Polyfill under active development: https://github.com/FremyCompany/css-grid-polyfill/
Grid by Example  simple usage examples for the CSS3 Grid Layout Module

I have been writing and speaking about the CSS Grid Layout Module for some time now. In order to learn how Grid works I’ve put together lots of small examples, and I am publishing them here as a resource for anyone else interested in this emerging specification.

Grid Examples

- Line based placement spanning cells
- Line based placement named lines with span
- Grid auto flow with a positioned element

Explore all of the examples

Examples of layout with Grid

- Two column responsive layout with footer
- Skeleton 12 column grid experiments
- Auto placement example

gridbyexample.com
Thank you!

Slides, links to examples and resources:
http://rachelandrew.co.uk/presentations/css-grid

Office Hours Today - 1.30pm Community Lounge.

@rachelandrew
me@rachelandrew.co.uk