September 23rd
São Paulo - Brazil

Rethinking Online Code Editors for Supporting Time-based Web Documents

Rodrigo Laiola Guimarães (IBM Research | Brazil)

What are online code editors?

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- Authoring tools that allow developers to code and see the results promptly

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- Bret Victor: *Inventing on Principle* and *Learnable Programming* —> http://vimeo.com/36579366

What are online code editors?

- Authoring tools that allow developers to code and see the results promptly
- Bret Victor: *Inventing on Principle* and *Learnable Programming* —> http://vimeo.com/36579366
- There are a number of Web playgrounds for prototyping HTML, CSS and JavaScript

w3schools.com

JSFIDDLE

CODEPEN

mozilla Thimble

JS Bin

In this work…

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- We go a step further by giving special attention to the **temporal aspect** (e.g. preserving presentation state between code changes)

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- Our proof of concept has been developed using many open source libraries, and currently it works in modern Web browsers (e.g., Safari, Firefox and Chrome)

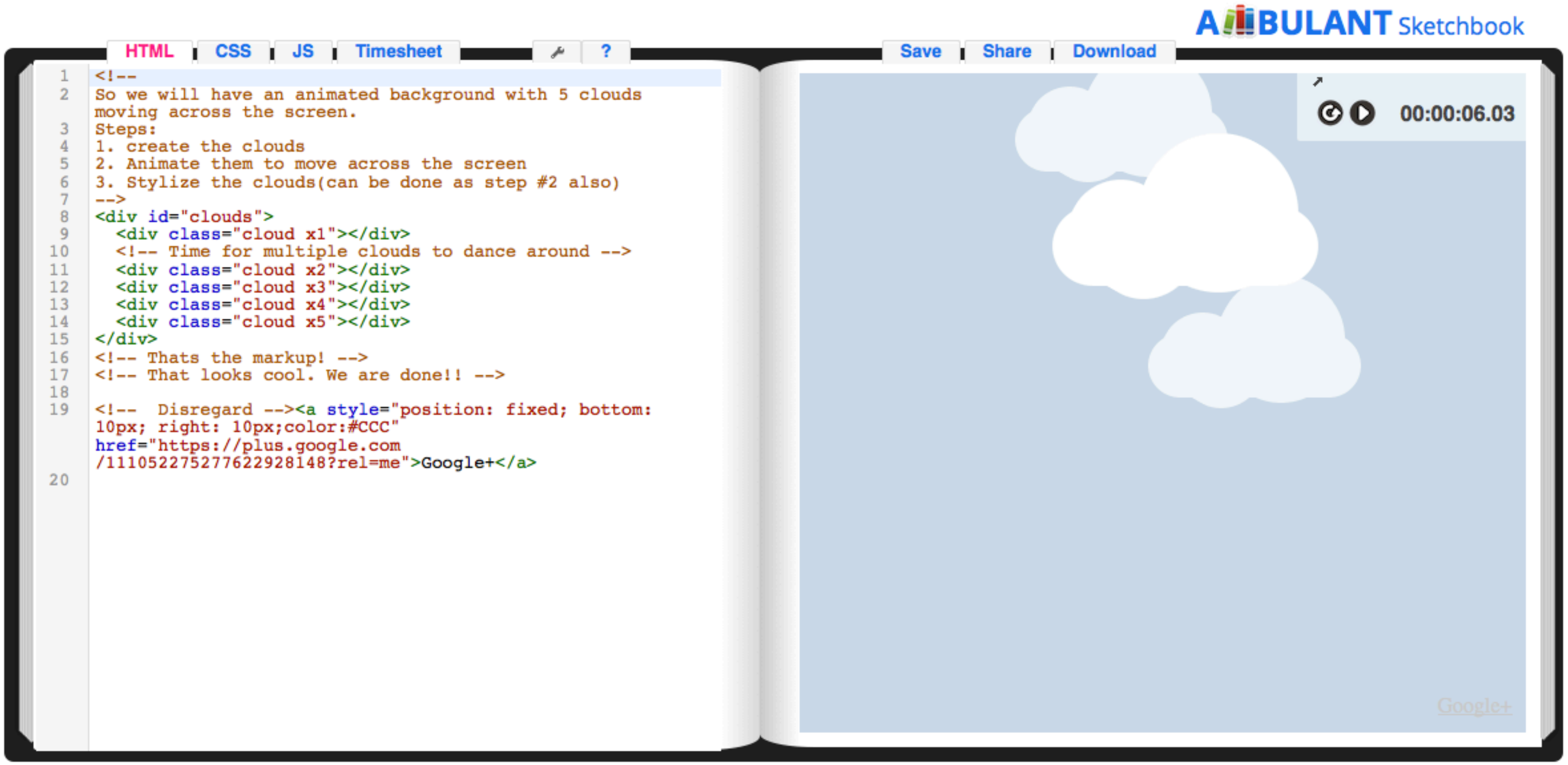
In this work…

- We go a step further by giving special attention to the **temporal aspect** (e.g. preserving presentation state between code changes)
- Our proof of concept has been developed using many open source libraries, and currently it works in modern Web browsers (e.g., Safari, Firefox and Chrome)
- Main functionalities: immediate feedback, coding assistance, playback control and programmatic visualization

Demo Video

User Interface

User Interface



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<!-- Thats the markup! -->
<!-- That looks cool. We are done!! -->

<!--  Disregard --><a style="position: fixed; bottom:
10px; right: 10px;color:#CCC"
href="https://plus.google.com
/111052275277622928148?rel=me">Google+</a>
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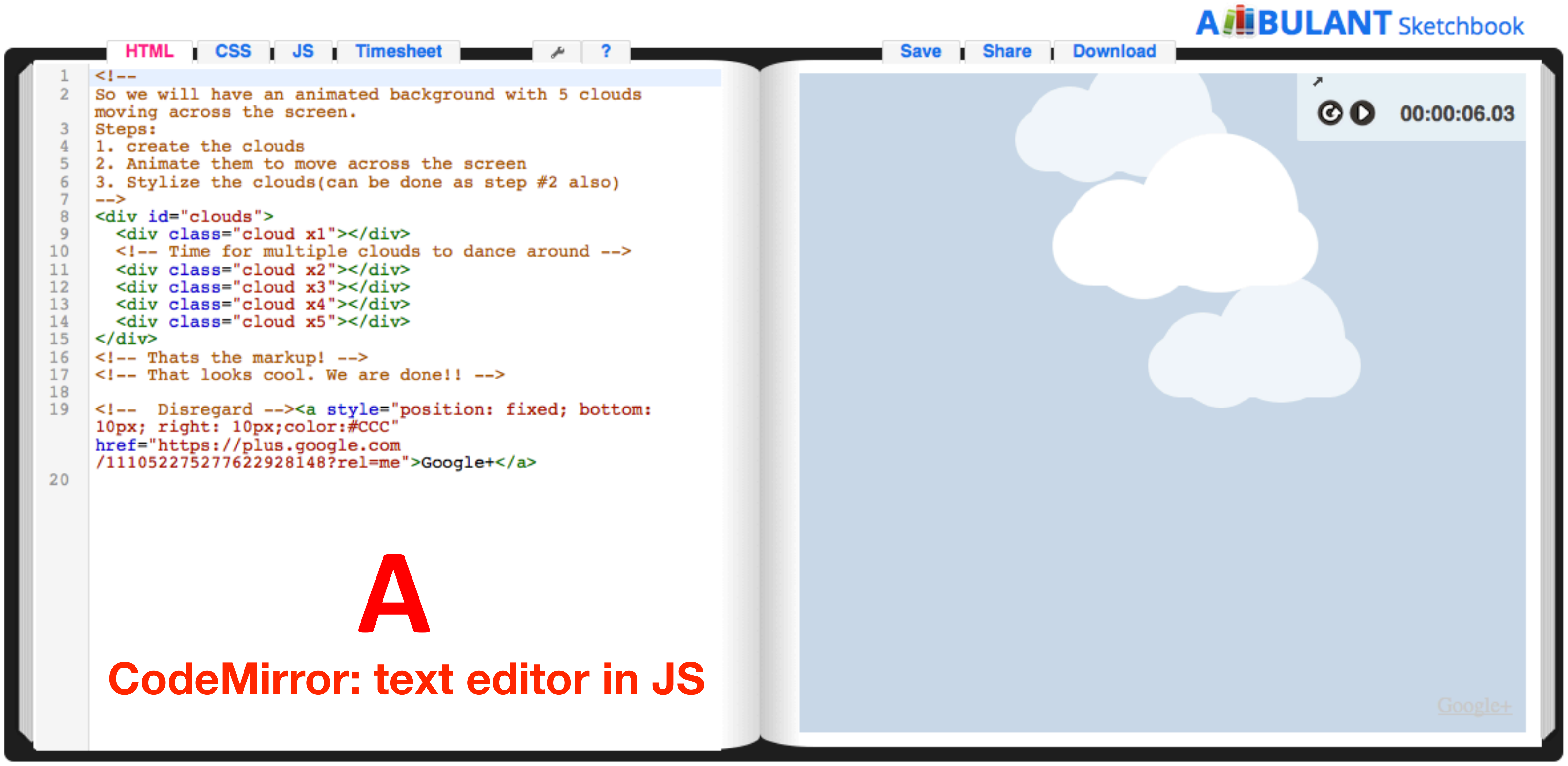

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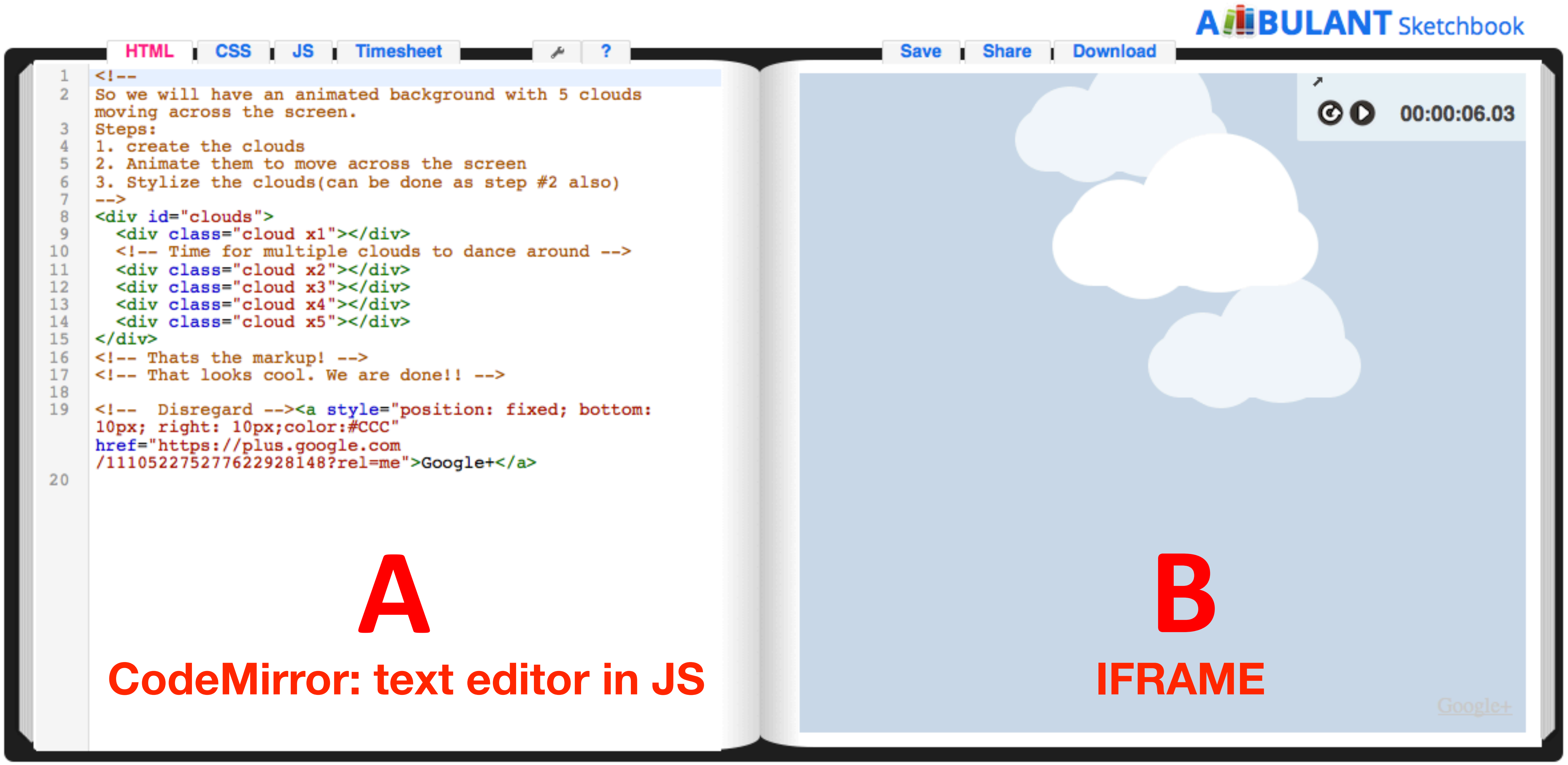

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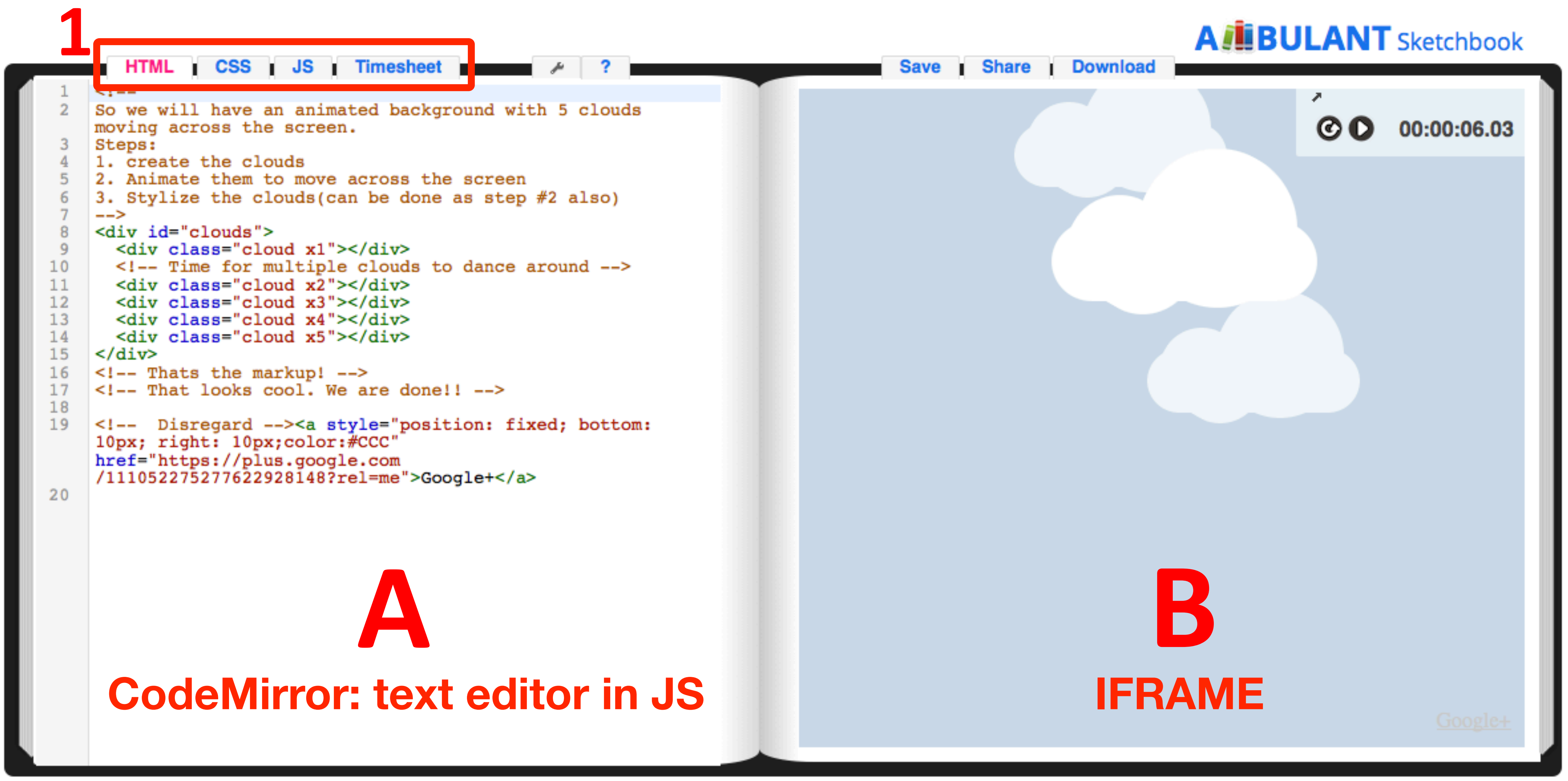

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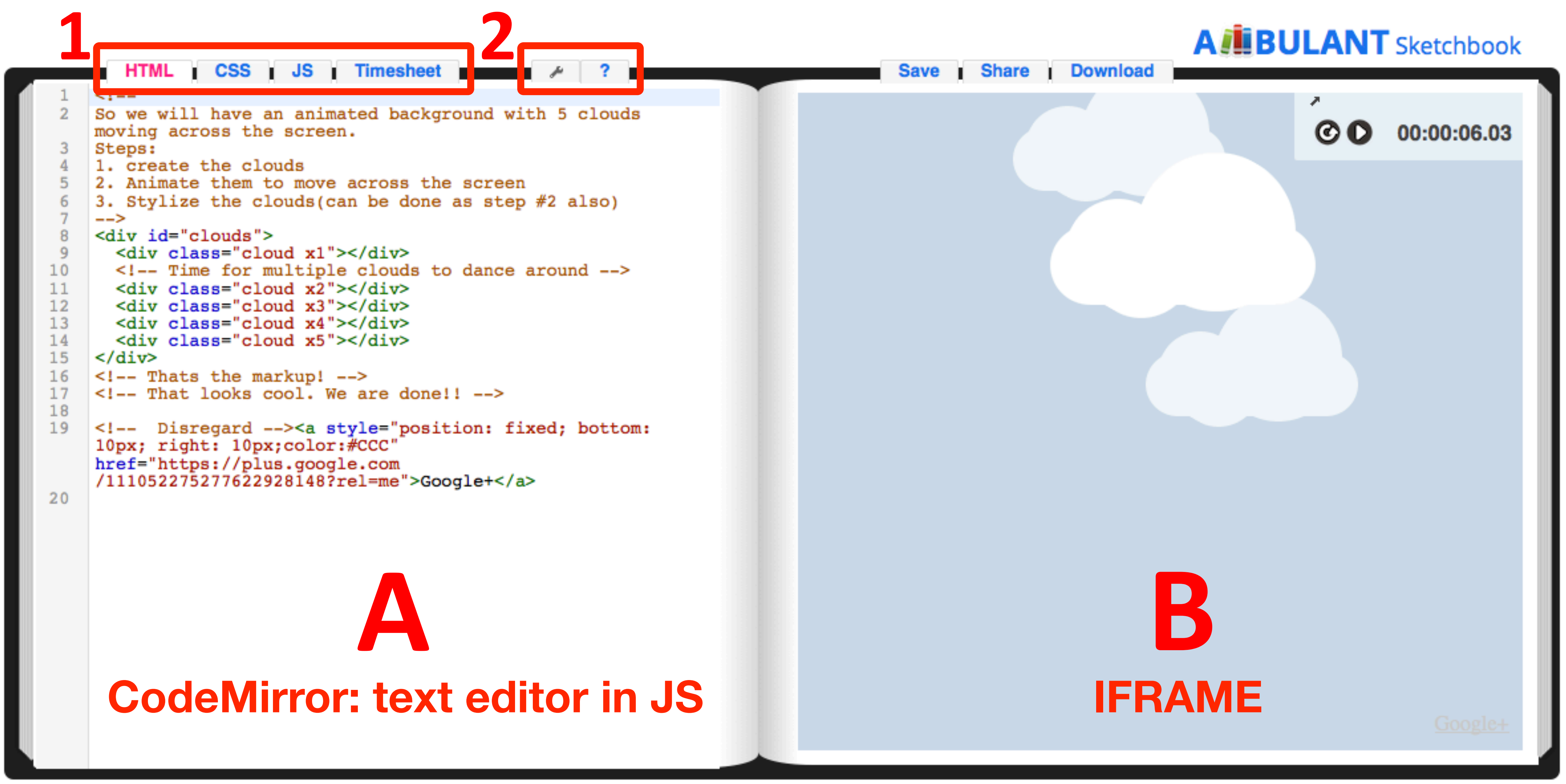

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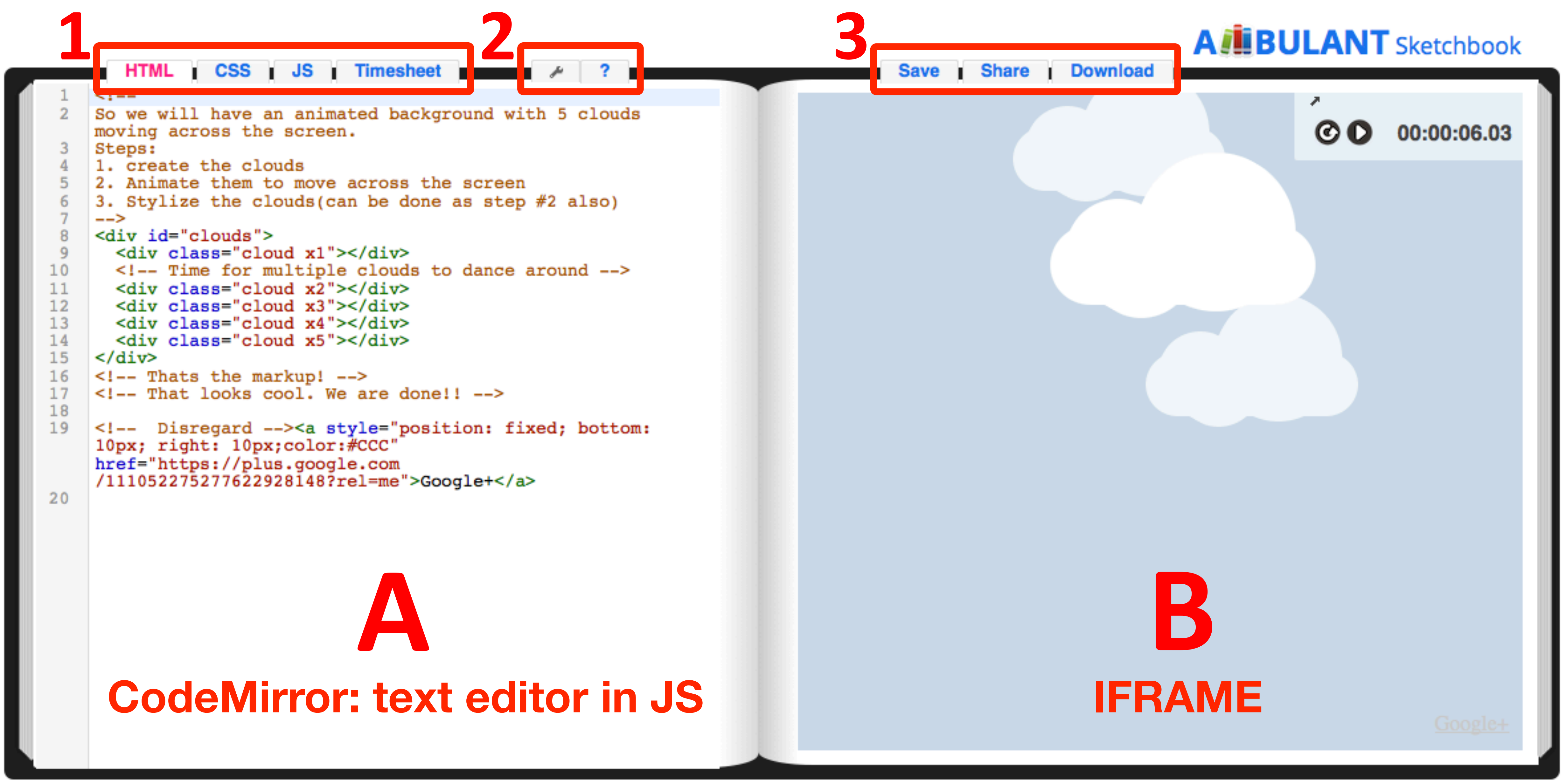

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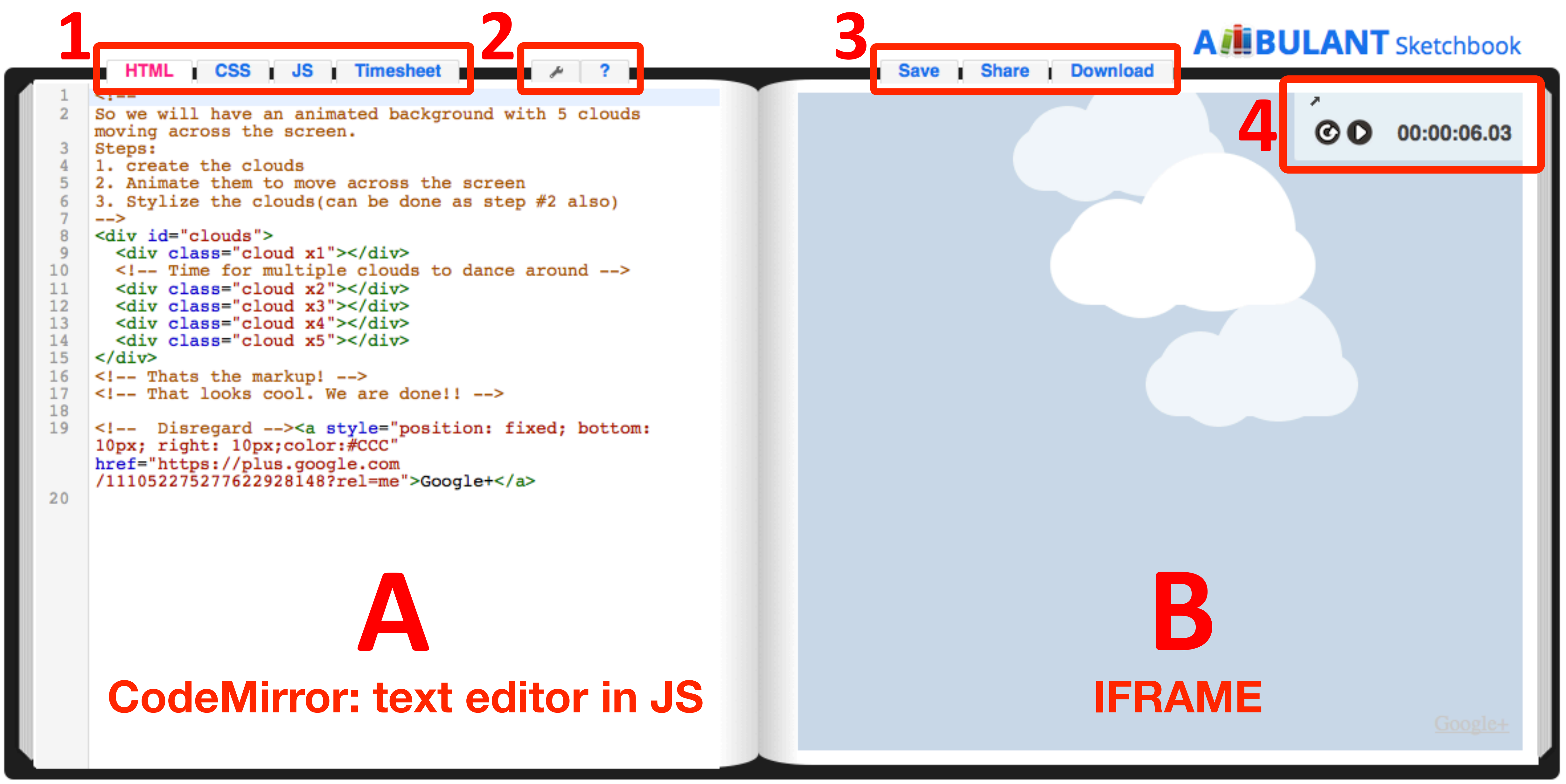

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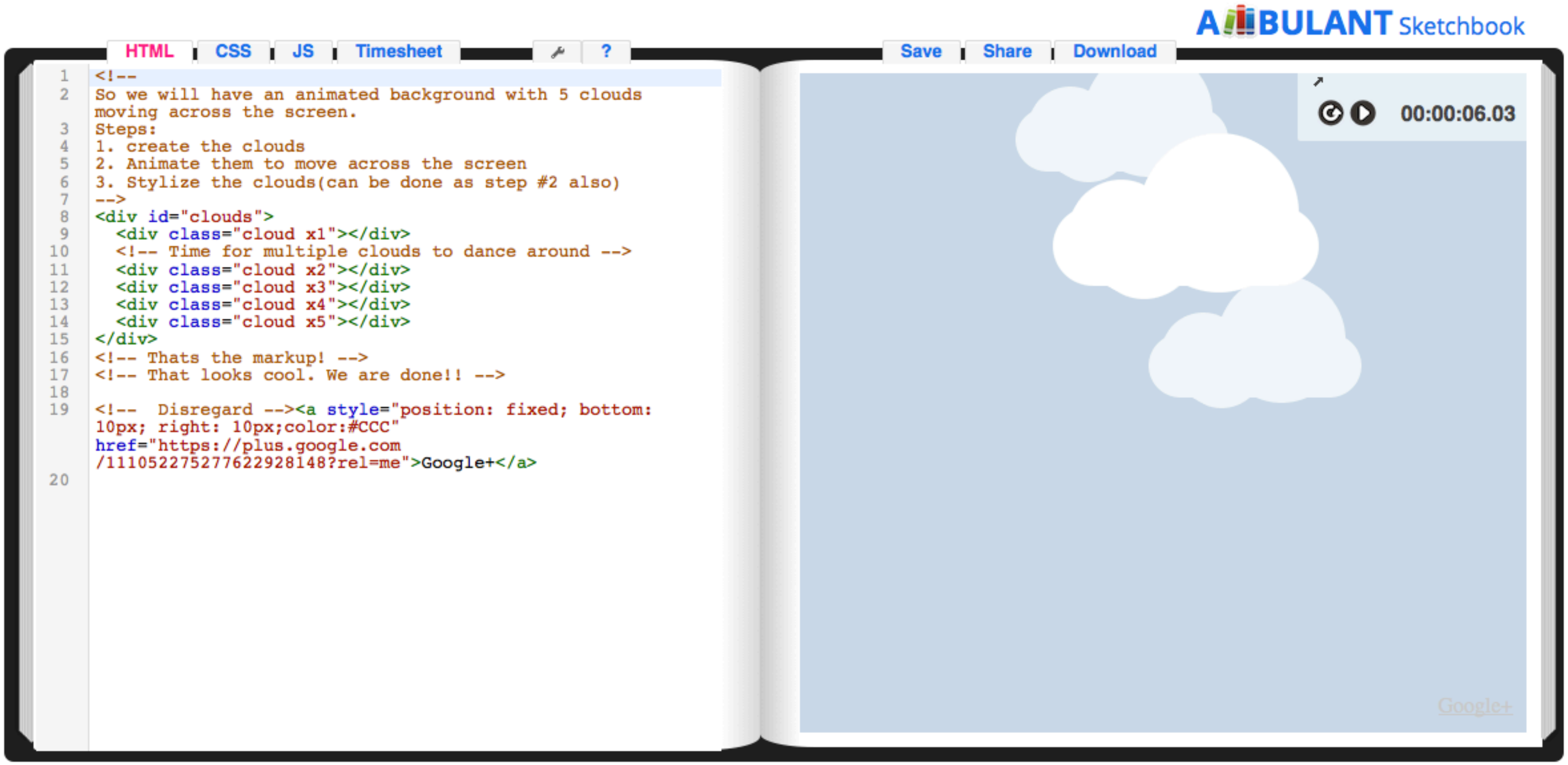

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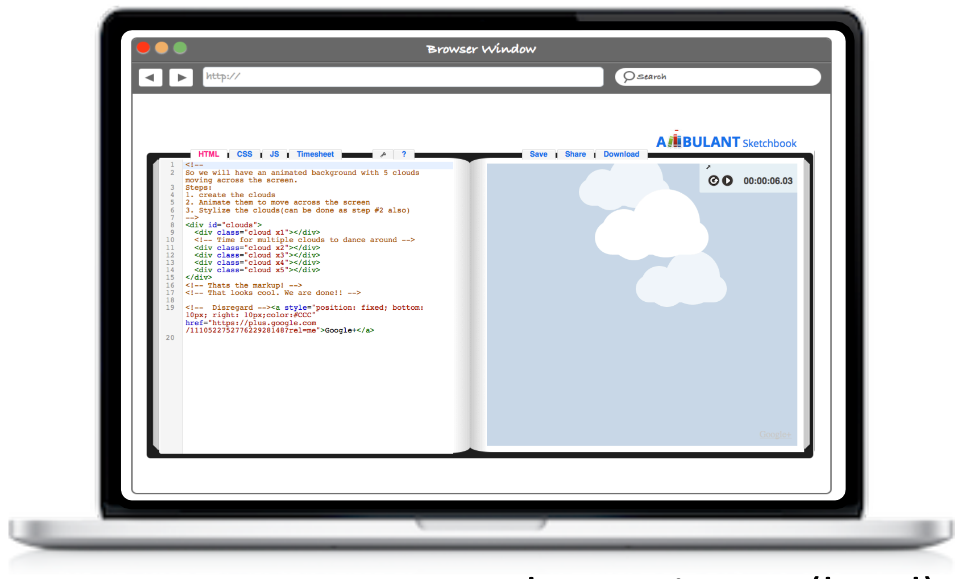
code editor



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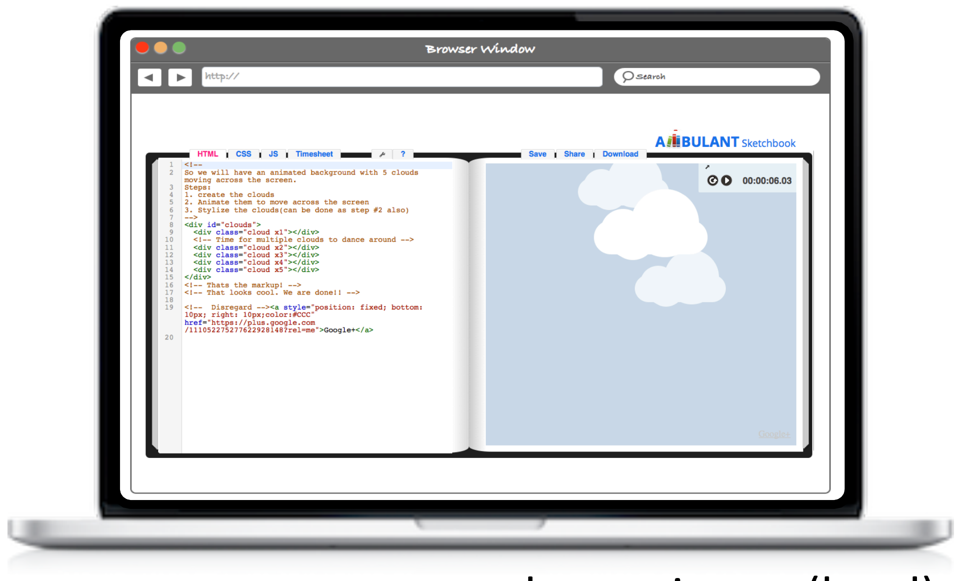
code previewer (local)

Infrastructure

web server

code editor



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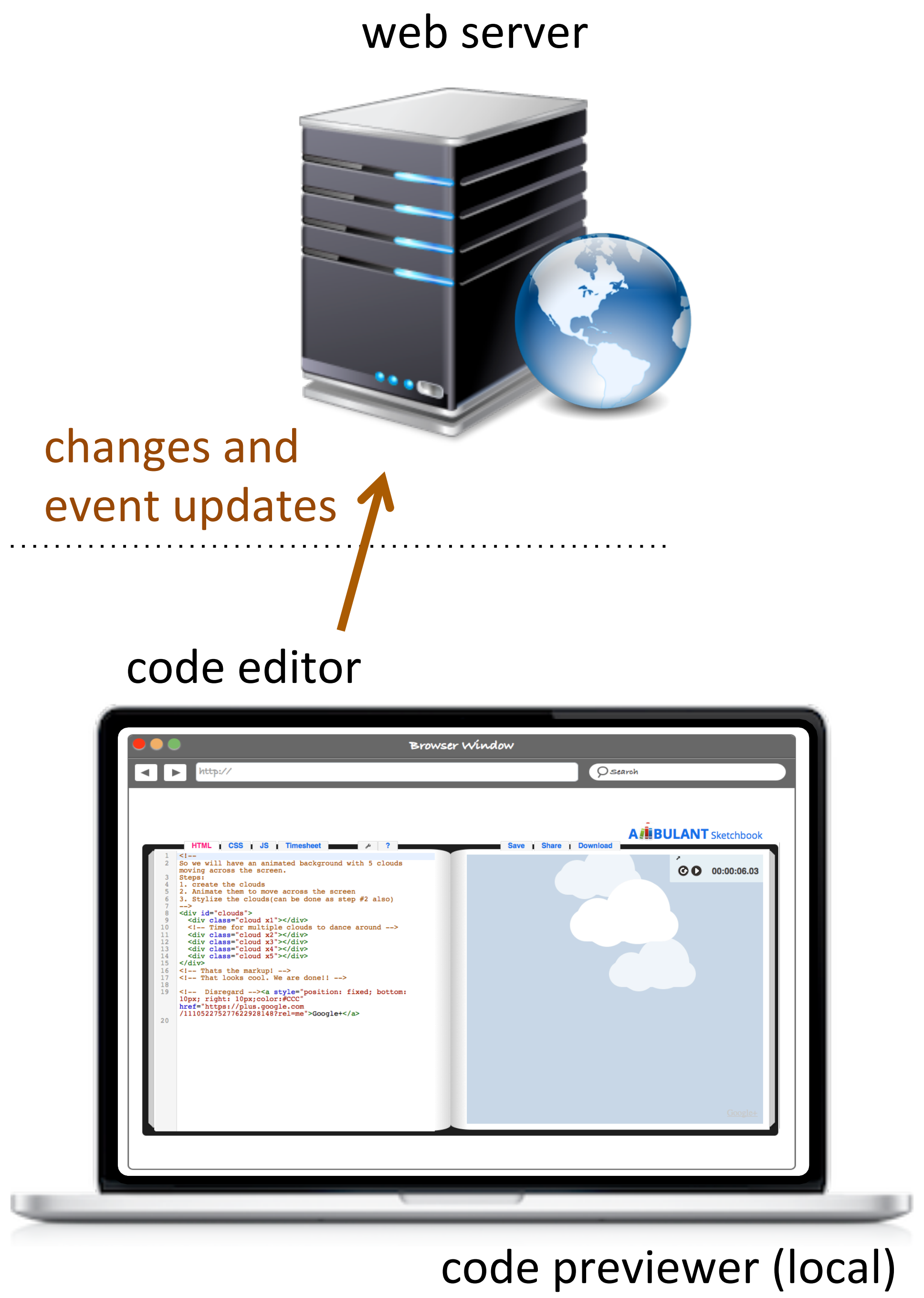

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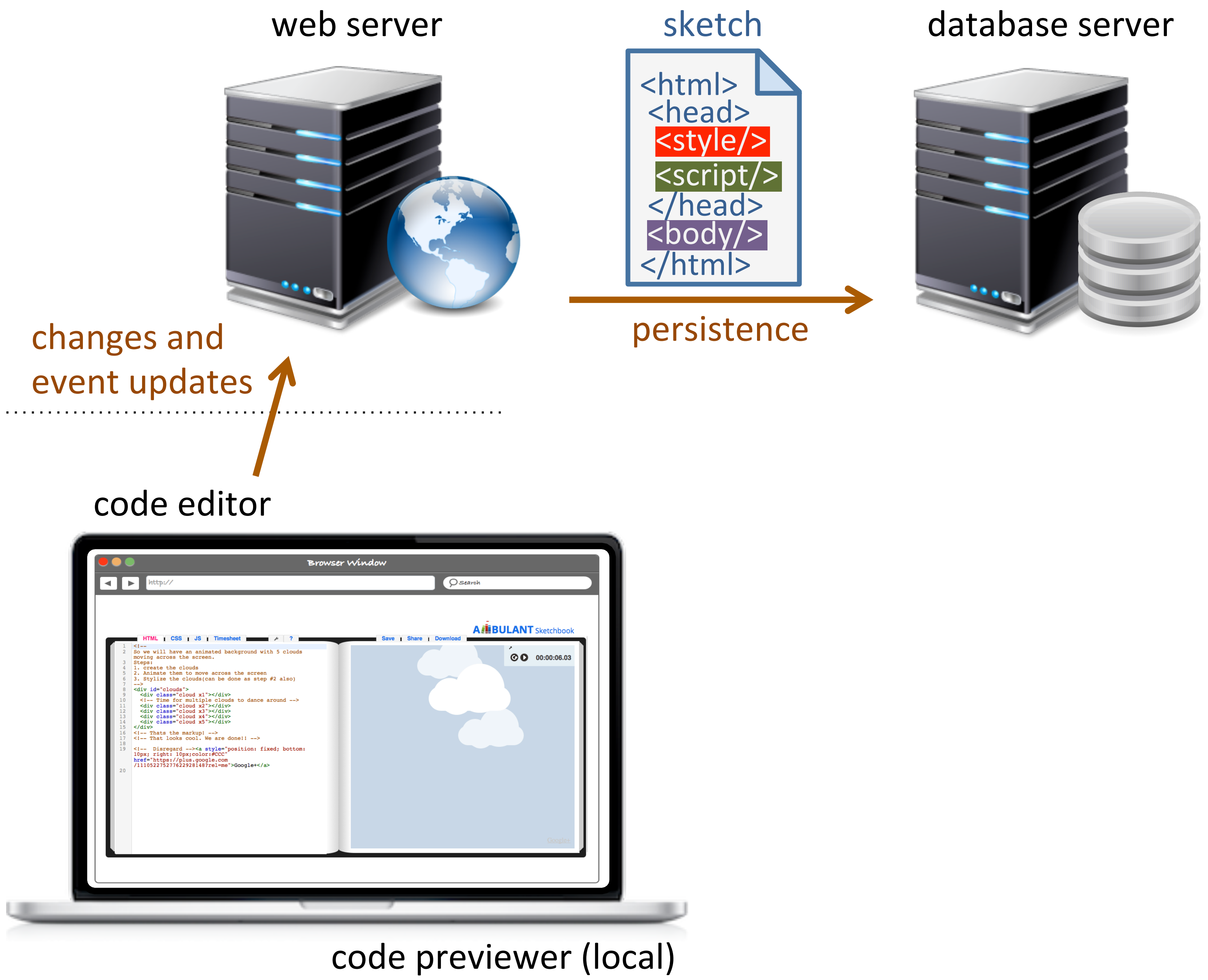

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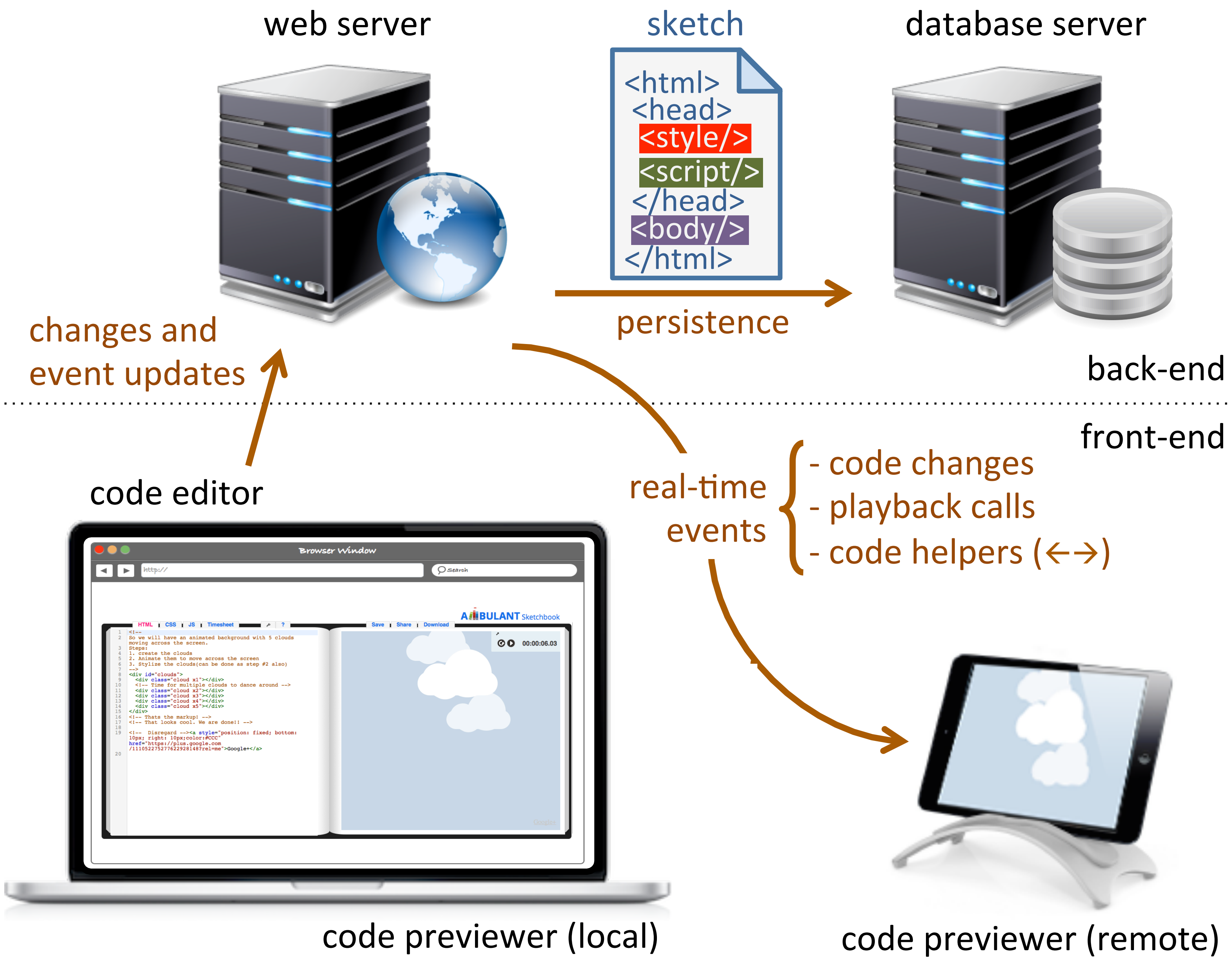

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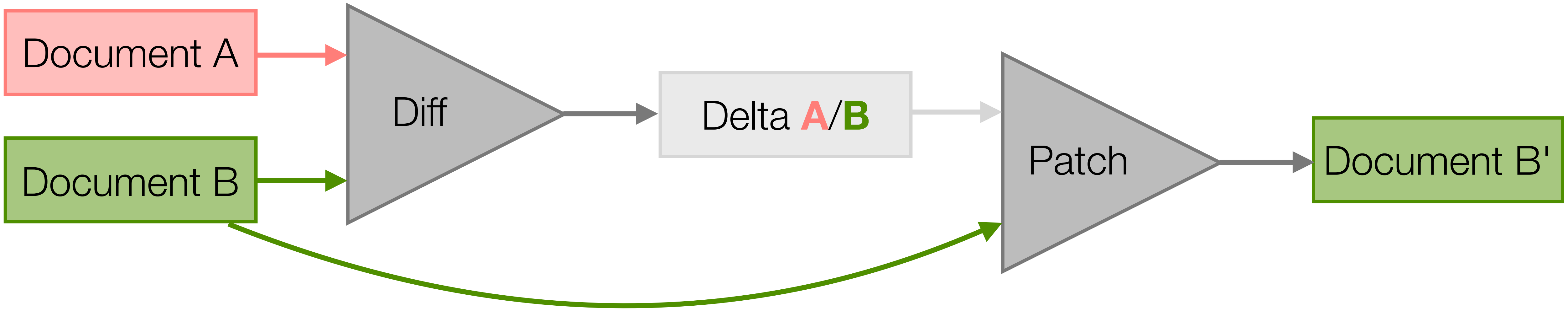
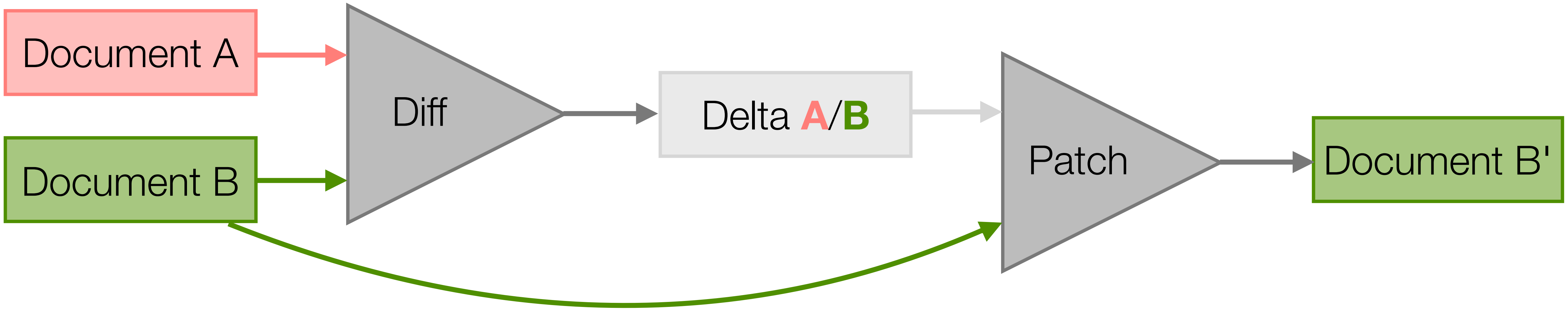


Implementation: Code Changes

- HTML

diffDOM: A JavaScript diffing algorithm for DOM elements



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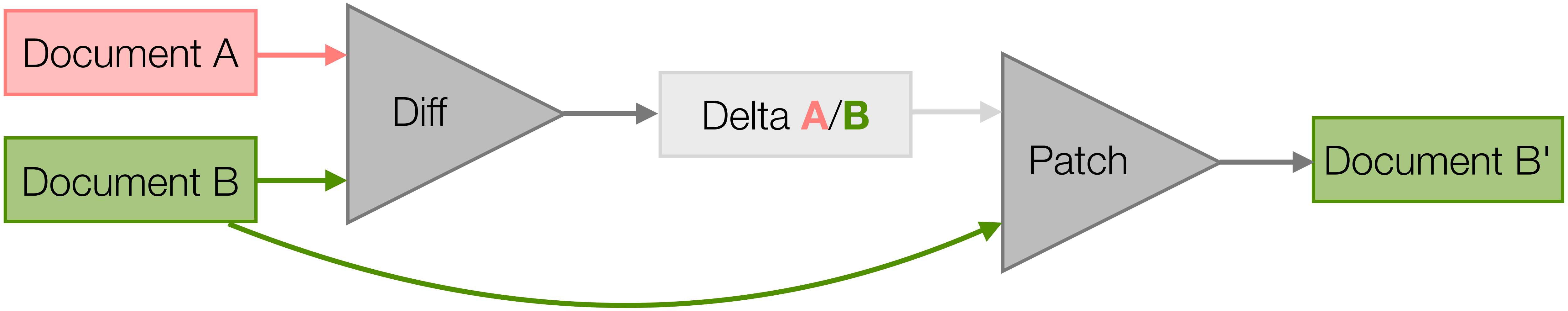
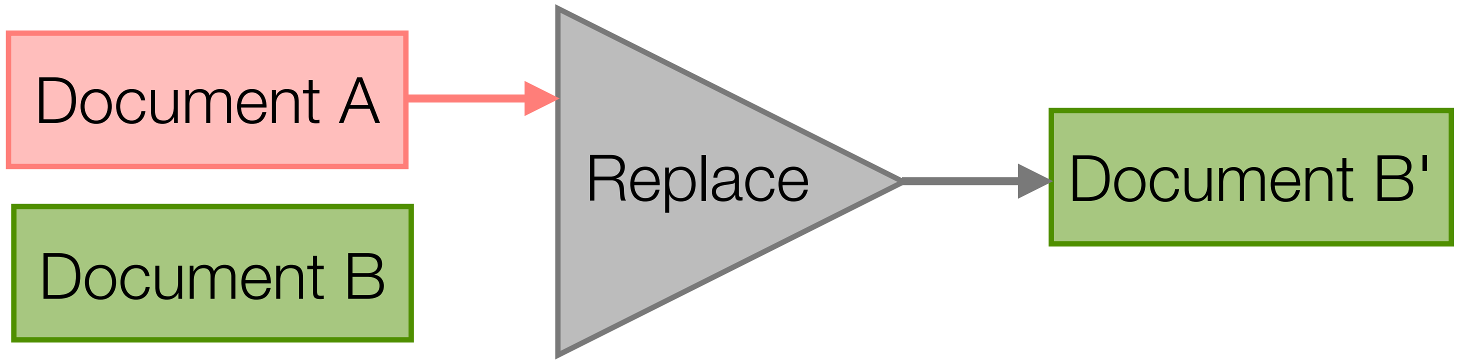


- CSS



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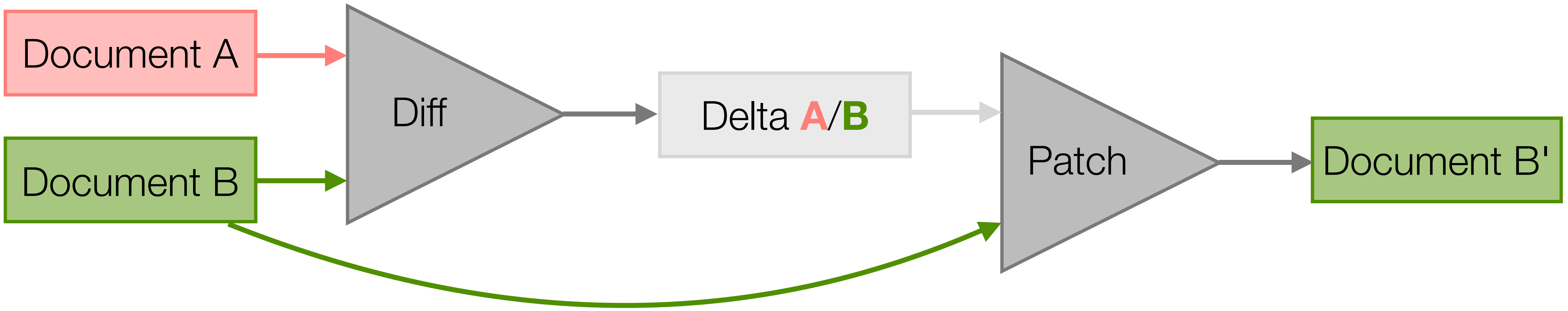

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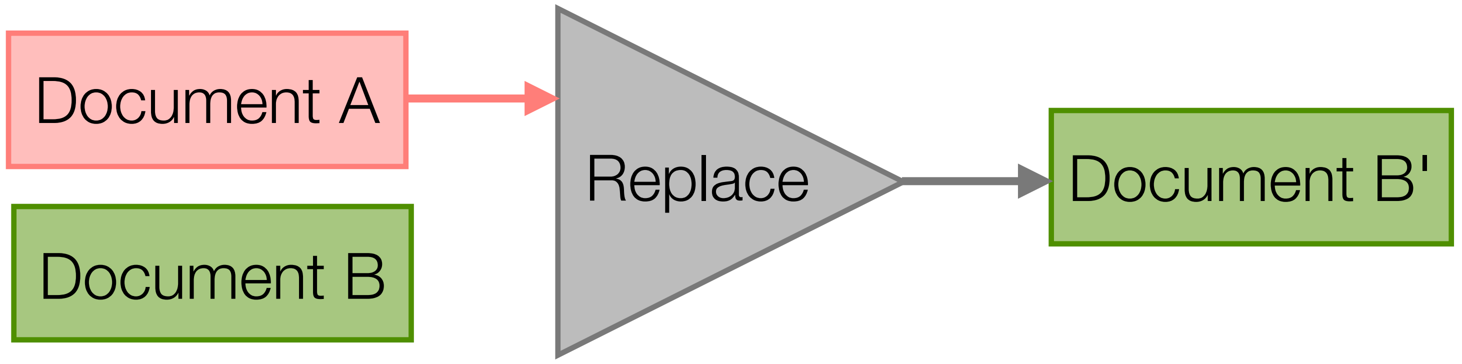

- JavaScript —> still to be done! (very hard)

Implementation: Helpers

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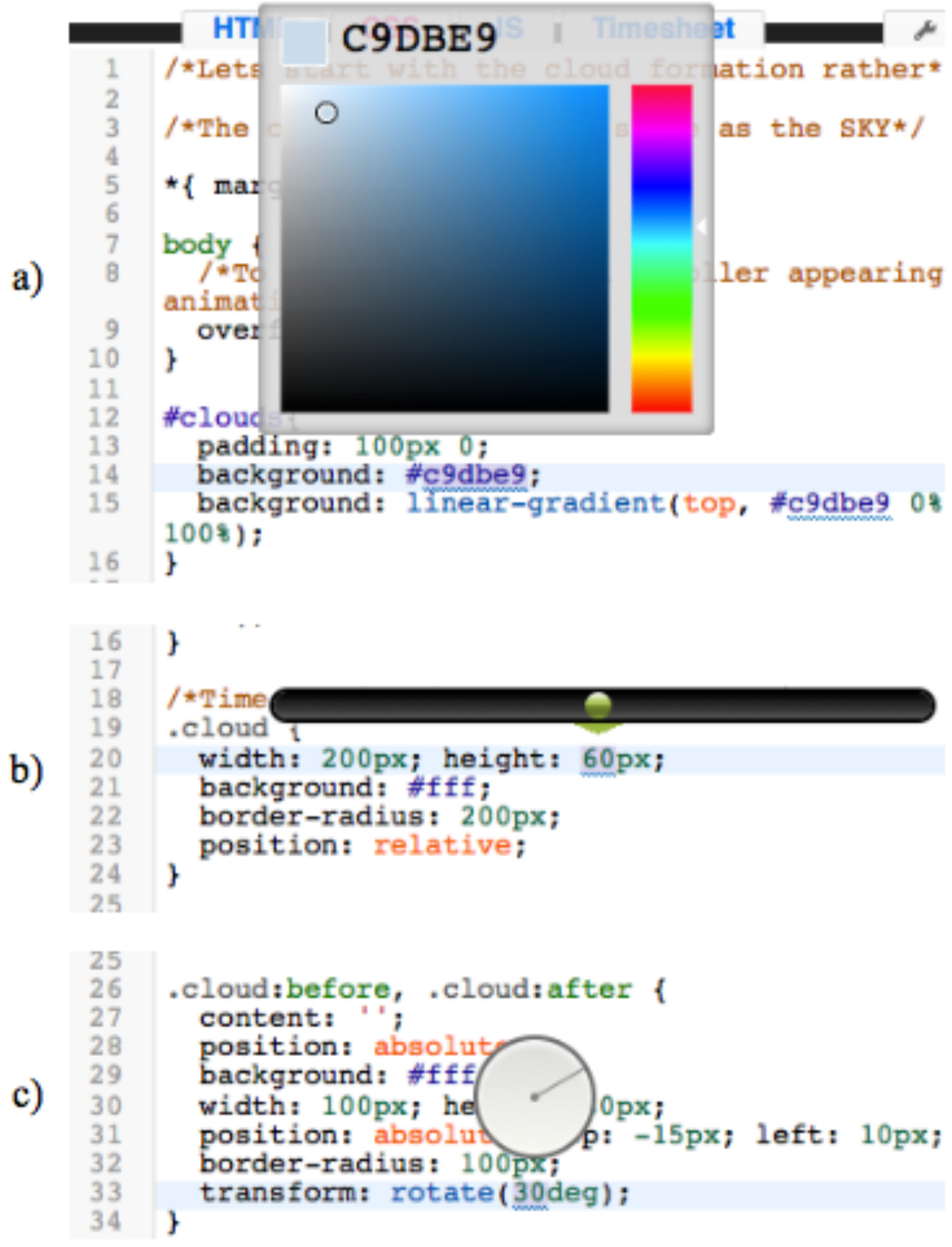
- Contextual helpers can facilitate the authoring process:
    - a) color picker
    - b) slider and
    - c) angle picker



```
/*Lets start with the cloud formation rather*

/*The                                     as the SKY*/

*{ mar

body {
  /*To                                  ller appearing
animat
  over
}

#cloud {
  padding: 100px 0;
  background: #c9dbe9;
  background: linear-gradient(top, #c9dbe9 0%
100%);
}
```

```
}
/*Time
.cloud {
  width: 200px; height: 60px;
  background: #fff;
  border-radius: 200px;
  position: relative;
}
```

```
.cloud:before, .cloud:after {
  content: '';
  position: absolut
  background: #fff
  width: 100px; he        0px;
  position: absolu        p: -15px; left: 10px;
  border-radius: 100px;
  transform: rotate(30deg);
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Implementation: Helpers

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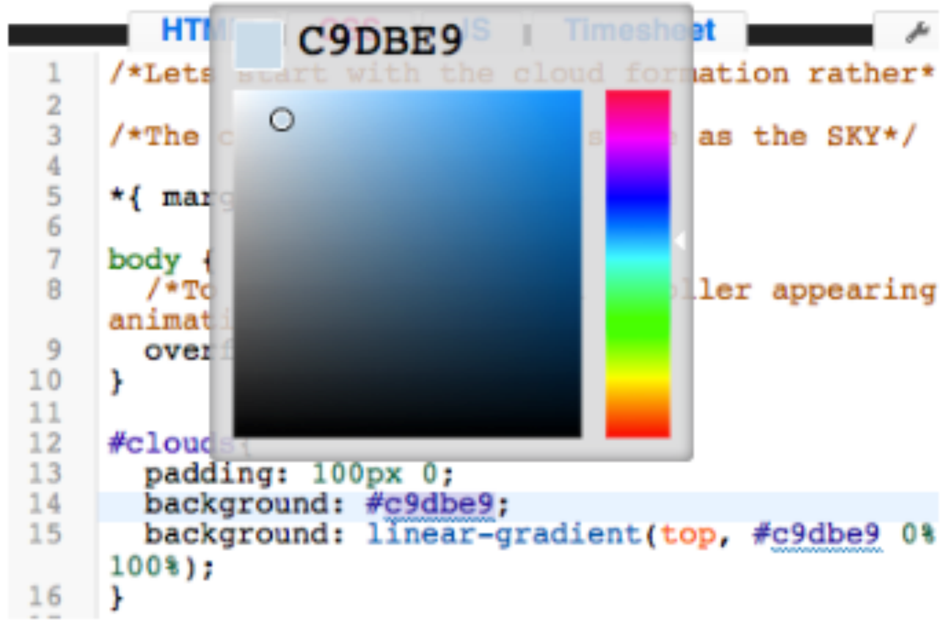
    - c) angle picker
- Inlet: JavaScript plugin for CodeMirror

a)



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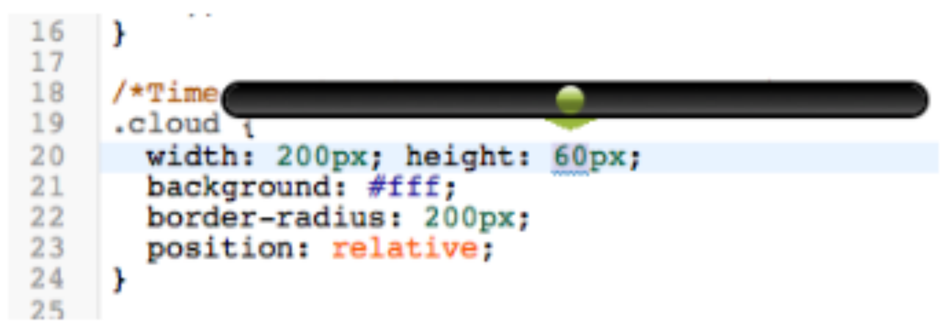

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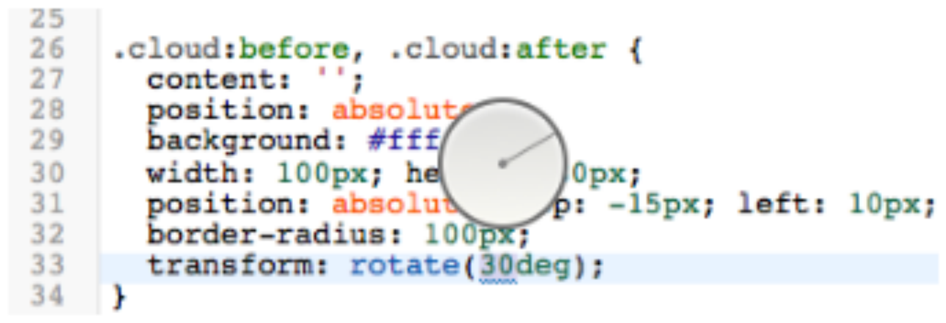

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User Evaluation

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- 22 post-secondary students over 2 weeks (IFES)

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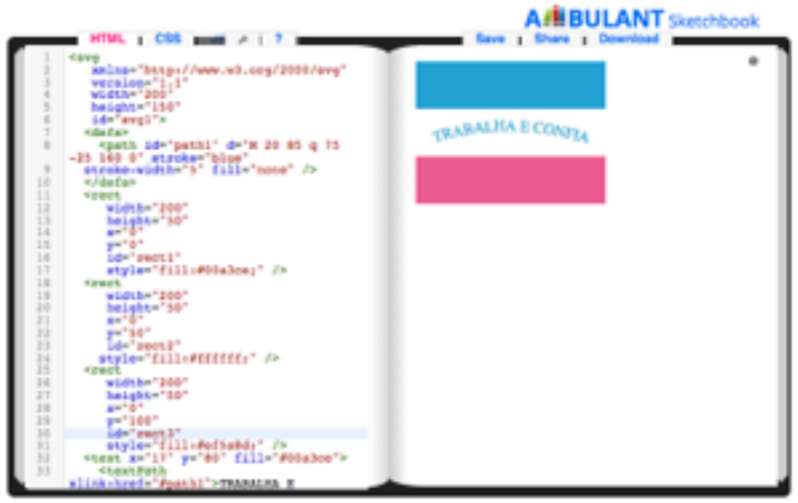
- Exercises on how to use SVG graphics on the Web



```
<svg
   xmlns="http://www.w3.org/2000/svg"
   version="1.1"
   width="200"
   height="150"
   id="svg1">
  <defs>
    <path id="path1" d="M 20 85 q 75
-25 160 0" stroke="blue"
  stroke-width="5" fill="none" />
  </defs>
  <rect
     width="200"
     height="50"
     x="0"
     y="0"
     id="rect1"
     style="fill:#00a3ce;" />
  <rect
     width="200"
     height="50"
     x="0"
     y="50"
     id="rect2"
    style="fill:#ffffff;" />
  <rect
     width="200"
     height="50"
     x="0"
     y="100"
     id="rect3"
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  <text x="17" y="80" fill="#00a3ce">
    <textPath
xlink:href="#path1">TRABALHA E
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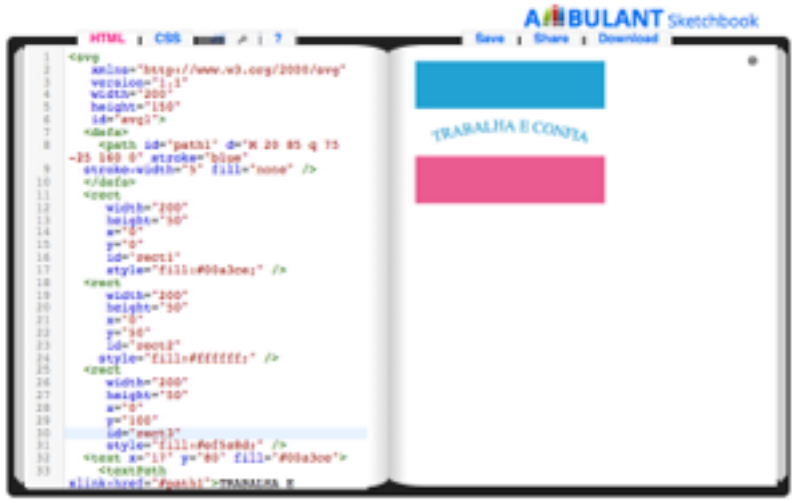
- Exercises on how to use SVG graphics on the Web
- Results based on SUS framework and open-ended questions



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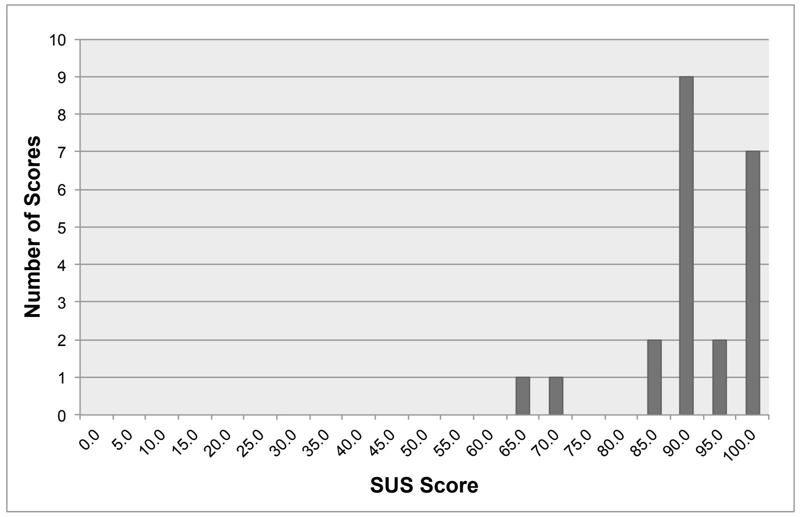

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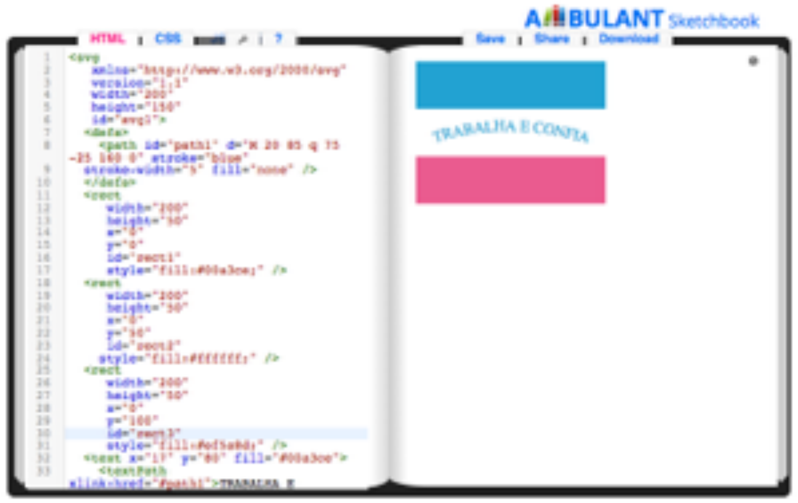

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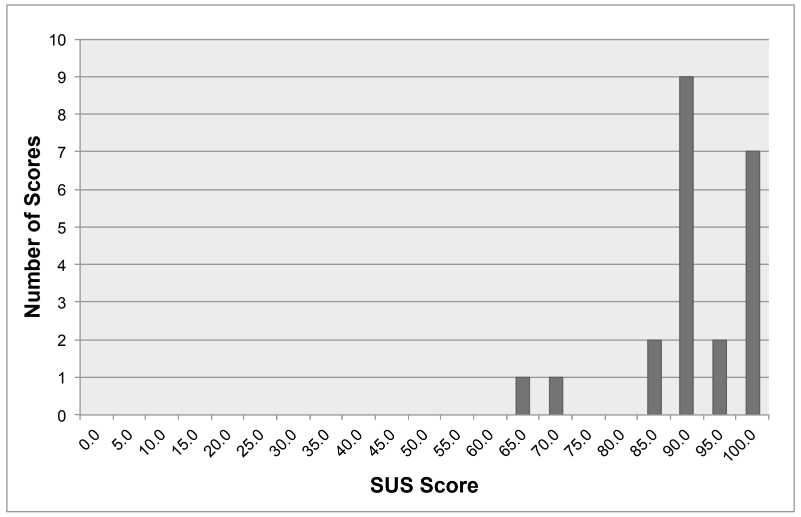
   id="svg1">
  <defs>
    <path id="path1" d="M 20 85 q 75
-25 160 0" stroke="blue"
  stroke-width="5" fill="none" />
  </defs>
  <rect
     width="200"
     height="50"
     x="0"
     y="0"
     id="rect1"
     style="fill:#00a3ce;" />
  <rect
     width="200"
     height="50"
     x="0"
     y="50"
     id="rect2"
    style="fill:#ffffff;" />
  <rect
     width="200"
     height="50"
     x="0"
     y="100"
     id="rect3"
     style="fill:#ef5a8d;" />
  <text x="17" y="80" fill="#00a3ce">
    <textPath
xlink:href="#path1">TRABALHA E
```



Mean SUS score = 90.0 / Learnability score = 84.7

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- Offer mechanisms to control and simulate the behavior of elements over time (e.g. temporal visualization)

AMBULANT Sketchbook

sketchbook.laiola.com.br

Thanks!

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