

A Blocks-Based Editor for HTML Code

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Abstract—This paper presents a block-programming editor for HTML code. The editor provides a block visualization of HTML syntax, allowing students to work in either blocks or text and switch freely. Our editor was created as an extension of Droplet, a dual-mode programming block editing framework that was previously used for JavaScript and CoffeeScript. We describe the process of extending Droplet to apply to HTML. We also discuss an analysis of real-world HTML tags and attributes and propose a palette based on this analysis.

I. INTRODUCTION

Teaching HTML has long been an early step in a programming curriculum. For example Budny, et al [1] in Four Steps to Teaching C Programming, suggest "The layout of a web page allowed us to begin to teach the basic concepts of program layout... We are teaching web page design ... not for the purpose of teaching HTML, but to teach students the concept of writing code." Mahmoud, et al [2] suggest that starting with HTML is a way of teaching "programming for fun" and is a strategy for motivating students.

Nonetheless, for first-time-coder, HTML can be difficult to learn. In a workshop with English students, Mauriello, Pagnucci, and Winner [3] observed "Students are generally not careful and experienced enough in their reading of the codes to find mistakes." HTML guides for non-coding students such as Taylor and Gitsaki [4] suggest simplifying the problem by starting with a small set of about 30 HTML tags to create a basic web page.

Therefore we are interested in finding an alternative to WYSIWYG HTML tools that expose the code, while still simplifying the process of learning to use HTML tags for the first time. In recent years, block programming languages such as Scratch [5] have introduced many students to coding through a visual representation of commands and control flow. Here we investigate whether a similar approach can be used with HTML code.

We aim to meet three goals simultaneously (borrowing terminology from Nielsen's usability heuristics[6]):

- Allow students to create HTML using *recognition rather than recall*, assembling blocks to make pages.
- Permit editing of real-world webpages with blocks or text: *the system must match the real world*.
- Provide students with a *minimalist design* with a clear, useful, realistic, yet minimal set of choices.

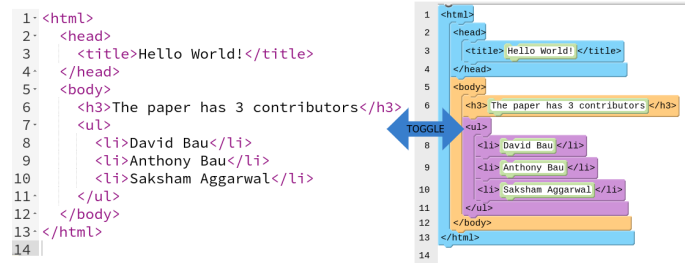


Fig. 1. Our HTML Block editor user experience

Users can switch between blocks and text freely.

II. BACKGROUND

A. Droplet's Text-First Approach to Blocks

We built our HTML editor as an extension of Droplet. Droplet [7] is a dual-mode blocks and text editor framework that allows students to work with traditional text code syntax using either drag-and-drop blocks or by typing the text. Students can switch modes at any time.

Droplet's guiding philosophy is that the text, not the blocks, are the primary data. Thus, Droplet programs begin and end their life as text. When Droplet opens a file, the text is parsed into blocks, preserving the original text within block markup. Block editing operations perform splice operations on the text markup stream. At the end of the editing session, the markup is simply discarded and a raw text program is generated again. Figure 2 shows a typical Droplet editing for a JavaScript program, and Figure 1 shows a typical droplet user experience for our HTML editor.

B. Adding A New Language to Droplet

Droplet is designed to be extended to any text language by creating a language adapter.

A Droplet language adapter must parse text to delineate blocks, and it can also provide rules that determine whether blocks are allowed to be dropped into specific locations. Typically the language parser relies on a standard language parser, inserting blocks based on positions of specific types of nodes in an AST. Callback functions are used to determine drag-and-drop permissibility.

New languages in Droplet also need a block palette. The Droplet palette is a reflection of useful choices, not a complete catalog of all possible blocks for a language. Similarly, dropdown choices for for sockets within blocks are similarly

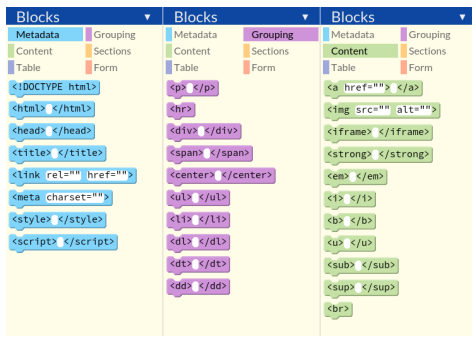


Fig. 4. Three panels from the palette

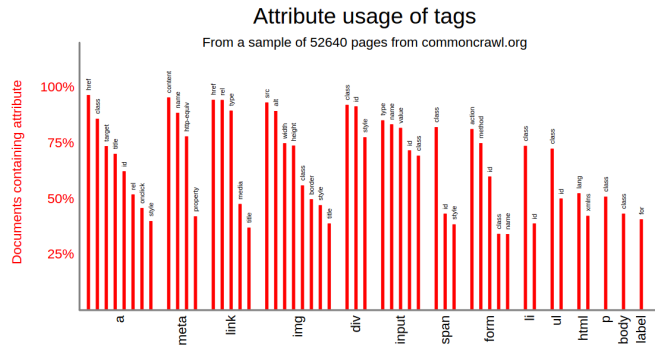


Fig. 5. Top attributes used with tags

We also created dropdown lists for each element (Figure 6) to allow students to choose between the most common attributes. The student can choose an attribute and enter the attribute value as text, or just enter the entire attribute/value pair as text.

IV. FUTURE WORK

A. Buttons for adding and removing attributes

In HTML, every tag can accept a variable number of attributes, and the HTML mode would benefit from improved block editor support for variable argument lists. We are building improvements to make it easy to use "add/remove" buttons on a block for adding new attributes.

B. Polymorphic elements

Some elements are used in several distinct ways, and we plan to do further analysis on common tag usage to decide



Fig. 6. Using commonly used attributes in a dropdown

on a few tags to represent in multiple ways on the palette. For example, two ways of using `<a>` are with `href` or with `name`; two ways of using `<script>` are with `src` or with inline script.

C. Transparent content model

Some tags such as `'a'`, `'ins'`, `'del'`, `'map'` are "transparent" elements, which means, according to the standard [24], their content model is derived from the content model of its parent element. This type of contextual content model is not currently implemented but provided as "flow content" [19]. We plan to add support for a transparent content model.

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