# Improvement of the JAWAA Editor

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## 1. PROBLEM AND MOTIVATION

JAWAA is a scripting language that was created to help computer science students to visualize data structures and algorithms and to debug programs that they have written with data structures. The JAWAA Editor was created in order to help novices build their own animations and to provide a layout mechanism for more advanced students. To achieve this, it would be ideal for the JAWAA Editor to provide the same functionality as the JAWAA language. However, some of the important features of the JAWAA language were not supported by the JAWAA Editor. It was missing some key tools.

We proposed to add features to the JAWAA Editor to more closely support the JAWAA language. In particular, we proposed to add tools to the Editor that would allow the user to create, edit, and animate arrays. Also, a tool was proposed that would allow the user to scale objects smoothly.

## 2. BACKGROUND AND RELATED WORK

JAWAA is a scripting language for visualizing data structures and algorithms. The first key forerunner of JAWAA is Tango. To build an animation with Tango, the user would add Tango methods to their program. Samba is another key forerunner. Similar to JAWAA, Samba animations are built with a file that has one command per line. JAWAA and Samba both have the advantage of being able to work with programs written in any language on any machine by simply adding commands through the program's output. The JAWAA language has the unique advantage of making it easy for users to create animations on the web and to animate data structures. [3][4]
JAWAA allows the user to create both primitive objects (shapes, lines, and text) and intelligent objects. Intelligent objects represent data structures such as arrays, stacks, queues, and trees. After these objects have been created, they can have action commands applied to them, which can change different attributes of the object, such as color or position. [1]

The JAWAA Editor is a graphical user interface that gives students and instructors an environment where they can build JAWAA animations visually. This helps to promote the original goal of making animation readily available for educational purposes. The Editor would better serve students and instructors if it had the ability to build data structures as well as primitives. JAWAA is meant to save students from the tedious job of learning how to program animations when they are just beginning to understand simple programs. [2]

## 3. APPROACH AND UNIQUENESS

*Arrays*
What really makes JAWAA unique is the ability to build and animate data structures. We proposed to add a tool to the JAWAA Editor to create and modify arrays. We had to think through some problems surrounding an array tool. For instance, we came up with an idea for a "Structure Selector" that would select an entire data structure so that attributes of that data structure could be changed as a whole.

*Scaling*
When we started working on the JAWAA Editor, objects could have their width and height changed, but they could not be smoothly scaled. We wanted a scaling tool that would output JAWAA commands to smoothly change the size of an object without changing the proportions.

## RESULTS AND CONCLUSIONS

We implemented a scale tool which prompts the user for a percentage, then scales the object by that percentage without changing the proportions. For instance, if the user enters "50", then the width and the height of the object will become half their size. The resulting animation file will have the JAWAA command for scaling the appropriate amount. So far, almost all of the objects that JAWAA can scale can be scaled with the JAWA Editor, except for text.

The array tool does allow the user to build an array and edit its attributes. An array can be created with any number of cells, which can be oriented either horizontally or vertically. By switching between the structure selector and object selector, the user can change attributes of the array as a whole (orientation, color, text) or individual cells (size, position, color, text). When the JAWAA file is

saved, the correct commands are added so the animation will reflect what was done in the editor.

Along with adding those features, we also added some smaller changes which should add more functionality to the JAWAA Editor.

The changes that we have made to the JAWAA Editor will make it more useful in an introductory programming course. In particular, the Editor now supports more of the abilities that the JAWAA language provides. With further work, the JAWAA Editor should become a powerful tool for students and instructors.

**REFERENCES**


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