Stack Smashing in Education

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Introduction

Buffer overflows are a common problem in cybersecurity. One specific example of buffer overflows is a concept called **stack smashing**. Stack smashing occurs when an attacker sends too much data to the stack. When successful, this attack overwrites existing data with the excess data that was sent.

This concept may give students a bit of trouble when they first encounter it. We know that many students, especially those with learning disabilities learn best with interactive tools. We researched ways to improve an existing interactive tool and the best way to help students master stack smashing in the near and distant future.

Background and Objectives

Background

- Stack smashing is difficult for students due to the amount of amount of previous concepts needed
- Interactive tools can be helpful for neurodivergent students

Objectives

- Learn about stack smashing in cybersecurity
- Develop a way for students to fully master the material

Method

Learn Stack Smashing

- Read a few academic papers
- Worked through Software Security modules
- Watched videos online explaining the subject

Familiarize With DISSAV

- Made a list of improvements to implement in the future
- Learned JavaScript to work on the backend of the tool

Future Features

DISSAV Tutorial Video

- Video explaining how stack smashing works while using DISSAV
- Completed by the end of 2023

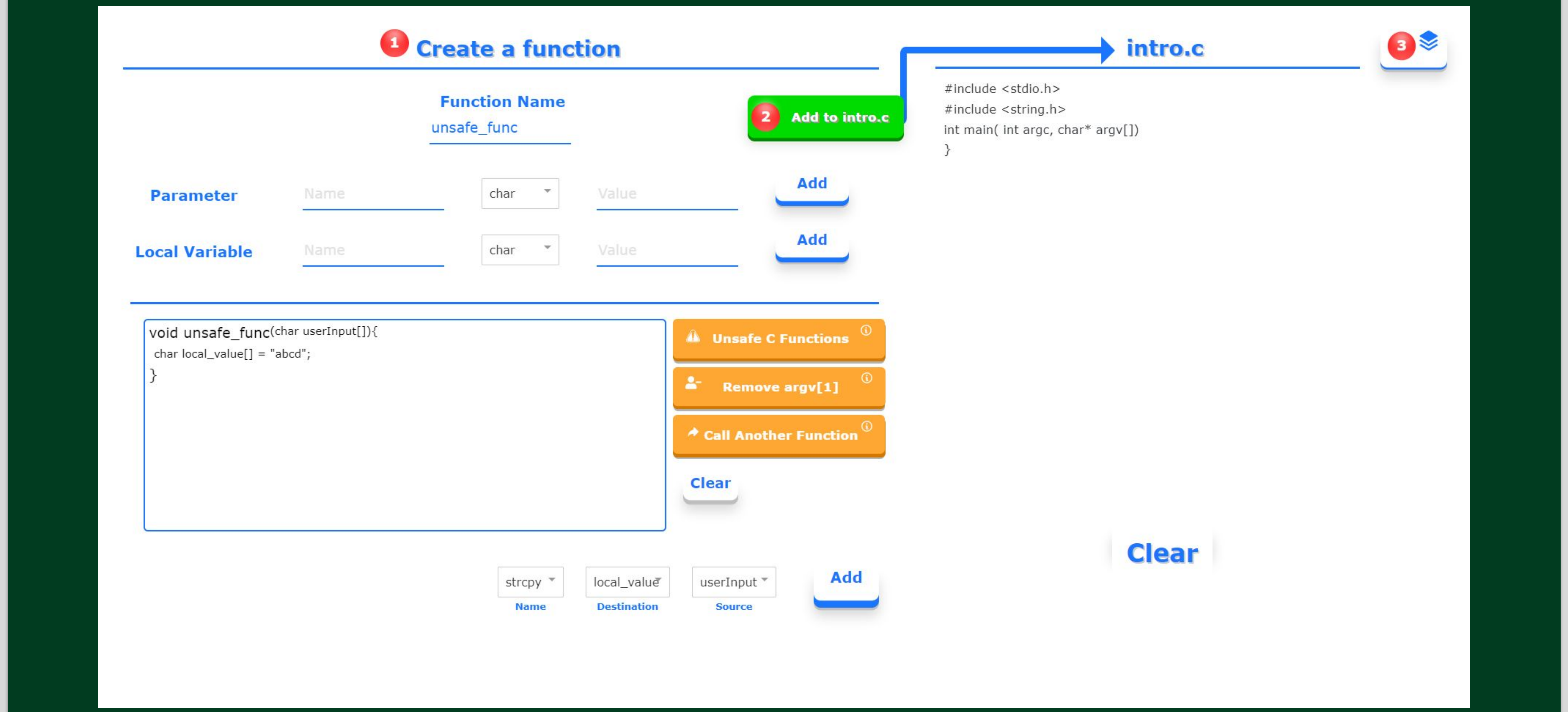
Bug Fixes

- Noteable bug that makes it hard for the student to visualize
- TBD in 2024

Level Implementation

- Create unsafe functions for students to fix based on what they have learned with varying levels of difficulty
- Add an experience point system to encourage student engagement
- TBD in 2024

DISSAV Tool



```
#include <stdio.h>
#include <string.h>
int main( int argc, char* argv[])
}
```

```
void unsafe_func(char userInput[]){
 char local_value[] = "abcd";
}
```

Caption for your photo

Conclusions

Interactive learning is very helpful for students, especially those with learning disabilities. I am a neurodivergent student and in my experience, interactive learning has always been the most helpful.

I wanted to create a tutorial to help students like myself understand what stack smashing using this interactive tool. Unfortunately, the concept of stack smashing can be difficult to understand and the DISSAV tool is flawed.

I believe that if I can help even one student understand stack smashing, then my time to teach (and soon improve) the DISSAV tool is worth the time.

Advisors

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