Introduction

The case we were assigned was a decimal 32 floating point converter which we implemented primarily using Python for the main converter and flask to implement the frontend of the web application. A slew of the problems encountered were a result of manually implementing conversions and other functions as opposed to relying on libraries for the functions.

Problems Encountered

One problem that we encountered was figuring out how to normalize the number so that it would be a whole number and adjusting the exponent accordingly.

In order to pad the number with 0s, if it was less than 7 digits, we had to make it a string first. We also had to account for possible inputs such as 127.0, where 0 would still be considered a significant number. Thus, we had to take in the number as a string first so that the 0 is included in the normalized number (e.g. the normalized number would be 0001270 instead of 0000127).

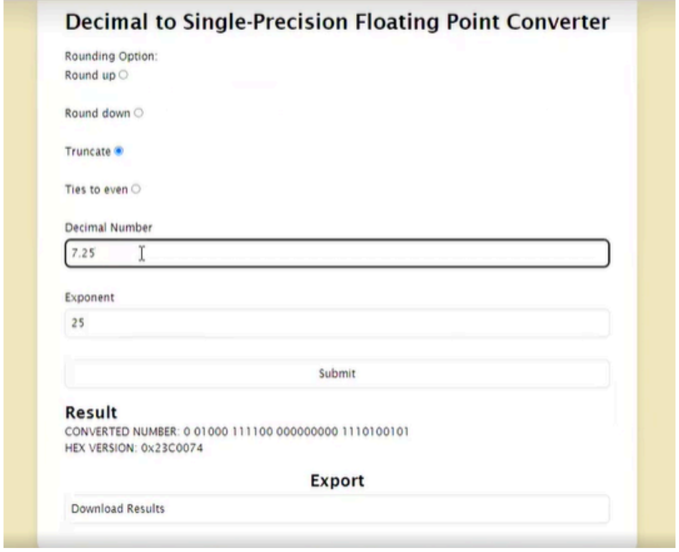
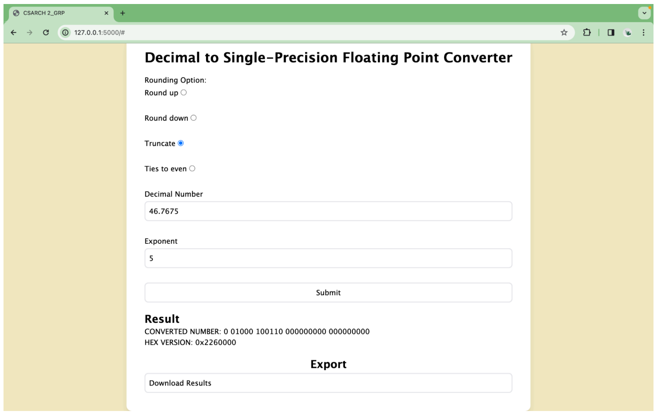
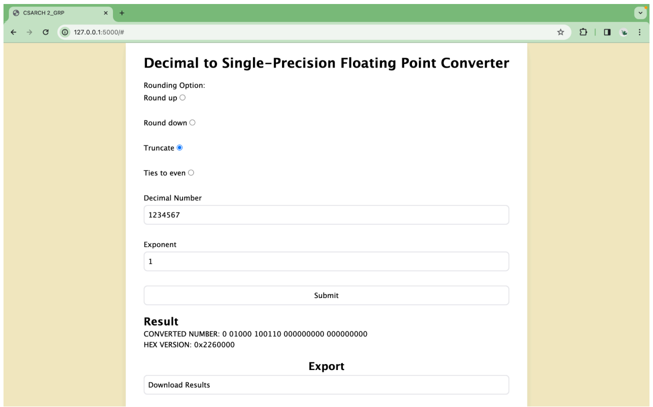
Moreover, since we wrote our backend using Python, we were unsure how to create the front end for it. We figured that a web application would be the easiest, but we had no experience in creating web applications with a Python backend. We still had to put in a lot of time in learning how to use the Flask framework in order to accomplish this.

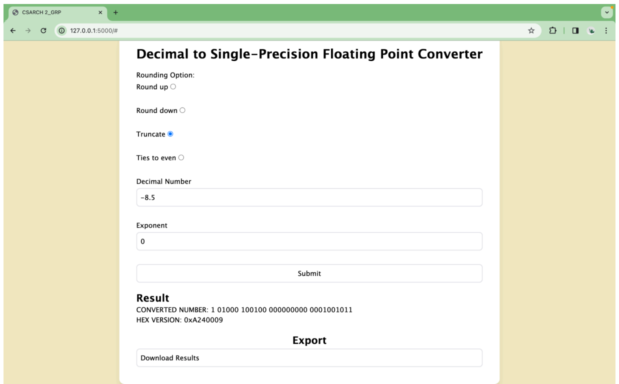
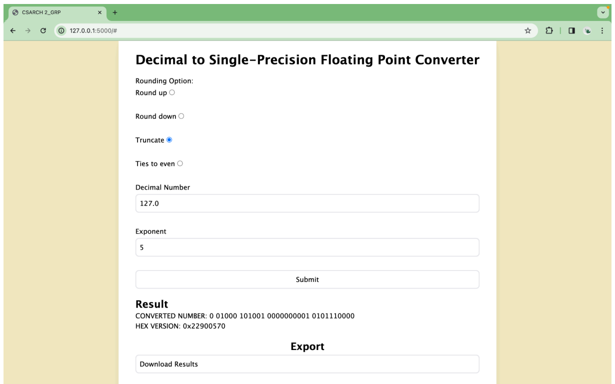
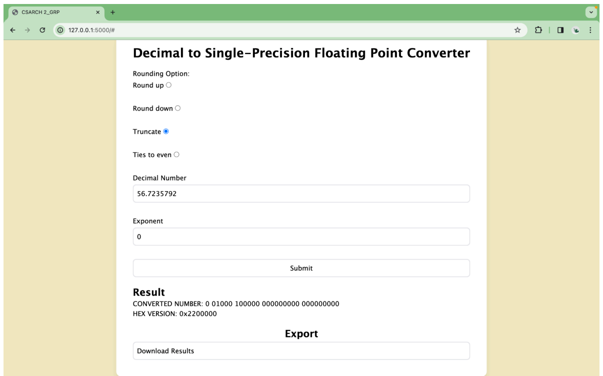
Another problem the group encountered was handling indeterminate numbers, such as the negative square root of 1 or 0 divided by itself. Since the Flask Form Integer and Float fields do not accept Strings as input, indeterminate numbers are nigh impossible to define. A potential solution to this problem could be to create predefined strings to represent all the possible indeterminate numbers (e.x., *“sqrt(-1)”* or *“0/0”* for the square root of negative numbers and 0 divided 0, respectively). However, given the myriad of ways that these strings could be typed—different spelling, spacing, or string lengths—it would be unreasonable to account for all the possible cases.

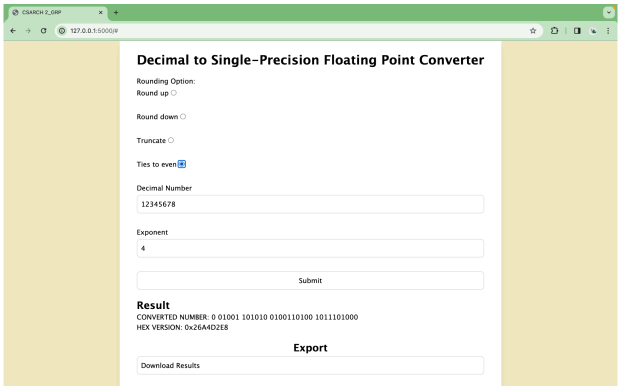
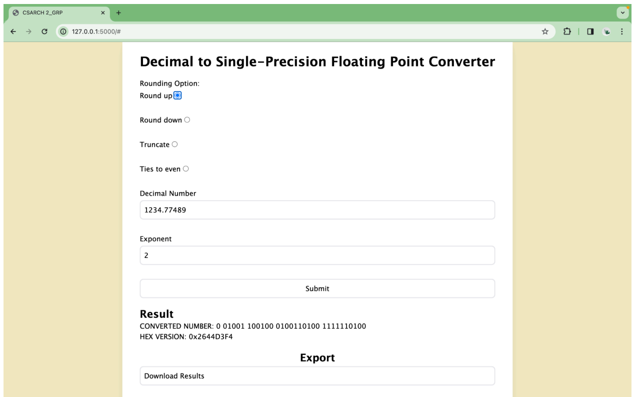
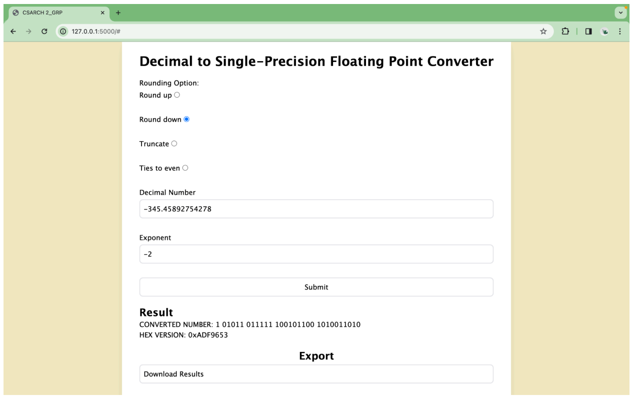
Test Cases Used in The Recording

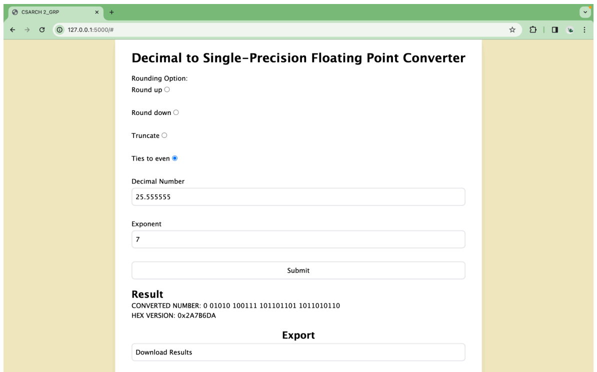
The following cases below were used to test the functionality of the application.

NORMAL CASES		
Decimal	**Exponent**	**Rounding Type**
7.25	25	Truncate

 Decimal to Single-Precision Floating Point Converter Rounding Option: Round up ○ Round down ○ Truncate ● Ties to even ○ Decimal Number 7.25 Exponent 25 Submit Result CONVERTED NUMBER: 0 01000 111100 000000000 1110100101 HEX VERSION: 0x23C0074 Export Download Results		
45.7675	5	Truncate
 CSARCH 2_GRP 127.0.0.1:5000/# Decimal to Single-Precision Floating Point Converter Rounding Option: Round up ○ Round down ○ Truncate ● Ties to even ○ Decimal Number 46.7675 Exponent 5 Submit Result CONVERTED NUMBER: 0 01000 100110 000000000 000000000 HEX VERSION: 0x2260000 Export Download Results		
1234567	1	Truncate
 CSARCH 2_GRP 127.0.0.1:5000/# Decimal to Single-Precision Floating Point Converter Rounding Option: Round up ○ Round down ○ Truncate ● Ties to even ○ Decimal Number 1234567 Exponent 1 Submit Result CONVERTED NUMBER: 0 01000 100110 000000000 000000000 HEX VERSION: 0x2260000 Export Download Results		
-8.5	0	Truncate

 CSARCH 2_GRP 127.0.0.1:5000/# **Decimal to Single-Precision Floating Point Converter** Rounding Option: Round up ○ Round down ○ Truncate ● Ties to even ○ Decimal Number: -8.5 Exponent: 0 Submit **Result** CONVERTED NUMBER: 1 01000 100100 000000000 0001001011 HEX VERSION: 0xA240009 **Export** Download Results		
127.0	5	Truncate
 CSARCH 2_GRP 127.0.0.1:5000/# **Decimal to Single-Precision Floating Point Converter** Rounding Option: Round up ○ Round down ○ Truncate ● Ties to even ○ Decimal Number: 127.0 Exponent: 5 Submit **Result** CONVERTED NUMBER: 0 01000 101001 0000000001 0101110000 HEX VERSION: 0x22900570 **Export** Download Results		
ROUNDING CASES		
56.7235792	0	Truncate
 CSARCH 2_GRP 127.0.0.1:5000/# **Decimal to Single-Precision Floating Point Converter** Rounding Option: Round up ○ Round down ○ Truncate ● Ties to even ○ Decimal Number: 56.7235792 Exponent: 0 Submit **Result** CONVERTED NUMBER: 0 01000 100000 000000000 000000000 HEX VERSION: 0x2200000 **Export** Download Results		
12345678	4	Ceiling

 **Decimal to Single-Precision Floating Point Converter** Rounding Option: Round up ○ Round down ○ Truncate ○ Ties to even ● Decimal Number 12345678 Exponent 4 Submit **Result** CONVERTED NUMBER: 0 01001 101010 0100110100 1011101000 HEX VERSION: 0x26A4D2E8 **Export** Download Results		
1234.77489	2	Floor
 **Decimal to Single-Precision Floating Point Converter** Rounding Option: Round up ● Round down ○ Truncate ○ Ties to even ○ Decimal Number 1234.77489 Exponent 2 Submit **Result** CONVERTED NUMBER: 0 01001 100100 0100110100 1111110100 HEX VERSION: 0x2644D3F4 **Export** Download Results		
-345.45892754278	-2	Floor
 **Decimal to Single-Precision Floating Point Converter** Rounding Option: Round up ○ Round down ● Truncate ○ Ties to even ○ Decimal Number -345.45892754278 Exponent -2 Submit **Result** CONVERTED NUMBER: 1 01011 011111 100101100 1010011010 HEX VERSION: 0xADF9653 **Export** Download Results		
25.555555	7	Ties to Even



Decimal to Single-Precision Floating Point Converter

Rounding Option:
Round up ○
Round down ○
Truncate ○
Ties to even ●

Decimal Number
25.555555

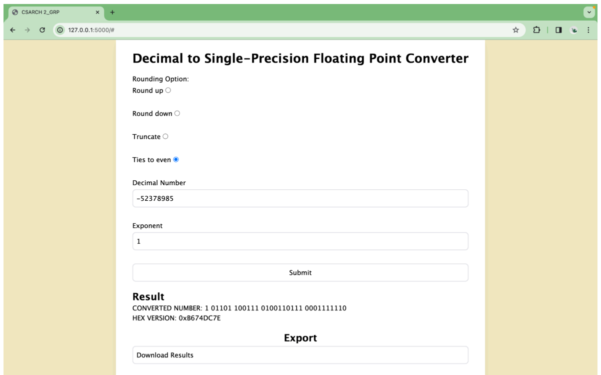
Exponent
7

Submit

Result
CONVERTED NUMBER: 0 01010 100111 101101101 1011010110
HEX VERSION: 0x2A7B6DA

Export
Download Results

-52378985	1	Ties to Even



Decimal to Single-Precision Floating Point Converter

Rounding Option:
Round up ○
Round down ○
Truncate ○
Ties to even ●

Decimal Number
-52378985

Exponent
1

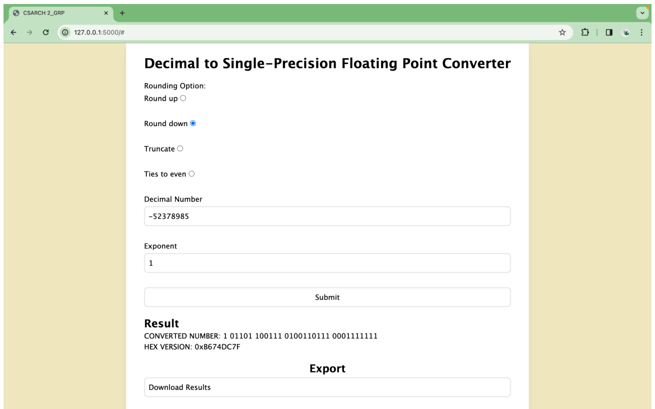
Submit

Result
CONVERTED NUMBER: 1 01101 100111 0100110111 0001111110
HEX VERSION: 0xB674DC7E

Export
Download Results

SPECIAL CASES

77	777	Any Rounding



Decimal to Single-Precision Floating Point Converter

Rounding Option:
Round up ○
Round down ●
Truncate ○
Ties to even ○

Decimal Number
-52378985

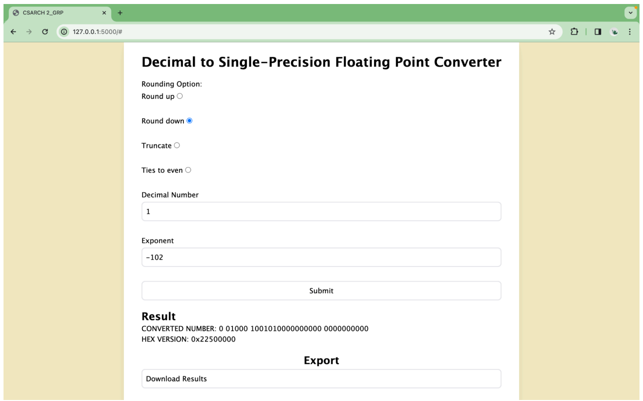
Exponent
1

Submit

Result
CONVERTED NUMBER: 1 01101 100111 0100110111 0001111111
HEX VERSION: 0xB674DC7F

Export
Download Results

1	-102	Any Rounding



Decimal to Single-Precision Floating Point Converter

Rounding Option:

Round up ○

Round down ●

Truncate ○

Ties to even ○

Decimal Number

1

Exponent

-102

Result

CONVERTED NUMBER: 0 01000 1001010000000000 0000000000
HEX VERSION: 0x22500000

Export