

Presented to the College of Computer Studies De La Salle University - Manila 2nd Term, A.Y. 2023-2024

In partial fulfillment of the course In CSARCH2 (S12)

Test Case Screenshots - Simulation Project

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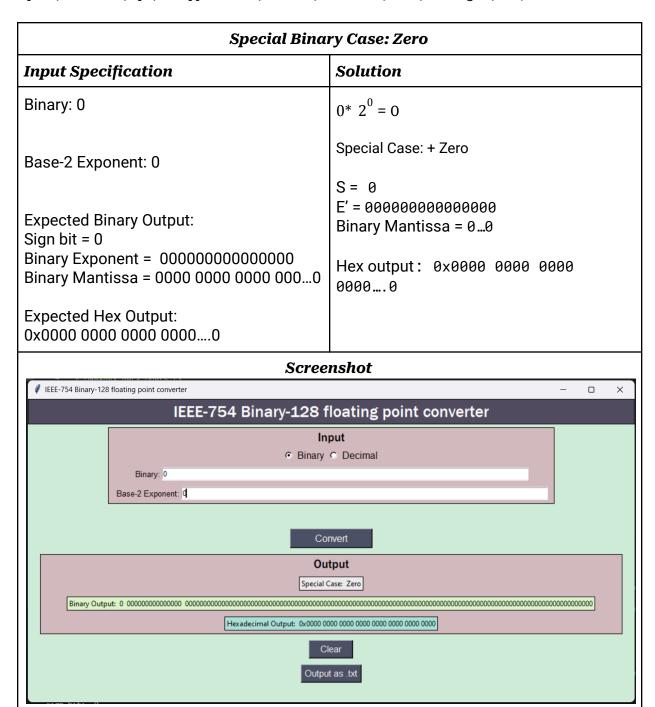
March 23, 2024

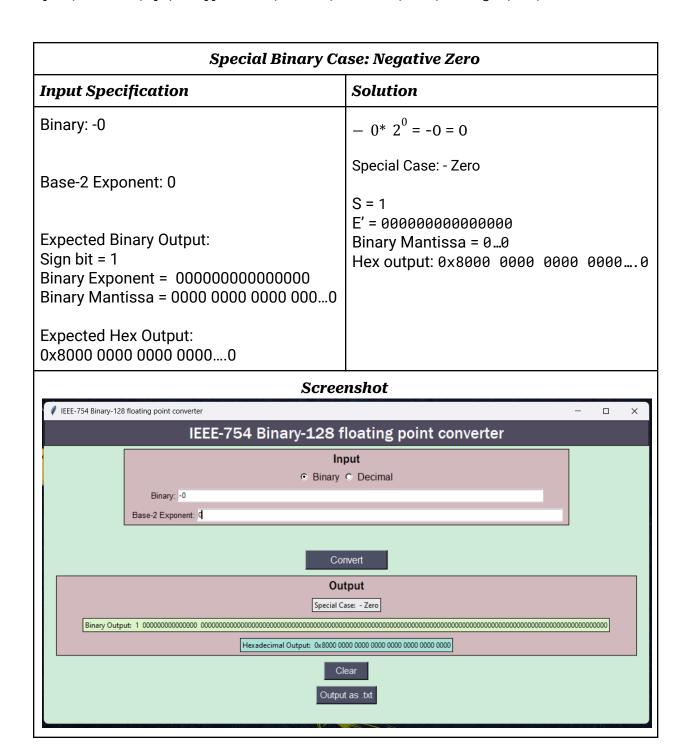
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Binary to Binary-128 floating point conversion

Normal Binary Case: Positive Number		
Input Specification	Solution	
Binary: 10101100	10101100 * 2 ⁵	
Base-2 Exponent: 5	Normalize to: 1.0101100 * 2 ¹²	
Expected Binary Output: Sign bit = 0 Binary Exponent = 1000 0000 0000 1011 Binary Mantissa = 0101 1000 00	S = 0 E' = 12 + 16383 E' = 10000000001011 Hex output: 0x400B 5800 0000 0000 0000 0000 0000 0000	
Expected Hex Output: 0x400B5800		
Scree	nshot	
	loating point converter	
Input		
Convert		
Output Special Case: Normal Binary Output: 0 10000000001011 0101100000 Hexadecimal Output: 0x4008 5800 0000 0000 0000 0000 0000		
Clear Output as .txt		

Normal Binary Case: Negative Number		
Input Specification	Solution	
Binary: -101.01	- 101.01 * 2 ⁵	
Base-2 Exponent: 5	Normalize to: $-1.0101x2^7$	
Expected Binary Output: Sign bit = 1 Binary Exponent = 100 0000 0000 0110 Binary Mantissa = 0101 00 Expected Hex Output: 0xC006500	S = 1 E' = 7 + 16383 E' = 100000000000110 Hex output: 0xC006 5000 0000 0000 0000 0000 0000 0000	
Scree	enshot	
	floating point converter	
Input © Binary © Decimal Binary: -101.01 Base-2 Exponent: 5		
Convert		
Output Special Case: Normal		
Clear Output as .txt		



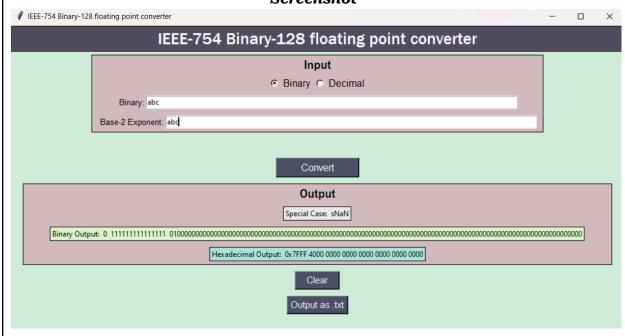


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Special Binary Case: Infinity	
Input Specification	Solution
Binary: 1	1 * 2 ¹⁶⁸³⁴
Base-2 Exponent: 16834	S = 0 E' = 16834 + 16383 E' = 100000000000000
Expected Binary Output: Sign bit = 0	Special Case: + Infinity
Binary Exponent = 111111 Binary Mantissa = 0000	Converted to E' = 11111111111111
Expected Hex Output: 0x7FFF 0000 0000 0000 0000 0000 0000	Hex output: 0x7FFF 0000 0000 0000 0000 0000 0000 00

Special Binary Case	: Very Small Number	
Input Specification	Solution	
Binary: 1	1 * 2 ⁻¹⁶⁸³⁵	
Base-2 Exponent: -16385	S = 0 E' = - 16835 + 16383 E' = - 2	
Expected Binary Output: Sign bit = 0	Special Case: Denormalized	
Binary Exponent = 0 Binary Mantissa = 0010 00	Denormalize: 0. 001 * 2 ⁻¹⁶⁸²	
Expected Hex Output: 0x0000 2000 0000 0000 0000 0000 0000	E' = 00000000000000000000000000000000000	
Scree	enshot	
	-	
	floating point converter	
Input		
Convert		
Output Special Case: Denormalized Binary Output: 0 00000000000000 001000 Hexadecimal Output: 0x0000 2000 0000 0000 0000 0000 0000		
Clear Output as .txt		

Special Bina	ry Case: sNaN
Input Specification	Solution
Binary: alphabet	$abc * 2^{-abc}$
Base-2 Exponent: alphabet	This will result in an invalid operation.
	This will be represented as sNaN.
Expected Binary Output: Sign bit = 0	Special Case: sNaN
Binary Exponent = 111111	S = 0
Binary Mantissa =	E' = 111111
0100 000	Binary Mantissa = 0100 00
Expected Hex Output:	Hex Output: 0x7FFF 4000 0000 0000
0x7FFF 4000 0000 0000 0000 0000 0000	0000 0000 0000 0000
0000	
Screenshot	
	- o x



Special Binar	ry Case: qNaN	
Input Specification	Solution	
Binary: sqrt(-1)	$\sqrt{-1 \cdot 2^1}$	
Base-2 Exponent:	This involves an operation with complex numbers.	
Expected Binary Output:	This will be represented as qNaN.	
Sign bit = 0	Special Case: qNaN	
Binary Exponent = 111111 Binary Mantissa = 1000 000	S = 0 E' = 111111	
Expected Hex Output: 0x7FFF 8000 0000 0000 0000 0000 0000 0000	Binary Mantissa = 1000 00 Hex Output: 0x7FFF 8000 0000 0000 0000 0000 0000	
	enshot	
IEEE-754 Binary-128 floating point converter IEEE-754 Binary-128	floating point converter	
Input © Binary © Decimal Binary: √-1 Base-2 Exponent: 1		
Convert		
Output Special Case: qNaN		
Binary Output: 0 1111111111111 100000000000000000000		
Clear Output as .txt		

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Decimal to Binary-128 floating point conversion

Normal Decimal Case: Positive Number		
Input Specification	Solution	
Decimal: 51	$51 * 10^2 = 5100$	
Base-10 Exponent:	To Binary: 1001111101100 * 2 ⁰	
Expected Binary Output: Sign bit = 0 Binary Exponent = 10000000001011 Binary Mantissa = 0011 1110 1100 00 Expected Hex Output: 0x400B3EC00	Normalize to: 1.0011111011 * 2 ¹² S = 0 E' = 12 + 16383 E' = 100000000001011 Binary Mantissa = 0011111011000 Hex Output: 0x400B3EC00	
Scree	nshot ×	
IEEE-754 Binary-128 f	loating point converter	
Input © Binary © Decimal Decimal: 51 Base-10 Exponent: 2		
Convert		
Output Special Case: Normal Binary Output: 0 100000000001011 001111101100000 Hexadecimal Output: 0x400B 3EC0 0000 0000 0000 0000 0000		
Clear Output as .txt		

Normal Decimal C	Case: Negative Number	
Input Specification	Solution	
Decimal: -4.27 Base-10 Exponent: 5 Expected Binary Output:	$-4.27 * 10^{5} = -427000$ To Binary: $11010000011111111000 * 2^{0}$ Normalize to:	
Sign bit = 1 Binary Exponent = 10000000010001 Binary Mantissa = 1010 0000 1111 1110 0000 00	1. $1010000011111111000x2^{18}$ S = 1 E' = 18 + 16383 E' = 100000000010001	
Expected Hex Output: 0xC011A0FE00	Hex Output: 0xC011A0FE00	
Scr	eenshot	
	-	
IEEE-754 Binary-128 floating point converter Input Binary © Decimal Decimal: 4.27 Base-10 Exponent: 5		
	Convert	

Output as .txt

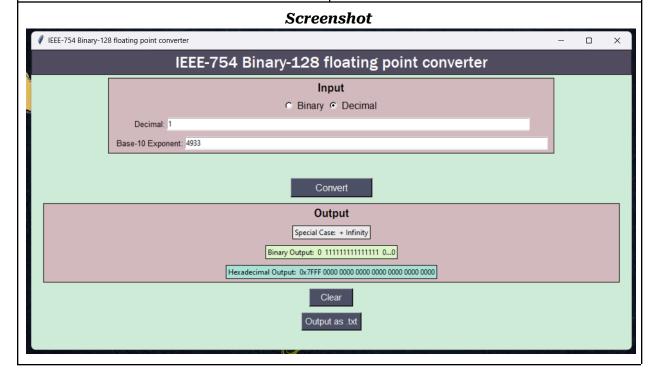
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Special Decimal Case: Zero	
Input Specification	Solution
Decimal: 0	$0 * 10^0 = 0$
Base-10 Exponent: 0 Expected Binary Output: Sign bit = 0 Binary Exponent = 000000000000000 Binary Mantissa = 0000 0000 0000 00000 Expected Hex Output: 0x0000 0000 0000 00000	Special Case: + Zero S = 0 E' = 0000000000000000 Binary Mantissa = 00 Hex Output: 0x0000 0000 0000

Screenshot

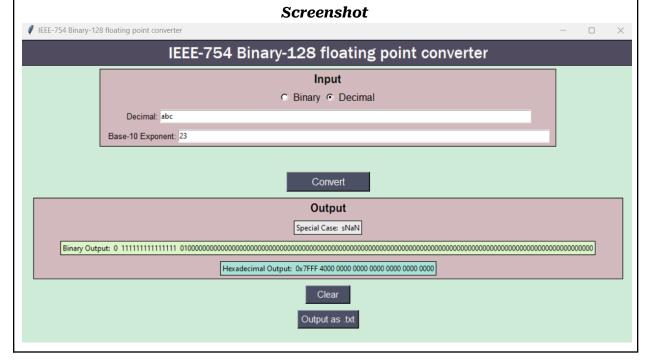
Special Decimal	Case: Negative Zero	
Input Specification	Solution	
Decimal: -0	$-0*10^{0} = -0 = 0$	
Base-10 Exponent: 0	Special Case: - Zero S = 1	
Expected Binary Output: Sign bit = 1 Binary Exponent = 000000000000000 Binary Mantissa = 0000 0000 0000 0000 Expected Hex Output: 0x8000 0000 0000 00000	E' = 00000000000000000000000000000000000	
Screenshot		
	- □ × If loating point converter	
Input © Binary © Decimal Decimal: -0 Base-10 Exponent: 0		
Convert		
Output Special Case: - Zero		

Special Decimal Case: Infinity	
Input Specification	Solution
Decimal:	$\begin{vmatrix} 1 * 10^{4933} \\ \approx 1.000011001111011111011 * 2^{16387} \end{vmatrix}$
Base-10 Exponent:	S = 0 E' = 16837 + 16383
Expected Binary Output: Sign bit = 0 Binary Exponent = 11111111111111111111111111111111111	E' = 1000000111100010 Special Case: + Infinity Converted to: E' = 11111111111111111111111111111111111
Expected Hex Output: 0x7FFF 0000 0000 0000 0000 0000	



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Special Decimal Cas	se: Very Small Number	
Input Specification	Solution	
Decimal: 5	$5 * 10^{-5123}$ $\approx 1.1111011001110110101001 * 2^{-17016}$	
Base-10 Exponent: -5123 Expected Binary Output: Sign bit = 0 Binary Exponent = 000000000000000 Binary Mantissa = 1111011001110110101~ Expected Hex Output: 0x0000 F676 A3EC 9CA0 B666 7736 E91F E6B0	S = 0 E' = -17016 + 16383 = -633 Special Case: Denormalized E' = 0000000000000000 Binary Mantissa = 1111011001110110101 \sim Hex output: 0x0000 F676 A3EC 9CA0 B666 7736 E91F E6B0	
Scree	enshot ×	
IEEE-754 Binary-128	floating point converter	
Input ☐ Binary ☐ Decimal Decimal: 5 Base-10 Exponent: -5123		
Convert		
Output Special Case: Denormalized		
Binary Output: 0 0000000000000000000000000000000000		
Hexadecimal Output: 0x0000 F676 A3EC 9CA0 B666 7736 E91F E680 Clear		
Output as .txt		

Special Decimal Case: sNaN	
Input Specification	Solution
Decimal: abc	abc * 10 ²³
Base-10 Exponent:	This will result in an invalid operation.
23	This will be represented as sNaN.
Expected Binary Output: Sign bit = 0	Special Case: sNaN
Binary Exponent = 11111	S = 0
Binary Mantissa = 0100 00	E' = 111111
	Binary Mantissa = 0100 00
Expected Hex Output: 0x7FFF 4000 0000 0000 0000 0000 0000	Hex Output: 0x7FFF 4000 0000 0000 0000 0000 0000 0000



Special Decimal Case: qNaN	
Input Specification	Solution
Decimal: sqrt(-9)	$\sqrt{-9 * 10^2}$
Base-10 Exponent:	This involves an operation with complex numbers.
	This will be represented as qNaN.
Expected Binary Output:	Special Case: qNaN
Sign bit = 0 Binary Exponent = 111111	opecial odde. qivarv
Binary Mantissa = 1000 000	S = 0
Billary Waltaga 1000 000	E' = 111111
Expected Hex Output:	Binary Mantissa = 1000 00
0x7FFF 8000 0000 0000 0000 0000 0000 0000	Hex Output: 0x7FFF 8000 0000 0000 0000 0000 0000 0000

