

CSARCH2

Simulation Project

*Develop a simulator using

- Web-based application (any programming language) with Graphical User Interface (GUI)
- Submission type:
 - (1) URL link of your web-based simulator; and
 - (2) GitHub link of Application Repository (source code, readme file/user's manual, documentation and analysis write-up, short video demonstration).
- Important:
 - Make sure I can access the above links. Otherwise, your score will be 0.0.
 - Readme/Documentation write-up should include screenshot/s of the program output/s (all possible test cases that will cover the specifications (normal, special case, different inputs, etc.)
 - Short video demonstration must: have a duration between 5 to 10 minutes, show that program compilation is successful, and show all test cases that covers the specifications (normal, special case, different inputs, etc.)

Deadline: **July 31, 2024** (Wednesday)

Group #	Project Topic (see description below)
01	IEEE-754 binary-32 floating point operation
02	Cache simulator (Direct)
03	Cache simulator (Full associative / LRU)
04	Cache simulator (Full associative / MRU)
05	Cache simulator (Block-set-associative / LRU)
06	Cache simulator (Block-set-associative / MRU)
07	IEEE-754 Decimal-32 floating-point converter (including all special cases)
08	IEEE-754 Binary-32 floating-point converter (including all special cases)
09	IEEE-754 Binary-32 floating point translator (including all special cases)
10	BCD generator and translator
11	UNICODE

Project Descriptions:

1. IEEE-754 binary-32 floating point operation
 - Input: (1) Two operands in binary and base-2 (2) Choice of rounding (G/R/S or rounding) (3) Number of digits supported
 - Process: addition of two operands

- Output: a.) Step-by-step operation (i.e., 1. Initial normalization 2.) operation 3.) post-operation normalization 4.) final answer; (b.) Option to output in a text file
2. Cache simulator (Direct)
 - Input: Block size, MM memory size (accept both blocks and words), cache memory size (accept both blocks and words), program flow to be simulated (accept both blocks and words) and other parameters deemed needed.
 - Output: number of cache hits, number of cache miss, miss penalty, average memory access time, total memory access time, snapshot of the cache memory. With option to output result in text file.
 3. Cache simulator (Full associative / LRU)
 - Input: Block size, MM memory size (accept both blocks and words), cache memory size (either blocks or words accept both blocks and words), program flow to be simulated (accept both blocks and words) and other parameters deemed needed.
 - Output: number of cache hits, number of cache miss, miss penalty, average memory access time, total memory access time, snapshot of the cache memory. With option to output result in text file.
 4. Cache simulator (Full associative / MRU)
 - Input: Block size, MM memory size (accept both blocks and words), cache memory size (accept both blocks and words), program flow to be simulated (accept both blocks and words) and other parameters deemed needed.
 - Output: number of cache hits, number of cache miss, miss penalty, average memory access time, total memory access time, snapshot of the cache memory. With option to output result in text file.
 5. Cache simulator (Block-set-associative / LRU)
 - Input: Block size, set size, MM memory size (accept both blocks and words), cache memory size (accept both blocks and words), program flow to be simulated (accept both blocks and words) and other parameters deemed needed.
 - Output: number of cache hits, number of cache miss, miss penalty, average memory access time, total memory access time, snapshot of the cache memory. With option to output result in text file.
 6. Cache simulator (Block-set-associative / MRU)
 - Input: Block size, set size, MM memory size (accept both blocks and words), cache memory size (accept both blocks and words), program flow to be simulated (accept both blocks and words) and other parameters deemed needed.

- Output: number of cache hits, number of cache miss, miss penalty, average memory access time, total memory access time, snapshot of the cache memory. With option to output result in text file.
7. IEEE-754 Decimal-32 floating-point converter (including all special cases)
- Input: Decimal and base-10 (i.e., 127.0×10^5) – should handle more than seven digits properly (provide an option for the user to choose the round-off method). Also, it can support NaN input
 - Output: (1) binary output with space between sections (2) it's hexadecimal equivalent (3) with the option to output in the text file.
8. IEEE-754 Binary-32 floating-point converter (including all special cases)
- Input: binary mantissa and base-2 (i.e., 101.01×2^5), decimal mantissa and base-10 (i.e., 15.75×10^5) and NaN
 - Output: (1) binary output with space between sections (2) it's hexadecimal equivalent (3) with an option to output in a text file
9. IEEE-754 Binary-32 floating point translator (including all special cases)
- Input: 8-digit hex input or 32-bit binary input (provide a separator for various sections of the input)
 - Output: (1) Decimal (provide an option for the user to choose between fixed or floating point) (2) with an option to paste the result in notepad
10. BCD generator and translator
- For BCD generator:
 - Input: decimal; output: unpacked BCD, packed BCD, densely-packed BCD;
 - For Densely-packed BCD translator:
 - Input: Densely-packed BCD, output: decimal
 - Note: output with an option to output result in a text file
11. UNICODE
- Input: Unicode (with invalid Unicode check)
 - Output: UTF-8; UTF-16; UTF-32 [format: xx xx xx; where x is hex nibble]
 - Note: output with option to paste result in notepad

Assessment Rubric for Simulation Project:

	EXEMPLARY	SATISFACTORY	NEEDS IMPROVEMENT	UNACCEPTABLE
Submission files	[20/20 pts] All required files are submitted; All file contents are organized and complete;	[15/20 pts] All required files are submitted; But a file has missing component or code comments, or is ambiguously written;	[10/20 pts] Missing source code, OR readme/user's manual (provided that a web-based simulator was submitted)	[5/20 pts] Missing source code AND readme/user's manual (provided that a web-based simulator was submitted)
Input	[30/30 pts] Complete input components, options, and/or cases; And adhered to input format specifications	[23/30 pts] Complete input components and/or cases; But did not adhere to input format specifications	[15/30 pts] An input component and/or case is missing	[8/30 pts] Two or more input components/cases are missing
Output	[40/40 pts] All outputs and cases are correct and/or accurate; Adhered to output format specifications	[30/40 pts] Outputs and cases are generally correct; But did not adhere to output format specifications	[20/40 pts] An output component/case is missing, incorrect or inaccurate	[10/40 pts] Two or more output components/cases are missing, incorrect or inaccurate
*** NOTE: No web-based simulator = 0.0				