Project Titles 21AIE112

Elements of Computing Systems-2

Batch A

General Instructions

Part 1: Write the Jack program of the given task and Compile and successfully simulate it on VM Emulator.

Part 2: Write your own general purpose assembler to convert the assembly program into 16 bit machine codes also use the Nand2tetris assembler for conversion. (Your own assembler should be developed by you and is different from the assembler tool supplied along with the book)

Part 3: Dump the machine codes generated by your own assembler into the RAM.hdl. Then design the architecture for implementing your machine instructions to get the result. (Here I presume that you already have the hdl scripts of all the hardware's used by the CPU. Additional thing what you have to do is connecting the address and data buses during the execution).

S.No	Questions
1	Write a Jack program to implement a symbol table. Possible entries in a symbol table: • Name : a string • Attribute: 1. Reserved word 2. Variable name 3. Type Name 4. Procedure name
2	Implement the storage allocation strategies 1. heap 2. stack 3. Static in Jack.
3	Develop a lexical analyzer to recognize a few patterns in Jack 1. Identifiers, 2. constants, 3. comments, 4. operators

4	Implement the following String library functions in Jack 1. Sets the j'th character of this string to the given character. 2. Appends the given character to the end of this string, and returns the string. 3. Erases the last character from this string. 4. Returns the integer value of this string until the first non-numeric character.
5	Implement the following String library functions in Jack 1. Sets this String to the representation of the given number. 2. Returns the new line character. 3. Returns the backspace character 4. Returns the double quote (") character
6	Implement the following String library functions in Jack 1. strlen () 2. strcmp () 3. strappend()
7	Implement the following Keyboard functions in Jack 1. Returns the ASCII code (as char) of the currently pressed key, or 0 if no key is currently pressed. 2.Reads the next character from the keyboard: waits until a key is pressed and then released, then echoes the key to the screen, and returns the value of the pressed key
8	Implement the following Keyboard functions in Jack 1. Prints the message on the screen, reads the next line (until a newline character) from the keyboard, and returns its value. 2.Prints the message on the screen, reads the next line (until a newline character) from the keyboard, and returns its integer value (until the first non-numeric character
9	Design Predictive parser for Jack language that has the following grammar expression: term (op term)* term: integerConstant | stringConstant | keywordConstant | varName | varName '[' expression ']' | subroutineCall | '(' expression ')' | unaryOp term subroutineCall: subroutineName '(' expressionList ')' | (className | varName) '.' subroutineName '(' expressionList ')' expressionList: (expression (',' expression)*)? op: '+' | '-' | '*' | '/' | '&' | '|' | '<' | '>' | '=' unaryOp: '-' | '~' keywordConstant: 'true' | 'false' | 'null' | 'this'