



Highsted Knowledge Organiser

Computer Science: Search and Sort Algorithms – Year 11 – Term 1

What I need to know

- Describe binary and linear search algorithms
- Describe bubble and insertion sort algorithms
- Demonstrate how each of the search and sort algorithms work

Key Vocabulary

- Linear search	- Binary search
- Insertion sort	- Bubble sort
- Merge sort	- Middle value
- Comparison	- Pass

Student reference point

Linear Search	Binary Search
<p>Searched Element 39</p> <p>Linear search is a type of search where each item in the list is checked one by one until the desired item is found.</p>	<p>Binary search is a type of search where the list is divided in half using a middle value and the required item is found. This process goes on until it is successful.</p>

Insertion Sort	Merge Sort
<p>Insertion sort is a type of sort where each item's value is checked to see where it should go in the list in the correct order.</p>	<p>Merge sort is a type of divide and conquer sort. The list is divided in half until each individual item is listed. Then the items are reassembled into sub lists until all items are sorted.</p>

Bubble Sort	
<p>First pass</p> <p>Second pass</p> <p>Third pass</p>	<p>How it could look in an exam</p> <pre> 01 function BubbleSort(sortList) 02 sorted = false 03 while sorted == false 04 sorted = true 05 for sortCount = 0 to len(sortList) - 2 06 if sortList[sortCount] > sortList[sortCount + 1] then 07 temp = sortList[sortCount] 08 sortList[sortCount] = sortList[sortCount + 1] 09 sortList[sortCount + 1] = temp 10 sorted = false 11 endif 12 next sortCount 13 endwhile 14 return sortList 15 endfunction </pre> <p>Bubble sort is a type of sort where 2 adjacent items are compared with each other each time and swapped. This process carries on until the list is sorted.</p>

Challenge questions

- What are the advantages of using binary search algorithm?
- What are the disadvantages of using bubble sort algorithm?
- How the insertion sort algorithm work?
- Write the algorithms for the binary search and insertion sort.

Suggested reading

- <https://www.bbc.co.uk/bitesize/guides/zidkw6f/revision/4>
- <https://www.ocr.org.uk/Images/577722-guide-to-searching-and-sorting-algorithms-in-ocr-exam-reference-language.docx>



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Computer Science: Subprograms – Year 11

What I need to know <ul style="list-style-type: none"> - What are subprograms - What is the difference between procedure and function 	Key Vocabulary	
	- Subprogram	- Procedure
	- Function	- Parameter
	- Argument	- Local variable
	- Global variable	- Def ()
	- Return value	-

Student reference point

Procedures

A procedure receives data from a program and performs a specified action on the data. It will **not return a value** but it will make the results available.

1. To create a procedure, we need to define it and give it a name first This example will say a greeting and a name.	<pre>procedure greeting(name) print("hello" , name) endprocedure</pre>	Parameters allow values to be passed to procedures and functions. They are defined within brackets. <i>name</i> is the parameter in this program.
2. To execute the procedure, use a procedure call statement. The procedure call statement refers to the name of the procedure.	<pre>greeting(name)</pre>	Calls the procedure using its name – <code>greeting ()</code> The name in bracket is the argument which will be obtained in the next step.
3. The procedure <code>greeting(name)</code> will be executed depending on the user input.	<pre>name = input("Enter name: ")</pre>	Argument is the value a parameter takes when the subprogram is called. Name from the user will be argument as it will be replaced in the parameter section of the function name.
<u>Python version</u>	<pre>def greeting(name): print("Hello", name) name = input("Enter name: ") greeting(name)</pre>	The program uses the argument to execute the program. The result will be outputted on the screen.

Functions

A function is a subprogram that does return a value. A function computes a value using data provided by the program and **returns a single value** to the program.

1. To create a function, we need to define and give it a name	<pre>function printSquare(a: integer) result = a * a return result end</pre>	Parameters used are a, b Data type is integer
2. To execute the function, we need to call the function.	<pre>input a answer = printSquare(a) print answer</pre>	The function will ask the user for 1 input then use the function method to calculate the answer and outputs the result <code>a = 5</code> <code>answer = 25</code>
<u>Python version</u>	<pre>def printSquare(number): return (number * number) #number = int(input('Enter a number: ')) print(printSquare(5))</pre>	<i>In python we use def () to define a procedure and function</i> <i>Def printSquare(number)</i> <i>Def greeting(name)</i>

Challenge question

- What are the advantages of using subprograms?

Suggested reading

- <https://www.bbc.co.uk/bitesize/guides/zb3yb82/revision/6>
- <https://isaacomputerscience.org/topics/subroutines?examBoard=all&stage=all>