# [Homework 4 Stacks

1. Describe why a stack is not a suitable data structure for holding client records at a call centre. Suggest a more suitable data structure and justify why it is suitable. [4]

A stack is a “First In Last Out” (FILO) data structure, an abstract data type. This means that when you push an item onto the stack, it becomes the last item so it will come out first if popped. For qholding client records at a data centre, you want a FIFO (First in First out) structure, since it only makes sense to prioritise who comes first. And plus, when you make the calls, it is done like a queue, you call first, someone else then calls, the order is you then the other person, if your records are stored in opposite order (stack), then your records get mixed with someone elses and that creates a problem because you don’t want your records to be lost and mixed with someone elses.

1. If a stack is implemented as a dynamic data structure, what bounds the number of items that can be pushed? [1]

Memory, if you run out of memory, the program returns error because theres no more space for items to be pushed onto, dynamic structures’ sizes can go on for as long as the memory still has space

3. The operation peek() returns the top item of a stack without removing it from the stack.   
What should happen if a peek() is attempted on an empty stack? [1]

You get an error because there is not items in the stack so there is no last item so the computer doesn’t know what the last item is.

1. Complete the following to show the state of a stack after the indicated operations.   
   The stack can only hold 4 items in total. [4]

|  |  |  |  |
| --- | --- | --- | --- |
| **Instruction** | **Stack** | **Front** | **Result** |
| stack = new array(4) | [] | -1 |  |
| push(rabbit) | [rabbit] | 0 |  |
| push(fox) | [rabbit, fox] | 1 |  |
| push(mouse) | [rabbit, fox, mouse] | 2 |  |
| peek() | [rabbit, fox, mouse] | 2 | mouse |
| pop() | [rabbit, fox] | 1 | mouse |
| pop() | [rabbit] | 0 | fox |
| push(hedgehog) | [rabbit, hedgehog] | 1 |  |
| push(magpie) | [rabbit, hedgehog, magpie] | 2 |  |
| push(badger) | [rabbit, hedgehog, magpie, badger] | 3 |  |
| isFull() |  | 3 | True |
| peek() | [rabbit, hedgehog, magpie, badger] | 3 | badger |
| pop() | [rabbit, hedgehog, magpie] | 2 | badger |
| pop() | [rabbit, hedgehog] | 1 | magpie |
| pop() | [rabbit] | 0 | hedgehog |
| pop() | [] | -1 | rabbit |
| isEmpty() |  | -1 | True |

[Total 10 Marks]