ANSWER BOOKLET
LIVRET DE RÉPONSES
CUADERNILLO DE RESPUESTAS

1

88%.

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4 PAGES / PÁGINAS

Candidate session number: / Numéro de session du candidat: / Número de convocatoria del alumno:

2	1	M	T	Z	0	P	1	-	C	S	M	L

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JAMIE SULLIVAN

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1 2 3 4 5 6 7 8 9 10

1

- client ✓
- server ✓

(2)

2

Phased implementation, whereby gradually, certain modules of the old system are switched over to the new system. ✓

(2)

3

Z = not (A xor B) ✓

need to draw (1)

4

a) - bugs appear during use of the OS
- updates become available, adding more improvements such as performance. (2)

b) - download from online server (2)
- physical update using external device

5

16 1
B F
↓ ↓
11 × 16 + 15 × 1 = 176 + 15
= 191 (2)

11 | 176
16 | 15
66 | 191
110
190

6

- higher speed (2)
- longer range (using signal amplifiers)
- wireless signals can easily be interfered with

7

- a variable has an identifier, data type and value (contents), and can be changed during a program's operation. (2)
- a constant is a fixed variable, which cannot be changed. It is always the same every time the program is run

8 8

6, 12, 18 ✓ ✓ ✓ (3)

8 9

A dedicated operating system can be more optimised for that phone's specific hardware. (1)

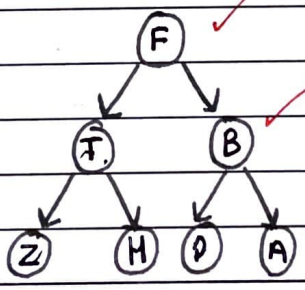
8 10

- size is not ~~iai~~ set upon initialisation (can be dynamically changed) ✓ (2)

- each element contains a pointer to the next (allowing elements to be spread through memory)

(3)

9 8



Where: F = foxtrot
T = tango
Z = zebra
H = Hotel
B = Bravo
D = Delta
A = Alpha

12

a) - router: will let the WLAN connect to the external network (the internet) packet forwarding
- wireless access points (WAP): devices set up throughout the school to broadcast wireless radio waves to devices on the network - will need many to fill the school. (3)

b) - more mobility (work flexibility)
- can use devices such as mobile tablets which are unlikely to have wired connectivity (2)

c) Methods of network security for the school:
1. Password protect access to the WLAN. This will ensure only those with access to the password (authorised) can connect to the network.
2. Whitelisting: school IT administrators could whitelist specific MAC addresses of students and staff. This would act as an additional layer of security in case the password got leaked. (4)

d) - physical VPN server within the school's network.
- client software on staff/student devices to access the server. (2)

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e) VPNs will create a "tunnel" between the client device ~~end~~ (staff computer) and the school server. Hence, any information travelling between staff and the school while they are on remote locations will be securely encrypted while it travels on the internet network. Hence, external entities will be unable to understand any potentially sensitive data being transmitted on over the VPN. ✓

(3)

13

a) ~~NAMES.resetNext(); L=[600]; F=[600]~~
~~loop while NAMES.hasNext()~~

```
I = 0
L = [600]  // last names ✓        I[600]
F = [600]  // first names          F[600]
NAMES.resetNext()  ✓                (2)
loop while NAMES.hasNext()
    NAME = NAMES.getNext()
L[I] = NAME.split(";")[0] → misunderstood ✗
    F[I] = NAME.split(";")[1]        ✗
end loop.
```

b)
```
BEGIN sort(L,F)
    ~~FLAG = FALSE~~ FLAG=FALSE; loop while FLAG=~~FALSE~~
    loop I from 0 to L.length -2 +1 ~~FLAG=TRUE~~
        if L[I] > L[I+1] then:
            TEMP = L[I]
            L[I] = L[I+1]
            L[I+1] = TEMP
            TEMP = F[I]
            F[I] = F[I+1]
            F[I+1] = F[I]
            FLAG = FALSE
        end if
    end loop                    (4)
end loop
```

c) - define MAX = 600 and MIN = 0. ✓
- check whether the (MAX+MIN) div 2 element is greater than or smaller than the required element:
  - greater than, MAX = (MAX+MIN) div 2
  - less than, MIN = (MAX+MIN) div 2
  - equals, found the element: break
- repeat the step above.

4

d) ~~sub-programs act as a layer of abstraction.~~

Sub-programs enhance code reusability. In the case of the binary search and bubble sort, they can be implemented into a sub-program which can be reused every time a sorting or search algorithm is required, saving programming time, required code storage and code readability.

2

ai) The lowest number can never be lower than 0, hence the algorithm will not find the lowest. (1)

aii) set LOWEST to some number that any inputted number can ever be greater than (e.g. by restricting the inputs). (2)

b) if statement with greater than 0 and less than 1000 :

literally just name of algorithm ✗

if NUMBER > 0 and NUMBER < 1000, then:

And a div 1 statement to convert to integer

c) START

HIGHEST = 0 ✓

LOWEST = 1000 // highest number is 999

COUNTER = 0

~~AVG_COUNTER = 0~~ ~~For~~ TOTAL = 0

loop while COUNTER ~~≤~~ < 1000 ✓ correct conditional loop

NUMBER = user input div 1 // integer ✗

if NUMBER > 0 and NUMBER < 1000, then:

COUNTER = COUNTER + 1

TOTAL = TOTAL + NUMBER ✓

if NUMBER > HIGHEST, then ✓

HIGHEST = NUMBER

end if

if NUMBER < LOWEST, then. ✓

LOWEST = NUMBER

end if

end if

// NOTE: if user inputs invalid number,

// counter will not be incremented, the loop

// will be repeated.

end loop

output ("Average: " TOTAL/COUNTER) ✓

output (HIGHEST) ✓

output (LOWEST) ✓ (8)

END.

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15

a) - the OS will be responsible for memory management on the OS, whereby "chunks" of memory are continually allocated and deallocated to programs ~~to~~ and software running ~~the~~ on the computer.
- the OS will also manage peripherals ~~by~~ by acting as an interface between physical hardware and code running ~~on top of~~ in the application layer. ~~Divice~~ Device drivers will allow all programs to interact with hardware through a common interface. (4)

- virtual memory
- programs
- multitasking

- calling
- through
- hardware

b) Virtual RAM (VRAM): the OS will break down memory into chunks ("pages") which are swapped with secondary memory if there is not enough space on ~~primary~~ the physical RAM. The complexity of this is hidden, because the user will not know this has happened (e.g. the ~~opt~~ application will still have its virtual memory allocated to it).

- peripheral → look into

ci) A laptop generally only needs enough memory to handle the currently running processes like the operating system and open applications. However, a file server will still need an operating system, but also needs enough memory to handle a variety of simultaneous requests to either read or write data. (2)

cii) Again, a laptop computer only needs enough processor power and speed to handle multitasking of all the processes on a computer, while a server needs ~~to~~ enough to handle a variety of incoming requests. The ~~processor~~ in a server will be more ~~specialised~~ toward reading and writing data. - hence, server has more. (1)

d) - motion sensor
- ~~light sensor~~ light sensor (2)

e) data ~~for~~ from the sensors will be sent through an ADC, whereby the microprocessor can receive and act upon digital data. It is likely that an AND operation can be used (on an abstract level), whereby ~~both~~ people need to be in the room AND the light sensor needs to be reading below a certain user-defined limit. (4)

be more specific

f) The use of continual feedback loops can be used, whereby the system may continue sensing the external environment to see if there are still people in there. It will then reset an internal timer on the microprocessor ("interrupt").

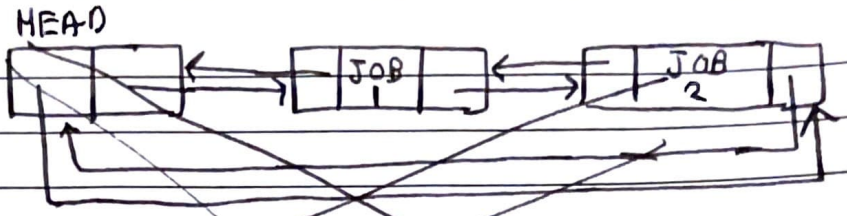
1

a) Print jobs will usually adhere to the first-in-first-out methodology, whereby the first job sent to the printer should be completed in a chronological order with the second, third etc. This is crucial for printers, because physical reality states that print jobs will not be completed immediately: hence, the need for queues.

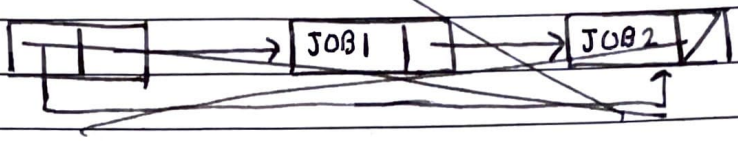
- specific queue methodology
- enqueue
- dequeue

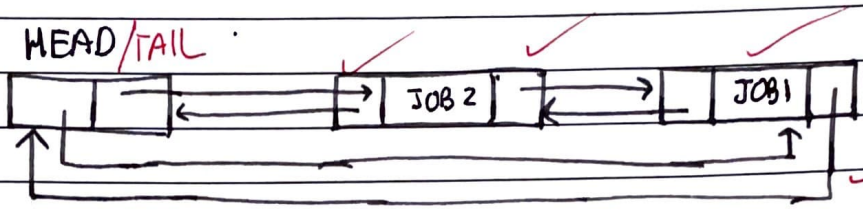
2

b)



Circular-double-linked list: print jobs ~~are~~ placed on the





3

- new jobs are added to the start of the linked list.
- jobs that are at the front of the queue will be pushed to the end of the linked list ("JOB1"), whereby the head node can "pop" it ~~to~~ from the list and fulfill the returned job.

c) Stacks operate on a last-in-first-out (LIFO) methodology, which does not fit the requirements of a print job. ~~It~~ This would mean that new print jobs would be prioritised ~~of~~ over existing print jobs in the stack.

3

- specific stack methodology

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d)

NUM	PRODUCT	OUTPUT
6		
5		
4		
3		
2		
1	1	
2	2	
3	6	
4	24	
5	120	
6	720	720

(3)

e) a stack can be used to "store" all the parameters for the recursive call. When adding all the elements to the stack, they are "piled on top of each other," ~~just like~~ using LIFO, like how the last recursive function call is the first one to be returned. By using .pop(), every function call on top of the base case can be "fulfilled".

→ revise

(2)