**Worksheet 1 Hardware and software**

**Task 1 Disk Defragmentation**

1. Here is a simplified diagram showing the contents of a hard disk drive.

Over time, different programs have been installed, updated, removed and reinstalled.

1. A user installs a new graphics package (**GP**) that takes up 5 blocks and a screen capture utility (**SC**) that takes up 2 blocks. Add **GP** and **SC** to the diagram to show where the memory management system might store the new blocks. [2]

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| OS | OS | OS | OS | WP | WP | OS |  |
| Music | Browser |  | WP | WP | Data |  | Data |
|  | Data |  |  |  | Data | SS | Browser |
| OS | Music | SS |  | SS | Browser |  | SS |

1. Defragment the drive to put all of the programs and files together so that they fit into continuous segments. The OS has been done for you. [7]

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| OS | OS | OS | OS | OS | OS |  |  |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |

1. Explain why the defragmented hard disk drive may improve performance. [2]
2. Explain why a certain amount of free hard disk drive space is needed to carry out disk defragmentation. [2]

2. Windows automatically creates “System Restore” points at regular intervals, for example daily or weekly. Why might you need to use a System Restore utility? Do some research to find out more about this utility and how you run it. Write down some facts you discover. [0]

3. Complete the table below, describing each type of systems software [9]

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Operating System** | **Utility** | **Library** | **Translator** |
| Disk defragmenter |  |  |  |  |
| Microsoft Windows |  |  |  |  |
| DLL file for web browsing |  |  |  |  |
| Android software |  |  |  |  |
| Backup manager |  |  |  |  |
| Java Compiler |  |  |  |  |
| Anti-virus program |  |  |  |  |
| Python interpreter |  |  |  |  |
| Module to generate random numbers |  |  |  |  |

4. Other than those above, name and describe the purpose of **two** different utility programs [4]

# Task 2 Systems software

1. In a language which you are familiar with, write a program to compare the execution time of two algorithms in milliseconds. You will need to import a **library program** to do this.

An example of a Python program is given below; you can use this one or a different one using algorithms you have already written.

What does this program demonstrate? [2]

#timing two methods of adding to a list.

#append and concatenate using +

import time # import a library program

def appendToList(n):

alist = []

t0 = time.clock()

for i in range(n):

alist.append(i)

t1 = time.clock()

runtime = round((t1 - t0)\* 1000,2)

print("time to append",n, " items to list ",runtime, "milliseconds")

def concatenateList(n):

alist = []

t0 = time.clock()

for i in range(n):

alist = alist + [i]

t1 = time.clock()

runtime = round((t1 - t0)\* 1000,2)

print("time to concatenate ",n, " items to list ",runtime, "milliseconds")

#main

k = int(input ("How many items do you want to add to your list? "))

appendToList(k)

concatenateList(k)

quit = input()