1.2.1 BIOS, Device Drives & Virtual Machines

1. Dave has several computing devices around his office. Each device has an operating system installed.

a) Dave has a PC which has a Basic Input Output System (BIOS).

Describe what is meant by the term 'BIOS'.

[2 marks]

- **Stored in ROM**
- **Tests hardware/components are working**
- **Starts the process of loading the operating system**

b) Describe what the effect would be to a computer if it had its BIOS overwritten

[2 marks]

- **The computer would not be able to boot/load the OS/run hardware checks/ set up its initial configuration**
- **Making the computer unusable**

2. Operating systems make use of device drivers.

Define what is meant by the term 'device driver', giving **one** example of a device driver that a home user would need.

[3 marks]

- **A program / software**
- **… that allows the operating system to communicate with hardware**
- **E.g. Printer driver / webcam driver / sound driver / graphic card driver (any suitable example)**

3. A software development company is building an operating system for a mobile phone that is in the process of being designed.

a) Explain how the developers could use virtual machines.

[2 marks]

- **Developers can run their operating system on a software implementation of the phone**
- **… until the physical machine is ready**

4. Explain why the programmers of anti-virus software may make use of virtual machines when developing anti-virus software.

[3 marks]

- **Allows them to run the software on multiple different operating systems**
- **… without the need for the physical machines**
- **They can run viruses on the VM to test if the software can catch them**
- **… without risking the physical machine/ can reset the VM back to its original state**

5. A programmer is writing a game to run on a variety of game consoles. Discuss the different ways in which they might use virtual machines in this process and any advantages and disadvantages of doing so.

[9 marks]

Points May Include:

- **A virtual machine is a piece of software that behaves in the same way as an actual computer.**
- **In this case the VM on the computer would behave as though it were a games console.**
- **Some VMs are used to interpret intermediate code.**

- **VMs of different consoles allow the program to be tested for different machines from the programmer's computer.**
- **Saves space and the time and cost of setting up multiple systems.**
- **Requires a powerful computer (as must run its own OS and the VM).**
- **The VMs need to be accurate representations of the physical machine, or the final code will not work on them.**
- **Game could be written in a language that is interpreted to intermediate code and is run off a VM.**
- **This means only one version of the code needs be written and it will run on all systems.**
- **This saves time and maximizes profits.**
- **However, the game will run more slowly than if it had been compiled to native code.**

- **Using Virtual Machines may be a useful tool during testing, saving time.**
- **Realistically physical machines will have to be used at some point to be 100% sure everything works as it should.**
- **Using a VM to run intermediate code makes it easy to release for a variety of platforms.**
- **But will be at the expense of game performance.**