

## Unit 2: Systems Software (2b. Applications Generation, AS Content)

Marks: /35

Answer all the questions.

1. A software company decides to release a duplicate file finder which it has named "De-Duplicator". Duplicate files are files that are exactly the same (bit for bit identical). Space is often wasted on computers by having multiple versions of the same file. Duplicate file finders are programs that find and identify duplicate files on a hard drive so that they can be removed.

A duplicate file finder is an example of a utility. Describe what is meant by a utility.

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----- [2]

2. The program, as shown in Fig.2 below, is written in assembly code using the Little Man Computer instruction set. It is *supposed* to take in two numbers and output the higher.

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      INP
      STA  NUMA
      INP
      STA  NUMB
      SUB  NUMA
      BRP  NOTA
      LDA  NUMB
      BRA  QUIT
NOTA  LDA  NUMA
QUIT  OUT
      HLT

NUMA  DAT
NUMB  DAT
```

**Fig.2**

State what type of translator program would be needed to convert the code above into machine code.

----- [1]

3. A gaming company decides to release a new video games console. The console will use a modified version of an operating system called Linux.

Linux is open-source.

Explain how Linux being open-source would benefit the games company.

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[2]

4(a). The owner of a small shop has bought some new stock-handling software and is setting up a computer system in order to run it.

The owner will use a number of pieces of utility software.

State the purpose of each of the following types of utility software and describe how the owner would use them.

File handlers

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----- [3]

(b). Hardware drivers

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----- [3]

(c). Backup utility

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----- [3]



6(a). A programmer spends her spare time contributing to an open source application that converts video files from a range of formats to one which uses lossy compression.

Describe what is meant by the term 'open source software'.

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[2]



7. Describe what is meant by the term 'assembler'.

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[2]

END OF QUESTION PAPER

Question		Answer/Indicative content	Marks	Guidance
1		<ul style="list-style-type: none"> <li>• A utility performs a specific task (1) and is usually related to the upkeep of the system (1).</li> <li>• Examples of a utility include a virus checker (1) / disk defragmenter (1).</li> </ul>	2	Up to 2 marks for a valid description.
		<b>Total</b>	<b>2</b>	
2		<ul style="list-style-type: none"> <li>• An assembler (1).</li> </ul>	1	For 1 mark.
		<b>Total</b>	<b>1</b>	
3		<ul style="list-style-type: none"> <li>• This means that a lot of the core functionality they need is already available (1) so the company just has to make amendments / additions specific to their system (1) saving time and money (1).</li> </ul>	2	Up to 2 marks for a valid explanation.
		<b>Total</b>	<b>2</b>	
4	a	Purpose –Manages data storage / organises data storage Uses – Used for the deletion / sorting / moving / copying / creation of files / folders – Manage the storage of software – Manage the storage of stock files – To access files	3	Maximum of 2 marks from Uses  <b>Examiner's Comments</b>  Most candidates correctly described how file handlers would be used but very few correctly stated the purpose, most stating that they 'organise files' rather than 'organise data storage'.
	b	Purpose – Enable peripheral and OS to communicate  Uses – To configure hardware – e.g. would be used to install a new keyboard; mouse; printer <i>(accept any examples sensible within context)</i>	3	Maximum of 2 marks from Uses Not enable hardware to communicate  <b>Examiner's Comments</b>  Some candidates gained credit for stating appropriate uses of hardware drivers but again the purpose was generally too vague. Many stating that they 'allow hardware to run' rather than 'allow communication between the operating system and peripheral device'

Question		Answer/Indicative content	Marks	Guidance
	c	Purpose –Automatically makes a copy of files –Storing them in a different location / medium – in case of loss / corruption (of original)  Uses –To make Incremental back-ups – Ensure that sales / stock data is backed up	3	Maximum of 2 marks from Purpose, 2 from Uses  <b>Examiner's Comments</b>  This question was well attempted by most candidates although too many responses included the term 'backup' to describe the purpose of the utility without explaining the term.
		<b>Total</b>	<b>9</b>	

Question	Answer/Indicative content	Marks	Guidance
5	<p><b>Mark band 6-8. High level response.</b></p> <p>Candidate has explained both terms in detail. Candidate has used appropriate technical terminology throughout. There are few, if any, spelling errors or grammatical errors.</p> <p><b>Mark band 3-5. Medium level response.</b></p> <p>Candidate has explained 1 of the terms in detail or explained both terms superficially. Candidate has used some technical terminology in the response. There may be spelling errors or grammatical errors, but they are not obtrusive.</p> <p><b>Mark band 0-2. Low level response.</b></p> <p>Candidate has listed some relevant points but failed to explain the terms in any detail. There is a lack of cohesion in the response. Candidate has failed to use correct technical terms in the response. Spelling and grammatical errors affect the readability of the response.</p> <p><i>Points may include:</i> <i>Intermediate code:</i> Is simplified code that... ...is between high level &amp; machine code ...is produced by compiler ...runs on any computer ...allows portability between machines Allows sections of code to be written in different languages... ...by different programmers ...suitable for specific tasks Error free</p> <p><i>Virtual machine:</i> A theoretical computer which provides... ...an environment in which a translator is available Uses an interpreter to run the intermediate code</p>	8	<p>For descriptions “in detail”, 3 or more relevant points are expected.</p> <p><b>Examiner's Comments</b></p> <p>This was the first of two banded response questions. In general candidates showed a good level of competence, however, a few diverged into talking about interpreters and error checking which was not what was required.</p>

Question			Answer/Indicative content	Marks	Guidance
			<i>Points in the context of</i> A translator is used to convert code from one language to another... ...from source code to object code Mention of types of translator: compilers, interpreters, assemblers		
			<b>Total</b>	<b>8</b>	

Question		Answer/Indicative content	Marks	Guidance
6	a	<ul style="list-style-type: none"> <li>• Source code is freely available...</li> <li>• ...for others to amend / examine / recompile</li> </ul>	2	<p><b>Examiner's Comments</b></p> <p>This question was generally well answered. However, candidates who referred to the 'software' being freely available rather than the 'source code' did not gain credit.</p>

Question	Answer/Indicative content	Marks	Guidance
b	<p><b>Mark Band 3–High Level (7-9 marks)</b>  The candidate demonstrates a thorough knowledge and understanding of a wide range of the technical issues the coding team might have considered; the material is generally accurate and detailed. The candidate is able to apply their knowledge and understanding directly and consistently to the context provided and come to a well argued conclusion. Evidence / examples will be explicitly relevant to the explanation. The candidate provides a thorough discussion which is well-balanced. Evaluative comments are consistently relevant and well-considered.</p> <p><i>There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated.</i></p> <p><b>Mark Band 2 –Mid Level (4-6 marks)</b>  The candidate demonstrates reasonable knowledge and understanding of the technical issues the coding team might have considered; the material is generally accurate but at times underdeveloped. The candidate is able to apply their knowledge and understanding directly to the context provided although one or two opportunities are missed. A reasoned conclusion is drawn. Evidence / examples are for the most part implicitly relevant to the explanation The candidate provides a reasonable discussion, the majority of which is focused. Evaluative comments are for the most part appropriate, although one or two opportunities for development are missed.</p> <p><i>There is a line of reasoning presented with some structure. The information presented is in the most part relevant and supported by some evidence.</i></p> <p><b>Mark Band 1-Low Level (1-3 marks)</b>  The candidate demonstrates a basic knowledge of the technical issues the coding team might have considered with limited understanding shown; the material</p>	9	<p>AO1: Knowledge and Understanding  The following is indicative of possible that candidates may refer to but is not prescriptive or exhaustive:  Java  One version needs be written and can be used on any device / OS combination that has the Java Virtual Machine rather than having to write multiple versions. Code running on a VM tends to be slower than compiled.  C++  Multiple versions of the code will need to be maintained for different architectures...  ...however there may be minimal differences between them, and then just need compiling with different compilers.</p> <p>Program will run quicker than alternatives.</p> <p>JavaScript  As interpreted likely to be by far the slowest option.  Will run in any browser.</p> <p>AO2: Application  The selected knowledge / examples should be directly related to the specific question. The following is indicative of possible factors / evidence that candidates may refer to but is not prescriptive or exhaustive:</p> <p>Java  Multiple devices can include devices other than PCs (i.e. phones, tablets). People with unusual operating systems or architectures would have access to the application.  It makes commercial sense to sell to as wide an audience as possible.  The speed reduction compared to compiled code will likely be noticeable with such a processor intensive task.  As running on a VM coders will have limited (if any) access to some of the low level features (e.g. access to the GPU) which can optimise the program.  Intermediate code is used helping protect</p>

Question	Answer/Indicative content	Marks	Guidance
	<p>is basic and contains some inaccuracies. A conclusion is made though it may not be well supported. The candidate makes a limited attempt to apply acquired knowledge and understanding to the context provided.</p> <p><i>The candidate provides a limited discussion which is narrow in focus. Judgments if made are weak and unsubstantiated. The information is basic and lacks supporting evidence.</i></p>		<p>intellectual property.</p> <p>C++ Some less used architectures may not be developed for as not commercially viable. Compiled code will run quicker than the other options. This is likely to be noticeable given the nature of the task. Easier to get access to lower level features (such as GPU access). Compiled code is not human readable helping to preserve intellectual property</p> <p>JavaScript Most people have web browsers so by far most compatible option (don't even need VM). The slow speed may be frustrating... ...though as no user interaction is needed this may be a trade off worth making. Source code is visible (though can be obfuscated) meaning it can easily be copied and amended.</p> <p>AO3: Evaluation Candidate has used the points above to justify their choice of language.</p> <p><b>Examiner's Comments</b></p> <p>Candidates were assessed on the quality of their extended response in this question. Some candidates did not extend their discussion beyond the benefits and drawbacks associated with writing code in each of these programming languages, therefore limiting credit awarded to low / mid band. Those candidates who discussed the benefits and drawbacks of selling a closed source application written in each of the languages with a justified recommendation were credited in the mid / high band. Centres should encourage candidates to structure their response to clearly address all parts of the question.</p>
	<b>Total</b>	<b>11</b>	

Question			Answer/Indicative content	Marks	Guidance
7			A program that translates assembly code (1) into machine code/object code (1)	2	
			<b>Total</b>	<b>2</b>	