Language Translators

Translator types / Development tools

1 A student uses a laptop to write a program that is saved as a text file.

The program code is written using an Integrated Development Environment (IDE).

(i) One presentation feature found in a typical IDE is prettyprint.

Identify **and** describe **one other** presentation feature found in a typical IDE.

(2)

(ii) One debugging feature found in a typical IDE is single stepping.

Identify **and** describe **one other** debugging feature found in a typical IDE.

(2)

Answer

Mark Scheme and Guidance

(i) **1 mark** for correct name, **1 mark** for matching description

- Expand/collapse code blocks…
- … sections of source code that are part of the same block can be expanded to see the content or collapsed so that the overall code is seen
- Auto-indentation // auto-formatting…
- … automatically indents/formats code as the user types so that the structure is clear // aids readability

(ii) **1 mark** for correct name, **1 mark** for matching description

- Breakpoints …
- … stops the code running on a set line to view the current status/variable contents/program flow
- Report window // variable watch window …
- … shows the values in variables/data structures and how they change when each line is run

(4 marks)

2 A program is written in a high-level language by a team of three programmers using an Integrated Development Environment (IDE).

Describe how the programmers can use the debugging features of a typical IDE during the development of the program.

Answer

Mark Scheme and Guidance

1 mark for each bullet point (**max 4**)

e.g.

- Single stepping
- Run the program one line at a time
- … and check the variable contents / program flow // show the effect of each line of code
- Set breakpoints
- … run the code up to a set line
- … and then check the status
- Variable/report watch window
- … view how the data changes as the program is running

(4 marks)

3 (a) A program has been developed and released for general use. After a few months of use an error is detected where under certain circumstances it outputs an unexpected value.

The program contains a function Lookup(). After investigation, it is found that this is the function that sometimes returns an incorrect value.

An Integrated Development Environment (IDE) is used to help locate the error.

The IDE features of watch window, single stepping and breakpoint will be used.

Explain these features including the order that they will be used in to locate the error in Lookup().

Answer

Mark Scheme and Guidance

For example:

- Set a breakpoint at the start of / within Lookup, to stop execution at a given statement
- then use single stepping to execute one statement / instruction at a time
- to display the value of variables using a watch window

One mark for each:

MP1 Order starting with a breakpoint **and** an explanation – 'stop execution <u>at this statement / line</u>'

MP2 Explanation of single stepping – execute 'line by line' / statements

MP3 Explanation of watch window – displaying the value of <u>variable(s)</u>

(3 marks)

(b) To solve the error a programmer decides to create a new module.

The design of the new module has been completed and the module is being coded.

Identify **two** features of an IDE that will help during the coding of this new module.

Answer

Mark Scheme and Guidance

Features include:

MP1 Editor

MP2 <u>Auto</u>- (syntax) complete / <u>auto</u> correction // identify undeclared variables(s)

MP3 Prettyprint / <u>auto</u>-indentation / <u>auto</u> (structure) highlighter

MP4 <u>Dynamic</u> syntax checking

MP5 Expand / collapse code blocks

MP6 Context sensitive prompts

Max 2 marks

(2 marks)

4 (a) A software developer is writing a computer program.

The developer uses an interpreter while writing the program code because it is easier for debugging.

Explain **one** reason why it is easier to debug the program code using an interpreter instead of a compiler.

Answer

Mark Scheme and Guidance

1 mark each to **max 2**:

- The interpreter will stop when an error is found
- … so the error can be corrected in real-time, and the result of changes seen immediately
- Only one error is displayed at a time
- … so fewer errors to correct simultaneously and no dependent errors

(2 marks)

(b) The program is ready to be sold to customers.

The developer uses a compiler because it creates an executable file.

Explain the reasons why the need to create an executable file makes the complier the appropriate choice when the program is complete.

Answer

Mark Scheme and Guidance

1 mark each to **max 3**:

- Program can be distributed without source code
- ... so it cannot be edited/stolen/plagiarised
- Users do not require the translator to run the program
- ... so time is not spent retranslating by user

(3 marks)

5 (a) A programmer uses an Integrated Development Environment (IDE) to write a computer program. The IDE has both a compiler and an interpreter as built-in translators.

The programmer decides to use the compiler when testing the final program.

Describe the benefits of using the compiler during testing.

Answer

Mark Scheme and Guidance

1 mark each to **max 2**:

- Creates an executable file
- ... so the code can be tested multiple times without having to recompile
- ... so **repeated testing** takes less time

(2 marks)

(b) IDEs have many features other than built-in translators.

Complete the table by identifying **one other** common IDE feature that can be used for each purpose. Describe how each feature helps the user during program development.

Each feature must be different. Do **not** give translator as one of your features.

Purpose	IDE feature	Description
for coding		
for presentation		
for debugging		

Answer

Mark Scheme and Guidance

1 mark for identification of each feature and **1 mark** for matching description:

e.g.

For coding:

IDE feature	Description
Context-sensitive prompts	**Gives suggestions** for code as the user types instead of having to write/remember the code
Auto-correct	Corrects spelling mistakes so that user has fewer errors to correct

For presentation:

IDE feature	Description
Pretty-printing	Colour code keywords so the user can identify any errors
Expand/collapse (code) blocks	The user can hide code that they are not currently working on

For debugging:

IDE feature	Description
Single stepping	Run the code **one line at a time** // shows the effect of each line of code
Breakpoints	Stop the code running at a set point to check the flow/variable contents

(6 marks)

6 (a) A programmer uses both a compiler and an interpreter to translate a program written in a high-level language.

Describe the advantages of using the interpreter compared to the compiler to translate the program.

Answer

Mark Scheme and Guidance

1 mark for each bullet point (**max 4**)

- easier to debug the program
- ... because it translates line-by-line and stops when an error is found whereas the compiler translates all the program at the same time
- ... only reporting one error at a time
- ... which allows the error to be corrected in real time whereas the program would need to be corrected and recompiled
- ... and the program can restart at same point when error occurred with a compiler the program needs to be re-run
- The effect of any changes made by the programmer can be seen immediately with a compiler the effects can only be seen after re-running
- A partially completed program can be translated / tested on its own a compiler cannot translate a partial program

(4 marks)

(b) State **one** reason why some high-level languages are partially compiled and partially interpreted.

Answer

Mark Scheme and Guidance

1 mark for each bullet point (**max 2**)

- Partially compiled programs can be used on different platforms as they are interpreted when run
- Code is optimised for the CPU as machine code is generated at run time
- Source code does not need recompiling so more efficient to run

(1 mark)

(c) (i) Identify **two** features that support the visual presentation of the code in a typical Integrated Development Environment (IDE).

(2)

(ii) Identify **two** features that support the debugging of the code in a typical IDE.

(2)

Answer

Mark Scheme and Guidance

1 mark for each bullet point (**max 2**)

- Prettyprint
- Expand/collapse code blocks
- Auto indentation / formatting

1 mark for each bullet point (**max 2**)

- Single stepping
- Breakpoints
- Report window
- Variable expressions

(4 marks)

7 A programmer uses an Integrated Development Environment (IDE) to develop a program that monitors air quality.

Describe the following features of a typical IDE.

Context‑sensitive prompts ....

Single stepping ....

Answer

Mark Scheme and Guidance

1 mark for each bullet point (**max 2** for each feature).

Context-sensitive prompts:

- As the code is being written
- ...the options to complete the statement are shown

Single stepping:

- allows the programmer to execute the program one line at a time
- ...so that the effects of each statement can be seen

(4 marks)