

L3 Lead Examiner Report 1906

Summer 2019

**L3 Qualification in Computing
Unit 2: Fundamentals of Computer
Systems**

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What is a grade boundary?

A grade boundary is where we set the level of achievement required to obtain a certain grade for the externally assessed unit. We set grade boundaries for each grade, at Distinction, Merit and Pass.

Setting grade boundaries

When we set grade boundaries, we look at the performance of every learner who took the external assessment. When we can see the full picture of performance, our experts are then able to decide where best to place the grade boundaries – this means that they decide what the lowest possible mark is for a particular grade.

When our experts set the grade boundaries, they make sure that learners receive grades which reflect their ability. Awarding grade boundaries is conducted to ensure learners achieve the grade they deserve to achieve, irrespective of variation in the external assessment.

Variations in external assessments

Each external assessment we set asks different questions and may assess different parts of the unit content outlined in the specification. It would be unfair to learners if we set the same grade boundaries for each assessment, because then it would not take accessibility into account.

Grade boundaries for this, and all other papers, are on the website via this link:

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Unit 2: Fundamentals of Computer Systems

Grade	Unclassified	N grade	Level 3		
			Pass	Merit	Distinction
Boundary Mark	0	11	23	37	51

Introduction

This is the fifth examination of Unit 2 (Fundamentals of Computer systems) for BTEC Level 3 National in computing which became available for first teaching in September 2016. Examination opportunities will continue to be available for this unit twice a year in January and May/June. This unit is a mandatory unit for all learners studying either the Extended Certificate (360 GLH), Foundation Diploma (510 GLH) or Extended Diploma (1080 GLH).

This unit, along with Unit 1 (Principles of Computer Science), are assessed through a written examination paper. The examination is designed to test learners' understanding of computer systems within a range of contexts. The paper is divided into four main questions, each with a number of sub parts. Each main question is based around a unique scenario; each scenario is outlined at the beginning of that question and additional information and/or stimulus is provided with individual parts as required.

While appropriate credit is given for learners who demonstrate appropriate 'stand-alone' knowledge, more successful learners can apply their understanding to the scenarios provided in the question.

The paper is designed to assess the full grade range of the qualification; as such the paper is ramped so that it gradually increases in difficulty as the questions progress with a higher percentage of 'Pass' targeted marks in the earlier parts of the paper and the higher-grade questions towards the end.

Introduction to the Overall Performance of the Unit

While detailed analysis of specific questions in the paper appears later in this report it should be noted that overall learner performance in this series improved slightly significantly compared to the January 2019 series and performance was marginally better than the Summer 2018 series.

Understanding of the basic subject knowledge and vocabulary was an area identified as one of concern in previous examination series and it is pleasing to see that on the whole progress has been made here. However there are still pockets of learners showing significant gaps in knowledge from the core content of the specification.

Improvement continues to be seen in exam general exam technique, learners generally are aware of the requirements of different command verbs, and as a result their answers are usually structured and presented in an appropriate way. The main issue observed in this area during the series was in response to 'Describe how...' style questions. Many learners failed to show the required technical understanding to adequately provide technically accurate descriptions of how technology work (for example, see Q1f).

It was pleasing to see that in this series there was a continued improvement in the quality of responses in the extended writing questions (6, 8, 10 and 12 marks), with a much greater range of responses seen. With a greater number of learners demonstrating work sufficient to access the middle and upper mark bands.

Centres are reminded that the extended questions are designed to differentiate across Pass, Merit and Distinction, therefore when preparing learners they should be aware that to access the middle and top mark bands, responses should demonstrate good subject knowledge that is applied in context.

While it was clear that some centres have made use of a range of support materials, such as the sample assessment materials, there was still a pocket of learners repeated answers verbatim from sample materials/past papers when presented with similar topics. While these learners were able to demonstrate some understanding and were duly credited, these responses were often not applied to the given scenario and therefore often only demonstrated superficial understanding. Centres are encouraged to work with learners in exploring Computing use in a range of scenarios and adapting responses to suit these scenarios.

Individual Questions

The following section considers each question on the paper, providing examples of learner responses and a brief commentary of why the responses gained the marks they did. This section should be considered with the live external assessment and corresponding mark scheme.

Q1a

Performance on this question was very good, with nearly all learner able to access at least one of the two marks available. The majority of learners were able to provide a linked response and gained both marks. Overall a good understanding of ways in which access levels protect data was shown.

Q1b

Performance on this question was quite poor with many learners not providing sufficient quality of response to gain credit. The main issue with learner responses was interpretation of the question.

Learners were required to look at the given stimulus and provide an explanation of features of the Operating System that could be used to prevent the suspicious activity. Many learners either just identified the suspicious activity or talked about general features of the multi-user operating systems.

While it was clear that learners were aware of what multi-user operating systems are, many were unable to select appropriate parts of that knowledge and apply it in context.

Q1b Example response:

The company's server uses a multi-user operating system.

Explain **two** features of a multi-user operating system that could be used to help prevent this suspicious network activity.

(4)

Feature 1

A validation feature which makes sure you're not logged in on any other device / station before you can log in on another machine.

Feature 2

A feature that automatically logs you out if it detects logging on using the same username but on a different IP address and notifies the IT department.

Lead Examiner Commentary:

Feature 1:

'make sure you're not logged in on any other device/station' (1) – alternative wording for 'filter IP address'

Feature 2:

'automatically logs you out' (1) if it detects logging using the same user name' (1) alternative wording for mark point 1 – point and expansion can be reversed if the response makes sense.

'on a different IP address' - this is enough to gain credit for 'filter IP address' but the mark has already been awarded.

3 marks total

Q1c

Performance on this question was quite disappointing with many learners not able to correctly identify 'public key' and 'Private key' as the correct keys used at points A and B in the diagram. Performance on this question was thematic, in that throughout the paper learners were often able to provide responses of why something may be used and understood general benefits, drawbacks and features. There was often a gap in knowledge when an understanding of technical processes was required. Learners often could not demonstrate sufficient knowledge of how something worked.

Q1d

While many learners were able to gain credit with the majority of those that did gaining full marks, a large percentage of learners did not gain credit here. Many blank responses were seen and many learners were unable to correctly apply the correct process for decoding the message using the Vigènere cipher.

Q1e

The majority of learners were able to provide at least one reason why the Vigènere cipher is more secure than a Caesar cipher, with many gaining two or three marks out of a possible four. Where learner responses were let down was with the clarity of response. While most learners attempted to provide four reasons, it was often difficult to award marks due to the lack of clarity in what was stated. Learners also often repeated previously made points in a slightly different way rather than making distinctly different points.

Centres are encouraged to work on clarity of response and examination technique with learners to help in this regard.

Q1f

Most learners were able to gain one or two marks out of a possible four. This question however is one example, out of a persistent theme in this series, where learners did not appear to have adequate depth of technical knowledge to gain higher marks. While most learners demonstrated that they know that a firewall monitors incoming (and outgoing) traffic many were not able to demonstrate knowledge beyond this. The issues in responses to this question fell broadly in to two categories:

1. Many learners did not have basic technical understating of a firewall's role and many were unable to distinguish it from anti-virus software.
2. A large number of learners were unable to provide technical descriptions of the 'process' of how it works.

Centres are encouraged to work on developing learner understanding of the how technologies carry out their role as well as what they are or why they are used. Centres should refer to the 'Technology update' to identify the scope of which technologies learners should be taught in conjunction with the specification.

Q1f Example response 1:

(f) Charles uses a firewall to protect company data.

Describe how a firewall prevents unauthorised access to stored data from outside the company.

(4)

Firewall monitor inputs and outputs. If a
 firewall detects an unauthorised user it will close
 of access &
 Firewall are more difficult to hack as some
 can adapt

Lead examiner commentary:

Monitor inputs and outputs (1) enough for Mark point 1

'an unauthorised user it will close of access' is not enough for mark point 5 this is a repeat of the question. To gain credit responses must be clearly understand 'unknown'/ suspicious.

1 mark

Q1f Example response 2:

(f) Charles uses a firewall to protect company data.

Describe how a firewall prevents unauthorised access to stored data from outside the company.

(4)

A firewall is a ~~pie~~ piece of software that checks all incoming and outgoing network data. ~~It is~~ ^{can be} setup to prevent certain ~~network traffic~~ incoming network traffic, which is configured by the user. Charles can configure his firewall to prevent ~~is~~ incoming network traffic from certain IP addresses (blacklist) or only allow certain IP addresses (whitelist).

(Total for Question 1 = 20 marks)

Lead examiner commentary:

'checks incoming and outgoing network data' (1) – mark point 1

'prevent certain...which is configured by the user' (1) – enough understanding shown to award mark point 4

'From certain IP addresses' (1) mark point 3

'only allow certain IP addresses' (1) mark point 5 - enough to award as a reverse argument for deny access to unknown

Mark point 5 could have been awarded for having shown knowledge of blacklist and whitelist.

4 marks total

Q2a

The majority of learners were able to gain one mark out of a possible three for this question, typically for identifying that the read/write speed of RAM would help to prevent potential lag.

Again, as with Q1f, many learners lacked the technical understanding of the given technology. Many learner responses often conflated the idea of the amount of data that can be stored in RAM at any one time, and the speed in which data is read/written.

As previously stated in this report, centres are encouraged to explore the technical aspects of technologies in more depth.

Q2b

This question was generally answered well with most learners able to show they understood that overclocking 'increases the clock speed of the CPU' which in turn 'improves the speed at which instructions are processed' which meant any gained a possible two out of three marks.

Q2b example response:

Myra wants to improve the performance of her computer.

She decides to 'overclock' the processor.

(b) Explain what is meant by 'overclocking'.

(3)

Overclocking is what you can do with certain CPUs in which have an OEM clock at say for instance 2.8GHz, but on the box says its turbo OC is 3.2GHz. If you enter the bios, most modern computers will have an option called as 'overclocking' in which you can adjust the clock speed of the processor there. ~~As such as high~~ Overclocking is essentially adjusting the clock speed of your processor so that it performs at a faster rate.

Lead examiner commentary:

'OEM clock at say for instance 2.8GHz but...turbo OC 3.2GHz' (1) – marked against 'to one higher than that intended by the manufacturer'

'adjusting the clock speed' (1)

'performs at a faster rate' (1)

3 marks total

Q2c

This question was well answered with the majority of learners able to provide a response that gained both marks available.

Q2d

The majority of learners were able to demonstrate an understanding of what emulation software is, but most learner responses did not show a depth of understanding beyond 'mimicking the original device'. Again, as with other questions in the paper that required descriptions of how a technical process works, learners were often unable to provide suitably accurate responses to demonstrate sufficient depth to gain higher marks.

Q2d example response 1:

(d) Myra wants to play a game on her computer that is designed to be played on a games console.
Describe how emulation would allow her to play the game. (4)

Emulators are basically a translator which ~~sits~~^{sits} between the game and the hardware. PC processors may not have the correct instruction sets to ~~run~~^{run} a console game, so this translator needs to change it into something your PC processor can execute. PC processors may also run too fast for old console games where physics + ~~graphics~~^{Timing} are tied to framerate, so emulators would slow this down to work. Many emulators allow for forced upscaling and anti-aliasing (along with other post processing) to make the game look better.

Lead examiner commentary:

A translator (1)

Sits between the game and the hardware (1)

'PC processors may also run too fast for console games' (1) enough to award 'adjusts system performance'

3 marks total

Q2d example response 2:

(d) Myra wants to play a game on her computer that is designed to be played on a games console.

Describe how emulation would allow her to play the game.

(4)

Emulation would allow her to play the game as it would convert the game console game to suit her computer. She would have to install the emulator on to her computer and then run it to play the game.

Lead examiner commentary:

'it would convert the game console game to suit her computer' (1) – Just enough to award 'translates instructions'.

1 mark awarded

Q2e

Learner performance on this question was the most disappointing out of all the extended writing questions. Learners performance on the question reflected the trend identified earlier in this report, in which learners struggled to demonstrate sufficient technical understanding.

For this question, many learners were unable to clearly demonstrate understanding of the differences between software and hardware interrupts,

resulting in most learners only procuring a response that accessed mark band 1. Where learners were able to demonstrate greater understanding, they rarely applied it to how interrupts were used in computer games.

Q2e example response:

(e) Analyse the role of interrupts when playing computer games.

You should make use of examples of software and hardware interrupts to support your answer.

(6)

Interrupts would be important as they will allow for high priority instructions to take place over low priority. Hardware interrupts could be used to allow the user to execute different moves. For example if the user was pressing the button to move and then also pressed the button to shoot then an interrupt may be used to allow the user to shoot rather than move.

Software interrupts would be important in getting the game to run smoothly. This is as an interrupt may be used to stop the CPU from executing something unimportant such as the soundtrack and instead focus on rendering in the game so if the character starts moving to a different area.

Without interrupts the user's experience of playing games would be damaged. This is as priority instructions may not be able to be completed in time as another instruction is being executed.

Lead examiner commentary:

Knowledge and understanding

The learner shows an accurate understanding of software and hardware interrupts.

Context

The response uses examples that are accurate and appropriate for the context.

Analysis

There is a clear link between what the interrupts do in a game and their role. The final paragraph considers their importance within the given context.

The response is placed in the top mark band

6 marks awarded.

Q3a

Learner performance on this question was again hampered by lack of understanding of technical processes, or how technology works. While it was clear that many learners knew the purpose of the sip-and-puff system, as evidenced by the majority of learners gaining at least 1 mark here, few learners were able to move beyond that gain three and four marks from their responses.

As in other areas of the examination learners regularly did not expand or develop the points they made and answers were often repetitive.

Q3b

Overall learner performance on the extended writing questions (3b, 3c, 4a and 4b) showed an improvement in quality in comparison to previous series.

While there is still improvement to be made, in relation to how learners apply their understanding to the given scenarios in an effective way, it was clear that centres and learners have worked on developing the way in which they respond to extended questions. There is a clear improvement in the way learners attempt to expand the points they make, as such we saw a greater proportion of learners producing responses that moved from mark band 1 in to mark band 2. The number of mark band three answers also increased but due to lack of application to the scenario, in general this was only a marginal increase.

In this question, in particular, learners covered compatibility in general terms but often did not select appropriate examples with which to link points to the scenario. Learners often either concentrated solely on the customer or the

company (rarely both), which meant the demands of the question were not fully met.

Q 3b Example Response 1:

(b) It is important that the technologies TechAssist provides for customers are compatible with other technologies and systems.

Analyse how compatibility issues might affect TechAssist and its customers.

(6)

Compatibility ensures that devices will work with the current software and hardware within a computer system. If TechAssist does not provide technologies that are compatible with other systems and technologies then the user may not be able to use their products. This will result in a loss of sales and profit for TechAssist. Users may also be forced to upgrade their systems to become compatible with their products adding additional cost to the user. Expertise and knowledge may also be required to make the products compatible with the users system and if the user does not have this then it will drive them away from their technologies and will instead go to competitors.

Lead examiner commentary:

Knowledge and understanding

The learner shows an understanding of small number compatibility issues (e.g. devices not working, set up time and knowledge).

Context

There is some attempt to relate the issues to both the company and the customer, but the points made are quite generic.

Analysis

There is some expansion of the points made but these are quite generic and do not really address issues of specialist technology

The response is placed in mark band 2.

4 marks awarded

Q3c

This question was (along with 4b) the best performing of the extended writing responses. The structure of responses was generally very good with points made being well explained and learners typically showed a good understating of the technologies they discussed.

Again, a large portion of learners were able to move from band 1 to band 2, but a lack of clarity in some responses, in terms of discussion of both hardware and software that could aid users with sight loss, restricted the number of learners accessing the top mark band.

Scope was also a factor in preventing higher attainment in a lot of cases, with most learners focusing on 'text-to-speech' and neglecting her areas that could have been included in their response.

Q 3c Example Response 1:

(c) TechAssist has a number of customers with sight loss.

These customers have each been provided with a smartphone.

Discuss ways in which the hardware and software provided by a smartphone could assist a person with sight loss.

(10)

A built in vibrating component in smartphones provides visually impaired people with an alternative sense of touch. This could be used to find out whether the correct button has been pressed by a unique set of vibrating notes which corresponds with each button on screen.

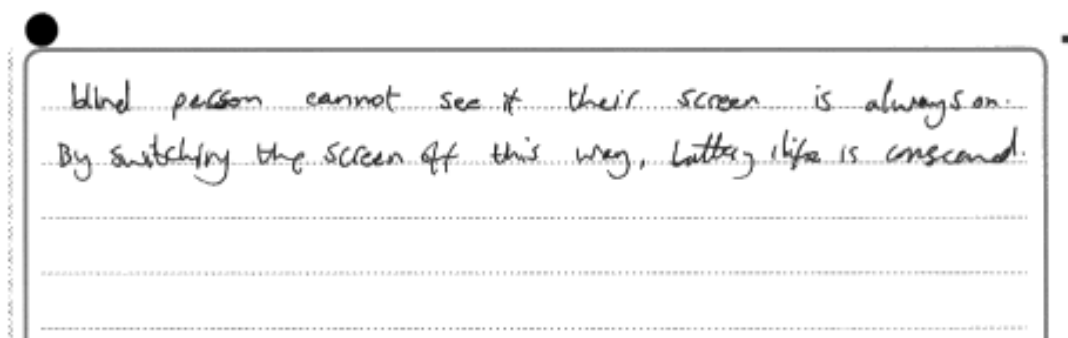
Samsung and Apple devices have a simplified user interface option, so icons appear as large as possible to prevent the user tapping the wrong thing on screen.

A built in speaker in smartphones is very useful, as when a user taps a button on screen it could be used to read out the button pressed by an artificially intelligent voice.

Many smartphone companies also provide voice command options, so instead of having to deal with pressing the wrong button all the time, a smartphone could be given a command such as "call Susan" and the phone automatically performs this task.

Many phones also have fingerprint scanners, so a blind person could lock or unlock their phones using this method as typing a passcode would be difficult without sight.

Other built in features can be really helpful, such as software which maximises battery life by automatically switching off the screen after 2 minutes or 5 minutes of inactivity, as a

**Lead examiner commentary:****Knowledge and understanding**

The learner shows a detailed understanding of hardware and software features (text-speech, voice recognition, accessibility features/enlarged display and haptics).

Context

All the points made are relevant to scenario (a user with limited sight).

Discussion

The learner has explored a range of points. They have expanded on the points made with clear explanations that are supported with links to the scenario.

The response fully meets the descriptor for mark band 3

10 marks awarded

Q4a

Although, learner performance on this question showed improvements relative to questions of similar demand in previous series (generally the mean mark for extended questions was higher in this series), this question did not perform quite as well as other extended question on this paper.

Typically, learners were able to identify utility software that could be used on laptops and describe their use, often the responses were more focused on generic ideas that would apply to a single laptop, rather than considering the specific scenario, in which 100 laptops within a business had to be managed and maintained.

While progress is clearly being made there are still areas of focus that centres should address with learners.

1. The extended questions are an opportunity to demonstrate deeper knowledge. Centres should work with learners to develop ideas and expand on points made. Using examples and reasons where appropriate
2. More successful learners make use of the context provided. To access the higher mark bands knowledge from the specifications core concepts should be considered and applied to the give scenario.

Q4a example response 1:

4 Jared is the lead IT technician for a medium-sized creative media business.

The company employs 100 people. They are each provided with a laptop that they use at the office, at home and when travelling.

(a) Discuss how Jared could use software to help manage and maintain the laptops.

(10)

Jared may use software to assist management and maintenance such as using an antivirus software that would protect and clear any data that may be a threat to the computer system. They may also use software, such as TeamViewer, which allows them to view all connected devices and operate their system. This would speed the process of monitoring the devices a lot faster being time efficient. Jared may also use a spare laptop as a template and compare conditions, status and ^{updates} ~~input~~ are up to date and set a good requirement. Another use of software Jared could use is to have a multi user operating system so that Jared can access the laptops when and where ever he ~~need~~ ^{needs} to, as an admin to ~~help~~ ^{help} ~~he~~ so that if there were any problems there are multiple ways to access it.

Lead examiner commentary:

Knowledge and understanding

The learner shows accurate knowledge of software that can be used to manage and maintain computers (remote access and monitoring, use of a 'standard' template on all laptops). Although this could have been improved through the correct use of 'ghosting' or 'imaging' for the template

Context

The points made are all relevant to the question, although the 'anti-virus' section is less so.

Discussion

There is some attempt at discussion, the learner attempts to explore and expand upon points made.

Using best fit the response is placed in mark band 2.

7 marks awarded

Q4b

Again there was marked improvement in the quality of responses when compared to similar style questions (12 mark evaluate) in previous series, with a higher percentage of mark band 2 and mark band three answers.

Typically learners made good use of the stimulus information to frame and structure their responses.

Learners showed improvements in their ability to present their understanding and start to make reasoned justifications.

To further develop performance on this style of question centres should work with learners to make more 'evaluative' comments. Often, learners' responses here do not vary in style from 'Analyse' or 'Discuss'.

When answering an 'evaluation' question, learners should not just try to consider the positive and/or negative aspects of a given technology or situation, but consider the impact/implications particularly referencing to the given scenario. They should 'evaluate' the appropriateness (i.e. should state if it is a positive or negative thing) and provide a reasoned and supported justification for this opinion in relation to information given in the scenario.

Q4b Example response:

(b) **Figure 3** shows a summary of the company's backup policy.

Backup Policy Summary
System to be backed up: Office network server
Location of system included in backup: Office server room - server rack 1
Type of backup: Full
Time of backup: Every Friday
Storage medium: Solid State Drive
Location of backup: Office server room - server rack 2

Figure 3

Evaluate the effectiveness of the backup policy.

Your evaluation should consider:

- the extent to which the policy would protect the data
- how the policy may impact on the recovery of data
- how the policy could be improved.

(12)

Overall, the backup policy seems to be very effective for a number of reasons.

Firstly, the backup is stored on a solid state drive. This form of drive is renowned for the reliability it possesses, with damage rarely causing much harm to the drive. Storing it on there will improve the likelihood the data will be protected, but also the ease of recovery. These drives ~~possess~~ do not have the issue of fragmentation, meaning data can be accessed and therefore restored much faster.

Secondly, for this type of backup the time of back up is appropriate. Performing a full backup every week ensures the entire network is protected ~~for~~ for the entire week's work, meaning restoring a backup wouldn't cause irrecoverable levels of data.

However, this type of backup is rarely effective. A full backup copies every bit of data on the system, everytime it is performed. This leads to inevitably large amounts of storage being used, which is expensive for an SSD. A better type to use would be incremental, which backs-up only data that has changed - including any new files. This keeps storage space available while also providing a safe backup.

Furthermore, the location of the backup could be an issue. Storing the backup on physically close to the actual system could mean that in the event of a back/power cut, both systems could be compromised instead of just the one. A ~~better~~ better option would be to store the data off-site, perhaps using a premium service such as Microsoft OneDrive.

Lead examiner commentary:

Vocab and arguments

The response uses correct vocabulary to support the arguments made. There is a good understanding of back up demonstrated.

Context

The points made are relevant to the question, the response supported by reference to the stimulus material.

Evaluation

The response makes many evaluative comments considering both positive and negative aspects of the back-up policy.

The improvements suggested are sensible and supported by logical arguments.

There is no conclusion present, however, for this particular question a conclusion is not required to answer this question.

Trait 3 of the mark scheme was applied in with a focus on quality of the evaluation.

The response is placed in mark band 3.

12 marks awarded

Summary

Overall, learners' performance has improved in this series both in terms of level of knowledge and examination preparation.

Based on performance in this examination series, learners are offered the following advice to help continue this improvement:

- Continue to develop understanding of key terminology used in the unit so that you can access the context of the question.
- Improve the quality of technical descriptions, by ensuring you have a good depth of understanding of how technologies work to improve response to 'describe how...' type questions
- Further support on the requirements of command verbs can be found in the specification and in training materials published on the Pearson website.
- Ensure that when providing answers/information your response is applied to the given context.
- For shorter response questions (5 marks or less), make note of the number of marks available this will help you identify the number of points you need to make. For example, a 4 mark 'Explain one...' style question would need to make at least four linked points, three of which expand/exemplify understating of a single point.
- When producing extended writing responses (6 marks or more) ensure you consider a range of points, each of which should be expanded or supported with examples and applied to the given context.
- Use the sample assessment materials, previous papers and sample marked learner work, when preparing for the examination. This will allow you to become more familiar with the style of the paper and the way in which you should respond to different types of questions.
- Make use of the 'Technology Update' which is published on the BTEC website ready for the start of each academic year. This document defines the scope of the technologies that may be used in examinations such as defining the range of 'common protocols', 'Input devices' 'utility software' etc. and should be used in conjunction with the specification when planning and delivering content.



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