

ANALYSIS OF STUDENTS' ERRORS IN SOLVING MATHEMATICS STORY PROBLEMS ON MULTIPLICATION AND DIVISION

ANALISIS JENIS KESALAHAN SISWA DALAM MENYELESAIKAN SOAL CERITA MATEMATIKA MATERI PERKALIAN DAN PEMBAGIAN

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Abstrak

Latar belakang yang menjadi dasar penelitian ini adalah bahwa beberapa siswa kelas IV SDN 2 Dersalam Kudus masih mengalami kesulitan dalam menyelesaikan soal cerita yang berkaitan dengan perkalian dan pembagian. Masalah dalam penelitian ini adalah jenis kesalahan yang dilakukan oleh siswa ketika menyelesaikan soal cerita matematika yang berkaitan dengan perkalian dan pembagian. Tujuan dari penelitian ini adalah untuk menganalisis dan memahami jenis kesalahan yang terjadi pada siswa kelas IV SDN 2 Dersalam Kudus dalam menyelesaikan soal cerita tentang perkalian dan pembagian. Metode yang diterapkan dalam penelitian ini adalah pendekatan kualitatif deskriptif, dengan jenis penelitian dalam bentuk studi kasus. Subjek dalam penelitian ini adalah tiga siswa kelas IV SDN 2 Dersalam Kudus pada Tahun Pelajaran 2024/2025. Data dalam penelitian ini diperoleh melalui observasi, wawancara dengan guru dan siswa, dan dokumentasi. Penelitian ini menunjukkan bahwa siswa yang berkemampuan tinggi tidak melakukan kesalahan dalam menyelesaikan soal cerita, sedangkan siswa yang berkemampuan sedang melakukan satu jenis kesalahan, dan siswa yang berkemampuan rendah mengalami empat jenis kesalahan dalam menyelesaikan soal cerita matematika perkalian dan pembagian, sehingga disimpulkan bahwa terdapat lima jenis kesalahan yang terjadi pada siswa dalam proses penyelesaian soal cerita matematika perkalian dan pembagian.

Abstract

The background that forms the basis of this research is that some fourth-grade students of SDN 2 Dersalam Kudus still have difficulty in solving word problems related to multiplication and division. The problem in this research is the types of errors made by students when solving mathematical word problems related to multiplication and division. The aim of this research is to analyze and understand the types of errors that occur in fourth-grade students of SDN 2 Dersalam Kudus in solving word problems on multiplication and division. The method applied in this research is a descriptive qualitative approach, with the type of research in the form of a case study. The subjects in this research were three fourth-grade students of SDN 2 Dersalam Kudus in the 2024/2025 Academic Year. The data in this research were obtained through observation, interviews with teachers and students, and documentation. This study shows that students with high abilities do not make mistakes in solving story problems, while students with medium abilities make one type of mistake, and students with low abilities experience four types of mistakes in solving multiplication and division math story problems, so it is concluded that there are five types of mistakes that occur in students in the process of solving multiplication and division math story problems.

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INTRODUCTION

Education has a significant influence on a nation's progress. Good education will produce capable successors who will contribute to the nation's progress (Khurriyati et al., 2022). Education

is a crucial factor in developing a person's mindset. This is due to the role of education in changing perspectives when facing problems (Riswari et al., 2023). Education is about providing a comfortable learning environment so that students can actively develop their spiritual strength, self-control, personality, intelligence, high morality, and the skills necessary for themselves and society (Yonanda et al., 2025). Education is a conscious effort to pass on culture from one generation to the next. Education is an effort to create a learning atmosphere and learning process so that students actively develop their potential to possess spiritual and religious strength, self-control, personality, intelligence, noble character, and the skills needed by themselves and society (Rahman et al., 2022).

Mathematics is a crucial subject in many disciplines because it enhances human reasoning skills, enabling them to reason and contribute to solving various problems in everyday life, both in the workplace, technology, and scientific development. Mathematics not only trains students to calculate quickly but also provides conceptual understanding, enabling them to grasp the meaning of abstract mathematical concepts and solve problems in various ways. Mathematics is a set of symbols that convey abstract ideas, so when we want to manipulate these symbols, we must first understand the mathematical concepts (Rohmah et al., 2023). Mathematics is a subject that many students avoid due to its complex formulas and calculations. Learning mathematics requires a high level of understanding and reasoning to solve problems (Nuraeni et al., 2023). According to Fitriadi and Tawakal (2021), mathematics is a field of knowledge that is crucial for human life. Students begin learning mathematics in elementary school and continue through college.

In school learning activities, mathematics is a subject that receives significant attention. This is due to the many challenges faced by students when working on math problems, particularly when solving math word problems. More specifically, information has been obtained that students experience difficulty in solving word problems. Word problems are considered to be more difficult than math problems that directly represent mathematical models (Yosef Fredik, 2021). Word problems in mathematics are questions related to everyday situations and usually use spoken language. Math word problems are less practical than solving math problems that involve numbers or mathematical models directly (Kraeng, 2021). Word problems are among the most difficult to understand (Ermawati & Riswari, 2020). Word problems can help students understand problem-solving (Halimah et al., 2023). The use of math problems presented in story form can provide students with experience in solving math problems and illustrate the relationship of these problems to everyday life (Unaenah et al., 2023).

Word problems are a type of math problem that requires more than just one method to solve, but can also be solved using various techniques and a combination of several methods. The variety of methods available to solve word problems in math problems can actually make it difficult for students (Anturichana et al., 2021). Word problems are typically more challenging to solve than problems that involve only numbers. To solve a word problem, students need to understand the information contained in the problem, recognize the mathematical objects to be worked with, be able to transform them into a mathematical model, and then be able to choose the appropriate arithmetic operation to solve the word problem, until the final stage, namely solving and drawing conclusions (Fitry et al., 2022). Word problems are more complex than number problems because some are non-routine. Students not only need to be skilled at calculating but also must focus on the solution process. On the other hand, elementary school children usually enjoy fun things, such as learning that uses pictures, games, or entertaining things (Meirina et al., 2024).

Observations conducted on October 22, 2024, with the fourth-grade homeroom teacher at SDN 2 Dersalam Kudus revealed that the teacher motivated students to learn, conveyed learning objectives, implemented learning methods and utilized learning resources, fostered student participation and actively engaged in learning, responded positively to students and encouraged them to summarize the material they had learned, conducted reflections with students, and finally, provided appreciation.

Interviews with the fourth-grade homeroom teacher at SDN 2 Dersalam Kudus conducted on October 22, 2024, revealed that most students enjoyed the teacher's presentation of math story problems. However, some students still made mistakes when solving math story problems on multiplication and division. This was due to a lack of understanding of the core questions and the lack of understanding of the steps involved in solving math story problems. The errors students made when solving math story problems can serve as an indicator of their mastery of the material. According to Sari et al (2022), errors that often occur in students include errors in translating or interpreting mathematical symbols and sentences, writing down what is known and translating what is asked in the story problem. To be able to identify the errors made by students, detailed identification is necessary. Teachers must analyze students' errors in working on story problems to identify the location of the error so that teachers can provide appropriate action to avoid the same error (Syafari et al, 2021).

METHOD

The research method used in this study is qualitative, often referred to as descriptive research. Qualitative research is a philosophically grounded research approach used to investigate scientific situations in which the researcher serves as a tool, data collection method, and analysis, focusing more on meaning (Khasanah et al., 2021). Descriptive qualitative research aims to comprehensively and in-depthly describe ongoing social realities. The qualitative descriptive method was chosen because this study relates to ongoing phenomena and is relevant to the current situation (Utami & Hakim, 2023).

This type of research is a case study. According to John W. Creswell in (Assyakurrohim et al., 2022), a case study is known in English as "A Case Study" or "Case Studies." The term "case" comes from the word "case," meaning event, situation, or study. Furthermore, the meaning of "case" itself is diverse and profound. A case study is an investigation of a "bounded system" or "a case/many cases" that is carried out in stages by collecting in-depth data and involving various sources of information in a context. This bounded system is influenced by time and location, while a case can be analyzed through a program, event, activity, or individual. In other words, a case study is research in which researchers investigate a specific phenomenon (case) in a period of time and activity (program, event, process, institution, or social group) and collect data in detail and in depth by applying various methods of information collection over a certain period. According to Ilhami (2024) a case study is an analysis of an event, situation, incident, or what is known as a social phenomenon, with the aim of identifying the nature or characteristics that exist in the case being studied.

The sampling technique used in this study was purposive sampling. Purposive sampling is a non-random sampling method in which researchers select samples based on specific criteria relevant to the research objectives, thus providing solutions to research problems (Peldi et al., 2024). Purposive sampling is a non-random sampling technique in which researchers ensure sampling by identifying specific individuals who meet the research objectives and can provide relevant answers to the case under study (Lenaini, 2021). This study selected subjects by selecting students with high, medium, and low levels of ability in solving multiplication and division mathematical story problems. Three fourth-grade students from SDN 2 Dersalam Kudus with high, medium, and low abilities in solving mathematics problems were selected, namely RAR, FOA, and MHWB.

Table 1. List of Research Subject Names

No	Name	Gender	Test Score	Category	Scoring Criteria
1.	RAR	Man	100	Tall	>75
2.	FOA	Man	70	Currently	55-75
3.	MHWP	Man	50	low	< 55

Sumber : (Isro'il & Supriyanto, 2020)

In qualitative research, various data collection techniques are commonly used. One method used is interviews, which involve direct communication between researchers and participants to gain an in-depth understanding of their experiences, perceptions, and perspectives on the topic being studied. Furthermore, observation is also an important technique in qualitative research, where researchers actively observe and document the behavior, interactions, and contexts occurring in the situation being studied (Ardiansyah et al., 2023). The research instruments prepared for this study included observations, interview sheets for teachers and students, and documentation.

RESULTS AND DISCUSSION

This chapter presents the results of the analysis of the types of student errors in solving mathematical story problems on the subject of multiplication and division of fourth-grade students of SDN 2 Dersalam Kudus. Data collection was carried out by documenting daily test questions and interviews in fourth-grade students of SDN 2 Dersalam Kudus with a total of 3 subjects. The purpose of using interviews and documentation was to determine each type of error in solving mathematical story problems of multiplication and division of students in each subject. The results of the analysis of the types of student errors in solving story problems on the subject of multiplication and division are as follows.

Analysis of Types of Student Errors in Solving Mathematical Story Problems on Multiplication and Division Material

The errors made by students when solving math story problems can be an indication of their mastery of the material. To identify the errors made by students, detailed identification is necessary. Teachers must analyze the errors made by students in solving story problems to identify the location of the errors so that teachers can take appropriate action to avoid similar errors (Syafari et al., 2021).

There are five types of errors made by students, namely (1) Reading Error, where one subject cannot explain some of the terms in the problem; (2) Comprehension Error, where one subject cannot understand what is known in the problem; (3) Transformation Error, where one subject cannot transform the problem so that the multiplication and division operations used are inappropriate; (4) Process Skill Error, where one subject uses multiplication and division operations incorrectly but the results are correct, and another subject uses the wrong steps to solve the problem. and (5) there were more subjects who did not answer correctly the final result of the story questions (Sartika et al, 2024).

Table 2. Types of Errors and Indicators

No	Type of Error	Indicator
1.	Reading error	Characterized by students not being able to read fluently
2.	Misunderstanding the problem	Students are unable to understand the meaning of the math story problem.
3.	Arithmetic operation transformation error	Students cannot determine the multiplication or division operations correctly to answer math story problems.
4.	Process skills errors	Students can determine the arithmetic operations of multiplication or division correctly, but in the process of calculating multiplication or division they make mistakes.
5.	The error is not being able to answer correctly the final result of the story problem.	Students can carry out the calculation process correctly, but the final result contains errors.

In this study, there were 3 students as subjects to analyze the types of errors in solving mathematical story problems, namely subjects RAR, FOA, MHWB. The following are the results of the study related to the analysis of student errors in solving mathematical story problems on multiplication and division material.

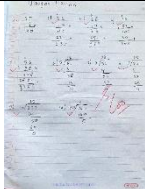
a. Results of the RAR Subject Analysis of Students in the High Ability Category

Before describing the interview results, it is important to understand that individual students' perceptions and experiences with mathematics can provide deeper insight into the types of errors students make when solving math word problems. In this case, the researcher conducted an in-depth interview with subject RAR to explore the types of errors students make when solving math word problems. Based on the interview results, subject RAR stated that:

"I really like math. I always pay attention when the teacher explains math lessons. I like math word problems. I can solve math word problems correctly. I can calculate mixed operations of multiplication and division, and I have also memorized multiplication and division up to 100." (Source: RAR Interview, June 16, 2025).

In accordance with RAR's statement, the subject enjoys the teaching and learning process, always pays attention when the teacher explains the math material. The subject also stated that he enjoys math word problems, and is able to solve math word problems correctly. To better understand the types of errors students make when solving math word problems in multiplication and division, the results of the student's daily tests are as follows.

Table 3. Results of RAR Subject Analysis

Questions and Results of Daily Tests on Multiplication and Division Story Questions for Grade IV	Types of Errors in Solving Multiplication and Division Story Problems
	Judging from the results of the RAR subject's test, it shows that he did not make any errors in solving the multiplication and division math story problems. It appears that the RAR subject obtained a perfect score.

Based on the results of daily tests and interviews, it was obtained that the RAR subjects were able to read and understand the meaning of the mathematical story coal of multiplication and division, the RAR subjects were able to work on mathematical story problems correctly, the RAR subjects were also able to determine and use formulas in solving mathematical story problems of

multiplication and division correctly and the RAR subjects were also able to calculate the final results in solving mathematical story problems of multiplication and division correctly.

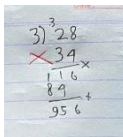
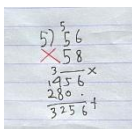
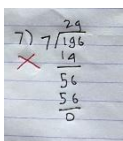
b. Results of FOA Subject Analysis for Students in the Medium Ability Category

In the mathematics learning process in class, each student has different experiences and perceptions of the material presented. In this case, the researcher conducted an in-depth interview with subject FOA to explore the types of errors students make when solving math word problems. Based on the interview results, subject FOA stated that:

"I quite like math lessons. I always pay attention when the teacher explains math lessons. I quite like math word problems. I am quite capable of solving math word problems correctly. I am quite capable of calculating mixed operations of multiplication and division, but I sometimes forget multiplication and division up to 100." (Source: FOA Interview, June 16, 2025).

In accordance with FOA's statement, during the mathematics learning process, the subject felt quite happy with the mathematics learning, always paid attention when the teacher explained the material. The subject also stated that he quite likes math word problems, and is quite capable of solving math word problems correctly. To further understand the types of errors students make when solving math word problems in multiplication and division, the results of the students' daily tests are as follows.

Table 4. Results of FOA Subject Analysis

Questions and Results of Daily Tests on Multiplication and Division Story Questions for Grade IV	Types of Errors in Solving Multiplication and Division Story Problems
3. Naila membawa 28 kantong jambu Kristal. Setiap kantong 34 jambu Kristal. Jadi banyaknya jambu Kristal yang dibawa Naila secara keseluruhan adalah 	Process skills errors It can be seen from the results of subject MHWB's answers that in the process of calculating multiplication there was an error, it was proven that $8 \times 4 = 32$, but MHWB answered $8 \times 4 = 36$.
5. Pak Kevin mempunyai toko yang besar. Di sana terdapat 56 tali tambang. Jika setiap tali tambang mempunyai panjang 38 meter. Maka panjang seluruh tali jika digabungkan adalah. 	Process skills errors It can be seen from the results of the FOA subject's answers that there was an error in the process of calculating multiplication, it was proven that $6 \times 8 = 48$, but in the repeat results the FOA answered $6 \times 8 = 56$.
7. Bu Tutik mendapat pesanan untuk membuat 196 seragam olahraga. Jika setiap hari ia bisa membuat 7 buah seragam olahraga. Maka Bu Tutik bisa menyelesaikan pesanan tersebut dengan waktu berapa hari? 	Process skills errors It can be seen from the results of the FOA subject's answers that there was an error in the process of calculating the division, as evidenced by the fact that $56 : 7 = 8$, but in the repeat results the FOA answered $56 : 7 = 9$.

Based on the results of daily tests and interviews, it was concluded that the FOA subject did not experience errors in reading and understanding multiplication and division mathematical story problems, the FOA subject also did not experience errors in applying multiplication or division operations in solving mathematical story problems correctly. However, the FOA subject experienced process skill errors in solving mathematical story problems, this was because the FOA sometimes still forgot multiplication and division up to 100, as evidenced by the results of the interview that the FOA subject said that he still often forgot multiplication and division up to 100.

c. Results of the Analysis of MHWB Subjects of Students in the Low Ability Category

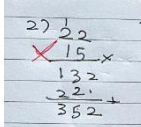
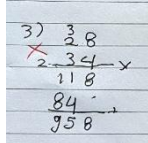
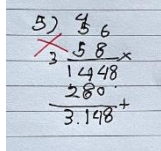
In the mathematics learning process in the classroom, it is crucial to understand that individual students' perceptions and experiences with mathematics can provide deeper insight into the types of

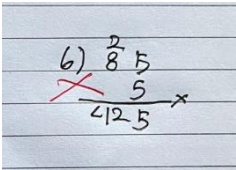
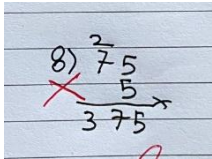
errors they make when solving mathematical word problems. In this context, the researcher conducted an in-depth interview with subject MHWB to explore the types of errors students make when solving mathematical word problems. Based on the interview, subject MHWB stated that:

"I don't like mathematics. I rarely pay attention when the teacher explains mathematics lessons. I don't like mathematical word problems because they are difficult to understand. I also have difficulty reading mathematical word problems because I'm not yet fluent in reading. I can't solve mathematical word problems correctly. I can't calculate mixed operations (multiplication and division), and I haven't memorized multiplication and division up to 100." (Source: Interview with MHWB, June 16, 2025).

In accordance with the statement of MHWB in the process of teaching and learning mathematics, the subject felt unhappy in learning mathematics, rarely paid attention to the teacher when the teacher explained the mathematics material, the subject also said that he did not like mathematics story problems because they were difficult to understand, the subject also had difficulty reading mathematics story problems because the subject was not yet fluent in reading, was unable to solve mathematics story problems correctly. To better understand the types of student errors in solving mathematics story problems on multiplication and division materials, it can be seen through the results of students' daily tests as follows.

Table 5. Results of MHWB Subject Analysis

Questions and Results of Daily Tests on Multiplication and Division Story Questions for Grade IV	Types of Errors in Solving Multiplication and Division Story Problems
2. Andi membeli 22 bungkus permen. Setiap bungkus berisi 15 potong permen. Jadi banyak permen yang dibeli Andi adalah 	Process Skill Errors As seen from the results of the MHWB subject's answers in the process of calculating multiplication, there was an error, as evidenced by the fact that $2 \times 5 = 10$, but on the test results, MHWB answered $2 \times 5 = 12$.
3. Naila membawa 28 kantong jambu Kristal. Setiap kantong 34 jambu Kristal. Jadi banyaknya jambu Kristal yang dibawa Naila secara keseluruhan adalah 	Process skill errors It can be seen from the results of the MHWB subject's answers that there was an error in the process of calculating multiplication, as evidenced by the fact that $8 \times 4 = 32$, but in the test results, MHWB answered $8 \times 4 = 38$.
5. Pak Kevin mempunyai toko yang besar. Disana terdapat 56 tali tambang. Jika setiap tali tambang mempunyai panjang 58 meter. Maka panjang seluruh tali jika digabungkan adalah. 	Error not being able to answer the final result correctly It can be seen from the results of the MHWB subject's answer in the process of calculating multiplication that it was correct, but an error occurred at the final stage in the process of calculating multiplication, namely in the $4 + 8 = 11$ section, it should be $4 + 8 = 12$. This makes the final result of the MHWB subject's answer wrong.
6. Sebuah pita yang panjangnya 85 m dipotong menjadi beberapa bagian. Setiap bagian memiliki panjang 5 m. Berapa potongan pita yang dihasilkan?	Arithmetic operation transformation error It can be seen from the answer results that subject MHWB used the wrong arithmetic operation, which in question number 6 should have used the division arithmetic operation, but subject

	MHWP used the multiplication arithmetic operation. • Misunderstanding of the problem It can be seen from the results of the daily test that the MHWP subjects made mistakes in using arithmetic operations. This is because the MHWP subjects were not yet able to understand the meaning of the story questions.
8. Ibu membeli 75 buah apel untuk diberikan kepada 5 orang anaknya sama banyak. Berapakah buah apel yang didapat oleh masing-masing anak? 	• Arithmetic operation transformation error It can be seen from the answer results that subject MHWP used the wrong arithmetic operation, which in question number 8 should have used the division arithmetic operation, but subject MHWP used the multiplication arithmetic operation. • Misunderstanding the problem It can be seen from the results of the daily test that the MHWP subjects made mistakes in using arithmetic operations. This is because the MHWP subjects were not yet able to understand the meaning of the story questions.

From the results of daily tests and interviews, it was concluded that the MHWP subjects still made many mistakes in solving multiplication and division mathematical story problems. The types of mistakes made by the MHWP subjects in solving multiplication and division mathematical story problems were (1) types of errors in reading, from the results of the MHWP subjects' interviews they said that they were still not fluent in reading, (2) errors in understanding story problems as seen from the results of the math story problem tests that the MHWP subjects could not understand the multiplication and division mathematical story problems. This was also added from the results of the interviews that the MHWP subjects experienced difficulties in reading. (3) types of errors in transforming multiplication or division arithmetic operations, seen from the results of the test answers on numbers 6 and 8, they should have used division arithmetic operations, but the MHWP subjects used multiplication arithmetic operations. (4) process skill errors. It can be seen from the results of the answers to the math story problems that the MHWP subjects experienced errors in the process of solving math story problems, the MHWP subjects experienced errors in calculating multiplication and division. This error occurred in questions 2 and 3 (5), resulting in the inability to correctly answer the final result of the story problem. It can be seen from the answers of the MHWP subjects that they also experienced errors in the final calculation results. This error occurred in question number 5.

From the results of observations and interviews with RAR, FOA, and MHWP students, the errors made by students were found in each type of error on each question item. In this study, only two subjects experienced errors in solving multiplication and division math story problems, namely FOA and MHWP students. One subject was categorized as having a very good understanding of solving multiplication and division math story problems, namely the RAR student. This was evidenced by the results of each student's test. The FOA student experienced one type of error, namely a process skill error in calculating multiplication or division. Errors in the calculation process are a type of error experienced by students after they are able to determine the correct mathematical operation, but are unable to carry out the calculation correctly (Maryono & Budiono, 2020). Meanwhile, MHWP students experienced five types of errors in solving multiplication and division math story problems, namely.

Misreading of multiplication and division math story problems. According to (Maryono & Budiono, 2020), reading errors occur when students fail to identify certain keywords or symbols in the problem, preventing them from proceeding to the next step in solving the problem. Reading errors can be identified through in-depth interviews with research subjects. This type of reading error is the least common error compared to other errors, as fourth-grade students' reading ability is generally adequate, although their understanding of the problem content may not be accurate.

Misunderstanding the Problem. According to (Putri & Musdi, 2021), misunderstanding the problem is a type of error students make when they can read the problem well but do not understand its meaning. This failure to understand the problem can lead to other errors, namely errors in transforming arithmetic operations. This is in line with the opinion of (Maryono & Budiono, 2020) that without understanding the problem, students are unlikely to be able to complete the transformation steps in solving story problems. Arithmetic operation transformation errors significantly impact student answers, because even if students know how to calculate correctly, if the operation used is incorrect, the result will still be incorrect.

Process skill errors in calculating multiplication or division. Calculation process errors are a type of error made when students can correctly determine the arithmetic operation but cannot calculate it correctly (Maryono & Budiono, 2020). Finally, errors in not being able to correctly answer the final result are errors that occur when students are able to correctly perform the calculation process but cannot correctly write the final result (Tamu, Nuhamara, & Nggaba, 2022). In this study, errors in writing the final answer were the lowest category of errors because they were only experienced by MHWB students and occurred on only one question.

CONCLUSION AND RECOMMENDATION

The results of the research and discussion above conclude that students in the high ability category did not experience errors in solving multiplication and division mathematical story problems, while students in the medium ability category experienced one type of error in solving mathematical story problems, namely the type of error in the process of calculating multiplication and division. And for students in the low ability category, they experienced four types of errors in solving mathematical story problems, namely the type of reading error, the type of error in understanding the story problem, the type of error in transforming arithmetic operations, and the type of error in calculating the final result. So from this study, there are five types of errors made by students when solving mathematical story problems regarding multiplication and division material.

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