higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)

SYSTEM ANALYSIS AND DESIGN
NQF LEVEL 3

(10041003)

8 December 2020 (Y-paper)
13:00–16:00

This question paper consists of 14 pages.

461Q1N2008

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TIME: 3 HOURS
MARKS: 200

INSTRUCTIONS AND INFORMATION

1. Answer all the questions.
2. Read all the questions carefully.
3. Number the answers according to the numbering system used in this question paper.
4. Start each section on a new page.
5. Write neatly and legibly.

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SECTION A

QUESTION 1

1.1 Various options are given as possible answers to the following questions. Choose the answer and write only the letter (A–D) next to the question number (1.1.1–1.1.10) in the ANSWER BOOK.

1.1.1 Which one of the following statements about the spiral software development model is correct?

A Some specifications are written before any code.
B Most specifications are written before any code.
C Some implementation must take place before any tests are conducted.
D Most tests are conducted before implementation takes place.

1.1.2 A ... is used by project managers to consider expected expenses against the benefits to be gained.

A flowchart
B cost-benefit analysis
C schedule
D cost structure

1.1.3 A ... is a tool specifying the tasks to be done, who must do them and when they must be done.

A schedule
B report
C system
D stakeholder

1.1.4 A ... outlines what the project manager should do when a risk becomes a reality.

A contingency plan
B quality management plan
C research plan
D communication plan

1.1.5 A … is a clearly identifiable point in a project that summarises the completion of a related or important set of tasks.

A risk
B milestone
C network
D budget

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1.1.6 … is the study of the health and comfort factors associated with users who spend a lot of time working with computers at a desk.

A Economics
B Physical space
C Ergonomics
D Power supply

1.1.7 … are unseen forces at work between team members.

A Team dynamics
B Team goals
C Roles
D Responsibilities

1.1.8 Leasing or purchasing is an example of … computer technology.

A rental
B upgrading
C purchase
D financing

1.1.9 Process of collecting and manipulating large volumes of data into understandable information:

A Data validation
B Data reservation
C Data processing
D Data destination

1.1.10 Process ensuring data is useful and correct:

A Data validation
B Data reservation
C Data processing
D Data destination

(10 × 1) (10)

1.2 Indicate whether the following statements are TRUE or FALSE by writing only 'True' or 'False' next to the question number (1.2.1–1.2.10) in the ANSWER BOOK.

1.2.1 It is often better that the prototype exceeds the final product so that the users can see all the possible options the system could have.

1.2.2 Maintenance is one of the stages of software development.

1.2.3 While there are many models for the software development life cycle, the staged delivery model is the best.

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1.2.4 Change of scope is a defined process for authorising and documenting changes in the scope of a project.

1.2.5 Assumptions are factors in project planning that are true, real or certain without proof or demonstration.

1.2.6 A deliverable is an item produced as a result of project activities.

1.2.7 An event trigger is the actual point at which a system responds to an event by doing something.

1.2.8 A risk management plan is prepared by a project manager to identify risks and to create response plans to minimise the effect of risks.

1.2.9 Tangible support such as working staff, material and equipment in the performance of a project are called resources.

1.2.10 Problems in the early stages of a project can be identified through planning.

(10 × 1) (10)

1.3 Write down each of the following acronyms in full:

1.3.1 TOC

1.3.2 BPA

1.3.3 AIS

1.3.4 BPR

1.3.5 ERD

1.3.6 SME

1.3.7 JAD

1.3.8 GSM

1.3.9 SWOT

1.3.10 BPI

(10 × 1) (10)

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1.4 Choose a term from COLUMN B that matches a description in COLUMN A. Write only the letter (A–O) next to the question number (1.4.1–1.4.10) in the ANSWER BOOK.

COLUMN A		COLUMN B	
1.4.1	Deliverable-orientated hierarchical decomposition of work by team to accomplish project objectives and required deliverables	A	peripheral
1.4.2	Organising and storing data to suit a specific purpose so that it can be accessed and manipulated in useful ways	B	scheduling
1.4.3	Any product, service or result that must be completed to finish a project	C	RFQ
1.4.4	Is a field in a table which uniquely identifies each row/record in a database table	D	work-breakdown structure
1.4.5	Device attached to host computer	E	software vendor
1.4.6	Standard business process purposes to invite suppliers to a bidding process on specific products or services	F	information system development process
1.4.7	Action of transforming input data into useful output	G	deliverable
1.4.8	Entire process consisting of all activities required to build, launch, and maintain information system	H	primary key
1.4.9	Software company developing and selling proprietary software	I	iterative development
1.4.10	Allocating development resources to many different tasks executed at a given moment and deciding which tasks will completed at a given time	J	processing
		K	data structure
		L	RAD
		M	CAT
		N	JAD
		O	system development life cycle

(10 × 1) (10)
[40]

TOTAL SECTION A: 40

SECTION B

QUESTION 2

2.1 Define each of the following terms:

2.1.1 Data processing

2.1.2 Enterprise resource planning

(2 × 2) (4)

2.2 Name THREE data processing operations. (3)

2.3 Give ONE term for the description below.

A computer security system preventing unauthorised users from gaining access to a computer network. (1)

[8]

QUESTION 3

3.1 There are THREE levels of decision making in an organisation.

Complete the TABLE by choosing a word from the list below. Write only the word next to the question number (3.1.1–3.1.6) in the ANSWER BOOK.

long term; tactical; operational; medium term; strategical; short term

LEVEL OF DECISION MAKING	SCOPE/DURATION OF DECISION	TYPE OF DECISION
Top-level management	3.1.1	3.1.2
Middle-level management	3.1.3	3.1.4
Lower-level management	3.1.5	3.1.6

(6 × 1) (6)

3.2 Explain the roles of each of the following persons as part of the Information System department of an organisation.

3.2.1 Systems analyst

3.2.2 Chief information officer (2 × 2) (4)

3.3 State FOUR factors influencing the complexity of information system planning. (4)

[14]

QUESTION 4

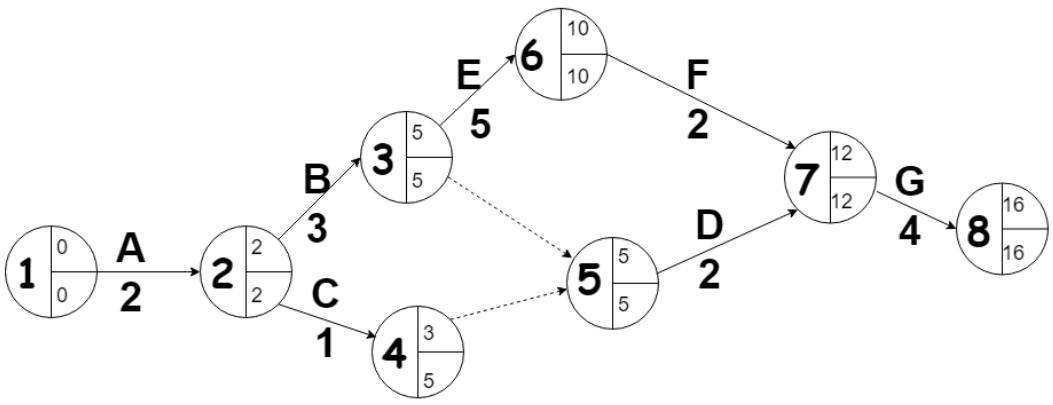
4.1 Draw an organisational chart (organogram) using the information below.

A salesperson reports to the sales manager, who reports to the marketing divisional manager, who in turn reports to the chief executive officer (CEO). A production employee reports to the production manager, who reports to the production divisional manager, who in turn reports to the CEO. The quality assurance (QA) department, however, reports directly to the production manager, who reports to the production divisional manager, who in turn reports to the CEO. The HR department reports to the finance divisional manager, who reports to the CEO.

(8)

4.2 Study the following table and accompanying PERT diagram for a project undertaken by the QUICK FEET FOOTBAL CLUB association and answer the questions.

TASK	PREVIOUS TASK	EXPECTED DURATION
A	–	2
B	A	3
C	A	1
D	B, C	2
E	B	5
F	E	2
G	D, F	4



4.2.1 Expand the acronym PERT. (1)

4.2.2 Explain why a company would use PERT. (2)

4.2.3 Which task has the longest duration? (1)

4.2.4 Which tasks precede D? (1)

4.2.5 List all the possible project paths and their duration. (3 × 2) (6)

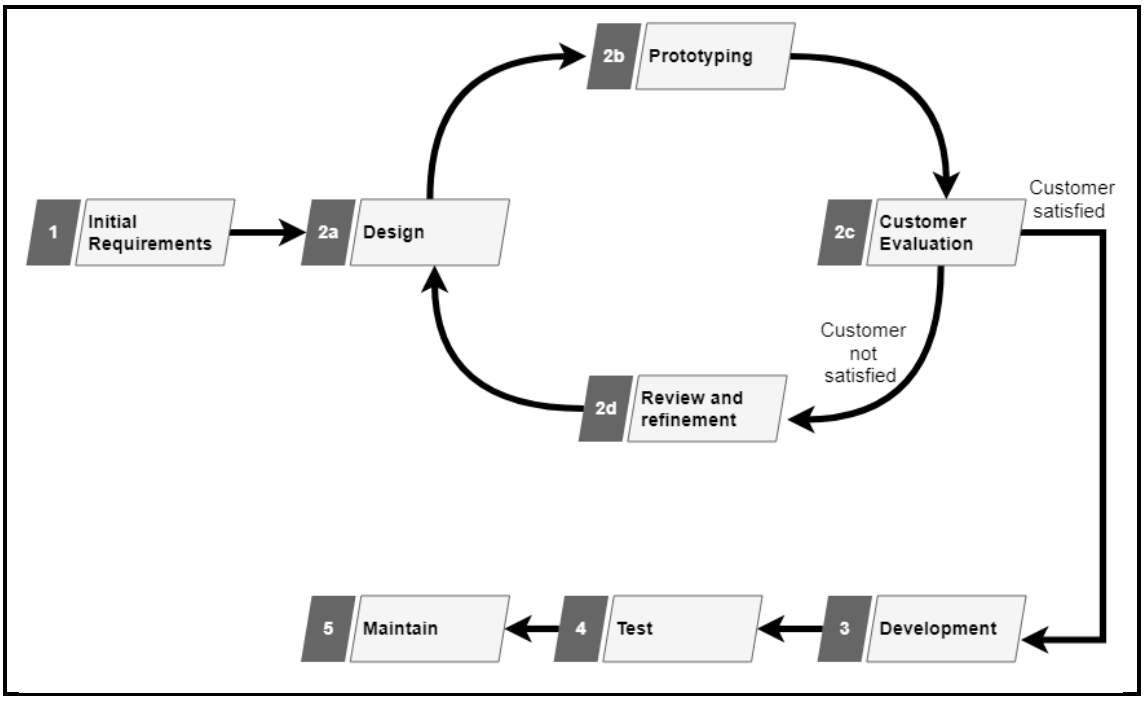
4.2.6 Indicate the critical path. (1)

[20]

QUESTION 5

5.1 List the FIVE phases of the waterfall model. (5)

5.2 The DIAGRAM below depicts the typical processes involved in the prototyping process.



DIAGRAM

5.2.1 Define *prototyping.* (2)

5.2.2 Expand the acronym SDLC. (1)

5.2.3 Explain the statement: '*Prototyping is an iterative process*'. (3)

5.2.4 Which ONE of the processes in the DIAGRAM involves a decision? (1)

5.2.5 Substantiate the answer QUESTION 5.2.4. (1)

5.2.6 State FOUR advantages of the prototyping methodology. (4)

5.3 Differentiate between a *vision statement* and a *mission statement*. (4)

[21]

QUESTION 6

6.1 A feasibility study can be considered as preliminary investigation that helps management to decide about whether a system should be feasible for development or not.

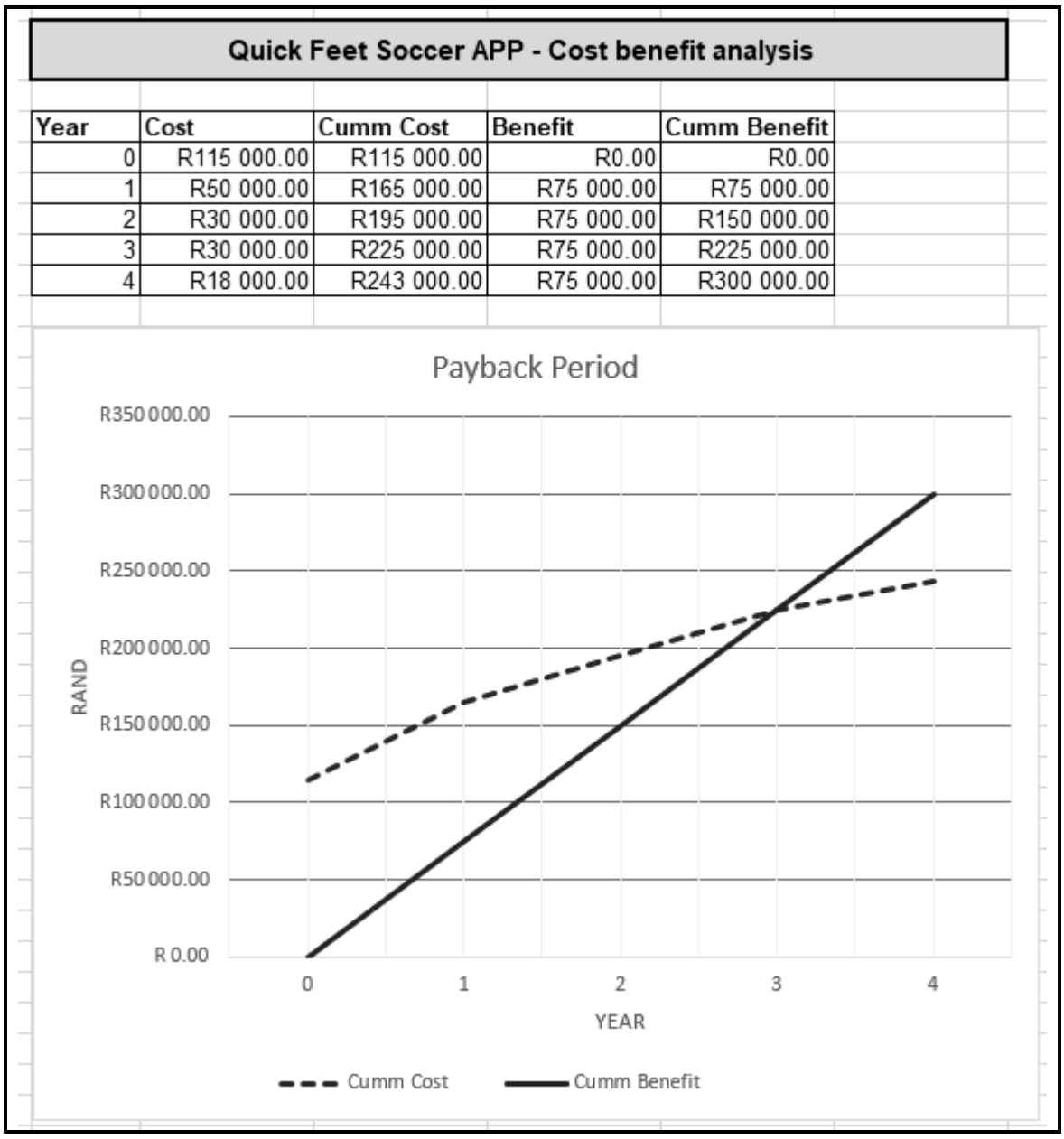
Differentiate between any THREE types of feasibility studies applicable to information system development. (3 × 2) (6)

6.2 State FOUR steps guiding the process to identify a set of candidate solutions. (4)

6.3 The QUICK FEET soccer club wants to develop a mobile application. The spreadsheet below comprising of a table and a graph shows the anticipated annual costs and benefits as well as the cumulative costs and benefits. Also included is an analysis of the benefits and costs incorporating a 12% discount factor. The payback period is indicated by a graph.

Quick Feet Soccer APP - Cost benefit analysis

Year	Cost	Cumm Cost	Benefit	Cumm Benefit
0	R115 000.00	R115 000.00	R0.00	R0.00
1	R50 000.00	R165 000.00	R75 000.00	R75 000.00
2	R30 000.00	R195 000.00	R75 000.00	R150 000.00
3	R30 000.00	R225 000.00	R75 000.00	R225 000.00
4	R18 000.00	R243 000.00	R75 000.00	R300 000.00



6.3.1 Use the data in the TABLE and calculate the return on investment (ROI). Express the answer as a full percentage. (4)

6.3.2 Use the graph and determine the payback period. Write the answer **in months**. (2)

6.3.3 The TABLE below presents a cost benefit analysis of the same project but with a discount factor of 12 applied to the cumulative benefits and costs.

YEAR	0	1	2	3	4
Benefits	R0.00	R75 000.00	R75 000.00	R75 000.00	R75 000.00
12% Discount Factor	1.00	0.89	0.80	0.71	0.64
Present Value	**R0.00**	**R66 975.00**	**R59 775.00**	**R53 400.00**	**R47 700.00**
Costs	115 000.00	50 000.00	30 000.00	30 000.00	18 000.00
12% Discount Factor	1.00	0.89	0.80	0.71	0.64
Present Value	**R115 000.00**	**R44 650.00**	**R23 910.00**	**R21 360.00**	**R11 448.00**

Use the given data and calculate the NPV. (3)
[19]

QUESTION 7

7.1 Define each of the following terms:

7.1.1 Entity

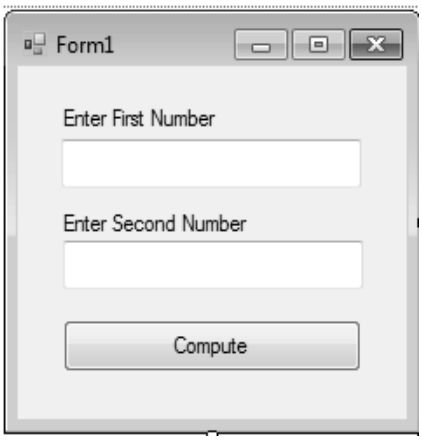
7.1.2 Attribute

(2 × 2) (4)

7.2 The WE FIND SPONSORS (WFS) Administration system assists soccer players to find sponsors for trips and gear. A player provides his details and the details of his club while various potential sponsors provide their company profile information as well. The system then matches potential sponsors to players and the sponsors are provided with a list of potential players they could sponsor. If a sponsor is found for a player a sponsor tag is generated and assigned to the player who is notified of the sponsor.

Draw a context diagram for the scenario above. Indicate all applicable data flows and external entities. (9)

7.3 Below is a simple program that accepts two integer numbers as inputs. The program then displays the sum of those two numbers in a message box when the Compute button is clicked.



PROGRAM

Construct the flow chart diagram for the program above. (6)

7.4 The QUICK FEET club is a soccer association operating in various districts of Tshwane including Ga-Rankuwa, Soshanguve, Mabopane and Atteridgeville.

Analyse the description and the TABLE below and draw an ERD (using Crow's foot notation) that displays the connectivity and relationship between each entity.

Each district in Tshwane sponsors one team to represent that district. Each team comprises a maximum of ten players and a minimum of seven players. Each team also has two coaches (an offensive and a defensive coach).

ENTITY	RELATIONSHIP	CONNECTIVITY	ENTITY
DISCTRICT	sponsors	1:1	TEAM
TEAM	comprises	1:M	PLAYER
TEAM	has	1:M	COACH

(10)
[29]

QUESTION 8

8.1 Define each of the following terms:

8.1.1 Modelling

8.1.2 Entity relationship modelling

8.1.3 External events

(3 × 2) (6)

8.2 Describe THREE different types of events related to event decomposition. (3 × 2) (6)

8.3 List FOUR fundamental benefits of a conceptual model. (4)
[16]

QUESTION 9

9.1 Define each of the following terms:

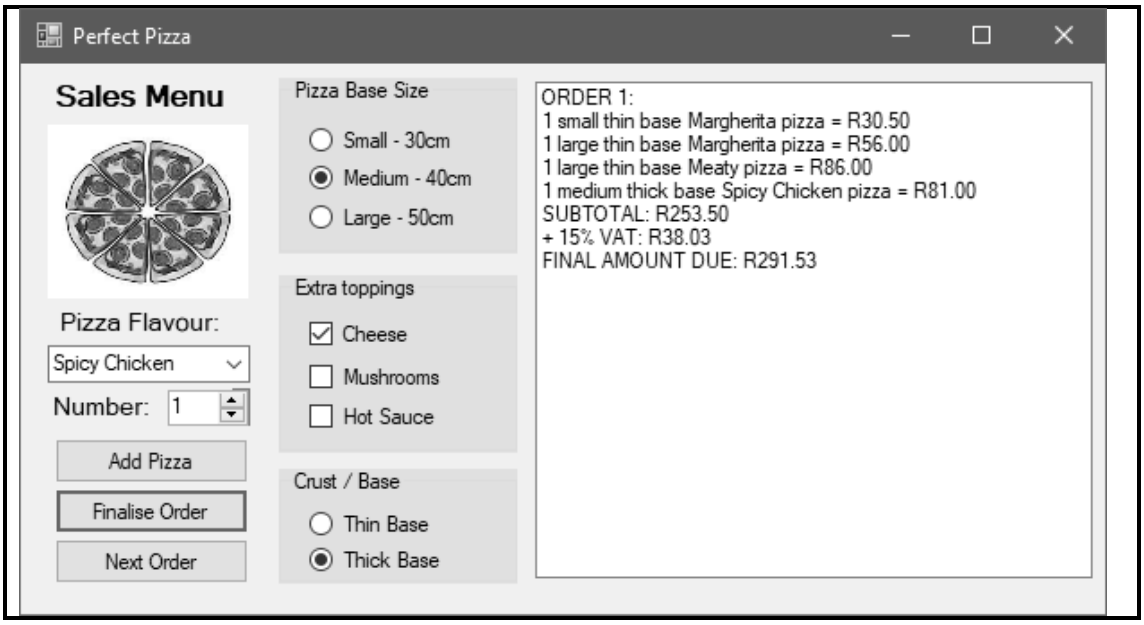
9.1.1 Data validation

9.1.2 Relational database

9.1.3 Foreign key

(3 × 2) (6)

9.2 Study the following GUI designed to assist the Perfect Pizza restaurant with orders.



9.2.1 How many checkboxes appear on the form? (1)

9.2.2 How many group boxes appear on the form? (1)

9.2.3 Differentiate between the use of *checkboxes* and *radio buttons* implemented as part of the given GUI. (2 + 2) (4)

9.2.4 Which component is most probably used to display the details regarding the order? (1)

9.2.5 State the purpose of the combo box as part of the application. (1)

9.2.6 Name the type of component used to supply the number of pizzas. (1)

9.2.7 Which other component could have been used in the design to allow the user to enter the number of pizzas? (1)

9.2.8 List any FIVE guidelines to which developers should adhere to when designing a UI. (5) **[21]**

QUESTION 10

10.1 List FIVE steps used to acquire new computer technology. (5)

10.2 State TWO factors that influence the decision about a financing method. (2)

10.3 Name FIVE important requirements for a main computer room. (5) **[12]**

TOTAL SECTION B: 160
GRAND TOTAL: 200

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