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TOTAL MARKS

NATIONAL SENIOR CERTIFICATE EXAMINATION
NOVEMBER 2024

INFORMATION TECHNOLOGY: PAPER II

EXAMINATION NUMBER

Time: 3 hours 150 marks

PLEASE READ THE FOLLOWING INSTRUCTIONS CAREFULLY

1. This question paper consists of 30 pages. Please check that your question paper is complete.
2. Read the questions carefully and make sure that you answer all parts of all the questions.
3. **Answer ALL the questions on the question paper and hand this in at the end of the examination. Remember to write your examination number in the space provided.**
4. Show all working where applicable.
5. A non-programmable calculator may be used.
6. It is in your own interest to write legibly and to present your work neatly.
7. Two blank pages (pages 29 and 30) are included at the end of the paper. If you run out of space for a question, use these pages. Clearly indicate the number of your answer should you use this extra space.

FOR MARKER'S USE ONLY

Question	1	2	3	4	5	6	7	8	**Total**
Marks	**10**	**10**	**25**	**10**	**30**	**15**	**16**	**34**	**150**
Marked									
Moderated									
Re-mark									

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SECTION A SHORT QUESTIONS

QUESTION 1 DEFINITIONS

Give the most appropriate term for each of the following expressions:

1.1 The practice of increasing the clock speed of a computer component, typically the central processing unit (CPU), beyond its factory settings.

_____

(1)

1.2 A design principle that subdivides a system into smaller parts that can be independently modified, replaced, upgraded or exchanged.

_____

(1)

1.3 A memory management technique that utilises an area on permanent storage when the system RAM is full.

_____

(1)

1.4 The electrical path along which data is transmitted inside any digital electronic device.

_____

(1)

1.5 A hardware component made of quartz crystal that regulates the internal components of the computer by issuing a high-frequency signal.

_____

(1)

1.6 A data file issued by a Certificate Authority to an organisation to prove the identity of the organisation.

_____

(1)

1.7 A signal to the processor via hardware or software indicating an event that needs attention.

_____

(1)

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1.8 High speed memory that is used to store recently used data and instructions.

_____

(1)

1.9 A programming technique that allows the creation of several methods/procedures with the same name, which differ from each other in terms of the list of parameters.

_____

(1)

1.10 A more modern replacement for BIOS that supports larger hard drives, faster boot times, and more security features.

_____

(1)

10 marks

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SECTION B SYSTEM TECHNOLOGIES

QUESTION 2 THEORY

For each of the terms in Column A below, you should select the **most correct** definition in Column C, matching the letter to the question number. You should merely write down the appropriate letter in Column B. An example is shown as Question 2.0, using 'Z' as the correct answer.

Column A		Column B	Column C	
2.0		Z		
2.1	Latency		A	A portion of the CPU that performs the mathematical and logical operations.
2.2	Registers		B	Low-level software found in a ROM chip.
2.3	Kernel		C	Translates the entire program into machine code before the program runs.
2.4	Mesh Topology		D	Using more than one hard disk as a security solution.
2.5	Mutator Method		E	Part of the Internet intentionally hidden from search engines and uses masked IP addresses.
2.6	Deep Web		F	A protocol that allows users to share, copy, move, and edit files through a web server.
2.7	BIOS		G	This is the act of creating an object from the class.
2.8	ALU		H	A type of networking where all nodes cooperate to distribute data amongst each other.
2.9	RAID		I	The time taken for a component to respond.
2.10	WebDav		J	Part of the Internet made up of non-indexed pages and cannot be accessed by search engines.
			K	A method which modifies the value of an instance variable.
			L	A type of temporary storage built directly into the central processing unit of a computer.
			M	The essential foundation of a computer's operating system.
			N	A common back up facility.

[10]

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SCENARIO

Consider the following scenario when answering the rest of the examination paper unless otherwise stated or the questions are of a general nature.

*A group of Matric students have decided to open their own Hair Studio named **pHab!** directly after matriculating to raise money to study further.*

QUESTION 3 APPLICATION

To reduce start-up costs, the students have decided to buy one laptop to start with and see how the business grows. Their local computer shop has the laptop shown below on sale.

Processor: Intel Celeron dual-core processor N4500
Memory: 4GB DDR4 Memory
Graphics: Intel UHD Graphics
WLAN: 802.11 a/b/g/n+acR2+ax wireless LAN
Gigabit Ethernet LAN Port (RJ45)
1 × USB Type-C
2 × USB Type-A
1 × HDMI
Windows 11 Home



[Source: <https://www.takealot.com/acer-aspire-3-intel-celeron-n4500-4gb-256gb-laptop/PLID95102571>]

3.1 Name ONE device which could connect to the laptop via a USB port.

_____

(1)

3.2 The laptop specification indicates primary memory.

3.2.1 What is the capacity of the installed primary memory?

_____

(1)

3.2.2 Do you think the primary memory capacity is sufficient for the business to complete everyday tasks? Justify your answer with ONE reason which refers to the scenario.

_____

_____

_____

(2)

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3.3 An operating system is critical to the operation of any device. For each of the operating systems listed, state whether the CPU of the laptop will be suitable to run the software with a justification and a cost thereof. The first row has been completed for you as an example.

Operating system name	**Is the CPU suitable? Justify.**	**Cost implications**
Android	***Yes – the laptop with 4GB RAM can run Android, but the performance may vary depending on the specific tasks and the Android emulator.***	***No cost***
Linux	3.3.1	3.3.2
Windows 11	3.3.3	3.3.4

(6)

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3.4 Users often wish to improve the performance of their computers. Below are TWO commonly used techniques to improve a computer's processing performance. Give TWO examples of how each of the techniques achieves this.

Technique:	Multitasking
Example 1	3.4.1
Example 2	3.4.2

(2)

Technique:	Multithreading
Example 1	3.4.3
Example 2	3.4.4

(2)

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3.5 The laptop has an onboard graphics card. One of the students has suggested that they rather buy a laptop with a **dedicated** graphics card.

Name TWO components found on a dedicated graphics card and give ONE reason why each component would improve a computer's overall performance.

Component 1	**Reason**
3.5.1	3.5.2
Component 2	**Reason**
3.5.3	3.5.4

(4)

3.6 The laptop's advert does not mention internal, permanent storage. Based on the scenario, recommend the best type of internal permanent storage and justify why you think this would be the most suitable for the business.

(3)

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3.7 Backing up the data, such as bookings and client information, is a vital task for the business to ensure that the data is safe. The salon wants to use cloud computing backup services to perform these tasks.

State TWO advantages and TWO disadvantages of using this type of backup service.

Advantage 1	
Advantage 2	
Disadvantage 1	
Disadvantage 2	

(4)
[25]

35 marks

SECTION C INTERNET AND COMMUNICATION TECHNOLOGIES

QUESTION 4 THEORY

For Questions 4.1 to 4.5, you need to select **the most correct answer** from the options A–D. An answer grid is at the bottom of this page for your answers. You merely need to write down the appropriate letter for your answer.

4.1 A smart client …

A is a desktop terminal that has an external hard drive.
B uses apps running locally with data stored remotely.
C is a device with limited dependence on the network.
D is used for applications, data storage, and utilities. (1)

4.2 Lossless compression ...

A is used by PNG and GIF files.
B is the family of data encoding methods that utilises imprecise estimates.
C is a technique where the size of the original file and the restored file are the same.
D All of the above. (1)

4.3 Search Engine Optimisation (SEO) ...

A is schema markup which is added to HTML.
B uniquely identifies nodes on a network.
C allows low-ranking placement in the Search Engine Page Results.
D None of the above. (1)

4.4 Location Based Services ...

A is a satellite-based radio navigation system.
B uses ARP (Address Resolution Protocol) to identify devices.
C is a software service that requires knowledge about where a mobile device is located.
D None of the above. (1)

4.5 Blockchain technology …

A has public keys that are assigned to transactions.
B uses a decentralised, distributed and public digital ledger to create trust.
C always uses the POP3 protocol for transmission.
D is owned by individuals. (1)

Question	4.1	4.2	4.3	4.4	4.5
Answer					

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4.6 The stylists want to play an online game in their down time on one of the laptops.

4.6.1 Which protocol would be the most suitable? Place a cross in the correct answer.

TCP ☐ UDP ☐

(1)

4.6.2 Give ONE reason for your choice in Question 4.6.1.

_____

_____

_____

(1)

4.6.3 Give ONE disadvantage for your choice in Question 4.6.1.

_____

_____

(1)

4.7 IP addresses and MAC addresses differ from each other. In the grid below choose ONE correct answer by placing a tick in ONE of the boxes.

Description of use	**Choose ONE**	
An address associated with a particular network card on any network and is assigned by the manufacturer.	IP	MAC
An address associated with a particular network card on a specific network, i.e. it will change when the device connects to a different network.	IP	MAC

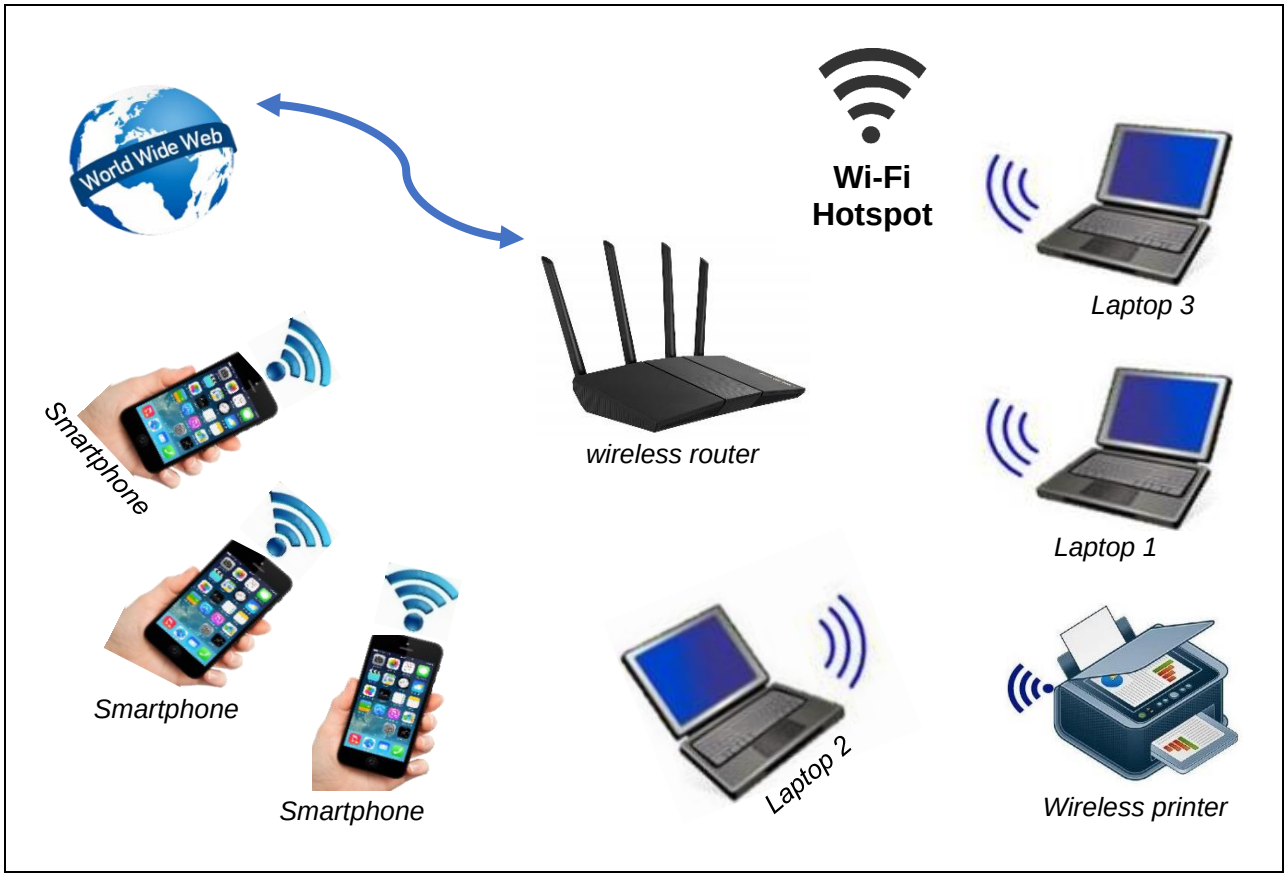
(2)
[10]

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QUESTION 5 APPLICATION

pHab! *is doing really well and has employed more hair stylists and has supplied them with a laptop each. Many of the customers bring a photo of the hairstyle they require to the salon on their smartphones. The business has decided to install a wireless network to connect the laptops, mobile devices and a LASER printer. One of the IT students from the same Matric group has also joined the business and he will be responsible for setting up a website allowing prospective customers to book appointments and advertise hairstyles.*

5.1 ***pHab!*** have been given the following network design:



5.1.1 The network design shows a wireless router. What is the function of a wireless router?

_____

_____

_____

_____

(2)

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5.1.2 A wireless network was chosen because copper cables have a number of weaknesses. Name and describe TWO weaknesses of copper cables when used in networking.

Weakness 1	
Description	

Weakness 2	
Description	

(4)

5.1.3 State ONE advantage of installing a wireless network.

_____

_____

_____

(1)

5.2 The business shares files containing images of new hairstyles with clients in the salons.

5.2.1 Choose ONE of the following models that would be the most suitable.

Peer-to-peer ☐ Client-server ☐

(1)

5.2.2 Give ONE reason for your choice in Question 5.2.1.

_____

_____

(1)

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5.3 As the business grows, various additional devices are added to the network.

5.3.1 What is the purpose of a firewall in a network?

_____

_____

(2)

5.3.2 The owners of ***pHab!***, the hair stylists and the customers will all have access to the network. Suggest FOUR other security measures that could be implemented to improve the network's security.

Security measure 1:	
Security measure 2:	
Security measure 3:	
Security measure 4:	

(4)

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5.4 The students have decided to open a second salon in a neighbouring town. They have used the same business model and network setup as the first shop. They will use cloud computing, cloud storage, and the Internet to connect the two businesses for day-to-day data tasks.

5.4.1 There is a difference between cloud computing and cloud storage. Explain the difference between the two concepts.

(2)

5.4.2 Give an example of each:

Cloud Computing: _____

Cloud Storage: _____

(2)

5.4.3 It is expected that 5G networks will increasingly be used in any further branches opened by ***pHab!*** and any other businesses in South Africa.

Discuss the difference between bandwidth and speed, in relation to internet connectivity.

BANDWIDTH	
SPEED	

(2)

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5.4.4 Some of the students of the business go home to their families for the holidays and others are located far away from the salons.

Explain how they could use the following technologies to communicate with each other and the benefits it has for the salon.

VOIP	
VPN	

(4)

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5.5 Networks are susceptible to malicious software because many of the customers bring USB flash disks as well as their smart phones into the salons with photos of the hairstyle they want. It is important that they are informed about possible threats.

Complete the following table that relates to malicious software and activities. The first row has been completed for you.

Malware/activity		**Description**	
Phishing		Attempts to trick individuals into giving away sensitive information or login credentials.	
5.5.1		A situation in which a person or program successfully identifies as another by falsifying data, to gain an illegitimate advantage.	
Trojan Horse		**5.5.2**	
Pharming		**5.5.3**	
5.5.4		**5.5.5**	

(5)
[30]

40 marks

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SECTION D SOCIAL IMPLICATIONS

QUESTION 6

*The website for the salon has become very popular. The IT student has created a Facebook page and Instagram account for **pHab!** The customers are able to book an appointment on the website by entering their details and choosing a date and time for their booking. The hair stylists and customers can post photos of the completed hair creations to all the platforms.*

6.1 Give TWO examples of personal information that this website and similar services, like Google, generally ask you to enter when you setup an account.

Example 1:	
Example 2:	

(2)

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6.2 The sharing of personal details online has risks associated with it. Name and describe THREE possible risks that salon customers and anybody who uses the Internet could be exposed to, by sharing their data online.

Risk	**Description**

(6)

6.3 South Africa has passed a law called the POPI Act (Protection of Personal Information Act). Name any TWO ways in which this act protects all citizens and their personal data online.

Example 1:	
Example 2:	

(2)

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6.4 A customer posted a photo on the ***pHab!*** Facebook page and Instagram account and has been receiving negative comments.

6.4.1 Name TWO strategies the customers could employ to handle this situation effectively.

Strategy 1:	
Strategy 2:	

(2)

6.4.2 The customer has also noticed that since they posted the photo to the ***pHab!*** Facebook page, a lot of advertisements for different hair styles are popping up on their personal Facebook page.

(a) What technology is used to create these personalised advertisements?

_____

(1)

(b) How does the technology listed above ensure that the advertisements are personalised and relevant to the user?

_____

_____

_____

_____

(2)

15 marks

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SECTION E DATA AND INFORMATION MANAGEMENT AND SOLUTION DEVELOPMENT

QUESTION 7

The ***pHab!*** students have decided that since their salons are expanding and becoming more professional, they need to create a suitable method to store customers' details, which will include the preferred hair style, cut, colour, etc., and a photo of the most recent style that the hair stylists have created.

7.1 Recommend TWO suitable data structures to store the data permanently for the salons and justify your choice. Your answers must relate to the scenario.

Recommendation	Justification

(4)

7.2 Invalid data can often lead to frustration on the side of a client or business owner. A well-designed storage structure should be created to deal with **Data Validation**, and the following items, listed below, should form part of the design. Give an explanation of the terms in the table, AND give a suitable example from the scenario, of how this validation technique will apply to data stored by the salon.

Check	**Description**	**Example**
Presence	7.2.1	7.2.2
Type	7.2.3	7.2.4
Format	7.2.5	7.2.6

(6)

7.3 Data Systems can have a major failure if there is an inaccurate representation of numbers, regardless of the business or company.

7.3.1 A programmer has coded a program to store and display numbers, but when the user enters a large number, the program displays a smaller number. For example, the user enters R102,90 for a haircut, the program displays R102. What type of error is this?

_____

(1)

7.3.2 Suggest a solution the programmer can implement in order to correct this error so that the correct amount is displayed. Give an example to support your answer.

_____

_____

_____

(2)

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7.4 Data is represented in computing in a fixed number of bits.

7.4.1 Why is the hexadecimal system often used in computing instead of the binary system?

(1)

7.4.2 What is the word size in a CPU and how does it impact the performance of a computer system?

(2)
[16]

QUESTION 8

An OOP application will be created to help keep track of the supplies needed in the hair salons, assist with ordering new stock, and determine the price of the items. The program will use a class called **Stock** to instantiate **Stock** objects.

The class will have the following fields:
- **itemLabel** – the name of each stock item
- **costPrice** – the price in rands and cents of the stock item
- **stockLevel** – the quantity on hand

These individual fields of any one object should not be accessible from outside the class.

The class will need the following methods:
- a constructor method to initialise the fields of the object
- an accessor method for the stockLevel field
- a mutator method for the itemLabel field
- a toString method to display all the fields of an object

8.1 Complete the standard **UML/class diagram** below for the **Stock** class according to the information given above. Choose appropriate data types for each field as well as appropriate parameter names.

Fields:
Methods:

(10)

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8.2 Inheritance establishes an 'is-a' relationship between classes in Object-Oriented Programming.

8.2.1 Give ONE advantage of Inheritance.

_____

_____

(1)

8.2.2 Composition and Inheritance differ from each other in relationship and usage. Complete the table below relating to composition.

Composition	
Relationship	
Usage	

(2)

8.2.3 Problem Solving involves an ability to solve more complex problems using computational thinking which involves different stages. Describe the two stages listed below.

Decomposition:	
Abstraction:	

(2)

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8.3 The OOP application has been extended to include a class that manipulates an array of **Stock** objects. The **Stock** class has also had some additional methods added to it.

An array of **Stock** objects, **sArr** has been instantiated. Three elements of the array are shown below.

	sArr[0]	sArr[1]	sArr[2]
itemLabel	Shampoo	Conditioner	Braids
costPrice	21,20	29,00	10,00
stockLevel	30	60	10

The algorithm shown below has been coded to check each item's stock level and decide if more stock needs to be ordered. If the stock level of an item is less than 50 items, then that item must be ordered. The algorithm will report for each item whether it needs to be ordered or not, how many items should be ordered, and the cost of the order.

```
1  orderQuantity ← 0
2  orderCost ← 0.00
3  for i ← 0 to 2, inc by 1
   begin
4    if sArr[i].getStockLevel() <=50
     begin
5      orderQuantity ← 50 – sArr[i].getStockLevel()
6      orderCost ← orderQuantity * sArr[i].getCostPrice()
7      display "Place an order for" + orderQuantity +
        "units of" + sArr[i].getItemLabel()
8      display "This order will cost ” + orderCost
     end
     else
     begin
9       display "Stock of" + sArr[i].getItemLabel() +
        "is sufficient"
     end if
   end for
```

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8.3.1 Complete the trace table shown below to test the algorithm. There are more lines on the grid than are needed for a correct answer.

Line	orderQuantity	orderCost	i	sArr[i].getStockLevel()<=50?	Display

(11)

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8.3.2 Line 4 of the algorithm is incorrect when compared to the requirements of the program. Re-write this line correctly.

_____

(1)

8.3.3 ***pHab!*** would like to give a year-end bonus to certain hairstylists. To receive a bonus, a stylist must have worked in the salon(s) for at least two years AND be considered a creative stylist OR must have worked in the salon(s) for at least two years AND consistently worked for more than 40 hours a week.

The following variables will be used:

W = had worked for at least two years
C = is considered to be a creative stylist
H = has consistently worked for more than 40 hours a week

The following function will be used to determine if a stylist qualifies for a bonus: (W AND C) OR (W AND H).

Complete the truth table below to represent this function. Use ONLY 0 or 1 (1 for TRUE and 0 for FALSE).

W	C	H	W.C	W.H	(W.C) + (W.H)
0	0	0			
0	0	1			
0	1	0			
0	1	1			
1	0	0			
1	0	1			
1	1	0			
1	1	1			

(5)

8.3.4 Write out the function that represents the combination of variables, which will result in a stylist receiving a bonus.

F(W,C,H) = _____

(2)
[34]

50 marks

Total: 150 marks

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ADDITIONAL SPACE (ALL QUESTIONS)

REMEMBER TO CLEARLY INDICATE AT THE QUESTION THAT YOU USED THE ADDITIONAL SPACE TO ENSURE THAT ALL ANSWERS ARE MARKED.

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