

THE ANNUAL TECHNICAL FEST OF ELECTRONICS ENGINEERING DEPARTMENT OF IIT (BHU)

UDYAM'21

DIGISM

Problem Statement for Round 1

Theme :

Once upon a time in Mumbai there lived a great businessman named Harshadh Mehta. In order to raise capital for his firm, Mehta had taken loan from several banks of the country. Recently it has been alleged that he had scammed the banks. To clean his image, he decided to start repaying his debts. Mehta evaluated his current holdings and decided to pick one such bank to which he owes the maximum amount (which should obviously be less than his current holdings).

You being his accountant, help Harshadh find the required bank.

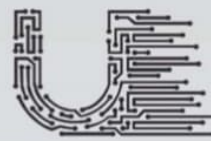
TASK DESCRIPTION :

The data will be stored in ROM in form of link list.

The head of link list will be at address 0.

A node at address 'n' represents following information:

- i) Data of current node at address 'n'
- ii) Address of next node at address 'n+1'



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Address of next node of last node is denoted by '255'

The values in both fields (data,next) can be between 0-255

There is no overlapping of nodes.

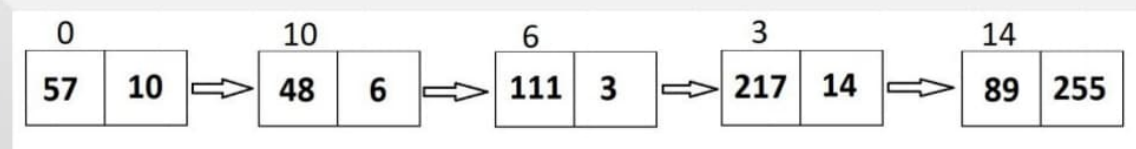
The node represents bank and data represents the debt in that bank.

EXAMPLE :

Address of current node (n)		(n+1)
Data of current node		Address of next node

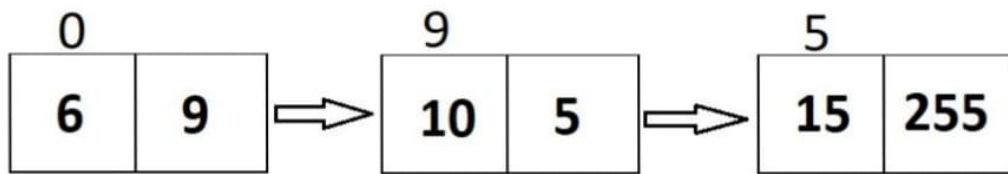
These link list will be denoted by the following sequence of numbers in ROM

I)



57,10,65,217,14,155,111,3,8,70,48,6,69,196,89,255,36,32

II)



6,9,2,99,145,15,255,4,89,10,5

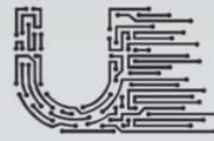
Task :

Read the value of current holdings(CH) of Harshad as a 8 bit number through logic state and the data about his debts as a binary file in ROM. Help him find the the bank to which he owes the maximum amount ($\leq CH$) so that he can clear the debt to this bank.

Display the address of the required bank and the amount Harshad is left with after this settlement.

PS:

- i) It is guaranteed that $CH > \text{minimum of all his debts across all banks}$.
- ii) If more than one solution exists, you can display any of them.



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Example :

In link list I) if CH=100

Address=14, Amount=11

In link list II) if CH= 50

Address= 5, Amount= 35

List of components allowed :

ROM(2732)

Comparator(7485)

Register(74179/74194)

Adder(74283)

Multiplexer(74157/74153)

Counter (74LS590,74161,74163,74LS169)

Decoder(74LS139/74HC154)

Encoder(74HC148)

Buffer(74HC241/74125)

Flip flops(74273/7474,74LS175,74LS109)

BCD to 7 segment decoder(74LS347/7448)

7 segment/BCD display

Logic Gates

Clock



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IC	COST
ROM(2732)	25
Clock	10
7485, 74283, 74157, 74153, 74179, 74194, 74273, 74161, 74163, 74LS590, 74LS169, 74HC154, 74HC241, 74LS175, 7448, 74LS347	2
74LS139, 74HC148, 7474, 74LS109	1
Logic gates, 74125	0.1
Logic states, Logic probes	Free

Scoring :

- Submissions are accepted till 11th April.
- Submit the simulation file (named <team_name>) along with the explanation of your approach to google form floated on the whatsapp group.
- 250 points will be awarded to the team on completing the PS.
- Total cost of the circuit will be deducted from the score.
- Bonus marks (max 100) will be given based on following factors:
 1. Time taken for submission
 2. Addition of some innovative features
 3. Readability/Clarity of circuit and its labelling
 4. Technical complexity/efficiency
 5. Structure and reusability

General Rules :

- The organizers reserve the right to change the rules as they deem fit. Change in rules, if any, will be notified on the Whatsapp group.
- The decision of the organizers shall be final and binding.
- **In case of any type of cheating/plagiarism suspected, the team will be immediately disqualified and no certificate will be given.**

Round Rules :

- If multiple ROM(s) are used all of them shall be fed with the same binary file.
- Simulations based on components other than specified will not be accepted.
- Only Proteus simulation file will be accepted in this Round.

Certification Policy :

- The top three teams will be awarded a certificate of excellence.
- All teams qualifying the first round will be awarded a certificate of participation.
- Disqualified teams will not be considered for any certificates