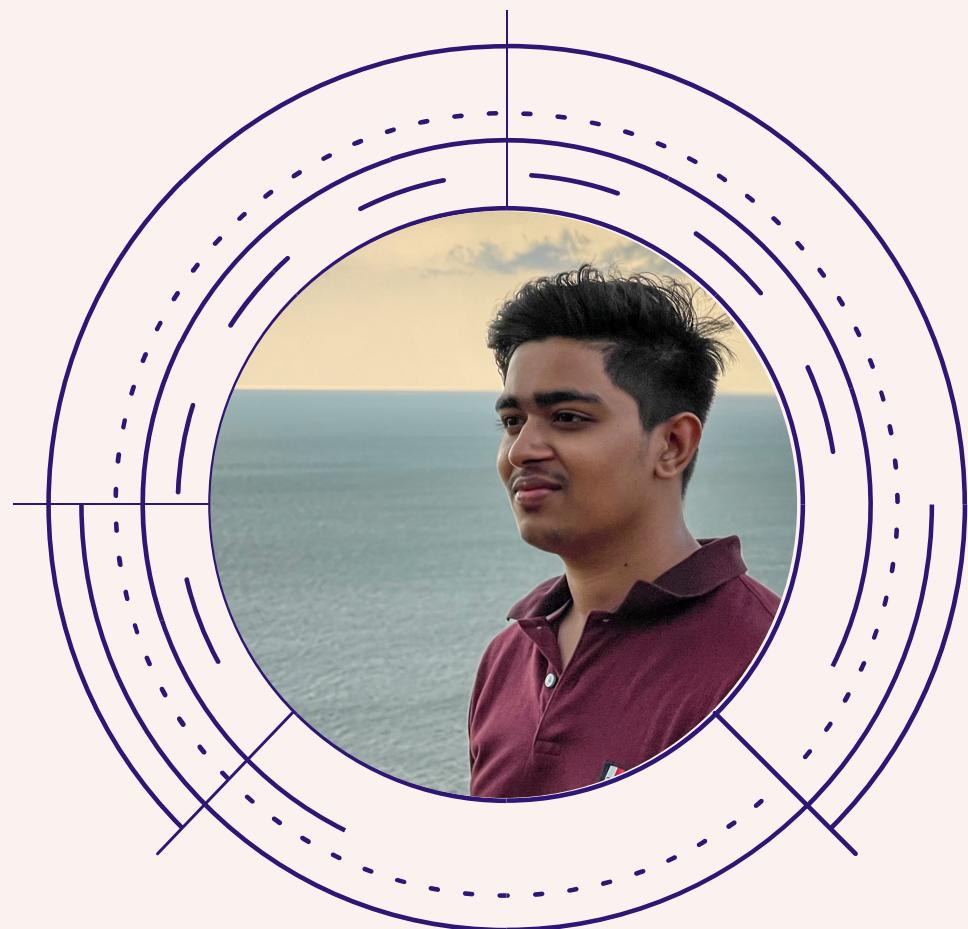
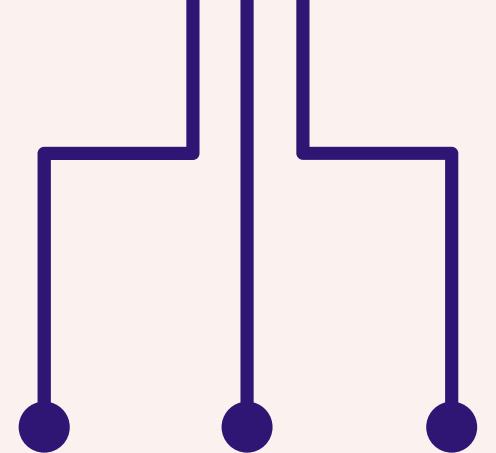


8086 ASSEMBLY LANGUAGE

Team Members



SAI AKARSH ACHE
191627002



SIMRAN
191627101



DEEPTI IYER
191627080



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CERTIFICATE

This is to certify that Mr/Ms Sai Akarsh Ache as satisfactorily completed the course of experiments/work in practical/mini project in **ICS241 Microprocessors** prescribed by MAHE, Manipal for the **IVth Semester BSc (Applied Sciences) in Computer Science Engineering** at this institute during the academic year 2021.

Name: Sai Akarsh Ache

Registration No.: 191726002

Date:23rd April,2021

Signature of Faculty In charge



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CERTIFICATE

This is to certify that Mr/Ms Simran as satisfactorily completed the course of experiments/work in practical/mini project in **ICS241 Microprocessors** prescribed by MAHE, Manipal for the **IVth Semester BSc (Applied Sciences) in Computer Science Engineering** at this institute during the academic year 2021.

Name: Simran

Registration No.: 191726101

Date:23rd April,2021

Signature of Faculty In charge



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CERTIFICATE

This is to certify that Mr/Ms Deepti K Iyer as satisfactorily completed the course of experiments/work in practical/mini project in **ICS241 Microprocessors** prescribed by MAHE, Manipal for the **IVth Semester BSc (Applied Sciences) in Computer Science Engineering** at this institute during the academic year 2021.

Name: Deepti K Iyer

Registration No.: 191726080

Date:23rd April,2021

Signature of Faculty In charge

SAI AKARSH ACHE

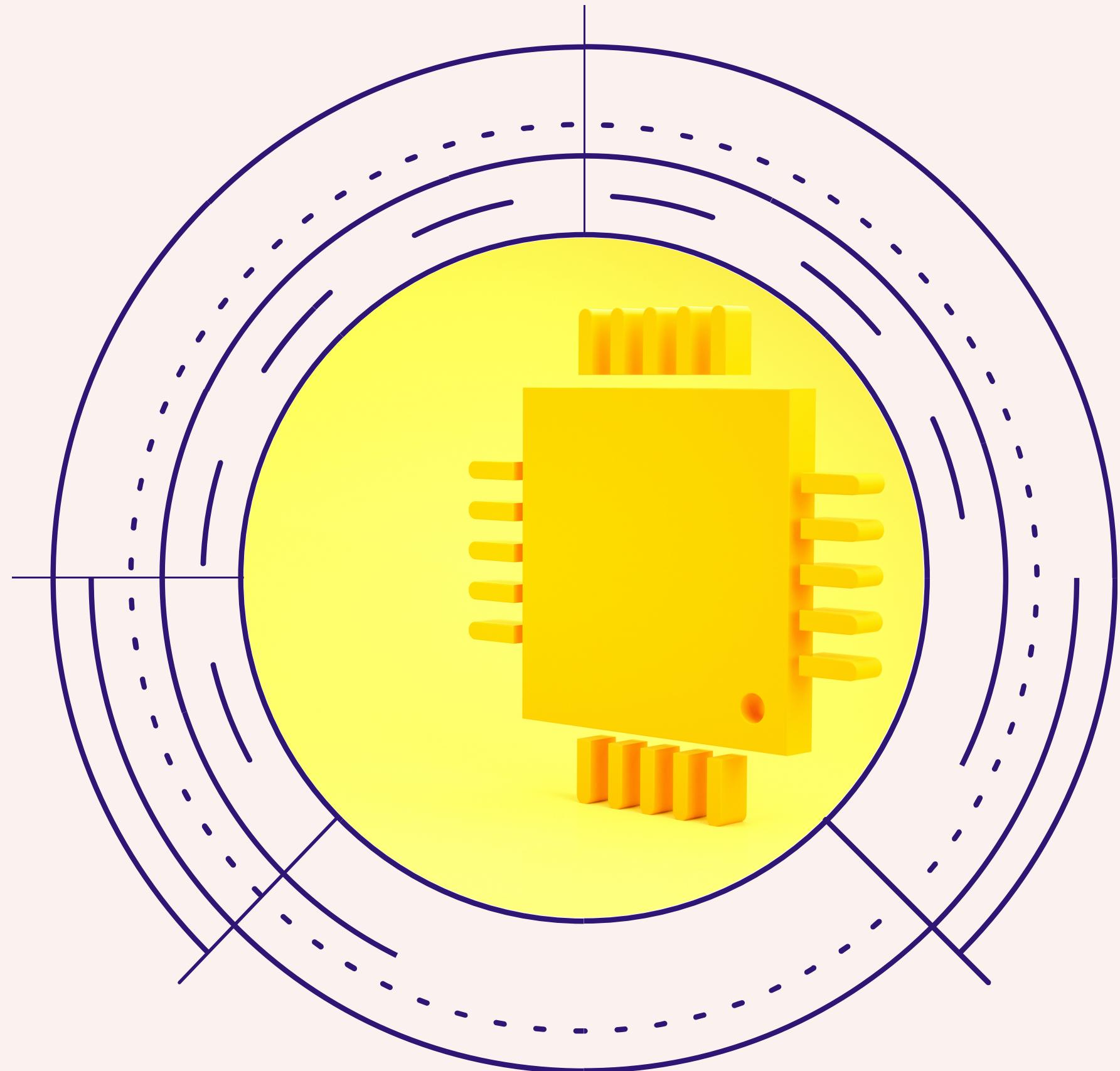
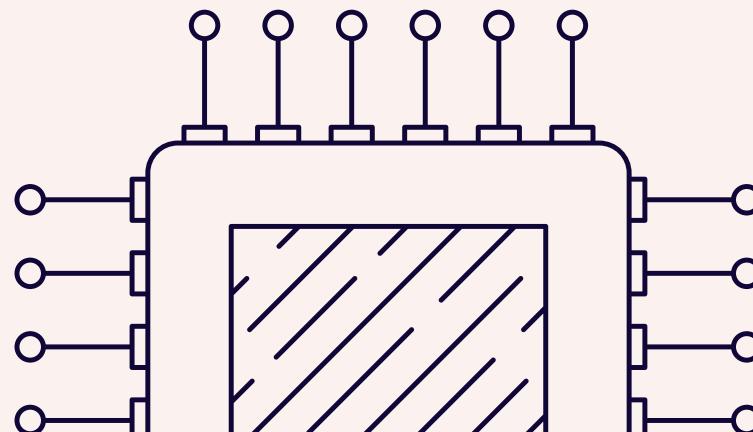
SIMRAN

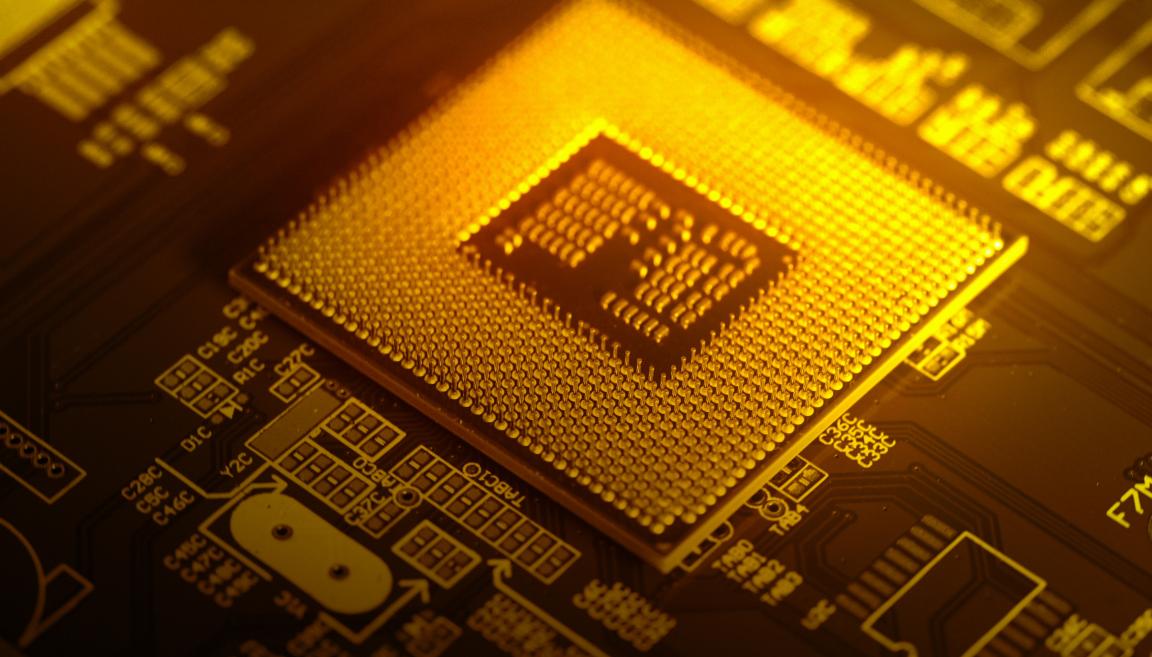
DEEPTI IYER

PROBLEM STATEMENT DESCRIPTION

Check whether or not a given number is an armstrong number.

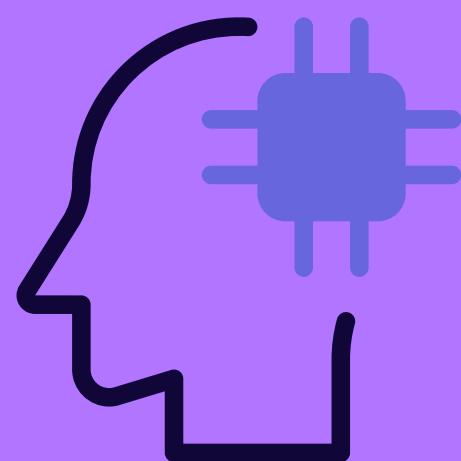
Input entered number through the console.





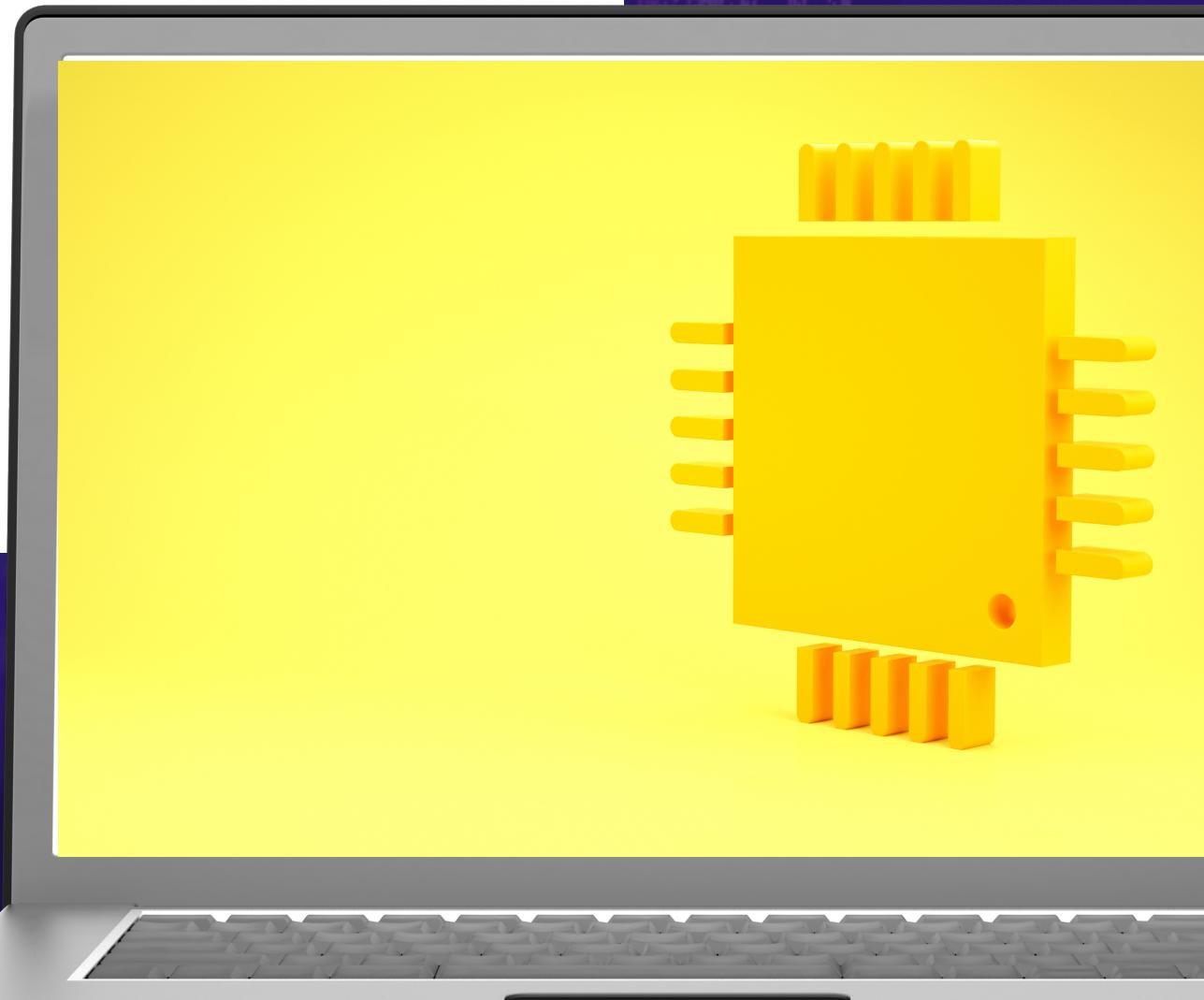
WHAT IS AN ARMSTRONG NUMBER?

In numerical number theory the Armstrong number is an n-digit base b number such that the sum of its (base b) digits raised to the power n is the number itself. If the number obtained totals to or equals the original number when each of the digits is raised to the power of the number of digits in the number and added to obtain a number, in any given number system, such a number is called an *Armstrong Number*.



CODE

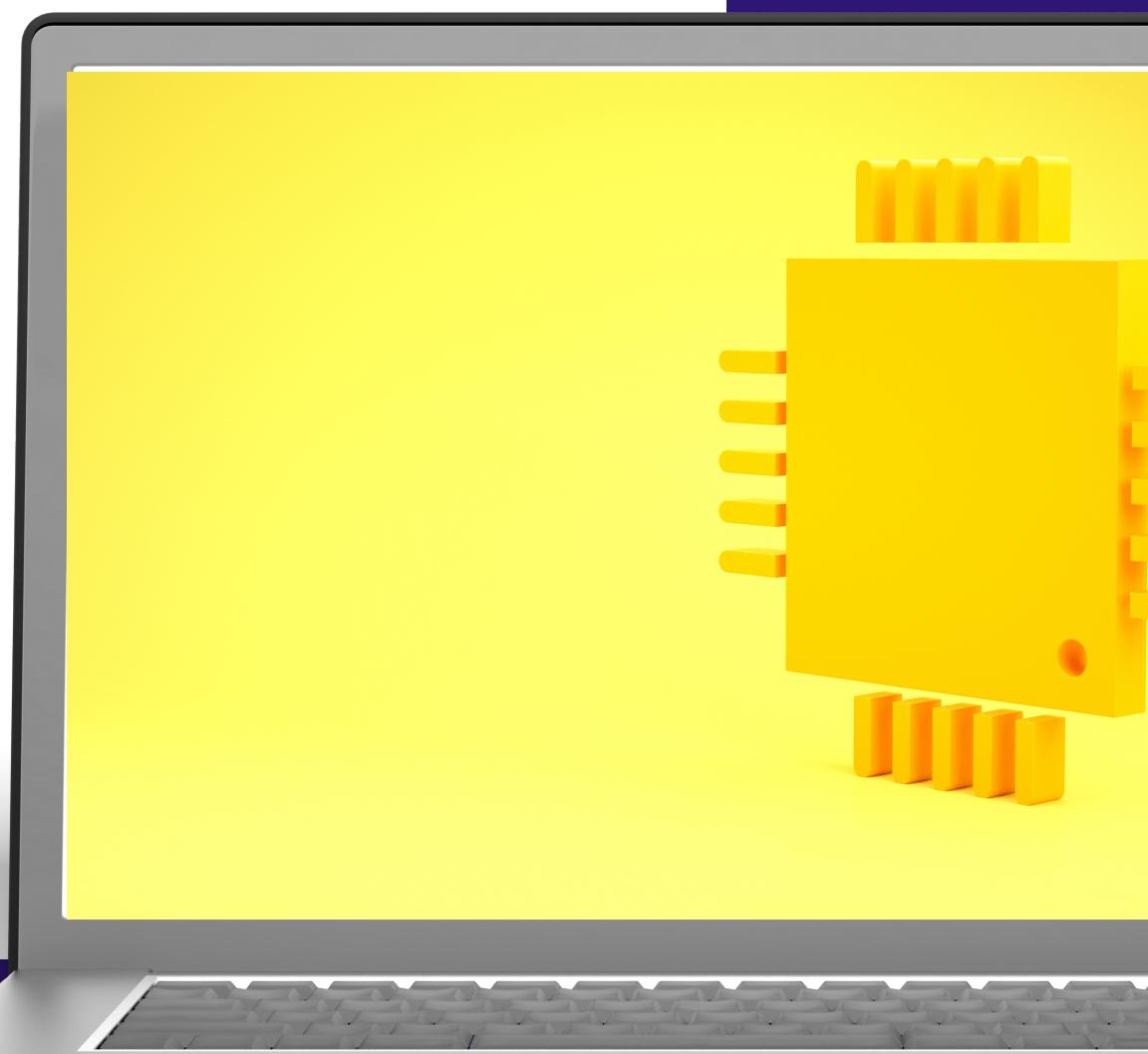
```
data segment
str db 'Enter a number:$'
msg1 db 0dh, 0ah, 'Number is armstrong', 0dh, 0ah, '$'
msg2 db 0dh, 0ah, 'Number is not armstrong', 0dh, 0ah, '$'
num dw ?
ten db 10
q db ?
rem db ?
digits db ?
data ends
```



CODE

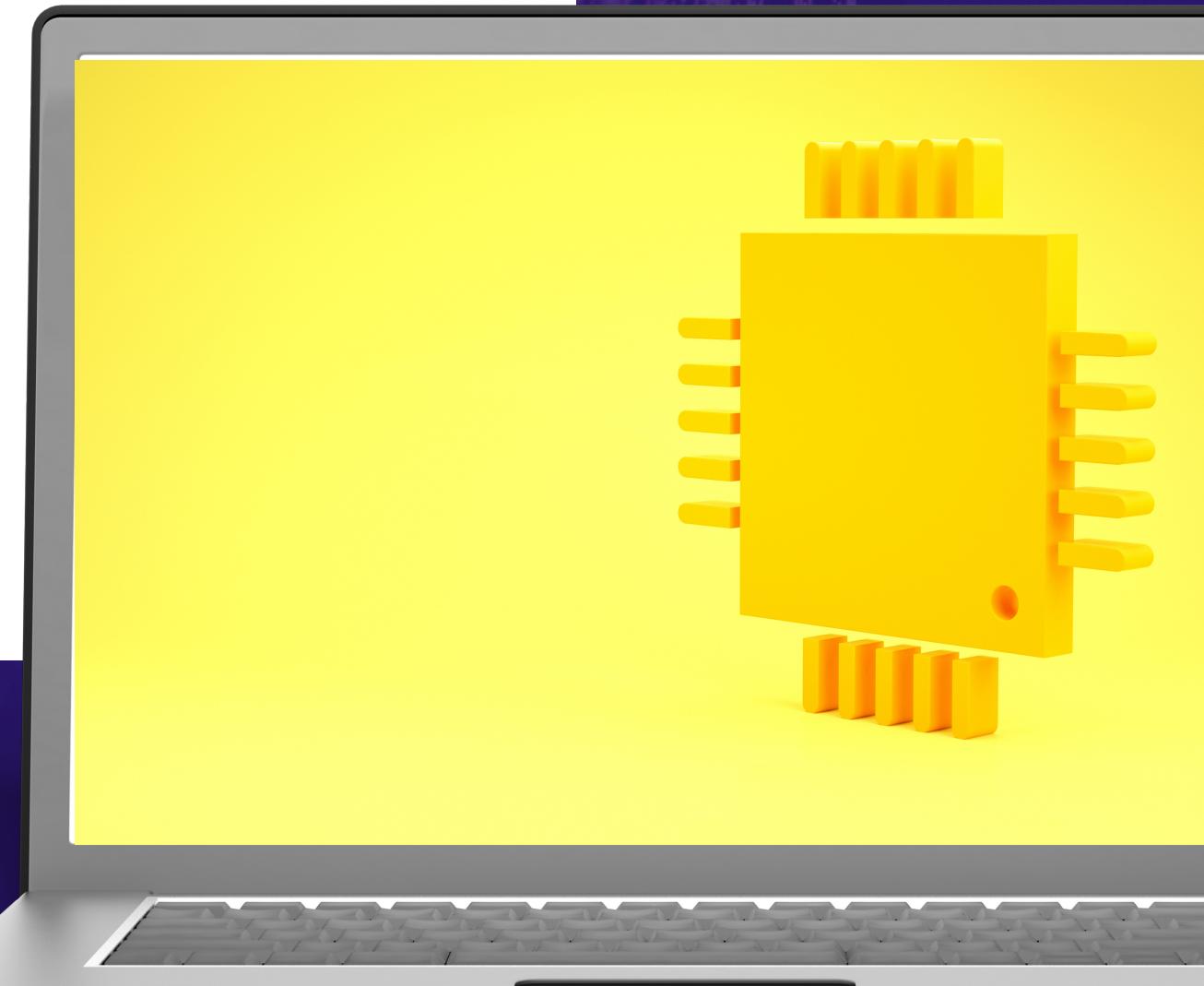
```
code segment  
assume cs: code, ds: data, es: data  
start:  mov ax, data  
        mov ds, ax  
        mov es, ax  
        mov ah, 09h  
        mov dx, offset str  
        int 21h  
        mov bl, 0  
        mov dh, 0  
        mov cl, 0
```

```
input:   mov ah, 01h    ;al -> inputted_number + 32  
         int 21h  
         cmp al, 13  
         je inputted  
         sub al, 30h  
         mov dl, al  
         mov ax, bx  
         mul ten  
         add ax, dx  
         mov bx, ax  
         inc cl  
         jmp input  
inputted:  
         mov num, bx  
         mov ax, num  
         mov bx, 0  
         mov digits, cl
```



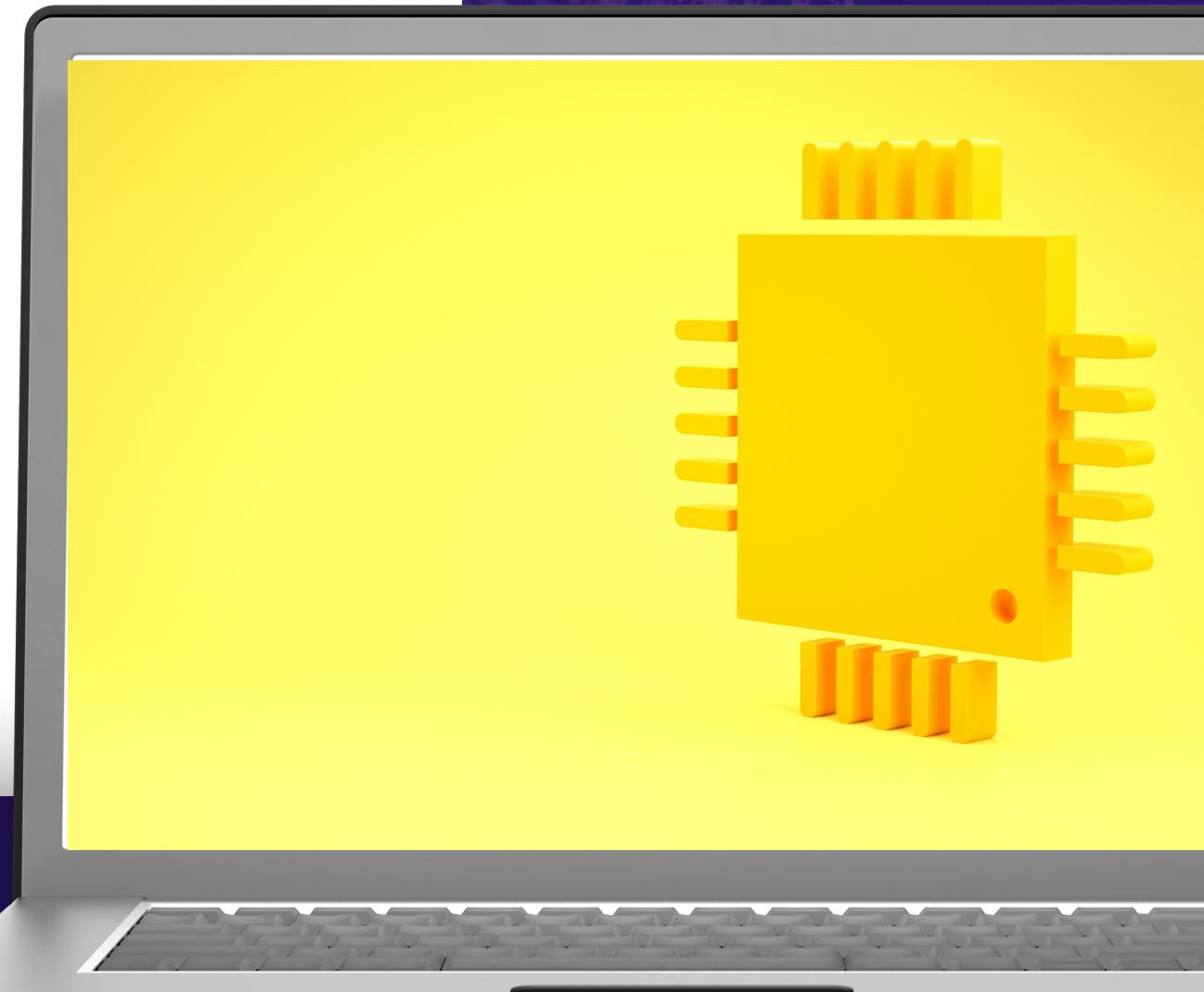
CODE

```
do:    cmp al,0
       je done
       div ten           ; al->quotient, ah->remainder
       mov rem, ah
       mov ah, 0
       mov q, al
       mov al, rem
       mov cl, digits
       dec cl
       multiply:        mul rem
                         loop multiply
       add bx, ax         ; bx -> bx + (last_digit)^3
       mov ax, 0
       mov al, q
       jmp do
```



CODE

```
done:    mov ax, num  
        cmp ax, bx  
        jne not_armstrong  
        lea dx, msg1  
        mov ah, 09  
        int 21h  
        jmp last  
not_armstrong:   lea dx, msg2  
                  mov ah, 09  
                  int 21h  
last:     mov ah, 4ch  
          int 21h  
code ends  
end start
```



OUTPUT

```
B:\>arm  
Enter a number:153  
  
Number is armstrong  
B:\>
```

HERE WE HAVE TAKEN THE NUMBER 153, WE KNOW IT IS AN ARMSTRONG NUMBER AS

$$153 = 1^3 + 5^3 + 3^3$$

OUTPUT 2

```
B:\>arm  
Enter a number:1634  
Number is armstrong
```

HERE WE HAVE TAKEN THE NUMBER 1634, WE KNOW IT IS AN ARMSTRONG NUMBER AS

$$1634 = 1^4 + 6^4 + 3^4 + 4^4$$

OUTPUT

```
B:\\arm
Enter a number:255
Number is not armstrong
B:\\
```

HERE WE HAVE TAKEN THE NUMBER
255, WE KNOW IT IS NOT AN
ARMSTRONG NUMBER

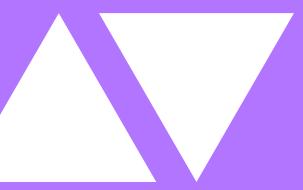
OUTPUT

HERE WE HAVE TAKEN THE NUMBER
1345, WE KNOW IT IS NOT AN
ARMSTRONG NUMBER

```
B:\arm
Enter a number:1345

Number is not armstrong

B:\>
```



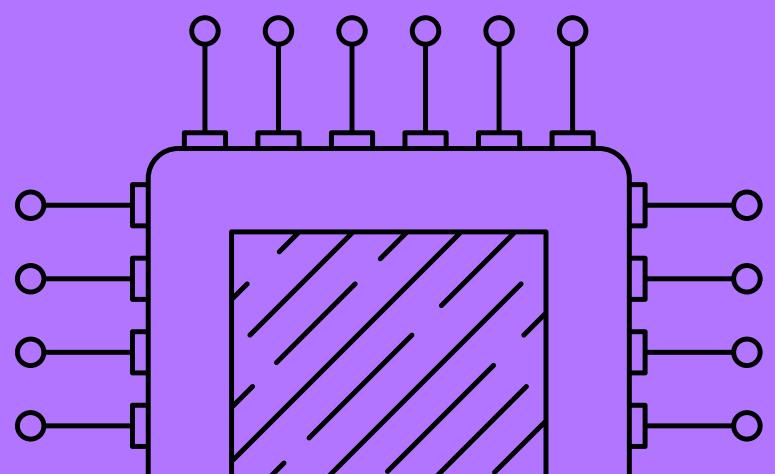
APPLICATIONS

Armstrong numbers (also called narcissistic numbers or pluperfect digital invariants (PPDI)) are well known in recreational mathematics.

Implementation in data security applications.

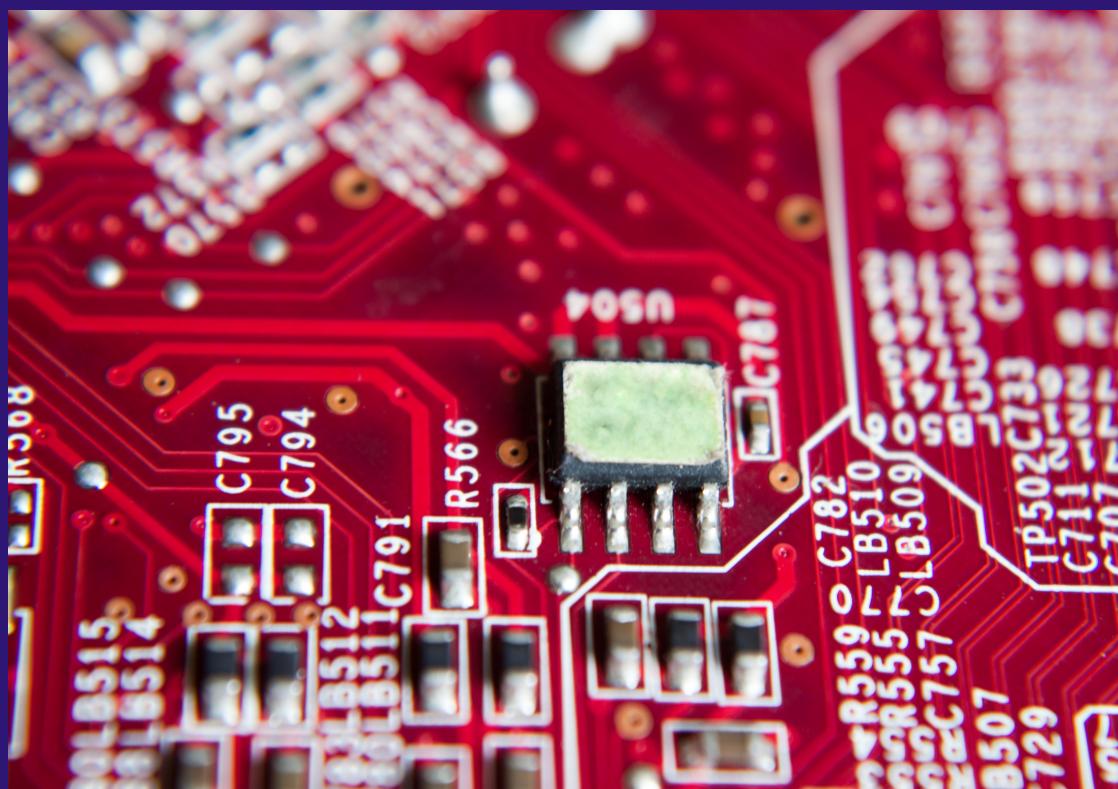
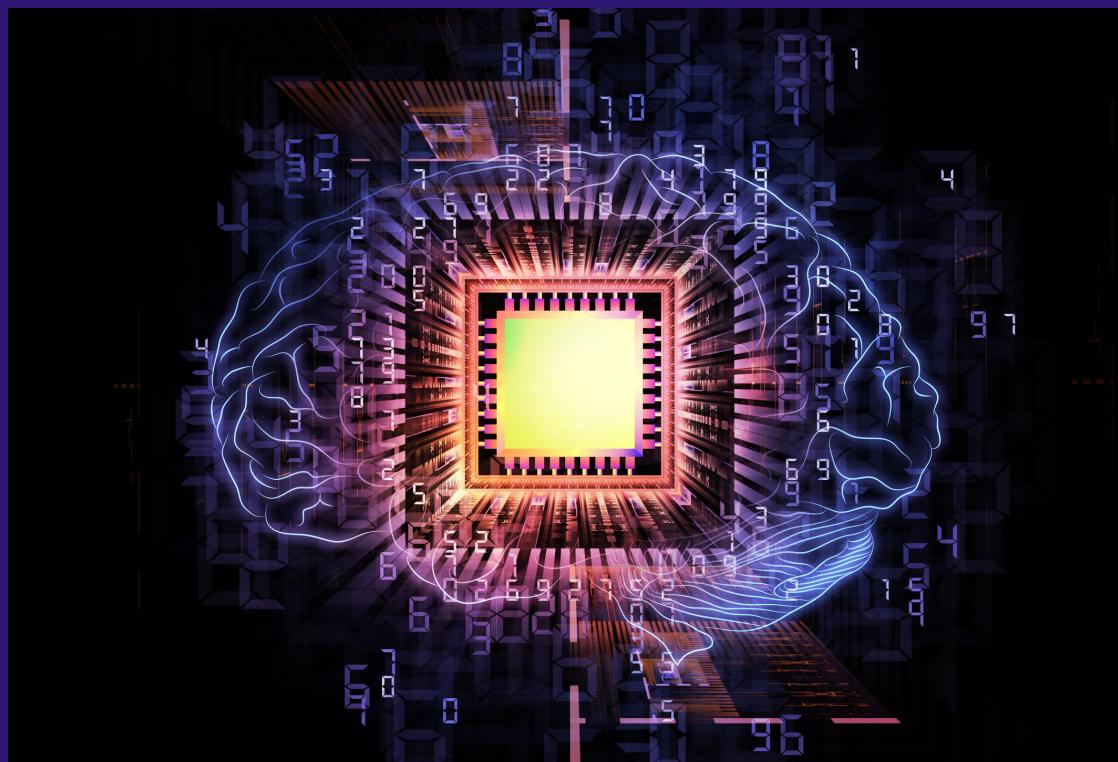
Used as learning tools to understand concepts better.

It can help those learning a new programming language because the way the number behaves in a given number base



CONCLUSION

One can study what is Armstrong number, its implementation and the code using 8086 assembly language program here. Regarding the practical applications using the unique property of Armstrong numbers, in reality, there are no intended real-world applications and the uniqueness of these numbers hold no practical use except as examples or learning tools to verify programs, learn concepts better and explore the rules in a new programming language. Its just a plain mathematical concept, which can also be used as puzzles as well as to amuse amateurs.



Thank
you