



CRUX



CODING BLOCKS

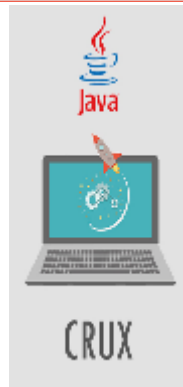
Programming Fundamentals

- Installations
- Number Systems
- Getting Started with Java

Sumeet Malik



Eclipse?



Any doubts on assignment?



BT – 4: Circular Jail Cell

There is a circular jail with 100 cells numbered 1-100. Each cell has an inmate and the door is locked. One night the jailor gets drunk and starts running around the jail in circles. In his first round he opens each door. In his second round he visits every 2nd door (2,4,6---) and shuts the door. In the 3rd round he visits every 3rd door (3,6,9---) and if the door is shut he opens it, if it is open he shuts it. This continues for 100 rounds (i.e. 4,8,12 ---; 5,10,15 ---; ---; 49,98 etc.) and exhausted the jailor falls down.

How many prisoners found their doors open after 100 rounds?





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BT - 5: Criminal Cupbearers

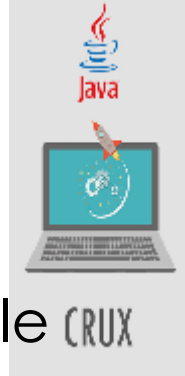
An evil king has 1000 bottles of wine. A neighboring queen plots to kill the bad king, and sends a servant to poison the wine. The king's guards catch the servant after he has only poisoned one bottle. The guards don't know which bottle was poisoned, but they do know that the poison is so potent that even if it was diluted 1,000,000 times, it would still be fatal. Furthermore, the effects of the poison take one month to surface. The king decides he will get some of his prisoners in his vast dungeons to drink the wine. **Rather than using 1000 prisoners each assigned to a particular bottle, this king knows that he needs to murder no more than 10 prisoners to figure out what bottle is poisoned, and will still be able to drink the rest of the wine in 4 weeks 1 day time. How does he pull this off?**



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Why binary number system?

- We humans use a decimal, or base-10, numbering system, presumably because people have 10 fingers
- Early computers were designed around the decimal numbering system. This approach made the creation of computer logic capabilities unnecessarily complex and did not make efficient use of resources. (For example, 10 vacuum tubes were needed to represent one decimal digit.)
- To deal with the basic electronic states of on and off, Von Neumann suggested using the binary numbering system



What is binary number system

- The binary, or base-2, numbering system is based on the same principles as the decimal, or base-10, numbering system, with which we are already familiar
- Bit(Binary Digit) is the basic unit. It can have only one of two values (0 or 1), and may therefore be physically implemented with a two-state device.
- Bits are commonly stored and manipulated in groups generally referred as Byte (group of 8 bits)
- Number of bits effect accuracy of result and also limits the size of numbers manipulated by computer.

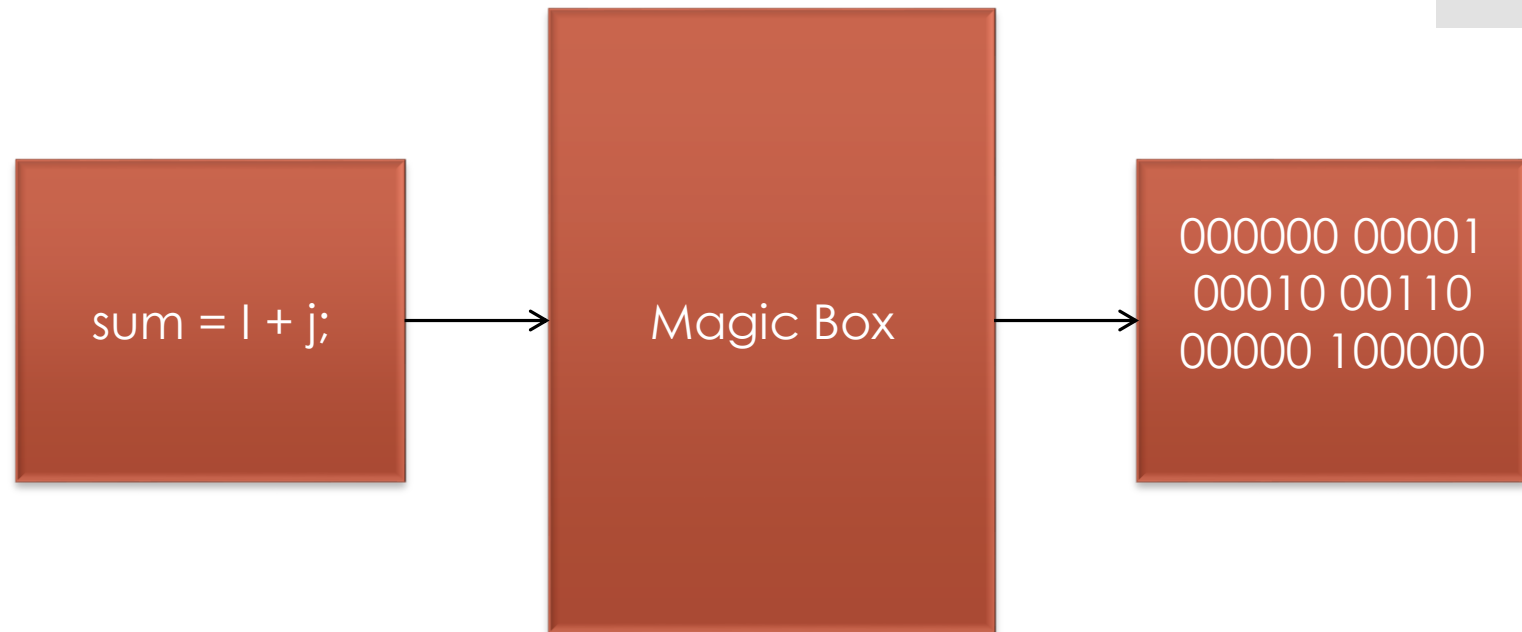
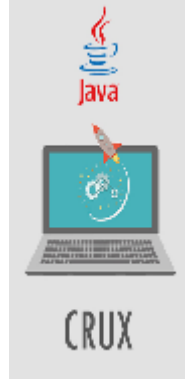


Other Number Systems

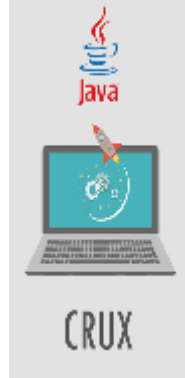
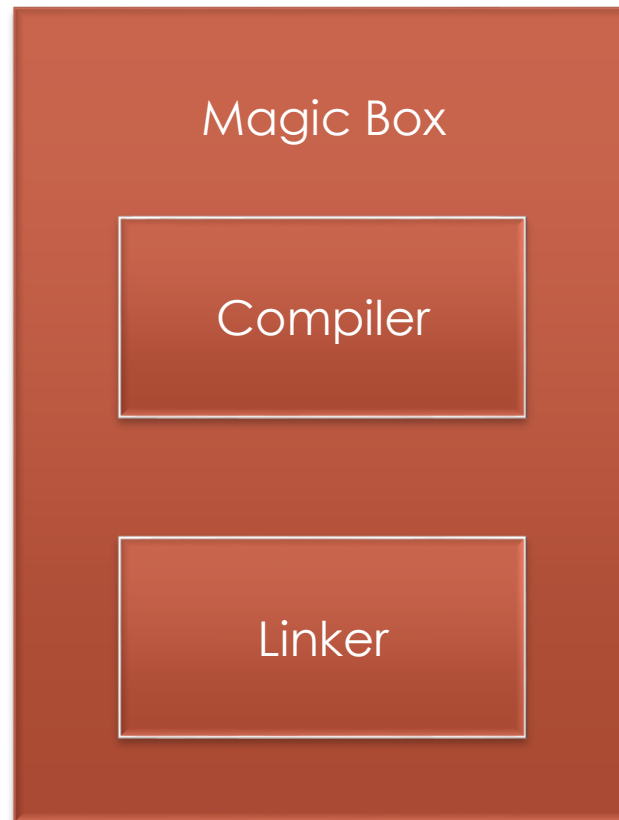


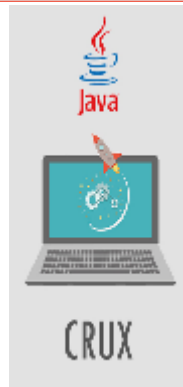
- Hexadecimal Number System (base 16)
- Octal Number System (base 8)

How do we work with High Level?



Components of the Magic Box





Java Virtual Machine



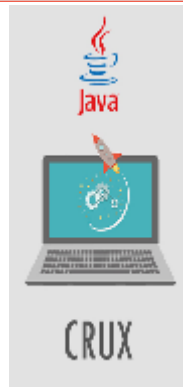
Time to write Hello World!



Simple Interest Calculation



Largest of three numbers



Print sum of numbers from 1 to N



Change Code to take User Input

Lets do these problems



- Check if a number is prime
- Nth Fibonacci number
- Reverse a number

Time to Try?



- Find all prime numbers between 2 to N
- Print all Fibonacci number less than N
- Sum of odd placed digits and even placed digits

Time to Try?



- Print the following pattern

1

2 3

4 5 6

7 8 9 10

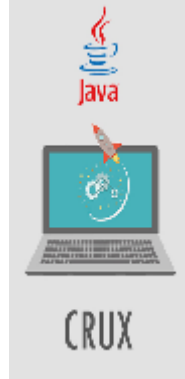
Time to Try?



- Print the following pattern

```
1
2 3 2
3 4 5 4 3
4 5 6 7 6 5 4
```

Time to Try?



- Print the following pattern

```
1
2 3 2
3 4 5 4 3
2 3 2
1
```



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Thank you

Sumeet Malik