



CRUX



CODING
BLOCKS

Programming Fundamentals

- Installations
- Number Systems
- Getting Started with Java

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IntelliJ Idea?



Any doubts on assignment?

BT – 5: Greedy Pirates

A pirate ship captures a treasure of 1000 golden coins. The treasure has to be split among the 5 pirates: 1, 2, 3, 4, and 5 in order of rank. The pirates have the following important characteristics: infinitely smart, bloodthirsty, greedy. Starting with pirate 5 they can make a proposal how to split up the treasure. This proposal can either be accepted or the pirate is thrown overboard. A proposal is accepted if and only if a majority of the pirates agrees on it. **What proposal should pirate 5 make?**



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



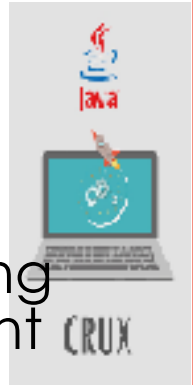
What is binary number system

- 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.



BT - 5: Criminal Cupbearers

An evil king has 1000 bottles of wine. A neighbouring 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?**



Other Number Systems



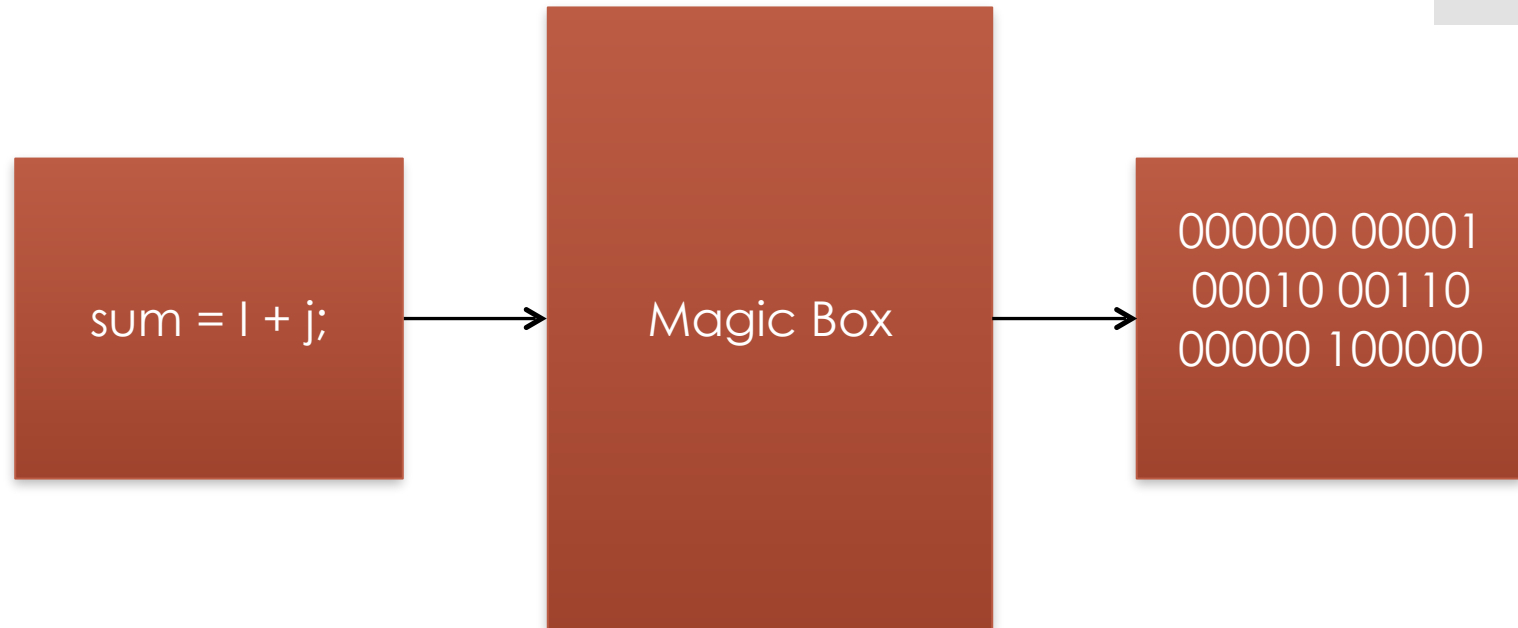
- Hexadecimal Number System (base 16)
- Octal Number System (base 8)

BT – 6: Infinite Quarter Sequence

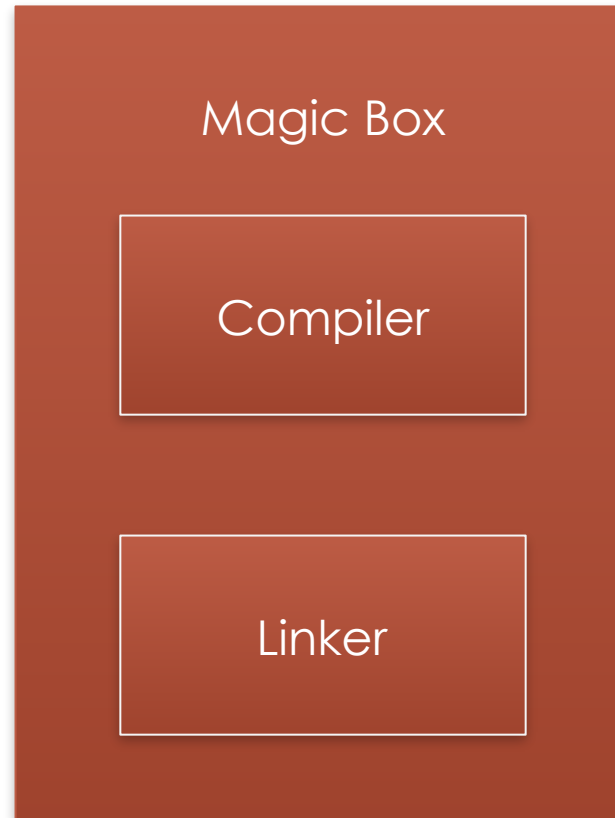


You are wearing a blindfold and thick gloves. An infinite number of quarters are laid out before you on a table of infinite area. Someone tells you that 20 of these quarters are tails and the rest are heads. He says that if you can split the quarters into 2 piles where the number of tails quarters is the same in both piles, then you win all of the quarters. You are allowed to move the quarters and to flip them over, but you can never tell what state a quarter is currently in (the blindfold prevents you from seeing, and the gloves prevent you from feeling which side is heads or tails). **How do you partition the quarters so that you can win them all?**

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
```



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Thank you

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