Computer Programming

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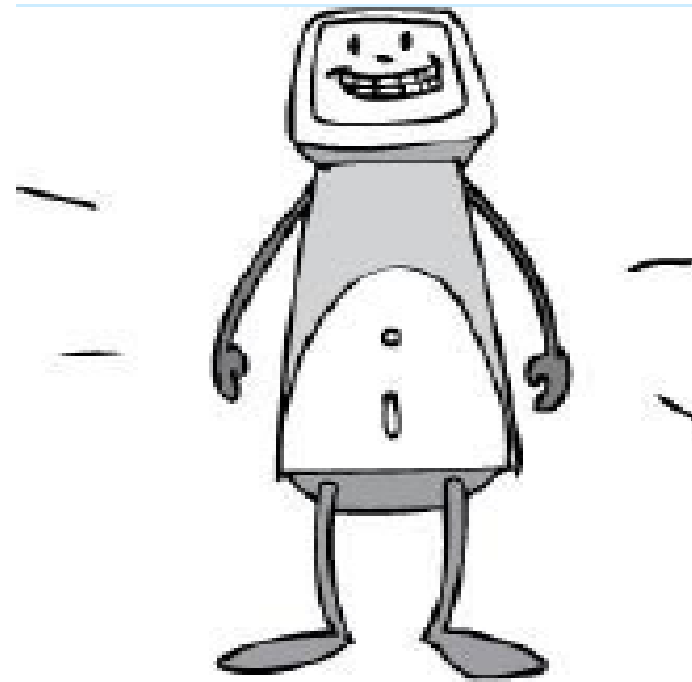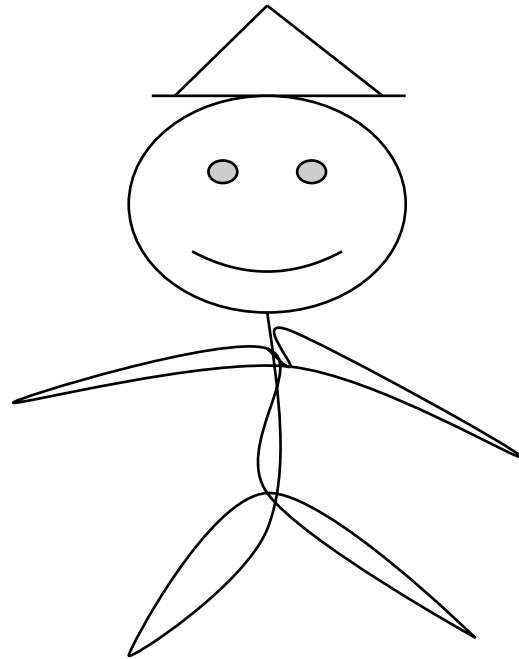IIT Bombay

Session: Mr Buddhuram Dumbo

Recap

- Computer can handle numbers
- It can
    - Collect input values,
    - Calculate new values using its computational abilities
    - Give us desired results as output values
- It can operate only when a 'program' is given to it
    - Program is a set of instructions
    - Computer first reads and understand the entire program
    - It then executes the instructions in specified order

Overview of This Lecture

- A conceptual model of the computer
    - Mr. Buddhuram Dumbo
    - Dumbo's tools
    - How to instruct Dumbo
       (Writng a program for Dumbo)
    - Input, Output, and Assignment instructions
    - A declarative instruction

Buddhu Ram Dumbo
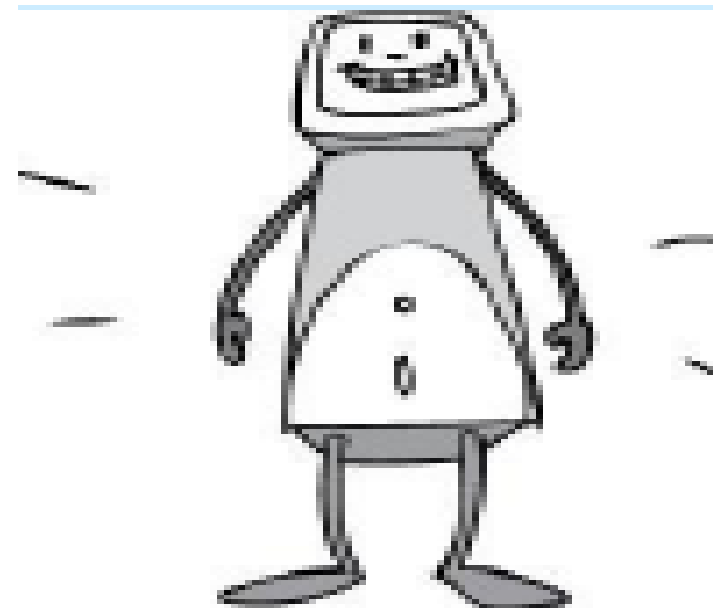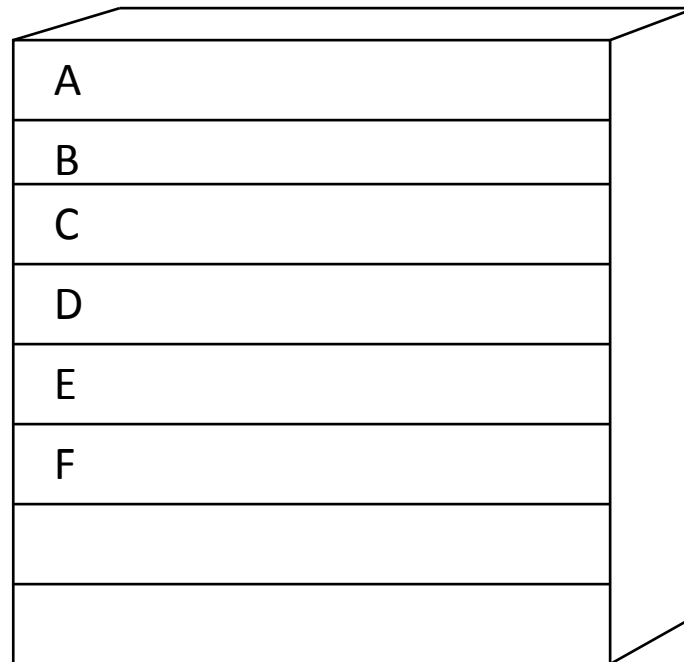
Mr. Dumbo has poor memory

- Mr Dumbo cannot remember anything in his head

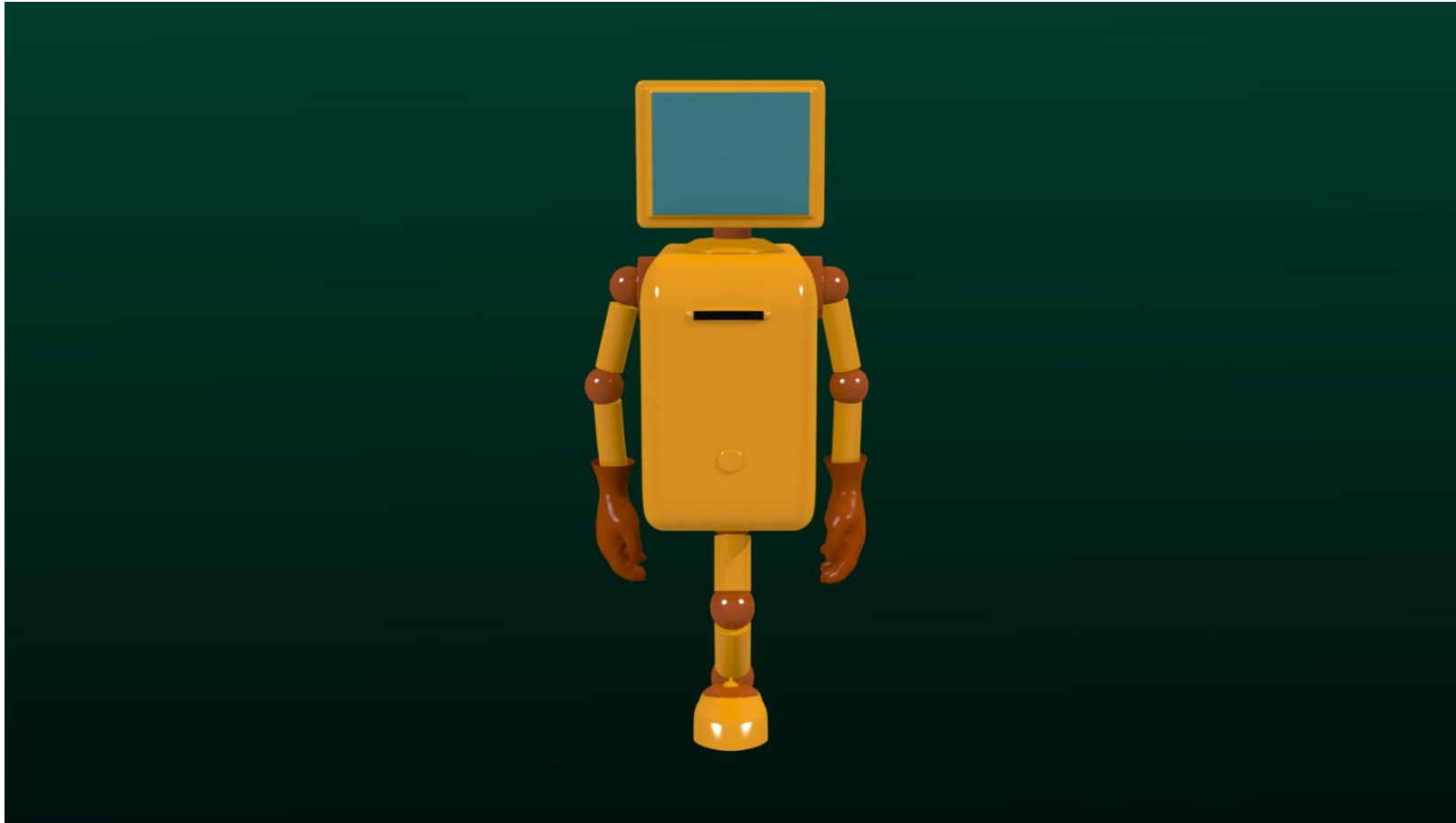# Mr. Dumbo uses a special device as memory

- Dumbo uses a cupboard with drawers serving as memory locations

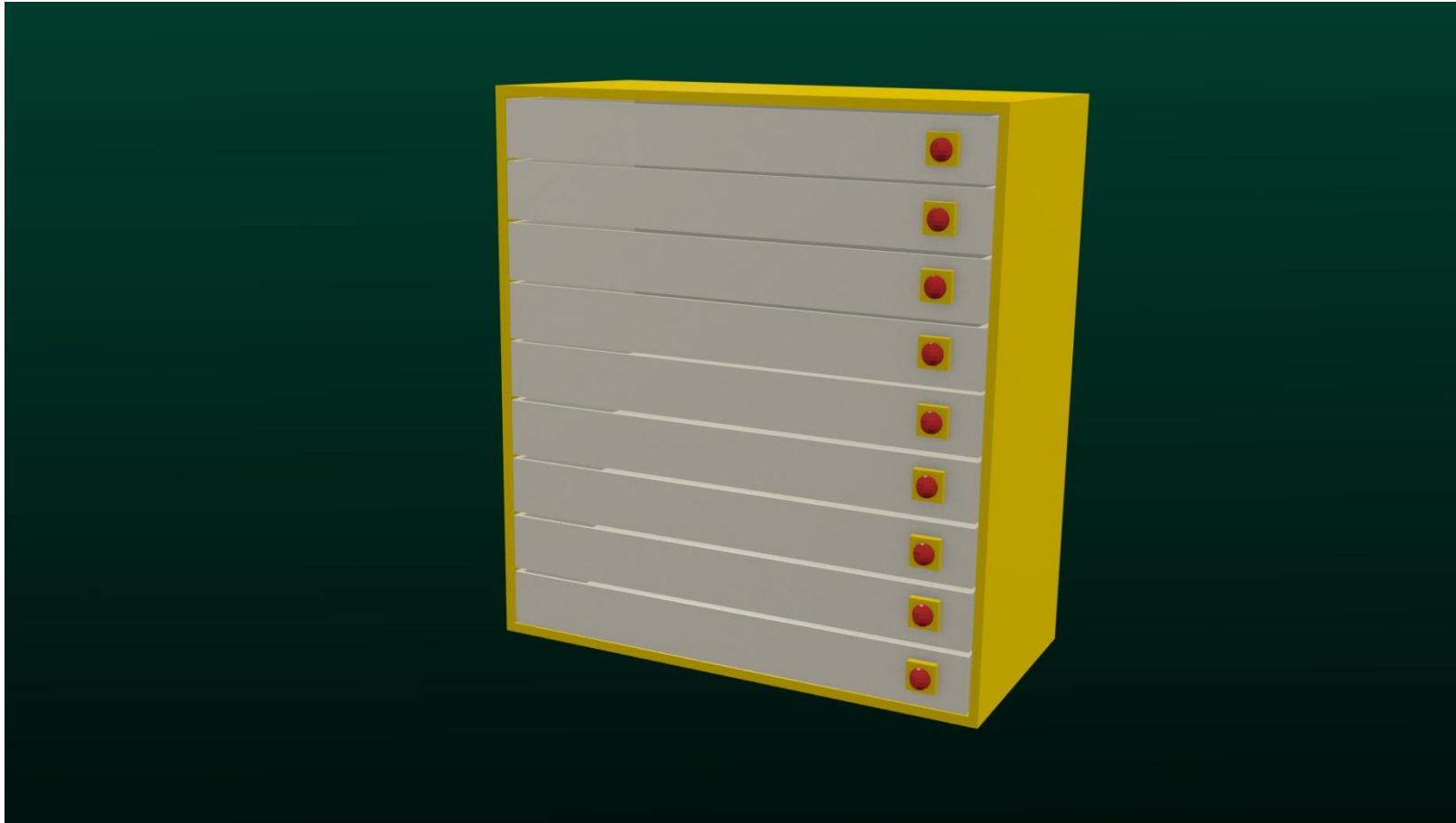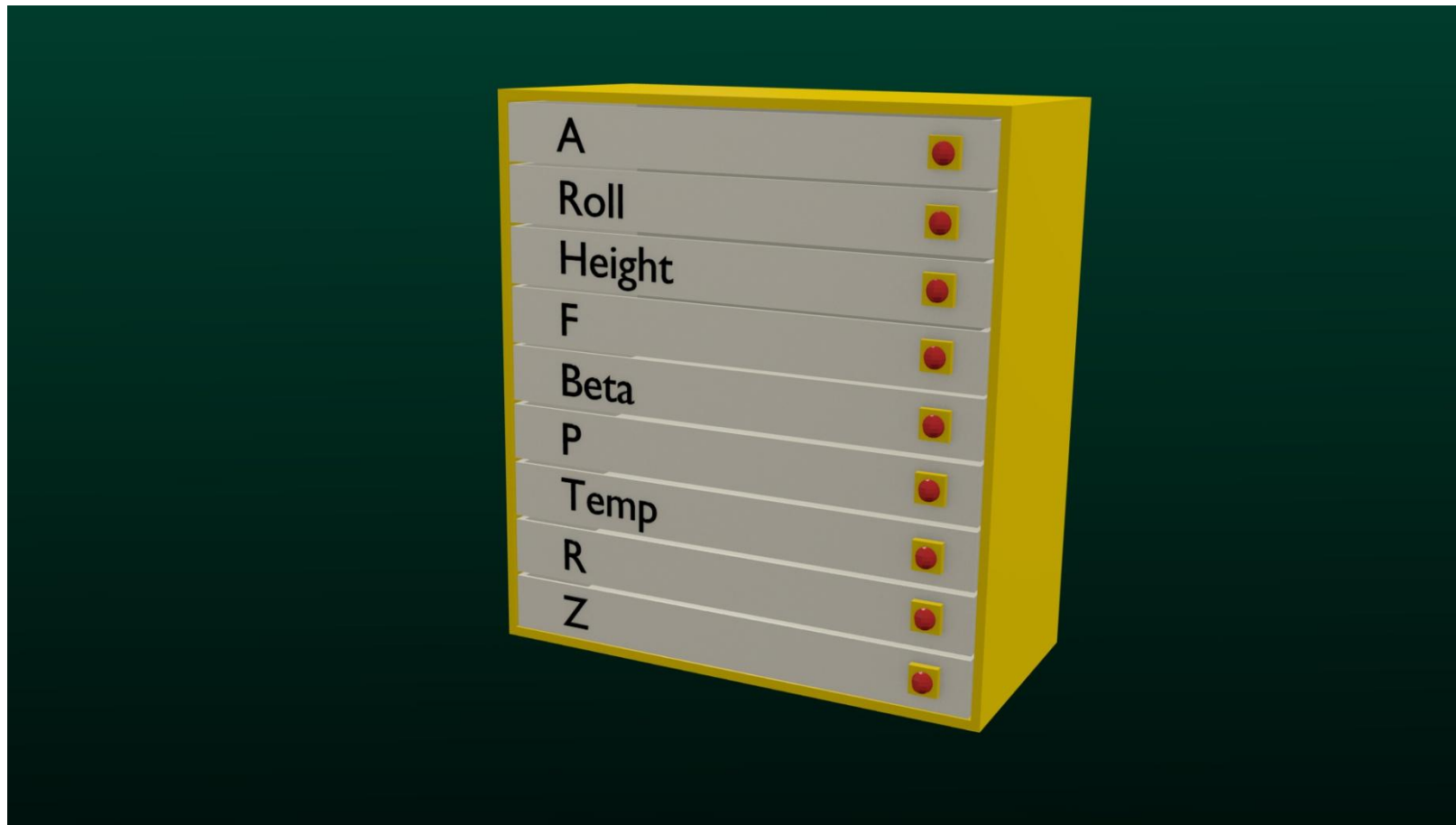**Dumbo's memory**

A
B
C
D
E
F

Dumbo and his tools

Dumbo and his tools

Dumbo and his tools

Dumbo and his tools

Dumbo and his tools

Dumbo and His Tools

- Animation showing Dumbo's [tools](#)

Instructing Mr. Dumbo

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- The 'instructions' to be written for Mr. Dumbo, can be
  - To get an input value from us, and to store it in a named location, say X, we will write the following instruction
    ```
    Input  X
    ```
  - To give us an output value, from a named location, say Y, we will write the instruction
    ```
    Output  Y
    ```
  - To perform a computation, say A-B, and to assign the calculated result value to a named location, say R, we will write the instruction
    ```
    R = A - B
    ```

A note on the 'Assignment' Instruction

- The instruction $R=A-B$ performs two distinct sub-tasks

- One sub-task deals with the intended calculations, and the other deals with storing the result of the calculations

- These two sub-tasks are written on two sides of '=' symbol
  - A computational expression on RHS
  - The name of a location on LHS

- This instruction is said to perform an 'Assignment' operation
  - It assigns a new value to R

A Declarative instruction for Mr. Dumbo

- We will use several 'names' in our instructions
  - Such as `A, B, R,` etc.
- Dumbo has to associate these names with specific drawers
- It is important to tell Dumbo about all such names we use
- We design a 'declaration' instruction

    `Use locations A, B, R`

- While 'Compiling' the program, Dumbo will label his memory drawers with these names

A program for Mr. Dumbo

```
Use locations A , B, SUM;
Input A;
Input B;
SUM = A + B;
Output SUM;
```

Summary

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- We got introduced to Mr Buddhuram Dumbo, who has
  - A set of drawers serving as memory locations
  - A cart to carry input and output values
  - A Workbench to perform computations
- We also defined how to write a program for Mr. Dumbo
- Instructions in a program can be for
  - input,
  - Output
  - Assignment
- A declarative instruction, to announce names we use