

# **Computer Programming**

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#### Session: Computational Procedure





- We have seen
  - Written procedures for complex activities
  - Procedures must first be understood, then executed





- A Computational Procedure
- How a 'Program' would be executed by a Computer



### Problem

- A tank has been erected in our yard to store water
- We want to paint it, to prevent rusting
- Given the painting charges in Rs. per sq. meter, what will be the cost of painting the entire tank, along with its top cover?

## Calculating the Surface Area





Calculating Surface Area ...



- Surface area of a tank to be painted
  - (radius r and height h)
    - = area of the outer surface
      - + area of the top circular cover
- Area of surface =  $2\pi rh$
- Area of circular cover =  $\pi r^2$



- Get from me, value of painting price P in Rs per sq. meter
- Get from me, values of radius R, and height H
- Calculate area A

 $A = 2\pi R H + \pi R^2$ 

• Calculate cost C

C = PA





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• Calculate cost C

C = PA

• Give me the value of C





- We write procedures to be executed by a computer
- Such procedures are called 'Programs'
- A computer is capable of doing the following:
  - First 'read' the entire program and 'Understand' all instructions ('Translation' or 'Compilation')
  - Carry out instructions of the program, one by one, in the stipulated order ('Execution')



 Next slide shows a test program. Instructions in that program can be easily carried out by a human

- Compile and execute that program.
- Try to work as correctly, and as quickly, as a computer can!!
- How fast can you be?

# Good luck

Compile and Execute this program



- 1. Raise one of your hands
- 2. Put down your raised hand
- 3. Close your eyes and count loudly up to 10
- 4. Loudly say 'Ha Ha Ha'
- 5. Write the value of Pi (  $\pi$  ) correct to 3 decimal places
- 6. Speak loudly the name of your mother tongue
- 7. Clap three times
- 8. While executing this program, ignore all earlier instructions and just raise both hands





- Ability to handle numerical values
  - 257, -78, 4.675, etc.
  - Large and small values (1.4E18, 0.356E-9)
- Ability to carry out numerical operations
  - Add ('+'), Subtract ('-'),
  - Multiply ('\*'), divide ('/'), ...



- Ability to collect values from as input, and to give back to us the calculated results, as output
- Ability to store these values temporarily
  - Notion of a 'memory' location
  - Ability to refer to locations by symbolic names





- Computer Programs are usually computational procedures
- These will generally Involve
  - Collecting some input values from the user
  - Performing calculations and getting some 'result' values
  - Giving back the result values as output