

TUTORIAL 2

PROGRAM DESIGN

Selection with Flowcharts and Pseudocode

What is a flowchart

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- Flow charting is the first step we take in understanding a process
- Flow charts provide a visual illustration, a picture of the steps the process undergoes to complete it's assigned task
- Organized combination of shapes, lines, and text

Symbols in Flowcharts

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There are 6 symbols commonly used

1. Terminal :

indicates the start / end
of the program



2. Input/ Output

Use for Input/Output
(I/O) operation.



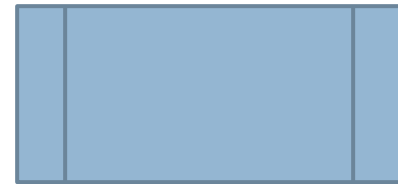
3. Process

An internal operation
(any processing taking place)



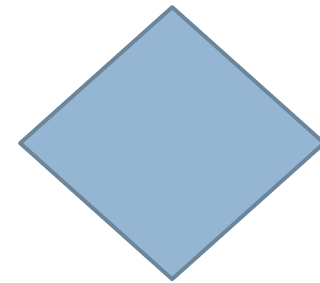
4. Pre-defined Process:

A named process such as a sub-routine or a module.



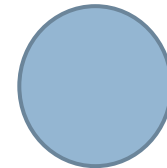
5. Decision:

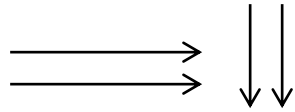
Decision making and branching



6. Connector:

A jump from one point in the flow to another





control flow

Control Structures in an Algorithm

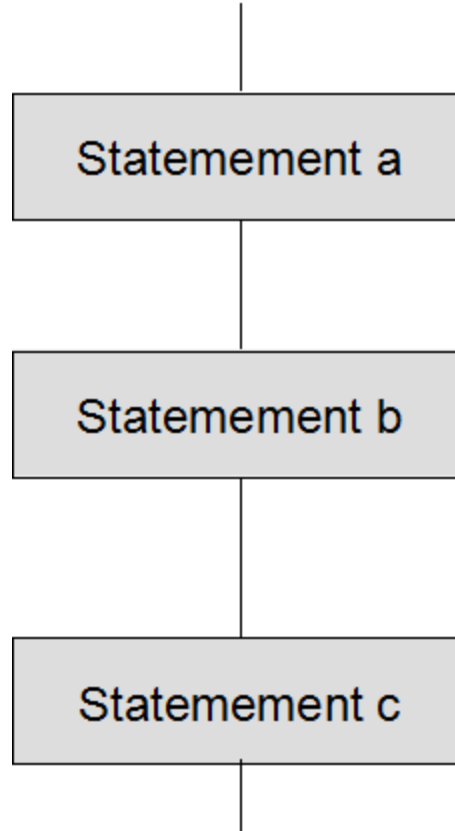
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1. Sequence
2. Selection
3. Iteration

Sequence

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- sequence is a set of instructions that are in a logical order, ie. one instruction after the other



Example 1 – Calculating Years and Days

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Write an algorithm to convert the input minutes into the number of years and days.

Eg:

Input(mint) : 527040 (equivalent to 366 days)

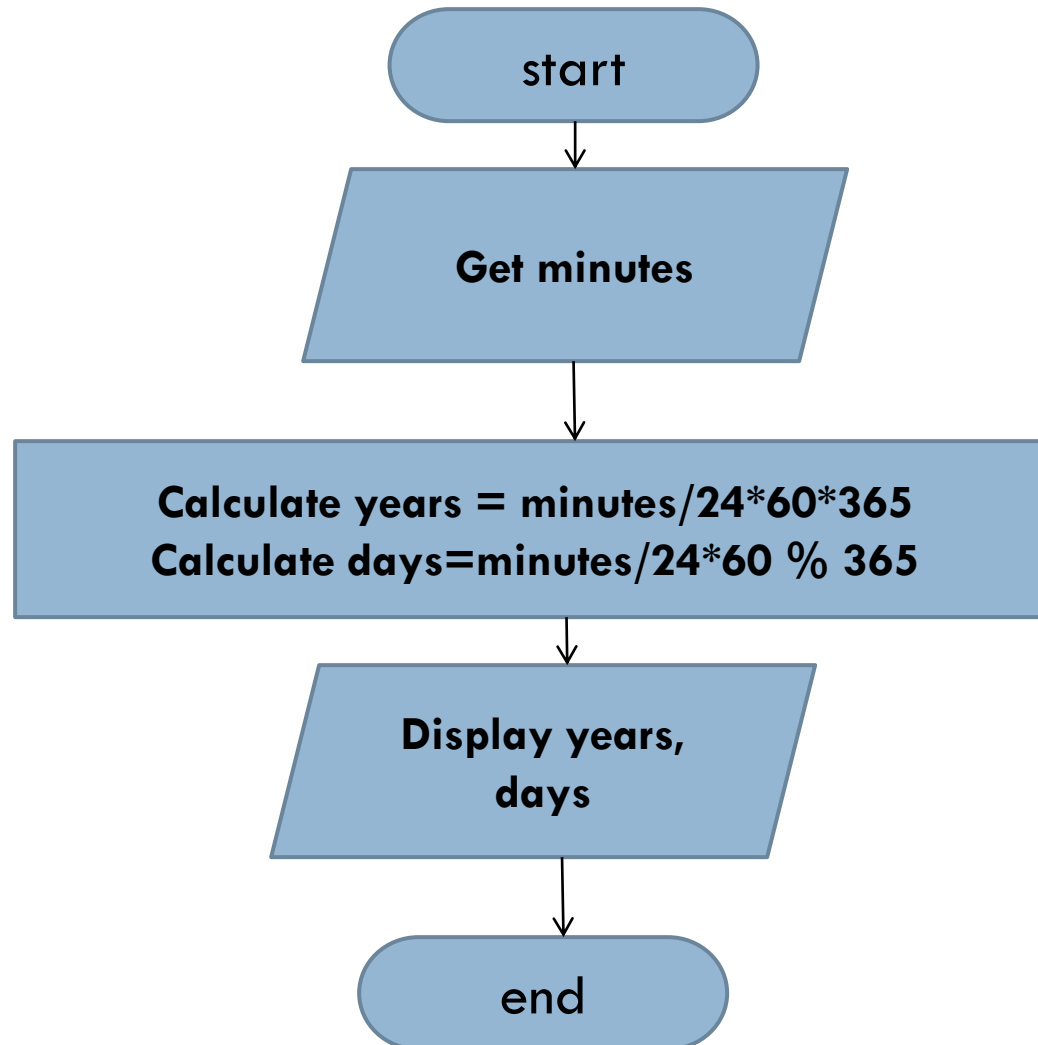
Ouput : 1 year 1 day

1. Read minutes from the user
2. Calculate the years as
 $\text{minutes} / 60 * 24 * 365$
3. Calculate the days as $(\text{minutes} / 60 * 24) \% 365$
4. Display the years, days



Flowchart

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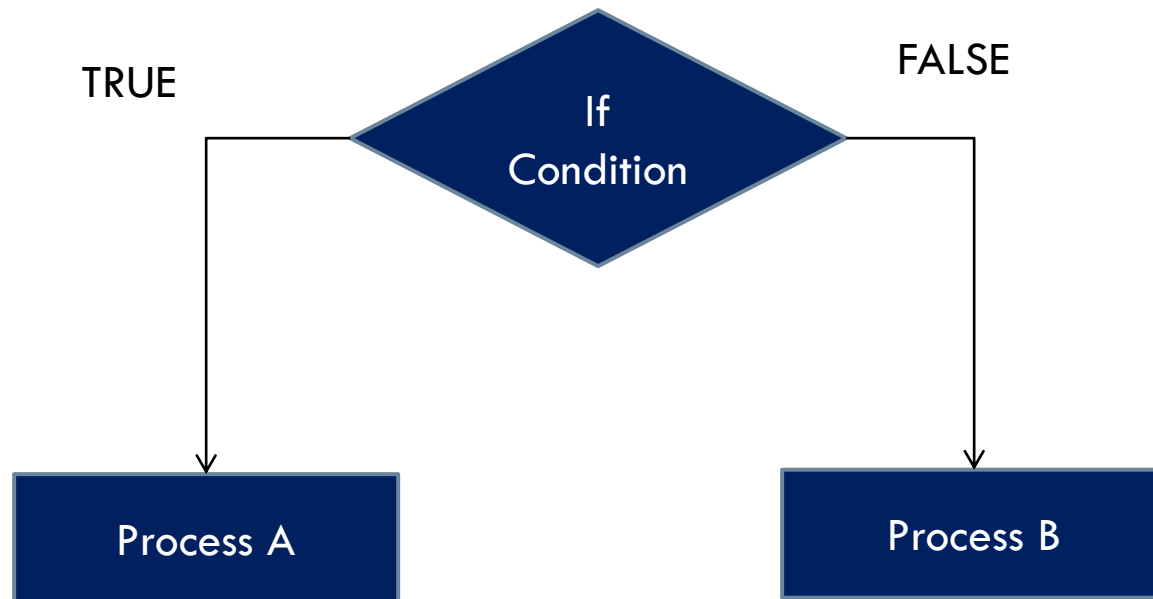
Selection

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- The selection structure is where statements can be executed or skipped depending on whether a condition evaluates to TRUE or FALSE
- There are three types of selection structures
 - Simple IF – ELSE
 - IF (NULL false Condition)
 - Switch (or Case)
- Selections may be extended to
 - Nested IF
 - Combined IF Conditions

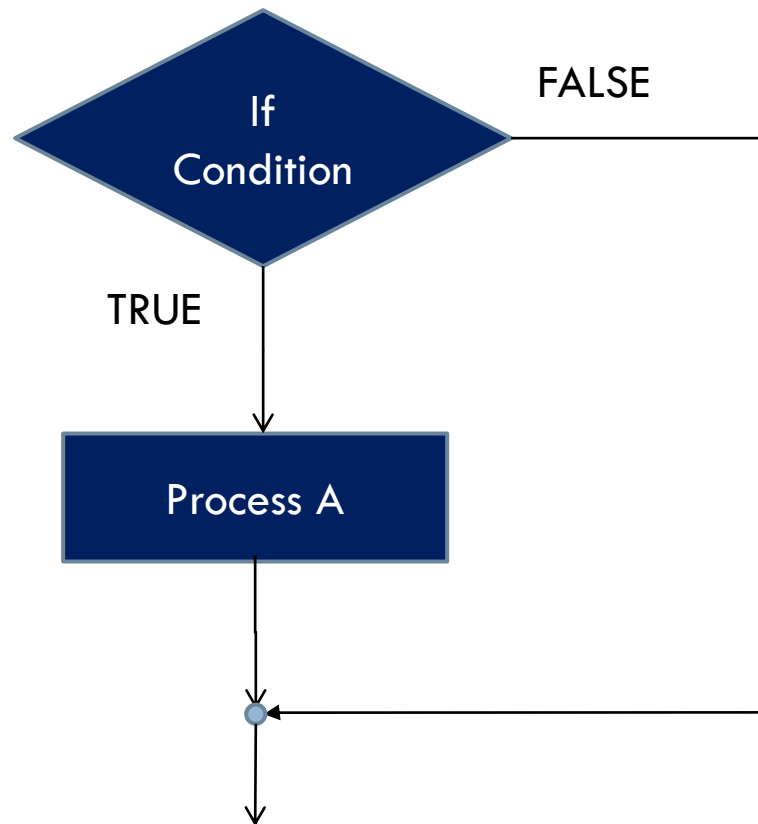
Simple IF-ELSE

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IF (NULL False Condition)

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Pseudocode

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Eg: IF std_gender = "female" THEN
 Add 1 to total_females
ELSE
 Add 1 to total_males
ENDIF

Example 2 - Direction of Numbered NYC Streets

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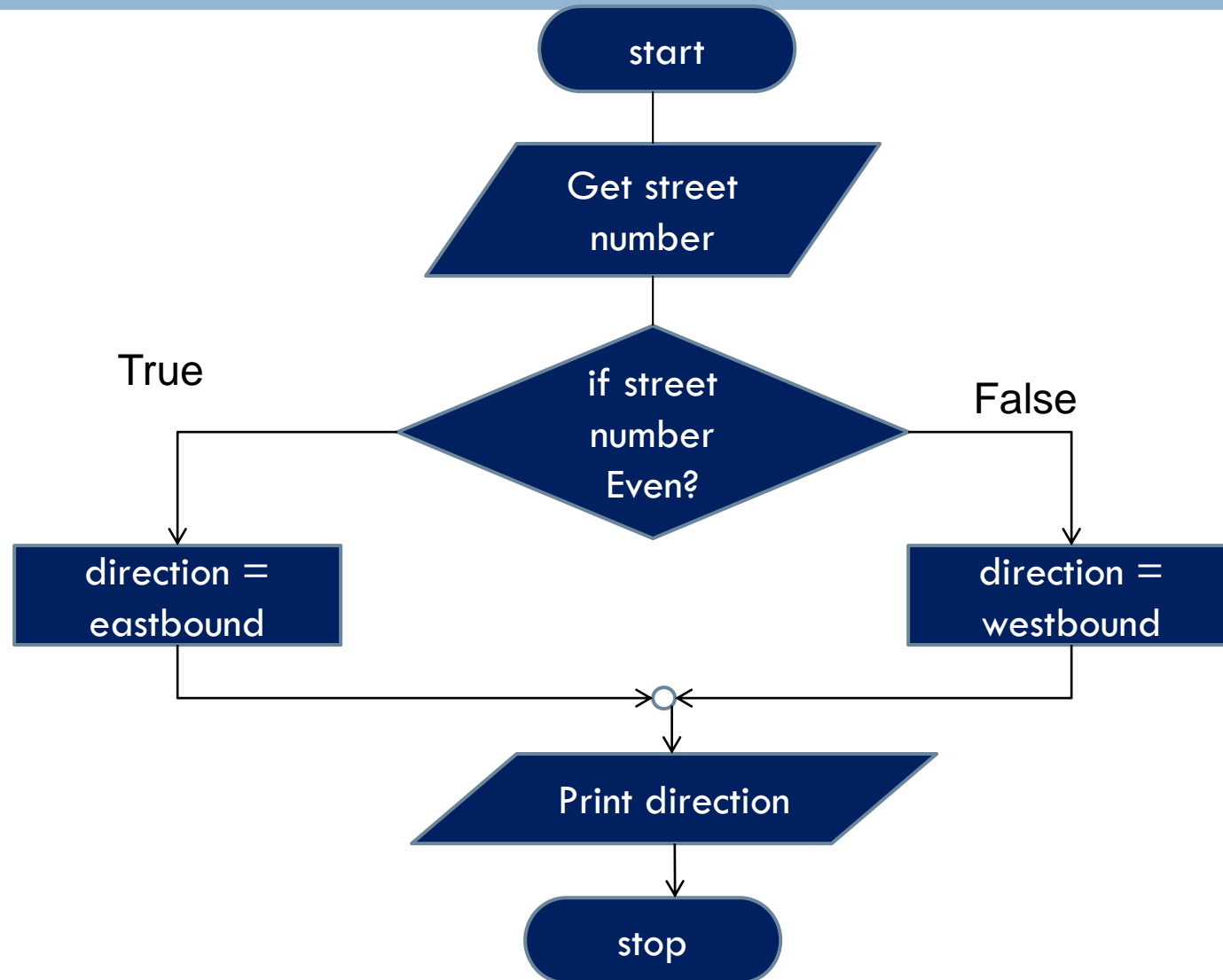
User inputs a street number of a one-way street in New York City, print the direction of the street, either eastbound or westbound, to the screen.

Note:

In New York City even numbered streets are Eastbound, odd numbered streets are Westbound

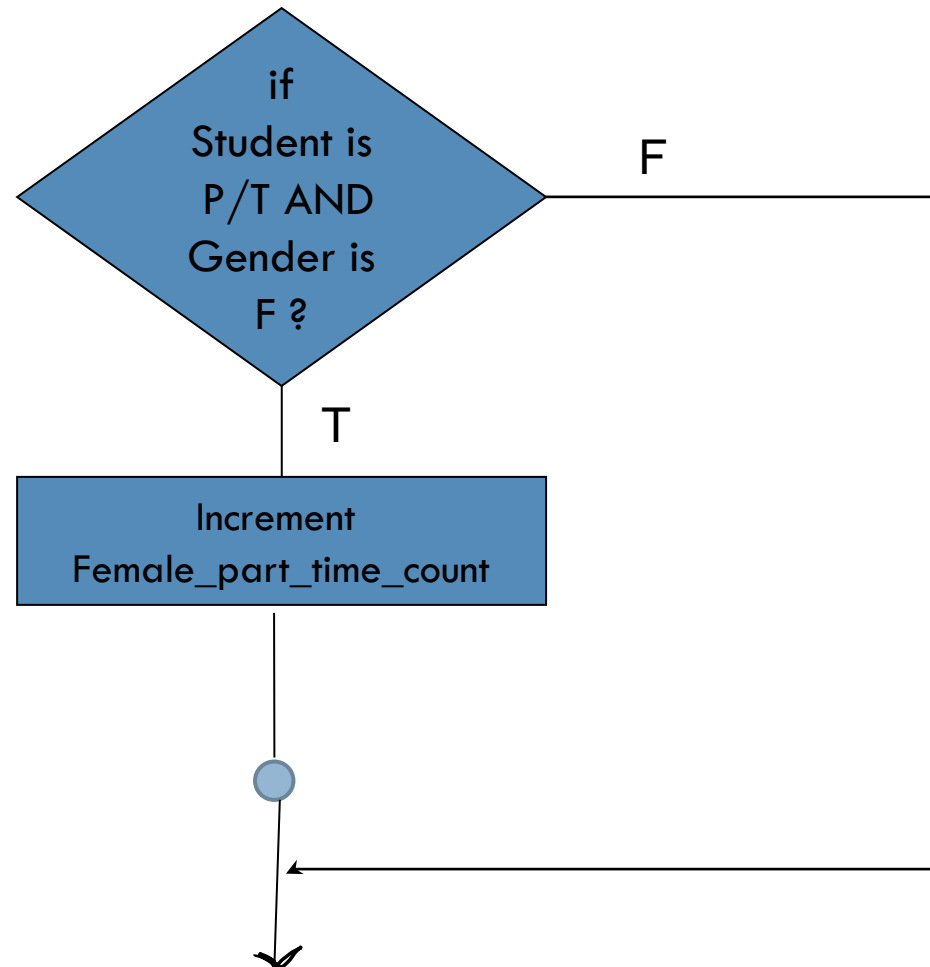
Solution

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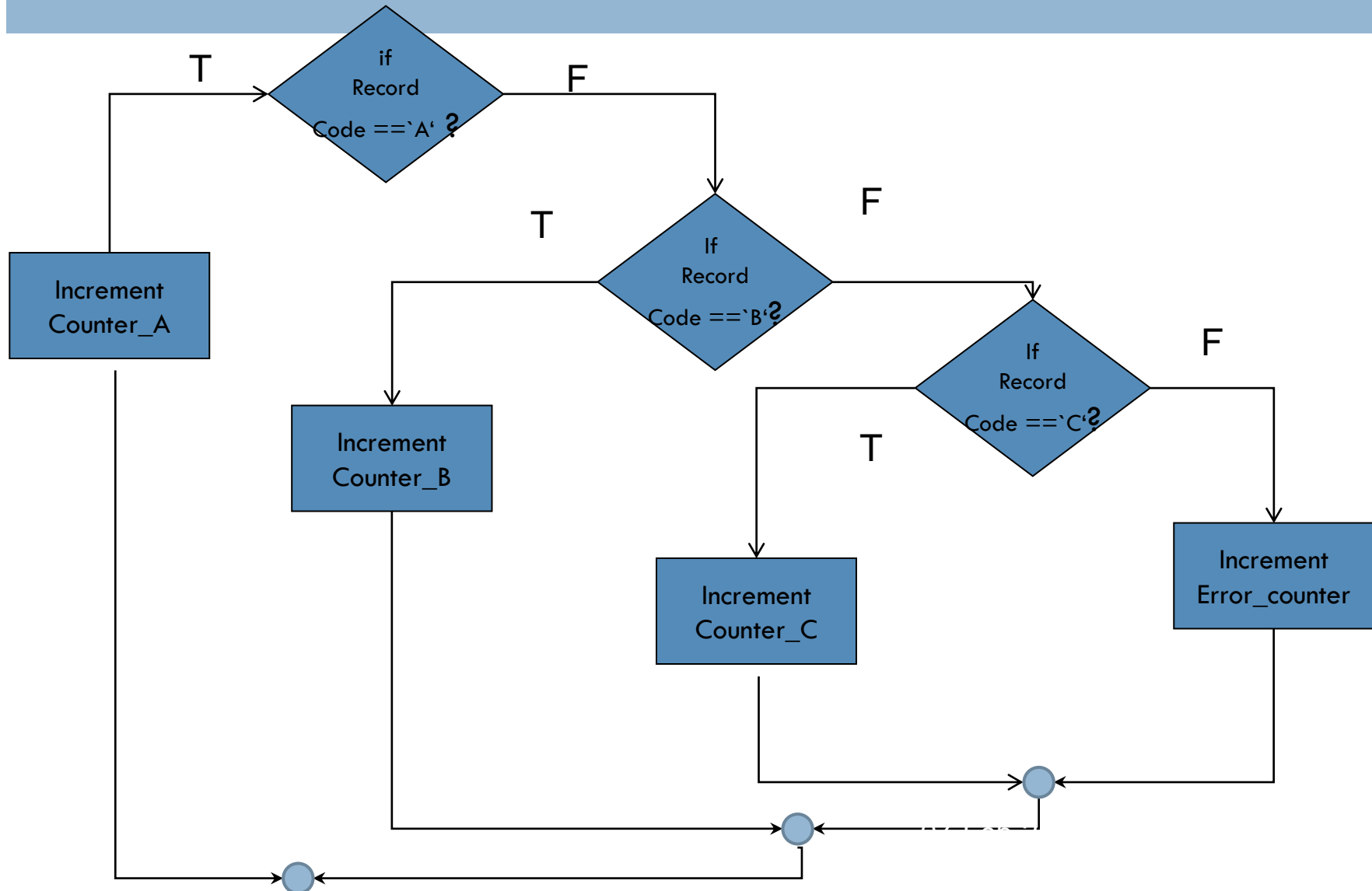
Combined IF statement

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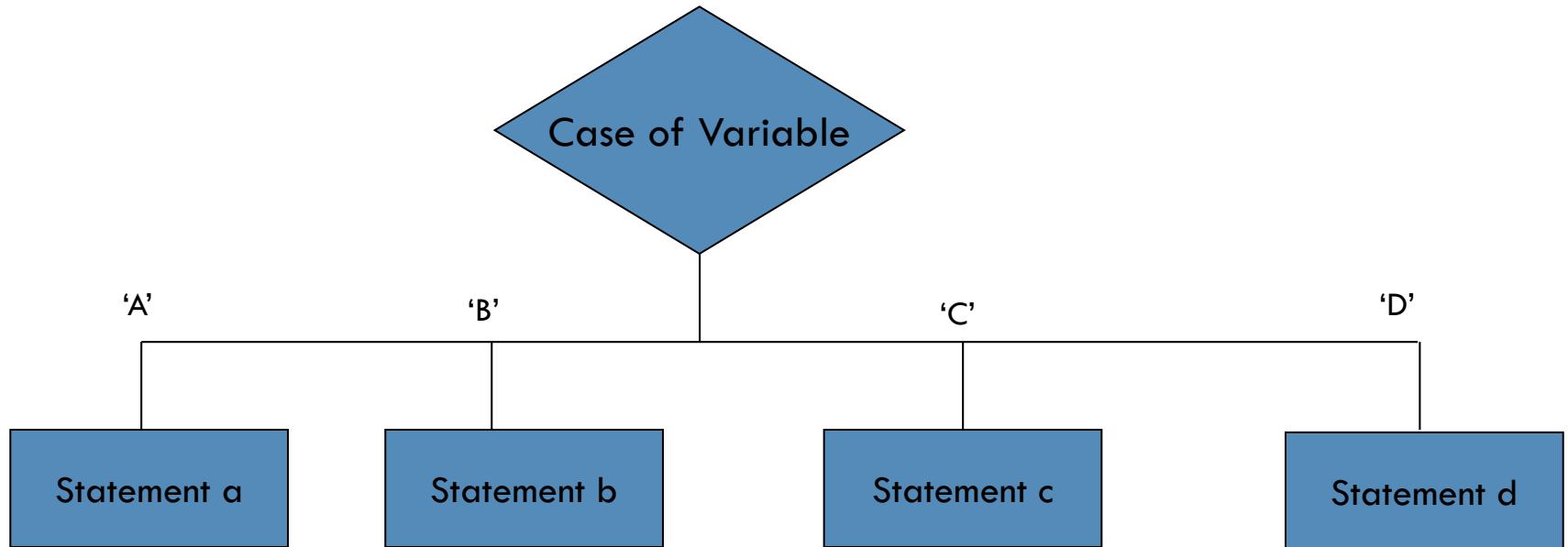
Nested IF statement

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Case Structure

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Example 3 – Pricing Algorithm

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In a pharmacy the final price for the medicine is calculated by applying a tax on the barcoded price. The tax percentages for the medicine categories are as follows:

Category	tax %
A	2.0
B	2.5
C	3.0

Represent the algorithm in flowchart in calculating the price for medicine, if a customer purchases a dozen of capsules where each is marked at \$2.50 in category B.