LECTURE 04
PROGRAM DESIGN

Flowcharts Repetition II

Motivation

This is what the program is supposed to do:

1. Prompt the user to input for a number (not necessarily a positive one)
2. Get the user's input
3. If the user's input is zero, the program quits. Otherwise, keep collecting values and add as we go along.

Number of Repetitions unknown!!

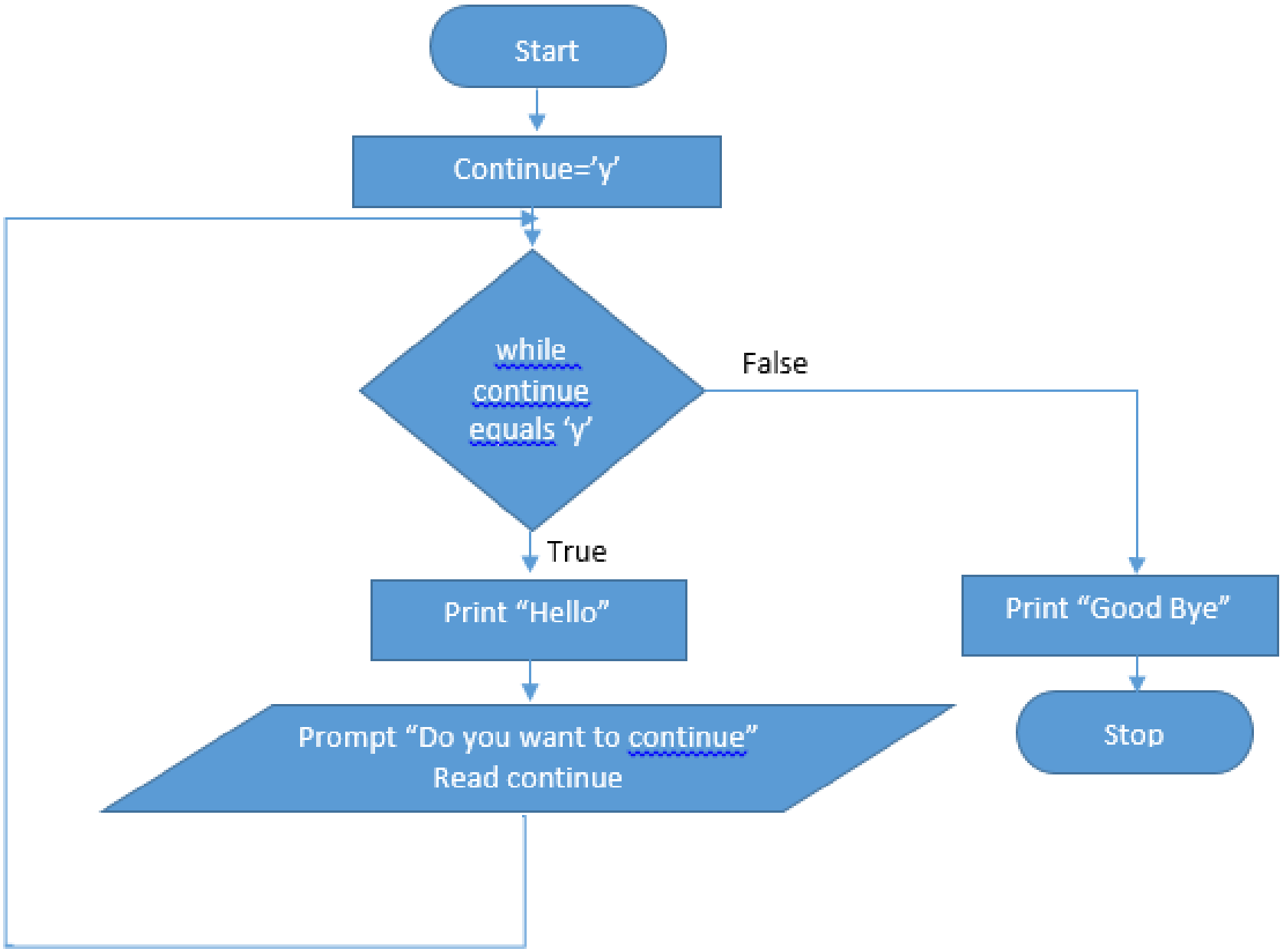
Looping until sentinel value is reached

- In certain programs it is expected to repeat a program block, until a value is read/input by the user.
- This is termed as a ‘Sentinel Value’
- “Sentinel value” must clearly be distinguishable between the other data to be processed.

Example 1 – Printing ‘Hello’

Consider an interactive program that displays ‘Hello’ repeatedly as long as the user wants to continue.

If the user wishes to terminate the program he would enter ‘n’. Then the program should print ‘Good Bye’ and should terminate.


Start
Continue='y'
while continue equals 'y'
False
True
Print "Hello"
Print "Good Bye"
Prompt "Do you want to continue"
Read continue
Stop

Example 2 – Processing Age

Design an algorithm that will accept person's name, age in years and months (eg: 25 years 6 months) and to calculate and display the age in months.

If the calculated months figure is more than 500, three asterisks should also appear beside the month figure.

The program should end when the user inputs 9999 as the persons age in years.

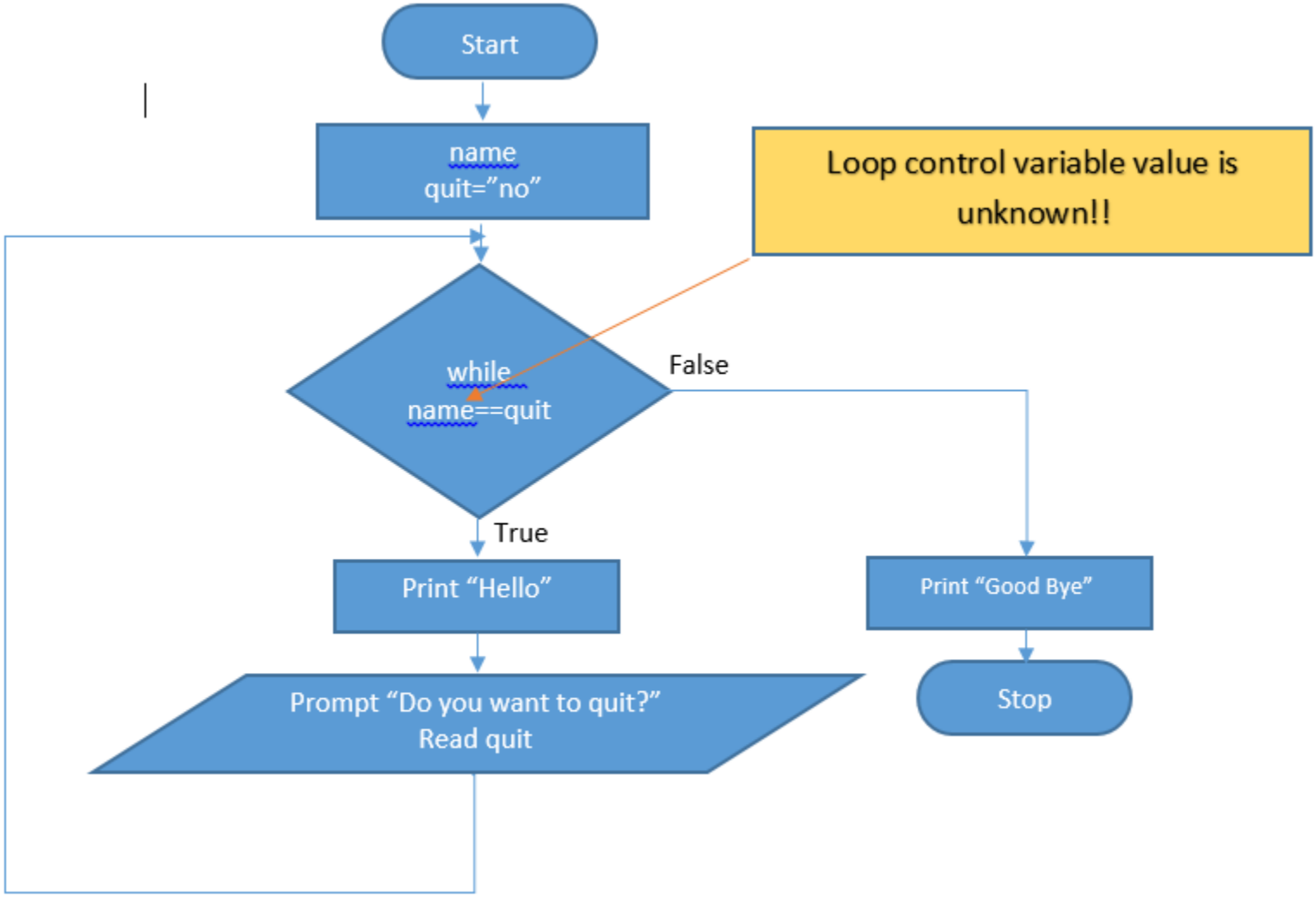
Infinite Loops

1. Executing the statements in the body of a `while` loop must eventually make the condition false
2. If not, it is called an *infinite loop*, which will execute until the user interrupts the program
3. This is a common logical error
4. You should always double check the logic of a program to ensure that your loops will terminate

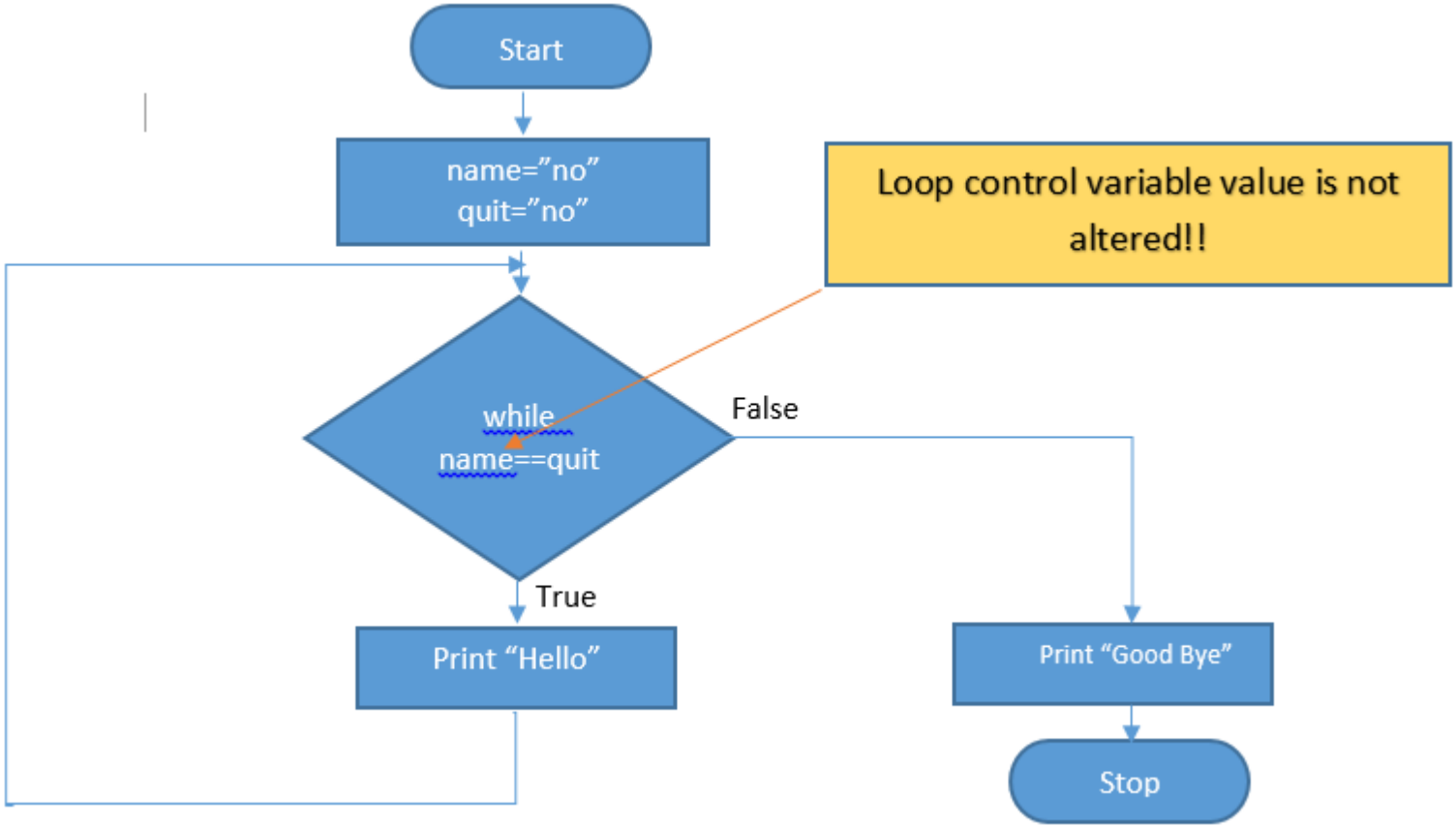
Common Loop Mistakes

1. Neglecting to initialize the loop control variables
2. Neglecting to alter the loop control variable
3. Using the wrong comparison with the loop control variable

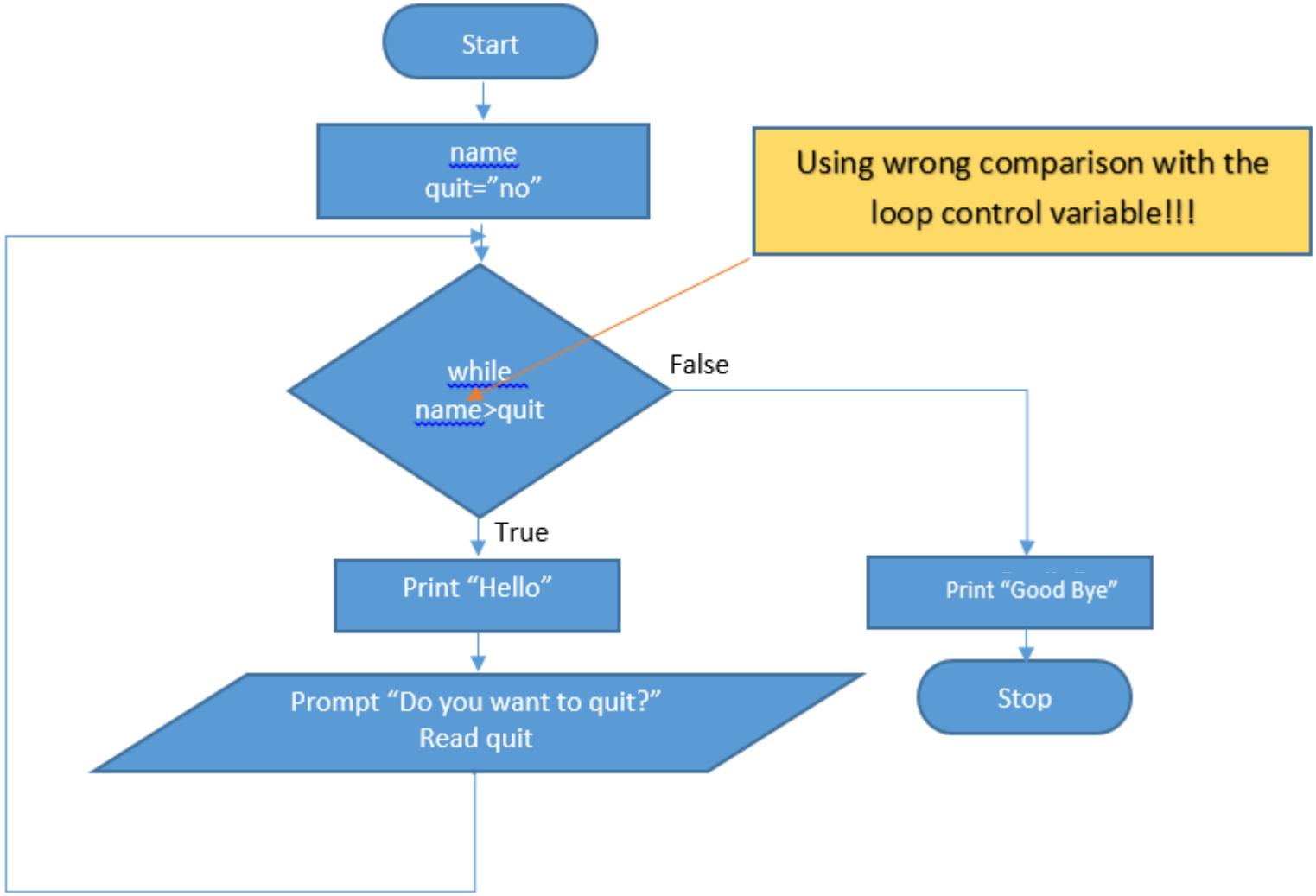
1. Neglecting to initialize the loop control variables



2. Neglecting to alter the loop control variable



3. Using the wrong comparison operator with the loop control variable



Nested Loops

- Similar to nested `if` statements, loops can be nested as well
- That is, the body of a loop can contain another loop
- For each iteration of the outer loop, the inner loop iterates completely

Example 3 – Printing the Apartment Price

A building contains 15 apartment units that will be on rent. Design an algorithm if you are required to print the apartment unit number and price. Rates as follows.

Units	Price per month
1-5	$800
6-10	$1,200
11- 15	$2,000

Example 4 – Printing Building wise Rates

If there are 20 such buildings modify the above flowchart to print the building number, apartment number and the price as the output.

Example 5 – Printing asterisks

Print out a grid of asterisks with dimensions specified by the user.

Eg:

Enter the height of the grid : 3

Enter the width of the grid : 5

Should produce the following output

```
* * * * * * * * * * *

* * * * * * * * * * *

* * * * * * * * * * *
```