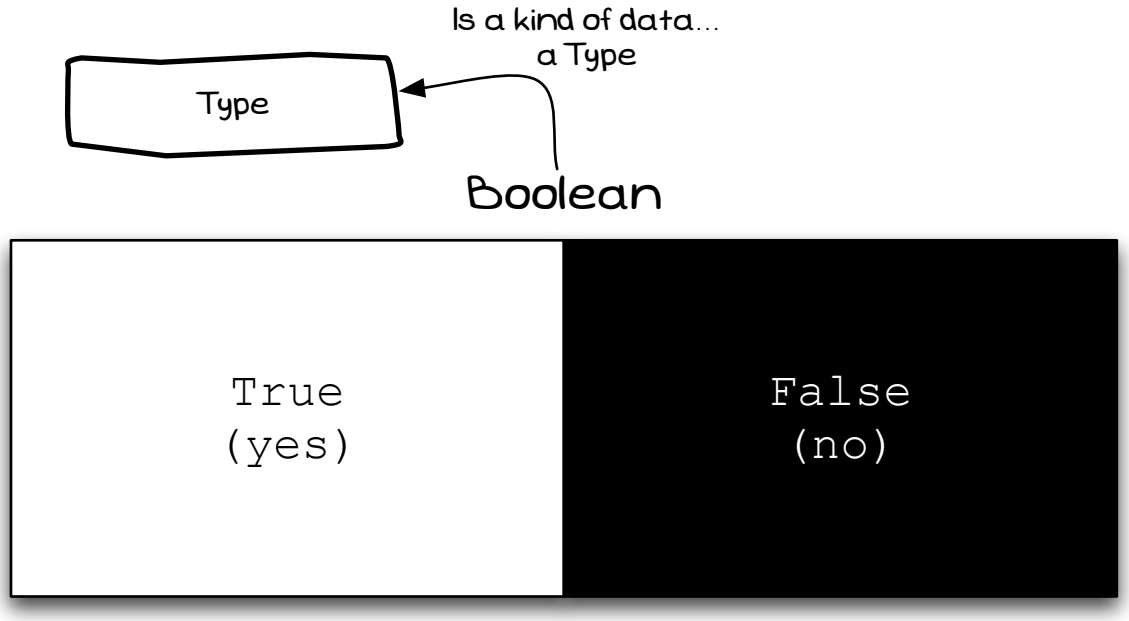
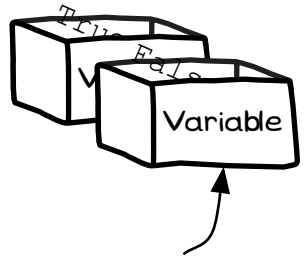
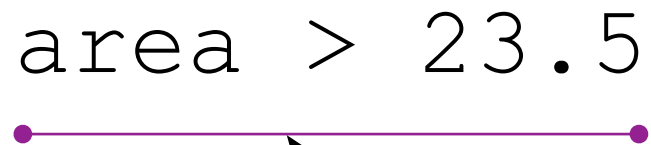
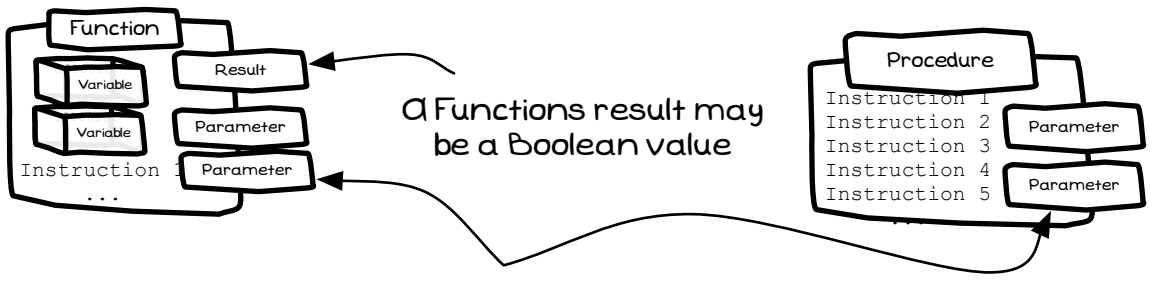



Variables can store Boolean values

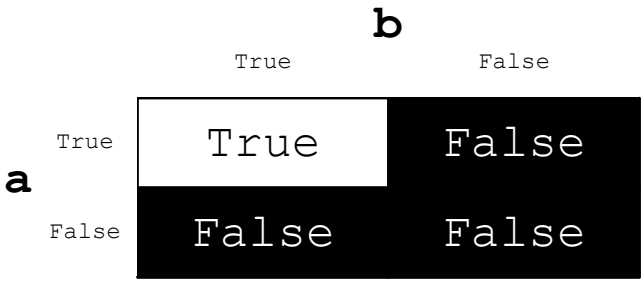



Expressions can calculate Boolean values. The answer is True or False (Yes or No)

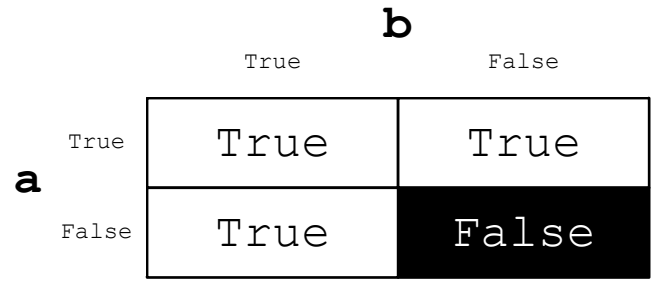



Parameters can accept Boolean values

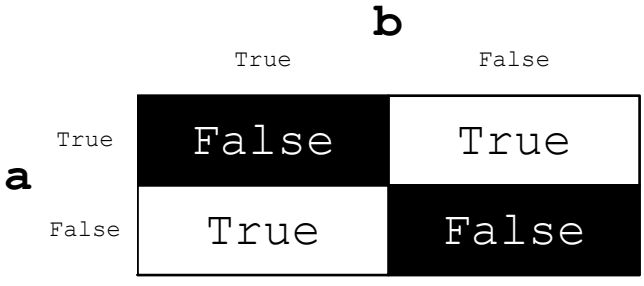
# Logical Operators



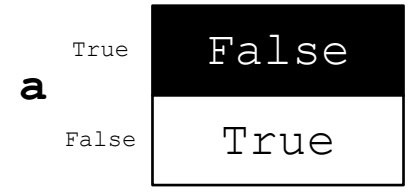

a **and** b



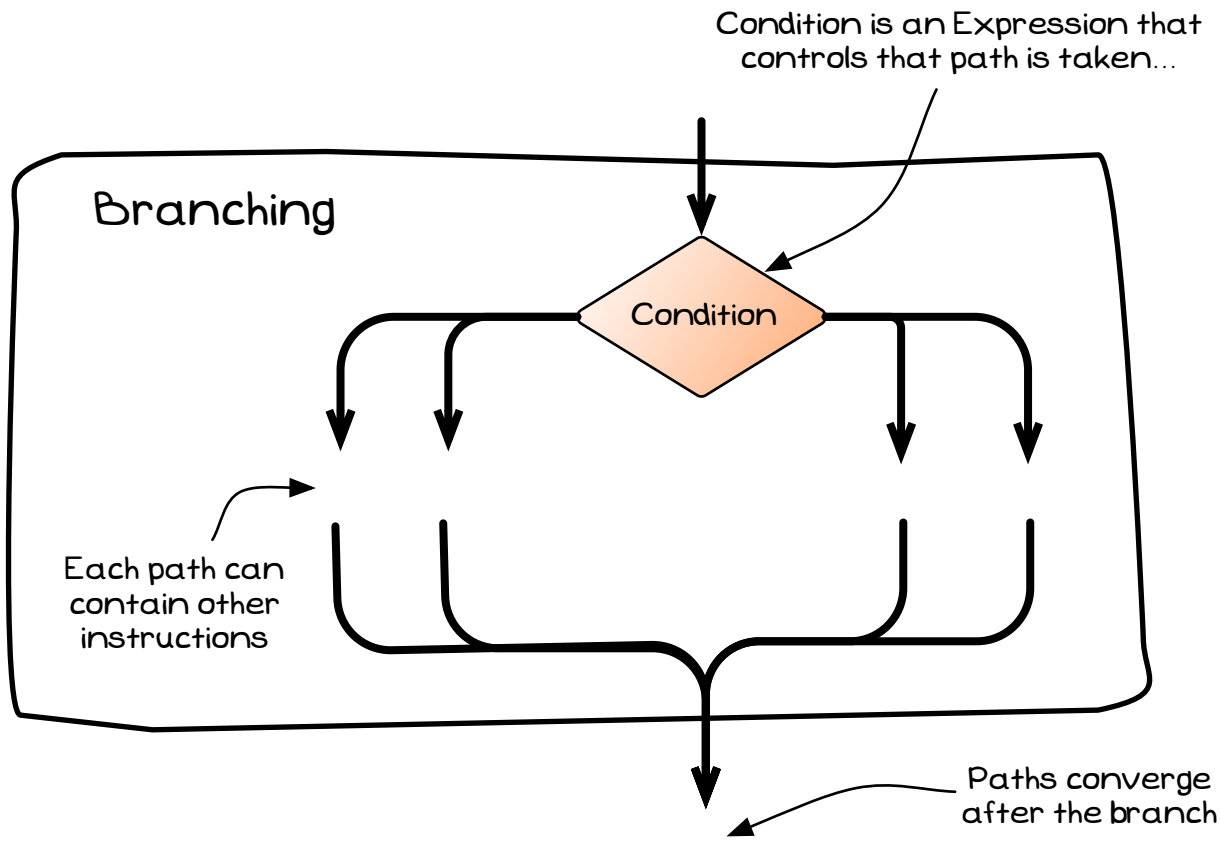

a **or** b

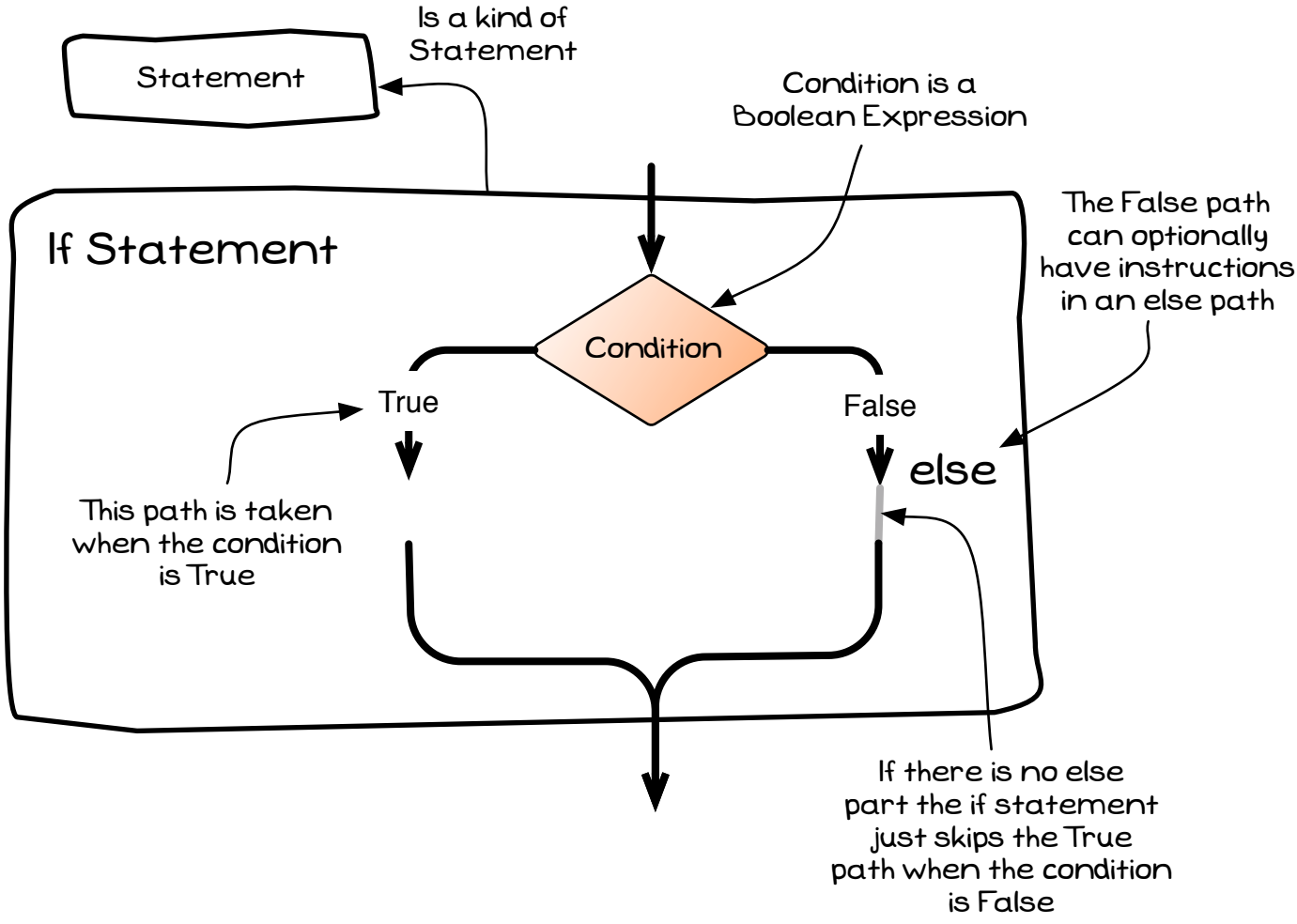


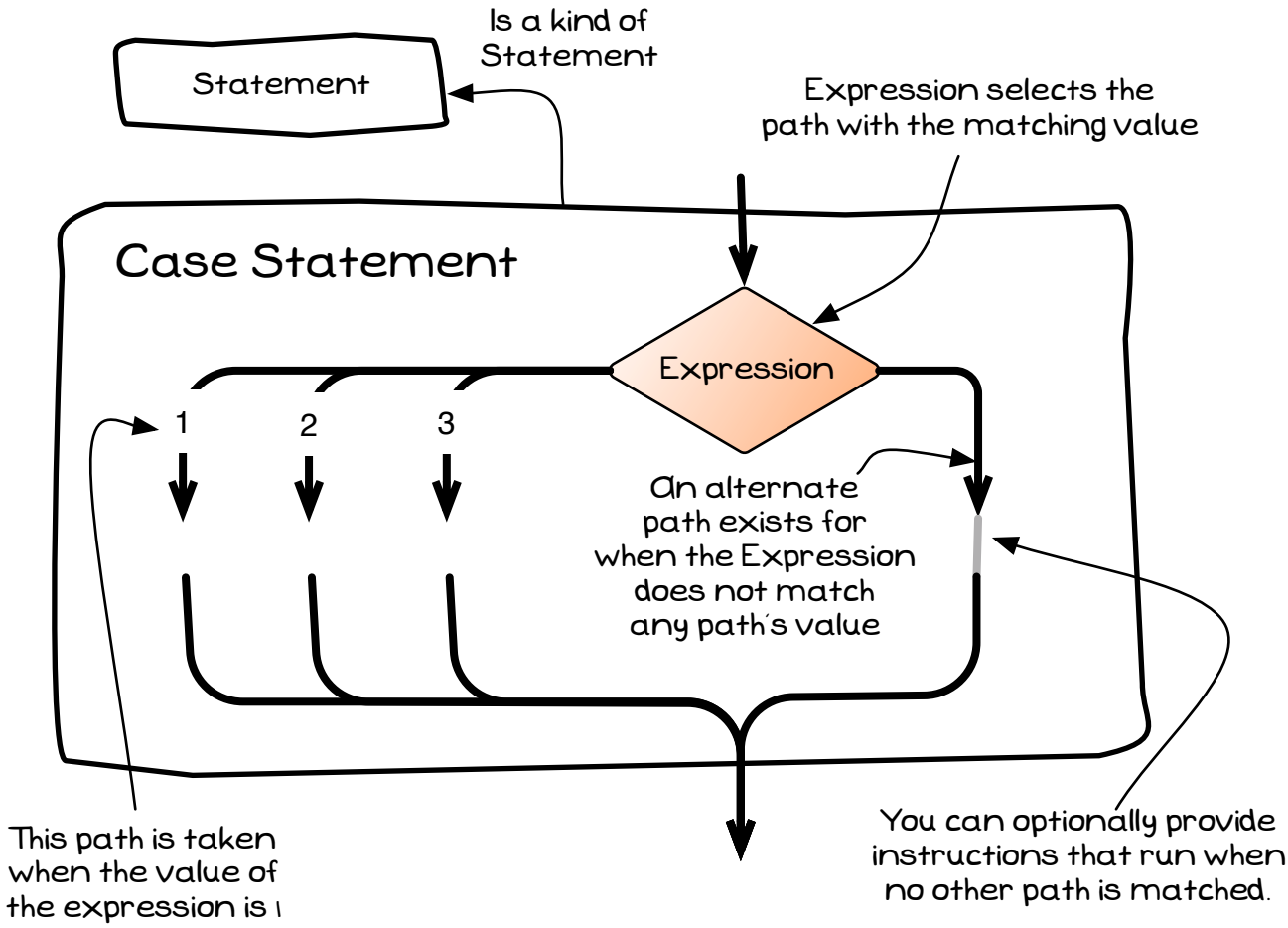

a **xor** b

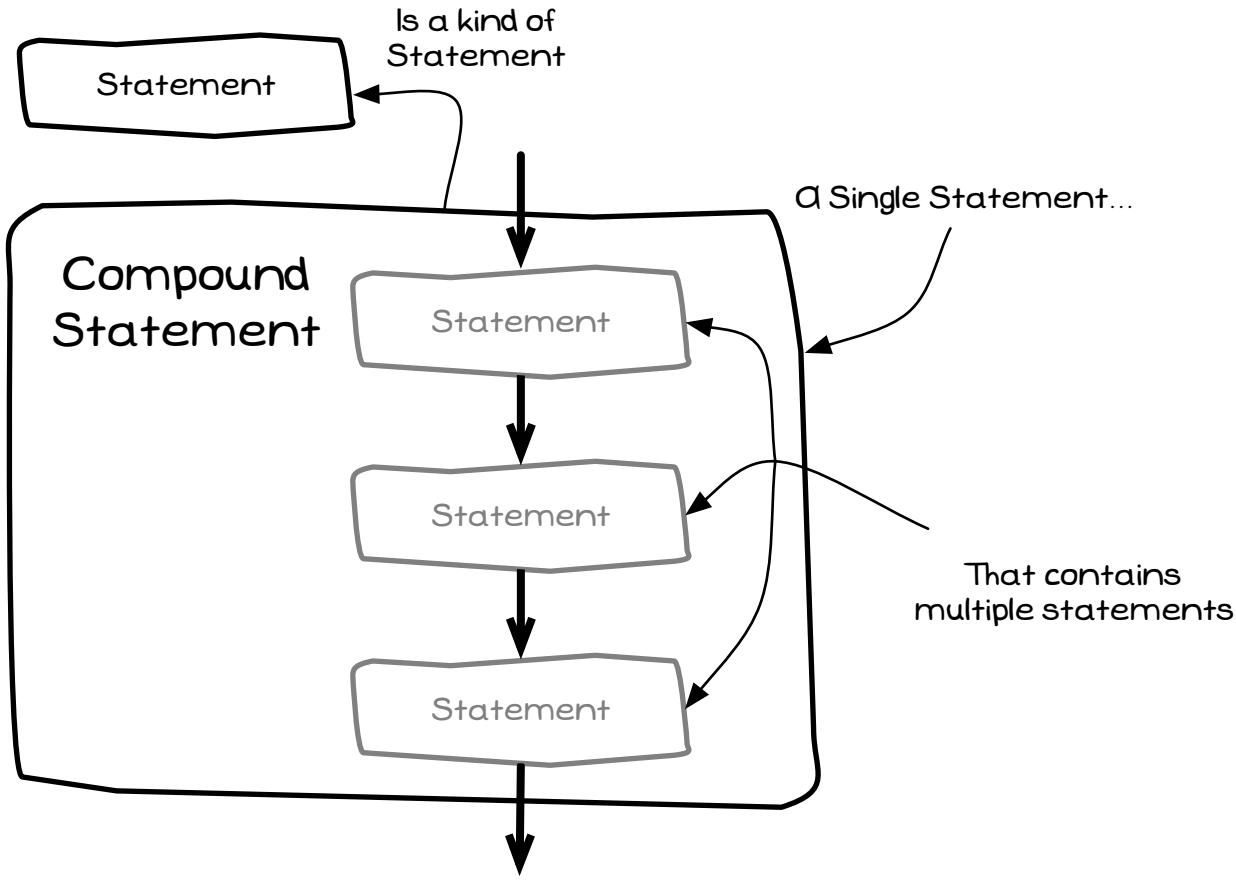


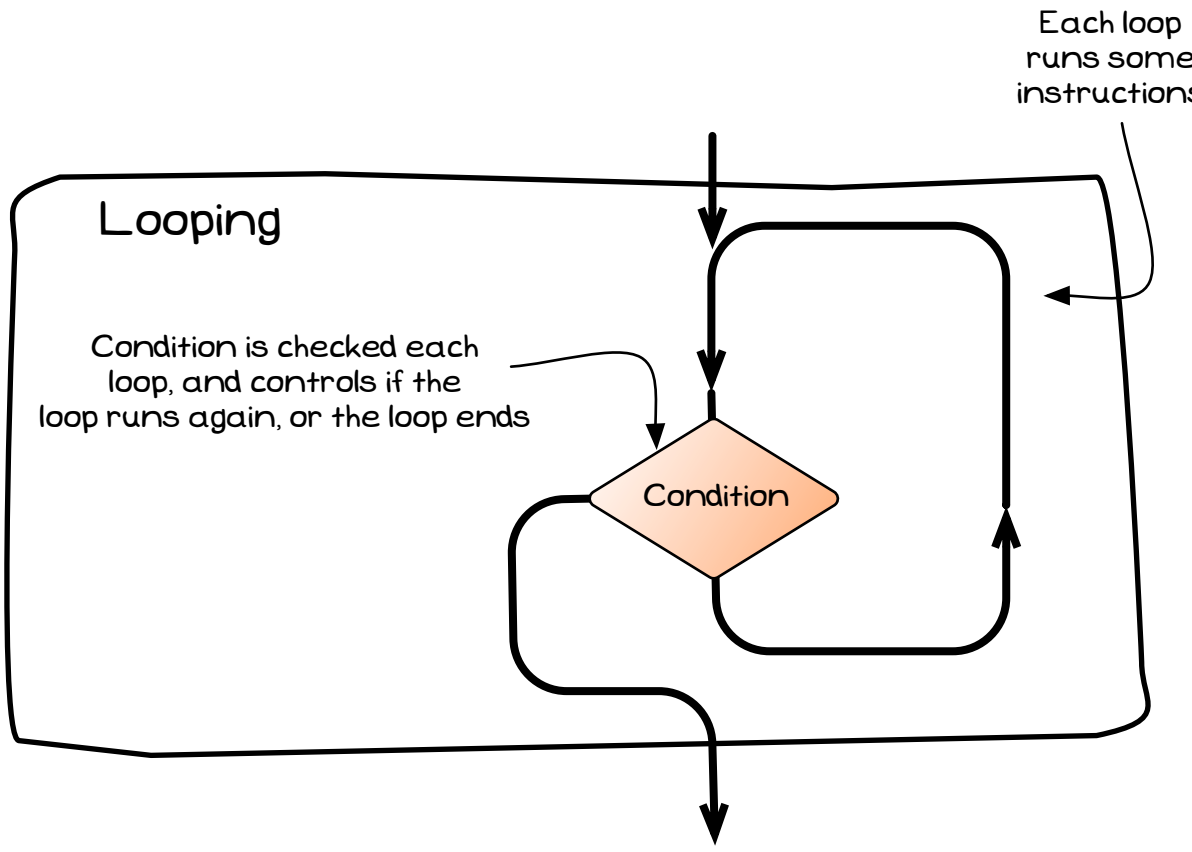

**not** a

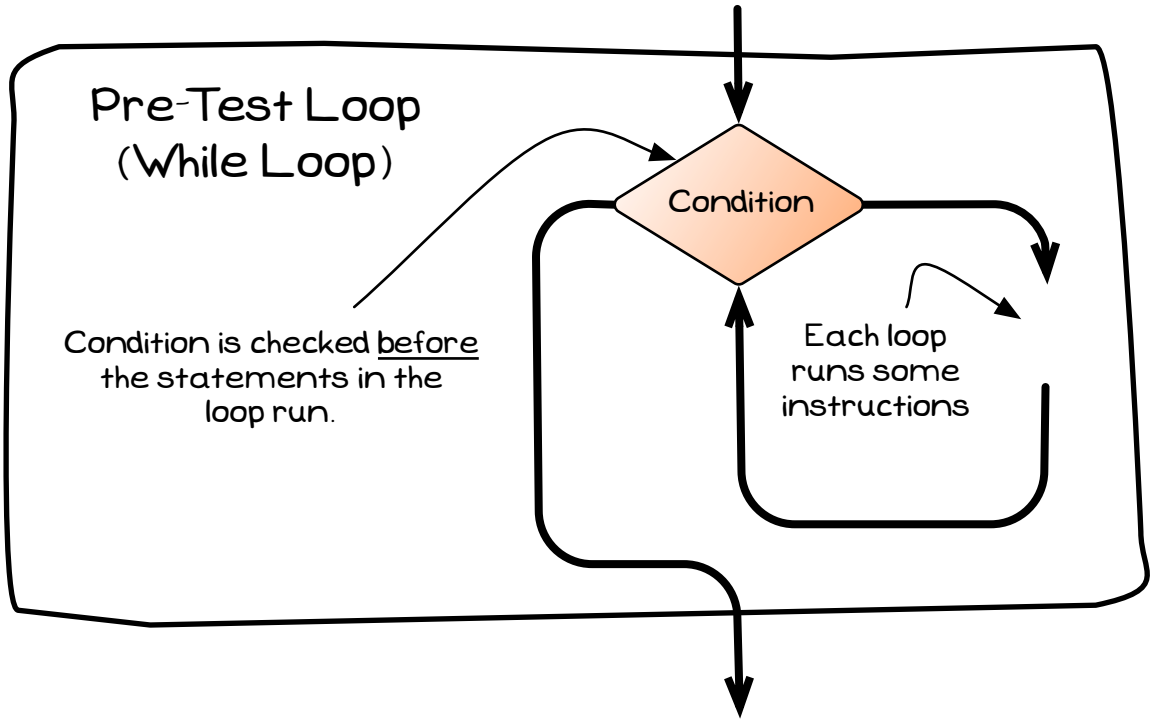

Condition is an Expression that controls that path is taken...
Branching
Condition
Each path can contain other instructions
Paths converge after the branch

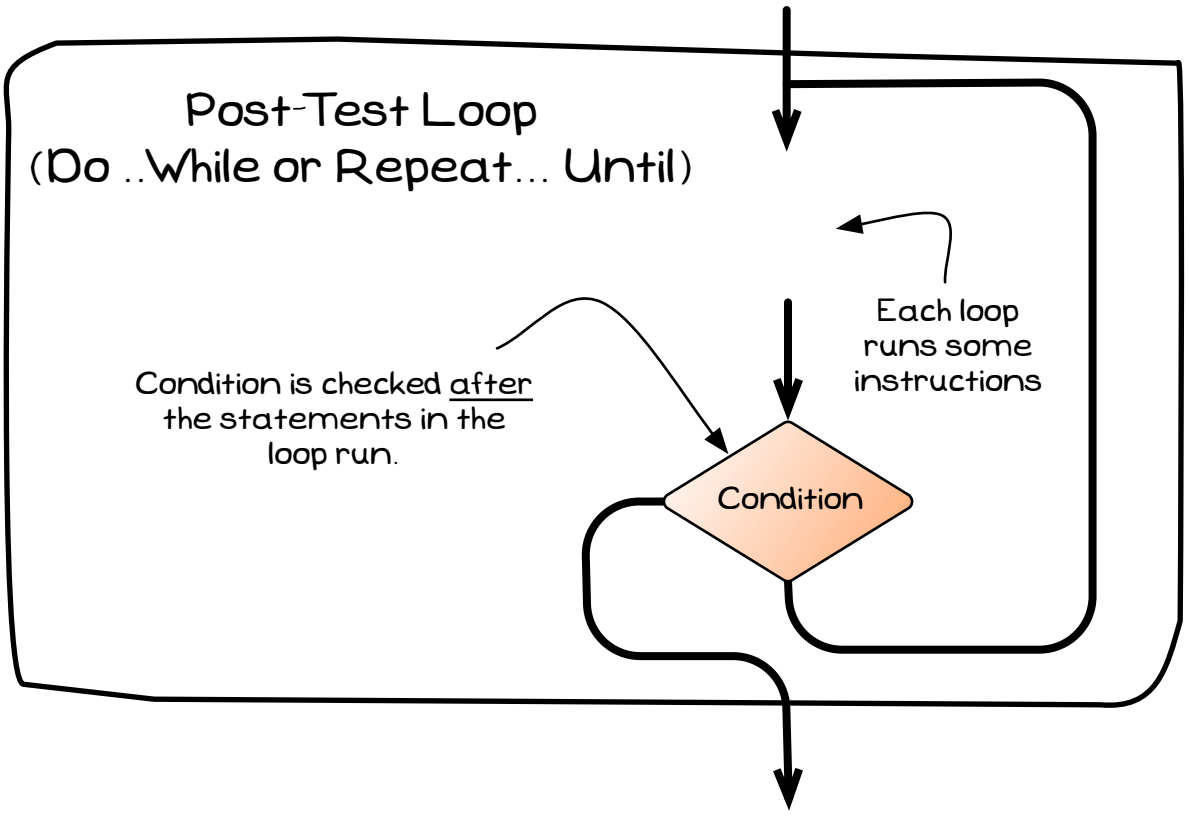

Statement
Is a kind of Statement
Condition is a Boolean Expression
If Statement
The False path can optionally have instructions in an else path
Condition
True
False
else
This path is taken when the condition is True
If there is no else part the if statement just skips the True path when the condition is False

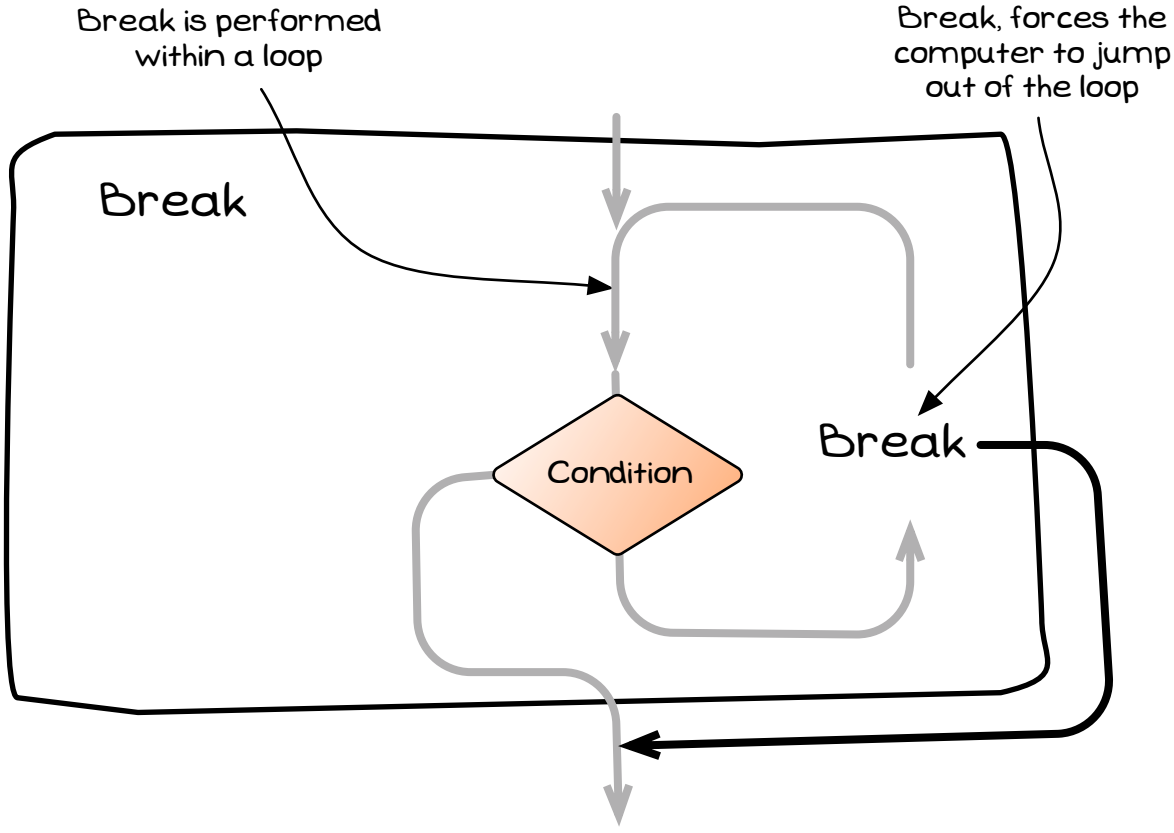

Statement
Is a kind of
Statement
Expression selects the
path with the matching value
Case Statement
Expression
1
2
3
An alternate
path exists for
when the Expression
does not match
any path's value
This path is taken
when the value of
the expression is
You can optionally provide
instructions that run when
no other path is matched.

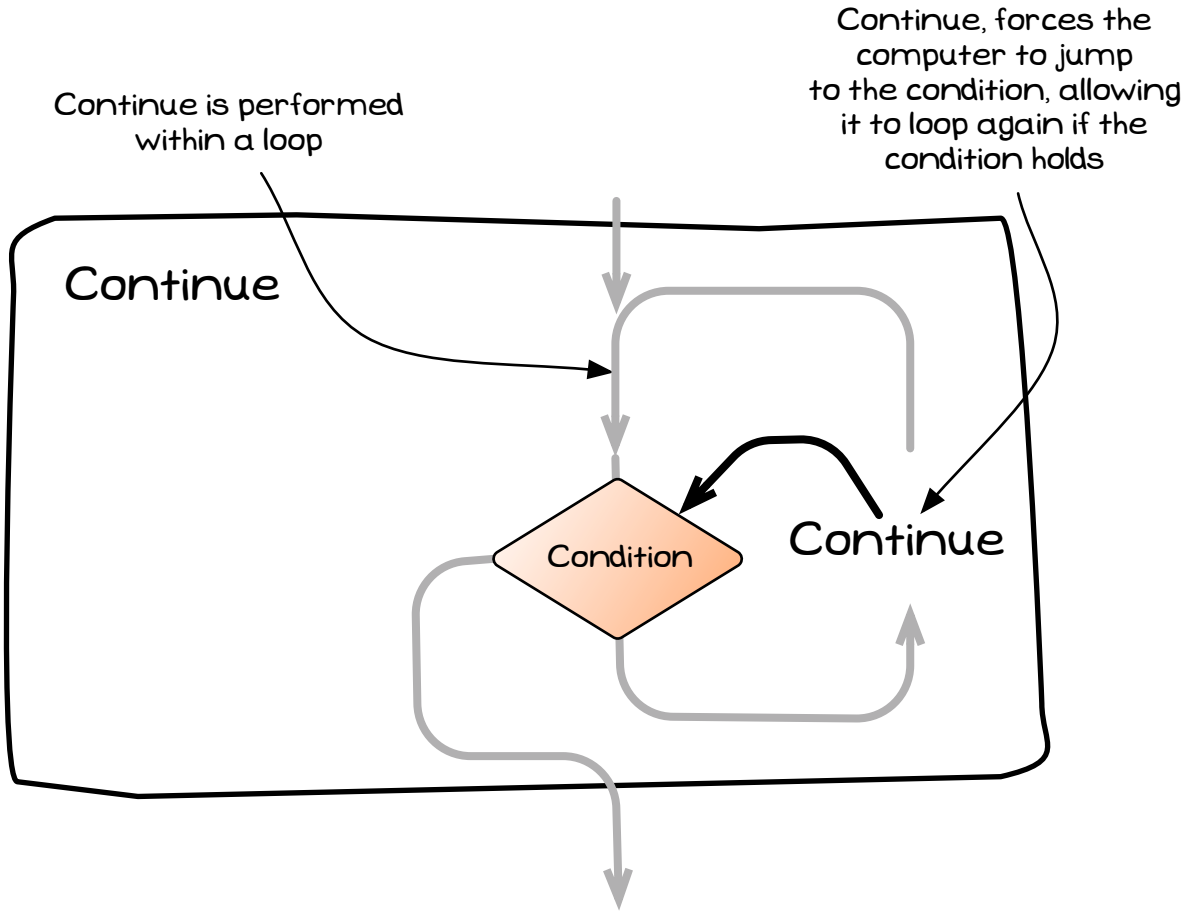

Statement
Is a kind of
Statement
A Single Statement...
Compound
Statement
Statement
Statement
Statement
That contains
multiple statements


Each loop runs some instructions
Looping
Condition is checked each loop, and controls if the loop runs again, or the loop ends
Condition

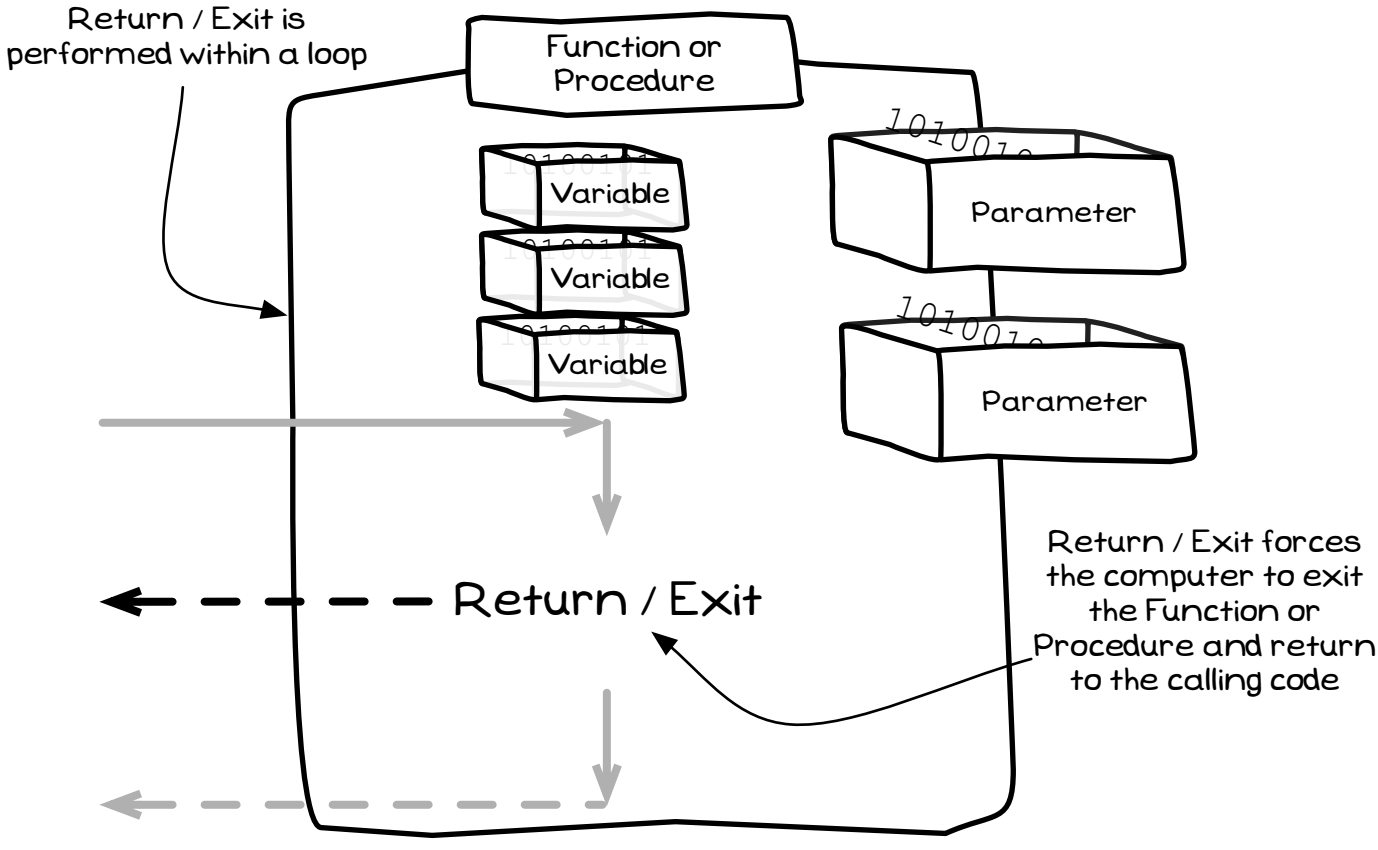

Pre-Test Loop
(While Loop)
Condition
Condition is checked before the statements in the loop run.
Each loop runs some instructions


Post-Test Loop
(Do ..While or Repeat... Until)
Each loop runs some instructions
Condition is checked after the statements in the loop run.
Condition

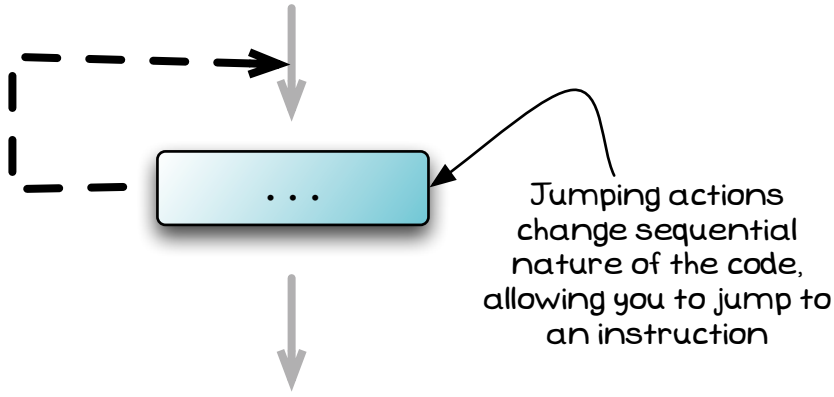

Break is performed within a loop
Break, forces the computer to jump out of the loop
Break
Condition
Break

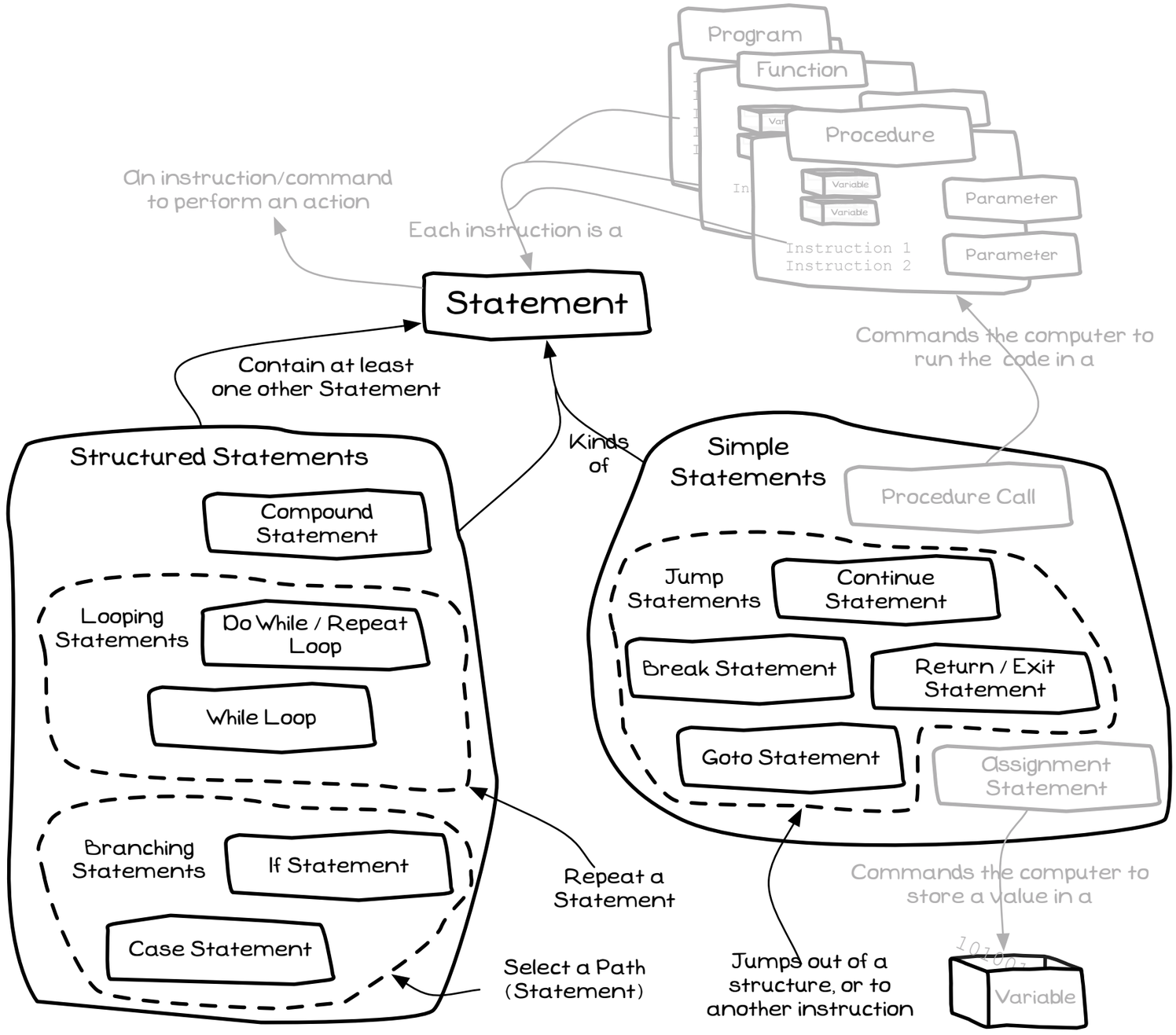

Continue, forces the computer to jump to the condition, allowing it to loop again if the condition holds
Continue is performed within a loop
Continue
Condition
Continue

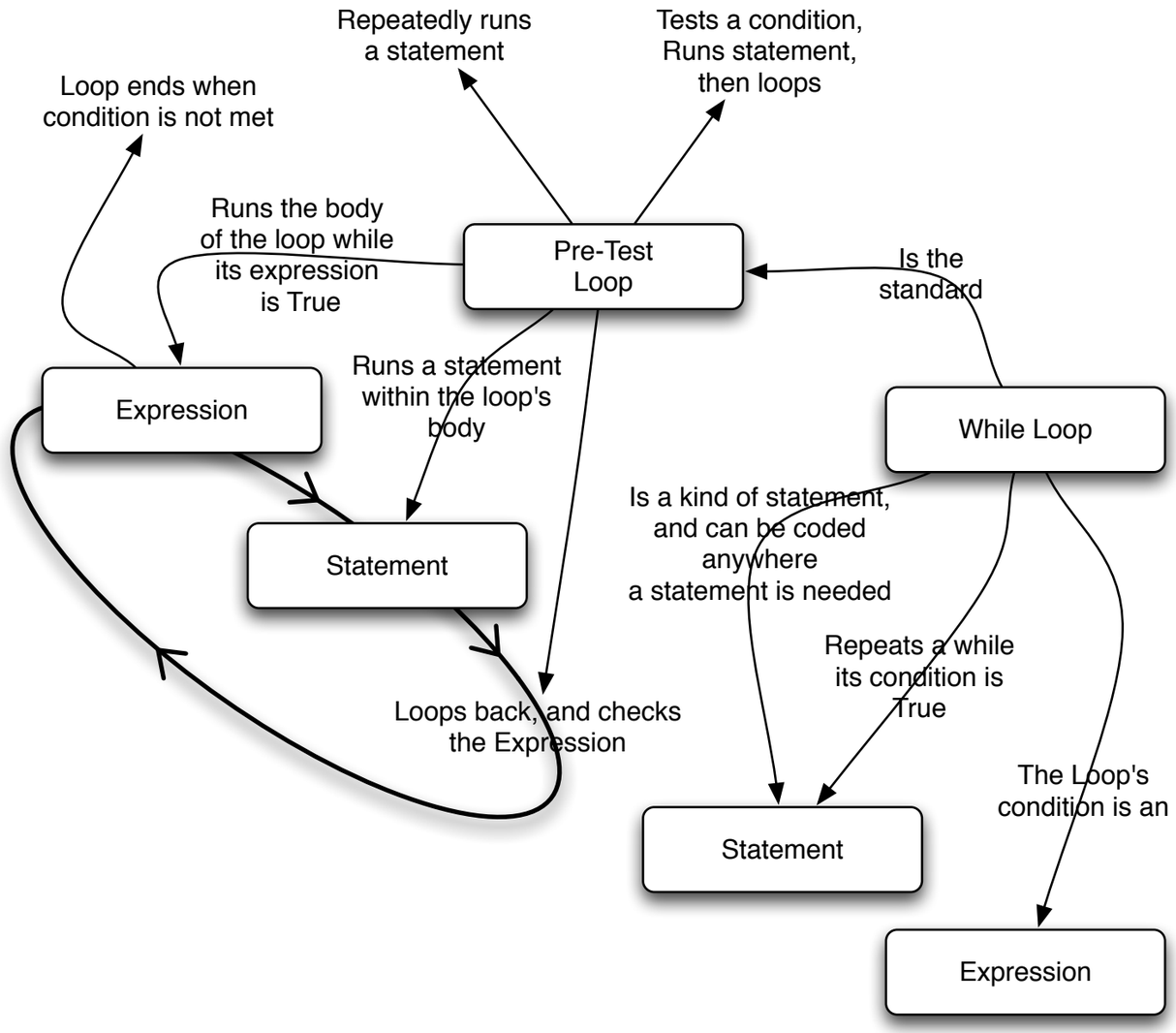
# Return / Exit

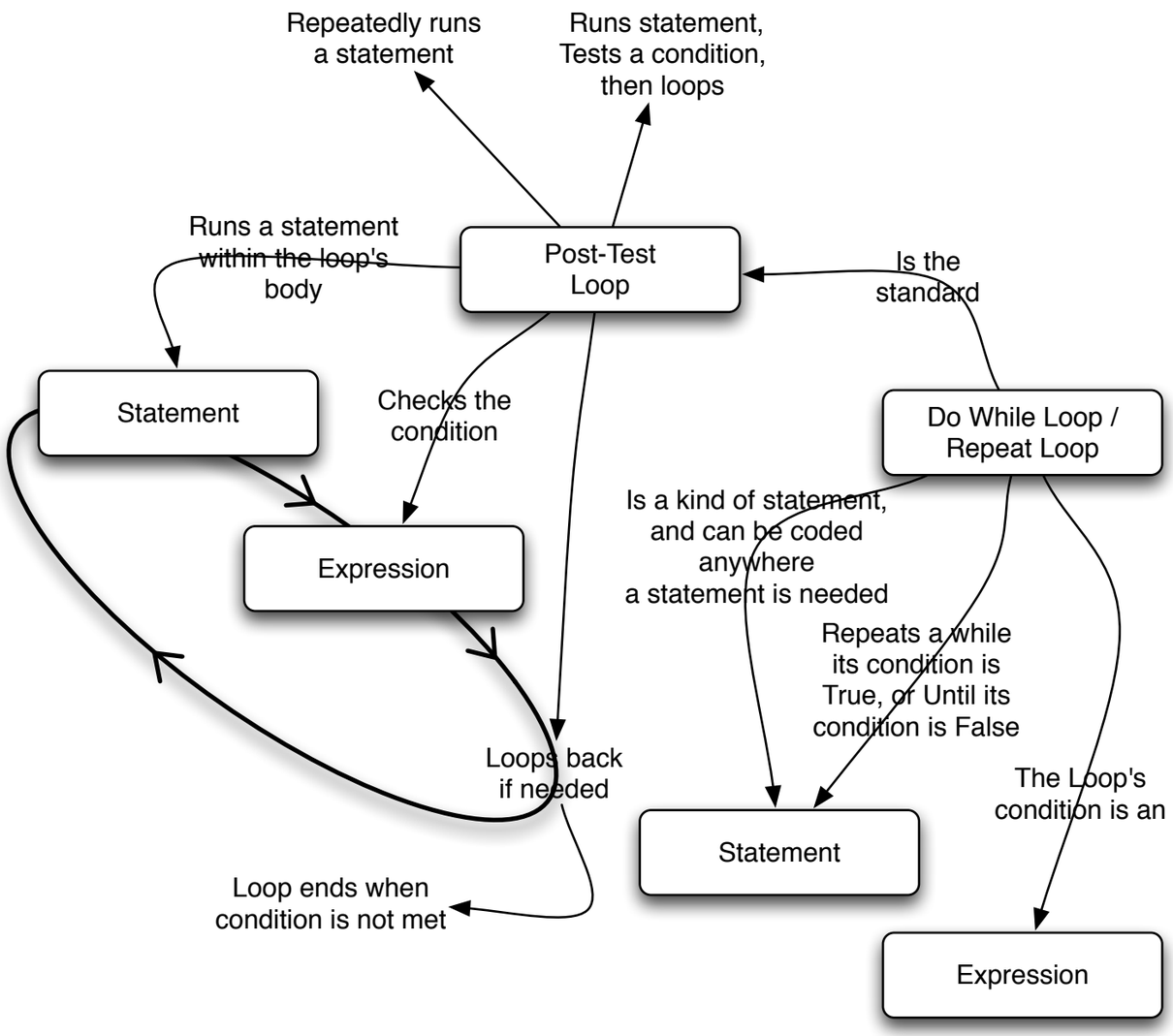

Return / Exit is performed within a loop
Function or Procedure
Variable
Variable
Variable
Parameter
Parameter
Return / Exit
Return / Exit forces the computer to exit the Function or Procedure and return to the calling code

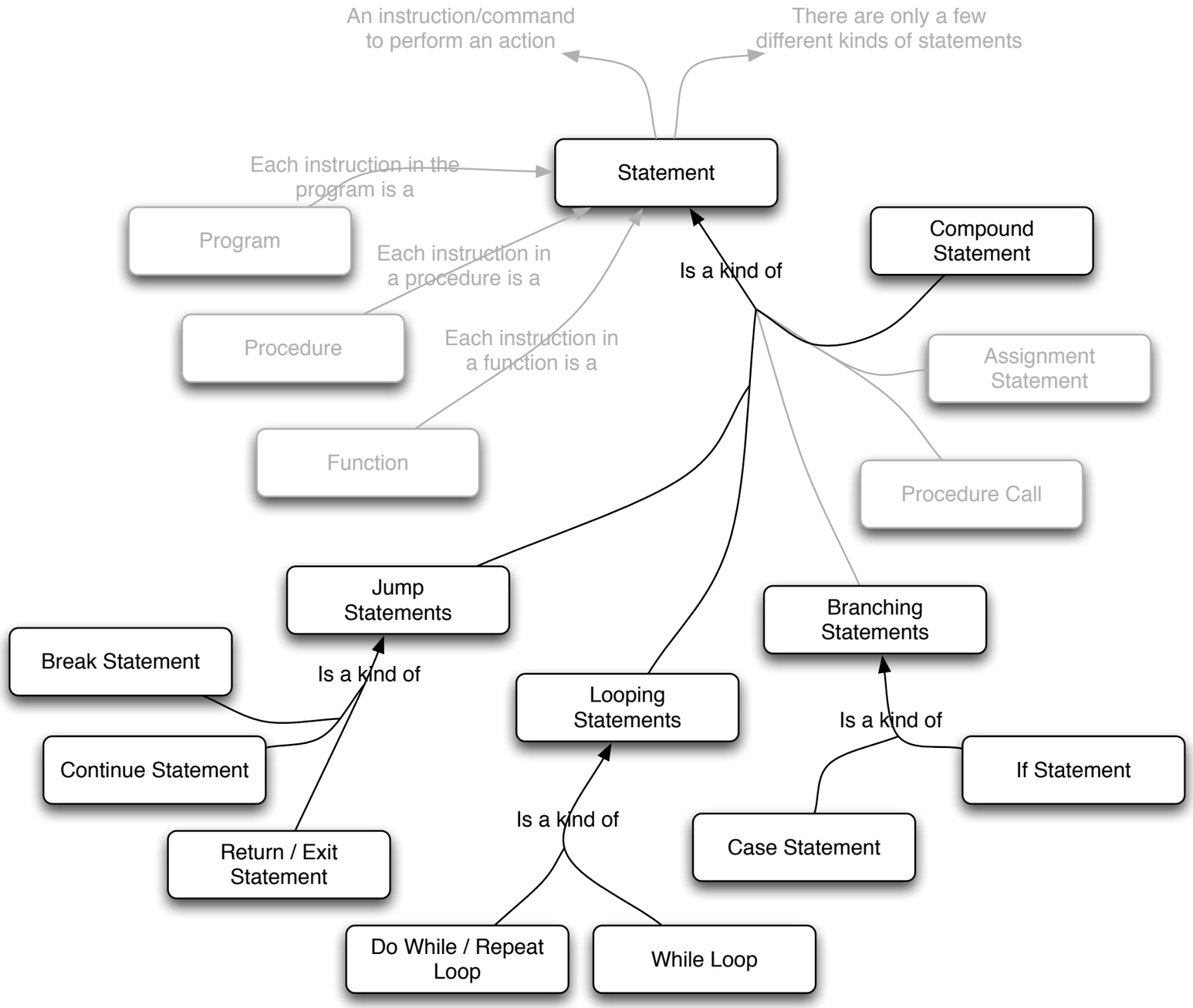
## Jumping

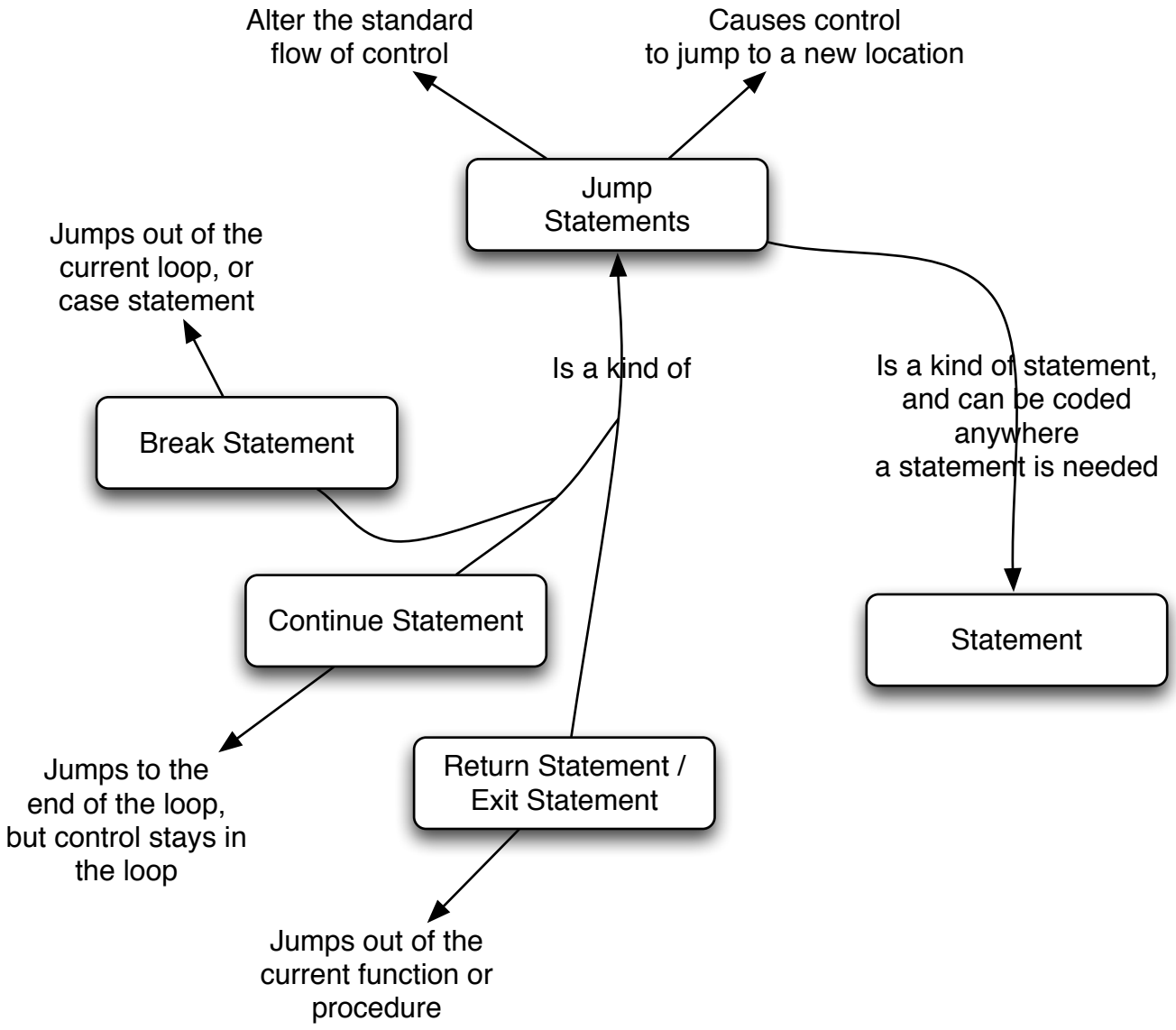

. . .
Jumping actions change sequential nature of the code, allowing you to jump to an instruction

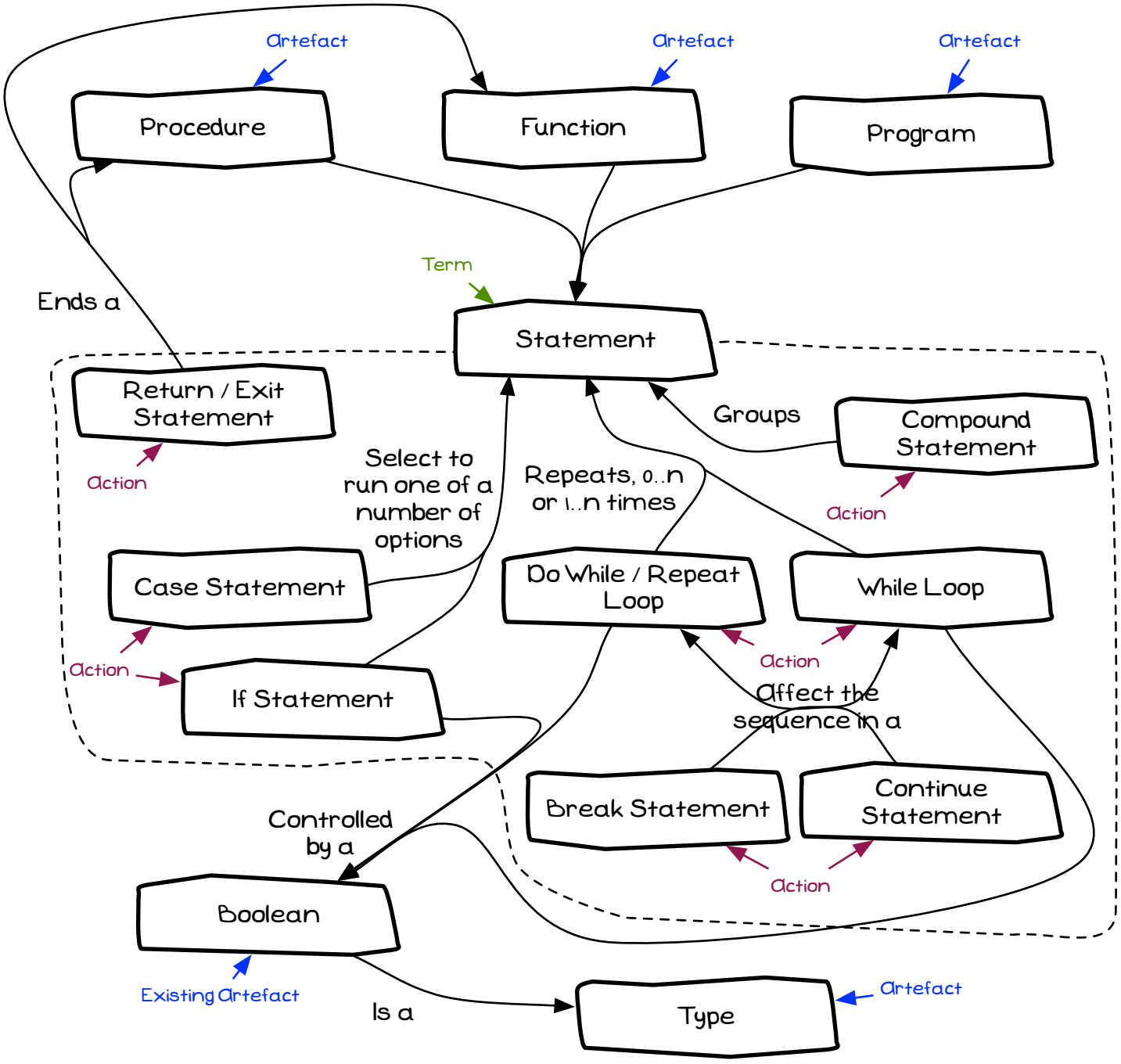

Program
Function
Procedure
Variable
Variable
Parameter
Parameter
Instruction 1
Instruction 2
An instruction/command
to perform an action
Each instruction is a
Statement
Contain at least
one other Statement
Commands the computer to
run the code in a
Kinds
of
Structured Statements
Compound
Statement
Looping
Statements
Do While / Repeat
Loop
While Loop
Branching
Statements
If Statement
Case Statement
Simple
Statements
Procedure Call
Jump
Statements
Continue
Statement
Break Statement
Return / Exit
Statement
Goto Statement
Assignment
Statement
Repeat a
Statement
Select a Path
(Statement)
Jumps out of a
structure, or to
another instruction
Commands the computer to
store a value in a
Variable

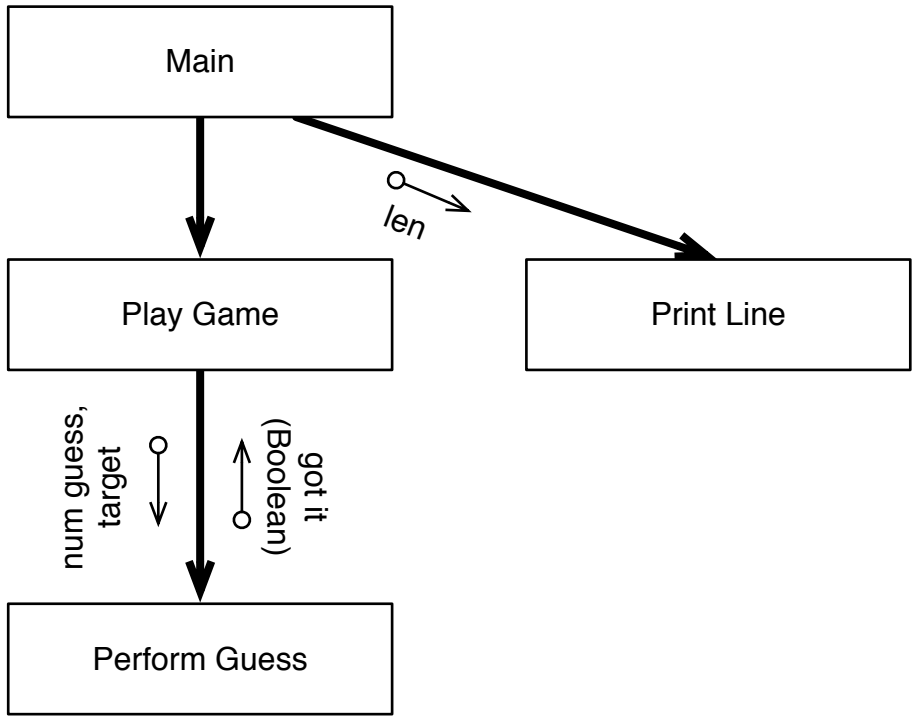

Repeatedly runs
a statement
Tests a condition,
Runs statement,
then loops
Loop ends when
condition is not met
Runs the body
of the loop while
its expression
is True
Pre-Test
Loop
Is the
standard
Runs a statement
within the loop's
body
Expression
While Loop
Statement
Is a kind of statement,
and can be coded
anywhere
a statement is needed
Repeats a while
its condition is
True
Loops back, and checks
the Expression
The Loop's
condition is an
Statement
Expression

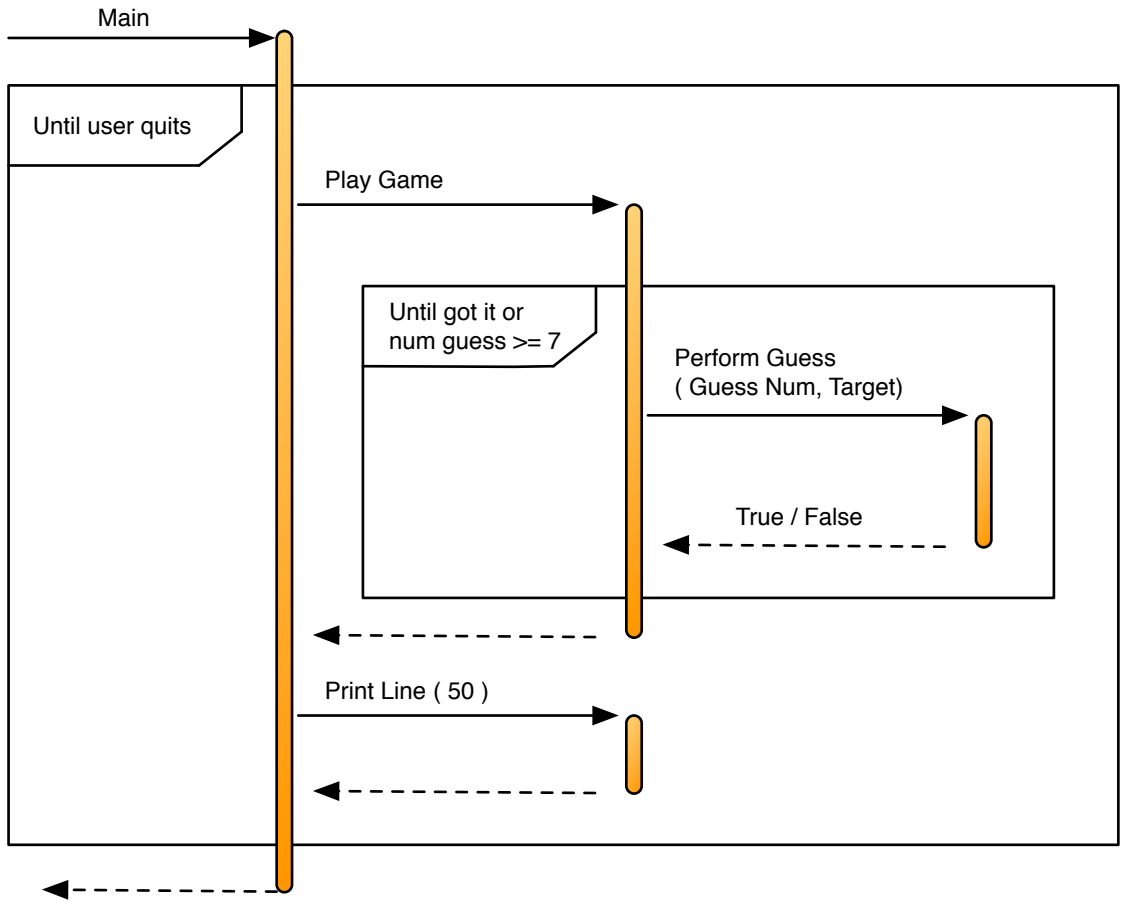

Repeatedly runs
a statement
Runs statement,
Tests a condition,
then loops
Runs a statement
within the loop's
body
Post-Test
Loop
Is the
standard
Statement
Checks the
condition
Do While Loop /
Repeat Loop
Expression
Is a kind of statement,
and can be coded
anywhere
a statement is needed
Repeats a while
its condition is
True, or Until its
condition is False
Loops back
if needed
The Loop's
condition is an
Statement
Loop ends when
condition is not met
Expression

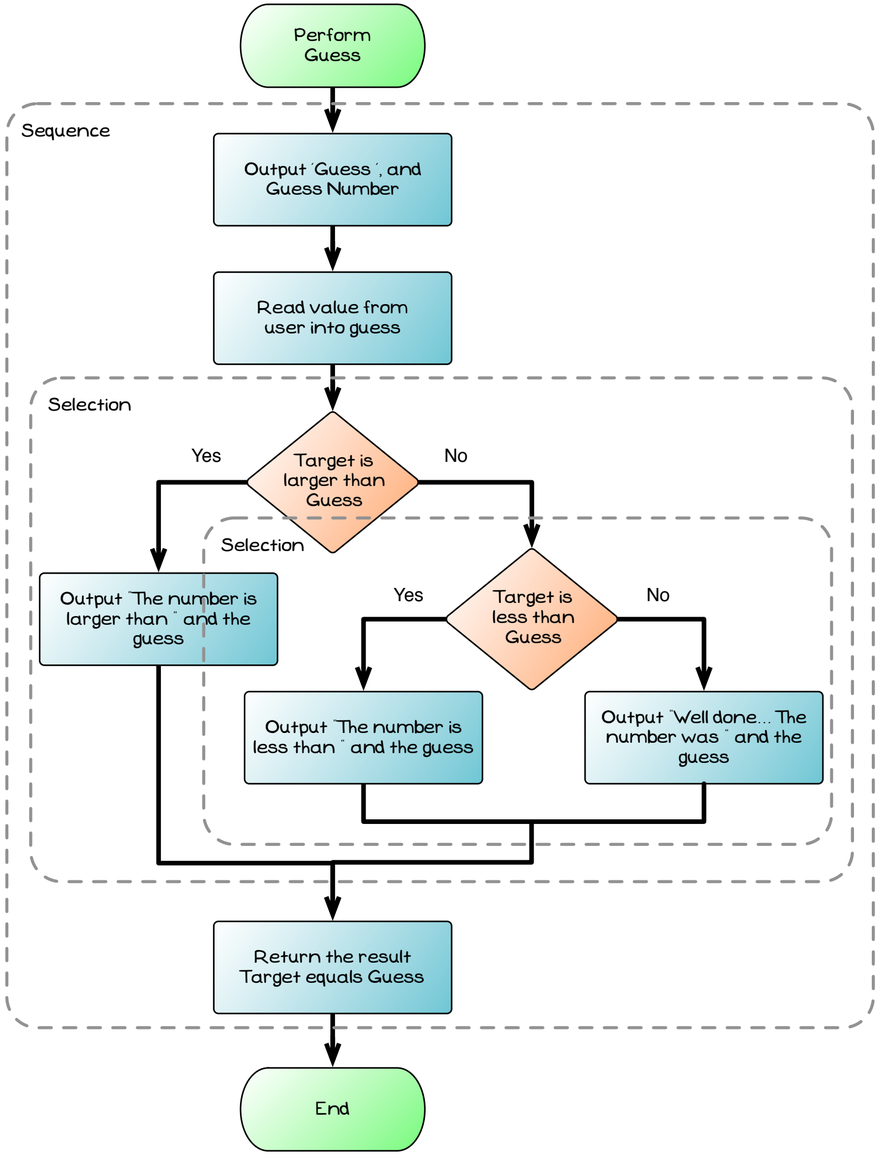

An instruction/command to perform an action
There are only a few different kinds of statements
Statement
Each instruction in the program is a
Program
Each instruction in a procedure is a
Procedure
Each instruction in a function is a
Function
Is a kind of
Compound Statement
Assignment Statement
Procedure Call
Branching Statements
Looping Statements
Jump Statements
Break Statement
Continue Statement
Return / Exit Statement
Is a kind of
Is a kind of
Is a kind of
If Statement
Case Statement
Do While / Repeat Loop
While Loop

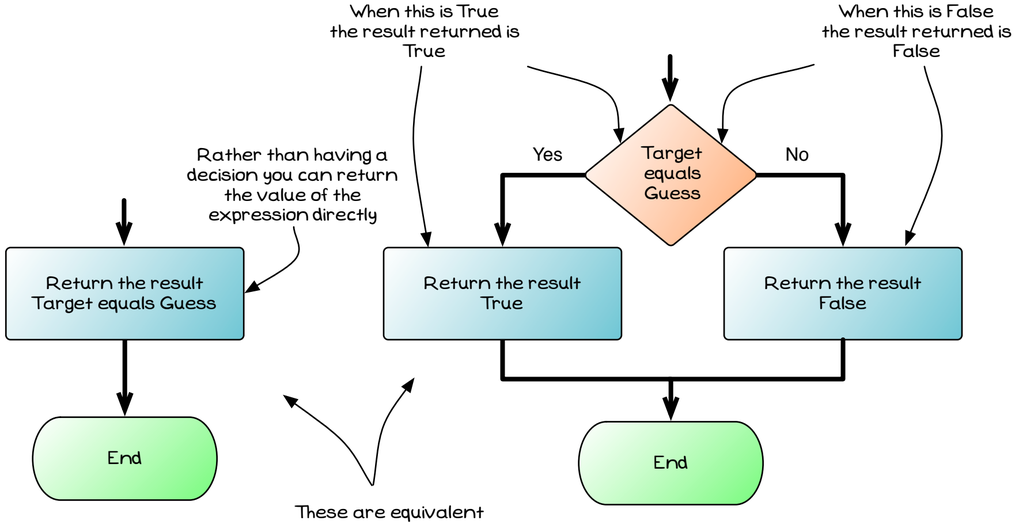

Alter the standard flow of control
Causes control to jump to a new location
Jump Statements
Jumps out of the current loop, or case statement
Is a kind of
Is a kind of statement, and can be coded anywhere a statement is needed
Break Statement
Continue Statement
Statement
Jumps to the end of the loop, but control stays in the loop
Return Statement / Exit Statement
Jumps out of the current function or procedure

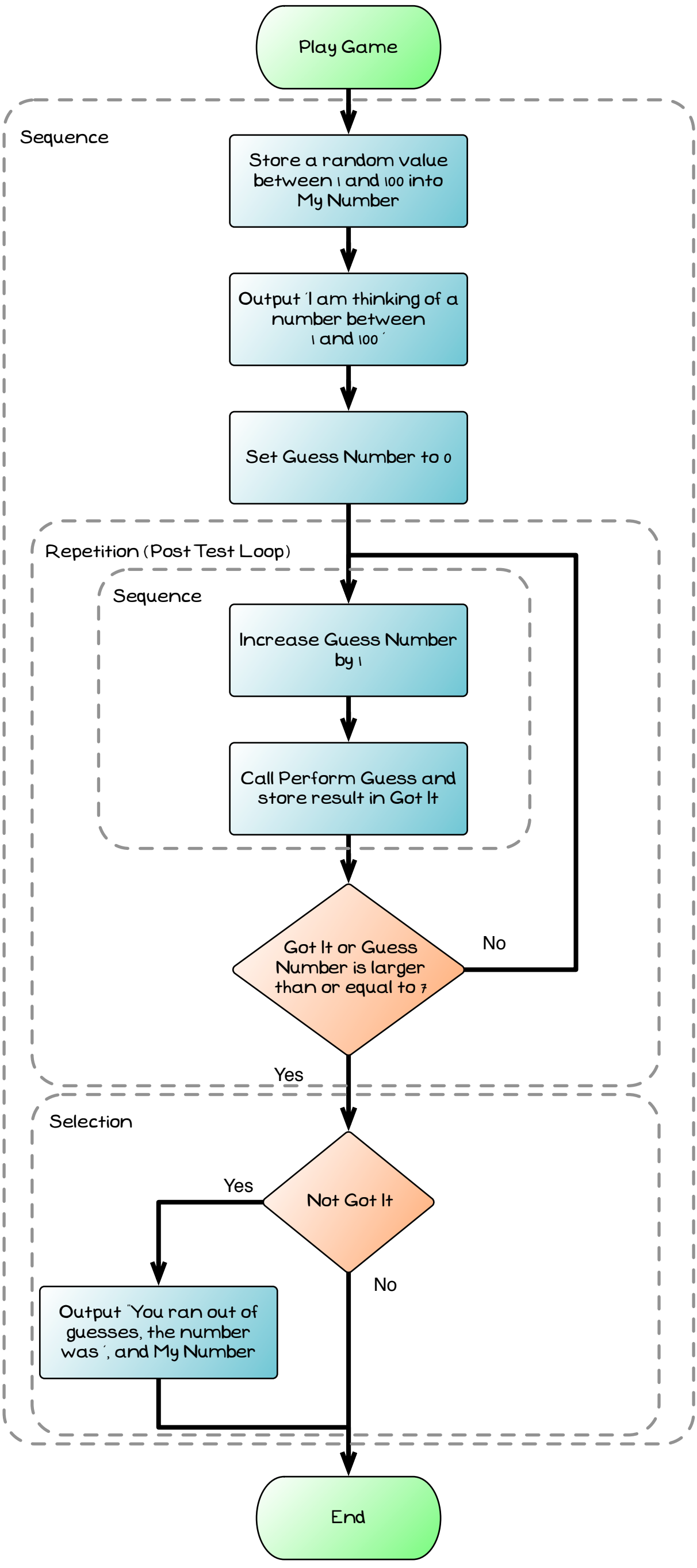

Artefact
Artefact
Artefact
Procedure
Function
Program
Term
Ends a
Statement
Return / Exit Statement
Action
Groups
Compound Statement
Action
Select to run one of a number of options
Repeats, 0..n or 1..n times
Case Statement
Do While / Repeat Loop
While Loop
Action
Action
Action
If Statement
Affect the sequence in a
Break Statement
Continue Statement
Action
Controlled by a
Boolean
Existing Artefact
Is a
Type
Artefact

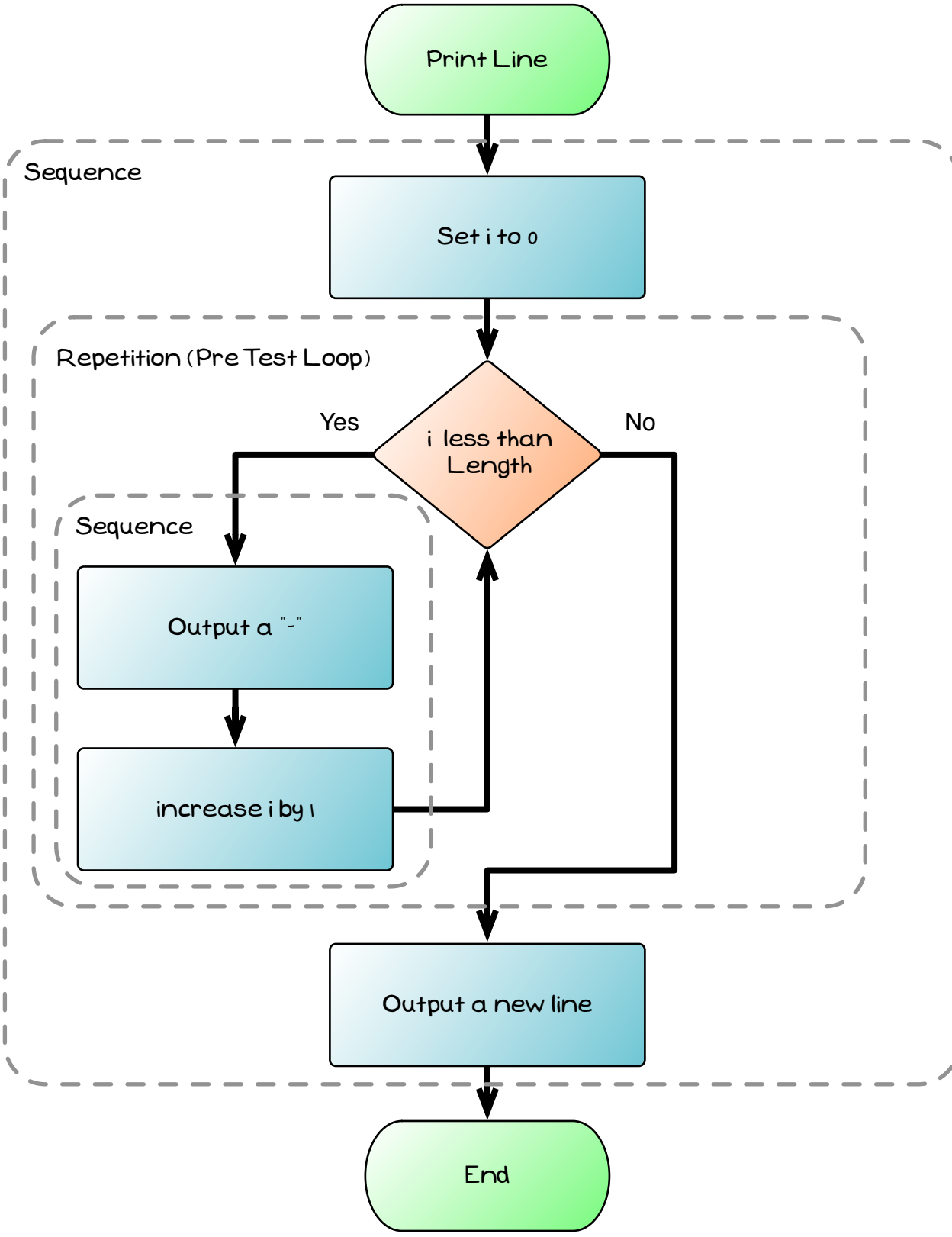

Main
len
Play Game
Print Line
num guess,
target
got it
(Boolean)
Perform Guess

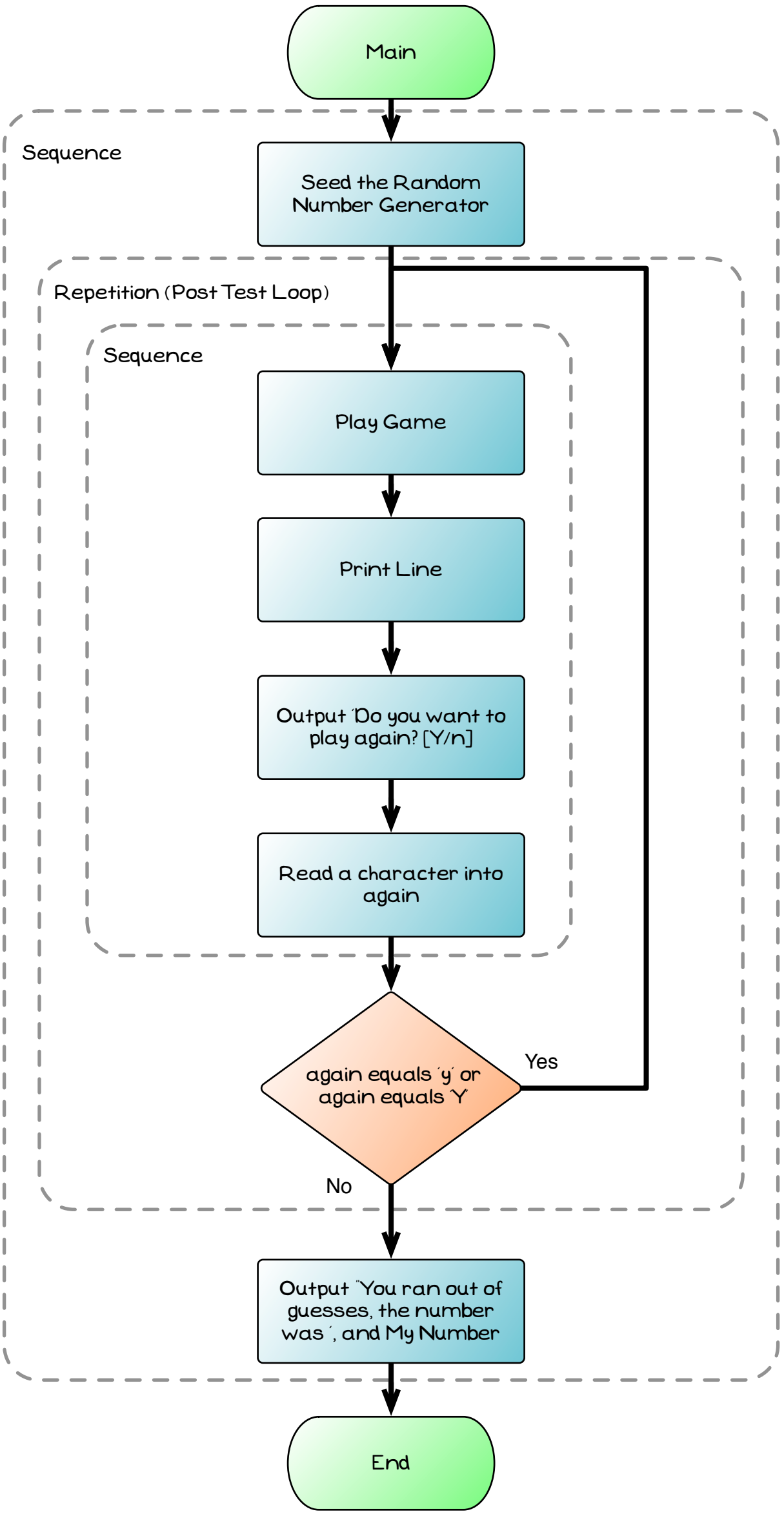

Main
Until user quits
Play Game
Until got it or
num guess >= 7
Perform Guess
( Guess Num, Target)
True / False
Print Line ( 50 )

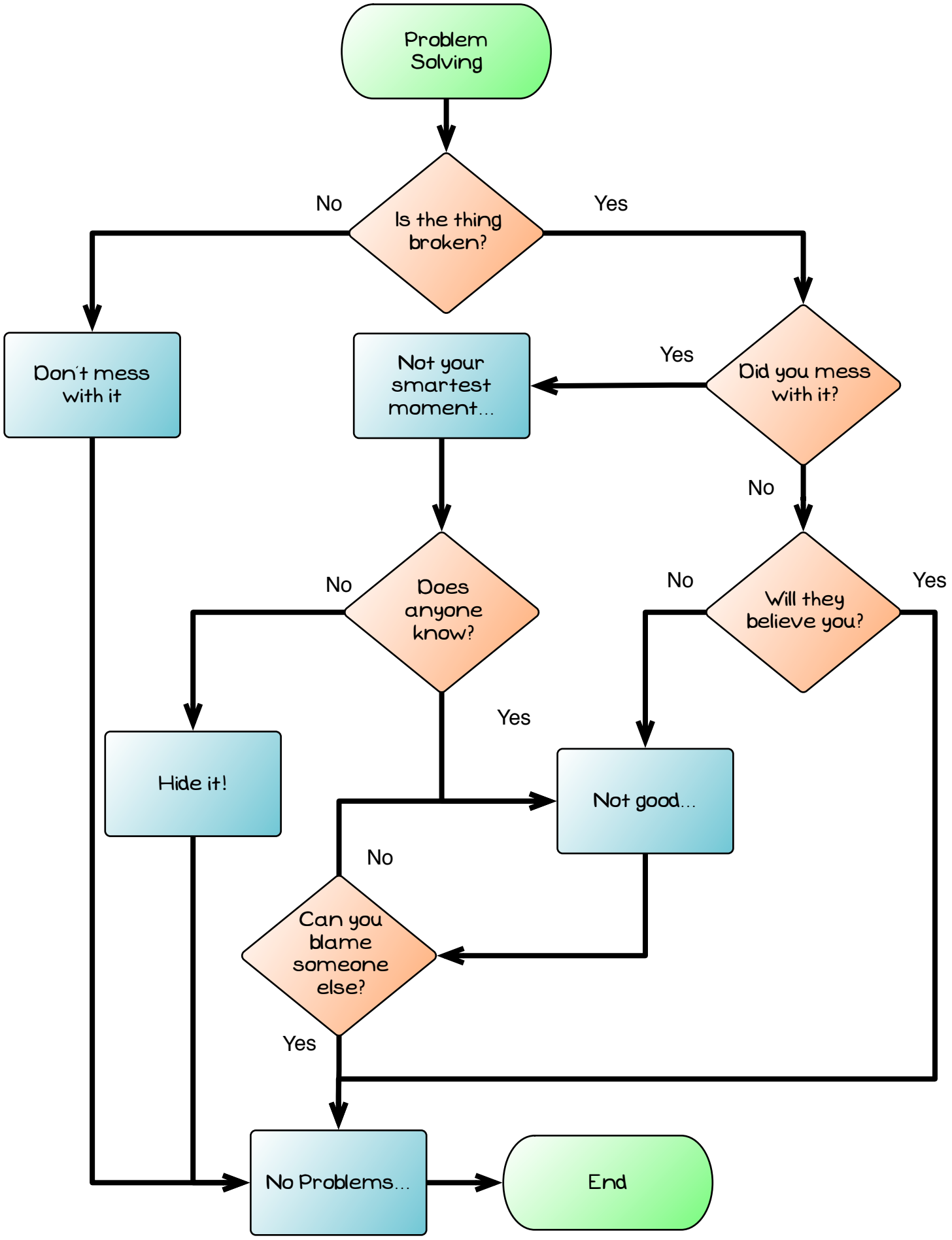

Perform Guess
Sequence
Output 'Guess ', and Guess Number
Read value from user into guess
Selection
Target is larger than Guess
Yes
No
Output "The number is larger than " and the guess
Selection
Target is less than Guess
Yes
No
Output "The number is less than " and the guess
Output "Well done... The number was " and the guess
Return the result Target equals Guess
End

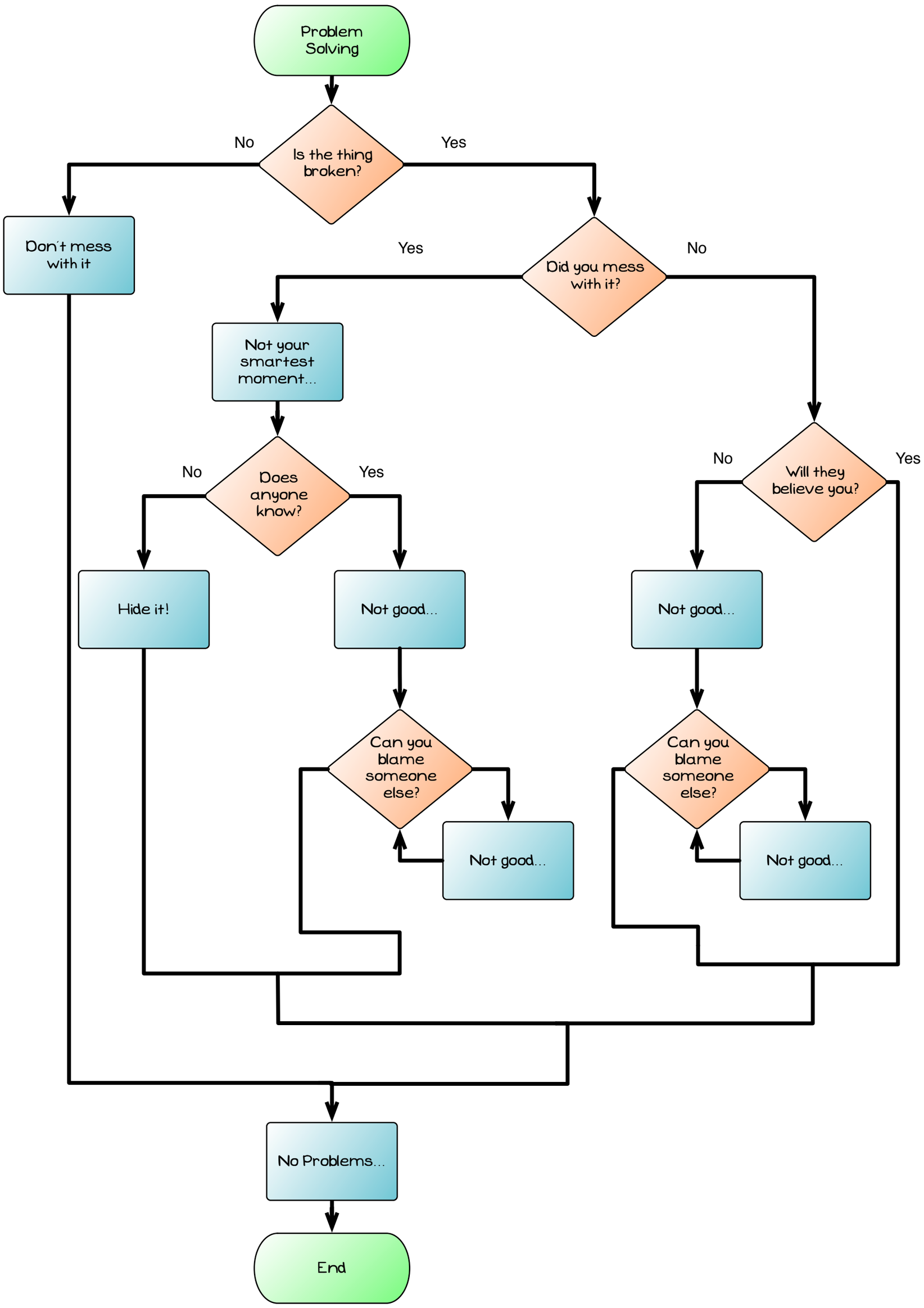

When this is True the result returned is True
When this is False the result returned is False
Rather than having a decision you can return the value of the expression directly
Target equals Guess
Yes
No
Return the result Target equals Guess
Return the result True
Return the result False
End
End
These are equivalent

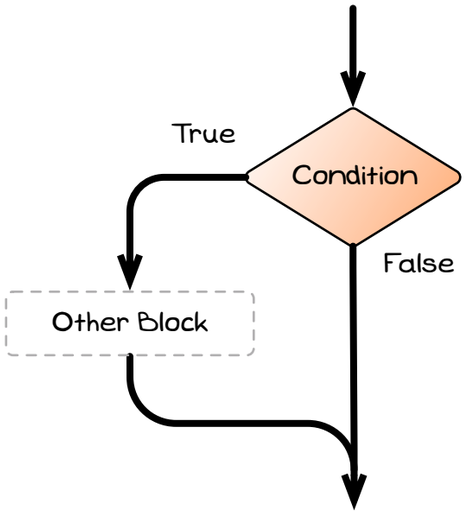

Play Game
Sequence
Store a random value between 1 and 100 into My Number
Output 'I am thinking of a number between 1 and 100'
Set Guess Number to 0
Repetition (Post Test Loop)
Sequence
Increase Guess Number by 1
Call Perform Guess and store result in Got It
Got It or Guess Number is larger than or equal to 7
No
Yes
Selection
Not Got It
Yes
No
Output "You ran out of guesses, the number was ', and My Number
End

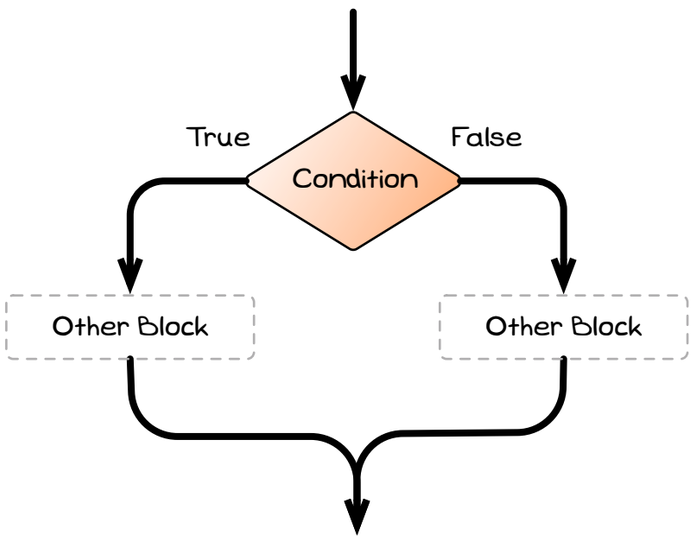

Print Line
Sequence
Set i to 0
Repetition (Pre Test Loop)
Yes
i less than Length
No
Sequence
Output a "-"
increase i by 1
Output a new line
End

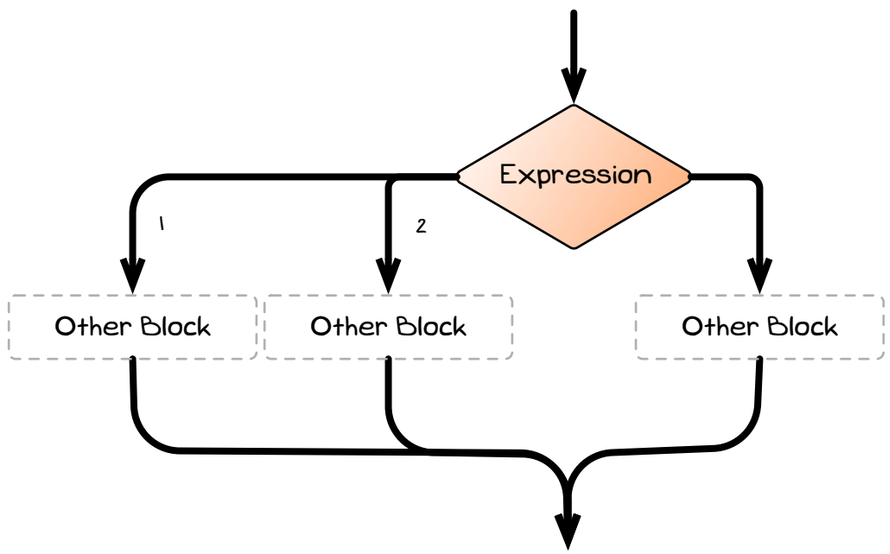

Main
Sequence
Seed the Random Number Generator
Repetition (Post Test Loop)
Sequence
Play Game
Print Line
Output 'Do you want to play again? [Y/n]
Read a character into again
again equals 'y' or again equals 'Y'
Yes
No
Output "You ran out of guesses, the number was ', and My Number
End

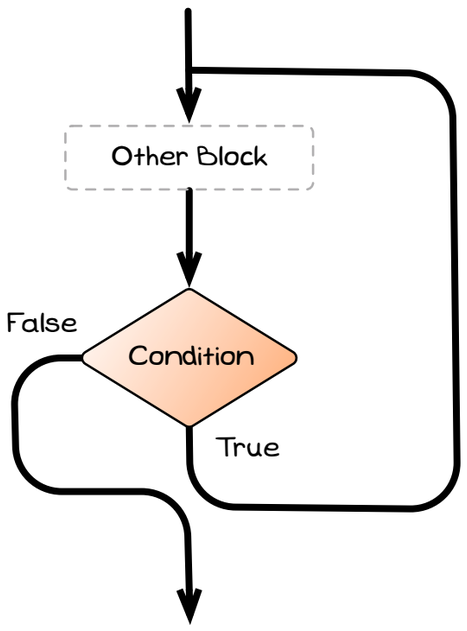

Problem Solving
Is the thing broken?
No
Yes
Don't mess with it
Did you mess with it?
Yes
Not your smartest moment...
No
Does anyone know?
No
Will they believe you?
No
Yes
Hide it!
Yes
Not good...
No
Can you blame someone else?
Yes
No Problems...
End

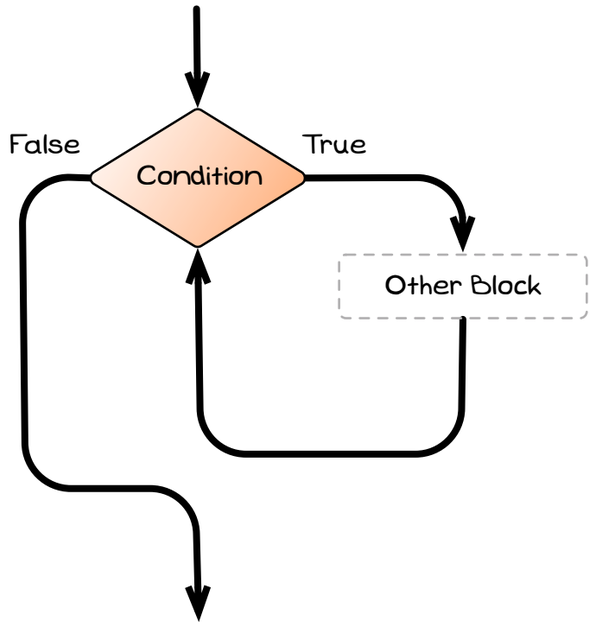

Problem Solving
Is the thing broken?
No
Yes
Don't mess with it
Did you mess with it?
Yes
No
Not your smartest moment...
Does anyone know?
No
Yes
Hide it!
Not good...
Can you blame someone else?
Not good...
Will they believe you?
No
Yes
Not good...
Can you blame someone else?
Not good...
No Problems...
End

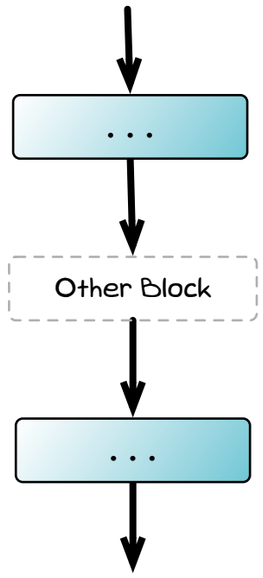

True
Condition
False
Other Block

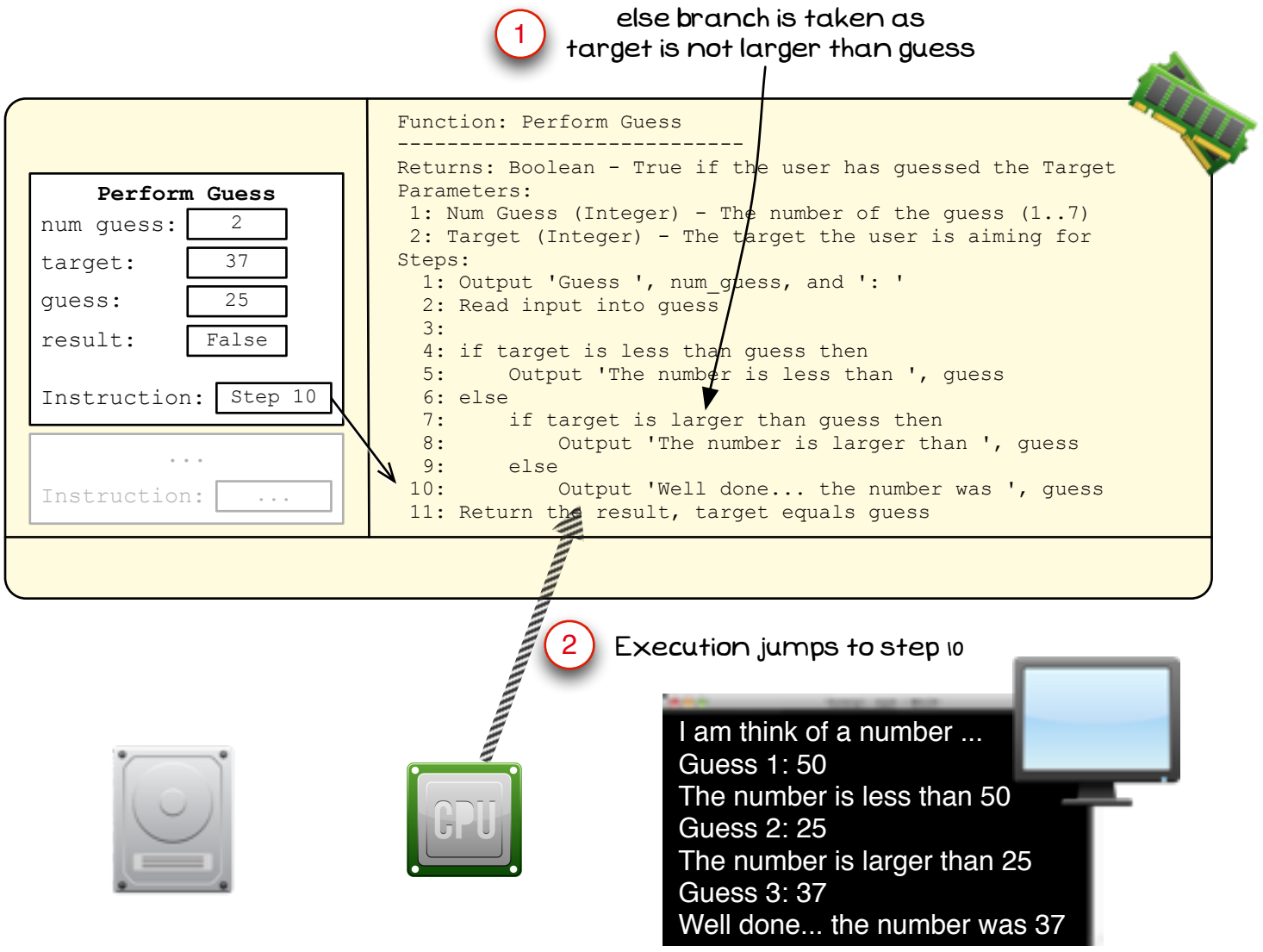

True
Condition
False
Other Block
Other Block

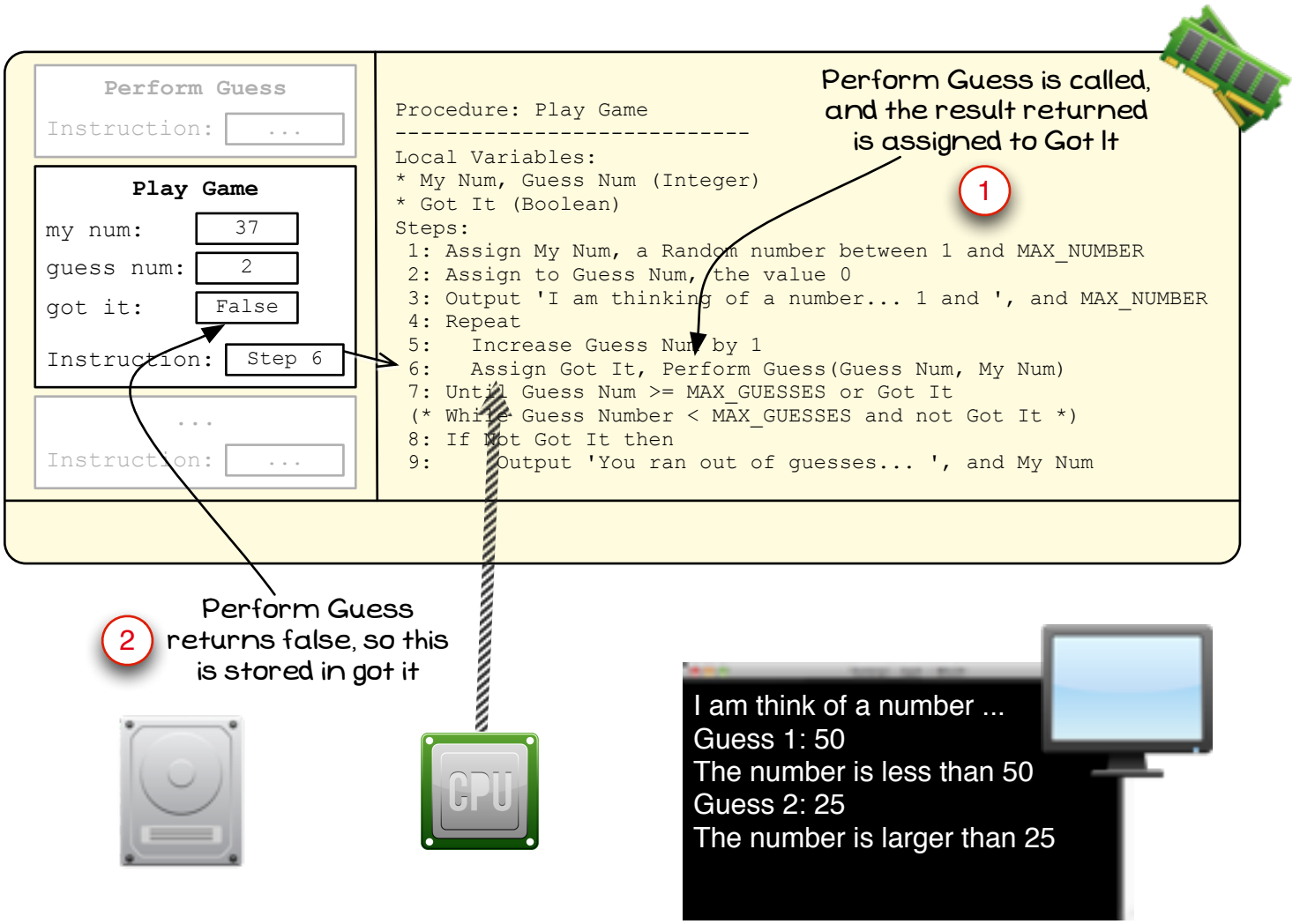

Expression
1
2
Other Block
Other Block
Other Block

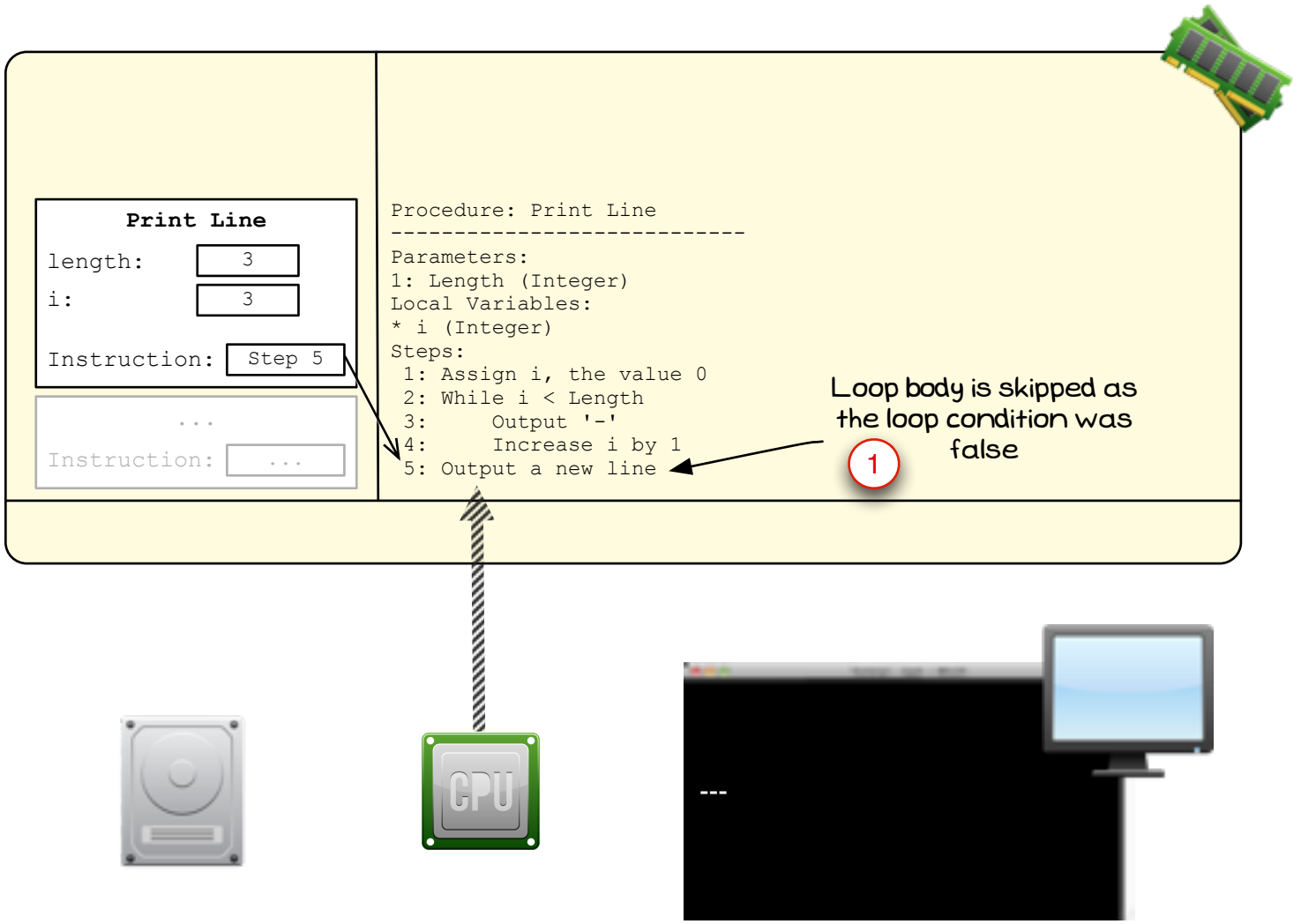

Other Block
False
Condition
True


False
Condition
True
Other Block


...
Other Block
...


1
else branch is taken as
target is not larger than guess
Perform Guess
num guess: 2
target: 37
guess: 25
result: False
Instruction: Step 10
...
Instruction: ...
Function: Perform Guess
Returns: Boolean - True if the user has guessed the Target
Parameters:
1: Num Guess (Integer) - The number of the guess (1..7)
2: Target (Integer) - The target the user is aiming for
Steps:
1: Output 'Guess ', num_guess, and ': '
2: Read input into guess
3:
4: if target is less than guess then
5: Output 'The number is less than ', guess
6: else
7: if target is larger than guess then
8: Output 'The number is larger than ', guess
9: else
10: Output 'Well done... the number was ', guess
11: Return the result, target equals guess
2
Execution jumps to step 10
CPU
I am think of a number ...
Guess 1: 50
The number is less than 50
Guess 2: 25
The number is larger than 25
Guess 3: 37
Well done... the number was 37


Perform Guess
Instruction: ...
Play Game
my num: 37
guess num: 2
got it: False
Instruction: Step 6
...
Instruction: ...
Procedure: Play Game
Local Variables:
* My Num, Guess Num (Integer)
* Got It (Boolean)
Steps:
1: Assign My Num, a Random number between 1 and MAX_NUMBER
2: Assign to Guess Num, the value 0
3: Output 'I am thinking of a number... 1 and ', and MAX_NUMBER
4: Repeat
5: Increase Guess Num by 1
6: Assign Got It, Perform Guess(Guess Num, My Num)
7: Until Guess Num >= MAX_GUESSES or Got It
(* While Guess Number < MAX_GUESSES and not Got It *)
8: If Not Got It then
9: Output 'You ran out of guesses... ', and My Num
Perform Guess is called, and the result returned is assigned to Got It
1
2
Perform Guess returns false, so this is stored in got it
CPU
I am think of a number ...
Guess 1: 50
The number is less than 50
Guess 2: 25
The number is larger than 25


Print Line
length: 3
i: 3
Instruction: Step 5
...
Instruction: ...
Procedure: Print Line
Parameters:
1: Length (Integer)
Local Variables:
* i (Integer)
Steps:
1: Assign i, the value 0
2: While i < Length
3: Output '-'
4: Increase i by 1
5: Output a new line
Loop body is skipped as the loop condition was false
1
CPU
---