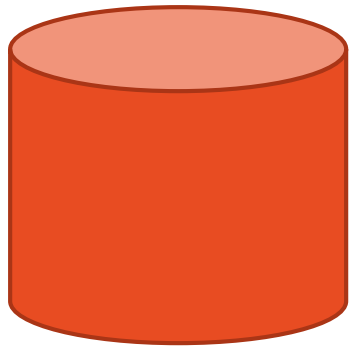


953103 Programming Logic Thinking

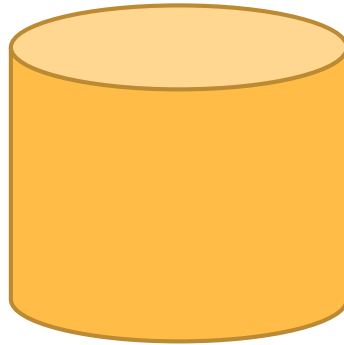
Arrays

Review of Variable

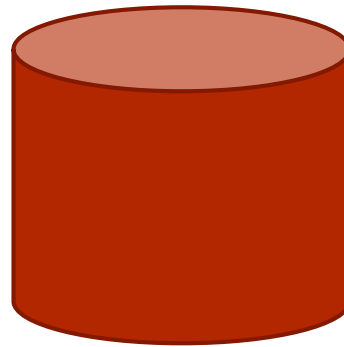
- Variable is a place in the memory to hold a value.
 - Only a value



amountOfWater



numberOfStudent



heightOfStudent

Only a “**SINGLE**” value

To create a variable

The image shows the CAMT Digital School interface. On the left is the 'Blocks' panel, and on the right is the 'Viewer' panel.

Blocks Panel:

- Logic
- Math
- Text
- List
- Color
- Variables** (highlighted with a green background)
- Procedures
- Screen1
- Label1

A large black arrow labeled '1' points to the 'Variables' category.

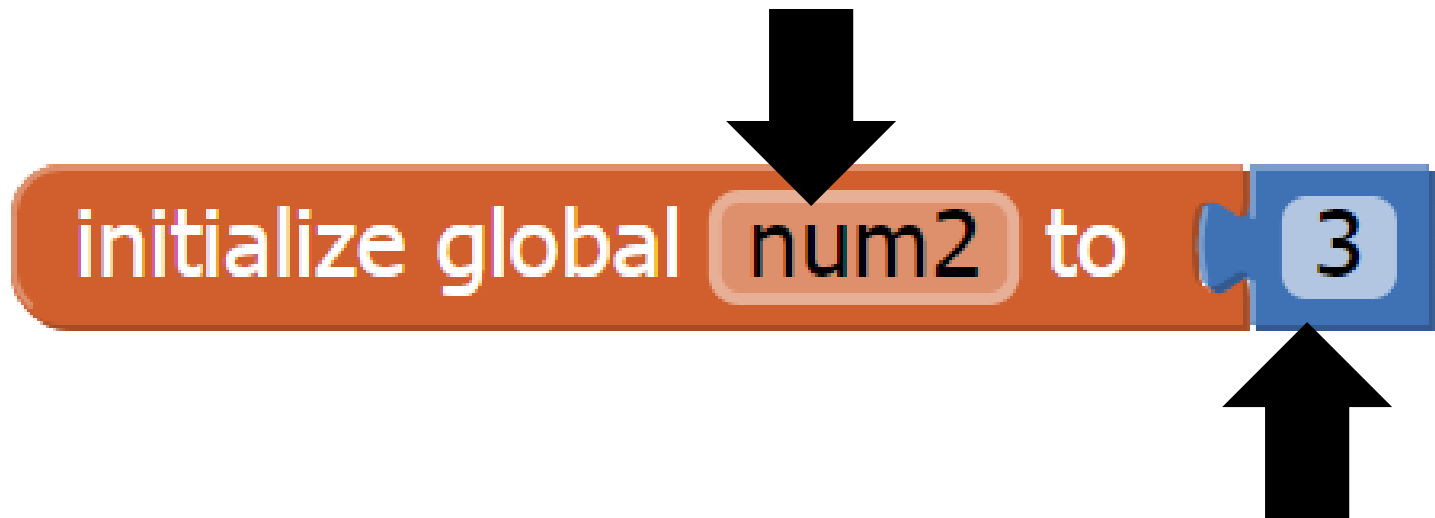
Viewer Panel:

A large black arrow labeled '2' points to the 'initialize global name to' block. The script in the viewer contains the following blocks:

- initialize global name to
- get
- set to
- initialize local name to in
- initialize local name to in

To initialize a variable

Name of the variable



Initial value of the variable

Blocks

Built-in

Control

Logic

Math

Text

Lists

Colors

Variables

Procedures

Screen1

Label1

Access the value of a variable

initialize global name to

get

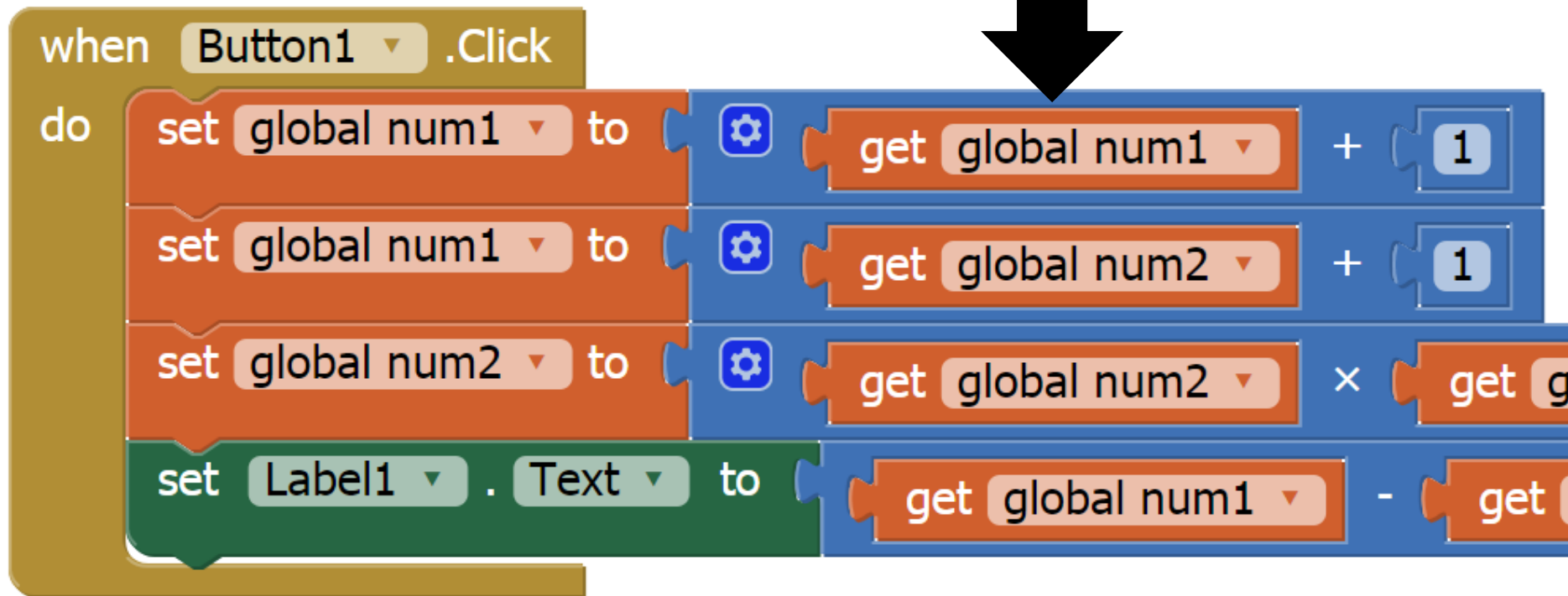
set to

initialize local name to

Change the value of a variable

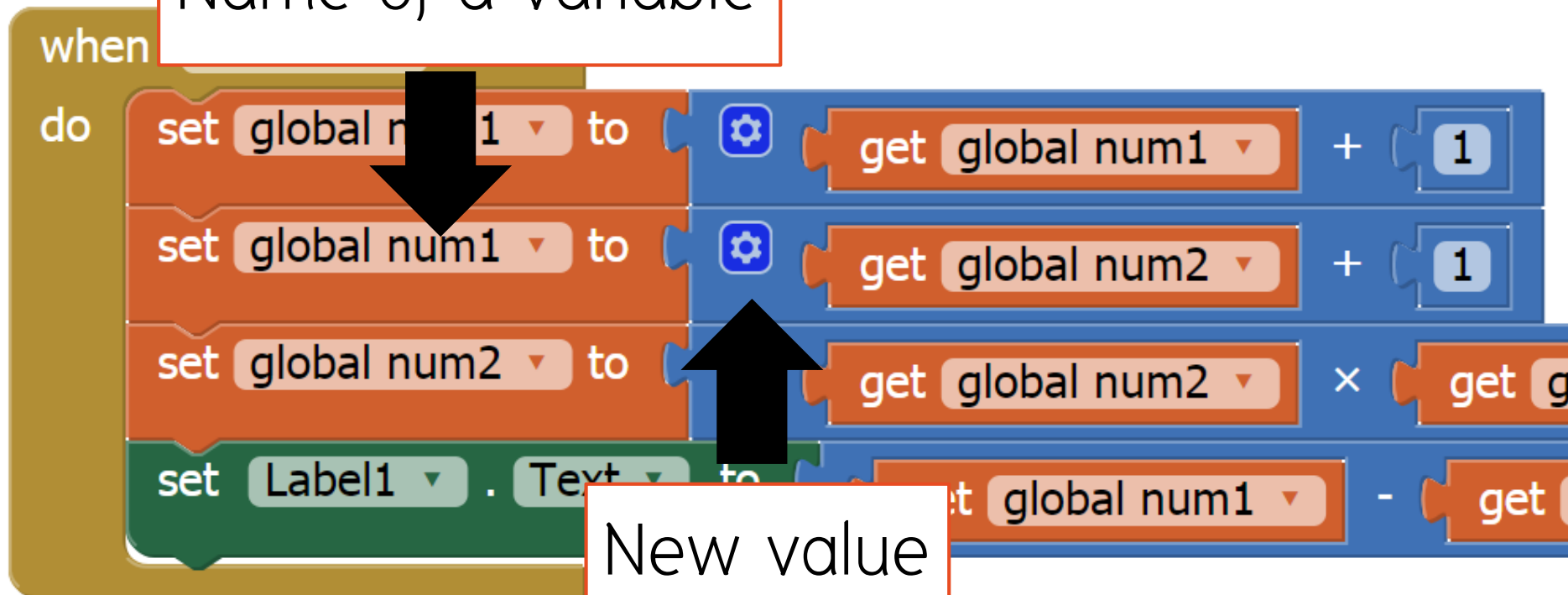
initialize local name to
in

Access the value of a variable



Change the value of a variable (AKA Assignment)

Name of a variable



New value

What if I want to store
the height of all student
in class.

How many variables do I need?

A Class has 5 students

initialize global heightOfStudent1 to 0

initialize global heightOfStudent2 to 0

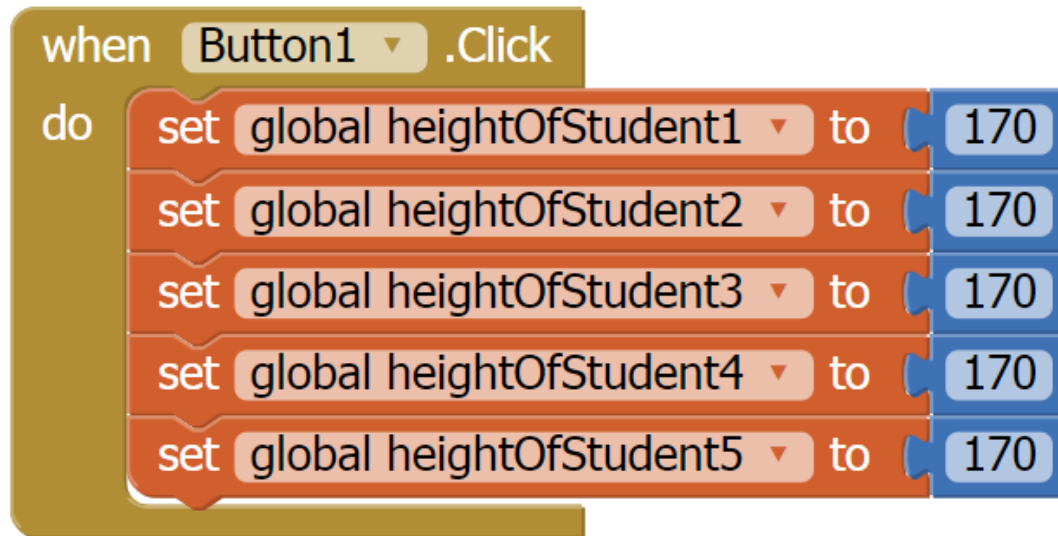
initialize global heightOfStudent3 to 0

initialize global heightOfStudent4 to 0

initialize global heightOfStudent5 to 0

Problems

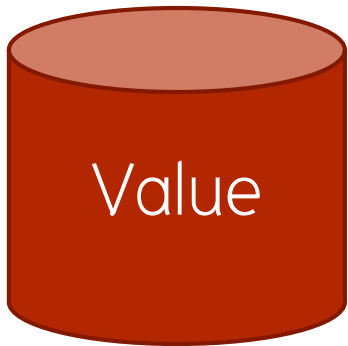
- It is a waste of time in creating variables.
 - You have to repeatedly create variables.
- It is hard to access and use the value
 - You have to do it separately. One variable at a time.



Array

What is arrays

- One name for many data.
 - One variable to store the height of each student in the class
- An *array* is a named sequence of variable capable of holding a *collection* of data of the same type.



Traditional variable

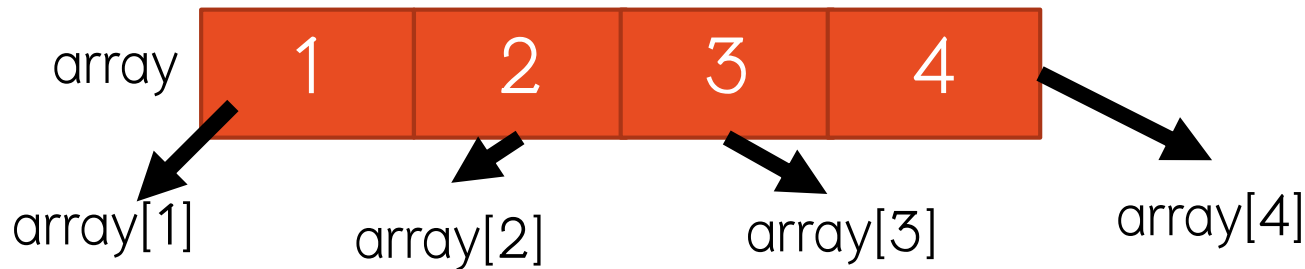
VS



Array variable

Characteristics of Array

- It is a type of variable.
- For each element in the array, we can access it by using index.
 - Index = an integer to represent the position of data.



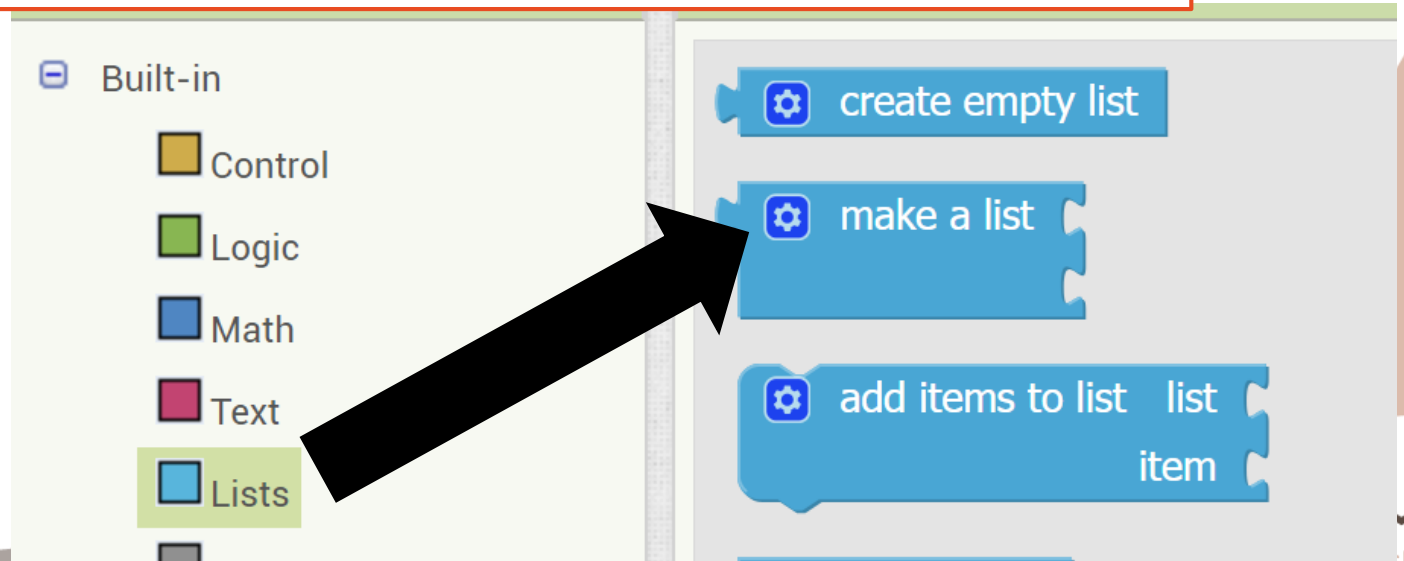
- Normally, the element in an array has the **same data type**.

Array Creation

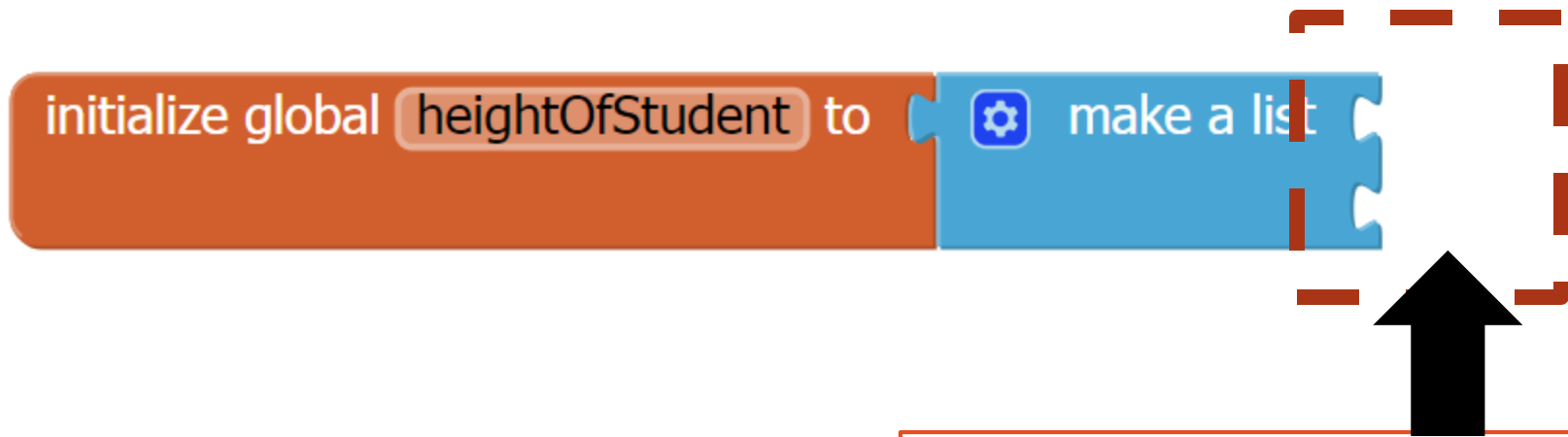
1. Create a variable

initialize global heightOfStudent to

2. Use “make a list” block to create array



Array Creation

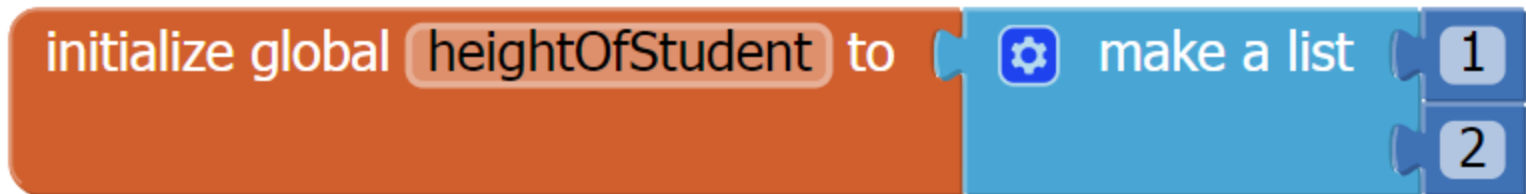


We need to initialize the array.

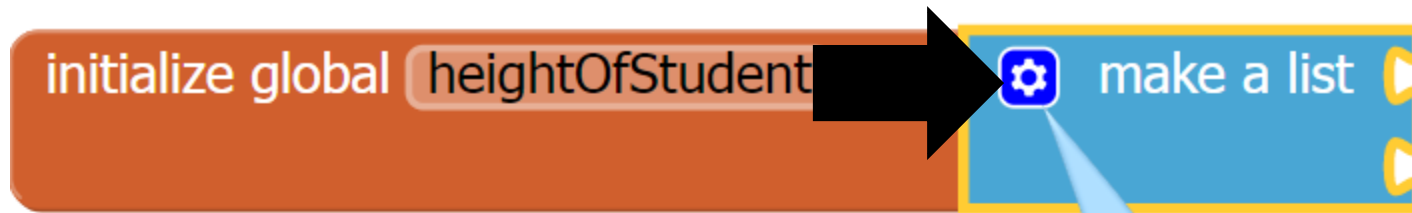
Init

Array Initialization

Drag the value into the slot.



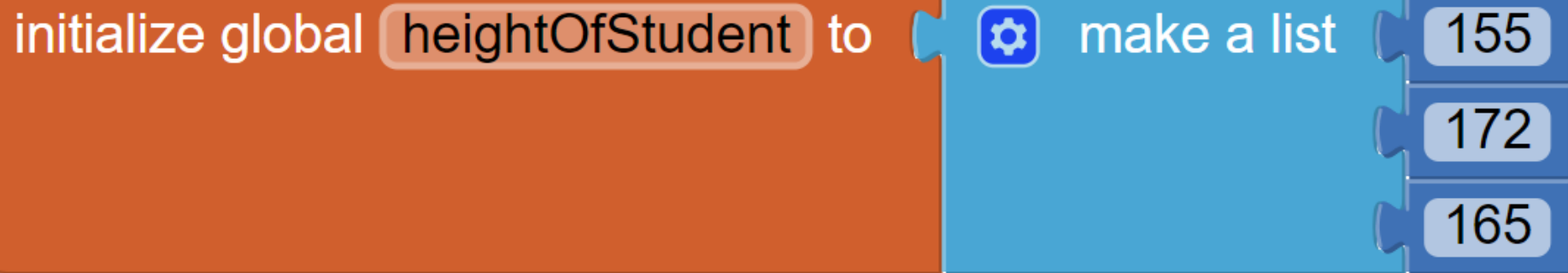
Array Initialization



You can change the number of initial elements

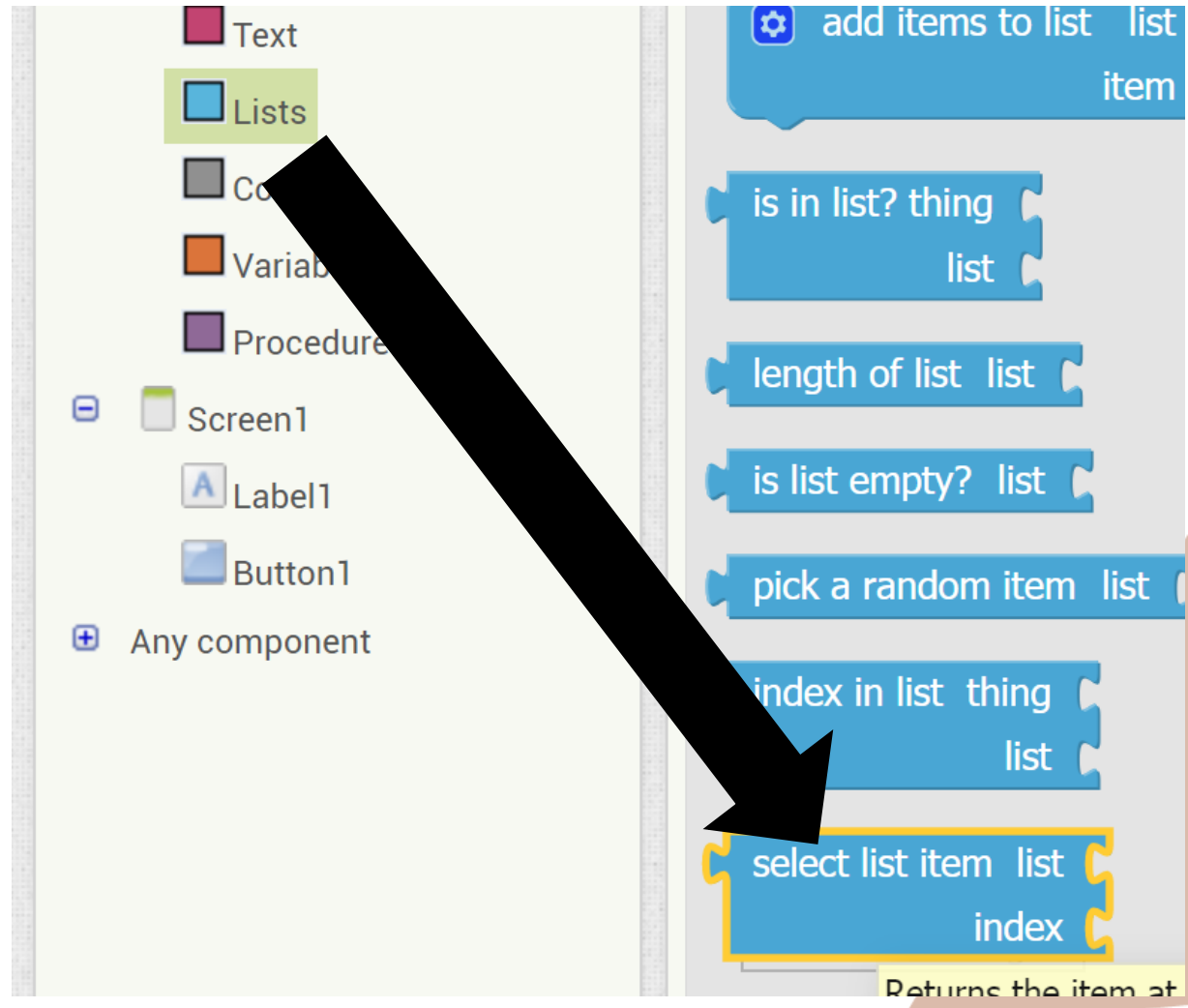


Array Initialization



Array Access

- You will need 2 things.
 - Array variable
 - Index
- The index of array starts from 1 .
- Other language may be different.
 - Starts from 0 .



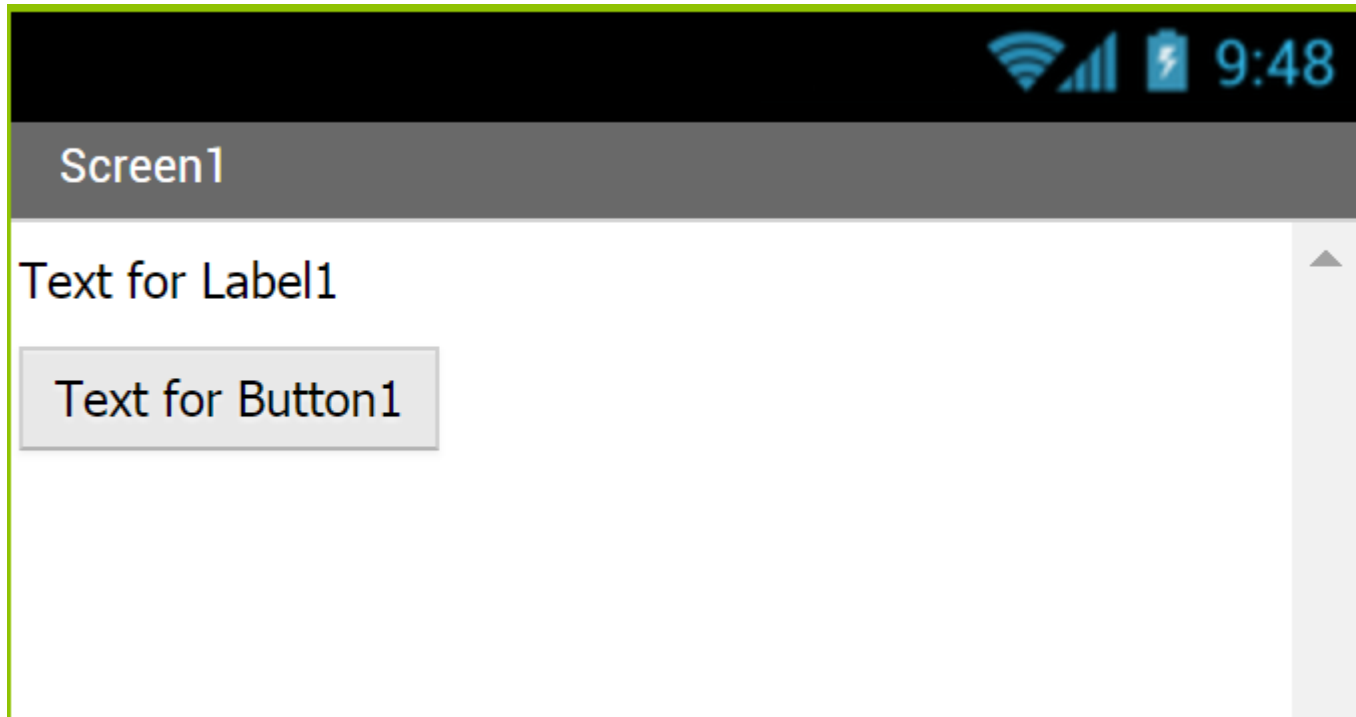
Array Access

select list item list
index

Name of the array

The index of element

Example



Example

initialize global heightOfStudent to

- make a list
 - 155
 - 172
 - 165

when Button1 .Click

do call Notifier1 .ShowMessageDialog

message

join

"The height of student 2 is "

select list item list

get global heightOfStudent

index

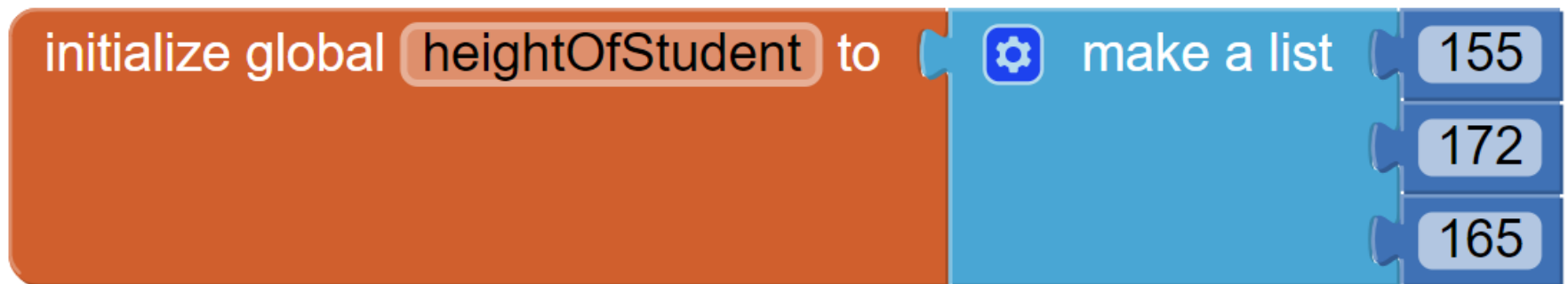
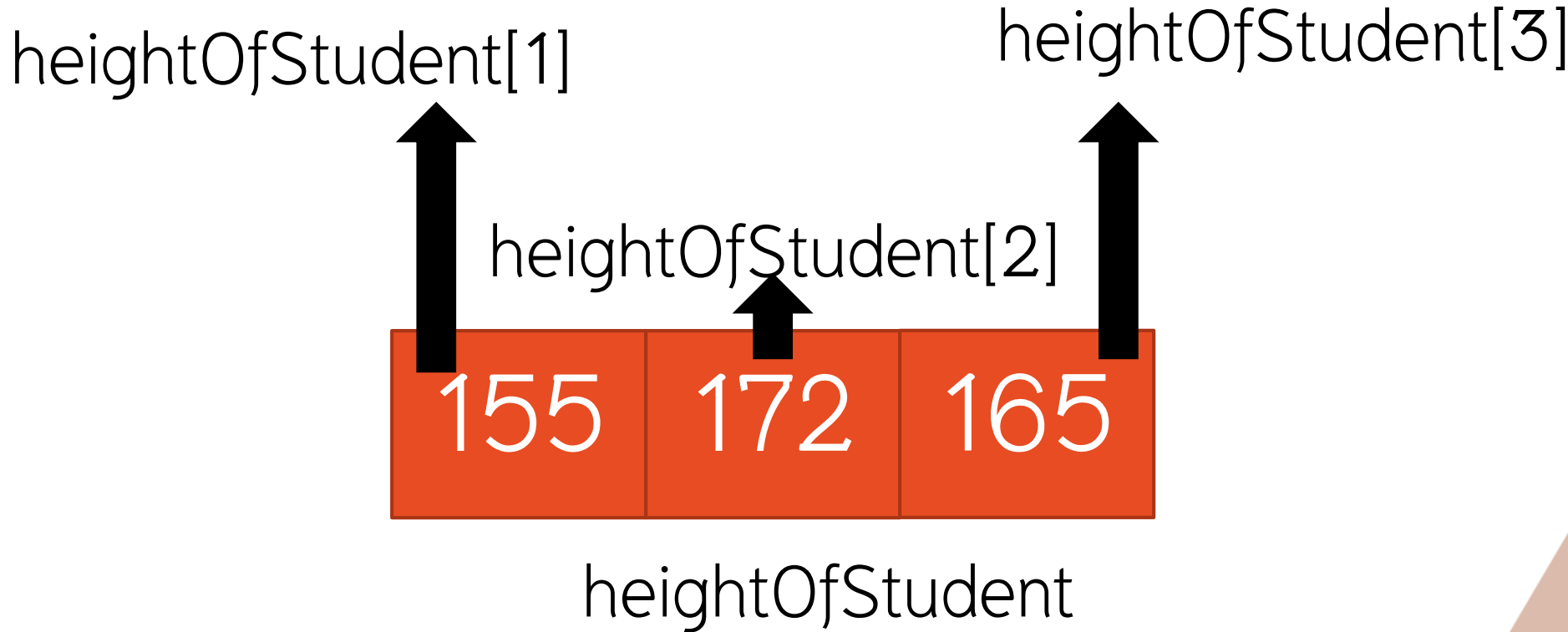
2

title

"Test Array"

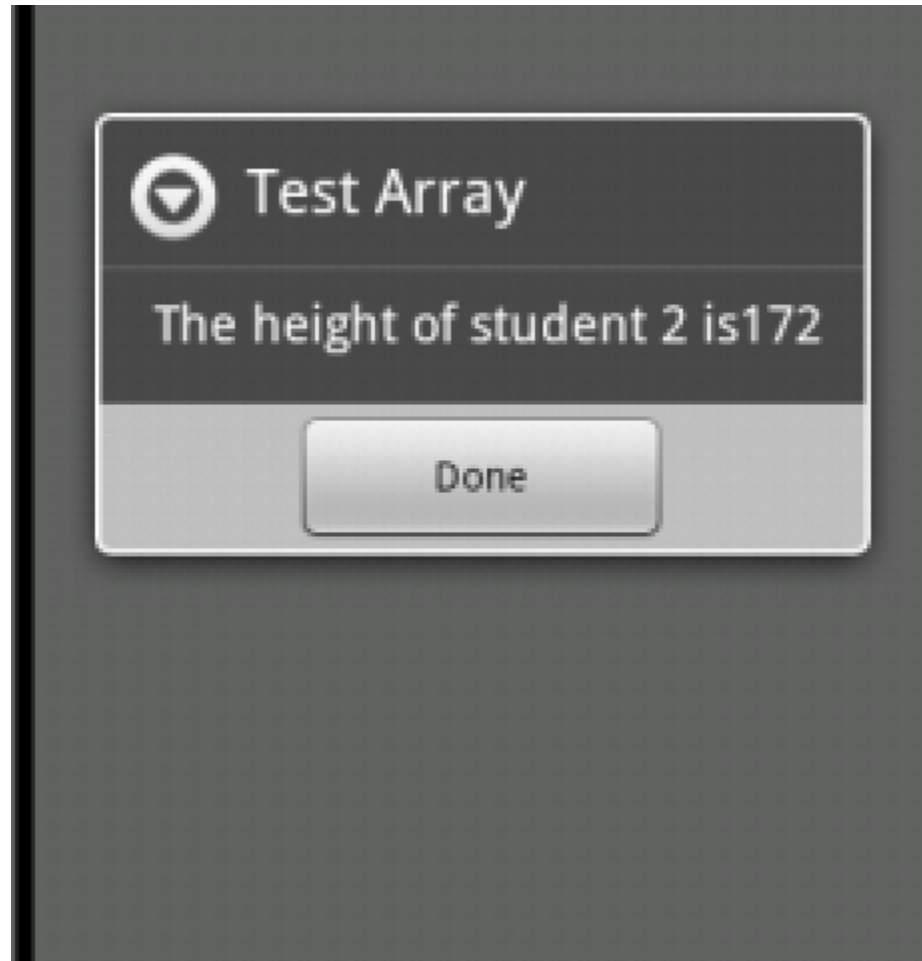
buttonText

"Done"

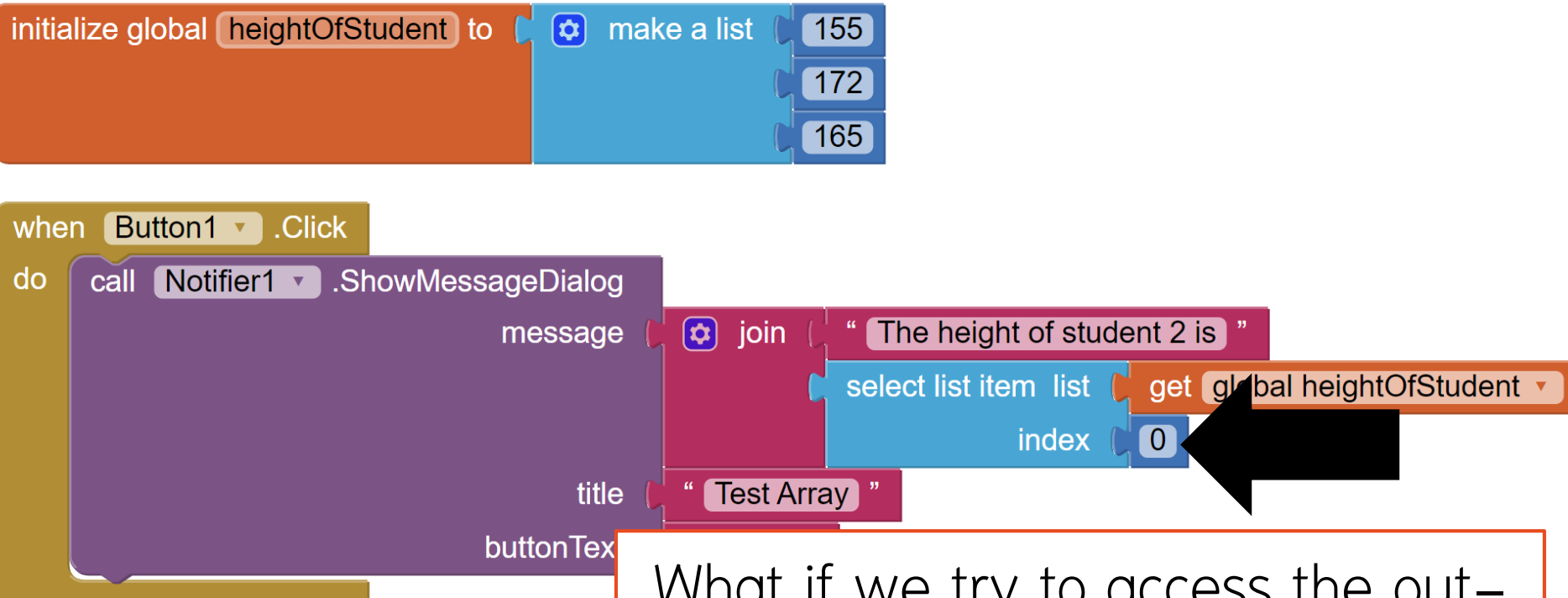


Example

- The result of the program is as follows.



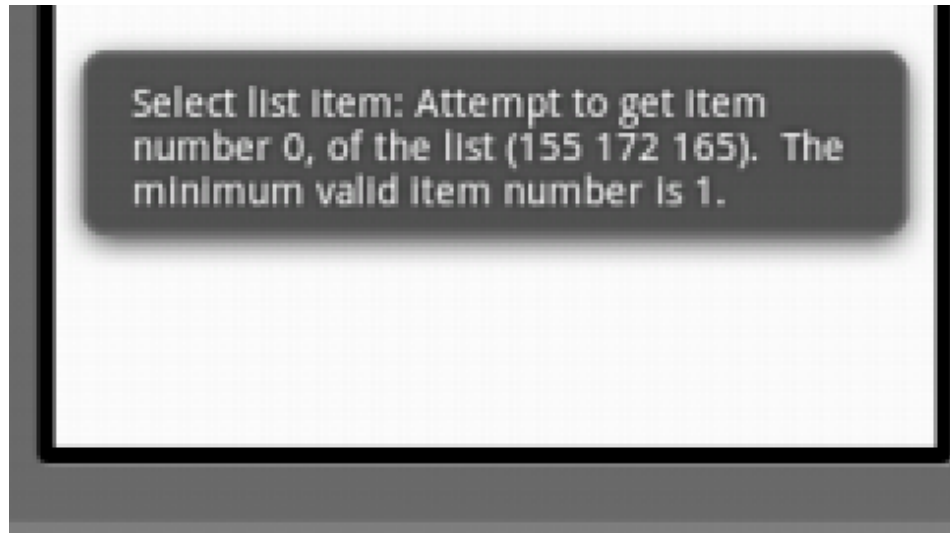
Example 2



What if we try to access the out-of-bound elements

Example 2

- The error message will pop up.



Runtime Error



Select list item: Attempt to get item number 0, of the list (155 172 165). The minimum valid item number is 1.
Note: You will not see another error reported for 5 seconds.

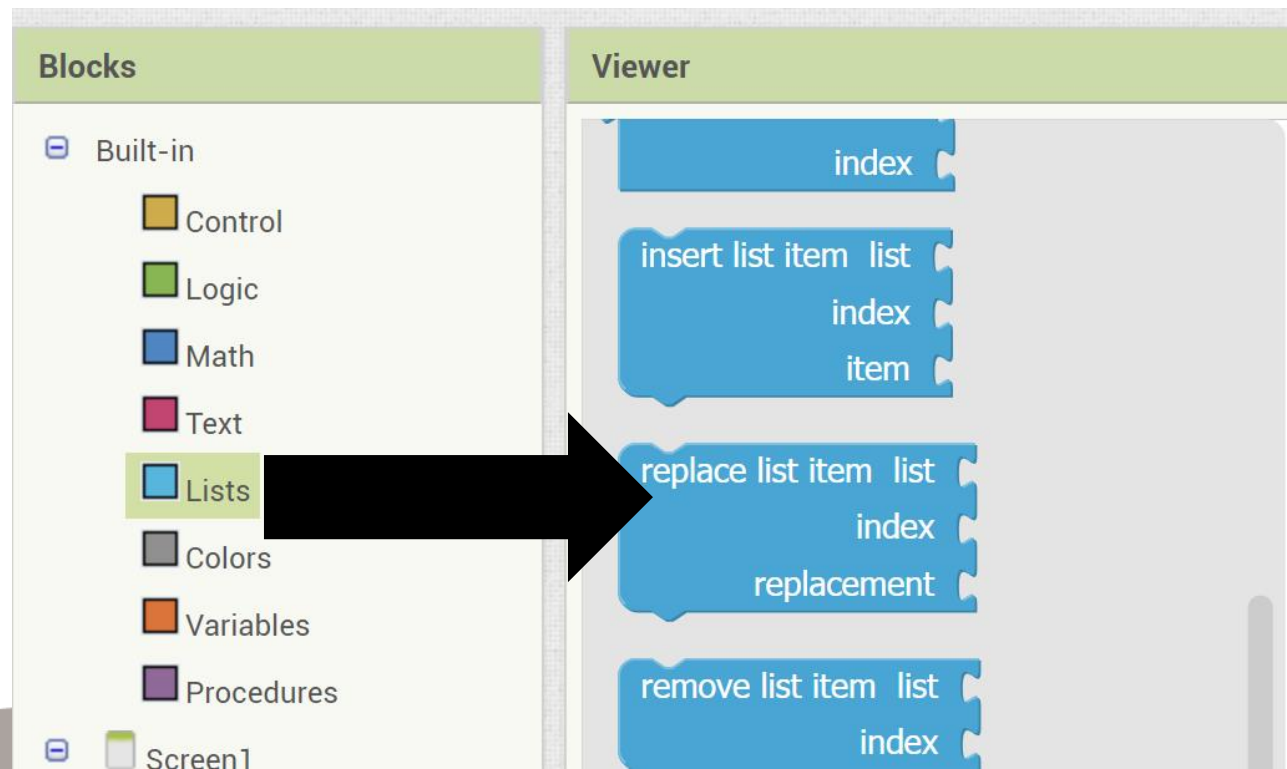
Dismiss

Example 2

- Index-out-of-Bound error
- Runtime error
- This error will show when you try to access the element of the array that is beyond the scope of the array.

Value Assignment in Array

- You will need 3 things.
 - Array variable
 - Index to assign a new value
 - The target value



Value Assignment in Array

```
replace list item list  
index  
replacement
```

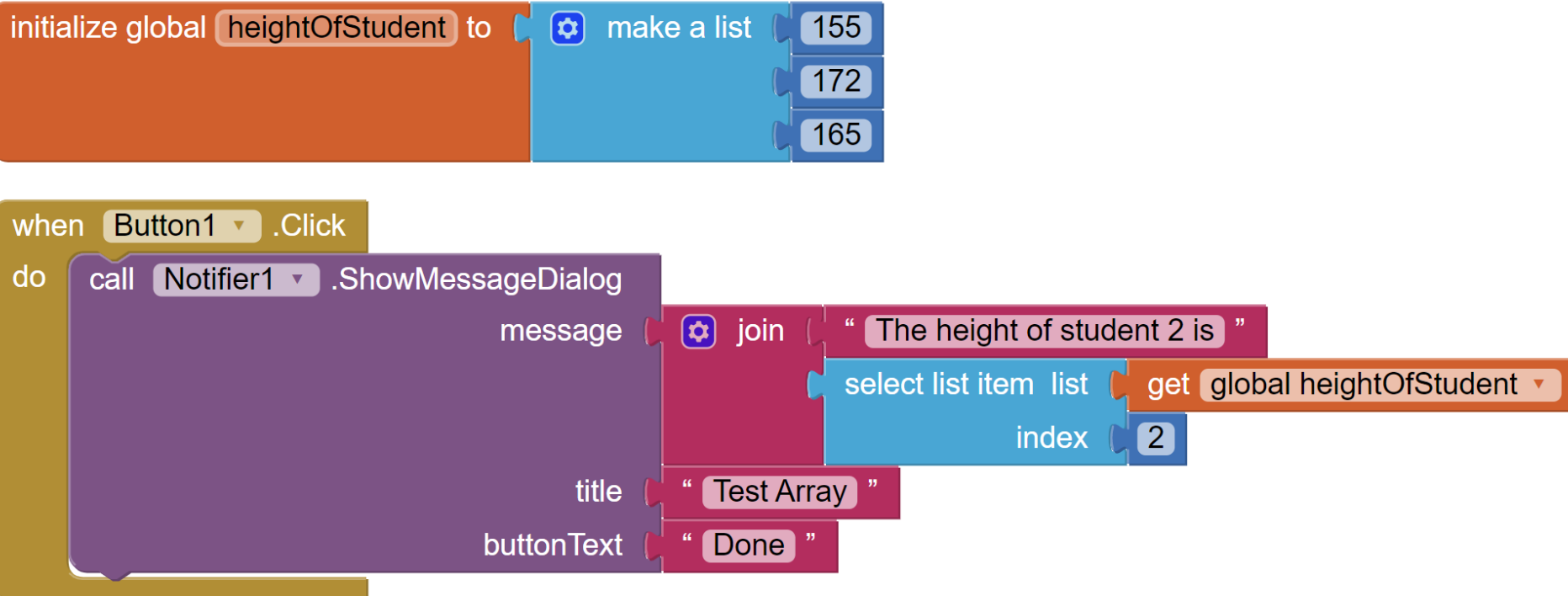
Name of the array

Index of the target
element

New value

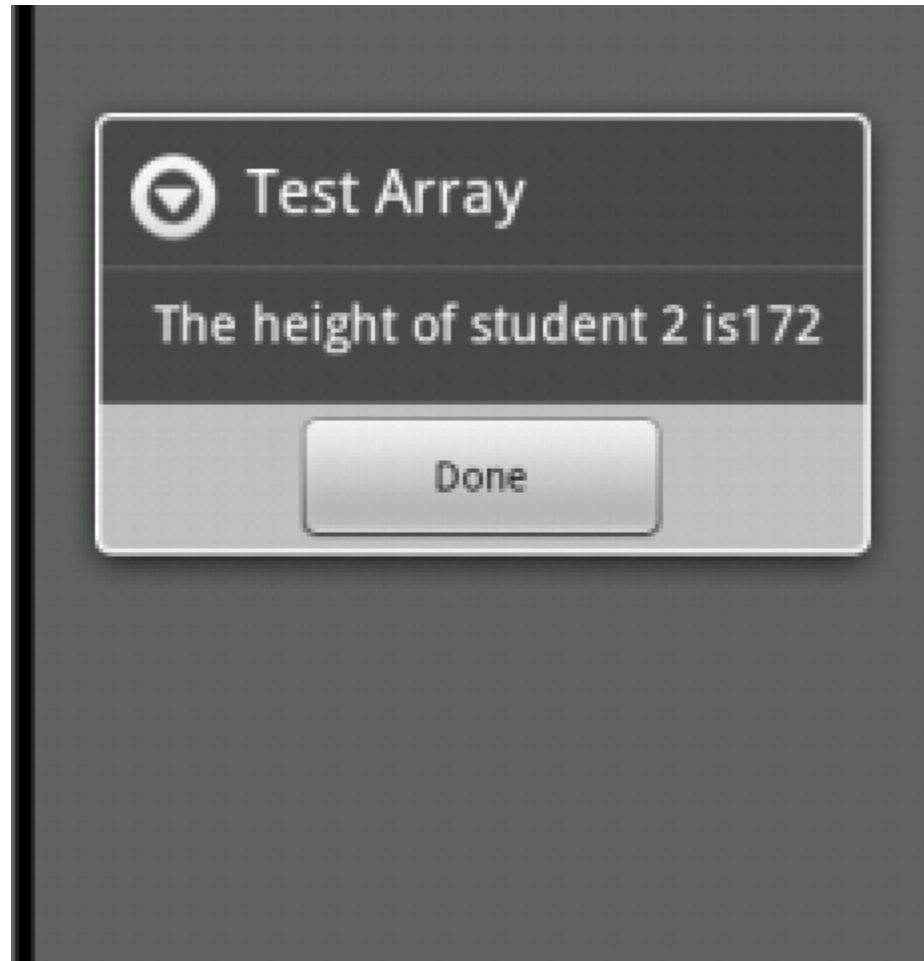
Example

- Using the same user interface



Example

- The result of the program is as follows.



Example

initialize global heightOfStudent to

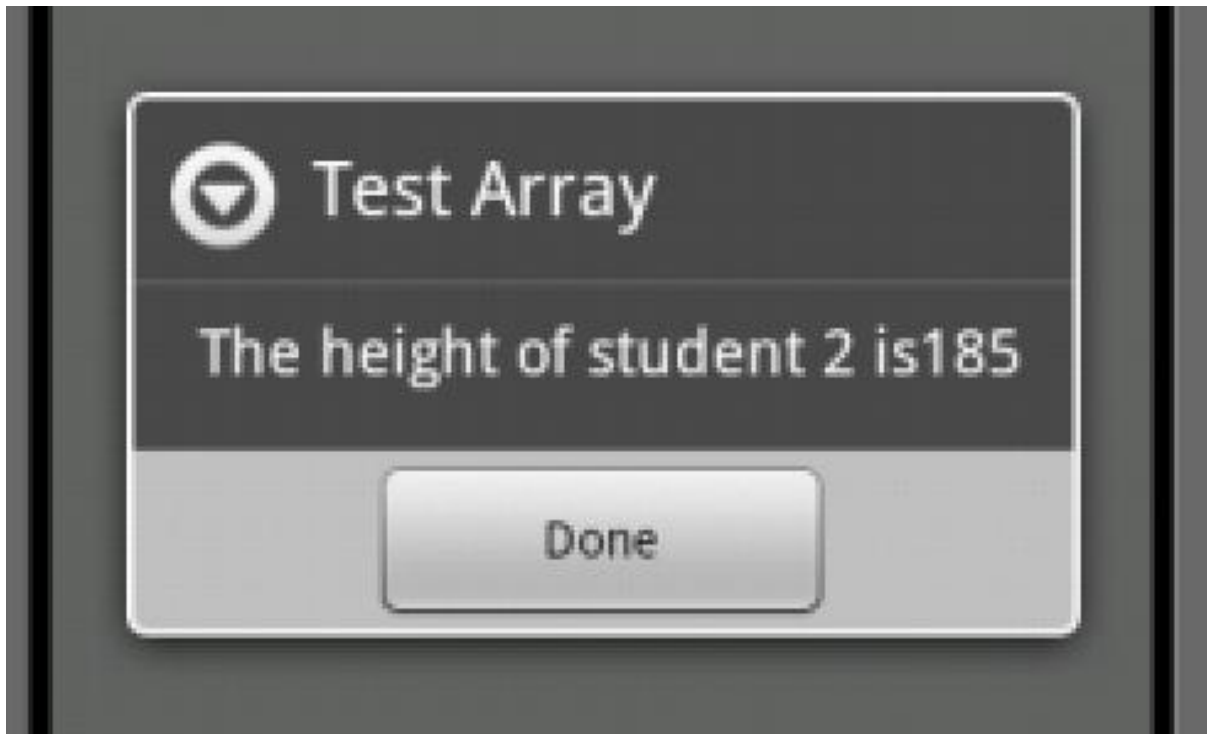
- make a list
 - 155
 - 172
 - 165

Change the element
at position 2 to 185

when Button1 .Click
do

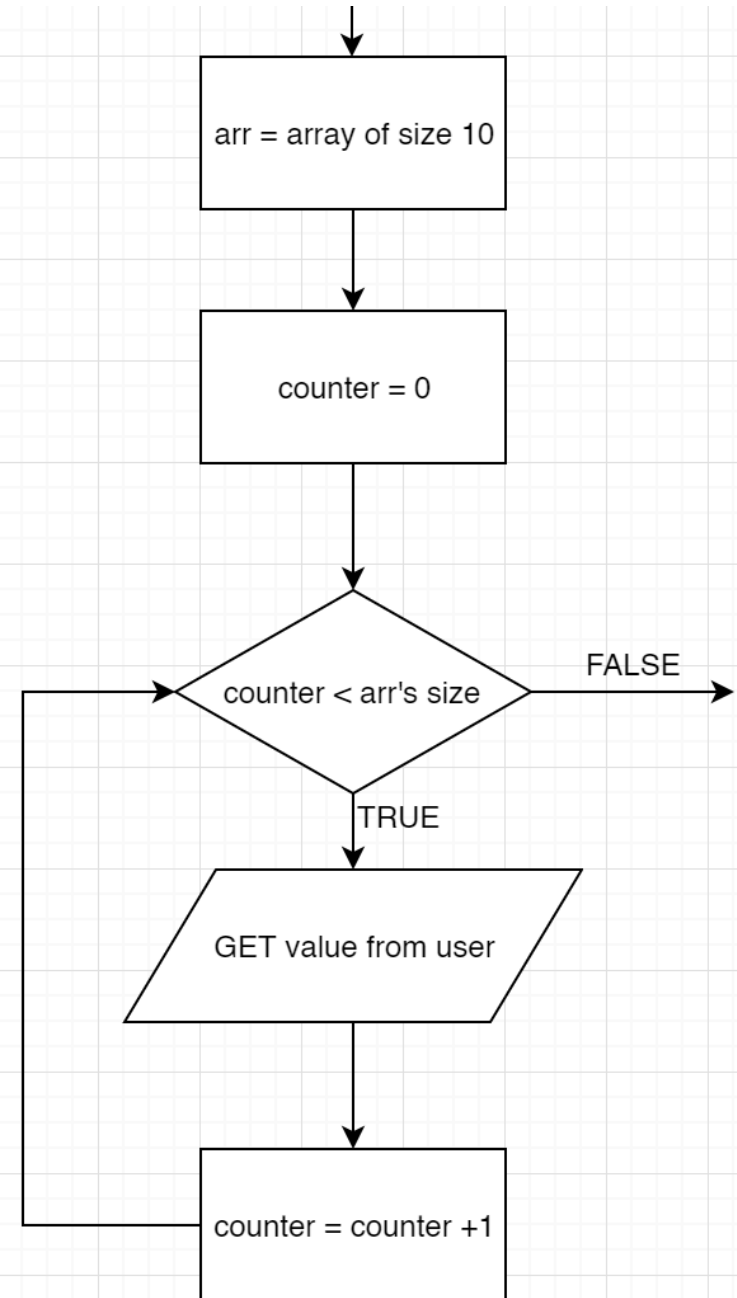
- replace list item list
 - index 2
 - replacement 185
- call Notifier1 .ShowMessageDialog
 - message
 - join
 - "The height of student 2 is "
 - select list item list
 - index 2
 - get global heightOfStudent
 - title "Test Array"
 - buttonText "Done"

- The result of the program is as follows.



Array Usage Technique

- Walk through the list of the array
 - Loop
- You can change the GET value to some other process
- Common structure when work with array



Q&A

