LECTURE 03. COLLECTIONS. PART I

Robotic Process Automation
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Camelia Chisăliţă-Creţu, Lecturer PhD
Babeş-Bolyai University

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UiPath
Robotic Process Automation

Contents

Arguments. Definition

- **Arguments** are
  - used to pass data from a project to another;
  - similar to parameters in method definition;

- **advantages**:
  - increase workflow readability;
  - increase sequence/flowchart reusability in workflows;

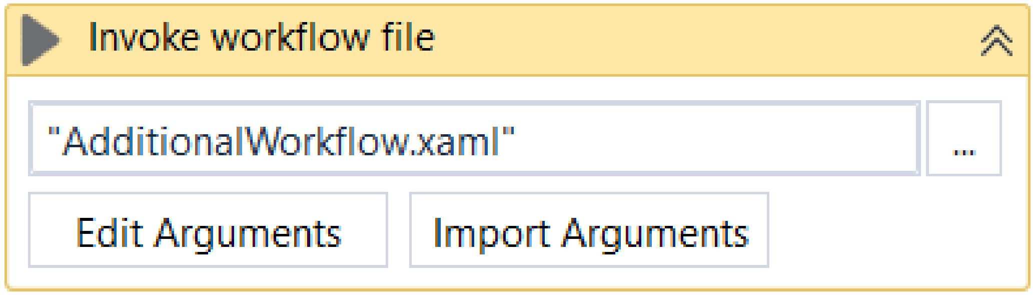
- **arguments vs variables:**
  - **argument** – it stores data dynamically and passes it on, between *automations*, i.e., projects;
  - **variable** – it passes data between *activities*.

Arguments. Types. Direction

- **argument types** – similar to *variable types* available in UiPath;
- **argument direction** – it indicates *where* the information stored in them is supposed to go;
- possible argument directions:
  - **In** – data can be used in the current project only; it was sent by another project;
  - **Out** – data can be used outside the current project;
  - **In/Out** – **In** + **Out**;
  - **Property** – not currently used.

Arguments. Invoke Workflow File Activity

- **Invoke Workflow File activity**
  - allows to invoke a specified workflow, passing a list of input/output arguments (parameters);
- **Properties to set:**
  - **WorkflowFileName** - a string with the file path of the **.xaml** file to be invoked; the file path is relative to the current project folder;
  - **Arguments** - the parameters that are passed to the invoked workflow;
  - **Isolated** - if checked, the invoked workflow runs in a separate Windows process; this is useful when isolating a faulty workflow from the main workflow (invoker).


"AdditionalWorkflow.xaml"

Demo 1

- Create a process that performs the following actions:
  - 1. *read* two integer numbers;
  - 2. *compute* the maximum value between the given numbers;
    - *define a distinct workflow having:*
      - *two input arguments;*
      - *one output argument;*
    - *invoke the defined workflow;*
  - 3. *print* the computed maximum value.

Generic Value Type

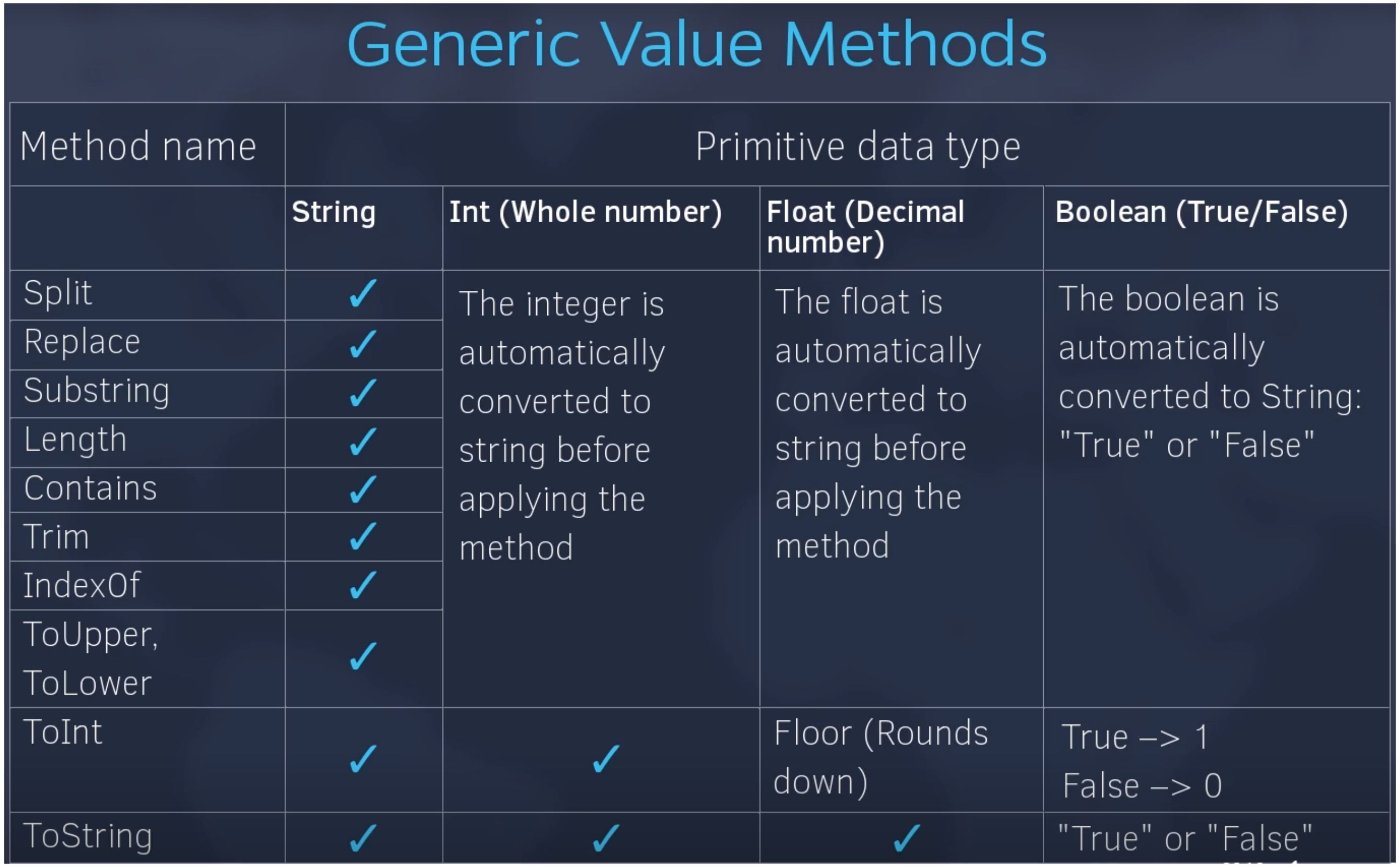
- **Generic Value** – special type, particular to UiPath;
  - it allows to hold values of different basic data types, e.g., text, numbers, date/time;
  - it is meant to simplify the use of basic activities;

- Advantages:
  - flexible use of variables;
  - no type considerations.

- E.g.:
  - `GenericValue A, B;`
  - `A=123; B="123";`
  - `Write Line: A+B` ==> 123+ToInt("123")=246;
  - `Write Line: B+A` ==> "123"+ToString(123)="123123";
  - `Write Line: "A+B="+A+B` ==> "A+B="+ToString(123)+"123"="A+B+123123".

Generic Value Type. Methods

- most of the methods allow to manipulate data stored using String-based methods;
- when cast is needed, other methods are available, e.g., `ToString` and `ToInt`.



Generic Value Methods

Method name	Primitive data type			
	String	**Int (Whole number)**	**Float (Decimal number)**	**Boolean (True/False)**
Split	✓	The integer is automatically converted to string before applying the method	The float is automatically converted to string before applying the method	The boolean is automatically converted to String: "True" or "False"
Replace	✓			
Substring	✓			
Length	✓			
Contains	✓			
Trim	✓			
IndexOf	✓			
ToUpper, ToLower	✓			
ToInt	✓	✓	Floor (Rounds down)	True –> 1 False –> 0
ToString	✓	✓	✓	"True" or "False"

Variable Categories

- **Scalar** - single value of a fixed type:
  - **Integer, Boolean, Character, Date Time**, etc.;
- **Collections** – *single dimension* structures, where multiple values are viewed as an entity:
  - **Array, List, Queue;**
  - **Strings;**
  - **Dictionary;**
- **Tables** – *two dimensional* structures, where multiple values are viewed as an entity:
  - **Data Table.**

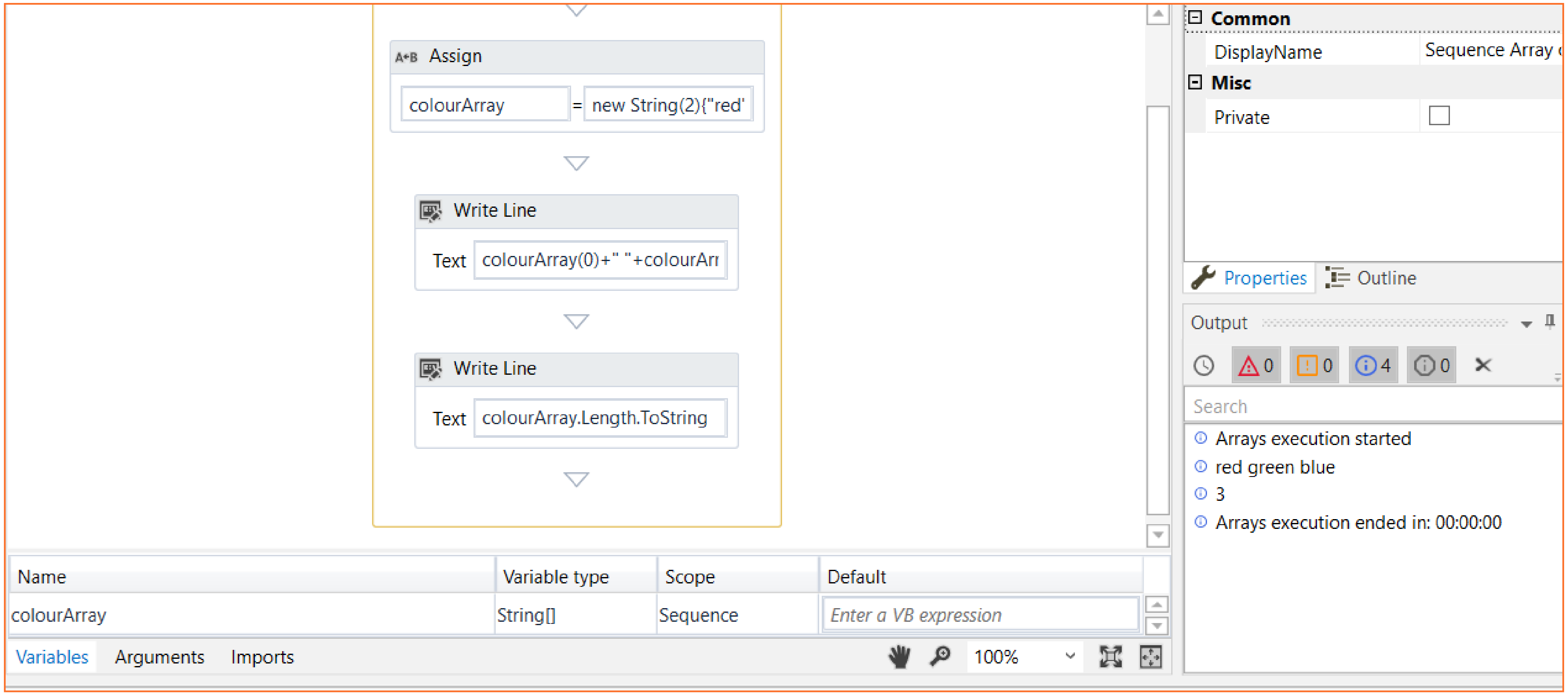
Arrays. Details

- **Array** characteristics in UiPath:
  - **an array has a fixed length**, set at declaration/instantiation/initialization time;
  - it implements the **IEnumerable** interface ==> can be iterated by using a **For Each** activity.

Arrays. Declaration. Instantiation. Initialization

- ways to **declare/instantiate/initialize** an array:
  - **Variables Panel:**
    - **Name:** colourArray; **Type:** String[]; **Default:** {“red”, “green”, “blue”} *//Length=3*
  - **Assign** activity:
    - colourArray= new String(){"red", "green", "blue"}*//Length=3*
    - colourArray= new String(2){"red", "green", "blue"}*//Length=3*
    - colourArray= new string(2){}*//values are set later, Length=3, valid indices: 0, 1, 2*
- ways to **set/change the values** in arrays:
  - **Assign** activity:
    - colourArray(0)= “red"// overrides or initializes the value on index = 0

Arrays. Example 1



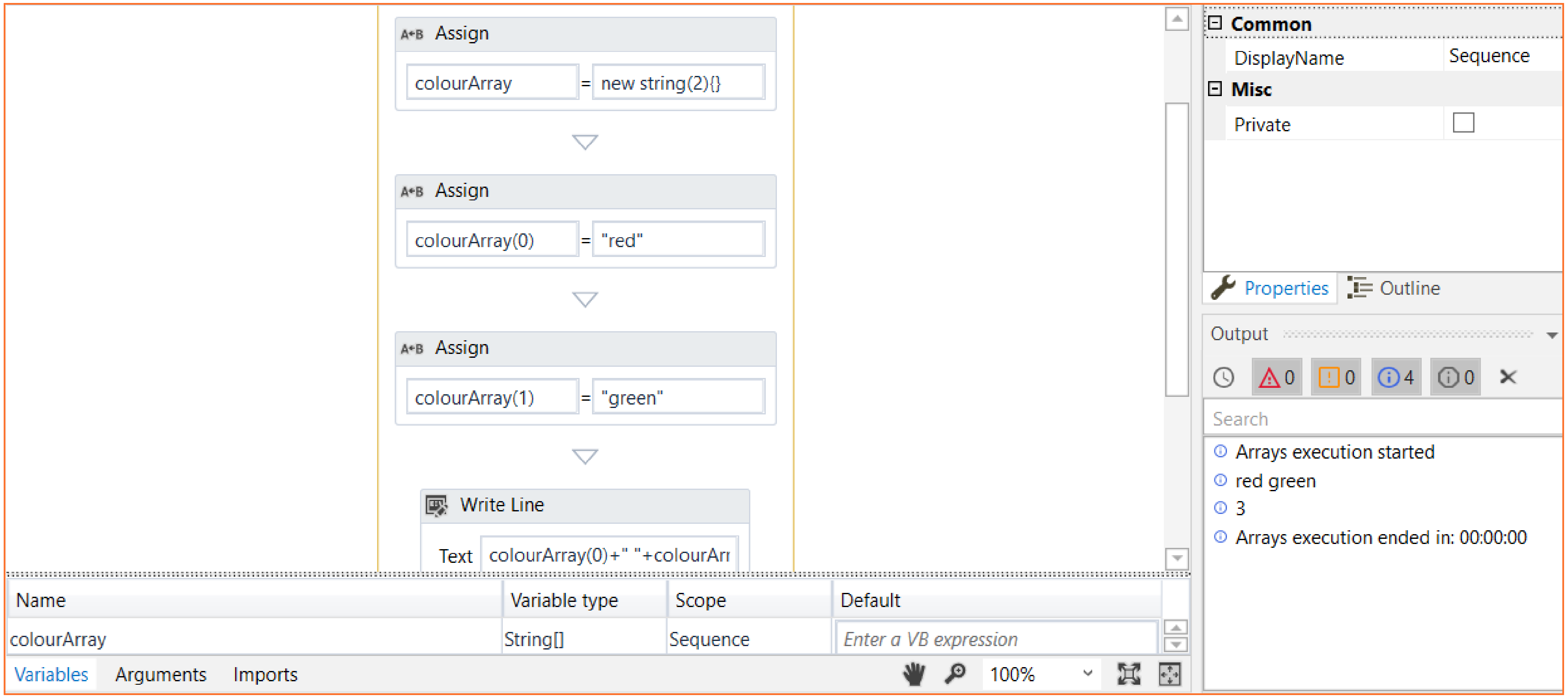
```
colourArray = new String(2){"red'
Text  colourArray(0)+" "+colourArr
Text  colourArray.Length.ToString
```

DisplayName	Sequence Array
Private	☐

Name	Variable type	Scope	Default
colourArray	String[]	Sequence	Enter a VB expression

```
Arrays execution started
red green blue
3
Arrays execution ended in: 00:00:00
```

Arrays. Example 2



Assign
colourArray = new string(2){}

Assign
colourArray(0) = "red"

Assign
colourArray(1) = "green"

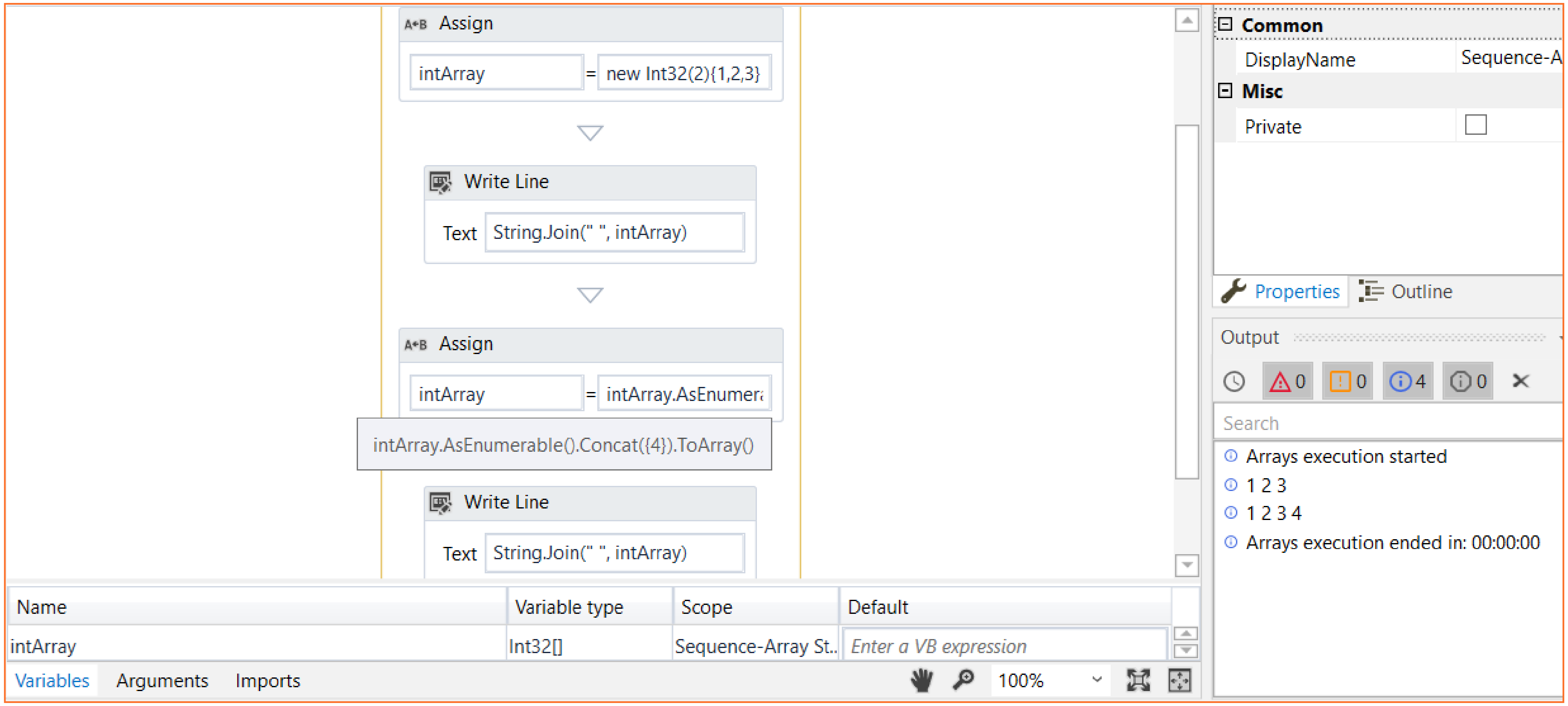
Write Line
Text colourArray(0)+" "+colourArr

Name	Variable type	Scope	Default
colourArray	String[]	Sequence	*Enter a VB expression*

Common
DisplayName Sequence
Misc
Private

```
Arrays execution started
red green
3
Arrays execution ended in: 00:00:00
```

Arrays. Example 3



Assign
intArray = new Int32(2){1,2,3}

Write Line
Text String.Join(" ", intArray)

Assign
intArray = intArray.AsEnumer
intArray.AsEnumerable().Concat({4}).ToArray()

Write Line
Text String.Join(" ", intArray)

Name	Variable type	Scope	Default
intArray	Int32[]	Sequence-Array St..	*Enter a VB expression*

Common
DisplayName: Sequence-A
Misc
Private: ☐

Output

```
Arrays execution started
1 2 3
1 2 3 4
Arrays execution ended in: 00:00:00
```

Demo 2

- Create a process that performs the following actions:
  - 1. *instantiate* an array of 5 integer numbers;
  - 2. *set* the values to generated numbers from 1 to 10 and:
    - 2.1. *print* the generated number;
    - 2.2. *check* if the number is even:
      - 2.2.1. if TRUE then *print* number+1 ;
      - 2.2.2. if FALSE then *print* number-1 ;
      - *use For Each activity to iterate the array;*
      - *use Log activity to print the generated values;*
  - 3. *compute* the sum of numbers in the array;
  - 4. *print* the sum;
  - 5. *print* the array;
    - *use a String-based method.*

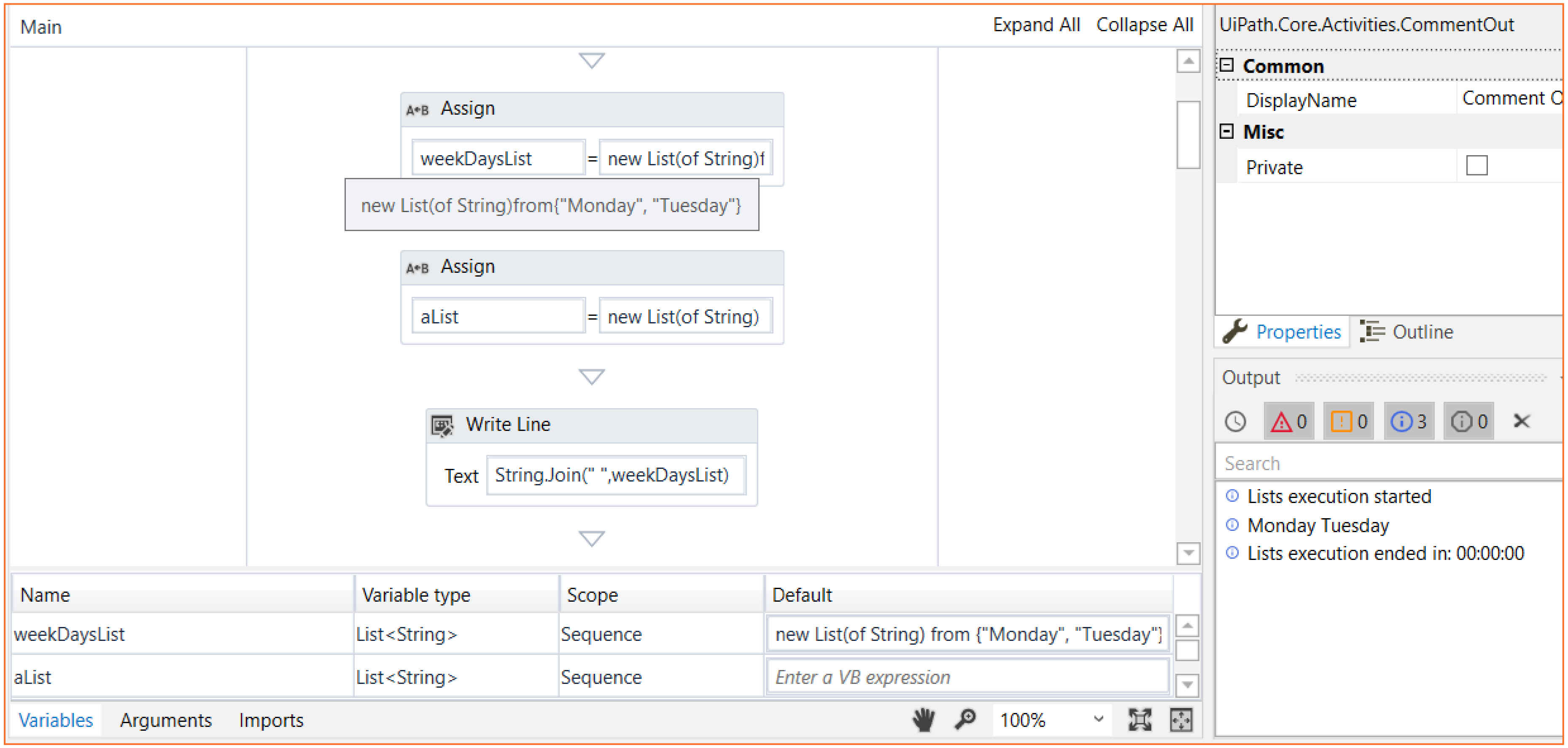
Lists. Details

- **List** characteristics in UiPath:
    - **a list has a flexible length**;
    - it implements the **IEnumerable** interface ==> can be iterated by using a **For Each** activity.

Lists. Declaration. Instantiation. Initialization

- ways to declare/instantiate/initialize a list:
  - **Variables Panel:**
    - **Name:** weekDaysList; **Type:** List<String>;
    - **Default:** new List(of String) from {"Monday", "Tuesday"} *//Length=2*
  - **Assign** activity:
    - weekDaysList = new List(of String)from{"Monday", "Tuesday"}*//Length=2*
    - weekDaysList = new List(of String) *//Length=0, values are added later*
- way to change values already set in a list:
  - **Assign** activity:
    - weekDaysList(0)= "Friday“ // overrides the value on index = 0

Lists. Example 1



Main

Expand All Collapse All

weekDaysList = new List(of String)f

new List(of String)from{"Monday", "Tuesday"}

aList = new List(of String)

Text String.Join(" ",weekDaysList)

Name	Variable type	Scope	Default
weekDaysList	List<String>	Sequence	new List(of String) from {"Monday", "Tuesday"}
aList	List<String>	Sequence	*Enter a VB expression*

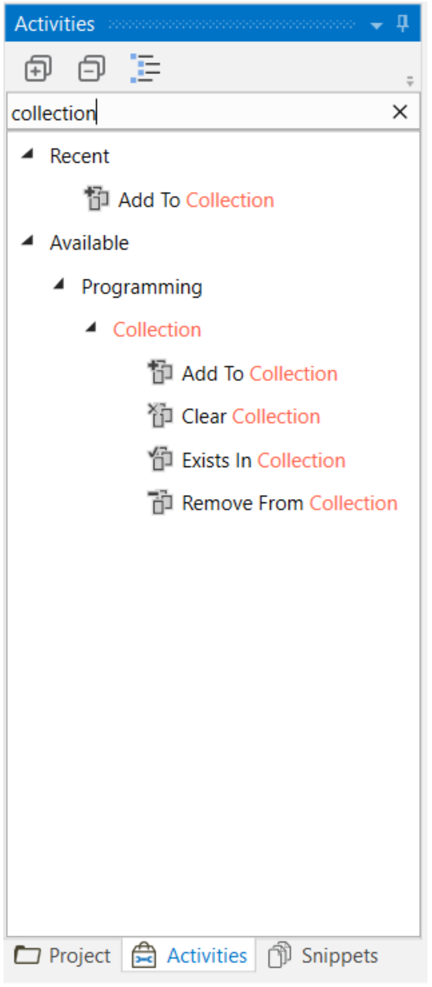
UiPath.Core.Activities.CommentOut

Common	
DisplayName	Comment O
Misc	
Private	☐

```
Lists execution started
Monday Tuesday
Lists execution ended in: 00:00:00
```

Lists. Operations

- ways to apply predefined operations on lists:
  - **Invoke Method** activity:
    - the user needs to know the signature of the use method;
    - it can be used to *add, insert, remove, etc.* an item from a list;
  - **Collection** package of activities:
    - **Add To Collection;**
    - **Clear Collection;**
    - **Exists In Collection;**
    - **Remove From Collection;**

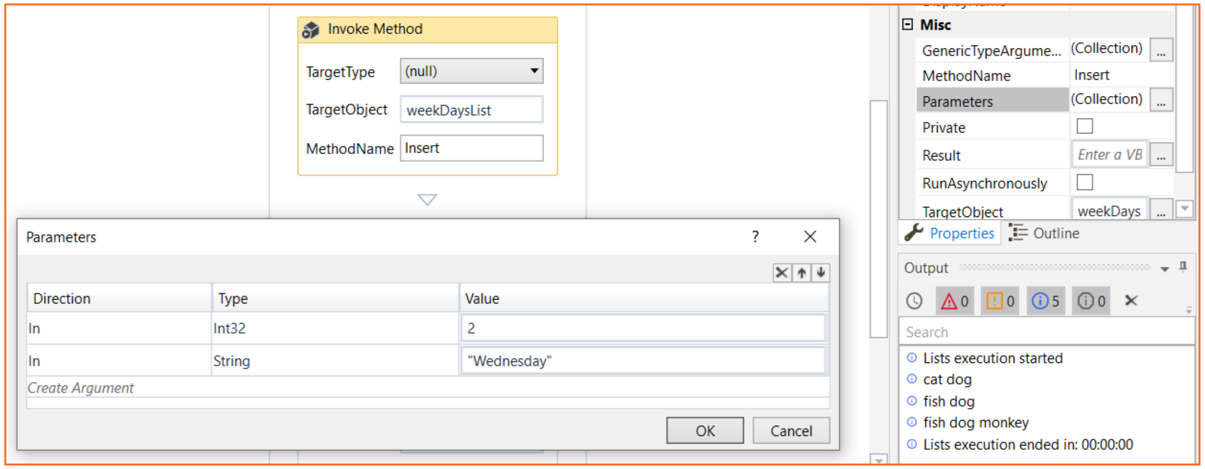


Activities

collection

Recent
- Add To Collection

Available
- Programming
  - Collection
    - Add To Collection
    - Clear Collection
    - Exists In Collection
    - Remove From Collection



Invoke Method

TargetType	(null)
TargetObject	weekDaysList
MethodName	Insert

Parameters

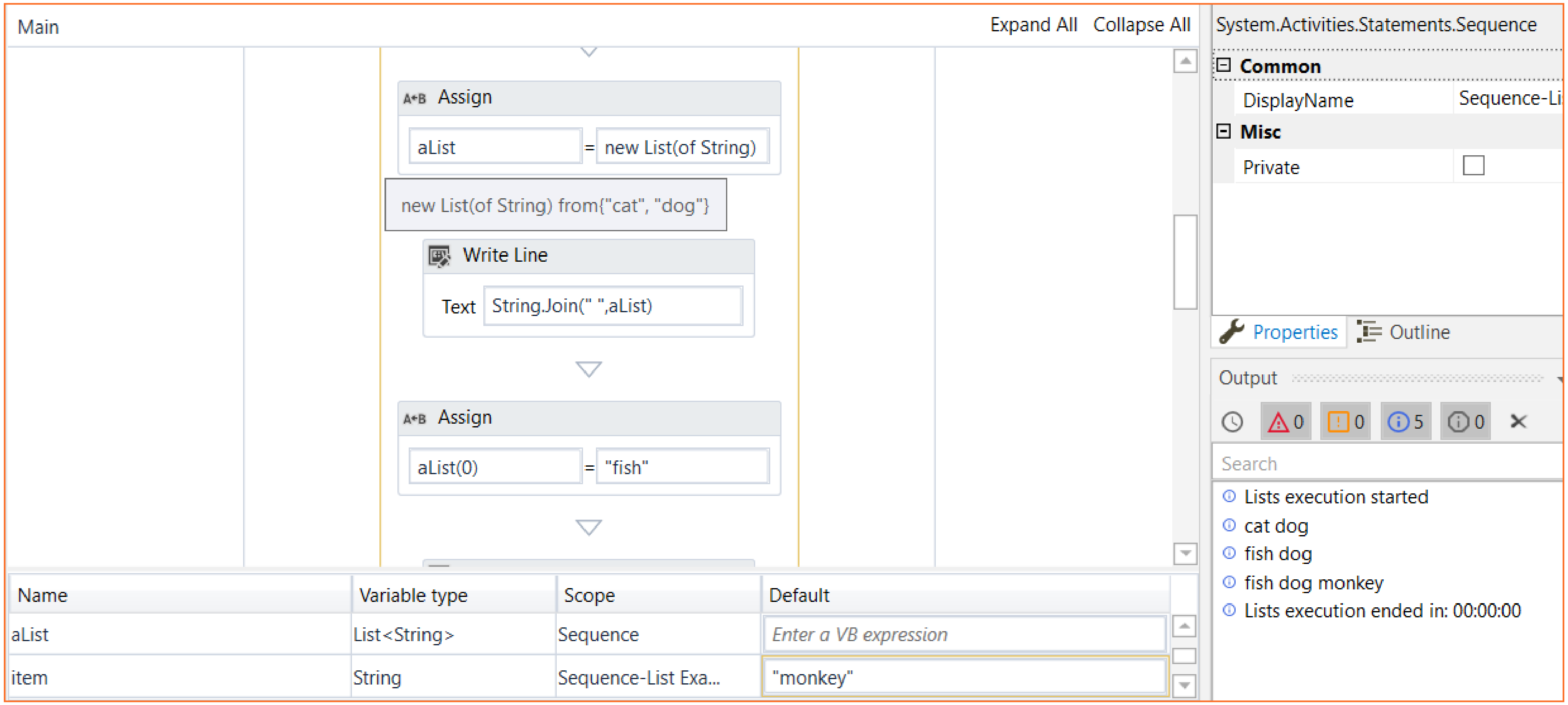
Direction	Type	Value
In	Int32	2
In	String	"Wednesday"

Misc

GenericTypeArgume...	(Collection)
MethodName	Insert
Parameters	(Collection)
Private	☐
Result	Enter a VB
RunAsynchronously	☐
TargetObject	weekDays

```
Lists execution started
cat dog
fish dog
fish dog monkey
Lists execution ended in: 00:00:00
```

Lists. Example 2A. Set/update an item



Main | Expand All | Collapse All

Assign: aList = new List(of String)

new List(of String) from{"cat", "dog"}

Write Line — Text: String.Join(" ",aList)

Assign: aList(0) = "fish"

Name	Variable type	Scope	Default
aList	List<String>	Sequence	*Enter a VB expression*
item	String	Sequence-List Exa...	"monkey"

System.Activities.Statements.Sequence

Common
DisplayName: Sequence-Li
Misc
Private: ☐

Properties | Outline

Output

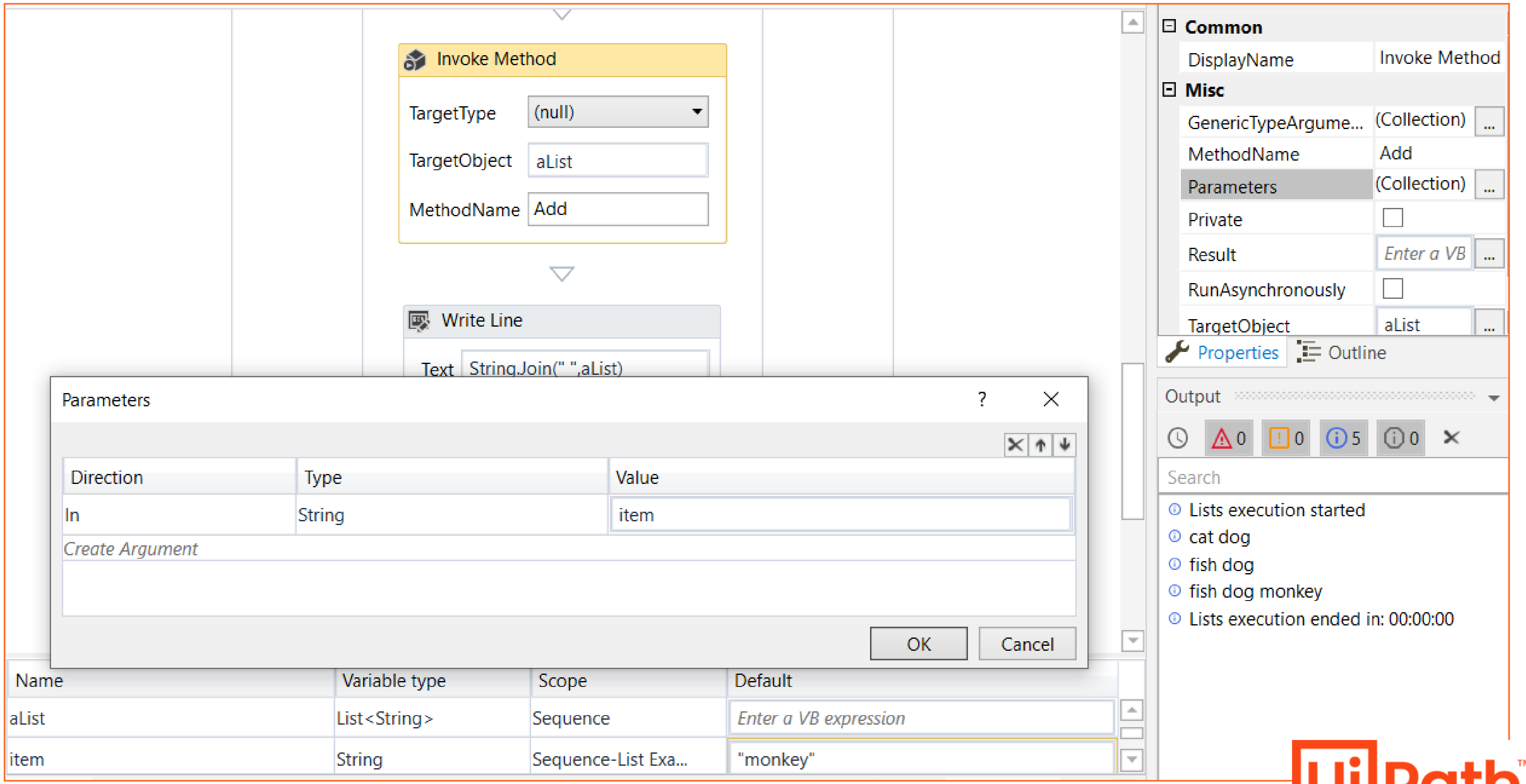
⚠ 0 | ! 0 | ⓘ 5 | ⓘ 0

Search

```
Lists execution started
cat dog
fish dog
fish dog monkey
Lists execution ended in: 00:00:00
```

Lists. Example 2B. Add an item

- **Invoke Method** activity can be used to *add, insert, remove, etc.* an item to/into/from a list;



Invoke Method

TargetType	(null)
TargetObject	aList
MethodName	Add

Write Line

Text: String.Join(" ",aList)

Parameters

Direction	Type	Value
In	String	item

Create Argument

OK · Cancel

Name	Variable type	Scope	Default
aList	List<String>	Sequence	Enter a VB expression
item	String	Sequence-List Exa...	"monkey"

Common

DisplayName	Invoke Method

Misc

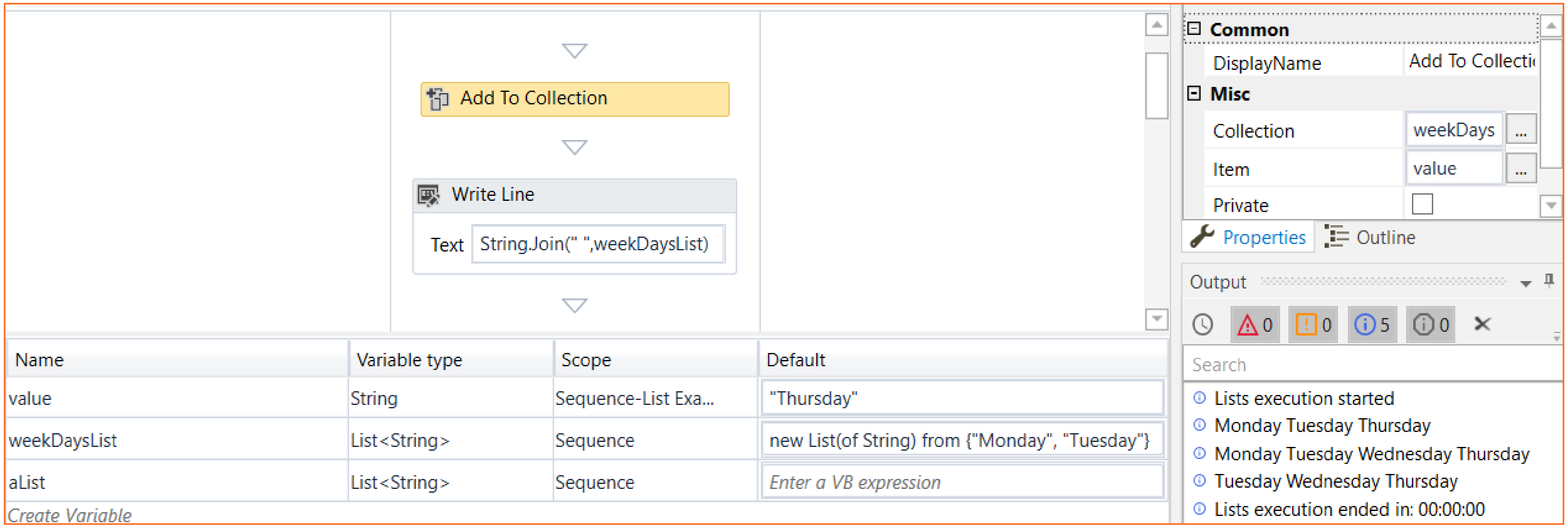
GenericTypeArgume...	(Collection)
MethodName	Add
Parameters	(Collection)
Private	☐
Result	Enter a VB
RunAsynchronously	☐
TargetObject	aList

Output

```
Lists execution started
cat dog
fish dog
fish dog monkey
Lists execution ended in: 00:00:00
```

Lists. Example 3. Collection Package

- **Add To Collection** activity is used add an item to the list;



Text: String.Join(" ",weekDaysList)

DisplayName	Add To Collecti
Collection	weekDays
Item	value
Private	☐

Name	Variable type	Scope	Default
value	String	Sequence-List Exa...	"Thursday"
weekDaysList	List<String>	Sequence	new List(of String) from {"Monday", "Tuesday"}
aList	List<String>	Sequence	Enter a VB expression

```
Lists execution started
Monday Tuesday Thursday
Monday Tuesday Wednesday Thursday
Tuesday Wednesday Thursday
Lists execution ended in: 00:00:00
```

Demo 3

- **Create a process that performs the following actions:**
  - **1. *create* a list of the following items:** {“still water”, “sparkling water”, “tea”, “coffee”, “wine”, “juice”, “green tea”, “black tea”};
  - **2. *generate* an index value (from 0 to 7);**
  - **3. *print* the message *“Do you like to drink some juice/green tea/…?”* and enter the answer (*yes* or *no*):**
    - **3.1. if “YES” move the item to the front of the list;**
    - **3.2. if “NO” move the item to the end of the list;**
  - **4. *repeat* step 3. *four* times;**
  - **5. *print* the bill, i.e., the list of accepted drinks.**

References

- UiPath Academy - https://academy.uipath.com
  - Awareness Training;
  - Level 1 – Foundation Training, Lesson 3;
- UiPath Docs - https://docs.uipath.com/studio
  - Arguments - https://docs.uipath.com/studio/docs/managing-arguments
  - Invoke Workflow File Activity - https://docs.uipath.com/activities/docs/invoke-workflow-file