LECTURE 04A. COLLECTIONS. PART II

Robotic Process Automation
[22 October 2019]

Elective Course, 2019-2020, Fall Semester

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Acknowledgements

This course is presented to our Faculty with the support of UiPath Romania.

UiPath

Robotic Process Automation

Contents

Dictionary. Details

- **Dictionary** characteristics in UiPath:
  - **a dictionary has a flexible length;**
  - it implements the **IEnumerable** interface ==> can be iterated by using a **For Each** activity;
  - it is used to store:
    - multiple related pairs (key, value) that are passed as a **single argument** between workflows;
    - data in **Orchestrator queues**;

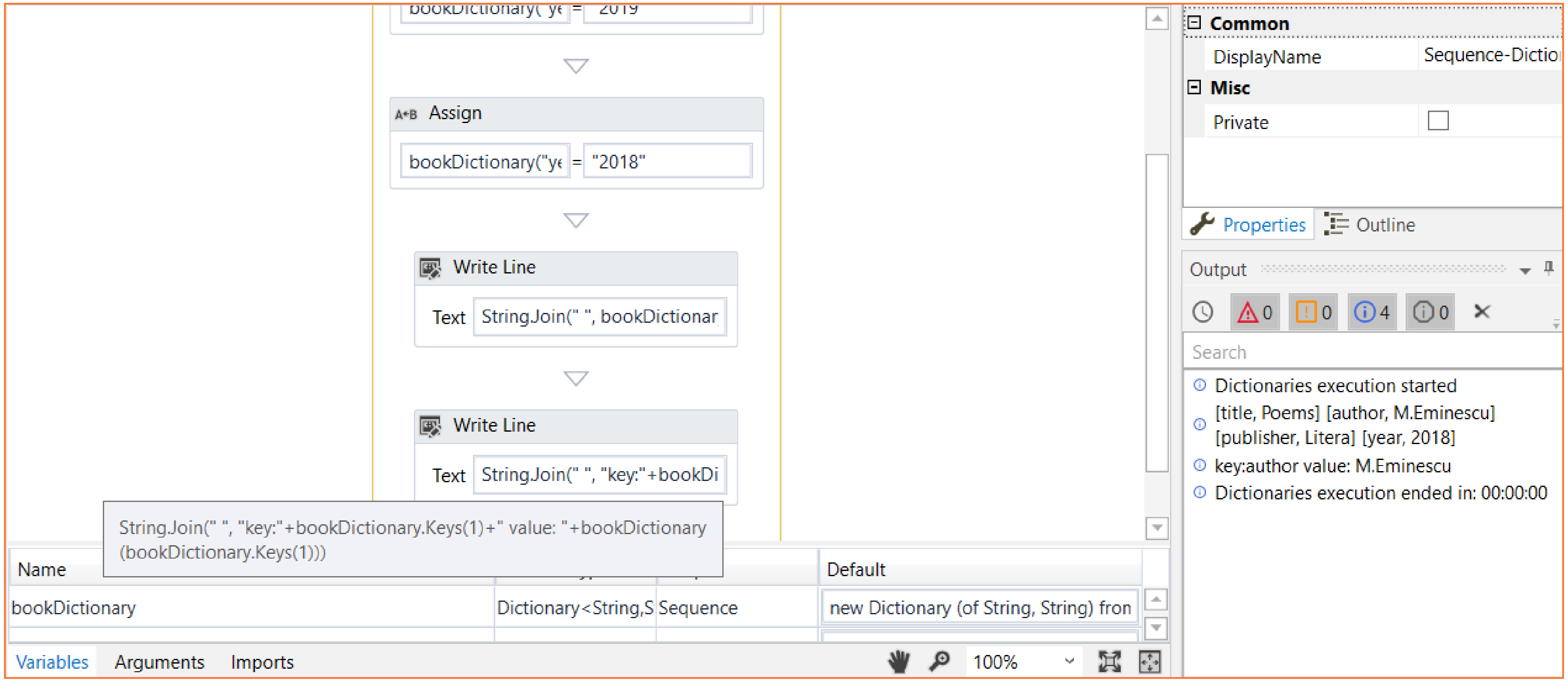
Dictionary. Declaration. Instantiation. Initialization

- ways to declare/instantiate/initialize a dictionary:
  - **Variables Panel:**
    - **Name:** bookDictionary; **Type:** Dictionary<String, String>;
    - **Default:** new Dictionary (of String, String) from{{"title", "Poems"}, {"author","M.Eminescu"}, {"publisher", "Litera"}}*//Count=3*
    - **Name:** gradeDictionary; **Type:** Dictionary<String, List<String>>;
    - **Default***:* new Dictionary(of Int32, List(of String)) from {{10, new List (of String) from {"Ana", "Anca"}}, {3, new List(of String) from {"me", "you", "her"}}} *//Count=2*
  - **Assign** activity:
    - monthDictionary = new Dictionary (of Int32, List(of String)) *//Count=0*
    - sDictionary = new Dictionary(of String, String) *//Count=0, pairs are added later*

Dictionary. Operations

- way to add pairs in a dictionary:
    - **Assign** activity:
        - bookDictionary("year") = "2019"// overrides the value on key “year” or adds a new pair {"year", "2019"}
        - monthDictionary(30)= new List(of String) from {"April", "June", "September"}
    - **Add To Collection** activity:
        - properties set:
            - Collection = monthDictionary(31);
            - Item = "March";

Dictionaries. Example 1


bookDictionary("ye = "2019"

Assign

bookDictionary("ye = "2018"

Write Line

Text String.Join(" ", bookDictionar

Write Line

Text String.Join(" ", "key:"+bookDi

String.Join(" ", "key:"+bookDictionary.Keys(1)+" value: "+bookDictionary (bookDictionary.Keys(1)))

Name	Variable type	Scope	Default
bookDictionary	Dictionary<String,S	Sequence	new Dictionary (of String, String) fron

Common

DisplayName	Sequence-Dictio

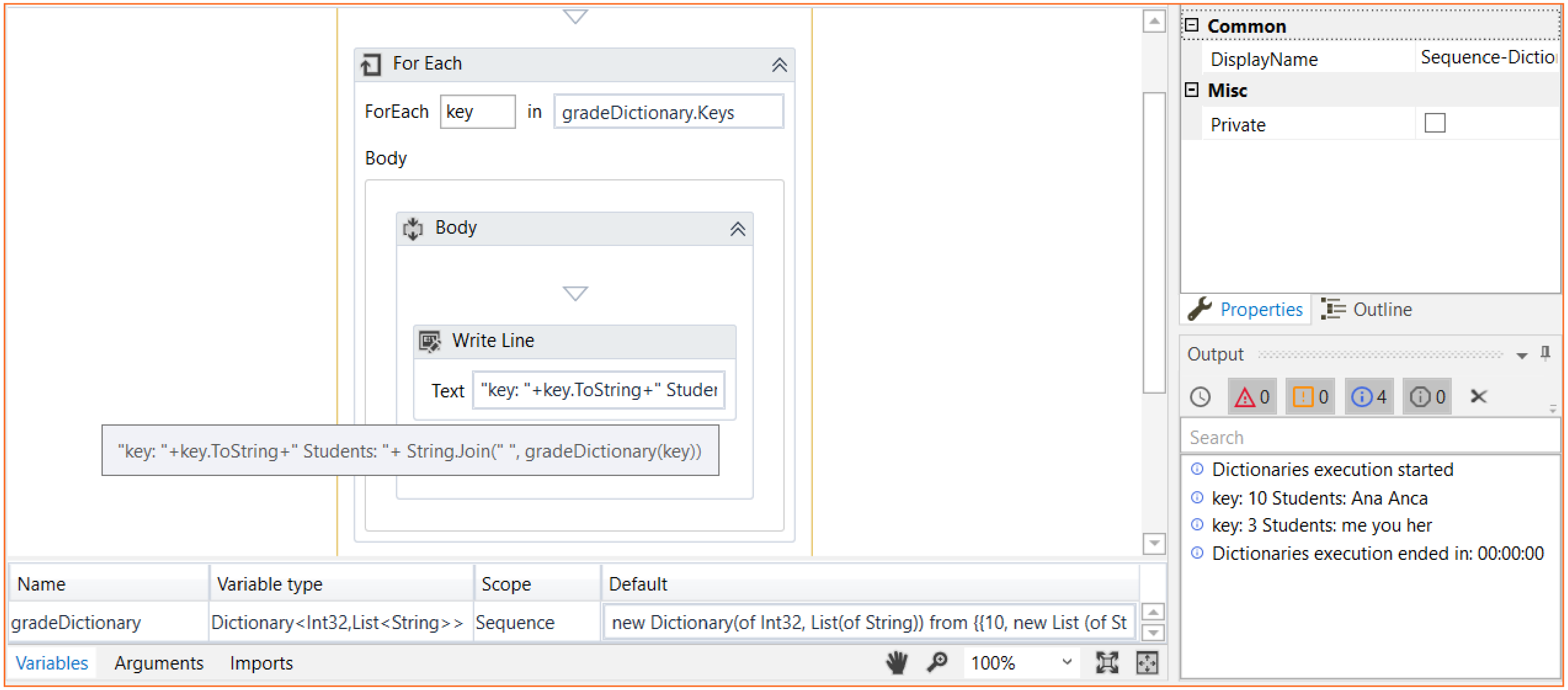
Misc

Private	☐

Output

```
Dictionaries execution started
[title, Poems] [author, M.Eminescu]
[publisher, Litera] [year, 2018]
key:author value: M.Eminescu
Dictionaries execution ended in: 00:00:00
```

Dictionaries. Example 2



For Each

ForEach key in gradeDictionary.Keys

Body

Body

Write Line

Text "key: "+key.ToString+" Studer

"key: "+key.ToString+" Students: "+ String.Join(" ", gradeDictionary(key))

Name	Variable type	Scope	Default
gradeDictionary	Dictionary<Int32,List<String>>	Sequence	new Dictionary(of Int32, List(of String)) from {{10, new List (of St

Common

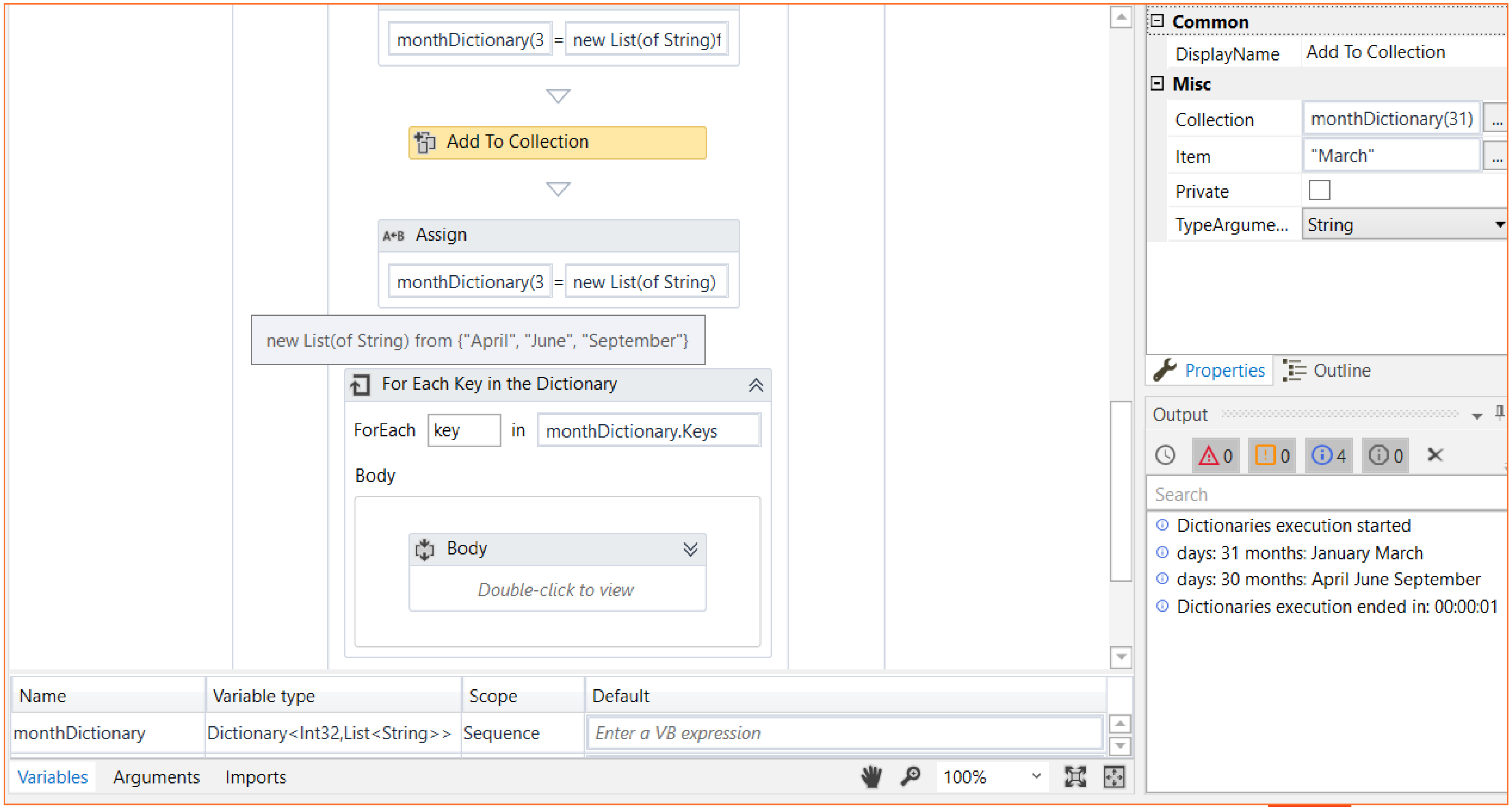
DisplayName Sequence-Dictio

Misc

Private

```
Dictionaries execution started
key: 10 Students: Ana Anca
key: 3 Students: me you her
Dictionaries execution ended in: 00:00:00
```

Dictionaries. Example 3



monthDictionary(3 = new List(of String)f

Add To Collection

Assign

monthDictionary(3 = new List(of String)

new List(of String) from {"April", "June", "September"}

For Each Key in the Dictionary

ForEach key in monthDictionary.Keys

Body

Body

Double-click to view

Name	Variable type	Scope	Default
monthDictionary	Dictionary<Int32,List<String>>	Sequence	*Enter a VB expression*

Variables Arguments Imports 100%

Common

DisplayName	Add To Collection

Misc

Collection	monthDictionary(31)
Item	"March"
Private	☐
TypeArgume...	String

Properties Outline

Output

0 0 4 0

Search

```
Dictionaries execution started
days: 31 months: January March
days: 30 months: April June September
Dictionaries execution ended in: 00:00:01
```

Demo 4

- Create a process that performs the following actions:
  - 1. *read* pairs of (continent, country):
    - 1.1. *build* a dictionary of countries organized by continents;
    - E.g.: {"Asia-Japan","North America-USA", "Europe-Romania", "South America-Argentina", "North America-Canada", "Asia-China", "Australia-Australia"}
  - 2. *print* the dictionary sorted by continents;
  - 3. *write* the dictionary details into a .txt file;
    - *use Append Line activity.*

Data Table. Details

- **Data Tables** characteristics in UiPath:
  - **a data structure with flexible length;**
  - it is similar to a Excel sheet consisting of rows and columns;
  - it can be iterated by using a **For Each Row** activity;
  - it is used for:
    - storing **data from Excel sheets** and .csv files;
    - web **data scrapping**.

Row/ Column	First	Last	Club Member
0	“John”	“Doe”	Yes
1	“Jane”	“Doe”	No
2	“Jane”	“Doe”	Yes
3	“John”	“Doe”	No

Data Table. Declaration. Instantiation. Initialization

- ways to declare/instantiate/initialize a dictionary:
  - **Variables Panel:**
    - **Name:** studentsTable; **Type:** DataTable;
  - **Read CSV** activity:
    - properties set:
      - FilePath = "members.csv“;
      - IncludeColumnNames = *checked*;
      - DataTable = membersDataTable.

Row/ Column	First	Last	Club Member
0	“John”	“Doe”	Yes
1	“Jane”	“Doe”	No
2	“Jane”	“Doe”	Yes
3	“John”	“Doe”	No

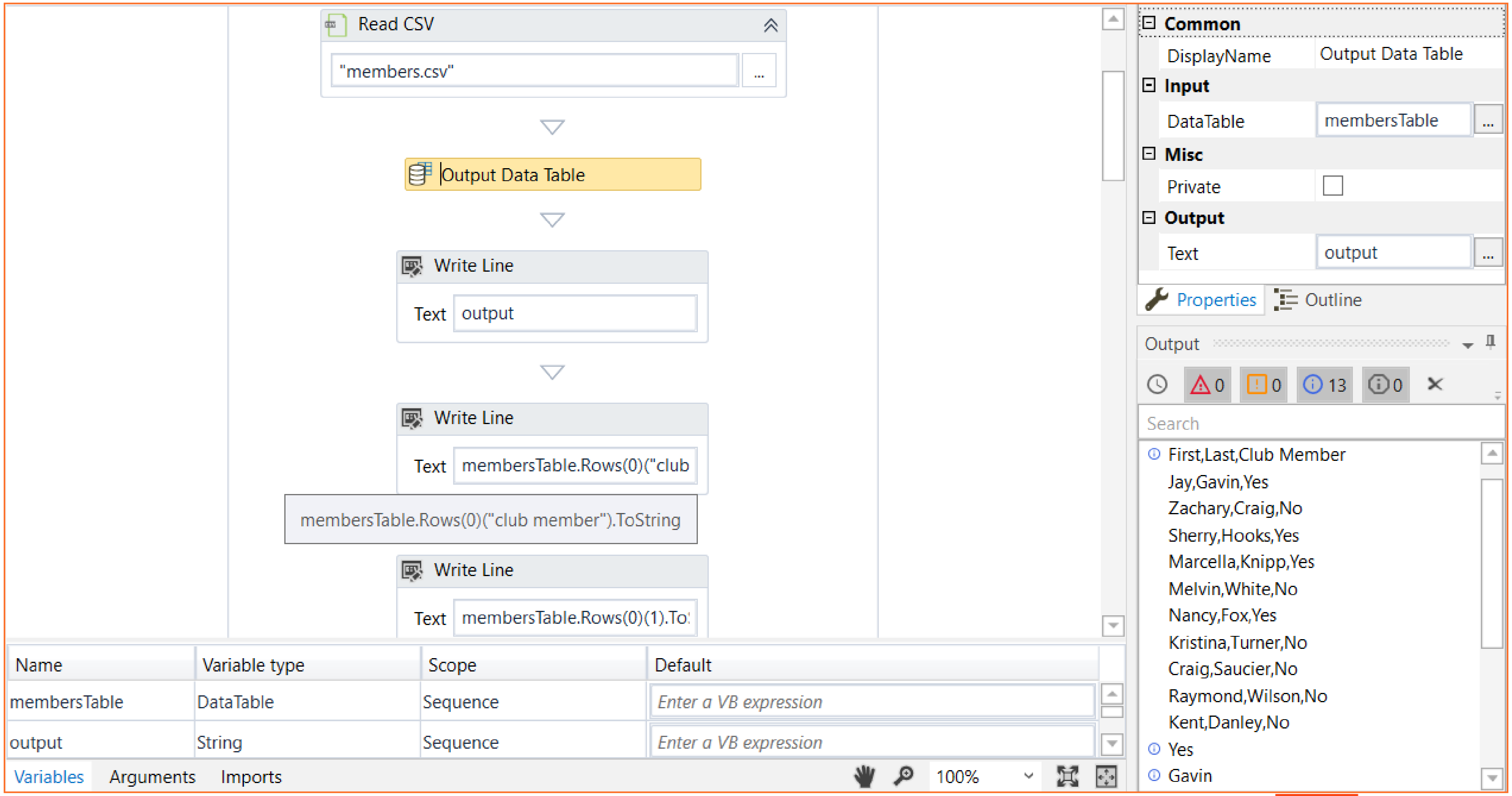
Data Table. Operations (1)

- ways to **convert data table to String**:
  - **Output Data Table** activity:
    - properties set:
      - Input = membersDataTable;
      - Output = <a String variable>;
- ways to **access data by rows** in a data table:
  - **For Each Row** activity:
    - variable to iterate rows, e.g., **row**;
    - accessing a field in a **row** formed of [First, Last, Club Member] attributes:
      - firstName= row("first").ToString;
    - field name is case insensitive, e.g., first, First;

Data Table. Operations (2)

- ways to **access data** by indexing rows/columns in data table:
  - firstName = membersDataTable.Rows(1)(“first”).ToString;
  - status = membersDataTable.Rows(0)(“club member”).ToString;
  - lastName = membersTable.Rows(0)("Last").ToString;
  - lastName = membersTable.Rows(0)(1).ToString;
- ways to **filter data** by using rules in a data table:
  - **Select** method:
    - **Array of [DataRow]** filtered = membersTable.Select("first>'M' AND"+"[club member]='YES'");
    - the result is an **Array** iterated by **For Each** activity;
  - **Filter Data Table** activity:
    - it allows to follow a wizard that states the rules and the output columns;
    - the result is a Data Table iterated by **For Each Row** activity;

Data Tables. Example 1. Output Data Table



Read CSV

"members.csv"

Output Data Table

Write Line

Text: output

Write Line

Text: membersTable.Rows(0)("club

membersTable.Rows(0)("club member").ToString

Write Line

Text: membersTable.Rows(0)(1).To:

Name	Variable type	Scope	Default
membersTable	DataTable	Sequence	*Enter a VB expression*
output	String	Sequence	*Enter a VB expression*

Variables Arguments Imports 100%

Common

DisplayName	Output Data Table

Input

DataTable	membersTable

Misc

Private	☐

Output

Text	output

Properties Outline

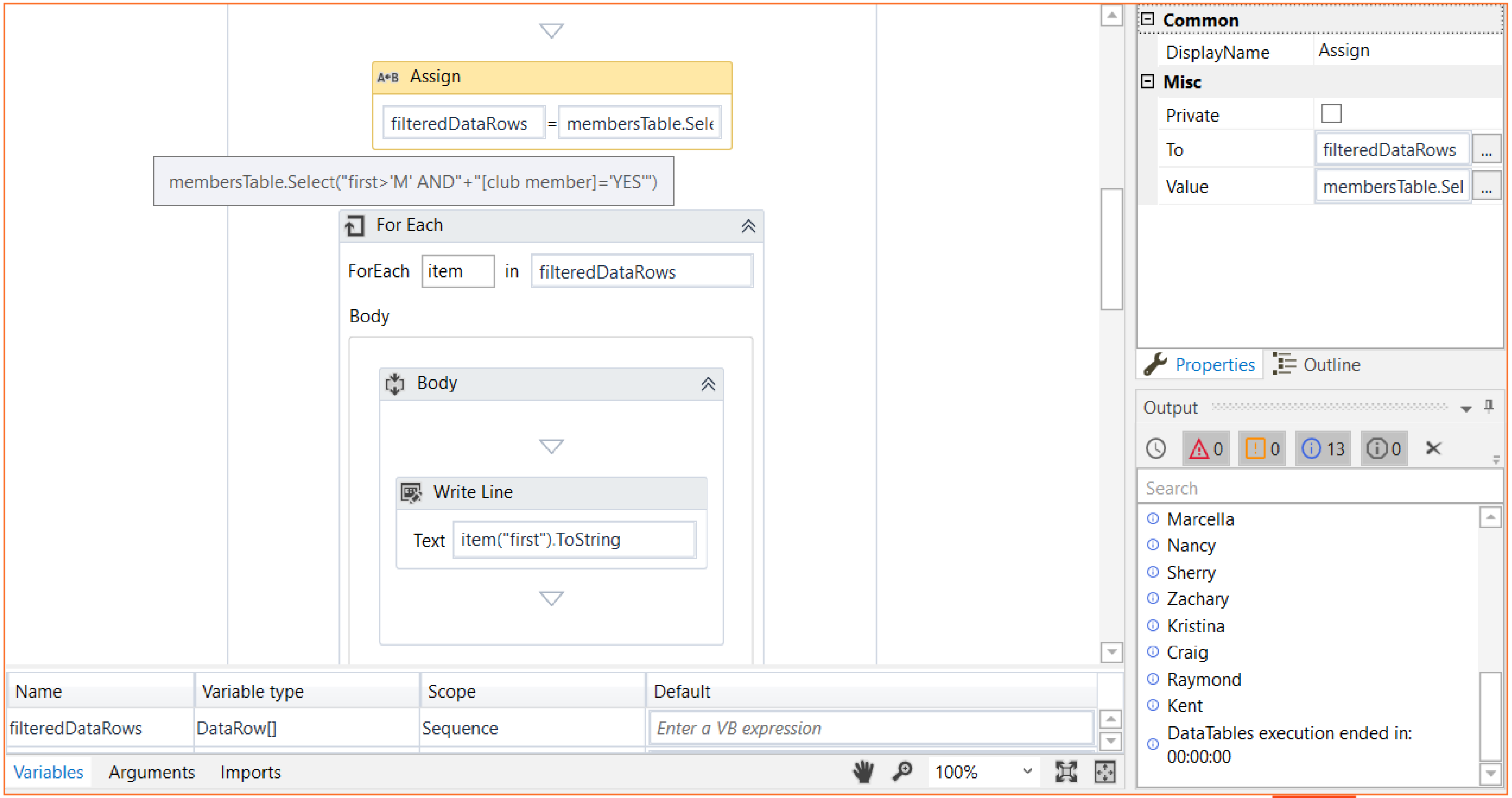
Output

0 0 13 0

Search

```
First,Last,Club Member
Jay,Gavin,Yes
Zachary,Craig,No
Sherry,Hooks,Yes
Marcella,Knipp,Yes
Melvin,White,No
Nancy,Fox,Yes
Kristina,Turner,No
Craig,Saucier,No
Raymond,Wilson,No
Kent,Danley,No
Yes
Gavin
```

Data Tables. Example 2A. Select method



Assign

filteredDataRows = membersTable.Sele

membersTable.Select("first>'M' AND"+"[club member]='YES'")

For Each

ForEach item in filteredDataRows

Body

Body

Write Line

Text item("first").ToString

Name	Variable type	Scope	Default
filteredDataRows	DataRow[]	Sequence	Enter a VB expression

Common

DisplayName	Assign

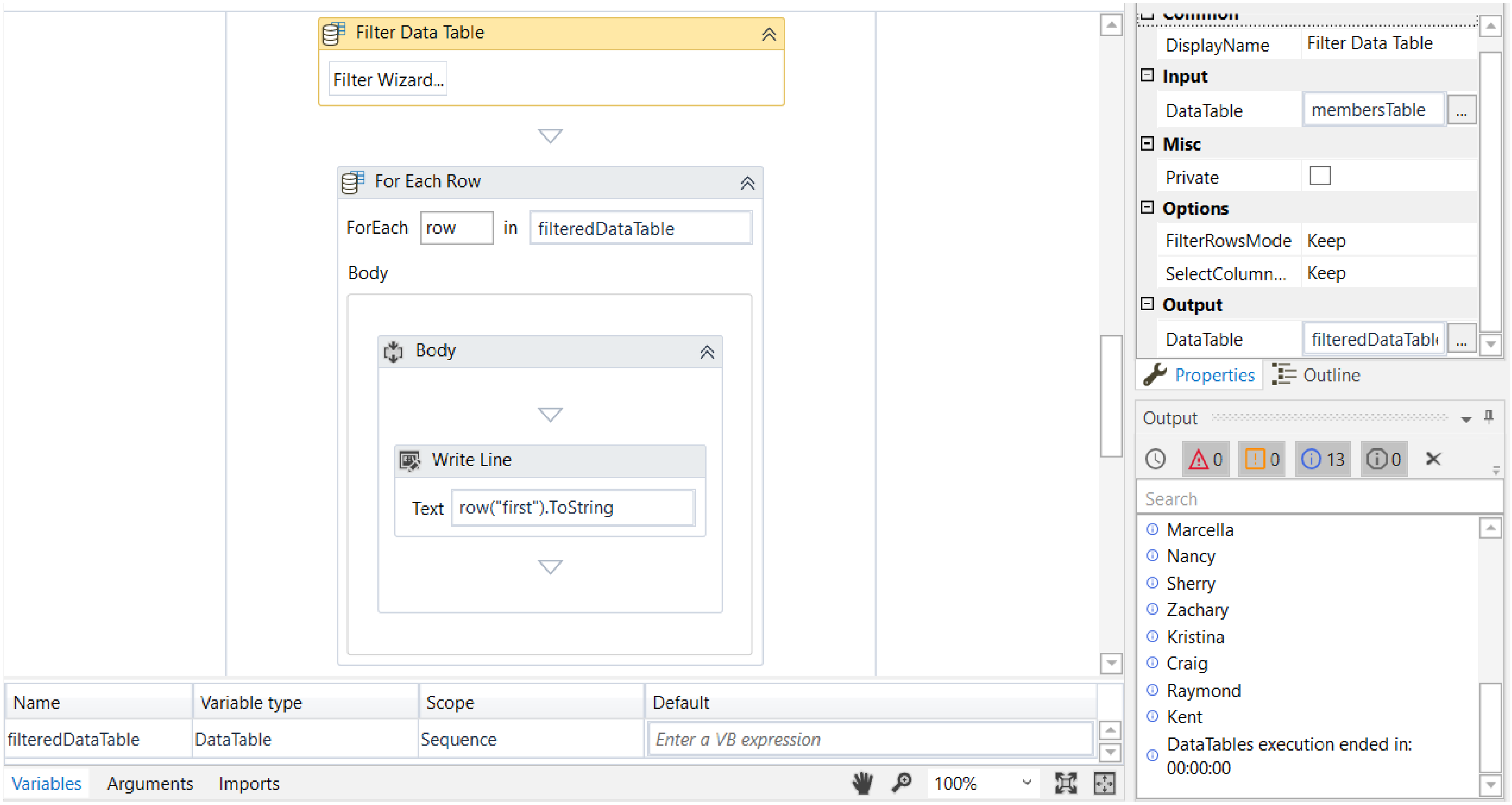
Misc

Private	☐
To	filteredDataRows
Value	membersTable.Sel

Output

```
Marcella
Nancy
Sherry
Zachary
Kristina
Craig
Raymond
Kent
DataTables execution ended in:
00:00:00
```

Data Tables. Example 2B. Filter Data Table


Filter Data Table
Filter Wizard...

For Each Row
ForEach row in filteredDataTable
Body

Body

Write Line
Text row("first").ToString

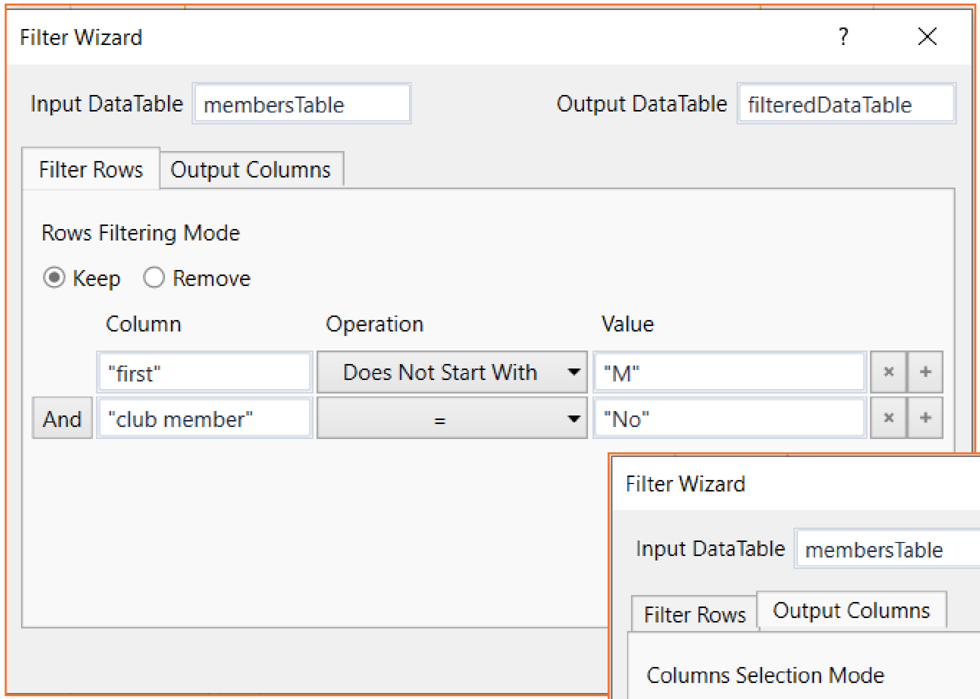
Name	Variable type	Scope	Default
filteredDataTable	DataTable	Sequence	Enter a VB expression

Common

DisplayName	Filter Data Table
Input	
DataTable	membersTable
Misc	
Private	☐
Options	
FilterRowsMode	Keep
SelectColumn...	Keep
Output	
DataTable	filteredDataTabl

```
Marcella
Nancy
Sherry
Zachary
Kristina
Craig
Raymond
Kent
DataTables execution ended in:
00:00:00
```

Data Tables. Example 2B. Filter Data Table - Wizard



Filter Wizard

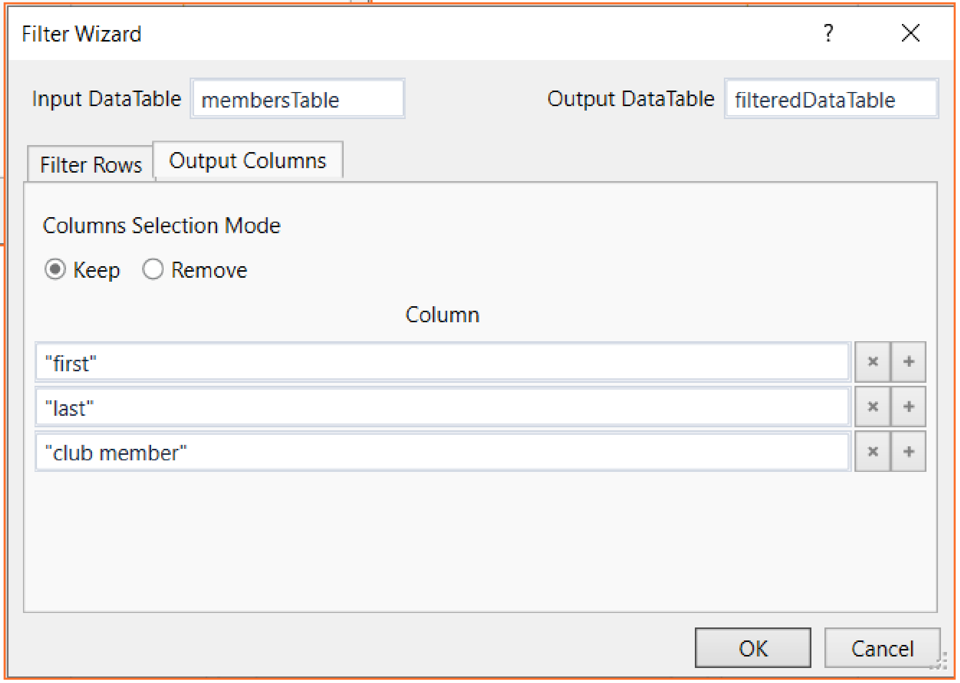
Input DataTable: membersTable
Output DataTable: filteredDataTable

Filter Rows | Output Columns

Rows Filtering Mode

[● Keep] ○ Remove

	Column	Operation	Value
	"first"	Does Not Start With	"M"
And	"club member"	=	"No"



Filter Wizard

Input DataTable: membersTable
Output DataTable: filteredDataTable

Filter Rows | Output Columns

Columns Selection Mode

[● Keep] ○ Remove

Column
"first"
"last"
"club member"

OK Cancel

Demo 5

- **Create a process that performs the following actions:**
  - **1. *read* "Students.csv" file with the following structure: Student, Specialisation, Group;**
    - ***use Read CSV activity;***
  - **2. *print* the .csv file content;**
    - ***use Output Data Table activity;***
  - **3. *enter* a specialisation;**
  - **4. *filter* students by specialisation and order them by group;**
    - ***use various ways:***
      - **filteredSortedDataTable** = (From row In studentsDataTable.Select("specialisation='"+spec+"'") Order By Convert.ToInt32(row("group")), row("student") Select row).ToArray.CopyToDatatable()
      - **filteredDataTable =** studentsDataTable.Select("specialisation='"+spec+"'")
      - **sortedDataTable <== Sort Data Table activity**
  - **5. *save* the resulted data into a .csv file.**
    - ***use Write CSV activity to write a Data Table object to a .csv file.***

References

- UiPath Academy - https://academy.uipath.com
  - Awareness Training;
  - Level 1 – Foundation Training, Lesson 3;
- UiPath Docs - https://docs.uipath.com/studio
  - Dictionary - https://docs.microsoft.com/en-us/dotnet/api/system.collections.generic.dictionary-2?view=netframework-4.8
  - Data Table variables - https://docs.uipath.com/studio/docs/data-table-variables