N3376

Usage of "length", "size", "count", etc. in context of retrieving array length

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Abstract

Due to increased discussion around the name of `_Lengthof` [85] operator, this paper, as a form of prior art, presents a list of almost 100 most popular computer languages, what words they use as a base to their respective way of retrieving the number of elements in arrays and array-like objects, with examples and references when possible.

Primary focus on "length", "size" and "count".

Contents

1 Popular high-level computer languages [1, 120, 121, 62]

- Ada
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- Apex
- APL
- AWK
  - GNU Awk
- BASIC
- Batch files
- C
- C++
- C#
- Carbon
- CMake
- COBOL
- Crystal
- Curl
- D
- Dart
- ECMAScript
  - ActionScript
  - JavaScript
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    * JScript
    * TypeScript
- Elixir
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- Forth
- Fortran
- FoxPro
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- GLSL
- Go
- Groovy
- Hack
- Haskell
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- Lisp
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  - Racket
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- Makefile
- MATLAB
- Modula-2
- Mojo
- ML
  - F#
  - OCaml
  - Standard ML
- Nim
- Objective-C
- Odin
- Pascal
  - Delphi
  - Object Pascal
- Perl
  - Raku
- PHP

- PL/I
- PowerShell
- Prolog
- Python
- R
- Ring
- RPG
- Ruby
- Rust
- SAS
- Scala
- Shell script
  - Bash
  - Korn Shell
- Simula
- Smalltalk
- Solidity
- SPARK
- SQL
  - PostgreSQL
  - Snowflake
- Swift
- SystemVerilog
- Tcl
- Vala
- VBA
- VHDL
- Vim script
- Visual Basic
- Wolfram Language
- X++
- Zig

2 Getting length of array-like objects

2.1 Languages using "size"

- Algol [9]   (ALGOL for ClearPath MCP Software by Unisys)

  ```
  SIZE(myArray)
  ```

  While there are some indicators some other implementations might have ways to compute the size from array bounds, author was not able to confirm. Classic dialects seems to be void of any such capabilities.

- Apex [12]

  ```
  myArray.size()
  ```

- C++ [84, 110]

  ```
  myArray.size()                    // `myArray` being of type std::array
  myVector.size()
  ```

- Carbon

  ```
  myList.size()
  ```

  Carbon has also arrays proper, but nowhere in documentation mentions how to get or calculate its size. Trying to guess at Compiler Explorer turned with no results. Looking at general trend with other data structures, classifying it under "size" seems most appropriate.

- Common Lisp [114]

  ```
  (size myArray)
  ```

- Crystal [35]

  ```
  myArray.size
  ```

- Curl [49]

  ```
  size(myArray)
  ```

- GDScript [21]

  ```
  myArray.size()
  ```

- Erlang [22]

  ```
  array:size(myArray)
  ```

- Fortran [69, 105]

  ```
  SIZE(myArray)
  ```

- Groovy [113, 68]

  ```
  myArray.size()
  ```

- Java [30]

  ```
  ArrayList.size()
  ```

- Julia [32, 65]

  ```
  size(myArray)[1]
  ```

- Kotlin [104, 71]

  ```
  myArray.size
  ```

- LabVIEW [19]

  Array Size function

- MATLAB [103]

  ```
  size(myArray)
  ```

- PHP [93]   (alias for `count()`)

  ```
  sizeof($myArray)
  ```

- Ruby [40, 100]   (alias for `.length`)

  ```
  myArray.size
  ```

- Smalltalk [13]

  ```
  myArray size.
  ```

- Snowflake [34]

  ```
  SELECT ARRAY_SIZE(ARRAY_CONSTRUCT(1, 2, 3)) AS SIZE;
  ```

- SPARK [108]

  ```
  size($"myArray")
  ```

- SystemVerilog [60]

  ```
  myArray.size
  $size(myArray)
  ```

- Tcl [18]

  ```
  array size myArray
  ```

2.2 Languages using "length"

- ActionScript [23]

  ```
  myArray.length
  ```

- Ada [4, 33, 3]

  ```
  myArray'Length
  ```

- C# [24, 25]

  ```
  myArray.Length
  myArray.GetLength()
  ```

- Clojure [8, 44]

  ```
  (alength myArray)
  ```

- CMake [79]

  ```
  list(LENGTH myList n)
  ```

- D [26]

  ```
  myArray.length
  ```

- Dart [46]

  ```
  myList.length
  ```

- Emacs Lisp [63]

  ```
  (length mySeq)
  ```

- Elixir [70]

  ```
  length(myList)
  ```

- Elm [14]

  ```
  length(myArray)
  ```

- Erlang [56]

  ```
  length(myList)
  ```

- F# [16]

  ```
  myArray |> Array.Length
  myArray |> Array.length
  ```

- Flutter [76]

  ```
  myList.length
  ```

- FoxPro [6, 7, 5]

  ```
  ALEN(myArray)
  ```

- GLSL [50]

  ```
  myArray.length()
  ```

- Go [39]

  ```
  len(myArray)
  ```

- GNU Awk [116]

  ```
  length(myArray)
  ```

- Haskell [51]

  ```
  length myList
  ```

- Java [27, 30]

  ```
  myArray.length
  ```

- JavaScript/TypeScript/CoffeeScript/JScript [17]

  ```
  myArray.length
  ```

- Julia [32, 65]

  ```
  length(myArray)
  ```

- Mojo [73]

  ```
  len(myList)
  ```

- Nim [87, 86]

```
len(myArray)
myArray.len
```

- OCaml [89, 88]

```
Array.length myArray
```

- Odin [91]

```
len(myArray)
```

- Pascal / Object Pascal / Delphi [99, 106]

```
Length(myArray)
```

- PostgreSQL [94]

```
SELECT array_length(myArray, 1) FROM table;
```

- PowerShell [95, 57]

```
$myArray.Length
```

- Prolog [112, 97]

```
length(myList, L)
```

- Python [38]

```
len(myList)
```

- R [10, 20, 67]

```
length(myArray)
```

- Racket [98]

  ```
  (array-length myArray)
  ```

- Ring [80]

  ```
  Len(myList)
  ```

- Ruby [41, 100]

  ```
  myArray.length
  ```

- Rust [15]

  ```
  myArray.len()
  ```

- Scala [29]

  ```
  myArray.length
  ```

- Scheme [11, 82]

  ```
  (length myList)
  (vector-length myVector)
  ```

- Solidity [122, 107]

  ```
  myArray.length
  ```

- Standard ML [119]

  ```
  Array.length myArray
  ```

- Vala [2]

  ```
  myArray.length[0]
  ```

- VHDL [36, 78]

  ```
  myArray'LENGTH
  ```

- Vim script [64]

  ```
  len(myList)
  myList->len()
  ```

- Visual Basic [28]

  ```
  myArray.Length
  myArray.GetLength()
  ```

- Wolfram Language [77]

  ```
  Length[myArray]
  ```

- Zig [52, 126]

  ```
  myArray.len
  ```

2.3 Languages using "count"

- Clojure [45]

  ```
  (count myCollection)
  ```

- Eiffel [53]

  ```
  myArray.count
  ```

- Hack [117]

  ```
  C\count($myArray)
  ```

- Logo [81]

  ```
  count :myArray
  ```

- PHP [92]

```
count($myArray)
```

- PowerShell [95]

```
$myArray.Count
```

- Ruby [42, 100]

```
myArray.count
```

- SQL [48, 109]

```
SELECT COUNT(*) FROM table;
```

- Swift [47]

```
myArray.count
```

2.4   Languages using other words

- C++ [111]

```
myVector.capacity()
```

- Common Lisp [115]

```
(array-dimension myArray 0)
```

- GAMS [61, 59]

```
card(mySet)
```

- Lua [96]

```
table.getn(myArray)
```

- Modula-2 [83]

```
HIGH(myArray)+1
```

- PL/I [55, 90]

```
DIM(myArray,1)
```

- Raku [43]

```
@myArray.elems
```

- RPG [54]

```
%ELEM(myArray)
```

- SAS [124]

```
dim(myArray)
```

- X++ [125]

```
dimOf(myArray)
```

2.5 Languages using symbols

- APL [66]

```
ρ myArray
```

- Bash [101]

```
${#myArray[@]}
```

- Korn Shell [31, 72]

```
${#myArray[*]}
${#myArray[@]}
```

- Perl [58]

  ```
  @myArray
  ```

- Shell script [118]

  ```
  $#
  ```

  (only one array per script/subshell in standard Shell language)

2.6 Languages where length is computed

- AWK

  ```
  n = 0; for (a in myArray) n++
  ```

- BASIC

  ```
  n = 0
  FOR i = 0 TO N  ' assuming N as an upper limit for all arrays
          ON ERROR GOTO FoundLength
          temp = myArray(i)
          n = length + 1
  NEXT i
  FoundLength:
  ```

- Batch files [37]

  ```
  set n=0
  :Loop
  if define myArray[%n%] (
     set /a n += 1
     goto :Loop
  )
  ```

- C/C++/Objective-C [85]

  ```
  sizeof myArray / sizeof myArray[0]
  ```

- COBOL [74, 75]

```
COMPUTE n = LENGTH OF myArray / LENGTH OF myArray-element
```

- Forth

```
\ users implement their own arrays as well as words for getting dimensions
```

- Makefile

```
ARRAY_SIZE := `echo $(myArray) | wc -w`
```

(very unreliable and requires passing the "array" to another language)

- Simula [102]

```
upperbound(myArray,1) - lowerbound(myArray,1) + 1
```

- VBA [123]

```
UBound(myArray) - LBound(myArray) + 1
```

3   Summary

- The vast majority of languages use derivatives of either "length" or "size",
  with "length" being the dominat base.

- Documentations, specifications and communities[1] use terms "length" and "size" quite freely
  and interchangeably in the meaning: the number of elements in array.

- "Length" is widely understood as "the number of elements in arrays and array-like types".

- "Count" often means "count of X in Y", where Y might contain more than just Xs.

- Very limited number of languages use "count" as their primary choice for denoting or re-
  trieving array length; sometimes it's a side effect of more versatile feature.

- From the list, non-definitive examples of "count" usage:

    - Clojure – has also `alength` (for Java arrays, but supposedly "works for all arrays");
    - PHP – provides alias: `sizeof()`;
    - PowerShell – dedicates `.Length` to arrays, `.Count` is inherited from underlying type;
    - Ruby – uses "count" to, nomen omen, count elements meeting condition;
      only if condition is empty then `.count` gives equivalent of `.length`;
    - SQL – uses `COUNT`, in similar fashion to Ruby, for more generic purpose.

- Many languages provide may provide additional ways of retrieving array length, but if that
  wasn't primary method or one from the focus group, it's rather missing from the list.

- On the list of other word bases we see "dimension", "elements", "capacity", "n", "high",
  and "cardinality".

- On the list of symbols we see "#", "@", and "ρ".

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[1]Communities speaking natural languages, different than English, also can have similar experience, for example
in Polish: "rozmiar tablicy" ("size of array") and "długość tablicy" ("length of array") are similarly quite often
seen interchanged in literature and conversations.

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