

Words used for retrieving number of elements in arrays and array-like objects across computer languages

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Abstract

Due to increased discussion around the name of `_Lengthof` [99] operator, this paper, as a form of prior art, presents a list of over 100 most popular computer languages (including non-programming ones that possess any concepts resembling arrays), 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".

Changelog

- N3402 (2024-11-24)
 - Removed mistakenly added Carbon
 - Added few missing languages
 - Fixed few missing URLs
 - Changed title
- N3376 (2024-10-12)
 - Initial version

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1 Popular high-level languages [1, 146, 147, 69, 136, 139]

- Ada
- ABAP
- ALGOL
- Apex
- APL
- AWK
 - gawk
- BASIC
- Batch files
- C
- C#
- C++
- CHILL
- CLIPS
- CMake
- COBOL
- Cobra
- ColdFusion
- Crystal
- Curl
- D
- Dart
- ECMAScript
 - ActionScript
 - JavaScript
 - * CoffeeScript
 - * JScript
 - * TypeScript
- Elixir
- Elm
- Erlang
- Flutter
- Forth
- Fortran
- FoxPro
- GAMS
- GDScript
- GLSL
- Go
- Groovy
- Hack
- Haskell
- Icon
- Java
- Julia
- Kotlin
- LabVIEW
- Lisp
 - Clojure
 - Common Lisp
 - Emacs Lisp
 - Racket
 - Scheme
- Logo
- Lua
- Makefile
 - GNU Make
- Maple
- MATLAB
- Modula-2
- Mojo
- ML
 - F#
 - OCaml
 - Standard ML
- MQL5
- Nim
- occam 2
- Objective-C
- Odin
- Pascal
 - Delphi
 - Object Pascal
- Perl
- PHP
- PL/I
- PostScript
- PowerShell
- Prolog
- Python
- R
- Raku
- Ring
- RPG
- Ruby
- Rust
- SAS
- Scala
- Shell script
 - Bash
 - Korn Shell
- Simula
- Simulink
- Smalltalk
- Solidity
- SPARK
- SQL
 - PL/SQL
 - PostgreSQL
 - Snowflake
- Swift
- SystemVerilog
- TeX
 - LaTeX
- Tcl
- V
- Vala
- VBA
- VBScript
- 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++ [98, 132, 134]

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

- CHILL [154]

```
SIZE(myArray)
```

- Common Lisp [140]

```
(size myArray)
```

- Crystal [36]

```
myArray.size
```

- Curl [54]

```
size(myArray)
```

- GDScript [21]

```
myArray.size()
```

- Erlang [22]

`array:size(myArray)`

- Fortran [82, 127]

`SIZE(myArray)`

- Groovy [138, 81]

`myArray.size()`

- Java [30]

`ArrayList.size()`

- Julia [32, 73]

`size(myArray)[1]`

- Kotlin [125, 84]

`myArray.size`

- LabVIEW [19]

Array Size function

- Maple [126]

`Size(myArray)`

- MATLAB [124]

`size(myArray)`

- MQL5 [34]

`ArraySize(myArray)`

- `occam 2` [104]

```
SIZE myArray
```

- `PHP` [108] (alias for `count()`)

```
sizeof($myArray)
```

- `Ruby` [42, 120] (alias for `.length`)

```
myArray.size
```

- `Smalltalk` [13]

```
myArray size.
```

- `Snowflake` [35]

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

- `SPARK` [130]

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

- `SystemVerilog` [66]

```
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()`

- CLIPS [46, 75]

`(length$?myArray)`

- Clojure [8, 47]

`(alength myArray)`

- CMake [93]

`list(LENGTH myList n)`

- Cobra [78]

`myArray.length`

- ColdFusion [41]

`ArrayLen(myArray)`

- D [26]

`myArray.length`

- Dart [49]

`myList.length`

- Emacs Lisp [70]

```
(length mySeq)
```

- Elixir [83]

```
length(myList)
```

- Elm [14]

```
length(myArray)
```

- Erlang [62]

```
length(myList)
```

- F# [16]

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

- Flutter [89]

```
myList.length
```

- FoxPro [6, 7, 5]

```
ALEN(myArray)
```

- gawk [142]

```
length(myArray)
```

- GLSL [55]

```
myArray.length()
```

- Go [40]

```
len(myArray)
```

- Haskell [56]

```
length myList
```

- Java [27, 30]

```
myArray.length
```

- JavaScript / TypeScript / CoffeeScript / JScript [17]

```
myArray.length
```

- Julia [32, 73]

```
length(myArray)
```

- Mojo [86]

```
len(myList)
```

- Nim [101, 100]

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

- OCaml [103, 102]

```
Array.length myArray
```

- Odin [106]

```
len(myArray)
```


- Pascal / Object Pascal / Delphi [119, 128]

```
Length(myArray)
```

- PostgreSQL [112]

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

- PostScript [114, 113, 58]

```
myArray length
```

- PowerShell [115, 63]

```
$myArray.Length
```

- Prolog [137, 117]

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

- Python [39]

```
len(myList)
```

- R [10, 20, 77]

```
length(myArray)
```

- Racket [118]

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

- Ring [94]

```
Len(myList)
```

- Ruby [43, 120]

```
myArray.length
```

- Rust [15]

```
myArray.len()
```

- Scala [29]

```
myArray.length
```

- Scheme [11, 96]

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

- Solidity [148, 129]

```
myArray.length
```

- Standard ML [145]

```
Array.length myArray
```

- V [151]

```
myArray.len
```

- Vala [2]

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

- VHDL [37, 92]

```
myArray'LENGTH
```

- Vim script [72]

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

- Visual Basic [28]

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

- Wolfram Language [90]

```
Length[myArray]
```

- Zig [57, 155]

```
myArray.len
```

2.3 Languages using "count"

- Clojure [48]

```
(count myCollection)
```

- Cobra [79]

```
myList.count
```

- Eiffel [59]

```
myArray.count
```

- Hack [143]

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

- Logo [95]

```
count :myArray
```

- PHP [107]

```
count($myArray)
```

- PL/SQL [110]

```
myTable.COUNT
```

- PowerShell [115]

```
$myArray.Count
```

- Ruby [44, 120]

```
myArray.count
```

- SQL [53, 131]

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

- Swift [52]

```
myArray.count
```

2.4 Languages using other words

- ABAP [91, 76]

```
LINES(myTable)
```

- C++ [135, 133, 50]

```
myVector.capacity()
```

```
std::extent<decltype(myArray)>::value  
std::extent_v<decltype(myArray)>
```

- Common Lisp [141]

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

- GAMS [67, 65]

```
card(mySet)
```

- GNU Make [71]

`$(words $(myList))`

- Lua [116]

`table.getn(myArray)`

- Modula-2 [97]

`HIGH(myArray)+1`

- PL/I [61, 105]

`DIM(myArray, 1)`

- PL/SQL [111]

`CARDINALITY(myTab)`

- Raku [45]

`@myArray.elems`

- RPG [60]

`%ELEM(myArray)`

- Simulink [68, 123]

Width block

- SAS [150]

`dim(myArray)`

- X++ [153]

`dimOf(myArray)`

2.5 Languages using symbols

- APL [74]

```
ρ myArray  
≠ myArray
```

- Bash [121]

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

- Icon [80]

```
*myArray
```

- Korn Shell [31, 85]

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

- Perl [64]

```
@myArray
```

- Shell script [144]

```
 $#
```

(only one array per script/subshell/function in standard POSIX 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 [38]

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

- C / C++ / Objective-C [99]

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

- COBOL [87, 88, 51]

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

- Makefile

```
N := `echo $(myList) | wc -w`
```

(unreliable and requires "passing" the list to another language)

- Simula [122]

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

- VBA / VBScript [149, 152]

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

2.7 Languages where arrays are implemented by users

- Forth
- TeX / LaTeX

3 Observations

- Some of the listed languages provide multiple ways of retrieving number of elements. Sometimes the ways are equivalent, but usually the underlying mechanism is different.
 - e.g. Ruby has `.length`, but `.count` without condition also gives the number of elements;
 - e.g. C++ allows to calculate array length via `sizeof arr / sizeof arr[0]`, by using `std::size()` function, by passing the type to `std::extent_v<T>` trait template, and couple other ways.

If such additional method was not a primary or prominent way, or at least from the focus group, it might be missing from this paper.

- The vast majority of languages use derivatives of either "length" or "size", with "length" being the dominant base.
- "Length" and "size" are also often used for other linear data structures beside arrays, like strings, linked lists, queues, etc.
- Documentations, specifications and communities¹ use terms "length" and "size" quite freely and interchangeably in the meaning of "the number of elements in data structure". Sometimes languages make them alias one another.
 - Other words also sometimes are seen as synonyms, although rarely and/or in specific contexts (e.g. "dimension" or "extent" would primarily be present when generalizing to multi-dimensional arrays).
- "Count" is 3rd most popular choice, albeit significantly lesser number of languages represent this category. Sometimes it is a side effect of more versatile feature (e.g. in meaning "count of X in Y", where Y might contain more than just Xs).
 - 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 – in similar fashion to Ruby, uses `COUNT` for more generic purpose.

Additionally, Clojure has also `alength` (for Java arrays, but supposedly "works for all arrays"), and PHP provides alias: `sizeof()`.

"Count" might be more popular for non-linear data structures, like e.g. graphs.

- 4th most common word is "dimension"; 5th are ex aequo "elements" and "cardinality". Including methods of calculating number of elements puts "bounds" in top 5 too.

¹Communities 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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