What is a Lambda?

Asked 16 years, 2 months ago Modified 5 years, 10 months ago Viewed 19k times



95



Could someone provide a good description of what a Lambda is? We have a tag for them and they're on the secrets of C# question, but I have yet to find a good definition and explanation of what they are in the first place.



language-agnostic

lambda

computer-science

terminology



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edited Jan 31, 2013 at 13:04



hippietrail

16.9k • 21 • 109 • 173

asked Sep 29, 2008 at 18:56



Fred

2,733 • 3 • 28 • 31

- 1 How about <u>Wikipedia's lambda calculus article</u> for a start? Then <u>Wikipedia's functional programming article</u> as a followup. – Thorsten79 Sep 29, 2008 at 18:58
- 2 possible duplicate of <u>What is a lambda (function)?</u> nawfal Jul 4, 2014 at 6:04

amda expression explained <u>here</u> beautifully. – Jameer Mulani Dec 4, 2017 at 16:35

7 Answers

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Closures, lambdas, and anonymous functions are not necessarily the same thing.

135

An anonymous function is any function that doesn't have (or, at least, need) its own name.





1

A closure is a function that can access variables that were in its lexical scope when it was declared, even after they have fallen *out* of scope. Anonymous functions do not necessarily have to be closures, but they are in most languages and become rather less useful when they aren't.

A lambda is.. not quite so well defined as far as computer science goes. A lot of languages don't even use the term; instead they will just call them closures or anon functions or invent their own terminology. In LISP, a lambda is just an anonymous function. In Python, a lambda is an anonymous function specifically limited to a single

expression; anything more, and you need a named function. Lambdas are closures in both languages.

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answered Sep 29, 2008 at 19:12



the term might be intended to imply lambda calculus en.wikipedia.org/wiki/Lambda calculus - Steven A. Lowe Nov 18, 2008 at 4:47

Wow I with I had more than one upvote to give this question. I've seen so many technical answers bogged down in terminology, but this one is concise and makes the point immediately. – Matthew Stopa May 8, 2011 at 22:47

5 A region where some variable can exist (i.e., a scope) defined by the structure of your code (i.e., lexically). For example, in most languages, a function defines a lexical scope; any variable declared inside the function is inaccessible outside of it. – Eevee Dec 3, 2012 at 3:24



19

Also called closures or anonymous functions.. I found the best description here. Basically, inline block of code that can be passed as an argument to a function.

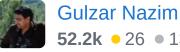


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edited Sep 29, 2008 at 19:09



answered Sep 29, 2008 at 19:03



52.2k • 26 • 130 • 170



18

"Lambda" refers to the <u>Lambda Calculus</u> or to a specific lambda expression. Lambda calculus is basically a branch of logic and mathematics that deals with functions, and is the basis of <u>functional programming languages</u>.



~ William Riley-Land



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edited Aug 10, 2009 at 20:05

answered Sep 29, 2008 at 19:00



wprl **25.4k** • 11 • 57 • 70



8

It's just an anonymous function declared inline, most typically assigned to a delegate when you don't want to write a full-fledged function.



In languages like lisp/scheme, they're often passed around quite liberally as function parameters, but the idiom in C# typically finds lambdas used only for lazy evaluation of functions, as in linq, or for making event-handling code a bit terser.



Share Improve this answer edited Sep 29, 2008 at 19:04

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There's not really such a thing as 'a lambda' in programming. It depends on the language, etc.





In short, normally a language that 'has lambdas' uses the term for anonymous functions or, in some cases, closures. Like so, in Ruby:





f = lambda { return "this is a function with no name" } puts f.call

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answered Sep 29, 2008 at 19:04





In response to the previous answers:



-The important thing about anonymous functions is not that they dont require a name.



-Closures are a separate concept.



-A gigantic wikipedia article is not making this any clearer.



Here's my answer in 3 parts:



- 1. A lambda is a function which is also an expression. This is the important thing.
- 2. Many languages which implement so-called "lambdas" add some *syntactic sugar* to make writing these short functions easier and faster, but this is not required.

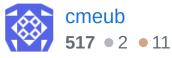
3. Some languages may require that a lambda has *no* side effects. That would be a more pure lambda in the functional sense.

When a function is an expression, it's a "first class citizen" within the language. I can do all the important things with it:

```
x = lambda(){ return "Hello World"; }
doit( 1, 2, lambda(a,b){ return a > b; }, 3 )
x = (lambda(a){ return a+1; }) + 5 // type error,
not syntax error
(lambda(a,b){ print(a); log(b); })( 1, 2 ) // ()
is valid operator here
```

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answered Aug 17, 2011 at 7:42





Clipped from wikipedia:

http://en.wikipedia.org/wiki/Lambda#Lambda.2C_the_wor

1 9





In programming languages such as Lisp and Python, lambda is an operator used to denote anonymous functions or closures, following lambda calculus usage.



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answered Sep 29, 2008 at 18:59



I guess you meant this line: In programming languages such as Lisp and Python, lambda is an operator used to denote anonymous functions or closures, following lambda calculus usage. I'd already scanned the article but missed that.

Fred Sep 29, 2008 at 19:03