

Live Coding Kotlin/Native Snake



github.com/dkandalov/kotlin-native-snake



[@dmitrykandalov](https://twitter.com/dmitrykandalov)

⚡ Lightning talk ⚡


What is
Kotlin/Native?

JetBrains/kotlin-native: x

← → ↺

GitHub, Inc. [US] | https://github.com/JetBrains/kotlin-native

☆ ⋮




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📊 Insights

Kotlin/Native infrastructure

- kotlin
- compiler
- llvm
- objective-c
- c

📁 4,212 commits

🌿 143 branches

📦 22 releases

👤 71 contributors

📄 Apache-2.0

Branch: master ▾


New pull request

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 olonho Small AS tweak.	Latest commit a174e65 a day ago
📁 Interop	Implement internal defFileDependencies tool 3 days ago
📁 backend.native	Use HTTPS when downloading dependencies (#2118) 2 days ago
📁 buildSrc	Fix KonanTest to correctly replace packages when test contains functi... 5 days ago
📁 cmd	[cmd] launcher for lldb with loading python bindings. 8 days ago
📁 common	Copyright update. (#1944) 28 days ago
📁 dependencies	Copyright update. (#1944) 28 days ago
📁 extracted	Split serialized package fragments metadata (#2051) 11 days ago
📁 gradle	[compiler][update] 1.3-M2-eap-33 / build: 1.3-M1-eap-77 a month ago
📁 klib	Let klib utility print the whole version string. 3 days ago
📁 konan	Update to Xcode 10.0 (#2078) 6 days ago
📁 libclangext	Update LLVM to 6.0.1 and WebAssembly target refactoring (#1788) a month ago

Releases

Tags

Latest release


v0.9.2

8f5ec56

v0.9.2

 vvlevchenko released this 2 hours ago · [7 commits](#) to master since this release

▼ Assets 5

-  [kotlin-native-linux-0.9.2.tar.gz](#) 83.2 MB
-  [kotlin-native-macos-0.9.2.tar.gz](#) 262 MB
-  [kotlin-native-windows-0.9.2.zip](#) 69 MB
-  [Source code \(zip\)](#)
-  [Source code \(tar.gz\)](#)

- Support Xcode 10.0
- iOS 9.0 is the minimal supported version for all targets
- Swift interop improvements
- Support shared top level values of some immutable types (i.e. String and atomic references)
- Support release Kotlin 1.3.0

Pre-release

v0.9.1

a14476f

v0.9.1

 ddolovov released this 10 days ago

Kotlin/Native is an LLVM backend for the Kotlin compiler, runtime implementation, and native code generation facility using the LLVM toolchain.



Kotlin/Native is an LLVM backend
for the Kotlin compiler, runtime
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LLVM toolchain.







Compiler frontend



Compiler backend



Compiler backend



Compiler backend



Kotlin/Native is an LLVM backend
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implementation, and native code
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LLVM



The LLVM Compiler Infrastructure

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LLVM Overview

The LLVM Project is a collection of modular and reusable compiler and toolchain technologies. Despite its name, LLVM has little to do with traditional virtual machines. The name "LLVM" itself is not an acronym; it is the full name of the project.

LLVM began as a [research project](#) at the [University of Illinois](#), with the goal of providing a modern, SSA-based compilation strategy capable of supporting both static and dynamic compilation of arbitrary programming languages. Since then, LLVM has grown to be an umbrella project consisting of a number of subprojects, many of which are being used in production by a wide variety of [commercial and open source](#) projects as well as being widely used in [academic research](#). Code in the LLVM project is licensed under the ["UIUC" BSD-Style license](#).

The primary sub-projects of LLVM are:

1. The **LLVM Core** libraries provide a modern source- and target-independent [optimizer](#), along with [code generation support](#) for many popular CPUs (as well as some less common ones!) These libraries are built around a [well specified](#) code representation known as the LLVM intermediate representation ("LLVM IR"). The LLVM Core libraries are [well documented](#), and it is particularly easy to invent your own language (or port an existing compiler) to use [LLVM as an optimizer and code generator](#).
2. **Clang** is an "LLVM native" C/C++/Objective-C compiler, which aims to deliver amazingly fast compiles (e.g. about [3x faster than GCC](#) when compiling Objective-C code in a debug configuration), extremely useful [error and warning messages](#) and to provide a platform for building great source level tools. The [Clang Static Analyzer](#) is a tool that automatically finds bugs in your code, and is a great example of the sort of tool that can be built using the Clang frontend as a library to parse C/C++ code.
3. The **LLDB** project builds on libraries provided by LLVM and Clang to provide a great native debugger. It uses the Clang ASTs and expression parser, LLVM JIT, LLVM disassembler, etc so that it provides an experience that "just works". It is also blazing fast and much more memory efficient than GDB at loading symbols.
4. The **libc++** and **libc++ ABI** projects provide a standard conformant and high-performance implementation of the C++ Standard Library, including full support for C++11 and C++14.

Latest LLVM Release!

19 September 2018: LLVM 7.0.0 is now [available for download](#)! LLVM is publicly available under an open source [License](#). Also, you might want to check out [the new features](#) in SVN that will appear in the next LLVM release. If you want them early, [download LLVM](#) through anonymous SVN.

ACM Software System Award!

LLVM has been awarded the **2012 ACM Software System Award!** This award is given by ACM to *one* software system worldwide every year. LLVM is [in highly distinguished company](#)! Click on any of the individual recipients' names on that page for the detailed citation describing the award.

Upcoming Releases

LLVM Release Schedule:

- 7.0.1:
 - To be decided.

Developer Meetings

Upcoming: [October 17-18, 2018 \(Workshop October 16\)](#)

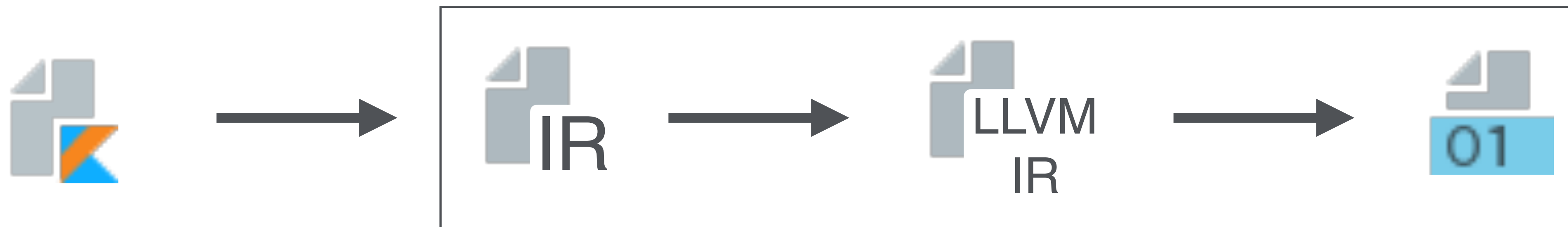
Proceedings from past meetings:

- [April 16-17, 2018](#)

Kotlin/Native



Kotlin/Native



Kotlin/Native



C/C++ (clang)

Objective-C

Rust


Swift


Julia

Graal VM

Kotlin/Native is an LLVM backend for the Kotlin compiler, runtime implementation, and native code generation facility using the LLVM toolchain.

kotlin.String → java.lang.String

kotlin.String  java.lang.String

 JS string

kotlin.String → java.lang.String

→ JS string

→ KString

kotlin.*



JVM



JS



Native

- reference counting
- native-specific code

Kotlin/Native is an LLVM backend for the Kotlin compiler, runtime implementation, and native code generation facility using the LLVM toolchain.

Why?

1. Performance

High Performance Managed Languages



[Like](#) | by [Martin Thompson](#) on Apr 28, 2017 | [Discuss](#)

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View Presentation Speed: **1x** 1.5x 2x

41:48 / 47:20

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Summary

Martin Thompson explores how their managed runtimes can equal, and even better in some cases, the performance of native languages.

High Performance Managed Languages

[Martin Thompson - @mjpt777](#)

Bio

Martin Thompson is a Java Champion with over 2 decades of experience building complex and high-performance computing systems. He is most recently known for his work on Aeron and SBE. He blogs at mechanical-sympathy.blogspot.com, and can be found giving training courses on performance and concurrency when he is not cutting code to make systems better.

2. CAPIs

- POSIX
 - native OS UI
 - interop between languages
 - C libraries
- (search for “awesome-c”)

3. Kotlin

End of the
⚡ Lightning talk ⚡

Live coding

Snake (video game genre)

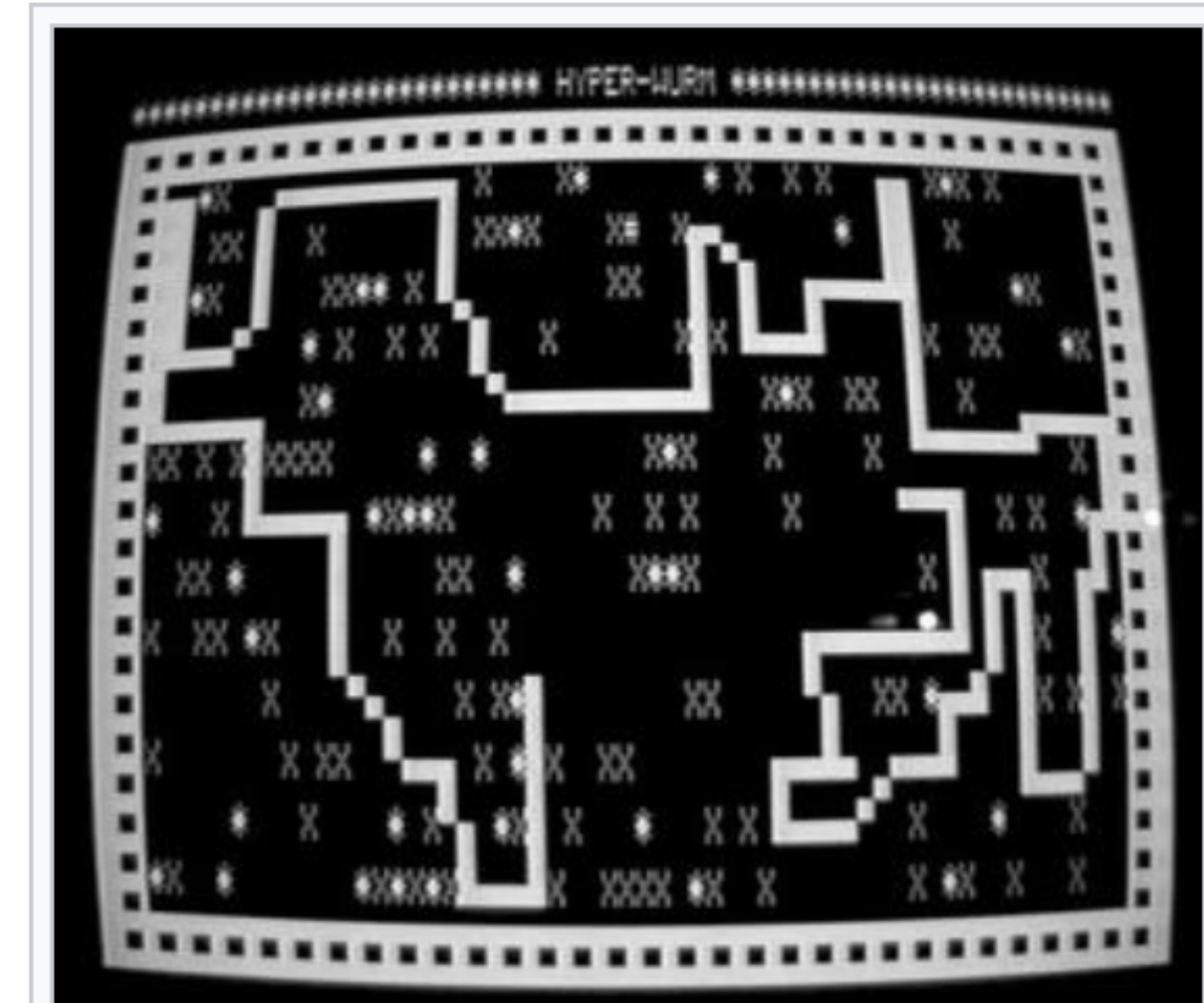
From Wikipedia, the free encyclopedia
(Redirected from [Snake \(video game\)](#))

Snake is the common name for a video game concept where the player maneuvers a line which grows in length, with the line itself being a primary obstacle. The concept originated in the 1976 [arcade game](#) *Blockade*, and the ease of implementing *Snake* has led to hundreds of versions (some of which have the word *snake* or *worm* in the title) for many platforms. After a variant was preloaded on [Nokia mobile phones](#) in 1998, there was a resurgence of interest in the snake concept as it found a larger audience. There are over 300 *Snake*-like games for [iOS](#) alone.^[2]

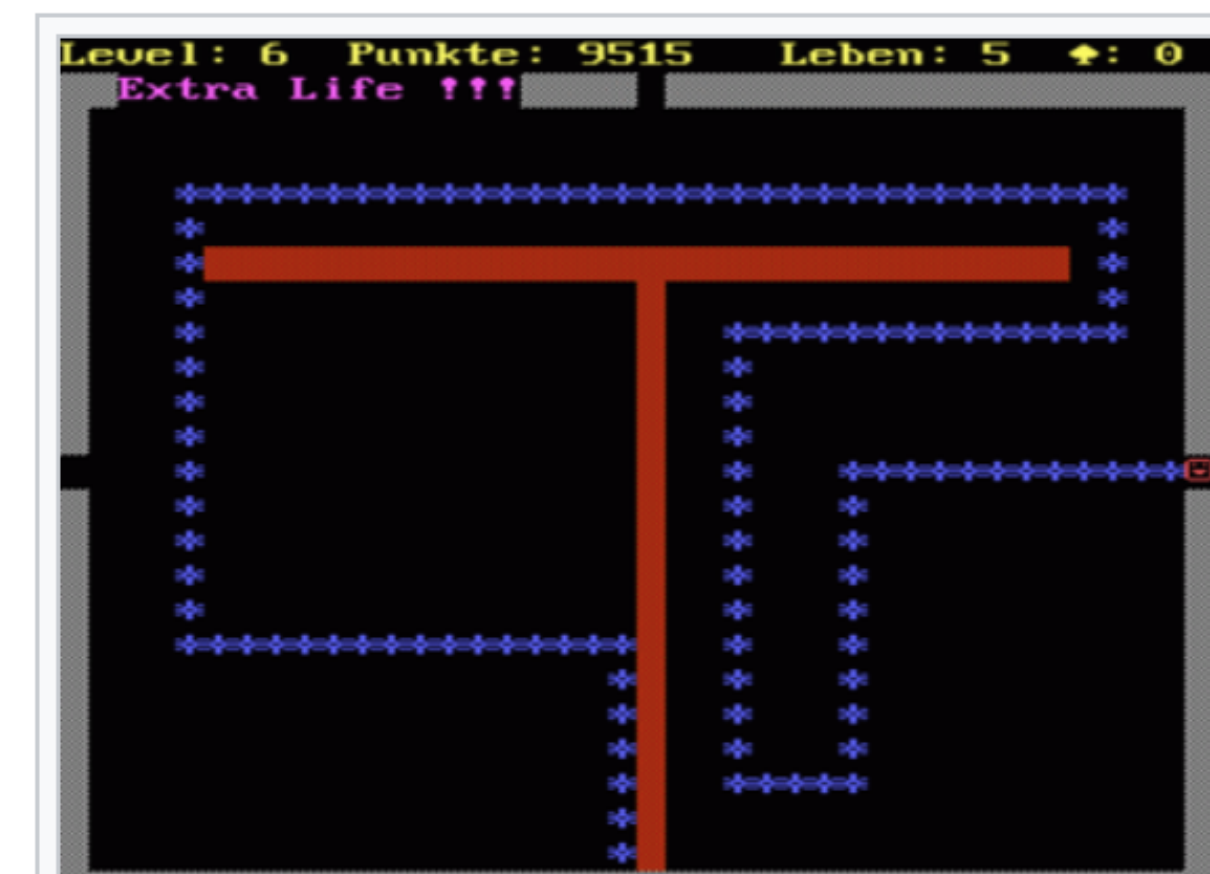
Contents [\[hide\]](#)

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- [2 History](#)
- [3 Nokia phones](#)
- [4 Reception](#)
- [5 References](#)
- [6 External links](#)

Gameplay [\[edit \]](#)



Snake on a TRS-80



ncurses

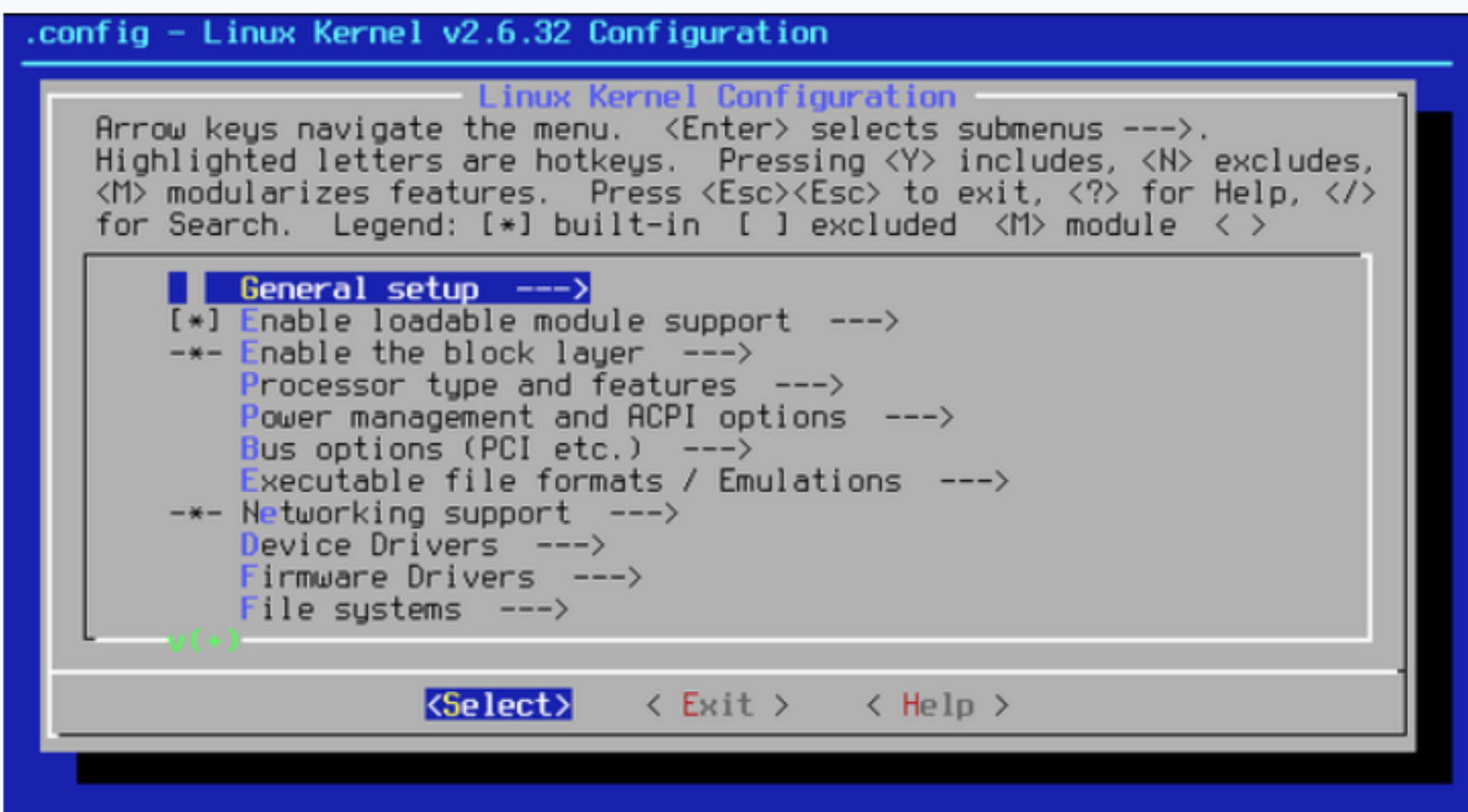
From Wikipedia, the free encyclopedia

ncurses (new curses) is a [programming library](#) providing an [application programming interface](#) (API) that allows the programmer to write [text-based user interfaces](#) in a terminal-independent manner. It is a toolkit for developing "GUI-like" [application software](#) that runs under a [terminal emulator](#). It also optimizes screen changes, in order to reduce the [latency](#) experienced when using remote [shells](#).


Contents [\[hide\]](#)

- History
 - [curses](#)
 - [pcurses](#)
 - [ncurses](#)
- [Terminal database](#)
- [License](#)
- [Programs using ncurses](#)
- [See also](#)
- [References](#)
- [External links](#)

ncurses



ncurses-based menuconfig

Developer(s)	GNU Project
Initial release	1993; 25 years ago
Stable release	6.1 / 27 January 2018; 6 months ago
Repository	ftp://ftp.gnu.org/gnu/ncurses/ 
Written in	C
Operating system	POSIX
Type	Widget toolkit
License	X11 License ^[1]

Disclaimer:
Very few unit tests



Disclaimer:

This is a happy

path  

There are more
native things...

- C and Objective-C interop
- concurrency with workers
 - object.freeze()
 - object.pin()
- @CName, @ThreadLocal

- memory leaks
- segmentation faults

Takeaways

THE
C
PROGRAMMING
LANGUAGE



Kotlin/Native

THE
C
PROGRAMMING
LANGUAGE



Kotlin/Native



THE
C
PROGRAMMING
LANGUAGE



Rust

Scala Native

Kotlin/Native







THE
C
PROGRAMMING
LANGUAGE



Rust

Scala Native

See also:

-  github.com/dkandalov/rust-snake
-  github.com/dkandalov/scala-native-snake
-  github.com/dkandalov/go-snake
-  github.com/dkandalov/graalvm-snake

It's early days
for Kotlin/Native

- slow compilation 🤪
- only CLion & AppCode
- tools are not perfect yet

What can
you do next?

kotlin-native/samples

GitHub, Inc. [US] | https://github.com/JetBrains/kotlin-native/tree/master/samples

JetBrains / kotlin-native

Watch 235

Star 4,831

Fork 307

Code

Issues 85

Pull requests 18

Projects 0

Wiki

Insights

Branch: master

kotlin-native / samples /

Create new file

Upload files

Find file

History

olonho

Fix macOS sample for Mojave with dark theme.

Latest commit b9e4697 a day ago

..

androidNativeActivity	[gradle-plugin] Depend on Kotlin 0.9.0-native (#1993)	19 days ago
calculator	Small AS tweak.	6 days ago
csvparser	[readme] Update gradle plugin readme	29 days ago
curl	[gradle-plugin] Depend on Kotlin 0.9.0-native (#1993)	19 days ago
git churn	[readme] Update gradle plugin readme	29 days ago
globalState	[readme] Update gradle plugin readme	29 days ago
gradle/wrapper	Provide a task to generate all Gradle wrappers in the project	4 months ago
gtk	[readme] Update gradle plugin readme	29 days ago
html5Canvas	Minor fixes for samples	8 months ago
libcurl	[readme] Update gradle plugin readme	29 days ago
nonBlockingEchoServer	Update Kotlin with tests to 1.3.0-dev-391 (#2037)	18 days ago
objc	Fix macOS sample for Mojave with dark theme.	a day ago
opengl	[readme] Update gradle plugin readme	29 days ago
python_extension	Fixed samples for 0.9 (#2002)	25 days ago
socket	[samples] Switch to the new DSL in some samples	29 days ago
tensorflow	[gradle-plugin] Depend on Kotlin 0.9.0-native (#1993)	19 days ago
tetris	[readme] Update gradle plugin readme	29 days ago

Reference

Tutorials

Books

More resources

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► Getting Started

► Basics

► Classes and Objects

► Functions and Lambdas

► Other

► Core Libraries

► Reference

► Java Interop

► JavaScript

▾ Native

Concurrency in Kotlin/Native

 Edit Page

Kotlin/Native runtime doesn't encourage a classical thread-oriented concurrency model with mutually exclusive code blocks and conditional variables, as this model is known to be error-prone and unreliable. Instead, we suggest a collection of alternative approaches, allowing you to use hardware concurrency and implement blocking IO. Those approaches are as follows, and they will be elaborated on in further sections:

- Workers with message passing
- Object subgraph ownership transfer
- Object subgraph freezing
- Object subgraph detachment
- Raw shared memory using C globals
- Coroutines for blocking operations (not covered in this document)

Workers

JetBrains/kotlin-native: X		
GitHub, Inc. [US] https://github.com/JetBrains/kotlin-native		
utilities	Implement internal defFileDependencies tool	8 days ago
.gitignore	samples: Port android build to stable android gradle plugin	11 months ago
.gitmodules	Added JB copyright (#417)	2 years ago
CHANGELOG.md	[changelog] update v0.9.3	a day ago
CONCURRENCY.md	docs: update headers in CONCURRENCY.md (#2102)	9 days ago
DEBUGGING.md	docs: drop debugging unnecessary title (#2091)	10 days ago
DISTRO_README.md	[bundle][doc] drop unwanted docs from bundle.	5 days ago
FAQ.md	Refresh interop docs. (#2130)	4 days ago
GRADLE_PLUGIN.md	Use HTTPS when downloading dependencies (#2118)	6 days ago
HACKING.md	Remove obsolete testData in properties. Replace it with testKotlinVer...	10 days ago
IMMUTABILITY.md	Proofread Watson (#2055)	16 days ago
INTEROP.md	Refresh interop docs. (#2130)	4 days ago
LIBRARIES.md	Updated LIBRARIES.md	3 days ago
LICENSE	Add missing LICENSE file	a year ago
OBJC_INTEROP.md	Update OBJC_INTEROP.md (#2075)	11 days ago
PLATFORM_LIBS.md	KT-26712: styles LIBRARIES.md for Kotlin web site (#2088)	10 days ago
README.md	Documentation update, v0.9.2 preps. (#2096)	9 days ago
RELEASE_NOTES.md	[bundle][doc] drop unwanted docs from bundle.	5 days ago
_nav_reference.yml	Add fat jars for gradle plugin (#2149)	19 hours ago
build.gradle	Add fat jars for gradle plugin (#2149)	19 hours ago
gradle.properties	[version] 0.9.4	19 hours ago
gradlew	build: Use Gradle 4.2	a year ago
gradlew.bat	Add Gradle wrapper. (#19)	2 years ago
settings.gradle	KLIB reader: uniform API for obtaining module descriptors from Kotlin	a month ago

▶ Getting Started

▶ Android

▶ Java Interop

▶ JavaScript

▾ Native

- Basic Kotlin/Native Application
- Interop with C Libraries
- Mapping Primitive Data Types from C
- Mapping Struct and Union Types from C
- Mapping Function Pointers from C

Mapping Struct and Union Types from C

Edit Page

Last Updated 23 July 2018

Struct and Union types from C and how they look in Kotlin/Native

This is the second post in the series. If you haven't done so already, you may want to begin with the very first tutorial of the series called [Mapping Primitive Data Types from C](#). There are also the [Mapping Struct and Union Types from C](#) and [Mapping Strings from C](#) tutorials.

In the tutorial you will learn:

- [How Struct and Union types are mapped](#)
- [How to use Struct and Union type from Kotlin](#)

We need to have a Kotlin compiler on our machines. You may want to take a look at the [A Basic Kotlin Application](#) tutorial for more information on performing this step. Let's assume, we have a console, where the `kotlinc-native`, `cinterop` and `klib` commands are available.

kotlinlang ▾

🔔 Dmitry Kandalov

≡ All Unreads

🗨 All Threads

Channels

build-tools

codereview

codingconventions

coroutines

datascience

eap

functional

general

getting-started

gradle

hiring

http4k

intellij

intellij-plugins

javascript

contributors

kotlin-native

kotlinconf

🔒 kotlinconf-speakers

kotlinlondon

ktor

More Unreads ▾

#kotlin-native

☆ | 👤 1,128 | 📌 1 | Kotlin Native (https://github.com/jetbr

https://download.jetbrains.com/kotlin/native/ Kotlin Native (https://github.com/jetbr Yesterday releases/0.9/windows/kotlin-native-windows-0.9.zip

GitHub release page is <https://github.com/JetBrains/kotlin-native/releases/tag/v0.9>.



GitHub

[JetBrains/kotlin-native](#)

Kotlin/Native infrastructure. Contribute to JetBrains/kotlin-native development by creating an account on GitHub.



1



1



2 replies

Last reply today at 18:13



Mohit Gurumukhani 18:14

Hey! I am using ktor ios engine to make get requests. However, making get requests using `client.get<String>(url)` results in cinterop error as the native compiler treats get as cinterop function instead of the ktor function. Is there a way to force the compiler? Also, with multithreading not supported in native coroutines, I wonder if there is a way to avoid ui freezing while calking client.



3 replies

Last reply today at 18:35



Nikolay Igotti [JB] 18:20

<https://blog.jetbrains.com/kotlin/2018/09/kotlinnative-v0-9-is-here/>



Kotlin Blog

Kotlin/Native v0.9 is here!

Summer may be almost over, but our Kotlin/Native team has been breaking a sweat to give you the Kotlin/Native v0.9 release... and here it is! Don't be fooled by the numbering – this is a ...

Yesterday at 18:14



11



Message #kotlin-native



Kotlin/Native



The End



github.com/dkandalov/kotlin-native-snake



[@dmitrykandalov](https://twitter.com/dmitrykandalov)

The End



github.com/dkandalov/kotlin-native-snake



@dmitrykandalov

