

# 动态化研发模式

# ARK

字节跳动 - Client Infra

徐纪光

# TABLE OF CONTENTS 大纲

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- 研发现状
- ARK介绍
- 数据收益
- 未来规划

研发现状

# 研发现状



Git



Cocoapods



Xcode

组件化

# 组件化



Optimize

# 组件化

## 宿主壳工程

Pod install 时间长

Build 较长

成功率低

IDE 慢、内存占用高

# 组件化

## 宿主壳工程

Pod install 时间长

Build 较长

成功率低

IDE 慢、内存占用高

工程配置  
资源文件

Dev-Pod: 本地开发组件

500+ APP依赖Pod

# 组件化

子壳/Example工程

彻底模块化

体验差异

速度较慢

容易劣化

工程配置  
资源文件

Dev-Pod: 本地开发组件

100+ 模块依赖Pod



# ARK

精简化

全链路稳定

工程配置  
资源文件

Dev-Pod: 本地开发组件

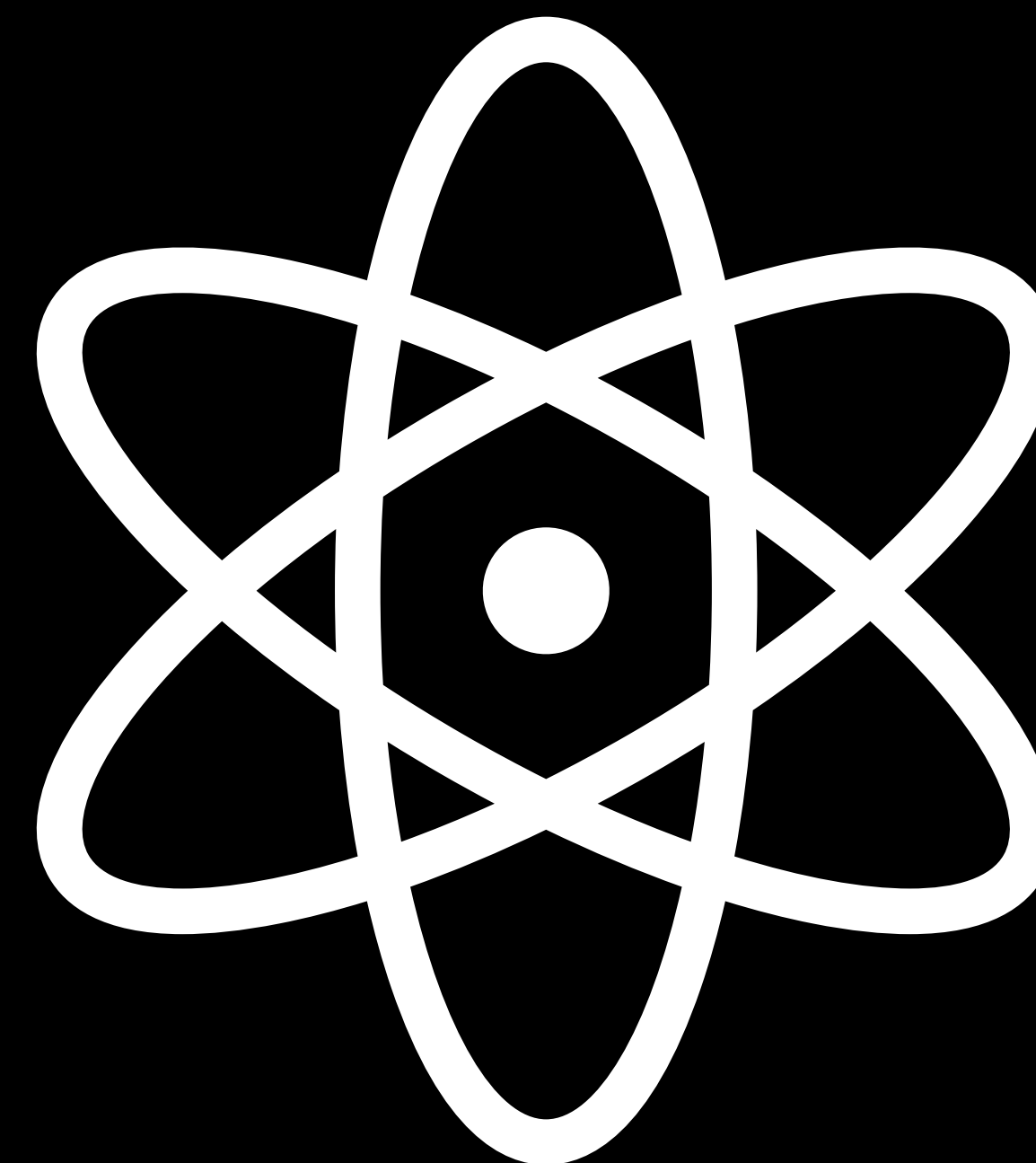
ARK

# 动态库

减少包体积

进程间共享，降低内存

动态加载应用内模块



# 动态库

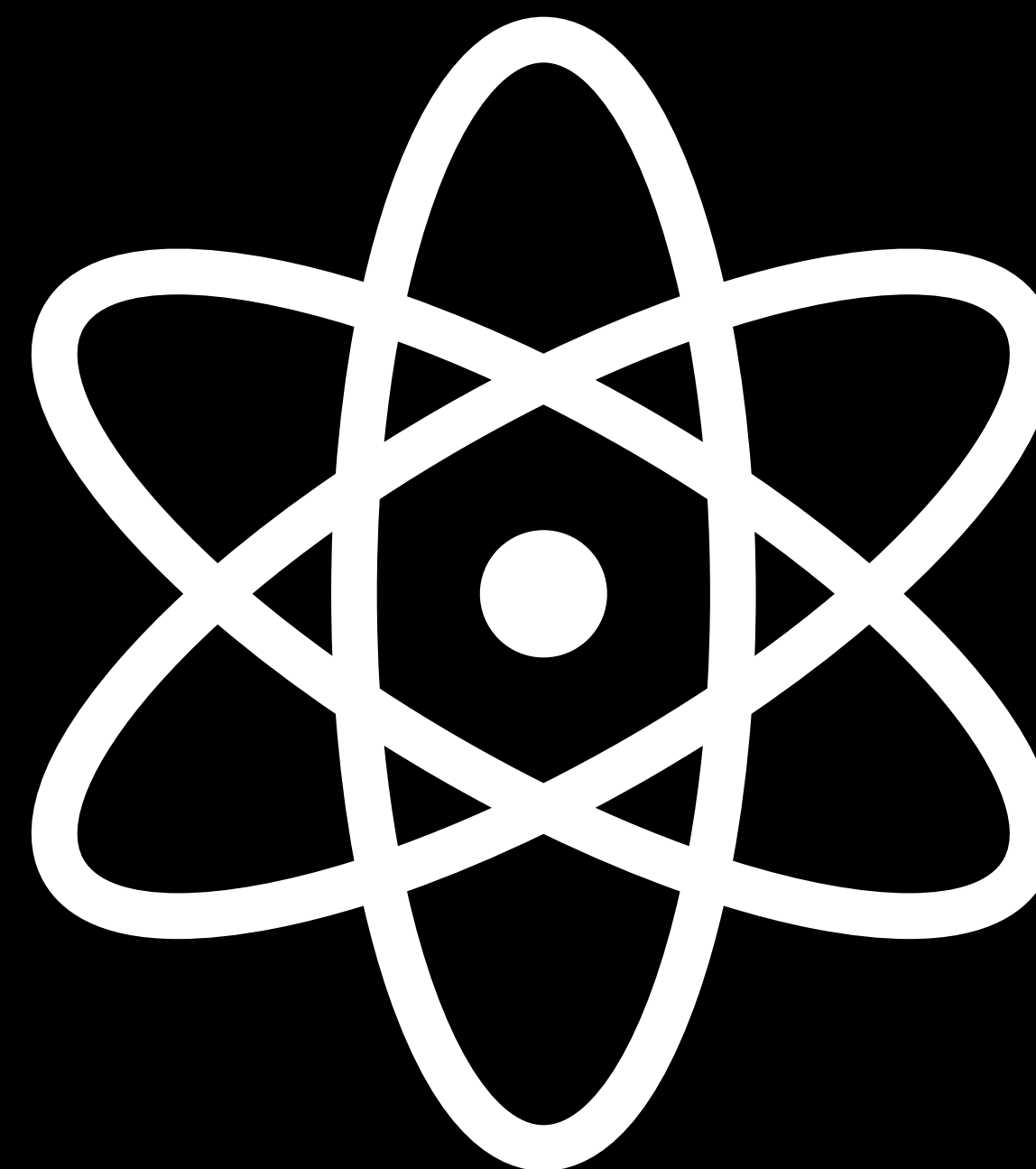
减少包体积

进程间共享，降低内存

动态加载应用内模块

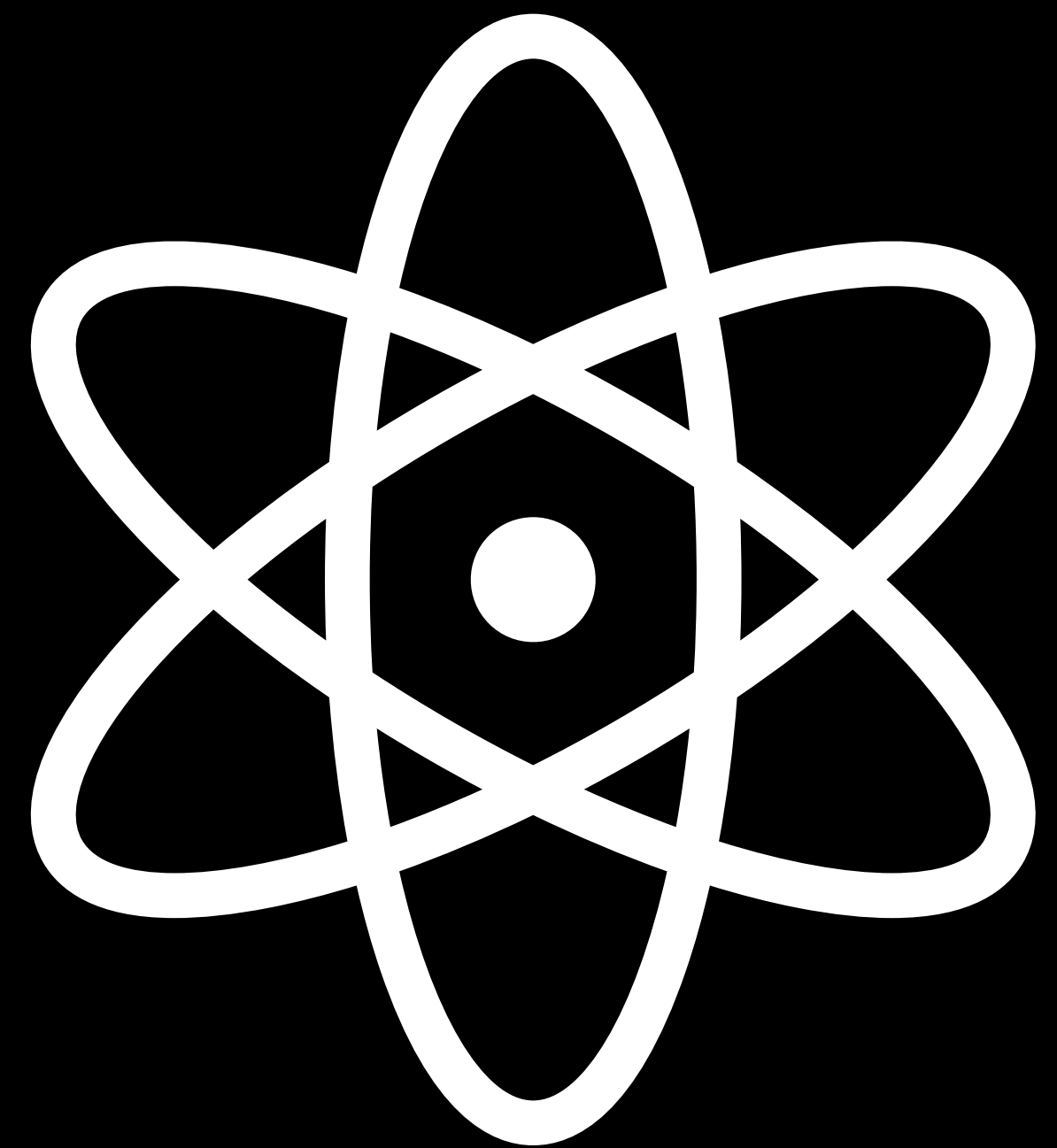
运行 ❌

编译 ✅



# 动态库

编译时替换应用内模块



# ARK 平台

Product.APP



Before

# ARK 平台

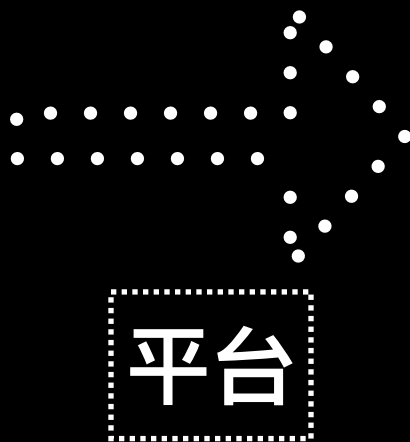
Product.APP



**Before**

# ARK 平台

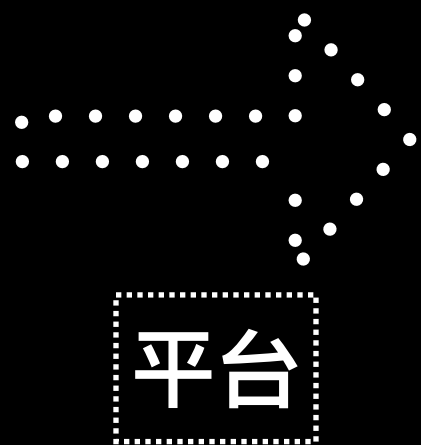
Product.APP



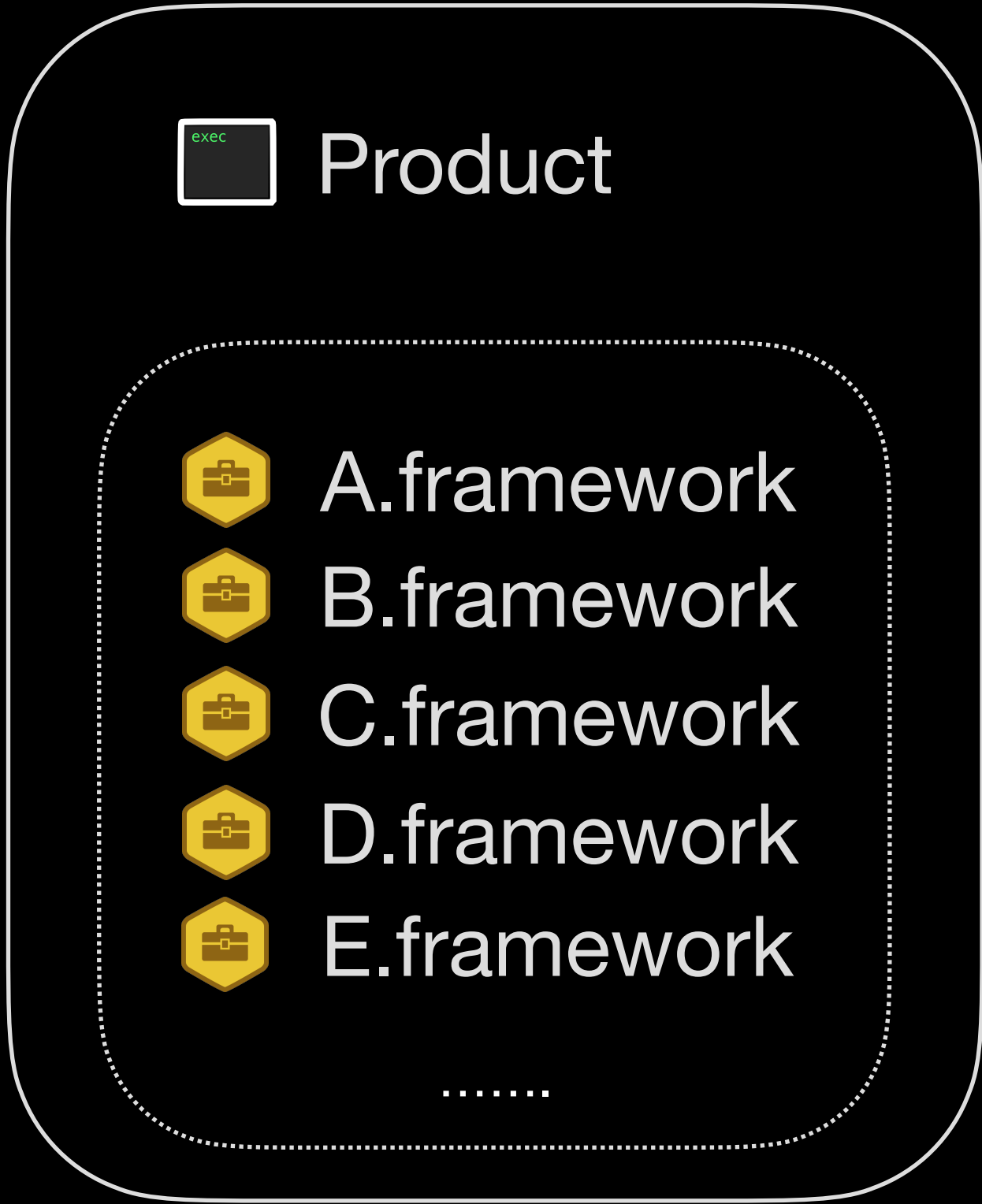


# ARK 平台

Product.APP



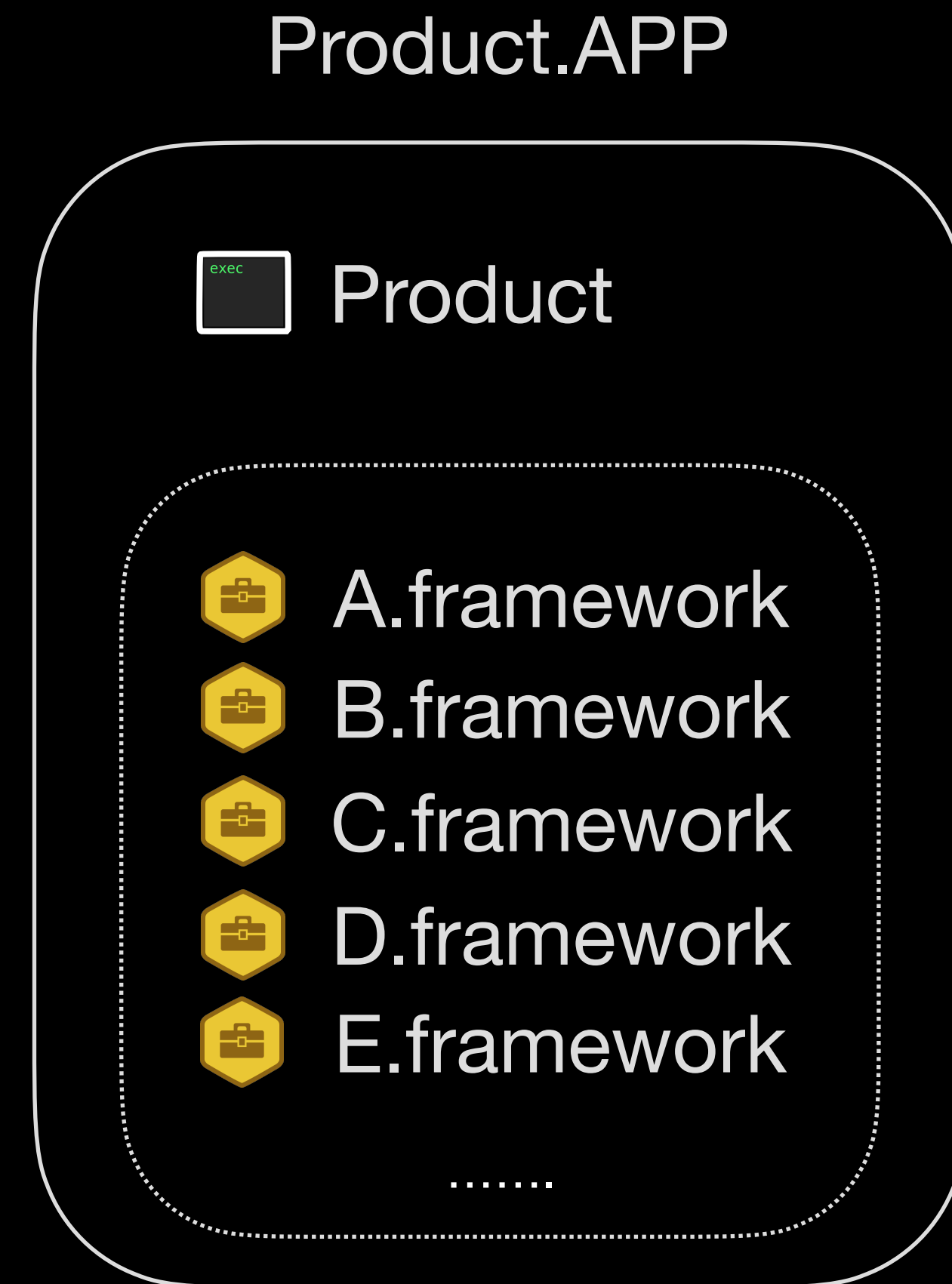
Product.APP



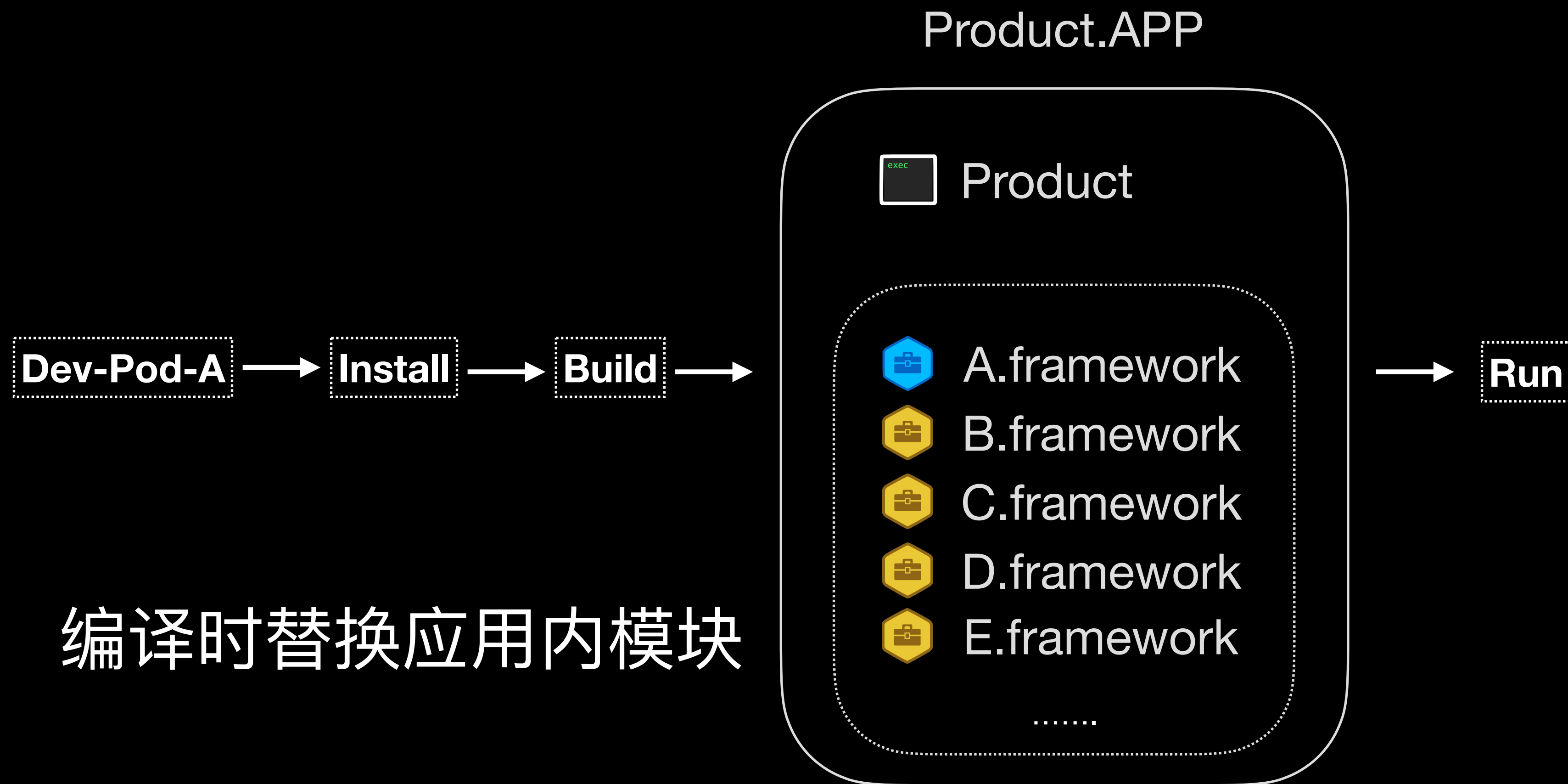
# ARK - 本地研发



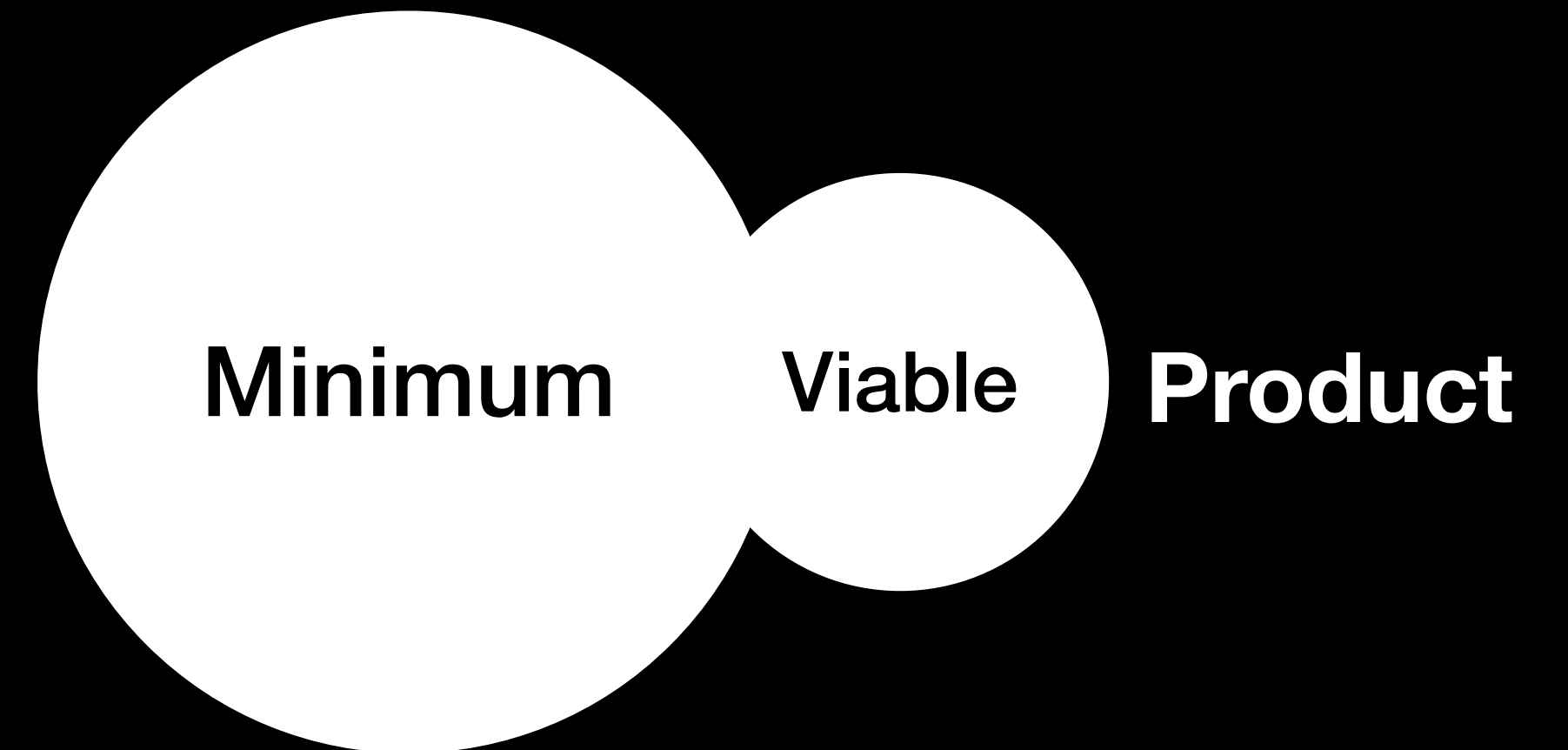
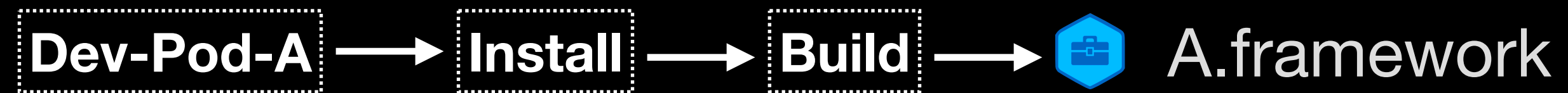
编译时替换应用内模块



# ARK - 本地研发



# ARK - 本地研发



# ARK核心

## 构建动态库

编译 

链接 

运行 

# ARK核心

## 构建动态库

```
/Applications/Xcode.app/Contents/  
Developer/Toolchains/  
XcodeDefault.xctoolchain/usr/bin/clang
```

```
-I/project/build/Debug/lib/include  
-I/project/build/include  
-I/project/llvm/include  
-I/project/build/project.hmap  
-F/project/build/Debug/lib
```

```
-c /project/llvm/lib/Support/Debug.cpp
```

```
-o /project/build/lib/Support/LLVM.build/  
Debug/LLVMSupport.build/Objects-  
normal/x86_64/Debug.o
```

编译 

链接 

运行 

# ARK核心

## 构建动态库

/Applications/Xcode.app/Contents/  
Developer/Toolchains/  
XcodeDefault.xctoolchain/usr/bin/clang

-I/project/build/Debug/lib/include  
-I/project/build/include  
-I/project/llvm/include  
-I/project/build/project.hmap  
-F/project/build/Debug/lib

-c /project/llvm/lib/Support/Debug.cpp

-o /project/build/lib/Support/LLVM.build/  
Debug/LLVMSupport.build/Objects-  
normal/x86\_64/Debug.o

.m

.swift

.c ...

编译 

链接 

运行 

# ARK核心

## 构建动态库

/Applications/Xcode.app/Contents/  
Developer/Toolchains/  
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-I/project/build/Debug/lib/include  
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-I/project/llvm/include  
-I/project/build/project.hmap  
-F/project/build/Debug/lib

-c /project/llvm/lib/Support/Debug.cpp

-o /project/build/lib/Support/LLVM.build/  
Debug/LLVMSupport.build/Objects-  
normal/x86\_64/Debug.o

.m

.swift

.c ...

编译 

链接 

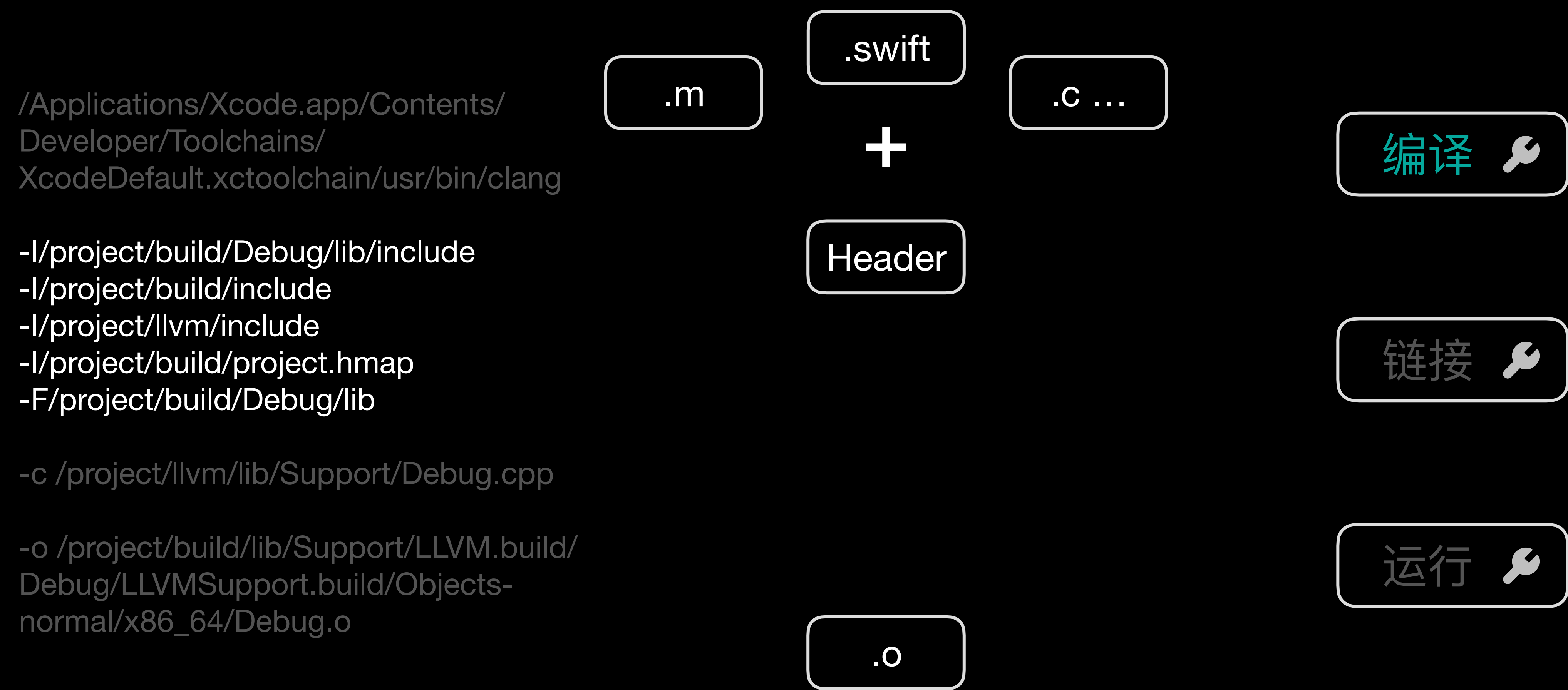
运行 

.o



# ARK核心

## 构建动态库

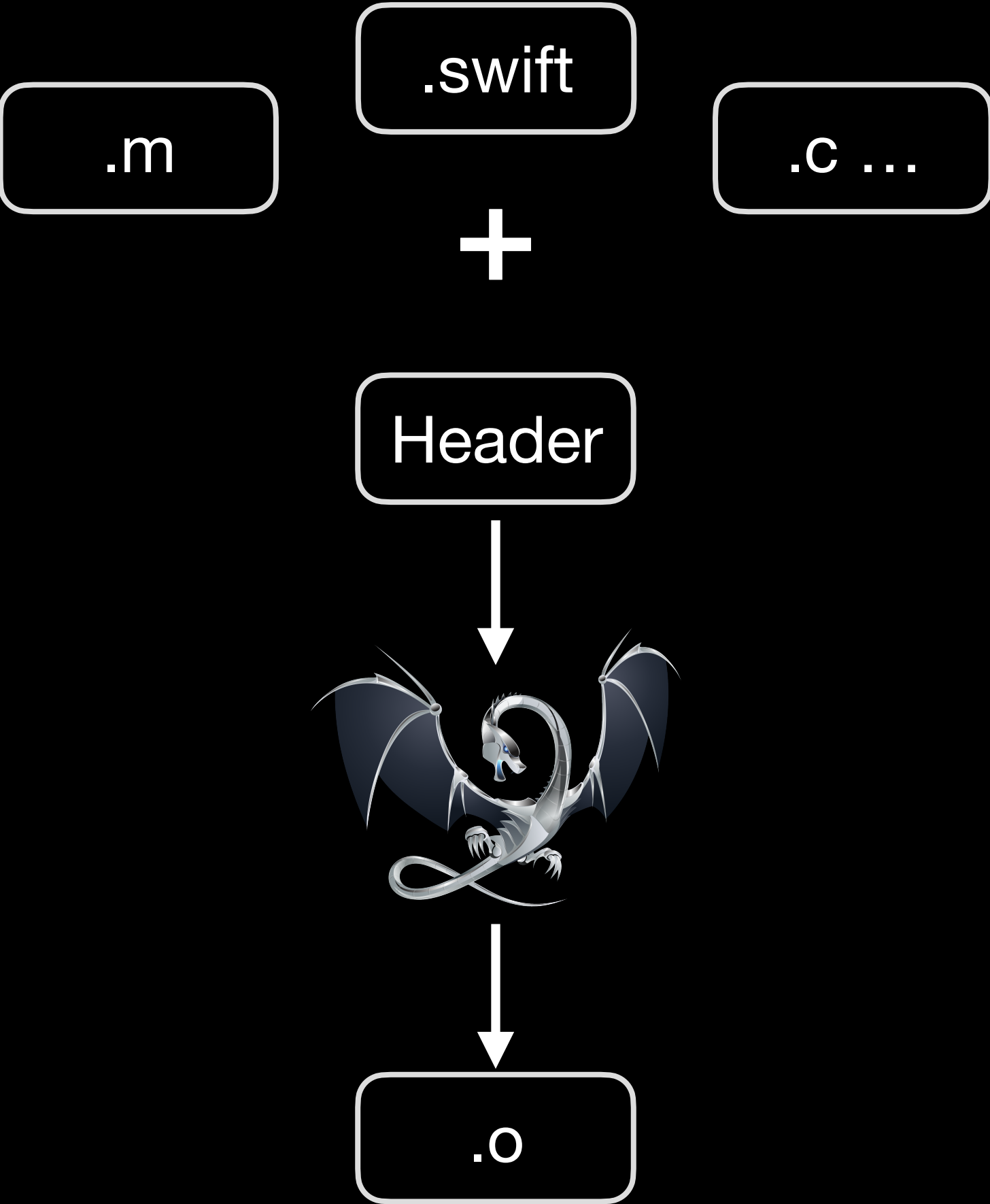


# ARK核心

## 构建动态库

/Applications/Xcode.app/Contents/  
Developer/Toolchains/  
XcodeDefault.xctoolchain/usr/bin/clang

-I/project/build/Debug/lib/include  
-I/project/build/include  
-I/project/llvm/include  
-I/project/build/project.hmap  
-F/project/build/Debug/lib  
  
-c /project/llvm/lib/Support/Debug.cpp  
  
-o /project/build/lib/Support/LLVM.build/  
Debug/LLVMSupport.build/Objects-  
normal/x86\_64/Debug.o



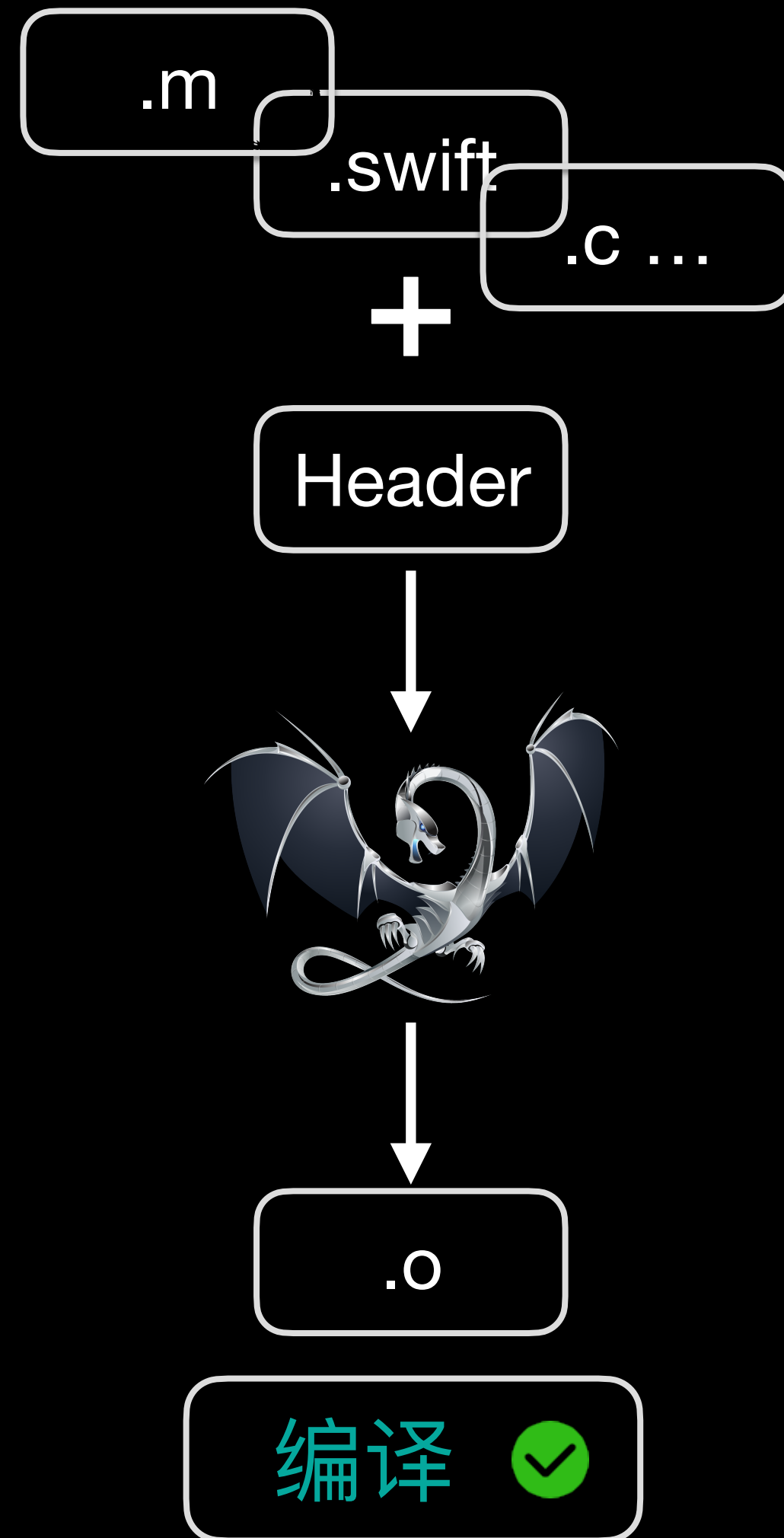
编译 🔧

链接 🔧

运行 🔧

# ARK核心

## 构建动态库

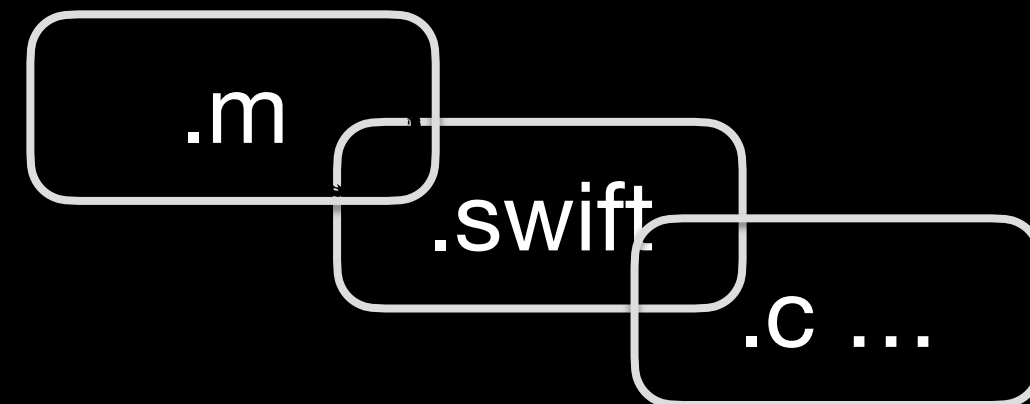


链接 

运行 

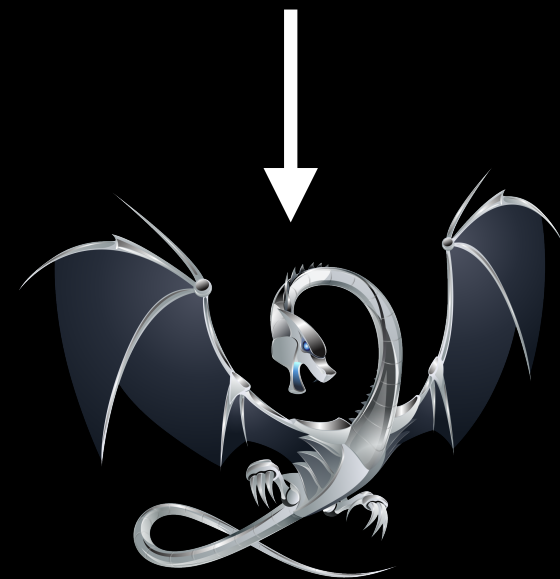
# ARK核心

## 构建动态库

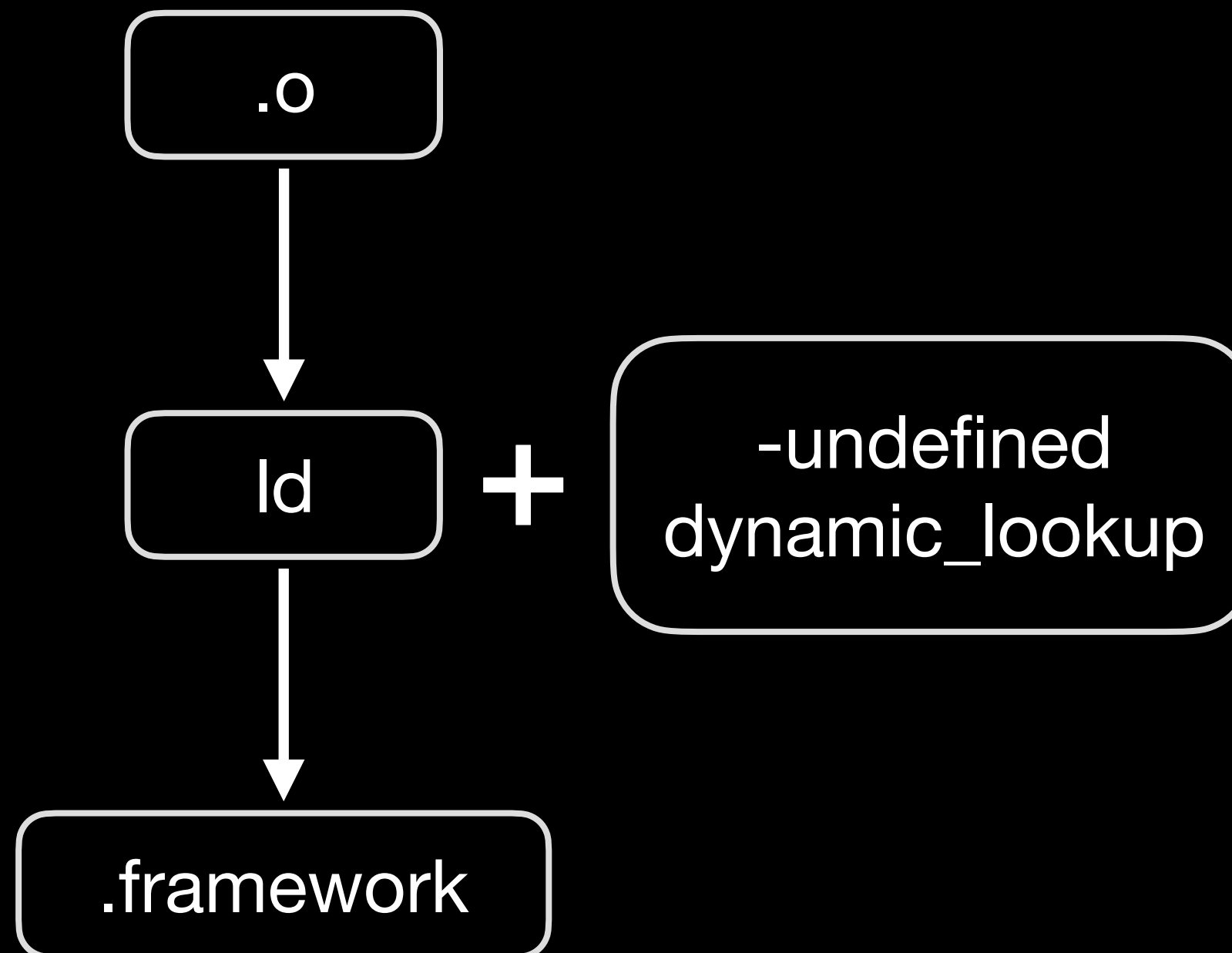


+

Header



编译 ✓

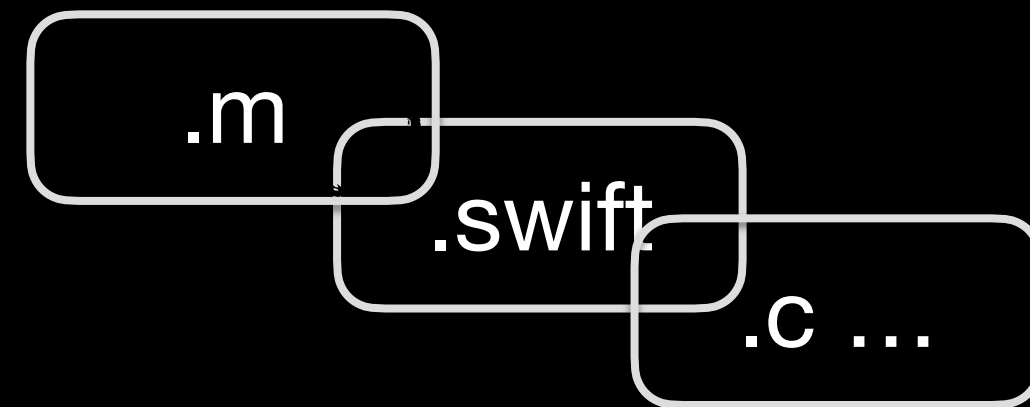


链接 🔧

运行 🔧

# ARK核心

## 构建动态库



+

Header



编译 ✓

`.o`



`ld`

+

`-undefined  
dynamic_lookup`



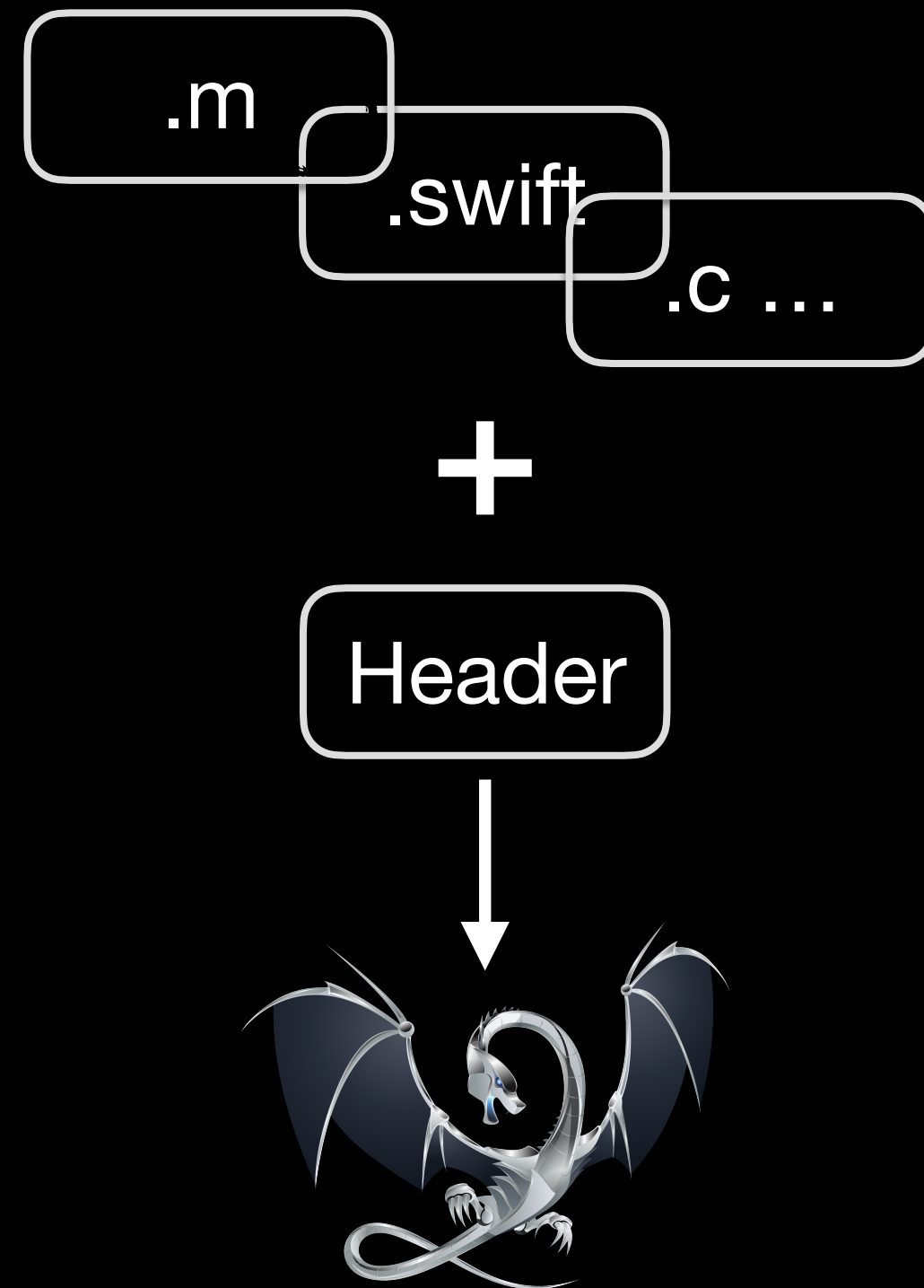
`.framework`

链接 ✓

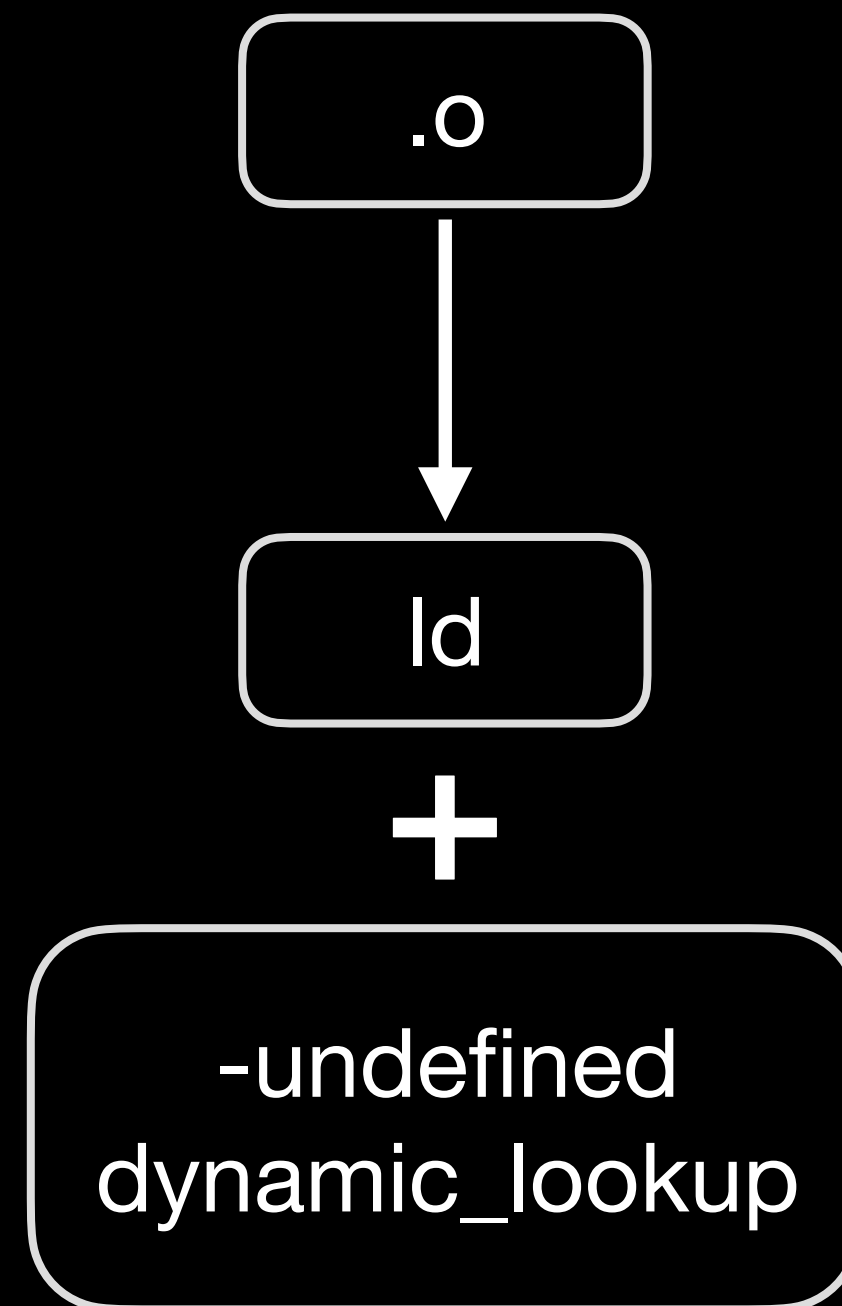
运行 🔧

# ARK核心

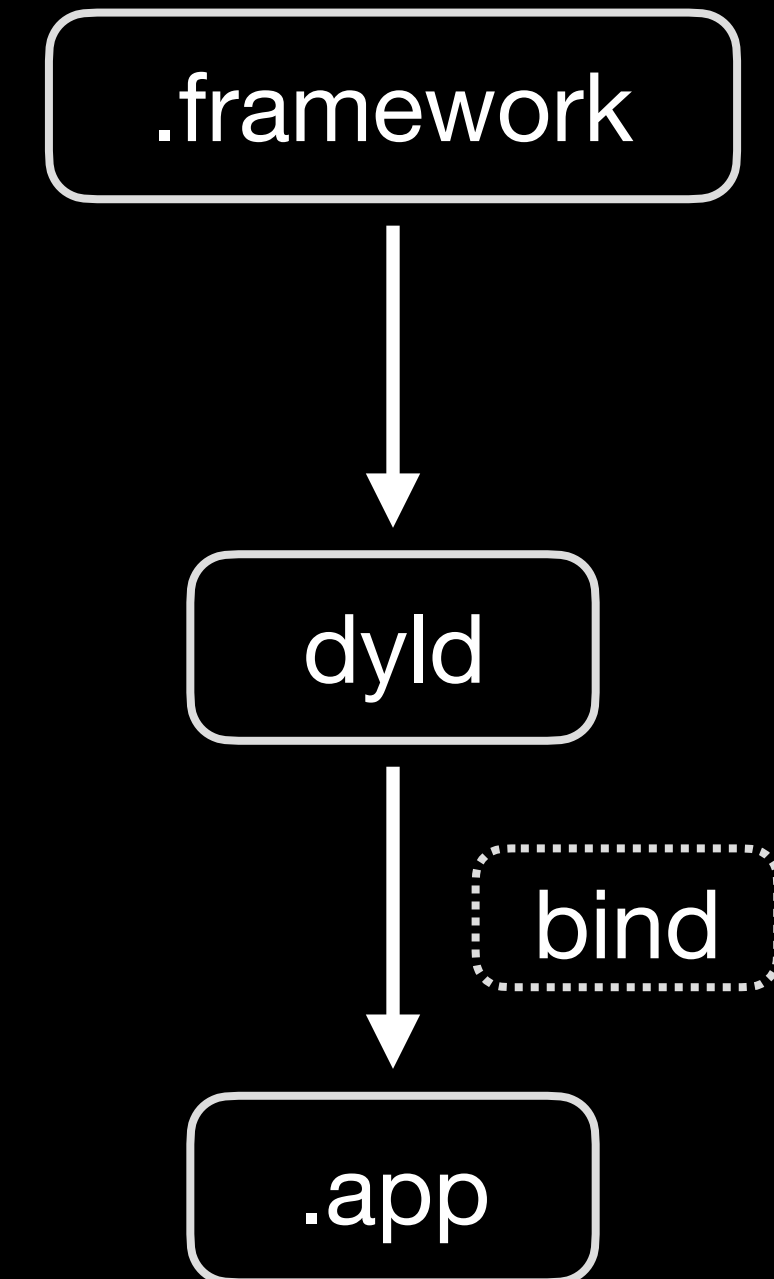
## 构建动态库



编译 ✓



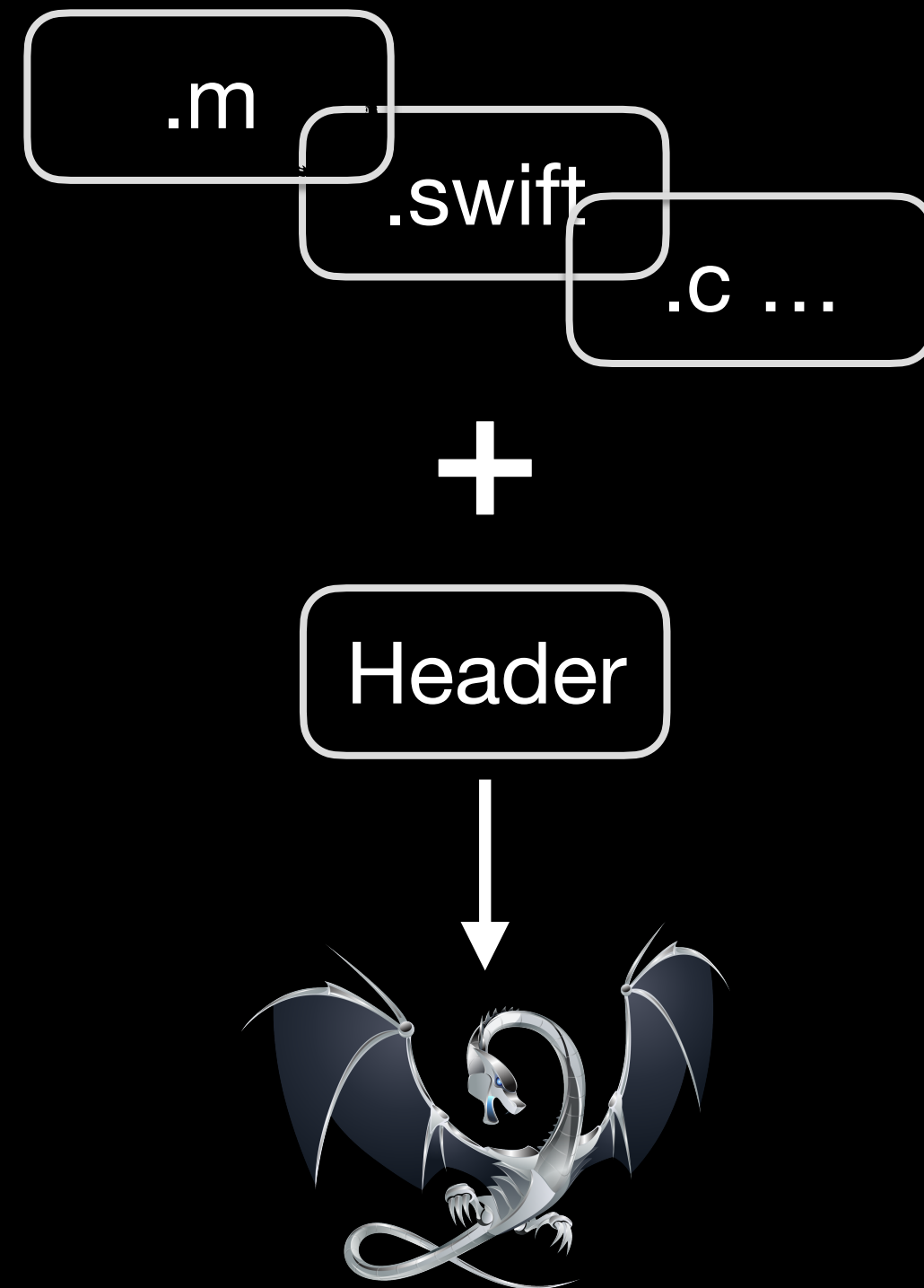
链接 ✓



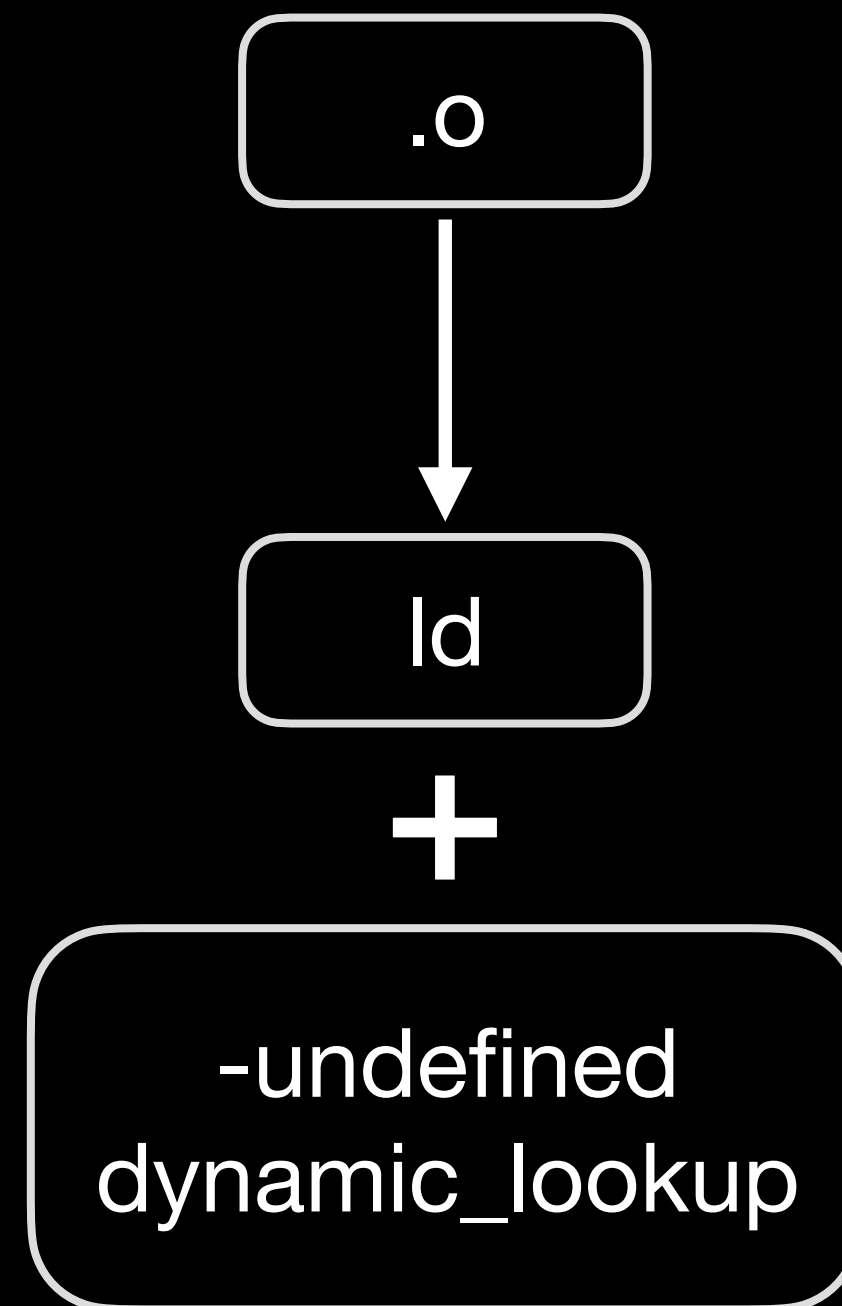
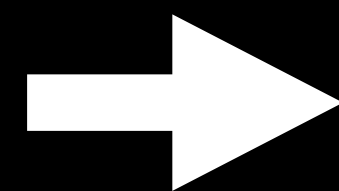
运行 🔧

# ARK核心

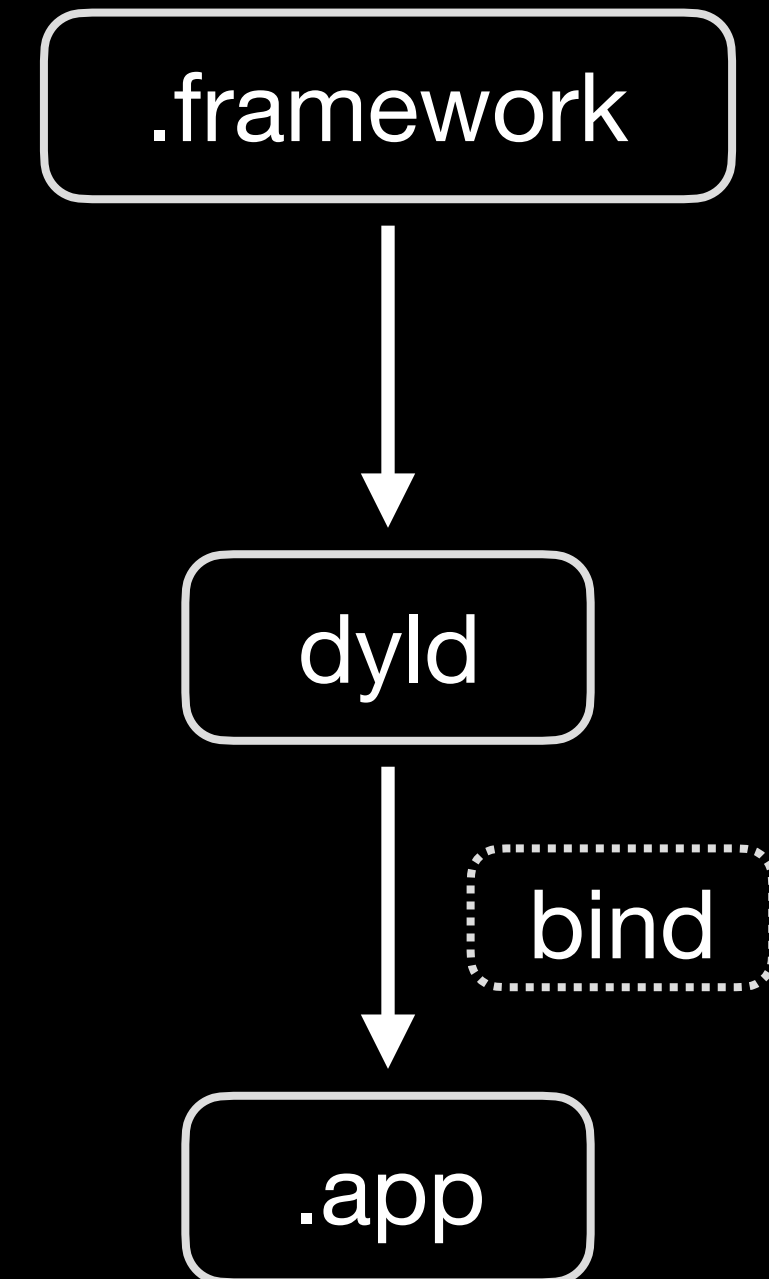
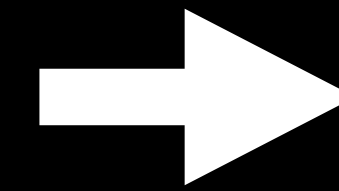
## 构建动态库



编译 ✓



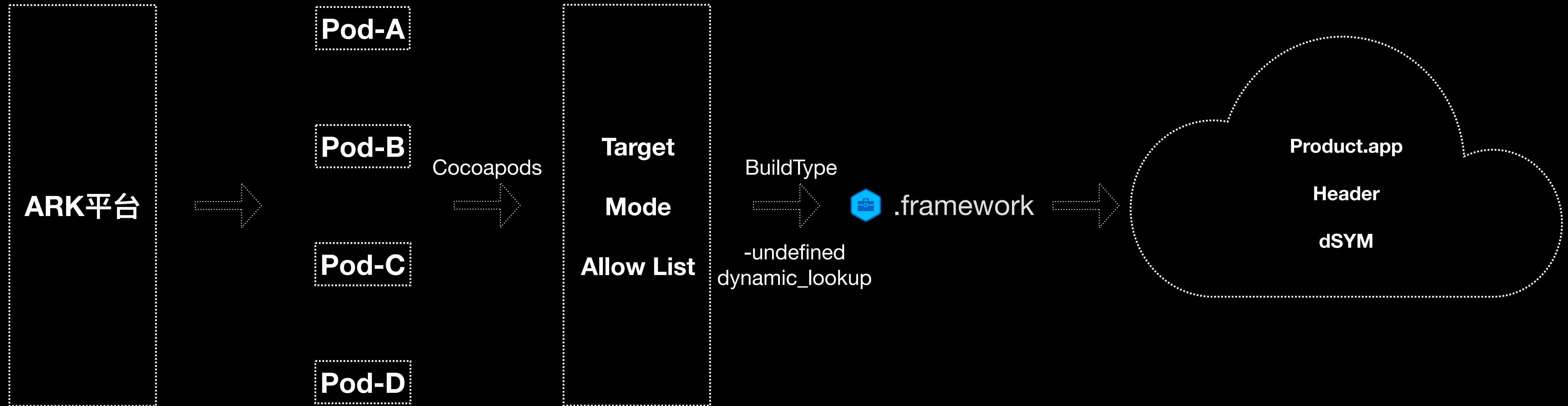
链接 ✓



运行 ✓

# ARK 核心

## 动态库控制策略





# ARK 核心

## 动态库控制策略

Product.APP



Product



A.framework



B.framework



C.framework



D.framework



E.framework

# ARK 核心

## 动态库控制策略

Product.APP

 Product

 libB

 libD

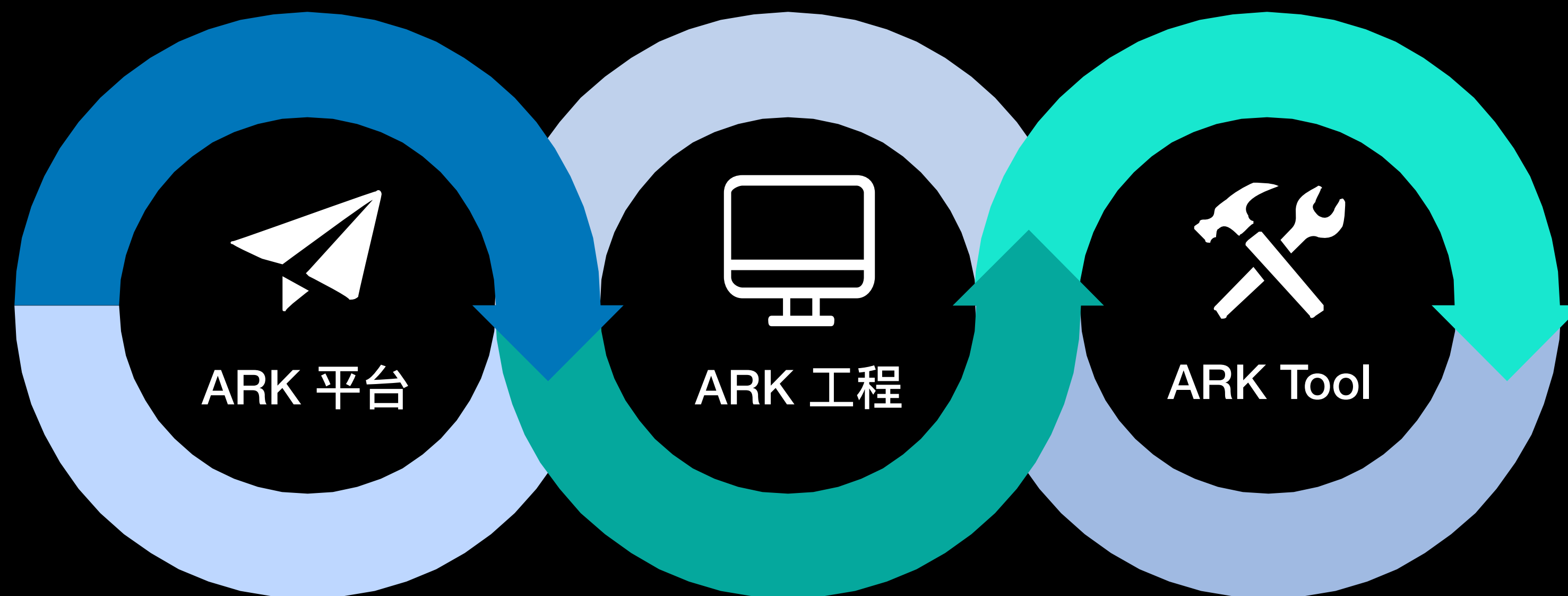
 A.framework

 C.framework

 E.framework

.....

# ARK 解决方案



# ARK 平台

## 构建策略

Master

Feature

Release

Hotfix

Develop

GitFlow

# ARK 平台

## 构建策略

Release

Develop

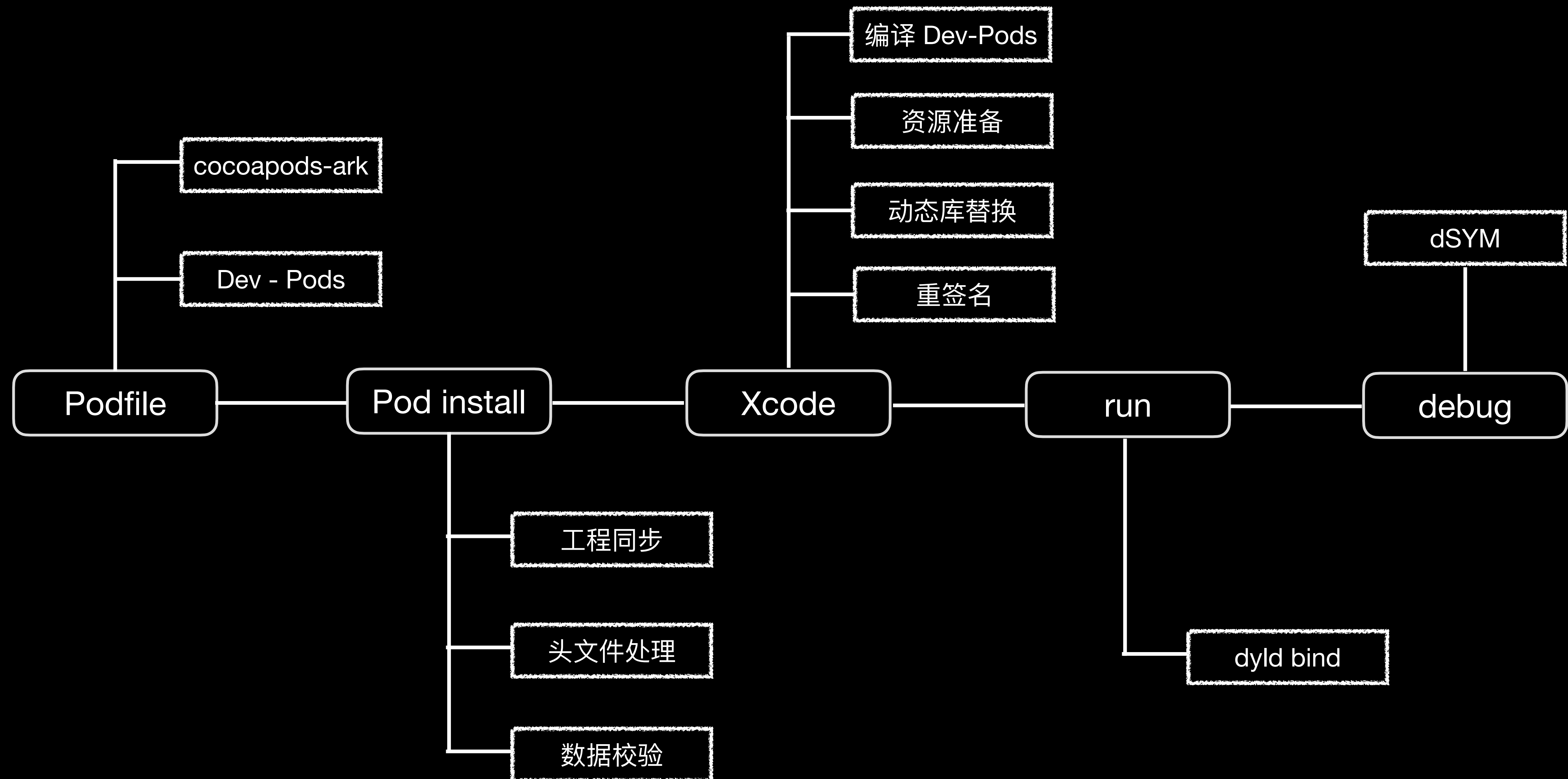
GitFlow

# ARK 平台

## 构建策略



# ARK 工程



# ARK工具链

## 体验优化

Document - Show Source Code

Debug Tool

Code Integration

- Workspace
  - Pods.xcodeproj
    - Dev-Pod-A
    - Dev-Pod-B

pod doc

- Workspace
  - Pods.xcodeproj
    - Dev-Pod-A
    - Dev-Pod-B
  - Document.xcodeproj
    - Pod-Source-C
    - Pod-Source-D
    - Pod-Source-E
    - ...



# ARK工具链

## 体验优化

Document - Show Source Code

Debug Tool

Code Integration

Deterministic Builds

dSYM

lldb source-map

# ARK工具链

## 体验优化

Document - Show Source Code

Debug Tool

Code Integration

# ARK工具链

## 动态库技术

Header Search Path Optimize

Undefined Symbol Bind Check

LLDB Launch/Attach Optimize

import "b.h"



import <b/b.h>



规范化头文件



制作头文件规范工具

不规范化头文件



提供Pods-plugin

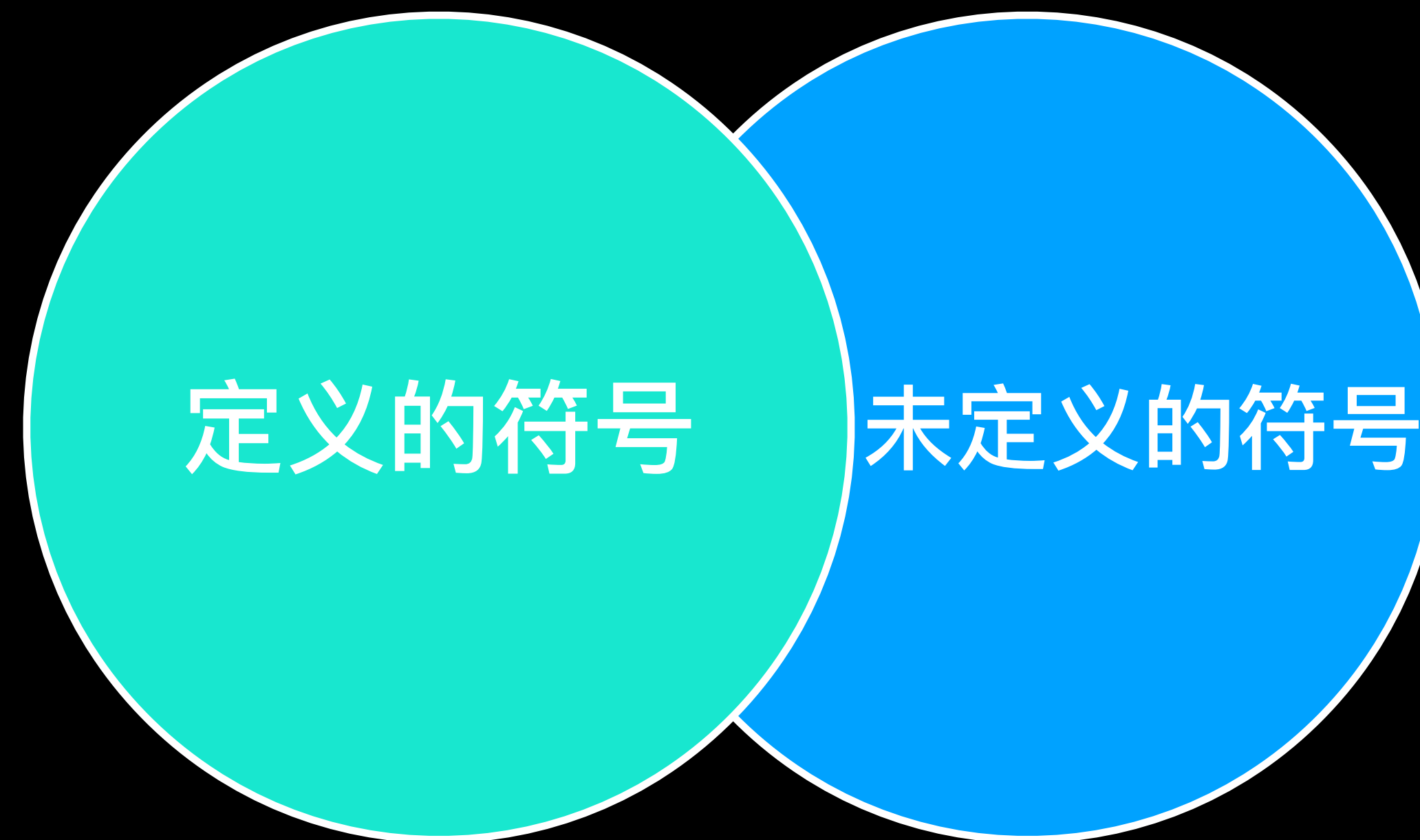
# ARK工具链

## 动态库技术

Header Search Path Optimize

Undefined Symbol Bind Check

LLDB Launch/Attach Optimize



Bad Case

# ARK工具链

## 动态库技术

Header Search Path Optimize

Undefined Symbol Bind Check

LLDB Launch/Attach Optimize



定义的符号

Good Case

# ARK工具链

## 动态库技术

Header Search Path Optimize

Undefined Symbol Bind Check

LLDB Launch/Attach Optimize



**Lost connection to the debugger  
on "iPhone 12 Pro Max".**

Restore the connection to "iPhone 12 Pro Max" and run "NewsInHouse" again, or if "NewsInHouse" is still running, you can attach to it by selecting Debug > Attach to Process > NewsInHouse.

Details

OK


# ARK工具链


## 动态库技术


Header Search Path Optimize


Undefined Symbol Bind Check

LLDB Launch/Attach Optimize

 This revision was landed with ongoing or failed builds. Thu, May 20, 7:11 PM

 Closed by commit [rG8dd106028b15: \[debugserver\] Add platform cache support to improve performance.](#) (authored by [kuperxu](#), committed by [JDevlieghere](#)). · [Explain Why](#)

 This revision was automatically updated to reflect the committed changes.

 [JDevlieghere](#) added a commit: [rG8dd106028b15: \[debugserver\] Add platform cache support to improve performance..](#)

数据收益



Before

VS

ARK

80 s



10 S

10 min



< 60 S

12 min



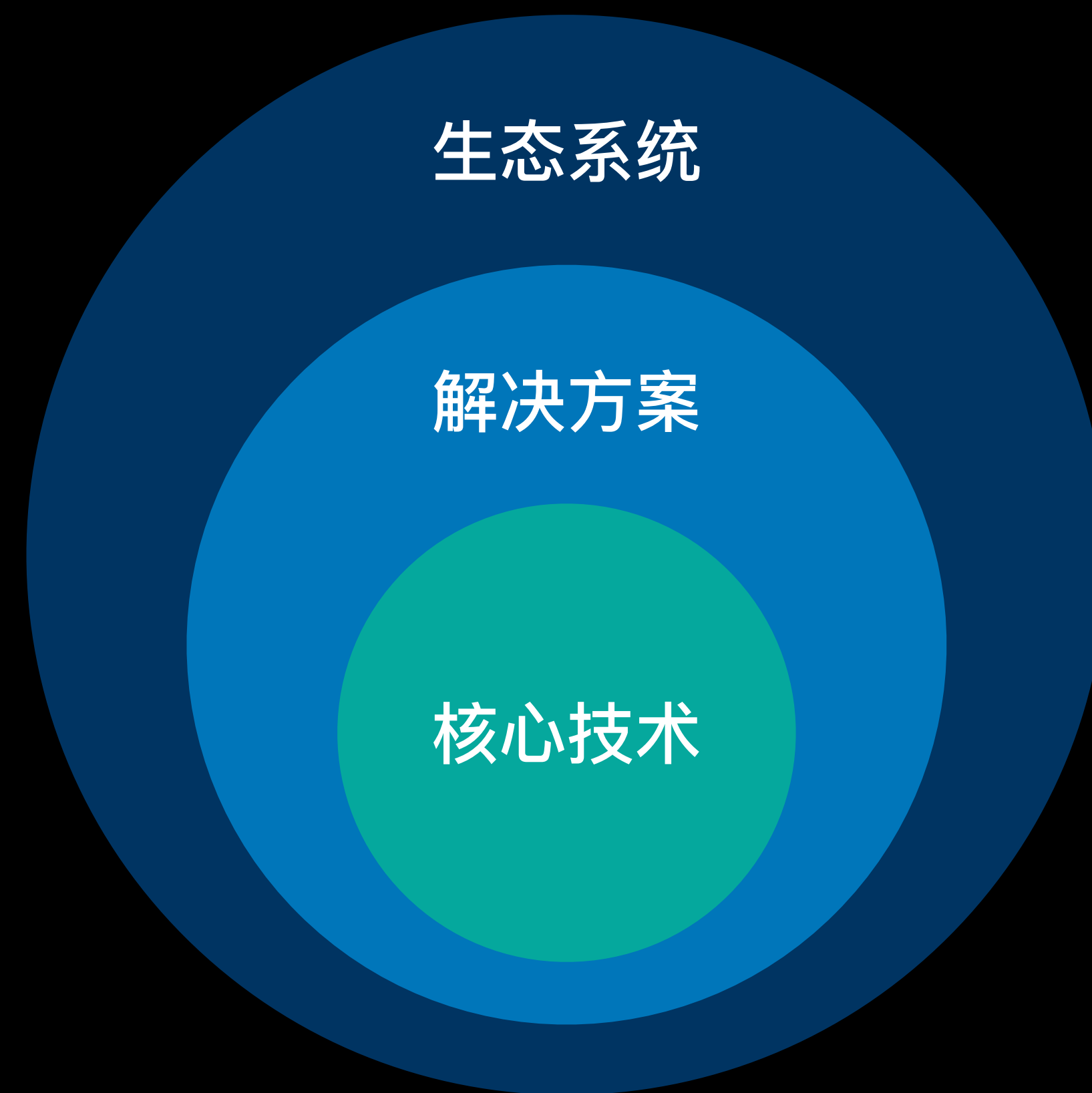
< 3 min

3 min



< 1 min

# 未来规划



**Thank You**