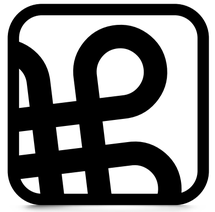


Macoun

Neues in Swift

Nikolaj Schumacher

Ablauf

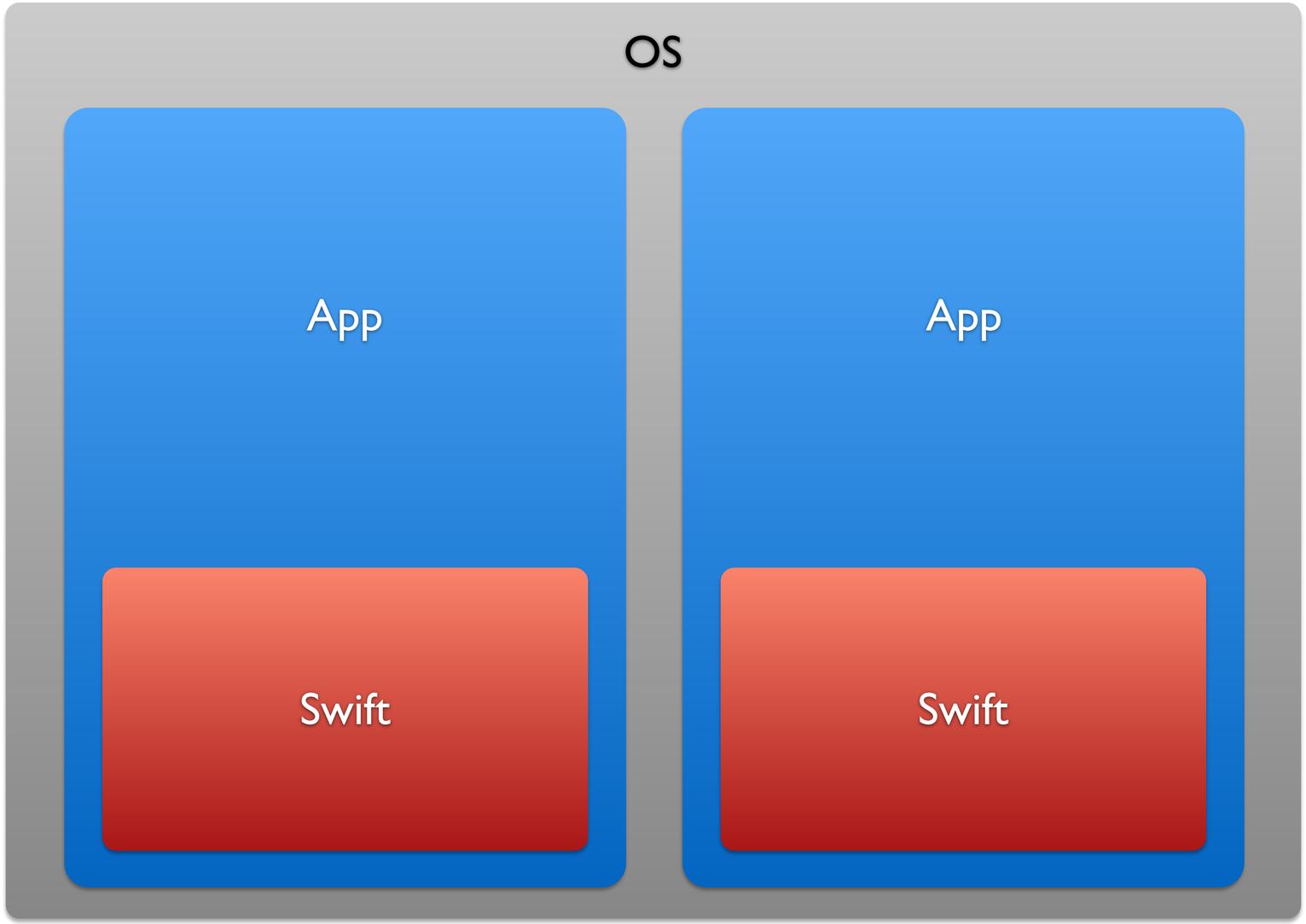
- ABI-Stabilität
- Property Wrapper
- Function Builder
- Strings
- Typen
- dynamische Features
- Collections
- Blitzrunde

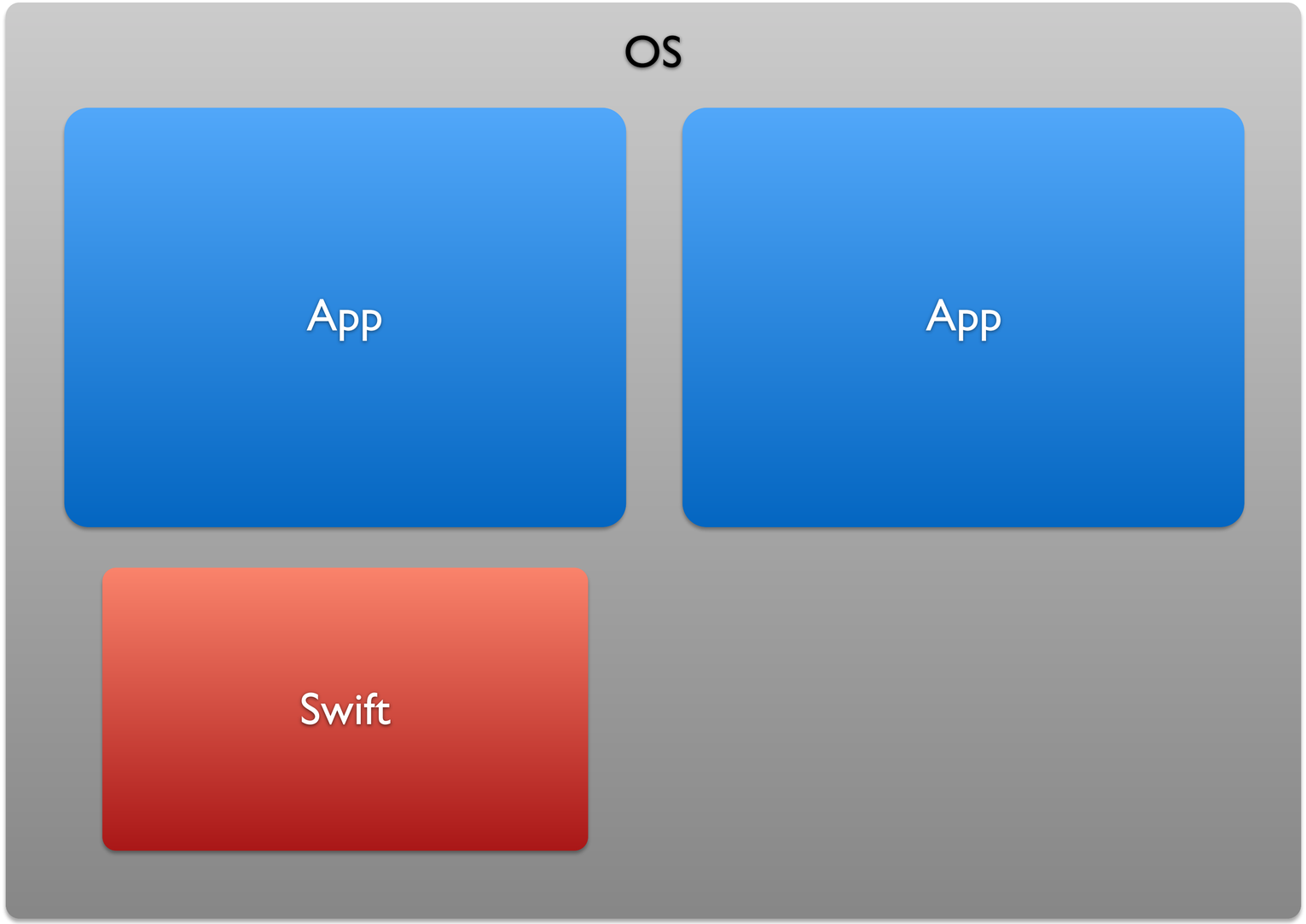
ABI-Stabilität

Was ist ABI?

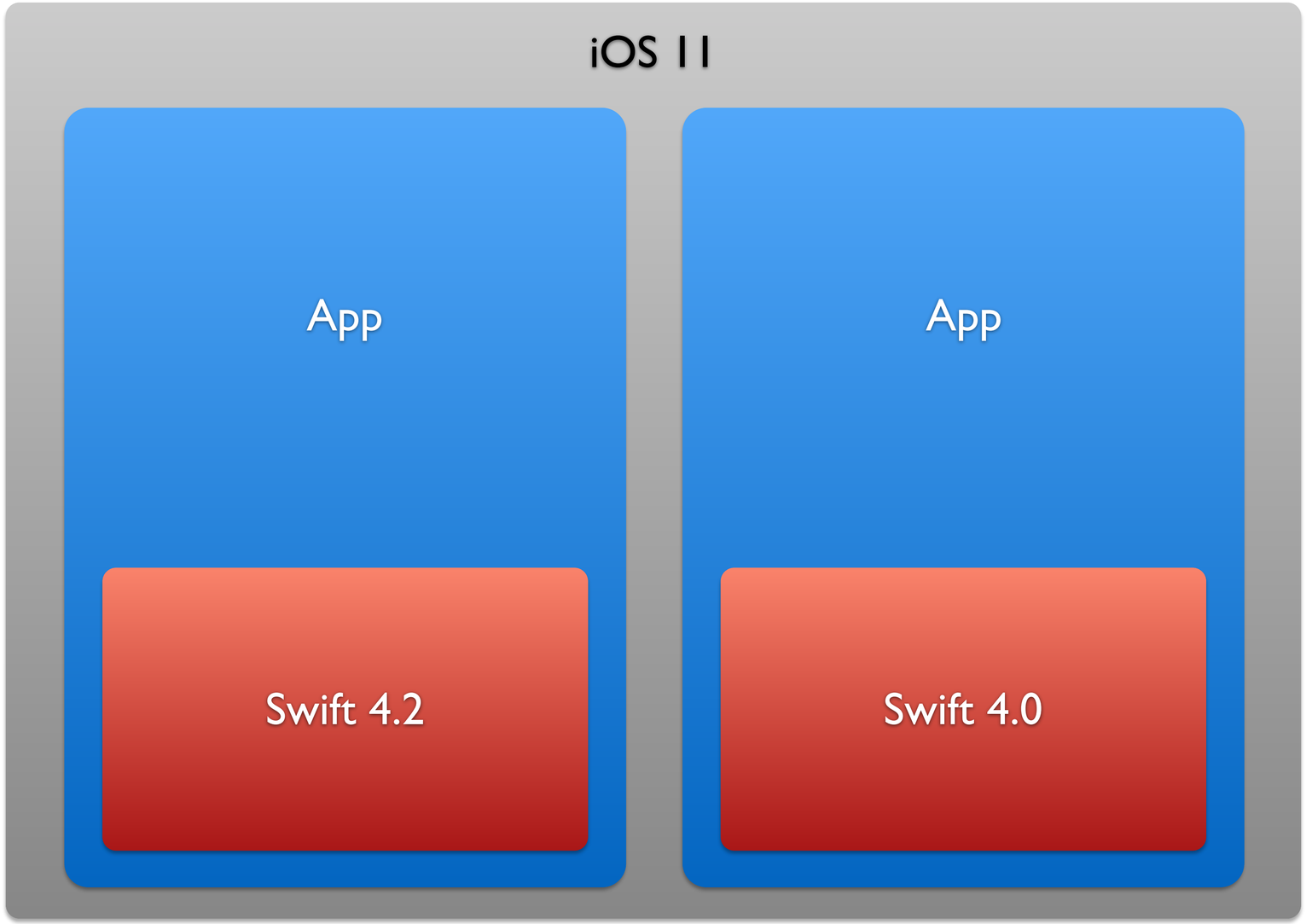
- Application Binary Interface
- Call Conventions
- Metadata

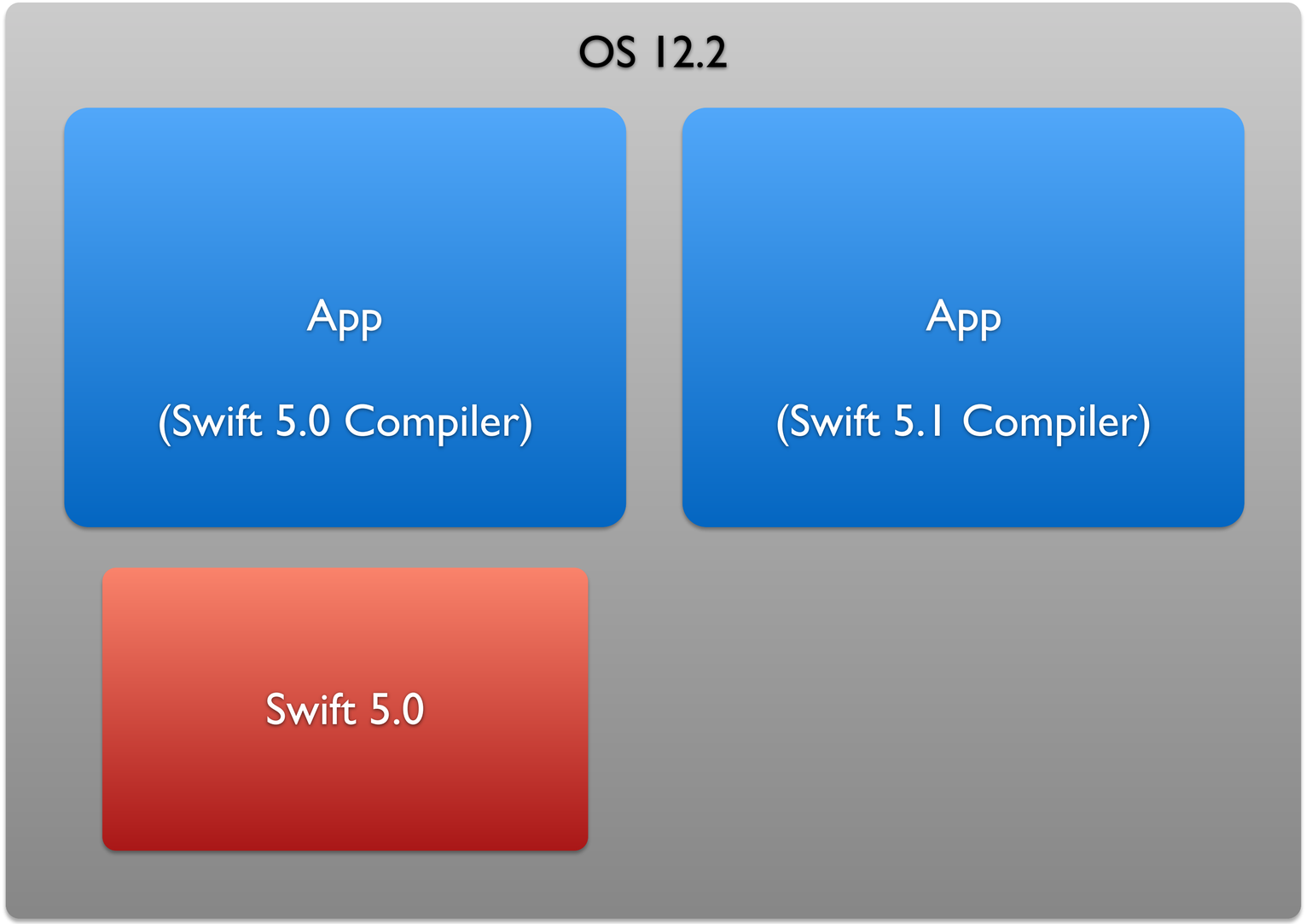
Vorteile


OS
App
Swift
App
Swift


OS
App
App
Swift

Nachteile


iOS 11
App
Swift 4.2
App
Swift 4.0


OS 12.2
App
(Swift 5.0 Compiler)
App
(Swift 5.1 Compiler)
Swift 5.0

Nachteile ABI-Stabilität

- nur bestimmte Swift Features verfügbar — Swift 5.0
- Compiler-Features 👍 — Swift 5.1
- Standardbibliothek 👎 — nur Swift 5.1

Modul-Stabilität

- seit Swift 5.1
- Abwärtskompatibilität
- für binäre Frameworks

Beispiele

- Property-Typ ändern ✗
- Property zu Struct hinzufügen ✓
- Größe des Typs zur Laufzeit bestimmt

@frozen

SE-0260

Swift 5.1

- struct oder enum
- Property zu Struct hinzufügen ✗
- Property-Typ ändern ✗
- Größe des Typs bleibt gleich (optimierbar)

zukunftsicheres Switch

SE-0192

Swift 5.0

```
enum Kuchen {
    case kirsch
    case streusel

    // + zukünftige Cases
}
```

```
func iss(kuchen: Kuchen) {

    switch kuchen {
        case .kirsch:
            print("Kirsch")
        case .streusel:
            print("Streusel")
        default:
            print("unbekannt")
    }
}
```

zukunftsicheres Switch

```
enum Kuchen {
    case kirsch
    case streusel

    // + zukünftige Cases
}
```

```
func iss(kuchen: Kuchen) {

    switch kuchen {
        case .kirsch:
            print("Kirsch")
        case .streusel:
            print("Streusel")
        @unknown default:
            print("unbekannt")
    }
}
```

Property Wrapper

SE-0158

Swift 5.1

Motivation

Wiederholten Code beim Zugriff auf Properties vermeiden

Motivation

```
struct S {
    var startDate: Date { return Date(timeIntervalSince1970: _startDate) }
    private var _startDate: Double

    var endDate: Date { return Date(timeIntervalSince1970: _endDate) }
    private var _endDate: Double
}
```

Motivation

```
struct S {
    var startDate: Date { return Date(timeIntervalSince1970: _startDate) }
    private var _startDate: Double

    var endDate: Date { return Date(timeIntervalSince1970: _endDate) }
    private var _endDate: Double
}
```

Beispiel User Defaults

```
struct LoginSettings {
    @UserDefault("stay_logged_in", default: false)
    var stayLoggedIn: Boolean
}
```

Beispiel User Defaults

```
@propertyWrapper
struct UserDefault<T> {
    let key: String
    let `default`: T

    var wrappedValue: T {
       get { UserDefaults.standard.object(forKey: key) as? T ?? self.default }
       set { UserDefaults.standard.set(newValue, forKey: key) }
   }
}
```

Beispiel User Defaults

```
struct LoginSettings {
    @UserDefault("stay_logged_in", default: false)
    var stayLoggedIn: Boolean

    func printSettings() {
       print("\(_stayLoggedIn.key): \(stayLoggedIn)")
    }
}
```

UserDefault<Bool>

Bool

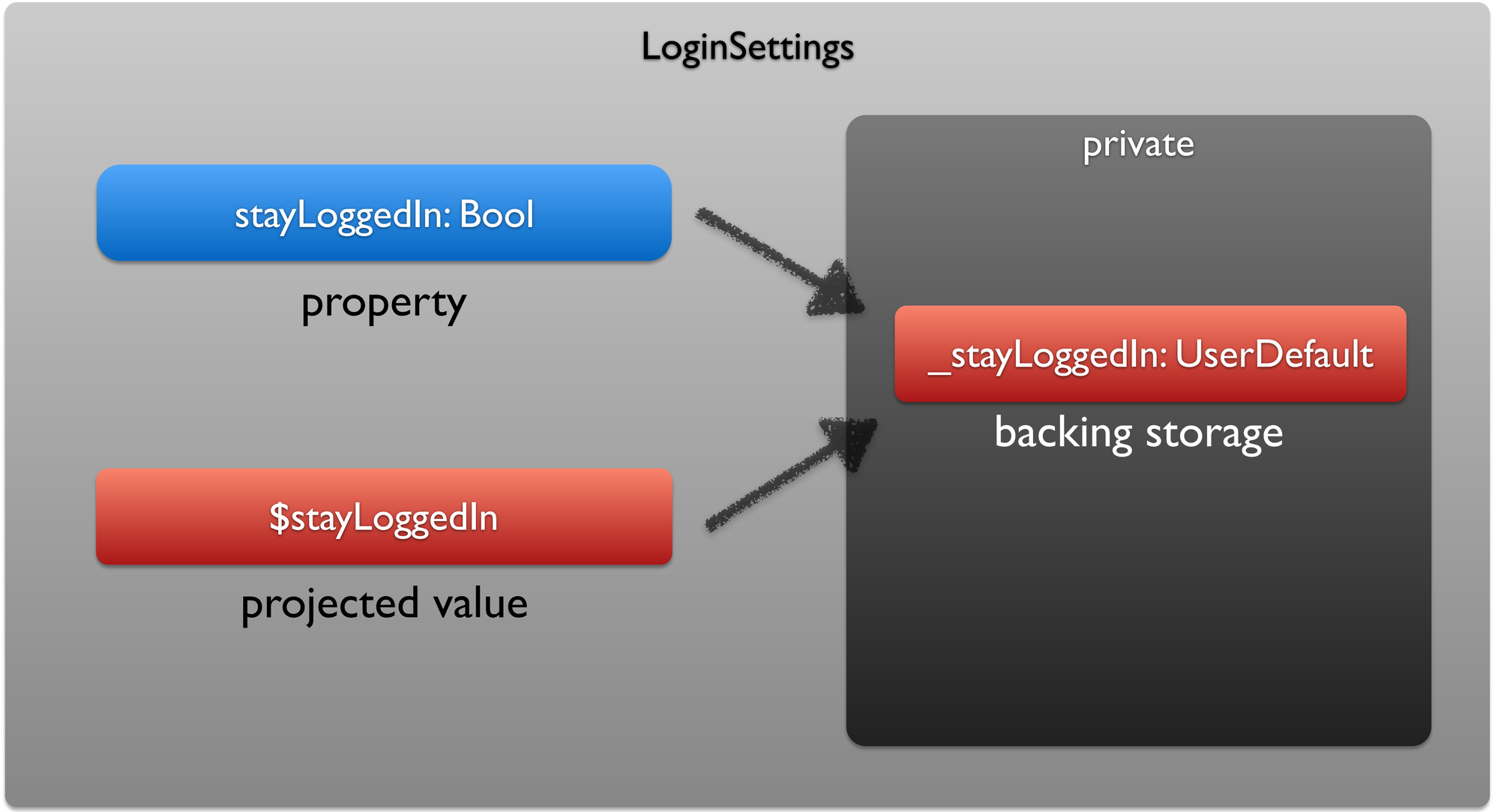
Arbeit für den Compiler

```
let loginSettings = LoginSettings()

print(loginSettings.stayLoggedIn)
```

```
let loginSettings = LoginSettings()

print(loginSettings
        ._stayLoggedIn
        .wrappedValue)
```


LoginSettings
private
stayLoggedIn: Bool
property
_stayLoggedIn: UserDefault
backing storage
$stayLoggedIn
projected value

Projected Value

```
@propertyWrapper
struct UserDefault<T> {
    …

    var projectedValue: Self {
       return self
   }
}
```

Projected Value

```
@propertyWrapper struct UserDefault<T> {
    …
    class Projection {
          …
          let key: String
          func addObserver() {…}
     }

     var projectedValue: Projection {
        return ProjectedValue(self)
     }
}
```

Projected Value

```
let loginSettings = LoginSettings()

loginSettings.$stayLoggedIn.addObserver {
    print("\($stayLoggedIn.key) changed to \(stayLoggedIn)")
}
```

UserDefault.Projection

Bool

Beispiel IUO

```
@propertyWrapper class LateInit<T> {
    var realValue: T? = nil

    var wrappedValue: T {
        get {
            guard let realValue = realValue else { fatalError() }
            return realValue
        }
        set { realValue = newValue}
    }
}
```

weitere Beispiele

- Lazy
- Atomarer Variablen
- Thread-lokale Variablen
- Copy-on-Write
- Validierung
- Observer/Subscribe

weitere Beispiele

SwiftUI

Function Builder

Swift 5.1*

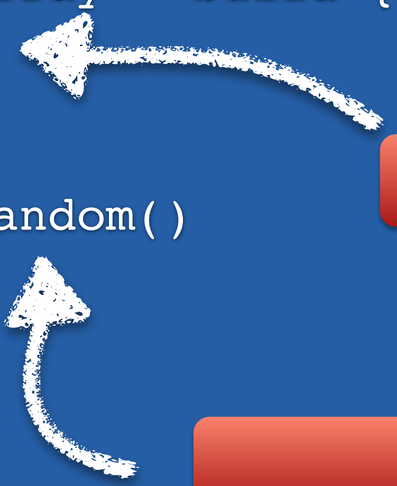
Swift 5.2?

*experimentell

Function Builder

```
func build(@MyBuilder builder: () -> Int) -> [Int] {…}

let array = build {
    1
    2
    3
    random()
}
```



unused expression

missing return

Arbeit für den Compiler

```
let array = build {
    1
    2
    3
    random()
}
```

```
let array = build {
    return MyBuilder.buildBlock(
        1,
        2,
        3,
        random()
    )
}
```

Strings

UTF-8

Swift 5.0

- Strings nutzen intern UTF-8 statt UTF-16
- weniger Konvertierung (C-Aufrufe)

Raw Strings

SE-0200

Swift 5.0

```
let path = "c:\\komische\\Windows\\Pfade\\"

let re = NSRegularExpression(pattern: "\\b\\w*-\\d*\\b", options: [])

let swift = "let swift = \"swift\""
```

Lösung

Escape-Level erhöhen

Raw Strings

```
let path = #"c:\komische\Windows\Pfade\"#

let re = NSRegularExpression(pattern: #"\b\w*-\d*\b"#, options: [])

let swift = #"let swift = "swift" "#
```

Raw Strings

```
let swift = ##"let swift = #"swift"# "##

let swift = ####"let swift = #"swift"# "####

let swift = ####"""
    let swift = #"swift"#
    "####
```

String Interpolationen

SE-0228

Swift 5.0

```
let time = TimeInterval(1.0 / 3.0 * 60.0 * 60.0)

print("Kirschkuchen in \(time) Stunden")
```

Kirschkuchen in 0.333333 Stunden

String Interpolationen

```
let time = TimeInterval(1.0 / 3.0 * 60.0 * 60.0)

extension TimeInterval {
    func toString() -> String {
        let formatter = RelativeDateTimeFormatter()
        formatter.locale = Locale(identifier: "de")
        let string = formatter.localizedString(fromTimeInterval: time)
    }
}

print("Kirschkuchen in \(time.toString())")
```

Kirschkuchen in 20 Minuten

Lösung

Overloading für String-Interpolationen

String Interpolationen

```
extension DefaultStringInterpolation {
    mutating func appendInterpolation(_ time: TimeInterval) {
        let formatter = RelativeDateTimeFormatter()
        formatter.locale = Locale(identifier: "de")
        appendLiteral(formatter.localizedString(fromTimeInterval: time))
    }
}

let time = TimeInterval(1.0 / 3.0 * 60.0 * 60.0)
print("Kirschkuchen \(time)")
```

String Interpolationen

```
extension DefaultStringInterpolation {
    mutating func appendInterpolation(time: TimeInterval, locale: String) {
        let formatter = RelativeDateTimeFormatter()
        formatter.locale = Locale(identifier: locale)
        appendLiteral(formatter.localizedString(fromTimeInterval: time))
    }
}

let time = TimeInterval(1.0 / 3.0 * 60.0 * 60.0)
print("Kirschkuchen \(time: time, locale: "de")")
```

Typen

Result

SE-0235

Swift 5.0

- ähnlich zu Optional
- expliziter Fehlerursache statt nil

Result

```
enum Result<Success, Failure> where Failure : Error {

    case success(Success)

    case failure(Failure)

}
```

Result

```
enum HttpError {
    case notFound
    case notAuthorized
}

typealias HttpResult = Result<String, HttpError>

func fetch(url: NSURL) -> HttpResult {…}
```

Opaque Typen

nur Swift 5.1

SE-0244

Protocol 'Equatable' can only be used as a generic constraint because it has Self or associated type requirements

Opaque Typen

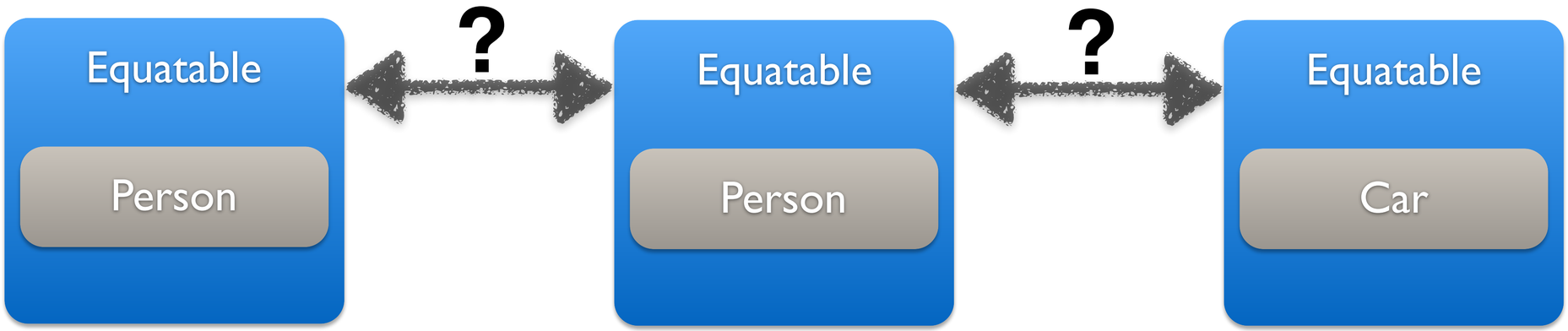
```
struct Person {

    var name: String

    var id: Equatable {
        return name
    }
}
```

Equatable

Equatable



some

- garantiert gleichen konkreten Type
- (aber nicht für zukünftige Versionen)
- tatsächlicher Typ unbekannt

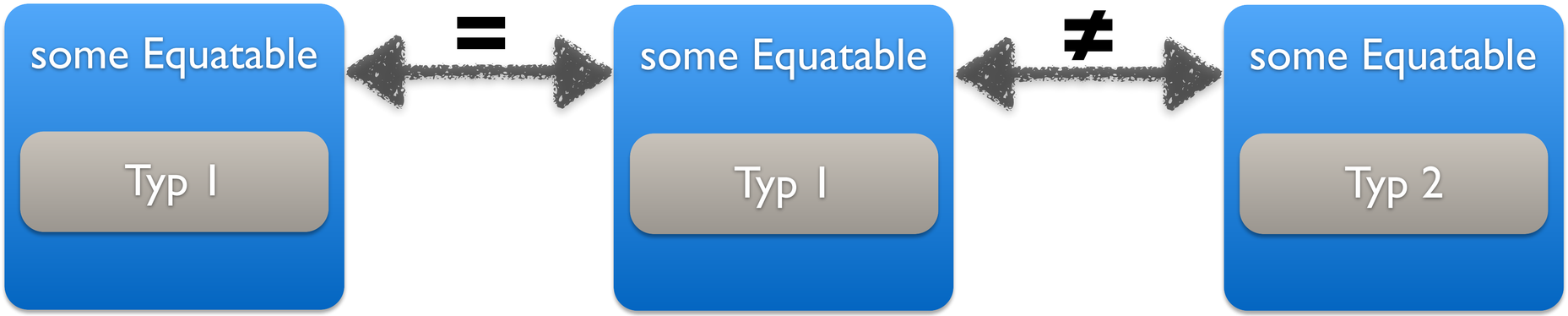
Opaque Typen

```
struct Person {

    var name: String

    var id: some Equatable {
        return name
    }
}
```

some Equatable



dynamische Features

KeyPath member lookup

SE-0252

Swift 5.1

- dynamisch Properties zu Typen hinzufügen
- Erweiterung zu @dynamicMemberLookup (Swift 4.2)
- Key-Path statt String

```
struct Person {
    let name: String
}

struct Car {
    let licensePlate: String
}
```

```
struct Person { let name: String }
struct Car { let licensePlate: String }


@dynamicMemberLookup
struct TimeTraveler<T> {
  let traveler: T

  subscript<U>(dynamicMember keyPath: KeyPath<T, U>) -> U {
    traveler[keyPath: keyPath]
  }
}
```

```
struct Person { let name: String }
struct Car { let licensePlate: String }

@dynamicMemberLookup
struct TimeTraveler<T> {
  let traveler: T

  subscript<U>(dynamicMember keyPath: KeyPath<T, U>) -> U {
    traveler[keyPath: keyPath]
  }
}

let person = TimeTraveler(traveler: Person(name: "Marty"))
print(person.name)

let car = TimeTraveler(traveler: Car(licensePlate: "OUTATIME"))
print(car.licensePlate)
```

Arbeit für den Compiler

```
person.name
```

```
person[dynamicMember: \Person.name]
```

@dynamicCallable

SE-0216

Swift 5.0

- Typen können aufgerufen werden
- wie Closures

@dynamicCallable

```
@dynamicCallable
struct Callable {

  func dynamicallyCall(withArguments args: [Int]) {
    …
  }

  func dynamicallyCall(withKeywordArguments args: KeyValuePairs<String, Int>) {
    …
  }

}
```

}

Arbeit für den Compiler

```
foo(arg1: 1, arg2: 2)



foo(1, 2, 3)
```

```
foo.dynamicallyCall(
    withKeywordArguments: [
        "arg1": 1,
        "arg2": 2
    ]
)

foo.dynamicallyCall(withArguments:
    [1, 2, 3]
)
```

Collections

entfernte Features

- Int statt IndexOffset
- SubSequence
- customization points

SE-0241

SE-0234

SE-0232

Diff

SE-0240

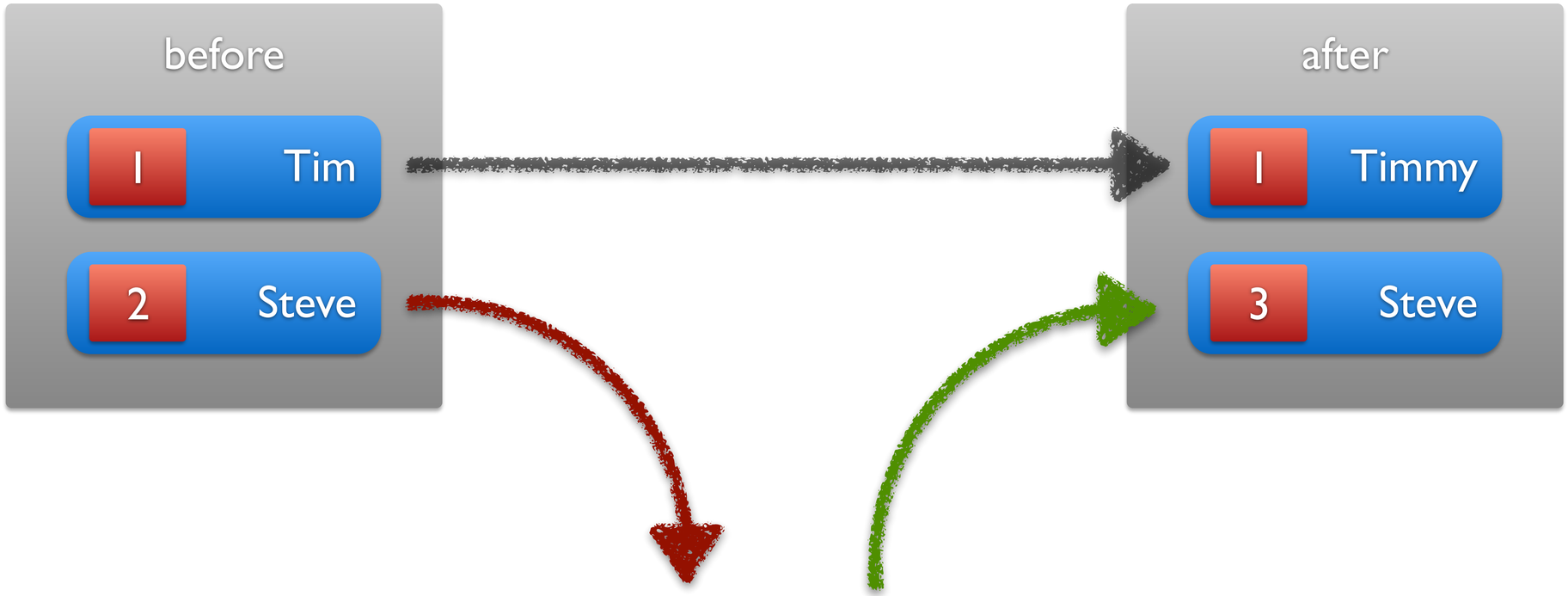
nur Swift 5.1

```
struct Person{
    var id: Int
    var name: String
}
let before = [
    Person(id: 1, name: "Tim"),
    Person(id: 2, name: "Steve")
]
let after = [
    Person(id: 1, name: "Timmy"),
    Person(id: 3, name: "Steve")
]
```

```
let diffs =
    after.difference(from: before) {
        $0.id == $1.id
    }

switch diff.first() {
case let .insert(index, element, _):
    // eingesetzt
case let .remove(index, element, _):
    // entfernt
}
```

Diff



Diff

```
struct Person : Identifiable {
    var id: Int
    var name: String
}
let before = [
    Person(id: 1, name: "Tim"),
    Person(id: 2, name: "Steve")
]
let after = [
    Person(id: 1, name: "Timmy"),
    Person(id: 3, name: "Steve")
]
```

```
let diffs =
    after.difference(from: before) {
        $0.id == $1.id
    }

before.applying(diffs)
// == after

after.applying(diffs.inverse())
// == before
```

Kleinigkeiten

- schnellere, unsichere Initialisierung
- compactMapValues
- KeyValuePars statt DictionaryLiteral

SE-0245 nur Swift 5.1

SE-0218 Swift 5.0

SE-0214 Swift 5.0

Blitzrunde

implicite Returns

SE-0255

Swift 5.1

```
struct Angle {
    var degrees: Double
    var radians: Double { return degrees / 180.0 * .pi }
}
```

SIMD

SE-0251

nur Swift 5.1

```
let x = SIMD4<Int>(1, 2, 3, 4)
let y = SIMD4<Int>(1, 2, 2, 4)

let isEqual: SIMDMask<SIMD4<Int.SIMDMaskScalar>> = x .== y
```

Struct Init mit Default

SE-0242

Swift 5.1

```
struct WallClock {
    var hours: Int
    var minutes: Int
    var seconds: Int = 0
    var milliseconds: Int = 0
}

WallClock(hours: 12, minutes: 30, seconds: 30, milliseconds: 500)
WallClock(hours: 12, minutes: 30, seconds: 30)
WallClock(hours: 12, minutes: 30)
```

statische Subscripts

SE-0254

Swift 5.1

```
enum Kuchen: CaseIterable {
    case kirsch

    static subscript(index: Int) -> Kuchen? {
        return self.allCases[index]
    }
}

Kuchen[0]
```

Self expression

SE-0068

Swift 5.1

```
class C {

    class func staticFunc() {}

    func instanceFunc() {
        type(of: self).staticFunc()
    }
}
```

```
class C {

    class func staticFunc() {}

    func instanceFunc() {
        Self.staticFunc()
    }
}
```

Identity Key Path

SE-0227

Swift 5.0

```
\.self
```

Identifiable

SE-0261

nur Swift 5.1

```
public protocol Identifiable {

    associatedtype ID : Hashable

    var id: Self.ID { get }
}
```

Codable Ranges

SE-0239

Swift 5.0

```
extension Range: Codable

extension ClosedRange: Codable

extension PartialRangeFrom: Codable

extension PartialRangeThrough: Codable

extension PartialRangeUpTo: Codable
```

Flatten try?

SE-0230

Swift 5.0

```
func doSomething() -> Int?? {
    return try? getOptional()
}
```

```
func doSomething() -> Int? {
    return try? getOptional()
}
```

BinaryInteger.isMultiple

SE-0225

Swift 5.0

```
42.isEven

43.isOdd

42.isMultiple(of: 3)
```

#if swift<

SE-0224

Swift 5.0

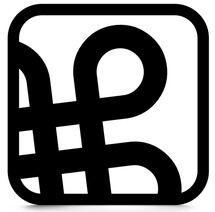
```
#if swift(>=5.1)
#else
    #warning("Swift zu alt")
#endif
```

```
#if swift(<5.1)
   #warning("Swift zu alt")
#endif
```

Fragen?

https://github.com/nschum/talks

Vielen Dank



Macoun