PROTOCOL-ORIENTED PROGRAMMING IN NETWORKING

ISHKAWA

ISHKAWA?

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Organizations

Contributions | Repositories | Public activity | Follow

Popular repositories

- **APIKit** — A networking library for building type safe web… — 525 ★
- **ISRefreshControl** — (deprecated) iOS4-compatible UIRefreshControl — 242 ★
- **ISColumnsController** — paginated container view controller. — 118 ★
- **ISDiskCache** — LRU disk cache for iOS. — 81 ★
- **UINavigationController-Transit…** — extension for custom transition by blocks. — 56 ★

Repositories contributed to

- antitypical/**Result** — Swift type modelling the success/failure of arbi… — 702 ★
- AliSoftware/**OHHTTPStubs** — Stub your network requests easily! Test your a… — 2,038 ★
- CocoaPods/**Specs** — The CocoaPods Master Repo — 2,861 ★
- kishikawakatsumi/**KeychainAcc…** — Simple Swift wrapper for Keychain that works … — 1,315 ★
- matteocrippa/**awesome-swift** — A collaborative list of awesome swift resource… — 6,680 ★

Public contributions

Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan
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Summary of pull requests, issues opened, and commits. Learn how we count contributions. Less More

Contributions in the last year	Longest streak	Current streak
576 total	13 days	0 days
Feb 12, 2015 – Feb 12, 2016	February 12 – February 24	Last contributed 13 days ago

OVERVIEW

PROTOCOL-ORIENTED PROGRAMMING IN NETWORKING

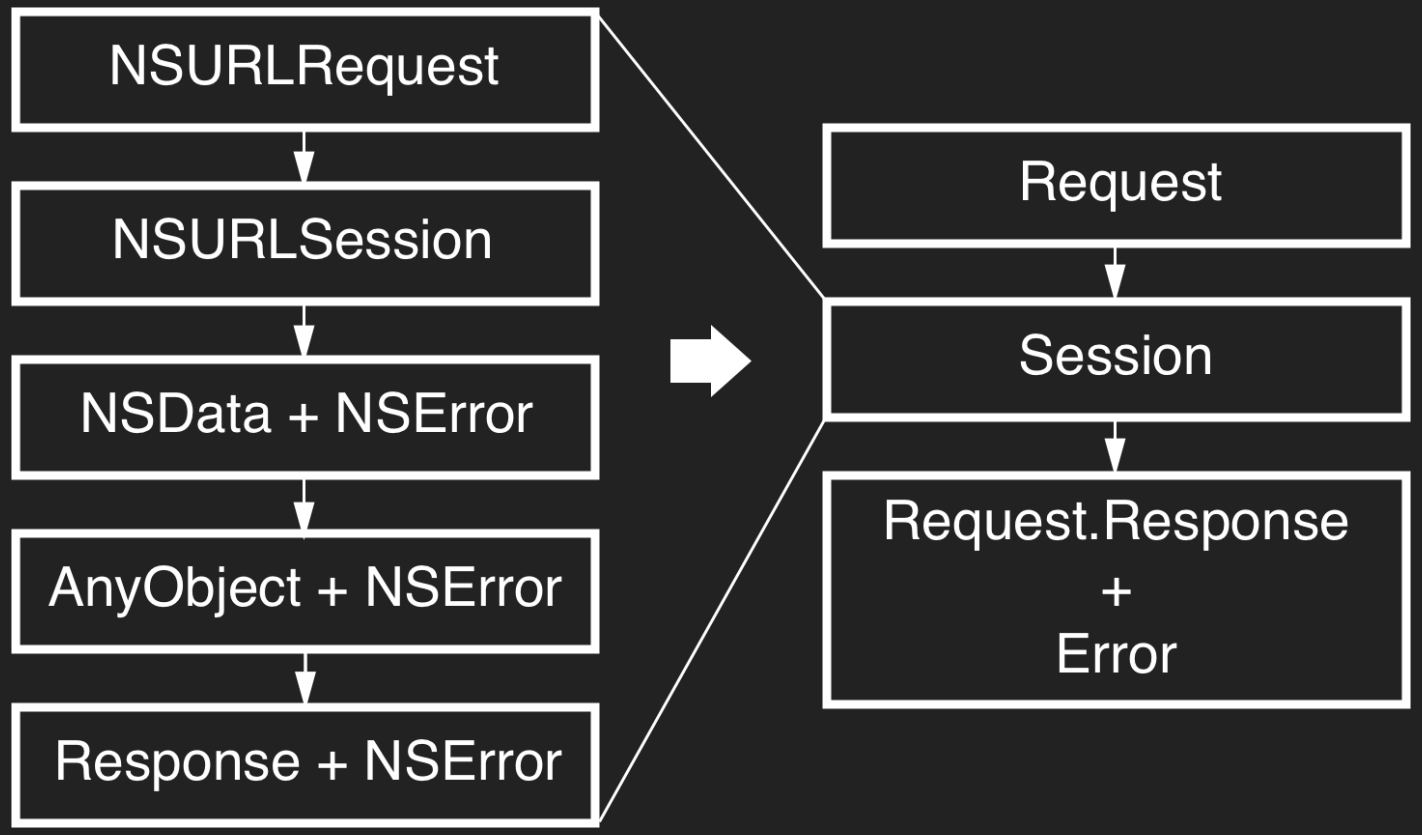
1. Wrapping NSURLSession using protocols
2. Generic programming on the protocols
3. Combination with RxSwift

TOPIC 1

Wrapping NSURLSession using protocols

- To make call-site code simpler
- To get responses type-safely

GOAL


NSURLRequest
NSURLSession
NSData + NSError
AnyObject + NSError
Response + NSError
Request
Session
Request.Response
+
Error

GOAL

```
let request = Request()

Session.sendRequest(request) { result in
    // result: Result<Request.Response, Error>
}
```

GOAL

```
let request = CreateIssueRequest(repositoryID: 123, title: "Test")

Session.sendRequest(request) { result in
    // result: Result<Issue, Error>
}
```

```
let request = SearchRepositoriesRequest(query: "swift")

Session.sendRequest(request) { result in
    // result: Result<PaginationResponse<Repository>, Error>
}
```

The type of result changes depending on the request type

WHY PROTOCOL?

1. To associate response type with request type
2. To provide flexible default implementation

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ASSOCIATING RESPONSE TYPE WITH REQUEST TYPE

```
protocol RequestType {
    typealias Response

    var baseURL: NSURL { get }
    var method: HTTPMethod { get }
    var path: String { get }
    var parameters: [String: AnyObject] { get }

    func responseFromObject(
        object: AnyObject,
        URLResponse: NSHTTPURLResponse) throws -> Response
}
```

ASSOCIATING RESPONSE TYPE WITH REQUEST TYPE

```
class Session {
    ...

    func sendRequest<Request: RequestType>(
        reqeust: Request,
        handler: Result<Request.Response, Error> -> Void) {
        do {
            let data: NSData = ...
            let json: AnyObject = ...
            let response = request.responseFromObject(json...)
            handler(.Success(response)) // Request.Response
        } catch {
            handler(.Failure(error))
        }
    }
}
```

ASSOCIATING RESPONSE TYPE WITH REQUEST TYPE

```
let request = CreateIssueRequest(repositoryID: 123, title: "Test")

Session.sendRequest(request) { result in
    // result: Result<Issue, Error>
}
```

```
let request = SearchRepositoriesRequest(query: "swift")

Session.sendRequest(request) { result in
    // result: Result<PaginationResponse<Repository>, Error>
}
```

The type of result changes depending on the request type

WHY PROTOCOL?

1. To associate response type with request type
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PROVIDING DEFAULT IMPLEMENTATION

PART 1: COMMON CONFIGURATIONS

```
protocol GitHubRequestType: RequestType {

}
```

```
extension GitHubRequestType {
    var baseURL: NSURL {
        return NSURL(string: "https://api.github.com")!
    }
}
```

PROVIDING DEFAULT IMPLEMENTATION

PART 2: PROTOCOL FOR JSON DECODING

```
struct SearchRepositoriesRequest: GitHubRequestType {
    func responseFromObject(
        object: AnyObject,
        URLResponse: NSHTTPURLResponse) throws -> Response {

        guard let dictionaries = object as? [[String: AnyObject]] else {
            throw InvalidObject(object)
        }

        let repositories = dictionaries.map { try Repository($0) }
        let hasNextPage = ...

        return PaginationResponse(
            elements: repositories,
            hasNextPage: hasNextPage)
    }
```

PROVIDING DEFAULT IMPLEMENTATION

PART 2: PROTOCOL FOR JSON DECODING

```
protocol Decodable {
    static func decode(object: AnyObject) throws -> Self
}
```

PROVIDING DEFAULT IMPLEMENTATION

PART 2: PROTOCOL FOR JSON DECODING

```
extension RequestType where Response: Decodable {
    func responseFromObject(
        object: AnyObject,
        URLResponse: NSHTTPURLResponse) throws -> Response {

        return Response.decode(object)
    }
}
```

PROVIDING DEFAULT IMPLEMENTATION

PART 2: PROTOCOL FOR JSON DECODING

```
struct SearchRepositoriesRequest: GitHubRequestType {
    let query: String

    // MARK: RequestType
    typealias Response = PaginationResponse<Repository>

    var method: HTTPMethod     { return .GET }
    var path: String           { return "/search/repositories" }
    var parameters: AnyObject { return ["q": query] }
}
```

WHY PROTOCOL?

1. To associate response type with request type
    - Simpler and safer call-site
2. To provide flexible default implementation
    - Documentation-like request definition

LINKS

- APIKit: https://github.com/ishkawa/APIKit
  - RequestType, Session, etc.
- Himotoki: https://github.com/ikesyo/Himotoki
  - Decodable, etc.

TOPIC 2

Practical example of generic programming on protocols

- Example: Pagination

PAGINATION REQUEST

```
curl -v https://api.github.com/search/repositories?q=swift&page=1
```

PAGINATION REQUEST

```
protocol PaginationRequestType: RequestType {
    typealias Response: PaginationResponseType

    var page: Int { get }

    func requestWithPage(page: Int) -> Self
}
```

PAGINATION RESPONSE

```
HTTP/1.1 200 OK
Server: GitHub.com
Content-Type: application/json; charset=utf-8
Link: <https://api.github.com/...>; rel="next"

{
    "total_count": 38262,
    "incomplete_results": false,
    "items": [
        ...
    ]
}
```

PAGINATION RESPONSE

```
protocol PaginationResponseType {
    typealias Element: Decodable

    var elements: [Element] { get }
    var hasNextPage: Bool { get }
}
```

PAGINATION CLIENT

```
class PaginationClient<Request: PaginationRequestType> {
    let baseRequest: Request
    let updateHandler: Void -> Void

    init(baseRequest: Request, updateHandler: Void -> Void) { ... }

    var elements: [Request.Response.Element]
    var hasNextPage: Bool
    var page: Int

    func refresh() { ... }
    func loadNextPage() { ... }
}
```

PAGINATION CLIENT

```
func refresh() {
    let request = baseRequest.requestWithPage(1)

    Session.sendRequest(request) { result in
        switch result {
        case .Success(let response):
            self.page = page
            self.elements = response.elements
            self.hasNextPage = response.hasNextPage
            self.updateHandler()

        case .Failure(let error):
            // handle error
        }
    }
}
```

GENERIC PROGRAMMING ON PROTOCOLS

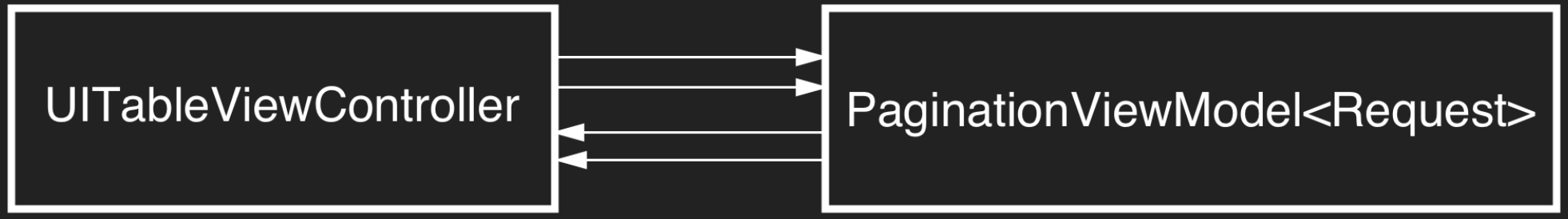
More type constraints,
more detailed implementation

TOPIC 3

Advanced example with reactive streams

RXPAGINATION

Refresh: Observable<Void>
NextPage: Observable<Void>



Elements: Observable<Request.Response>
Loading: Observable<Bool>
HasNextPage: Observable<Bool>

PAGINATION VM WITH RXSWIFT

```
class PaginationViewModel<T: PaginationRequestType> {
    init(baseRequest: T) { ... }

    // Input
    let refreshTrigger: PublishSubject<Void>
    let nextPageTrigger: PublishSubject<Void>

    // Output
    let elements: Observable<[Request.Response.Element]>
    let hasNextPage: Observable<Bool>
    let loading: Observable<Bool>
}
```

LIVE!

STEPS TO IMPLEMENT PAGINATION

- Give a base request to ViewModel
- Bind input and output streams

CONCLUSION

PROTOCOL-ORIENTED IN NETWORKING

1. Protocol is a good choice for abstraction of networking
2. More type constraints, more detailed implementation
3. Abstraction of event stream is also nice

TRY! POP