Swagger & Code Generation

COMPARISON OF AUTOMATIC CODE GENERATION TOOLS FOR SWAGGER FILE FORMAT - 14 MAY 2015

Criteria for selection

1) Code generator must support Swagger file format

2) Only client-side bindings are considered

3) Must create complete libraries rather than just code snippets

3) Only the following languages are considered
- C#
- Java / Android
- Objective-C
- PHP
- Python
- Ruby

Code Generators Considered

INCLUDED (BASED ON CRITERIA)

1) Swagger CodeGen (http://editor.swagger.io)

2) REST United (http://restunited.com)

3) Restlet Studio (http://studio.restlet.com)

4) APIMATIC (https://apimatic.io)

EXCLUDED (BASED ON CRITERIA)

1) Paw (https://luckymarmot.com/paw)
   ◦ Generates only code snippets
   ◦ Does not support Swagger

2) Alpaca (https://github.com/pksunkara/alpaca)
   ◦ Does not support Swagger

Code Base for CodeGen Engines

1. **Swagger.IO** is the official host for open source **Swagger CodeGen** project

2. **REST United** uses a **customized** version of **Swagger CodeGen** project and performs better than the official branch

3. **Restlet Studio** uses **Swagger CodeGen** for Objective-C, but has its **own CodeGen** engine for Android and Java

4. **APIMATIC** has its own CodeGen engine for all languages

Test 1
Google Spreadsheets API

Swagger Version: 2.0

Swagger Url: https://raw.githubusercontent.com/kinlane/api-stack/gh-pages/data/google/google-spreadsheets-swagger.json

Swagger Author: Kin Lane

Number of Endpoints: 76

Number of Models: 0

Contains Auth Info: No

Contains Error Info: No

Process	Swagger.IO	REST United	APIMATIC
Import	**Partial Success**	**Partial Success**	**Success**
Swagger JSON	2 Warnings	145 Warnings	Success
Code Generation	**Partial Success**	**Success**	**Success**
Android	Error	Success	Success
C#	Success	Success	Success
Java	Error	Success	Success
Objective-C	Error	Success	Success
PHP	Success	Success	Success
Python	Success	Success	Success
Ruby	Success	Success	Success
Compilation	**Failed**	**Partial Success**	**Success**
Android	-	Failed - 31 Errors	Success
C#	Failed - 18 Errors	Failed - 46 Errors	Success
Java	-	Failed - 31 Errors	Success
Objective-C	-	Success	Success
PHP	Failed - 76 Errors	Success	Success
Python	Failed - 1 Errors	Failed - 1 Errors	Success
Ruby	Failed - 1 Errors	Success	Success

Restlet Studio does not support Swagger 2.0

Test 2
GitHub API

Swagger Version: 2.0

Swagger Url:
https://raw.githubusercontent.com/kinlane/api-stack/gh-pages/data/github/github-swagger.json

Swagger Author: Kin Lane

Number of Endpoints: 131

Number of Models: 0

Contains Auth Info: No

Contains Error Info: No

Process	Swagger.IO	REST United	APIMATIC
Import	**Partial Success**	**Partial Success**	**Success**
Swagger JSON	1 Warnings	249 Warnings	Success
Code Generation	**Partial Success**	**Success**	**Success**
Android	Error	Success	Success
C#	Success	Success	Success
Java	Error	Success	Success
Objective-C	Error	Success	Success
PHP	Success	Success	Success
Python	Success	Success	Success
Ruby	Success	Success	Success
Compilation	**Partial Success**	**Partial Success**	**Success**
Android	-	Success	Success
C#	Failed - 18 Errors	Failed - 12 Errors	Success
Java	-	Success	Success
Objective-C	-	Failed – 43+ Errors	Success
PHP	Success	Success	Success
Python	Failed - 1 Errors	Failed - 1 Errors	Success
Ruby	Failed - 1 Errors	Failed - 1 Errors	Success

Restlet Studio does not support Swagger 2.0

Test 3
Uber API

Swagger Version: 2.0

Swagger Url:
https://raw.githubusercontent.com/
swagger-api/swagger-spec/master/
examples/v2.0/yaml/uber.yaml

Swagger Author: Tony Tam

Number of Endpoints: 5

Number of Models: 7

Contains Auth Info: No

Contains Error Info: Yes

Process	Swagger.IO	REST United	APIMATIC
Import	**Partial Success**	**Partial Success**	**Success**
Swagger YAML	8 Warnings	~~YAML~~ (Used JSON)	Success
Code Generation	**Success**	**Success**	**Success**
Android	Success	Success	Success
C#	Success	Success	Success
Java	Success	Success	Success
Objective-C	Success	Success	Success
PHP	Success	Success	Success
Python	Success	Success	Success
Ruby	Success	Success	Success
Compilation	**Partial Success**	**Partial Success**	**Success**
Android	Failed - 2 Errors	Success	Success
C#	Success	Success	Success
Java	Success	Success	Success
Objective-C	Success	Success	Success
PHP	Success	Success	Success
Python	Success	Failed - 1 Errors	Success
Ruby	Success	Failed - 6 Errors	Success

Restlet Studio does not support Swagger 2.0

Test 4
Simple Pet-Store API

Swagger Version: 1.2

Swagger Url:
https://raw.githubusercontent.com/mission-liao/pyswagger/9b029f875740631cca0aebac36675431823080 2a/pyswagger/tests/data/v1_2/wordnik/pet.json

Swagger Author: Tony Tam

Number of Endpoints: 9

Number of Models: 4

Contains Auth Info: No

Contains Error Info: Yes

Process	Restlet Studio	REST United	APIMATIC
Import	**Success**	**Failed**	**Success**
Swagger JSON		Failed at import	Success
Code Generation	**Success**	**Not Imported**	**Success**
Android	Success	-	Success
C#	Not Supported	-	Success
Java	Success	-	Success
Objective-C	Success	-	Success
PHP	Not Supported	-	Success
Python	Not Supported	-	Success
Ruby	Not Supported	-	Success
Compilation	**Partial Success**	**Not Generated**	**Success**
Android	Success	-	Success
C#	Not Supported	-	Success
Java	Success	-	Success
Objective-C	Failed – 10+ Errors	-	Success
PHP	Not Supported	-	Success
Python	Not Supported	-	Success
Ruby	Not Supported	-	Success

Swagger.IO does not support Swagger 1.2

Test 5
Pet-Store Schema API

Swagger Version: 1.2

Swagger Url:
https://raw.githubusercontent.com/signalfx/swagger-cli-client/master/example/petstore-schema.json

Swagger Author: Tony Tam

Number of Endpoints: 20

Number of Models: 5

Contains Auth Info: No

Contains Error Info: Yes

Process	Restlet Studio	REST United	APIMATIC
Import	**Success**	**Failed**	**Success**
Swagger JSON	Failed at import	Failed at import	Success
Code Generation	**Not Imported**	**Not Imported**	**Success**
Android	-	-	Success
C#	Not Supported	-	Success
Java	-	-	Success
Objective-C	-	-	Success
PHP	Not Supported	-	Success
Python	Not Supported	-	Success
Ruby	Not Supported	-	Success
Compilation	**Not Generated**	**Not Generated**	**Success**
Android	-	-	Success
C#	Not Supported	-	Success
Java	-	-	Success
Objective-C	-	-	Success
PHP	Not Supported	-	Success
Python	Not Supported	-	Success
Ruby	Not Supported	-	Success

Swagger.IO does not support Swagger 1.2

Test 6
Marvel Comics API

Swagger Version: 1.0

Swagger Url:
http://gateway.marvel.com/docs/public

Swagger Author: Marvel Offical

Number of Endpoints: 39

Number of Models: 37

Contains Auth Info: No

Contains Error Info: Yes

Process	APIMATIC
Import	**Success**
Swagger JSON	Success
Code Generation	**Success**
Android	Success
C#	Success
Java	Success
Objective-C	Success
PHP	Success
Python	Success
Ruby	Success
Compilation	**Success**
Android	Success
C#	Success
Java	Success
Objective-C	Success
PHP	Success
Python	Success
Ruby	Success

Swagger 1.1, 1.2 are currently only supported by APIMATIC

Compilation Success?

Successful compilation does not mean that the SDK will work out of the box!

1. **Missing Authentication Info**
   ◦ Swagger.IO and Restlet Studio do not generate authentication code, even when auth info is available
   ◦ APIMATIC and REST United support OAuth 1 & 2, Basic Auth, and Custom Headers/Parameters

2. **Missing Schemas/Model definitions**
   ◦ All except APIMATIC use "void" return type when schemas are missing
   ◦ This essentially means all responses are ignored, and no data is returned

3. **APIMATIC's struggle:** SDK's should work out of the box!
   ◦ Generated code often does not work out of the box, AND to make matter even worse, its not even easy to fix by hand
   ◦ APIMATIC has implemented fallbacks to handle missing schemas and model definitions
   ◦ Missing auth info cannot be fixed by any fallback measure

Swagger Completeness

INCOMPLETE SWAGGERS

1. Invalid JSON

2. Missing BaseURIs

3. Missing Authentication Information

4. Missing Endpoint OperationIds/NickNames

5. Missing Schemas/Models

6. Missing Error Codes/Messages

PROPOSAL FOR ENHANCEMENTS

1. Support for Streaming API/WebHooks

2. Support for Error Models, not just Error Messages

Functionality + Code Quality

1. **Idiomatic Code**
   - Naming conventions
   - Design patterns
   - Namespaces and packaging

2. **General Code Climate**
   - High readability and general formatting
   - Code comments
   - Redundant and unreachable code

3. **Completeness**
   - Generate IDE support (Visual Studio, XCode, Android Studio, Eclipse)
   - Enabled IDE type-hinting (PyCharm, Ruby Mine, Netbeans)

Functional Code is not good enough!

CodeGen Settings

Generic Code Styling

Yes	**Asynchronous Code**	Generate asynchronous code for API Calls and deserialization?
Yes	**HTTP Method Prefix**	Use HTTP Method prefixes for endpoint wrappers?
No	**Model Postfix**	Use "Model" postfixes for generated class names?
Yes	**Enum Postfix**	Use "Enum" postfixes for enumerated types?

Configuration Settings

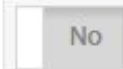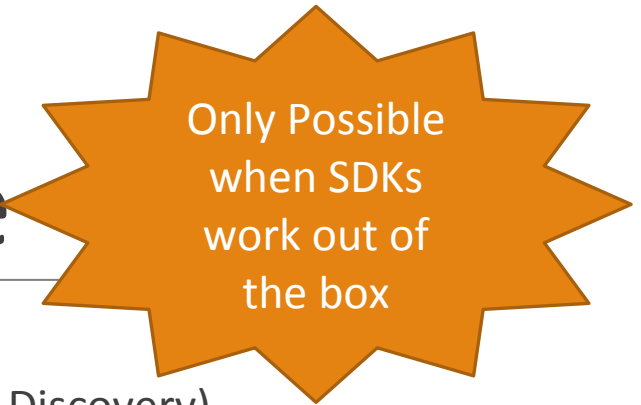|		
Yes	**Constructor Config**	Use class constructors for config variables?
Yes	**Use AndroidManifest.xml**	Use "AndroidManifest.xml" for config variables in Android?
Yes	**Use AppInfo.plist**	Use "App-Info.plist" file for config variables in iOS?
No	**Generate CoreData**	Generate "CoreData" schema and entity classes in iOS?

Code-Generation-as-a-Service

Only Possible when SDKs work out of the box

1. **APIMATIC's CGaaS is available as an API**
   ◦ Accepts API Description (Swagger, RAML, API Blueprint, IO Docs, Google Discovery)

2. **Embeddable JavaScript widget**
   ◦ Just maintain your API description, and the widget provides fresh SDKs from your own dev-portal

3. **GitHub widget**
   ◦ Uses API Commons discovery manifest to locate API description - Provides SDKs from GitHub repos

4. **APIMATIC On-Prem**
   ◦ Available as a universal Linux binary - Provides simple locally hosted API

5. **APIMATIC – SmartBear Ready! API Plugin**
   ◦ Generates SDKs from inside Ready! API

SDKS.IO – The SDK Search Engine

Statistics for Sources of API Descriptions

BridgeName	Parsed	Failed	TotalCount
APIMATIC	21	0	21
Github	8480	2088	10568
APIs.io	10	6	16
API Commons	11	3	14
Mashery	110	26	136
Google	115	1	116
Apigee	63	19	82
Mashape	1145	67	1212

SDKS.IO – The SDK Search Engine

Statistics for API Descriptions Located

FormatName	Parsed	Failed	TotalCount
APIMATIC Format	29	0	29
WADL (W3C)	63	19	82
Swagger v1.x - v2.0 (JSON)	1069	823	1892
I/O Docs (Mashery API Management version)	110	26	136
API BluePrint Format 1A	4986	1087	6073
RESTful API Modeling Language (RAML 0.8)	880	96	976
Google API Discovery Format v1	1682	92	1774
Mashape JSON Format	1145	67	1212

Our Latest Feature - Streaming APIs

1. We have recently launched support for Streaming APIs
    ◦ Deserializes a stream of JSON Objects asynchronously

2. Currently available in C#, Java and Android

Examples
◦ Twitter Streaming API
◦ CBIX (bitcoin exchange – real-time index and trades)