大疆互联网的一站式自动化测试解决方案
(基于HttpRunner)

李隆 (debugtalk)

MTSC2018
第四届中国移动互联网测试开发大会
TesterHome | IT大咖说
大疆创新
TesterHome

自我介绍

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You can find me here:

- **Blog:** http://debugtalk.com
- **GitHub:** https://github.com/debugtalk
- **TesterHome:** https://testerhome.com/debugtalk

主题概要

1、背景介绍

2、核心目标

3、**设计思路**

4、核心特性

5、**大疆内部实践**

6、Q & A

1、背景介绍

背景介绍

1、业务线众多：电商、生产制造、管理运营，etc.

2、高速发展和扩张：业务增长、人员增长

3、普遍具有功能回归测试、性能测试、持续集成、线上监控等需求

2013~2017年大疆销售额（来源：前瞻产业研究院）

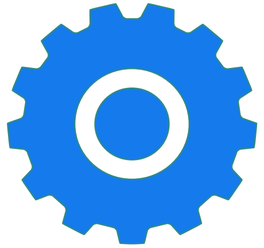
效率低

成本高

背景介绍

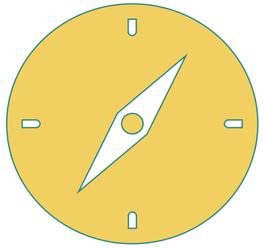
自动化测试?

传统自动化测试方法存在的问题：



工具多 & 杂

学习成本高



团队协作难

维护成本高

2、核心目标

核心目标

业务导向，快速落地

少投入

- 工具开发&维护
- 学习使用成本
- 编写&录入测试用例
- 测试用例管理&维护

高收益

- 实现自动化回归测试
- 性能测试脚本复用
- 兼具持续集成、线上监控
- 辅助手工测试：自定义生成特定业务数据

3、设计思路

设计思路

- 如何快速实现从0到1?
- 如何避免闭门造车?
- 如何兼具自动化、性能、持续集成、线上监控?
- 如何保障工具质量?
- 如何实现协作管理?

设计思路 - 如何快速实现从0到1?

充分复用开源项目

Grafana

Jenkins

pytest
helps you write better programs

POSTMAN

swagger

YAML JSON

Requests
http for humans

HttpRunner

python

JSON Schema

Charles
WEB DEBUGGING PROXY
charlesproxy.com

unittest

Fiddler
Web Debugging Proxy

LOCUST

Flask
web development, one drop at a time

Jinja

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TesterHome

设计思路 - 如何避免闭门造车?

拥抱开源生态

博客驱动开发

HttpRunner / HttpRunner

Unwatch 78 | Star 684 | Fork 283

Code | Issues 80 | Pull requests 0 | Projects 4 | Wiki | Insights | Settings

One-stop solution for HTTP(S) testing. http://cn.httprunner.org/ Edit

api-test locustio performance-testing locust httptest testrunner htmltestrunner load-testing Manage topics

563 commits | 2 branches | 30 releases | 6 contributors | MIT

2017-06-20	ApiTestEngine 演进之路（0）开发未动，测试先行
2017-06-18	接口自动化测试的最佳工程实践（ApiTestEngine）

2017-09-09	约定大于配置：ApiTestEngine实现热加载机制	2018-05-12	HttpRunner 实现 hook 机制
2017-08-27	ApiTestEngine 集成 Locust 实现更好的性能测试体验	2018-03-25	HttpRunner 再议参数化数据驱动机制
2017-08-20	ApiTestEngine QuickStart	2018-02-16	HttpRunner 实现参数化数据驱动机制
2017-08-05	How to install a package from Github that has other github depende	2018-02-08	HttpRunner 通过 skip 机制实现对测试用例的分组执行控制
2017-07-17	ApiTestEngine 演进之路（4）测试用例中实现 Python 函数的调用	2017-12-23	HttpRunner 的测试用例分层机制
2017-07-11	ApiTestEngine 演进之路（3）测试用例中实现 Python 函数的定义	2017-12-13	HttpRunner 的结果校验器优化
2017-07-07	ApiTestEngine 演进之路（2）探索优雅的测试用例描述方式	2017-11-14	HttpRunner 支持 HAR 意味着什么?
2017-06-28	300行Python代码打造实用接口测试框架	2017-11-08	ApiTestEngine 正式更名为 HttpRunner
2017-06-22	ApiTestEngine 演进之路（1）搭建基础框架	2017-11-06	ApiTestEngine，不再局限于API的测试

设计思路 - 如何兼具自动化、性能、持续集成、线上监控?

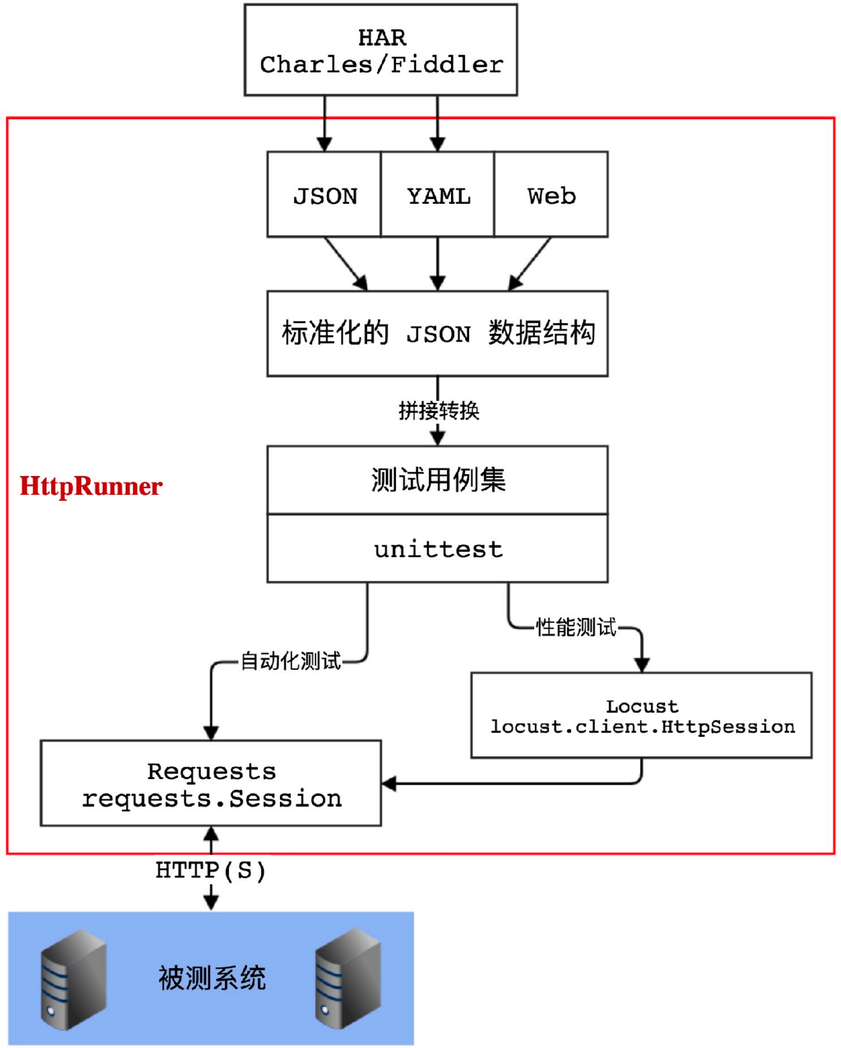
实现命令行（CLI）调用

自动化 → 持续集成

线上监控

引入并发机制

性能测试



设计思路 - 如何保障工具质量?

测试驱动开发

- Custom Mock Server
- httpbin.org by kennethreitz
- Postman Echo services

HttpRunner

license MIT | build passing | coverage 77% | pypi v1.4.8 | python 2.7, 3.4, 3.5, 3.6

Secure | https://httpbin.org

HTTP Methods	Testing different HTTP verbs
Auth	Auth methods
Status codes	Generates responses with given status code
Request inspection	Inspect the request data
Response inspection	Inspect the response data like caching and heade
Response formats	Returns responses in different data formats
Dynamic data	Generates random and dynamic data
Cookies	Creates, reads and deletes Cookies
Images	Returns different image formats
Redirects	Returns different redirect responses
Anything	Returns anything that is passed to request

Postman Echo
37 requests

- Request Methods
- Headers
- Authentication Methods
- Cookie Manipulation
- Utilities
- Utilities / Date and Time
- Utilities / Postman Collection
- Auth: Digest

开源社区反馈

- TesterHome
- Github issues

Filters | is:open is:issue label:bug | Labels | Milestones

Clear current search query, filters, and sorts

14 Open | 34 Closed | Author | Labels | Projects

- len_eq not working with array directly in json bug
  #278 opened 19 days ago by hectoryo
- 配置parameters参数化时，没有调用相应参数的，也重复执行了 bug
  #258 opened on May 29 by master-walker
- skip对调用suite的用例无效，将是skip放入suite内部则会报错 bug
  #257 opened on May 28 by wushenghang
- 自定义校验器，明明是两个相当的值也报不相等了，求指教 bug enhancement
  #244 opened on May 22 by wuyajun2016
- 'utf-8' codec can't decode byte 0xd6 in position 76: invalid continuation byte bug
  #243 opened on May 22 by lukcyjane
- version-1.4.4，post接口测试报告没有request_body显示 bug
  #238 opened on May 18 by JacobHZ
- 框架不兼容响应body中含有中文的场景 bug
  #228 opened on May 15 by smigoYu
- parameters 中调用函数报错 bug
  #226 opened on May 13 by BensonMax

设计思路 - 如何实现协作管理?

Main Interface

All of Requests' functionality can be accessed by these 7 methods. They all return an instance of the **Response** object.

`requests.request`(*method, url, **kwargs*) [source]

Constructs and sends a **Request**.

Parameters:
- **method** – method for the new **Request** object.
- **url** – URL for the new **Request** object.
- **params** – (optional) Dictionary or bytes to be sent in the query string for the **Request**.
- **data** – (optional) Dictionary or list of tuples `[(key, value)]` (will be form-encoded), bytes, or file-like object to send in the body of the **Request**.
- **json** – (optional) A JSON serializable Pyt
the **Request**.
- **headers** – (optional) Dictionary of HTTI
Request.
- **cookies** – (optional) Dict or CookieJar object to send with the **Request**.

interface

```
[
    {
        "test": {
            "name": "create user which does not exist",
            "request": {
                "url": "http://127.0.0.1:5000/api/users/1000",
                "method": "POST",
                "headers": {
                    "device_sn": "9TN6O2Bn1vzfybF",
                    "token": "kEoKIu6SRPTX3IZA"
                },
                "json": {
                    "name": "user1",
                    "password": "123456"
                }
            },
            "validate": [
                {"eq": ["status_code", 201]},
                {"eq": ["content.success", true]}
            ]
        }
    }
]
```

JSON

```
url = "http://127.0.0.1:5000/api/users/1000"
method = "POST"
headers = {
    "device_sn": "9TN6O2Bn1vzfybF",
    "token": "kEoKIu6SRPTX3IZA"
}
json = {
    "name": "user1",
    "password": "123456"
}

resp = requests.request(method, url, headers=headers, json=json)
status_code = resp.status_code
success = resp.json()["success"]

assert status_code == 201
assert success is True
```

Python

```
- test:
    name: create user which does not exist
    request:
        url: http://127.0.0.1:5000/api/users/1000
        method: POST
        headers:
            device_sn: "9TN6O2Bn1vzfybF",
            token: "kEoKIu6SRPTX3IZA"
        json:
            name: "user1"
            password: "123456"
    validate:
        - eq: [status_code, 201]
        - eq: [content.success, true]
```

YAML

设计思路 - 如何实现协作管理?

约定大于配置

- 统一测试用例描述形式（JSON/YAML）
- JSON Schemas

```
import requests  # make sure this is installed
from jsonschema import validate
from jsonschema.exceptions import ValidationError

schema = requests.get('http://schema.httprunner.org/json/v1.json').json()

test_input = {}  # Whatever needs to be validated.

try:
    validate(test_input, schema)
except ValidationError:
    print 'It is not a valid colle
else:
    print 'It is a valid collecti
```

```
[
    {
        "test": {
            "name": "create user which does not exist",
            "request": {
                "url": "http://127.0.0.1:5000/api/users/1000",
                "method": "POST",
                "headers": {
                    "device_sn": "9TN6O2Bn1vzfybF",
                    "token": "kEoKIu6SRPTX3IZA"
                },
                "json": {
                    "name": "user1",
                    "password": "123456"

e": [
": ["status_code", 201]},
": ["content.success", true]}
```

```
➜ demo git:(master) ✗ hrun --prettify test1.json
Start to prettify JSON file: test1.json
success: test1.pretty.json
```

```
{
    "$schema": "http://json-schema.org/draft-06/schema",
    "$id": "https://github.com/HttpRunner/schemas/blob/master/json/v1.json",
    "title": "HttpRunner Schemas",
    "description": "HttpRunner Schemas",
    "type": "array",
    "items": {
        "oneOf": [
            {"$ref": "#/definitions/config"},
            {"$ref": "#/definitions/test"}
        ]
    },
    "definitions": {
        "config": {
            "$id": "#/definitions/config",
            "description": "testset config, used for public configuration",
            "type": "object",
            "minProperties": 1,
            "maxProperties": 1,
            "properties": {
                "config": {
                    "$ref": "#/definitions/config_dict"
                }
            },
            "required": ["config"]
        },
        "config_dict": {…
        },
        "test": {
            "$id": "#/definitions/test",
            "description": "testcase description",
            "type": "object",
            "minProperties": 1,
            "maxProperties": 1,
            "properties": {
                "test": {
                                                #/definitions/test_dict"

                                                t"]

            }
```

设计思路 - 如何实现协作管理?

统一用例管理平台

- 统一存储和管理
- 平台服务化

社区中基于 HttpRunner 的接口测试平台:

- HttpRunnerManager
- SECO
- testcenter
- ApiTestWeb

设计思路 - 总结

HttpRunner 是什么?

- 一套新的自动化测试工具/框架 ？

- 通用的自动化测试解决方案
- 融合最佳工程实践

4、核心特性

核心特性

- 抓包录制 & 生成用例
- *Postman* 转换生成用例
- *Swagger* 转换生成用例
- *YAML/JSON* 用例格式
- *JSON Schema*
- 数据驱动机制
- 测试用例分组执行控制
- *setup & teardown hooks*
- 热加载机制*(debugtalk.py)*
- 性能测试
- *CLI* 调用
- 可扩展测试报告*(Jinja2)*
- 测试用例分层机制
- 加载环境变量*(.env)*
- ...

核心特性 - 代码示例

Code	Method	Host	Path
200	POST	127.0.0.1:5000	/api/get-token
201	POST	127.0.0.1:5000	/api/users/1000

Filter: 127.0.0.1

Overview | Contents | Summary | Chart | Notes

```
POST /api/get-token HTTP/1.1
Host: 127.0.0.1:5000
User-Agent: python-requests/2.18.2
Accept-Encoding: gzip, deflate
Accept: */*
Connection: keep-alive
Content-Type: application/json
device_sn: 9TN6O2Bn1vzfybF
user_agent: iOS/10.3
os_platform: ios
app_version: 2.8.6
Content-Length: 52

{"sign": "19067cf712265eb5426db8d3664026c1ccea02b9"}
```

Headers | Text | Hex | JavaScript | JSON | JSON Text | Raw

```
HTTP/1.0 200 OK
Content-Type: application/json
Content-Length: 46
Server: Werkzeug/0.12.2 Python/3.6.0
Date: Tue, 01 Aug 2017 07:56:31 GMT
Proxy-Connection: Close

{"success": true, "token": "F8prvGryC5beBr4g"}
```

Code	Method	Host	Path
200	POST	127.0.0.1:5000	/api/get-token
201	POST	127.0.0.1:5000	/api/users/1000

Filter: 127.0.0.1

Overview | Contents | Summary | Chart | Notes

```
POST /api/users/1000 HTTP/1.1
Host: 127.0.0.1:5000
User-Agent: python-requests/2.18.2
Accept-Encoding: gzip, deflate
Accept: */*
Connection: keep-alive
Content-Type: application/json
device_sn: 9TN6O2Bn1vzfybF
token: F8prvGryC5beBr4g
Content-Length: 39

{"name": "user1", "password": "123456"}
```

Headers | Text | Hex | JavaScript | JSON | JSON Text | Raw

```
HTTP/1.0 201 CREATED
Content-Type: application/json
Content-Length: 54
Server: Werkzeug/0.12.2 Python/3.6.0
Date: Tue, 01 Aug 2017 07:56:31 GMT
Proxy-Connection: Close

{"success": true, "msg": "user created successfully."}
```

案例简介

核心特性 - 代码示例


```python
import unittest
import requests

class FirstTestcase(unittest.TestCase):

    def test_get_token(self):
        url = "http://127.0.0.1:5000/api/get-token"
        method = "POST"
        headers = {
            "user_agent": "iOS/10.3",
            "device_sn": "9TN6O2Bn1vzfybF",
            "os_platform": "ios",
            "app_version": "2.8.6"
        }
        json = {
            "sign": "19067cf712265eb5426db8d3664026c1ccea02b9"
        }

        resp = requests.request(method, url, headers=headers, json=json)
        status_code = resp.status_code
        token = resp.json()["token"]

        assert status_code == 200
        assert len(token) == 16

    def test_create_user_which_does_not_exist(self):
        url = "http://127.0.0.1:5000/api/users/1000"
        method = "POST"
        headers = {
            "device_sn": "9TN6O2Bn1vzfybF",
            "token": "kEoKIu6SRPTX3IZA"
        }
        json = {
            "name": "user1",
            "password": "123456"
        }

        resp = requests.request(method, url, headers=headers, json=json)
        status_code = resp.status_code
        success = resp.json()["success"]

        assert status_code == 201
```

```yaml
- test:
    name: get token
    request:
        url: http://127.0.0.1:5000/api/get-token
        method: POST
        headers:
            user_agent: "iOS/10.3",
            device_sn: "9TN6O2Bn1vzfybF",
            os_platform: "ios",
            app_version: "2.8.6"
        json:
            sign: 19067cf712265eb5426db8d3664026c1ccea02b9
    extract:
        - token: content.token
    validate:
        - eq: [status_code, 200]
        - len_eq: [content.token, 16]

- test:
    name: create user which does not exist
    request:
        url: http://127.0.0.1:5000/api/users/1000
        method: POST
        headers:
            device_sn: "9TN6O2Bn1vzfybF",
            token: "kEoKIu6SRPTX3IZA"
        json:
            name: "user1"
            password: "123456"
    validate:
        - eq: [status_code, 201]
        - eq: [content.success, true]
```

信息量等价

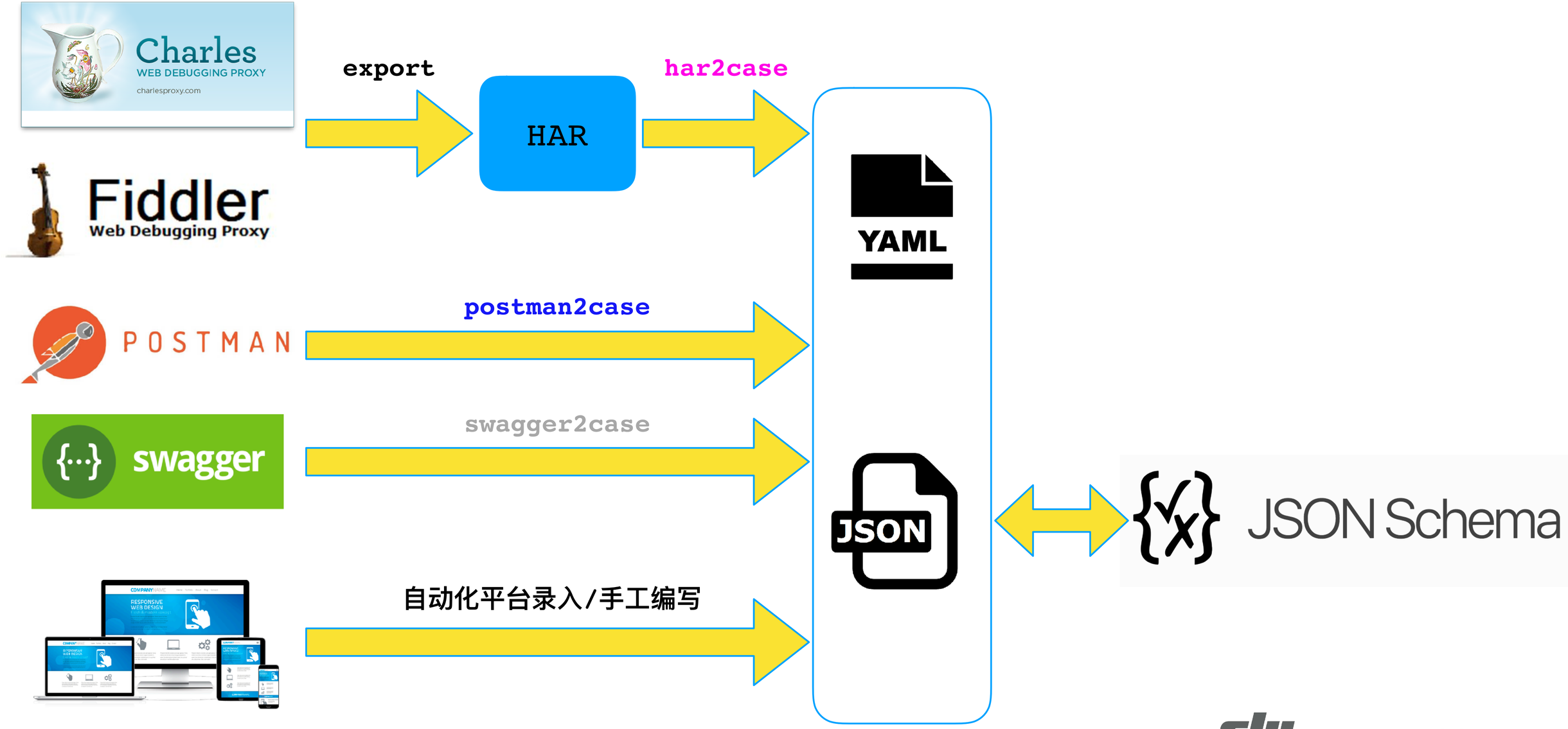
重复

迥异

简洁

规范

核心特性 - 测试用例生成


Charles
WEB DEBUGGING PROXY
charlesproxy.com
export
HAR
har2case
Fiddler
Web Debugging Proxy
YAML
POSTMAN
postman2case
swagger
swagger2case
JSON
JSON Schema
自动化平台录入/手工编写

核心特性 - 测试脚本优化


```yaml
- config:
    name: "smoketest for CRUD users."
    parameters:
        - os_platform: ["ios", "android"]
    variables:
        - user_agent: 'iOS/10.3'
        - device_sn: ${gen_random_string(15)}
        - os_platform: 'ios'
        - app_version: '2.8.6'
    request:
        base_url: http://127.0.0.1:5000
        headers:
            Content-Type: application/json
            device_sn: $device_sn
```

用例集全局定义
config

变量定义
variables

变量引用
$var

函数调用
${func($a, 9)}

```yaml
- test:
    name: get token
    request:
        url: /api/get-token
        method: POST
        headers:
            user_agent: $user_agent
            device_sn: $device_sn
            os_platform: $os_platform
            app_version: $app_version
        json:
            sign: ${get_sign($user_agent, $device_sn, $os_platform, $app_version)}
    extract:
        - token: content.token
    setup_hooks:
        - ${setup_hook_prepare_kwargs($request)}
    teardown_hooks:
        - ${teardown_hook_sleep_N_secs($response, 2)}
    validate:
        - {"check": "status_code", "comparator": "eq", "expect": 200}
        - len_eq: ["content.token", 16]
```

结果提取
extract

结果校验
validate

数据驱动
parameters

setup_hooks

teardown_hooks

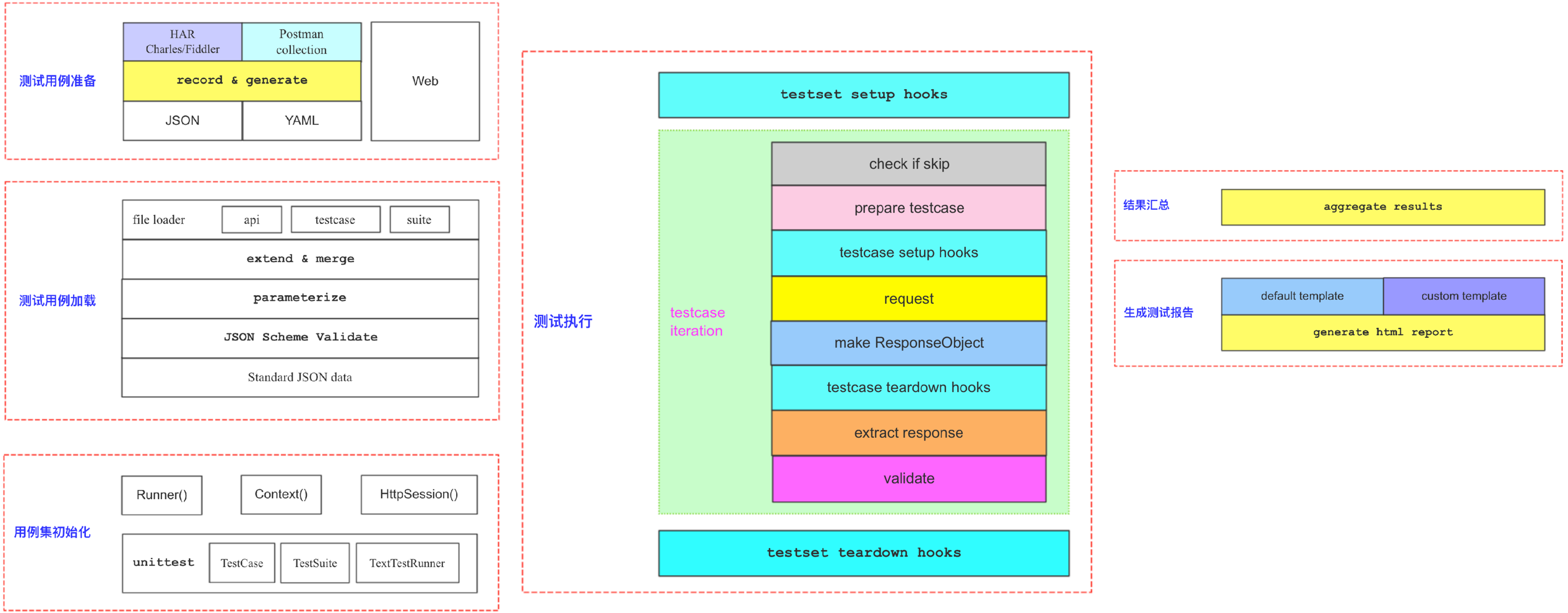
```yaml
- test:
    name: create user which does not exist
    request:
        url: /api/users/1000
        method: POST
        headers:
            token: $token
        json:
            name: "user1"
            password: "123456"
    validate:
        - eq: ["status_code", 201]
        - {"check": "content.success", "comparator": "eq", "expect": true
```

核心特性 - 测试脚本优化

函数定义
debugtalk.py

```python
import hashlib
import hmac
import random
import string

SECRET_KEY = "DebugTalk"

def gen_random_string(str_len):
    random_char_list = []
    for _ in range(str_len):
        random_char = random.choice(string.ascii_letters + string.digits)
        random_char_list.append(random_char)

    random_string = ''.join(random_char_list)
    return random_string

def get_sign(*args):
    content = ''.join(args).encode('ascii')
    sign_key = SECRET_KEY.encode('ascii')
    sign = hmac.new(sign_key, content, hashlib.sha1).hexdigest()
    return sign
```

核心特性 - 逻辑流程图

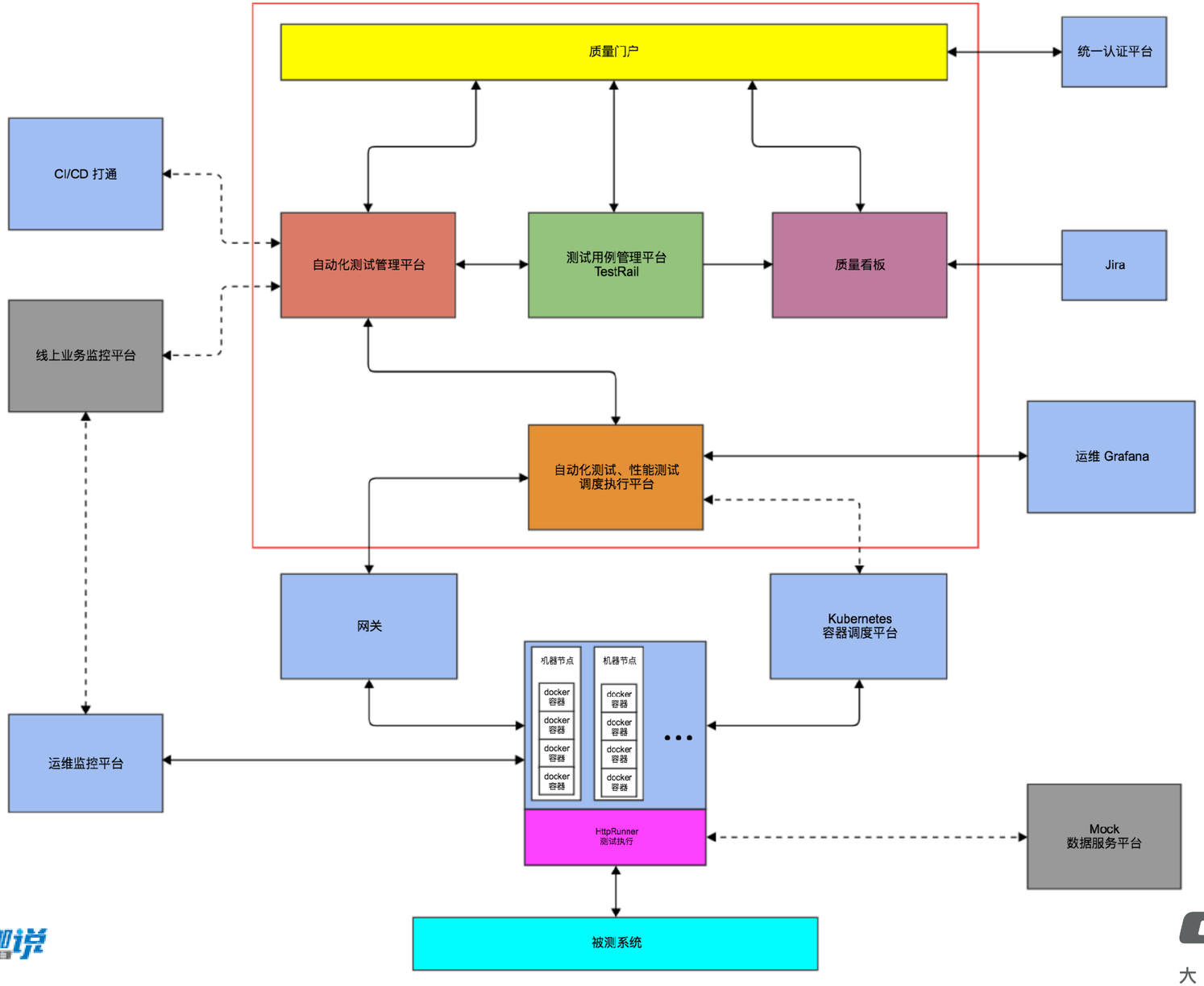

测试用例准备
HAR
Charles/Fiddler
Postman
collection
record & generate
JSON
YAML
Web
测试用例加载
file loader
api
testcase
suite
extend & merge
parameterize
JSON Scheme Validate
Standard JSON data
用例集初始化
Runner()
Context()
HttpSession()
unittest
TestCase
TestSuite
TextTestRunner
测试执行
testset setup hooks
testcase
iteration
check if skip
prepare testcase
testcase setup hooks
request
make ResponseObject
testcase teardown hooks
extract response
validate
testset teardown hooks
结果汇总
aggregate results
生成测试报告
default template
custom template
generate html report

5、大疆内部实践案例

大疆内部实践案例

- 整体架构图
- 自动化测试平台
- 打通功能测试平台（TestRail）
- 性能测试平台

大疆内部实践案例 - 整体架构图



大疆内部实践案例 - 自动化测试平台

欢迎您：leo.lee

首页 项目列表 任务列表

DJI官网
- 接口定义
- 测试用例
- 测试场景
- 测试数据
- 测试环境
- 测试脚本
- 隐私变量

接口修改

common

项目名称	DJI官网
接口描述	current_time
接口定义	test_current_time
接口参数	方法参数,$xxx

GET /api/util/current_time data 发送 保存

data

Key	Type	Value
	string	

测试结果	测试通过
request_header	{ Accept-Encoding: "gzip, deflate", Connection: "keep-alive", authorization: "Basic d3d3LXJlbGVhc2U6WGdWZTlZZ2ZGRUxkN0M0YWZqajZO", Accept: "*/*", user-agent: "Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/67.0.3396.87 Safari/537.36" }
request_body	null
response_header	{ 26 items }
response_body	{"status":200,"extra":{},"success":true,"data":[{"time":1531292562070}]}
trace	

在线调试接口

大疆内部实践案例 - 自动化测试平台

用例组装

接口

拖动接口至右边测试用例列表组成测试用例。

- test1 api luguo.he
- ddd api luguo.he
- test_api api luguo.he
- test_api_copy api luguo.he
- test_jj api luguo.he
- test api luguo.he
- test_copy api luguo.he
- 获取配置文件 api luguo.he
- defabcabc api luguo.he
- origizationService api luguo.he
- origizationService api luguo.he

测试用例

从左侧接口列表拖动接口组成测试用例。

- test testcase luguo.he
- test testcase luguo.he
- test testcase luguo.he
- 获取配置文件 testcase luguo.he

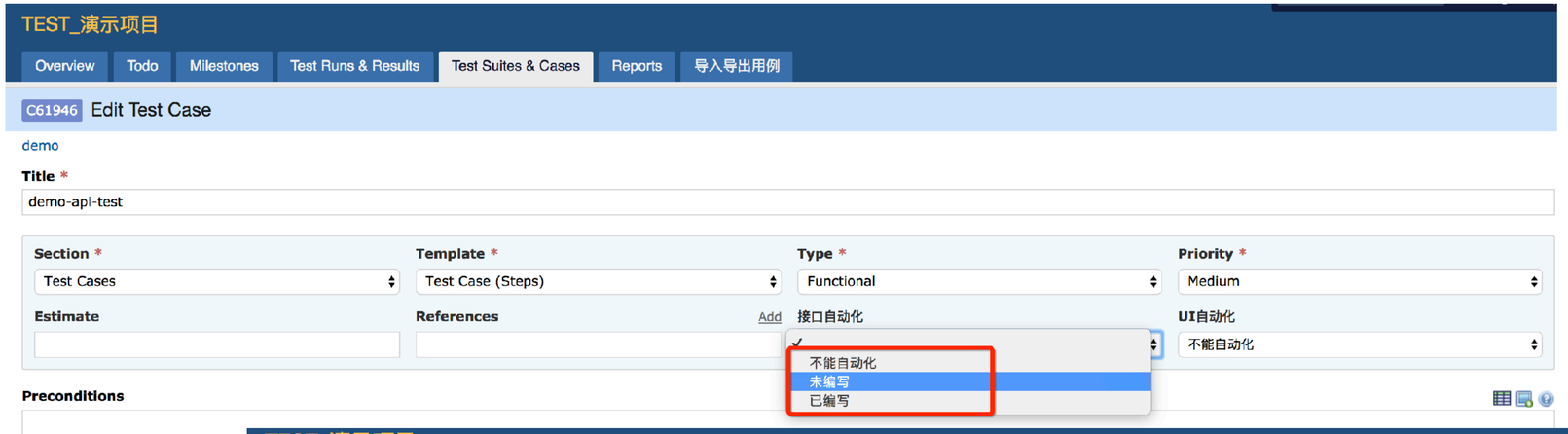
测试场景

从左侧接口列表/测试用例列表拖动组成测试场景。

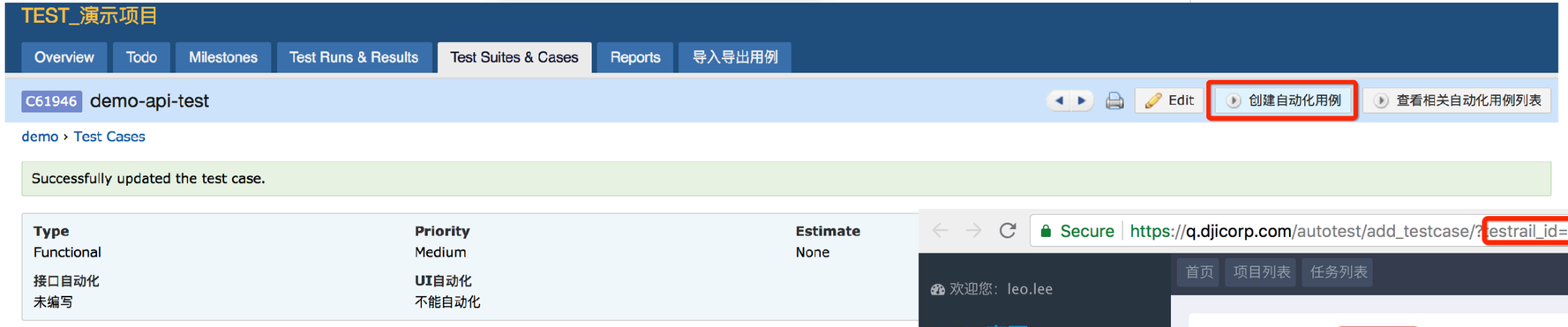
- ddd api luguo.he
- test testcase luguo.he

拖拽组装生成测试场景

大疆内部实践案例 - 打通功能测试平台（TestRail）



关联功能测试用例和自动化测试用例



自动化率统计

大疆内部实践案例 - 打通功能测试平台（TestRail）

TEST_演示项目

Overview | Todo | Milestones | Test Runs & Results | Test Suites & Cases | Reports | 导入导出用例

R1726 demo

Reports | Rerun | Edit | Suite | 触发自动化任务 | 查看自动化任务

2 Passed 67% set to Passed
0 Partially Passed 0% set to Partially Passed
0 Blocked 0% set to Blocked
0 Retest 0% set to Retest
0 Failed 0% set to Failed

67% passed
1 / 3 untested (33%).

Sort: Section | Filter: None | Add Results | Assign To | Columns

Test Cases (3)

ID	Title	Assigned To	Status
T2796...	演示		Passed
T2796...	sds		Passed
T2796...	demo-api-test		Untested

触发执行

查看执行结果

Secure | https://q.djicorp.com/autotest/task_list/1/?type_data=testrail_testrun_1726

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项目列表
任务列表

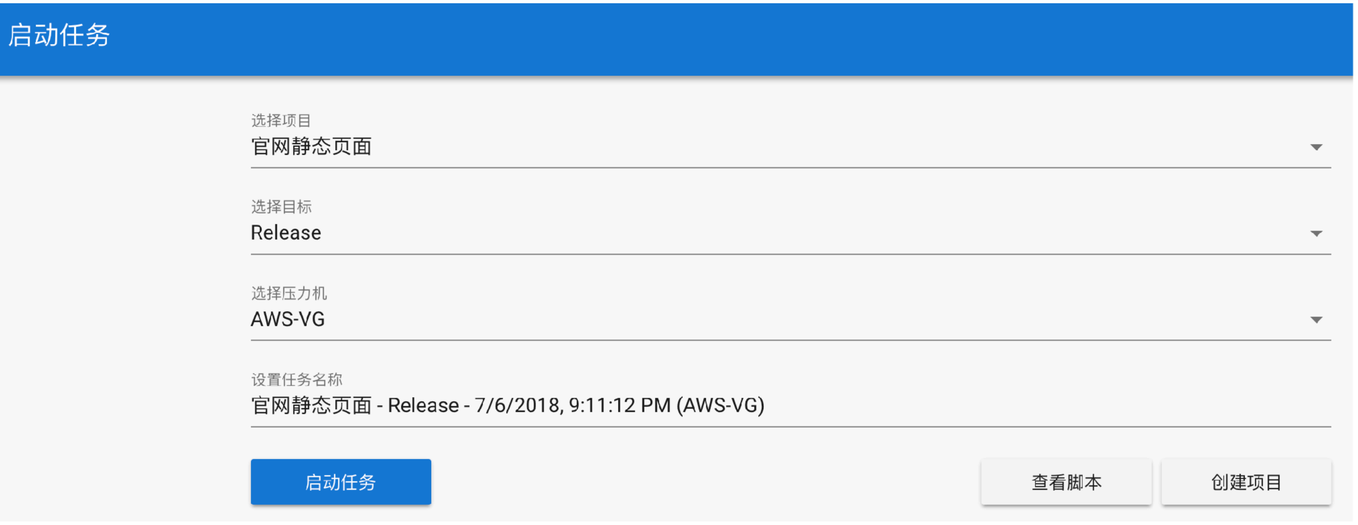
首页

任务列表

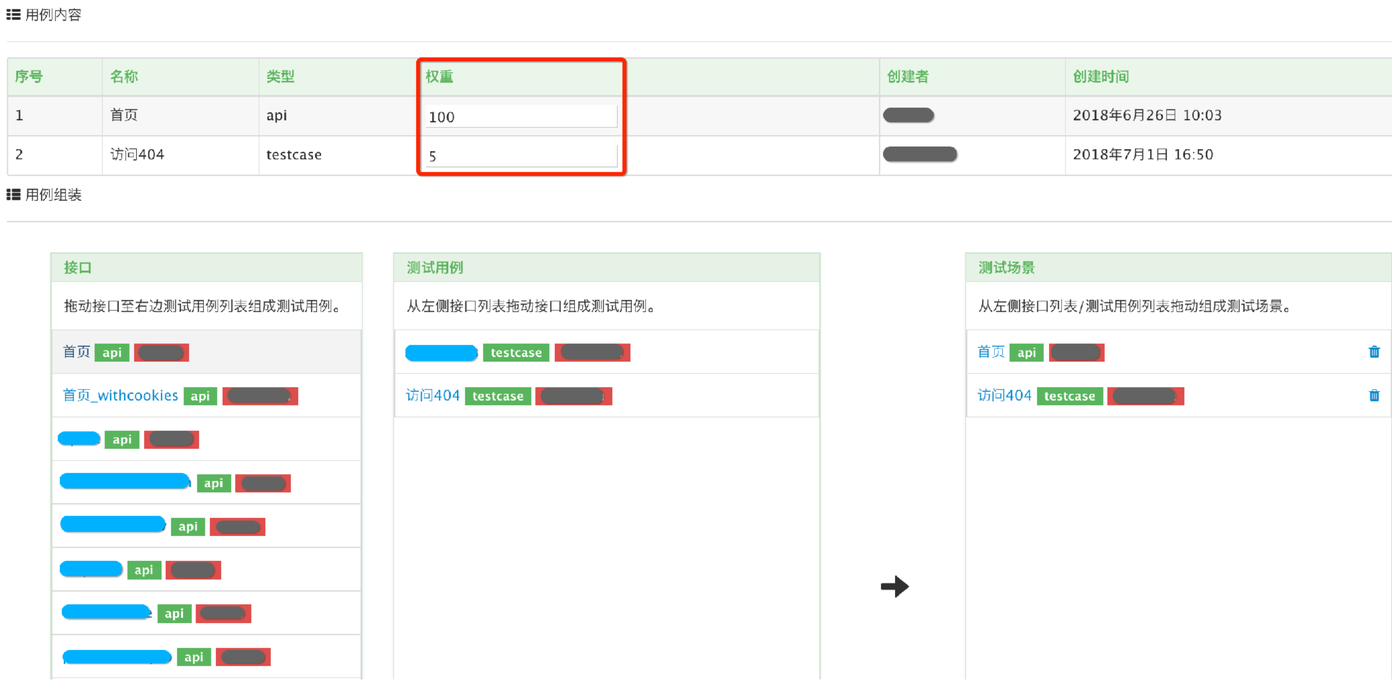
任务名称 | 创建人 | testrail_testrun_ | 查询

	任务名称	运行状态(完成/失败/正在运行/等待运行)	测试结果(通过/不通过)	类型	创建人
	demo	2/0/0/0	2/0	testrail_testrun_1726	leo.lee
	demo_演示	leo.lee	运行完成	测试通过	2018-07-06 21:00:39
	demo_sds	leo.lee	运行完成	测试通过	2018-07-06 21:00:39

大疆内部实践案例 - 性能测试平台



查看性能测试任务对应的自动化测试用例



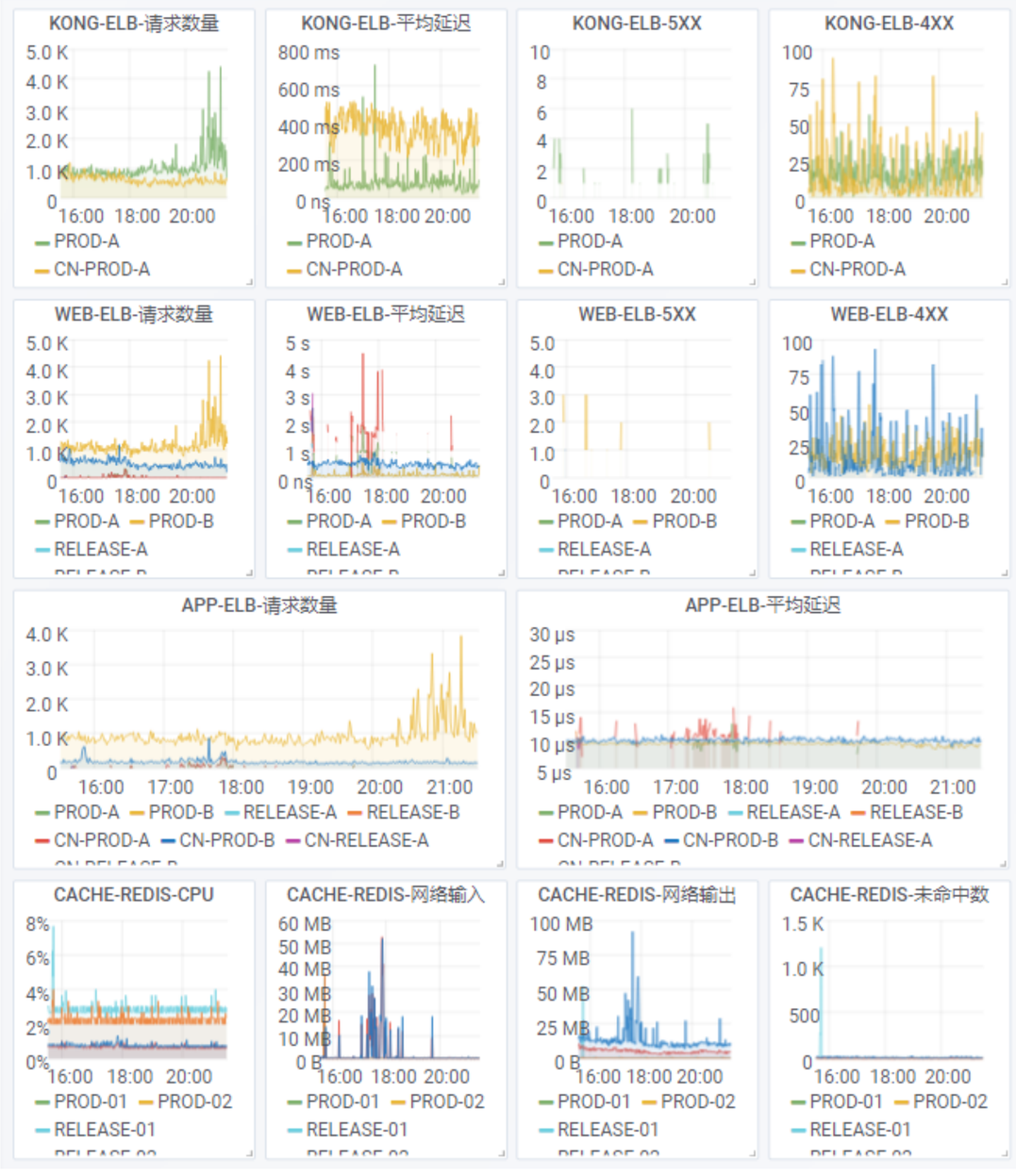
比例权重配置

大疆内部实践案例 - 性能测试平台

智能加压

性能数据
Grafana

New Relic



Q
&
A

Thanks

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大疆创新

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