MSA
SDK

msaSDK - FastAPI based Microservice Architecture Development Kit

To build PoC's, MVP's, API's with CRUD and Dashboards fast and consistent.

Build on top of FastAPI, SQLModel, SQLAlchemy, Amis and many other bullet proofed libraries.

Features

- **Build connected distributed applications faster**: Ready for Dapr..
- **Consistency**: With sometimes 10s or 100s of Micro Services, the SDK helps to easy version control and provides a stable Dapr Basis.
- **High performance**: Based on FastAPI. Enjoy all the benefits.
- **High efficiency**: Perfect code type hints. Higher code reusability.
- **Support asynchronous and synchronous hybrid writing**: `ORM` is based on `SQLModel` & `Sqlalchemy`. Freely customize database type. Asynchronous mode. Strong scalability.
- **Front-end separation**: The front-end is rendered by `Amis`, the back-end interface is automatically generated by `msaSDK - Admin`. The interface is reusable.
- **Strong scalability**: The background page supports `Amis` pages and ordinary `html` pages. Easily customize the interface freely.
- **Automatic api documentation**: Automatically generate Interface documentation by `FastAPI`. Easily debug and share interfaces.

Dependencies

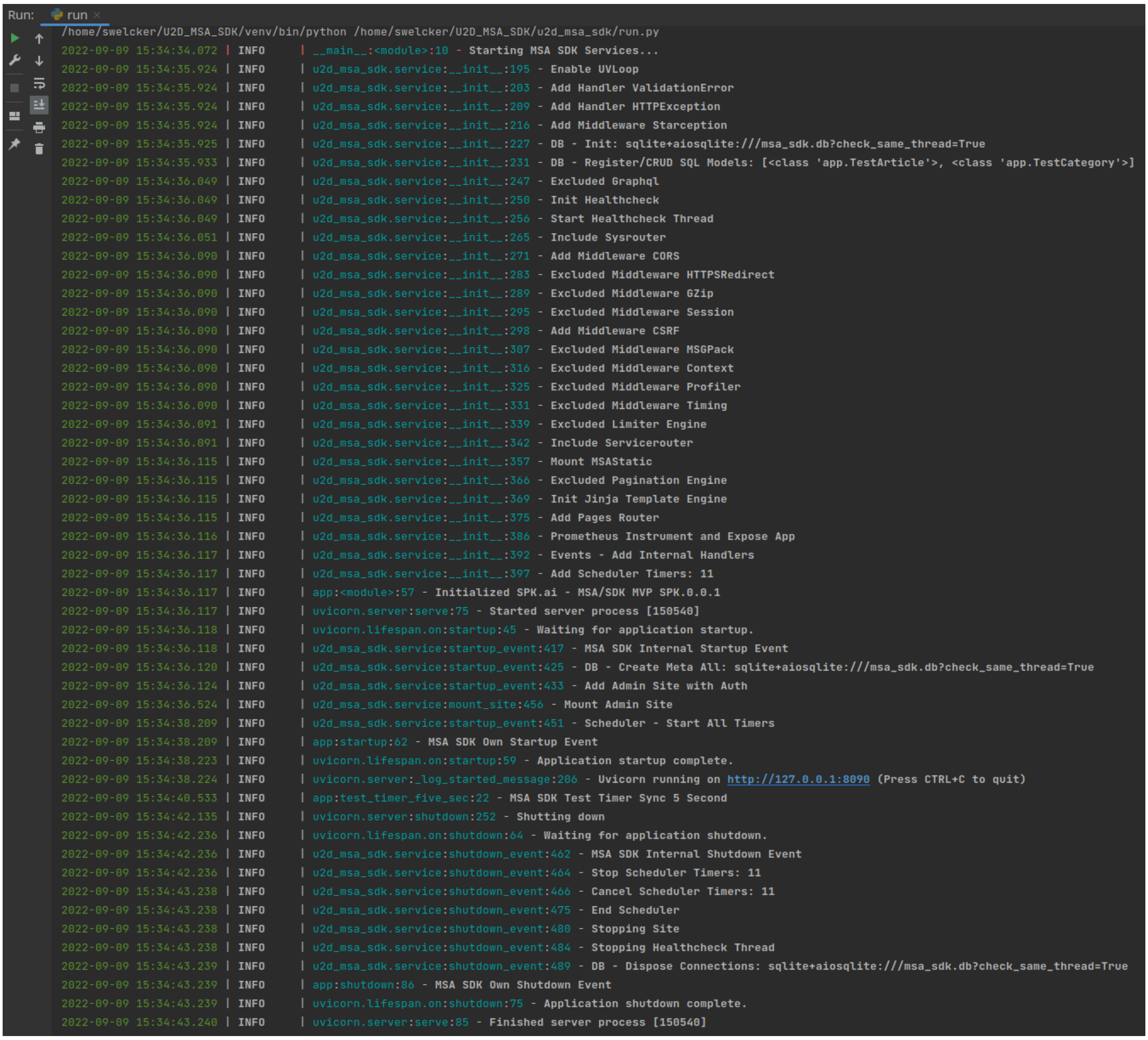
- FastAPI
- SQLModel combined with SQLAlchemy and Pydantic, with all their features .
- Amis: Vue Frontend

Usage example is in the app module __init__.py

```
# -*- encoding: utf-8 -*-
"""
Copyright (c) 2022 - U2D.ai / S.Welcker
"""
__version__ = "0.0.1"

from typing import Optional
from sqlmodel import SQLModel
from msaSDK.admin.utils.fields import Field
from msaSDK.models.service import get_msa_app_settings
from msaSDK.service import MSAApp
from msaSDK.utils.scheduler import MSATimers, MSATimerEnum


# example async function to be executed by a timer
async def test_timer_min():
  app.logger.info("msaSDK Test Timer Async Every Minute")


# example sync/blocking function to be executed by a timer
def test_timer_five_sec():
  app.logger.info("msaSDK Test Timer Sync 5 Second")


# SQLModel class to be used for auto API CRUD and/or Admin Site Web UI
class TestArticle(SQLModel, table=True):
  id: Optional[int] = Field(default=None, primary_key=True, nullable=False)
  title: str = Field(title='ArticleTitle', max_length=200)
  description: Optional[str] = Field(default='', title='ArticleDescription',
max_length=400)
  status: bool = Field(None, title='status')
  content: str = Field(title='ArticleContent')


# SQLModel class to be used for auto API CRUD and/or Admin Site Web UI
class TestCategory(SQLModel, table=True):
  id: Optional[int] = Field(default=None, primary_key=True, nullable=False)
  title: str = Field(title='ArticleTitle', max_length=200)
  description: Optional[str] = Field(default='', title='ArticleDescription',
max_length=400)
  status: bool = Field(None, title='status')
  content: str = Field(title='ArticleContent')


# get the MSA app setting, clear the cache, set some settings
get_msa_app_settings.cache_clear()
```

```
settings = get_msa_app_settings()
settings.title = "SPK.ai - MSA/SDK MVP"
settings.version = "SPK.0.0.1"
settings.debug = True

# Create some timers with a MSATimer instance, define the interval and set the handler
my_timers: MSATimers = MSATimers()
my_timers.create_timer(MSATimerEnum.every_minute, test_timer_min)
my_timers.create_timer(MSATimerEnum.on_the_5_second, test_timer_five_sec)

# Create the main app instance, like the FastAPI but provide a Setting Definition
Instance
# Optional the Classes of your SQLModels
# Define if the optional Admin Site gets mounted automatically, if False you need to
Mount in your own Startup MSAUIEvent Handler
# Optional the MSATimers instance
app = MSAApp(settings=settings, timers=my_timers, auto_mount_site=True,
             sql_models=[TestArticle, TestCategory],
             contact={"name": "msaSDK", "url": "http://u2d.ai", "email":
"stefan@u2d.ai"},
             license_info={"name": "MIT", "url": "https://opensource.org/licenses/MIT",
})

# use the internal logger of app
app.logger.info("Initialized " + settings.title + " " + settings.version)


# Optional use startup event
# Mount the Admin Site here if enabled and the auto mount option was False
@app.on_event("startup")
async def startup():
  app.logger.info("msaSDK Own Startup MSAUIEvent")
  # app.mount_site()


# Optional use shutdown event
@app.on_event("shutdown")
async def shutdown():
  app.logger.info("msaSDK Own Shutdown MSAUIEvent")
```

Typical Run Log

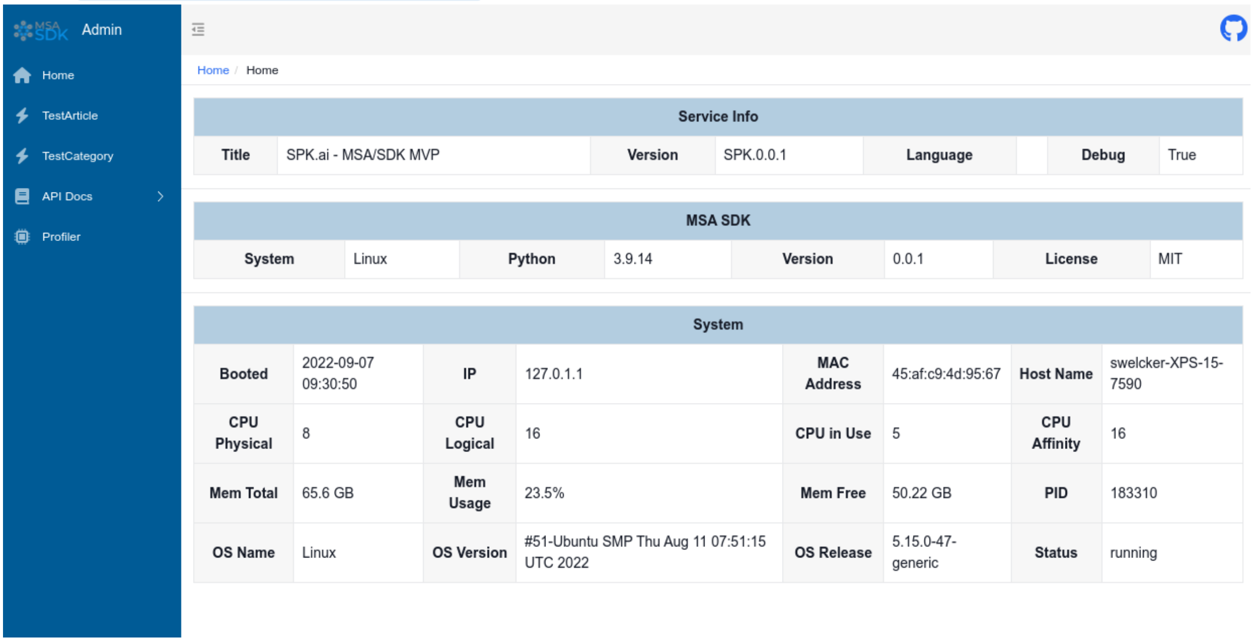


```
/home/swelcker/U2D_MSA_SDK/venv/bin/python /home/swelcker/U2D_MSA_SDK/u2d_msa_sdk/run.py
2022-09-09 15:34:34.072 | INFO     | __main__:<module>:10 - Starting MSA SDK Services...
2022-09-09 15:34:35.924 | INFO     | u2d_msa_sdk.service:__init__:195 - Enable UVLoop
2022-09-09 15:34:35.924 | INFO     | u2d_msa_sdk.service:__init__:203 - Add Handler ValidationError
2022-09-09 15:34:35.924 | INFO     | u2d_msa_sdk.service:__init__:209 - Add Handler HTTPException
2022-09-09 15:34:35.924 | INFO     | u2d_msa_sdk.service:__init__:216 - Add Middleware Starception
2022-09-09 15:34:35.925 | INFO     | u2d_msa_sdk.service:__init__:227 - DB - Init: sqlite+aiosqlite:///msa_sdk.db?check_same_thread=True
2022-09-09 15:34:35.933 | INFO     | u2d_msa_sdk.service:__init__:231 - DB - Register/CRUD SQL Models: [<class 'app.TestArticle'>, <class 'app.TestCategory'>]
2022-09-09 15:34:36.049 | INFO     | u2d_msa_sdk.service:__init__:247 - Excluded Graphql
2022-09-09 15:34:36.049 | INFO     | u2d_msa_sdk.service:__init__:250 - Init Healthcheck
2022-09-09 15:34:36.049 | INFO     | u2d_msa_sdk.service:__init__:256 - Start Healthcheck Thread
2022-09-09 15:34:36.051 | INFO     | u2d_msa_sdk.service:__init__:265 - Include Sysrouter
2022-09-09 15:34:36.090 | INFO     | u2d_msa_sdk.service:__init__:271 - Add Middleware CORS
2022-09-09 15:34:36.090 | INFO     | u2d_msa_sdk.service:__init__:283 - Excluded Middleware HTTPSRedirect
2022-09-09 15:34:36.090 | INFO     | u2d_msa_sdk.service:__init__:289 - Excluded Middleware GZip
2022-09-09 15:34:36.090 | INFO     | u2d_msa_sdk.service:__init__:295 - Excluded Middleware Session
2022-09-09 15:34:36.090 | INFO     | u2d_msa_sdk.service:__init__:298 - Add Middleware CSRF
2022-09-09 15:34:36.090 | INFO     | u2d_msa_sdk.service:__init__:307 - Excluded Middleware MSGPack
2022-09-09 15:34:36.090 | INFO     | u2d_msa_sdk.service:__init__:316 - Excluded Middleware Context
2022-09-09 15:34:36.090 | INFO     | u2d_msa_sdk.service:__init__:325 - Excluded Middleware Profiler
2022-09-09 15:34:36.090 | INFO     | u2d_msa_sdk.service:__init__:331 - Excluded Middleware Timing
2022-09-09 15:34:36.091 | INFO     | u2d_msa_sdk.service:__init__:339 - Excluded Limiter Engine
2022-09-09 15:34:36.091 | INFO     | u2d_msa_sdk.service:__init__:342 - Include Servicerouter
2022-09-09 15:34:36.115 | INFO     | u2d_msa_sdk.service:__init__:357 - Mount MSAStatic
2022-09-09 15:34:36.115 | INFO     | u2d_msa_sdk.service:__init__:366 - Excluded Pagination Engine
2022-09-09 15:34:36.115 | INFO     | u2d_msa_sdk.service:__init__:369 - Init Jinja Template Engine
2022-09-09 15:34:36.115 | INFO     | u2d_msa_sdk.service:__init__:375 - Add Pages Router
2022-09-09 15:34:36.116 | INFO     | u2d_msa_sdk.service:__init__:386 - Prometheus Instrument and Expose App
2022-09-09 15:34:36.117 | INFO     | u2d_msa_sdk.service:__init__:392 - Events - Add Internal Handlers
2022-09-09 15:34:36.117 | INFO     | u2d_msa_sdk.service:__init__:397 - Add Scheduler Timers: 11
2022-09-09 15:34:36.117 | INFO     | app:<module>:57 - Initialized SPK.ai - MSA/SDK MVP SPK.0.0.1
2022-09-09 15:34:36.117 | INFO     | uvicorn.server:serve:75 - Started server process [150540]
2022-09-09 15:34:36.118 | INFO     | uvicorn.lifespan.on:startup:45 - Waiting for application startup.
2022-09-09 15:34:36.118 | INFO     | u2d_msa_sdk.service:startup_event:417 - MSA SDK Internal Startup Event
2022-09-09 15:34:36.120 | INFO     | u2d_msa_sdk.service:startup_event:425 - DB - Create Meta All: sqlite+aiosqlite:///msa_sdk.db?check_same_thread=True
2022-09-09 15:34:36.124 | INFO     | u2d_msa_sdk.service:startup_event:433 - Add Admin Site with Auth
2022-09-09 15:34:36.524 | INFO     | u2d_msa_sdk.service:mount_site:456 - Mount Admin Site
2022-09-09 15:34:38.209 | INFO     | u2d_msa_sdk.service:startup_event:451 - Scheduler - Start All Timers
2022-09-09 15:34:38.209 | INFO     | app:startup:62 - MSA SDK Own Startup Event
2022-09-09 15:34:38.223 | INFO     | uvicorn.lifespan.on:startup:59 - Application startup complete.
2022-09-09 15:34:38.224 | INFO     | uvicorn.server:_log_started_message:206 - Uvicorn running on http://127.0.0.1:8090 (Press CTRL+C to quit)
2022-09-09 15:34:40.533 | INFO     | app:test_timer_five_sec:22 - MSA SDK Test Timer Sync 5 Second
2022-09-09 15:34:42.135 | INFO     | uvicorn.server:shutdown:252 - Shutting down
2022-09-09 15:34:42.236 | INFO     | uvicorn.lifespan.on:shutdown:64 - Waiting for application shutdown.
2022-09-09 15:34:42.236 | INFO     | u2d_msa_sdk.service:shutdown_event:462 - MSA SDK Internal Shutdown Event
2022-09-09 15:34:42.236 | INFO     | u2d_msa_sdk.service:shutdown_event:464 - Stop Scheduler Timers: 11
2022-09-09 15:34:43.238 | INFO     | u2d_msa_sdk.service:shutdown_event:466 - Cancel Scheduler Timers: 11
2022-09-09 15:34:43.238 | INFO     | u2d_msa_sdk.service:shutdown_event:475 - End Scheduler
2022-09-09 15:34:43.238 | INFO     | u2d_msa_sdk.service:shutdown_event:480 - Stopping Site
2022-09-09 15:34:43.238 | INFO     | u2d_msa_sdk.service:shutdown_event:484 - Stopping Healthcheck Thread
2022-09-09 15:34:43.239 | INFO     | u2d_msa_sdk.service:shutdown_event:489 - DB - Dispose Connections: sqlite+aiosqlite:///msa_sdk.db?check_same_thread=True
2022-09-09 15:34:43.239 | INFO     | app:shutdown:86 - MSA SDK Own Shutdown Event
2022-09-09 15:34:43.239 | INFO     | uvicorn.lifespan.on:shutdown:75 - Application shutdown complete.
2022-09-09 15:34:43.240 | INFO     | uvicorn.server:serve:85 - Finished server process [150540]
```

Interface Preview

Home Screen with System Info

- Open `http://127.0.0.1:8090/admin/` in your browser:

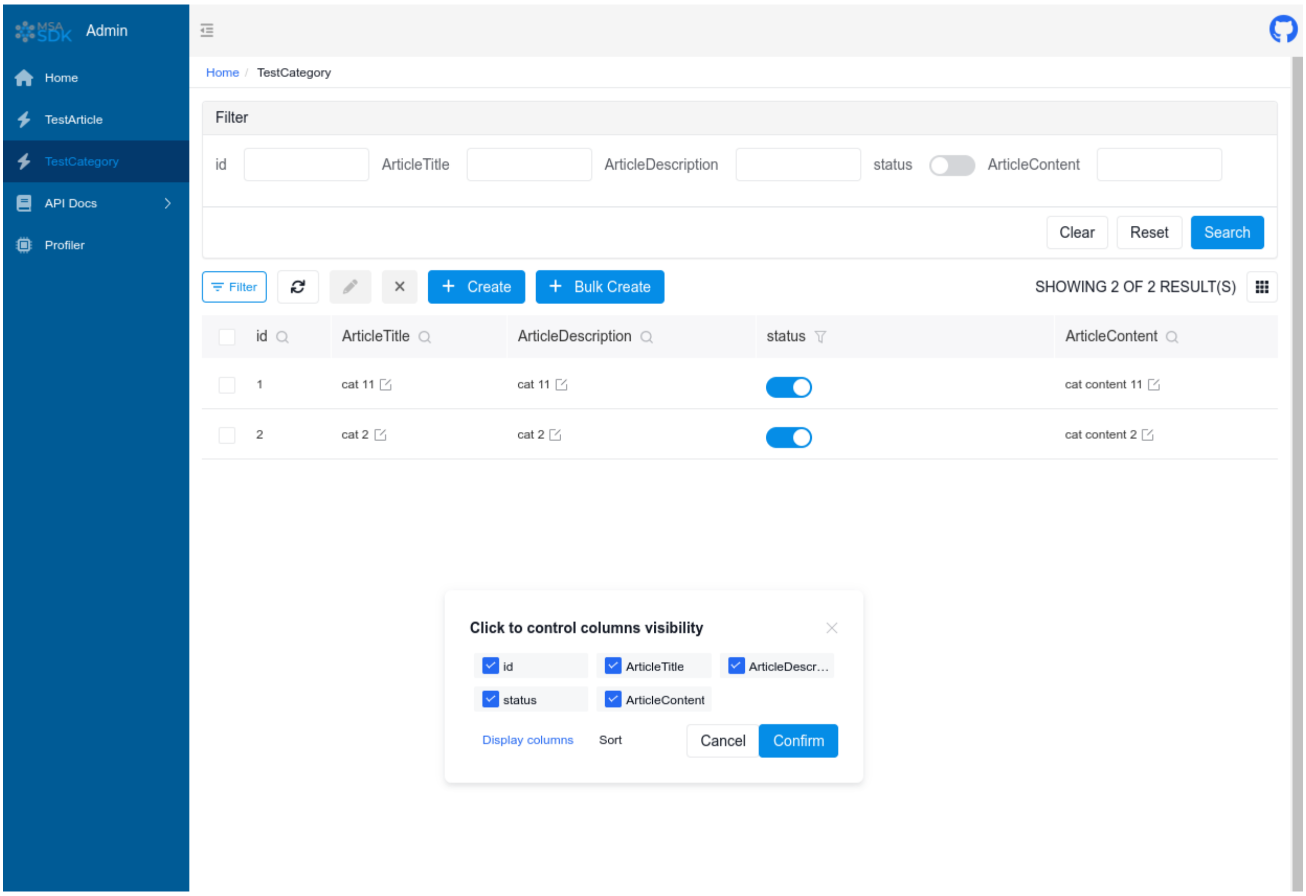


Service Info							
Title	SPK.ai - MSA/SDK MVP	Version	SPK.0.0.1	Language		Debug	True

MSA SDK							
System	Linux	Python	3.9.14	Version	0.0.1	License	MIT

System							
Booted	2022-09-07 09:30:50	IP	127.0.1.1	MAC Address	45:af:c9:4d:95:67	Host Name	swelcker-XPS-15-7590
CPU Physical	8	CPU Logical	16	CPU in Use	5	CPU Affinity	16
Mem Total	65.6 GB	Mem Usage	23.5%	Mem Free	50.22 GB	PID	183310
OS Name	Linux	OS Version	#51-Ubuntu SMP Thu Aug 11 07:51:15 UTC 2022	OS Release	5.15.0-47-generic	Status	running

CRUD of SQLModels Screen



Filter: id □ ArticleTitle □ ArticleDescription □ status ○ ArticleContent □

SHOWING 2 OF 2 RESULT(S)

□	id	ArticleTitle	ArticleDescription	status	ArticleContent
□	1	cat 11	cat 11	●	cat content 11
□	2	cat 2	cat 2	●	cat content 2

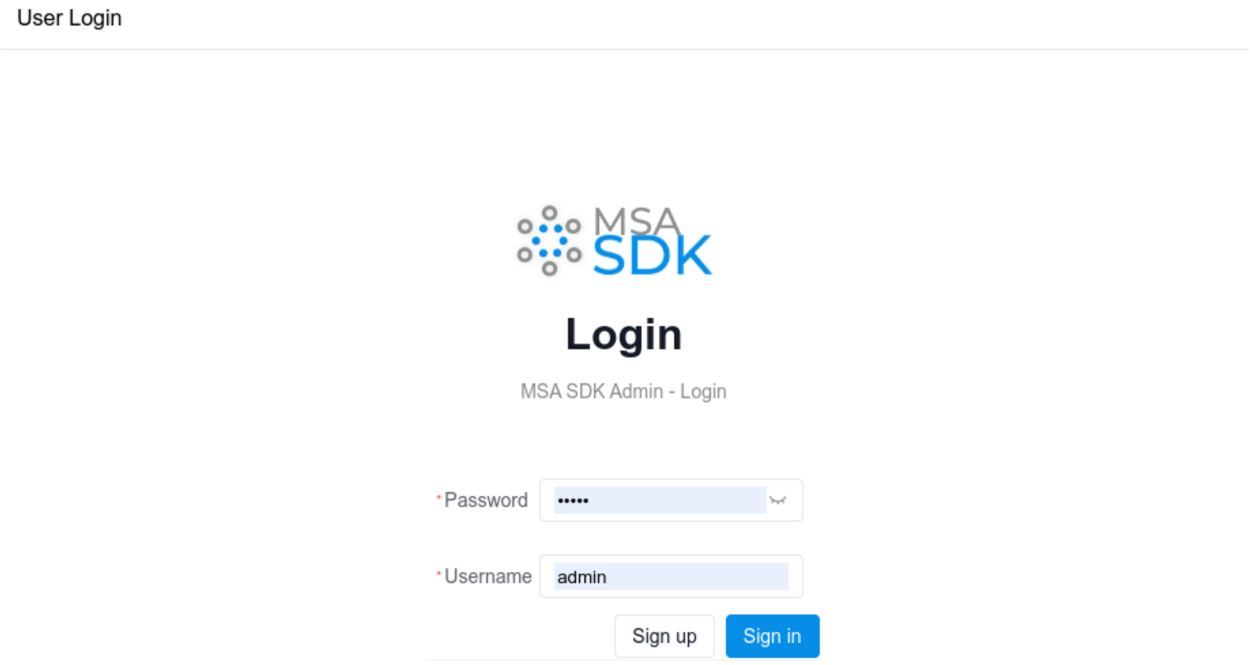
Click to control columns visibility

☑ id ☑ ArticleTitle ☑ ArticleDescr...
☑ status ☑ ArticleContent

Display columns Sort Cancel Confirm

Login Screen

- Open `http://127.0.0.1:8090/admin/auth/form/login` in your browser:



User Login

Login

MSA SDK Admin - Login

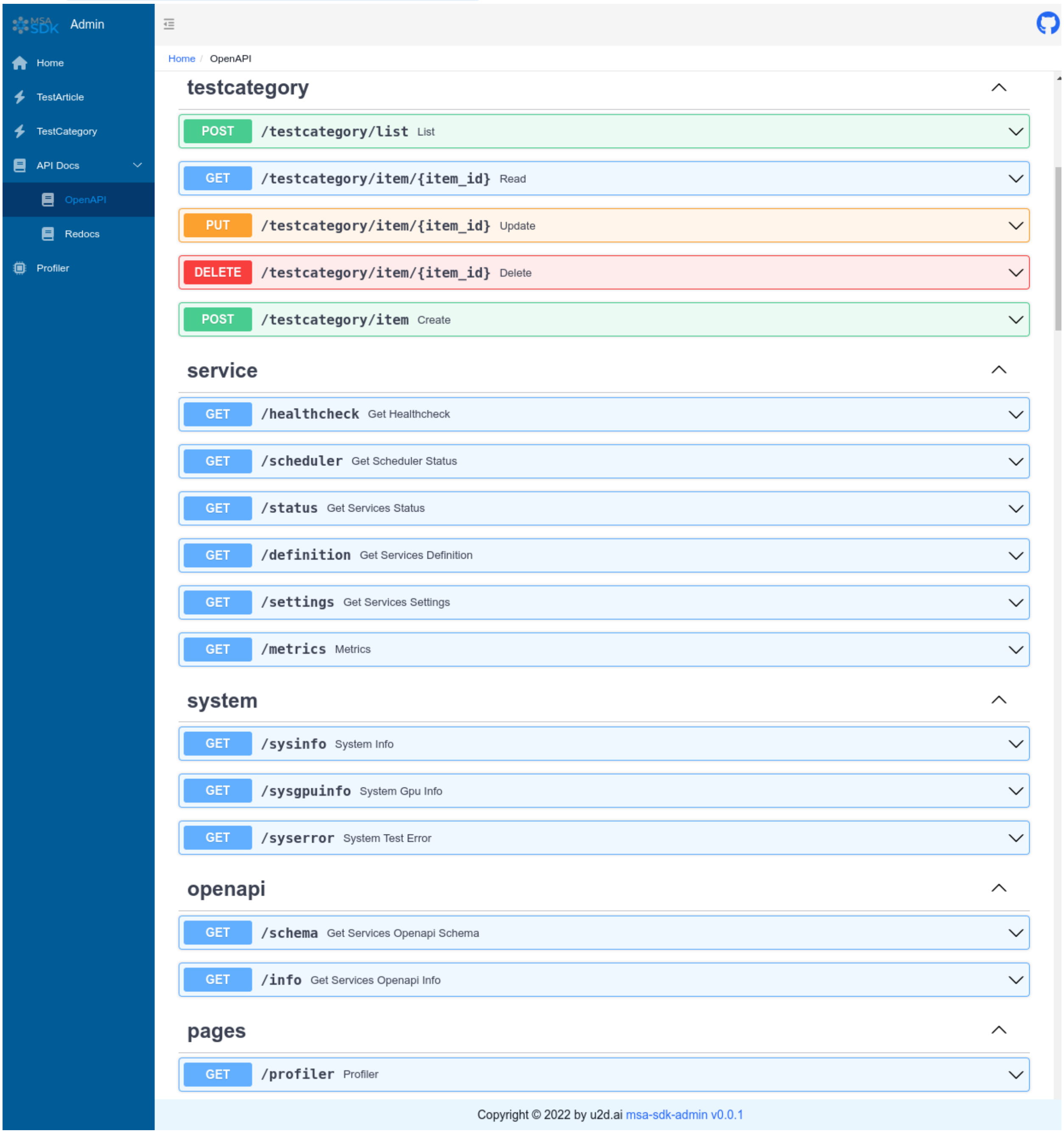
*Password •••••

*Username admin

-

OpenAPI Interactive Documentation (Swagger) Screen

- Open `http://127.0.0.1:8090/#/admin/docs` in your browser:



testcategory

POST `/testcategory/list` List

GET `/testcategory/item/{item_id}` Read

PUT `/testcategory/item/{item_id}` Update

DELETE `/testcategory/item/{item_id}` Delete

POST `/testcategory/item` Create

service

GET `/healthcheck` Get Healthcheck

GET `/scheduler` Get Scheduler Status

GET `/status` Get Services Status

GET `/definition` Get Services Definition

GET `/settings` Get Services Settings

GET `/metrics` Metrics

system

GET `/sysinfo` System Info

GET `/sysgpuinfo` System Gpu Info

GET `/syserror` System Test Error

openapi

GET `/schema` Get Services Openapi Schema

GET `/info` Get Services Openapi Info

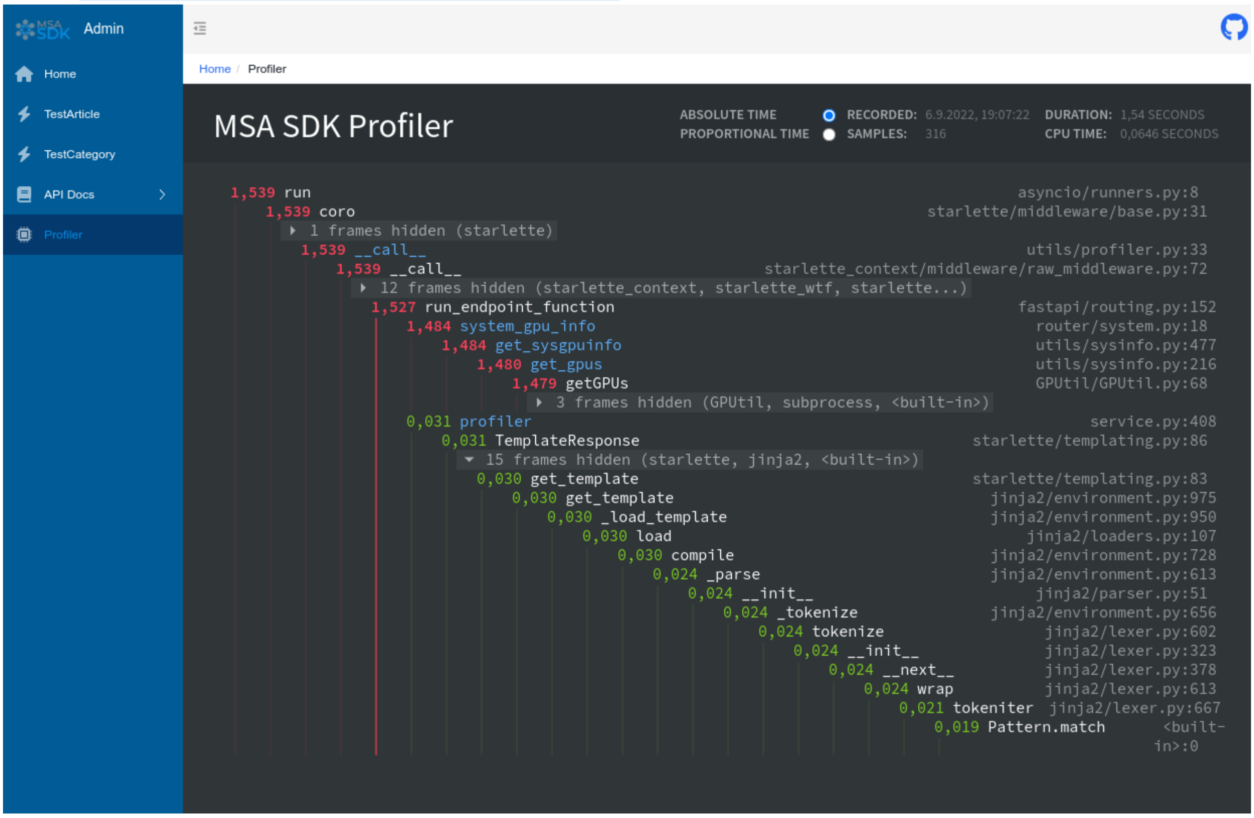
pages

GET `/profiler` Profiler

Copyright © 2022 by u2d.ai msa-sdk-admin v0.0.1

Profiler Screen

- Open `http://127.0.0.1:8090/#/admin/profiler` in your browser:



MSA SDK Profiler

ABSOLUTE TIME ● RECORDED: 6.9.2022, 19:07:22 DURATION: 1,54 SECONDS
PROPORTIONAL TIME ○ SAMPLES: 316 CPU TIME: 0,0646 SECONDS

```
1,539 run                                                      asyncio/runners.py:8
  1,539 coro                                          starlette/middleware/base.py:31
    ▸ 1 frames hidden (starlette)
    1,539 __call__                                             utils/profiler.py:33
      1,539 __call__                   starlette_context/middleware/raw_middleware.py:72
        ▸ 12 frames hidden (starlette_context, starlette_wtf, starlette...)
        1,527 run_endpoint_function                           fastapi/routing.py:152
          1,484 system_gpu_info                                 router/system.py:18
            1,484 get_sysgpuinfo                               utils/sysinfo.py:477
              1,480 get_gpus                                   utils/sysinfo.py:216
                1,479 getGPUs                                   GPUtil/GPUtil.py:68
                  ▸ 3 frames hidden (GPUtil, subprocess, <built-in>)
          0,031 profiler                                             service.py:408
            0,031 TemplateResponse                     starlette/templating.py:86
              ▾ 15 frames hidden (starlette, jinja2, <built-in>)
              0,030 get_template                       starlette/templating.py:83
                0,030 get_template                    jinja2/environment.py:975
                  0,030 _load_template                jinja2/environment.py:950
                    0,030 load                            jinja2/loaders.py:107
                      0,030 compile                   jinja2/environment.py:728
                        0,024 _parse                  jinja2/environment.py:613
                          0,024 __init__                  jinja2/parser.py:51
                            0,024 _tokenize           jinja2/environment.py:656
                              0,024 tokenize              jinja2/lexer.py:602
                                0,024 __init__            jinja2/lexer.py:323
                                  0,024 __next__          jinja2/lexer.py:378
                                    0,024 wrap            jinja2/lexer.py:613
                                      0,021 tokeniter  jinja2/lexer.py:667
                                        0,019 Pattern.match      <built-
                                                                 in>:0
```

License Agreement

- `msaSDK` Based on `MIT` open source and free to use, it is free for commercial use, but please clearly show the copyright information about msaSDK - Auth Admin in the display interface.

How to create the documentation

We use mkdocs and mkdocsstring. The code reference and nav entry get's created virtually by the triggered python script /docs/gen_ref_pages.py while `mkdocs` `serve` or `build` is executed.

Requirements Install for the PDF creation option:

PDF Export is using mainly weasyprint, if you get some errors here pls. check there documentation. Installation is part of the msaSDK, so this should be fine.

We can now test and view our documentation using:

```
mkdocs serve
```

Build static Site:

```
mkdocs build
```