



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, 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 -*-
"""
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"""
__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

```

Run: /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 Servicrouter
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:

The screenshot shows the MSA SDK Admin interface. The left sidebar contains links: Home, TestArticle, TestCategory, API Docs, and Profiler. The main content area displays three tables:

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

The screenshot shows the MSA SDK Admin interface for the 'TestCategory' screen. The left sidebar contains links: Home, TestArticle, TestCategory, API Docs, and Profiler. The main content area displays a table with 2 rows of data. A modal dialog is open, titled 'Click to control columns visibility', allowing users to toggle the visibility of columns.

Filter: id, ArticleTitle, ArticleDescription, status, ArticleContent

Clear Reset Search

Filter Refresh Edit X + Create + Bulk Create

SHOWING 2 OF 2 RESULT(S)

<input type="checkbox"/>	id	ArticleTitle	ArticleDescription	status	ArticleContent
<input type="checkbox"/>	1	cat 11	cat 11	<input checked="" type="checkbox"/>	cat content 11
<input type="checkbox"/>	2	cat 2	cat 2	<input checked="" type="checkbox"/>	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

Sign up

Sign in

-

OpenAPI Interactive Documentation (Swagger) Screen

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

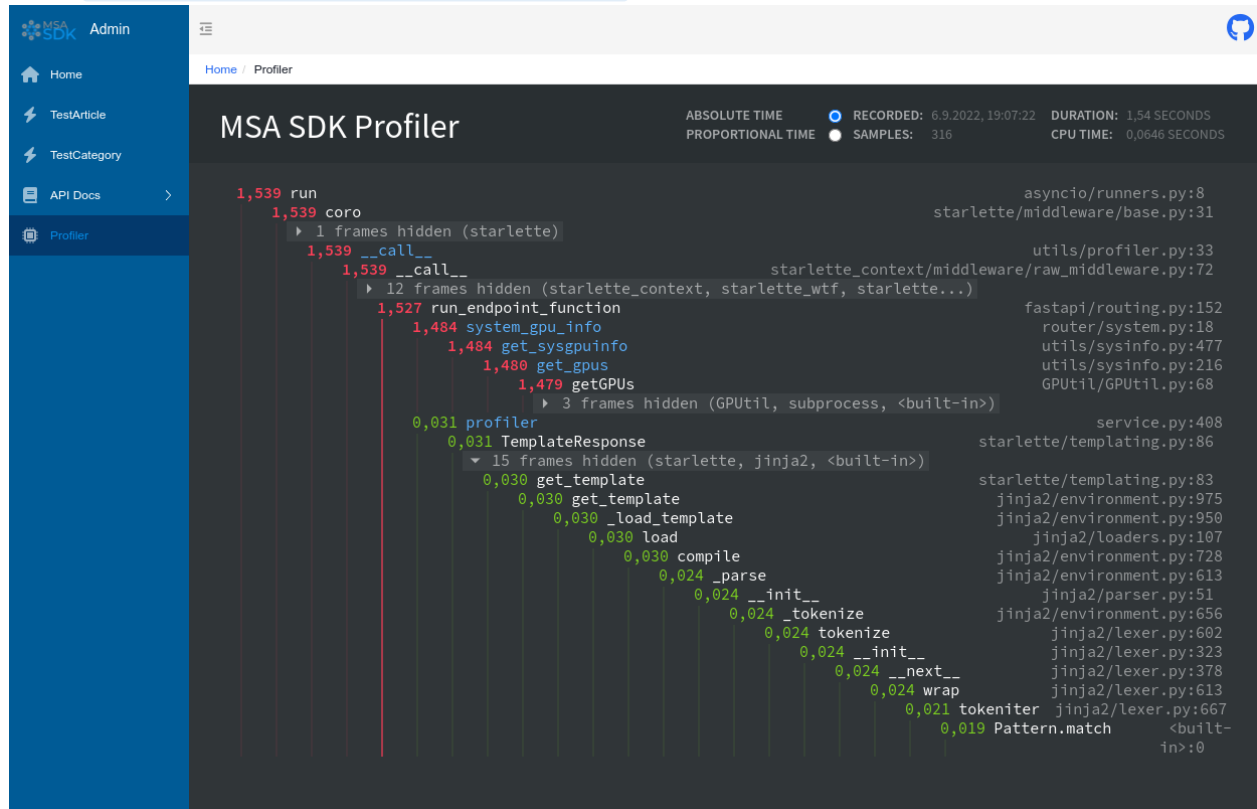
The screenshot displays the msaSDK Admin interface. On the left is a dark blue sidebar with navigation links: Home, TestArticle, TestCategory, API Docs (expanded), OpenAPI (selected), Redocs, and Profiler. The main content area shows the OpenAPI documentation for the 'testcategory' endpoint. It lists several endpoints with their methods and descriptions:

- 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

At the bottom of the page, there is a copyright notice: 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:



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How to create the documentation

We use `mkddocs` and `mkddocsstring`. The code reference and nav entry get's created virtually by the triggered python script `/docs/gen_ref_pages.py` while `mkddocs` `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:

```
mkddocs serve
```

Build static Site:


```
mkdocs build
```