

1: ./solutions/__init__.py

2: ./solutions/domains/__init__.py

3: ./solutions/domains/models/values.py

```
from dataclasses import dataclass
```

```
@dataclass(frozen=True)
```

```
class Symbol:
```

```
    name: str
```

```
@dataclass(frozen=True)
```

```
class Price:
```

```
    value: float
```

```
@dataclass(frozen=True)
```

```
class Volume:
```

```
    value: float
```

```
@dataclass(frozen=True)
```

```
class Weight:
```

```
    value: float
```

4: ./solutions/domains/models/__init__.py

5: ./solutions/domains/models/aggregates.py

```
from dataclasses import dataclass
```

```
from typing import List
```

```
from solutions.domains.models.entities import Asset, Entity
```

```
@dataclass
class Portfolio(Entity):
    assets: List[Asset] = None

    def total_weight(self):
        return sum(asset.weight.value for asset in self.assets)
```

6: ./solutions/domains/models/entities.py

```
from dataclasses import dataclass, field
```

```
from solutions.domains.models.values import Price, Symbol, Weight, Volume
from solutions.utils.numbers import get_id
```

```
@dataclass
class Entity:
    id: int = field(default_factory=get_id().__next__)

    def __eq__(self, other):
        if not isinstance(other, Entity):
            return False
        return self.id == other.id
```

Objets d'Entité

```
@dataclass
class Asset(Entity):
    symbol: Symbol = None
    weight: Weight = None
```

```
@dataclass
class MarketData(Entity):
    symbol: Symbol = None
    price: Price = None
    volume: Volume = None
```

7: ./solutions/domains/services/__init__.py

8: ./solutions/domains/services/market_data.py

```
import asyncio
```

```
import aiohttp as aiohttp
```

```
from solutions.applications.market_data.repositories import \
    MarketDataRepository
```

```
class MarketDataService:
```

```
    @classmethod
```

```
    async def get_market_data_for_assets(cls, assets):
```

```
        async with aiohttp.ClientSession(trust_env=True) as session:
```

```
            tasks = [
```

```
                asyncio.create_task(
```

```
                    MarketDataRepository.get_market_data(
```

```
                        session, asset.symbol.name)) for
```

```
                    asset in assets]
```

```
            return await asyncio.gather(*tasks)
```

```
9: ./solutions/utils/loggers.py
```

```
import datetime
```

```
from pathlib import Path
```

```
from loguru import logger
```

```
log_file = Path(__file__).parents[2] / "logs" /
```

```
    "app_risks_" \
```

```
    f"{datetime.datetime.now().strftime('%Y-%m-%d_%H-%M-%S')}.log"
```

```
log_file.parent.mkdir(parents=True, exist_ok=True)
```

```
# logger.add(sys.stdout, format="{time} {level} {message}", colorize=True)
```

```
logger.add(log_file, format="{time} {level} {message}", colorize=True)
```

```
10: ./solutions/utils/datetime.py
```

```
import datetime
```

```
import time
```

```
utc_now = datetime.datetime.utcnow().replace(tzinfo=datetime.timezone.utc)
```

```
utc_now_tsp: int = int(utc_now.timestamp())
```

```
monotonic_time = time.monotonic()
```

```
if __name__ == '__main__':  
    print(  
        f"Monotonic UTC now: {utc_now.isoformat()} or {utc_now_tsp} "  
        f"({monotonic_time:.3f} seconds since epoch)")
```

11: ./solutions/utils/__init__.py

12: ./solutions/utils/numbers.py

```
import uuid
```

```
def get_id():  
    while True:  
        yield uuid.uuid4()
```

13: ./solutions/infrastructures/__init__.py

14: ./solutions/infrastructures/main.py

```
import threading
```

```
from solutions.infrastructures.external_services.market_data_sqlite3 import \  
    update_market_data  
from solutions.infrastructures.internal_services.market_data_restx_api import \  
    app
```

```
if __name__ == '__main__':  
    t_event = threading.Event()  
    t_extrn = threading.Thread(target=update_market_data, args=(t_event, 60))  
    t_extrn.start()  
    t_intern = threading.Thread(target=app.run, kwargs={'debug': False})  
    t_intern.start()  
  
    t_extrn.join()  
    t_intern.join()
```

15: ./solutions/infrastructures/internal_services/__init__.py

16: ./solutions/infrastructures/internal_services/market_data_restx_api.py

```
import sqlite3

from flask import Flask
from flask_restx import Resource, fields, Api

app: Flask = Flask(__name__)

api = Api(app, version='1.0', title='Market Data API',
          description='API pour récupérer les données de marché')

ns = api.namespace('marketdata',
                  description='Endpoints pour les données de marché')

market_data_model = api.model('MarketData', {
    'symbol': fields.String(required=True,
                           description="Le symbole de l'entreprise"),
    'price': fields.Float(required=True,
                         description="Le prix actuel de l'action"),
    'volume': fields.Integer(required=True,
                           description="Le volume d'actions échangées")
})

@ns.route('/<string:symbol>')
@api.response(404, 'Aucune donnée pour le symbole')
class MarketData(Resource):
    name = 'Market Data'

    @classmethod
    def get_market_data(cls, symbol):
        conn = sqlite3.connect('market_data.db')
        try:
            c = conn.cursor()
            c.execute(f"SELECT * FROM market_data WHERE symbol = '{symbol}' "
                    "ORDER BY timestamp DESC LIMIT 1")
            data = c.fetchone()
        finally:
            conn.close()
        if not data:
```

```

        return None
    return {'symbol': data[0], 'price': data[1], 'volume': data[2]}

@api.doc(responses={
    200: 'Success',
    404: 'Data not found'
})
@ns.marshal_with(market_data_model)
def get(self, symbol):
    print(self.name)
    data = self.get_market_data(symbol)
    if not data:
        api.abort(404, f"Aucune donnée pour le symbole {symbol}")
    return data, 200

if __name__ == '__main__':
    app.run(debug=True)

17: ./solutions/infrastructures/external_services/market_data_sqlite3.py

import random
import sqlite3
import threading
import time

lock = threading.Lock()

market_data_list = [
    {'symbol': 'AAPL', 'price': 150.0, 'volume': 1000000},
    {'symbol': 'GOOGL', 'price': 2500.0, 'volume': 500000},
    {'symbol': 'AAPL', 'price': 155.0, 'volume': 1200000},
    {'symbol': 'GOOGL', 'price': 2525.0, 'volume': 550000},
    {'symbol': 'AAPL', 'price': 157.0, 'volume': 1500000},
    {'symbol': 'GOOGL', 'price': 2550.0, 'volume': 600000},
]

def create_market_data():
    with lock:
        conn = sqlite3.connect('market_data.db')
        cursor = conn.cursor()
        cursor.execute("""
            CREATE TABLE IF NOT EXISTS market_data (

```

```

        symbol TEXT,
        price REAL,
        volume INTEGER,
        timestamp BIGINT
    )
    """
    conn.commit()
    conn.close()

```

```

def update_market_data(event: threading.Event, waiting_time: float = 60.0):
    create_market_data()
    conn = sqlite3.connect('market_data.db')
    c = conn.cursor()
    while True:
        for data in market_data_list:
            c.execute(f"INSERT INTO market_data VALUES "
                      f"('{data['symbol']}', {data['price']}, "
                      f"{data['volume']}, (strftime('%s', 'now') * 1000))")
            conn.commit()
            time.sleep(random.uniform(0.1, 1))
        print(f"update in {waiting_time} seconds...")
        event.wait(waiting_time)

```

```

if __name__ == '__main__':
    t_event = threading.Event()
    t = threading.Thread(target=update_market_data, args=(t_event, 60))
    t.start()
    t.join()

```

18: ./solutions/infrastructures/external_services/__init__.py

19: ./solutions/applications/__init__.py

20: ./solutions/applications/globals/__init__.py

21: ./solutions/applications/globals/contexts.py

```
import asyncio
from datetime import datetime

from solutions.applications.portfolios.contexts import PortfolioContext
from solutions.applications.market_data.events import MarketDataFetched
from solutions.applications.portfolios.factories import MarketDataFactory
from solutions.applications.portfolios.repositories import PortfolioRepository
from solutions.applications.risks.contexts import RiskManagementContext
from solutions.domains.services.market_data import MarketDataService
from solutions.utils.loggers import logger
```

```
# Contexte global ApplicationContext
```

```
class ApplicationContext:
```

```
    def __init__(self):
        self.portfolio_repository = PortfolioRepository()
        self.market_data_repository = MarketDataService()
        self.market_data_factory = MarketDataFactory()
        self.market_data_fetched_handler = self.on_market_data_fetched
        self.portfolio_context = PortfolioContext(
            portfolio_repository=self.portfolio_repository,
            market_data_service=self.market_data_repository,
            market_data_factory=self.market_data_factory,
            market_data_fetched_handler=self.market_data_fetched_handler)
        self.risk_management_context = RiskManagementContext(
            portfolio_context=self.portfolio_context)
```

```
@classmethod
```

```
def on_market_data_fetched(cls, event: MarketDataFetched):
    logger.info(
        f"Received event: {event.symbol.name}, {event.price.value}, "
        f"{event.volume.value} on "
        f"{datetime.fromtimestamp(event.timestamp)}")
```

```
    async def run(self):
        await self.portfolio_context.fetch_market_data()
        portfolio_risk = \
            self.risk_management_context.calculate_portfolio_risk()
        logger.info(f"Portfolio risk: {portfolio_risk}")
```

```
if __name__ == '__main__':
    asyncio.run(ApplicationContext().run())
```


22: ./solutions/applications/market_data/events.py

```
from solutions.domains.models.values import Price, Symbol, Volume
from solutions.utils.dates import utc_now_tsp
```

```
class MarketDataFetched:
    def __init__(self, symbol: Symbol, price: Price, volume: Volume,
                  timestamp: float = utc_now_tsp):
        self.symbol = symbol
        self.price = price
        self.volume = volume
        self.timestamp = timestamp
```

23: ./solutions/applications/market_data/__init__.py

24: ./solutions/applications/market_data/repositories.py

```
import aiohttp
```

```
from solutions.applications.portfolios.factories import MarketDataFactory
```

```
class MarketDataRepository:
    @classmethod
    async def get_market_data(cls, session, symbol):
        url = f"http://localhost:5000/marketdata/{symbol}"
        async with session.get(url) as response:
            if response.status != 200:
                print(response)
                # Handle error response here
                return
            try:
                response_json = await response.json()
            except aiohttp.ContentTypeError:
                print(response_json)
                # Handle unexpected response here
                return
        return MarketDataFactory.create_market_data(
            symbol=symbol,
            price=response_json['price'],
            volume=response_json['volume'])
```

25: ./solutions/applications/portfolios/__init__.py

26: ./solutions/applications/portfolios/factories.py

```
from solutions.domains.models.entities import MarketData
from solutions.domains.models.values import Price, Symbol, Volume
```

```
class MarketDataFactory:
    @classmethod
    def create_market_data(cls, symbol: str, price: float, volume: float):
        return MarketData(symbol=Symbol(symbol), price=Price(price),
                           volume=Volume(volume))
```

27: ./solutions/applications/portfolios/repositories.py

```
from solutions.domains.models.aggregates import Portfolio
from solutions.domains.models.entities import Asset
from solutions.domains.models.values import Symbol, Weight
from solutions.utils.loggers import logger
```

```
class PortfolioRepository:
    def __init__(self, db_connector=None):
        self._db_connector = db_connector
        self._portfolio = self.get()

    @property
    def portfolio(self):
        return self._portfolio

    @property
    def db_connector(self):
        return self._db_connector

    def get(self):
        logger.info("DB Connection for Portfolio fetch")
        logger.debug(self.db_connector or "Mock Portfolio from DB")
        return Portfolio(assets=[
            Asset(symbol=Symbol('AAPL'), weight=Weight(0.5)),
            Asset(symbol=Symbol('GOOGL'), weight=Weight(0.5))])
```

```
def find(self, *args, **kwargs):
```

```
...
```

```
def add(self, *args, **kwargs):
```

```
...
```

```
def remove(self, *args, **kwargs):
```

```
...
```

```
def save(self, *args, **kwargs):
```

```
...
```

28: ./solutions/applications/portfolios/contexts.py

```
from solutions.applications.market_data.events import MarketDataFetched
from solutions.applications.portfolios.factories import MarketDataFactory
from solutions.applications.portfolios.repositories import PortfolioRepository
from solutions.domains.models.values import Symbol
from solutions.domains.services.market_data import MarketDataService
```

Contexte borné PortfolioContext

```
class PortfolioContext:
```

```
    def __init__(self, portfolio_repository: PortfolioRepository,
                  market_data_service: MarketDataService,
                  market_data_factory: MarketDataFactory,
                  market_data_fetched_handler):
```

```
        self.portfolio_repository = portfolio_repository
```

```
        self.market_data_service = market_data_service
```

```
        self.market_data_factory = market_data_factory
```

```
        self.portfolio = None
```

```
        self.market_data = {}
```

```
        self._market_data_fetched_handler = market_data_fetched_handler
```

```
    async def fetch_market_data(self):
```

```
        self.portfolio = self.portfolio_repository.portfolio
```

```
        market_data = \
```

```
            await self.market_data_service.get_market_data_for_assets(
                self.portfolio.assets)
```

```
        for md in market_data:
```

```
            self.market_data[md.symbol.name] = md
```

```
            self._market_data_fetched_handler(MarketDataFetched(
                md.symbol, md.price, md.volume))
```

```
def get_market_data(self, symbol: Symbol):  
    return self.market_data[symbol.name]
```

```
def calculate_risk(self) -> float:  
    return sum(asset.weight.value  
                * self.market_data[asset.symbol.name].price.value  
                / self.market_data[asset.symbol.name].volume.value  
                for asset in self.portfolio.assets) / self.total_weight()
```

```
def total_weight(self):  
    return self.portfolio.total_weight()
```

29: ./solutions/applications/risks/__init__.py

30: ./solutions/applications/risks/contexts.py

```
from solutions.applications.portfolios.contexts import PortfolioContext
```

```
# Contexte borné RiskManagementContext
```

```
class RiskManagementContext:
```

```
    def __init__(self, portfolio_context: PortfolioContext):  
        self.portfolio_context = portfolio_context
```

```
    def calculate_portfolio_risk(self) -> float:  
        return self.portfolio_context.calculate_risk()
```