Design

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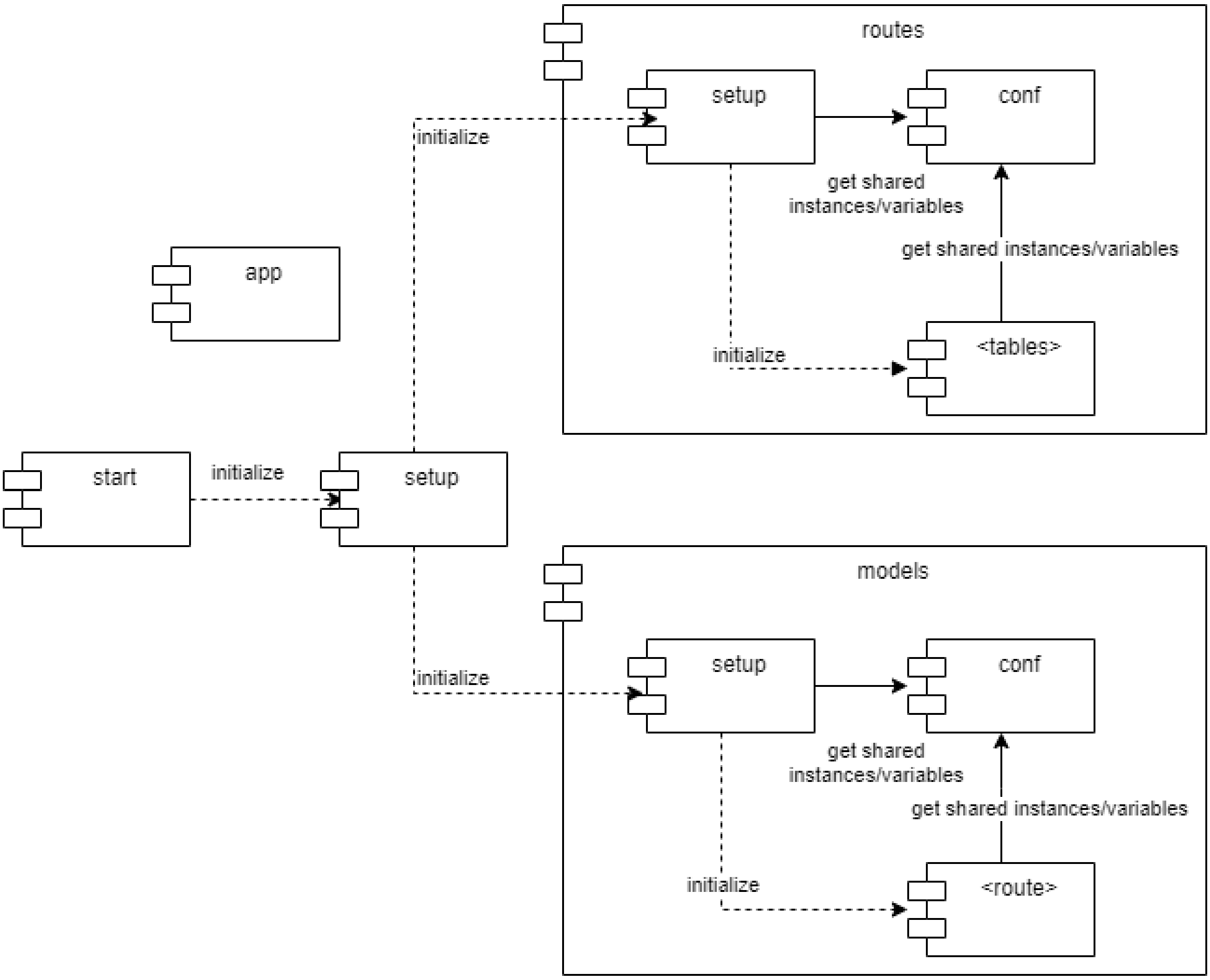
Database Design

- The DB is in-memory sqlite database.

Table: task

Column Name	Data Type	Primary Key
id	integer	O
name	string	X
status	boolean	X

Architecture


routes
setup
conf
initialize
get shared instances/variables
get shared instances/variables
initialize
<tables>
app
start
initialize
setup
models
setup
conf
initialize
get shared instances/variables
get shared instances/variables
initialize
<route>

The architecture separates routes (for API) and models (for database) into modules.

Each module has *conf.py* which defines shared variables and *setup.py* which initializes routes/models by importing. (<*table*>/<*route*> stands for implementation of tables/routes (e.g., *tasks.py* in models and routes))

Since <*table*>/<*route*> and *setup* require shared variables and *setup.py* import <*table*>/<*route*> for initialization, the separation of *conf.py* and *setup.py* avoids circular import. Due to the same reason, flask app instance is created in *app.py* which are imported by almost all Flask codes.

The execution of the web server follows the similar pattern.

start.py initializes the whole server by importing *setup.py* which later imports *routes/setup.py* and *models/setup.py*. And then *start.py* start the server.

Containerization

The server is containerized in docker image with following port configuration.

- Run server on 58080 port in container
- Expose 58080 port of the container
- Publish 58080 port of the container on 58080 port of host

Dockerfile defines 2 stages of image

- server: run the server
- unit-test: test the server code

Web APIs

Since the specification of web APIs is not complete and RESTful, the API design is refined as below. In addition, some error message are designed when the requests fail. Request and response data are shown below the following table.

url	method	request data	response code	response data	usage & meaning
/tasks	GET		200	Get_All_Response	Get all tasks
/tasks	POST	Post_Request	201	Post_Response	Create a task
			500	Error_Message	Failed in task creation
/tasks/<id>	GET		200	Get_Response	Get the task of the specific id
			404	Error_Message	No task of such id in task getting
			500	Error_Message	Failed in task getting
/tasks/<id>	PUT	Put_Request	200	Put_Response	Update the task of the specific id
			404	Error_Message	No task of such id in task update

url	method	request data	response code	response data	usage & meaning
			500	Error_Message	Failed in task update
/tasks/<id>	DELETE		200	Delete_Response	Delete the task of the specific id
			404	Error_Message	No task of such id in task deletion
			500	Error_Message	Failed in task deletion

Data Definition

- Get_All_Response

```
{
    "result": [
        {"id": 1, "name": "name", "status": 0}
    ]
}
```

- Post_Request

```
{
  "name": "買晚餐"
}
```

- Post_Response

```
{
    "result": {"name": "買晚餐", "status": 0, "id": 1}
}
```

- Error_Message

```
{
    "message": "description of error"}
}
```

- Get_Response

```
{
    "result": {
        "id": 1, "name": "name", "status": 0
    }
}
```

- Put_Request

```
{
    "name": "買早餐",
    "status": 1,
    "id": 1
}
```

- Put_Response

```
{
  "name": "買早餐",
  "status": 1,
  "id": 1
}
```

- Delete_Response

```
{
  "result": true
}
```

Testing

- Use pytest to run unit tests defined in *tests*.
- Use GitHub CI to run test after every push to any branch.

Environment and Dependencies

- python==3.9.1
- pipenv==2020.11.15
- packages for server running
  - flask-restx==0.5.1 (use flask==2.0.2) Since Flask no longer provides updates for 1.x.x, the server use Flask 2.x.x
  - flask-sqlalchemy==2.5.1
- packages for testing
  - pytest==6.2.5

- packages for development
    - autopep8==1.5.7
    - pylint==2.11.1
- docker==20.10.8
- docker-compose==2.0.0