ASSIGNMENT 3 – LAB 5: HTTP and REST API

MAIN TOPICS: HTTP, API AND RESTful API. Context: servcie-oriented software architecture and resource-based approacj, Flask and UUID.

Objective:

Write the python code to run a Flask server exposing a REST API that allows the creation/modification/deletion of resources offered by a "random response time" web application. Each resource must represent a generator of response times following a given random distribution, with specified parameter(s), mimicking the diverse computation time of some web application server.

The user must be able to call the given resource and generate a random response time, which must be emulated with a random sleep interval or by running a CPU-intensive task. An example of how to run a CPU-intensive task for a specified time interval is shown in the code snipped below:

```python
import time

interval = 3.4333  # Assumed to be randomly generated
start_time = time.time()
while time.time() - start_time < interval:
    x = time.time() - start_time
    x = float(x) / 3.141592  # Dividing x by Pi
    x = float(3.141592) / x  # Dividing the number Pi by x
```

The resource endpoint must be defined according to a RESTful standard scheme and must support the four CRUD operations. At least the following random response time distributions must be implemented:

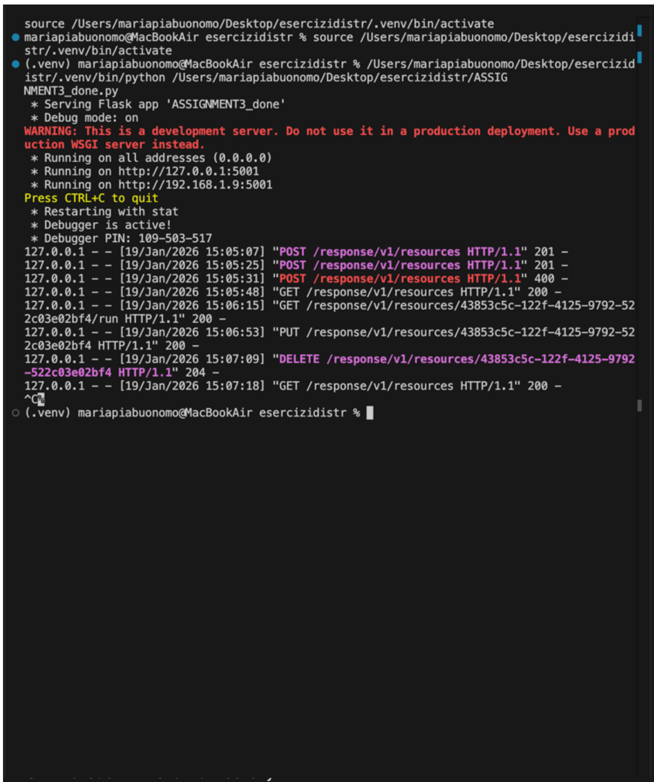
- deterministic (parameter: fixed response time)
- uniform within an interval `[0:T]` (parameter: size of the interval)
- exponential (parameter: mean response occurrence rate)

The resource descriptor must be structured in this way:

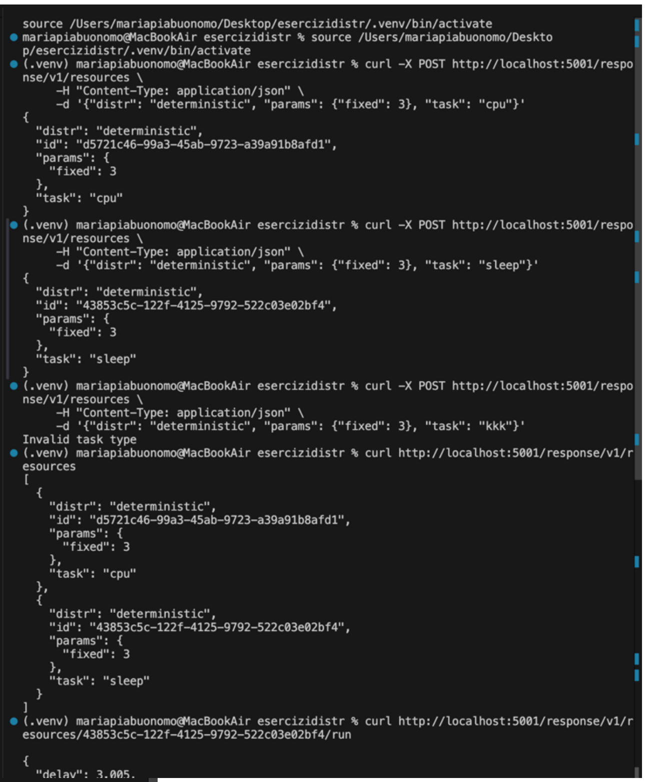
```
   {"id" : "String -> UUID generated by the server upon resource creation",
   "distr" : "String -> Type of the random response time distribution for this
resource",
   "params" : {} "Dictionary -> Name and value of each parameter required by the
specified random distribution type",
   "task" : "String -> Type of task to be run within each randomly generated
interval, either sleep or CPU-intensive"
   }
```

For each resource created, an execution endpoit must be defined that the user can call (e.g. using cURL) to make the server run an instance of the response time generated by the specified resource.

OBSERVATIONS

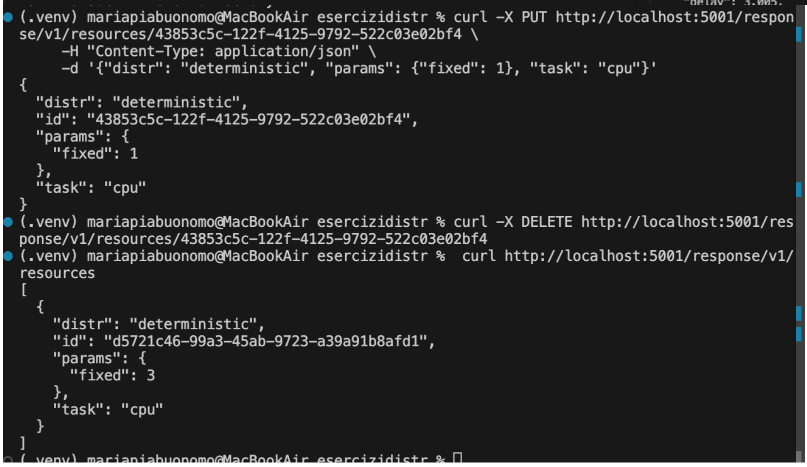


```
source /Users/mariapiabuonomo/Desktop/esercizidistr/.venv/bin/activate
mariapiabuonomo@MacBookAir esercizidistr % source /Users/mariapiabuonomo/Desktop/esercizidi
str/.venv/bin/activate
(.venv) mariapiabuonomo@MacBookAir esercizidistr % /Users/mariapiabuonomo/Desktop/esercizid
istr/.venv/bin/python /Users/mariapiabuonomo/Desktop/esercizidistr/ASSIG
NMENT3_done.py
 * Serving Flask app 'ASSIGNMENT3_done'
 * Debug mode: on
WARNING: This is a development server. Do not use it in a production deployment. Use a prod
uction WSGI server instead.
 * Running on all addresses (0.0.0.0)
 * Running on http://127.0.0.1:5001
 * Running on http://192.168.1.9:5001
Press CTRL+C to quit
 * Restarting with stat
 * Debugger is active!
 * Debugger PIN: 109-503-517
127.0.0.1 - - [19/Jan/2026 15:05:07] "POST /response/v1/resources HTTP/1.1" 201 -
127.0.0.1 - - [19/Jan/2026 15:05:25] "POST /response/v1/resources HTTP/1.1" 201 -
127.0.0.1 - - [19/Jan/2026 15:05:31] "POST /response/v1/resources HTTP/1.1" 400 -
127.0.0.1 - - [19/Jan/2026 15:05:48] "GET /response/v1/resources HTTP/1.1" 200 -
127.0.0.1 - - [19/Jan/2026 15:06:15] "GET /response/v1/resources/43853c5c-122f-4125-9792-52
2c03e02bf4/run HTTP/1.1" 200 -
127.0.0.1 - - [19/Jan/2026 15:06:53] "PUT /response/v1/resources/43853c5c-122f-4125-9792-52
2c03e02bf4 HTTP/1.1" 200 -
127.0.0.1 - - [19/Jan/2026 15:07:09] "DELETE /response/v1/resources/43853c5c-122f-4125-9792
-522c03e02bf4 HTTP/1.1" 204 -
127.0.0.1 - - [19/Jan/2026 15:07:18] "GET /response/v1/resources HTTP/1.1" 200 -
^C%
(.venv) mariapiabuonomo@MacBookAir esercizidistr %
```



```
source /Users/mariapiabuonomo/Desktop/esercizidistr/.venv/bin/activate
mariapiabuonomo@MacBookAir esercizidistr % source /Users/mariapiabuonomo/Deskto
p/esercizidistr/.venv/bin/activate
(.venv) mariapiabuonomo@MacBookAir esercizidistr % curl -X POST http://localhost:5001/respo
nse/v1/resources \
     -H "Content-Type: application/json" \
     -d '{"distr": "deterministic", "params": {"fixed": 3}, "task": "cpu"}'
{
  "distr": "deterministic",
  "id": "d5721c46-99a3-45ab-9723-a39a91b8afd1",
  "params": {
    "fixed": 3
  },
  "task": "cpu"
}
(.venv) mariapiabuonomo@MacBookAir esercizidistr % curl -X POST http://localhost:5001/respo
nse/v1/resources \
     -H "Content-Type: application/json" \
     -d '{"distr": "deterministic", "params": {"fixed": 3}, "task": "sleep"}'
{
  "distr": "deterministic",
  "id": "43853c5c-122f-4125-9792-522c03e02bf4",
  "params": {
    "fixed": 3
  },
  "task": "sleep"
}
(.venv) mariapiabuonomo@MacBookAir esercizidistr % curl -X POST http://localhost:5001/respo
nse/v1/resources \
     -H "Content-Type: application/json" \
     -d '{"distr": "deterministic", "params": {"fixed": 3}, "task": "kkk"}'
Invalid task type
(.venv) mariapiabuonomo@MacBookAir esercizidistr % curl http://localhost:5001/response/v1/r
esources
[
  {
    "distr": "deterministic",
    "id": "d5721c46-99a3-45ab-9723-a39a91b8afd1",
    "params": {
      "fixed": 3
    },
    "task": "cpu"
  },
  {
    "distr": "deterministic",
    "id": "43853c5c-122f-4125-9792-522c03e02bf4",
    "params": {
      "fixed": 3
    },
    "task": "sleep"
  }
]
(.venv) mariapiabuonomo@MacBookAir esercizidistr % curl http://localhost:5001/response/v1/r
esources/43853c5c-122f-4125-9792-522c03e02bf4/run

{
  "delay": 3.005,
```



```
(.venv) mariapiabuonomo@MacBookAir esercizidistr % curl -X PUT http://localhost:5001/respon
se/v1/resources/43853c5c-122f-4125-9792-522c03e02bf4 \
     -H "Content-Type: application/json" \
     -d '{"distr": "deterministic", "params": {"fixed": 1}, "task": "cpu"}'
{
  "distr": "deterministic",
  "id": "43853c5c-122f-4125-9792-522c03e02bf4",
  "params": {
    "fixed": 1
  },
  "task": "cpu"
}
(.venv) mariapiabuonomo@MacBookAir esercizidistr % curl -X DELETE http://localhost:5001/res
ponse/v1/resources/43853c5c-122f-4125-9792-522c03e02bf4
(.venv) mariapiabuonomo@MacBookAir esercizidistr %  curl http://localhost:5001/response/v1/
resources
[
  {
    "distr": "deterministic",
    "id": "d5721c46-99a3-45ab-9723-a39a91b8afd1",
    "params": {
      "fixed": 3
    },
    "task": "cpu"
  }
]
(.venv) mariapiabuonomo@MacBookAir esercizidistr %
```

1st 201: POST, it's the dispatch of the information on the web page. The 2nd 201 refers to the tested change of task from cpu to sleep. When I tried to put a random task it gave back the error I've implemented in the code: 400 stands for Bad Request.

In the GET I wanted to see if all the resources were as I programmed and the second refers to the update of one of them (200 ok there). I tried the PUT and DELETE (store of the request and cancellation). Last check to see if all went right.