Cloud Computing - Mini Project Report
Breaking Down Monoliths
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Short Description and Scope of the Project

- The first task of the project involves adding the required modules to the requirements file, and then writing a Dockerfile in order to deploy a Docker container which runs the Flask application.
- The next task is to debug the following issues in a web based calculator application
    - Python treating the inputs as strings, hence the arithmetic operations not working as expected
    - Since by default there are no values in each field, a None type exception is raised
- The next task is “breaking the monolith”; that is splitting each of the calculator’s functions into separate flask applications, so that each function may work as required when the main landing service goes down.
- Then we added 7 more services, namely:
    - LCM
    - GCD
    - Modulus
    - Less Than
    - Greater Than
    - Exponent
    - Equals
- The project is written in a very modular fashion, hence can be extended to add more functionality with minimal effort.

Methodology

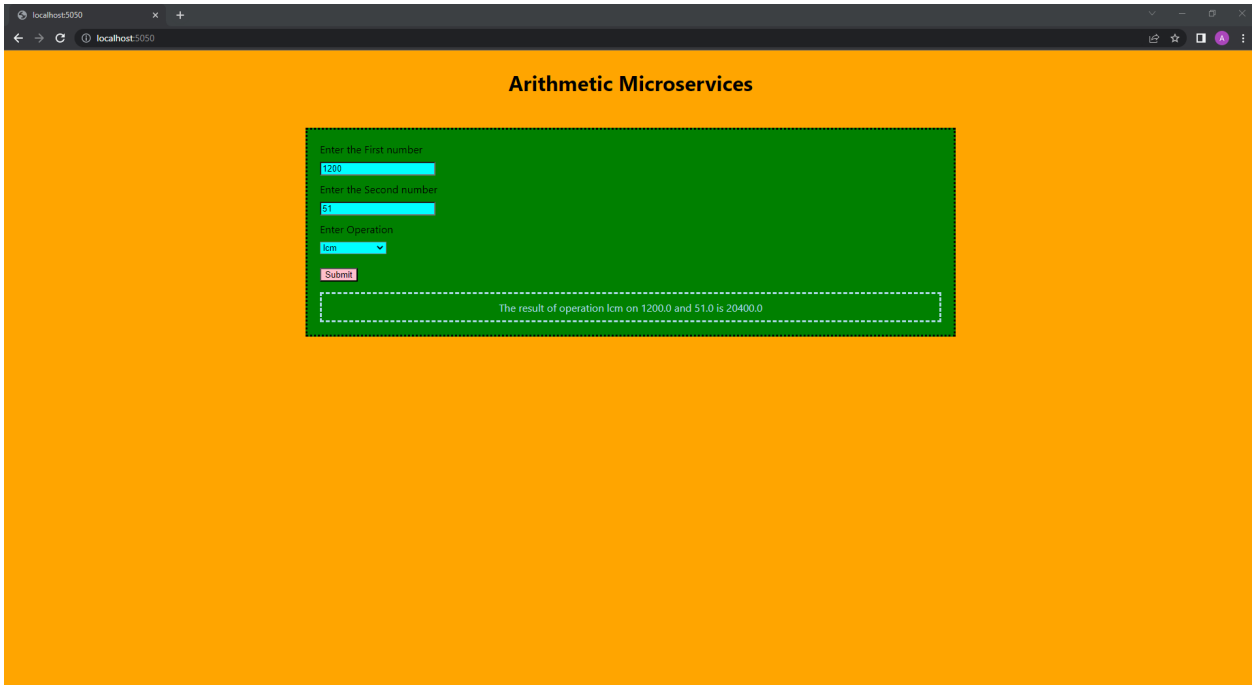
- We split each microservice into a separate flask application, that ran on different port numbers
- In order to achieve modularity, mapping of ports and functions is done by simply adding an entry to a python dictionary

```
operation_mapping = {
    "add": {
        "operation": "addition",
        "port": 5051,
        "method": "add",
    },
    "subtract": {
        "operation": "subtraction",
        "port": 5052,
        "method": "sub"
    },
    "multiply": {
        "operation": "multiplication",
        "port": 5053,
        "method": "mul"
    },
    "divide": {
        "operation": "division",
        "port": 5054,
        "method": "div"
    },
    "gcd": {
        "operation": "gcd",
        "port": 5055,
        "method": "gcd"
```

- The application takes the numbers and function as input from the landing page, and then sends a POST request to the appropriate URL.
- The response, which contains the result of applying the function on the inputs, is received by the landing page and displayed.
- Any errors raised, for example by inappropriate input, would be caught and displayed.

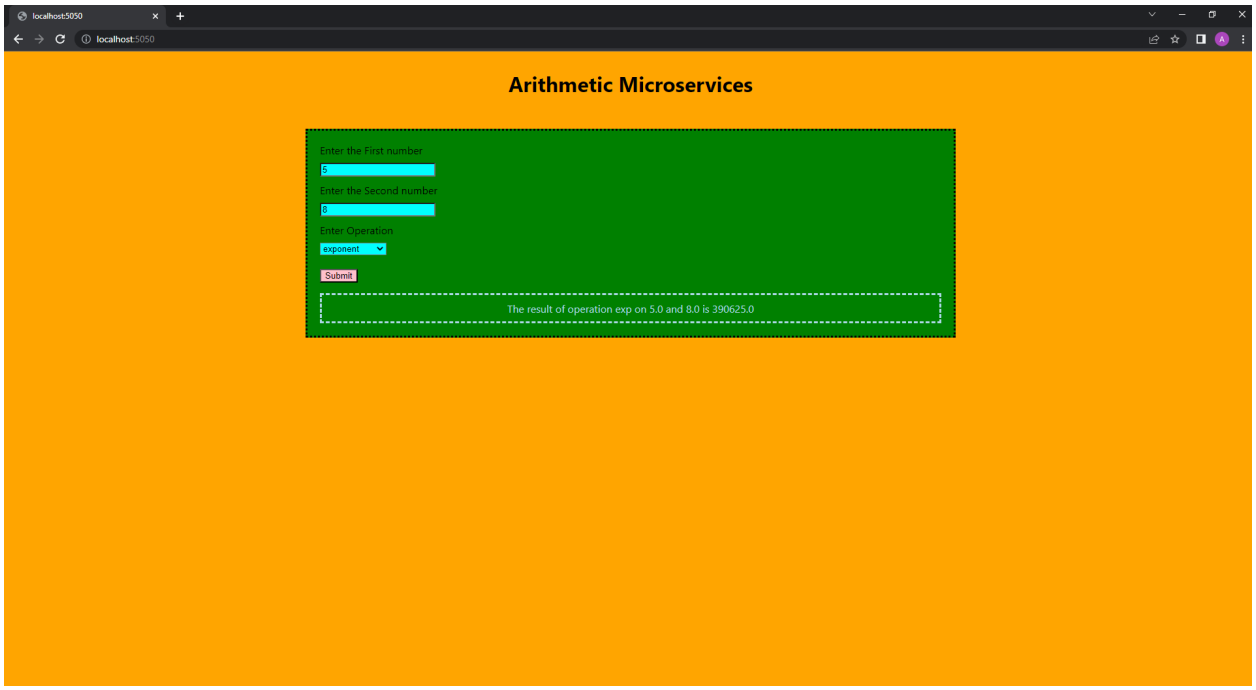
Testing

LCM operation

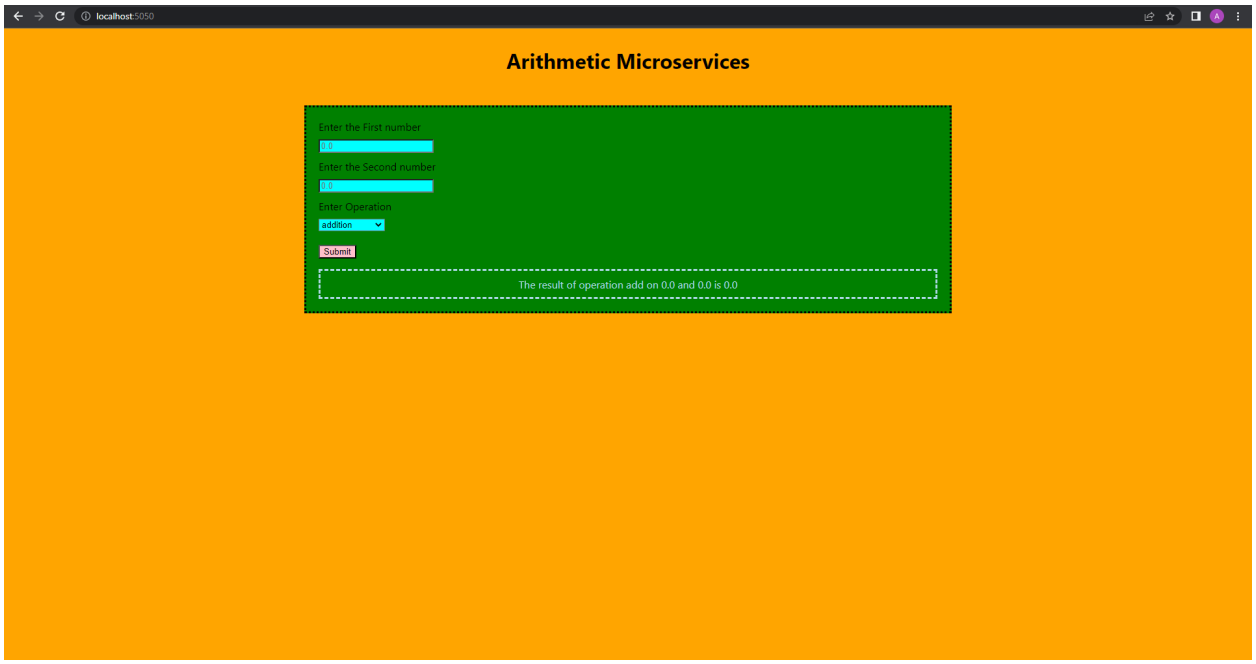


Multiplication operation

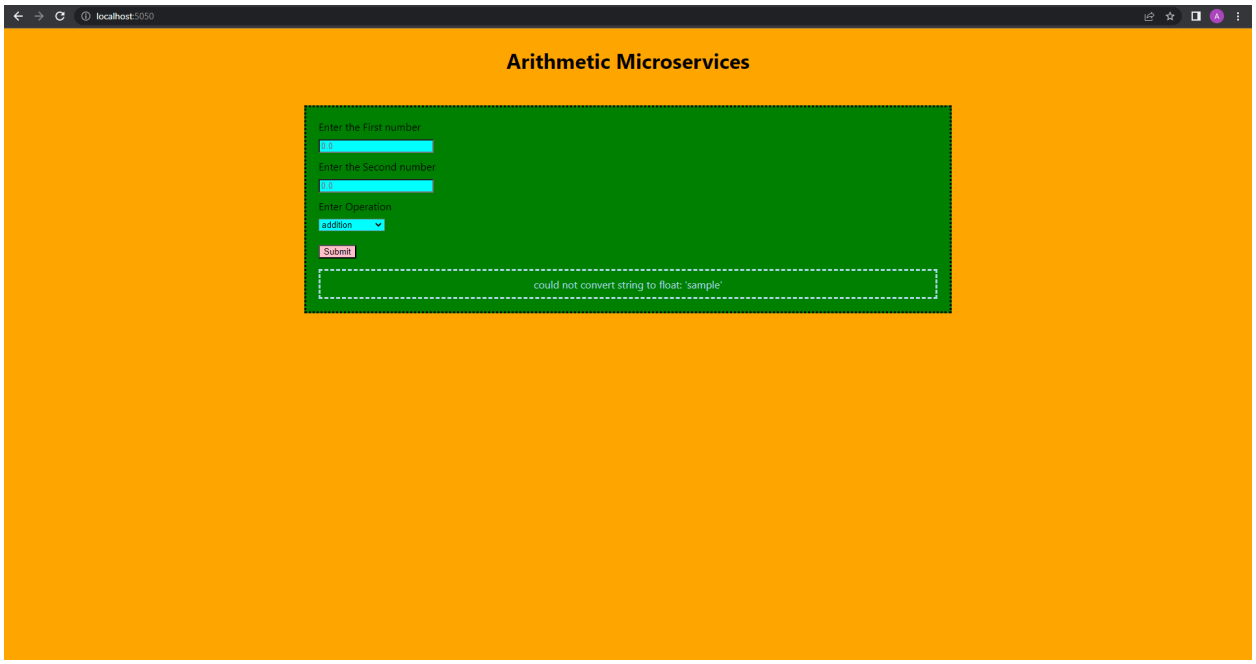
Exponent operation



Default value of 0 taken when no input provided



Error raised when string provided as input



Zero Division error

Results and Conclusions

- The monolithic application has been broken down into simpler microservices enabling us to extend the application to multiple services.
- The initial services (addition, subtraction, multiplication and division) have been split into their own services that will process the data it receives from the landing service and return the result.
- Some simple error handling has been done to ensure that the error message is displayed when an error occurs.
- The addition, subtraction, multiplication and division microservices work as expected.
- Additional services such as modulus, gcd, lcm etc. were added to extend the functionality of the application.
- The extra services added have also been modularized and work as expected.

Hence we conclude that breaking down a complex app into separate microservices helps increase readability, ability to debug, extendability, high flexibility etc.