

DOS Project Part#1

We used node js and npm must download to use node, and we used nodemon package for Hot-Reload.

Docker must be downloaded, to run our containers:

`docker-compose up -d --build` → to build all containers

`docker-compose down` → to stop all containers

If we want to display the running Containers currently, we type:

`docker ps`

To Interact with our Container from Terminal:

`docker exec -it container_name bash`

Sqlite3 database must be downloaded, to dealing with Database:

`sqlite> .tables;`

`sqlite> SELECT * FROM tablename;`

We create 3 Services, 2 for Backend servers: Catalog & Order, 1 for Frontend Client Service. we create Dockerfile, to create our containers.

- **catalog-service**
it contains 3 Requests: search by book topic, info by item number and purchase book
- **order-service**
it contains purchase request
- `localhost:3005/search/:bookTopic`
`localhost:3005/info/:itemNumber`
`localhost:3006/purchase`

SQL ▾

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id	bookTopic	numberOfItems	bookCost	bookTitle
1	Distributed System	48	200	How to get a good grade in DOS in 40 minutes a day
2	Distributed System	44	150	RPCs for Noobs.
3	Undergraduate School	32	100	Xen and the Art of Surviving Undergraduate School
4	Undergraduate School	26	90	Cooking for the Impatient Undergrad

PROBLEMS

OUTPUT

DEBUG CONSOLE

TERMINAL

PORTS

```
PS C:\Users\Engineer\Desktop\DOS_Project_Part1\src\client-service> node index.mjs
Usage: CLI [options] [command]

CLI for DOS Project

Options:
  -V, --version          output the version number
  -h, --help             display help for command

Commands:
  search-book-title|search  search about specific book using book topic
  info-book-item-number|info  info about specific book using item number
  purchase-book-by-item-number|purchase  purchase specific book using item number
  help [command]           display help for command
PS C:\Users\Engineer\Desktop\DOS_Project_Part1\src\client-service>
```

This is the table of books in Database and its columns. The command used for each service

node index.mjs purchase

node index.mjs info

node index.mjs search

Now, Let's test each part of our code:

search(topic) - which allows the user to specify a topic and returns all entries belonging to that category (a title and an item number are displayed for each match).

currently all books belong to one of two topics: distributed systems and undergraduate school.

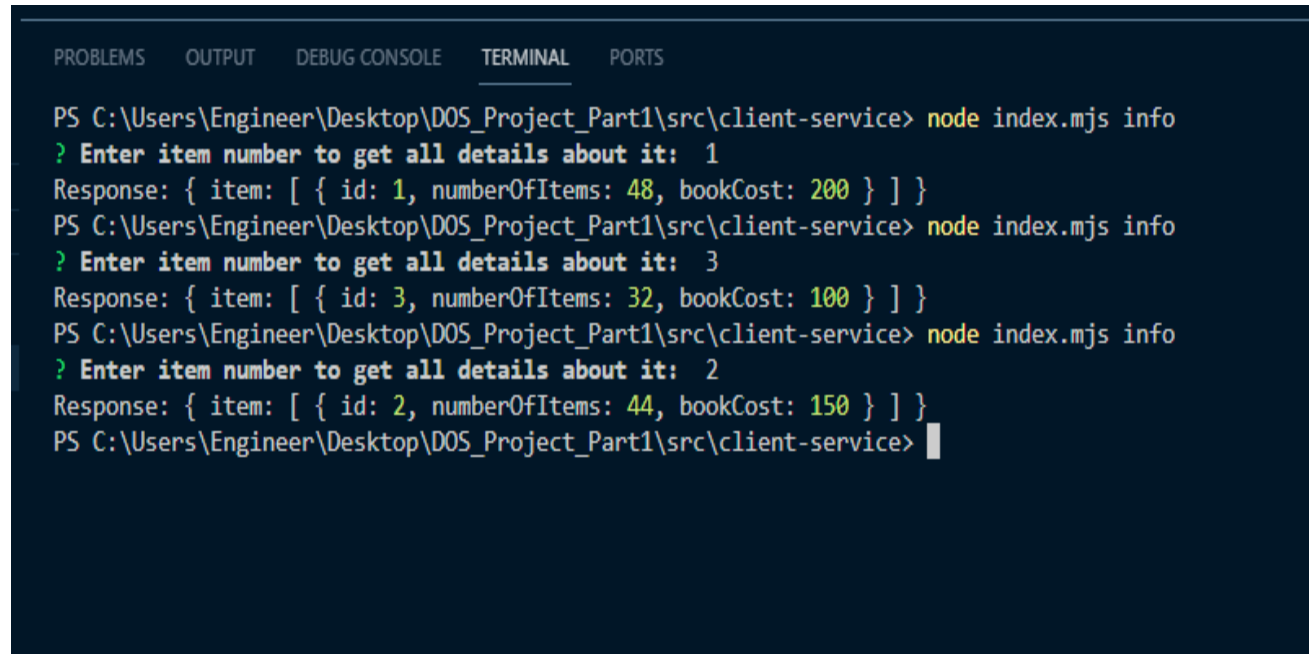
```
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS

PS C:\Users\Engineer\Desktop\DOS_Project_Part1\src\client-service> node index.mjs search
? Enter topic to get all books belonging to that: Distributed System
Response: {
  items: [
    {
      id: 1,
      bookTopic: 'Distributed System',
      numberOfItems: 48,
      bookCost: 200,
      bookTitle: 'How to get a good grade in DOS in 40 minutes a day'
    },
    {
      id: 2,
      bookTopic: 'Distributed System',
      numberOfItems: 44,
      bookCost: 150,
      bookTitle: 'RPCs for Noobs.'
    }
  ]
}
```

```
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS

PS C:\Users\Engineer\Desktop\DOS_Project_Part1\src\client-service> node index.mjs search
? Enter topic to get all books belonging to that: Undergraduate School
Response: {
  items: [
    {
      id: 3,
      bookTopic: 'Undergraduate School',
      numberOfItems: 32,
      bookCost: 100,
      bookTitle: 'Xen and the Art of Surviving Undergraduate School'
    },
    {
      id: 4,
      bookTopic: 'Undergraduate School',
      numberOfItems: 26,
      bookCost: 90,
      bookTitle: 'Cooking for the Impatient Undergrad'
    }
  ]
}
```

info(item_number) - which allows an item number to be specified and returns details such as number of items in stock and cost.



```
PS C:\Users\Engineer\Desktop\DOS_Project_Part1\src\client-service> node index.mjs info
? Enter item number to get all details about it: 1
Response: { item: [ { id: 1, numberOfItems: 48, bookCost: 200 } ] }
PS C:\Users\Engineer\Desktop\DOS_Project_Part1\src\client-service> node index.mjs info
? Enter item number to get all details about it: 3
Response: { item: [ { id: 3, numberOfItems: 32, bookCost: 100 } ] }
PS C:\Users\Engineer\Desktop\DOS_Project_Part1\src\client-service> node index.mjs info
? Enter item number to get all details about it: 2
Response: { item: [ { id: 2, numberOfItems: 44, bookCost: 150 } ] }
PS C:\Users\Engineer\Desktop\DOS_Project_Part1\src\client-service>
```

The catalog server supports two operations: query and update. Two types of queries are supported: query-by-subject and query-by-item. In the first case, a topic is specified and the server returns all matching entries. In the second case, an item is specified and all relevant details are returned. The update operation allows the cost of an item to be updated or the number of items in stock to be increased or decreased.

The order server supports a single operation: purchase(item_number). Upon receiving a purchase request, the order server must first verify that the item is in stock by querying the catalog server and then decrement the number of items in stock by one. The purchase request can fail if the item is out of stock.

purchase(item_number) - which specifies an item number for purchase.

recieve item number & order cost from CLI (frontend) then send them to catalog service using axios post request.

When a book is purchased, the data base changes so that a book is deducted from the stock.

SQL ▾

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id	bookTopic	numberOfItems	bookCost	bookTitle
1	Distributed System	46	200	How to get a good grade in DOS in 40 minutes a day
2	Distributed System	44	150	RPCs for Noobs.
3	Undergraduate School	32	100	Xen and the Art of Surviving Undergraduate School
4	Undergraduate School	26	90	Cooking for the Impatient Undergrad

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS

```
PS C:\Users\Engineer\Desktop\DOS_Project_Part1\src\client-service> node index.mjs purchase
? Enter item number to purchase it: 1
? Enter amount of money to pay: 200
Response: { message: 'Send Request To Catalog Server' }
PS C:\Users\Engineer\Desktop\DOS_Project_Part1\src\client-service> node index.mjs purchase
? Enter item number to purchase it: 1
? Enter amount of money to pay: 200
Response: { message: 'Send Request To Catalog Server' }
PS C:\Users\Engineer\Desktop\DOS_Project_Part1\src\client-service> █
```

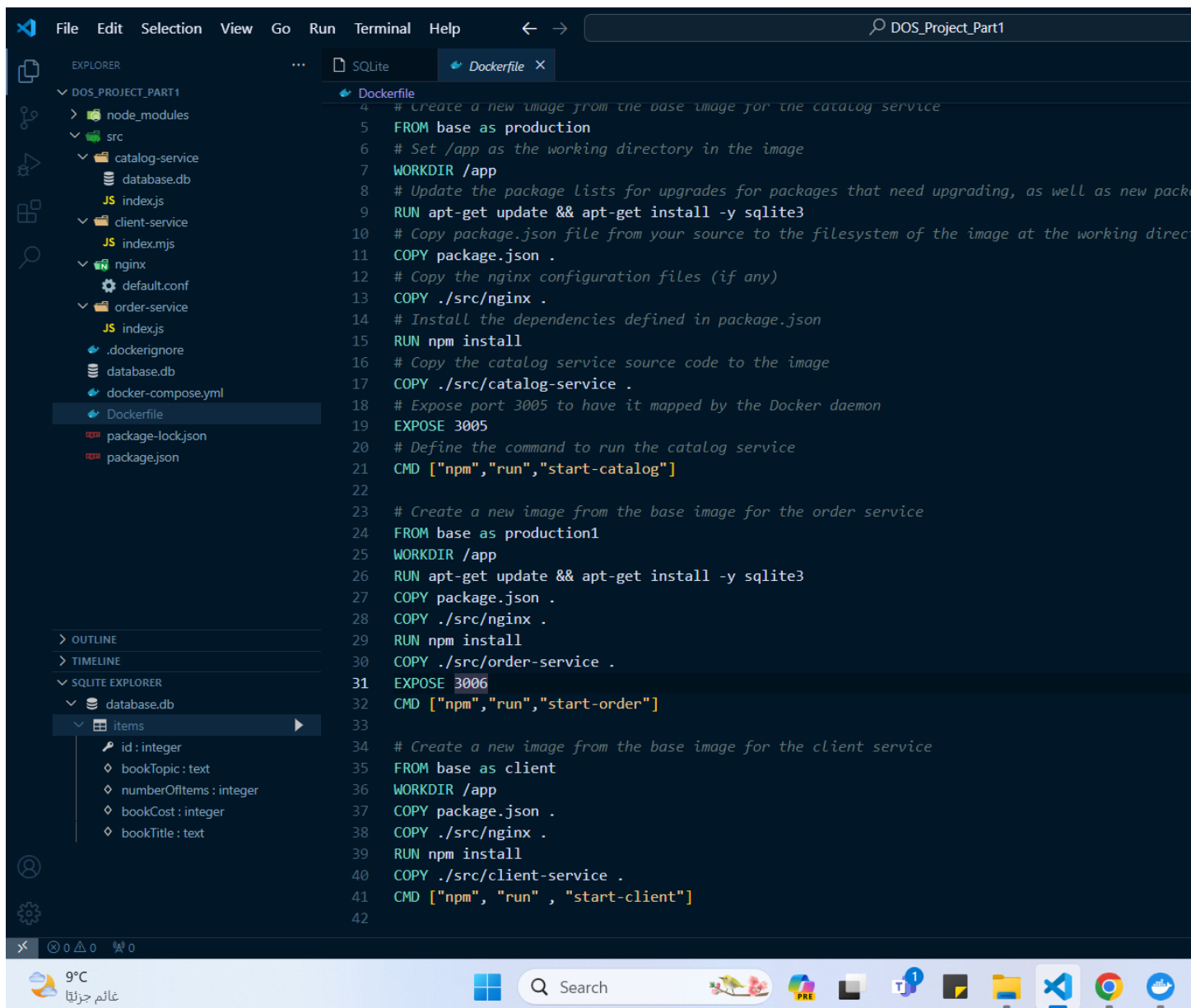
SQL ▾

< 1 / 1 > 1 - 4 of 4

id	bookTopic	numberOfItems	bookCost	bookTitle
1	Distributed System	46	200	How to get a good grade in DOS in 40 minutes a day
2	Distributed System	43	150	RPCs for Noobs.
3	Undergraduate School	32	100	Xen and the Art of Surviving Undergraduate School
4	Undergraduate School	26	90	Cooking for the Impatient Undergrad

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS

```
PS C:\Users\Engineer\Desktop\DOS_Project_Part1\src\client-service> node index.mjs purchase
? Enter item number to purchase it: 1
? Enter amount of money to pay: 200
Response: { message: 'Send Request To Catalog Server' }
PS C:\Users\Engineer\Desktop\DOS_Project_Part1\src\client-service> node index.mjs purchase
? Enter item number to purchase it: 1
? Enter amount of money to pay: 200
Response: { message: 'Send Request To Catalog Server' }
PS C:\Users\Engineer\Desktop\DOS_Project_Part1\src\client-service> node index.mjs purchase
? Enter item number to purchase it: 2
? Enter amount of money to pay: 150
Response: { message: 'Send Request To Catalog Server' }
PS C:\Users\Engineer\Desktop\DOS_Project_Part1\src\client-service> █
```



```
4 # Create a new image from the base image for the catalog service
5 FROM base as production
6 # Set /app as the working directory in the image
7 WORKDIR /app
8 # Update the package lists for upgrades for packages that need upgrading, as well as new packages
9 RUN apt-get update && apt-get install -y sqlite3
10 # Copy package.json file from your source to the filesystem of the image at the working directory
11 COPY package.json .
12 # Copy the nginx configuration files (if any)
13 COPY ./src/nginx .
14 # Install the dependencies defined in package.json
15 RUN npm install
16 # Copy the catalog service source code to the image
17 COPY ./src/catalog-service .
18 # Expose port 3005 to have it mapped by the Docker daemon
19 EXPOSE 3005
20 # Define the command to run the catalog service
21 CMD ["npm", "run", "start-catalog"]
22
23 # Create a new image from the base image for the order service
24 FROM base as production1
25 WORKDIR /app
26 RUN apt-get update && apt-get install -y sqlite3
27 COPY package.json .
28 COPY ./src/nginx .
29 RUN npm install
30 COPY ./src/order-service .
31 EXPOSE 3006
32 CMD ["npm", "run", "start-order"]
33
34 # Create a new image from the base image for the client service
35 FROM base as client
36 WORKDIR /app
37 COPY package.json .
38 COPY ./src/nginx .
39 RUN npm install
40 COPY ./src/client-service .
41 CMD ["npm", "run", "start-client"]
42
```

SQLITE EXPLORER

- database.db
 - items
 - id : integer
 - bookTopic : text
 - numberOfItems : integer
 - bookCost : integer
 - bookTitle : text

This Dockerfile contains 3 parts for each service. Docker builds images automatically by reading the instructions from a Dockerfile, which is a text file that contains all commands, in order, needed to build a given image. A Dockerfile adheres to a specific format and set of instructions which you can find at Dockerfile reference.

Use a Dockerfile to define your app's environment so it can be reproduced anywhere. Define the services that make up your app in docker-compose.yml so you can run them together in an isolated environment. Use docker compose up and Docker compose command to start and run your entire app.

The screenshot shows the VS Code interface with a REST client request in the left pane and a PowerShell terminal in the right pane.

REST Client Request:

- Method: POST
- URL: `http://localhost:3006/purch`
- Body: `1`
- Headers: `raw` (JSON)
- Buttons: `Send`, `Save`, `Send` (dropdown)
- Buttons: `Params`, `Auth`, `Headers (7)`, `Body`, `Pre-req.`, `Tests`, `Settings`, `Cookies`, `Beautiful`
- Buttons: `Save as example`

PowerShell Terminal Output:

```
PS C:\Users\Legion\Desktop\DOS\DOS_Project\src\client-service> node index.mjs i
? please enter items number to get info about it: 1
Response Data: { item: [ { id: 1, numberOfItems: 836, bookCost: 3000 } ] }
PS C:\Users\Legion\Desktop\DOS\DOS_Project\src\client-service> node index.mjs i
? please enter items number to get info about it: 2
Response Data: { item: [ { id: 2, numberOfItems: 9, bookCost: 1500 } ] }
PS C:\Users\Legion\Desktop\DOS\DOS_Project\src\client-service> node index.mjs i
? please enter items number to get info about it: 3
Response Data: { item: [ { id: 3, numberOfItems: 5, bookCost: 1000 } ] }
PS C:\Users\Legion\Desktop\DOS\DOS_Project\src\client-service> node index.mjs i
? please enter items number to get info about it: 4
Response Data: { item: [ { id: 4, numberOfItems: 15, bookCost: 900 } ] }
PS C:\Users\Legion\Desktop\DOS\DOS_Project\src\client-service> node index.mjs p
? please enter book item number to purchase it: 1
? Enter amount of money to pay: 10000
Response Data: { message: 'Send Request To Catalog' }
PS C:\Users\Legion\Desktop\DOS\DOS_Project\src\client-service>
```

A yellow arrow points to the `'Send Request To Catalog'` message in the terminal output.

```
16
17 // Define a POST endpoint for making a purchase
18 app.post("/purch", async (req, res) => {
19   // Extract order details from the request body
20   const order = {
21     id: req.body.id, // Extract book ID
22     orderCost: req.body.orderCost, // Extract order cost
23   };
24
25   try {
26     // Make a POST request to the catalog server to process the order
27     const response = await axios.post(
28       `http://catalog-server:3005/order`, // URL of the catalog server
29       order // Data to be sent in the request body
30     );
31
32     // Log the response from the catalog server
33     console.log(response.data);
34
35     // Send a response indicating that the request was successfully sent to the catalog server
36     res.send({ message: "Send Request To Catalog Server" });
37   } catch (err) {
38     // Log any errors that occur during the request
39     console.log(err);
40
41     // Send an error response with status code 400 if an error occurs
42     res.status(400).send({ error: err });
43   }
44 };
45
46 // Start the server and listen on the specified port
47 app.listen(port, () => {
48   console.log(`Server is running on http://localhost:${port}`);
49 });
50
```

The benefit of the Bazar.com project lies in its implementation of a lightweight, distributed online book store using microservices architecture and RESTful APIs.

In conclusion, the Bazar.com project demonstrates the design and implementation of a lightweight, distributed online book store using modern web development techniques. It emphasizes scalability, flexibility, efficiency, reliability, and ease of testing, while also promoting good software engineering practices such as version control, collaboration.

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