Docker Assignment 1

Sap: 500102077

Project was executed in Mac OS

Database Container

```
CREATE TABLE products (

id SERIAL PRIMARY KEY,
name VARCHAR(100) NOT NULL,
description TEXT,
price DECIMAL(10, 2) NOT NULL,
image_url VARCHAR(255),
created_at TIMESTAMP DEFAULT CURRENT_TIMESTAMP
);
```

```
CREATE TABLE orders (
id SERIAL PRIMARY KEY,
customer_name VARCHAR(100) NOT NULL,
customer_email VARCHAR(100) NOT NULL,
status VARCHAR(50) DEFAULT 'pending',
created_at TIMESTAMP DEFAULT CURRENT_TIMESTAMP
);

CREATE TABLE order_items (
id SERIAL PRIMARY KEY,
order_id INTEGER REFERENCES orders(id),
product_id INTEGER REFERENCES products(id),
quantity INTEGER NOT NULL,
unit_price DECIMAL(10, 2) NOT NULL
);

-- Insert some sample products
INSERT INTO products (name, description, price, image_url) VALUES
('Chocolate Cake', 'Rich chocolate layer cake with ganache', 29.99,
'https://www.bbc.co.uk/food/recipes/easy_chocolate_cake_31070'),
('Sourdough Bread', 'Artisanal sourdough bread', 8.99,
'https://cookidoo.co.uk/recipes/recipe/en-GB/r643607'),
('Blueberry Muffin', 'Moist muffin loaded with blueberries', 3.99,
'https://www.wildernesswife.com/blog/2019/08/04/jordan-marsh-blueberry-muffin-recipe/'),
('Croissant', 'Buttery, flaky French pastry', 4.50, 'https://www.istockphoto.com/photos/butter-
croissant');
```

```
volumes:
postgres_data:
redis_data:
rabbitmq_data:
```

Database in compose file

```
postgres:

image: postgres:13
container_name: bakery-db
```

```
environment:
POSTGRES_USER: postgres
POSTGRES_PASSWORD: postgres
POSTGRES_DB: bakery
volumes:
- postgres_data:/var/lib/postgresql/data
- ./database/init:/docker-entrypoint-initdb.d
ports:
- "5432:5432"
healthcheck:
test: ["CMD-SHELL", "pg_isready -U postgres"]
interval: 10s
timeout: 5s
retries: 5
restart: unless-stopped
```

Docker Compose file used

```yaml
version: '3.8'

services:
postgres:
image: postgres:13
container_name: bakery-db
environment:
POSTGRES_USER: postgres
POSTGRES_PASSWORD: postgres
POSTGRES_DB: bakery
volumes:
- postgres_data:/var/lib/postgresql/data
- ./database/init:/docker-entrypoint-initdb.d
ports:
- "5432:5432"
healthcheck:
test: ["CMD-SHELL", "pg_isready -U postgres"]
interval: 10s
timeout: 5s
retries: 5
restart: unless-stopped

redis:
```

```
image: redis:6
container_name: bakery-redis
ports:
- "6379:6379"
volumes:
- redis_data:/data
healthcheck:
test: ["CMD", "redis-cli", "ping"]
interval: 10s
timeout: 5s
retries: 5
restart: unless-stopped

rabbitmq:
image: rabbitmq:3-management
container_name: bakery-rabbitmq
ports:
- "5672:5672"
- "15672:15672"
volumes:
- rabbitmq_data:/var/lib/rabbitmq
healthcheck:
test: ["CMD", "rabbitmqctl", "status"]
interval: 30s
timeout: 10s
retries: 5
restart: unless-stopped

backend:
build: ./backend
container_name: bakery-backend
depends_on:
- postgres
- rabbitmq
- redis
environment:
DB_HOST: postgres
DB_NAME: bakery
DB_USER: postgres
DB_PASSWORD: postgres
RABBITMQ_HOST: rabbitmq
REDIS_HOST: redis
ports:
- "5000:5000"
```

```
restart: unless-stopped
healthcheck:
test: ["CMD", "curl", "-f", "http://localhost:5000/health"]
interval: 30s
timeout: 10s
retries: 3

worker:
build: ./worker
container_name: bakery-worker
depends_on:
- postgres
- rabbitmq
environment:
DB_HOST: postgres
DB_NAME: bakery
DB_USER: postgres
DB_PASSWORD: postgres
RABBITMQ_HOST: rabbitmq
restart: unless-stopped

frontend:
build: ./frontend
container_name: bakery-frontend
depends_on:
- backend
environment:
REACT_APP_API_URL: http://localhost:5000
ports:
- "3000:3000"
restart: unless-stopped

volumes:
postgres_data:
redis_data:
rabbitmq_data:
```

Dockerfile for Frontend

```
FROM node:14-alpine

WORKDIR /app

COPY package*.json ./
RUN npm install

COPY . .

EXPOSE 3000

CMD ["npm", "start"]
```

Dockerfile for Backend

```
FROM python:3.9-slim

WORKDIR /app

COPY requirements.txt .
RUN pip install --no-cache-dir -r requirements.txt

COPY . .

EXPOSE 5000

CMD ["python", "app.py"]
```

requirements.txt for backend

```
FROM python:3.9-slim

WORKDIR /app

COPY requirements.txt .
RUN pip install --no-cache-dir -r requirements.txt

COPY . .
```

```
EXPOSE 5000

CMD ["python", "app.py"]
```

```
Flask==2.0.1
Werkzeug==2.0.3
Flask-CORS==3.0.10
psycopg2-binary==2.9.1
pika==1.2.0
redis==3.5.3
```

Dockerfile for Worker.py

```
FROM python:3.9-slim

WORKDIR /app

COPY requirements.txt .
RUN pip install --no-cache-dir -r requirements.txt

COPY . .

CMD ["python", "worker.py"]
```

requirements.txt for worker

```
psycopg2-binary==2.9.1
pika==1.2.0
```

RabbitMq

Additional Notes for Advanced Features

1. Redis Caching

The Redis caching implementation provides:

- Reduced database load by caching product listings
- Faster response times for frequently accessed data
- Cache invalidation when orders are placed to ensure data consistency

It has been implemented in the backend code and is imported through compose.yml

```
redis:
image: redis:6
container_name: bakery-redis
ports:
- "6379:6379"
volumes:
- redis_data:/data
healthcheck:
test: ["CMD", "redis-cli", "ping"]
interval: 10s
timeout: 5s
retries: 5
restart: unless-stopped
```

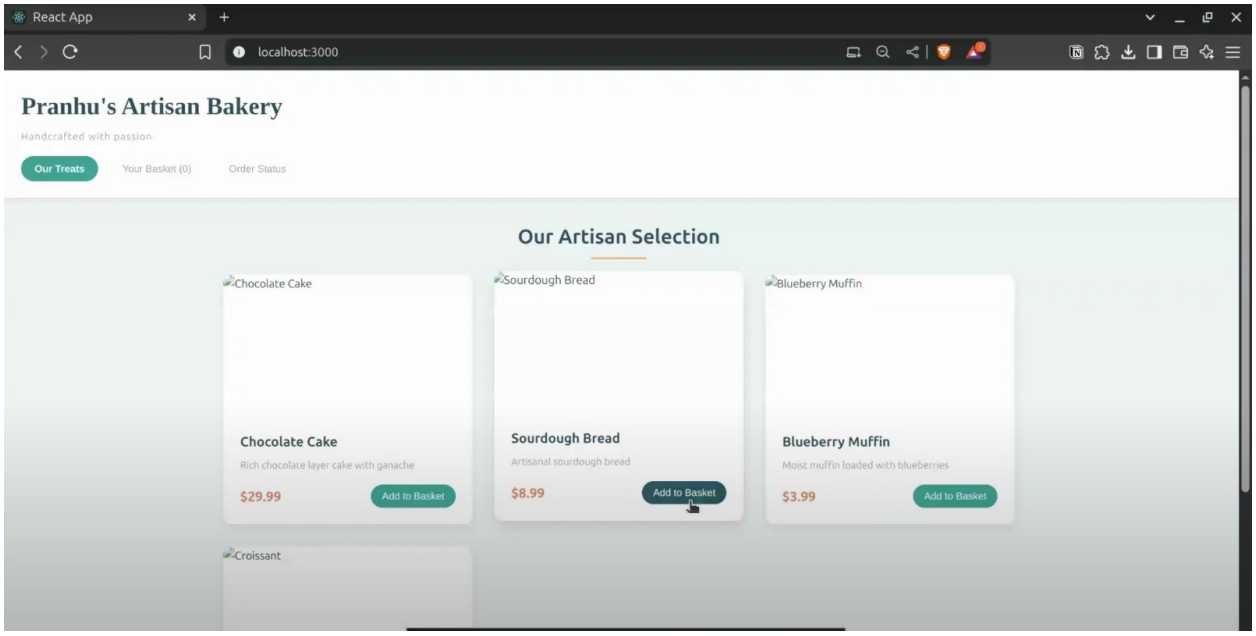
2. Worker Service with RabbitMQ

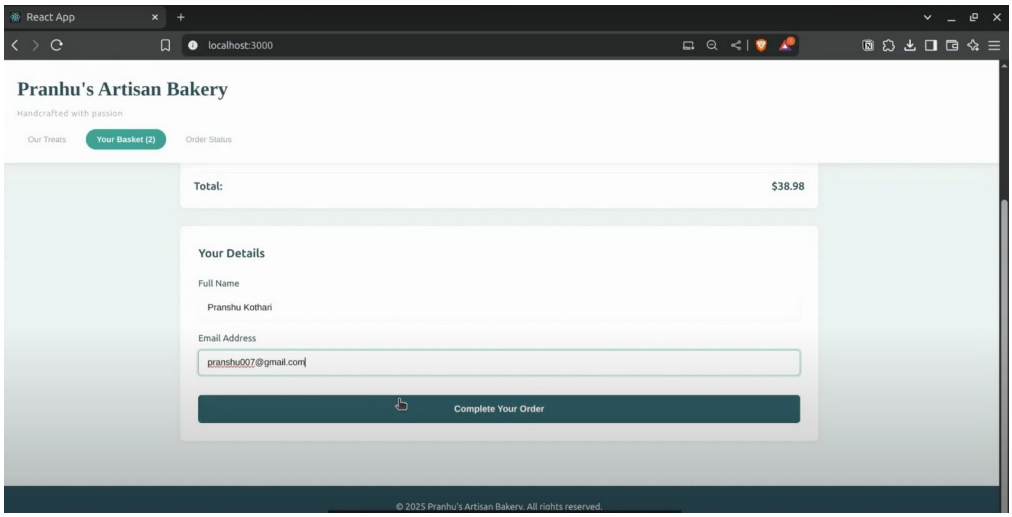
The worker service:

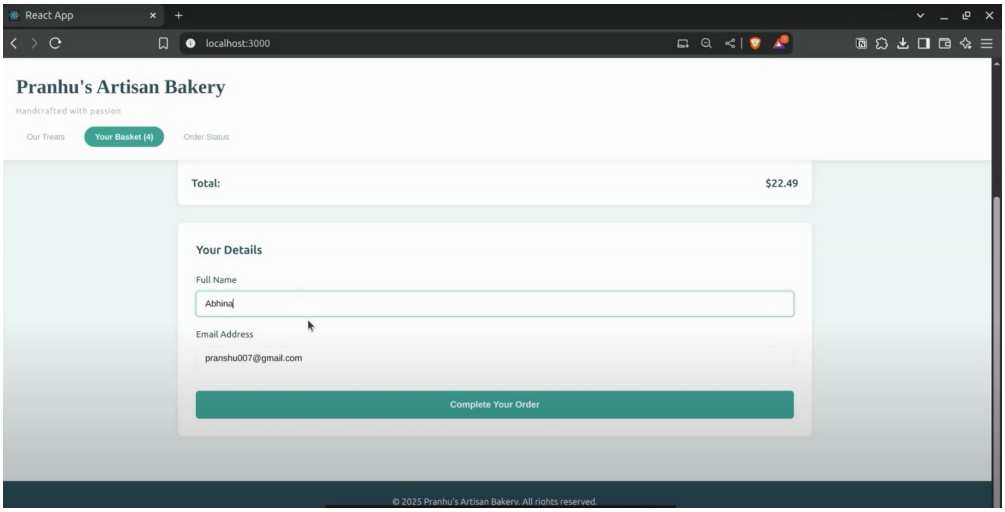
- Processes orders asynchronously to improve scalability
- Updates order status in the database as processing progresses
- Implements retry logic and error handling for robustness

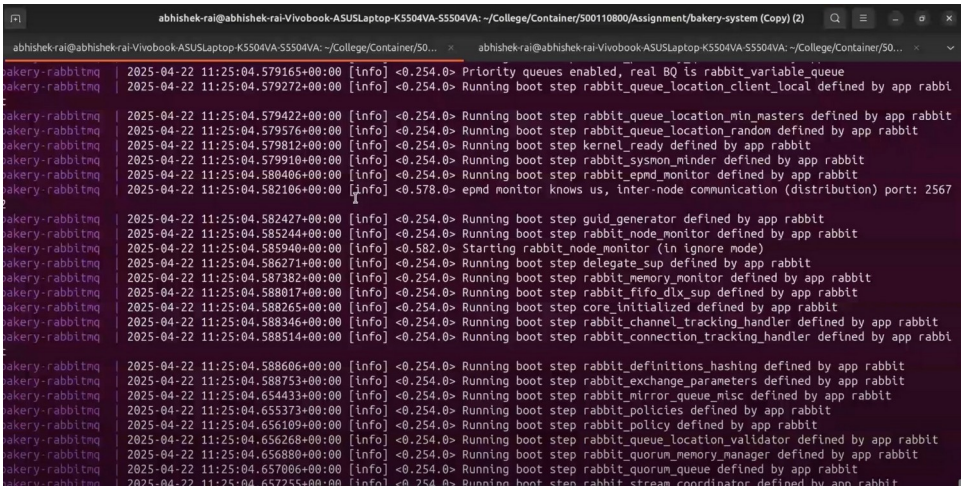
```
rabbitmq:
image: rabbitmq:3-management
container_name: bakery-rabbitmq
ports:
- "5672:5672"
- "15672:15672"
volumes:
- rabbitmq_data:/var/lib/rabbitmq
healthcheck:
test: ["CMD", "rabbitmqctl", "status"]
interval: 30s
timeout: 10s
retries: 5
restart: unless-stopped
```

Results




React App
localhost:3000
Pranhu's Artisan Bakery
Handcrafted with passion
Our Treats
Your Basket (2)
Order Status
Total:
$38.98
Your Details
Full Name
Pranshu Kothari
Email Address
pranshu007@gmail.com
Complete Your Order
© 2025 Pranhu's Artisan Bakery. All rights reserved.


React App
localhost:3000
Pranhu's Artisan Bakery
Handcrafted with passion
Our Treats
Your Basket (4)
Order Status
Total:
$22.49
Your Details
Full Name
Abhina
Email Address
pranshu007@gmail.com
Complete Your Order
© 2025 Pranhu's Artisan Bakery. All rights reserved.


abhishek-rai@abhishek-rai-Vivobook-ASUSLaptop-K5504VA-S5504VA: ~/College/Container/500110800/Assignment/bakery-system (Copy) (2)
abhishek-rai@abhishek-rai-Vivobook-ASUSLaptop-K5504VA-S5504VA: ~/College/Container/50...
abhishek-rai@abhishek-rai-Vivobook-ASUSLaptop-K5504VA-S5504VA: ~/College/Container/50...
bakery-rabbitmq | 2025-04-22 11:25:04.579165+00:00 [info] <0.254.0> Priority queues enabled, real BQ is rabbit_variable_queue
bakery-rabbitmq | 2025-04-22 11:25:04.579272+00:00 [info] <0.254.0> Running boot step rabbit_queue_location_client_local defined by app rabbi
bakery-rabbitmq | 2025-04-22 11:25:04.579422+00:00 [info] <0.254.0> Running boot step rabbit_queue_location_min_masters defined by app rabbit
bakery-rabbitmq | 2025-04-22 11:25:04.579576+00:00 [info] <0.254.0> Running boot step rabbit_queue_location_random defined by app rabbit
bakery-rabbitmq | 2025-04-22 11:25:04.579812+00:00 [info] <0.254.0> Running boot step kernel_ready defined by app rabbit
bakery-rabbitmq | 2025-04-22 11:25:04.579910+00:00 [info] <0.254.0> Running boot step rabbit_sysmon_minder defined by app rabbit
bakery-rabbitmq | 2025-04-22 11:25:04.580406+00:00 [info] <0.254.0> Running boot step rabbit_epmd_monitor defined by app rabbit
bakery-rabbitmq | 2025-04-22 11:25:04.582106+00:00 [info] <0.578.0> epmd monitor knows us, inter-node communication (distribution) port: 2567
bakery-rabbitmq | 2025-04-22 11:25:04.582427+00:00 [info] <0.254.0> Running boot step guid_generator defined by app rabbit
bakery-rabbitmq | 2025-04-22 11:25:04.585244+00:00 [info] <0.254.0> Running boot step rabbit_node_monitor defined by app rabbit
bakery-rabbitmq | 2025-04-22 11:25:04.585940+00:00 [info] <0.582.0> Starting rabbit_node_monitor (in ignore mode)
bakery-rabbitmq | 2025-04-22 11:25:04.586271+00:00 [info] <0.254.0> Running boot step delegate_sup defined by app rabbit
bakery-rabbitmq | 2025-04-22 11:25:04.587382+00:00 [info] <0.254.0> Running boot step rabbit_memory_monitor defined by app rabbit
bakery-rabbitmq | 2025-04-22 11:25:04.588017+00:00 [info] <0.254.0> Running boot step rabbit_fifo_dlx_sup defined by app rabbit
bakery-rabbitmq | 2025-04-22 11:25:04.588265+00:00 [info] <0.254.0> Running boot step core_initialized defined by app rabbit
bakery-rabbitmq | 2025-04-22 11:25:04.588346+00:00 [info] <0.254.0> Running boot step rabbit_channel_tracking_handler defined by app rabbit
bakery-rabbitmq | 2025-04-22 11:25:04.588514+00:00 [info] <0.254.0> Running boot step rabbit_connection_tracking_handler defined by app rabbi
bakery-rabbitmq | 2025-04-22 11:25:04.588606+00:00 [info] <0.254.0> Running boot step rabbit_definitions_hashing defined by app rabbit
bakery-rabbitmq | 2025-04-22 11:25:04.588753+00:00 [info] <0.254.0> Running boot step rabbit_exchange_parameters defined by app rabbit
bakery-rabbitmq | 2025-04-22 11:25:04.654433+00:00 [info] <0.254.0> Running boot step rabbit_mirror_queue_misc defined by app rabbit
bakery-rabbitmq | 2025-04-22 11:25:04.655373+00:00 [info] <0.254.0> Running boot step rabbit_policies defined by app rabbit
bakery-rabbitmq | 2025-04-22 11:25:04.656109+00:00 [info] <0.254.0> Running boot step rabbit_policy defined by app rabbit
bakery-rabbitmq | 2025-04-22 11:25:04.656268+00:00 [info] <0.254.0> Running boot step rabbit_queue_location_validator defined by app rabbit
bakery-rabbitmq | 2025-04-22 11:25:04.656880+00:00 [info] <0.254.0> Running boot step rabbit_quorum_memory_manager defined by app rabbit
bakery-rabbitmq | 2025-04-22 11:25:04.657006+00:00 [info] <0.254.0> Running boot step rabbit_quorum_queue defined by app rabbit