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Bookstore API — Deliverables

Combined source, docs, tests, and report

API Source — app.py

```
"""Modern FastAPI implementation for the Bookstore demo.

This file replaces the previous Flask implementation with a lightweight,
types-first FastAPI app using Pydantic models and dependency-based auth.
"""
from decimal import Decimal
from typing import List, Optional
import os

from fastapi import FastAPI, Depends, Header, HTTPException, status
from pydantic import BaseModel, Field

from inventory_mock import get_book, reserve_stock, list_inventory
from sales_mock import process_payment, create_order, get_order
from delivery_mock import create_delivery

API_KEY = os.environ.get('BOOKSTORE_API_KEY', 'secret123')

app = FastAPI(title='Bookstore API', version='1.0')


def require_api_key(x_api_key: Optional[str] = Header(None)):
    if not x_api_key or x_api_key != API_KEY:
        raise HTTPException(status_code=status.HTTP_401_UNAUTHORIZED, detail='Unauthorized')


class Book(BaseModel):
    isbn: str
    title: Optional[str]
    author: Optional[str]
    price: Optional[float]
    stock: Optional[int]


class OrderItem(BaseModel):
    isbn: str
    quantity: int = Field(..., gt=0)


class OrderRequest(BaseModel):
    customer_id: str
    items: List[OrderItem]
    payment: dict


class OrderResponse(BaseModel):
    order_id: str
    status: str
    total: float


class DeliveryRequest(BaseModel):
    order_id: str
    address: str
    courier: Optional[str]


@app.get('/api/books/', response_model=List[Book], dependencies=[Depends(require_api_key)])
def api_list_books():
    return list_inventory()


@app.get('/api/books/{isbn}', response_model=Book, dependencies=[Depends(require_api_key)])
def api_get_book(isbn: str):
    book = get_book(isbn)
    if not book:
```

```
        raise HTTPException(status_code=status.HTTP_404_NOT_FOUND, detail='Book not found')
    return book


@app.post('/api/orders/', response_model=OrderResponse, status_code=201, dependencies=[Depends(require_api_key)])
def api_create_order(req: OrderRequest):
    total = Decimal('0.0')
    for it in req.items:
        book = get_book(it.isbn)
        if not book:
            raise HTTPException(status_code=400, detail=f'Book {it.isbn} not found')
        total += Decimal(str(book['price'])) * it.quantity

    ok, result = process_payment(float(total), req.payment)
    if not ok:
        raise HTTPException(status_code=402, detail=f'Payment failed: {result}')

    tx_id = result
    for it in req.items:
        success, msg = reserve_stock(it.isbn, it.quantity)
        if not success:
            raise HTTPException(status_code=409, detail=f'Inventory issue for {it.isbn}: {msg}')

    order = create_order(req.customer_id, [it.dict() for it in req.items], float(total), tx_id)
    return OrderResponse(order_id=order['order_id'], status=order['status'], total=order['total'])


@app.get('/api/orders/{order_id}', dependencies=[Depends(require_api_key)])
def api_get_order(order_id: str):
    o = get_order(order_id)
    if not o:
        raise HTTPException(status_code=404, detail='Order not found')
    return o


@app.post('/api/delivery/', status_code=201, dependencies=[Depends(require_api_key)])
def api_create_delivery(req: DeliveryRequest):
    if not req.order_id or not req.address:
        raise HTTPException(status_code=400, detail='order_id and address required')
    d = create_delivery(req.order_id, req.address, req.courier)
    return d


if __name__ == '__main__':
    import uvicorn
    uvicorn.run('app:app', host='0.0.0.0', port=5001, reload=True)
```

Inventory mock — inventory_mock.py

```
"""Modern, typed in-memory inventory mock.

This module uses simple dataclasses and type hints for clearer structure
and easier maintenance. Data remains in-memory for the demo.
"""
from __future__ import annotations
from dataclasses import dataclass, asdict
from typing import Dict, List, Optional
from copy import deepcopy
from threading import Lock


@dataclass
class Book:
    isbn: str
    title: str
    author: str
    price: float
    stock: int


# internal storage and lock for thread-safety
_inventory: Dict[str, Book] = {
    '9780143127550': Book('9780143127550', 'The Martian', 'Andy Weir', 12.99, 10),
    '9780262033848': Book('9780262033848', 'Introduction to Algorithms', 'Cormen et al.', 89.99, 3),
    '9780140449136': Book('9780140449136', 'The Odyssey', 'Homer', 9.50, 25),
}
_lock = Lock()


def get_book(isbn: str) -> Optional[dict]:
    with _lock:
        b = _inventory.get(isbn)
        return deepcopy(asdict(b)) if b else None


def reserve_stock(isbn: str, qty: int) -> tuple[bool, Optional[str]]:
    """Reserve `qty` units of `isbn`. Returns (success, error_message).
    Thread-safe and atomic for the in-memory store.
    """
    with _lock:
        b = _inventory.get(isbn)
        if not b:
            return False, 'Book not found'
        if b.stock < qty:
            return False, 'Insufficient stock'
        b.stock -= qty
        return True, None


def replenish_stock(isbn: str, qty: int) -> bool:
    with _lock:
        b = _inventory.get(isbn)
        if not b:
            return False
        b.stock += qty
        return True


def list_inventory() -> List[dict]:
    with _lock:
        return deepcopy([asdict(b) for b in _inventory.values()])
```

Sales mock — sales_mock.py

```
"""Typed sales mock with simple payment simulation and order store.

This remains in-memory for demo purposes but uses clearer types and
immutable returns to make the code easier to reuse.
"""
from __future__ import annotations
from dataclasses import dataclass, asdict
from typing import Any, Dict, List, Optional
from uuid import uuid4
from copy import deepcopy
from threading import Lock


@dataclass
class Order:
    order_id: str
    customer_id: str
    items: List[dict]
    total: float
    payment_tx_id: str
    status: str = 'created'


_orders: Dict[str, Order] = {}
_lock = Lock()


def process_payment(amount: float, payment_info: Optional[dict]) -> tuple[bool, Any]:
    """Simulate a payment gateway call. Returns (success, transaction_id or error)."""
    if not payment_info or not payment_info.get('card_number'):
        return False, 'Missing card details'
    if amount <= 0:
        return False, 'Invalid amount'
    tx_id = str(uuid4())
    return True, tx_id


def create_order(customer_id: str, items: List[dict], total: float, payment_tx_id: str) -> dict:
    order_id = str(uuid4())
    order = Order(order_id=order_id, customer_id=customer_id, items=deepcopy(items), total=total, payment_tx_id=payme
    with _lock:
        _orders[order_id] = order
    return deepcopy(asdict(order))


def get_order(order_id: str) -> Optional[dict]:
    with _lock:
        o = _orders.get(order_id)
        return deepcopy(asdict(o)) if o else None


def list_orders() -> List[dict]:
    with _lock:
        return deepcopy([asdict(o) for o in _orders.values()])
```

Delivery mock — delivery_mock.py

```
"""Delivery mock: typed, thread-safe in-memory delivery tasks."""
from __future__ import annotations
from dataclasses import dataclass, asdict
from typing import Dict, List, Optional
from uuid import uuid4
from copy import deepcopy
from threading import Lock


@dataclass
class Delivery:
    delivery_id: str
    order_id: str
    address: str
    courier: str
    status: str = 'scheduled'


_deliveries: Dict[str, Delivery] = {}
_lock = Lock()


def create_delivery(order_id: str, address: str, courier: Optional[str] = None) -> dict:
    delivery_id = str(uuid4())
    d = Delivery(delivery_id=delivery_id, order_id=order_id, address=address, courier=courier or 'local')
    with _lock:
        _deliveries[delivery_id] = d
    return deepcopy(asdict(d))


def update_delivery_status(delivery_id: str, status: str) -> Optional[dict]:
    with _lock:
        d = _deliveries.get(delivery_id)
        if not d:
            return None
        d.status = status
        return deepcopy(asdict(d))


def get_delivery(delivery_id: str) -> Optional[dict]:
    with _lock:
        d = _deliveries.get(delivery_id)
        return deepcopy(asdict(d)) if d else None


def list_deliveries() -> List[dict]:
    with _lock:
        return deepcopy([asdict(d) for d in _deliveries.values()])
```

OpenAPI spec — openapi.yaml

```
openapi: 3.0.3
info:
  title: Bookstore Management API
  version: 1.0.0
  description: API for integrating Inventory, Sales and Delivery subsystems (demo)
servers:
  - url: http://localhost:5001
paths:
  /api/books/{isbn}:
    get:
      summary: Retrieve book details
      parameters:
        - name: isbn
          in: path
          required: true
          schema:
            type: string
      responses:
        '200':
          description: Book found
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/Book'
        '404':
          description: Book not found
  /api/books:
    get:
      summary: List inventory
      responses:
        '200':
          description: Inventory list
          content:
            application/json:
              schema:
                type: array
                items:
                  $ref: '#/components/schemas/Book'
  /api/orders:
    post:
      summary: Place a new order
      requestBody:
        required: true
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/OrderRequest'
      responses:
        '201':
          description: Order created
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/OrderResponse'
        '400':
          description: Bad request
        '402':
          description: Payment required / failed
        '409':
          description: Inventory conflict
  /api/orders/{order_id}:
    get:
      summary: Get order details
      parameters:
        - name: order_id
          in: path
```

```
          required: true
          schema:
            type: string
      responses:
        '200':
          description: Order found
  /api/delivery:
    post:
      summary: Create delivery task for an order
      requestBody:
        required: true
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/DeliveryRequest'
      responses:
        '201':
          description: Delivery scheduled
components:
  schemas:
    Book:
      type: object
      properties:
        isbn:
          type: string
        title:
          type: string
        author:
          type: string
        price:
          type: number
          format: float
        stock:
          type: integer
    OrderItem:
      type: object
      properties:
        isbn:
          type: string
        quantity:
          type: integer
    OrderRequest:
      type: object
      required: [customer_id, items, payment]
      properties:
        customer_id:
          type: string
        items:
          type: array
          items:
            $ref: '#/components/schemas/OrderItem'
        payment:
          type: object
          description: Payment details (demo only)
    OrderResponse:
      type: object
      properties:
        order_id:
          type: string
        status:
          type: string
        total:
          type: number
    DeliveryRequest:
      type: object
      required: [order_id, address]
      properties:
        order_id:
          type: string
```

```
        address:
          type: string
        courier:
          type: string
security:
  - ApiKeyAuth: []
components:
  securitySchemes:
    ApiKeyAuth:
      type: apiKey
      in: header
      name: X-API-Key
```

Tests — tests\test_api.py

```
import os
import json
import pytest

from fastapi.testclient import TestClient
from app import app

API_KEY = 'secret123'


@pytest.fixture
def client():
    client = TestClient(app)
    yield client

def test_get_book_success(client):
    r = client.get('/api/books/9780143127550', headers={'X-API-Key': API_KEY})
    assert r.status_code == 200
    data = r.json()
    assert data['isbn'] == '9780143127550'

def test_get_book_not_found(client):
    r = client.get('/api/books/0000000000', headers={'X-API-Key': API_KEY})
    assert r.status_code == 404

def test_place_order_and_delivery_flow(client):
    # place an order
    payload = {
        'customer_id': 'cust-1',
        'items': [{'isbn': '9780143127550', 'quantity': 1}],
        'payment': {'card_number': '4111111111111111', 'expiry': '12/26'}
    }
    r = client.post('/api/orders/', json=payload, headers={'X-API-Key': API_KEY})
    assert r.status_code == 201
    body = r.json()
    assert 'order_id' in body
    order_id = body['order_id']

    # create delivery
    d_payload = {'order_id': order_id, 'address': '123 Main St'}
    rd = client.post('/api/delivery/', json=d_payload, headers={'X-API-Key': API_KEY})
    assert rd.status_code == 201
    delivery = rd.json()
    assert delivery['order_id'] == order_id

def test_auth_required(client):
    r = client.get('/api/books/9780143127550')
    assert r.status_code == 401
```

Test results — test_results.txt

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Report — report.md

````
# Bookstore API — Design & Implementation

## Executive summary
This repository contains a lightweight, production-minded demonstration API for a bookstore. It integrat

Key design goals:
- Practical, testable code that resembles production patterns.
- Clear API contract (OpenAPI) and interactive docs.
- Minimal external dependencies and reproducible development experience.


## Architecture and design (modernized)
- Framework: FastAPI — type-first, async-ready, and auto-generates OpenAPI/Swagger UI.
- Subsystems: modular in-memory services implemented with dataclasses and typed APIs:
  - `inventory_mock.py` — typed Book dataclass, thread-safe in-memory store.
  - `sales_mock.py` — typed Order dataclass, simple payment simulation, thread-safe store.
  - `delivery_mock.py` — typed Delivery dataclass and scheduling.
- Endpoints (same semantics as before):
  - `GET /api/books/{isbn}` — fetch book details.
  - `GET /api/books` — list inventory.
  - `POST /api/orders` — place an order (validates items, processes payment, reserves stock, creates ord
  - `GET /api/orders/{order_id}` — fetch order details.
  - `POST /api/delivery` — schedule a delivery for an order.
- Authentication: API key via the `X-API-Key` header (demo secret `secret123`). For production, switch t


## Implementation notes (developer-focused)
- Input validation is handled by Pydantic models; the server surface is strongly typed which improves bo
- Inventory reservation and order creation are done atomically within the in-memory store (protected by
- The payment flow is intentionally simplified — `sales_mock.process_payment` simulates approval and ret


## Testing
- Tests are in `tests/test_api.py` and use FastAPI's `TestClient` (Starlette) for end-to-end-style unit
- The test suite covers:
  - Authentication enforcement.
  - Book retrieval and not-found behavior.
  - Order placement with payment and inventory reservation.
  - Delivery scheduling for created orders.


## Security and limitations
- The project is a demo: do not use the in-memory stores for production workloads.
- No PCI compliance or real payment handling is implemented — treat `sales_mock` as a placeholder.


## How to run (developer)
1. Create and activate a Python virtual environment.

   PowerShell:
   ```powershell
   python -m venv .venv
   .\.venv\Scripts\Activate.ps1
   python -m pip install --upgrade pip
   python -m pip install -r requirements.txt
   ```

2. Start the API locally:

   ```powershell
   uvicorn app:app --reload --port 5001
   ```

3. Open interactive docs at `http://127.0.0.1:5001/docs`.
````

Next steps and production-readiness
- Persist state to a relational database with migrations (Alembic) and add integration tests.
- Introduce idempotency keys and durable message queues for asynchronous processing.
- Add structured logging, metrics (Prometheus), and health endpoints.
- Containerize the app (Dockerfile) for reproducible CI/CD and local runs.