FastAPI automated testing

INTRODUCTION TO FASTAPI



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What Are Automated Tests?

Unit Tests

- Focus: Isolated code
- Purpose: Validate code function
- Scope: Function or method
- Environment: Isolated Python env

```
def test_main():
    response = main()
    assert response == {"msg": "Hello"}
```

System Tests

- Focus: Isolated system operations
- Purpose: Validate system function
- Scope: Endpoint
- Environment: Python env with app running

Using TestClient

TestClient: HTTP client for pytest

```
# Import TestClient and app
from fastapi.testclient import TestClient
from .main import app
# Create test client with application context
client = TestClient(app)
def test_main():
    response = client.get("/")
    assert response.status_code == 200
    assert response.json() == {"msg": "Hello"}
```

Testing Error or Failure Responses

 App
 Test

```
app = FastAPI()
@app.delete("/items")
def delete_item(item: Item):
    if item.id not in item_ids:
        raise HTTPException(
            status_code=404,
            detail="Item not found.")
    else:
        delete_item_in_database(item)
        return {}
```

Let's practice!

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Building a JSON CRUD API

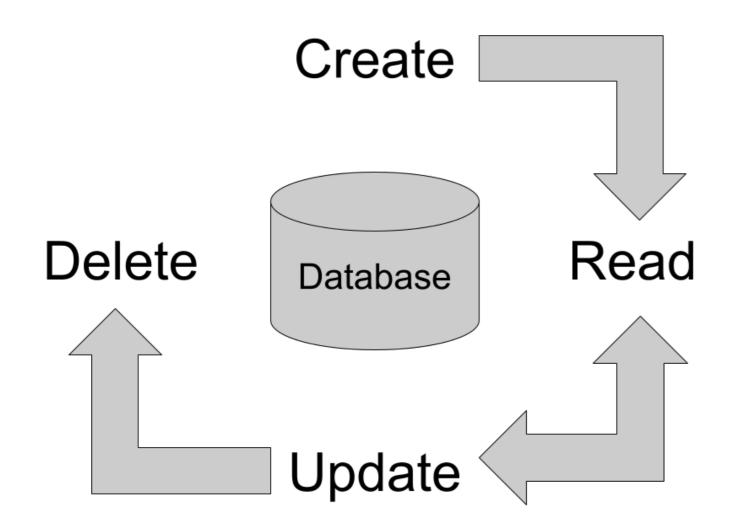
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Four Steps in Object Management Lifecycle (CRUD)



API Operations

Create

POST operation

Read

GET operation

Update

PUT operation

Delete

DELETE operation

JSON CRUD API Motivation

Fundamentals

- Manage the entire object lifecycle
- Understand best practices for HTTP API operations
- Design our own data management APIs

Opportunities

- Business logic for more complex data operations
- High throughput data pipelines
- Machine Learning inference pipelines

Building a CRUD Module

```
from pydantic import BaseModel
class Review(BaseModel):
    movie: str
    num_stars: int
    text: str
class DbReview(BaseModel):
    movie: str
    num_stars: int
    text: str
    # Reference database ID of Reviews
    review_id: int
```

```
# crud.py
def create_review(review: Review):
    # Create review in database
def read_review(review_id: int):
    # Read review from database
def update_review(review: DbReview):
    # Update review in database
def delete_review(review_id: int):
    # Delete review from database
```

POST Endpoint to Create

Endpoint: /reviews

Input: Review

Output: DbReview

```
@app.post("/reviews", response_model=DbReview)

def create_review(review: Review):
    # Create the movie review in the database
    db_review = crud.create_review(review)
    # Return the created review with database ID
    return db_review
```

GET Endpoint to Read

• Endpoint: /reviews

• Input: ?review_id=1234

Output: DbReview

```
@app.get("/reviews", response_model=DbReview)

def read_review(review_id: int):
    # Read the movie review from the database
    db_review = crud.read_review(review_id)
    # Return the review
    return db_review
```

PUT Endpoint to Update

Endpoint: /reviews

Input: DbReview

Output: DbReview

```
@app.put("/reviews", response_model=DbReview)

def update_review(review: DbReview):
    # Update the movie review in the database
    db_review = crud.update_review(review)
    # Return the updated review
    return db_review
```

DELETE Endpoint to Delete

• Endpoint: /reviews

Input: DbReview

Output: {}

```
@app.delete("/reviews")

def delete_review(review: DbReview):
    # Delete the movie review from the database
    crud.delete_review(review.review_id)
    # Return nothing since the data is gone
    return {}
```

Let's practice!

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Writing a manual functional test

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What Are Functional Tests?

System Tests

- Focus: Isolated system operations
- Purpose: Validate system function
- Scope: Endpoint
- Environment: Python env with app running

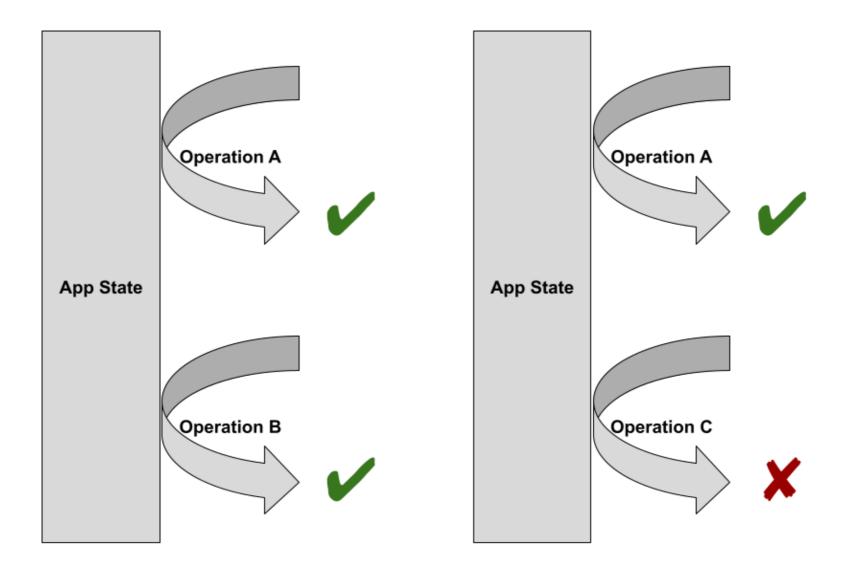
```
def test_read():
    response = client.get("/items/1")
    assert response.status_code == 200
```

Functional Tests

- Focus: Integrated system
- Purpose: Validate system overall
- Scope: Application
- Environment: Python env with app running

```
def test_delete_then_read():
    response = client.delete("/items/1")
    assert response.status_code == 200
    response = client.get("/items/1")
    assert response.status_code == 404
```

Test Workflows





Functional Test Workflow Examples

Successful workflows

- Create, then read
- Create, then update
- Create, then delete
- ...

Failing workflows

- Read without create
- Update after delete
- Delete without create
- •

Functional Test Scripts

- Outside test framework "Manual tests"
- Use requests

```
import requests
ENDPOINT = "http://localhost:8000/items"

# Create item "rock"

r = requests.post(ENDPOINT, json={"name": "rock"})

assert r.status_code == 200

# Get item rock

r = requests.get(ENDPOINT, json={"name": "rock"})

assert r.status_code == 200
```

Workflows built against known application state

Let's practice!

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Wrap up INTRODUCTION TO FASTAPI



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FastAPI Review

- FastAPI key features and use cases
- Four types of HTTP operations
- Building a JSON CRUD API
- Using status codes to communicate success and failure
- Using async
- System tests
- Manual functional tests

Congratulations!

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