ANGULAR ARCHITECTS
INSIDE KNOWLEDGE

Angular Testing

2 - E2E Advanced

Agenda

1. Misc. Features
2. Patterns for E2E Tests & Databases

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1. **Misc. Features**
2. Patterns for E2E Tests & Databases

Mocking Requests

```
cy.intercept('GET', 'http://localhost:4200/holidays', {
  body: {
    holidays: [
      {
        title: 'Cambodia',
        teaser: 'Discover old temples and learn about the great Khmer Empire',
        imageUrl: 'https://eternal-app.s3.eu-central-1.amazonaws.com/assets/AngkorWatSmall.jpg',
        description:
          'Travel to Siem Reap in Cambodia and visit the...'
      }
    ]
  }
});
```

Asserting Requests

```
it('should assert the holidays request', () => {

  cy.intercept('https://api.eternal-holidays.net/holidasy').as('request');

  cy.visit('');

  cy.testid('btn-holidays').click();

  cy.wait('@request');

});
```

Creating Requests

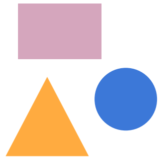
```
cy
  .request('https://api.eternal-holidays.net/holiday')
  .then((res) => cy.log(res.body));
```

- All HTTP Methods available
- Can send to any origin
  - No Same-Origin Policy
- No CORS
- Good fit for "Test-APIs"

3 Level Architecture

Tests

Page Object Models



Utility Functions

Page Object Model

```
class Sidemenu {

  click(name: "Customers" | "Holidays"): void {

    cy.get("mat-drawer a").contains(name).click();

  }

}

export const sidemenu = new Sidemenu();
```

Cypress.Commands.add

- Extends the cy object
- Needs to be done two times (TS declaration and implementation)
- Combines existing cy commands
- No need to return data

Cypress Commands Example

```
declare namespace Cypress {
  interface Chainable<Subject> {
    testid(selector: string): Chainable<JQuery<HTMLElement>>;
  }
}

Cypress.Commands.add(
  'testid',
  (selector: string) => cy.get(`[data-testid=${selector}]`)
);
```

Cypress.Commands.addQuery (since v12)

- As Command but marks it as query
- Enforces Retry-bility
  - Synchronous
  - Retried
  - Indempotent
    - don't use side effects!

```
Cypress.Commands.addQuery(
  'Testid',
  function (selector: string, options = {}) {
    const getFn = cy.now('get', `[data-testid=${selector}`, options)
      as (subject: unknown) => unknown;

    return (subject) => {
      const element = getFn(subject);
      return element;
    };
});
```

cy.task 1/2

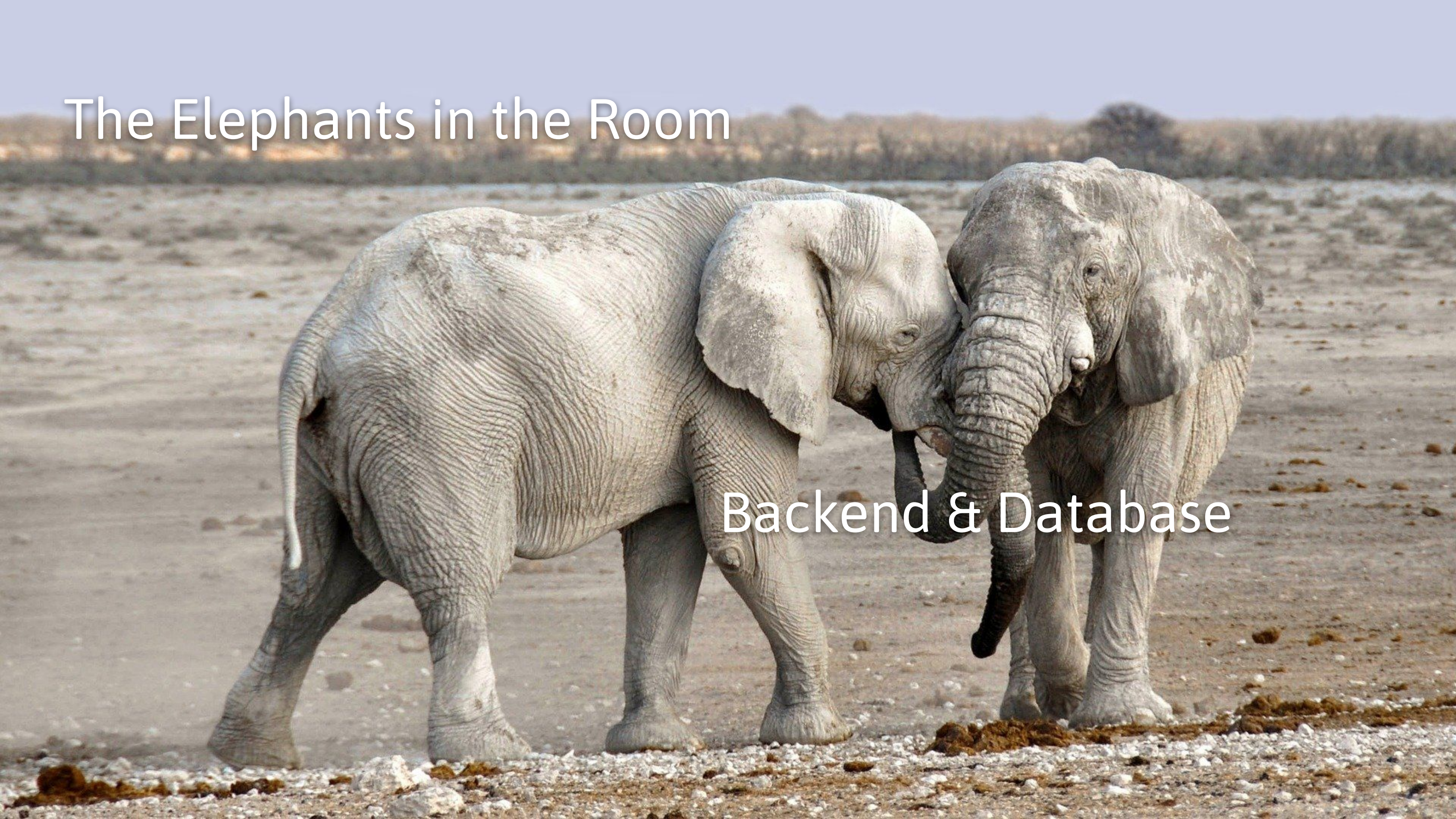
- Run commands in Node.js
- Far more possibilities:
    - Writing to the filesystem (logging)
    - Connecting to a database
    - Combine Cypress with other E2E Tools

cy.task 2/2

```
export default defineConfig({
  e2e: {
    setupNodeEvents(on, config) {
      on('task', {
        async log(message: string) {
          await fs.writeFile('cypress.log', message);
        },
      });
    },
  },
});
```

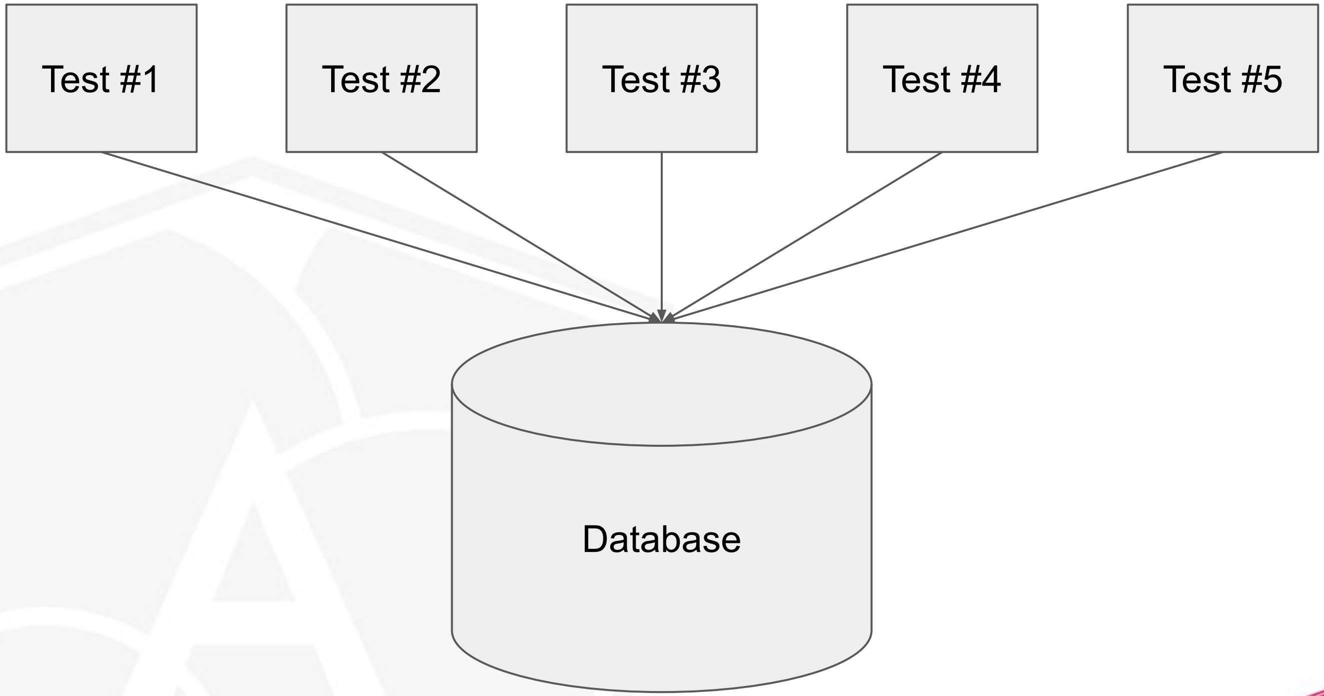
Agenda

1. Misc. Features
2. **Patterns for E2E Tests & Databases**

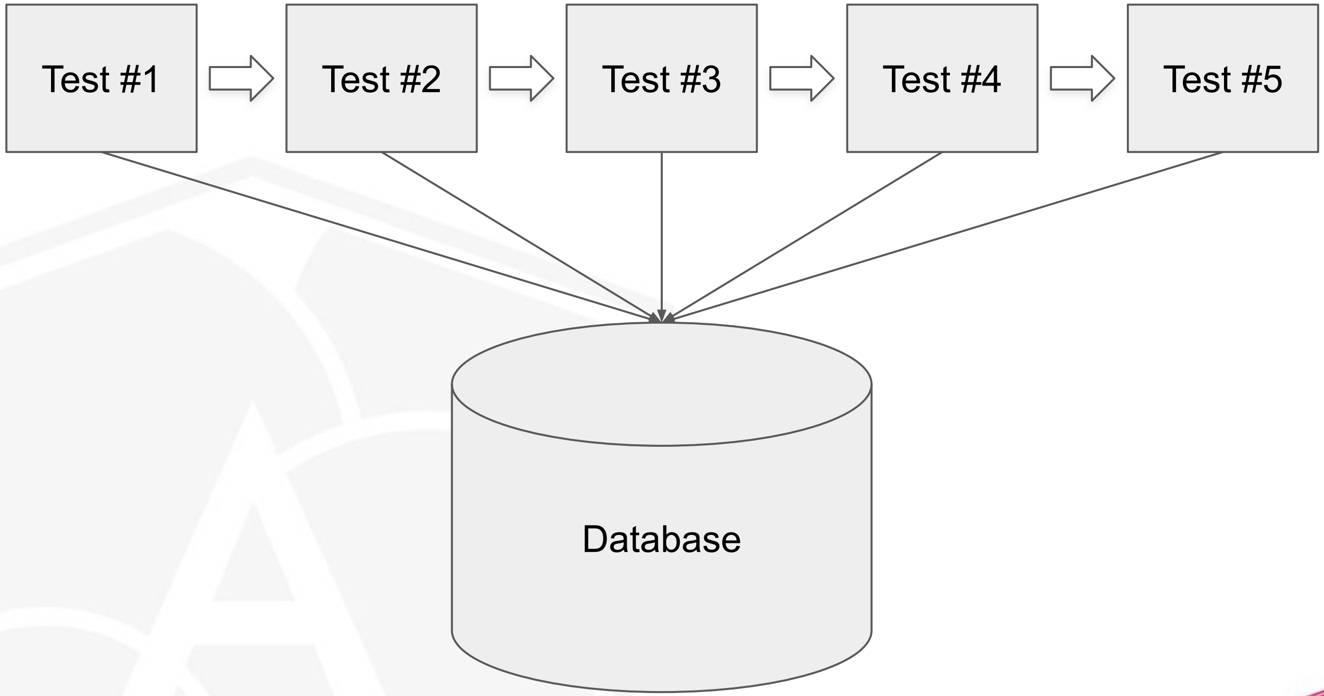


The Elephants in the Room

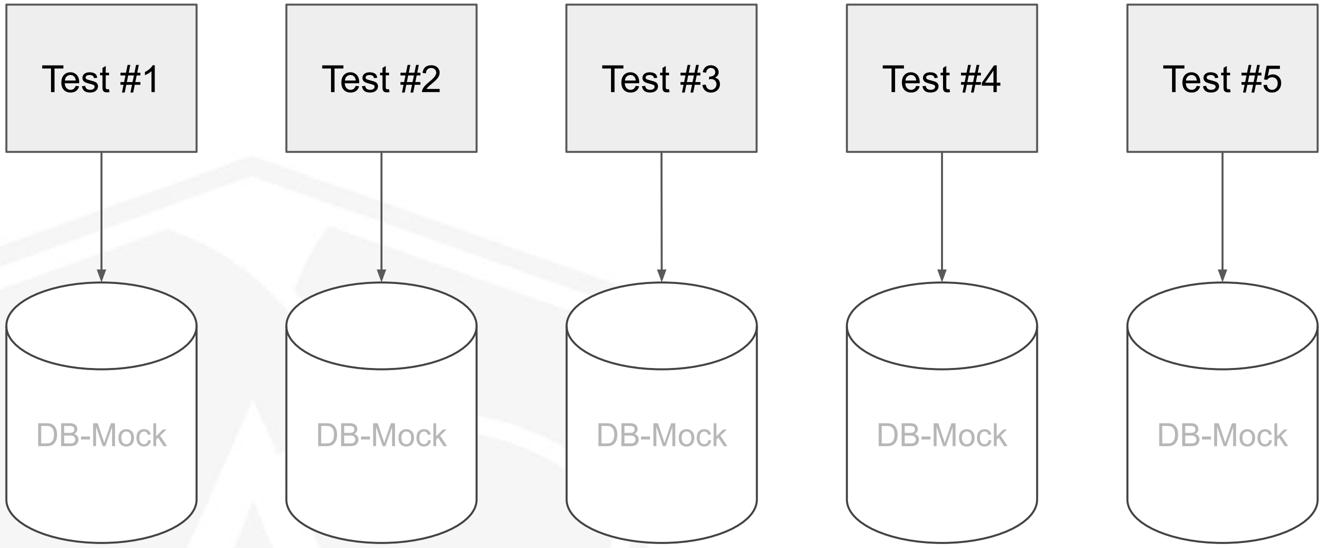
Backend & Database


Test #1
Test #2
Test #3
Test #4
Test #5
Database

Indirect "Transitive" Coupling



Copy Strategy from non-E2E???



Database in E2E Tests
Database in Non-E2E Tests

Test Seeded Database & done???

Issues with Test Seed

- "One size fits all" approach
- Tight Coupling → Not scalable
- Fast Reseeding not always possible
- Multiple Databases
- Data from External Systems → no Seeding possible

Individual Scope - Best Case Scenario

- Data is referenced to a particular entity
  - User
  - Product
  - …
- Multi-Tenant Systems
- Customer-Centric Systems
  - Insurances
  - Banks

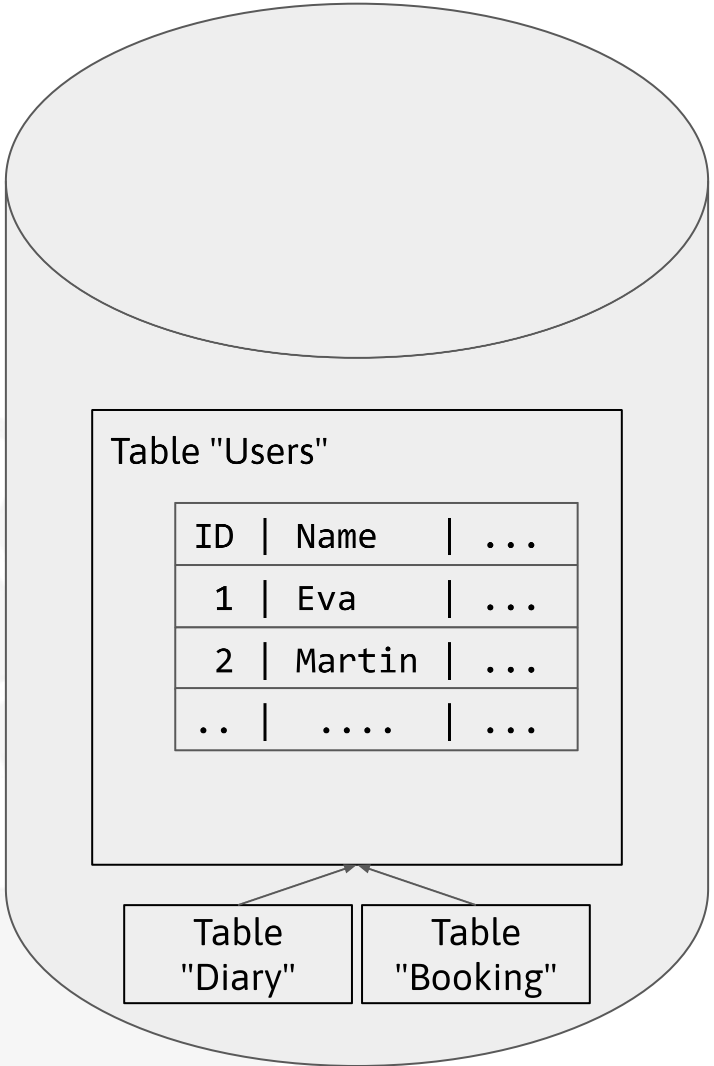
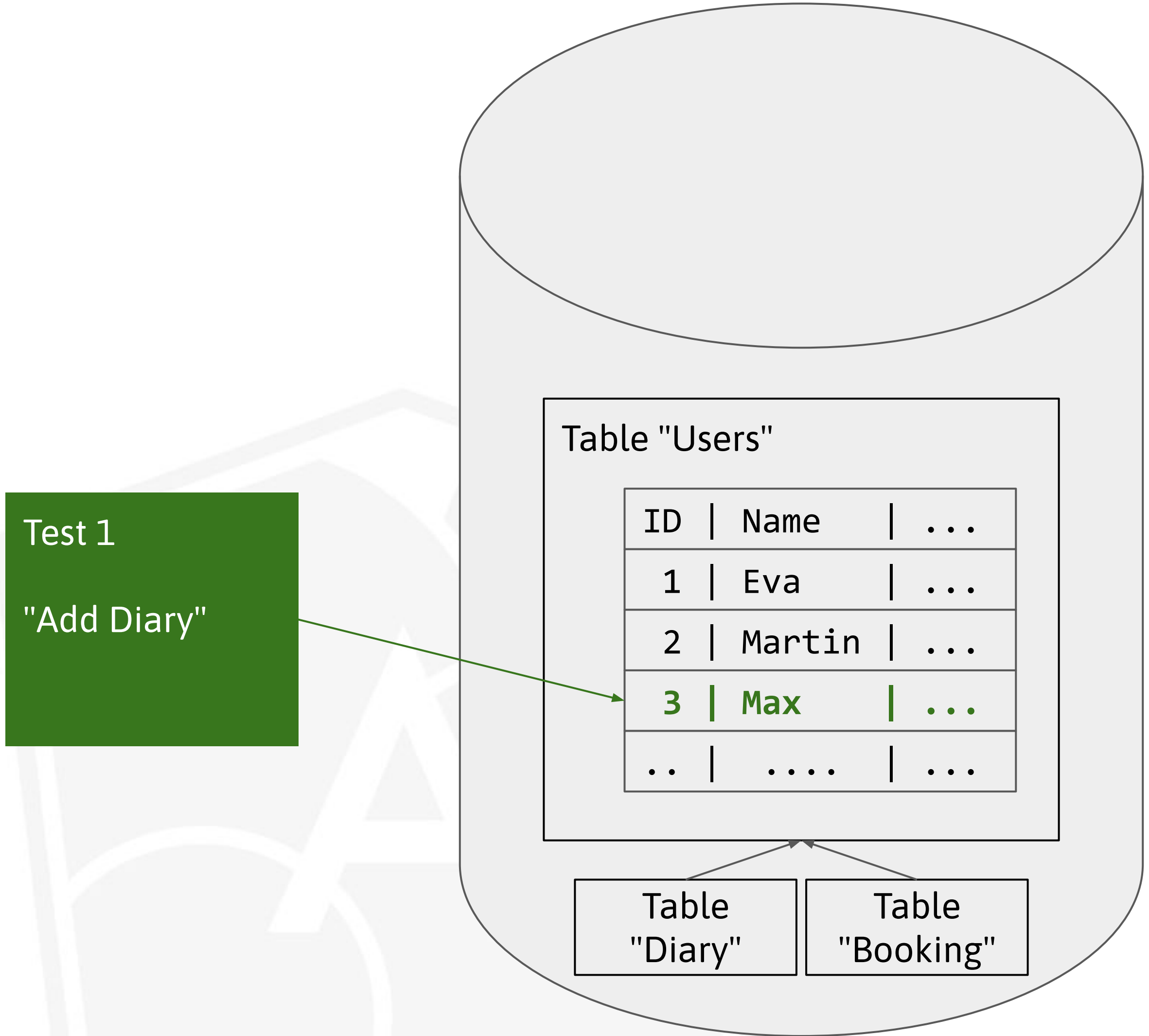
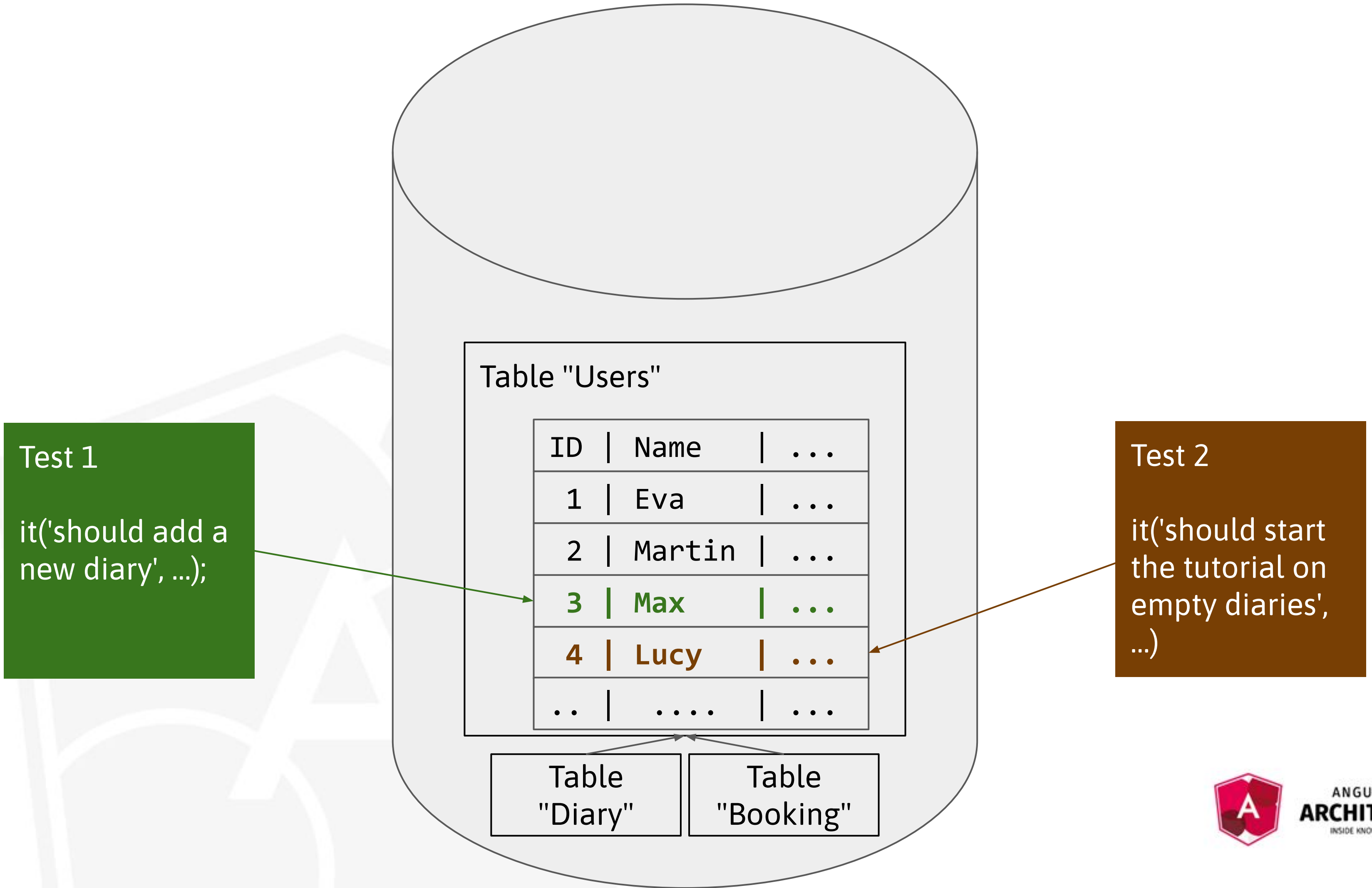


Table "Users"
ID | Name | ...
1 | Eva | ...
2 | Martin | ...
.. | .... | ...
Table "Diary"
Table "Booking"


Test 1
"Add Diary"
Table "Users"
ID | Name | ...
1 | Eva | ...
2 | Martin | ...
3 | Max | ...
.. | .... | ...
Table "Diary"
Table "Booking"



Test 1
it('should add a new diary', ...);
Table "Users"
ID | Name | ...
1 | Eva | ...
2 | Martin | ...
3 | Max | ...
4 | Lucy | ...
.. | .... | ...
Table "Diary"
Table "Booking"
Test 2
it('should start the tutorial on empty diaries', ...)

Test Setup !== Test

ANGULAR ARCHITECTS
INSIDE KNOWLEDGE

API Arrange Possibilities: Normal Requests

- Default Case
- Call same endpoints as the Frontend
- Don't use the frontend directly!
- cy.task() as alternative

API Arrange Possibilities: Dedicated Test API

- Backend provides special API for test mode
- Shortcuts possible, e.g.
  - merge chain of requests into one
  - Overcome Security Issues
- Best Option

Testing Scopes

- Individual Scope
  - All data depends on a certain ID
  - e.g. Personalised Data
  - Best Option in Combination with Test API (Sign Up & In)
- Global Scope
  - Tests Affect each other
  - Challenging Parallel Runs
  - Not so easy to solve...

Global Pattern I: Independent Tests

- Read-Only Character
- No Arranging required
- Rely on Test Seed
- Smoke Tests
- Tests for Static Elements

Global Pattern II: Intelligent Tests

- "I'll create and find it"
- Flexible
- Requires more code

Global Pattern III: Dependent Test Group

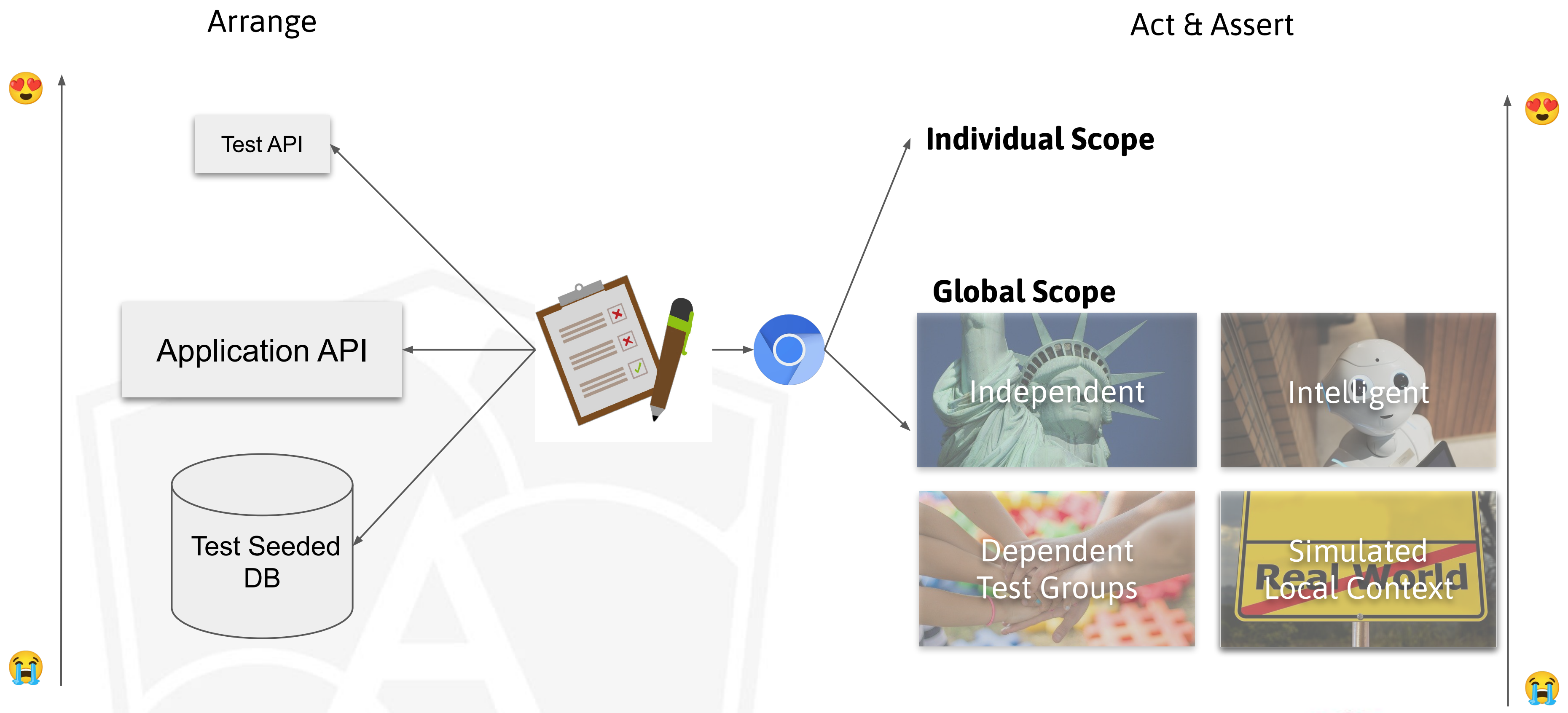
- Default Group
- Logical Group of Unit Tests
- Internal knowledge about other tests
- Order is important
- Database Reset after each Group Run

Global Scope IV: Simulated Individual Context

- Mock all APIs
- Transforms a global into an individual context

Global Scope V: Integration Tests

- Don't test it all and rely on integration tests


Arrange
Act & Assert
Test API
Application API
Test Seeded DB
Individual Scope
Global Scope
Independent
Intelligent
Dependent Test Groups
Simulated Local Context
~~Real World~~

Summary

- You will not have completely isolated tests
- Try to minimize loose coupling
- Always prefer Backend API over Test Seed
- Look out for opportunities with individual scope