

# TESTING REACT COMPONENTS (MMT-M2020)

# RECAP HOMEWORK

# RECAP HOMEWORK

## MULTIPLE ASSERTIONS IN ONE TEST

```
it('score of a roll is stored into the score', () => {
    const game = new Game();
    game.roll(5);
    expect(game.score).toBe(5);
    game.roll('/');
    expect(game.score).toBe(10);
    game.roll('X');
    expect(game.score).toBe(30);
})
```

# RECAP HOMEWORK

## MULTIPLE ASSERTIONS IN ONE TEST

- » usually a sign that a test is doing too much
- » split into multiple tests

```
it('when 5 pins are hit, score is 5', () => {
  const game = new Game();
  game.roll(5);
  expect(game.score).toBe(5);
})

it('when a strike was hit, score is 10', () => {
  const game = new Game();
  game.roll('x');
  expect(game.score).toBe(10);
})

it('when a strike was followed by 5 pins, score is 20', () => {
  const game = new Game();
  game.roll('x');
  game.roll(5);
  expect(game.score).toBe(20);
})
```

# RECAP HOMEWORK MAGIC STRINGS

```
// ...
if (item === '-') {
//           ^^^
// extract magic strings to constants and give them names
    return accumulated;
}

if (item === '/') {
    let nextThrow = getNextThrows(frames, index, i, 1)[0];
    if (nextThrow === '-')
        nextThrow = 0;
    else if (nextThrow === 'X')
        nextThrow = 10;
    else
        nextThrow = Number(nextThrow);
    return 10 + nextThrow;
}
```

# RECAP HOMEWORK

## MAGIC STRINGS

» extract magic strings into constants

```
const MISS = '-'
const SPARE = '/'
const STRIKE = 'X'

// ...
if (item === MISS) {
    // ^^^^
    // replace magic characters with constants
    return accumulated;
}
//...
```

# RECAP HOMEWORK

## NO LINTING

- » next time -2 points
- » please run
  - » `npx eslint --init`
  - » install linter
  - » `npx mrm lint-staged`
  - » automatically verify code before each commit

# TESTING REACT COMPONENTS

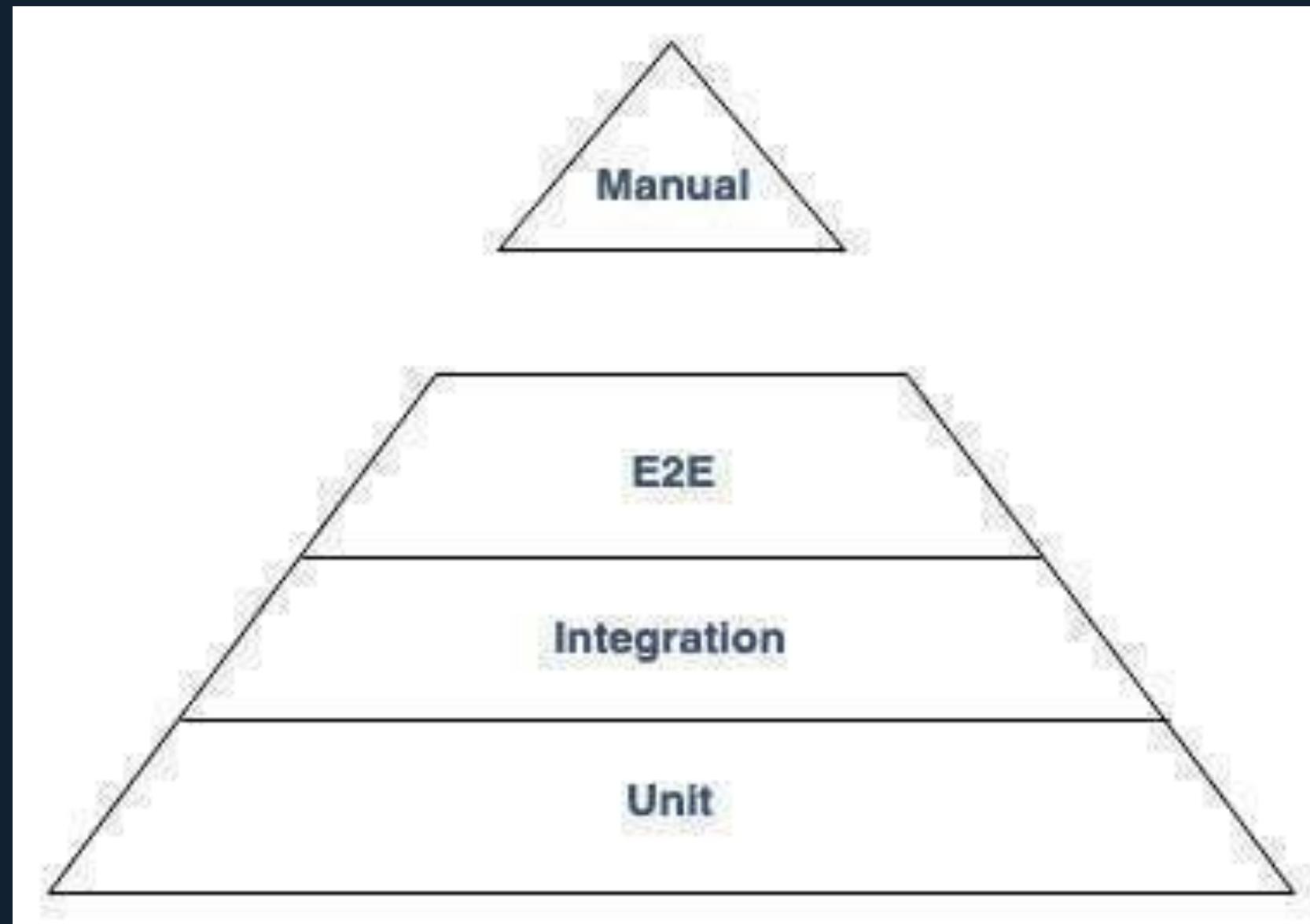
# TESTING REACT COMPONENTS

## TOOLS

- » Cypress (e2e testing "Software Quality Assurance")
- » React Test Utils (Facebook, low level)
- » Enzyme (AirBnB, more high level)
- » React Testing Library (best of both worlds)

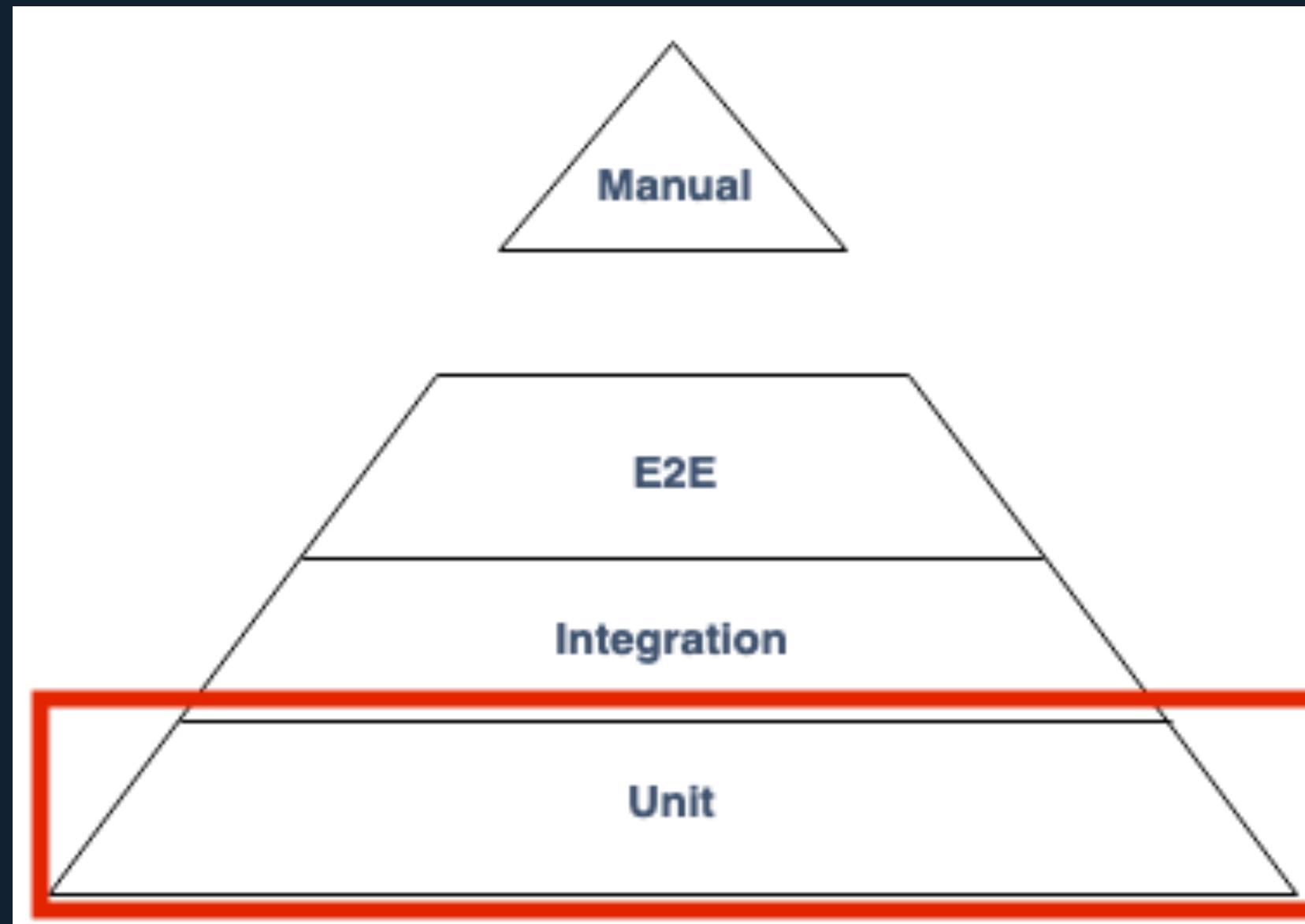
# TESTING REACT COMPONENTS

## TESTING PYRAMID



# TESTING REACT COMPONENTS

## TESTING PYRAMID



# TESTING COMPONENTS

## VERIFY THAT SOME TEXT IS RENDERED

```
// button.spec.js
import React from 'react'
import { render, cleanup, queryByText } from '@testing-library/react'
import { Button } from './Button'

afterEach(cleanup)
describe('Button', () => {
  it('renders given text', () => {
    // Arrange
    const givenText = 'A Button'

    // Act
    const { container } = render(<Button>{givenText}</Button>)

    // Assert
    expect(queryByText(container, givenText)).toBeTruthy()
  })
})
```

# TESTING COMPONENTS

## VERIFY THAT SOME TEXT IS RENDERED

- » Run the test and watch it fail
- » The test will guide you towards the implementation

# TESTING COMPONENTS

## VERIFY THAT SOME TEXT IS RENDERED

```
// button.js
import React from 'react'

const Button = ({ children }) => {
  return <>{children}</>
}

}
```

# TESTING COMPONENTS

## VERIFY THAT AN HTML TAG IS RENDERED

```
// button.spec.js
import React from 'react'
import { render, cleanup, queryByText } from '@testing-library/react'
import { Button } from './Button'

afterEach(cleanup)
describe('Button', () => {
  // ... other tests

  it('renders a button html tag', () => {
    const givenText = 'A Button'
    const { container } = render(<Button>{givenText}</Button>)

    expect(container.querySelectorAll('button'))
    // 1) ^^^^^^^^^^^^^^^^^^
      .toHaveLength(1)
    // 2) ^^^^^^^^^^^^^^

    // 1) get all button HTML tags from the rendered container
    // 2) verify that there is exactly one button HTML tag
  })
})
```

# TESTING COMPONENTS

## VERIFY THAT AN HTML TAG IS RENDERED

```
import React from 'react'

export const Button = ({ children }) => (
  <button> /* render a Button instead of a fragment */
  {children}
</button>
)
```

# TESTING USER INTERACTIONS

# TESTING USER INTERACTIONS

- » How can we test user interactions?
- » eg. when the button was clicked?

```
import React from 'react'

const Button = ({ onClick, children }) => {
  // ^^^^^^
  // How can we verify that the onClick handler is
  // called when the button is clicked?
  return <button>{children}</button>
}
```

# TESTING USER INTERACTIONS

## SPY OBJECTS

- » Spy objects are stubs that also record the way they were called
- » Useful when:
  - » A hard to verify side effect is triggered (eg. E-Mail sending)

```
it('sends an email on sign up', () => {  
  const sendEmail = jest.fn()  
  const signUp = signUp({ sendEmail }, username, password)  
  expect(sendEmail).toHaveBeenCalledWith({ username, password })  
})
```

# TESTING USER INTERACTIONS

## SPY OBJECTS

- » Spy objects can be used to verify user interactions in react components

```
// button.spec.js

it('when button was clicked, calls given onClick handler', () => {
  const onClick = jest.fn() // create function spy
  const { container } = render(<Button onClick={onClick}>My Button</Button>)
  fireEvent.click(container.querySelector('button'))
// 1)                                     ^^^^^^^^^^^^^^^^^^^^^^^^^^
// 2)           ^
// 1) select the DOM element to be clicked
// 2) fire the click event

  expect(onClick).toHaveBeenCalled()
// verify that the onClick spy has been called at least once
})
```

# TESTING USER INTERACTIONS

## SPY OBJECTS

```
import React from 'react'

const Button = ({ onClick, children }) => (
  <button onClick={onClick}>
    /* 1)                                     ^^^^^^     */
    {children}
  </button>
)
// 1) set click handler on the button DOM element
```

# EXERCISE 1

- » You're building an issue tracking system
- » Build a component which displays the names of assignees
  - » eg. <Assignees assignees={['Mike', 'Sepp', 'David']} />
  - » build a simple ul

# EXERCISE 2

- » WITH more than 3 assignees,
- » only display 3 assignees
- » display a show more button

# EXERCISE 3

- » WHEN the show more button was clicked
- » display all assignees
- » a show less button is displayed instead of a show more button
- » AND the show less button was clicked, only displays 3 assignees

# EXERCISE 4

- » WITH less than 4 assignees,
- » don't display a "show more" button

# HOMEWORK

# HOMEWORK 1

- » Build 2 React Components using TDD
- » Try to not open the browser during implementation
- » Work in a strict TDD loop
  - » commit before every new test
  - » write descriptive commit messages
- » You can use as a starting point <https://github.com/webpapaya/fhs-react-redux-starter-kit>

# HOMEWORK 2

» MoneyTransactionCreate

  » users => { id, name }

  » onSubmit => { debtorId, creditorId, amount }

» MoneyTransactionList (Lists all Money Transactions)

  » moneyTransactions

  » onMoneyTransactionPaid => { id, paidAt: (new Date()).toISOString() }

# HOMEWORK 3

App

Button

I owe somebody      Somebody owes me

User	Amount	
Select		Create
A user	10,40\$	Paid
A user	10,40\$	
A user	10,40\$	
A user	-10,40\$	Paid
A user	10,40\$	

# FEEDBACK

- » Questions: [tmayrhofer.lba@fh-salzburg.ac.at](mailto:tmayrhofer.lba@fh-salzburg.ac.at)
- » <https://de.surveymonkey.com/r/8TW92LL>