

# Test Driven Development (TDD)

In Practice by Sumana Saha

# Speaker Introduction

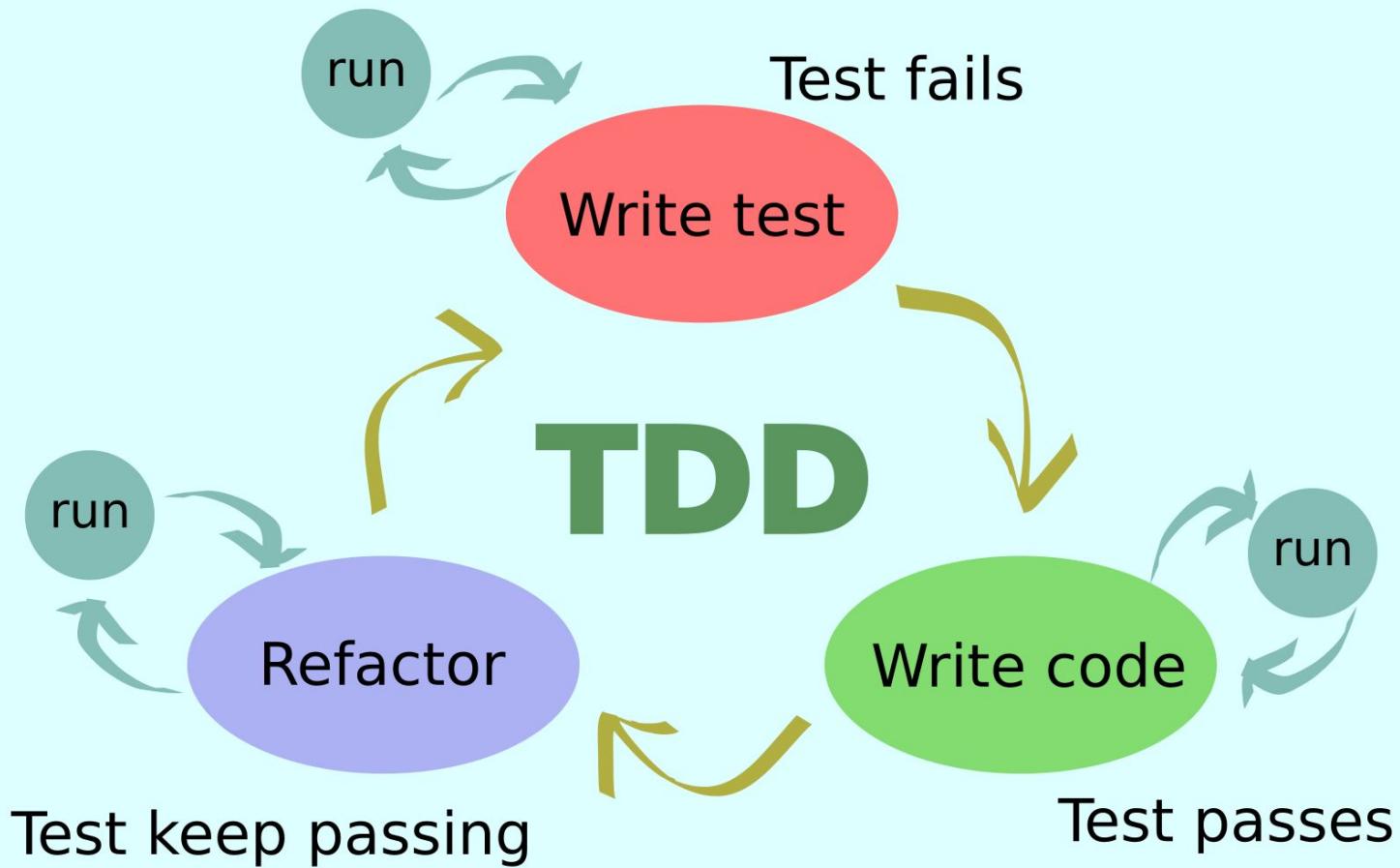
- Software Engineer at RatePay GmbH, Berlin
- Passionate about Clean Code, Microservices
- Ask me anything about Programming, Fitness, Travel
- Fun fact : I am a cat lover
- Not so fun fact : I am a perfectionist
- Social Media presence : LinkedIn, Twitter



# Agenda

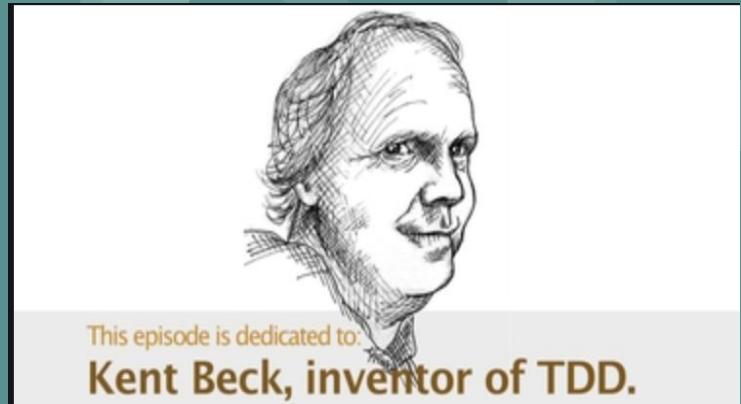
- What is TDD?
- A brief history about TDD
- Agile Connections
- Practical approach
- Pros and Cons
- User survey
- Resources
- Discussions





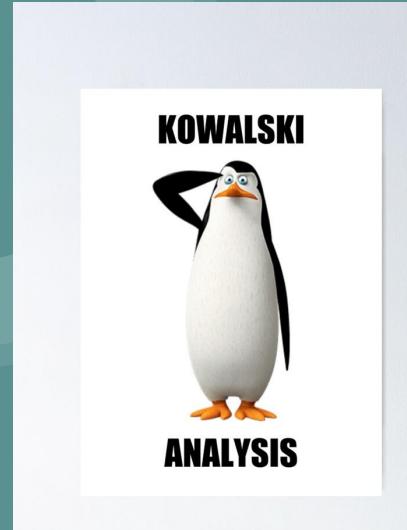
# History

- Originated in 20th Century
- Version 1 name “**test-first development**”
- Rediscovered and Coined the term “**Test Driven Development**” by Kent Beck (American Software Engineer in 2003)



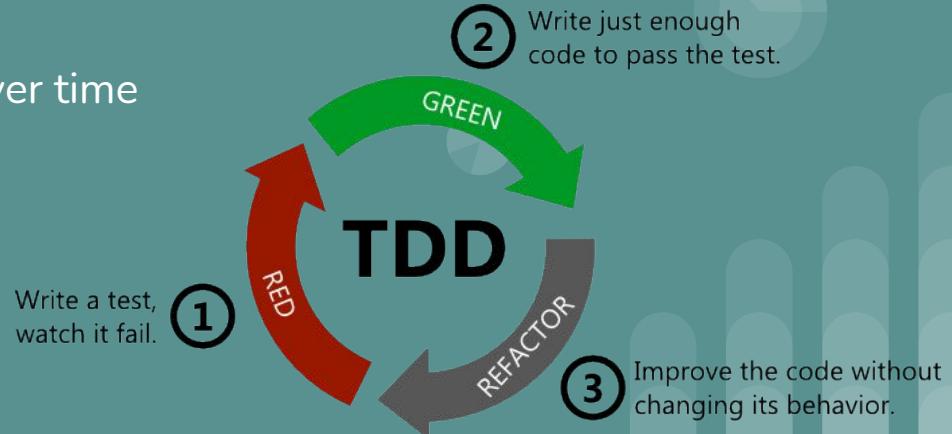
# Agile & TDD

- TDD is a Quality Development Techniques in Agile Software Development
- Test cases Analysis should be done way before writing automated test cases
- Minimum Viable Product(MVP) is creating the “Happy Path” use case using TDD
- Working software in Primary measure of Progress
- TDD provides incremental developments which goes hand in hand with Agile methodologies



# Practical Approach - Rules

- Write a “single” unit test describing an aspect of the program
- Run the test which should fail because the program lacks that feature
- Write “just enough code”, the simplest possible, to make the test pass
- “Refactor” aka Red-Green-Refactor the code until it conforms to the simplicity criteria
- Repeat, “accumulating” unit tests over time



# Tools needed to start TDD

- Your favourite IDE aka Integrated Development Environment
- Programming language (Java, in this case)
- Build Tool Maven, Gradle etc
- Testing Libraries like JUnit, Mockito, Wiremock etc





# Let's look some real codes

example > src > main > java > com > sumanasaha > tddjavaexample > TddJavaExampleApplication.java EmailAddressValidatorTest.test\_emailAddressValidatorFunction

Project Commit Pull Requests Structure Favorites AWS Explorer

TddJavaExampleApplication.java TddJavaExampleApplicationTests.java

```
package com.sumanasaha.tddjavaexample;

import ...

@SpringBootApplication
public class TddJavaExampleApplication {

    public static void main(String[] args) { SpringApplication.run(TddJavaExampleApplication.class, args);
}

}
```

HELP.md LICENSE mvnw mvnw.cmd pom.xml README.md External Libraries Scratches and Consoles

Git TODO Problems Terminal Python Packages Services Build Event Log

Shared indexes are downloaded for Maven library in 5 sec, 922 ms (13,04 MB) (a minute ago)

14:1 LF UTF-8 Tab\* main AWS: No credentials selected

tdd-java-example – TddJavaExampleApplication.java

Project    src    test    java    com    sumanasaha    tddjavaexample    validator    EmailAddressValidatorTest.test\_emailAddressValidatorFunction

File    TddJavaExampleApplication.java    TddJavaExampleApplicationTests.java

```
package com.sumanasaha.tddjavaexample;

import ...

@SpringBootApplication
public class TddJavaExampleApplication {

    public static void main(String[] args) {
        SpringApplication.run(TddJavaExampleApplication.class, args);
    }

}
```

Class    Interface    Enum    Annotation    File Header

HELP.md    LICENSE    mvnw    mvnw.cmd    pom.xml    README.md

External Libraries    Scratches and Consoles

Git    TODO    Problems    Terminal    Python Packages    Services    Build

Shared indexes are downloaded for Maven library in 5 sec, 922 ms (13,04 MB) (2 minutes ago)

14:1 LF UTF-8 Tab\* main AWS: No credentials selected

tdd-java-example – PhoneNumberValidatorTest.java

src > test > java > com > sumanasaha > tddjavaexample > validator > PhoneNumberValidatorTest EmailAddressValidatorTest.test\_emailAddressValidatorFunction

Project Commit Pull Requests Structure Favorites AWS Explorer

File Project TddJavaExampleApplication.java PhoneNumberValidatorTest.java TddJavaExampleApplicationTests.java

1 package com.sumanasaha.tddjavaexample.validator;

2

3

4 public class PhoneNumberValidatorTest {

5

6 //GOAL : create a phone number validator function

7 |

8 }

9

HELP.md LICENSE mvnw mvnw.cmd pom.xml README.md External Libraries Scratches and Consoles

Git TODO Problems Terminal Python Packages Services Build

Shared indexes are downloaded for Maven library in 5 sec, 922 ms (13,04 MB) (3 minutes ago)

7:5 LF UTF-8 4 spaces main AWS: No credentials selected Event Log

tdd-java-example – PhoneNumberValidatorTest.java

src > test > java > com > sumanasaha > tddjavaexample > validator > PhoneNumberValidatorTest EmailAddressValidatorTest.test\_emailAddressValidatorFunction

TddJavaExampleApplication.java > PhoneNumberValidatorTest.java > TddJavaExampleApplicationTests.java

Project Commit Pull Requests Structure Favorites AWS Explorer

src

- main
  - java
    - com.sumanasaha.tddjavaexample
      - validator
- resources
- test
  - java
    - com.sumanasaha.tddjavaexample
      - validator

- HELP.md
- LICENSE
- mvnw
- mvnw.cmd
- pom.xml
- README.md
- External Libraries
- Scratches and Consoles

package com.sumanasaha.tddjavaexample.validator;

import org.junit.jupiter.api.Test;

public class PhoneNumberValidatorTest {

//GOAL : create a phone number validator function

@Test

public void test.phoneNumberValidatorFunction(){} }

Git TODO Problems Terminal Python Packages Services Build

Shared indexes are downloaded for Maven library in 5 sec, 922 ms (13,04 MB) (3 minutes ago)

10:5 LF UTF-8 4 spaces main AWS: No credentials selected Event Log

tdd-java-example – PhoneNumberValidatorTest.java

src test java com sumanasaha tddjavaexample validator PhoneNumberValidatorTest TddJavaExampleApplication.java PhoneNumberValidatorTest.java TddJavaExampleApplicationTests.java

Project Commit Pull Requests Structure Favorites AWS Explorer

package com.sumanasaha.tddjavaexample.validator;

import org.junit.jupiter.api.Test;

public class PhoneNumberValidatorTest {

//GOAL : create a phone number validator function

@Test

public void test\_phoneNumberValidatorFunction(){

Run 'test\_phoneNumberVa...()' ^♂R

Debug 'test\_phoneNumberVa...()' ^♂D

Run 'test\_phoneNumberVa...()' with Coverage

Modify Run Configuration...

HELP.md LICENSE mvnw mvnw.cmd pom.xml README.md

External Libraries Scratches and Consoles

Git TODO Problems Terminal Python Packages Services Build

Shared indexes are downloaded for Maven library in 5 sec, 922 ms (13,04 MB) (3 minutes ago)

Event Log

10:5 LF UTF-8 4 spaces main AWS: No credentials selected

tdd-java-example – PhoneNumberValidatorTest.java

The screenshot shows the IntelliJ IDEA interface with the following details:

- Project View:** Shows the project structure under "tdd-java-example". The "test" directory contains "java" and "resources" sub-directories. The "java" directory under "test" contains "com.sumanasaha.tddjavaexample.validator" package, which includes "PhoneNumberValidatorTest" and "TddJavaExampleApplicationTests".
- Code Editor:** Displays the code for "PhoneNumberValidatorTest.java". The code defines a class "PhoneNumberValidatorTest" with a single test method "test.phoneNumberValidatorFunction()".
- Run Tab:** Shows the run configuration for "PhoneNumberValidatorTest.test\_phoneNumberValidatorFunction...". It indicates "Tests passed: 1 of 1 test – 46 ms".
- Output Tab:** Shows the terminal output: "/Library/Java/JavaVirtualMachines/adoptopenjdk-11.jdk/Contents/Home/bin/java ...". Below it, "Process finished with exit code 0" is displayed.
- Status Bar:** Shows "10:55 LF UTF-8 4 spaces", "main", and "AWS: No credentials selected".

```
package com.sumanasaha.tddjavaexample.validator;

import org.junit.jupiter.api.Test;

public class PhoneNumberValidatorTest {

    //GOAL : create a phone number validator function

    @Test
    public void test.phoneNumberValidatorFunction(){}
}
```

tdd-java-example – PhoneNumberValidatorTest.java

Project    .idea    TddJavaExampleApplication.java    PhoneNumberValidatorTest.java    TddJavaExampleApplicationTests.java    Maven

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

```
import org.junit.jupiter.api.Test;  
  
public class PhoneNumberValidatorTest {  
  
    //GOAL : create a phone number validator function  
  
    private PhoneNumberValidator phoneNumberValidator;  
  
    @Test  
    public void test.phoneNumberValidatorFunction(){  
  
    }  
}
```

Cannot resolve symbol 'PhoneNumberValidator'    More actions...    :

Project Explorer    GitHub    Build Status    AWS Explorer    Event Log

Git    Run    TODO    Problems    Terminal    Python Packages    Services    Build

Tests passed: 1 (moments ago)    15:9    LF    UTF-8    4 spaces    main    AWS: No credentials selected

tdd-java-example – PhoneNumberValidatorTest.java

umanasaha > tddjavaexample > validator > **PhoneNumberValidatorTest** > **phoneNumberValidator**

TddJavaExampleApplication.java > PhoneNumberValidatorTest.java > TddJavaExampleApplicationTests.java

Project Commit Pull Requests Structure Favorites AWS Explorer

File Edit View Insert Run Tools Help

0 1 1 ^ v Main

import org.junit.jupiter.api.Test;

public class PhoneNumberValidatorTest {

//GOAL : create a phone number validator function

Create Class PhoneNumberValidator

Destination package: com.sumanasaha.tddjavaexample.validator

Target destination directory: .../src/main/java/com/sumanasaha/tddjavaexample/validator

Cancel OK

}

File Git Run TODO Problems Terminal Python Packages Services Build

Cannot resolve symbol 'PhoneNumberValidator'

11:29 LF UTF-8 4 spaces main AWS: No credentials selected Event Log

The screenshot shows an IntelliJ IDEA interface with a dark theme. The code editor displays a Java test class named 'PhoneNumberValidatorTest'. A modal dialog titled 'Create Class PhoneNumberValidator' is open, prompting the user to specify the destination package as 'com.sumanasaha.tddjavaexample.validator' and the target destination directory as '.../src/main/java/com/sumanasaha/tddjavaexample/validator'. The bottom status bar indicates the current time as 11:29, file encoding as LF, character width as 4 spaces, and the current branch as main. The bottom navigation bar includes links for Git, Run, TODO, Problems, Terminal, Python Packages, Services, and Build.

The screenshot shows a Java development environment with the following details:

- Project Tree:** The project is named "tdd-java-example" located at "/sumana/SumanasahaProject". It contains a .idea file and a src directory with main and test sub-directories. The main directory has a java folder containing com.sumanasaha.tddjavaexample and validator packages. The validator package contains PhoneNumberValidator and TddJavaExampleApplication classes. The test directory also has a java folder with com.sumanasaha.tddjavaexample.validator and PhoneNumberValidatorTest classes.
- Code Editor:** The editor shows the PhoneNumberValidator.java file. The code defines a public class PhoneNumberValidator with a single brace on line 6.
- Toolbars and Status Bar:** The bottom bar includes icons for Git, Run, TODO, Problems, Terminal, Python Packages, Services, Build, and AWS Explorer. The status bar shows "Tests passed: 1 (a minute ago)" and "6:5 LF UTF-8 4 spaces main AWS: No credentials selected".

Project

Commit

Pull Requests

Structure

Favorites

AWS Explorer

java > com > sumanasaha > tddjavaexample > validator > PhoneNumberValidatorTest.java

setUp

PhoneNumberValidatorTest.test\_phoneNumberValidatorFunction

Git: ✓ ✓ ✓

PhoneNumberValidatorTest.java

PhoneNumberValidator.java

TddJavaExampleApplicationTests.java

6

7

8 public class PhoneNumberValidatorTest {

9

10 //GOAL : create a phone number validator function

11

12 private PhoneNumberValidator phoneNumberValidator;

13

14 @BeforeEach

15 public void setUp() {

16 phoneNumberValidator = new PhoneNumberValidator();

17 }

18

19 @Test

20 public void test\_phoneNumberValidatorFunction() {

21

22 }

23

24 }

25

26 }

27

Maven

Event Log

Git: LF UTF-8 4 spaces main AWS: No credentials selected

Tests passed: 1 (3 minutes ago)

```
public class PhoneNumberValidatorTest {  
    //GOAL : create a phone number validator function  
    private PhoneNumberValidator phoneNumberValidator;  
  
    @BeforeEach  
    public void setUp() {  
        phoneNumberValidator = new PhoneNumberValidator();  
    }  
  
    @Test  
    public void test_phoneNumberValidatorFunction() {  
    }  
}
```

tdd-java-example – PhoneNumberValidatorTest.java

The screenshot shows the IntelliJ IDEA interface with the following details:

- Project Tree:** The project is named "tdd-java-example". It contains a ".idea" file, a "src" directory with "main" and "test" sub-directories. "main/java" contains "com.sumanasaha.tddjavaexample.validator" which includes "PhoneNumberValidator" and "TddJavaExampleApplication". "test/java" contains "com.sumanasaha.tddjavaexample.validator" which includes "PhoneNumberValidatorTest" and "TddJavaExampleApplicationTests".
- Code Editor:** The current file is "PhoneNumberValidatorTest.java". The code defines a test class with an "setUp" method and a "test\_phoneNumberValidatorFunction" test method.
- Toolbars and Status Bar:** The top bar shows tabs for "TddJavaExampleApplication.java", "PhoneNumberValidatorTest.java" (which is the active tab), and "PhoneNumberValidator.java". The bottom status bar shows "Tests passed: 1 (5 minutes ago)" and "AWS: No credentials selected".

```
public class PhoneNumberValidatorTest {  
    //GOAL : create a phone number validator function  
    private PhoneNumberValidator phoneNumberValidator;  
  
    @BeforeEach  
    public void setUp()  
    {  
        phoneNumberValidator = new PhoneNumberValidator();  
    }  
  
    @Test  
    public void test_phoneNumberValidatorFunction()  
    {  
        //GIVEN  
        String phoneNumberTestData = "+49-15730845951";  
        // WHEN  
        // THEN  
    }  
}
```

tdd-java-example – PhoneNumberValidatorTest.java

Project Commit Pull Requests Favorites AWS Explorer

validator PhoneNumberValidatorTest test\_phoneNumberValidatorFunction PhoneNumberValidatorTest.test\_phoneNumberValidatorFunction TddJavaExampleApplication.java PhoneNumberValidatorTest.java PhoneNumberValidator.java TddJavaExampleApplicationTests.java

10 public class PhoneNumberValidatorTest {  
11 //GOAL : create a phone number validator function  
12 private PhoneNumberValidator phoneNumberValidator;  
13  
14 @BeforeEach  
15 public void setUp()  
16 {  
17 phoneNumberValidator = new PhoneNumberValidator();  
18 }  
19  
20 @Test  
21 public void test\_phoneNumberValidatorFunction()  
22 {  
23 //GIVEN  
24 String phoneNumberTestData = "+49-15730845951";  
25 // WHEN  
26 phoneNumberValidator.validate(phoneNumberTestData);  
27 // THEN  
28 }  
29  
30 // Cannot resolve method 'validate' in 'PhoneNumberValidator'  
31 Create method 'validate' in 'PhoneNumberValidator'  
32

Git Run TODO Problems Terminal Python Packages Services Build Event Log

Tests passed: 1 (5 minutes ago) 28:60 LF UTF-8 4 spaces main AWS: No credentials selected

java > com > sumanasaha > tddjavalexample > validator > PhoneNumberValidator > validate

Project TddJavaExampleApplication.java < PhoneNumberValidatorTest.java < PhoneNumberValidator.java < TddJavaExampleApplicationTests.java

2 ▲ 2 ▼ Maven

Commit Pull Requests

PhoneNumberValidator.java

```
package com.sumanasaha.tddjavalexample.validator;

public class PhoneNumberValidator {

    public boolean validate( final String phoneNumberTestData ) {
        return true;
    }
}
```

target

- HELP.md
- LICENSE
- mvnw
- mvnw.cmd
- pom.xml
- README.md

External Libraries

Scratches and Consoles

AWS Explorer Favorites

Git Run TODO Problems Terminal Python Packages Services Build Event Log

Tests passed: 1 (6 minutes ago) 7:21 LF UTF-8 4 spaces main AWS: No credentials selected

tdd-java-example – PhoneNumberValidatorTest.java

Project    File    View    Tools    Help

File    New    Open    Save    Recent

File    Project    TddJavaExampleApplication.java    PhoneNumberValidatorTest.java    PhoneNumberValidator.java    TddJavaExampleApplicationTests.java

Project    tdd-java-example ~/sumana/SumanasahaProject

- > .idea
- > src
  - > main
    - > java
      - > com.sumanasaha.tddjavaexample
        - > validator
          - PhoneNumberValidator
          - TddJavaExampleApplication
    - > resources
    - > test
      - > java
        - > com.sumanasaha.tddjavaexample
          - > validator
            - PhoneNumberValidatorTest
            - TddJavaExampleApplicationTests
    - > target
    - HELP.md
    - LICENSE
    - mvnw
    - mvnw.cmd
    - pom.xml
    - README.md
  - > External Libraries
  - > Scratches and Consoles

Commit    Pull Requests    Structure    Favorites    AWS Explorer

10 public class PhoneNumberValidatorTest {  
11  
12 //GOAL : create a phone number validator function  
13  
14 private PhoneNumberValidator phoneNumberValidator;  
15  
16 @BeforeEach  
17 public void setUp()  
18 {  
19 phoneNumberValidator = new PhoneNumberValidator();  
20 }  
21  
22 @Test  
23 public void test\_phoneNumberValidatorFunction() {  
24  
25 //GIVEN  
26 String phoneNumberTestData = "+49-15730845951";  
27  
28 // WHEN  
29 boolean actual = phoneNumberValidator.validate(phoneNumberTestData);  
30  
31 // THEN

Git    Run    TODO    Problems    Terminal    Python Packages    Services    Build

Tests passed: 1 (6 minutes ago)

Event Log

tdd-java-example – PhoneNumberValidatorTest.java

Project    File    View    Tools    Help

File: PhoneNumberValidatorTest.java

16                @BeforeEach  
17                public void setUp()  
18                {  
19                      phoneNumberValidator = new PhoneNumberValidator();  
20                }  
21  
22                @Test  
23                public void test\_phoneNumberValidatorFunction() {  
24  
25                      // GIVEN  
26                      String phoneNumberTestData = "+49-15730845951";  
27  
28                      // WHEN  
29                      boolean actual = phoneNumberValidator.validate(phoneNumberTestData);  
30  
31                      // THEN  
32                      assertThat( actual ).isTrue();  
33  
34                }  
35  
36                }  
37  
38                }

Project Explorer    Problems    Run    Terminal    Python Packages    Services    Build

Tests passed: 1 (7 minutes ago)

32:39 LF UTF-8 4 spaces main AWS: No credentials selected

Project

Commit

Pull Requests

Structure

Favorites

AWS Explorer

Git Run TODO Problems Terminal Python Packages Services Build

Tests passed: 1 (7 minutes ago)

32:39 LF UTF-8 4 spaces main AWS: No credentials selected Event Log

# tdd-java-example – PhoneNumberValidatorTest.java

File Project Test TddJavaExampleApplication.java PhoneNumberValidatorTest.java PhoneNumberValidator.java TddJavaExampleApplicationTests.java

```
16     @BeforeEach
17     public void setUp()
18     {
19         phoneNumberValidator = new PhoneNumberValidator();
20     }
21
22     @Test
23     public void test_phoneNumberValidatorFunction() {
24         Run... ^R
25         Debug... ^D
26         Run with Coverage...
27         Profile...
28         Modify Run Configuration...
29         // WHEN
30         boolean actual = phoneNumberValidator.validate(phoneNumberTestData);
31
32         // THEN
33         assertThat( actual ).isTrue();
34     }
35
36 }
37 }
```

tdd-java-example – PhoneNumberValidatorTest.java

Project: tdd-java-example ~/sumana/SumanasahaProject

src

- main
- java
  - com.sumanasaha.tddjavaexample
  - validator
    - PhoneNumberValidator
    - TddJavaExampleApplication
- resources
- test
  - java
    - com.sumanasaha.tddjavaexample
    - validator
  - PhoneNumberValidatorTest
  - TddJavaExampleApplicationTests
- target

HELP.md

LICENSE

Run: **Tests passed: 1 of 1 test – 157 ms**

Test Results: 157ms

- Test Results: 157ms
- PhoneNumberValidatorTest: 157ms
  - test\_phoneNumberValidator: 157ms

/Library/Java/JavaVirtualMachines/adoptopenjdk-11.jdk/Contents/Home/bin/java ...

Process finished with exit code 0

Tests passed: 1 (moments ago)

32:39 LF UTF-8 4 spaces main AWS: No credentials selected

Project Commit Pull Requests Structure Favorites AWS Explorer Run Git Run TODO Problems Terminal Python Packages Services Build Event Log

```
    // WHEN
    boolean actual = phoneNumberValidator.validate(phoneNumberTestData);
    // THEN
    assertThat( actual ).isTrue();
}
```

tdd-java-example – PhoneNumberValidator.java

java > com > sumanasaha > tddjavaproject > validator > validate > PhoneNumerValidatorTest.test\_phoneNumberValidatorFunction

Project    Maven

Commit    Pull Requests

PhoneNumerValidator

TddJavaExampleApplication

resources

test

java

com.sumanasaha.tddjavaproject

validator

PhoneNumerValidatorTest

TddJavaExampleApplicationTests

target

HELP.md

LICENSE

mvnw

mvnw.cmd

pom.xml

README.md

External Libraries

Scratches and Consoles

```
package com.sumanasaha.tddjavaproject.validator;

public class PhoneNumerValidator {

    @
    public boolean validate( final String phoneNumerTestData ) {
        if( phoneNumerTestData.length() > 10 ) {
            return true;
        }
        return false;
    }
}
```

Git   Run   TODO   Problems   Terminal   Python Packages   Services   Build

Tests passed: 1 (a minute ago)   Event Log

tdd-java-example – PhoneNumberValidatorTest.java

Project File Edit View Search Tools Help

validator > test > PhoneNumberValidatorTest > test\_phoneNumberValidatorFunction

TddJavaExampleApplication.java < PhoneNumberValidatorTest.java < PhoneNumberValidator.java < TddJavaExampleTests.java

18       phoneNumberValidator = new PhoneNumberValidator();  
19     }  
20 }  
21  
22 @Test  
23 public void test\_phoneNumberValidatorFunction() {  
24 Run 'test\_phoneNumberVa...' ^♂R  
25 Debug 'test\_phoneNumberVa...' ^♂D  
26 Run 'test\_phoneNumberVa...' with Coverage  
27 Modify Run Configuration...  
28 String phoneNumberTestData = "+49-15730845951";  
29 // WHEN  
30 boolean actual = phoneNumberValidator.validate(phoneNumberTestData);  
31 // THEN  
32 assertThat(actual).isTrue();  
33 }  
34 }  
35 }  
36 }  
37 }

Project > tdd-java-example ~/sumana/SumanaSahaProject  
src  
  main  
    java  
      com.sumanasaha.tddjavaexample  
        validator  
          PhoneNumberValidator  
          TddJavaExampleApplication  
    resources  
  test  
    java  
      com.sumanasaha.tddjavaexample  
        validator  
          PhoneNumberValidatorTest  
          TddJavaExampleApplicationTests  
target  
HELP.md  
LICENSE  
mvnw  
mvnw.cmd  
pom.xml  
README.md  
External Libraries  
Scratches and Consoles

Commit Pull Requests Structure Favorites AWS Explorer

Git Run TODO Problems Terminal Python Packages Services Build

Tests passed: 1 (a minute ago)

29:52 LF UTF-8 4 spaces main AWS: No credentials selected Event Log

tdd-java-example – PhoneNumberValidatorTest.java

Project    TddJavaExampleApplication.java    PhoneNumberValidatorTest.java    PhoneNumberValidator.java    TddJavaExampleApplicationTests.java    Analyzing...

File    tdd-java-example /sumana/SumanasahaProject    Main

src

main

java

com.sumanasaha.tddjavaexample

validator

PhoneNumberValidator

TddJavaExampleApplication

resources

test

java

com.sumanasaha.tddjavaexample

validator

PhoneNumberValidatorTest

TddJavaExampleApplicationTests

target

HELP.md

LICENSE

18    phoneNumberValidator = new PhoneNumberValidator();

19    }

20    }

21

22    @Test

23    public void test.phoneNumberValidatorFunction() {

24

25       // GIVEN

26       String phoneNumberTestData = "+49-15730845951";

27

28       // WHEN

29       boolean actual = phoneNumberValidator.validate(phoneNumberTestData);

30

31       // THEN

Run:    PhoneNumberValidatorTest.test.phoneNumberValidatorFunction...    Tests passed: 1 of 1 test – 146 ms

Test Results    146 ms

Test Results    146 ms

PhoneNumberValidatorTest    146 ms

test.phoneNumberValidatorFunction    146 ms

/Library/Java/JavaVirtualMachines/adoptopenjdk-11.jdk/Contents/Home/bin/java ...

Process finished with exit code 0

Tests passed: 1 (moments ago)

Event Log

```
23:50 (33 chars) LF UTF-8 4 spaces P main AWS: No credentials selected
```

Project

tdd-java-example ~/sumana/SumanasahaProject

src

main

java

com.sumanasaha.tddjavaexample

validator

PhoneNumberValidator

TddJavaExampleApplication

resources

test

java

com.sumanasaha.tddjavaexample

validator

PhoneNumberValidatorTest

TddJavaExampleApplicationTests

target

HELP.md

LICENSE

mvnw

mvnw.cmd

pom.xml

README.md

External Libraries

Scratches and Consoles

PhoneNumberValidatorTest.java

PhoneNumberValidatorTest.java

PhoneNumberValidator.java

TddJavaExampleApplicationTests.java

Project

File

Edit

Settings

Terminal

Python Packages

Services

Build

Git

Run

TODO

Problems

Terminal

Python Packages

Services

Build

Event Log

Tests failed: 1, passed: 0 (moments ago)

32:00 main AWS: No credentials selected

```
21
22
23     @Test
24     public void test_phoneNumberValidatorFunction() {
25         Run 'test_phoneNumberVa...' ^♂R
26         Debug 'test_phoneNumberVa...' ^♂D
27         Run 'test_phoneNumberVa...' with Coverage
28         Modify Run Configuration...
29
30         String phoneNumberTestData = "+49-15730845951";
31
32         // WHEN
33         boolean actual = phoneNumberValidator.validate(phoneNumberTestData);
34         boolean actualForInvalidTestData = phoneNumberValidator.validate(phoneNumberInvalidTestData);
35
36         // THEN
37         assertThat( actual ).isTrue();
38         assertThat( actualForInvalidTestData ).isFalse();
39
40     }
41
42 }
```

tdd-java-example – PhoneNumberValidatorTest.java

File: PhoneNumberValidatorTest.java

```
21
22     @Test
23     public void test_phoneNumberValidatorFunction() {
24
25         //GIVEN
26         String phoneNumberTestData = "+49-15730845951";
27
28         String phoneNumberInvalidTestData = "+49-157";
29
30         // WHEN
31         boolean actual = phoneNumberValidator.validate(phoneNumberTestData);
32         boolean actualForInvalidTestData = phoneNumberValidator.validate(phoneNumberInvalidTestData);
33
34         // THEN
```

Run: > PhoneNumberValidatorTest.test\_phoneNumberValidatorFunction... Tests passed: 1 of 1 test – 140 ms

Test Results 140 ms

- Test Results 140 ms
- PhoneNumberValidatorTest 140 ms
  - test\_phoneNumberValidatorFunction 140 ms

/Library/Java/JavaVirtualMachines/adoptopenjdk-11.jdk/Contents/Home/bin/java ...

Process finished with exit code 0

Tests passed: 1

Git Run TODO Problems Terminal Python Packages Services Build

32:00 main AWS: No credentials selected Event Log

Project ▾

tdd-java-example ~/sumana/SumanasahaProject

.idea

src

main

java

com.sumanasaha.tddjavaexample

validator

PhoneNumberValidator

TddJavaExampleApplication

resources

test

java

com.sumanasaha.tddjavaexample

validator

PhoneNumberValidatorTest

TddJavaExampleApplicationTests

target

HELP.md

LICENSE

mvnw

mvnw.cmd

pom.xml

README.md

External Libraries

Scratches and Consoles

Project

Commit

Pull Requests

Structure

Favorites

AWS Explorer

Git Run TODO Problems Terminal Python Packages Services Build

Events Log

Tests passed: 1 (4 minutes ago)

40:60 main AWS: No credentials selected

tdd-java-example – PhoneNumberValidatorTest.java

PhoneNumberValidatorTest.java

PhoneNumberValidatorTest.test\_phoneNumberValidatorFunction

TddJavaExampleApplication.java

PhoneNumberValidator.java

TddJavaExampleApplicationTests.java

Maven

```
22
23 @Test
24
25     public void test_phoneNumberValidatorFunction() {
26
27         //GIVEN
28         String phoneNumberTestData = "+49-15730845951";
29
30         String phoneNumberInvalidTestData = "+49-157";
31
32         String phoneNumberWithoutCountryCode = "157000";
33
34         // WHEN
35         boolean actual = phoneNumberValidator.validate(phoneNumberTestData);
36         boolean actualForInvalidTestData = phoneNumberValidator.validate(phoneNumberInvalidTestData);
37         boolean actualForWithoutCountryCode = phoneNumberValidator.validate(phoneNumberWithoutCountryCode);
38
39         // THEN
40         assertThat( actual ).isTrue();
41         assertThat( actualForInvalidTestData ).isFalse();
42         assertThat( actualForWithoutCountryCode ).isTrue();
43     }
}
```

tdd-java-example – PhoneNumberValidator.java

File Project View Insert Tools Window Help

Project Commit Pull Requests Structure Favorites AWS Explorer

File Java com sumanasaha tddjavaexample validator PhoneNumberValidator validate TddJavaExampleApplication.java PhoneNumberValidatorTest.java PhoneNumberValidator.java TddJavaExampleApplicationTests.java

1 package com.sumanasaha.tddjavaexample.validator;

2

3

4 public class PhoneNumberValidator {

5

6 @

7 if( phoneNumberTestData.length() > 10

8 && phoneNumberTestData.startsWith( "+49" ) ) {

9 return true;

10 }

11 }

12 return false;

13 }

14 }

15 }

16 }

File Git Run TODO Problems Terminal Python Packages Services Build Event Log

Tests failed: 1, passed: 0 (a minute ago)

11:10 main AWS: No credentials selected

tdd-java-example – PhoneNumberValidatorTest.java

Project Commit Pull Requests Structure Favorites AWS Explorer

javaexample > validator > PhoneNumberValidatorTest > m test\_phoneNumberValidatorFunction

TddJavaExampleApplication.java | PhoneNumberValidatorTest.java | PhoneNumberValidator.java | TddJavaExampleApplicationTests.java

22  
23 @Test  
24     public void test\_phoneNumberValidatorFunction() {  
25  
26         //GIVEN  
27         String phoneNumberTestData = "+49-15730845951";  
28  
29         String phoneNumberInvalidTestData = "+49-157";  
30  
31         String phoneNumberWithoutCountryCode = "157000";  
32  
33         // WHEN  
34         boolean actual = phoneNumberValidator.validate(phoneNumberTestData);  
35         boolean actualForInvalidTestData = phoneNumberValidator.validate(phoneNumberInvalidTestData);  
          boolean actualForWithoutCountryCode = phoneNumberValidator.validate(phoneNumberWithoutCountryCode);

Run: > PhoneNumberValidatorTest.test\_phoneNumberValidatorFunction... | Tests passed: 1 of 1 test – 136 ms

Test Results 136 ms

Test Results 136 ms

Test Results 136 ms

/Library/Java/JavaVirtualMachines/adoptopenjdk-11.jdk/Contents/Home/bin/java ...

Process finished with exit code 0

Tests passed: 1 (moments ago)

Git Run TODO Problems Terminal Python Packages Services Build Event Log

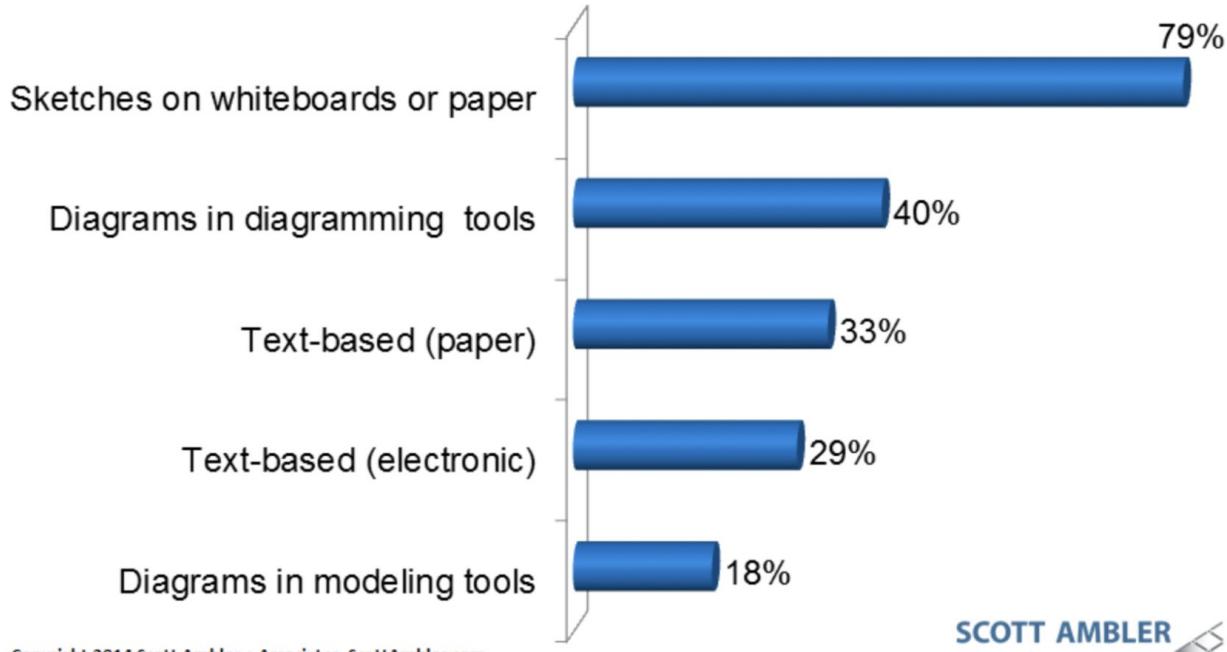
# Pros of TDD

- Efficient in finding errors and problems
- Required knowledge of internals of software under test is beneficial for thorough testing
- Allows finding hidden errors
- Programmers introspection
- Helps optimizing code
- Due to the required internal knowledge of the software maximum code coverage is obtained

# Cons of TDD

- Requires Code access
- Requires high-level knowledge of internals of the software under test
- Testing are often tightly coupled to the implementation details of the production code, causing unwanted test failures when the code is refactored
- It might not find unimplemented or missing features

To explore design, teams following an Test Driven Development (TDD) approach were also creating:



SCOTT AMBLER  
+ Associates 

Source : <http://www.ambysoft.com/surveys/tdd2014.html>

# Useful Resources

- Book - “Test-Driven Java Development” by Viktor Farcic & Alex Garcia  
“Test-Driven Development By Example” by Kent Beck
- Video Course - Clean Code with Java: Learn Simple Design, Refactoring & TDD by in28Minutes Official
- Blog -  
<https://martinfowler.com/bliki/TestDrivenDevelopment.html>





**Let's try to discuss the questions  
in your mind??**

----- Thank you