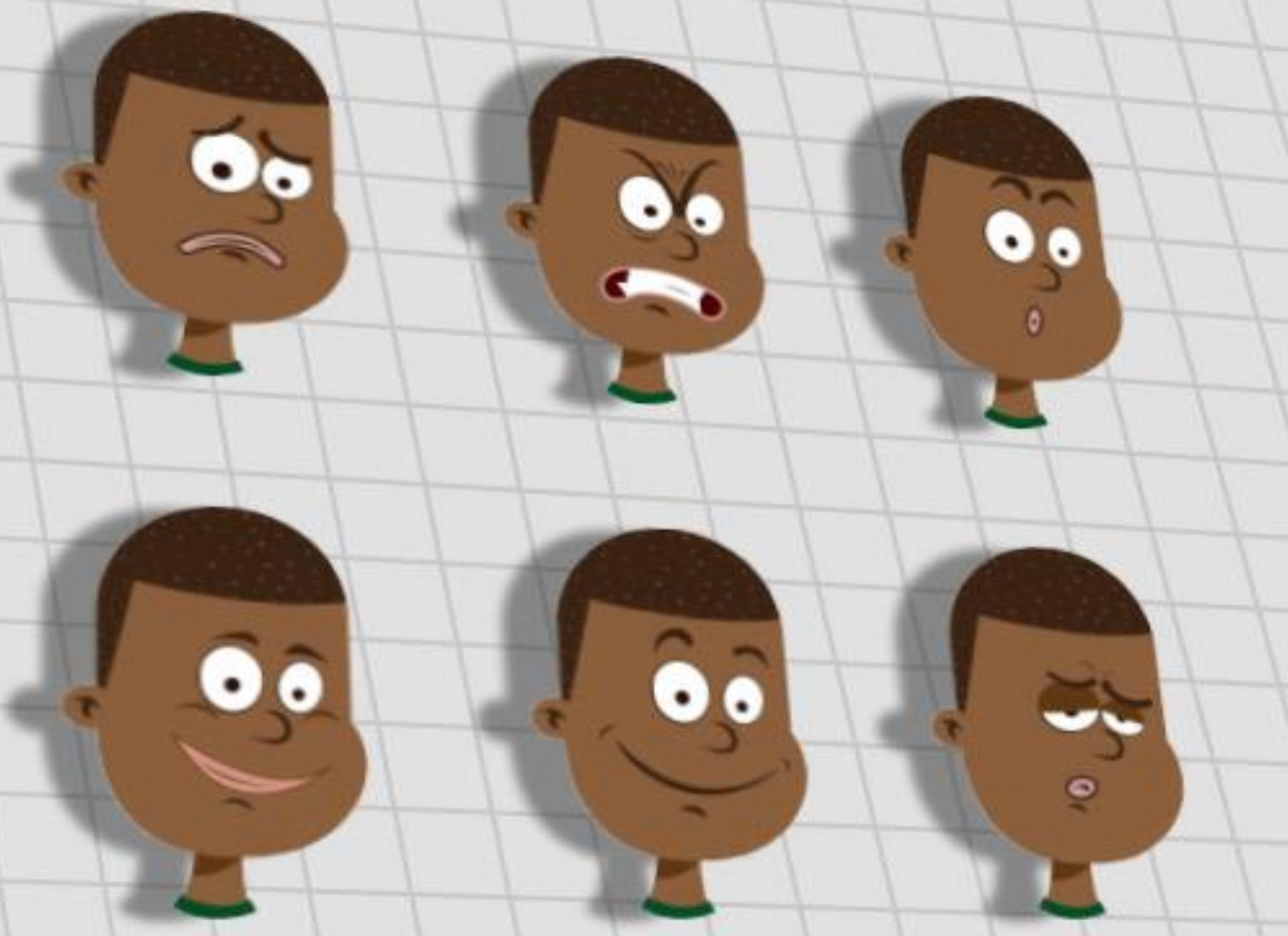

Behavior Driven Development

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About the Tutorial

Behavior Driven Development (BDD) is a software development process that originally emerged from Test Driven Development (TDD). BDD uses examples to illustrate the behavior of the system that are written in a readable and understandable language for everyone involved in the development.

Audience

BDD focuses on providing a shared process and shared tools promoting communication among software developers and business analysts to collaborate on software development, with the aim of delivering products with business value. Hence, this tutorial is going to be useful for software developers as well as business analysts at every level.

Prerequisites

Before you start proceeding with this tutorial, we are assuming that you are already aware of the basics of testing and have some hands-on experience of some testing tools. If you are not well aware of these concepts, then we will suggest you to go through our short tutorial Software Testing.

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1. BDD – Introduction

Behavior Driven Development (BDD) is a software development process that originally emerged from Test Driven Development (TDD).

According to Dan North, who is responsible for the evolution of BDD, "BDD is using examples at multiple levels to create a shared understanding and surface uncertainty to deliver software that matter."

BDD uses examples to illustrate the behavior of the system that are written in a readable and understandable language for everyone involved in the development. These examples include –

- Converted into executable specifications.
- Used as the acceptance tests.

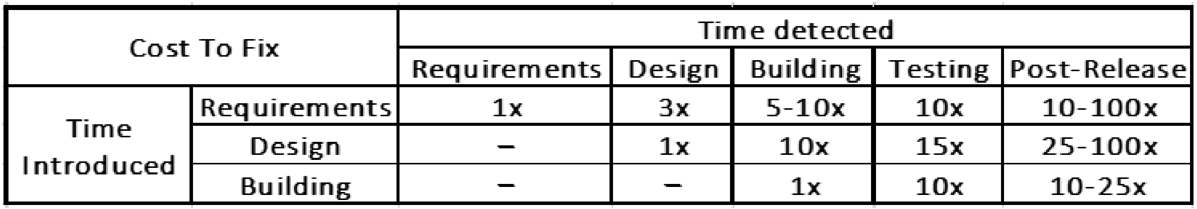
BDD – Key features

Behavior Driven Development focuses on –

- Providing a shared process and shared tools promoting communication to the software developers, business analysts and stakeholders to collaborate on software development, with the aim of delivering product with business value.
- What a system should do and not on how it should be implemented.
- Providing better readability and visibility.
- Verifying not only the working of the software but also that it meets the customer's expectations.

Origin of BDD

The cost to fix a defect increases multifold if the defect is not detected at the right time and fixed as and when it is detected. Consider the following example.



Cost To Fix		Time detected				
		Requirements	Design	Building	Testing	Post-Release
Time Introduced	Requirements	1x	3x	5-10x	10x	10-100x
	Design	–	1x	10x	15x	25-100x
	Building	–	–	1x	10x	10-25x

This shows that unless requirements are obtained correctly, it would be expensive to fix the defects resulting from misunderstanding the requirements at a later stage. Further, the end product may not meet the customer's expectations.

The need of the hour is a development approach that –

- Is based on the requirements.
- Focuses on requirements throughout the development.
- Ensures that the requirements are met.

A development approach that can take care of the above-mentioned requirements is BDD. Thus, Behavior Driven Development –

- Derives examples of different expected behaviors of the system.
- Enables writing the examples in a language using the business domain terms to ensure easy understanding by everyone involved in the development including the customers.
- Gets the examples ratified with customer from time to time by means of conversations.
- Focuses on the customer requirements (examples) throughout the development.
- Uses examples as acceptance tests.

BDD Practices

The two main practices of BDD are –

- Specification by Example (SbE)
- Test Driven Development (TDD)

Specification by Example

Specification by Example (SbE) uses examples in conversations to illustrate the business rules and the behavior of the software to be built.

Specification by Example enables the product owners, business analysts, testers and the developers to eliminate common misunderstandings about the business requirements.

Test Driven Development

Test Driven Development, in the context of BDD, turns examples into human readable, executable specifications.

The developers use these specifications as a guide to implement increments of new functionality. This, results in a lean codebase and a suite of automated regression tests that keep the maintenance costs low throughout the lifetime of the software.

Agile BDD

In Agile software development, BDD method is used to come to a common understanding on the pending specifications.

The following steps are executed in Agile BDD –

- The developers and the product owner collaboratively write pending specifications in a plain text editor.
- The product owner specifies the behaviors they expect from the system.
- The developers –
    - Fill the specifications with these behavior details.
    - Ask questions based on their understanding of the system.
- The current system behaviors are considered to see if the new feature will break any of the existing features.

Agile Manifesto and BDD

The Agile Manifesto states the following –

We are uncovering better ways of developing software by doing it and helping others do it. Through this work, we have come to value –

- **Individuals and interactions** over Processes and tools
- **Working software** over Comprehensive documentation
- **Customer collaboration** over Contract negotiation
- **Responding to change** over Following a plan

That is, while there is value in the items on the right, we value the items on the left more.

BDD aligns itself to the Agile manifesto as follows –

Agile Manifesto	BDD Alignment
Individuals and interactions over processes and tools.	BDD is about having conversations.
Working software over comprehensive documentation.	BDD focuses on making it easy to create software that is of business value.
Customer collaboration over contract negotiation.	BDD focuses on scenarios based on ideas with continuous communication with the customer as the development progresses. It is not based on any promises.

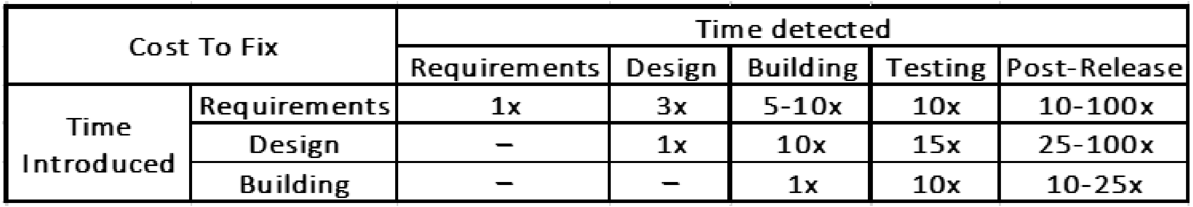
Agile Manifesto	BDD Alignment
Responding to change over following a plan.	BDD focuses on continuous communication and collaboration that facilitates absorption of changes.

2. BDD – Test Driven Development

When you look at any reference on Behavior Driven Development, you will find the usage of phrases such as “BDD is derived from TDD”, “BDD and TDD”. To know how BDD came into existence, why it is said to be derived from TDD and what is BDD and TDD, you have to have an understanding of TDD.

Why Testing?

To start, let us get into the fundamentals of testing. The purpose of testing is to ensure that the system that is built is working as expected. Consider the following example.



Cost To Fix		Time detected				
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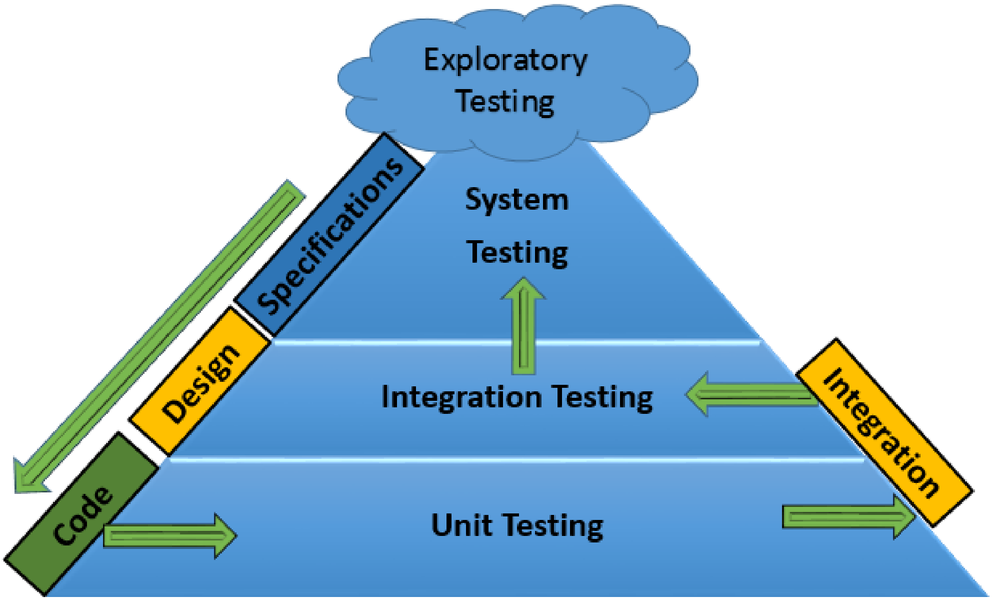
Hence, by experience we have learnt that uncovering a defect as and when it is introduced and fixing it immediately would be cost effective. Therefore, there is a necessity of writing test cases at every stage of development and testing. This is what our traditional testing practices have taught us, which is often termed as Test-early.



This testing approach is termed as the Test-Last approach as testing is done after the completion of a stage.