# Unit Testing Methodology

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BHAVI 2018

July 5, 2018

# Summary of Unit Testing

- Unit testing is the practice of testing individual units of a larger program.
- Typically is testing is automated, however can be done manually
- Serves to streamline development process as to avoid large debugging times
- Is a central component of Test-Driven Development

# Test-Driven Development

- Also called Test-Driven Design
- Method of software programming that involves a process of unit testing, programming, and refactoring
- Includes unit testing, integration testing, and system or end-to-end testing
- Reduces the time spent debugging and testing the code at the endpoint because the code is continuously tested during the design process to ensure the functionality of any new changes.

# Reasons to Perform Unit Testing

- Stops the creation of compound errors (errors that stem from failure in multiple components)
- Allows for easy identification of the point of failure in a given program
- Helps to ensure the program still functions as the code base changes
- Simplifies integration of multiple sections of code

# How to perform Unit Testing

- Unit Testing is most commonly performed by an automated tool
- The particular tool usually depends on the language
- Ex: Pyunit for Python, Junit for Java, Ctest for C++, etc.

# Steps of Unit Testing

1. Divide the program into set methods or units and name them
2. Develop a set of simple tests and make some "dummy" data to test with
3. Make the simplest possible program that is capable of passing the unit test
4. Refactor and develop the code ensuring that with each new change the unit test is still passed.

# Challenges with Unit Testing

1. One of the biggest challenges with unit testing is dividing the program into testable units
2. This is because the code must be carefully planned such that there are not units that are unable to be tested
3. The code developed in the TDD process is only as good as the tests used, and thus the unit tests must be as accurate to real-life use as possible