

# Write Java Unit Tests Automatically with AI for Code

Build critical applications faster, reduce the business risk of change and deliver more software with less

## Manual unit testing holds businesses back

There aren't enough good developers to write all the software that's needed. So why spend time and money working on code that doesn't add direct business value?

In the case of unit tests, it's because they're a critical part of ensuring the software you deliver is as good, and as reliable, as you and your customers need it to be.

Important initiatives like application modernization and cloud migration only increase the need for the confidence and operational continuity that high volume, high quality unit testing brings.

But unit testing requires effort. It's common for expensive Java developers to spend anywhere between 25% and 50%<sup>1</sup> of their time writing, maintaining and executing unit tests instead of doing more productive work - like improving and modernizing your codebase.

## Diffblue Cover: Deliver more value, more quickly

Diffblue Cover gives enterprises and Java developers the means to unlock more value from unit testing.

Cover uses Artificial Intelligence to autonomously write Java unit tests - either when you're writing new code, or across entire existing projects - so that developers can spend more time on value-add work. Each takes just a few seconds to write, compared to tens of minutes for a human.

Cover automatically maintains unit test libraries as software evolves, even on applications with millions of lines of code, to ensure coverage doesn't dip while your teams move faster.

“Diffblue Cover frees up developers to focus on delivering higher quality software, faster – and improves our developers’ experience.”

Jonathan Lofthouse,  
Managing Director & Global Head of Markets Technology, Citi

### WHY DIFFBLUE COVER?

#### ✓ Build software faster

Write comprehensive Java unit test suites in hours, saving years of work and sharply reducing costs. Coverage gates no longer need to delay deployment.

#### ✓ Increase productivity

With Cover, developers spend up to 50% more time on code that adds real value.

#### ✓ Improve code quality

Unit tests written by Cover's AI technology go far beyond the 'happy path' to minimize regressions and avoid issues in production systems.

#### ✓ Easy test maintenance

Automatically update unit tests to save more time and avoid the 'knowledge gap' problem as teams evolve.

#### ✓ Accelerate modernization

Writing unit tests in bulk delays major projects like cloud migration. Cover helps you modernize more quickly, without risk.

#### ✓ Developer experience

40% of Java developers<sup>1</sup> want to stop writing unit tests. Cover helps to keep talent happier and more engaged.

1 Diffblue research

## Diffblue Key Features

A range of features leverage Cover's AI for Code technology to increase coverage, accelerate development and reduce risk.



### Cover Core

The heart of the platform, Cover Core uses AI to automatically write human-like JUnit tests that are indistinguishable from those written by a developer. Cover Core lets you can find bugs sooner, deploy code changes faster, stop worrying about quality gates and coverage levels, and minimize tedious, unproductive developer effort.



### Cover Reports

Cover Reports delivers valuable insights about your Java codebase. It visualizes the state of unit testing and pinpoints unique, actionable insights. Understand coverage, identify risk and prioritize effort. Benchmark and track over time.



### Cover Optimize

Cover Optimize enables faster, cheaper, more flexible delivery of Java code by minimizing the time needed to run unit tests, whether on the developer desktop or in a Continuous Integration (CI) pipeline.



### Cover Refactor

Cover Refactor suggests and applies fixes that improve the observability of Java code and make it more testable, automatically increasing unit test coverage and reducing the risk of regressions.

To learn more about Diffblue Cover visit  
[diffblue.com/products](https://diffblue.com/products)

# Diffblue Cover In Action: Goldman Sachs

Global bank saves over a year of manual effort with Diffblue Cover and AI for Code.

## Challenge

Goldman Sachs aimed to efficiently boost legacy code coverage and allow engineering teams to refocus their efforts on the development of innovative, business-critical new features.

## Results

Diffblue Cover enabled engineering teams in the legacy modernization program to significantly increase test coverage. In one important backend system coverage grew from 36% to 72% in under 24 hours. In another module over 3,000 tests were written in just 8 hours - equivalent to a year of work for a human developer.<sup>2</sup>

Higher code coverage has provided greater confidence in application stability when adding new code, improving the speed at which the engineering teams can deliver business value.

“We’re excited about how much time and work this has saved our engineers so they can refocus on increasing our feature velocity, code quality, and software security. It’s great to have higher confidence in the integrity of our existing codebase.”

Jonathan Goodfellow, Managing Director, Goldman Sachs QAE team



Coverage was boosted by 100% in less than 24 hours for one repo



Achieved a time saving of 1 man-year<sup>2</sup> for a core application

## Goldman Sachs

### KEY BENEFITS

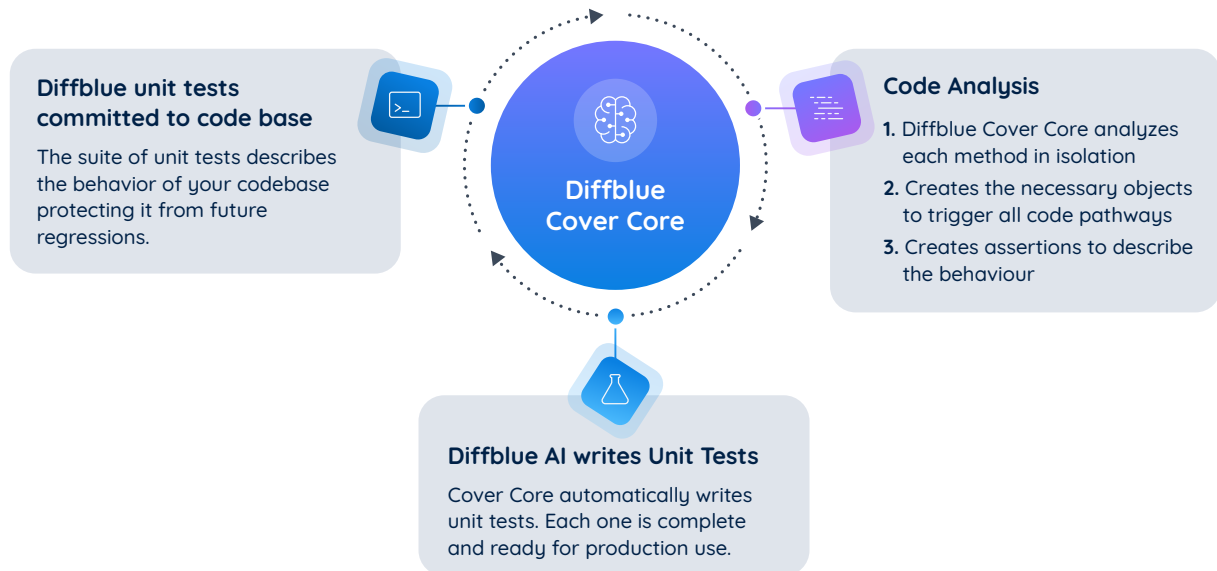
-  **Code Coverage**  
 With Diffblue Cover, new code coverage levels exceed industry standards.
-  **Agility**  
 Increase in agility and efficiency of new development.
-  **Confidence**  
 Engineering teams can modify code with confidence.
-  **Savings**  
 Create test suites in less than 10% of the manual time,<sup>1</sup> saving years of work and sharply reducing cost.
-  **Modernization**  
 Legacy applications can now migrate to cloud or be included in other critical transformation programs.

Read the full Goldman Sachs case study at [diffblue.com](https://diffblue.com)

<sup>2</sup> Manual effort assumes industry averages of 30 minutes per manual test and 6 hours productive time per day

## How It Works

Diffblue Cover Core uses AI to analyze the bytecode of the methods in your application and automatically write associated unit tests. It determines all the different ways to call each method to cover all of the code, so each unit test fully describes a single behavior of a single method - ready to catch any behavioral change. Every time Cover Core finds a new or different path following a code change it produces a new test, including the method call and all of the necessary assertions.



## Diffblue Cover Wrote This Code Automatically

Diffblue Cover Core wrote this unit test, which validates code designed to upload files to an AWS S3 bucket, completely automatically in just a few seconds.

```
@ContextConfiguration(classes = {AmazonS3.class, CloudStorageService.class})
@ExtendWith(SpringExtension.class)
public class CloudStorageServiceDiffblueTest {
    @MockBean
    private AmazonS3 amazonS3;
    @Autowired
    private CloudStorageService cloudStorageService;

    @Test
    public void testUploadFileToBucket() throws SdkClientException {
        // Arrange
        PutObjectResult putObjectResult = new PutObjectResult();
        when(this.amazonS3.putObject(anyString(), anyString(), (File) any())) .thenReturn(putObjectResult);

        // Act and Assert
        assertEquals(putObjectResult, this.cloudStorageService.uploadFileToBucket("bucket-name",
            "Object-key", Paths.get(System.getProperty("java.io.tmpdir"), "test.txt").toFile());
        verify(this.amazonS3).putObject(anyString(), anyString(), (File) any());
    }
}
```



# Diffblue Cover helps you increase business agility and accelerate transformation



Optimize the velocity and quality of Java teams; catch regressions early



Reduce software development costs and increase productivity



Untangle the complexity of refactoring legacy code



Accelerate modernization and cloud migration of core applications

## The Diffblue Cover Platform

Diffblue Cover includes a range of features that let you extract more value from Java unit testing:



### ABOUT DIFFBLUE

Founded by leading computer scientists from the University of Oxford, Diffblue is changing the way code is developed. The company's flagship developer tool, Diffblue Cover, uses AI to automatically write unit tests that help Java development teams and organizations deliver better, more modern software at higher speed. Diffblue: AI for Code. Learn more at [Diffblue.com](https://diffblue.com) or contact us at [info@diffblue.com](mailto:info@diffblue.com)