

# **UTBot Simplifies Auto Test Generation**



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# Generating C/C++ tests with KLEE is hard. UTBot does the work!

### 1. Prepare a project

Project type	Project preparation
CMake project	UTBot runs patched CMake to generate both
	compile_commands.json and link_commands.json
Make project	UTBot runs patched Bear to generate both
	compile_commands.json and link_commands.json
Other	UTBot asks user to run Bear
	\$BUILD_COMMAND

**compile\_commands.json** — compilation database **link\_commands.json** — linking commands for libraries and executables (specific to UTBot)

### 3. Google Test generation

KLEE returns test case descriptions for a function that was previously specified as an entry point. UTBot performs the transformation of KLEE output into the Google Test format.

```
TEST(regression, strToTime_test_1) {
   char s_buffer[] = "00:00";
                                        Construct
   const char * s = s_buffer;
                                     expected output
   struct Time expected = {
        .hour = 0U,
        minutes = 0U
   struct Time actual = (strToTime(s);
   EXPECT_EQ(expected.hour, actual.hour);
   EXPECT_EQ(expected.minutes, actual.minutes);
   Construct parameters
 Run Test With Coverage
                               Trigger the function (
FST(error, strToTime_test_2)
   char s_buffer[] = "90:00";
   const char * s = s_buffer;
   strToTime(s);
   FAIL() << "Function was supposed to fail";</pre>
```

## **Enhancements in KLEE**

#### Speed:

- Pruning the Recursive States\*
- Weakest Precondition in Symbolic Execution

#### Code coverage:

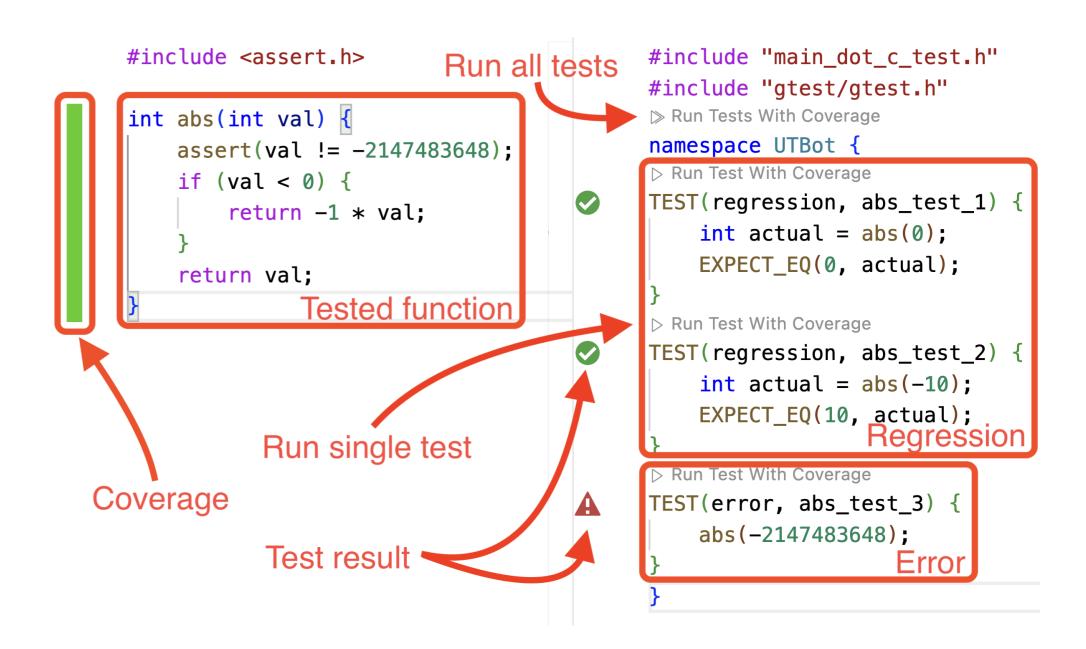
- Floating-point Support
- Complex Test Input Generation\*
- Detection of Undefined Behavior\*
- \* presented at the 3rd International KLEE Workshop, 2022

#### 2. Prepare KLEE run

During the analysis phase, UTBot uses information about the declared top-level functions and types collected while opening the project. UTBot wraps the functions for KLEE.

#### 4. Compile and run tests

There are plugins for VS Code and CLion, GitHub Actions.



UTBot allows compiling test files to link them with the rest of the code and to run the tests to get results and information about code coverage. UTBot can also be used as a zero false positive static analyzer by generating a SARIF report.

#### References

https://www.utbot.org https://github.com/UnitTestBot/UTBotCpp https://github.com/UnitTestBot/klee