



# Saint Petersburg Research Center

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**INTERNSHIPS**

# Addition for Bear (C++)

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# Project background

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- **Bear**: build a project (cmake, clang) -> compilation database (json)
- JSON: arguments, file, directory, output
- **Bear with addition**: + linking database (json)
- Bear with addition used in **UTBot**
- **Bear**: intercept + citnames

```
"arguments": [  
  "/usr/bin/c++",  
  "-std=gnu++14",  
  "-c",  
  "-o",  
  "CMakeFiles/small_project.dir/main.cpp.o",  
  "../main.cpp"  
],  
"directory": "/home/maria/Desktop/work/bear/my_tests/small/build",  
"file": "/home/maria/Desktop/work/bear/my_tests/small/main.cpp",  
"output": "/home/maria/Desktop/work/bear/my_tests/small/build/CMakeFiles/small_project.dir/main.cpp.o"
```

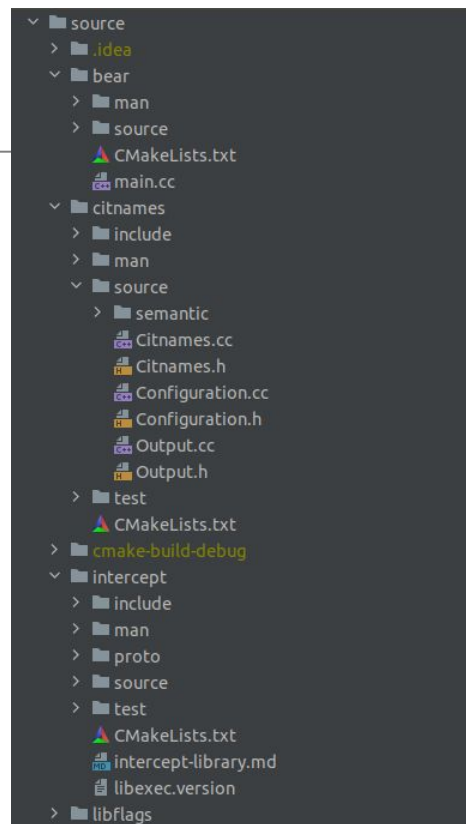
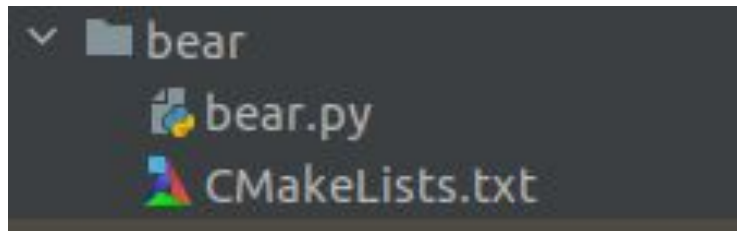
# Problem statement

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Bear (Python) -> Bear (C++)

## Tasks:

- make addition (linking database) for Bear C++
- test the new version



# Different users – different scenarios

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- **UTBot**
- static analyzers
- other projects that already use original Bear
  
- compilation databases only
- compilation and linking databases

```
Usage: bear <command> [--output-compile <arg>] [--output-link <arg>] [--verbose] [--with-link] -- ...

commands
  intercept
  citnames

--output-compile <arg>
    path of the result compile file (default: compile_commands.json)
--output-link <arg>
    path of the result link file (default: link_commands.json)
--verbose
    run in verbose mode
--with-link
    whether to create a link base
-- ...
    command to execute
```

# What has been done? Source

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- implemented the formation of linking database as in Py version
- supplemented the formation of linking database for cases not supported by Py version
- added new launch options and new custom configuration options for output
- update documentation
  
- fixed incorrect parsing of compiler flags with same prefixes (suggested fixing a bug in the original project, got approval for fixes)
- updated and extended parsing of compiler flags to adapt to a wider range of tasks
- added selection and saving of libraries added using linking flags -l, -L, -Wl
- added parsing ar and ranlib
- added compiler events filtering
- added processing of unsorted event base for citnames

# What has been done? Test

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- added unit tests
- updated existing and added new functional tests
- manually tested on small and large open projects
- tested the interaction of the project with the provided Makefile creation tool for compilation and linking databases from Bear

# Demo

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```
{
  "arguments": [
    "/usr/bin/ar",
    "qc",
    "../libs/libpoly.a",
    "CMakeFiles/poly.dir/__generated-sources/settings.cpp.o",
    "CMakeFiles/poly.dir/adapters/script_runner.cpp.o",
    "CMakeFiles/poly.dir/cairo/utils.cpp.o",
    "CMakeFiles/poly.dir/components/bar.cpp.o",
    "CMakeFiles/poly.dir/components/builder.cpp.o",
    "CMakeFiles/poly.dir/components/command_line.cpp.o",
    "CMakeFiles/poly.dir/components/config.cpp.o",
    "CMakeFiles/poly.dir/components/config_parser.cpp.o",
    "CMakeFiles/poly.dir/components/controller.cpp.o",
    "CMakeFiles/poly.dir/components/logger.cpp.o",
    "CMakeFiles/poly.dir/components/renderer.cpp.o",
    "CMakeFiles/poly.dir/components/screen.cpp.o",
    "CMakeFiles/poly.dir/components/eventloop.cpp.o",
```

```
{
  "arguments": [
    "/usr/bin/gcc",
    "-O2",
    "-Wall",
    "main.o",
    "blowfish.o",
    "rwfile.o",
    "keys.o",
    "wrapbf.o",
    "endian.o",
    "wrapzl.o",
    "-L/usr/local/lib",
    "-lz",
    "-o",
    "bcrypt"
  ],
  "directory": "/home/maria/Desktop/work/bear/tests_for_bear/bcrypt-1.1",
  "file": "",
  "files": [
    "/home/maria/Desktop/work/bear/tests_for_bear/bcrypt-1.1/main.o",
    "/home/maria/Desktop/work/bear/tests_for_bear/bcrypt-1.1/blowfish.o",
    "/home/maria/Desktop/work/bear/tests_for_bear/bcrypt-1.1/rwfile.o",
    "/home/maria/Desktop/work/bear/tests_for_bear/bcrypt-1.1/keys.o",
    "/home/maria/Desktop/work/bear/tests_for_bear/bcrypt-1.1/wrapbf.o",
    "/home/maria/Desktop/work/bear/tests_for_bear/bcrypt-1.1/endian.o",
    "/home/maria/Desktop/work/bear/tests_for_bear/bcrypt-1.1/wrapzl.o"
  ],
  "output": "/home/maria/Desktop/work/bear/tests_for_bear/bcrypt-1.1/bcrypt"
}
```



# Next step

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- get a review of the remaining PRs on github
- integrate the new version into UTBot
- propose changes to the original project

# Maria

Contacts for questions

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BEAR