Use Case 1 Code Analysis with C or Cpp

Code Analysis with C/C++

> Please note that these instructions may be outdated!

The static analysis of C/C++ is a bit different from the analysis of other programming languages because the preprocessor complicates the analysis process a little bit. Resolving header files and macros, used in the preprocessing phase, is essential for a complete and correct C/C++ static code analysis. Let's break down step by step how to analyze a C application with Kiuwan Code Security.

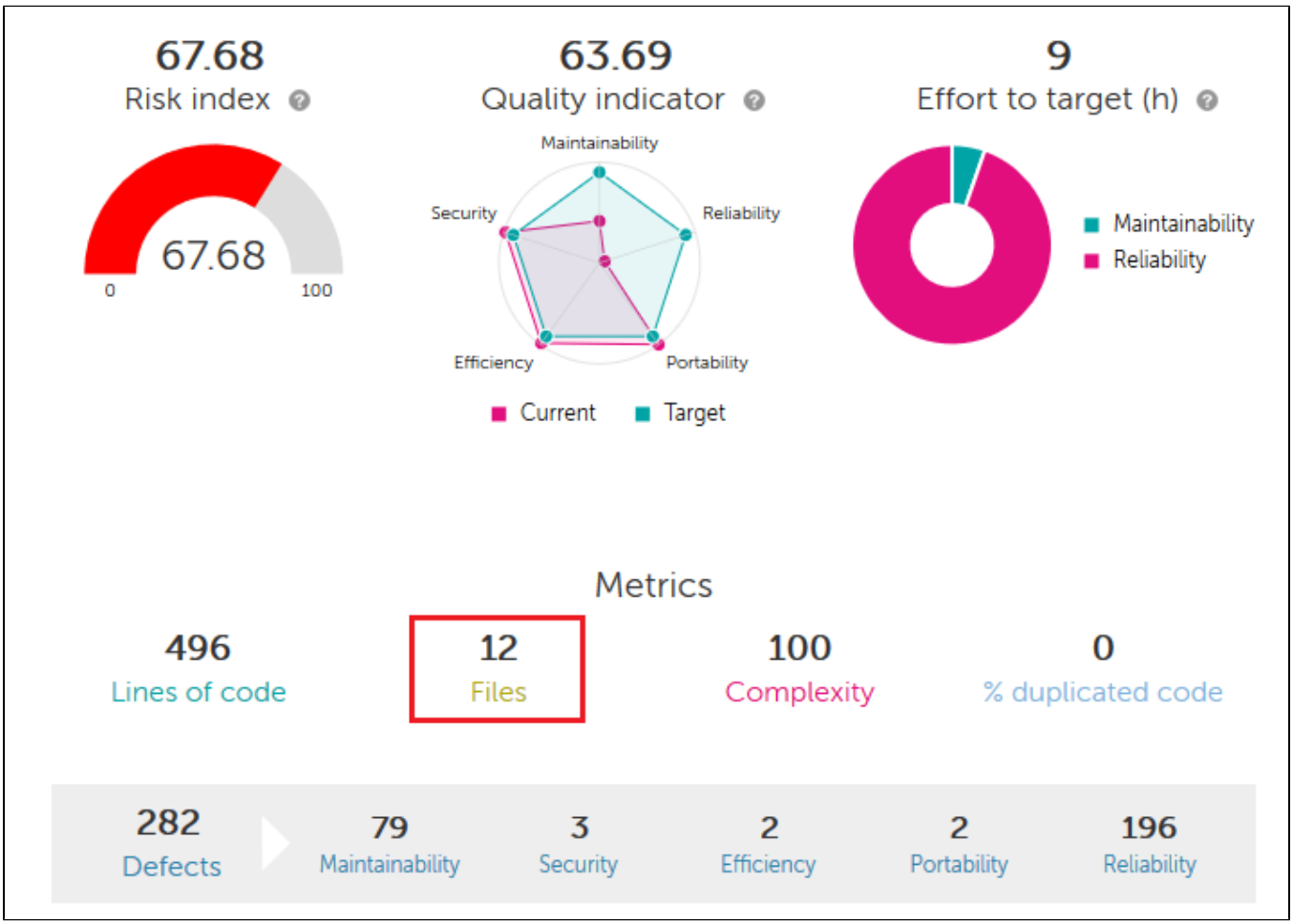
(Please note: some screenshots may be outdated)

Analyzing in the cloud

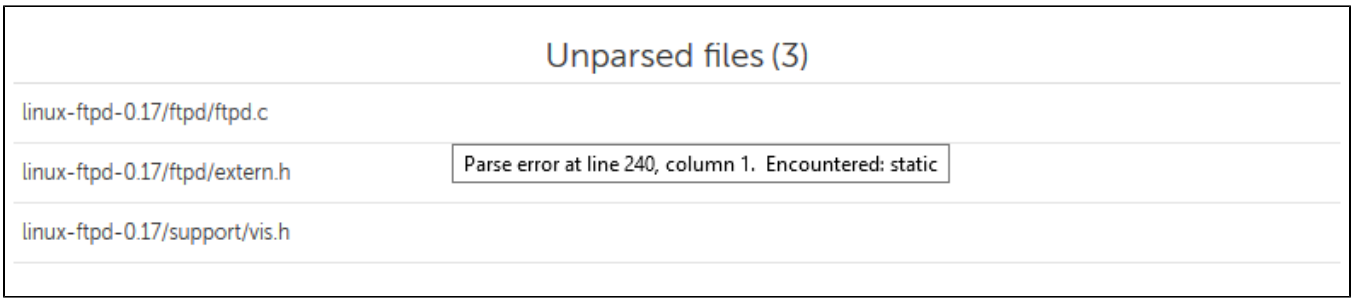
We use the Linux FTP server (linux-ftpd-0.17) as our sample application. The source code was downloaded from https://launchpad.net/ubuntu/utopic/+source/linux-ftpd.

Analyzing the code with Kiuwan Code Security is easy:

1. Create an application.
2. Upload the source code:
3. Start the analysis,
4. View the results:



We found **15 files** to analyze in the uploaded ZIP file, but **only 12 were analyzed**. Why this difference? Let's look at the logs window (open the pop-up menu to the right of 'new analysis' button) to see the cause:



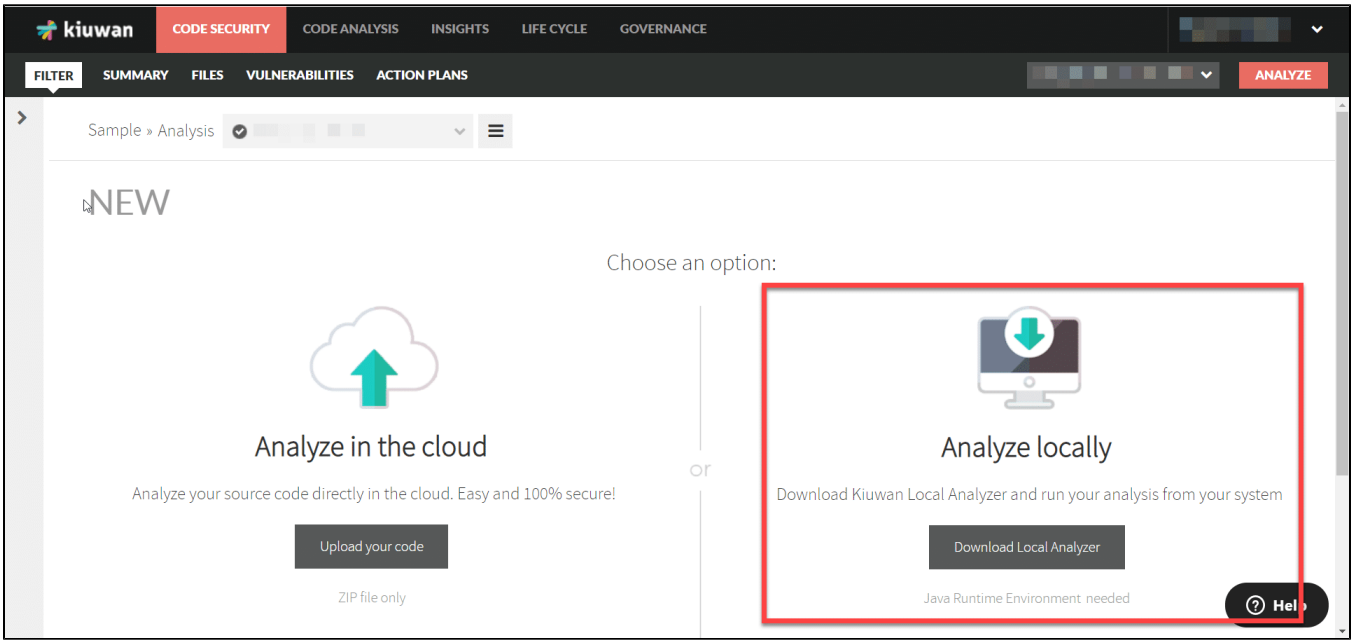
There are **three unparsed files**. Place the cursor over each row and the tooltip will display the parser error.

Normally, these errors are due to badly constructed files (they do not compile) or a specific statement that is not supported by our analyzers.

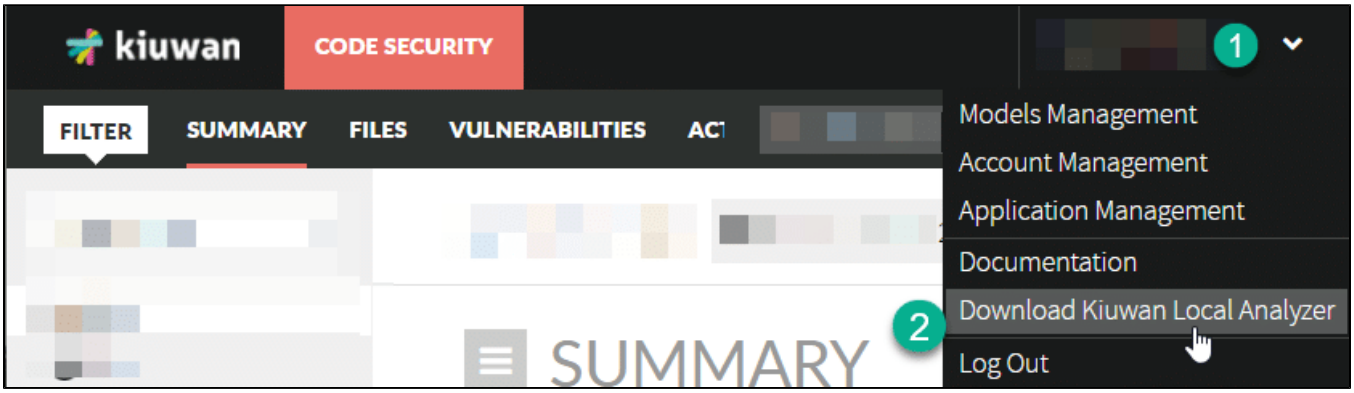
But when we analyze C or C ++, we must **ensure** that we have **fully declared macros** and **directories where header files could be found** before declaring that these files are wrong.

Analyzing locally

This extra configuration cannot be done when analyzing in the cloud, so you **have to use the Kiuwan Local Analyzer**, which you can download from the new analysis screen:



Or from your management drop-down menu:



Once the local analysis is complete, you can check the temp folder under Kiuwan Local Analyzer **installation directory**. You can find a new directory for this analysis. In our case: **%KiuwanLocalAnalyzer%\temp\linux-ftpd.82232984**

Here are the **log files** (certainly not very user friendly) that help us to find the causes of parsing errors.

The file .unresolved.headers.log has the list of **header files** that were not found during the analysis. These files are not mandatory for a successful analysis, but they **can help you to know where you have declared some macros** that are subsequently used.

Our first parsing error.

```
Cannot parse C:\_dev\c\linux-ftpd-0.17\ftpd\extern.h, due to: Parse error at line 38, column 1. Encountered: void
line[38]: void blkfree __P((char **));
```

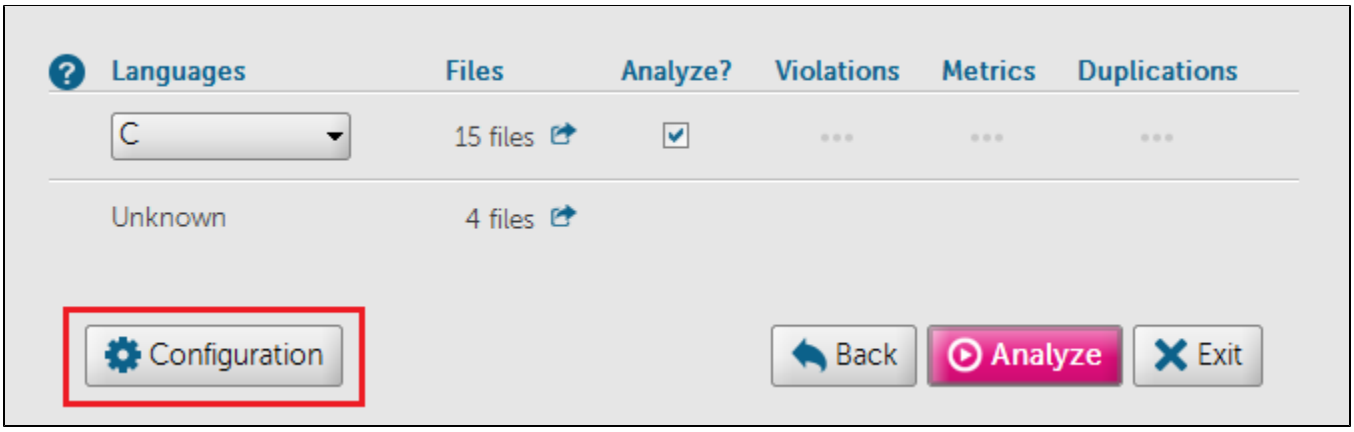
This error is due to the macro __P, which was not found during the analysis. This symbol is known as a parameter wrapper. It is a kind of macro, often used in sources that are **meant to be compatible** with pre-ANSI compilers to protect parameter declarations in function prototypes.

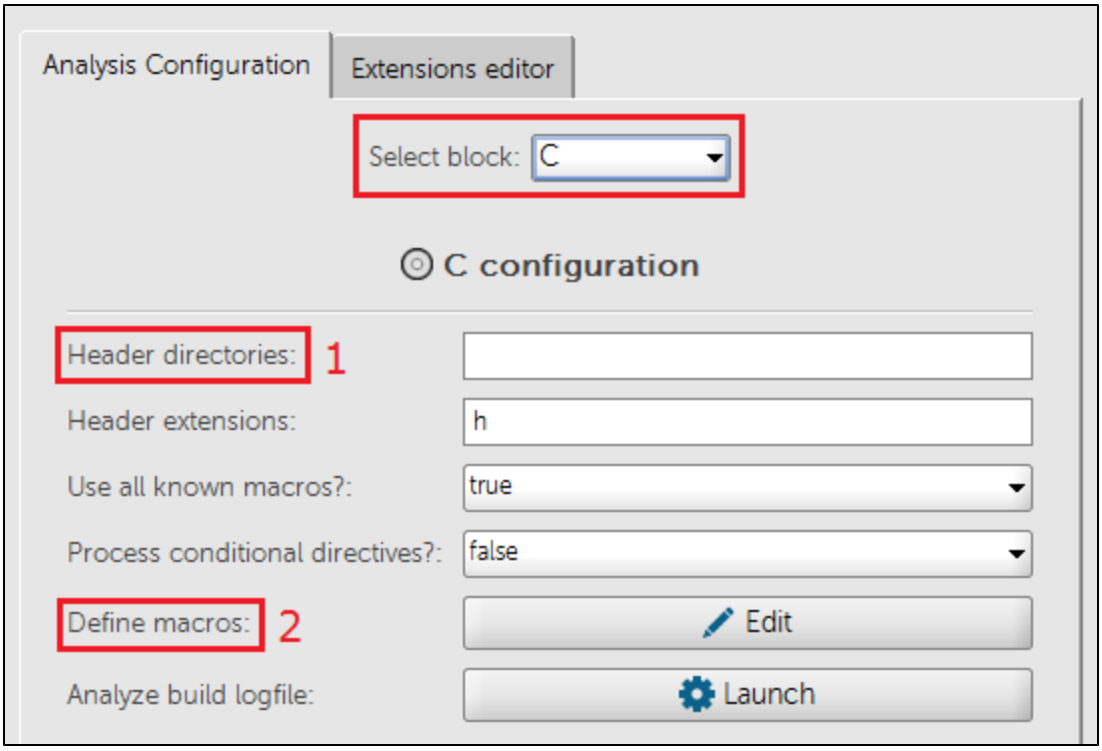
This macro, in our system, is located in /usr/include/x86_64-linux-gnu/sys/cdefs.h file, and is defined as:

```
#define __P(args) args
```

The sys/cdefs.h file was one of the listed in the log file c.unresolved.headers.log.

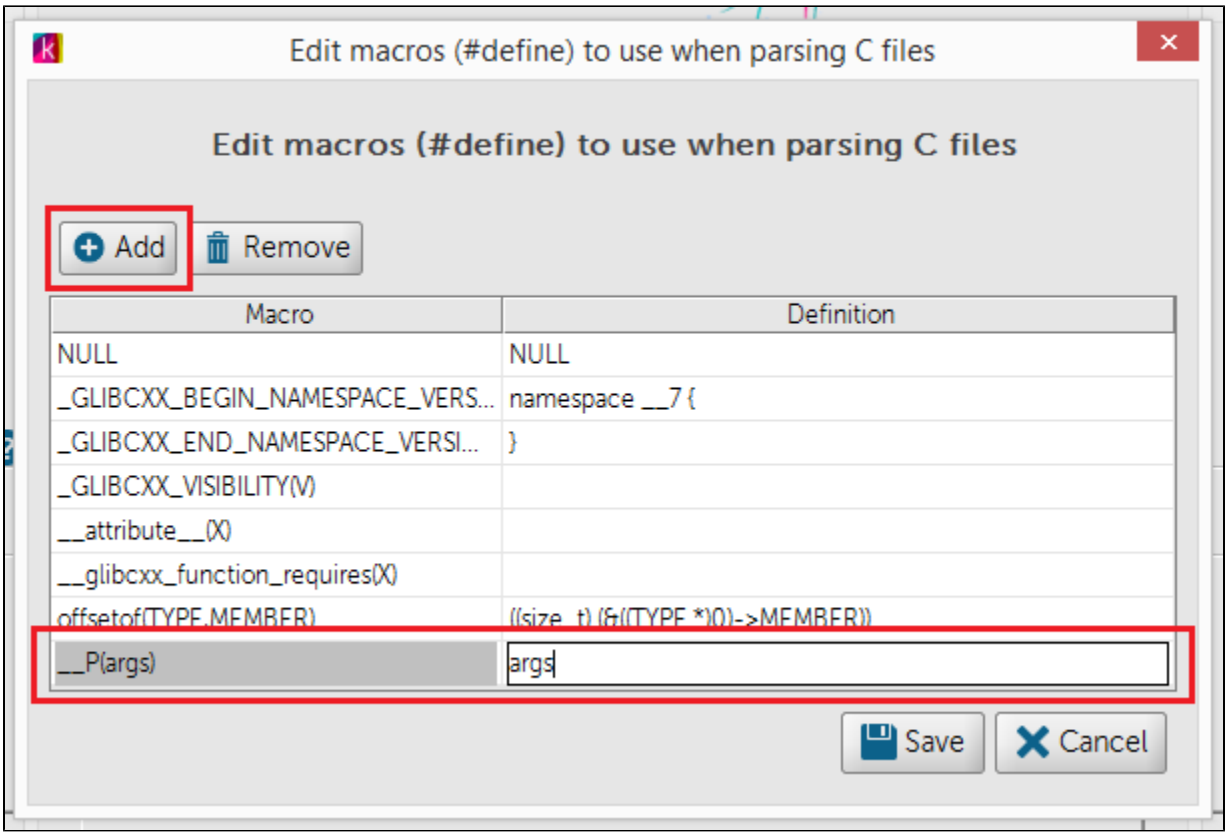
To solve this problem, we can edit the configuration for this application. On Kiuwan Local Analyzer's 'Analyze screen', click on **Configuration**:





We have 2 options:

1. **Edit the 'Header directories' entry**, where you can set a comma-separated directories list (absolute or relative to source directories), which includes files that could be found. This is a good option if you are analyzing in the **same machine** where the code is compiled and you have access to all source code dependencies.
2. Go to the **'Macro definition section'**, and click on **Edit**. On the new screen, you can define this new macro:



In both cases, this configuration is saved for subsequent analyses, so the configuration is a ‘one-time’ action.

Let’s go to the second error.

Once one error is fixed, we need to **analyze it again**, since **some errors are hidden or caused by another one**. In the new log file, after the second analysis, we get:

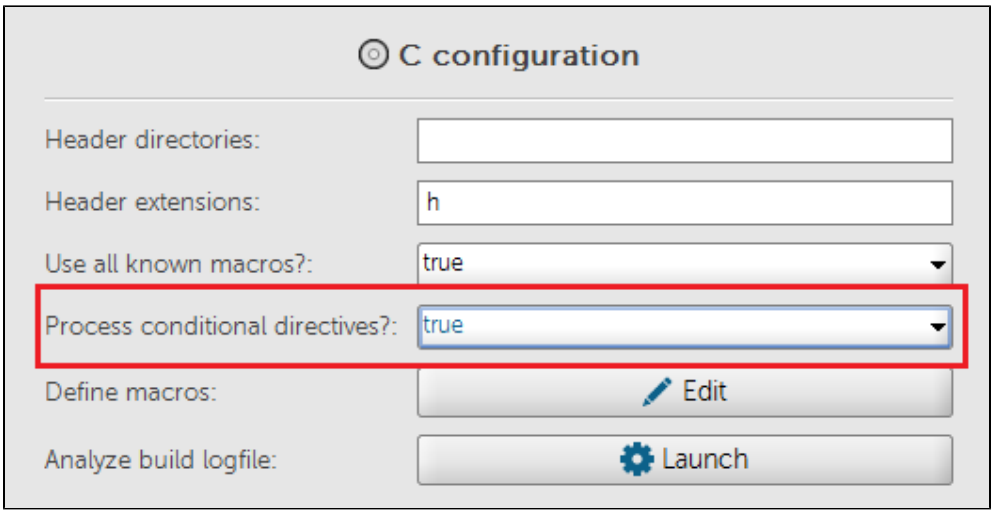
```
Cannot parse C:\_dev\c\linux-ftpd-0.17\ftpd\ftpd.c, due to: Parse error at line 1644, column 1. Encountered: reply
line[1644]: reply(int n, char *fmt, va_dcl va_alist)
```

Seeing the code, around line 1644, we find:

```
#ifdef __STDC__
reply(int n, const char *fmt, …)
#else
reply(int n, char *fmt, va_dcl va_alist)
#endif
```

Our analyzer does not support the LEGACY mode to handle variable argument lists used in va_dcl va_alist.

To skip this definition, we can **define the macro __STDC__, with value 1**, as seen before, and ask KIUWAN to process the preprocessor conditional directives.



After this last change all files were processed, so we have finished our work.

Conclusion

In short, when we have problems in our C analysis:

1. **Analyze locally**: Local Kiuwan Analyzer
2. **Resolve parsing errors** whose origin is due to configuration problems:
    - Review unresolved.headers.log
    - Include Header directories
    - Define macros
    - Whether we need to process conditional directives