Introduction: Many existing C++ projects still use C strings along with standard C functions such as strcpy() and strstr() that are used to manipulate and analyse the string contents. Unfortunately, since C strings do not store their own length, functions that operate on them are often inefficient and slow. Additionally, functions like strcpy() are prone to buffer overflow attacks because of their lack of bounds checking. The std::string class from the C++ standard library is a modern alternative to C strings. Replacing C strings with std::string objects can improve the safety, performance and readability of the code. Therefore, the goal of our bachelor thesis is to develop an Eclipse CDT plug-in that assists a developer refactoring away from C strings.

Approach/Technologies: The CharWars plug-in extends the functionality of the Pointerminator plug-in which was the result of our previous term project. It consists of a set of checkers and quick-fixes. The checkers analyse the code that is being written using Codan, a framework for doing static analysis of C++ code. The quick-fixes perform the refactorings by replacing nodes in the Abstract Syntax Tree (AST). The CDT-Testing framework allowed us to pursue a test-driven and agile approach.

Result: Our thesis starts with an analysis of the different use cases of C strings and their related C functions. We defined refactorings that could be applied in various situations and decided which ones we were going to implement. The resulting plug-in finds problems in the code and marks them in the editor. The programmer can then trigger the refactoring through the marker. The plug-in was tested in the open source C++ project XBMC and the results were evaluated in the documentation. This allowed us to refine the refactorings and gain insight into the limitations of the plug-in.

CharWars – Rise of the fallen strings

Replace C-String Library calls with C++ std::string Operations

C string functions that can be refactored by the plug-in

Architecture overview

Example refactoring