

NC Language Server for VS-Code

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With the availability of integrated development environments such as Eclipse, Visual Studio or IntelliJ, supporting features such as syntax highlighting, syntax checking and auto completion have become an integral part of everyday programming. Unfortunately, these features are still not available for some languages, such as the G-code based NC language from Siemens, which is used to control the axes of CNC machines. With this thesis, I wanted to change that.

Introduction

A numerical control (NC) language server is an extension that provides development support for the Sinumerik NC programming language. This language includes features such as loops, other control structures and macros familiar from the C programming language. In addition, there are many other controller-specific extensions such as synchronous actions and transformations that make the language comparatively flexible, powerful, but also complicated. In this thesis, the Lance extension was developed to be used with Microsoft's Visual Studio Code text editor, with the goal of improving the development experience of NC developers.

Extension

The language appliance for numerical control code (Lance) implements the language server protocol (LSP), an open standard developed by Microsoft, that makes it mostly editor independent. The code and other user interactions in the editor are sent to the server via the protocol. The code is then processed by a specially built parser, generated by ANTLR, a leading parser generation tool. ANTLR allows the grammar of the language to be written in a syntax similar to the extended Backus-Naur form (EBNF). The grammar was written primarily by consulting the various manuals available for the language. Depending on the requests sent by the editor, the parse tree is then visited by various purpose dependent visitors to read out the information necessary to answer it.

