



Supervisor's statement of a final thesis

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Thesis title: Generated parser for the console language of the Algorithms library
Branch / specialization: Web and Software Engineering, specialization Software Engineering
Created on: 12 June 2023

Evaluation criteria

1. Fulfillment of the assignment

- ▶ [1] assignment fulfilled
- [2] assignment fulfilled with minor objections
- [3] assignment fulfilled with major objections
- [4] assignment not fulfilled

The task was to analyze the current state of the implementation of the handwritten parser of the command line interface language of the Algorithms Library Toolkit, to design a replacement implementation with a generated parser, and test the correctness of the substitution. I declare the goals were fulfilled.

2. Main written part

90/100 (A)

The thesis is written in English on a high-quality level. There are occasional factual, typographic, and linguistic issues, but not in an amount that would decrease the understandability of the text.

I understand that the thesis is not focused on the theoretical aspects of the underlying theory of formal languages; however, starting definitions with grammars without first defining sentences is a little hasty. Also, the notions used to represent building blocks of some definitions are overloaded, not only as far as their content goes, but they also are type different (i.e., alpha can be a character or a sentence of terminals and nonterminals). The definition of regular grammar does not allow one to generate an empty sentence.

It would be nice to state what limitations are introduced by selecting the approach to solve the newline issue.

What are the reasons a colon is a part of the identifier?

I'm missing the keyword "else" in Figure 2.1. Moreover, if the left recursiveness was concluded to be problematic, I would like to see a similar statement about ambiguity. In Code sample 2.5, I would use `contains` instead of `count`. In Code sample 3.20, I suppose you have forgotten to use `retPtr` with return statement?

There are missing articles. On one occasion, there was also a missing period at the sentence ends. "ones" in "... context-free grammars that contain direct left-recursion but not indirect ones" should be "one".

There is an extra closing parenthesis in the definition of Sentential form, and there should be any number of derivations allowed to generate a sentential form.

"The approach which it is solved in this thesis is by using grammar actions and semantic predicates inside the lexer." does not seem to be a valid English sentence.

In the description of introspect AST command: "This method prints itself on the stream passed as an argument.": `itself` refers to the method but it was supposed to be a reference to AST nodes.

3. Non-written part, attachments

95 /100 (A)

I find the ANTLR parser generator very useful. But, even though I understand the reasoning behind the choice of ANTLRv4 due to its more compact specification of some rules (implying the ANTLRv4's rule syntax design dropping the neat in-rule specification of AST); I find the ANTLRv3 usability higher. On the other hand, the development of ANTLRv3 effectively ended, so just due to this, it was disqualified, and I believe ANTLRv4 was the best choice here too.

Some other changes in behavior and internal functionality due to the design of ANTLRv4 I may not like, but since the goal was to phase out from the hand-written parser, I can only learn to live with them. (In particular, I don't understand the reasoning behind storing the input in a string prior parsing.) This is something that I wanted to mention, but what is not anyhow a reason to deduct points here. It is the opposite; some issues required the student to explore out-of-the-box solutions to something that should have been available as a built-in feature.

I particularly like the implementation of testing.

Few notes:

I don't understand the need for the creation of a copy of a string "text" in `Autocomplete::filter_completions`; moreover, it does not need to be captured by the lambda, only the length would be enough (i.e. `[prefixLentgth = prefix.size()]``).

Why don't you just return the transformation result in `Parser::parse(CharStream&)`?

The code style is a little inconsistent (a single line body of a loop wrapped/not wrapped in braces; `is const` before or after the first type in a declaration).

In general, I prefer the use of `auto` at only a limited number of places, for instance, to deduce the type of iterators. The way the new code uses `auto` a) extensively and b) inconsistently is a little suboptimal.

4. Evaluation of results, publication outputs and awards

100 /100 (A)

Not only the implementation fulfills the thesis assignments, but it also extends it with introduction of code completion redesign that is also based on ANTLRv4 parser.

5. Activity of the student

- ▶ [1] excellent activity
- [2] very good activity
- [3] average activity
- [4] weaker, but still sufficient activity
- [5] insufficient activity

The student worked on the thesis continually over the timeframe allocated for the bachelor's thesis. The student actively sought consultations.

6. Self-reliance of the student

- ▶ [1] excellent self-reliance
- [2] very good self-reliance
- [3] average self-reliance
- [4] weaker, but still sufficient self-reliance
- [5] insufficient self-reliance

The student solved the majority of issues that arose throughout the implementation phase of working on the bachelor's thesis alone and only a few times resorted to a discussion about somewhat more architectural choices.

The overall evaluation

95 /100 (A)

The resulting implementation (and the documentation in the form of the thesis text) represents a leap forward in the processing of user commands and scripts in the console interface of the Algorithms library toolkit. The extension of the implementation so that even the code completion is implemented based on the underlying ANTLR grammar represents a figurative cherry on top.

In general I'm very satisfied with the thesis results and I recommend to evaluate the thesis with A grade (excellent).

Instructions

Fulfillment of the assignment

Assess whether the submitted FT defines the objectives sufficiently and in line with the assignment; whether the objectives are formulated correctly and fulfilled sufficiently. In the comment, specify the points of the assignment that have not been met, assess the severity, impact, and, if appropriate, also the cause of the deficiencies. If the assignment differs substantially from the standards for the FT or if the student has developed the FT beyond the assignment, describe the way it got reflected on the quality of the assignment's fulfilment and the way it affected your final evaluation.

Main written part

Evaluate whether the extent of the FT is adequate to its content and scope: are all the parts of the FT contentful and necessary? Next, consider whether the submitted FT is actually correct – are there factual errors or inaccuracies?

Evaluate the logical structure of the FT, the thematic flow between chapters and whether the text is comprehensible to the reader. Assess whether the formal notations in the FT are used correctly. Assess the typographic and language aspects of the FT, follow the Dean's Directive No. 52/2021, Art. 3.

Evaluate whether the relevant sources are properly used, quoted and cited. Verify that all quotes are properly distinguished from the results achieved in the FT, thus, that the citation ethics has not been violated and that the citations are complete and in accordance with citation practices and standards. Finally, evaluate whether the software and other copyrighted works have been used in accordance with their license terms.

Non-written part, attachments

Depending on the nature of the FT, comment on the non-written part of the thesis. For example: SW work – the overall quality of the program. Is the technology used (from the development to deployment) suitable and adequate? HW – functional sample. Evaluate the technology and tools used. Research and experimental work – repeatability of the experiment.

Evaluation of results, publication outputs and awards

Depending on the nature of the thesis, estimate whether the thesis results could be deployed in practice; alternatively, evaluate whether the results of the FT extend the already published/known results or whether they bring in completely new findings.

Activity of the student

From your experience with the course of the work on the thesis and its outcome, review the student's activity while working on the thesis, his/her punctuality when meeting the deadlines and whether he/she consulted you as he/she went along and also, whether he/she was well prepared for these consultations.

Self-reliance of the student

From your experience with the course of the work on the thesis and its outcome, assess the student's ability to develop independent creative work.

The overall evaluation

Summarize which of the aspects of the FT affected your grading process the most. The overall grade does not need to be an arithmetic mean (or other value) calculated from the evaluation in the previous criteria. Generally, a well-fulfilled assignment is assessed by grade A.