VISUALCOMP: EDUCATIONAL COMPILER WITH VISUALIZATION IN JAVA

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BACKGROUND

Teaching **compiler construction** is challenging due to its abstract and complex internal phases (lexical analysis, parsing, semantic checking, code generation). Traditional teaching methods and industrial tools often obscure the inner workings of the compiler, making it harder for students to understand how source code is transformed.

PROBLEM

Students struggle to understand how **high-level code** is processed by a compiler, especially when only exposed to theory or complex tools. There is a lack of beginner-friendly, interactive tools that visually demonstrate how compilers work **step by step.**

GOAL

To develop an **educational compiler** in Java, integrated with a JavaFX graphical interface, that allows students to:

- Enter **simplified source code**.
- Visualize compilation steps including tokenization, parsing, and derivation tree construction.
- Understand each **compiler phase** through interactive animations.

PROPOSED METHOD

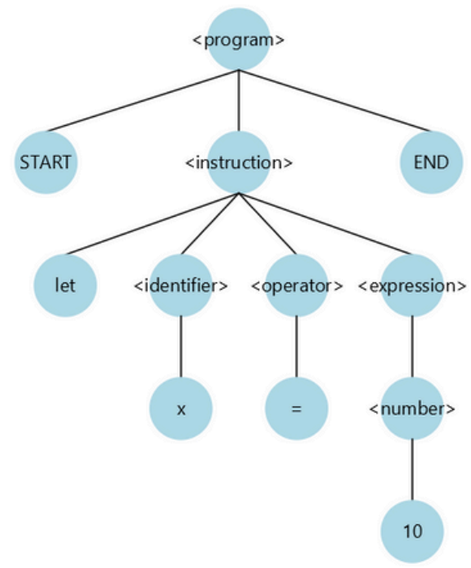
VisualComp includes:

- Lexical analysis with regex
- Syntatic analysis
- Semantic checks

JavaFX interface with:

- Code editor
- Error console
- Derivation tree viewer

Figure 1: Derivation tree.



RESULTS

- Full analysis: lexical, syntactic, semantic
- Animated derivation tree
- Clear error messages
- Easy to use for students

CONCLUSION

VisualComp connects theory with practice.
It makes compiler learning simple and visual.
An ideal tool for teaching compilation basics.