BRNO UNIVERSITY OF TECHNOLOGY
FACULTY OF INFORMATION TECHNOLOGY

Bachelor's Thesis Assignment

165352

Institut:	Department of Computer Graphics and Multimedia (DCGM)
Student:	**Mačura Daniel**
Programme:	Information Technology
Title:	**-**
Category:	Compiler Construction
Academic year:	2024/25

Assignment:

1. Study and familiarize yourself with FDTD simulations. Review the tools Ansys Lumerical and Meep. Understand the differences between the scripting languages LSF and Python with the Meep library. Investigate the algorithms used in code translation by the transpiler.
2. Propose an algorithm and implement a one-way source-to-source translation of equivalent commands within a single simulation.
3. Evaluate the extent to which automatic translation is suitable, justifying your reasoning for each example.
4. Create test examples and translate them into equivalent examples in the second tool. Simulate the examples and measure the accuracy in comparison to examples that can be easily solved analytically. Measure the speed in relation to accuracy and the number of cores used.
5. Evaluate the results obtained and suggest possible extensions.

Literature:

- Teixeira, F.L., Sarris, C., Zhang, Y. *et al.* Finite-difference time-domain methods. *Nat Rev Methods Primers* **3**, 75 (2023). https://doi.org/10.1038/s43586-023-00257-4
- Alfred Aho, Jeffrey Ullman, Ravi Sethi, Monica Lam, Compilers: Principles, Techniques, and Tools 2nd Edition, 2006, ISBN 032148681

Requirements for the semestral defence:
Points 1 and 2.

Detailed formal requirements can be found at https://www.fit.vut.cz/study/theses/

Supervisor:	**Milet Tomáš, Ing., Ph.D.**
Head of Department:	Černocký Jan, prof. Dr. Ing.
Beginning of work:	1.11.2024
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