MASTER'S THESIS ASSIGNMENT

I. Personal and study details

Student's name:	**Dupák Jakub**
Personal ID number:	**483785**
Faculty / Institute:	**Faculty of Electrical Engineering**
Department / Institute:	**Department of Control Engineering**
Study program:	**Open Informatics**
Specialisation:	**Computer Engineering**

II. Master's thesis details

Master's thesis title in English:

Memory safety analysis in Rust GCC

Master's thesis title in Czech:

Analýza bezpe ného p ístupu k pam ti pro kompilátor Rust GCC

Guidelines:

Rust is a modern programming language focused on producing safe and performant code that is being largely adopted across the programming industry. The Rust compiler rustc is implemented on top of the LLVM compiler framework. GCCRS implements a new Rust front end on top of GCC to leverage GCC capabilities for Rust projects and provides a second independent Rust implementation.
The student will implement memory safety analysis (borrow checking) in the Rust GCC compiler using the Polonius project.
1) Study Polonius API and analysis principles.
2) Study Rust GCC control-flow information representation.
3) Design and implement foreign-function interface from Rust GCC (C++) to Polonius (Rust).
4) Design and implement input of control-flow information to Polonius.
5) Design and implement input of relevant memory operation facts to Polonius.
6) Design and implement output of Polonius analysis and basic error reporting.

Bibliography / sources:

[1] MATSAKIS, Nicholas D. and KLOCK, Felix S., 2014, The rust language. ACM SIGAda Ada Letters. 2014. Vol. 34, no. 3, p. 103–104. DOI 10.1145/2692956.2663188.
[2] An alias-based formulation of the borrow checker, 2018. Baby Steps [online], Accessed June 2023. Available from: http://smallcultfollowing.com/babysteps/blog/2018/04/27/an-alias-based-formulation-of-the-borrow-checker
[3] RAKIC, Rémy and MATSAKIS, Niko. Polonius. Available from: https://rust-lang.github.io/polonius/

Name and workplace of master's thesis supervisor:

Ing. Pavel Píša, Ph.D.   Department of Control Engineering FEE

Name and workplace of second master's thesis supervisor or consultant:

Date of master's thesis assignment:	**01.09.2023**	Deadline for master's thesis submission: **09.01.2024**

Assignment valid until:
by the end of winter semester 2024/2025

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Ing. Pavel Píša, Ph.D.
Supervisor's signature

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Head of department's signature

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prof. Mgr. Petr Páta, Ph.D.
Dean's signature

III. Assignment receipt

The student acknowledges that the master's thesis is an individual work. The student must produce his thesis without the assistance of others, with the exception of provided consultations. Within the master's thesis, the author must state the names of consultants and include a list of references.

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Date of assignment receipt   Student's signature