

MURATOV ARTYOM

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EDUCATION

System programming and compiler technology course

MIPT course, Lector: Ilya Rudolfovich Dedinsky

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- I am taking this course in Ilya Rudolfovich Dedinsky's advanced programming group.
- The course is based on projects that focus on various aspects of the C language or processor architecture including projects written in assembly language. The course provides skills in large project management, using version control system, debugging, including graphical methods, and code optimization.
- I have now done 14 projects in this course. It has given me a lot of experience in C and asm programming, managing large projects on my own and using different programming and debugging tools like Git, Radare2, Perf and Godbolt and graphics libraries such as SFML and Graphviz.

1-year Department of Radio Engineering and Cybernetics

MIPT

- A course including Mathematical Analysis, Linear Algebra, General English, General Physics, General Physics Laboratory Practicum, Computer Science, Discrete analysis and Probability Theory.

MAIN PROJECTS

C/C++ projects

Mandelbrot fractal

[github.com/RTCupid/Mandelbrot Fractal](https://github.com/RTCupid/Mandelbrot_Fractal)

- Project based on optimization calculations points for Mandelbrot fractal using AVX instructions. It includes using graphics library SFML to check the accuracy of calculations and make beautiful graphics.
- In the first phase of the project, I wrote a variant of a common loop and optimized it using optimization keys. Then I performed loop unrolling, which resulted in performance improvement. At the last stage, optimization using intrinsics was performed, which increased the performance of the program by times with optimization key -O3.
- As a result, I got a 6.3 times performance improvement over the original version of the calculations.

Programming language

[github.com/RTCupid/Programming Language](https://github.com/RTCupid/Programming_Language)

- Project based on recursive descent. My programming language includes frontend, backend parts and other my program - processor, to execute code.
- I write function Tokenizer. This function checks the keywords and creates an array of tokens from the code file in my language. Then the array of tokens is passed to the recursive descent function and it builds a binary tree from it.
- A file is written from the binary tree, which is passed to the backend. The backend reconstructs the tree, and makes a file from it in my assembly language, which is then executed by my program processor.

Differentiator

github.com/RTCupid/Differentiator

- My program differentiator takes an expression as input and differentiates it. Also it convolves constants and removes neutral expressions. The program output generates a LaTeX file with step-by-step solution and funny comments.

NASM project

My Printf

[github.com/RTCupid/My Printf](https://github.com/RTCupid/My_Printf)

- My function printf. It is based on two calling conventions: cdecl and fastcall. The program includes my cdecl version of printf that handles specifiers: %c, %s, %d, %x, %o, %b.
- The selection of the code that will process the specifier is made using the Jump Table. Also it has trampoline for transition from fastcall version to cdecl version of my printf.

TECHNICAL SKILLS

Programming languages: C/C++, NASM, Python (Matplotlib)

Tools: Git, Radare2, Make, Perf, Godbolt, Excel

Libraries: SFML, Graphviz, Matplotlib

Languages: Russian (Native) and English (B1).

Program on Linux.

INTERESTS

- I am a member of the MIPT table tennis team and football player.
- Like to read classical books and books about programming and computers.