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Theme: «Si[mulation of macro- and micro- fusion procedure in CPU core](https://lms.hse.ru/?ap&t_id=248001)»

Literature Review

Until recently, many researchers have shown interest in the field of operation fusion in CPU core. Using contemporary technologies, they have carried out a lot of experiments to observe this research field. Their works had a great influence on the microprocessor’s development in modern world. The key aim of all performed researches is to find the way to improve CPU’s processing rate. Some of the achieved results and studies are reviewed here. The largest share of research information in the sphere of CPU’s operation fusions is provided by Agner’s Fog manual [1][2] and Intel company [3]. Besides those sources, a considerable contribution was made by Celio, Dabbelt, A. Patterson and Asanović, who’s work illustrates the ways to avoid ISA Bloat with macro-op fusion for RISC-V [4]. On the other hand, Taram, Venkat and Tullsen investigated micro-op fusions as method of increasing efficiency of RISC-V systems.

One of the most significant research was done by Agner Fog. His manuals [1][2] contain information about experiments with different AMD and Intel processors. There are numerous code examples which show processes of micro- and macro- fusions in CPU core. Also, Agner Fog investigates which operations could be fused for each chosen processor. Based on the results he provides a huge analysis of operation fusion influence on system efficiency, instruction timings and latency. All in all, this manual completely illuminates the field of research. Therefore, it is used in different internet resources and scientific works.

The other equally important source of information is Intel 64 and IA-32 Architectures optimization Reference Manual [3]. It provides basic data about micro- and macro- fusions and its effect on improvement of front-end throughput. Furthermore, there is a detailed description of how operations are being fused in the CPU core with some code examples.