Development and Construction of a TTL Processor

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Purpose: The purpose of this project was to develop and construct a functional 32-bit processor capable of executing programs generated by a compiler, controlling a color display, and performing tasks such as Mandelbrot set calculations. The processor was built using TTL components for simplicity and ease of visualization. Procedure: The development process involved designing the processor from scratch using the "Digital" logic designer and simulator tool. A compiler was built that translates standard C code into the processor's machine language to generate programs for the processor. Additionally, subroutines were implemented for division, multiplication, float operations, and interfacing with the display. Results: The resulting processor is Turing Complete and capable of generating Mandelbrot fractals on a display. Programs can be easily generated using standard C code, and the processor consumes approximately 1 watt while running at a stable clock speed of around 2MHz. Although less efficient than modern processors, it surpasses the capabilities of the Apollo Guidance Computer. Conclusions: The constructed processor successfully meets the project objectives, demonstrating effective control of the color display and program execution. Despite minor stability issues, the implementation of Mandelbrot fractals showcases the functionality of the processor. Overall, the project's methodology proved successful in achieving the desired results.

Awards Won: