

Research Paper 1 - Historical Processors

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1 Overview

The assignment gives the student the opportunity to apply some of the analysis techniques that we have been using in class to consider processors from early Intel x86 and ARM architectures (and before). You will need to select a processor architecture and provide an analysis of the design and implementation of processors in this family. You should consider the hardware design, instruction set architecture, and features that supported the development of system software in the time period of the processor family.

2 Processor candidates

A non-exhaustive list of microprocessor families can found on the CPU World web site at <http://www.cpu-world/CPUs>. You may select any processor architecture from this list that predates the Intel Pentium 4 family of processors.

3 Content Outline

The following outline is suggested but not required. You don't have to follow it exactly but your paper, at bare minimum, needs to include some discussion of the listed topics.

1. Introduction
2. Processor History
 - a. Evolution from prior designs
 - b. Targeted market for device
 - c. General purpose or embedded systems
 - d. Preferred market: business computing, scientific computing,
- 3 Processor Design
 - a. Chip packaging and technology (VLSI, Superscalar, ...)
 - b. Instruction set architecture
 - c. Memory hierarchy
 1. Register structure
 2. Cache design, if any
 - d. Addressing modes
 - e. Special instructions
 - f. Pipeline stages, if any
 - g. Assembler syntax
 1. Example program
 2. Software support for this processor
4. Analysis
 - a. Contribution to field
 - b. Innovations in processor design, if any
 - c. What distinguished this architecture from prior work?
 - d. What features, if any, were incorporated in later processor
 - e. Strengths/Weaknesses of design

4 Formatting Guidelines

Your analysis of the processor design should result in a paper that is 5 to 7 pages in length and in dual column format. All work should follow the style and formatting guidelines published by the Institute of Electrical and Electronics Engineers (IEEE) for submission of work to the IEEE Transactions and Journals. Per the IEEE guidelines, any issues of style not covered in the IEEE documents will follow the style guidelines in the The Chicago Manual Style of Style.

You can find information about the IEEE style guidelines at http://www.ieee.org/publications_standards/publications/authors/authors_journals.html. A Microsoft Word template for working documents in the IEEE Transactions format can be found at http://www.ieee.org/documents/trans_jour.doc. You must follow the IEEE requirements for citations and references (as listed in the IEEE guidelines).

4.1 Note:

Many of the courses that you take at Athens State University require you to write research papers using the style guidelines published by American Psychological Association (APA). It is important to note that this is quite often not the case in math, science, and engineering disciplines. In Computer Science, most research venues will require that you use the guidelines published by the IEEE or ACM that are based on the Chicago Manual of Style.

5 Submission Guidelines

You will submit your work as an attachment to an assignment in the Blackboard Learning Management System. Your document must be in PDF format; submission in any other format will result in a deduction in points on the assignment.

6 Assessment criteria

Your work will be evaluated using two rubrics: the University's "College Level Writing Rubric" (found at <http://web.athens.edu/writing/pdfs/College-Level-Writing-Rubric.pdf>) that will contribute 40% of the points allocated to this assignment and the following course-level "Technical Rubric" that will contribute 60% of the points allocated to this assignment: a. sufficient material covered (20%) b. showing understanding (20%) c. material presented in a logical order (5%) d. material related to topics you identify as important (10%) e. not just a summary of your references

1. appropriate conclusions (10%)
2. draw together material to identify industry trends, potential future research areas, etc.