Independent Study Assignment

Foundations & Trends in Computer Architecture (Competency 1)

Professor: Lester D. Suarez
Course: CET3126C – Advanced Microprocessors
Due Date: _____
Weight: 10% of final grade

Objective

Work independently to research and explain the history, core terminology, classic components, and current industry trends in computer architecture. You'll also practice performance metrics (CPI, IPC, Speedup) with a short quantitative exercise.

Instructions

Complete **all 10 sections** below. Label each section clearly and write **1–2 well-developed paragraphs** per section unless otherwise noted. Use credible sources (textbook, academic/industry sites, standards, vendor whitepapers) and **cite them**.

1) What is "Computer Architecture"?

Define the term and briefly explain how it relates to microarchitecture, ISA, and system design.

2) Historical Milestones (Timeline)

Create a concise timeline (bullet list or short narrative) from early computers to modern processors. Include at least **6** major milestones.

3) Classes of Computing Systems

Describe at least **three** (e.g., desktop, server, embedded). For each: typical constraints, performance goals, and example use cases.

4) Classic Components of a Computer

Explain **Input, Output, Memory, Datapath, Control** and how they interact during instruction execution.

5) Transistor Scaling & Moore's Law

Summarize Moore's Law and Dennard scaling at a high level and how scaling enabled performance gains.

6) The "Power Wall"

Explain what it is, why it emerged, and its impact on clock frequency and thermal design.

7) From Uniprocessors to Multiprocessors

Discuss why industry shifted to multi-core and the implications for software (parallelism).

8) IC Manufacturing (Overview)

Outline the main stages from design to packaged chip (e.g., masks, lithography, deposition/etch, doping, test, packaging). A diagram is welcome (optional).

Submission

- Submit via email to lsuarez9@mdc.edu or **GitHub** to the course repo under: https://github.com/lsuarez9/CET3126C/<Student_Folder>
- File name: `LastName_FirstName_CET3126C_Comp1.pdf`

Evaluation (100 pts)

- Section content (1–8): **10 pts each = 80 pts**
- Technical accuracy & use of terminology: **10 pts**
- Writing quality & formatting: **5 pts**
- Citations & source quality: **5 pts**