Indian Institute of Technology Tirupati
Computer System Architecture (CS5202)
Credit: L-T-P-C : 3-1-0-3

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1 Syllabus

- Quantitative Analysis and Instruction Set:
  Measuring performance and Metric, RISC and CISC Instruction set, Impact of ISA on Performance.
- Processor Architecture:
  Instruction-Level Parallelism, Superscalar and VLIW architecture; Multi-core processors, Thread-Level Parallelism;
- Memory Subsystem:
  Multilevel caches, Caches in multi-core processors, Memory controllers for multi-core systems;
- Multiple processor systems:
  Taxonomy, Distributed and Shared memory system, Memory consistency models, Cache coherence, and Interconnection networks, Network-on-chip;
- Advanced topics in architecture:
  SIMD processor (GPU and GPGPU), Accelerators and domain specific architecture, Reliable architecture, Dark Silicon and Power Issues.

2 References

- J. L. Hennessy and D. A. Patterson, "Computer Architectures: A Quantitative Approach", Morgan Kaufmann, an Imprint of Elsevier, 5^{th} Edition, 2012
- J. P. Shen and M. H. Lipasti, Modern Processor Design, MC Graw Hill, Crowfordsville, 2005
- Literatures on Computer Architecture

3 Prerequisite

- Computer Organisation (CS2600) and
- Digital System Design (EE2001) or equivalent courses.
- If someone has not done these courses, it is advised to discuss with instructor.

4 Evaluation

Quizzes: 20% (Q1: 10% + Q2: 10%).
This will be a mid-semester evaluation based on the syllabus that has been covered till the date. These quizzes will test the quantitative and conceptual understanding on the Architecture.

Class test and participation: 10%.
The objective of these evaluation is to test the attentiveness of the student during lecture hours. This consist of tests such as surprise test, interactive questioning during lectures, and discussion.

Assignments: 10%.
The assignment will test the programming (C/C++ and python) and system understanding on Computer Architecture. Typically the assignment consist of design and evaluation of architecture simulator.

Project: 20%.
This is one of the important component of this course. This requires review of selected literatures, new idea, and evaluation of it using simulator.

Final Test: 40%.
This will be the end semester evaluation. This will by nature be similar as mid-semester quizzes (close book with necessary chit sheet), however, this will have large number of question with higher level of difficulty.
