

長庚大學電機工程學系 (資工領域) 博士班資格考 計算機架構 考題

1. **(15 pts)** Briefly explain the concept of virtual machines and its applications on cloud computing.
2. **(20 pts)** Explain the following processor design concepts. For each one, give an example commercial product that falls into this category.
  - (a) Instruction-level parallelism
  - (b) Thread-level parallelism
  - (c) Data parallelism.
3. **(15 pts)** Explain the difference between superscalar and VLIW (Very Long Instruction Word) processors. Give application scenarios (practical industry applications) for the two kinds of processors.
4. **(20 pts)** Give an example, with a program fragment and the pipeline behavior, to explain why branch prediction may improve the performance of a pipelined processor.
5. **(15 pts)** Explain how compiler optimization helps to improve the performance of a multi-core processor. Give a program transform example to show the concepts.
6. Discuss the concepts about Moore's law by answering the following questions.
  - (a) **(5 pts)** What is Moore's law?
  - (b) **(10 pts)** What's the impact to global economy if the scaling trend of Moore's law stops? (There is no clear answer to this question but I want to hear your own opinion.)