**Qualifying Examination: Computer Architecture (September 2014)**

1. Explain the difference between superscalar and VLIW (Very Long Instruction Word) processors. Give application scenarios (practical industry applications) for the two kinds of processors.
2. Describe the constraints for compiler instruction scheduling to parallelize the execution of instructions. Give examples to show how the compiler instruction scheduling improve the performance of the following processor:
3. A single-pipelined RISC processor,
4. A VLIW processor.

Note that your program example should also encounters the constraints on instruction scheduling and show how the compiler deals with the constraints.

1. Draw the typical architecture of a cache memory and explain why the cache memory may help to improve the program execution performance.
2. Explain a multi-core processor needs a cache coherence protocol. Give an example of an cache coherence protocol and show how it works.