

2006 Paper 13 Question 2

Computer Design

- (a) Early processors used an accumulator to hold an intermediate result whereas more modern processors use a register file or a stack.
- (i) Why use a stack or register file rather than an accumulator? [4 marks]
 - (ii) What are the advantages and disadvantages of using a register file rather than a stack? [6 marks]
- (b) In 1946, Burks, Goldstein and von Neumann made the observation “Ideally one would desire an indefinitely large memory capacity such that any particular word would be immediately available. We are forced to recognize the possibility of constructing a hierarchy of memories, each of which has greater capacity than the preceding but which is less quickly accessible.”
- (i) Why is this memory design issue even more pressing today? [5 marks]
 - (ii) What architectural techniques are used today to approximate a large memory which is nearly instantaneously accessible? [5 marks]