

## 2004 Paper 8 Question 1

### Comparative Architectures

- (a) Why is accurate branch prediction so important to modern microprocessor designs? [2 marks]
- (b) Explain the operation of local history branch predictors, trade-offs made in their design, and limitations in their performance. [6 marks]
- (c) For what reasons are some branches difficult to predict? What strategies can be employed to mitigate such potential performance problems? [4 marks]
- (d) Describe a trace cache, and hence explain what advantages it might offer over a traditional instruction cache. [4 marks]
- (e) It is possible to obtain some of the benefits of a trace cache with a purely software approach, using runtime binary re-writing techniques. How might such a system operate? [4 marks]