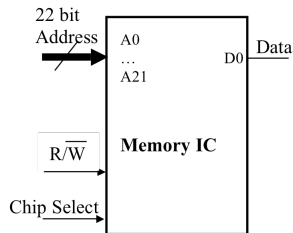


5. (a) Explain the memory hierarchy with the aid of a diagram. Comment on the motivation for the hierarchy and its role in computer system design. [10]
- (b) The diagram below shows a $4\text{M} \times 1$ memory integrated circuit (IC). Explain how a collection of these ICs could be organised in the design of a $16\text{M} \times 8$ memory. Justify the organisation and state how many ICs would be required. [7]



- (c) Computer systems commonly use caches to improve performance.
- Outline the role of caches in the memory hierarchy. [3]
 - Explain what is meant by *spatial locality* and *temporal locality*. Your answer should explain how these concepts relate to cache performance. [5]