



**Universidade de Aveiro**  
**Mestrado Integrado em Engenharia de Computadores e Telemática**  
**Arquitectura de Computadores Avançada**  
**VHDL Simulation**

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1. A *population counter* is a digital circuit which counts the number of bits of a word that have the value one. Assume that words are 32 bits long. Many solutions are possible. You should seek for solutions that trade a balance between hardware complexity and processing time in two different situations. In the first, the word is available in parallel; in the second, the word is provided bit by bit. For each case, do the following:
  - 1.1. Specify the circuit interface and draw a schematics of its internal organization.
  - 1.2. Write the VHDL code that describes it.
  - 1.3. Create a Quartus project and simulate its operation.