## 2.8 CONVECTION COOLED COMPUTE SERVERS

*Authors: S J Wakes, S Cartwright, A Trotman*

*Authors affiliations: Departments of Applied Sciences and Computer Science, University of Otago*

**Abstract:**

*The BBC report that about 1/3 of the energy used to run a compute server is spend on cooling [1]. This cooling is needed because the servers are typically tightly packed into a very small space and the CPUs get very hot; the Intel Xeon E7460 six-core CPU has a thermal design power of 130w! We have addressed this problem in two ways. First, we have designed a low-power personal super computer (compute server) that houses many low power (3w) CPUs on the same board. Second, and relevant to this application, we have designed a novel case for that computer. Being aluminium, and touching the CPUs, our case is also the CPU heat sink. This alleviates the need for an internal fan to blow air across an internal and separate heat sink; it also substantially increases the surface area of the heat sink. The case is also novel in shape. Rather than stacking like boxes on top of each other, our cases stack like a spiral staircase. This substantially increases the flow of air around each computer.*

*Computational Fluid Dynamics has been used to model the case and main components of the electronic circuit to design the passive ventilation of such a case. This paper will discuss the design process and preliminary findings that have influenced the case design for optimized natural convection cooling.*

*[1] http://news.bbc.co.uk/2/hi/programmes/click_online/8297237.stm*