

## **Wavelet2** **- Server for Signal and Language Processing Calculations**

### **Abstract**

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### **Introduction**

Wavelet2 is a recently acquired calculations server owned by Signal Processing Group AGH. It is used for tasks related to developing automatic speech recognition system using Matlab, C++ and SQL. It allows 16 processes on processors and much more on CUDA. Its computational power is significantly smaller than any modern supercomputers but was equipped in stable software which allows more efficient work on specialised signal and language processing tasks than Cyfronet computers.

### **Hardware**

Server's main frame is Intel Server Board S5520HC. It was designed for 2 processors, and has two (FC)LGA1366 slots. It operates with Triple Channel standard and has PCI Express 2.0 x16 and regular PCI. The transfer between processors is with minimum 6.4 GB/s, and FSB bus operates on 1333 MHz. There are SATA ports and integrated Gigabit LAN (10/100/1000 Mbit) card. It works with 32GB DDR3 memory. It has 2 RJ45 Gigabit Ethernet and USB 2.0 ports.

Processors Intel XEON X5550 are four cores with average efficiency 4600 units in PassMark CPU Mark test. They contain 8MB Cache, in 45nm technology, 8 processing threads, with 64-bit instructions.

The server has two Kingston KVR1333D3D4R9SK3/12GI 3 x DDR3 4GB 1333MHz ECC Reg with Parity CL9 Dual Rank x4 w/ RAM memories. They provide service of Triple Channel. In total they provide 24 GB of RAM memory.

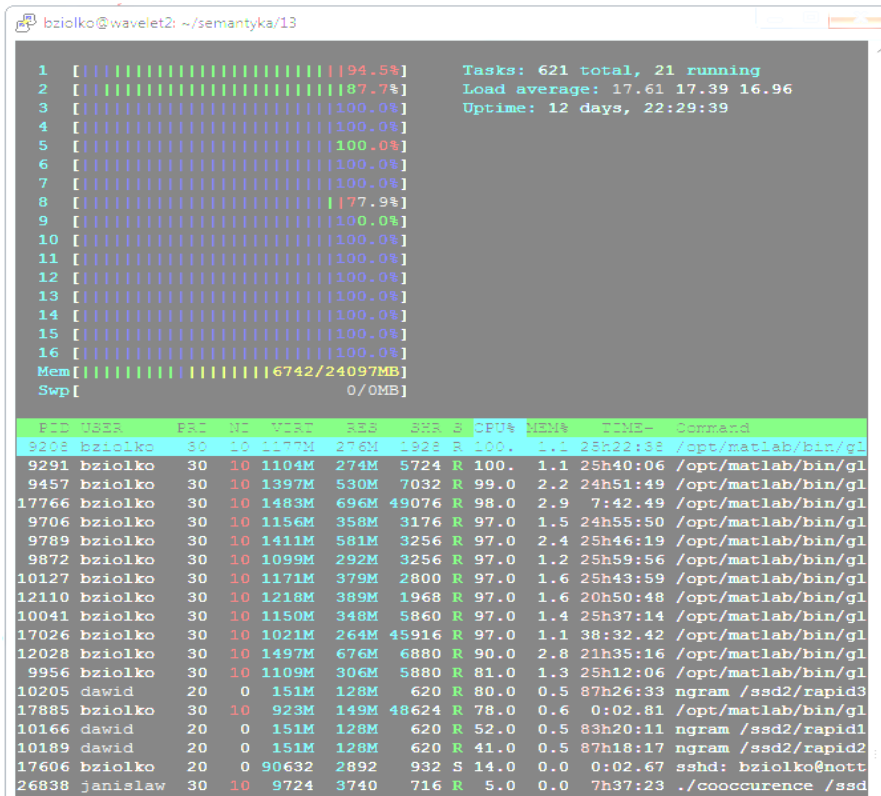
The server is equipped in Lite-On Super AllWrite z LightScribe DVD+/-R 20x, SATA DVD recorder. Two hard drives 256GB were added. Their Random Access Time is around 0.1 milliseconds. Minimal reading speed is 200MB/s and 150MB/s for writing. Three further harddrives, 1500GB each, are included. They have 64 MB Cache memory. Random Access Time is 10 milliseconds and data transfer 300MB/s.

The server is also equipped in GeForce with CUDA GTX 295 BFG 1792MB. It has PCI Express x16 port and DVI output. There are 2 processors GPU and 480 stream processors. It has 1792MB type DDR3 memory. The memory bus is 896-bit (448bit per GPU). Memory throuput is above 100GB/s and computation efficiency above 1750GFlops (single precision). It supports OpenCL technology, Linux and Microsoft DirectX 10.

The server has Creative SB 5.1 VX PCI OEM sound card with PCI port. It supports Microsoft DirectSound 3D. The server works through UPS system real minimal power 900W and signaling USB port. It operates for 10 minute with 50% workload.

## Software and operating system

Ubuntu Server LTS (Long Term Support), with Linux kernel 2.6.32-25 is installed on the computer. We are using SVN 1.6.6 and Trac 0.1.7 to manage our software development process. Most computations are conducted with MATLAB and our own software written in C++ and Python. The server has MySQL installed, however, several database needs are covered by SQLite into our programs. The server is very heavily used what is presented on the figure.



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