

Utilization of Bitsets for Bit-Stream Data Processing in Space Geodesy

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The rapid price reduction of PCs and the speed-up of CPUs have brought software-ization of the signal processing hardware of space geodesy on the two ways as follows:

(1) Emulations of signal processing using C-like native byte-codes:

The bit-masking and byte-translation tables play important roles to emulate registers and discrete digital devices. For the maximum performance, this method does not usually correspond to a faithful simulation of hardware. Bitwise operations in MATLAB-like tools are also included in this category.

(2) Faithful emulation designs using software class objects like as SystemC:

One to one correspondence between hardware registers and software objects are very high. The efficiency of translation to HDL to write into FPGA is also very high. The overhead of the software inside is apt to high to realize the faithfulness.

The new method proposed here is to utilize dynamic bitset classes originally developed for the mathematical set theory. The dynamic bitset classes in boost C++ library have many useful member-functions for digital processing as well as several mathematical member-functions such as