1000 000 = No 1's in word

GA MODULE GENERAL DESCRIPTION

The GA module contains the Scalar Integer Add, Scalar Population Count, and Scalar Leading Zero Count functional units.

The GA module receives scalar data from the eight VR modules. The Sj operand is latched on the GA, clock period six of the instruction. The Sk operand, for an add or subtract, is latched clock period seven.

The Scalar Integer Adder is a two's complement adder with look ahead carry. A carry is propagated through a four bit group and then into the next four bit group. The adder actually forms two results, divided into four bit groups. One of the two results is chosen, depending upon whether or not there is a final carry into the four bit group. The four bit groups which make up the final answer can come from either of the results.

The add is implemented using the formula Si=Sj+Sk; during a 104 instruction.

The subtract is implemented using the formula Si=-(-Sj+Sk); during a 105 instruction.

The Scalar Population Count unit counts the number of set bits in Sj. The result is entered into the lower order seven bits of Si. When k field bit 0 is set in the instruction, only bit 0 of the population count is transferred to Si. This tells you whether the population count is odd or even and yields an even parity bit on the Scalar Register value. The count is performed during a 106 instruction.

The Scalar Leading Zero Count unit counts the number of leading zeros in Sj, until a set bit position is encountered. Counting is done from the most to the least significant bit position. The result is entered into the lower order 7 bit positions of Si. The upper bits of Si are zeroed out. The count is performed during a 107 instruction.

The GA module receives four control signals from the JA module. All four control signals arrive on the GA during clock period one of an instruction. The four control signals include a Go Bit, bits 0 and 1 of the f field, and bit 0 of the k field.

The Go Bit says that the JA module has decoded an instruction in the range 104-107.

Bits 0 and 1 of the f field are used by the GA to determine if the instruction is a 104 (add), 105 (subtract), 106 (pop count), or 107 (leading zero count).

Bit 0 of the k field is used when it is desired to transfer only bit 0 of the population count, back to the scalar destination.

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