VB MODULE GENERAL DESCRIPTION

The VB module is one of two modules that make up the Vector Integer Functional unit. The unit is comprised of the VA and the VB modules. The VB module contains the Vector Integer Shift, Vector Population Count, and Vector Leading Zero Count units. The Vector registers are both the source and destination of all information processed on the VB module.

There is a single sixty-four bit data path from the Vector registers to the VB module. The source vector register is selected by the j field of the instruction. The data is streamed into the VB module with sequential vector elements arriving on the VB in sequential clock periods. The single sixty-four bit path from the VB module back to the vector registers is shared between the results of VB module functions and the results of the VA module functions. VA module results spend one clock period on the VB module while in route to the result vector register. The result vector register is selected by the i field of the instruction.

VB Module Instruction Summary

Vector Integer Shift

150ijk Enter Vi with Vj elements shifted left Ak
151ijk Enter Vi with Vj elements shifted right Ak

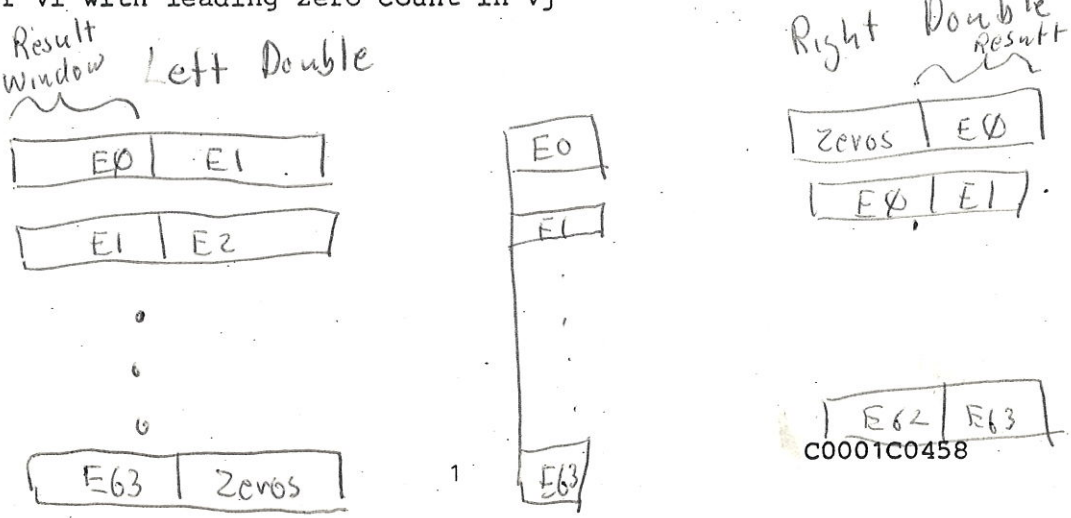
152ijk Enter Vi with Vj long shifted left Ak
153ijk Enter Vi with Vj long shifted right Ak

Vector Population Count

164ijk Enter Vi with population count of Vj

Vector Leading Zero Count

165ij- Enter Vi with leading zero count in Vj



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VB Module Vector Integer Shift Concepts

The vector integer shift functional unit shifts single or double wide vector data elements to the right or left with zero fill and end off data handling. The hardware on the VB module performs right shift. A left shift is done by flipping incoming operands end for end, doing a right shift, and flipping the result end for end before it is sent to the output mux for transfer to the result register. The data structure for shifts is most easily explained by discussing individual instructions, which will be handled later in this section. There are four instructions which activate the vector shifter.

The four shift instructions are 150-153. Each instruction streams elements of a vector register, specified by the instruction j field, through the VB module. The result of the vector shift is gated into the VB module output mux by default. Since the output mux is shared by four units the data from the shifter must be kept at all zeroes unless a shift instruction is active. This is done in the initial shift ranks by not allowing data to enter the shifter. Shifted data is sent to the result register which is a vector register selected by the instruction i field.

Vector Integer Shift Instruction Summary

150ijk Enter Vi with Vj elements shifted left Ak
151ijk Enter Vi with Vj elements shifted right Ak

152ijk Enter Vi with Vj long shifted left Ak
153ijk Enter Vi with Vj long shifted right Ak