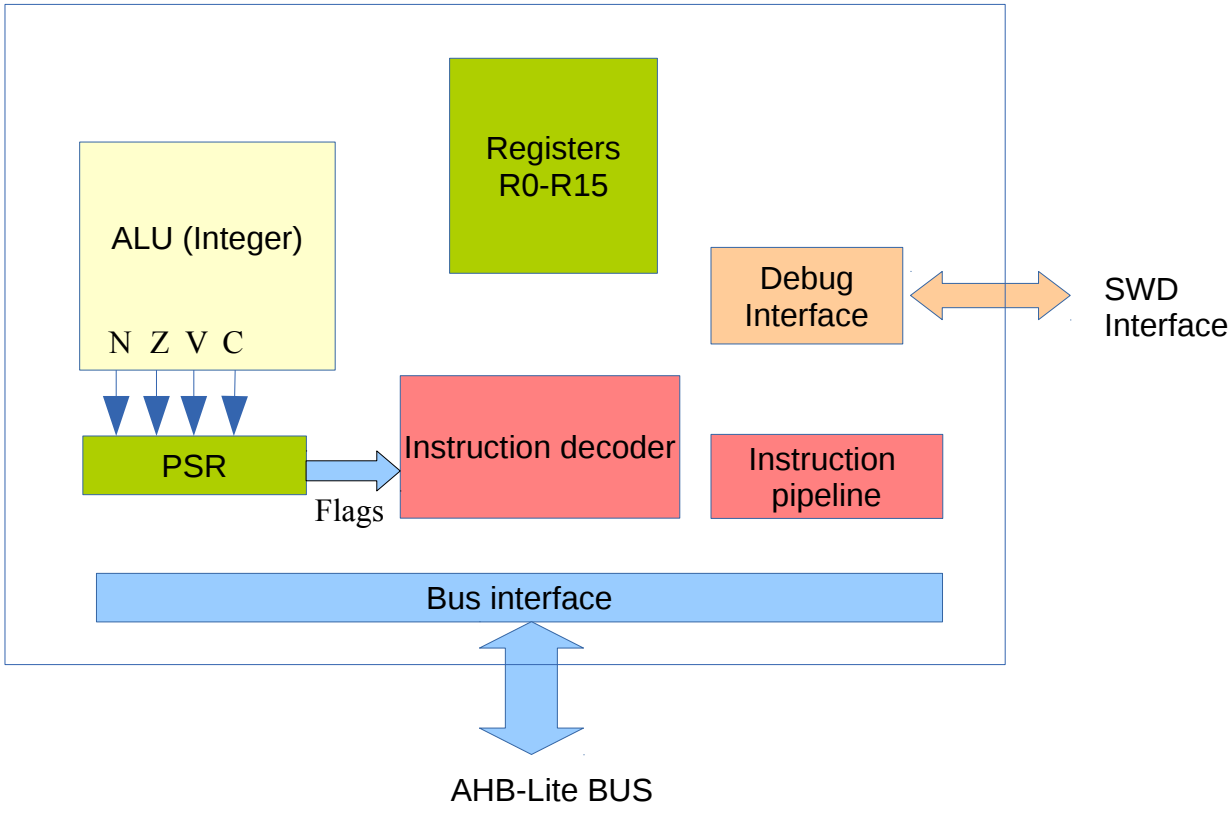
DT228-1 Micros Lab. Arm assembler 1.

Key topics: Using the Keil IDE, simple data movement and calculation. Arithmetic flags.

Introduction

At the end of this lab you should be somewhat competent using the Keil Integrated Development Environment for ARM. You should also be able to understand the operation of simple ARM assembler programs. Furthermore you should begin to appreciate the mechanism by which microprocessor make decisions. Microprocessors decide to execute one branch of a program or another based on the status of the arithmetic flags.



These flags are outputs from the Arithmetic Logic Unit. When a calculation is performed the flags are set or cleared depending on the result. These outputs are latched in the Program Status Register (PSR). When the Instruction Decoder executes a conditional branch instruction i.e. when it makes a decision it reads the arithmetic flags and bases its decision upon them. There are four arithmetic flags: **N**egative, **Z**ero, signed o**V**erflow and **C**arry (unsigned overflow)

Tasks

(1) Download and single step through the addition program contained in the support files for this laboratory exercise. Note the contents of the registers at each step. Check that the result makes it into the correct memory location.

(2) Modify the program so that it performs the following calculations in turn. Single step through the program noting and explaining the changes to the N,Z,Vand C flags (note: C is the logical inverse of "Borrow" In other words, if the Carry flags is NOT SET after a subtraction then there WAS a borrow):

(a) 1-1
(b) 1-2
(c) 2-1
(d) 0x7fffffff + 1
(e) 0xffffffff +1