Lab 5 – uDMA and LEDs

CSE 479 – Advanced Embedded Systems
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Program Overview:

Description:

This lab uses the Tiva's micro direct memory access controller (uDMA) to send data the results in the illumination of the daughter board's LEDs as the binary representations of digits 0 through 15. The uDMA controller facilitates an increment once per second and then wraps back around 0 after 15 has been displayed. See Figure 1:

High-Level Flowchart:

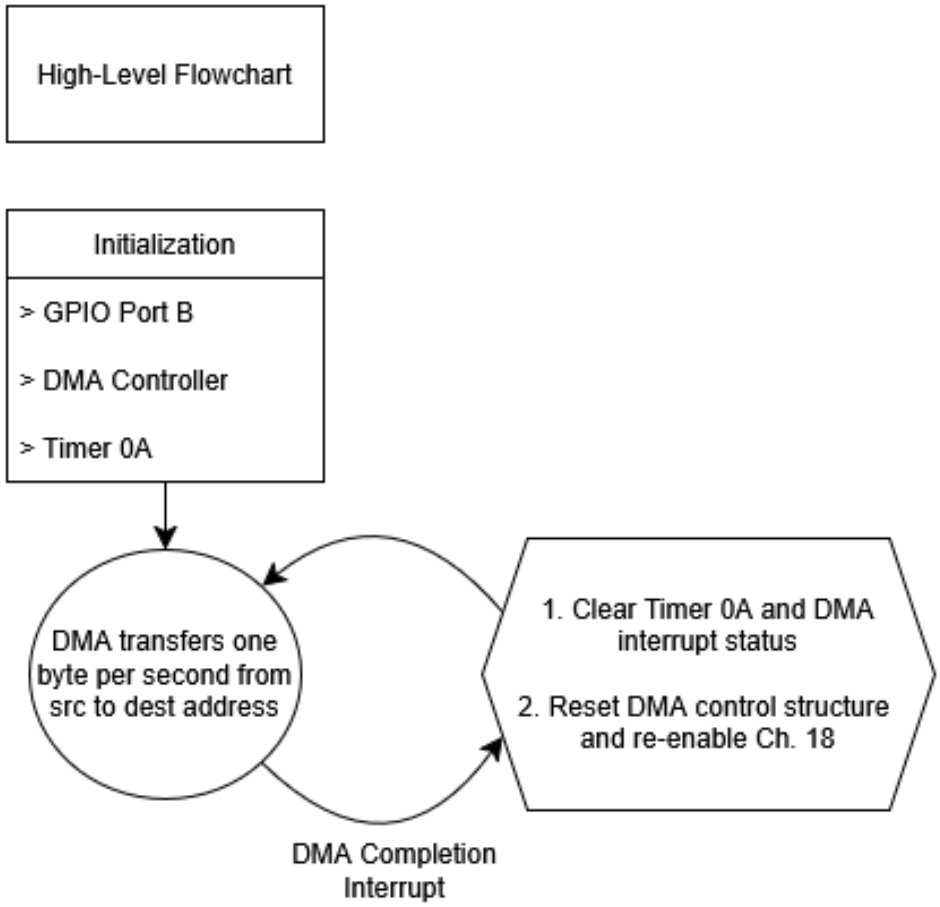

Figure 1: Overview of uDMA Program

Subroutines:

timer_init:

General purpose timer 0A is configured as a 32-bit, periodic countdown timer that triggers an event every second. System interrupts are enabled on the vector table for this module, but the timer itself does not interrupt the processor. Instead, the uDMA controller generates a completion interrupt at the end of each transfer that uses the timer's interrupt handler. See Figure 2:

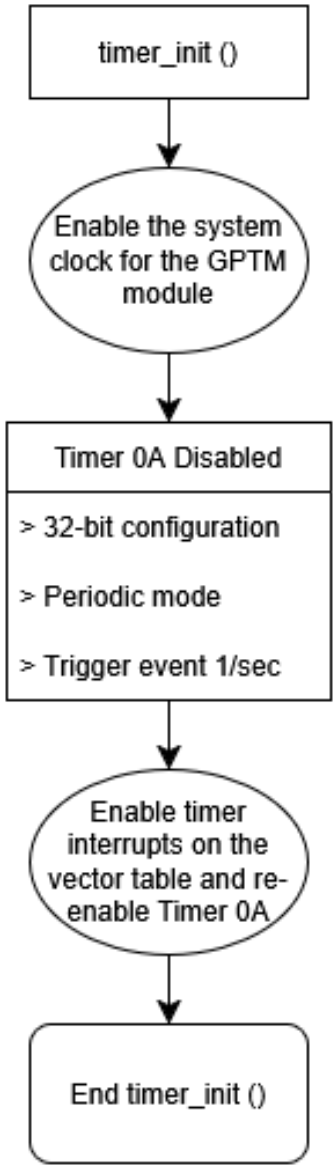

Figure 2: Overview of Timer 0A Setup

gpio_init:

GPIO Port B corresponds to the daughter board's LEDs, which do not need to be configured in any special way in order to use the uDMA controller. Pins PB0-3 are set as digital outputs and use pull-down resistors. See Figure 3:

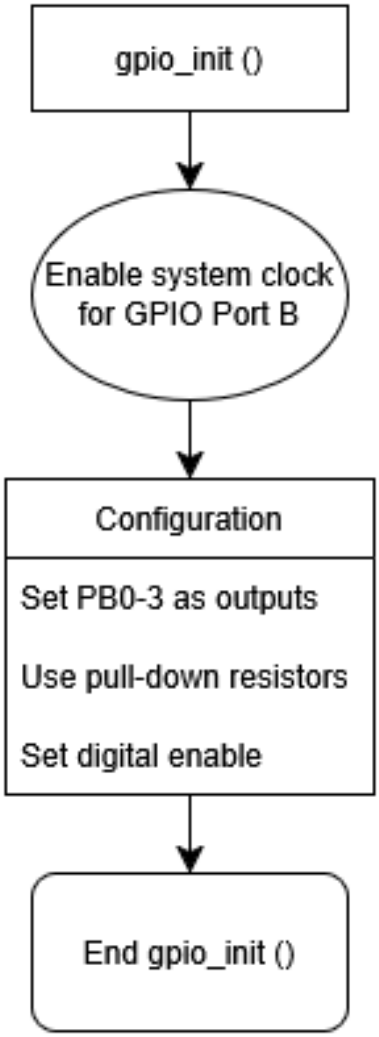

Figure 3: Overview of GPIO Port B Setup

dma_init:

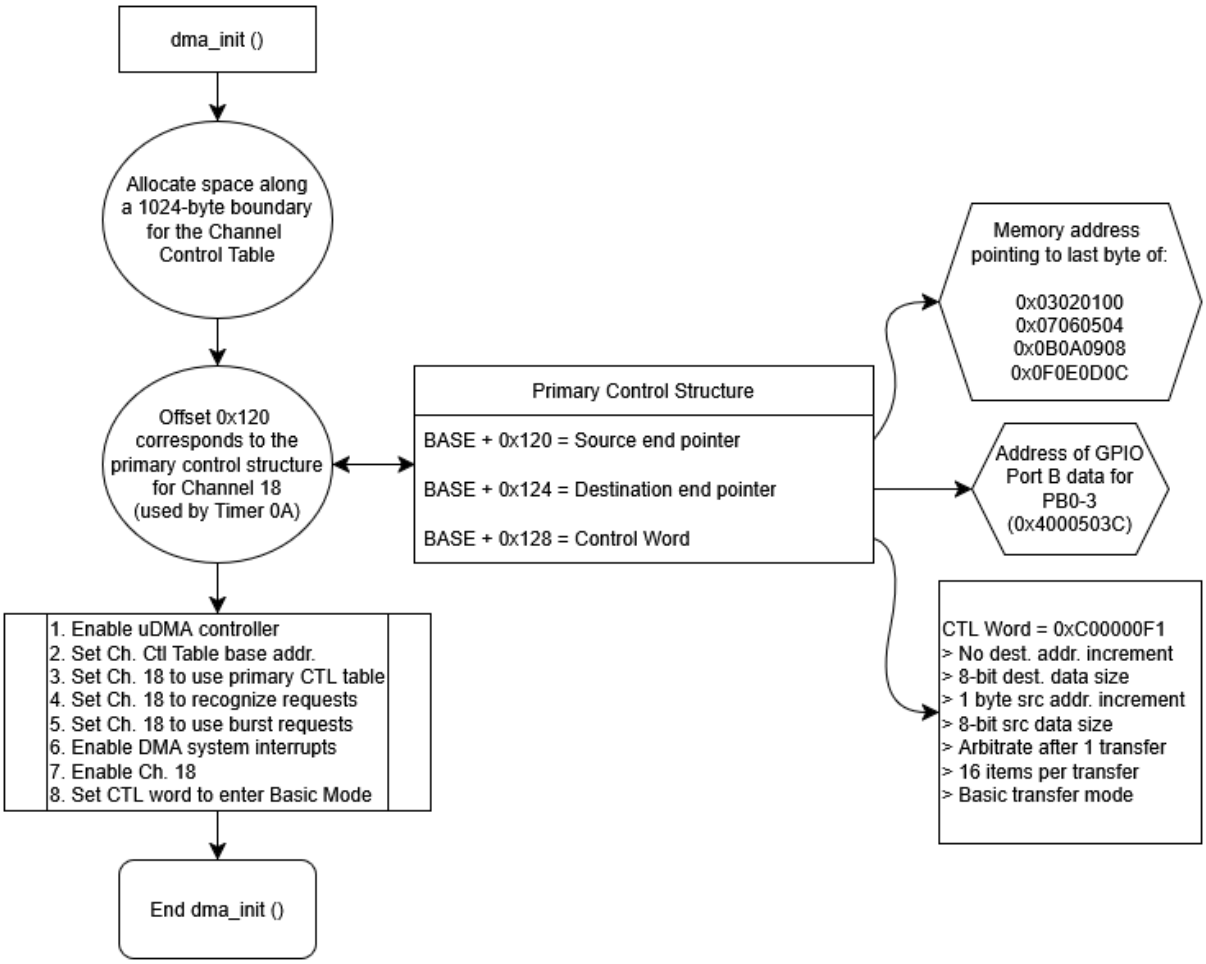

Figure 4: Overview of DMA Setup

TimerHandler:

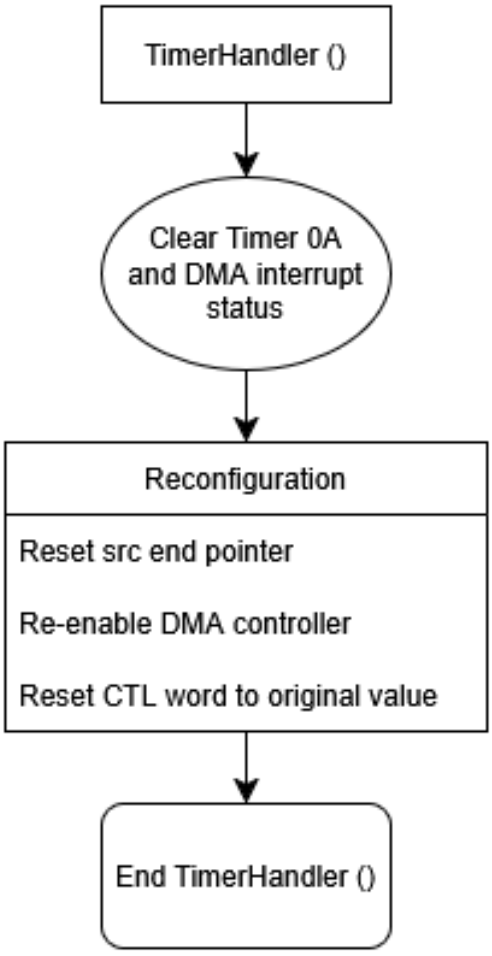

Figure 5: Overview of Timer Interrupt Handler