CST250 Project 2: UART Number Input

Learning Objectives:

- Interact with a memory mapped input/output (I/O) device
- Implement either a poll or interrupt driven I/O driver
- Understand and implement error handling

The Task

In this project you will be working individually to creating a program that converts an ASCII string into a binary value and displays a character on the UART indicating either an error or a successful conversion. An equals character ('=') will be used to indicate the end of a number and a negative sign ('-') before the number indicates that the value is negative. If it is negative then you will need to convert the value to its two's compliment. This is done by inverting all of the bits and then adding 1. Inverting, or performing a bitwise NOT on all bits, is equivalent to performing a NOR where both inputs to the NOR are the number you wish to NOT. The result of your signed conversion, either positive or negative, should be put in register $v0.

Use numbers through the UART to indicate the state of your program after completing a number input attempt. If a number is successfully converted then it should output a '0' character. If a number contains an invalid character (i.e. 3a4 or #5) then it should output a '1' character. If the value is larger than can be stored in a single 32-bit register then it should output a '2' character. Here are some sample inputs and their corresponding outputs:

UART Input	UART Output	Converted Number (Signed Decimal value in $v0)
10=	0	10
-125=	0	-125
1024=	0	1024
-10=	0	-10
3a4=	1	0
123456789123456789=	2	0

Following each number input the calculator should revert to a state where it is ready to take another number as input. In other words, manually resetting the PLPTool simulation between numbers **should not** be required. It should be ready and waiting for another input after processing the previous input.

Deliverables:

1. Write a Reflection in your Blackboard Journal in an entry titled *Project 2 Reflection*. (3 points)

2. Submit your program on blackboard with the format: lastname_project2.plp. (12 points)

Reflection Prompt:

In this entry, discuss what you took away from this project. Did something not work the first time around? If it didn't, mention what it was and how you fixed it. Having completed the program, is there anything you would have done differently?