14:332:437 Digital System Design
Lab8-N-bit Parameterized Barrel Shifter

Introduction

A barrel shifter is a digital circuit that can shift a data word by a specified number of bits in one clock cycle (source: Wikipedia).
Here we will implement an N-bit (parameter N) barrel shifter that rotates an arbitrary number of bits to the *right*. Note that:

i) the width of the required binary input shift pattern will change with N,

ii) the number of lines of code of the most efficient description will logarithmically (base 2) scale with N.

You are NOT allowed to use the following:

i) the in-built $\log$ function,

ii) for-loops,

iii) shift operators ($>>$ and/or $<<$),

iv) unscalable design having static shift pattern-based assignments. For example, describing all N cases exhaustively in a case statement (or if-else).

What to turn in

Submit the following in a PDF report on Sakai.

1. SystemVerilog hardware description for $N = 8$.
2. Modified description (from part a.) for $N = 64$.

Questions

1. Can your design in part b. be verified on the DE2-115 board? Justify your answer.
2. Is your design combinational or sequential?