Digital Integrated Circuits and Systems

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Lab 6: Square wave generator II

Tool: Vivado 2025.1
Task: simulate the square wave signal generator in Vivado
add frequency and amplitude settings

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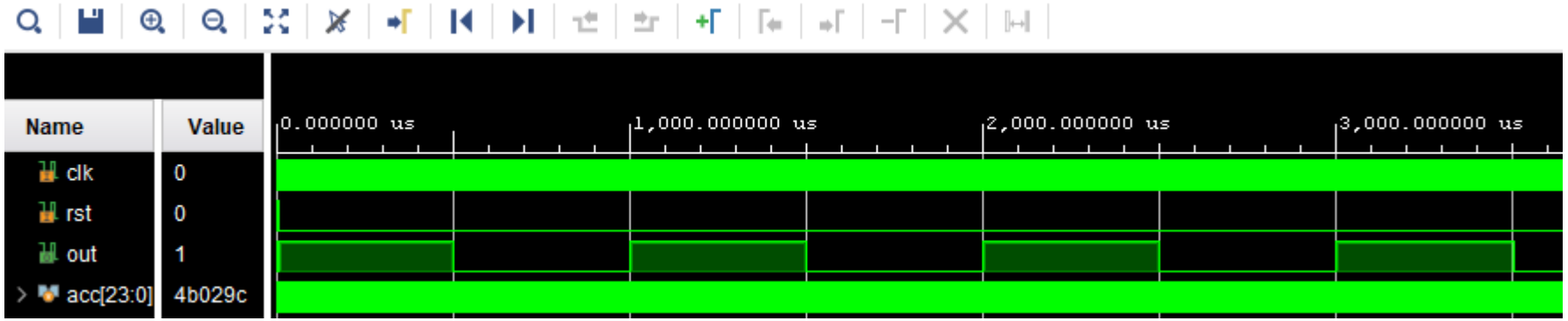
Simulate in Vivado

- Vivado project with square wave generator
- **Run Simulation,** Run > Restart and write in **Tcl Console**

```
add_force clk {0 0ns} {1 4ns} -repeat_every 8ns
add_force rst {1 0ns}
run 16 ns
add_force rst {0 0ns}
run 5 ms
```

- View > Zoom Fit and measure out period: _____



- Change increment value and repeat simulation

Generator with frequency input

Output frequency of 24-bit accumulator: $f = f_{clk} * inc / 2^{24}$

- f_{clk} = 125 MHz

Design generator with frequency set input

- add 16-bit input for setting frequency as integer number in kHz
- internally compute 24-bit increment: inc = setfreq * 8'd134;
  - How to compute the constant 134?
- verify on simulation with different frequency settings
- add a 14-bit input for setting output amplitude and change output to 14-bit signed vector
  - output should toggle between -amp and +amp