OpenCL Tutorial

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Let’s feel the pain

Goals

- Refresh some concepts about HDL languages
- Familiarize with the tutorial infrastructure setup
- Use the Quartus tool to create HDL designs

HDL Basics

Different Styles

- Structural
- RTL
- Behavioural

Old style HLD

YOU DO...

- Create Project
  - Open Quartus (in your desktop)
  - load the file “contrast.v” (LAB1.1)
  - Do save as (with the same name) to trigger the default project creation
  - Follow the Wizard until the end

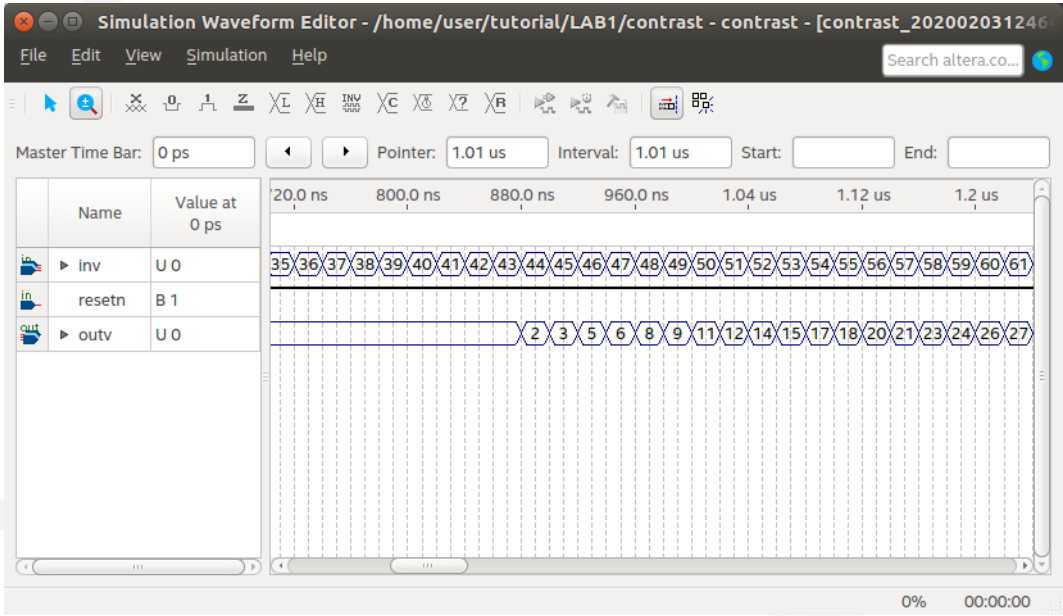
The Code

```
//
// We apply a simple linear function to increase the contrast
//
// outv = m * inv + n
//
//                    m is the slope. we will use a fraction to compute it (like 3/2)
//  n is the offset, which we will derive by forcing to have the response
//                     centered so...
//
//                                        128 = 3 / 2 * 128 + n    ---> n = 128 - 128(3/2) = -64
`define FRAC_NUM 3
`define FRAC_DEN 2
`define N 64

module contrast( input resetn,
                 input [7:0] inv ,
                 output [7:0] outv );

wire [15:0] s1;
wire [15:0] s2;
wire [15:0] s3;

assign s1 = inv * `FRAC_NUM;
assign s2 = s1 / `FRAC_DEN;
assign s3 = s2 - `N;

assign outv =  (s2 < `N) ? 0 : (s3 > 255) ? 255 : s3;

module contrast(input resetn,
        input [7:0] inv ,
        output wire [7:0] outv );

endmodule
```

Old style HLD

YOU DO...

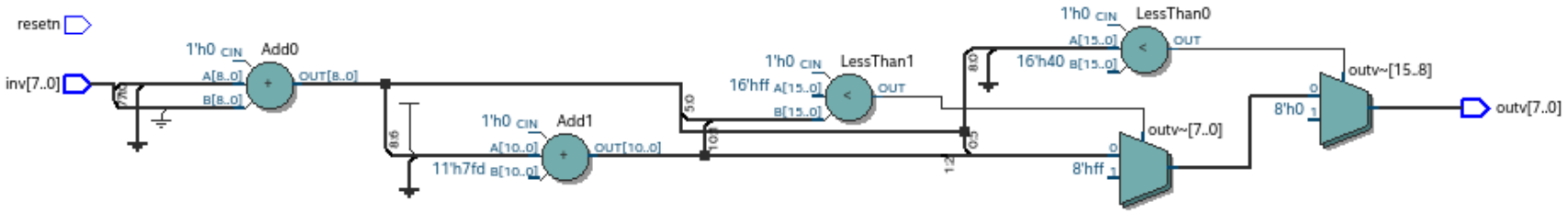
- Simulate
  - –Run analysis task
  - –Create a waveform (University Program)
  - –Select inputs/outputs
  - – Create a testbench
  - – Run simulation



Old style HLD

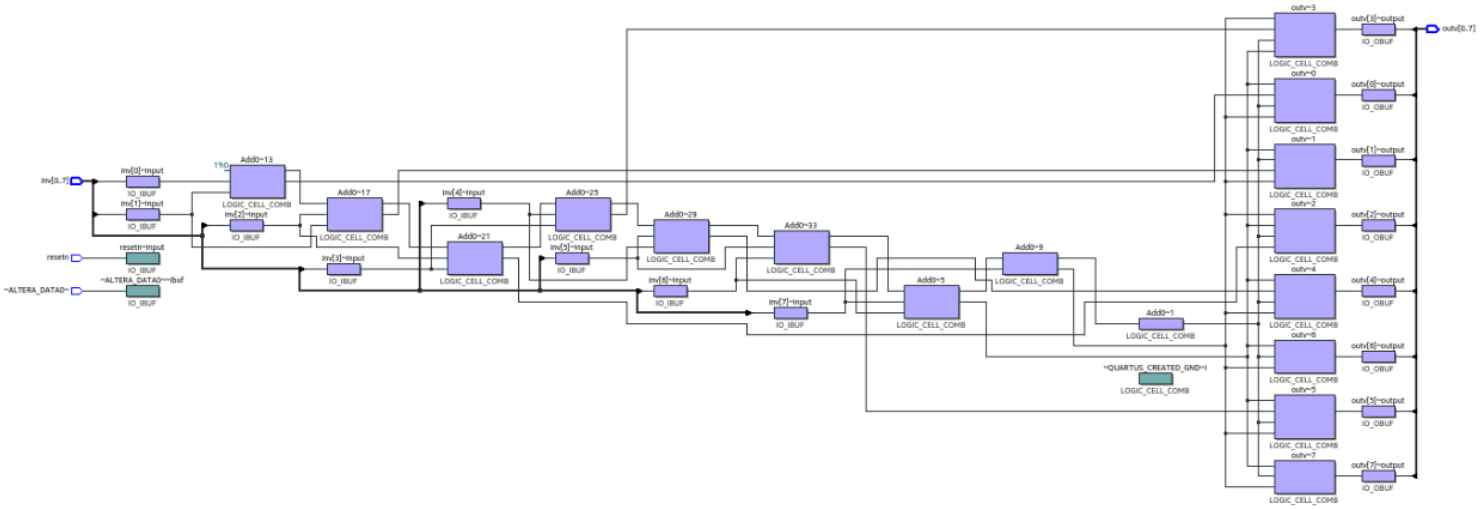
YOU DO...

- Run Fitter
- View circuit
  - Open circuit in Netlist Viewer



QUESTION: Where are the Mult and Div?

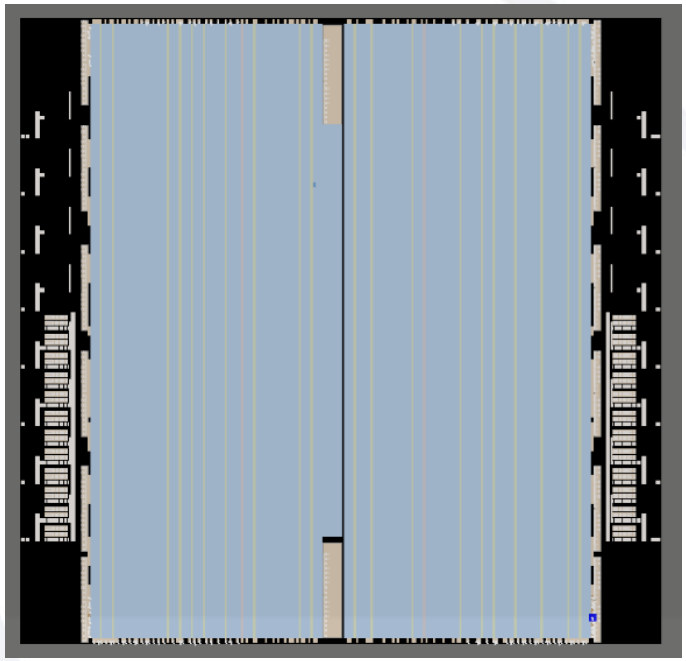
- YOU DO:
  - Open Technology Mapper

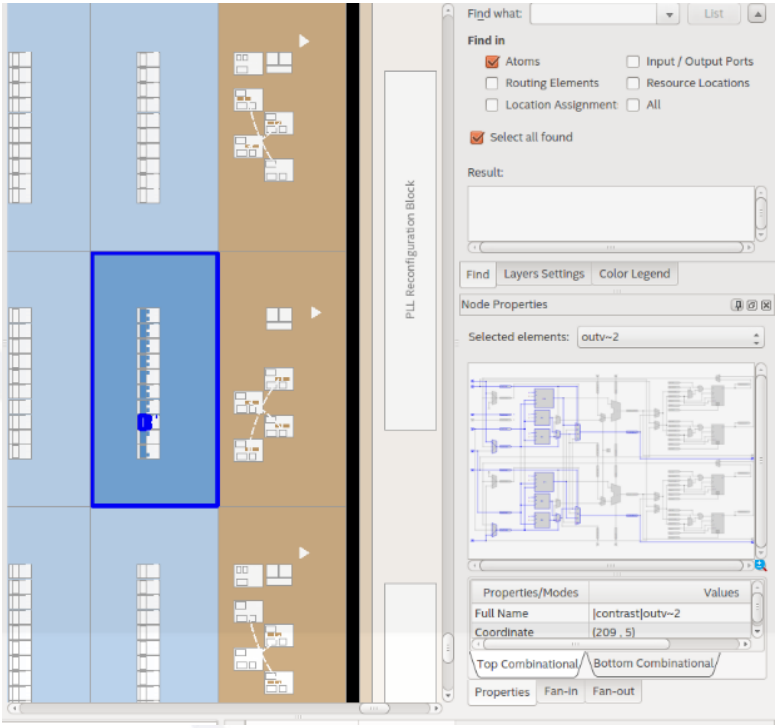


QUESTION: Where are the Comparators?

YOU DO

- Find your active cells in Chip Planner





Questions?