Embedded system, from software to hardware
(EDAN15 VT15 Final Report)

Anton Eliasson, dat11ael@student.lu.se
Daniel Lundell, daniel.lundell.746@student.lu.se

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Abstract

Brief description of the report. Context, hypothesis, experiments, results, conclusion. The abstract should contain enough information about the rest of the document, but not too many details. Between 5–10 lines in this format.

1 Introduction

This is the lab report on the laboratory work in the Embedded Systems Design(EDAN15) course at LTH.

This is the part where you give background information and prepare the reader to deal with the rest of the document. *This is the final report on the laboratory work in the Embedded Systems Design (EDAN15) course, LTH ...* Describe the lab work organization, its relation to the rest of the course as you see it.

The rest of the report is organized as follows. Section 2 describes the experimental setup of each of the four labs. ... Half a page for introduction will suffice.

2 Experiments

Describe what you have to do as laboratory work. Describe your application, target platform. Give information about the host platform and tool chain. Use references (here and whenever appropriate elsewhere in the report) to publications [2] or web pages (e.g. for companies [3]). Do avoid giving random web pages and wikipedia as reliable sources of information.

2.1 Software algorithms

The software algorithm choosen was the Euclidean subtration algorithm. This was choosen to avoid the need of calculations using division, modulo and recursion. The algorithm is very simple and well defined.

```
function gcd(a,b)
        while(a != b) {
                if a>b
                        a = a-b
                else
                        b = b-a
        }
        return a;
}
```

Listing 1: Working on your report

2.2 Single processor

Describe what is particular to this solution.

2.3 Dual processor

Describe what is specific to this solution. How do you divide the work between the processors? How do you communicate in between them? Are there any other ways to do this? How did you make sure your solution works properly? How did you test it? Debug it in any way?

2.4 Hardware accelerated

Describe your specific hardware accelerator. Describe the structure and behavior. Why did you choose to implement exactly this part of the algorithm? How does it fit in the whole system? How did you make sure your solution works properly? How did you test it? Debug it in any way?

Use pictures and timing diagrams, such as the one in Figure 1. Do explain every picture and diagram.

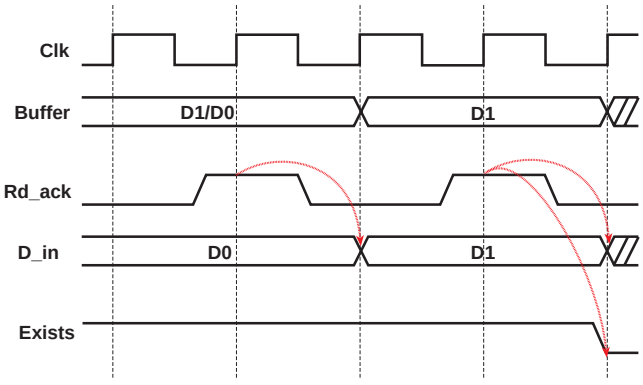

Figure 1: A figure example

3 Measurements and Discussion

This is probably the most important part of the report. In here you must describe the what and how you measure. Describe any specific parts in the hardware architecture or the software that help you conduct measurements. You should use graphs or tables to present your results, such as Table 1 or 2, but do not forget to describe the measures and units in the columns or graph axis.

Item		
Animal	Description	Price ($)
Gnat	per gram	13.65
	each	0.01
Gnu	stuffed	92.50
Emu	stuffed	33.33
Armadillo	frozen	8.99

Table 1: Avoid vertical lines in tables.

		Primes				
		2	3	5	7	
Powers	504	3	2	0	1	
	540	2	3	1	0	
Powers	gcd	2	2	0	0	min
	lcm	3	3	1	1	max

Table 2: Uses *multirow* LaTeXpackage

Say a few words about the complexity of the different solutions and how long did it take to reach a working design.

3.1 Performance

Give the performance figures for your solutions. Note that both the number of clock cycles AND the clock frequency is important for performance!

Discuss how and why the figures are different in between solutions. Discuss how these figures are different from your expectation. For example, should a dual processor system be twice faster than a single processor system? Is it? Why? How about compiler optimizations?

Explain whether and how the data sets your algorithm operates on influence the results. For example, why computing the something for 10 numbers is slower than computing the same thing for 30 numbers?

3.2 Device Utilization

Give the FPGA resources consumed by each of your solutions. Explain how these relate to each other – e.g. whether a dual processor system has double the area of a single processor system and how do these relate to the hardware accelerated solution. Explain why or how using different algorithms influences or not the device utilization.

3.3 Power and Energy

The power and energy consumption are also important for a design. The XPower Analyser that comes with the Xilinx ISE helps you determine the power consumption for your designs. Have a look at the hierarchical breakdown of power consumption and identify the parts of your design that consume a lot of power. Also, as you know energy is the time integral of power:

$$E = \int_{t_1}^{t_2} P dt \approx P \Delta t \tag{1}$$

How do your different solutions compare from the power and energy consumption point of view?

4 Summary

In this part you briefly summarize your report. Continue with conclusions, lessons learned, unexpected results, unsolved problems or other issues that remain open. Relate back to the content of the course and explain whether or how the laboratory work helped you or not with understanding certain issues from the theoretical part.

References

[1] Xilinx. *MicroBlaze Processor Reference Guide*, EDK v6.2 edition, June 14 2004.

[2] Xilinx Inc. `http://www.xilinx.com/`, 2007.