Report Writing Guidance

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Report Structure

- Your report should be like a story book. It should have a ***beginning***, and ***middle***, and an ***end***.
- Just like a book, it is useful to split into ***sections*** (chapters) which come in a ***sensible order***. Think it out carefully!
- Each of the ***sections*** (chapters) should have a ***number*** and a ***title***.

1) Introduction

2) Background Theory

....

....

9) Conclusions

Notes:

- In most reports you will also need ***subsections*** for distinct sub-topics, with appropriate numbering. For example...

1) Introduction

2) Background Theory

    2.1) Binary Numbers

    2.2) Binary Arithmetic

    2.3) Arithmetic Circuits

....

....

9) Conclusions

The Beginning...

- Your report should have a ***title page*** including the title for the report, your name, registration number, and the class details.
    - If it is a group report, state all student names and the ***group number*** or ***letter***.
- Next comes the ***abstract***. This is a short section giving a ***high level overview*** of the document / project, and the ***outcomes***.
(*Note this section is not numbered!*)

Abstract

This report details the specification, design, implementation and testing of a circuit for performing arithmetic calculations on a Xilinx Spartan 3 FPGA. The results obtained confirm correct operation of the circuit and show that the design can be implemented on the target FPGA while using only 20% of its resources.

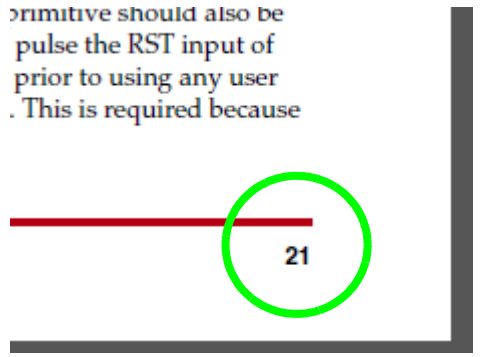
Notes:

- Next comes the ***Table of Contents***...
- You should **not** need to make this manually. Word and other programs can generate the Table of Contents ***automatically***! Use this!
- Make sure that the ***section numbers***, ***section titles*** and ***page numbers*** are all included.

Table of Contents

General Numbering

- **Rule # 1**: Put ***page numbers*** on the ***pages***!
  - Top, bottom, right, left, centre...
    ... doesn't matter too much.
  - Not including page numbers is a ***crime***!



- **Rule # 2**: ***figures*** and ***tables*** must be numbered too.
- They should also have a ***descriptive caption***.

Circuit	Test A	Test B
adder	passed	passed
subtractor	passed	failed

Table 5 : Test results

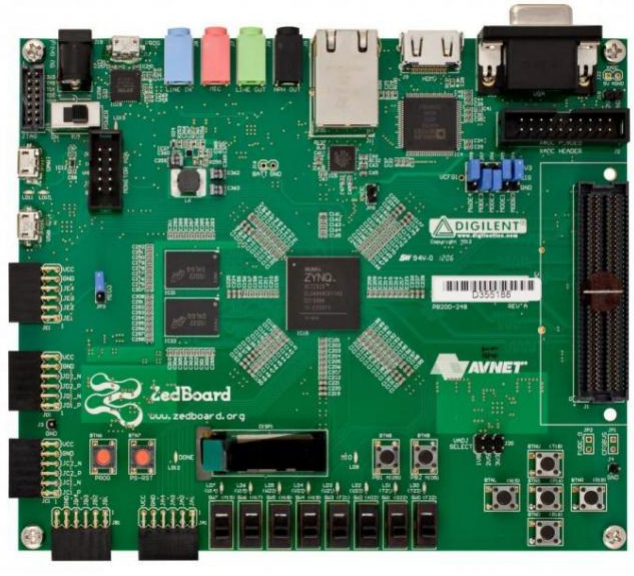


Figure 3 : Photograph of the ZedBoard

Notes:

- When referring to figures, do so explicitly by ***number*** from the body text.

... and the FPGA board used for prototyping was the ZedBoard as shown below:

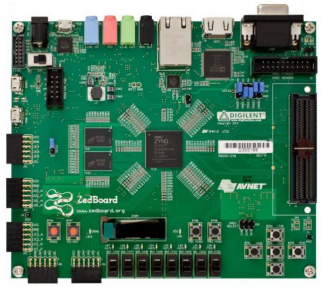
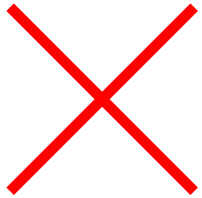


Figure 3 : Photograph of the ZedBoard



... and the FPGA board used for prototyping was the ZedBoard as shown in Figure 3.

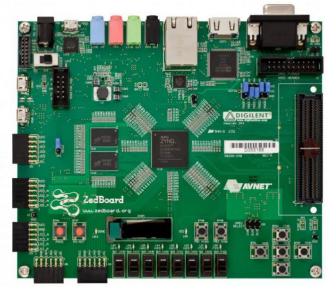
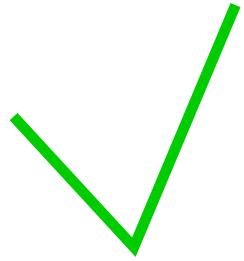


Figure 3 : Photograph of the ZedBoard



Equations

- If your report requires equations, take care to present these clearly using an equation editor.
- Choose an appropriate ***size*** for the equation (not too big or small).
- Equations should be centred on the page, and ***numbered*** to the right hand side.

> ... and the equation for the output of the FIR filter is given as
>
> $$y(k) = \sum_{n=0}^{N-1} w_n x(k-n) \qquad (3)$$
>
> where N is the total number of coefficients, w_n is the n_{th} weight, k is...

- Remember that you need to ***define all of the symbols used*** in the equation (like N, w_n, k etc. in the above example).

Notes:

- You can then refer to your equations as required, using the defined ***number***.

- You just need to give the number in ***round brackets***.

> ... as was shown in (3), the output of the FIR filter can be calculated using a convolution sum operation...

Code

- When writing about VHDL (for example) then often it is useful to include some code in the report.
- You should put a ***full code listing*** in the ***appendix***.
- It might also be helpful to your explanation to include ***small snippets*** in the main part of the report.
    - Then you can discuss these in particular, without sending the reader off to look up the appendix and then identify the exact section you are talking about.
- Make this ***easy to read*** and ***differentiate from the main body text*** - use a different font (`Courier New` is good for code) and perhaps draw a box around the outside.

```
entity my_multiplier is
      port (a_input : in unsigned (10 downto 0)....
....
```

Notes:

Referencing

- Most reports will require a list of ***references***.
- References are included as a separate section at the end of the report, after the conclusions.
- It contains a ***numbered list of sources***, giving details of the title, author, publication, date, etc..

10) References

[1] Ashenden, P., *The Designer's Guide to VHDL*, Morgan Kauffman, 3rd Edition, July 2008.

[2] Lee, D.Y., Yannakakis, M., "Principles and Methods of Testing Finite State Machines - a Survey", *Proceedings of the IEEE*, Vol. 84, Issue 8, 1996, pp. 1090-1123.

[3] ....

[4] ....

Notes:

- Any document or website which the reader can refer to for more information can be included as a reference.

- If you have used information / work from specific sources then you should reference them.

- ***Cite the references from the main text***. For example, when you want to talk about VHDL techniques, refer to the VHDL book:

> ... a circuit was designed for the arithmetic unit, and this made use of VHDL functions [1].

Presentation of Text

- Make sure you check your English thoroughly.
- Choose a ***reasonable font size (10-12 points)*** and use it consistently.
    - ***Do not use enormous fonts!***
    - ***Do not change fonts*** within the report (pay particular attention to this when writing group reports!).

> Sometimes you are reading along quite happily, thinking about the information being presented. Then suddenly, even half way through a paragraph, the font changes and it might even get bigger or smaller.
>
> It is very off putting! Try to stick with the same font.

- Try to write in reasonably sized paragraphs (not too long!)

Notes:

- The appearance of the text is better if it is ***fully justified***, rather than left justified.

It doesn't really matter what this text says, the main point is just that it looks a little smarter when fully justified on the page, rather than left justified where all of the lines finish at different points on the right hand side of the page.

Perhaps you can compare these two examples and see what you think. Do you prefer the example on the right hand side, or the example on the left hand side? Remember that you can set this option easily in Word or another word processor if you happen to be using something different.

It's also worth considering the spacing between paragraphs - many people expect to see a slightly larger gap between paragraphs and find that this makes the text easier to read, too.

Compare these two paragraphs to the two paragraphs at the top - which are easier on the eye?

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It's also worth considering the spacing between paragraphs - many people expect to see a slightly larger gap between paragraphs and find that this makes the text easier to read, too.

Compare these two paragraphs to the two paragraphs at the top - which are easier on the eye?

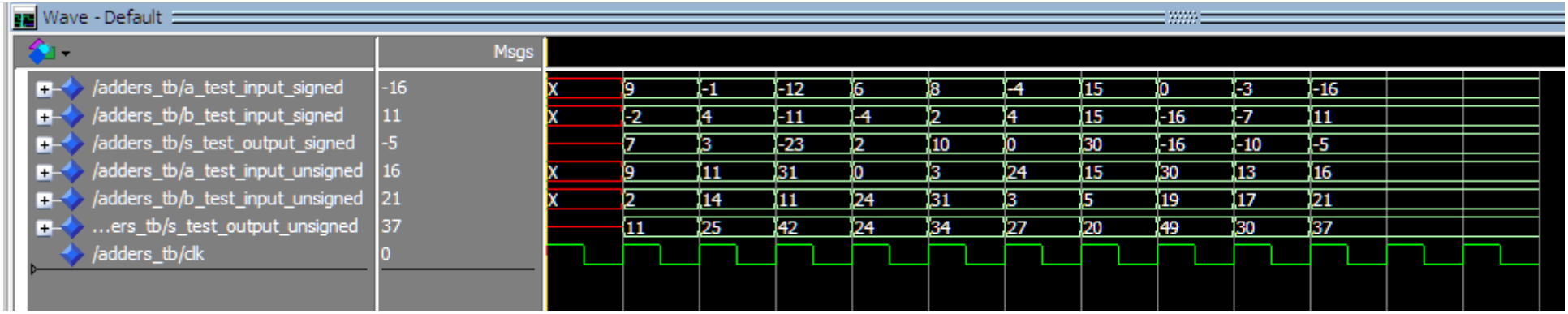
- Don't be afraid to summarise information in ***tables*** or using ***bullet points*** - this is a useful way to make key information easily extractable.

Content - “The Thoughtful Bit”

- Remember that the report should ***present information clearly*** but it should also ***interpret*** and ***discuss***.

- It is ***not helpful*** just to say...

Here are the results :

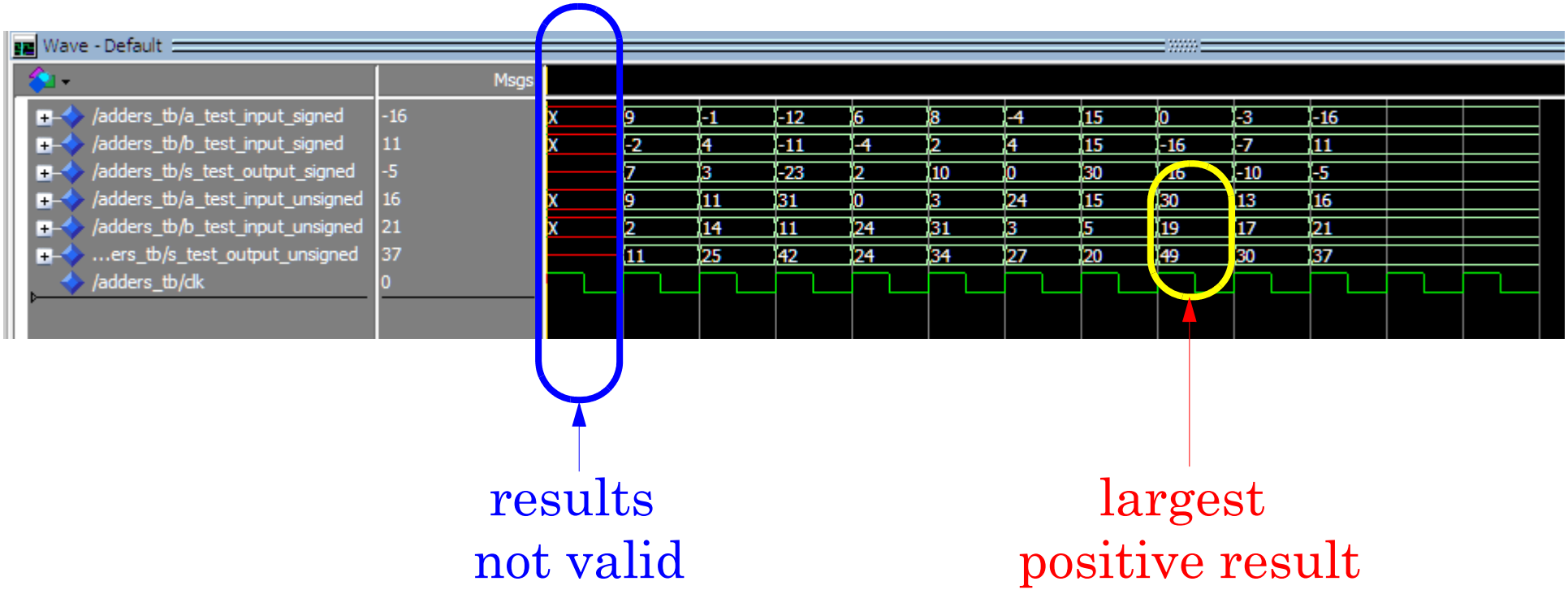


- As the author, to show your understanding and to help the reader, you should explain **(1)** what the results **show**, and **(2)** what they **mean**.

Notes:

- Often it is helpful to ***pick out particular features*** from a waveform or diagram and make specific comments about them.

- You can draw the reader's attention to something, and add a label / comment to ***explain*** what they see.



Depth

- ***Depth*** and ***thoroughness*** are important.
- When writing the report, make sure to clearly cover all of the required points and make a conscientious effort to give ***sufficient detail*** in your explanation. Use ***diagrams*** / ***tables*** / ***bullet points*** whenever this would help.
- ***Imagine you are the reader*** - what would you want to know?
    - *Have you clearly explained the problem / requirements?*
    - *Have you described your design and explained your choices?*
    - *Have you described how you implemented the design?*
    - *Have you presented and interpreted your results?*
- Also, in the academic context - are you clearly demonstrating your ***understanding*** of the material?

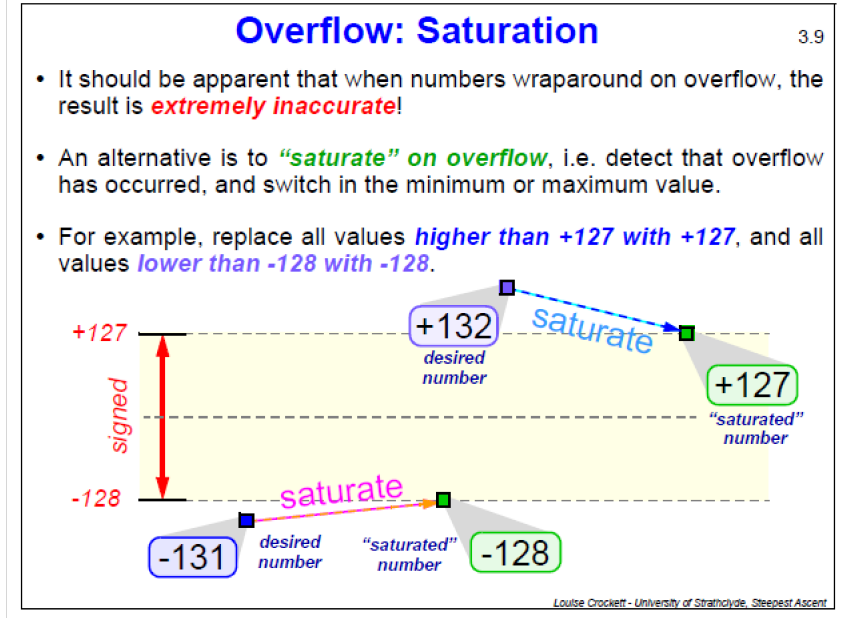
Notes:

- ***Copying materials*** - text or diagrams - from lecture notes into your report ***does not help to convey your understanding***!
  - Why would the lecturer want to see their own explanations repeated back to them?

…

Saturation works as shown in the diagram:

…



- It is only clear that you understand if you ***write in your own words***, and come up with ***your own examples and diagrams***.

Conclusions

- The Conclusions section is often a weak one.
- The main purpose of the conclusions section is to ***review the technical work and outcomes*** - it is ***not*** primarily for personal reflections.
- The conclusions should aim to:
    - *Remind the reader of the purpose of the work*
    - *Review the work undertaken (briefly)*
    - *Review the key outcomes*
    - *Conclude whether the aims were met, and how*
    - *Any additional comments, suggestions for future work, and so on...*
- It is not sufficient to say that you learned more about VHDL!

Notes:

- You can consider also adding a "***Discussion***" or "***Analysis***" section before the Conclusions
    - This gives you a chance to consider the results and outcomes, which is important. It is especially useful if there is a lot to reflect upon (thus not making the Conclusions too long).
- You may also add a personal reflection, but the technical conclusions are more important!
- Do not make any false claims! Don't say everything went brilliantly if it didn't - it is more useful to highlight problems and possible solutions.