VLSI Design Project 2013/2014

The report is of 9000 words which is up to 30pgs including the figures and total report of 50pgs including appexdix and other details.

**Report Content**

* **Introduction**
* The details of the design and the novelty of the design
* Hierarchy
* About the chosen architecture
* Instruction set and mapping in brief
* **Architecture Diagram**
* A simplified architecture diagram with all connections excluding the control signals.
* **Description of registers**
* Describe the function of all the registers shown in the architecture diagram. Any conventions must be mentioned.
* **Overview of Instruction Set and Addressing Modes**
* Overview of the instruction set, giving details of the types of instruction supported and the addressing modes available for each of these types. At this stage you may wish to describe the instruction field coding and the length of the instructions under different addressing modes.
* **Instruction Set**

You should provide complete documentation for the instruction set. For each instruction *(or group of instructions)* and each addressing mode you should list the Mnemonic (instruction name used in assembly language), the operation (including any changes to status flags), the assembly language syntax, a short text description and the instruction format.

The following is an example from the SPARC Instruction Set (you need not follow exactly the the arrangement shown but you should ensure that that all elements are included):

**And and modify icc**

* + **Mnemonic:**

**ANDcc**

* + **Description:**

This instruction does a bitwise logical AND of the contents of register R[rs1] with either the contents of R[rs2] (in register register mode) or the 13 bit, sign-extended immediate value contained in the instruction (in register immediate mode). The result is stored in register R[rd]. ANDcc also modifies all the integer condition codes in the manner described below.

**Register Register Mode**

* + - **Assembler Syntax:**

ANDcc Rs1, Rs2, Rd e.g. ANDcc R3, R4, R12

* + - **Format:**

https://secure.ecs.soton.ac.uk/notes/bim/notes/fcde/assign/gif/ANDcc.gif

* + - **Operation:**

R[rd] <- R[rs1] AND R[rs2]

N <- R[rd]<31>

Z <- if R[rd]=0 then 1, else 0

V <- 0

C <- 0

**Register Immediate Mode**

* + - **Assembler Syntax:**

ANDcc Rs1, simm13, Rd e.g. ANDcc R3, -316, R12

* + - **Format:**

https://secure.ecs.soton.ac.uk/notes/bim/notes/fcde/assign/gif/ANDccI.gif

* + - **Operation:**

R[rd] <- R[rs1] AND sign\_extend(simm13)

N <- R[rd]<31>

Z <- if R[rd]=0 then 1, else 0

V <- 0

C <- 0

Note that syntax and semantics of each instruction are unambiguously defined such that the programmer reading this guide can work out how to write assembly language for your processor. Similarly the instruction coding is given so that the programmer may produce machine code (i.e. a hex format file) for your processor.

With this sort of arrangement it is typical to have only one or a very few instructions per page. For this reason it is essential that the contents page for your document lists all of these instructions, with page numbers, so that the document may easily be used as a reference guide by the programmer.

* **Programming Tips**
* This section of the report should guide the programmer on making the best use of your processor.
* Details of useful pseudo-instructions. This allows you to show the flexibility of your small instruction set.
* Details of suggested use of subroutines. In particular you should include sequences of instructions used for subroutine call and return along with the setting up and destruction of stack frames. These sequences should match those used in your example programs.
* **Assembler**

The programmer will need to know:

* + how to format assembly language for your assembler
  + whether your assembler supports labels for branch targets
  + what if any *assembler directives* are supported (e.g. ORG, EQU, FCW).
  + how to run your assembler
* **Example Programs**

You should include and discuss the assembly language for the example programs:

* + Multiply
  + Factorial
  + Random
  + Interrupt
* **Running the Simulations**

This section of the report should give details on:

* How to run the simulations, including the commands required to run each of the programs on each of the models (behavioural, mixed & structural).
* Include screen shots of the register window with a brief explanation of the information presented.
* For each of the programs you should give details of the number of clock cycles required for the simulation run.

**Report Presentation**

The presentation of this report should match that of the previous report on Microprocessor research.

Since this report is a group effort, the author(s) of each section or chapter should be declared in order to allow the fair allocation of marks. Where no author is declared, no marks will be awarded.

**Appendix**

* An appendix to the report should indicate how the project was managed and how the tasks were divided amongst the members of the group
* Division of labour form

**LETS HOPE FOR THE BEST!!!!!!!!!!**