Design and Verification
of
Platform Level Interrupt Controller

Submitted by:

2019-FYP-33

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Abbreviations

LAH **L**ist **A**bbreviations **H**ere

Abstract

Abstract of the project is written here (and usually kept to just this page). (Maximum 350 words)

Chapter 1

Introduction

Discuss the opening perspective of the problem area, the challenge in that area, and refine the challenge into a concise statement. $(1 - 2$ pages)

Chapter 2

Problem Statement

Unmet need or problem, what is the unmet need or problem the FYDP is aiming to solve? How significant is the problem? Quantify as much as possible. In case of a research problem, show the significance of the unsolved problem. Who needs it? List the type of customers who will be interested in the solution of the problem. For each type of customer, indicate the potential market size. In case of a research problem, identify its scope. (1 page)

Chapter 3

Literature Review

What has been done by others to solve the problem? What solutions are already present in the market? What are their disadvantages? In the case of a research problem, a literature review of the state-of-the-art should be included. At least 10 latest research papers should be cited in the literature review. $(2-3$ pages$)$

Chapter 4

Project Overview and Objectives

Discuss the overview/goal of the project and outline the proposed solution. Give your valued proposition. How is your solution going to be different and better than others? Students must describe the final project output in detail, its expected packaging, and hardware/software components. In case of a research problem, how the proposed research solution is expected to be better than the state-of-the-art? Write three to four bullet points to clearly define the objectives of your project. ($1 - 2$ pages)

Chapter 5

Project Development Methodology/Architecture

Distribute the project goals into smaller objectives/modules and outline deliverables for each objective. Explain the modules of the project through a system-level block diagram. Students may also mention tools, technologies, and suitability of the method(s) to be employed with justification. In case of a research problem, outline the approaches that will be investigated in the project. $(2-3 \text{ pages})$

Chapter 6

Project Milestones and Deliverables

Clear milestones should be defined at the start of the project in the form of a Gantt chart. It is recommended to use excel or some equivalent software to make a Gantt chart. $(1 - 2$ pages)

Chapter 7

Block Diagram

As interrupts come from sources (from the same or different sources), we also tell whether the interrupt is **Level or edge triggered**? Then gateway passes these intterupts to target in the form of ip (interrupt pending).

Target then segregates the interrupts with respect to their priority. Then finally, using valid-ready interface interrupt is sent to RISC-V processor to service it. High priority interrupt is serviced first.
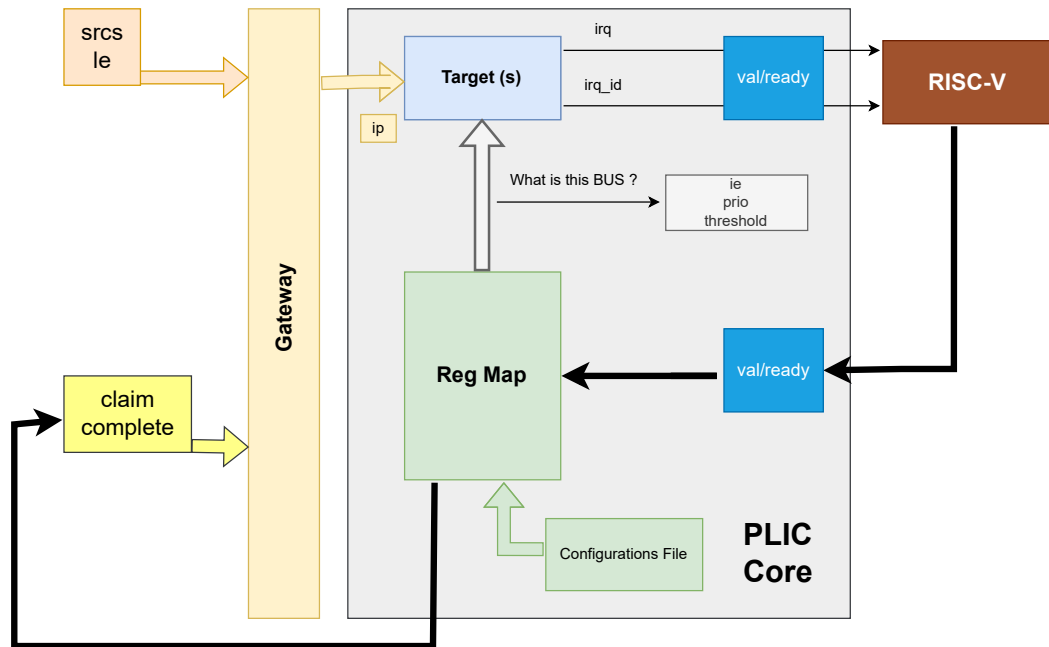

FIGURE 7.1: Block Diagram.

As we see in the figure 7.1, there is also a block Reg Map (Register Map). It is used to store a particular interrupt is enabled or not, what is its priority, what is the threshold of the target to take that interrupt? etc. We program all this stuff using configuration file. At last, Processor also tells PLIC core that particular interrupt is taken and PLIC takes action to mark it as complete.

Chapter 8

Flow Chart

Once interrupt source triggers the interrupt, it then goes to gateway and then gateway will request that interrupt to PLIC Core which is shown in the Figure 8.1.

After the interrupt is requested to PLIC core, it will then **alert/notify** target(s). Now the important step comes, after the target has received the interrupt, it will send a signal back to PLIC core that this interrupt is claimed (Also the claim ID). Receiving the claim from target, PLIC will send claim response that this interrupt should be serviced or not. Then the interrupt handler services the that particular interrupt.
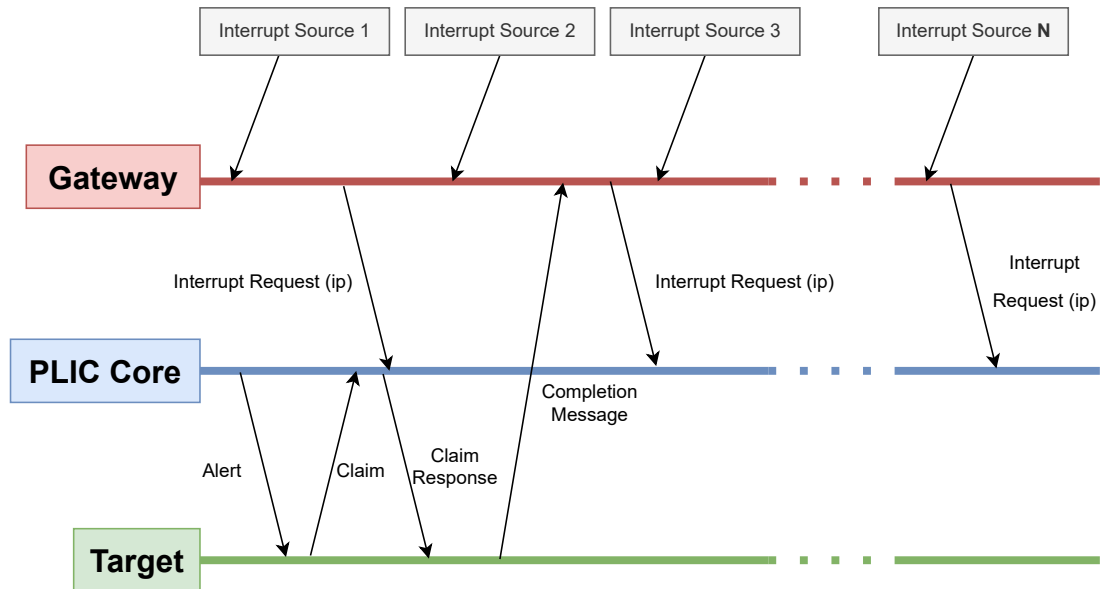

FIGURE 8.1: Flow Chart.

Finally, the interrupt completion message will be sent to gateway that this interrupt is completed and no need to send any other interrupt from that source. So is the case with all other pending interrupts from other sources.

Chapter 9

Work Division

Clear work division among group members must be indicated. (1 page)

Chapter 10

Costing

Make a table of major required components with estimated prices. (1 page)

Appendix A

Introduction to Latex (Do not include this in the final version of your synopsis)

The material provided in this appendix is taken from

A.1 Learning LaTeX

LaTeX is not a WYSIWYG (What You See is What You Get) program, unlike word processors such as Microsoft Word or Corel WordPerfect. Instead, a document written for LaTeX is actually a simple, plain text file that contains *no formatting*. You tell LaTeX how you want the formatting in the finished document by writing in simple commands amongst the text, for example, if I want to use *italic text for emphasis*, I write the '`\emph{}`' command and put the text I want in italics in between the curly braces. This means that LaTeX is a "mark-up" language, very much like HTML.

A.1.1 A (not so short) Introduction to LaTeX

If you are new to LaTeX, there is a very good eBook – freely available online as a PDF file – called, "The Not So Short Introduction to LaTeX". The book's title is typically shortened to just "lshort". You can download the latest version (as it is occasionally updated) from here:
http://www.ctan.org/tex-archive/info/lshort/english/lshort.pdf

It is also available in several other languages. Find yours from the list on this page:
http://www.ctan.org/tex-archive/info/lshort/

It is recommended to take a little time out to learn how to use LaTeX by creating several, small 'test' documents. Making the effort now means you're not stuck learning the system when what you *really* need to be doing is writing your thesis.

A.1.2   A Short Math Guide for LaTeX

If you are writing a technical or mathematical thesis, then you may want to read the document by the AMS (American Mathematical Society) called, "A Short Math Guide for LaTeX". It can be found online here:

http://www.ams.org/tex/amslatex.html

under the "Additional Documentation" section towards the bottom of the page.

A.1.3   Common LaTeX Math Symbols

There are a multitude of mathematical symbols available for LaTeX and it would take a great effort to learn the commands for them all. The most common ones you are likely to use are shown on this page:

http://www.sunilpatel.co.uk/latexsymbols.html

You can use this page as a reference or crib sheet, the symbols are rendered as large, high quality images so you can quickly find the LaTeX command for the symbol you need.

A.1.4   Figures

There will hopefully be many figures in your thesis (that should be placed in the 'Figures' folder). The way to insert figures into your thesis is to use a code template like this:

```
\begin{figure}[htbp]
  \centering
    \includegraphics[width = 1.5in]{./Figures/uet_logo.pdf}
    \rule{35em}{0.5pt}
  \caption{The UET Laore logo.}
  \label{fig:uet_logo}
\end{figure}
```

Also look in the source file. Putting this code into the source file produces the picture of the UET logo that you can see in the figure below.

FIGURE A.1: The UET Lahore logo.

Sometimes figures don't always appear where you write them in the source. The placement depends on how much space there is on the page for the figure. Sometimes there

is not enough room to fit a figure directly where it should go (in relation to the text) and so LaTeX puts it at the top of the next page. Positioning figures is the job of LaTeX and so you should only worry about making them look good!

Figures usually should have labels just in case you need to refer to them (such as in figure A.1). The '\caption' command contains two parts, the first part, inside the square brackets is the title that will appear in the 'List of Figures', and so should be short. The second part in the curly brackets should contain the longer and more descriptive caption text.

The '\rule' command is optional and simply puts an aesthetic horizontal line below the image. If you do this for one image, do it for all of them.

The LaTeX Thesis Template is able to use figures that are either in the PDF or JPEG file format. It is recommended that you read this short guide on how to get the best out of figures in LaTeX, available here:
http://www.sunilpatel.co.uk/texhelp5.html

Though it is geared more towards users of Mac and OS X systems, much of the advice applies to creating and using figures in general. It also explains why the PDF file format is preferred in figures over JPEG.

A.1.5   Typesetting mathematics

If your thesis is going to contain heavy mathematical content, be sure that LaTeX will make it look beautiful, even though it won't be able to solve the equations for you.

The "Not So Short Introduction to LaTeX" (available here) should tell you everything you need to know for most cases of typesetting mathematics. If you need more information, a much more thorough mathematical guide is available from the AMS called, "A Short Math Guide to LaTeX" and can be downloaded from:
ftp://ftp.ams.org/pub/tex/doc/amsmath/short-math-guide.pdf

There are many different LaTeX symbols to remember, luckily you can find the most common symbols here. You can use the web page as a quick reference or crib sheet and because the symbols are grouped and rendered as high quality images (each with a downloadable PDF), finding the symbol you need is quick and easy.

You can write an equation, which is automatically given an equation number by LaTeX like this:

```
\begin{equation}
E = mc^{2}
  \label{eqn:Einstein}
\end{equation}
```

This will produce Einstein's famous energy-matter equivalence equation:

$$E = mc^2 \tag{A.1}$$

All equations you write (which are not in the middle of paragraph text) are automatically given equation numbers by LaTeX. If you don't want a particular equation numbered, just put the command, '`\nonumber`' immediately after the equation.

A.2 Sectioning and Subsectioning

You should break your thesis up into nice, bite-sized sections and subsections. LaTeX automatically builds a table of Contents by looking at all the '`\chapter{}`', '`\section{}`' and '`\subsection{}`' commands you write in the source.

The table of Contents should only list the sections to three (3) levels. A '`\chapter{}`' is level one (1). A '`\section{}`' is level two (2) and so a '`\subsection{}`' is level three (3). In your thesis it is likely that you will even use a '`\subsubsection{}`', which is level four (4). Adding all these will create an unnecessarily cluttered table of Contents and so you should use the '`\subsubsection*{}`' command instead (note the asterisk). The asterisk (*) tells LaTeX to omit listing the subsubsection in the Contents, keeping it clean and tidy.

References