Department of
Computer Science and Engineering

Lab No. 03

Title: Introduction to Technical Report Writing Using Latex (Part 2)

Integrated Design Project I

CSE 324

Green University of Bangladesh

1 Objective(s)

- To learn typesetting of journal articles, technical reports, books, and slide presentations.
- To learn formatting documents containing sectioning, cross references, tables, equations and figures.
- To learn typesetting of complex mathematical formulae.

2 LATEX

LATEX is used all over the world for scientific documents, books, as well as many other forms of publishing. Not only can it create beautifully typeset documents, but it allows users to very quickly tackle the more complicated parts of typesetting, such as inputting mathematics, creating tables of contents, referencing and creating bibliographies, and having a consistent layout across all sections. Due to the huge number of open source packages available (more on this later), the possibilities with LATEX are endless. These packages allow users to do even more with LATEX, such as add footnotes, draw schematics, create tables etc.

One of the most important reasons people use LATEX is that it separates the content of the document from the style. This means that once you have written the content of your document, we can change its appearance with ease. Similarly, you can create one style of document which can be used to standardise the appearance of many different documents. This allows scientific journals to create templates for submissions. These templates have a pre-made layout meaning that only the content needs to be added. In fact there are hundreds of templates available for everything from CVs to slideshows.

3 Getting Started with LATEX

https://www.overleaf.com/learn/latex/Learn_LaTeX_in_30_minutes#What_is_LaTeX.3F

Title and Abstract

- Tell LaTeX the `\title` and `\author` names in the preamble.
- Then use `\maketitle` in the document to actually create the title.
- Use the `abstract` environment to make an abstract.

```
\documentclass{article}

\title{The Title}

\author{A. Author}

\date{\today}

\begin{document}
\maketitle

\begin{abstract}
Abstract goes here...
\end{abstract}

\end{document}
```

The Title

A. Author

January 26, 2020

Abstract

Abstract goes here...

Sections

- Just use `\section` and `\subsection`.
- Can you guess what `\section*` and `\subsection*` do?

```
\documentclass{article}
\begin{document}

\section{Introduction}

The problem of \ldots

\section{Method}

We investigate \ldots

\subsection{Sample Preparation}

\subsection{Data Collection}

\section{Results}

\section{Conclusion}

\end{document}
```

1 Introduction

The problem of . . .

2 Method

We investigate . . .

2.1 Sample Preparation

2.2 Data Collection

3 Results

4 Conclusion

Labels and Cross-References

- Use `\label` and `\ref` for automatic numbering.
- The amsmath package provides `\eqref` for referencing equations.

```
\documentclass{article}
\usepackage{amsmath} % for \eqref
\begin{document}

\section{Introduction}
\label{sec:intro}

In Section \ref{sec:method}, we \ldots

\section{Method}
\label{sec:method}

\begin{equation}
\label{eq:euler}
e^{i\pi} + 1 = 0
\end{equation}

By \eqref{eq:euler}, we have \ldots

\end{document}
```

1 Introduction

In Section 2, we . . .

2 Method

$$e^{i\pi} + 1 = 0 \quad (1)$$

By (1), we have . . .

Structured Documents Exercise

Typeset this short paper in LaTeX: [1]

Click to open the paper

Make your paper look like this one. Use `\ref` and `\eqref` to avoid explicitly writing section and equation numbers into the text.

Click to open this exercise in **Overleaf**

- Once you've tried, click here to see my solution.

[1] From `http://pdos.csail.mit.edu/scigen/`, a random paper generator.

Graphics

- Requires the `graphicx` package, which provides the `\includegraphics` command.
- Supported graphics formats include JPEG, PNG and PDF (usually).

```
\includegraphics[
  width=0.5\textwidth]{gerbil}

\includegraphics[
  width=0.3\textwidth,
  angle=270]{gerbil}
```

Image license: CC0

Interlude: Optional Arguments

- We use square brackets [ ] for optional arguments, instead of braces { }.
- `\includegraphics` accepts optional arguments that allow you to transform the image when it is included. For example, `width=0.3\textwidth` makes the image take up 30% of the width of the surrounding text (`\textwidth`).
- `\documentclass` accepts optional arguments, too. Example:

  ```
  \documentclass[12pt,twocolumn]{article}
  ```

  makes the text bigger (12pt) and puts it into two columns.
- Where do you find out about these? See the slides at the end of this presentation for links to more information.

Floats

- Allow LaTeX to decide where the figure will go (it can "float").
- You can also give the figure a caption, which can be referenced with `\ref`.

```
\documentclass{article}
\usepackage{graphicx}
\begin{document}

Figure \ref{fig:gerbil} shows \ldots

\begin{figure}
\centering
\includegraphics[%
  width=0.5\textwidth]{gerbil}
\caption{\label{fig:gerbil}Aww\ldots.}
\end{figure}

\end{document}
```

Figure 1: Aww....

Figure 1 shows ...

Image license: CC0

Subfigures

Firstly, we need to load up the caption and subcaption packages:

- \usepackage {caption}
- \usepackage {subcaption}

To add some spacing between the figures we'll use the \hfill command.

```
\begin{figure}
    \centering
    \begin{subfigure}[b]{0.3\textwidth}
        \centering
        \includegraphics[width=\textwidth]{graph1}
        \caption{$y=x$}
        \label{fig:y equals x}
    \end{subfigure}
    \hfill
    \begin{subfigure}[b]{0.3\textwidth}
        \centering
        \includegraphics[width=\textwidth]{graph2}
        \caption{$y=3\sin x$}
        \label{fig:three sin x}
    \end{subfigure}
    \hfill
    \begin{subfigure}[b]{0.3\textwidth}
        \centering
        \includegraphics[width=\textwidth]{graph3}
        \caption{$y=5/x$}
        \label{fig:five over x}
    \end{subfigure}
      \caption{Three simple graphs}
      \label{fig:three graphs}
\end{figure}
```

Tables

- Tables in LaTeX take some getting used to.
- Use the `tabular` environment from the `tabularx` package.
- The argument specifies column alignment — **l**eft, **r**ight, **r**ight.

```
\begin{tabular}{lrr}
Item   & Qty & Unit \$ \\
Widget & 1   & 199.99  \\
Gadget & 2   & 399.99  \\
Cable  & 3   & 19.99   \\
\end{tabular}
```

Item	Qty	Unit $
Widget	1	199.99
Gadget	2	399.99
Cable	3	19.99

- It also specifies vertical lines; use `\hline` for horizontal lines.

```
\begin{tabular}{|l|r|r|} \hline
Item   & Qty & Unit \$ \\\hline
Widget & 1   & 199.99  \\
Gadget & 2   & 399.99  \\
Cable  & 3   & 19.99   \\\hline
\end{tabular}
```

Item	Qty	Unit $
Widget	1	199.99
Gadget	2	399.99
Cable	3	19.99

- Use an ampersand [&] to separate columns and a double backslash [\][\] to start a new row (like in the `align*` environment that we saw in part 1).

Citation Steps

1. Create a new reference file in the .bib extension (Figure 1).

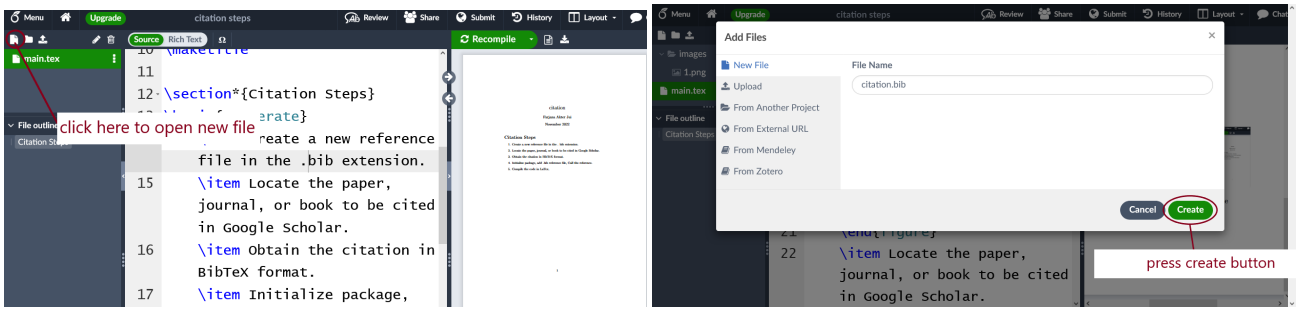

Figure 1: Create .bib file

2. Locate the paper, journal, or book to be cited in Google Scholar (Figure 2).

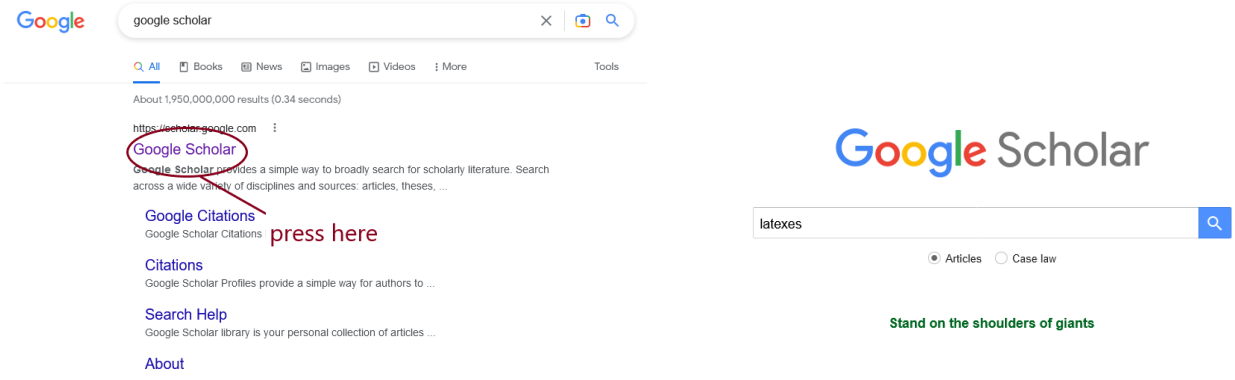

Figure 2: Search Related paper in google scholar

3. Obtain the citation in BibTeX format (Figure 3).

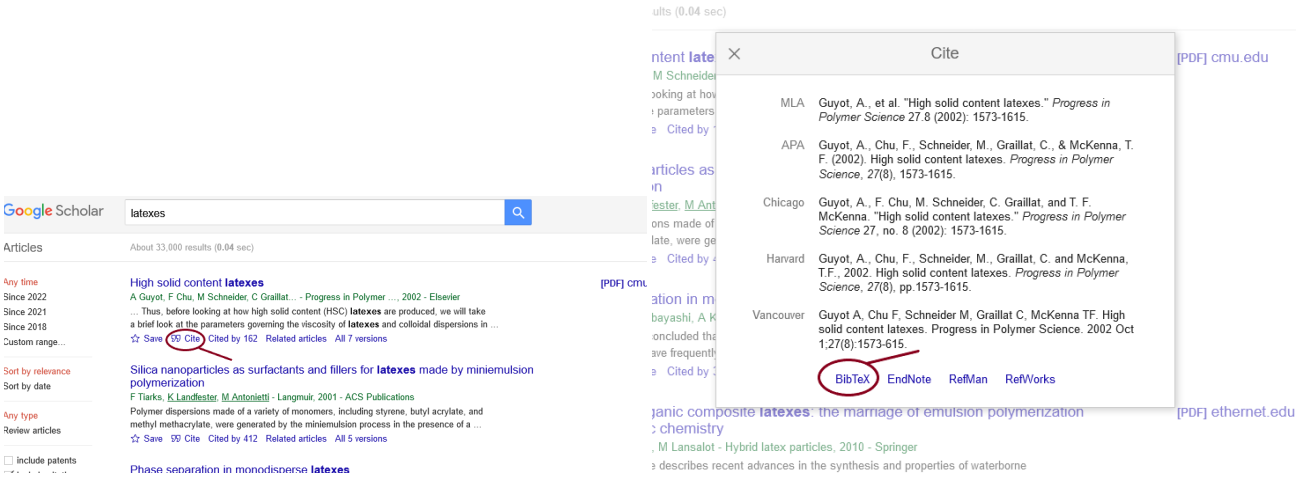

Figure 3: Get bibtex file by pressing red marks

4. Paste BibTeX format in .bib file (Figure 4).

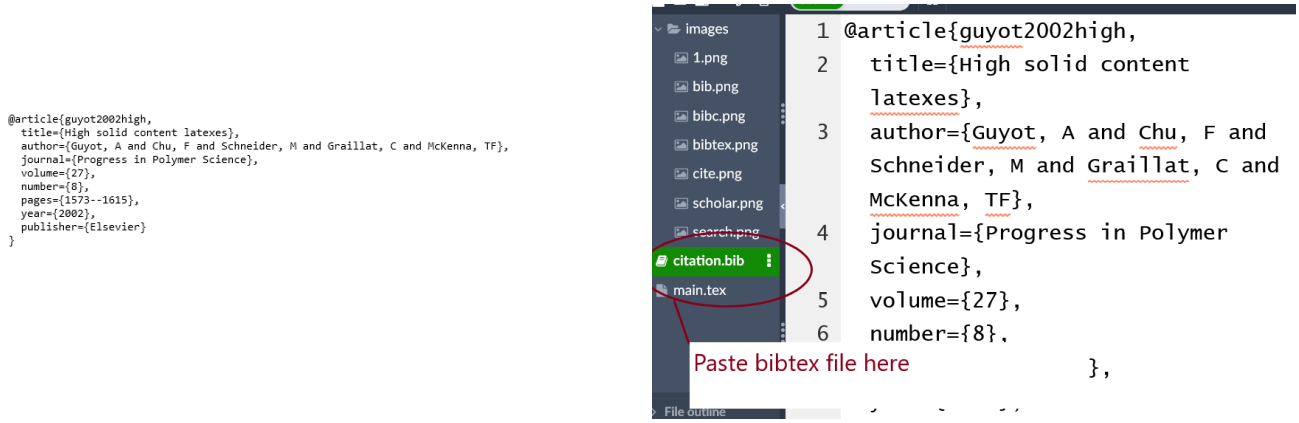

Figure 4: Paste BibTeX format in .bib file

5. Initialize package, add .bib reference file, Call the reference (Figure 5).

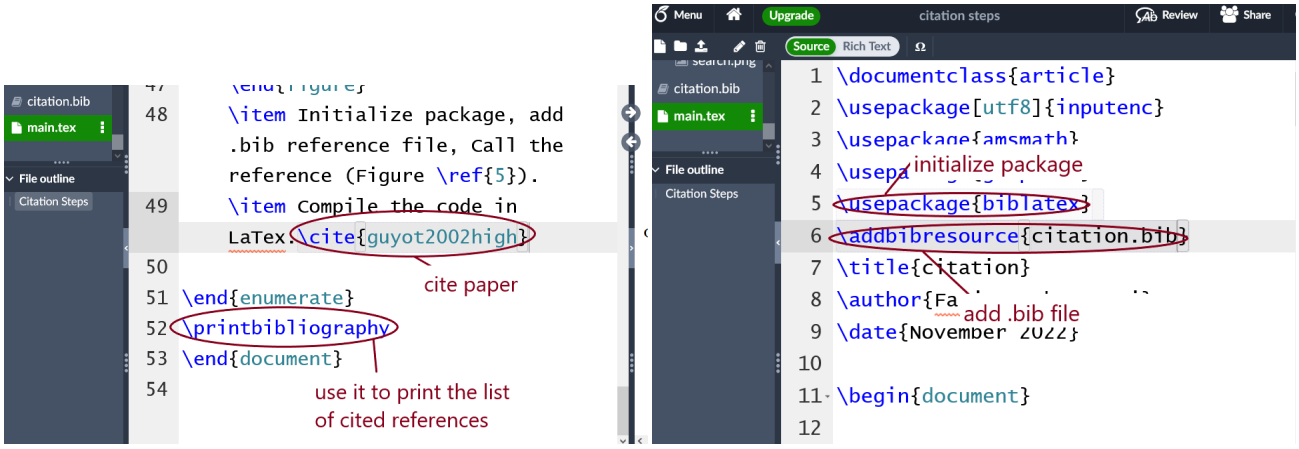

Figure 5: package initialization and print cited references

6. Compile the code in LaTeX. Citation is used in this line [1]

4 Lab Task (Please implement yourself and show the output to the instructor)

1. Show the output learnt from the link to the Course instructor.

5 Policy

Copying from internet, classmate, seniors, or from any other source is strongly prohibited. 100% marks will be *deducted* if any such copying is detected.

References

[1] A Guyot et al. "High solid content latexes". In: *Progress in Polymer Science* 27.8 (2002), pp. 1573–1615.