Bridges to Prosperity Overleaf and LaTeX Tutorial

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Abstract

This is where you describe your project. This is probably a good place to mention that you can get LaTeX and Overleaf help by clicking on the question mark above. Another good reference is the wikibook. For specific questions, you can often find them already answered at Stack Exchange.

Using Overleaf

Source and Rich Text

In Overleaf, you can view the code for your document in either Source or in 'Rich Text'. The 'Source' is your raw `.tex` file, which is like a `.txt` file that contains your code which LaTeX compiles and turns into a PDF. The Rich Text view adds a graphical interpretation of the code that is visually somewhere between the `.tex` file and the resulting PDF.

The Rich Text view may be the best way to view your work when you are starting out. It has the advantage of giving a sense of how your document is structured, whereas looking at the Source can sometimes be a little overwhelming. Additionally, if you prefer more of a GUI (graphical user interface) when word processing, the Rich Text view offers a few extra buttons. One of the most useful of these is the 'Add a Comment' button (rectangular speech bubble with plus sign inside), which allows you to make comments, respond to them, and close them. You can minimize comments, and if you want to do this, be sure to press the 'minimize' button in the top right of the comment box instead of the 'close' button, which marks the discussion about the comment closed. If you want to un-close a comment, you need to go to Source view and delete the last time-stamp, which ends with a period to show that the comment has been closed, as well as the % in the line above it. A way of making comments directly in the document is given in a later section.

Viewing your code in Source mode can be helpful in terms of debugging and performing more code-oriented tasks, since it is exactly what is compiled and run (Overleaf automatically does this every time you make an edit if preview is switched to "Auto"). Source mode has a few additional advantages for those who have experience (or want to gain experience) using a text editor. Overleaf has key bindings for both VIM and Emacs, which can be accessed in 'Settings' (gear button at the top right). In my experience, both work, but the VIM bindings

work a little more naturally in a web browser environment. As with text editors, you can also change the color scheme for the syntax highlighting, and this can be done in 'Settings'.

Important Buttons

So far, we've mentioned several important buttons:

- Help Button (question mark) - Directs you to useful tutorials and references as well as to Overleaf support if you really get stuck (you should be able to solve most of your issues by referring to the references and tutorials).

- Settings Button (gear) - Gives you options for how you edit and view your project.

- Source/Rich Text Switch - Gives you the choice between editing your file in a more text-based or graphical mode.

For the rest of this part of the tutorial, we will focus on the functionality of a few of the other buttons in Overleaf.

Project

The Project Button shows all of the files in your project. The way LaTeX projects work is that there is a main file (the `.tex` file) and several supporting files which are called upon when the main file is compiled and run to create a document. These include image files for figures and BibTeX (`.bib`) files for bibliographies, which will be discussed later in this tutorial. To add a file to your project, simply click on Project and then on the 'Add Files...' button. To add a file saved to a location on your computer, simply click on Computer next, browse for your file, and drag and drop it. Another useful feature is that you can press the 'Download as ZIP' button to get a `.zip` file containing all of your project documents if you would like to save them locally somewhere.

History & Revisions

This button allows you to save the project in its current state so that you can refer back to it later. To do this, you simply click on History & Revisions and then write a name for the version (perhaps who worked on it and the date) and click on the 'Add Label' button. This will create a snapshot of your project from that time. This is helpful for a number of reasons. For one, you can recover your document by pressing the 'Restore' button to bring it back to a previous state if for some reason something goes wrong. More importantly, you can press the 'Compare' button to compare the document in its current state to a prior version. This functions like the "Track Changes" feature in MS Word, and will allow you to see what edits another user has made to your document. This is essential for working with your advisor. Whenever you submit a report to your advisor, you should save a version with a name that reflects the date and the version number. When your advisor has finished editing your draft, they should also save a similarly-named version that will allow you to see what changes they have suggested.

Share and PDF

The last two buttons of interest are Share and PDF, and they are fairly self explanatory. Share gives you the URLs for both the editing view of your project as well as a read-only view in case there is a reason you want someone to be able to read your document without being able to change it. The PDF button does exactly what you would think: it generates a PDF of your project.

Using LaTeX

This part of the tutorial is intended to give you a better understanding of how LaTeX, the typesetting language used by Overleaf, works and how you can use it.

1   Sections

Here, the hierarchy of headings is shown.

1.1   Subsections

1.1.1   Subsubsections

This is probably the lowest you'll need to go.

Paragraphs

Subparagraphs

Unnumbered Sections

This would be your *first* (italics added by using the `\emph{}` command) paragraph. Notice that this section is unnumbered, but the "Sections" section above was numbered. This is because of the asterisk (*) following the 'section' command for this section.

This would be your **second** (boldface added by using the `\textbf{}` command) paragraph.[1] LaTeX automatically indents all paragraphs after the first paragraph. Although this text is on a new line, it is a continuation of the same paragraph, because there is no line between it and the prior line.

Another way to insert an un-indented line is to use the `\noindent` command to remove indentation.

- To add a bullet-point list, simply begin an `itemize` environment with `\begin{itemize}` ... `\end{}`.

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[1]You can add footnotes by using the `\footnote{}` command.

- Bullet points are then added with the \item command.

1. If you want a numbered list, begin an enumerate environment.

2. As with the itemize environment, points are added with the \item command.

   (a) In order to make sub-points (or sub-sub-points), simply begin a new enumerate (or itemize) environment beneath the point you wish to expand upon.

Comments

In addition to the method of commenting provided by Overleaf (refer to the section titled "Source and Rich Text"), there is a more functional method of commenting, made possible by use of the Track Changes package. With this packages, you can insert a \note in the middle of the text. $^{WP:}$ [Like this!] You can also $^{WP:}$\annote text [like this!]. $^{WP:}$~~You can \remove text you do not want.~~ $^{WP:}$And, you can \add text that you do want. $^{WP:}$~~Lastly, you can \change out one piece of text~~for another that you think would be better. To add other editors, simply go to the preamble and use the command \addeditor{} with the new editor's initials in the curly braces. The documentation for this package can be found here. A note on this

Mathematics

LaTeX is particularly good at typesetting mathematics (it stems from the work of Stanford mathematician, Don Knuth), so it is quite versatile at writing equations. Your best resource for formatting mathematics is the wikibook chapter on mathematics. Another helpful resource is a GUI equation editor (not unlike the one in MS Word) called HostMath.

Within text, an inline equation would be $1 + 1 = 2$, accomplished by enclosing the formula with dollar signs (\$). Numbered equations are written using \begin{equation} ... \end{equation}:

$$H_L = K_e \frac{V^2}{2g}. \tag{1}$$

Note that within the 'equation' environment, the command \label was used with a name in curly brackets. This makes it possible to reference the equation number in the text. For example, the minor loss relationship is given in Equation 1 (equation number automatically generated by using the \ref{} command).

Probably the least intuitive (but still easy) part of writing mathematics in LaTeX is writing fractions. To demonstrate how to use the \frac command: the price of electricity is $\$30 \div GJ = \frac{\$30}{GJ}$. Now for the easy stuff. Exponents and subscripts are easy: $H_2CO_3 \rightarrow CO_3^{2-} + 2H^+$. You also use them to give the limits of summations and integrals: $\sin x = \sum_{n=0}^{\infty} \frac{(-1)^n}{(2n+1)!} x^{2n+1}$. You can use them to denote roots, but you can also use the root symbol with \sqrt[]{} (the order of the root goes in the square brackets) as demonstrated here: $x^{1/3} = \sqrt[3]{x}$. As shown previously, you can use parentheses as well as square and curly brackets to enclose characters in your equations. If standard parentheses or brackets are too

small (for example, if they are enclosing a fraction), you can use `\left` before the opening character and `\right` before the closing character like this: $\left(\frac{e^x}{\log_{10} x} \right)$.

Adding special symbols in LaTeX is fairly simple, and you can find a list of the ones available natively within LaTeX in the wikibook. If you are having trouble finding one you are looking for, you can try to locate it graphically at Detexify. Greek letters, for example, are very easy. Simply type \ and the name of the letter (e.g., α is `\alpha`). For capital Greek letters, you just capitalize the name of the letter (e.g., Γ is `\Gamma`). While we're thinking about symbols in this section it might also be good to mention that some symbols that commonly occur in writing happen to have very specific meanings in LaTeX code that will lead to problems if you use them as they are. Some of these are %, &, $, and _. You might have guessed that the backslash is not available, either. If you use it in the text, it will give you a space. To write a backslash, you need to use `\textbackslash`.

Lastly, there are a few good things to know about equation editing. First of all, LaTeX will automatically set the spacing in your equations, so if you want to intentionally add spaces, you need to write them. There are four different spaces available, as shown here: $a\,b\,c\,d\,e$. I generally use \: for spacing, like when I need to write units in an equation. Speaking of writing units, LaTeX automatically italicizes letters in equations to reflect that they are variables, but that doesn't make sense for writing units. In this case, you can change the font by enclosing whatever you don't want italicized with `\mathrm{}` (rm is short for Roman). Some other available fonts are **Bold** and `Monospace`.

Figures

To understand how to insert a figure, refer to Figure 1. As can be seen in the code, the commands for inserting a figure are contained within a `figure` environment. Note that after `\begin{figure}` is a [H]. This bracketed letter tells LaTeX how strict to be in placing the figure. Without this bracketed expression, LaTeX decides what it thinks looks best. The bracketed H tells it to put the figure "right here", that is, where it falls in the code. The first command given after `\begin{figure}` is `\centering`. This centers the figure, whereas the default is to left-justify it. The next command is perhaps the most important command, `\includegraphics`, which imports the image file (which you need to add to your project with the Project button) into the document. The expression in square brackets immediately after the command modifies the command (see a pattern?). In this case, the modification is to to display the image at 50% of its size with `[scale=0.5]`. The expression in curly brackets is the name (verbatim) of the image file that is to be imported into the document. The caption below the figure is added with `\caption` and a label is given with `\label` as is done with equations. Please note that it is important that the `\label` command come after the `\caption` command. For further reference, refer to the wikibook.
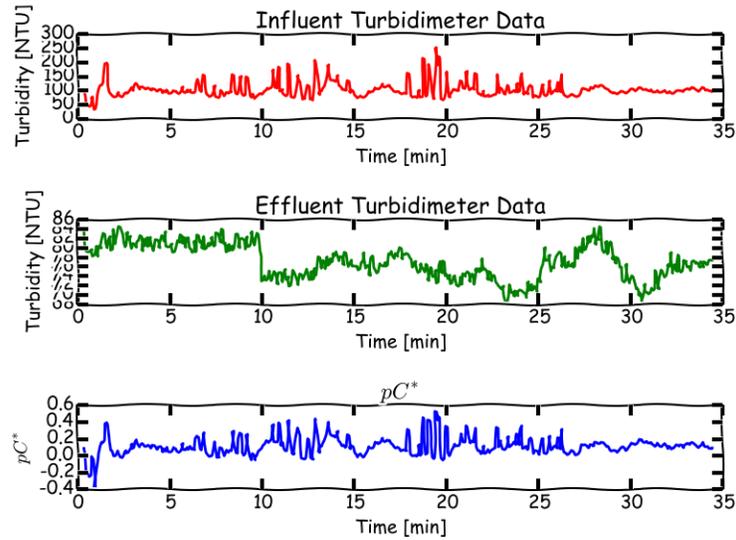
Figure 1: My Beautiful Data

Tables

Tables are quite like figures in their structure, as can be seen in the code for Table 1. There are, nonetheless, a few notable differences. The most important is that within the `table` environment is a `tabular` environment. This is an improvement over the `table` environment's functionality. To begin, notice the statement in curly brackets after the `\begin{tabular}` command. This is where the columns of the table are generated. The letters `l`, `c`, and `r` stand for left-justified, centered, and right-justified columns. The `p` column is a column with a fixed width, in this case set to 5 cm. The pipes and doubled pipes between the columns give lines and double lines between columns. If these are left out, there is no vertical line between the columns. Looking to the next line, `\hline` is the way to add lines between each row and must be done for each row where this is desired, just like with the pipes for vertical lines. The next line shows how rows are written. Between each column, an ampersand (&) must be written. At the end of the row, a double backslash (\\), which is the command for a new line, is needed to indicate the end of the row. At the end of the table, the `\hline` command is doubled to show how double lines can be placed between rows in tables. As a last comment about tables, notice that the `\caption` command comes before the table. This is in order to place the caption on top of the table, which is proper style for tables. For further reference, refer to the wikibook. Also, for a great tool for creating tables, visit tablesgenerator.com.

Table 1: Look at my data!

100	2	3	These data are very interesting.
4	500	6	Don't you think?
7	8	900	Okay, so they aren't real data.

Adding References

Once you know how to do it, citations and bibliographies are easy in LaTeX, and you may find yourself wondering why you would ever trouble yourself with the tedium of doing it manually again. In order to do this in LaTeX, you need to import a `.bib` file into your project which contains the bibliographic information of your sources. There are many ways to do create a BibTeX file, but I would recommend Zotero, which generates bibliography entries with the click of a button when you are on the web page of your source. To download Zotero, visit the download page. For some information on how to get started with it, visit the introduction page. Once you have an account and some sources, you can easily develop a BibTeX file from the sources. In Overleaf, simply go to Project > Add files... > Bibliography. Here, there in option for Zotero, which allows Overleaf to access your Zotero account and pull all of the sources in your Zotero account into one BibTeX file. If this doesn't work, you can also manually generate a BibTeX file in Zotero by selecting the sources you want to include (CTRL + click), right clicking them, and selecting Export Items and then choosing BibTeX for the format.

Once you have a `.bib` file, the process is quite easy. At the end of the document, you need two commands. The first is `\bibliographystyle{apalike}`, which gives an APA-esque format to your references. The other command is `\bibliography{}`, which accepts as an input the name of your `.bib` file. This automatically adds a section at the end of your document called "References". This section is populated with references from your `.bib` file as you cite them in your document. Citing is easy. Each reference in a `.bib` file has a name given to it for reference. Zotero automatically generates names for each source based on the author, title, and year. To cite a source at the end of a sentence, simply use `\citep{}`, which takes the name of the source as an argument. An example of a citation would be (Tennekes and Lumley, 1972). If you were to mention our beloved Tennekes and Lumley (1972) in a sentence, you would simply use the command `\citet` to give the year of publication in parentheses after the names of the authors, as was done in this sentence.

If you want to add a hyperlink to your document, you can do so by using the command `\href{<URL>}{<description>}`. For example, you can see the documentation for the `hyperref` package that this command is a part of by clicking here.

Editing Exercise - Review Call 3

3.0 Local Logistics

3.1 Expectations for Community Involvement and Interaction

The community is expected to provide labor throughout the entirety of the bridge construction process. Sp far, the logistics and communication with the community has been coordinated through Barret.

3.2 Expectations for Municipal Support

The municipality will provide funding for the bridges as well as materials. The community is in charge of, and has already delivered the aggregates. They are also responsible for the collection of rock/stone which they have already begun. As of now all communication with the municipality has been through Barret and Richar (updates) when the university arrives on site they plan on forming communication with the municipality as well.

3.3 Expectations for In-Country Partner

Since the university recieved this site so late in the process, B2P has done all the work that would have been done by EIA for a platinum project. EIA will only provide the transportation to site for the team.

3.4 Food and Lodging

Arrangements for food and lodging have been made through Richar. the team will depend on the community for food and lodging. The community has provided the university with a community center with ample space. The team will have a place to sleep as well as being able to have a small section allocated for dining. Things such as laundry will be done by the team members themselves. Richar is in touch with the community and is finding someone who will provide the service of cooking two meals a day for the team, this will be agreed upon shortly.

3.5 Transportation

Transportation will consist of using both EIA's services as well as public transportation. Upon the travel team's arrival, the team will be transported from La Paz to site through a hired minibus from EIA or a take a bus to Cochabamba then use EIA services to get to site. When on site, transportation for the team to Cochabamba would be by using a bus. The team realistically would be traveling to Villa Tunari or Shinoata which is about 1 hour from site via local mini buses that make pick ups around the area in the morning and evenings. There are markets for the team to buy groceries in both of these towns.

3.6 In-Country Finances

Personal Expenses will be handled by individuals and group expenses such as food and transportation will be handled by the logistics manager and project manager. While in country, the team will have access to their bank account via a B2P university member who is not traveling who has access to our school account or the faculty adviser. Group funds will be distributed to the chapter members in Bolivianos when needed.

4.0 Construction Plan

4.1 Site and Design Overview

Due to time constraints the site was obtained directly from Bridges to Prosperity. Below is an overhead view of the proposed bridge site and the surrounding resources in Shinoata. the topographical survey was performed by Richar the B2P Bolivia Program Engineer on December 1st, 2016. The original survey data is no longer in use, as of July 4th, 2017 the community has done additional excavations on the right side of the proposed bridge site. the original topographical surveys called for an implementation of a 2-1 design, with the new excavations the proposed design has now been changed to a 1-1 design.

4.2 Construction Preparation

4.2.1 Pre-Travel Training

The traveling team has watched the B2P training videos as a group and have discussed and been tested on the knowledge of these videos.

4.2.2 Construction Manual Analysis

Every traveling team member is required to read the construction portion of the manual.

4.2.3 Team-Specific Construction Manuals

Since this is the university's first year going to build their bridge the standard manual has shaped most of our preparation. The three students who traveled the previous summer have given their knowledge on the critical construction phase that they experienced firsthand.

4.3 Bridge Corps Support

Sam, a Bridge Corps member and engineer will be on site from early August to the finish of construction (duration of critical construction phase). Will, a bridge corps in training and engineer as well will be on site the same time as Sam to get trained. The university does not have any backup bridge corps at the moment; we are trying to build our pool of members for thie reason. Sam has been actively involved in B2P for years now; we had the luck of meeting Sam at last year's bridge builder conference in Indiana. He has completed

3 bridges with university teams and is approved for signing off on hold points found in the Construction Verification and Safety Verification forms.

4.4 Construction Schedule

The construction schedule created using smartsheet is attached in appendix 7.4. All task with durations are pictured below. The project seems to span from July 11th- August 15th. We are leaving a week of buffer zone incase of any unforeseen circumstances and the team will fly out August 25th.

4.5 Hazard Mitigation Plan

The most notable hazards will occur during excavation, sag setting, anchor construction, and decking. For these critical task, the team has discussed a plan to mitigate potential risk and a plan in case one of these risk should occur.

Potential hazards during excavation include collapses, injuries from flying rocks or tools, strained muscles or other injuries of the body, and fatigue. The community will start excavation before arriving on-site alongside the B2P mason, who is very experience and will teach the community the best ways to mitigate these potential hazards and ensure that a high standard of safety is upheld when it comes to proper benching/sloping portion of the build. When the uiversity team arrives on-site and works with the community to complete excavation, they will wear proper PPE and stress the importance of clear communication during this process. The proper PPE that is to be worn for excavating includes long sleeves, long pants, eyeglasses, steel-toed work boots, gloves and hardhats.

For anchor excavation and construction, the primary hazards include excavation collapse, concrete, burns, setting cage in the anchor, cuts while tying the rebar, and fatigue. To best mitigate these hazards, the team will have proper PPE, communication the ability to rely on their team members for teamwork, and be able to have sufficient rest time. The proper PPE for this stage in construction are long sleeves, long pants, eyeglasses, steel-toed work boots, and glove. When mixing concrete, it is important to wear a mask or bandana to prevent inhalation of cement dust.

During sag setting, the safety manager will stress that only the required personnel be present. Sag setting requires education and awareness of winch safety, identification of danger zones, and damp redundancy. An in-depth safety meeting will be conducted between all parties to explain why this construction day has extreme potential for serious accidents.

When it comes to fall protection, as long as any member on site is above 6ft they must be ties off to meet OSHA requirements. Any member who is going to be on the cables as decking commences must be tied off properly in a harness. During decking students, community members, and masons are presented with fall hazards, pwoer tool hazards, and fatigue. To mitigate these hazards proper training is essential when it comes to power tool handling, falling protocol, communication among the worksite, and sufficient rest time. The team will have a fall rescue plan in order in case someone falls during decking. This hazard needs to be mitigated because falling can lead to hitting your head on the cables or decking, losing consciousness, losing the ability to move, and hazards during the actual rescue itself. The fall rescue has different protocol for different incidents. These plans are as follows:

1. Self-rescue

   - if the fallen team member is still conscious the safest option is to remain calm and pull themselves back up to the deck. This minimizes the risk for other team members as well.

2. Assisted self-rescue with a rope system

   - if self-rescue is not an option due to any reasons, another team member will assist and rescue the fallen member. This will call for a team member to stand as close as possible to the fallen member while having both feet on the finished deck and providing a rope to allow the fallen member to swing themselves to safety.

3. Unconscious rescue with a rope system

   - If the person is unconscious, a rope ladder system will need to be implemented. A rope ladder will be connected to the cables, allowing team members to reach their fallen team member and bring them to safety.

Another hazard that is unique to our site is the lack of access to the left side of the site. This site has an additional hazard of transporting heavy materials, such as rock, cement, etc without a pre-existing route. The community has recently set up a cable that runs from the right side to the left side to pass the material pictured in figure 1 below. They have already begun the transportation of the aggregate and rocks on to the left side via the cable. This also brings up the hazard of people crossing from the right side to the left side of the site. This will be mitigated by crossing the river at a path about 200 meters away from the proposed bridhe site. The communty has a path that crosses the river where the waer level seems to be the lowest. The water level for the time period of construction will be extremely low, it is currently below knee level and has a tendency to stay this way until September. In figure 2 one can see richar crossing the river using this path. Some other requirements the team is planning on implementing once on site are:

1. No one is to cross the river while they are alone

2. Designate one loation that everyone will use as a crossing point

3. Tie a rope across the river at the designated crossing point to hold on to

4. The water level will be checked by the safety manager, alongside a community member, each morning before anyone crossed the river

   (a) if water levels rise the safety manager will suspend work on the left side until levels become safely passable.

Quality Control and Hold Point Sign Off

In regards to hold points Sam, the certified Bridge Corp member, will sign-off. Richar will also be on site to oversee some of the hold points before Sam arrives on site. Such as the site layout, tower construction and anchor construction.

The Quality Control Manager, Dan, is responsible for being familiar with QC forms and hold points and will be the person in charge of checking the quality of work done throughout construction. Dan will also be responsible for taking as-builts construction photos and as-built measurements throughout the construction process. Dan will also shadow the Bridge Engineer, Richard as he takes as-built measurements and complies red-line documentation of the design changes. the entire university travel team will be responsible for completing the Post-Travel report and Dan will be responsible for the QC photo list from the university Binder Field Guide and "red line" documentation of design changes. Dan will also be in charge of ensuring that everyone on site is properly trained when it comes to concrete mixing. He will emphasis the importance of being consistent with the ratios of the mix regarding water, aggregate, and cement.

References

Tennekes, H. and Lumley, J. (1972). *A First Course in Turbulence.* MIT Press, Cambridge, Mass.