

Pre-requisite learning

The EDB application allows you to create pages containing text, equations, tables and charts in plain text files. The application then builds a complete web site, including navigation links and SEO components. The application also allows the site to be published to a beta URL and production URL.

Basic commands

The EDB application is a set of **command line** Python programs. The directory structure within the application is critical, as the application programs infer how the web site should be constructed by how you've arranged and named your text files in the `/source` directory. You will not need to know anything about the Python programming language to use the EDB - only which commands to invoke to build, view, and publish the web site as you work. Details on these commands are explained below. If you are completely new to using the command line, please take a look at the following tutorial to familiarize yourself with the command prompt in Windows. The relevant command you will need to understand is `cd` - all other file and folder manipulation will be done through your text editor (VSCode) - which is discussed below.

[Basic Command Prompt Tutorial](#)

Getting the Application

The application consists of many folders and files. In order to allow multiple people to work on the EDB content, and for continued application development, the EDB is managed through a `git` repository. `git` is a platform that allows for very powerful version control - it tracks changes and allows you to "commit" them and "push" your changes to a central repository so others can always see the latest work.

Git needs to be installed on your machine. You can download it [here](#)

We will not be using many features of `git`, and since the number of people editing the EDB content will somewhat limited, it will be rare for you to need any advanced knowledge of how git works.

The initial step is to create a Github account - this website is the central repository for the EDB, and it is a private repository - you will need to be granted access before moving forward. Create your account [here](#), and contact me (sfrees@intelliquip.com) for access.

Once you have access, open the Command Prompt and use the `cd` command to navigate to the directory you want to put the EDB application in. For example, create a directory called `C:\projects\`, and navigate the command prompt there by entering `cd C:\projects` at the command prompt.

Next, clone the repository with the following command:

```
git clone https://github.com/freezer333/hi-edb.git
```

This will create a directory called `hi-edb` under your `C:\projects` directory.

Later, as you begin to make changes to the EDB, you will need to use `git` to commit your changes. The details of this is covered below in the "Version control with `git`" section.

Text Editor - Visual Studio Code

While any text editor is suitable for creating the EDB content, you should use something geared towards programming, to avoid character encoding problems. You may download and install this [here](#).

Once installed, you can open the `hi-edb` directory. **Important** - to develop content, you will *only* make edits and additions to the `/source` directory. The other directories contain application code (which you should not edit) and output artifacts (`/build`) that is content the application generates for publishing the site.

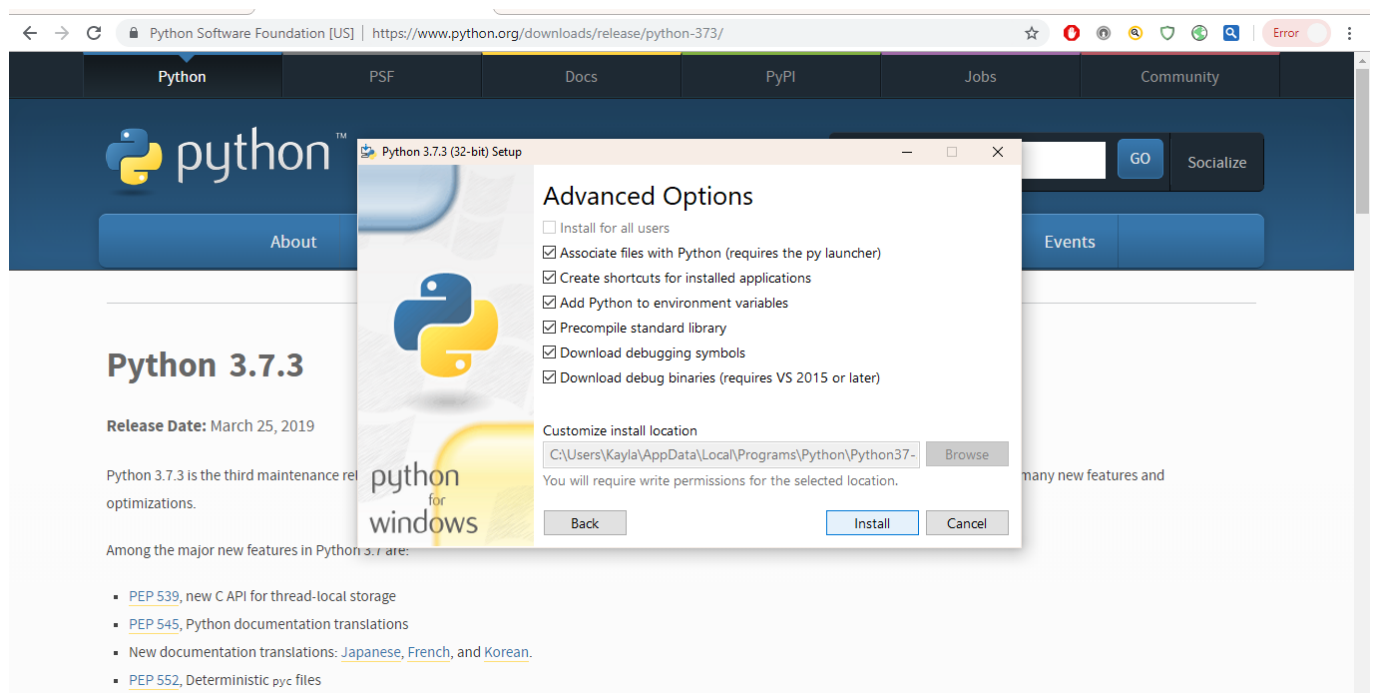
Visual Studio Code allows you to open a folder - `hi-edb` - which is the most efficient way of working. This will give you a side panel on the left side of the screen that you can use to navigate and open any file in the directory structure. Under the `/source` directory, you should see folders like `01_system-curves` and a number of `.md` files - among other types. As will be explained below, you will do all of your work by creating and editing `.md` text files and `.csv` data files (for tables and charts).

Python Setup

To build EDB content, you will need Python installed, and you will need to install a series of dependencies.

Download and install Python version 3.7 or above [here](#)

During installation, make sure you add Python to your path, and check off the following options:



After you install Python, close the Command Prompt (if you already have it open) and re-launch it. Navigate to into the `hi-edb` directory using the `cd` command (`cd C:\projects\hi-edb`).

Next, execute the following commands one by one. There are dependencies for the EDB application itself. The `pip3 install` commands will contain a good deal of output - please make sure each completes successfully.

```
pip3 install virtualenv
python3 -m venv env
```

```
source env/bin/activate

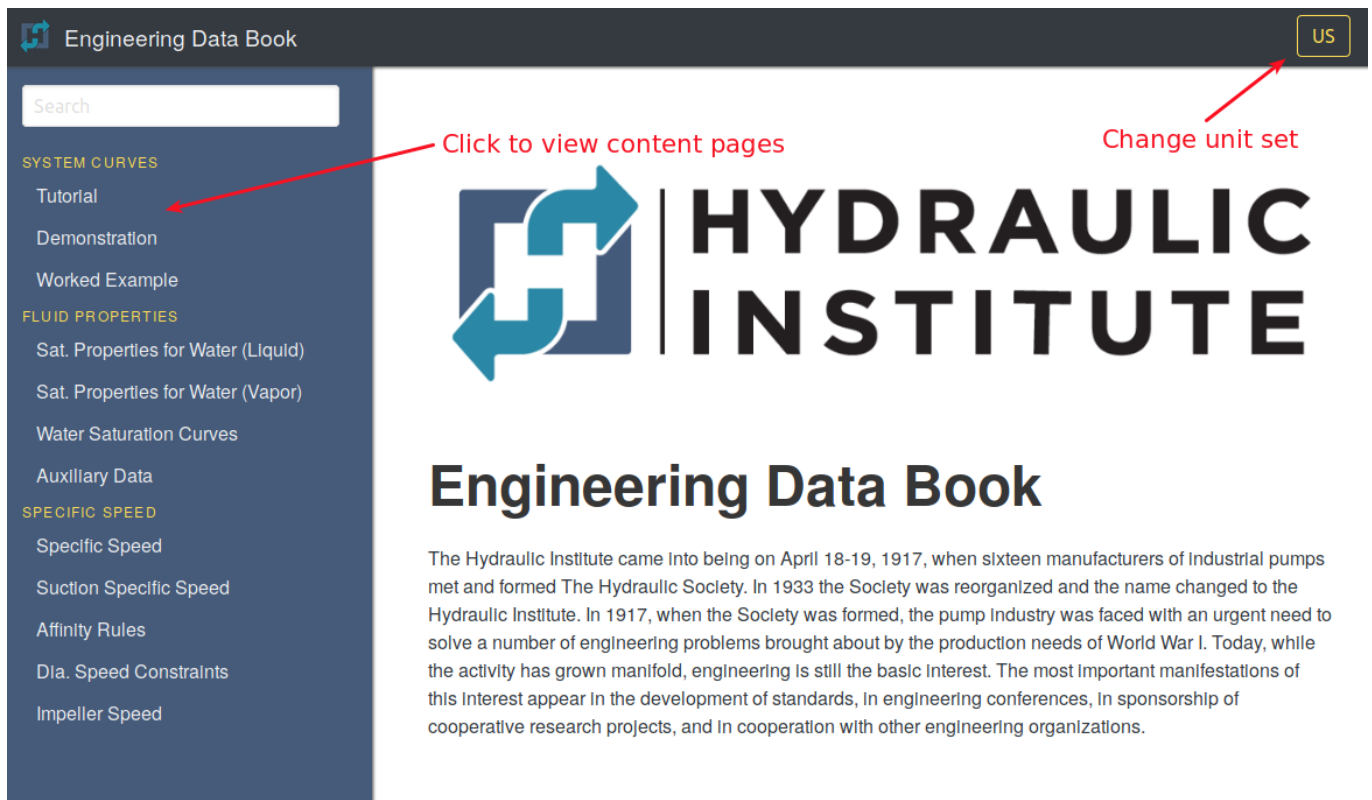
pip3 install Jinja2
pip3 install lesscpy
pip3 install Markdown
pip3 install watchdog
pip3 install htmlmin
pip3 install awscli --upgrade --user
pip3 install s3-deploy-website
```

There is already content in the EDB, so as a quick check that you have everything setup correctly on your machine, issue the following command:

```
python3 serve.py
```

This builds the EDB content and launches a web server locally on your machine. The functionality of this tool is described in more detail later in this readme, but for now, open a web browser and navigate to <http://localhost:8081>.

You should see the web site:



Creating Content

All content is created in the `/source` directory. The contents of the directory include a top level `index.md` which is the home page of the site, and directories which define the section structure of the EDB. Each

directory will contain additional `.md` files which become HTML pages, along with additional data like images and csv file to support the pages. **Sub-directories in sections are not supported.**

Metadata

Each content page, along with index.md files in each directory, contain meta data sections that define basic properties of the page/section to be created. At the very least, each `.md` file will have a title - which will be what is used to identify the content on the HTML page.

```
-----  
title:  Pump Info  
-----  
  
... the page content ....
```

All metadata must appear at the top of the file, and the metadata is sectioned off from the rest of the page content with a sequence of 5 dashes `-----`, and closed with the same 5 dashes.

The following metadata attributes are supported:

- **title** - title of the page to appear in the table of contents
- **author** - optional text to indicate who wrote the page. Will be injected at the end of the page.
- **date** - optional date of last update.

Directory (Topic Headings)

Each directory **must** include a `index.md` file. This file must include a meta data entry, but no additional content. The meta data should at least include the title.

Note that each directory is prefixed with a number (i.e. 03_specific_speed). The naming convention is used to define the order of the sections in the table of contents. You can change the ordering simply by changing the directory names and rebuilding.

Page ordering within sections

The EDB is arranged in a hierarchy of topics. Folder structure under the `/source` directory is used to arrange the hierarchy, however the order of pages within the same directory is determined by alphabetical order.

Note - this is why the actual page title is always included in the metadata section discussed above. **The recommended way to create individual pages is to prefix their filenames with a number** - ensuring the order of the pages is always clear.

For example, the main topic "System Curves" has three pages within it - "Tutorial", "Demonstrator", and "Worked Example". To ensure that the pages appear in the given order, you would arrange the folder structure as follows:

```
source  
---- index.md
```

```
---- 01_system-curves
| -- index.md
| -- 01_tutorial.md
| -- 02_demonstrator.md
| -- 03_worked-example.md
```

The `index.md` entry at the root of the directory structure is the front page of the EDB, and contains standard markup. While it must have a meta data block, it is not necessary to place any values in it. See the current `index.md` for detail.

Within sub-directories, which represent sections of the EDB, the contents of `index.md` contains the true title of the section:

```
----
title: System Curves
----
```

The prefixes 01, 02, 03 ensure the topics held under System Curves appear in the correct order. Their page titles will be derived from their metadata block. For example - within `03_worked-example.md`:

```
----
title: Worked Example
date: April 16th, 2019
author: Scott Frees
----
```

Note that `date` and `author` are optional. If you add them, they will appear at the bottom of the page.

Directory and File Naming

As described below, the title of directories and pages that *users* see in their browser is **not** determined by the file / directory names you create in the `source` directory - the public facing names are defined in the metadata blocks within the directories and files.

It is absolutely critical that DO NOT INCLUDE spaces in the names of your files or folders.

Likewise, **DO NOT use underscore characters _ anywhere in the file or directory name** OTHER than to separate the numeric prefix used to order the pages.

For example, the following are all valid folder or file names:

- `01_system-curves`
- `01_SystemCurves`
- `01_systemcurves`

The following **are not valid names**, and will result in build failure

- `01_system_curves` (multiple underscores will lead to malformed URLs)
- `01-system-curves` (an underscore should always separate the ordering prefix)
- `01__system-curves` (multiple underscores will lead to malformed URLs)
- `01_system curves` (spaces between words will create invalid URLs)

You are highly recommended to follow the standard URL **slug** notation - which uses all lower cases, an separates words using a single dash - character. While not absolutely necessary, following this convention is known to improve search engine optimization. You should make every effort to make the names of your directories and files be short, clear, and consistent - **they will be used to build URLs for your pages**.

Section / Topic Nesting

The EDB is meant to be easily navigated. Sections (directories) may have files (topics) in them - but no sub-directories. Thus, the EDB consists of sections, which have several topics. Each topic page can contain headings and sub headings - but there is no ability to create nested sections/pages.

This choice was made to ease navigation, and also to ensure each topic page can have adequate detail. It is critical for SEO to ensure the EDB has long content - not a series of very short pages.

Page Content

All pages can contain general text. Text is entered using Markdown, a simplified syntax for HTML.

Text

Regular text is entered using Markdown, which is a very simple way of entering text that can later be transformed into HTML by a program.

Markdown Basics

Markdown is just text - but it also lets you describe when certain parts of text should appear as headings, in **bold** and *italics*, or when links and images should appear in the text.

The following is a Markdown block:

```
# Heading 1
This is BOLD and this is italics. [Here](www.google.com) is where
you can find out more.
A list:
- Thing 1
- Thing 2
And a numberd list
1. Thing 1
2. Thing 2
1. Thing 3 (notice you don't need correct numbers...)
```

It is rendered like this:

Heading 1

This is **BOLD** and this is *italics*. [Here](#) is where you can find out more. A list:

- Thing 1
 - Thing 2 And a numberd list
1. Thing 1
 2. Thing 2
 3. Thing 3 (notice you don't need correct numbers...)
-

See the following resources for additional information:

- <https://commonmark.org/help/>
- <https://www.markdownguide.org/cheat-sheet>
- <https://www.markdowntutorial.com/>

You can also use the existing content as examples to learn how to create the content.

Units of Measure

The application allows a user to switch between US customary units and metric units. Tables and Charts (see below) can be created with both data sets, and the application will display the data according to the current unit set.

There are situations where you will be placing quantity data within text itself, and you might want that text to reflect the current unit set as well. This is supported through an extension HTML element - **units**. As markdown supports HTML elements embedded in text, you may place these elements directly within any flowing text. You will supply **us** and **metric** text - which typically would be the quantity and the unit label - and the app will automatically display the correct text based on the current unit set.

Example The Fluid Property section has an Auxiliary Data page, which displays Enthalpy reference state. You can see this implemented using the **units** element, embedded right into the markdown text.

```
H = <units us = "19771.296093 Btu/lb-mole at 80.3 F and 0.15 psia"
metric="2551.013479 kJ/kg at 26.9 C and 0.010 bar."/>
```

Note that no actual unit conversion are ever being done by the app - you are responsible for adding the text for both unit sets.

Supscripts and Superscript

Markdown allows HTML elements to be embedded into text content. In order to use subscripts and superscripts (outside of LaTeX formulas - see below), you can simply use the associated HTML elements.

Here is some sample Markdown text with superscript:

Using the combined frictional loss equation above, we can determine the head loss (in feet) as a function of velocity (in ft/sec²).

Here is some sample Markdown text with subscript:

The US customary symbol N_{SS} is sometimes used to designate suction specific speed.

Note - any HTML element can be used within Markdown - if you are not familiar with HTML, you might want to read up on some of the elements.

<https://www.w3schools.com/tags/>

It is best to use as few of these as possible however - you should only use HTML elements when there is no equivalent Markdown support. **Do not use HTML to support alternative page layouts and styling** - this may cause conflicts with the way the rest of the site is auto-generated.

Formulas / Equations

All pages can contain blocks for equations, which are entered in LaTeX and automatically typeset when the EDB is built. All equations are block elements - meaning they occupy their own vertical real estate on the screen.

Mathematical formulas are not very well supported by HTML - so we need an alternative method of defining them such that they are rendered to the screen correctly. We use LaTeX to do this.

LaTeX formulas are supported via a *custom extension* to markdown syntax. To include LaTeX equations, the LaTeX line must have a `=+=` on the line preceding and after it. The actual LaTeX text must have `$$` at the beginning and end of the line as well.

For example:

```
=+=
$$ \Delta h_f = \{ \{fL \over D\} * v^2 \over 2g\} $$
=+=
```

The block will compile and be typeset as the following:

$$\Delta h_f = \frac{\frac{fL}{D} * v^2}{2g}$$

About LaTeX

LaTeX is a typesetting language used in many scientific and engineering fields, primarily where technical and mathematical text appears in publication. For the EDB, we are only using a very small subset of the language - the part that describes mathematical equations.

You may find the following links instructive - however remember that there is a lot more to LaTeX than what you need for EDB development.

- <http://www.personal.ceu.hu/tex/cookbook.html>
- <https://en.wikibooks.org/wiki/LaTeX/Mathematics>
- <https://www.youtube.com/watch?v=DvDO1mea1w0>

Tables

All pages can contain blocks for tabular data. Tabular data is entered into the EDB by supplying CSV files, and referencing them within the page. If the data table has US and Metric values, two CSV files can be specified, and the platform will select the correct one based on the chosen unit set of the user.

Important - while HTML supports tables, using them directly will be extremely error-prone, and you will not be able to take advantage of the unit conversions and formatting that the EDB will give you.

Instead, tables are supported via a *custom extension* to markdown syntax. To include a table, you must define a `=|=` line, followed by meta data describing the table, and finally end the block with an other line containing only `=|=`.

For example:

```
=|=
title: Data Points
data-us: datapoints_us.csv
data-metric: datapoints_metric.csv
=|=
```

The block above would create a table in the page titled "Data Points". The `data-us` and `data-metric` lines in the meta data block point to a CSV file containing the data. Alternatively, if the table does not need to support units, then you may specify a `data` value instead of the `us` and `metric` variants.

Remember, CSV files are not Excel files - which end in a .xlsx extension. While it is convenient to edit CSV files in Excel, you must always remember to save as CSV (which have a .csv extension). When opening a CSV in VSCode or whatever Markdown editor you are using, you will clearly see that CSV means "common separated values". CSV files are just straight text files, with rows on each line, columns separated by commas.

The CSV files do contain additional meta data to provide the platform information about how to format the table (or chart, see below). This metadata appears in the first row and first column.

Always leave the first column of the first row empty.

Column Meta Data - First row

The first row contains meta data to describe the column data. Each column, except the first column, should contain one of the following:

- **text** - the column data will be formatted as standard text
- **numeric** - the column data will be formatted as a number. *Note, the application does not handle specifying decimal places - whatever is written in the CSV file is displayed to the user.*

Row Meta Data - First column of every (other) row

The first column of every row in the CSV file should always contain the following:

- **heading** - The row contains headings. Multiple heading rows are permitted, and will appear in the order they are specified.
- **data** - The row is interpreted as standard data - not a heading.

Example

Consider the following CSV file, created in Excel.

	A	B	C	D	E	F	
1		text	numeric	numeric	numeric		
2	heading	Example	Flow Rate gpm	Velocity ft/sec	Head Loss feet		
3	data	ABC	0	0	265		
4	data	DEF	20	0.504	265		
5	data	GHI	40	1.008	266		
6	data	JKL	60	1.512	268		
7	data	MNO	80	2.016	270		
8	data	PQR	100	2.52	273		
9	data	STU	120	3.024	276		
10	data	VWX	140	3.528	280		
11	data	YZZ	160	4.032	285		
12	data		180	4.536	290		
13	data		200	5.04	296		
14	data		220	5.545	303		
15	data		240	6.049	310		
16	data		260	6.553	317		
17	data		280	7.057	326		
18	data		300	7.561	335		
19							

When properly saved, it would appear as a plain text file in a coding editor:

```
,text,Number-0,Number-3,Number-0
heading,Example,"Flow Rate
gpm","Velocity
ft/sec","Head Loss
feet"
data,ABC,0,0,265
data,DEF,20,0.504,265
data,GHI,40,1.008,266
data,JKL,60,1.512,268
data,MNO,80,2.016,270
data,PQR,100,2.52,273
data,STU,120,3.024,276
```

```
data,VWX,140,3.528,280
data,YZZ,160,4.032,285
data,,180,4.536,290
data,,200,5.04,296
data,,220,5.545,303
data,,240,6.049,310
data,,260,6.553,317
data,,280,7.057,326
data,,300,7.561,335
```

Notice the leading comma - this is because the first column on the first row is blank. In this case, the first row defines the first column as text data, and the other three as numeric data - which is displayed differently in the HTML.

Each subsequent row is either a heading or data.

Charts

```
=/=
title: Data Points
data-us: datapoints_us.csv
data-metric: datapoints_metric.csv
x: 2
series: 4, 3
=/=
```

Images

Images are supported naturally by Markdown. Images can be placed in the same directory as the page, or in a central `/image` directory. The links you enter will be resolved as a relative URL. External images can also be used using an absolute URL (not recommended).

For an image that is saved in the same directory as the text content you are developing, you can use the following syntax:

```
![System Curve](./system-curves-001.png "System Curve")
```

By default, the image will appear on the output page at its native size. It's recommended to use image editing software to change the dimensions of all images to the size that best suites the page you are writing. If you need to specify alternative image dimensions however, you may use standard HTML rather than the Markdown syntax. The following would force the image to be 50x200 pixels on the screen.

```
<img src='system-curves-001.png' width='50' height='200' />
```

For images that are going to appear on many pages, in different sections, a good option is to store the image in the `/images` directory, rather than in a section directory (or multiple section directories). You can place any image in the `/image` directory, and reference it from any page like this:

```
![Hydraulic Institute](/images/hi.jpg "Hydraulic Insititute")
```

Note that the image path begins with `/image`, which creates an absolute URL to the image in the output.

Finally, if you need to link to an external image, not within the EDB, you can use a full URL like so:

```
![Hydraulic Institute]  
(http://www.pumps.org/images/HI/HI_logo_web_250px_wide.jpg "Hydraulic  
Insititute")
```

Linking to external images is not recommended - we have no control over whether or not that image stays the same over time, or is always available.

Internal Links

When linking to other pages within the document, you must provide the non-prefixed file name, with a `.html` extension, using standard Markdown link syntax.

For example, a page linking to the Worked Example page under "System Curves" would contain a link to `/system-curves/worked-example.html`. While that link will work globally, throughout the EDB (since it starts with a `/`), you may also use relative links. For example, if you were linking to Worked Example under System Curves, from the System Curves Tutorial page, you caould simply link to `tutorial.html`. If linking to Worked Example from another section (i.e., a page under "Specific Speed"), you could also use `../system-curves/worked-example.html`.

External Links

External links follow standard Markdown link syntax. Often, links to external sites should open in a new browser tab - to keep the user on the EDB page. Markdown does not support this, in this case you should include the actual HTML markup - which will be honored by the system. The following text, written within the page's markdown text, will open example.com in a new browser tab/window:

```
<a href="http://example.com/" target="_blank">example</a>
```

Sales Links

Hydraulic Institute offer seminars, courses, books, and resources that deliver added value to readers of the EDB. It is likely that links to these products will be embedded within topic pages. We haven't decided yet how this will be done - the simplest method is just using external links - however there may be more details to follow.

Interactive Demonstrators

Some pages within the EDB will be interactive applications - allowing users to get a better understanding of a particular topic. These interactive application pages will be created by software developers using JavaScript.

Auto-Generated Content

There are several features of the EDB web site that are created automatically. These features will continue to be developed - however these enhancements will not require any content changes.

Cross-Links

Within each section (directory), links appear at the bottom of each topic page to all other pages within the same directory. These links are automatic, and cannot be changed - however you may also elect to link to other pages from within the page content using the strategy defined above in "Internal Links".

Search

All text content you create in the topic pages is indexed and made available to the search functionality. Users can perform a fuzzy text search to find different topic pages by keyword.

PDF Document

A PDF version of the EDB will be generated from the same content as the web site. This feature is not yet complete.

EDB Management

To build, view, and publish the EDB, you will need to invoke Python programs. Before doing anything, always make sure you open the Command Prompt, navigate into the `hi-edb` directory, and issue the following command:

```
source ./env/bin/activate
```

If you fail to do this, the commands will error out.

Local Preview

All work should be done from within the `source` directory. While you can build the EDB HTML site manually, the easiest way to do your development is to execute the following command from the root project directory:

```
python3 serve.py
```

This script automatically builds the EDB, and monitors file changes in the `source` directory. Any time you save a modification, the EDB is automatically rebuilt.

The file system monitoring is not perfect. When creating new files, for example, it is possible the `server.py` script will fail, as it will attempt to generate the site from partial / empty files. If this happens, type Ctrl+c a few times to kill the script, and re-launch it when ready to view.

The EDB is always built to the `build` directory. The files contained there are suitable for viewing with a web browser - *but you shouldn't open them directly* by clicking on them. **Instead, the `server` script also launches a local web server** so you can view the built EDB in your web browser exactly as if it is deployed.

To view the EDB while you are developing, got to <http://localhost:8081>. While the EDB is automatically rebuilt whenever any source files change, **you must click the refresh button on your web browser to see the changes.**

Version control with `git`

Keeping up to date

Before you begin working on the EDB each day (or more frequently), it is a good idea to ensure you have the latest content and application code. This may include bug fixes to the application, feature enhancements, or additional content created by others. To get up to date, issue the following command:

```
git pull origin master
```

In most cases, this command will work without issue. Any changes made by others will be automatically merged into your workspace. If you have failed to commit your own changes for a while, or if someone is working on exactly the same content as you are (unlikely!), you may get merge conflicts. If so, you can either take care of these your self - or ask a developer for assistance.

Here are some helpful links on using git from the command line, and dealing with merges in VS Code:

- <https://git-scm.com/docs/git-merge>
- <https://code.visualstudio.com/Docs/editor/versioncontrol>

Note we will not use branches - we will do all work in `master`. You can safely disregard branch discussions in these resources - these are features of `git` used in more complex situations.

Adding your changes

Whenever you've completed a chunk of work (for example, complete a page), it is important to commit your changes and push to the central repository. Doing this regularly dramatically reduces the chances of merge conflicts. **Please make sure you do this!**

First - make sure there are no new changes available

```
git pull origin master
```

This will make sure you don't try to push your changes overwriting changes someone else has made while you were working.

Next, you must add your changes to git. Do this by entering the `hi-edb` folder with the command prompt and issuing the following command:

```
git add .
```

Next, you commit the changes, adding a message to describe your changes:

```
git commit -m "Completed suction specific speed page"
```

The first time you run this command, you may be asked to identify yourself to git. If so, enter the following commands (using your own name and email!)

```
git config --global user.name "Mona Lisa"  
git config --global user.email "mlisa@pumps.org"
```

Finally, you must push your changes to the central repository.

```
git push origin master
```

Once that completes successfully, you can go back to working on other things.

Hosting

The HI EDB is deployed to an Amazon S3 bucket, and served to the public internet from there.

S3 Configuration

The following is only necessary once, to setup Amazon S3 - it is documented here for historical purpose

- Create bucket - named `hi-edb-beta`
- Region: US East (N. Virginia)
- Next
- Next (default configuration options)
- Set Permissions: Uncheck Block all public access

After creating the bucket, click on it from the list. Click on the Bucket Policy and add the following:

```
{  
  "Version": "2012-10-17",  
  "Statement": [  
    {  
      "Sid": "PublicReadGetObject",  
      "Effect": "Allow",
```

```
        "Principal": "*",
        "Action": [
            "s3:GetObject"
        ],
        "Resource": [
            "arn:aws:s3:::hi-edb-beta/*"
        ]
    }
]
```

Go to properties, and then Static website hosting. Enable web hosting on the bucket.

Setting Credentials

Before being able to deploy, you must setup HI's amazon credentials on your machine. **You will be given credentials separately, please do not check the credentials into any files within this project for security purposes.**

```
aws configure
AWS Access Key ID [*****]: <enter access key>
AWS Secret Access Key [*****]: <enter secret key>
```

Deploying to Beta

Execute the following from the command line

```
python3 beta.py
```

The live (beta) page will be here: <http://hi-edb-beta.s3-website-us-east-1.amazonaws.com/#/>.

Deploying to Production

Production deployment requires a few more steps than beta, because we use Amazon Cloudfront to reduce response time. In addition, we use build flags to use compressed versions of the site to further increase response time.