LAB1 - EnglishPal Dependency Analysis and Dependency Graph

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Introduction

EnglishPal is a website application dedicated to helping people improve their English. This lab study help us understand the current health level of the architecture of EnglishPal.

Materials and Methods

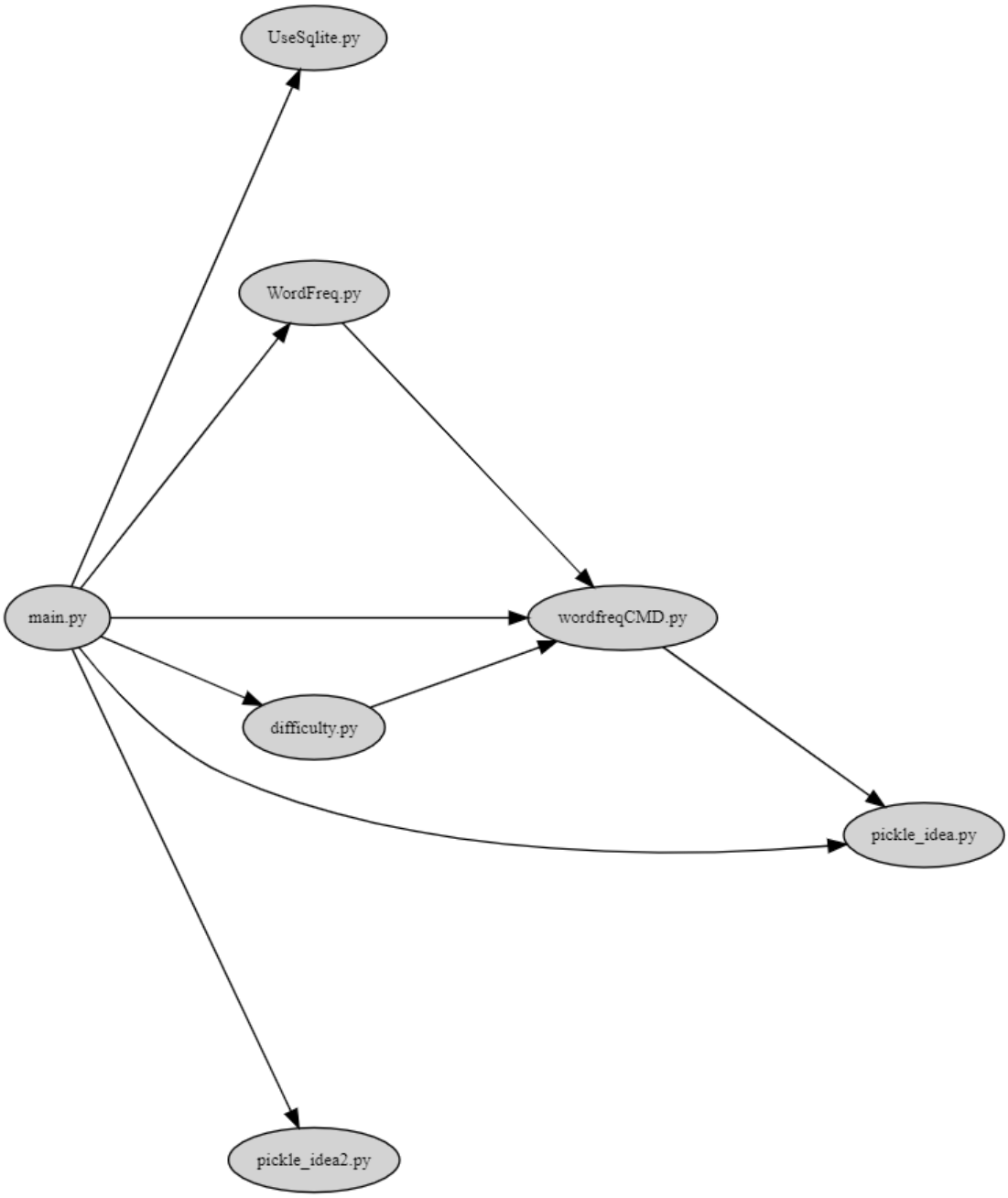
The module-level dependencies are captured by snakefood, and the class/function-level dependency graph for EnglilshPal is hand-drawn and can be plotted by Mermaid.

Results

1. EnglishPalModule.dot:

```
strict digraph "dependencies" {
    graph [
            rankdir="LR",
            overlap="scale",
            size="8,10",
            ratio="fill",
            fontsize="16",
            fontname="Helvetica",
            clusterrank="local"
         ]
        node [
            fontsize=10
            shape=ellipse
            // style=filled
            // shape=box
        ];

"UseSqlite.py"  [style=filled];
"WordFreq.py"  [style=filled];
"WordFreq.py" ->
"wordfreqCMD.py";
"difficulty.py"  [style=filled];
"difficulty.py" ->
"wordfreqCMD.py";
"main.py"  [style=filled];
"main.py" -> "UseSqlite.py";
"main.py" -> "WordFreq.py";
"main.py" -> "difficulty.py";
"main.py" -> "pickle_idea.py";
"main.py" -> "pickle_idea2.py";
"main.py" -> "wordfreqCMD.py";
"pickle_idea.py"  [style=filled];
"pickle_idea2.py"  [style=filled];
"wordfreqCMD.py"  [style=filled];
"wordfreqCMD.py" ->
"pickle_idea.py";
}
```



2. class/function-level.txt

```
graph LR

load_freq_history -->pickle_idea.load_record
verify_user --> Sqlite3Template.RecordQuery
add_user -->Sqlite3Template.InsertQuery
check_username_availability -->
Sqlite3Template.RecordQuery
get_expiry_date -->Sqlite3Template.RecordQuery
get_today_article --> Sqlite3Template.RecordQuery
get_today_article --> load_freq_history
get_today_article --> difficulty.get_difficulty_level
get_today_article --> user_difficulty_level
get_today_article -->random.shuffle
get_today_article -->random.choice
get_today_article --> text_difficulty_level
get_today_article --> within_range
get_today_article --> get_answer_part
mark_word --> load_freq_history
mark_word --> pickle_idea.dict2lst
mark_word --> pickle_idea.merge_frequency
mark_word --> pickle_idea.save_frequency_to_pickle
mainpage --> WordFreq
mainpage --> load_freq_history
mainpage --> pickle_idea.dict2lst
mainpage --> pickle_idea.merge_frequency
mainpage --> pickle_idea.save_frequency_to_pickle
mainpage --> pickle_idea.dict2lst
user_mark_word --> load_freq_history
user_mark_word -->pickle_idea2.dict2lst
user_mark_word -->pickle_idea2.merge_frequency
user_mark_word -->pickle_idea2.save_frequency_to_pickle
userpage --> WordFreq
userpage --> pickle_idea.load_record
userpage --> load_freq_history
userpage --> sort_in_descending_order
signup --> check_username_availability
signup --> render_template
signup --> add_user
signup --> verify_user
login --> render_template
login --> verify_user

difficulty.load_record --> pickle.load
difficulty.difficulty_level_from_frequency --> math.log
difficulty.get_difficulty_level --> revert_dict
difficulty.get_difficulty_level -->
sort_in_ascending_order
difficulty.text_difficulty_level --
>sort_in_descending_order

pickle_idea.merge_frequency --> pickle_idea.lst2dict

pickle_idea2.merge_frequency --> pickle_idea2.lst2dict

Sqlite3Template.do --> Sqlite3Template.connect
Sqlite3Template.do --> Sqlite3Template.instructions
Sqlite3Template.do --> Sqlite3Template.operate
```

graph LR load_freq_history -->pickle_idea.load_record verify_user --> Sqlite3Template.RecordQuery add_user -->Sqlite3Template.InsertQuery check_username_availability --> Sqlite3Template.RecordQuery get_expiry_date -->Sqlite3Template.RecordQuery get_today_article --> Sqlite3Template.RecordQuery get_today_article --> load_freq_history get_today_article --> difficulty.get_difficulty_level get_today_article --> user_difficulty_level get_today_article -->random.shuffle get_today_article -->random.choice get_today_article --> text_difficulty_level get_today_article --> within_range get_today_article --> get_answer_part mark_word --> load_freq_history mark_word --> pickle_idea.dict2lst mark_word --> pickle_idea.merge_frequency mark_word --> pickle_idea.save_frequency_to_pickle mainpage --> WordFreq mainpage --> load_freq_history mainpage --> pickle_idea.dict2lst mainpage --> pickle_idea.merge_frequency mainpage --> pickle_idea.save_frequency_to_pickle mainpage --> pickle_idea.dict2lst user_mark_word --> load_freq_history user_mark_word -->pickle_idea2.dict2lst user_mark_word -->pickle_idea2.merge_frequency user_mark_word -->pickle_idea2.save_frequency_to_pickle userpage --> WordFreq userpage --> pickle_idea.load_record userpage --> load_freq_history userpage --> sort_in_descending_order signup --> check_username_availability signup --> render_template signup --> add_user signup --> verify_user login --> render_template login --> verify_user difficulty.load_record --> pickle.load difficulty.difficulty_level_from_frequency --> math.log difficulty.get_difficulty_level --> revert_dict difficulty.get_difficulty_level --> sort_in_ascending_order difficulty.text_difficulty_level -->sort_in_descending_order pickle_idea.merge_frequency --> pickle_idea.lst2dict pickle_idea2.merge_frequency --> pickle_idea2.lst2dict Sqlite3Template.do --> Sqlite3Template.connect Sqlite3Template.do --> Sqlite3Template.instructions Sqlite3Template.do --> Sqlite3Template.operate WordFreq.get_freq --> wordfreqCMD.sort_in_descending_order

3. Pros and cons of the current architecture of EnglishPal:

Shortcoming:

1. The addition of the web pages makes the system inefficient to deliver media elements.
2. All the processing tasks are done by the server before the delivery of the content to the client. The server inefficient to handle multiple user requests.
3. Any development change or maintenance costs a lot.

Advantages:

1. Efficient with full-stack, no communication costs between front-end and back-end.
2. Effective for simple and small projects, with simple CRUD and smaller codebase, it's more enough.
3. Higher security, protecting the API from attack.
4. Similar concept and syntax, it helps focusing on project features.
5. It reduces the mistakes in communications.

Discussions

Through this lab we tried to understand the current health level of the architecture of EnglishPal. During the lab, we learnt to use Snakefood, Graphviz Online, Mermaid as well as Read the Docs. Most importantly, we mastered a basic work flow of analysing the structure and the dependency of an existing project which will sure to contribute to the future work.

References

Graphviz. https://graphviz.org/