

Developing a Writing Coach for Knowledge Base Article Writing

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Self Introduction



Steven Coyne



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Major: Natural Language Processing



Research: Writing Assistance, Educational Technology

Background

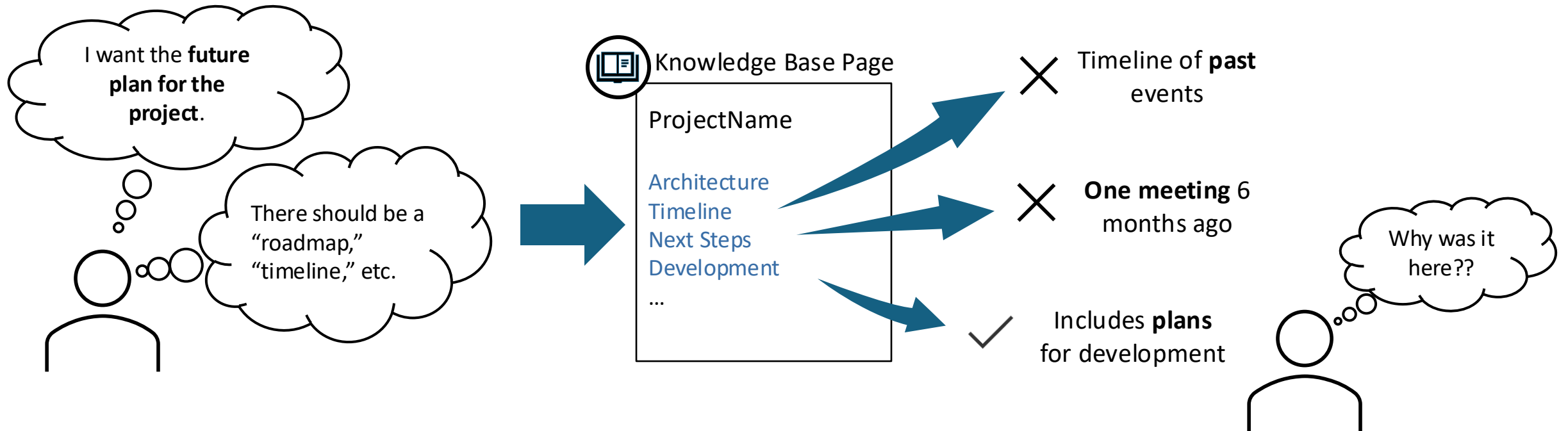
- **Information sharing** is critical in any organization.
- A **knowledge base** can facilitate this.
- Essentially a communication tool between writers and readers.



Background: Challenges

Challenge 1: Organization

- Users have a **mental model** for where information “should be.”
- Writers might not make predictably-organized pages.
- **Result:** Hard to find needed information.



Background: Challenges

Challenge 2: Page Quality

- Pages can be uninformative or confusing.
- **Issues with:**
 - Structure
 - Formatting
 - Detail level
 - Grammar and Spelling
 - etc.
- **Result:** Wasted effort interpreting pages.



Knowledge Base Page

ProjectName

Overview

...

...

Vision

...

...

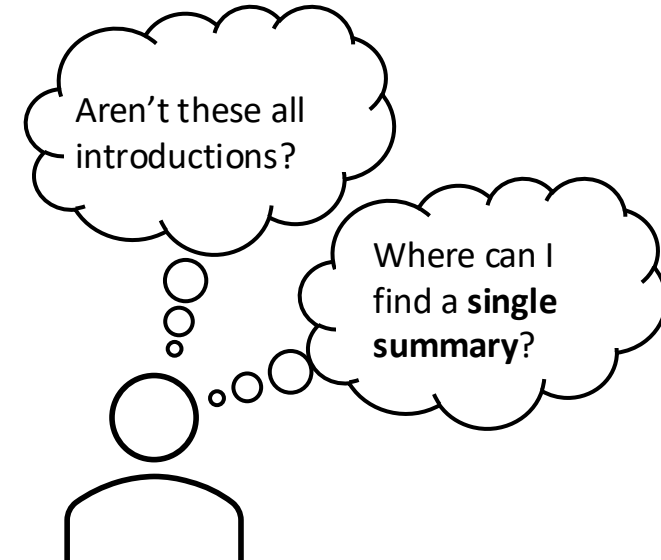
The Project:

Introduction

Goals

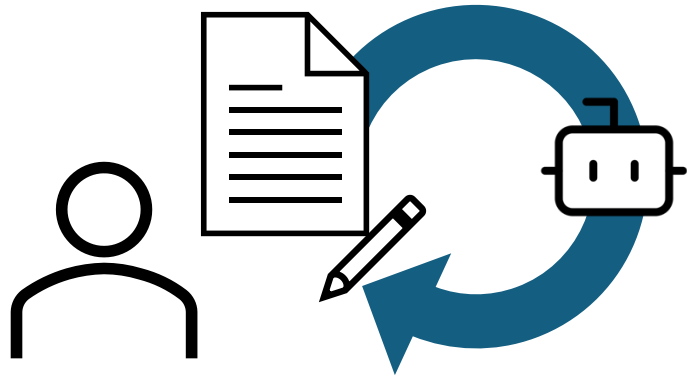
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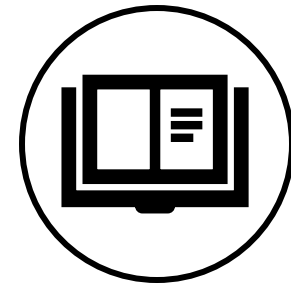
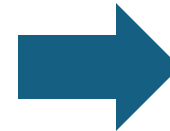
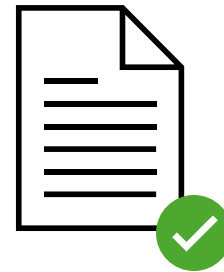
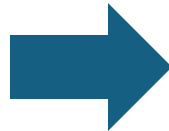


Project Objective

- Make an **AI Writing Coach** to help people write pages.
 - Start by targeting **Challenge 2: Page Quality**
 - Provide **constructive feedback** to:
 1. Improve pages
 2. Build contributor's skills long-term



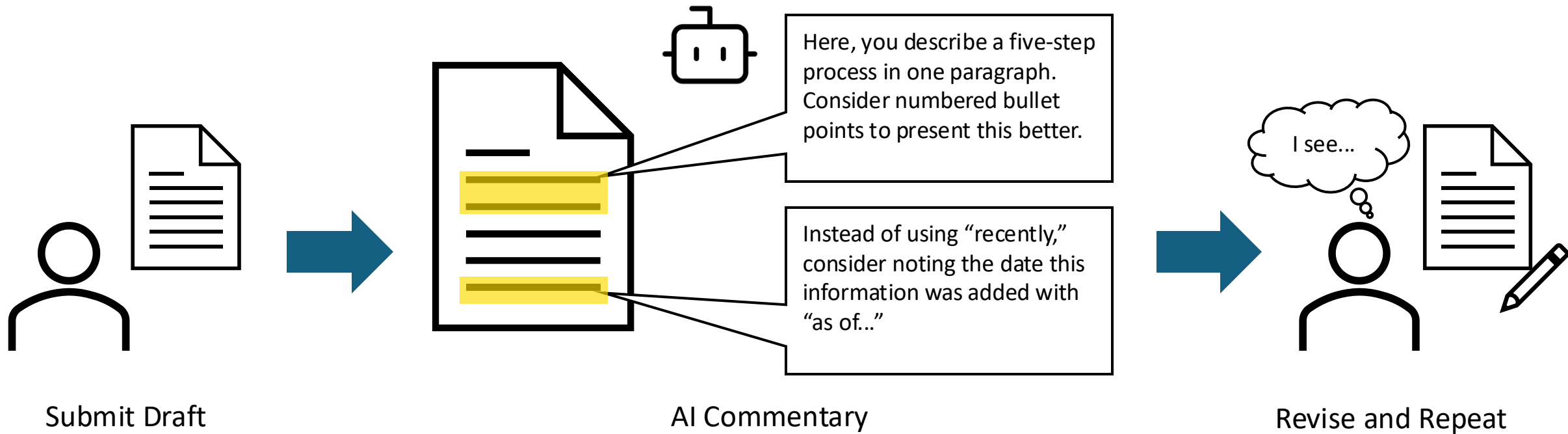
Write with AI Feedback



Submit High-Quality Pages to Knowledge Base

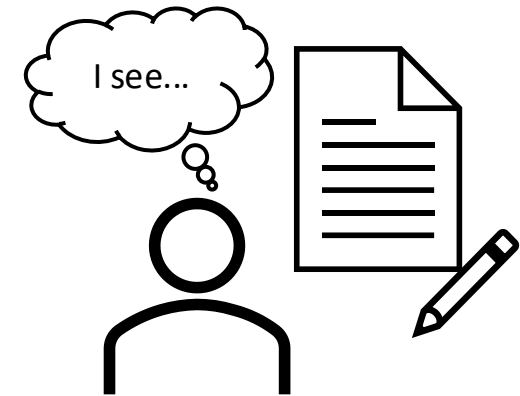
Project Objective: Expected Use

- Users request a review.
- The AI provides **feedback comments**.
- The user reads the comments and may revise the document.



Project Objective: Feedback for Skills Development

- **Existing systems:** Rewrite, summarize, transform, etc.
 - Can improve productivity
 - Users may learn implicitly if the result is good
- **Our System:** More focus on **long-term learning**
 - A "coach" offering constructive feedback
 - Does not implement the suggestions - the human does



Dimensions of Good Writing

We define six dimensions of page writing to assess:

- Clarity and Conciseness
- English Grammar
- Formatting and Visualization
- Professionalism and Collaboration
- Structure and Organization
- Tags, Links, and Connections

Criteria:

- 1) Important in this setting
- 2) Sufficiently distinct

User can choose a dimension to focus on, resulting in different **review types**

- Also: “General” review combining a little of each.

Prompting

- The review type affects the **prompt** and **input**.

Based on review
type

Ex. “Tags, Links and Connections” adds the file tree and set of existing tags to the input:

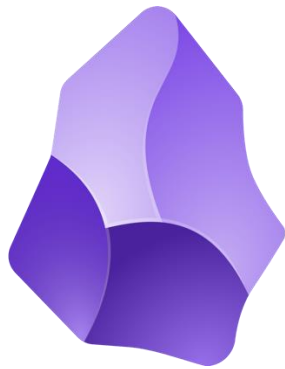
```
Page hierarchy:
Project
  Bugs
    Bug - Users Stuck After Login
    ...
  Meetings
    2024-09-17 Implementation Team MTG
  Roadmap
  Weekly Reports
    2024-09-13 Weekly Report
    2024-09-20 Weekly Report

Set of existing tags used in the knowledge base: [planning, meeting, bug, weekly-report]
```

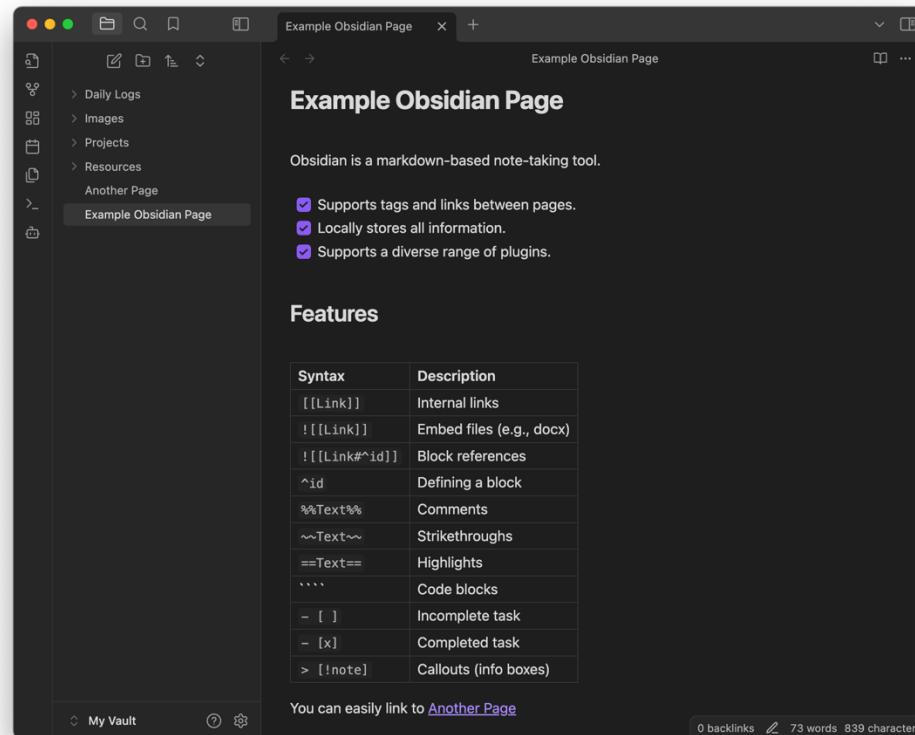
Prompt Component
Role and task intro
Setting
Coaching Guidelines
Feedback Guidelines
Format Instructions
Task Instructions
Input
Reminders

Setting

- For simplicity, this project was implemented in Obsidian
 - **Obsidian:** Markdown-based note-taking application.
 - Manages connections between documents in a graph.
 - Stores everything on local PC.

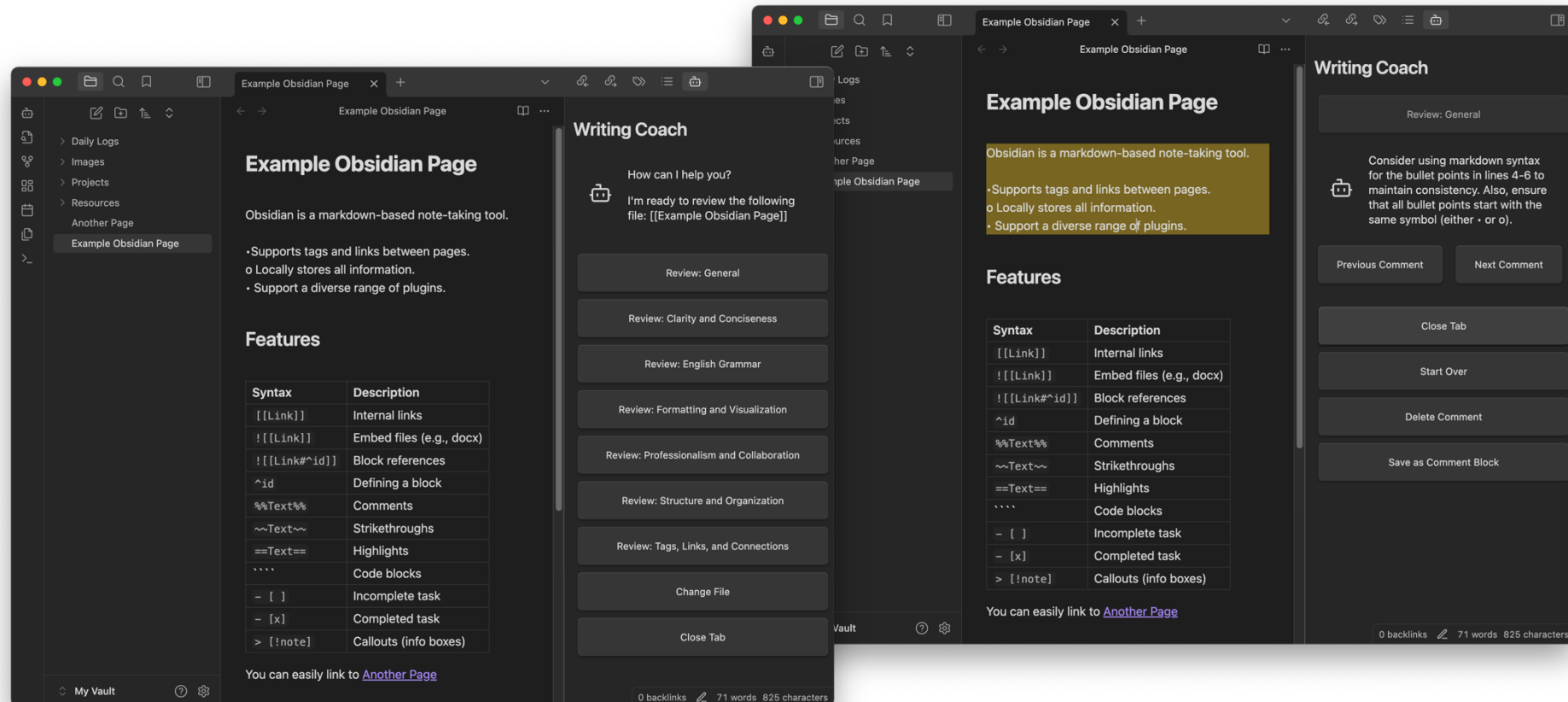


Obsidian

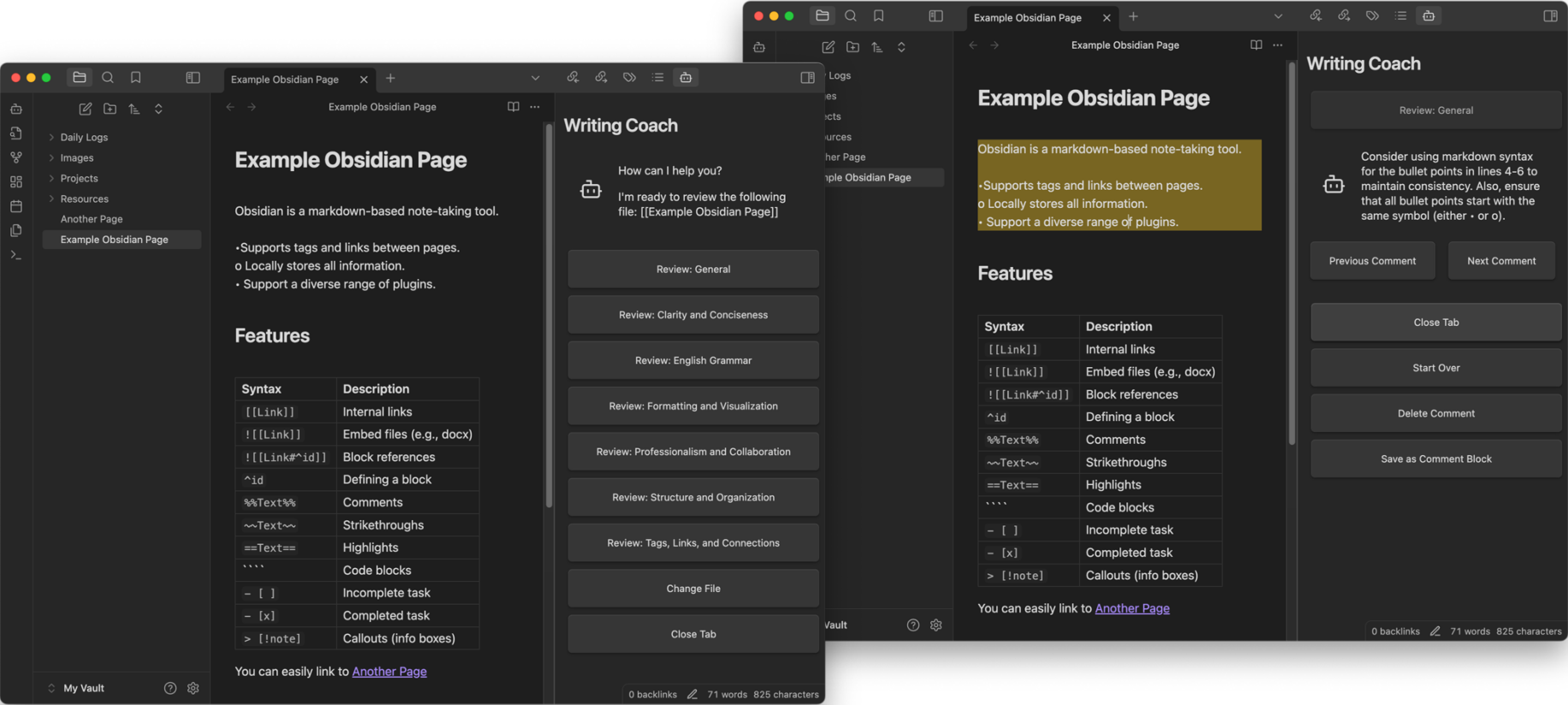


Interface and User Experience

- Activate writing coach sidebar.
- Use a button to request a review of a certain type.
- Writing Coach displays each comment separately while highlighting.

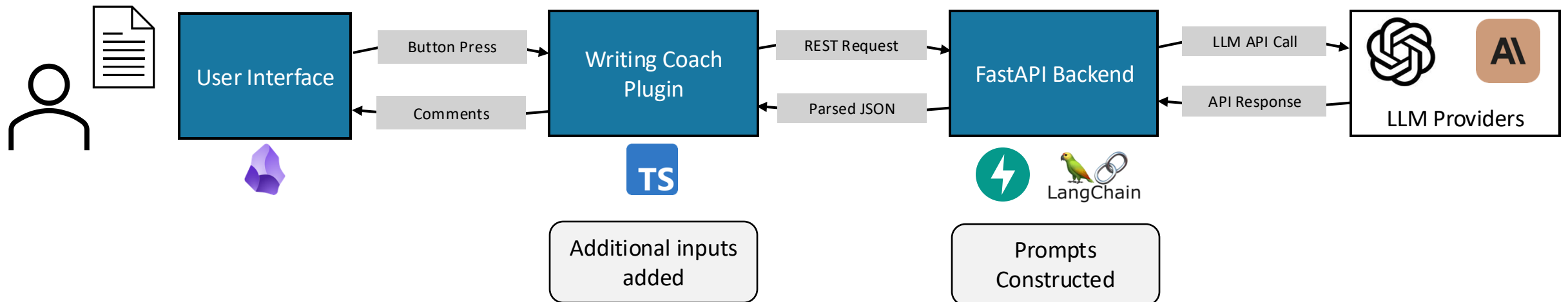


Live Demo



Architecture

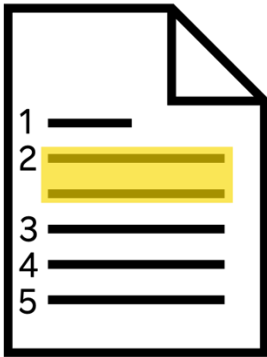
- **Front End:** Implemented in Obsidian with TypeScript.
 - Button-based interface to interact with AI.
- **Back End:** Implemented in Python with FastAPI and LangChain.
 - Prompts vary based on the “review type” requested.



Challenges

Localizing Comments

- How do we highlight the right area for each comment?
- LLMs are not good at counting characters or lines.
- **Solution:** Add line numbers to the text.
 - Seeing a number for every line is enough for the LLM to refer to them.
 - We include indices in each comment output.



Numbered Input

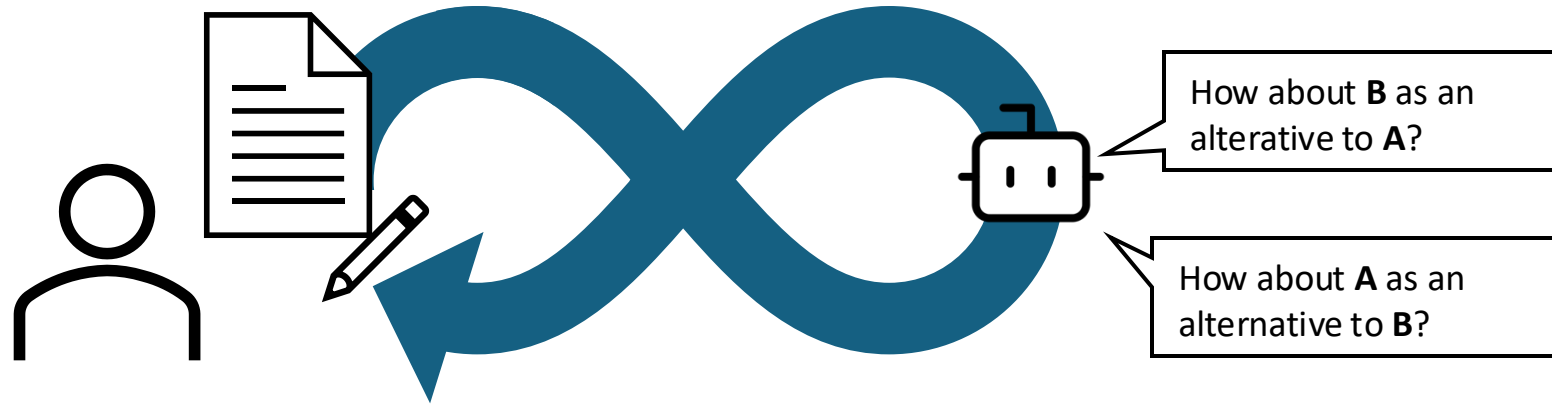
```
{  
  "start_line": 2,  
  "end_line": 2,  
  "comment_content": "Here, you describe  
a five-step process in one paragraph.  
Consider numbered bullet points to  
present this better."  
}
```

AI Comment (JSON)

Challenges

Ending Feedback

- At first, the Writing Coach targets serious issues.
- But eventually, it could nitpick forever with vague or superficial suggestions.



- **Solution:** Rate the page 1-10 first.
 - If the score is 9-10, comment “Looks good!”
 - **Result:** More likely to reach an acceptable end.

Future Work

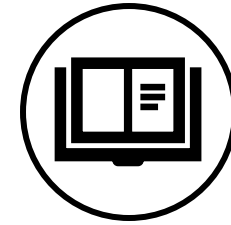
This work could be extended in several directions:

- **Mode to *work together* on revisions**
 - Isolated environment that the AI can edit with the user.
 - When the user is satisfied, a button pushes it to the main document.
- ***Personalize* to the user**
 - In a real setting, we can know their team, etc.
 - Analytics of problem points and progress.
- **Address the *Organization* challenge**
 - Examine knowledge base pages and suggest merges, deletions, etc. to clean it up.

What I learned

General

- Writing principles
- Documentation and knowledge management principles
- Creating for a specific platform (Obsidian Plugins)



Technical

- TypeScript
- LangChain and Prompt Engineering
- CodeMirror text editor API
 - May help me develop other writing programs



CodeMirror

```
1 function hello(who = "world") {  
2   console.log(`Hello, ${who}!`)  
3 }
```

What I learned

UI/UX

- This is a **language user interface (LUI)**
 - Resembles a “chat” with constrained options
 - Users are used to a bot icon and “moving” downwards
- **Put the user in control**
 - We highlight, not edit
 - All actions require button click
 - User can discard comments
- **No surprises**
 - Only change the document when requested

Writing Coach

How can I help you?



I'm ready to review the following file: [[Example Obsidian Page]]

Review: General



Processing your request...



Review complete. Now, let's go through the feedback comments one by one. Click on the button below to start.

View Comments

Close Tab

Start Over

