

AI for Software Dev

Video #1 - Chat Bots

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Introduction

- AI can help make software development more productive:
 - Write unit tests for existing libraries
 - Create small code analysis tools
 - Find and explain bits of code syntax
 - List library public interfaces
 - Explain how third-party code works
 - Help you learn languages and libraries
 - More ...
- Each video describes an AI facility, e.g., web app, agent, console
 - Provides an example of how that may be used to support dev work.

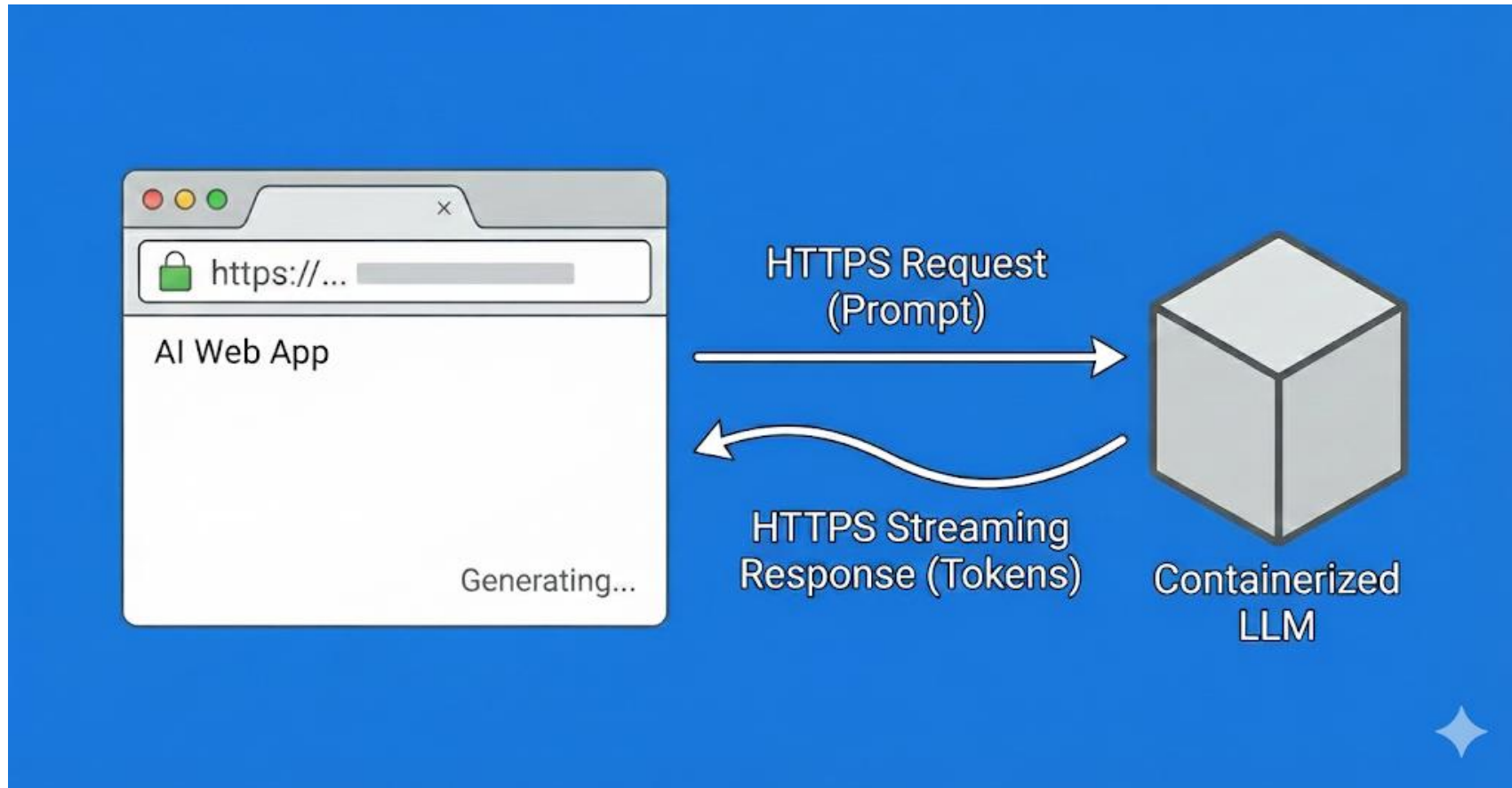
Background

- Many AI platforms, e.g., OpenAI, Anthropic, Gemini, ... have at least three ways of interacting with a Large Language Model (LLM):
 - Chat Bot web application (topic of this presentation)
 - Can't read from or write to local repositories
 - Can't read code from github repository
 - Can paste a zip with code at the end of a prompt
 - Agent (topic of 2nd presentation)
 - Uses local code application to communicate with LLM
 - Can read from and write to local repositories
 - Console (topic of 3rd presentation)
 - Like agent but you don't have to write agent code
 - You simply use the console

Chat Bots

- Chat Bots are web applications consisting of:
 - **Browser-based interface** that accepts prompts and displays results
 - A containerized pre-trained **Large Language Model (LLM)** running in a Linux server in a data center
 - **Https-based communication infrastructure** to ferry prompts to, and results from the LLM

AI Web App Structure



Limitations

- AI Chat Bots have web application limitations:
 - Cannot read from or write to local repositories
 - Cannot read files from github repository

Work Arounds

- You can paste code text at the end of a prompt
 - Prompt specifies what to do with the following code
- You can create a zip for a local repository or download a github zip
 - Paste zip file at the end of a prompt
- You can request Chat Bot to download its results to your local download directory

Example

– Size and Complexity of code functions

- This prompt:

“Generate a list of function line counts and complexities for all functions in the zip file pasted at end of this prompt.

Line count is total number of lines including code, whitespace, comments

Complexity is the number of open braces in each function”

- AI Generated a list of all the functions with correct line counts and complexities for a Rust Thread Pool.
 - Note: Rust code is easier to parse than C++ and doesn't have function overloads.

Partial Code and Analysis Results

```
30  /*-----  
31      construct threadpool, starting nt threads,  
32      provide threadpool processing as f:F in new  
33  */  
34  pub fn new<F>(nt:u8, f:F) -> ThreadPool<M>  
35  where F: FnOnce(&BlockingQueue<M>) -> () + Send + 'static + Copy  
36  {  
37      /* safely share BlockingQueue with Arc */  
38      let sqm = Arc::new(BlockingQueue::<M>::new());  
39      let mut vt = Vec::<Option<JoinHandle<()>>>::new();  
40      /* start nt threads */  
41      for _i in 0..nt {  
42          /*-----  
43              ref sq to master shared queue (sqm) is captured  
44              by thread proc closure  
45          */  
46          let sq = Arc::clone(&sqm);  
47          let handle = std::thread::spawn( move || {  
48              f(&sq); // thread_pool_processing  
49          });  
50          vt.push(Some(handle));  
51      }  
52      Self { // return newly created threadpool  
53          sbq: sqm,  
54          thrd: vt,  
55      }  
56  }
```

Per-function Metrics

| File | Function | Start line | Line count | Complexity |
|------------|--------------|------------|------------|------------|
| src/lib.rs | new | 34 | 23 | 4 |
| src/lib.rs | wait | 58 | 17 | 2 |
| src/lib.rs | post_message | 76 | 4 | 1 |
| src/lib.rs | get_message | 81 | 6 | 1 |
| src/lib.rs | test_new | 93 | 11 | 3 |

Conclusion

- You can find all the details here:

https://jimfawcett.github.io/NewSite/Code/CodeBites_ChatBotAI.html

- The next presentation explores:
 - AI Agents
 - Use local application to communicate with the LLM
 - Uses HTTPS-based API
 - Can read from and write to local file system
- The one after that explores:
 - AI Consoles
 - Have access to local repositories
 - Don't need to write Agent code

End of Presentation