

# 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.

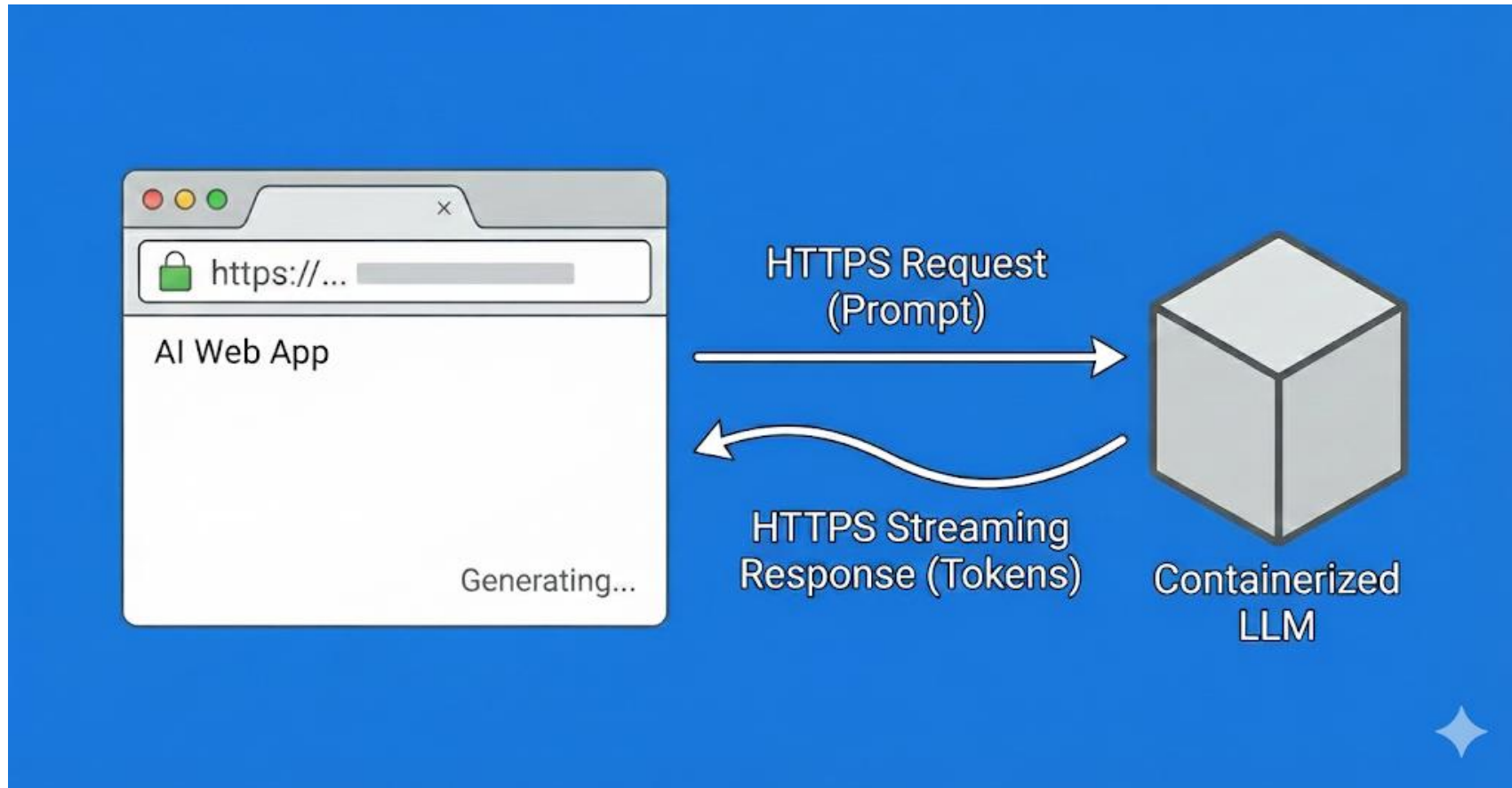
# Background

- 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 3<sup>rd</sup> 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](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