KAIST Graduate School of Information Security

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KERNEL SYSTEM SECURITY

"new components for new operating systems"

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AI-powered-Shell

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PROJECT PRESENTATION

SUBJECT

WHICH FUNCTIONALITY OR MODULE DOES THE OS/ KERNEL NEED?

RULES

EXPLAIN THE ASSOCIATED BACKGROUND AND YOUR REASON WHY SUCH FUNCTIONALITY WILL BE NEEDED IN THE FUTURE

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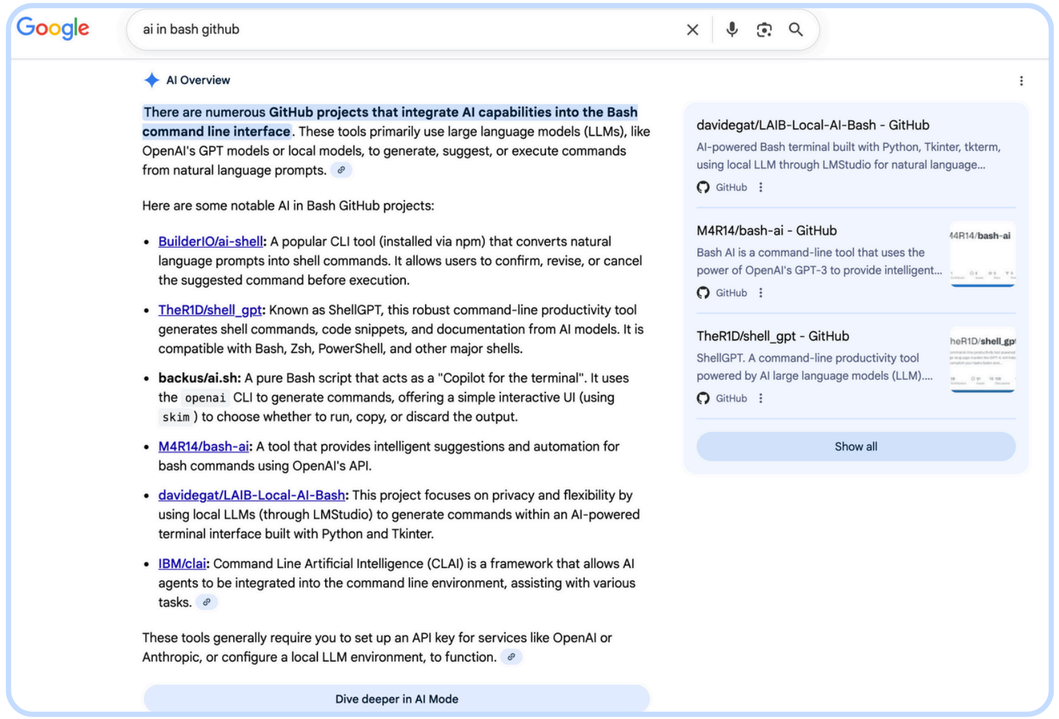
2. RESEARCH QUESTION

BASE OBSERVATION

- As the LLM usage are increasing, no real progress has been seen to enhance user experience since the first versions.

- Switching between windows and interruptions in tasks creates an overhead for the user and reduces productivity.

3. RELATED WORK



KEY POINTS

- Get the **context**;
- Connect shell to **LLM API**;
- Send **sensitive content** to service providers;
- Send sensitive data to ... USA, China ? This could make my European ears bleed.

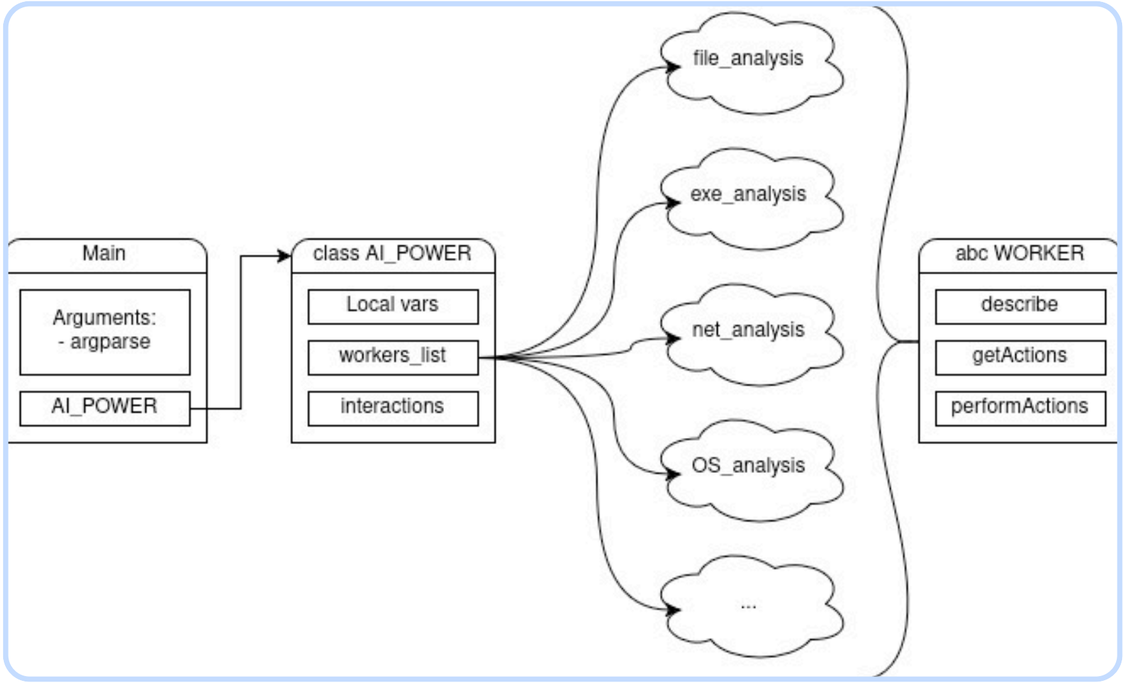
4. SOLUTION IMPLEMENTATION

```
================================================================================
                          AI-POWERED SHELL ASSISTANT
================================================================================

Loading context from: /tmp/ai_powered_shell_arthub.json
Question: The command 'why isnt it working' was not found. What should I do?

✓ Detected OS: Arch Linux
✓ Package Manager: pacman
✓ Debug context saved to /tmp/ollama_context_debug_12712.md

... Calling Ollama API (model: mistral)...


================================================================================
                                OLLAMA RESPONSE
================================================================================

  Diagnosis:  The user encountered an error while trying to execute the file `./ch64`, which is due to a mismatch in the executable format and the system architecture.

 Explanation:  The executable `ch64` is a 32-bit MIPS binary, but the user's system is running on an x86_64 architecture. As a result, the system cannot execute this file.

 Actionable Solutions:
1.  Recompile the `ch64` executable for the correct architecture or use a cross-compiler to create a version compatible with x86_64 systems.
2.  If this is not an option, you can create a chroot environment with the appropriate MIPS system and run the binary within that environment. To do so, install qemu-user-s
te `sudo chroot . /usr/bin/qemu-mips-static ./ch64`.

 Additional Context:
It might be helpful to know whether you have the necessary development tools installed for building MIPS binaries on your Arch Linux system. If not, consider installing the
a command like `sudo pacman -S mips-newlib`.

 Warning:  The chroot method may require elevated privileges and should be used with caution. Always ensure you understand the implications before executing such commands.

================================================================================
```

4. SOLUTION IMPLEMENTATION

```
archlinux% in which file is there the string "True" in this directory

Error: Command 'in' not found.
Would you like AI assistance? [Q]uick / [D]eep / [N]o (default: Q): D
Deep Model
... Step 1: Requesting for the workers using Ollama API (model: mistral)...
... Step 2: Running following workers: {'file_analysis': ['file1.txt', 'file2.txt', 'file3.txt', 'file4.txt', 'file5.txt']}...
[BEGIN USER PROMPT]
```

```
... Step 3: Final AI request using Ollama API (model: mistral)...

================================================================================
                                OLLAMA RESPONSE
================================================================================

 In the given context, the user is trying to find a file containing the string "True" within the current directory /home/arthub/Downloads/test_dir. From the "Workers Results" section, it is
clear that only file3.txt contains the string "True".

To solve this problem, you can run the following command:

command: find . -type f -exec grep -l "True" {} \;

This command uses find to search for files recursively within the current directory and its subdirectories. The -type f option limits the search to files, not directories. The -exec grep -l
"True" {} \; part executes the grep command on each file found by find, looking for the string "True", and prints only the names of the files that contain it (the -l option).

As a side note, if the user wants to limit the search only within the current directory, you can modify the command as follows:

command: grep -L "True" file1.txt file2.txt file3.txt file4.txt file5.txt

This command searches for the string "True" in each of the five files directly (without recursion), and prints only the names of the files that do not contain it (the -L option). In this cas
e, since we know that only file3.txt contains the string "True", you can replace all the other file names with a wildcard like so:

command: grep -L "True" *

================================================================================
```



5. ASSESSMENT AND CONCLUSION

VALIDATION PROCESS

1- Logging feature
2- Quality of Service

SCENARIOS

1- Find the biggest file of the directory
2- Find the file containing the string “True”
3- Why cant I reach internet on firefox (DNS issue)
4- Wrong file type

CONCLUSION – TO GO FURTHER

- Long delay for deep mode (>= 2*classic mode);
- Not always accurate;

But

- Tests made with a GTX 1060 and very small model;
- Still in an early phase, efficiency can be improved.

Some ideas…

1- Reduce the size of the prompts (currently very detailed);
2- Use better hardware;
3- Create new workers.

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THANK YOU FOR YOUR ATTENTION!

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