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Semester: 3
Subject: Ethical Hacking
Assignment: Linux AI Help Chat using Groq API
Repository: https://github.com/Aksa-006/EH_sem5_2025_Notes.git
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Project Title: Building a Beginner-Friendly AI Linux Assistant Using Groq API

➢ Objective

The main goal of this assignment is to design a simple, intelligent assistant that helps beginners understand Linux commands in plain English. Many new users find it difficult to grasp terminal commands due to their technical nature. By using an AI model, this tool simplifies the command-line experience and promotes self-learning in the field of cybersecurity.

➢ Tools & Technologies Used

1. **Python** (for scripting the assistant)
2. **Groq API** (using the free llama-3.3-70b-versatile model)
3. **Command Line Interface (CLI)**
4. **GitHub** (for version control and submission)

➢ How It Works

This project uses a simple Python-based chatbot interface powered by the Groq AI API to help users understand Linux commands in plain, beginner-friendly language. Below is a detailed breakdown of how the assistant works at each step:

1. User Input via Command Line

The program runs in a terminal (command-line interface). When launched, it continuously prompts the user to enter a Linux command (like ls, cd, sudo, mkdir, etc.). This input is accepted using Python's input() function.

2. Command Sent to Groq API

Once the user enters a command, the Python script sends a POST request to Groq’s hosted AI API using the requests library. The payload includes:

- The chosen AI model: llama-3.3-70b-versatile
- A formatted instruction asking the model to explain the Linux command in simple English
- Required headers including the Authorization key

This request mimics a real conversation, where the model is asked to act like a tutor for Linux beginners.

3 AI Generates Human-Friendly Explanation

Once the command is sent, the AI model hosted on Groq’s API processes it using natural language understanding. The model has been instructed to act like a Linux tutor for beginners. Instead of just returning a short, technical definition, the AI generates a multi-sentence explanation that breaks down what the command does, why it's used, and often includes helpful notes on syntax or options.

The output is structured to be:

- Clear and concise, avoiding jargon
- Context-aware, often describing what happens when the command is used
- Beginner-friendly, assuming no prior technical background
- Educational, often including insights into when and why to use the command.

4 Display of Explanation

The explanation is extracted from the JSON response and displayed back in the terminal. The user sees a short, easy-to-understand description of what the entered command does. This gives them immediate feedback and builds confidence using Linux commands.

5 Looping Until User Exits

The assistant continues to run in a loop, allowing users to ask about as many commands as they like. The only way to exit is to type exit, which breaks the loop using a simple condition:

```
if cmd.lower() == "exit": break
```

This makes the tool lightweight, fast, and user-friendly—even for those with no programming background.

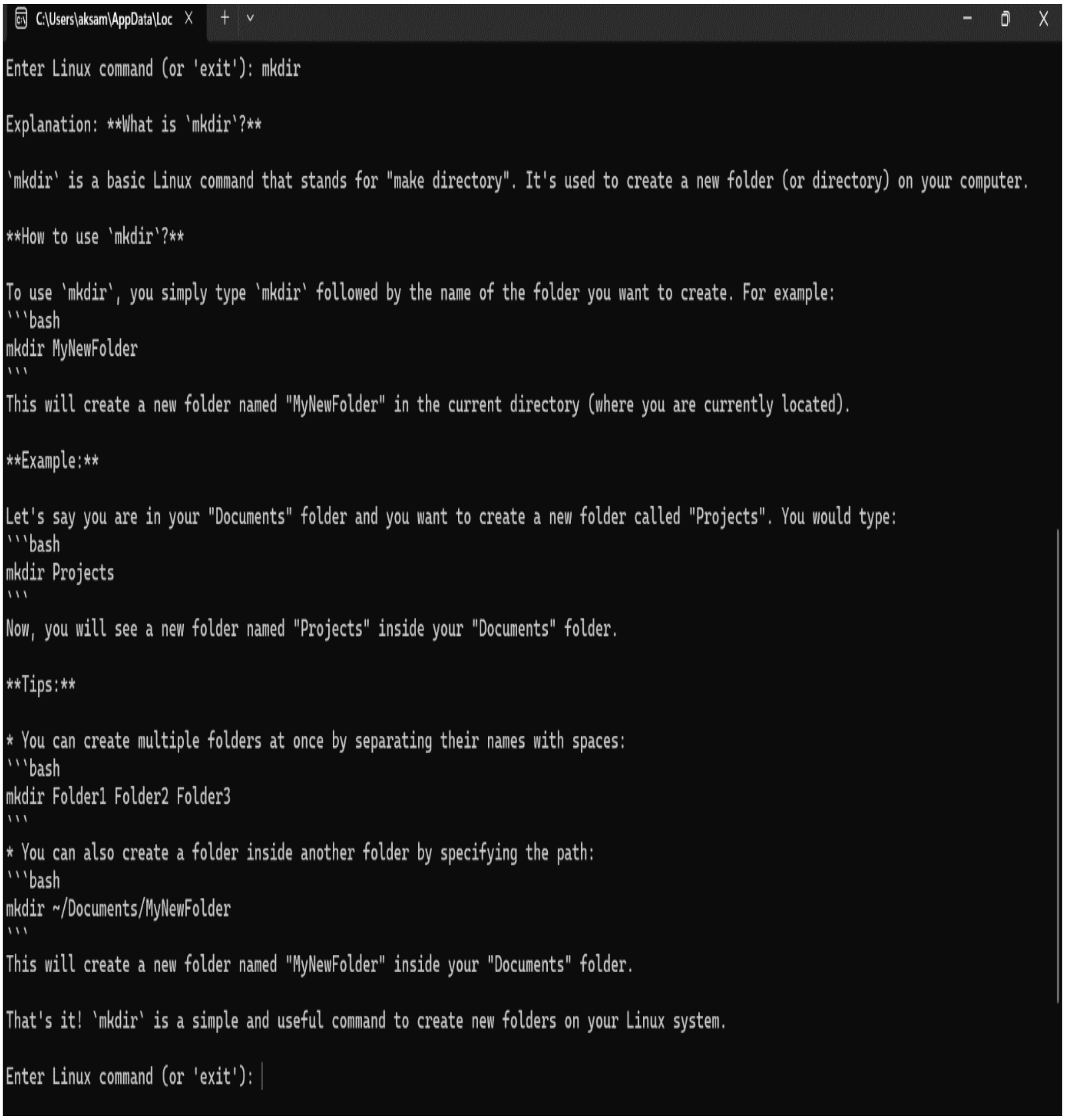
➢ SUMMARY

- Accepts user input
- Connects to a large language model
- Formats and sends an API call
- Receives and processes AI output
- Displays results clearly

➢ Python Code

```
import requests

GROQ_API_KEY =
"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"

def explain(cmd):

   r = requests.post("https://api.groq.com/openai/v1/chat/completions",

      headers={"Authorization": f"Bearer {GROQ_API_KEY}", "Content-Type":
"application/json"},

      json={"model": "llama-3.3-70b-versatile", "messages": [{"role": "user", "content":
f"Explain the Linux command '{cmd}' in simple English for beginners."}]})

   return r.json().get("choices", [{}])[0].get("message", {}).get("content", "Invalid response.")

while True:

   cmd = input("Enter Linux command (or 'exit'): ")

   if cmd.lower() == "exit": break

   print("\nExplanation:", explain(cmd), "\n")
```

- **OUTPUT**



~~~
Enter Linux command (or 'exit'): mkdir

Explanation: **What is `mkdir`?**

`mkdir` is a basic Linux command that stands for "make directory". It's used to create a new folder (or directory) on your computer.

**How to use `mkdir`?**

To use `mkdir`, you simply type `mkdir` followed by the name of the folder you want to create. For example:
```bash
mkdir MyNewFolder
~~~
This will create a new folder named "MyNewFolder" in the current directory (where you are currently located).

Example:

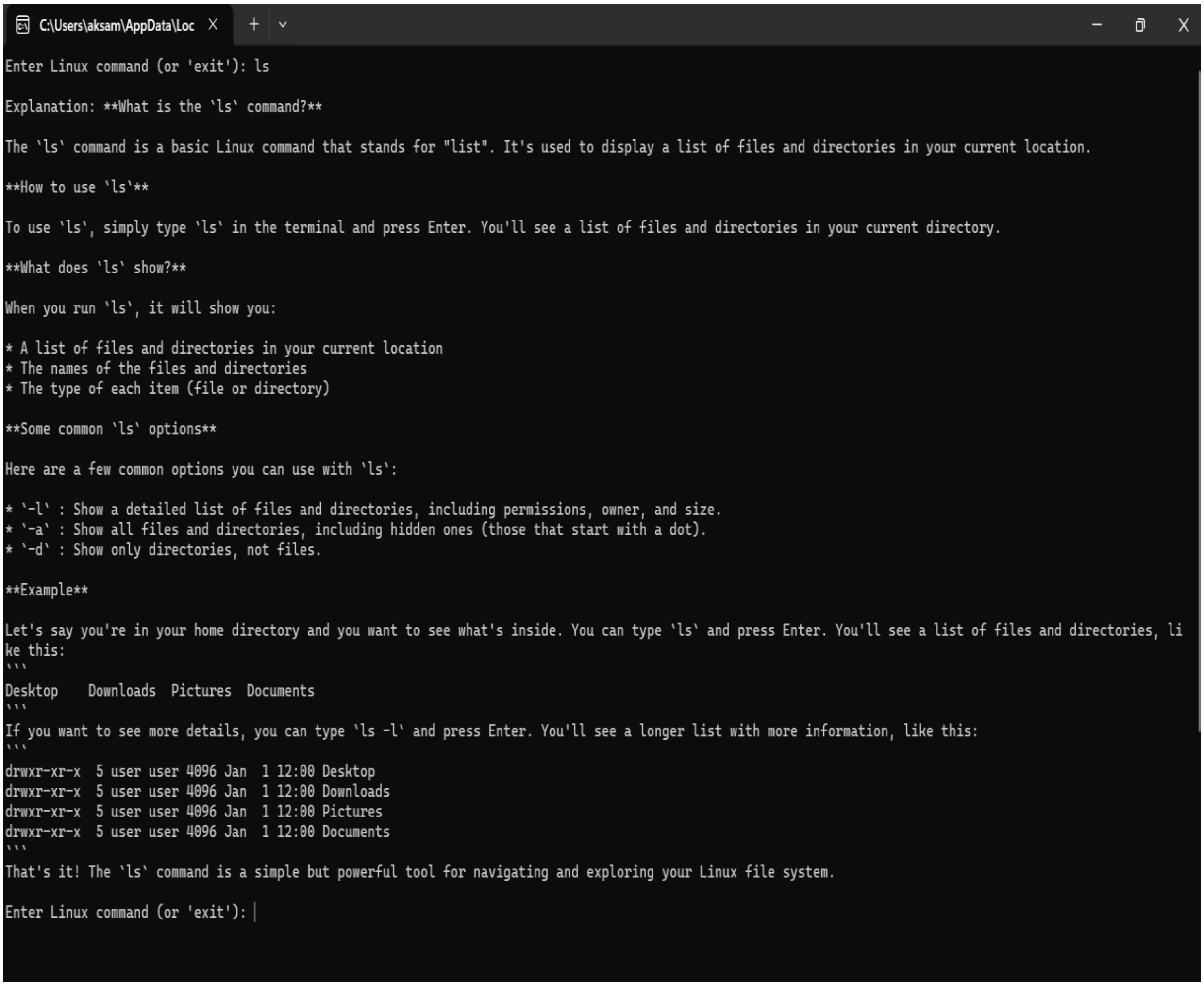
Let's say you are in your "Documents" folder and you want to create a new folder called "Projects". You would type:
```bash
mkdir Projects
```
Now, you will see a new folder named "Projects" inside your "Documents" folder.

Tips:

* You can create multiple folders at once by separating their names with spaces:
```bash
mkdir Folder1 Folder2 Folder3
```
* You can also create a folder inside another folder by specifying the path:
```bash
mkdir ~/Documents/MyNewFolder
```
This will create a new folder named "MyNewFolder" inside your "Documents" folder.

That's it! `mkdir` is a simple and useful command to create new folders on your Linux system.

Enter Linux command (or 'exit'):
```
```



~~~
Enter Linux command (or 'exit'): ls

Explanation: **What is the `ls` command?**

The `ls` command is a basic Linux command that stands for "list". It's used to display a list of files and directories in your current location.

**How to use `ls`**

To use `ls`, simply type `ls` in the terminal and press Enter. You'll see a list of files and directories in your current directory.

**What does `ls` show?**

When you run `ls`, it will show you:

* A list of files and directories in your current location
* The names of the files and directories
* The type of each item (file or directory)

**Some common `ls` options**

Here are a few common options you can use with `ls`:

* `-l` : Show a detailed list of files and directories, including permissions, owner, and size.
* `-a` : Show all files and directories, including hidden ones (those that start with a dot).
* `-d` : Show only directories, not files.

**Example**

Let's say you're in your home directory and you want to see what's inside. You can type `ls` and press Enter. You'll see a list of files and directories, li
ke this:
```
Desktop    Downloads  Pictures  Documents
```
If you want to see more details, you can type `ls -l` and press Enter. You'll see a longer list with more information, like this:
```
drwxr-xr-x  5 user user 4096 Jan  1 12:00 Desktop
drwxr-xr-x  5 user user 4096 Jan  1 12:00 Downloads
drwxr-xr-x  5 user user 4096 Jan  1 12:00 Pictures
drwxr-xr-x  5 user user 4096 Jan  1 12:00 Documents
```
That's it! The `ls` command is a simple but powerful tool for navigating and exploring your Linux file system.

Enter Linux command (or 'exit'):
~~~

➢ AI’s Role in Cybersecurity Education

Artificial Intelligence is transforming how cybersecurity is taught and learned. For beginners, technical concepts like Linux commands, ethical hacking tools, or network configurations can feel overwhelming. AI bridges this gap by offering real-time, personalized explanations in simple language—just like a tutor would.

Tools like AI-powered chatbots help students practice commands, clarify doubts instantly, and learn at their own pace. They can simulate real scenarios, provide hands-on feedback, and adapt to each learner’s needs. This makes cybersecurity education more interactive, accessible, and less intimidating, especially for those without a technical background. Ultimately, AI is helping democratize cybersecurity learning and empowering the next generation of cyber professionals.

Here’s how this chatbot fits into a modern learning ecosystem:

1. Simplifies complex syntax for beginners.
2. Promotes active learning instead of rote memorization.
3. Encourages independent problem-solving by providing instant guidance.
4. Accessible to anyone with internet and a basic terminal setup.
5. Can be integrated into cybersecurity tools and learning platforms.

➢ Conclusion

This project demonstrates how a lightweight Python chatbot, powered by Groq’s advanced language model, can make Linux and cybersecurity concepts easier to understand for beginners. By translating complex commands into simple explanations, the assistant acts as a helpful learning companion—bridging the gap between technical knowledge and everyday users. With just a few lines of code, we’ve built a tool that reflects the broader impact of AI in education**:** making cybersecurity more approachable, interactive, and inclusive**.** As the field continues to evolve, tools like this can play a crucial role in empowering new learners and building a stronger, more cyber-aware generation.
