The Problem

- Cybersecurity is a constantly evolving field. Even though the goals and motivations of attackers remain relatively unchanged, the techniques and methodologies used by attackers change as technologies shift.
- Current security systems look for specific vulnerabilities and thereby are strict and inflexible.
- As a result, the number of common vulnerabilities and exposures (CVEs) has increased every year.

Our Solution

- Develop an expert system that intelligently reasons and infers the potential weakness for file storage
- Uses First Order Logic to make inferences
- Users can create their own unique knowledge base about their system and query the system to find weak areas

Terminal Application

- Users can
  - Create a knowledge base
  - Add queries to the knowledge base
  - Display all queries in the current knowledge base
  - Delete queries from the knowledge base
  - Ask questions of the knowledge base
- Complete with auto-complete function for easy user input

Knowledge Base Implementation

- Manually enter the
  - Type of object
  - Storage location
  - Relevant path
  - Testing which locations have access to sensitive data

Reasoning/Visualization

- In addition to returning a result to the user's query, the expert system returns a textual reasoning/explanation for why it returns the result.

Knowledge Base Explanation

- The knowledge base describes the paths how files/documents stored
- Two sensitive data: Employee Data & Customer Data
- The sensitive data can be accessed via two paths: Auth / File - Drive

Future Work, References, and Acknowledgments

- Develop more intuitive UI for easier use
- Turning first order logic queries input into natural language queries
- CanSourceAccessSensitiveData(GitHub, sens_data)
- What sensitive data can GitHub access?
- Reimplementing the visualization result to image connected graph for easier to understand

AIMA Python: Logic Notebooks

- The open-source python library, aimacode-python implements first order logic in python [1]
- It additionally provides python implementations of first order logic algorithm from Russell and Norvig’s “Artificial Intelligence - A Modern Approach” [2]
- From this library, the forward chaining and backward chaining algorithms are used in the implementation of the first order logic expert system