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Cybersecurity Vulnerabilities in the Smart Grid & Thermodynamical Properties Database Software

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COMPUTER SCIENCE

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CAPSTONE DESIGN EXPO 2015

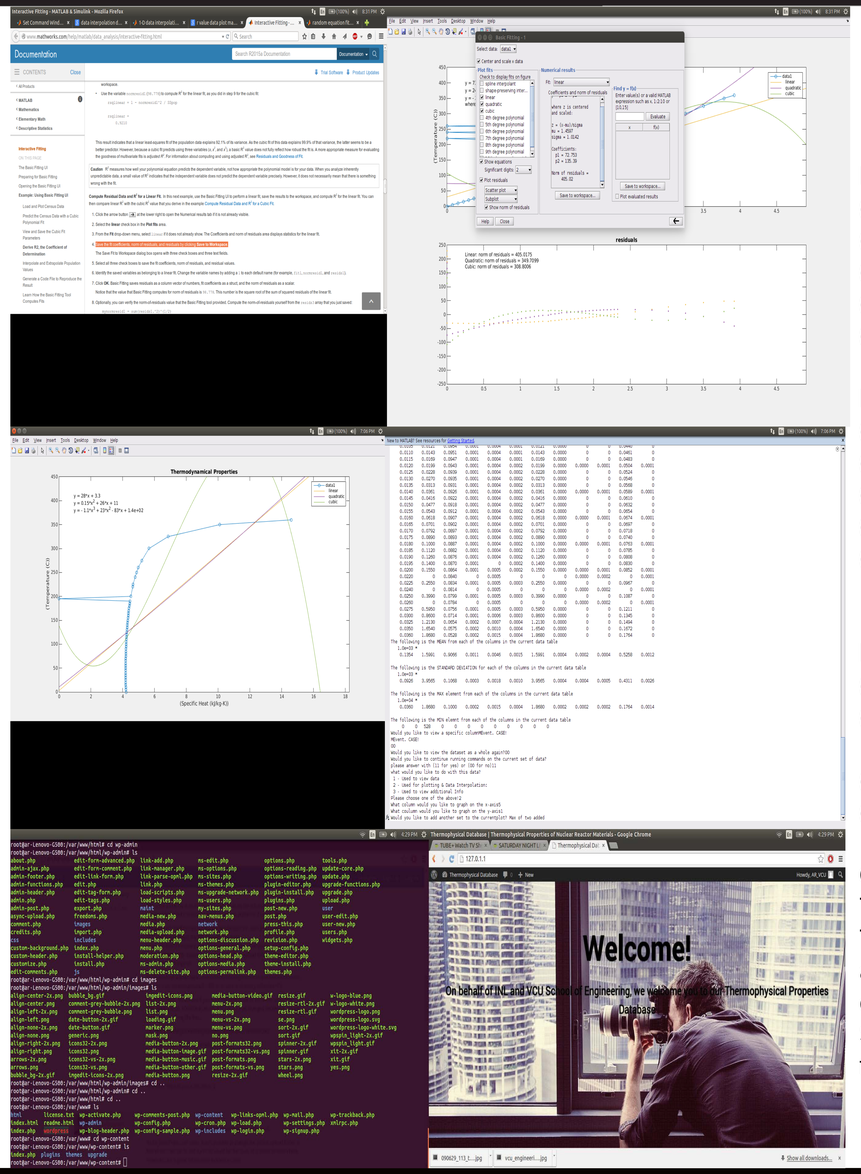
Software

OBJECTIVE:
Researching cyebrsecurity vulnerabilities in smart grids and Investigate current solutions to the problems. The solutions were not in the
scope of my ability to implement. In response I wrote a well researched paper on a collection of current issues.
All software developed was intended to be used by researchers in order to access information quickly, as well as have the ability to graph the data. A small interactive application with functionality was developed in two different languages.

I. Linux LAMP for web development:
- Linux: Operating system.
- Apache: Server.
- MySQL: Databases
- PHP5: Web management.

II. J2EE Application Development:
- Allows user to trim data.
- Allows the user to focus on specific properties
-Allows the user to graph data they find interesting. The graphing application included an interface where the user and can pull useful data as well as many other things.

III. MATLAB Function Collective:
- Development of multiple MATLAB programs.
- Developed to alleviate data handling.
- Helps construct analysis fro researchers.
- Open source files allow for code to be edited to the preference of the researcher.
- Consolidates all of the data to a specifics file.
- Allows for new data to be saved separately for access by researchers



Research

I. Fluids in nuclear reactors:
(1) Types of coolants (i.e sodium, water, helium)
(2) Thermodynamical properties of coolants.
(3) Types of nuclear reactors and the goal behind the design.
(4) Components of nuclear reactors. (i.e heat exchangers)
(5) Thermodynamical properties of components.

II. Technology and how it supports the smart grid
(1) History of the Smart grid
(2) The need for innovation.
(3) Supporting Technology.
(4) Ethics & the smart grid
(5) Security of the smart grid.
(5) Moving forward.

III. Optimal Control Theory
(1) An Introduction to Applied Optimal Control By Greg Knowles.
(2) An Introduction to Mathematical Control Theory
By Lawrence S Evans.
(3) How to set up and optimal control problem.
(4) Solving an optimal control problem.

CONCLUSION:
There is definitely room for advancements in the each of the tasks. The software can be further developed to allow for more functionality and further integration of tools for researchers. Also the lack of a front end development makes it not very user friendly.
Students who tackle this project in the next year should have access to the Cybersecurity lab here at VCU.

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