

Be sure to read the entire exam before you start. If you have any questions I'm available at mphamner@gmail.com

1. Access Control Mechanisms

Consider the following situation. Mary wants to go see the Broadway production of Hamilton on tour at the Kennedy Center. She would like to purchase her ticket online (\$432 for the cheap seats).

Mary has checked the Kennedy Center's website and found information about entering the theatre. It says,

After selecting your perfect Kennedy Center Opera House event, you will go to our ticket listings page. Here you will have access to our vast seller network with up to date pricing and filters to make your search a breeze. Interactive maps with smooth scrolling and section dividers for any device will allow a seamless experience. Delivery notes and any special instructions will be noted directly beneath the desired listing. Simply click on the quantity selector and then the tickets you would like to purchase in the checkout.

In the checkout, you will be given ample time to review your Kennedy Center Opera House tickets and select from the available delivery options. We have many different payment options, including all major credit cards, PayPal, and Apple pay. After reviewing your order details, click on the purchase button to secure your order (Retrieved from https://www.ticketsonsale.com/venues/kennedy-center-opera-house?gclid=EAlaIQobChMI9JDejflm5wIVxJyzCh26gQe2EAAYAiAAEgKiifD_BwE February 20, 2020).

Assume Mary uses a credit card to purchase her ticket. To use a credit card Mary must create an account including a password. Once she has created her account she can log into the ticket agents website using her password and purchase her ticket. (Hint: think of this the same way you would think about someone taking a flight or a train using their ticket as their "token". But, instead of entering a physical vehicle, airplane or train, Mary is taking a virtual trip entering her online account using her password.)

Using the programming and mathematical languages you have learned in CIS634 (emacs, LaTeX, HOL, etc.) generate a report for the Kennedy Center's ticket agent giving a formal proof for why Mary should be allowed on the website to purchase her ticket.

2. Access Control Mechanisms

Consider the following situation. Don has a checking account at his bank, the Bank of Riches. To get money from his checking account Don needs an official state-issued identification card, typically his bank card #4789 1112 3873 4609, and his personal identification number (PIN).

Don is going out Friday night so stops at his bank on the way home from work. He presents her credentials to the teller. Using the programming and mathematical languages you have learned in CIS634 (emacs, LaTeX, HOL, etc.) generate a report for the Bank's manager giving a formal proof for why Don should retrieve money from his checking account. Hint: the PIN will act as a "ticket" while the bank card is checked against an access control list (ACL) when it is swiped or inserted.

3. Discretionary Access Control

Discretionary access control poses real-world challenges in security. This problem is intended to help you explore what those challenges are and some potential ways to mitigate negative impacts due to these challenges. Consider the 2005 paper, "On Safety in Discretionary Access Control," written by Li and Tripunitara at Purdue University. I've uploaded this paper to our course website for you. You can use this paper, your textbook, or other resources at your disposal. But remember, whatever you use you will be on the clock to get your exam done.

Given what you now know, the question is whether or not you believe that safety in existing discretionary access control schemes being "decidable" means that these schemes are in fact safe. Or, if this merely means that we can decide what the level of safety in these schemes is. You are to include a 1 page summary in your report that expresses your thinking about this topic including a sentence that summarizes your conclusion.

Interestingly, the research that Li and Tripunitara conducted is based on an access control scheme being modeled by a four-tuple $\langle \Gamma, \Psi, Q, \vdash \rangle$ where Γ is the set of states... Sound familiar? Given what we have covered in CIS634 so far, you should be able to read this paper and comprehend their research at some level in order to reach a conclusion for your answer.

As usual, your report should include a complete folder and subfolders with all sections included in a LaTeX final report. You should have the following:

1. Title page

2. Abstract
3. Acknowledgements
4. Table of Contents
5. Executive Summary
6. Chapter 1: Your submission to answer Question 1 of this exam
7. Chapter 2: Your submission to answer Question 2 of this exam
8. Chapter 3: Your submission to answer Question 3 of this exam
9. Appendices of source code – as required

Good luck!