CIS-481: Introduction to Information Security

In-Class Exercise #9

IQ Team: 4
Names of team members: Daniel Kearl, Mohammed Al Madhi, Yuxuan Chen, Joseph Baxter

Logistics

A. Get together with other students on your assigned team in person and virtually.
B. Discuss and complete this assignment in a collaborative manner. Don't just assign different problems to each teammate as that defeats the purpose of team-based learning.
C. Choose a scribe to prepare a final document to submit via Blackboard for grading, changing the file name provided to denote the number of your assigned **IQ Team**.

Problem 1
Name and describe the four categories of locks based on the triggering process (discussed in your text on pp. 508-509). In what situations is each type of lock preferred? *(8 points)*

Manual locks: Common locks found pretty much anywhere, some include combination locks or standard padlocks. These are preferable when a baseline level of security is required without much hassle, usually not seen too often in secure business environments.

Programmable: Locks that can be changed or reconfigured after installation without the need for a locksmith. These don't always need electricity to operate, and can be code-based or use mechanical lock/key. These are popular for use with server rooms or similar environments, because they can be changed easily and don't always require electricity.

Electromechanical locks or electronic locks: can use magnetic strips on ID Cards, radio signals from badges, personal identification number such as PINs. Electronic locks can be integrated into an alarm system and combined with other building management systems. These locks can be integrated with sensors to lock and unlock. Due to their broad range of use cases, these lock types can be well suited to many different environments, though it seems they would be particularly useful somewhere that may involve automating them, maybe via chips in employee IDs.

Biometric locks - Uses finger, palm, and hand readers, iris and retina scanners, and many other physical recognition features. These are the most sophisticated of the types mentioned here, because they not only incorporate very newer technology, but they also may even implement some form of AI/machine learning (usually seen in iris scanners or facial recognition). These locks can range from very high precision and security, like an iris scanner securing a portion of a facility, to pretty standard levels of the same, like a fingerprint scanner you would find in the average smartphone.

Problem 2

Your text describes three elements that must be present for a fire to ignite and continue to burn. Newer research suggests a fourth element is required, too. See:

https://www.firesafe.org.uk/information-about-the-fire-triangletetrahedron-and-combustion/

Name and describe the four elements of the "fire tetrahedron". How do fire suppression systems manipulate the four elements to quell fires? *(9 points)*

Fuel - Material that is able to undergo oxidation
Oxygen - allows the fuel material to undergo oxidation
Heat - provides energy to the fuel and oxygen allowing their molecules to become active and undergo the reaction
Chemical Chain Reaction - self-sustaining chemical reaction of material being oxidized releasing light and heat which provides heat energy to allow more material to oxidize

Fire suppression systems control fire by removing one or more of the 4 elements, preventing the reaction from continuing. Water removes heat which lowers the material to below the ignition point, and also can soak the fuel, removing its ability to burn easily. Detection systems in liquid fuel lines can divert combustible chemicals from reaching the fire, preventing additional fuel from burning. Fire extinguishers can provide a barrier that deprives burning material from reaching additional oxygen or starve the fire by displacing its current oxygen supply. Lastly, and perhaps the most complicated, suppression systems that use gases such as halon can create interference between the individual molecules preventing the transfer of electrons in the oxidation process.

Problem 3
Name and describe the five classes of fire described in the text. Does the class of a fire dictate how to control the fire? How so? *(8 points)*

Class of a fire does dictate how fires need to be controlled, because different fuels and environments will behave differently. For example, using water on an oil fire may only spread the fuel out further and will do little to extinguish the fire, as they require removing oxygen from the environment. Each class is defined and followed by the action to control the fire in each class. The following information outlines each class of fire, and can also be found on pages 515 and 516 of the Principles book:

Class A - Involves ordinary combustibles such as wood, paper textiles, rubber, cloth and other general trash. They are extinguished by interrupting the ability of the fuel to be ignited, usually by soaking it. The fire is often controlled with water, though multipurpose dry chemical extinguishers are also great for these types of fires.

Class B - Fires that are fueled by combustible liquids or gases, like, gasoline, oils, etc. These fires are extinguished by removing oxygen from the environment to starve out the fire. Carbon dioxide, multipurpose dry chemical, and halon-based fire extinguishers are all great for these types of fires.

Class C - Fires that are caused by energized electrical equipment or appliances. They are extinguished with non-conducting agents only. Carbon dioxide, multi-purpose dry chemical, and Halon fire extinguishers are recommended for these. Never use a water fire extinguisher on a Class C fire, because water is very conductive.

Class D - Fire that is fueled by combustible metals, such as magnesium, lithium, and sodium. Class D fires require special extinguishing agents and techniques, so ordinary extinguishers usually won't cut it. Luckily, these aren't exactly common in the typical everyday environment.

Class K - Fires that are fueled by combustible cooking oil and fats commonly found in commercial kitchens. These fires are classified as Class F in other parts of the world, namely much of Europe and around Australia. These fires require special water mist, dry powder, or CO2 agents to extinguish the fire.