Lesson Title: Confidentiality, Integrity, and Availability

9/8/11

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Rationale

Why is this lesson important? Why does the student need this lesson? How does this lesson fit in the larger module?

It is important to understand the three principles of security: confidentiality, integrity, and availability. The student needs this lesson to understand the meaning of security. This lesson provides the student with a firm understanding of security.

Objective(s)

What will the student know, be able to do, and value at the end of this lesson? This is smaller amounts of information than the module objectives.

The student will be able to describe the three principles of security.

Exploration

Explicit concepts related to the Module goal are explored. It is at this point that the student will be provided basic information about the topic and the chance to explore some basic concepts about the topic. This is where the instructor imparts information.

- Three principles of security
  - Define confidentiality: Confidentiality ensures that only authorized individuals have access to information. It refers to mechanisms that prevent unauthorized information disclosure.
  - Define integrity: Integrity ensures that the information is authentic and has not been modified by additions, deletions, modifications, or rearrangement.
  - Define availability: Availability is the percentage of time that a system is working correctly during a time period. It refers to mechanisms that ensure the system or data is available. In other words, the level of performance is acceptable.
    - Power outages
    - Natural disasters
    - Denial of service

Reflection

Several questions are posed to the student to answer and then often discuss as a class. This is an attempt to determine whether the student "gets" the basic concepts delivered above. If they do get it, move on to engagement. If they do not get it, go back to exploration above. It could be as simple as asking a few probing questions or as complex as asking the student to write a paper.

- What is confidentiality?
- What is integrity?
- What is availability?
Engagement

Concepts learned in the Exploration are further developed by conducting experiments, designing and building solutions, and solving problems. This is an attempt to cause the student to apply the new knowledge. By applying the new knowledge, the student is much more likely to retain this information. This engagement could be accomplished through a debate, an experiment, a problem solving activity, or anything else that would cause the student to demonstrate understanding and competence.

- Discuss different attacks and which of the three principles of security each attack violates. For each of the following, what security principle was violated?
  - Several individuals send many messages to a web server preventing customers from using it.
  - An attacker changes the price from $10 to $100 during a credit-card transaction.
  - An attacker listens to an individual provide a credit card number and expiration date over the telephone and later purchases items with the credit card information.

Expansion

Provide opportunities for students to expand the concepts to more general or global situations including connection to the Module goal. Expand back to the big ideas of the module and prepare for the next lesson.

- If you could read the identification number of a passive RFID tag on a TV at a store, are there any major attacks that could be performed?
- What would be the advantage of changing the identification number in a passive RFID tag on a TV at a store?

Lesson Assessment

Assess student understanding of the lesson content. This does not have to be a full-blown examination. It could be a graded homework assignment, a quiz, a performance examination, a graded problem solving activity, or something similar.

- Quiz or exam

Equipment

- None

Software

- None

References

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