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Introduction to Security

Key Security Concepts

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Confidentiality

- preserving authorized restrictions on information access and disclosure.
- including means for protecting personal privacy and proprietary information

Integrity

- guarding against improper information modification or destruction,
- including ensuring information nonrepudiation and authenticity

Availability

- ensuring timely and reliable access to and use of information

Computer Security Terminology

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- **Adversary** (threat agent) - An entity that attacks, or is a threat to, a system.
- **Attack** - An assault on system security that derives from an intelligent threat; a deliberate attempt to evade security services and violate security policy of a system.
- **Countermeasure** - An action, device, procedure, or technique that reduces a threat, a vulnerability, or an attack by eliminating or preventing it, by minimizing the harm it can cause, or by discovering and reporting it so that corrective action can be taken.

Computer Security Terminology

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- **Risk** - An expectation of loss expressed as the probability that a particular threat will exploit a particular vulnerability with a particular harmful result.
- **Security Policy** - A set of rules and practices that specify how a system or org provides security services to protect sensitive and critical system resources.
- **System Resource (Asset)** - Data; a service provided by a system; a system capability; an item of system equipment; a facility that houses system operations and equipment.

- **Threat** - A potential for violation of security, which exists when there is a circumstance, capability, action, or event that could breach security and cause harm.

- **Vulnerability** - Flaw or weakness in a system's design, implementation, or operation and management that could be exploited to violate the system's security policy.

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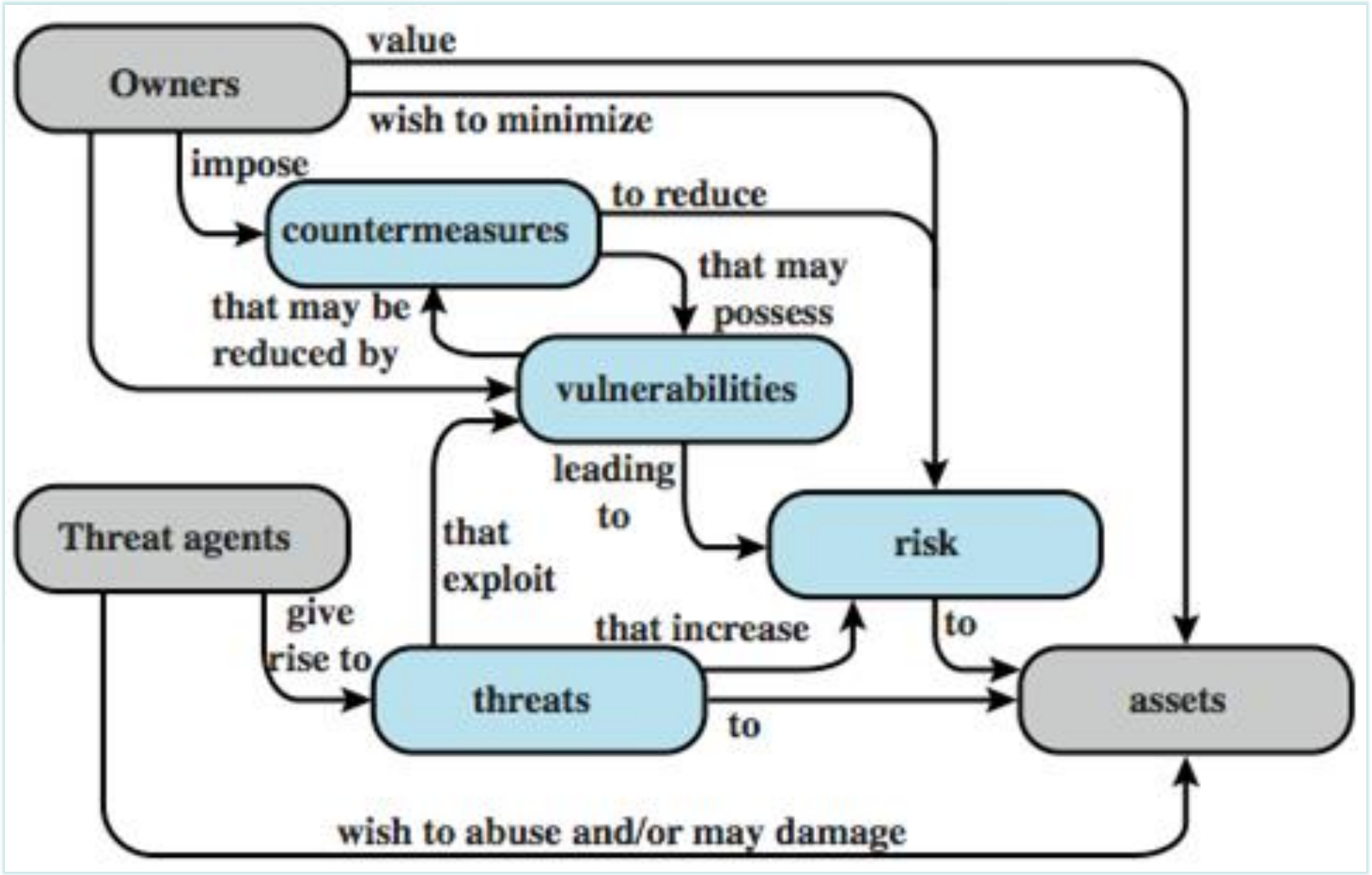
Security Concepts and Relationships



Threat Consequences

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- **Unauthorized disclosure** is a threat to *confidentiality*
- ***Exposure***: This can be deliberate or be the result of a human, hardware, or software error
- ***Interception***: unauthorized access to data
- ***Inference***: e.g., traffic analysis or use of limited access to get detailed information
- ***Intrusion***: unauthorized access to sensitive data

- **Deception** is a threat to either system or data *integrity*
- ***Masquerade***: e.g., Trojan horse; or an attempt by an unauthorized user to gain access to a system by posing as an authorized user
- ***Falsification***: altering or replacing of valid data or the introduction of false data
- ***Repudiation***: denial of sending, receiving or possessing the data.

Passive and Active Attacks

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- **Passive attacks** attempt to learn or make use of information from the system but does not affect system resources
  - eavesdropping/monitoring transmissions
  - difficult to detect
  - emphasis is on prevention rather than detection
  - two types:
    - message contents
    - traffic analysis
- **Active attacks** involve modification of the data stream
  - goal is to detect them and then recover
  - four categories:
    - masquerade
    - replay
    - modification of messages
    - denial of service

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Thanks