# Security Policies

## Security Definitions

Below are give some (relatively) formal definitions[1]:

- a ***security policy*** is a statement that partitions the states of a system into a set of *authorized*, or secure, states and a set of *unauthorized*, or non-secure, states.
- a ***secure system*** is a system that starts in an authorized state and cannot enter an unauthorized state.
- a ***breach of security*** occurs when a system enters an unauthorized state.
- a ***security mechanism*** is an entity or procedure that enforces some part of the security policy.
- a ***security model*** is a model that represents a particular policy or set of policies.

[1] Matt Bishop: Computer Security

## The Military Security Policy (1)

- the **Military Security Policy** is based on protecting classified information with respect to *confidentiality*.
- each piece of information is ***rank***ed at a particular *sensitivity* level:
  - unclassified
  - restricted
  - confidential
  - secret
  - top secret
- each piece of information may be associated with one (or more) projects, called ***compartments***.
- The combination **<rank; compartments>** is called the **classification** or **class** of a piece of information.

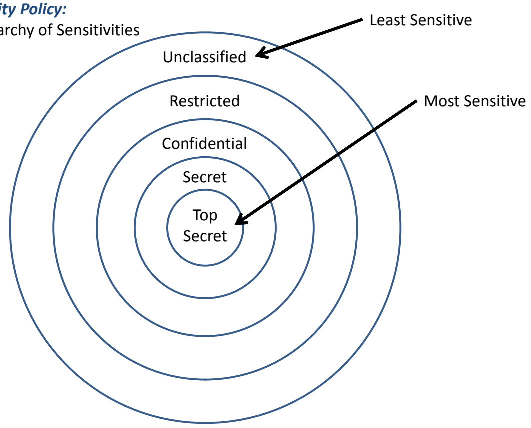
## The Military Security Policy (2)

- a person has a **clearance** to access information up to a certain level of sensitivity.
- The clearance of a person has the same form as the classification of a piece of information:

  **<rank; compartments>**
- the **need-to-know** rule (principle of least privilege) means that individuals shall only have access to those data that they need in order to perform their jobs.
- the use of compartments helps to enforce the need-to-know rule.
- the user may ***not*** alter classifications, i.e. the policy requires Mandatory Access Control (MAC).

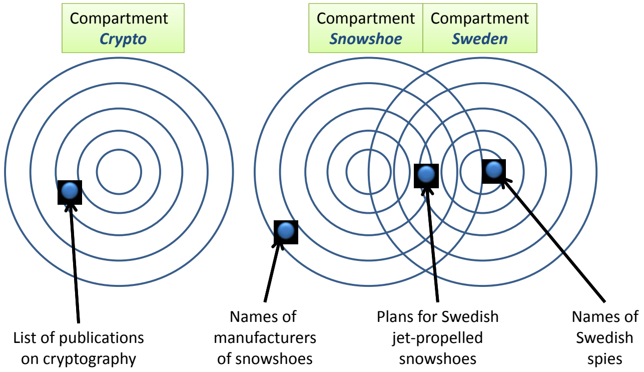
***Military Security Policy:***

Hierarchy of Sensitivities



***Note***: Here an object has a single rank, but may belong to several compartments.

Plans for Swedish jet-propelled snowshoes = <Confidential; {Snowshoe,Sweden}>


Compartment *Crypto*
Compartment *Snowshoe*
Compartment *Sweden*
List of publications on cryptography
Names of manufacturers of snowshoes
Plans for Swedish jet-propelled snowshoes
Names of Swedish spies

Pfleeger, Sec 7.2 Security Policies

# Commercial Security Policies (1)

- commercial security policies generally have a broader scope than the military security policy.
- they may address issues such as industrial espionage, conflicts of interest and rules for how activities must be performed within a company. Also they ***extend*** the scope to *integrity* and *availability*.
- they are normally less formal. There is no formalized notion of clearance and consequently are the rules for allowing access less regularized.
- the degrees of sensitivity are normally (but variants exists):
  - public
  - proprietary
  - internal

# Commercial Security Policies (2)

- the **Clark-Wilson security policy:**
  - proposes a policy for *well-formed transactions*, which gives rules for the logistic process within the company, in terms of which steps must be performed by which person with a specified authority and in which order. Thus it addresses the *integrity aspect*.
- the Clark-Wilson security policy is defined in terms of access triples:

  **<UserID; TP; {$\mathbf{CDI_i}$,$\mathbf{CDI_k}$, ....}>,**

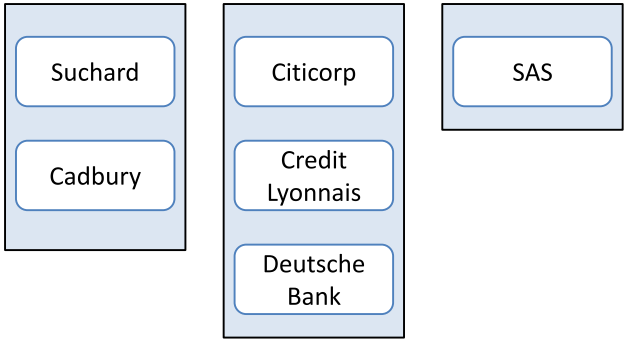
  which stands for
  - **User ID**entification,
  - **T**ransformation **P**rocedure and
  - **C**onstrained **D**ata **I**tems resp.

## Commercial Security Policies (3)

- **Lee, Nash and Poland** suggested an addition to the *Clark-Wilson* policy that involves *separation of duty*. The aim is to prevent abuse that can arise when the same person performs too many related actions in a company.
- the **Chinese Wall policy** [by Brewer and Nash] enforces rules that prevents flow of information between companies that may have conflicting interests, e.g. competing.
  – the policy is defined in terms of three primitives:
    - objects,
    - company groups, and
    - conflict classes.

  – and the same employee may not access information from different companies in the same conflict class. Thus it *addresses confidentiality*.

## Chinese Wall Policy Example



## Bell-La Padula Security Model

- **Simple Security Property**:
  A subject *s* may have *read* access to an object *o* only if C(*o*)≤C(*s*).

- ***-Property**:
  A subject *s* who has *read* access to an object *o* may have *write* access to an object *p* only if C(*o*)≤C(*p*).

## Bell- La Padula pros and cons

- **Advantages:**
  – A subject may not downgrade information

- **Problems:**
  – ”High” users can never talk to ”low” users
  – Addresses only confidentiality
  – Anyone can create an object with a higher classification
  – ”Float-up” (i.e. down-grade needed)
  – Does not address access control
  – Does not address covert channels

- **Principle of tranquility:**
  – Subjects and objects may not change their security level once they are instantiated