4.4. Types of Access Control

A security policy may use two types of access controls, alone or in combination. In one, access control is left to the discretion of the owner. In the other, the operating system controls access, and the owner cannot override the controls.

The first type is based on user identity and is the most widely known:

> **Definition 4–13.** If an individual user can set an access control mechanism to allow or deny access to an object, that mechanism is a **discretionary access control** (DAC), also called an **identity-based access control** (IBAC).

Discretionary access controls base access rights on the identity of the subject and the identity of the object involved. Identity is the key; the owner of the object constrains who can access it by allowing only particular subjects to have access. The owner states the constraint in terms of the identity of the subject, or the owner of the subject.

> EXAMPLE: Suppose a child keeps a diary. The child controls access to the diary, because she can allow someone to read it (grant read access) or not allow someone to read it (deny read access). The child allows her mother to read it, but no one else. This is a discretionary access control because access to the diary is based on the identity of the subject (mom) requesting read access to the object (the diary).

The second type of access control is based on fiat, and identity is irrelevant:

> **Definition 4–14.** When a system mechanism controls access to an object and an individual user cannot alter that access, the control is a **mandatory access control** (MAC), occasionally called a **rule-based access control**.

The operating system enforces mandatory access controls. Neither the subject nor the owner of the object can determine whether access is granted. Typically, the system mechanism will check information associated with both the subject and the object to determine whether the subject should access the object. Rules describe the conditions under which access is allowed.

> EXAMPLE: The law allows a court to access driving records without the owners' permission. This is a mandatory control, because the owner of the record has no control over the court's accessing the information.

Definition 4–15. An **originator controlled access control** (ORCON or ORGCON) bases access on the creator of an object (or the information it contains).

The goal of this control is to allow the originator of the file (or of the information it contains) to control the dissemination of the information. The owner of the file has no control over who may access the file. Section 7.3 discusses this type of control in detail.

EXAMPLE: Bit Twiddlers, Inc., a company famous for its embedded systems, contracts with Microhackers Ltd., a company equally famous for its microcoding abilities. The contract requires Microhackers to develop a new microcode language for a particular processor designed to be used in high-performance embedded systems. Bit Twiddlers gives Microhackers a copy of its specifications for the processor. The terms of the contract require Microhackers to obtain permission before it gives any information about the processor to its subcontractors. This is an originator controlled access mechanism because, even though Microhackers owns the file containing the specifications, it may not allow anyone to access that information unless the creator, Bit Twiddlers, gives permission.
