

The Access Control Matrix

		Objects				
		1	2	3	4	5
Subjects	1		R		R	
	2			R,W		R,W
	3	R,X	R,W	R,W		
	4			R		

objects: the things to be protected, e.g., files

subjects: users, groups, roles

matrix entries: access rights, i.e., operations allowed by a subject on an object

A common implementation is an *access control list* for each object.

Access Control Administration

- there must be a mechanism for changing the access rights describe in the access control matrix
 - set of subjects is dynamic
 - set of objects is dynamic
 - access rights may need to change
- some approaches
 - encode access control change rights in the access control matrix
 - * add “owner” as a possible access right. Subject with owner rights on object x can change access rights in x 's column.
 - new users/subjects can inherit rights from others

Example: Access Rights in Unix

- subjects are users and groups (group membership is maintained separately)
- each object has an owner and a group
- access rights are specified for the owner, for the group, and for everyone else
- object access rights can be modified by the object owner
- major access rights are read, write, and execute
- access controls can be applied to files, devices, shared memory segments, and more.

Authentication

- object access is performed by processes
- to apply access controls, it is necessary to associate processes with users
- this requires user *authentication*
- some authentication techniques:
 - passwords
 - cryptographic (e.g., public key methods)
 - physical tokens (e.g., smart cards)
 - biometrics

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