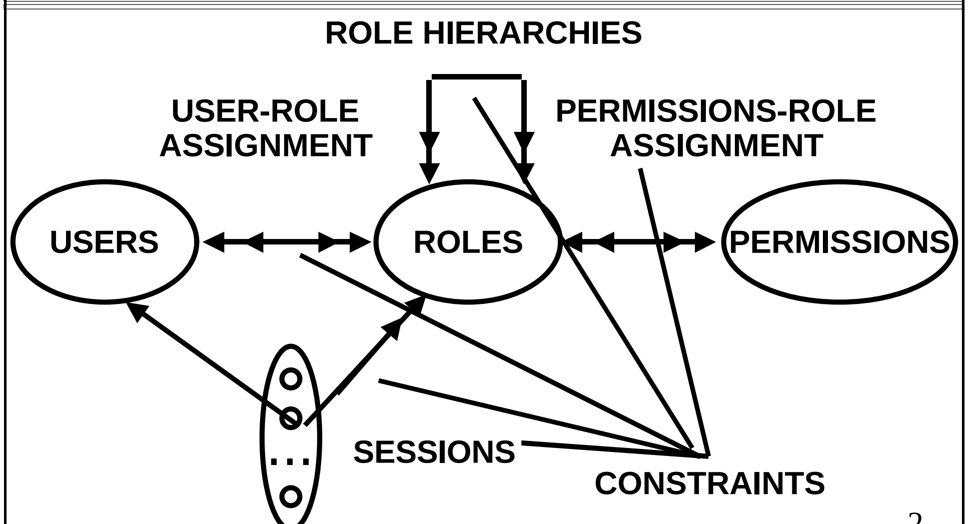
INFS 767 Fall 2000

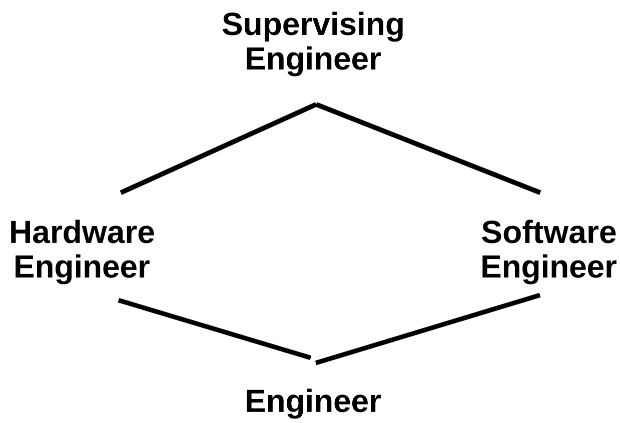
RBAC-LBAC-DAC

Prof. Ravi Sandhu

RBAC96



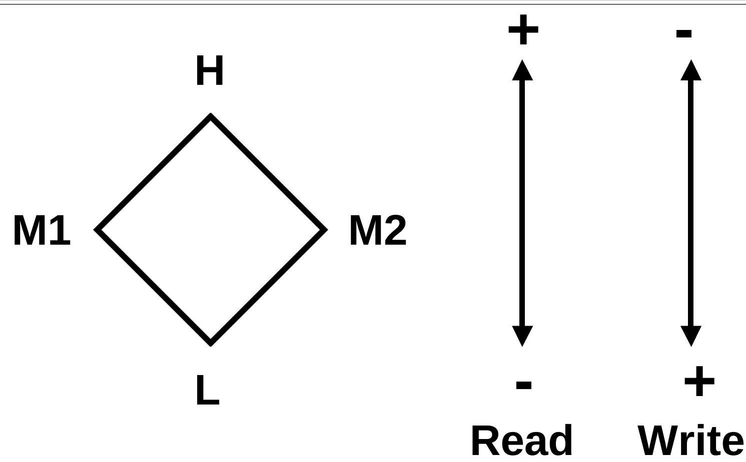
HIERARCHICAL ROLES



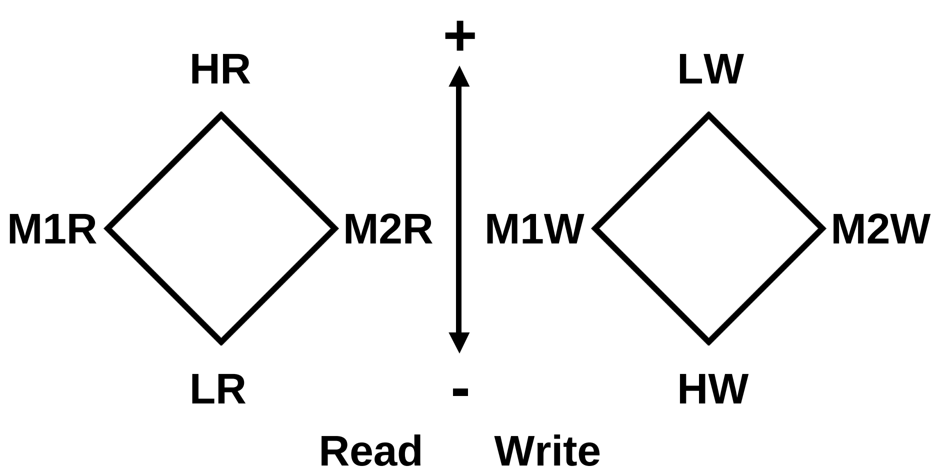
WHAT IS THE POLICY IN RBAC?

- **RBAC is policy neutral**
  - **Role hierarchies facilitate security management**
  - **Constraints facilitate non-discretionary policies**

LBAC: LIBERAL *-PROPERTY



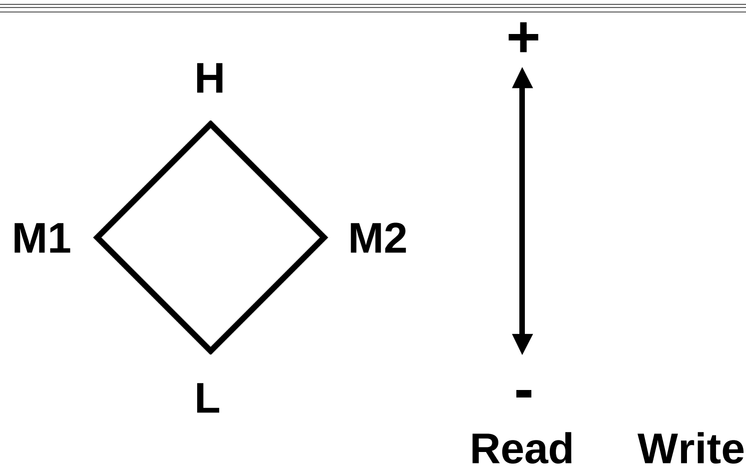
RBAC96: LIBERAL *-PROPERTY



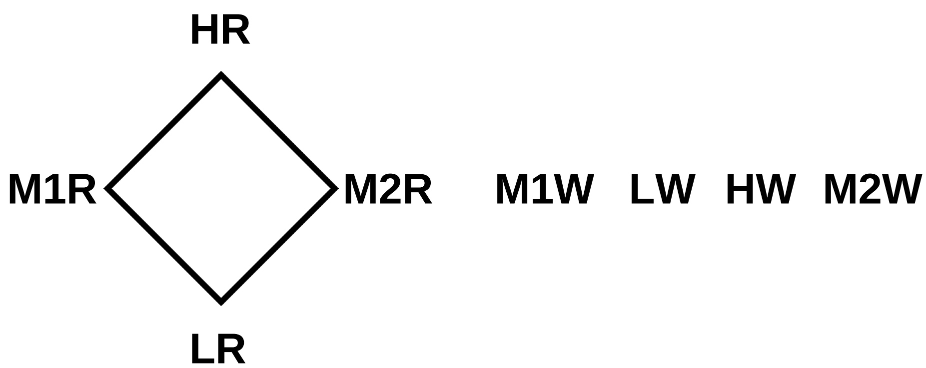
RBAC96: LIBERAL *-PROPERTY

- user ∈ xR, user has clearance x
  user ∈ LW, independent of clearance
- Need constraints
  - session ∈ xR iff session ∈ xW
  - read can be assigned only to xR roles
  - write can be assigned only to xW roles
  - (O,read) assigned to xR iff
    (O,write) assigned to xW

LBAC: STRICT *-PROPERTY



RBAC96: STRICT *-PROPERTY



Variations of DAC

- **Strict DAC**
- **Liberal DAC**

Strict DAC

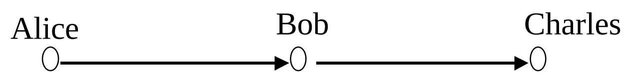
- Only owner has a discretionary authority to grant access to an object.
- Example:
  - Alice has created an object (he is owner) and grants access to Bob. Now Bob cannot grant propagate the access to another user.

Liberal DAC

- Owner can delegate discretionary authority for granting access to other users.
  - One Level grant
  - Two Level Grant
  - Multilevel Grant

One Level Grant

- Owner can delegate authority to another user but they cannot further delegate this power.



Two Level Grant

- In addition a one level grant the owner can allow some users to delegate grant authority to other users.

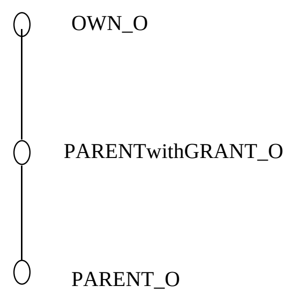
Revocation

- Grant-Independent Revocation.
- Grant-Dependent Revocation.

Common Aspects

- **Creation of an object in the system requires the simultaneous creation of**
  - **three administrative roles**
    - **OWN_O, PARENT_O, PARENTwithGRANT_O**
  - **One regular role**
    - **READ_O**

Administration of roles associated with object O



Administrative role hierarchy

Common Aspects II

- **We require simultaneous creation of Eight Permissions**
  - **canRead_O**
  - **destroyObjet_O**
  - **addReadUser_O, deleteReadUser_O**
  - **addParent_O, deleteParent_O**
  - **addParentWithGrant_O, deleteParentWithGrant_O**

Roles and associated Permissions

- **OWN_O**
  - **destroyObject_O, addParentWithGrant_O, deleteParentWithgrant_O**
- **PARENTwithGRANT_O**
  - **addParent_O, deleteParent_O**
- **PARENT_O**
  - **addReadUser_O, deleteReadUser_O**
- **READ_O**
  - **canRead_O**

Common Aspects III

- **Destroying an object O requires deletion of four roles and eight permissions in addition of destroying the object O.**

Strict DAC in RBAC96

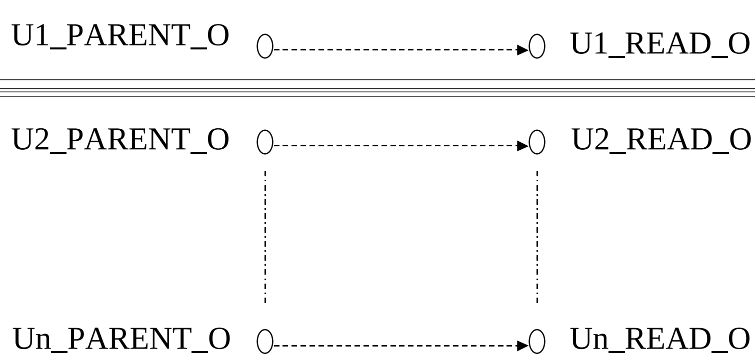
- **Cardinality constraints as:**
  - **Role OWN_O = 1**
  - **Role PARENTwithGRANT_O = 0**
  - **Role PARENT_O = 0**

One level DAC in RBAC96

- **Cardinality constraints as:**
  - **Role OWN_O = 1**
  - **Role PARENTwithGRANT_O = 0**

Two Level DAC in RBAC96

- Cardinality constraints as:
  - Role OWN_O = 1



READ_O role associated with members of PARENT_O