INFS 767 Fall 2003

RBAC-MAC-DAC

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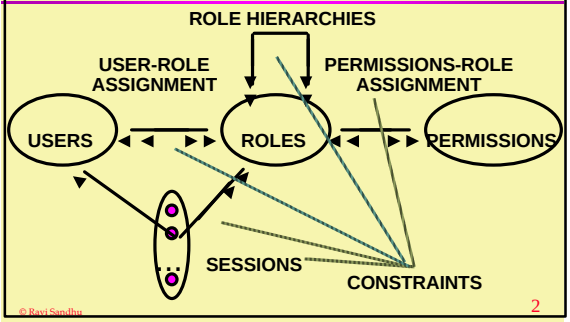
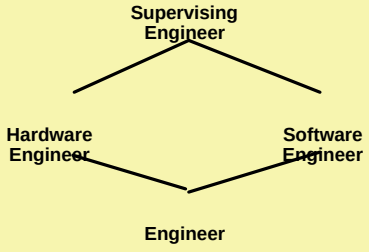
RBAC96



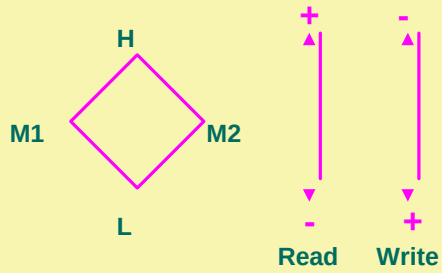
HIERARCHICAL ROLES



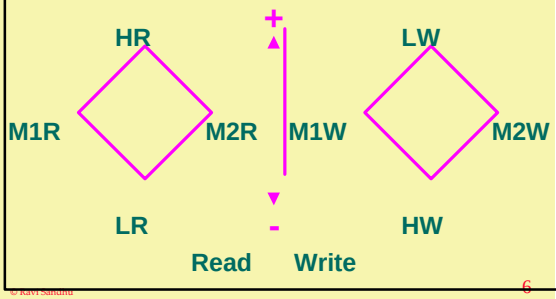
WHAT IS THE POLICY IN RBAC?

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

LBAC: LIBERAL *-PROPERTY



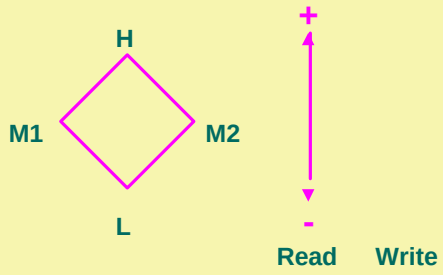
RBAC96: LIBERAL *-PROPERTY



RBAC96: LIBERAL *-PROPERTY

- user Î xR, user has clearance x
  user Î LW, independent of clearance
- Need constraints
  - session Î xR iff session Î 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

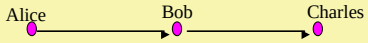
- Only owner has discretionary authority to grant access to an object.
- Example:
  - Alice has created an object (she is owner) and grants access to Bob. Now Bob cannot grant propagate the access to another user.

Liberal DAC

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

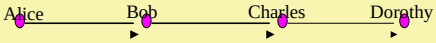
One Level Grant

- 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.

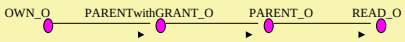


Revocation

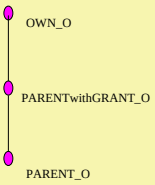
- Grant-Independent Revocation.
- Grant-Dependent Revocation.

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

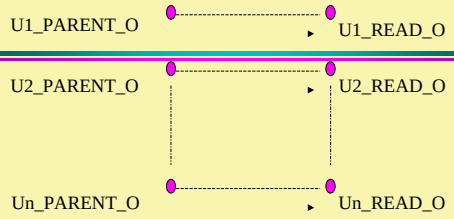
- Cardinality constraints as:
  - Role OWN_O = 1
  - Role PARENTwithGRANT_O = 0
  - Role PARENT_O = 0

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