Lecture 4: RBAC-LBAC

OUTLINE

- RBAC96 model: policy neutral
- LBAC models: policy full and varied
- LBAC can be reduced to RBAC96
  - LBAC < RBAC96?
- why bother to do this?
**RBAC96**

**ROLE HIERARCHIES**

- USER-ROLE ASSIGNMENT
- PERMISSION-ROLE ASSIGNMENT

- USERS
- ROLES
- PERMISSIONS
- SESSIONS

**HIERARCHICAL ROLES**

- Supervising Engineer
  - Hardware Engineer
  - Software Engineer
  - Engineer
WHAT IS THE POLICY IN RBAC?

- RBAC is policy neutral
  - Role hierarchies facilitate security management
  - Constraints facilitate non-discretionary policies
Lecture 4: RBAC-LBAC

LBAC: LIBERAL *-PROPERTY

```
+  -
H  +  -
M1  M2
L

Read  Write
```

RBAC96: LIBERAL *-PROPERTY

```
HR  +  LW
M1R  M2R  M1W  M2W
LR  -  HW

Read  Write
```

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RBAC96: LIBERAL *-PROPERTY

- user $\in xR$, user has clearance $x$
- user $\in LW$, independent of clearance

Need constraints
- session $\in xR$ iff session $\in xW$
- 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

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<th>H</th>
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Read  Write
RBAC96: STRICT *-PROPERTY

HR
M1R M2R M1W LW HW M2W LR

LBAC: WRITE RANGE

H
M1 M2 L

• subjects have 2 labels
  ● read label
  ● write label

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RBAC96: WRITE RANGE

LIBERAL *-PROPERTY

HR
M1R
M2R
LR
M1W
M2W
LW
HW

read role \(\circ\) write role

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RBAC96: WRITE RANGE

STRICT *-PROPERTY

HR
M1R
M2R
M1W
LW
HW
M2W
LR

read role \(\circ\) write role

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LBAC: CONFIDENTIALITY AND INTEGRITY

two independent lattices

one composite lattice

RBAC96: CONFIDENTIALITY AND INTEGRITY READ ROLES

Same for all cases
RBAC96: CONFIDENTIALITY AND INTEGRITY WRITE ROLES

- LSW-HIW
- HSW-HIW
- LSW-LIW
- HSW-LIW

Liberal confidentiality
Liberal integrity

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RBAC96: CONFIDENTIALITY AND INTEGRITY WRITE ROLES

- LSW-HIW
- HSW-HIW

- LSW-LIW
- HSW-LIW

Strict confidentiality
Liberal integrity

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RBAC96: CONFIDENTIALITY AND INTEGRITY WRITE ROLES

LSW-HIW  HSW-HIW  LSW-LIW  HSW-LIW

Strict confidentiality
Strict integrity

SUMMARY

- policy-neutral RBAC96 can accommodate policy-full LBAC in all its variations
- LBAC variations are modeled by
  - adjusting role hierarchy
  - adjusting constraints
COVERT CHANNELS

- are a problem for LBAC
- remain a problem for RBAC but
  - they don’t get any worse
  - same techniques can be adapted
  - who cares about them anyway