

# ECS 235B Module 5

## Attribute-Based Access Control Matrix

# Attributes

- *attribute*: variable of a specific data type associated with an entity
- $att(o)$ : set of attribute values associated with  $o$ , called the *attribute value tuple* of  $o$ 
  - Each attribute is written  $o.a_i$ , with value  $v$  drawn from set  $Va_i$
- *attribute predicate*: boolean expression built from attributes and constants with appropriate operation and relation symbols
  - Unary predicate: built from one attribute
  - Binary predicate: built from two attributes
  - Can have as many attributes in a predicate as needed
  - Example:  $Alice.credit \geq \$100.00$

# Attribute Based Access Control Matrix (ABAM)

- Change access control matrix so rows correspond to subjects and their attributes, and columns correspond to objects and their attributes
- Note access control matrix discussed previously is special case
  - Just make the attribute sets be empty

# Primitive Operations

- **enter, delete** as before
- **create subject  $s$  with attribute tuple  $att(s)$** : create subject  $s$  with given attribute tuple; additionally, add an identity attribute with a unique value
- **create object  $o$  with attribute tuple  $att(o)$** : create object  $o$  with given attribute tuple; additionally, add an identity attribute with a unique value
- **destroy** as before except it also deletes. the associated attribute tuple
- **update attribute  $o.a_i$** : update  $att(o) = (v_1, \dots, v_i, \dots, v_n)$  to  $att(o)' = (v_1, \dots, v_i', \dots, v_n)$ , where  $v_i, v_i' \in Va_i$ , and  $v_i \neq v_i'$

# Commands

- Like previous commands, except that conditions may include attribute predicates
- Let  $p$  give  $q$   $r$  rights over  $f$ , if  $p$  owns  $f$  and value of  $p$ 's attribute *jobcode* is between 3 and 5 inclusive

```
command grant•read•file•attribute•3to5( $p$ ,  $f$ ,  $q$ )  
  if own in  $A[p, f]$  and  $3 \leq p.\text{jobcode}$  and  $p.\text{jobcode} \leq 5$   
  then  
    enter  $r$  into  $A[q, f]$ ;  
end
```