

**In Class Assignment – Access Control Matrices**  
**October 4, 2009 — Professor Patrick McDaniel**

*Please read the instructions and questions carefully and complete this assignment by yourself.* You will be graded for clarity and correctness.

1. Draw a access control matrices for the following UNIX filesystem. Group G1 contains S1 and S3, group G2 contains S3.

User	Group	Access (U/G/W)	File
S1	G1	rwxrwxrwx	a.txt
S1	G2	-----rwx	b.txt
S2	G1	---rwx---	c.txt
S1	G1	r-xr-----	d.txt
S1	G1	rw--wx---	e.txt
S2	G2	rwxr-----	f.txt

2. There are four military buses ( $B_1, B_2, B_3, B_4$ ) transporting two Army troops ( $A_1, A_2$ ) and two Navy troops ( $N_1, N_2$ ). Buses  $B_1$  and  $B_2$  are owned by the Army, and  $B_3$  and  $B_4$  by the Navy. The troops can ride on any bus so long as all of the following rules are respected simultaneously:
- The Army soldiers are allowed to ride on any bus so long as it is not owned by the Navy.
  - $A_1$  and  $N_1$  are only allowed to ride on an even numbered bus.
  - $N_2$  must ride on  $B_3$ .
- (a) Draw the access control matrix for this environment.

- (b) Assuming that only one troop/crew can fit on a bus, identify all assignments of troops to buses such that all troops are assigned a bus at the same time.

3. There is an apartment building with 10 apartments ( $A_1 \dots A_{10}$ ). The tenants share a single laundry room with a single clothes washers and dryers. The following rules apply to the use of the laundry room. Unless otherwise stated, any apartment may wash their clothes at any time.
- Apartments 1-5 must wash their clothes in the day and dry them at Night.
  - Apartments 6-10 must wash their clothes at night and dry them during the day.
  - Even numbered apartments must wash their clothes on the weekend.
  - Odd numbered apartments must wash their clothes during the week.
  - No apartment divisible by 3 can wash or dry their clothes on Fridays.
  - Apartment 9 can only dry its clothes at times apartment 7 can.

(a) Draw access control matrices for the laundry room.

(b) If possible, identify a schedule in which at least 9 apartments can wash and dry their clothes at least once a week, but no more than one apartment can wash or dry in a given or night or day. Fill in the following schedule.

	Day Wash	Day Dry	Night Wash	Night Dry
Sunday				
Monday				
Tuesday				
Wednesday				
Thursday				
Friday				
Saturday				