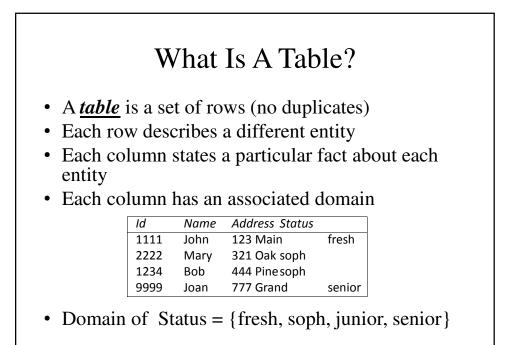
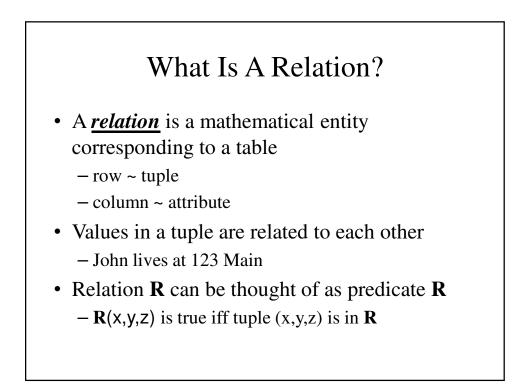
# CSC 443 – Database Management Systems

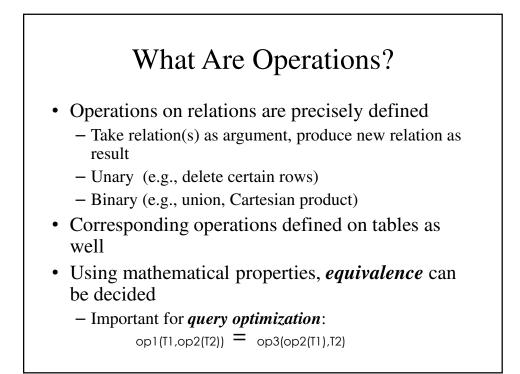
Lecture 2 –Databases: The Big Picture

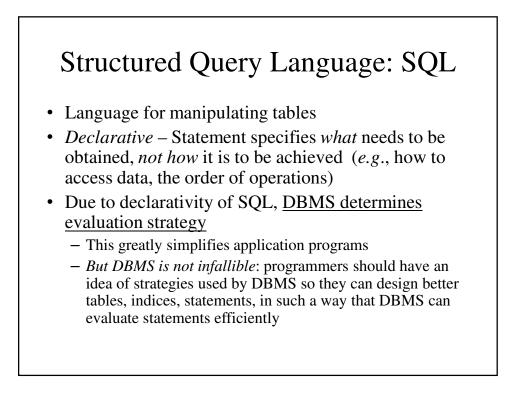
### Databases

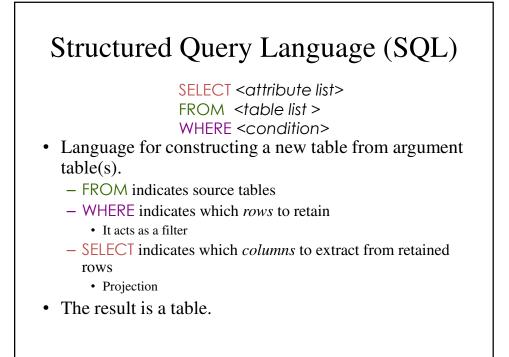
- There are three different types of databases:
  - Hierarchical databases
  - Network databases
  - Relational databases
- We are particularly interested in relational databases
- In relational databases, data is stored in tables.

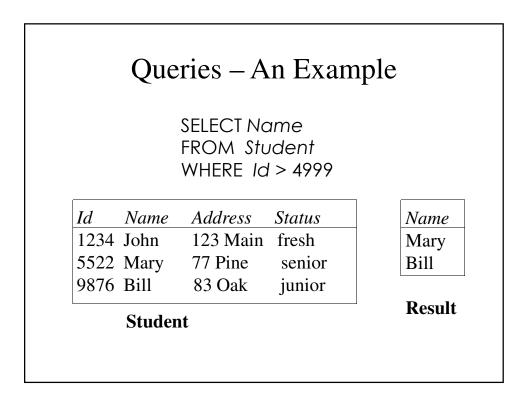


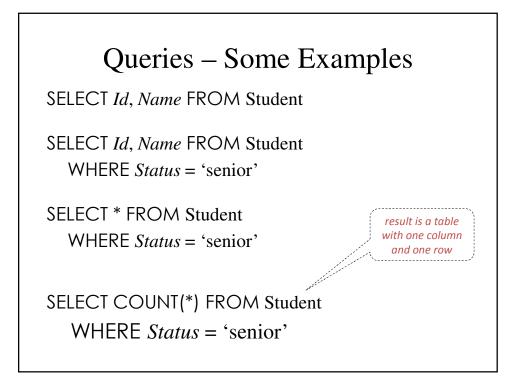


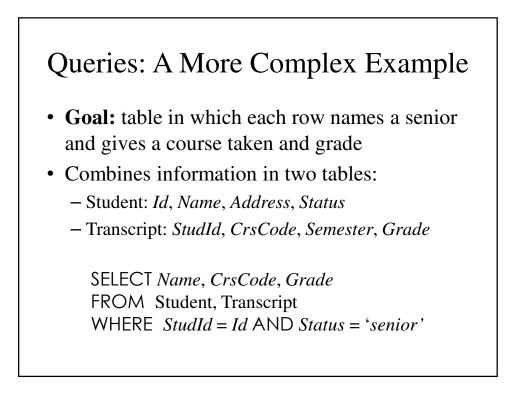




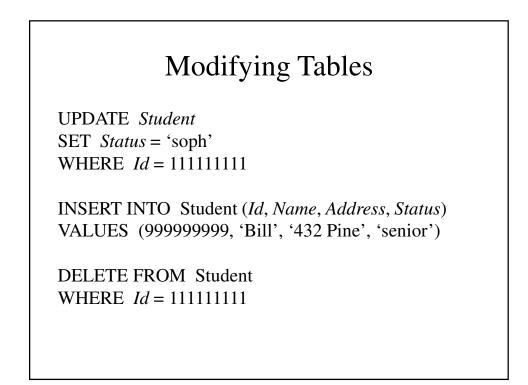


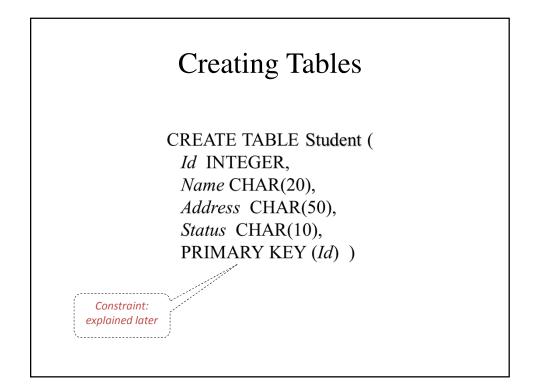


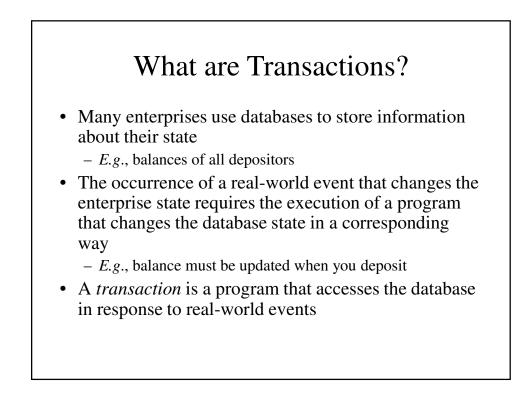


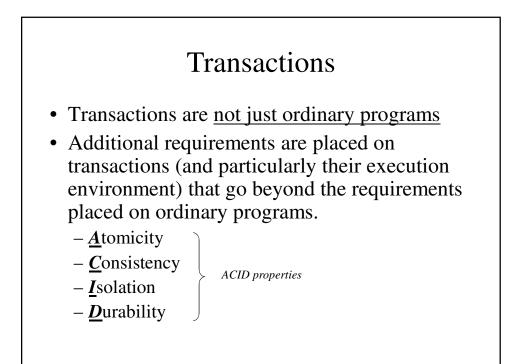


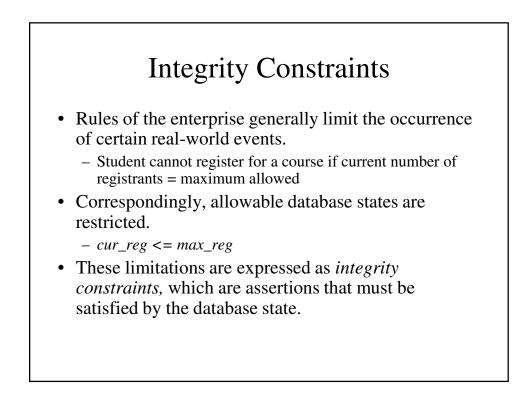
Join		T1		T2	
	a1	a2	аЗ	b1	b2
SELECT a1, b1	А	1	хху	3.2	17
FROM T1, T2 WHERE <i>a</i> 2 = <i>b</i> 2	В	17	rst	4.8	17
FROM T1, T2 yields:	a1	a2	аЗ	b1	b2
	А	1	хху	3.2	17
	А	1	хху	4.8	17
	В	17	rst	3.2	17
	В	17	rst	4.8	17
WHERE <i>a2</i> = <i>b2</i>	В	17	rst	3.2	17
yields:	В	17	rst	4.8	17
SELECT a1, b1		В	3.2		
yields result:			В	4.8	







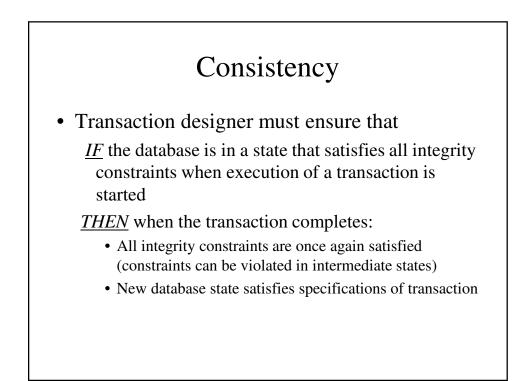




### Atomicity

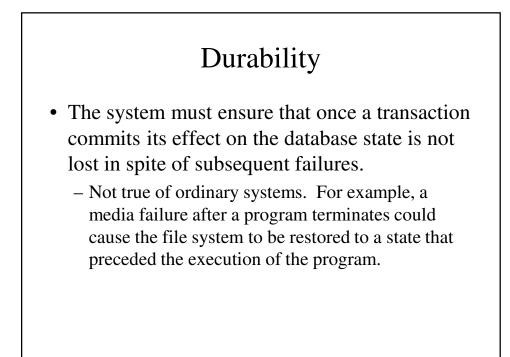
- A real-world event either happens or does not happen.
  - Student either registers or does not register.
- Similarly, the system must ensure that either the transaction runs to completion (*commits*) or, if it does not complete, it has no effect at all (*aborts*).

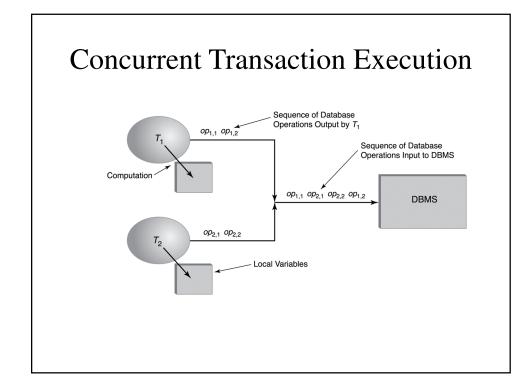
 This is not true of ordinary programs. A hardware or software failure could leave files partially updated.

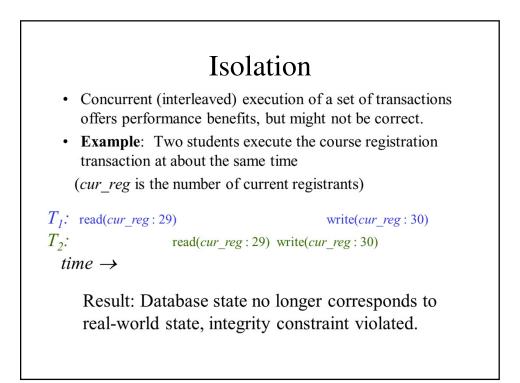


## Isolation

- Deals with the execution of multiple transactions concurrently.
- If the initial database state is consistent and accurately reflects the real-world state, then the *serial* (one after another) execution of a set of consistent transactions preserves consistency.
- But serial execution is *inadequate* from a performance perspective.







### Isolation

- The effect of concurrently executing a set of transactions must be the same as if they had executed serially in some order
  - The execution is thus not serial, but serializable
- Serializable execution has better performance than serial, but performance might still be inadequate. Database systems offer several isolation levels with different performance characteristics (but some guarantee correctness only for certain kinds of transactions – not in general)

