

Outline

- Databases and DBMSs
- Data Models and Data Independence

- Database Transactions
- DBMS Languages
- Development of DBMSs



What is a Database? Database • Large, integrated collection of data. • A database usually models a real-world enterprise. • Entities (e.g., instructors, students, courses) Properties (e.g., student number '11111', course title 'cscc43) Relationships (e.g., Lei is teaching CSCC43) Examples Student, payroll, customer, product databases Scientific and medical databases • You may not notice it, but databases are behind almost everything you do on the Web Google searches • Queries at Amazon, eBay, etc. ROSI • Other examples? 4









• A *database schema* is a description of a particular collection of data, using a given data model.













Database Transactions

- A transaction is an atomic sequence of database actions (read/write), I.e., it executes completely, or aborts leaving DB in a consistent state, if DB is consistent when transaction begins.
- Beyond this, the DBMS does not really understand the semantics of the data, e.g., how the interest on a bank account is computed.
- Thus, ensuring that a transaction (run alone) preserves consistency is ultimately the user's responsibility!











Database Languages

A DBMS supports several languages and several modes of use:

- Interactive textual query languages, such as SQL;
- Interactive commands embedded in a host programming language (Pascal, C, Cobol, Java, etc.)
- Interactive commands embedded in ad-hoc development languages (known as 4GL), usually with additional features (e.g., for the production of forms, menus, reports, ...)
- Form-oriented, non-textual user-friendly languages such as QBE.

Courses(]	itle R	oomCode Tr	strutor)		
Rooms(Co	de Bui	Idina Floor)	Sharony		
stances Courses	,		Rooms		
Title	RoomC	ode Instructor	Code	Building	Floor
Net works	N3	Dann y	DS1	Ex-OMI	Ground
Syste m s	N3	John	N3	Ex-OMI	Ground
Data bases	G	Lei	G	Science	Third
"list the title which is local ELECT Title	e, room ted on th e, ROO	code and buildi ne ground level" mCode, Buil	<i>ng of cours</i> ding	es that are t	taught in a























And How About These?	
SELECT a	
FROM R, S	
WHERE R.b = S.b;	
SELECT a	
FROM R	
WHERE b IN (SELECT b FROM S);	
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