Database Design Process

2-fold Process

- Model some part of the Real World (Miniworld) as DATA
- Determine the OPERATIONS to be used on this model.
- Both have DBMS independent and DBMS specific aspects.
REQUIREMENTS COLLECTION & ANALYSIS

• Discover DATA and OPERATIONS requirements
  – Interaction with the customer
• We will discuss DATA now, OPERATIONS later
• Questions
  – what data must be available?
  – How are data elements to be related?
• RESULT: DATABASE REQUIREMENTS

CONCEPTUAL DESIGN PROCESS

RESULT: High Level CONCEPTUAL SCHEMA
• ex: Entity Relationship Diagram
• Level of DESIGN, not CONCEPTUAL LEVEL of DBMS Architecture
LOGICAL DESIGN for DATA MODEL

• Implement High Level CONCEPTUAL SCHEMA in some Database
• Use DATA MODEL of that DB: Relational, Network, OO...
• RESULT: Database CONCEPTUAL SCHEMA
  – In RDB, Table Schemas and Constraints

PHYSICAL DESIGN

• Incorporates knowledge of how the data will be used:
  – from the operations analysis
• RESULT: INTERNAL SCHEMA
  – Layout
  – Clustering (what tables near other tables for faster disk access)
  – Access methods: B-Tree, Hash Table, Indexes
Database Design Process

OPERATIONS DESIGN PROCESS

Parallels DATA Design Process
REQUIREMENTS COLLECTION & ANALYSIS

- Discover OPERATIONS requirements
  - Interaction with the customer
- Questions
  - How will data be used?
  - Estimated Frequency of Operations
- RESULT: FUNCTIONAL REQUIREMENTS

FUNCTIONAL ANALYSIS

- Requirements are broken down into operations and sequences
- List of the transactions known to be required
- RESULT: High Level TRANSACTION SPECS
  - Info needed for PHYSICAL DESIGN of DB
APPLICATION PROGRAM DESIGN

• Can plan LOGIC of programs without full knowledge of final DB design
• RESULT: Program Skeleton

TRANSACTION IMPLEMENTATION

• Requires at least CONCEPTUAL DB DESIGN
• RESULT: APPLICATION PROGRAMS
Operations Design Process

Combined Design Process
Oracle Designer

- CASE Tool
  - Computer Assisted S/W Engineering
- Builds Database from ERDs
- Builds Beginnings of Applications for DB
  - Same look & feel
  - Finish with Oracle Developer

High Level Diagrams ⇒ DB & Apps.

- Build ERD (in Oracle Dialect)
- **Build Model of business operations using one of several tools**
  - Business Process Modeller
  - Data Flow Diagrammer
  - Hierarchical Input Output (HIPO) chart
- **Cross check**
  - Is all data mentioned in model found in ERD?
  - Is all data collected in ERD needed in model?
ERD to DB Diagram

- “Click” → Database diagram
- Fill-out-forms for DB fields
  - All caps
  - Limited set of values
  - Always show as Dropdown List
- “Click” → DDL for DB
  - Create Table statements
  - Package of triggers enforcing constraints for each table

Model to Applications

- “Click”: Model + DB Diag → Raw Apps
- Overall styling, look & feel with Designer
- Final perfection with Oracle Developer, a tool like Visual Basic.
This Course

Entity Relationship Diagram
Database Diagram
DDL
Go to Biz School for modeling.