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# Database Design Process

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# 2-fold Process

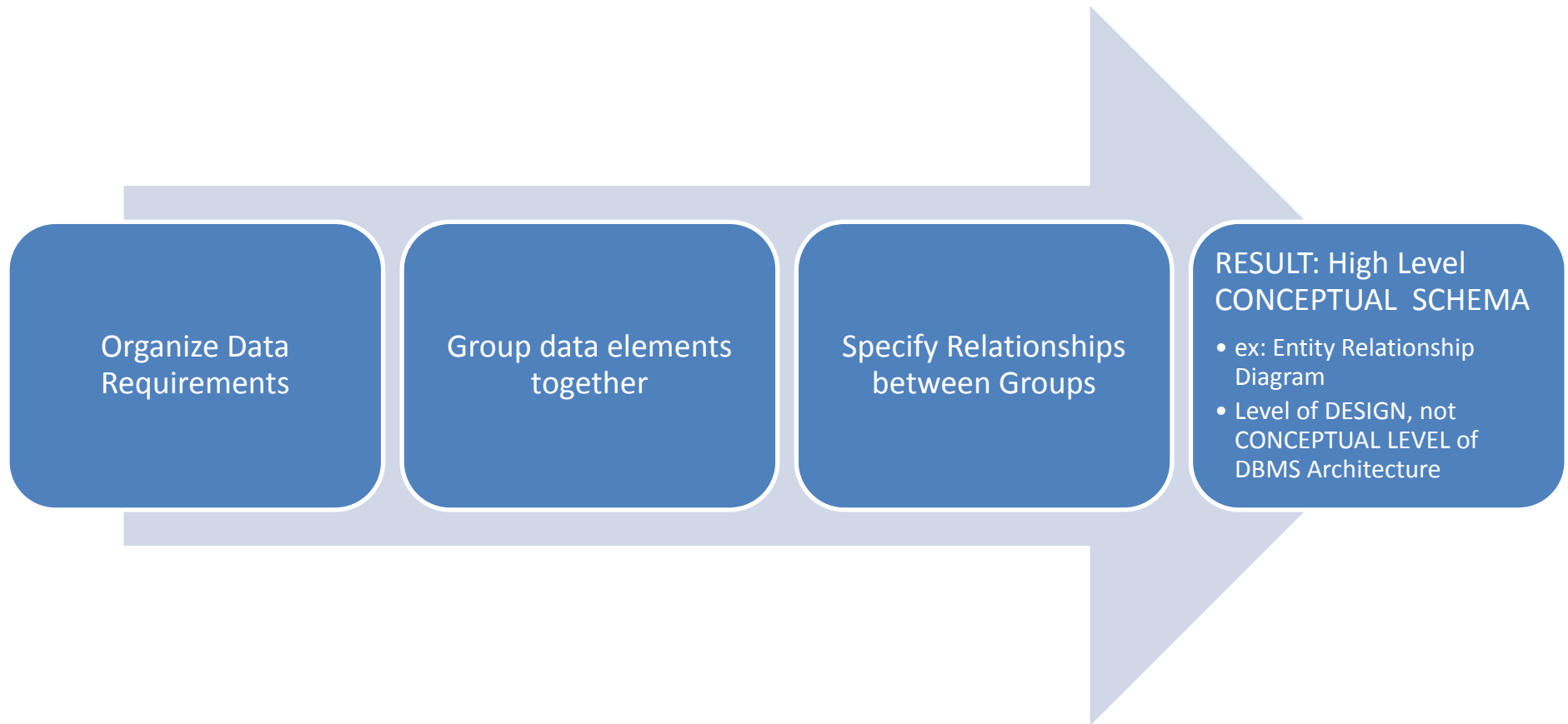
- Model some part of the Real World (Miniworld) as DATA
- Determine the OPERATIONS to be used on this model.
- Both have DBMS independent and DBMS specific aspects.

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# 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



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# LOGICAL DESIGN for DATA MODEL

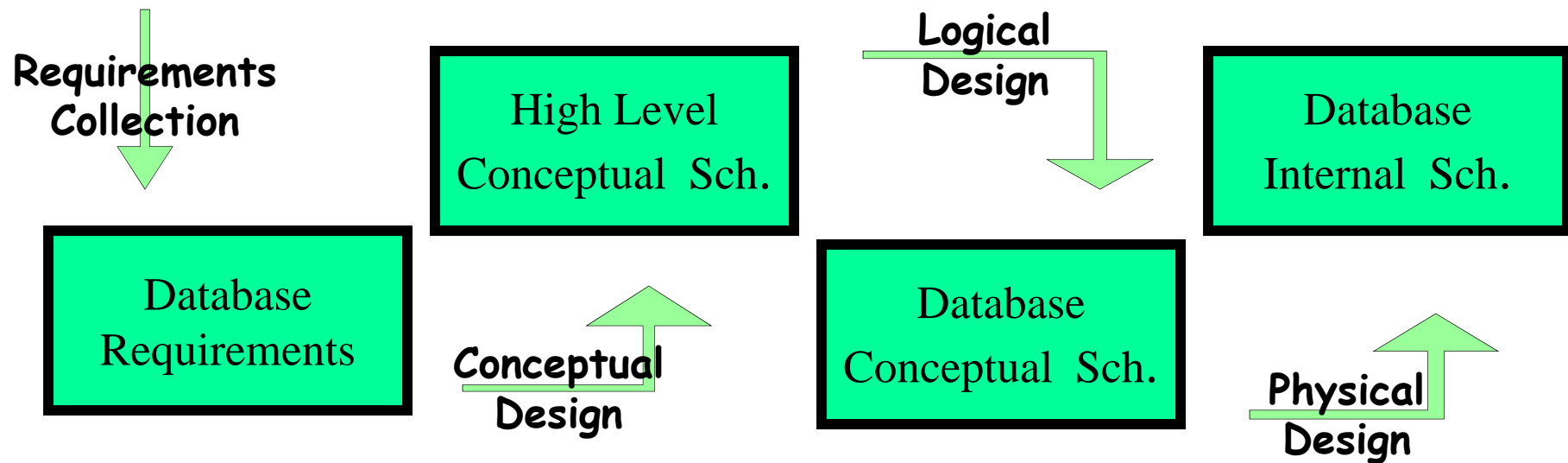
- Implement High Level CONCEPTUAL SCHEMA in some Database
- Use DATA MODEL of that DB: Relational, Network, OO...
- RESULT: Database CONCEPTUAL SCHEMA
  - In RDB, Table Schemas and Constraints

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# 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
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# Database Design Process



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# OPERATIONS DESIGN PROCESS

Parallels DATA Design Process

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# REQUIREMENTS COLLECTION & ANALYSIS

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

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# 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

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# APPLICATION PROGRAM DESIGN

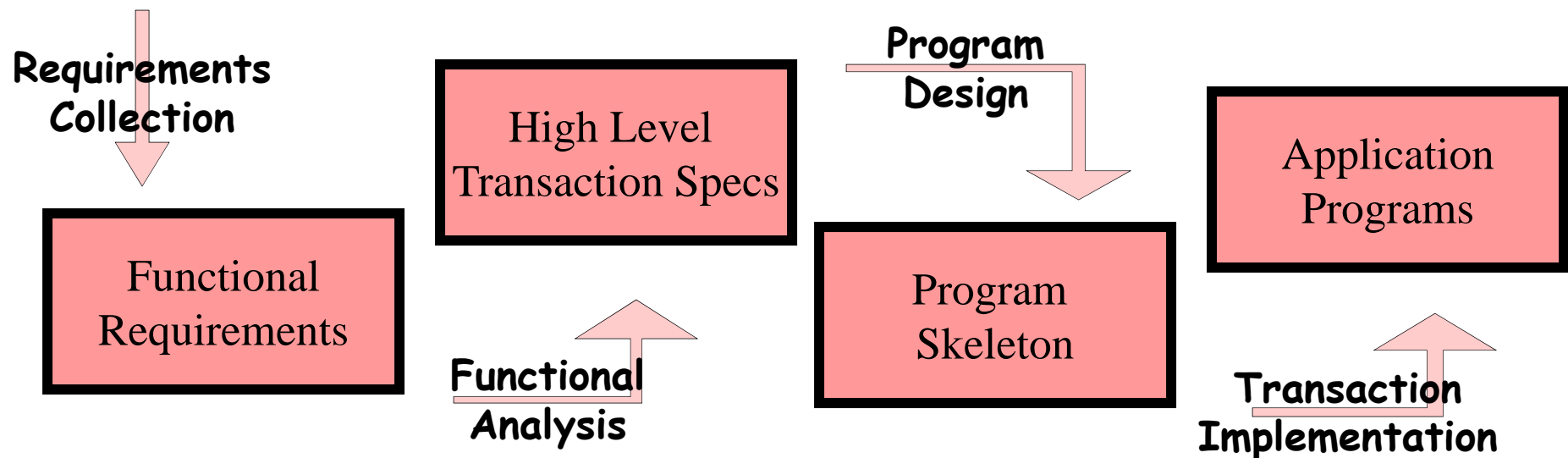
- Can plan LOGIC of programs without full knowledge of final DB design
- RESULT: Program Skeleton

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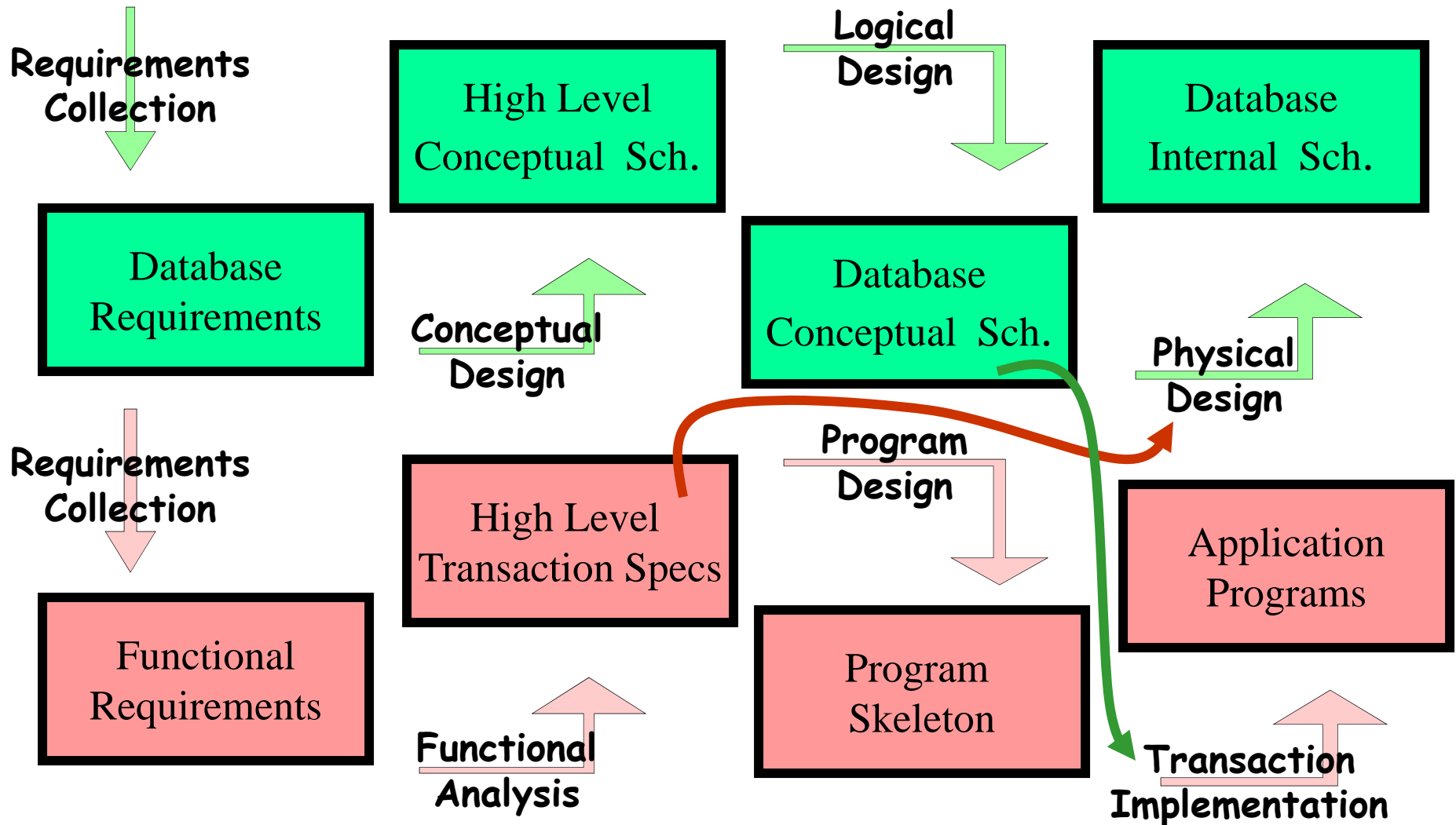
# TRANSACTION IMPLEMENTATION

- Requires at least CONCEPTUAL DB DESIGN
- RESULT: APPLICATION PROGRAMS

# Operations Design Process



# Combined Design Process



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# 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

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# High Level Diagrams $\Rightarrow$ 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?



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# 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
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# 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.

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# This Course

Entity Relationship Diagram

Database Diagram

DDL

Go to Biz School for modeling.