

Chapter 2: The Database Development Process

Modern Database Management

6th Edition

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Information Systems Architecture (ISA)

Overall blueprint for organization's information systems

Consists of:

- Data (Enterprise Data Model – simplified ER Diagram)
- Processes – data flow diagrams, process decomposition, etc.
- Data Network – topology diagram (like fig 1.8)
- People – people management using project management tools (Gantt charts, etc.)
- Events and Points in Time (when processes are performed)
- Reasons for events and rules (e.g. decision tables)

Information Engineering

A data-oriented methodology to create and maintain information systems

Top-down planning approach.

Four steps:

- *Planning*
 - Results in an **Information Systems Architecture**
- *Analysis*
 - Results in **functional specifications**...i.e. what we want
- *Design*
 - Results in **design specifications**...i.e. how we'll do it
- *Implementation*
 - Results in final **operational system**

Information Systems Planning

Strategy development

- IT Planning to meet Corporate strategy

Three steps:

1. Identify strategic planning factors
2. Identify corporate planning objects
3. Develop enterprise model

Identify Strategic Planning Factors (table 2.1)

Organization goals – what we hope to accomplish

Critical success factors – what **MUST** work in order for us to survive

Problem areas – weaknesses we now have

Identify Corporate Planning Objects (table 2.3)

Organizational units

Organizational locations

Business functions – these might become the users

Entity types – the things we are trying to model

Information (application) systems

Develop Enterprise Model

Decomposition of business functions

- See figure 2.2

Enterprise data model

- See figure 2.1

Planning matrixes

- See figure 2.3

Enterprise Data Model

First step in database development

Specifies scope and general content

Overall picture of organizational data, not specific design

Entity-relationship diagram

Descriptions of entity types

Relationships between entities

Business rules

Figure 2-1 Segment from enterprise data model (Pine Valley Furniture Company) [simplified E-R diagram, repeat of figure 1.3]

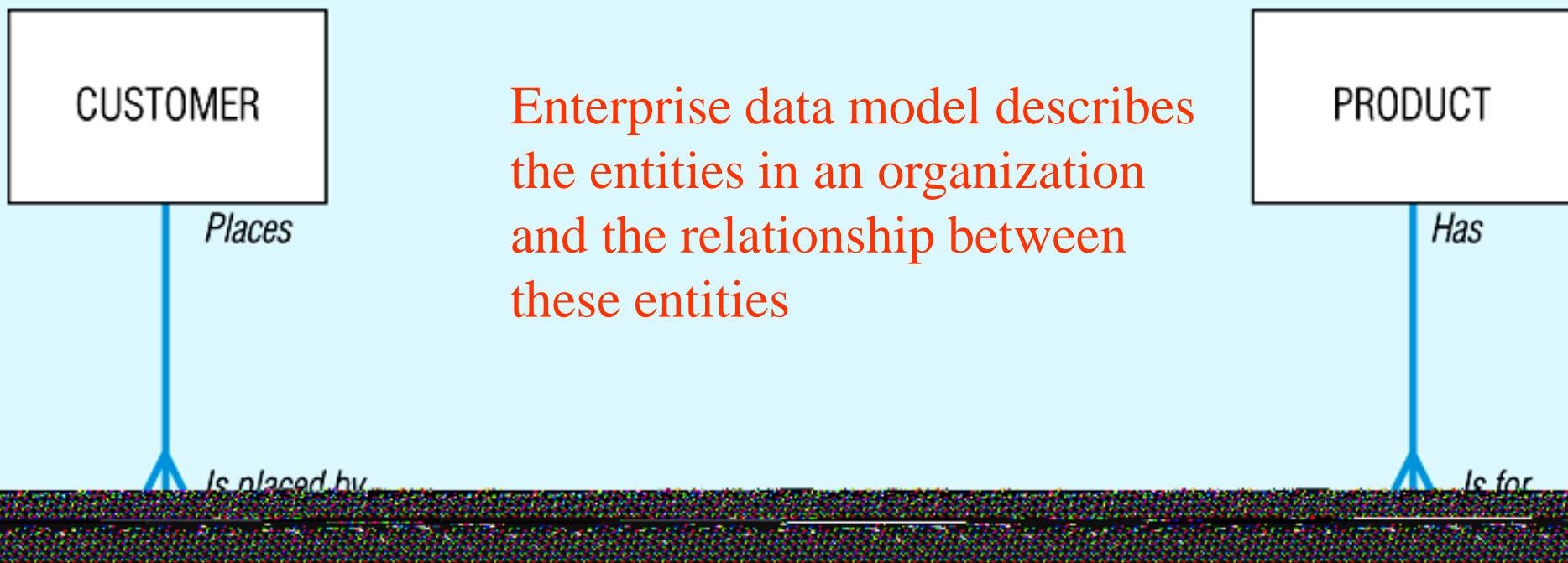


Figure 2.2 -- Example of process decomposition of an order fulfillment function (Pine Valley Furniture)

Decomposition -- breaking large tasks into smaller tasks in a hierarchical structure chart

Planning Matrixes

Function-to-data entity

Location-to-function

Unit-to-function

IS-to-data entity

Supporting function-to-data entity

- which data are captured, used, updated, deleted within each function

IS-to-business objective

Example business function-to-data entity matrix (fig. 2.3)

Business Function (users) \ Data Entity Types	Customer	Product	Raw Material	Order	Work Center	Work Order	Invoice	Equipment	Employee
Business Planning	X	X						X	X
Product Development		X	X		X			X	
Materials Management		X	X	X	X	X		X	
Order Fulfillment	X	X	X	X	X	X	X	X	X
Order Shipment	X	X		X	X		X		X
Sales Summarization	X	X		X			X		X
Production Operations		X	X	X	X	X		X	X
Finance and Accounting	X	X	X	X	X		X	X	X

Alternative Approaches to Database and IS Development

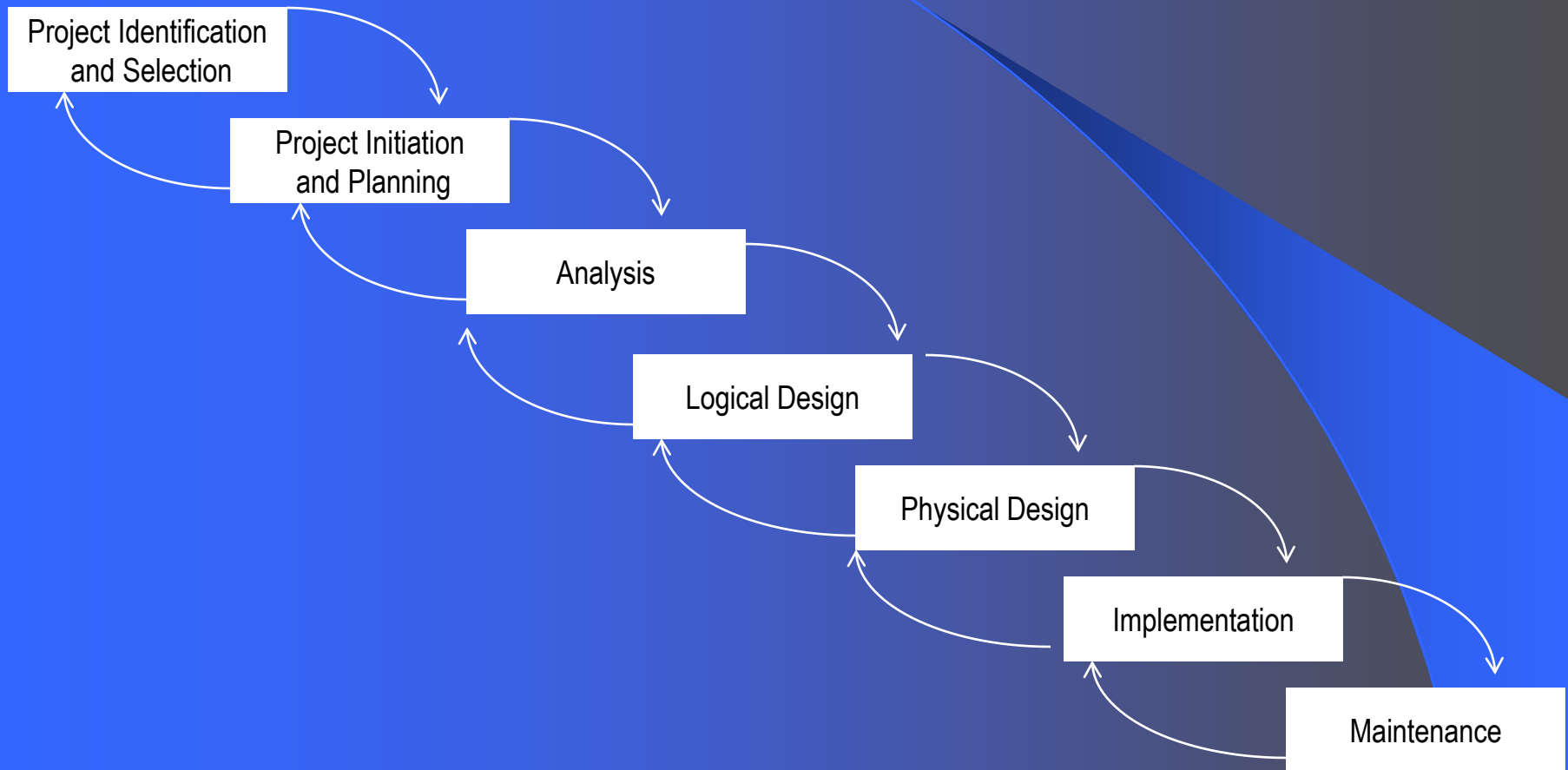
SDLC

- System Development Life cycle
- Detailed, well-planned development process
- Time-consuming, but comprehensive
- Long development cycle

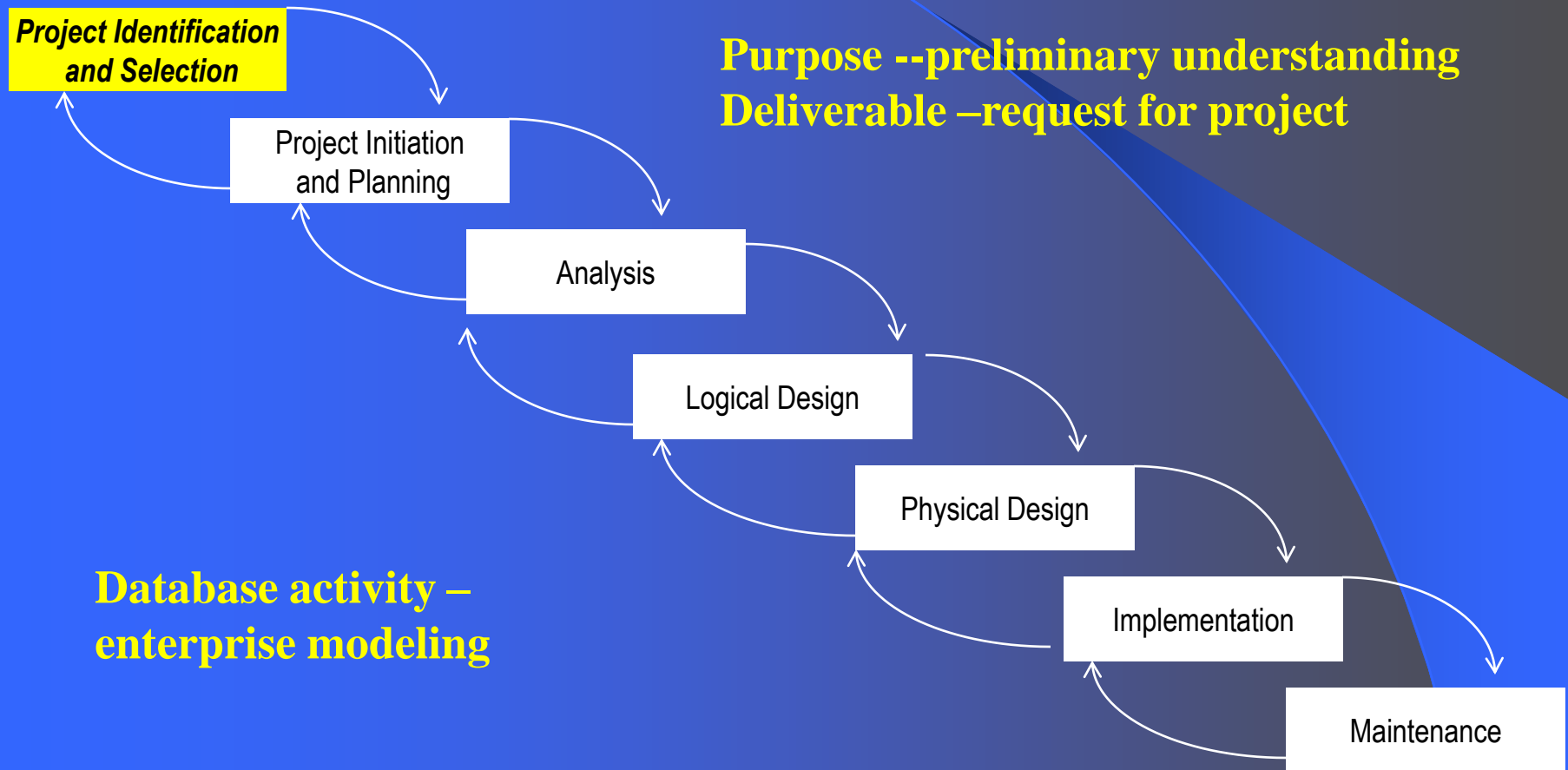
Prototyping

- Rapid application development (RAD)
- cursory attempt at conceptual data modeling.
- Define database during development of initial prototype.
- Repeat implementation and maintenance activities with new prototype versions.

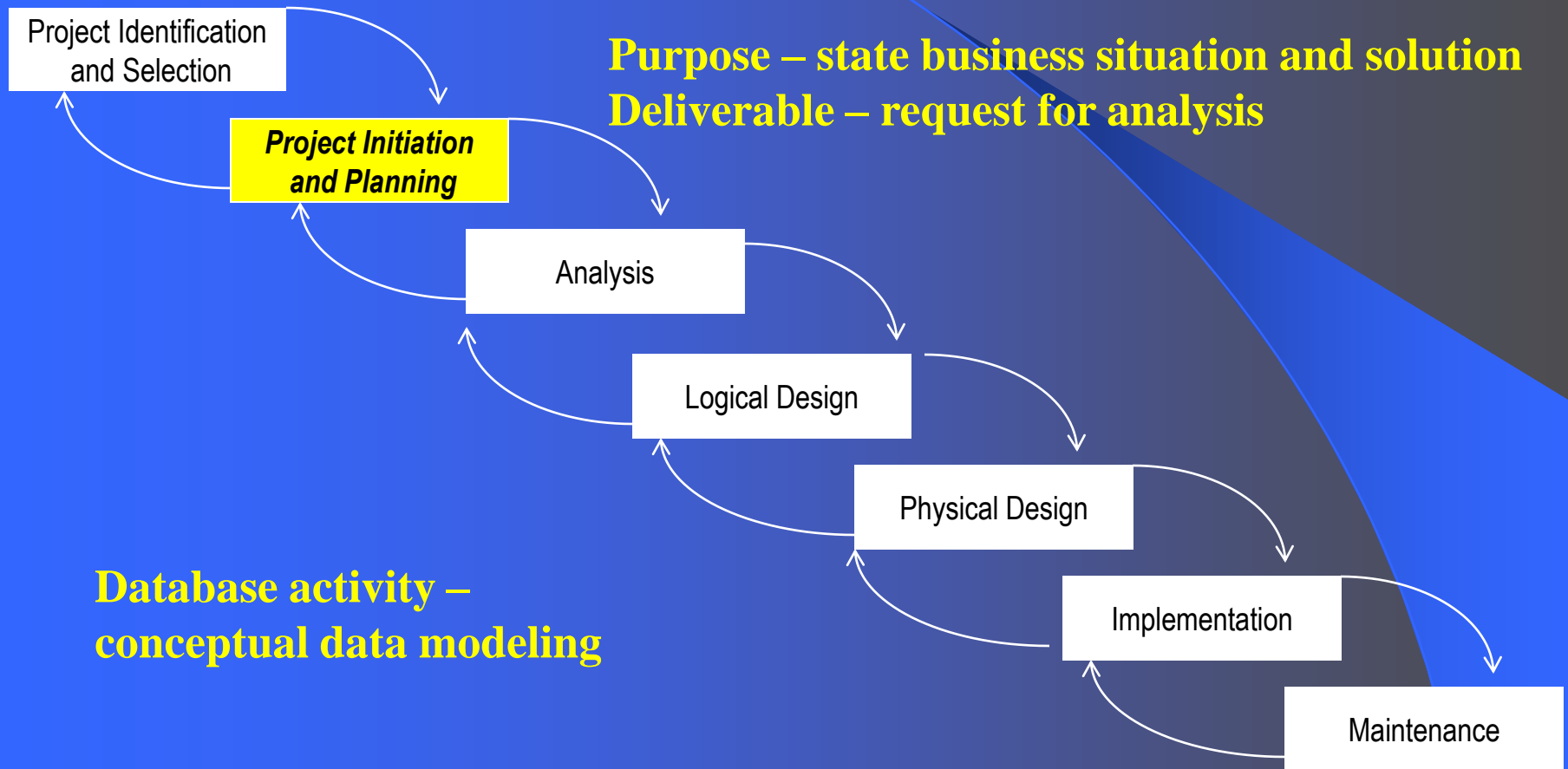
Systems Development Life Cycle (figures 2.4, 2.5)



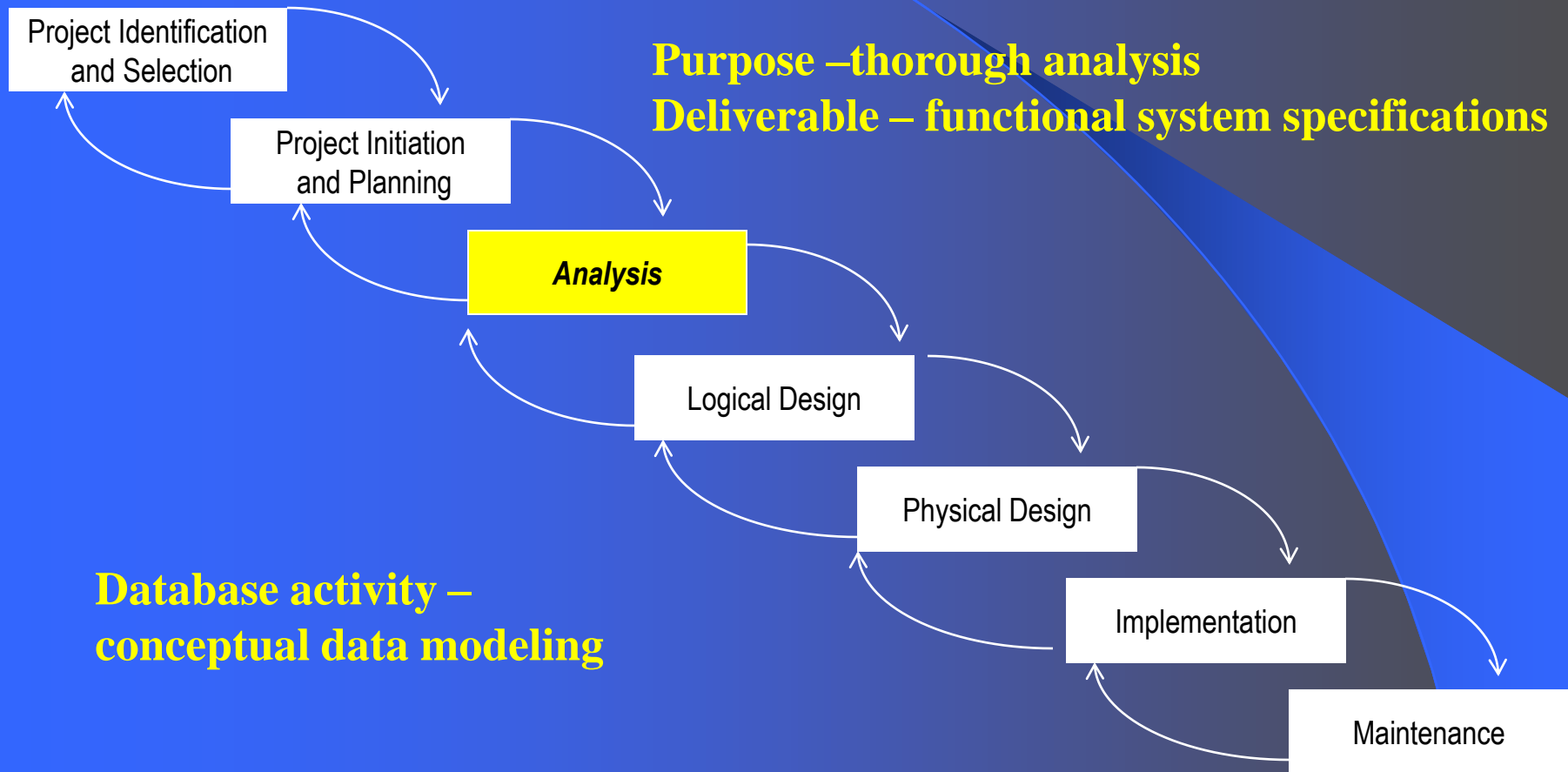
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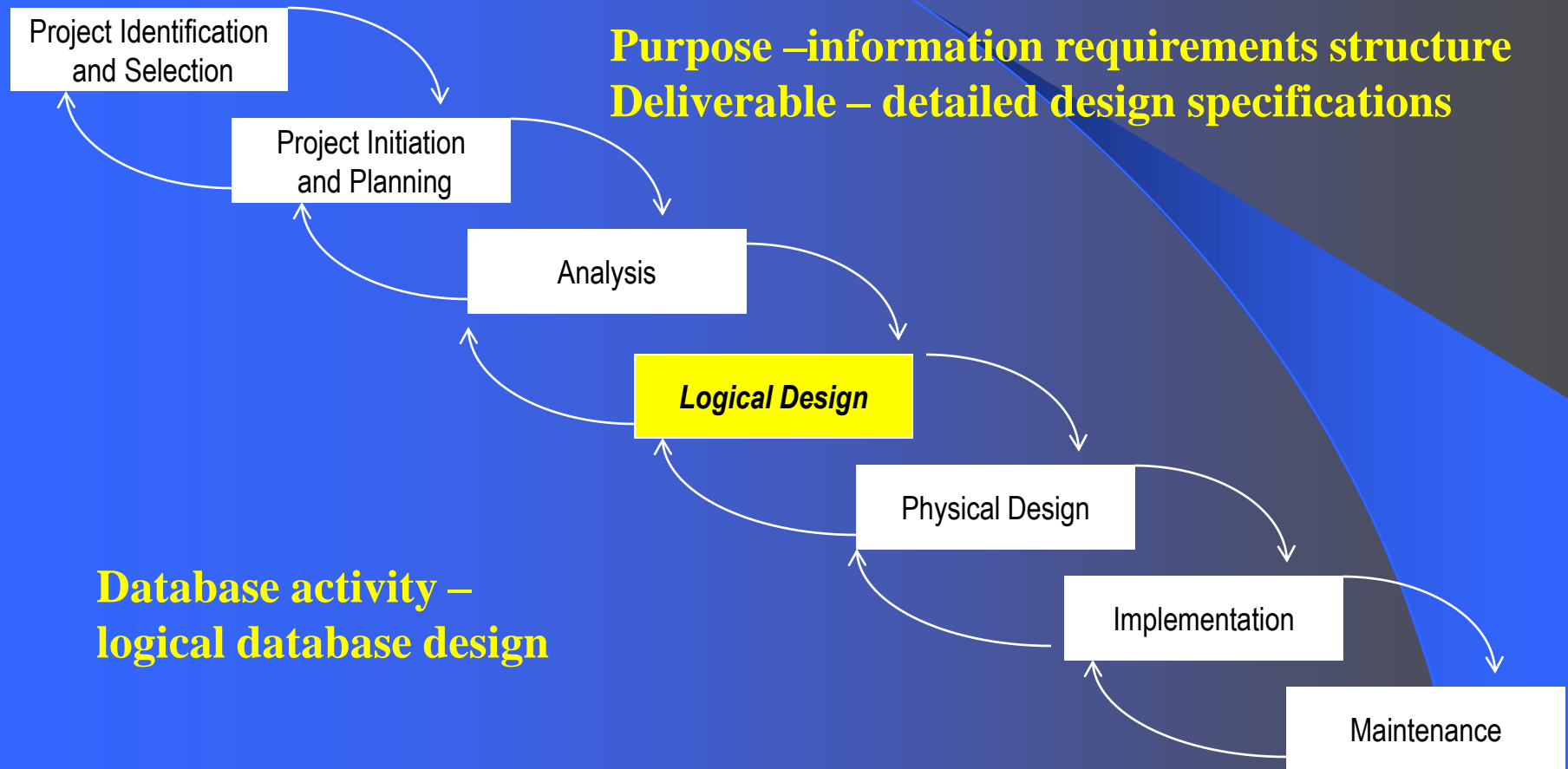
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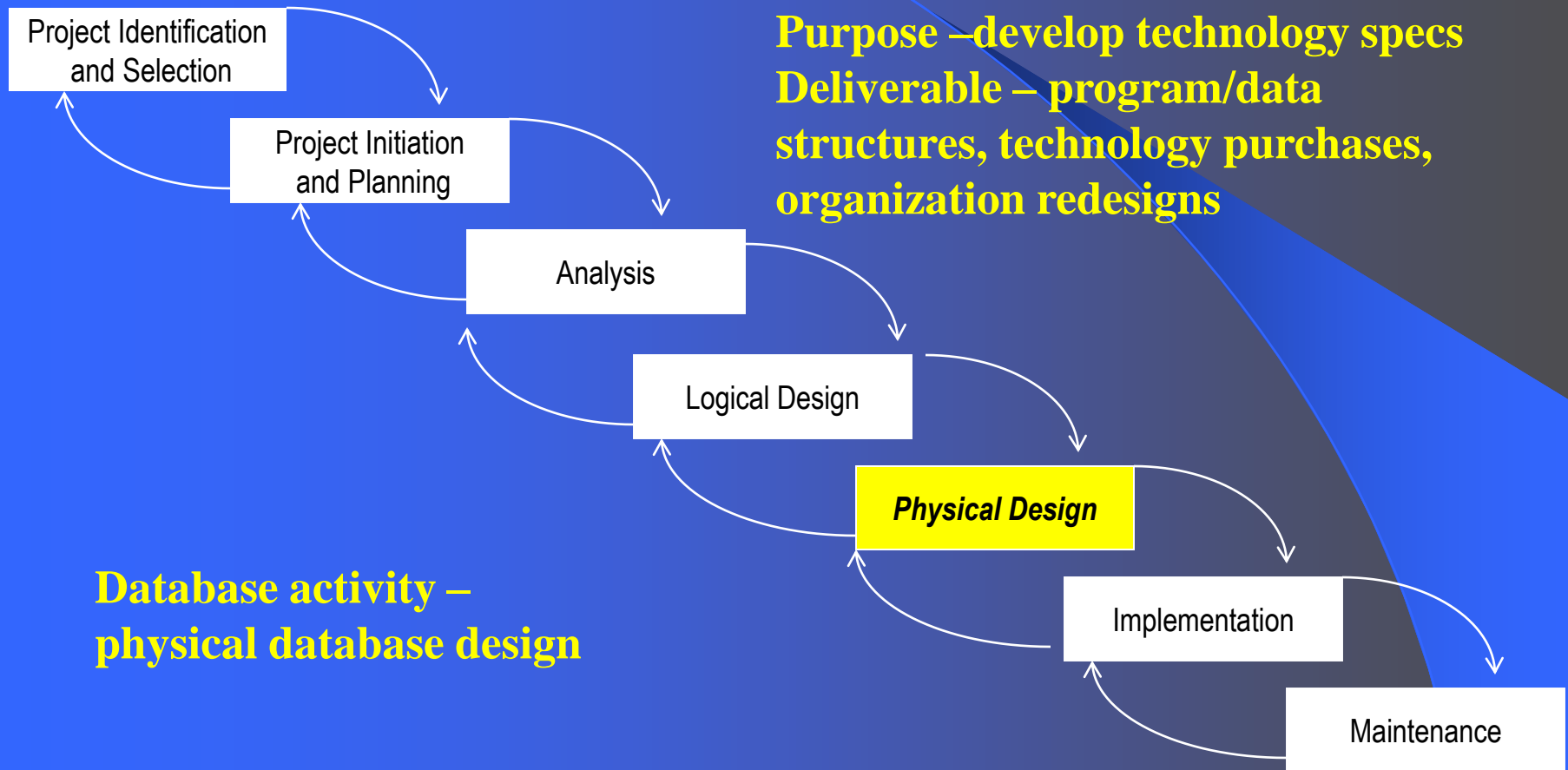
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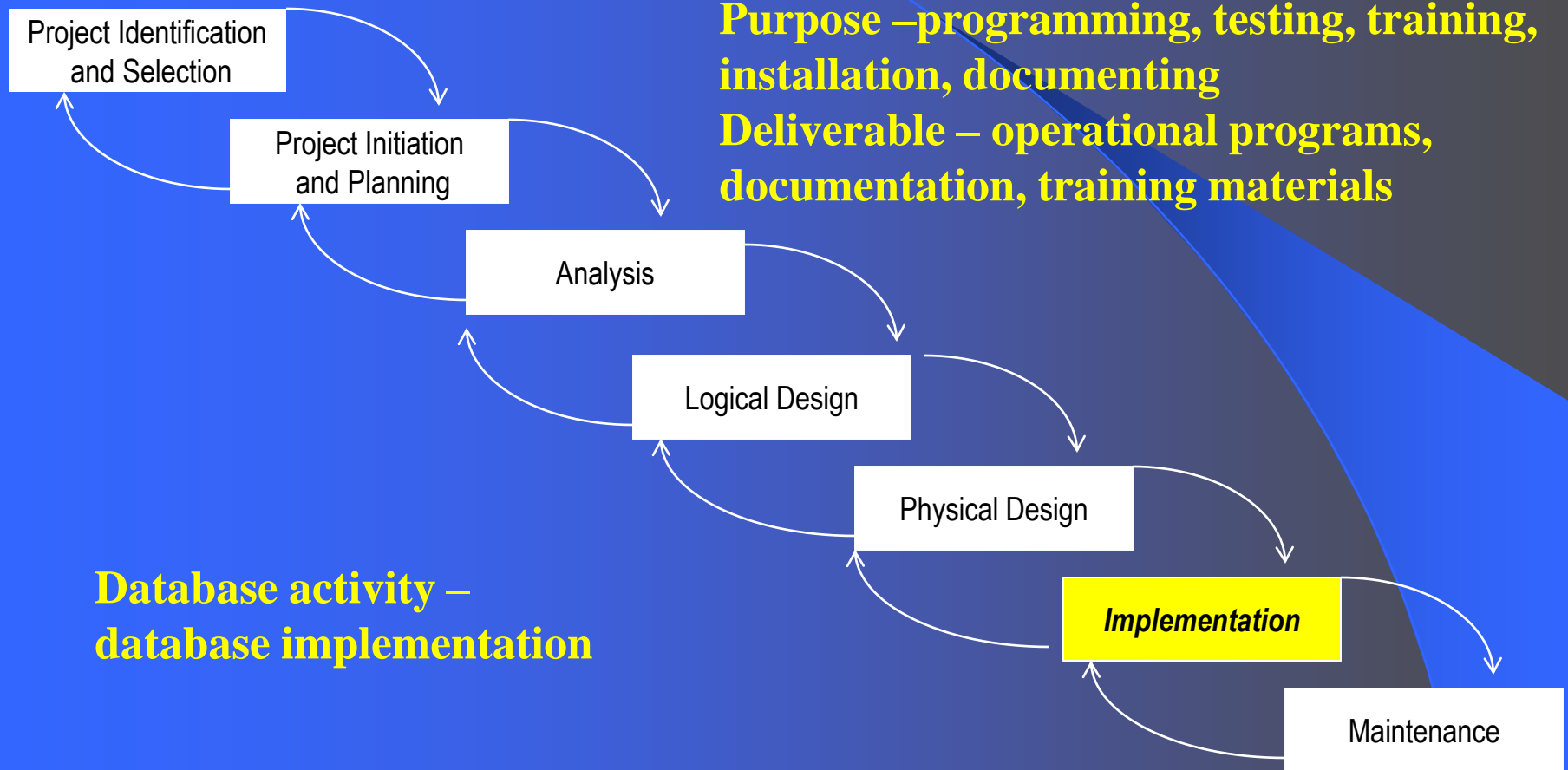
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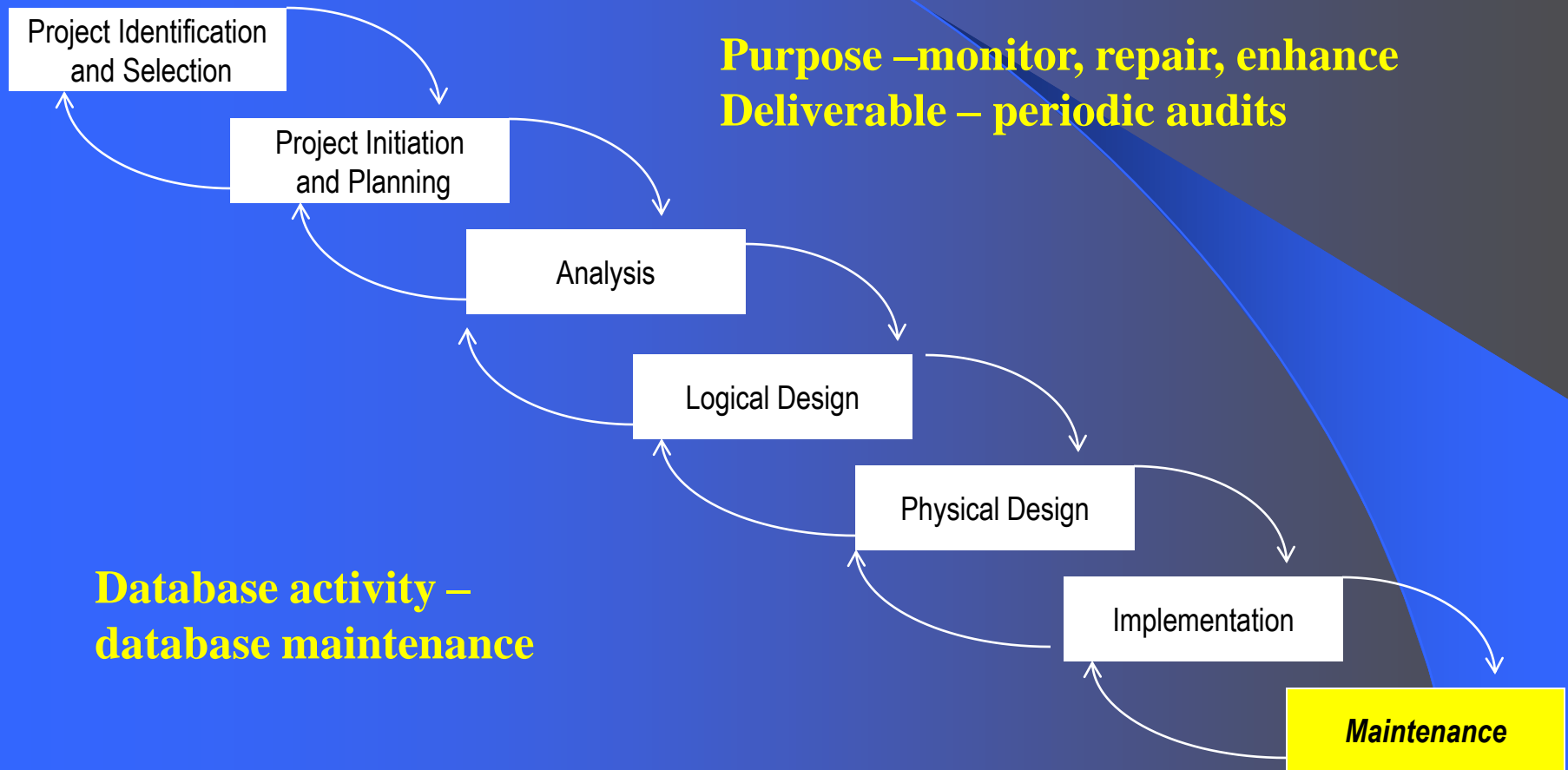


Figure 2-6 The *prototyping methodology* and database development process

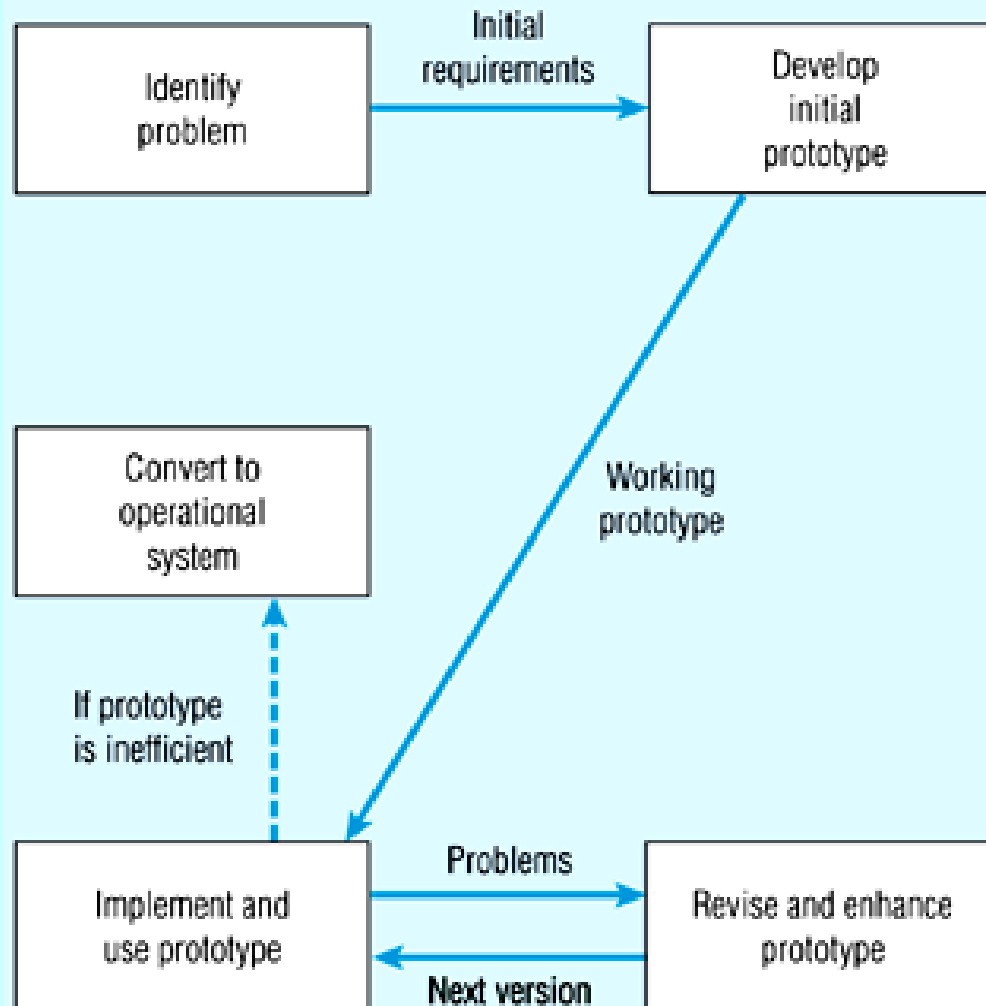


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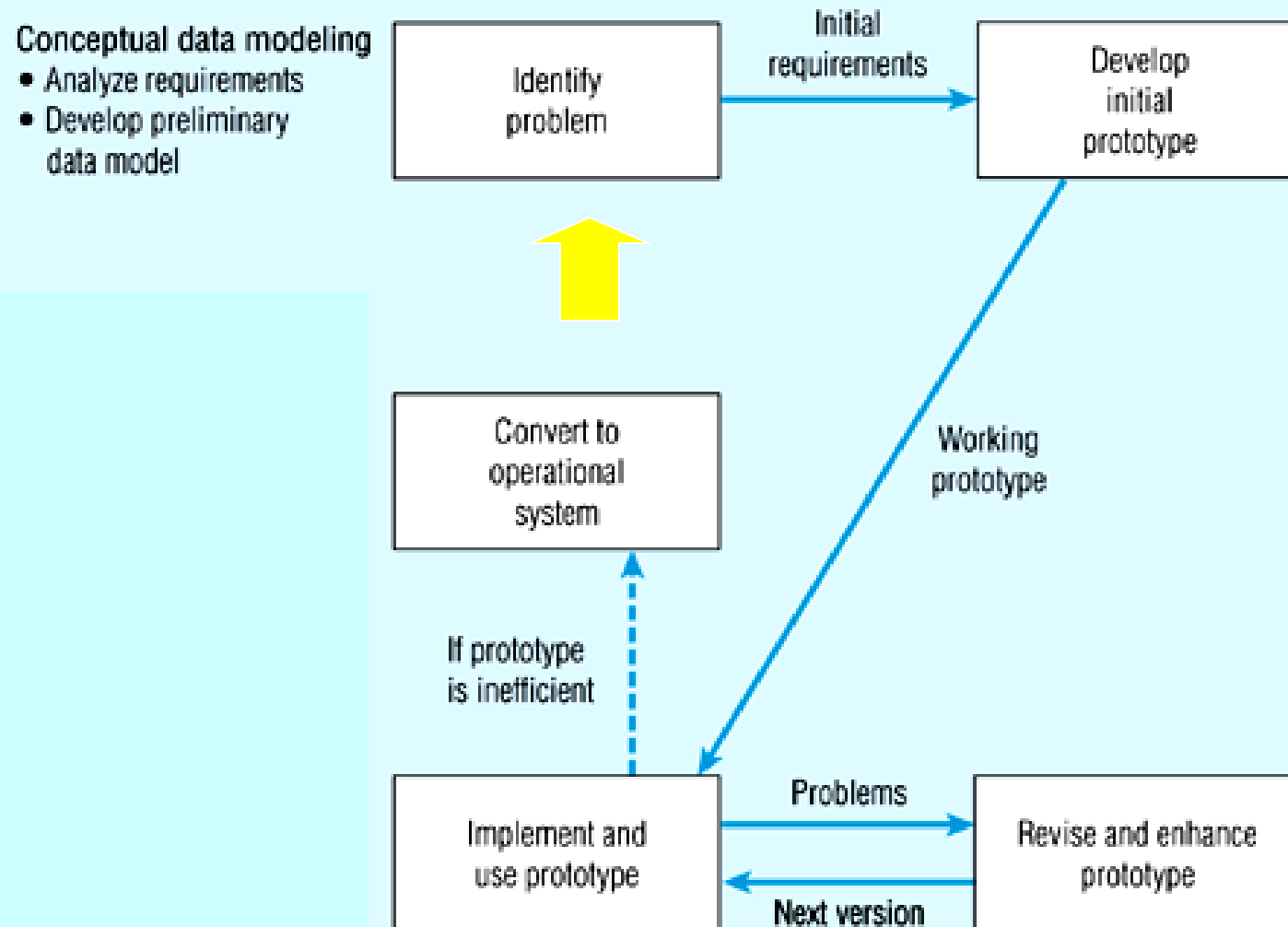


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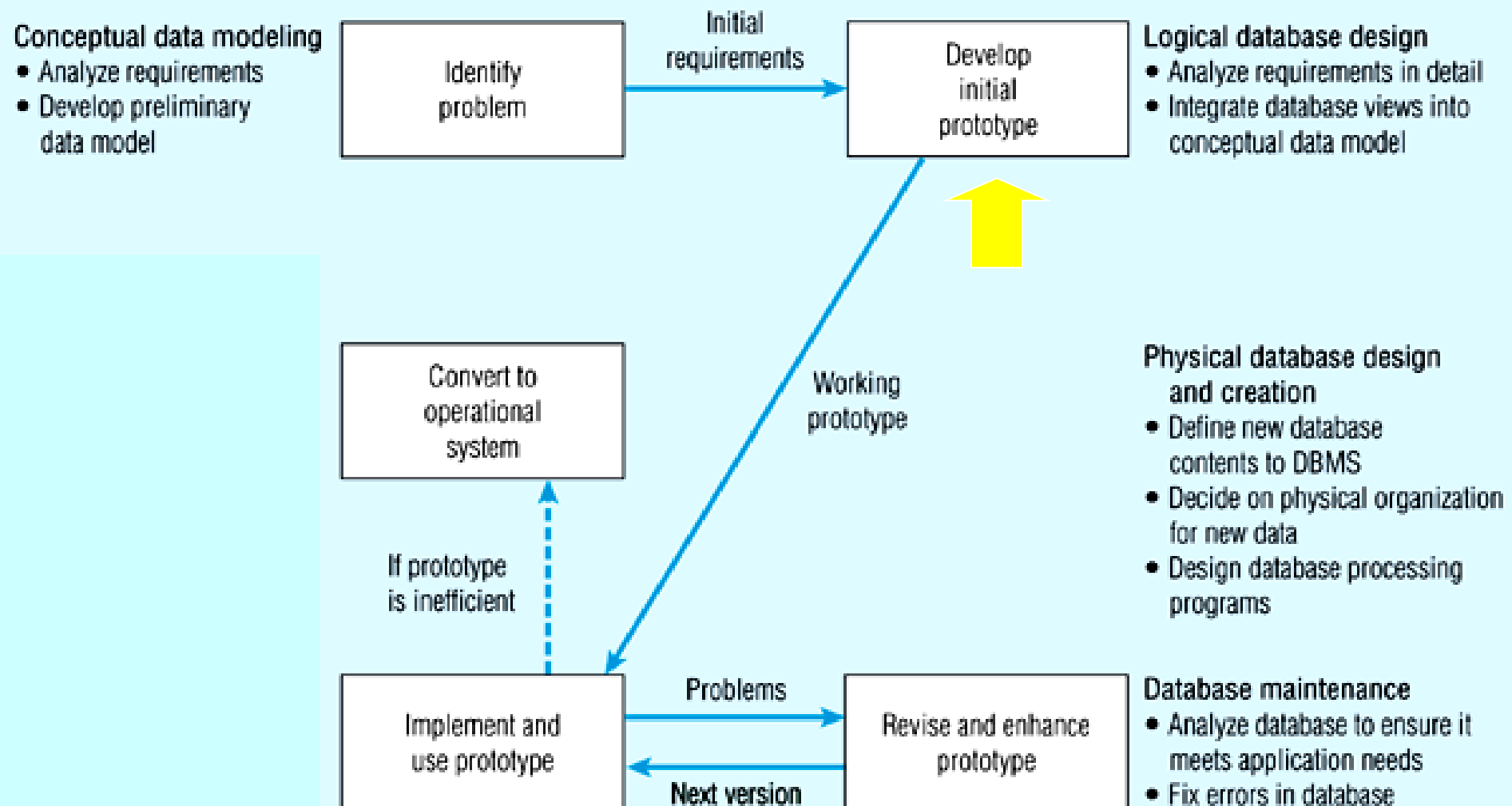


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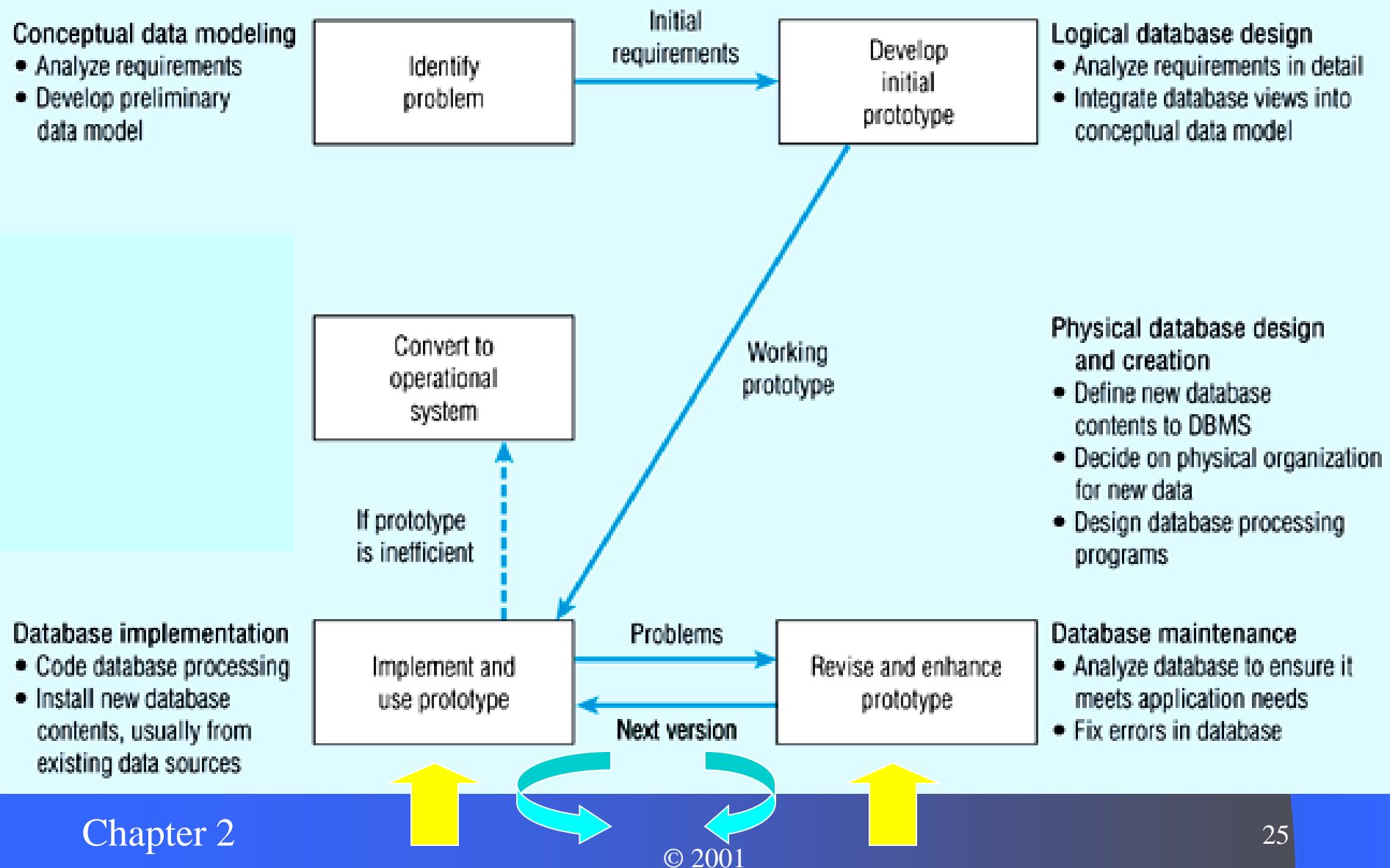
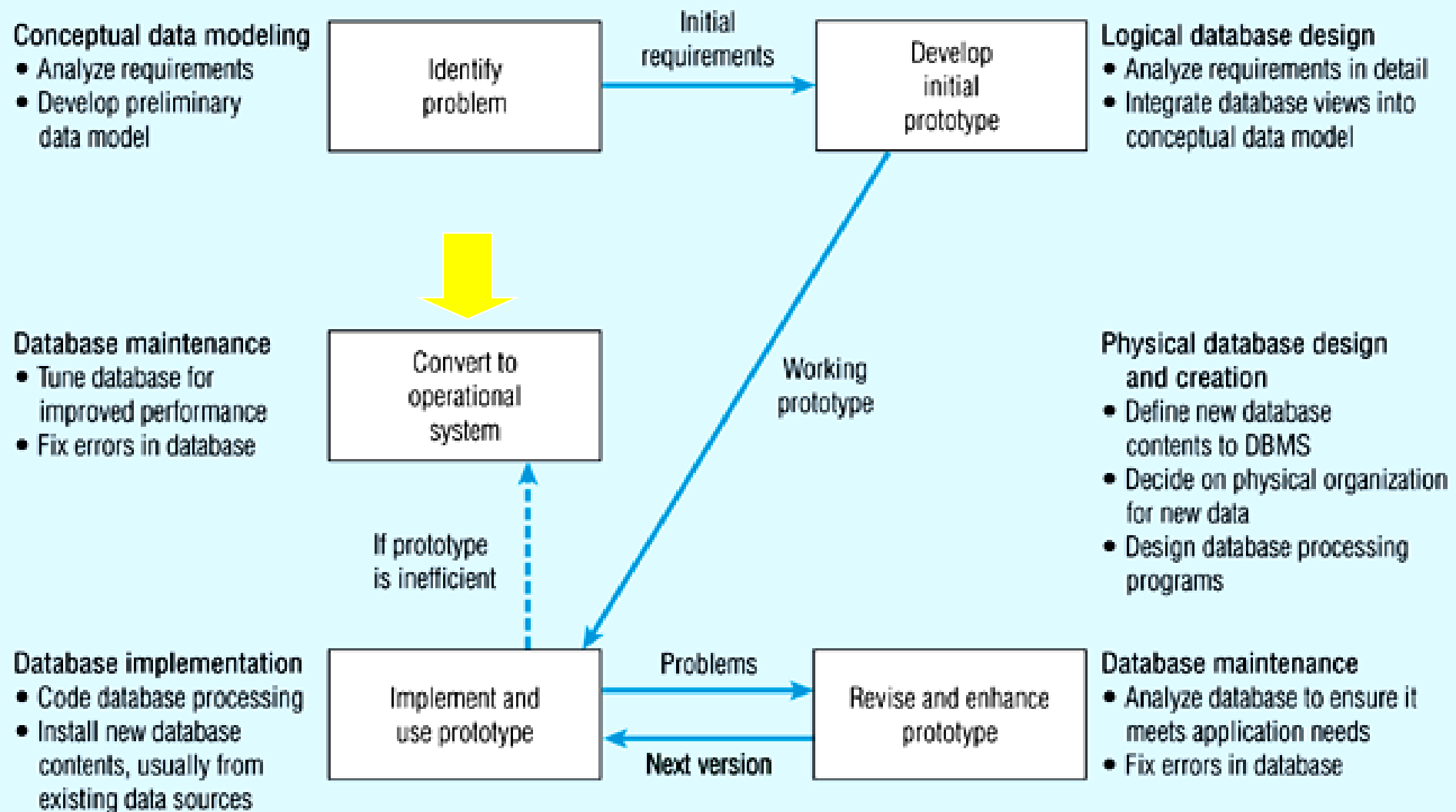


Figure 2-6 The *prototyping methodology* and database development process



Managing Projects: People Involved

Systems analysts

Database analysts

Users

Programmers

Database/data administrators

Systems programmers, network
administrators, testers, technical writers

Figure 2-7a Gantt Chart

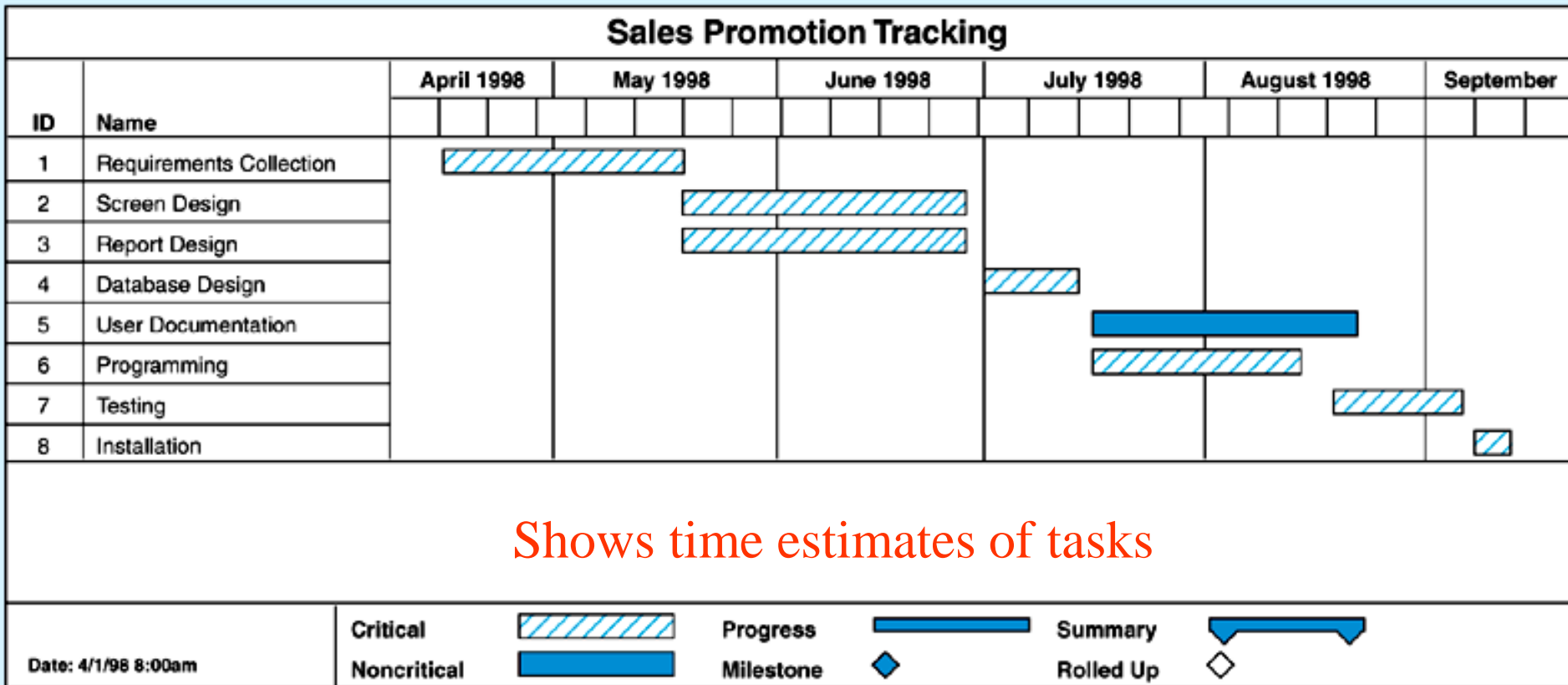
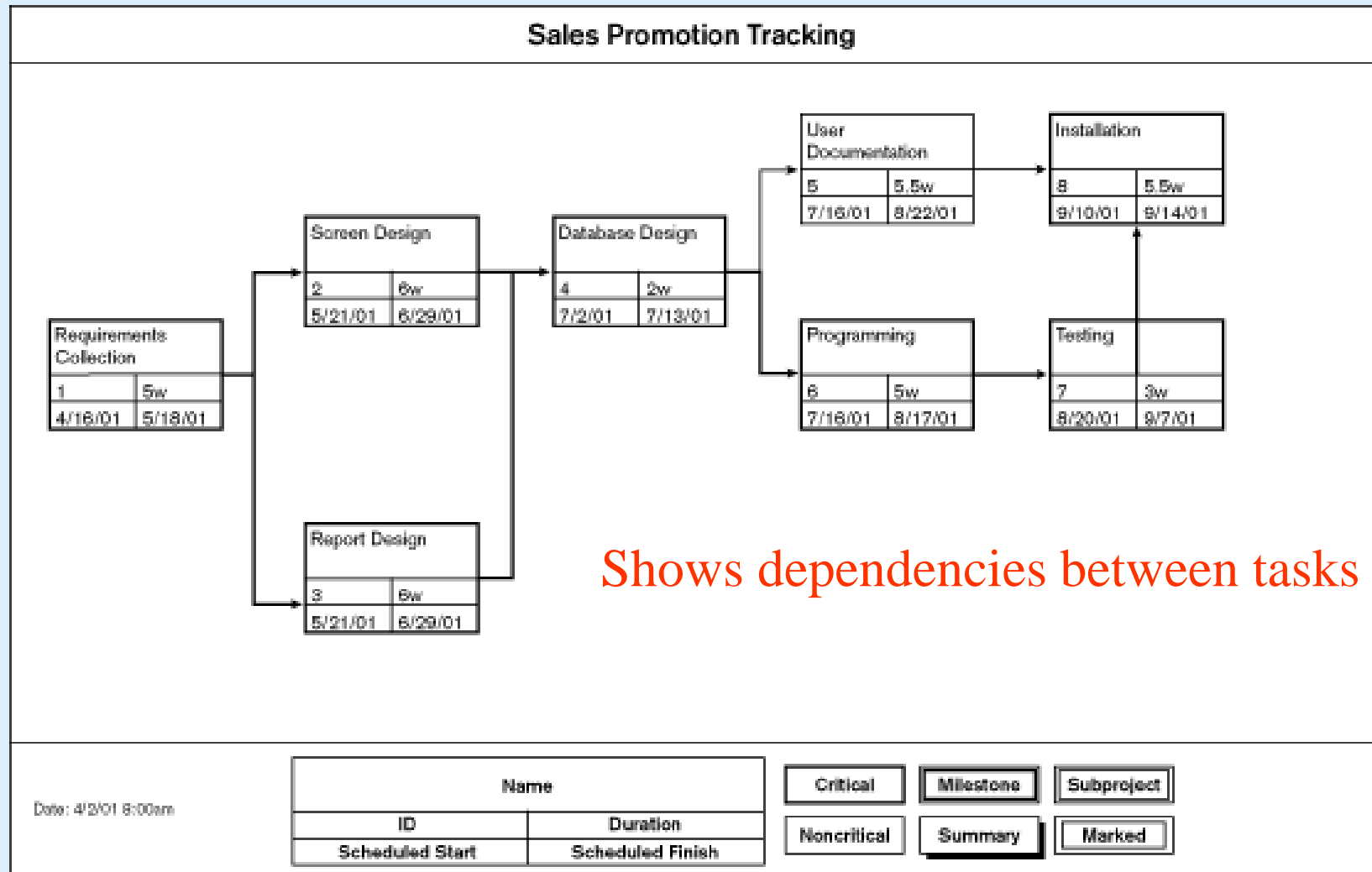


Figure 2-7b PERT chart



Database Schema

Physical Schema

- Physical structures – covered in chapters 5 and 6

Conceptual Schema

- ER models – covered in chapters 3 and 4

External Schema

- User Views
- Subsets of Conceptual Schema
- Can be determined from business-function/data entity matrices
- DBA determines schema for different users
- **This is part of people-management in databases**

Figure 2-8 Three-schema database architecture

One organizational database description

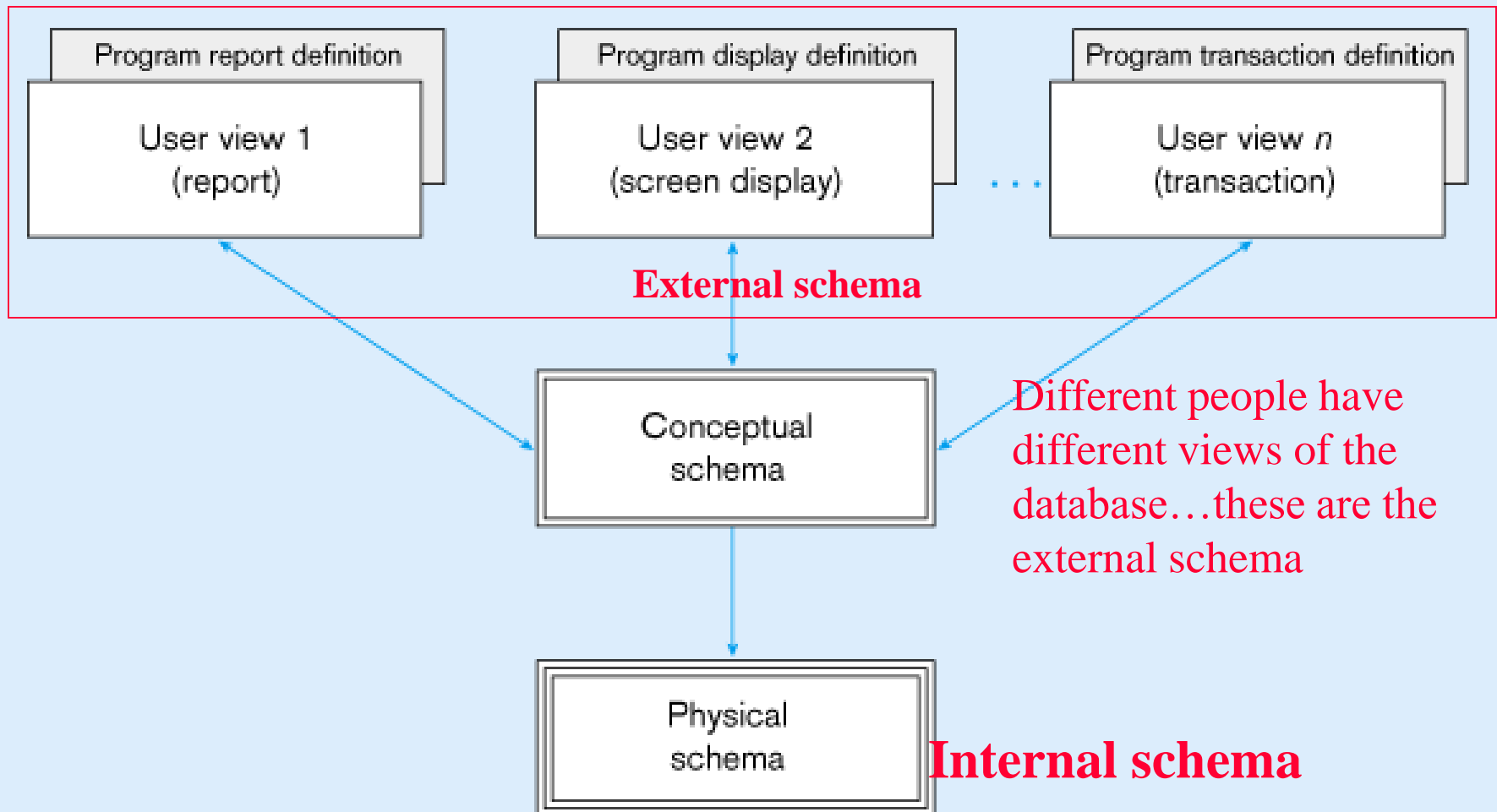
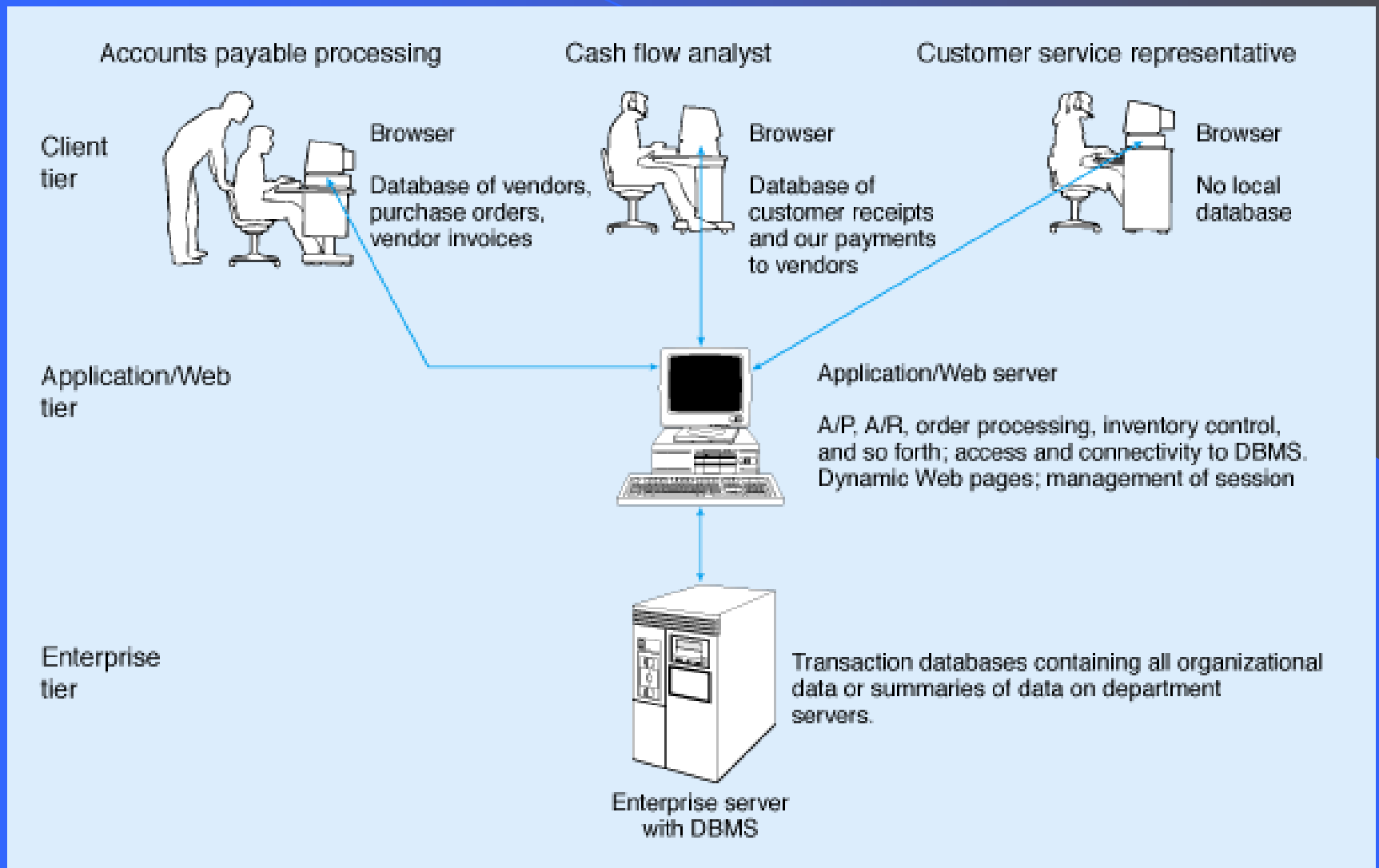
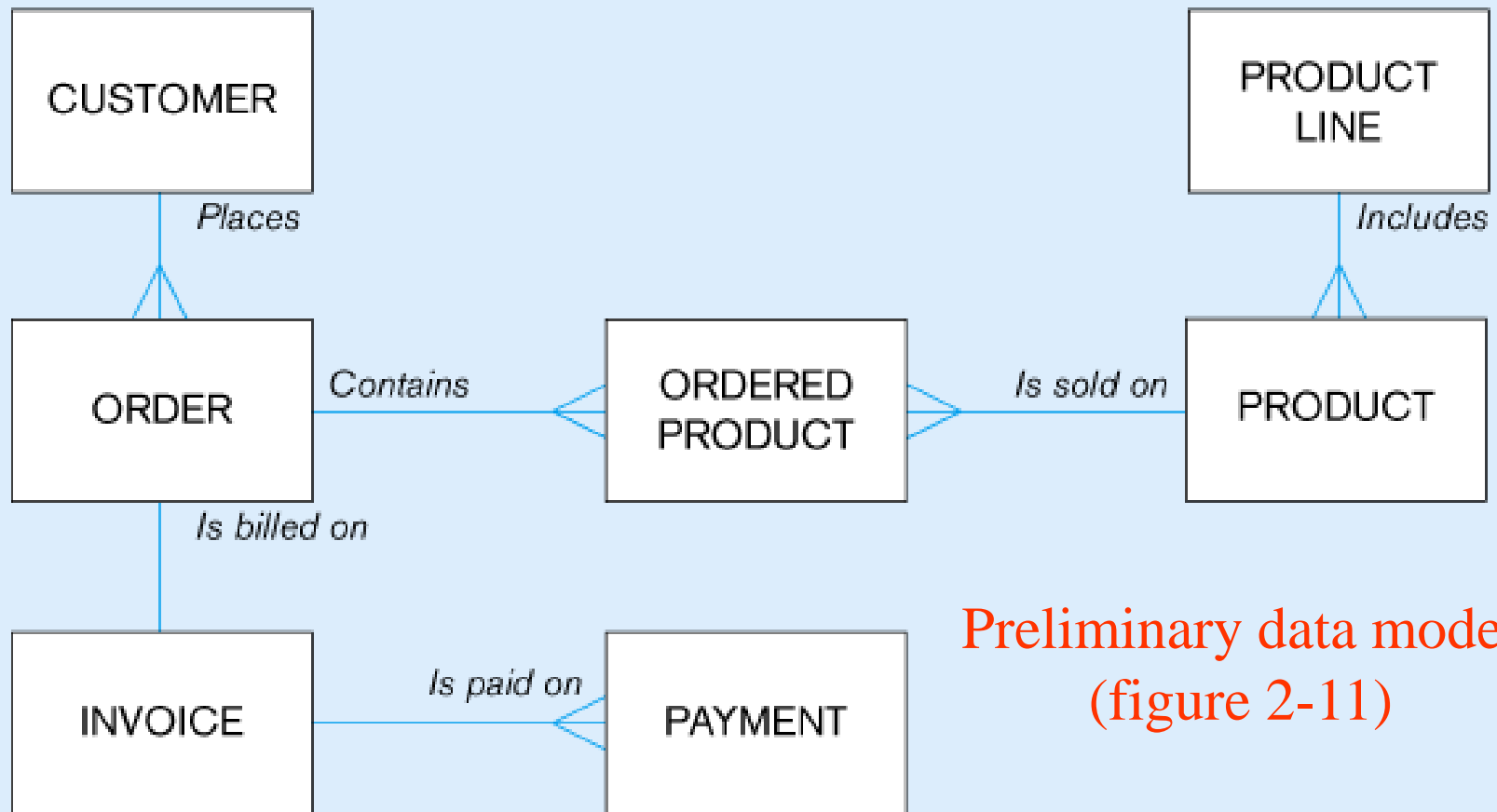


Figure 2-10 Three-tiered client/server database architecture

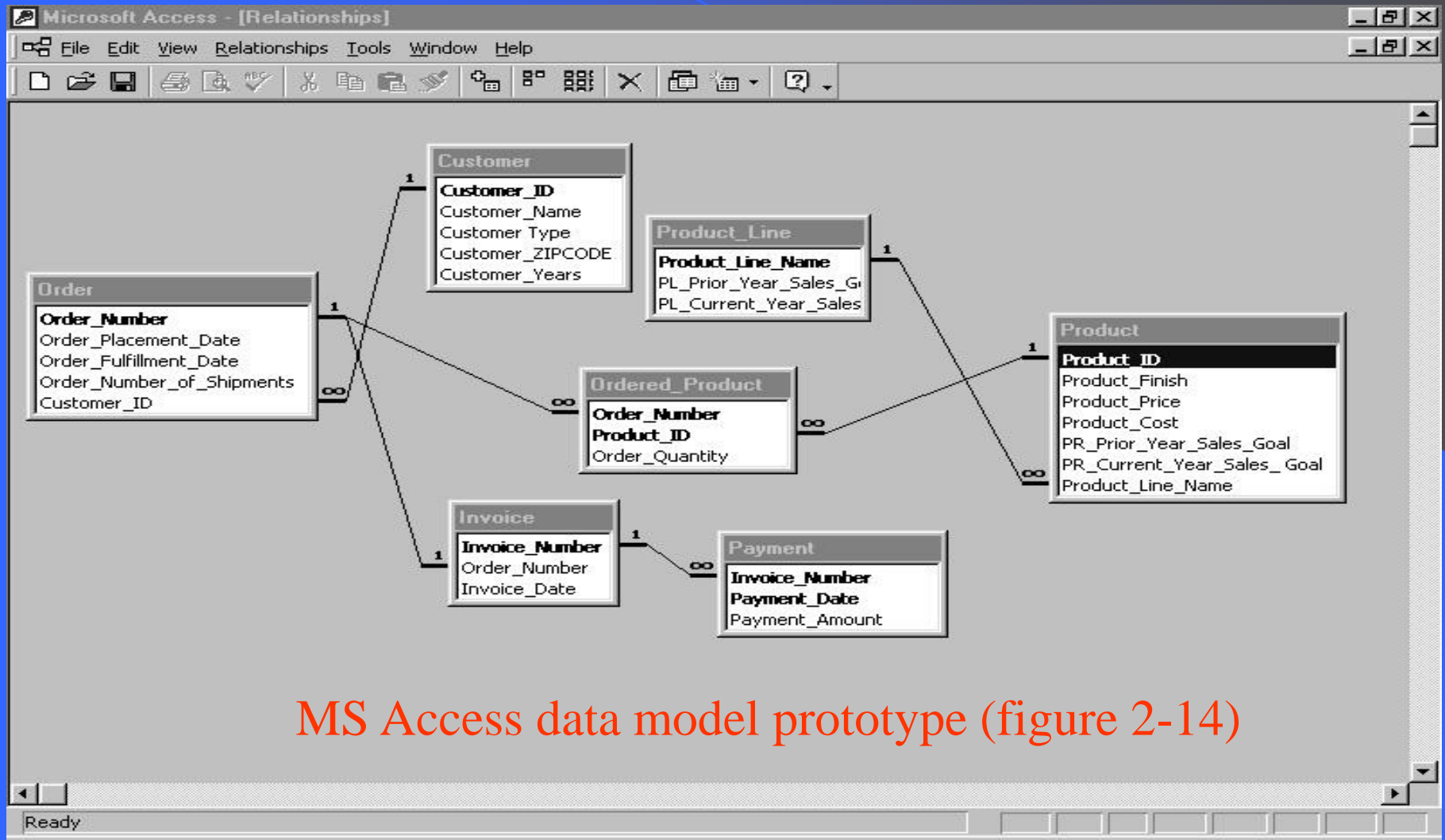


Pine Valley Furniture



Preliminary data model
(figure 2-11)

Pine Valley Furniture



MS Access data model prototype (figure 2-14)