



Taken From Modern Systems Analysis and Design

Eighth Edition

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DFD



Learning Objectives

- ✓ Understand the logical modeling of processes by studying examples of data flow diagrams (DFDs).
- ✓ Draw data flow diagrams following specific rules and guidelines that lead to accurate and well-structured process models.
- ✓ Decompose data flow diagrams into lower-level diagrams.

Process Modeling for Structured Analysis

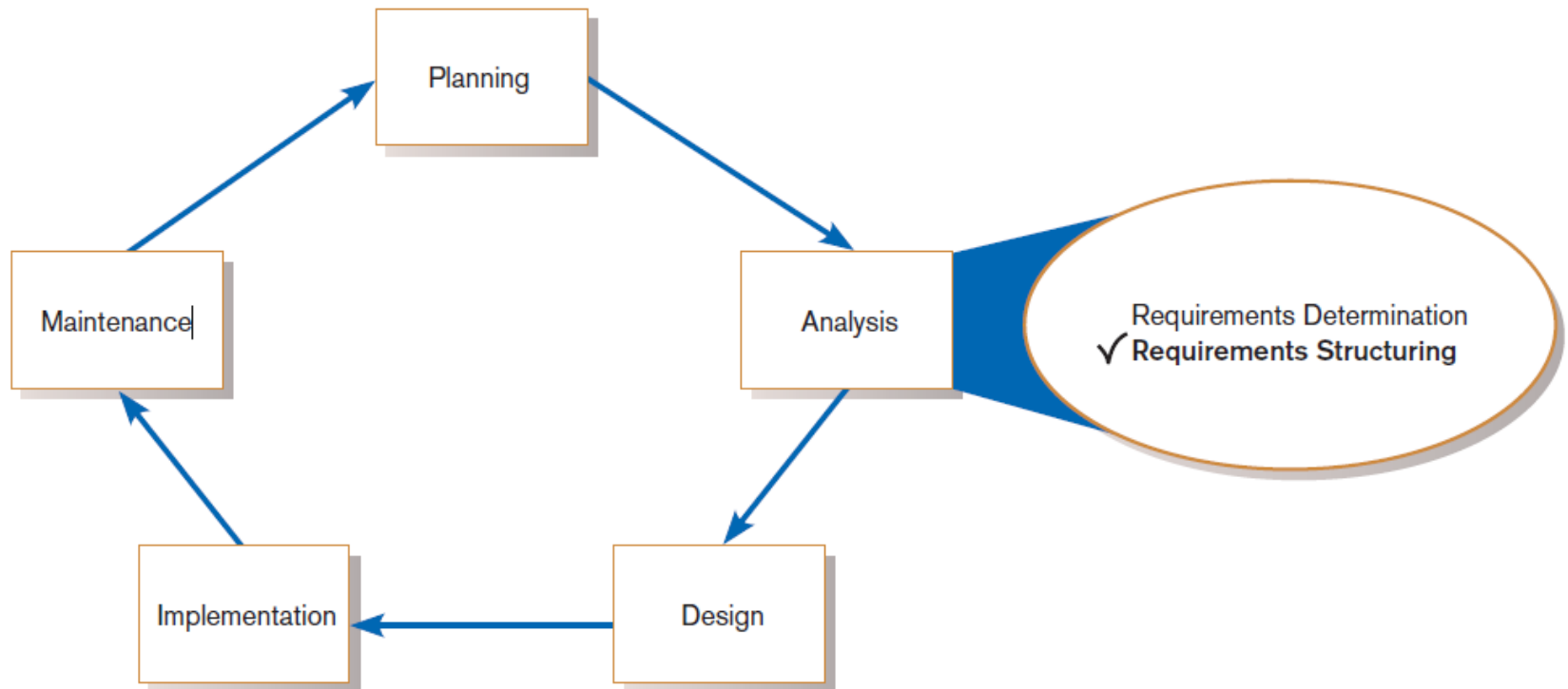


FIGURE 7-1

Systems development life cycle with the analysis phase highlighted



Process Modeling (Cont.)

- Graphically represent the processes that capture, manipulate, store, and distribute data between a system and its environment and among system components.
- Utilize information gathered during requirements determination.
- Model processes and data structures.



Deliverables and Outcomes

- Context data flow diagram (DFD)
 - Scope of system
- DFDs of current physical system
 - Adequate detail only
- DFDs of current logical system
 - Enables analysts to understand current system



Deliverables and Outcomes (Cont.)

- DFDs of new logical system
 - Technology independent
 - Show data flows, structure, and functional requirements of new system
- Thorough description of each DFD component



Data Flow Diagramming Mechanics

- Represent both physical and logical information systems
- Only four symbols are used
- Useful for depicting purely logical information flows
- DFDs that detail physical systems differ from system flowcharts which depict details of physical computing equipment.

Definitions and Symbols

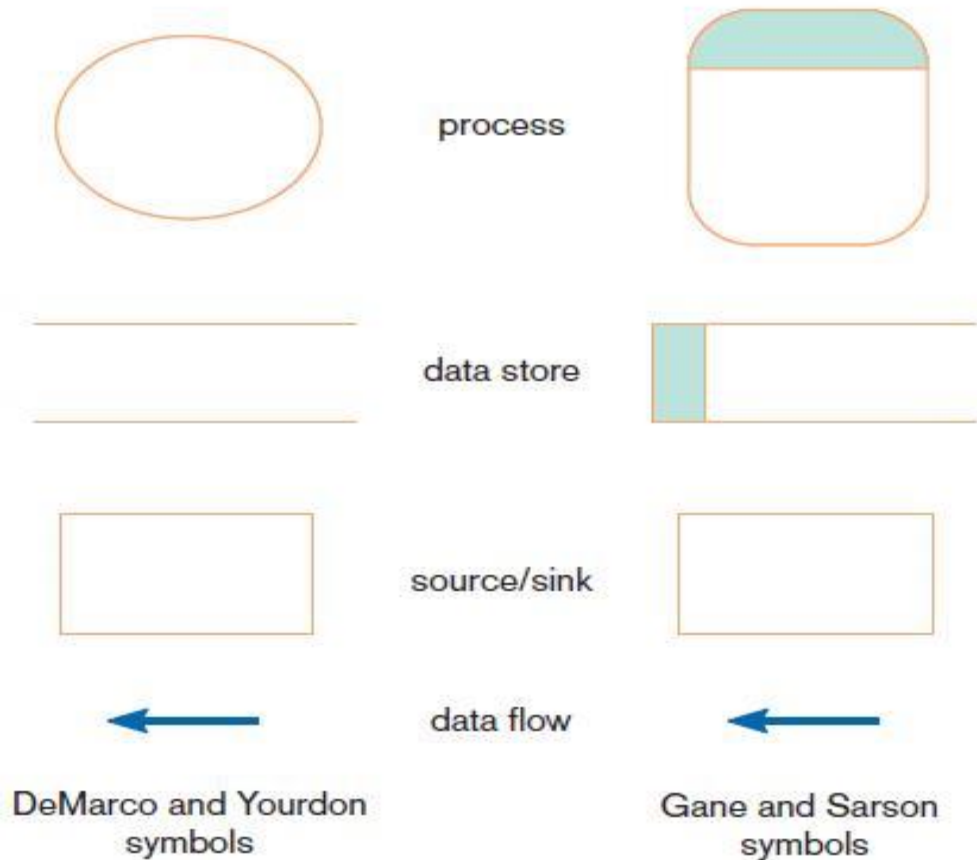


FIGURE 7-2
Comparison of DeMarco
and Yourdon
and Gane and Sarson
DFD symbol sets



Definitions and Symbols (Cont.)

- **Process:** work or actions performed on data (inside the system)
- **Data store:** data at rest (inside the system)



Definitions and Symbols (Cont.)

- **Source/sink:** external entity that is the origin or destination of data (outside the system)
- **Data flow:** arrows depicting movement of data



Developing DFDs

- **Context diagram** is an overview of an organizational system that shows:
 - the system boundaries.
 - external entities that interact with the system.
 - major information flows between the entities and the system.
- **Note:** only one process symbol, and no data stores shown

Context Diagram

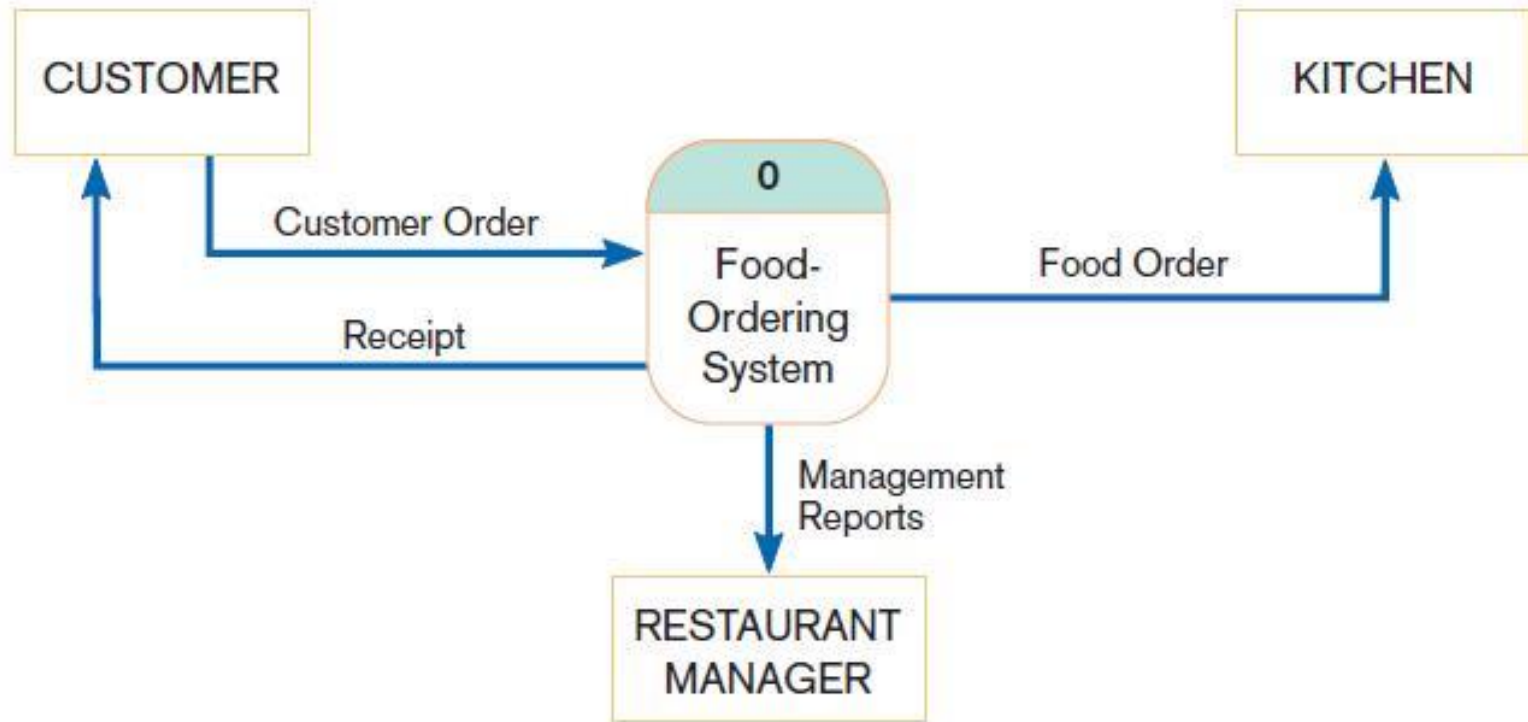


FIGURE 7-4

Context diagram of Hoosier Burger's food-ordering system



Developing DFDs (Cont.)

- **Level-0 diagram** is a data flow diagram that represents a system's major processes, data flows, and data stores at a high level of detail.
 - Processes are labeled 1.0, 2.0, etc. These will be decomposed into more primitive (lower-level) DFDs.

Level-0 Diagram

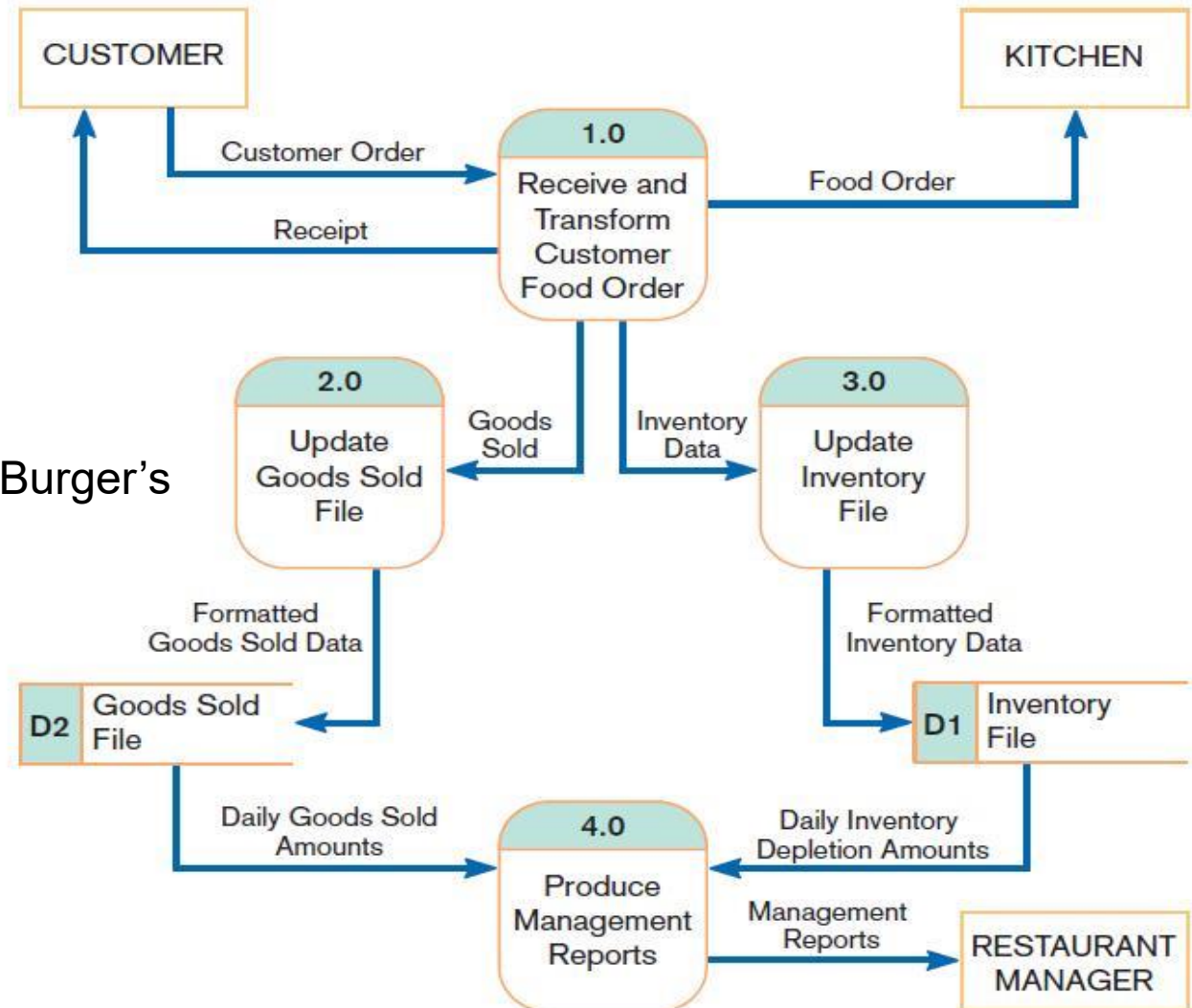


FIGURE 7-5
Level-0 DFD of Hoosier Burger's
food-ordering system



Data Flow Diagramming Rules

- There are two DFD guidelines that apply:
 - *The inputs to a process are different from the outputs of that process.*
 - Processes purpose is to transform inputs into outputs.
 - *Objects on a DFD have unique names.*
 - Every process has a unique name.

Data Flow Diagramming Rules (Cont.)

TABLE 7-2 Rules Governing Data Flow Diagramming

Process:

- A. No process can have only outputs. It would be making data from nothing (a miracle). If an object has only outputs, then it must be a source.
- B. No process can have only inputs (a black hole). If an object has only inputs, then it must be a sink.
- C. A process has a verb phrase label.

Data Store:

- D. Data cannot move directly from one data store to another data store. Data must be moved by a process.
- E. Data cannot move directly from an outside source to a data store. Data must be moved by a process that receives data from the source and places the data into the data store.
- F. Data cannot move directly to an outside sink from a data store. Data must be moved by a process.
- G. A data store has a noun phrase label.

Source/Sink:

- H. Data cannot move directly from a source to a sink. It must be moved by a process if the data are of any concern to our system. Otherwise, the data flow is not shown on the DFD.
- I. A source/sink has a noun phrase label.



Data Flow Diagramming Rules (Cont.)

TABLE 7-2 Rules Governing Data Flow Diagramming (cont.)

Data Flow:

- J. A data flow has only one direction of flow between symbols. It may flow in both directions between a process and a data store to show a read before an update. The latter is usually indicated, however, by two separate arrows because these happen at different times.
- K. A fork in a data flow means that exactly the same data goes from a common location to two or more different processes, data stores, or sources/sinks (this usually indicates different copies of the same data going to different locations).
- L. A join in a data flow means that exactly the same data come from any of two or more different processes, data stores, or sources/sinks to a common location.
- M. A data flow cannot go directly back to the same process it leaves. There must be at least one other process that handles the data flow, produces some other data flow, and returns the original data flow to the beginning process.
- N. A data flow to a data store means update (delete or change).
- O. A data flow from a data store means retrieve or use.
- P. A data flow has a noun phrase label. More than one data flow noun phrase can appear on a single arrow as long as all of the flows on the same arrow move together as one package.

(Source: Based on Celko, 1987.)

Data Flow Diagramming Rules (Cont.)

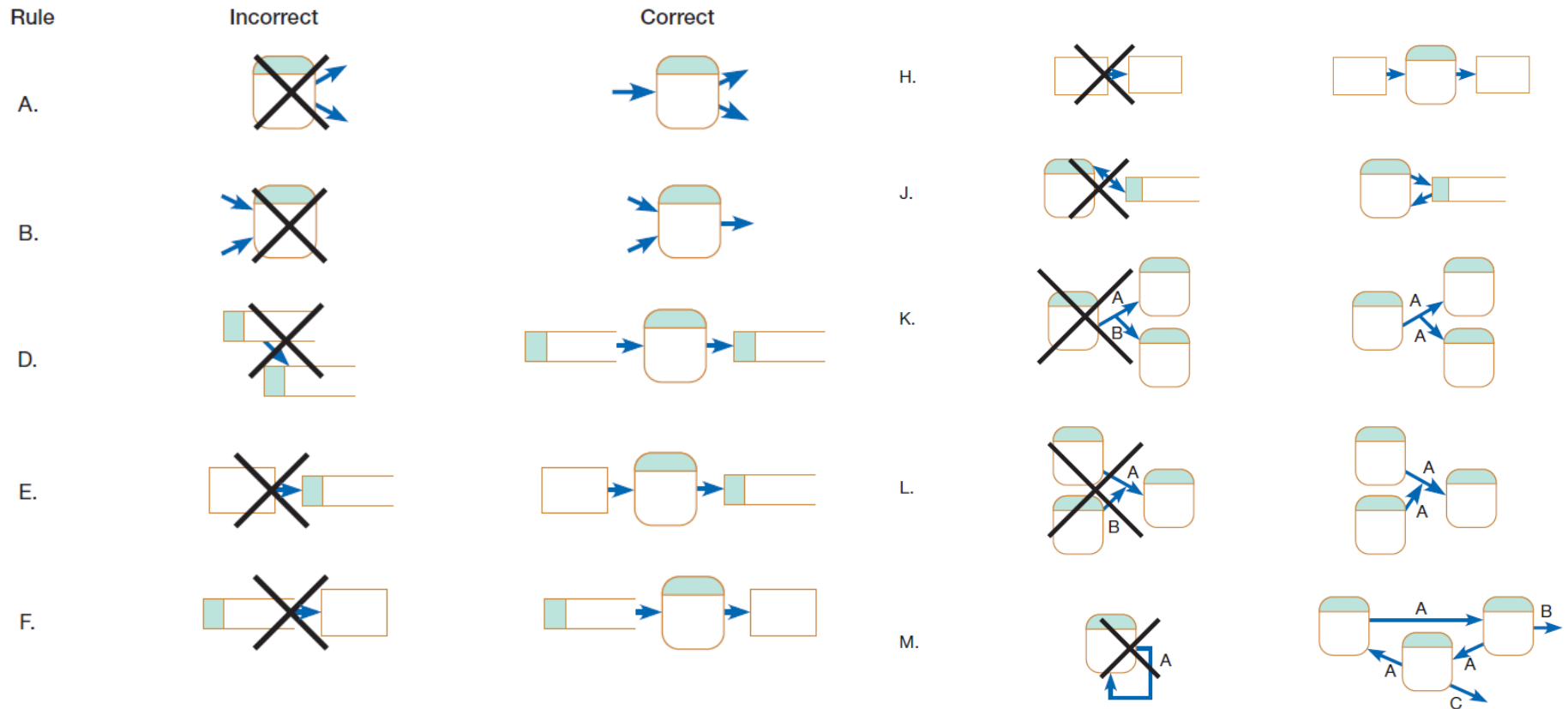


Figure 7-6
Incorrect and correct ways to draw DFDs