CHAPTER

8

PROCESS MODELING

Models: Logical and Physical

A **model** is a representation of reality. Just as a picture is worth a thousand words, most models are pictorial representations of reality.

Logical models show *what* a system is or does. They are implementation *in*dependent; that is, they depict the system independent of any technical implementation.

Physical models show not only what a system is or does, but also *how* the system is (to be) physically and technically implemented. They are implementation *de*pendent because they reflect technology choices.

Process Modeling and DFDs

Process modeling is a technique for organizing and documenting the structure and flow of data through a system's processes, and/or the logic, policies, and procedures to be implemented by a system's processes.

A data flow diagram (DFD) is a tool (and type of process model) that depicts the flow of data through a system and the work or processing performed by that system.

DFDs have become a popular tool for business process redesign.

External Agents

- An external agent defines a person, organization unit, or other organization that lies outside of the scope of the project but that interacts with the system being studied.
  - External agents define the "boundary" or scope of a system being modeled.

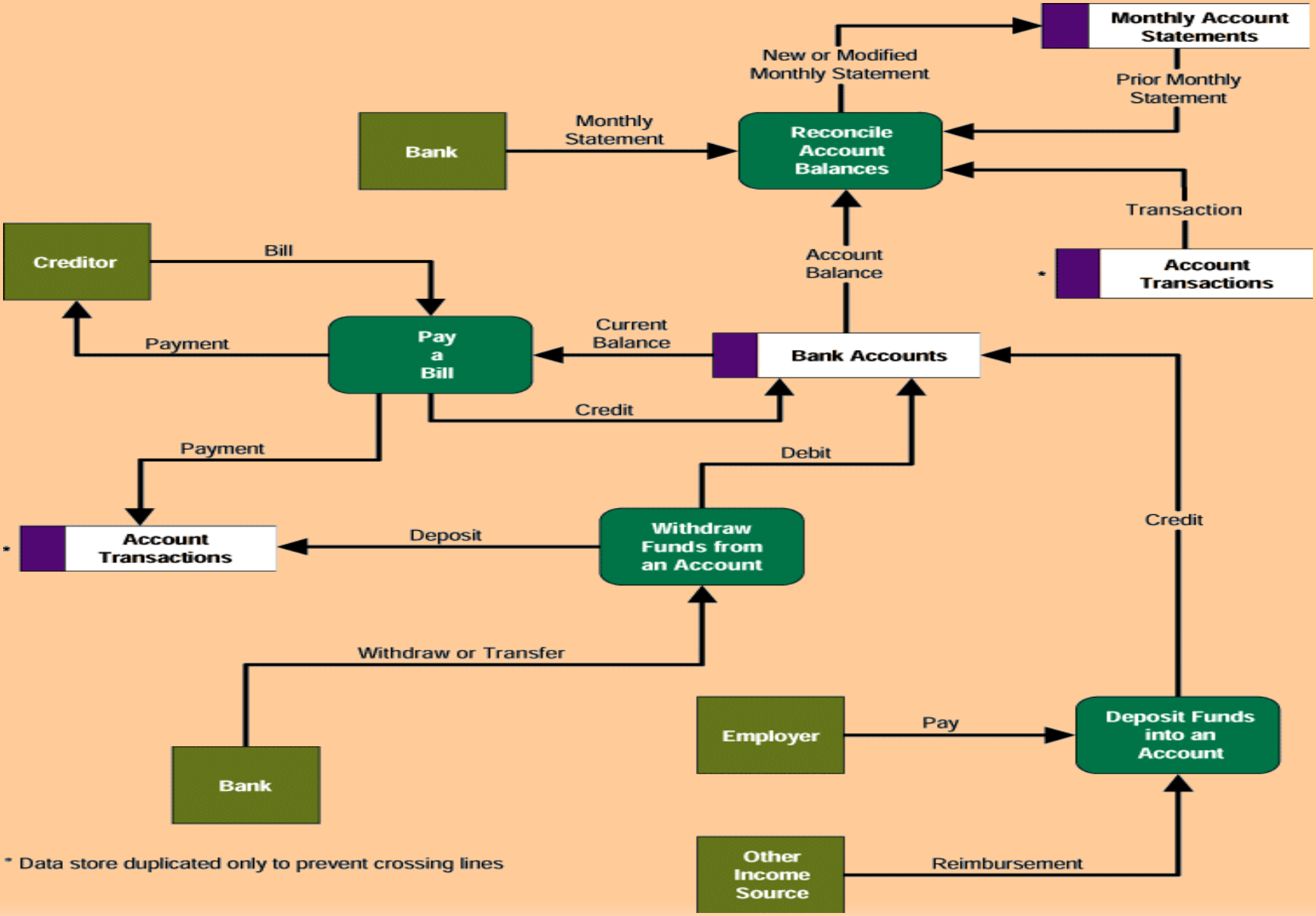
Data Stores

- A data store is an inventory of data.
  - Frequently implemented as a file or database.
  - A data store is "data at rest" compared to a data flow that is "data in motion."
  - Almost always one of the following:
    - Persons (or groups of persons)
    - Places
    - Objects
    - Events (about which data is captured)
    - Concepts (about which data is important)
  - Data stores depicted on a DFD store all instances of data entities (depicted on an ERD)

DFD

- Three symbols and one connection:
  - Round rectangles represent processes or work to be done-process color
  - Square represents external agents-interface color
  - Open ended boxes represent data stores (sometimes called files or databases)
  - Arrows represent data flows, i/p and o/p to and from the process

Simple Data Flow Diagram



Differences Between DFDs and Flowcharts

- Processes on DFDs can operate in parallel (at-the-same-time)
  - Processes on flowcharts execute one at a time
- DFDs show the flow of data through a system
  - Flowcharts show the flow of control (sequence and transfer of control)
- Processes on one DFD can have dramatically different timing
  - Processes on flowcharts are part of a single program with consistent (regular) timing

Systems Thinking

Systems thinking is the application of formal systems theory and concepts to systems problem solving.

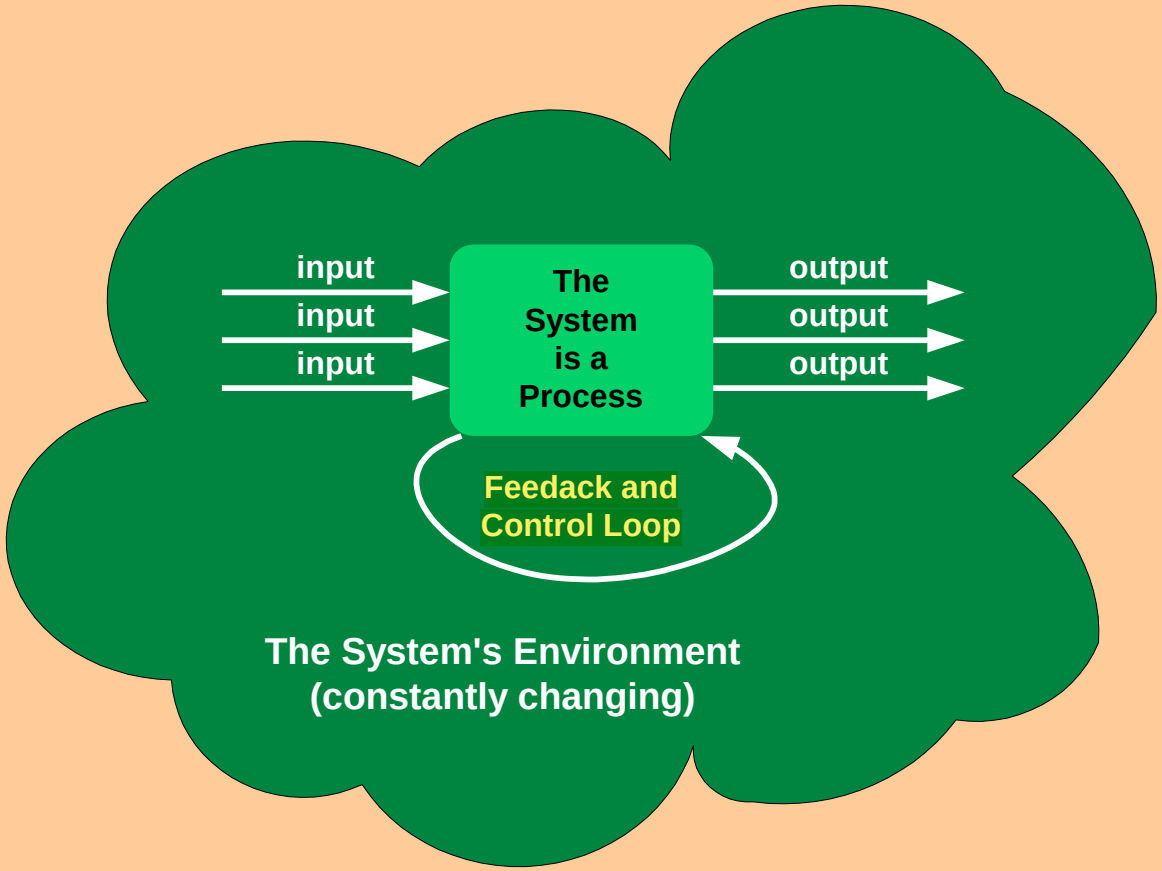
DFDs are a tool that supports systems thinking.

Process Concepts

A **process** is work performed on, or in response to, incoming data flows or conditions.

A Process

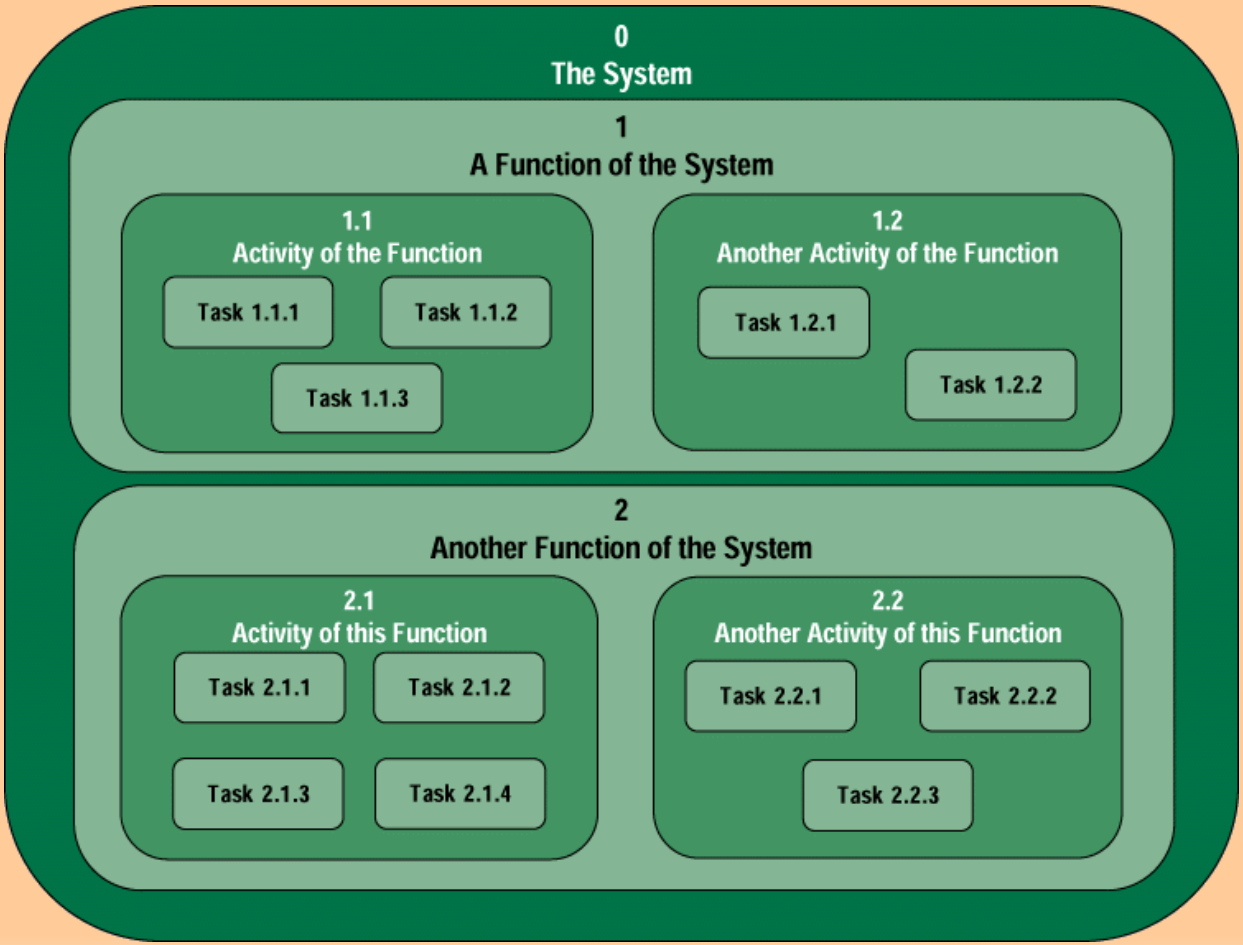
A System is a Process



Decomposition

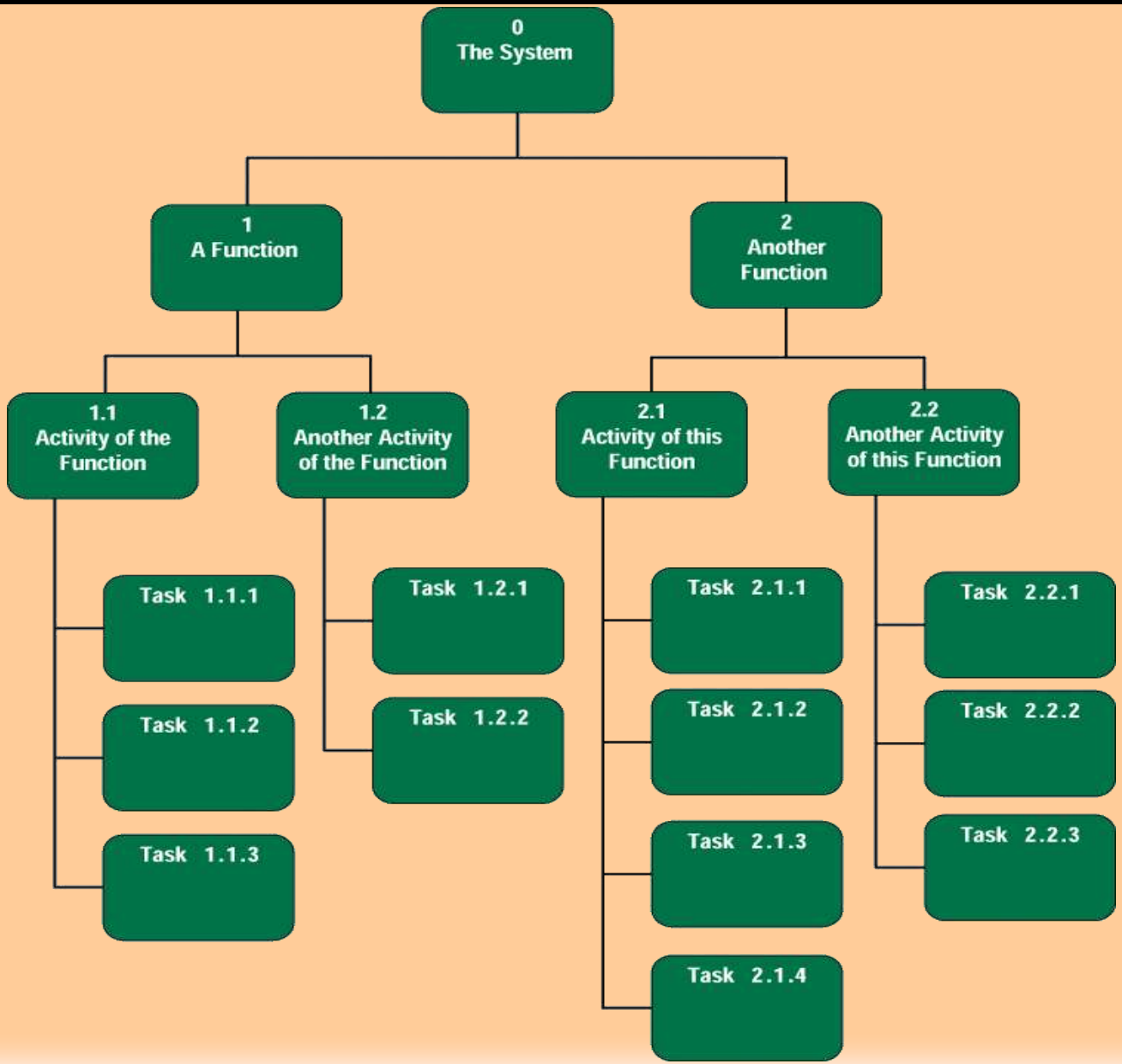
Decomposition is the act of breaking a system into its component subsystems, processes, and subprocesses.

System Decomposition



Decomposition Diagrams

A decomposition diagram or hierarchy chart shows the top-down, functional decomposition of a system.



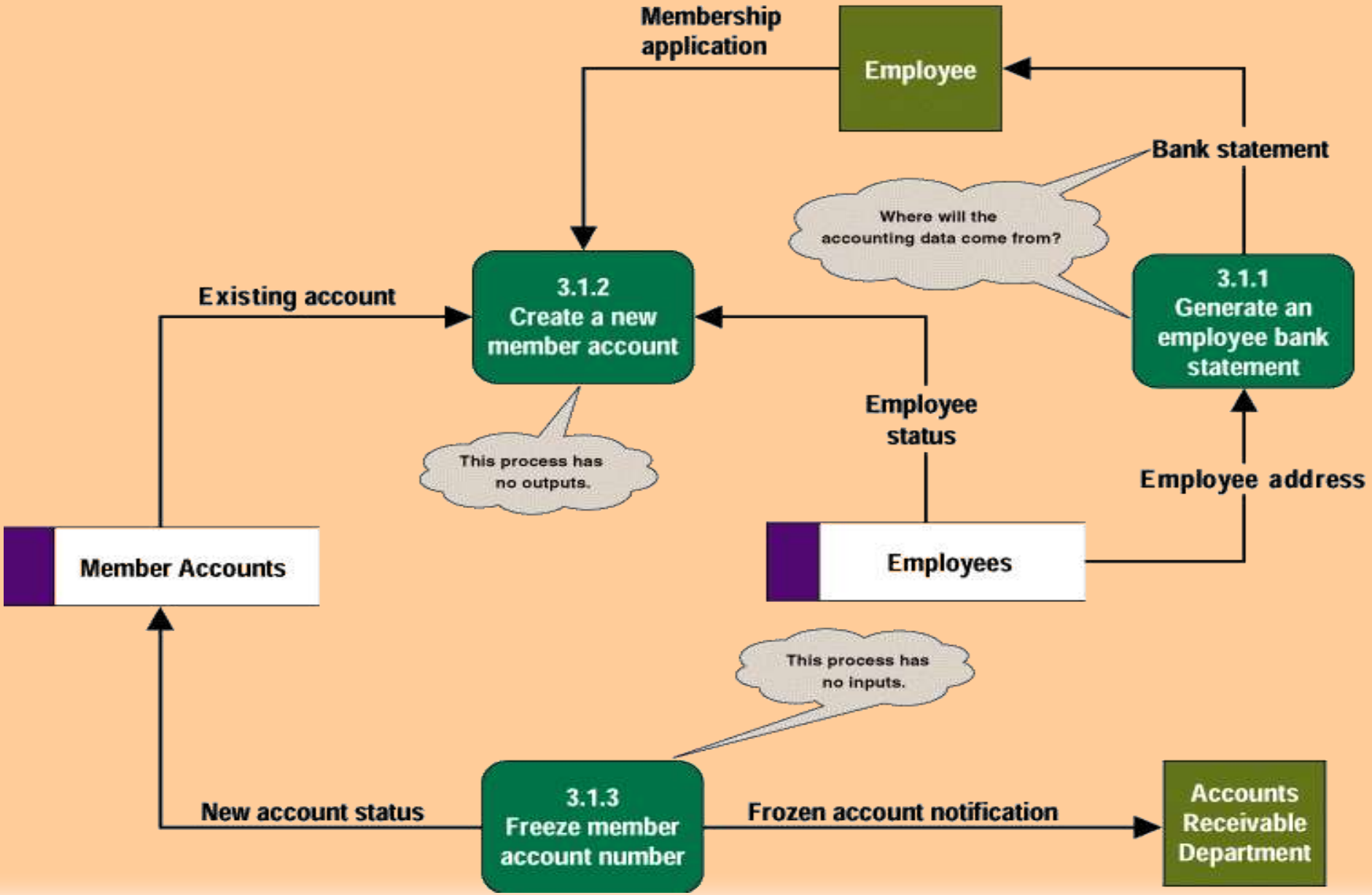
Types of Logical Processes

- A function is set of related and ongoing activities of a business.
- An event (or transaction) is a logical unit of work that must be completed as a whole (as part of a function).
- An elementary process (or primitive process) is a discrete, detailed activity or task required to respond to an event. Usually, several such tasks must be completed to respond to an event.

Common Process Errors on DFDs

- 3.1.2 has inputs but no outputs (it is called black hole because data enter the process and then disappear). In most cases the modeler simply forgot the output
- 3.1.3 has outputs but no inputs. Unless you are David Copperfield (most commercially successful magician in history) it's a miracle. In most cases the input flows were likely forgotten.
- 3.1.1 the inputs are insufficient to produce the o/p (it is called gray hole because
  - Misnamed process
  - Misnamed inputs and/or outputs
  - Incomplete facts
- gray holes are most common errors

Common Process Errors on DFDs

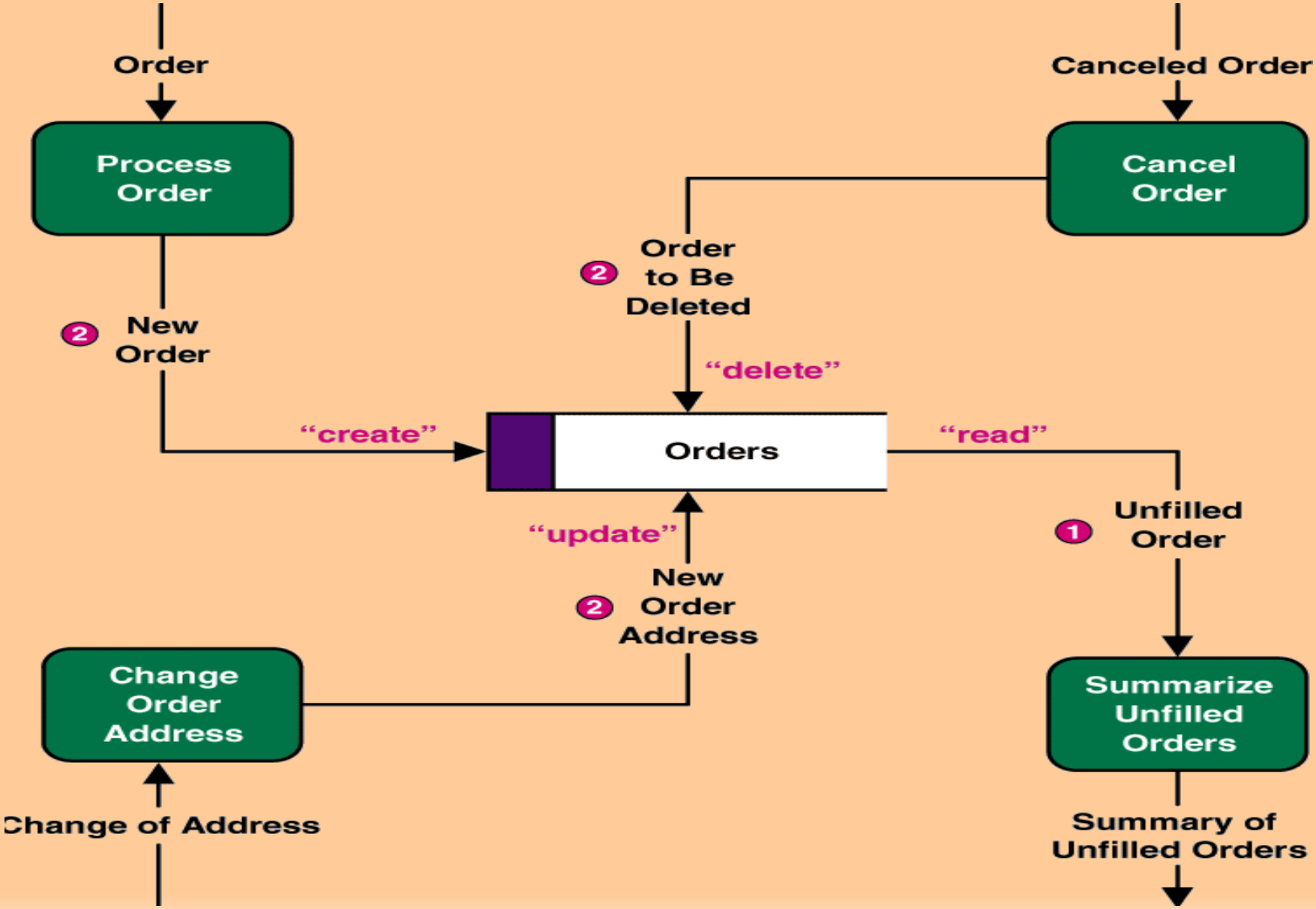


Data Flows & Control Flows

- A data flow represents an input of data to a process, or the output of data from a process.
  - A data flow may also be used to represent the creation, reading, deletion, or updating of data in a file or database (called a data store).

  - A composite data flow is a data flow that consists of other data flows.
- A control flow represents a condition or nondata event that triggers a process.
  - Used sparingly (carefully) on DFDs.

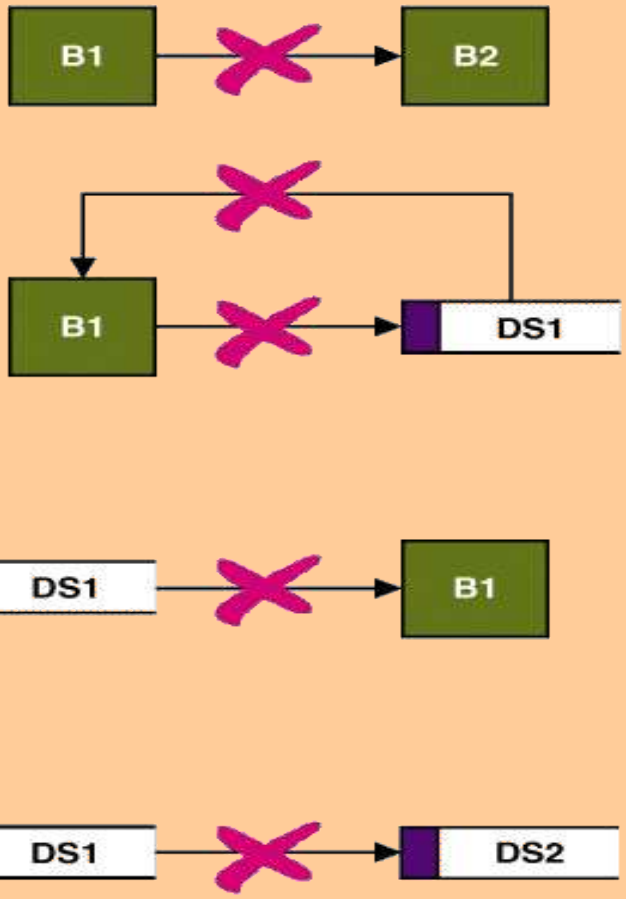
Data Flows to and from Data Stores

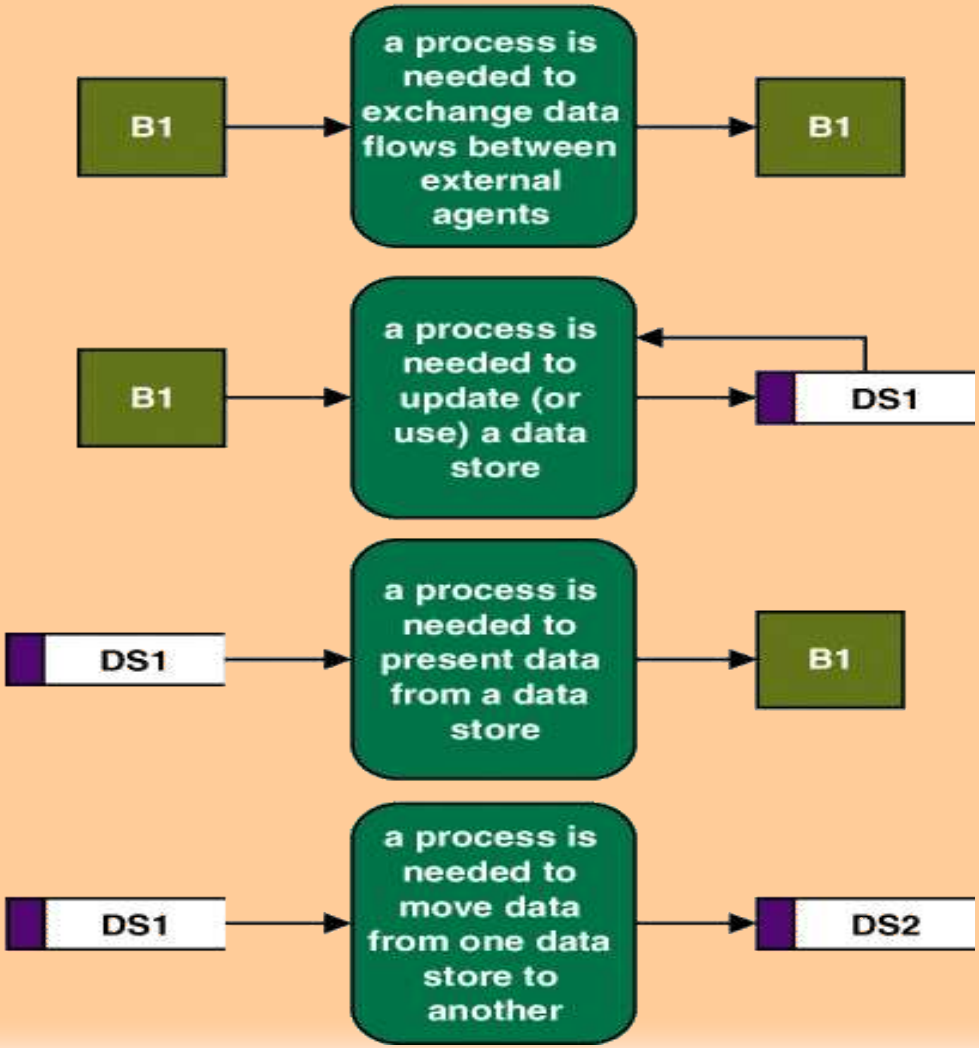


Illegal Data Flows

Illegal data flows

Corrected data flows





Data Types and Domains

Data attributes should be defined by data types and domains.

A data type defines what class of data can be stored in an attribute (e.g., character, integers, real numbers, dates, pictures, etc.).

A domain defines what values or range of values an attribute can legitimately (legally) take on.

Diverging and Converging Data Flows

- A diverging data flow is one that splits into multiple data flows.
  - Useful for illustrating data that starts out naturally as one flow, but needs to be routed to parallel processes.
  - Also useful for illustrating multiple copies of the same output going to different destinations.
- A converging data flow is the merger of multiple data flows into a single packet.
  - Useful for illustrating data from multiple sources that must come back together for some subsequent (consequent)processing

Diverging and Converging Data Flows