Data Flow Diagrams (DFDs)

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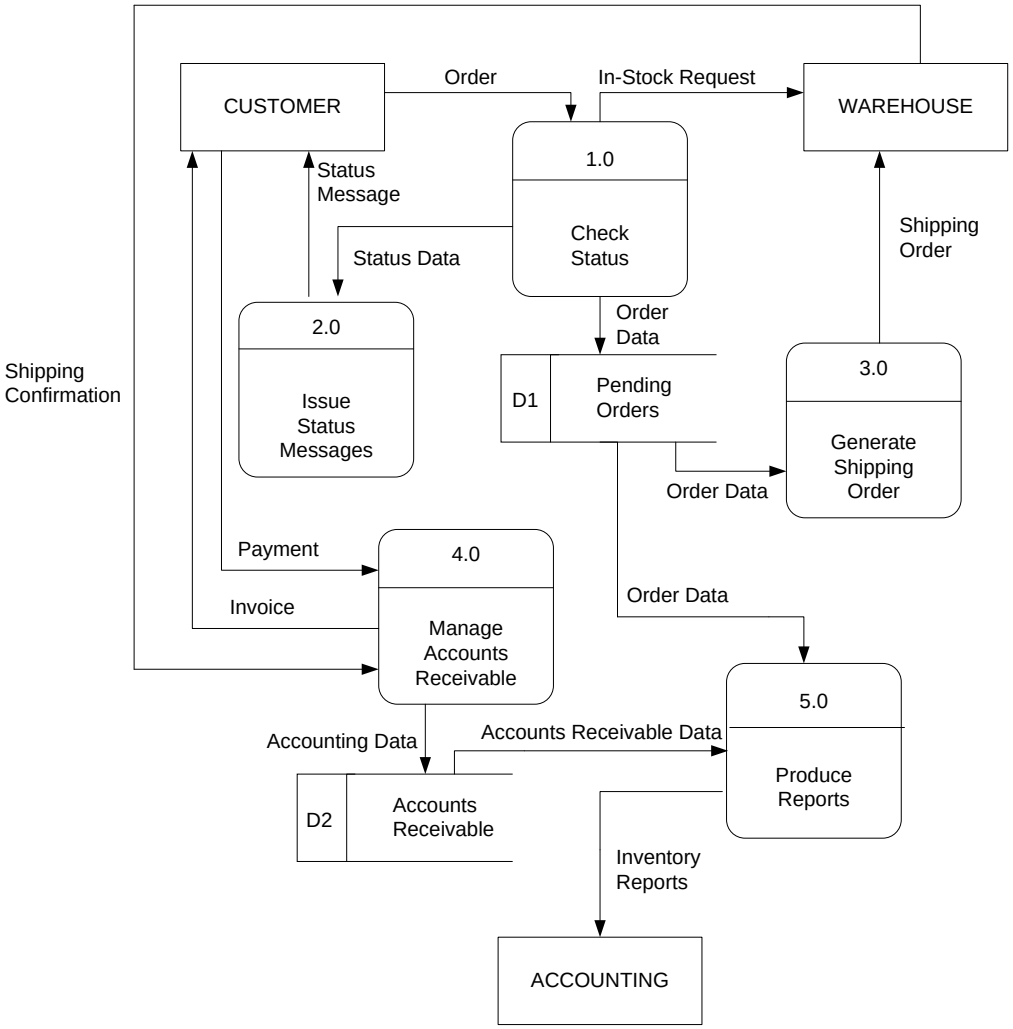
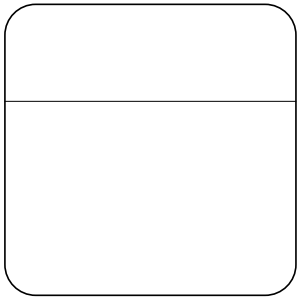
- Data flow diagram (DFD) is a picture of the movement of data between external entities and the processes and the processes and data stores within a system

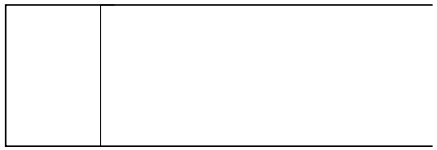


DFD Symbols (Gane & Sarson)



Process

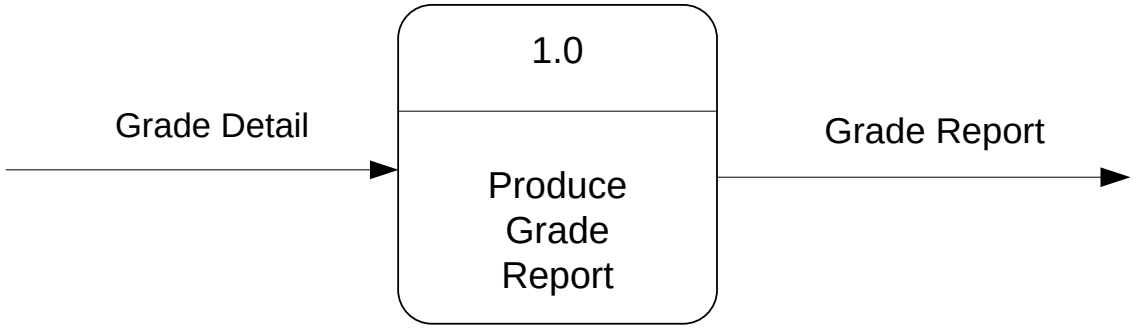
Data Flow



Data Store

Source/Sink (External Entity)

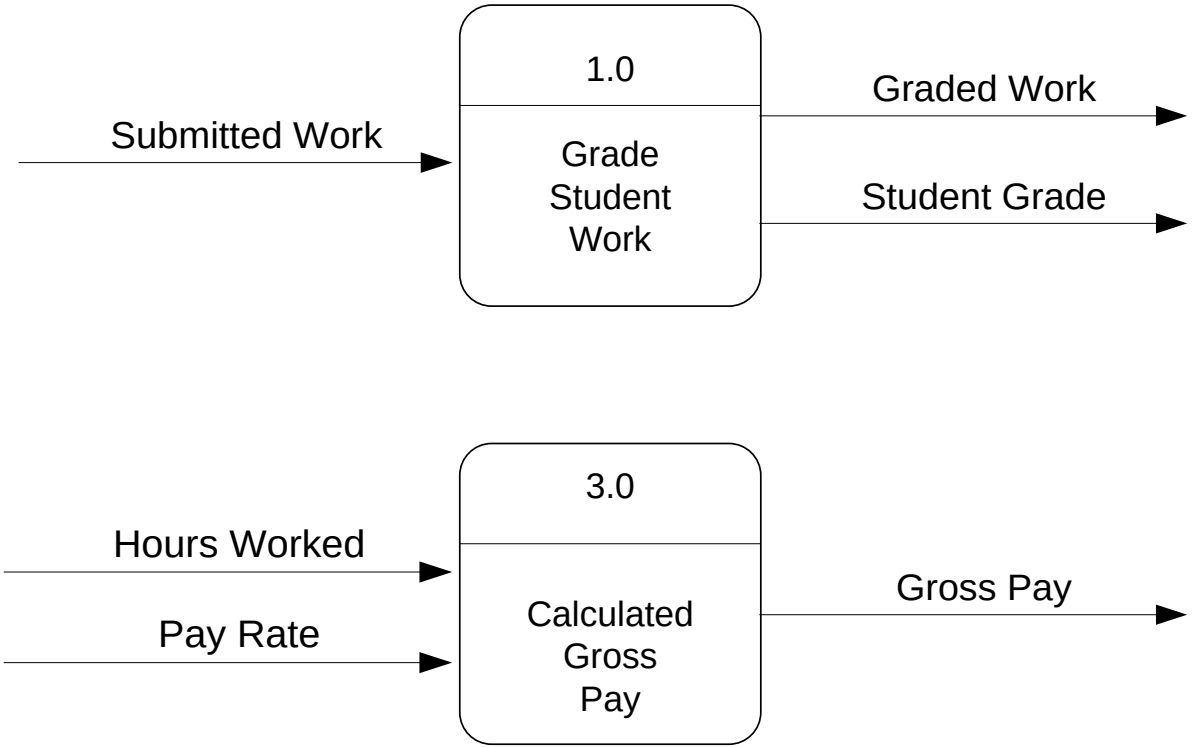
Process



- Work or actions performed on data (inside the system)
- Labels should be verb phrases
- Receives input data and produces output

Rule 1: Process

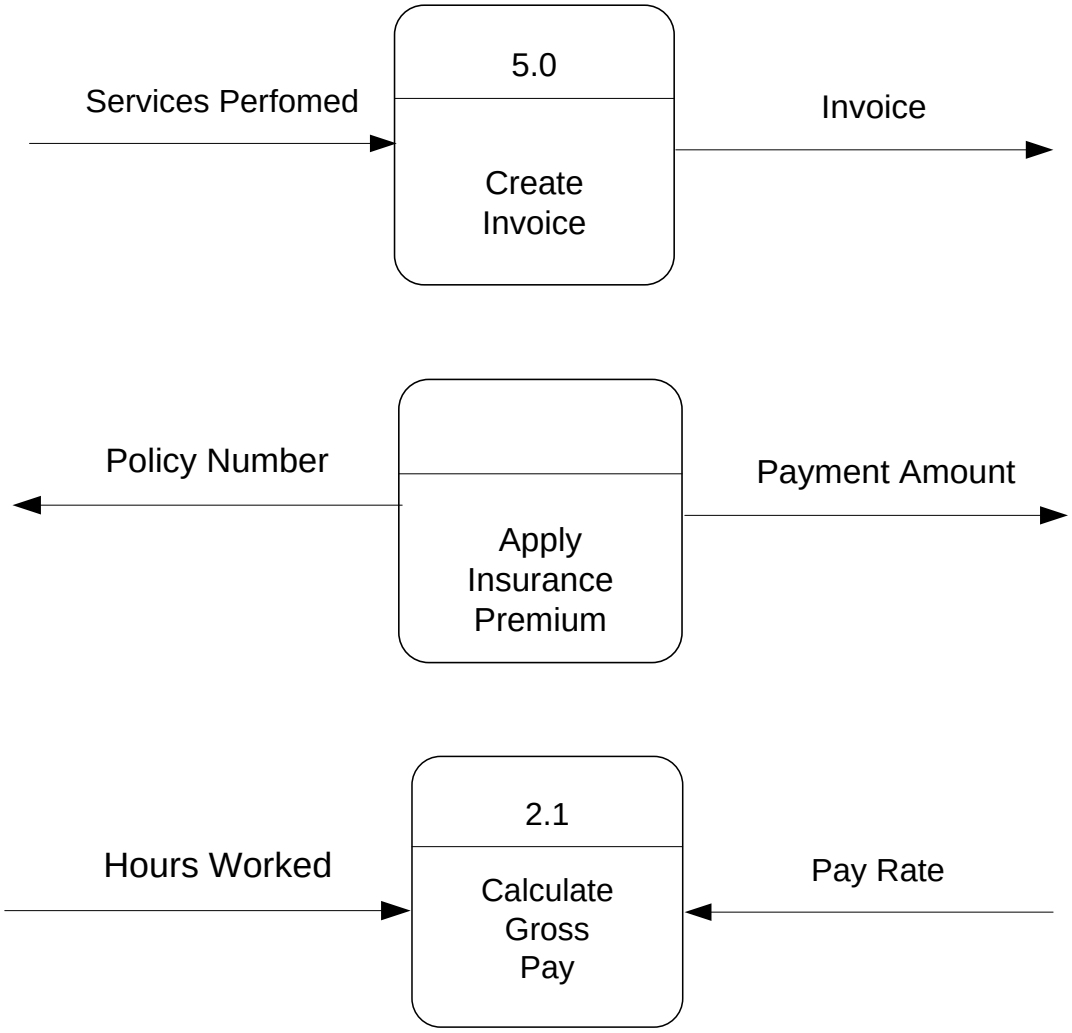
- Can have more than one outgoing data flow or more than one incoming data flow



Rule 2: Process

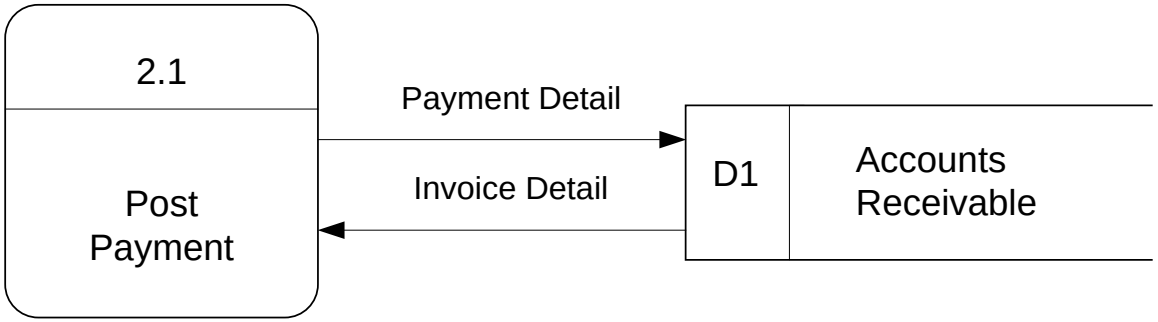
- Can connect to any other symbol (including another process symbol)

Process: Correct/Incorrect?

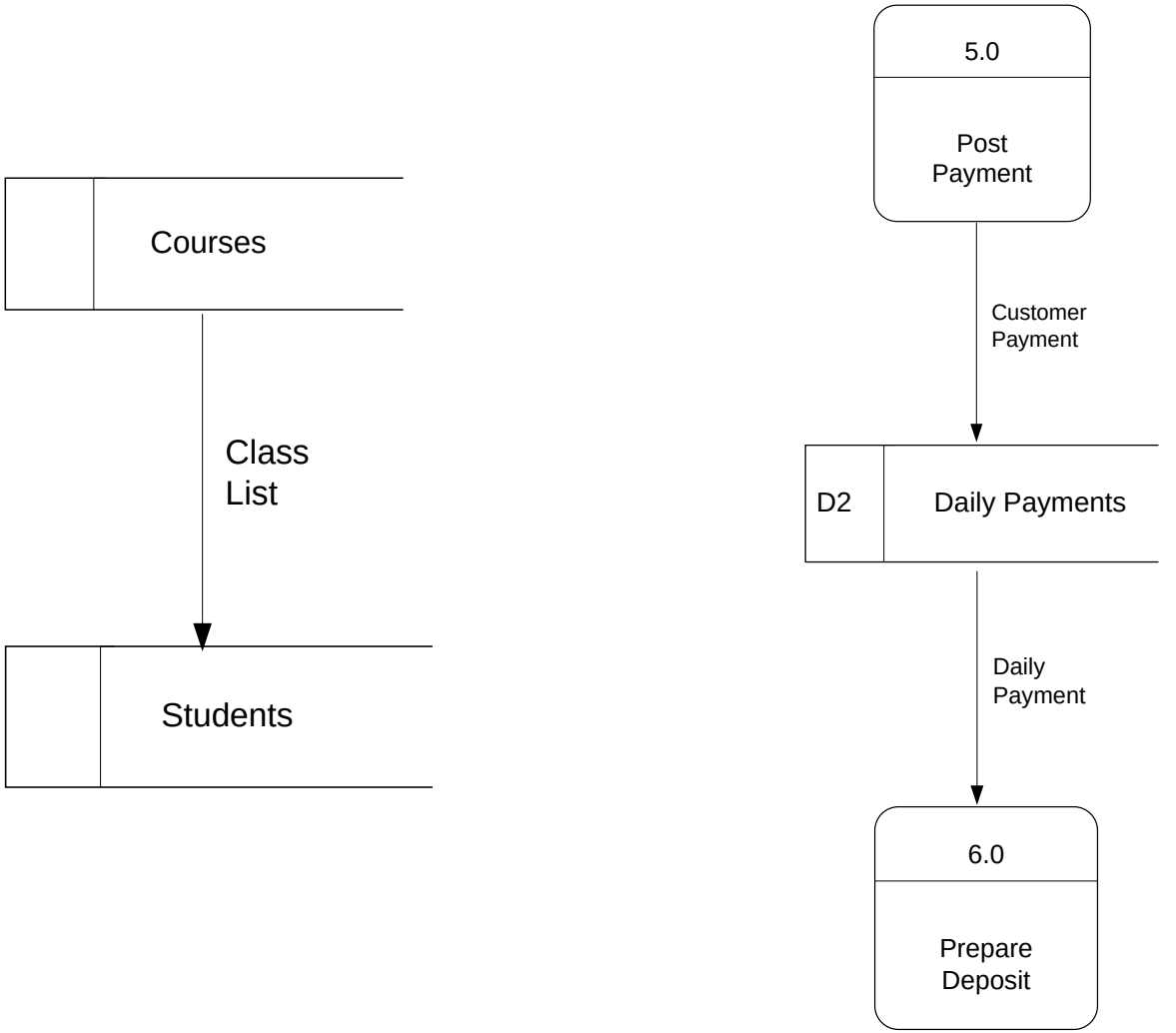


Data Flow

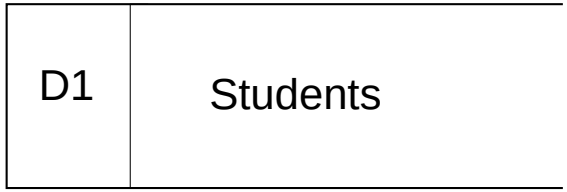
- Is a path for data to move from one part of the IS to another
- Arrows depicting movement of data
- Can represent flow between process and data store by two separate arrows



Data Flow: Correct/Incorrect?



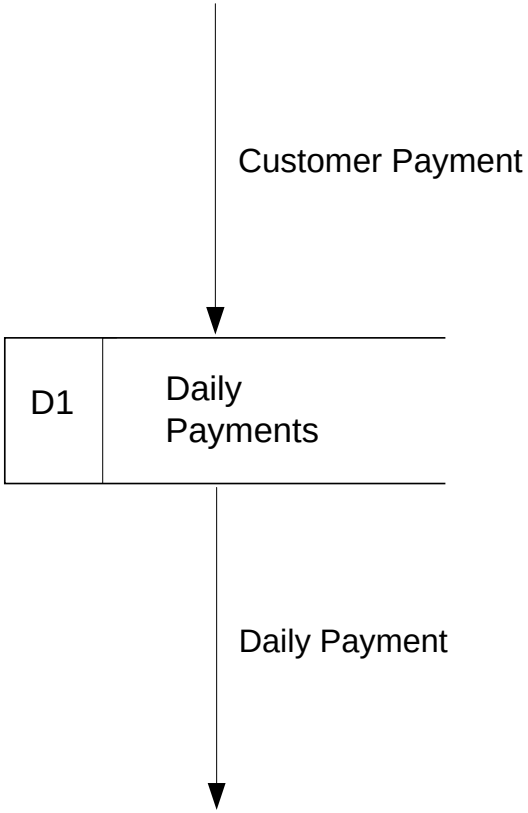
Data Store



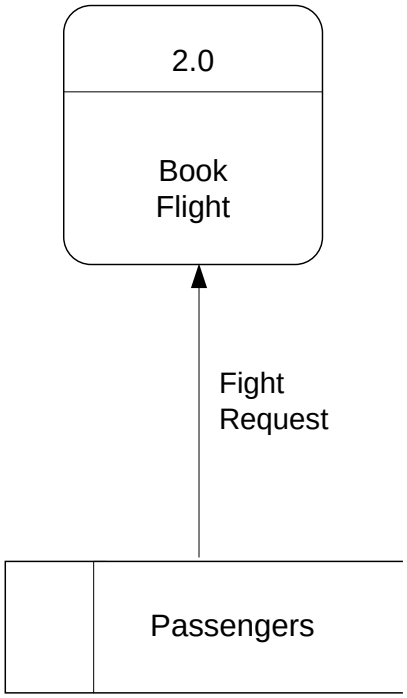
- Is used in a DFD to represent data that the system stores
- Labels should be noun phrases

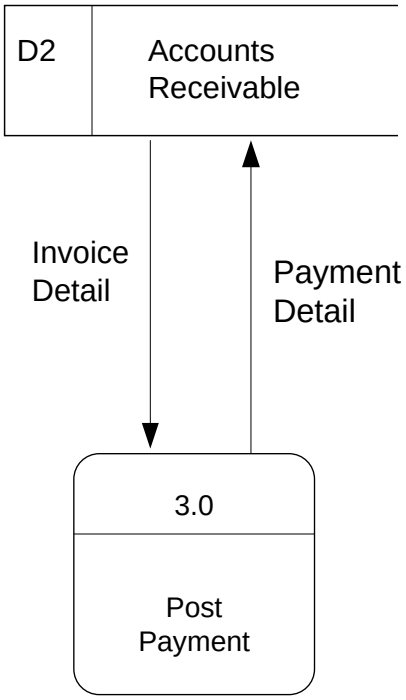
Rule: Data Store

- Must have at least one incoming and one outgoing data flow

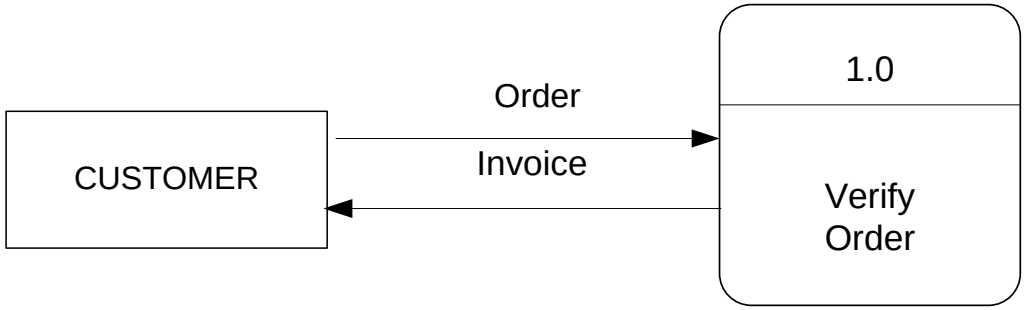


Data Store: Correct/Incorrect?





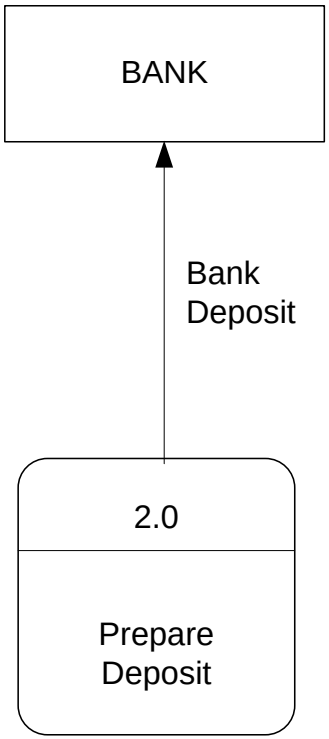
Source/Sink (External Entity)



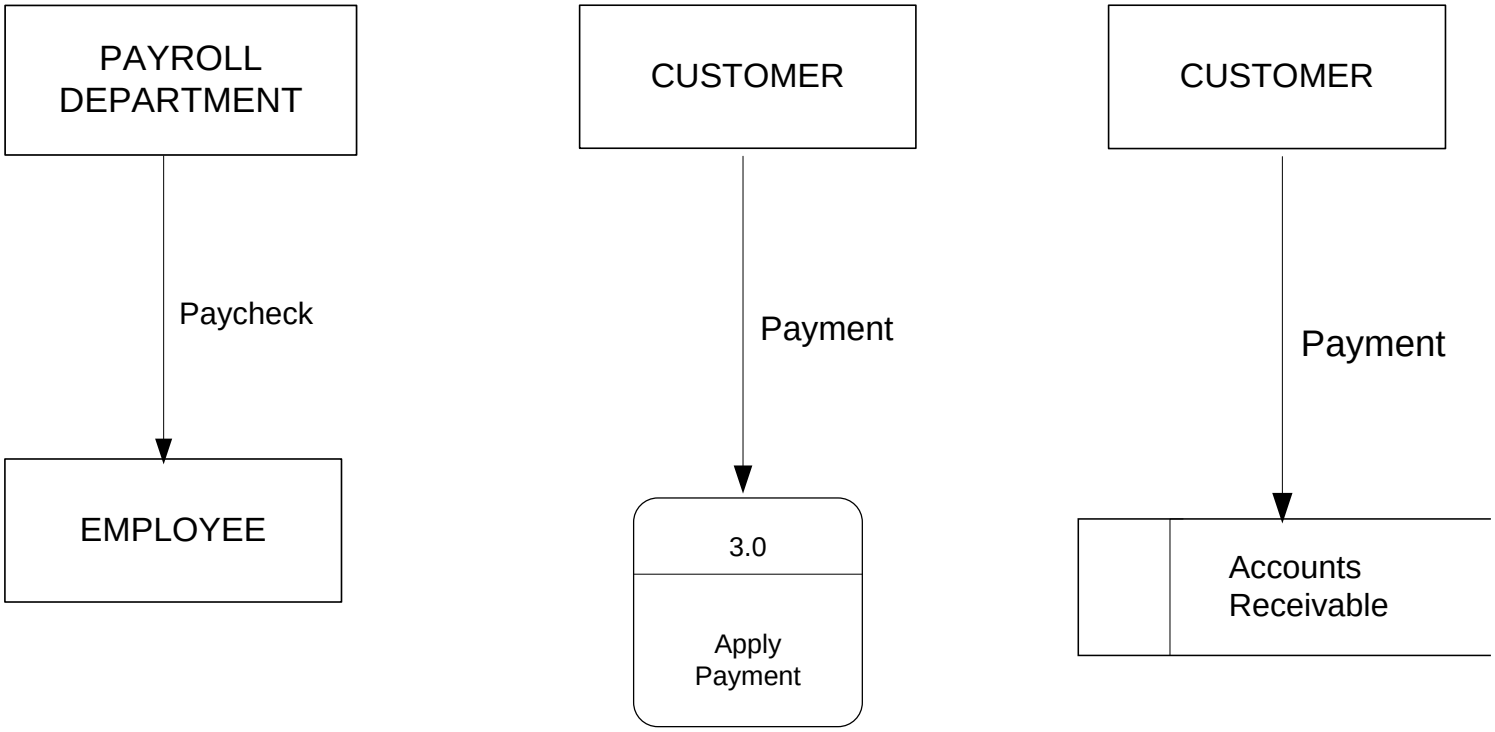
- External entity that is origin or destination of data (outside the system)
- Is the singular form of a department, outside organisation, other IS, or person
- Labels should be noun phrases
- Source – Entity that supplies data to the system
- Sink – Entity that receives data from the system

Rule: Source/Sink

- Must be connected to a process by a data flow



Source/Sink: Correct/Incorrect?

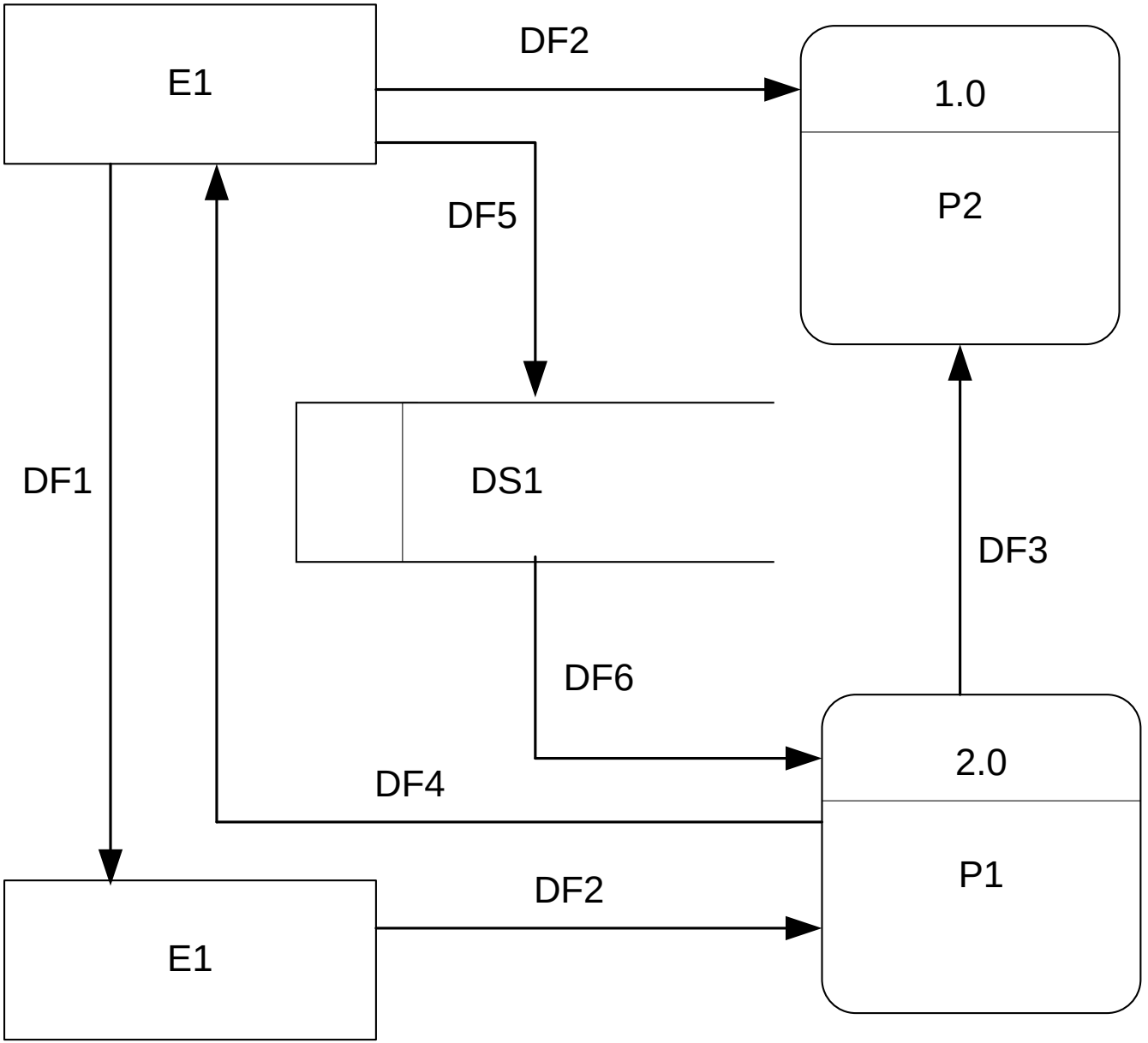


Rules for Using DFD Symbols

- Data Flow That Connects

	YES	NO
A process to another process	✓	
A process to an external entity	✓	
A process to a data store	✓	
An external entity to another external entity		✓
An external entity to a data store		✓
A data store to another data store		✓

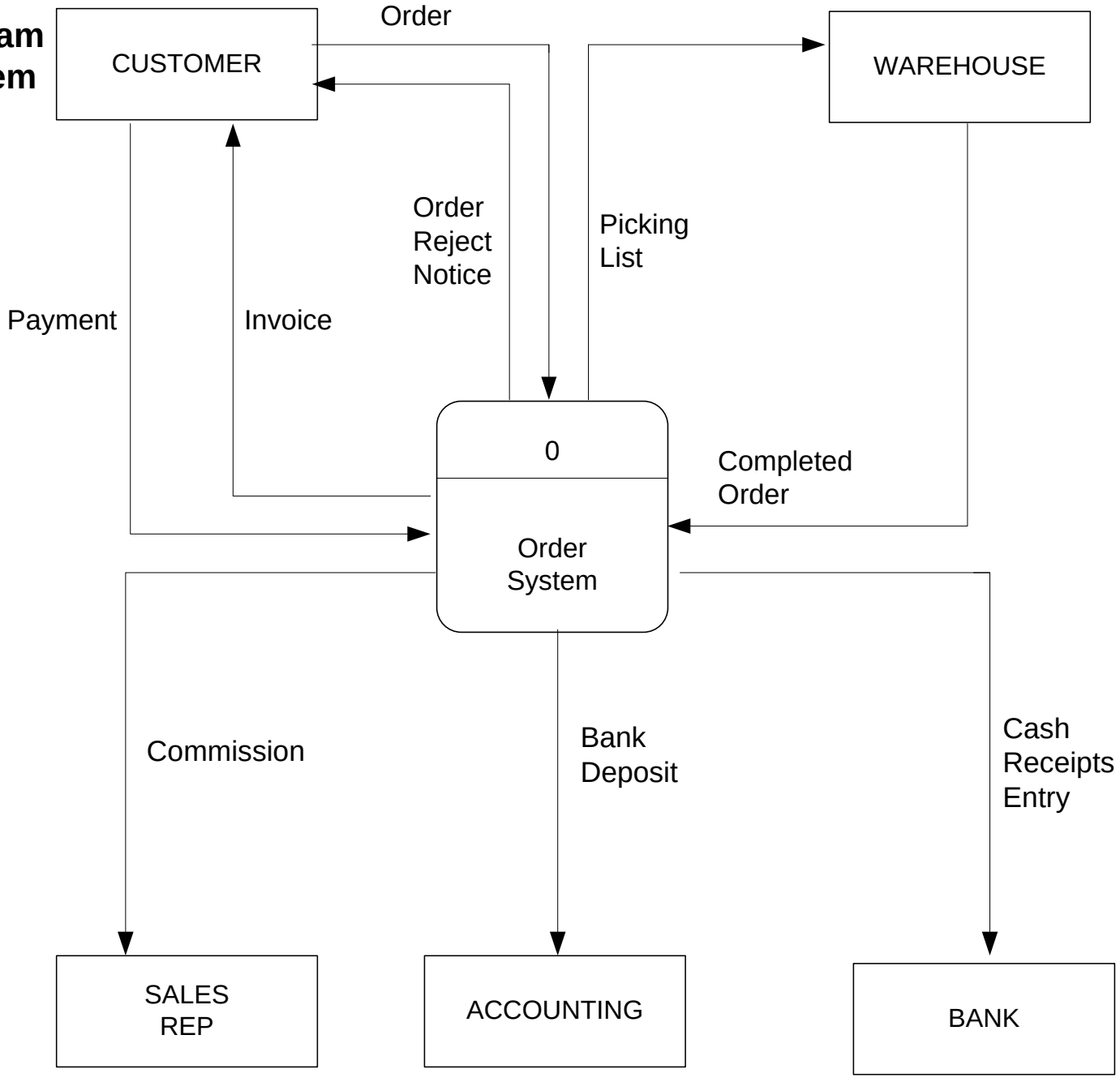
List the errors of this DFD



Context Diagram

- Top-level view of IS
- Shows the system boundaries, external entities that interact with the system, and major information flows between entities and the system.
- Example: Order system that a company uses to enter orders and apply payments against a customer’s balance

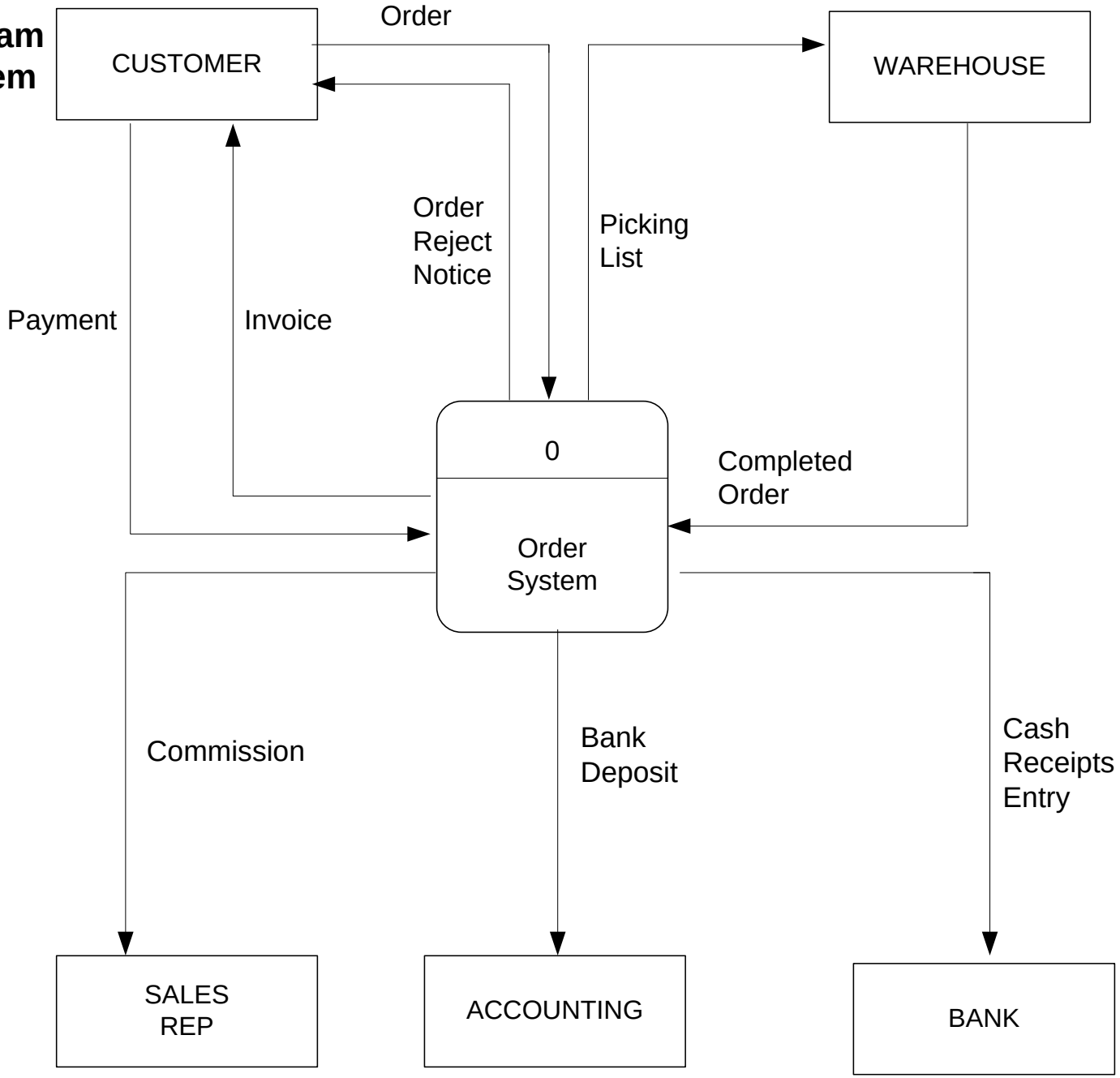
Context Diagram of Order System



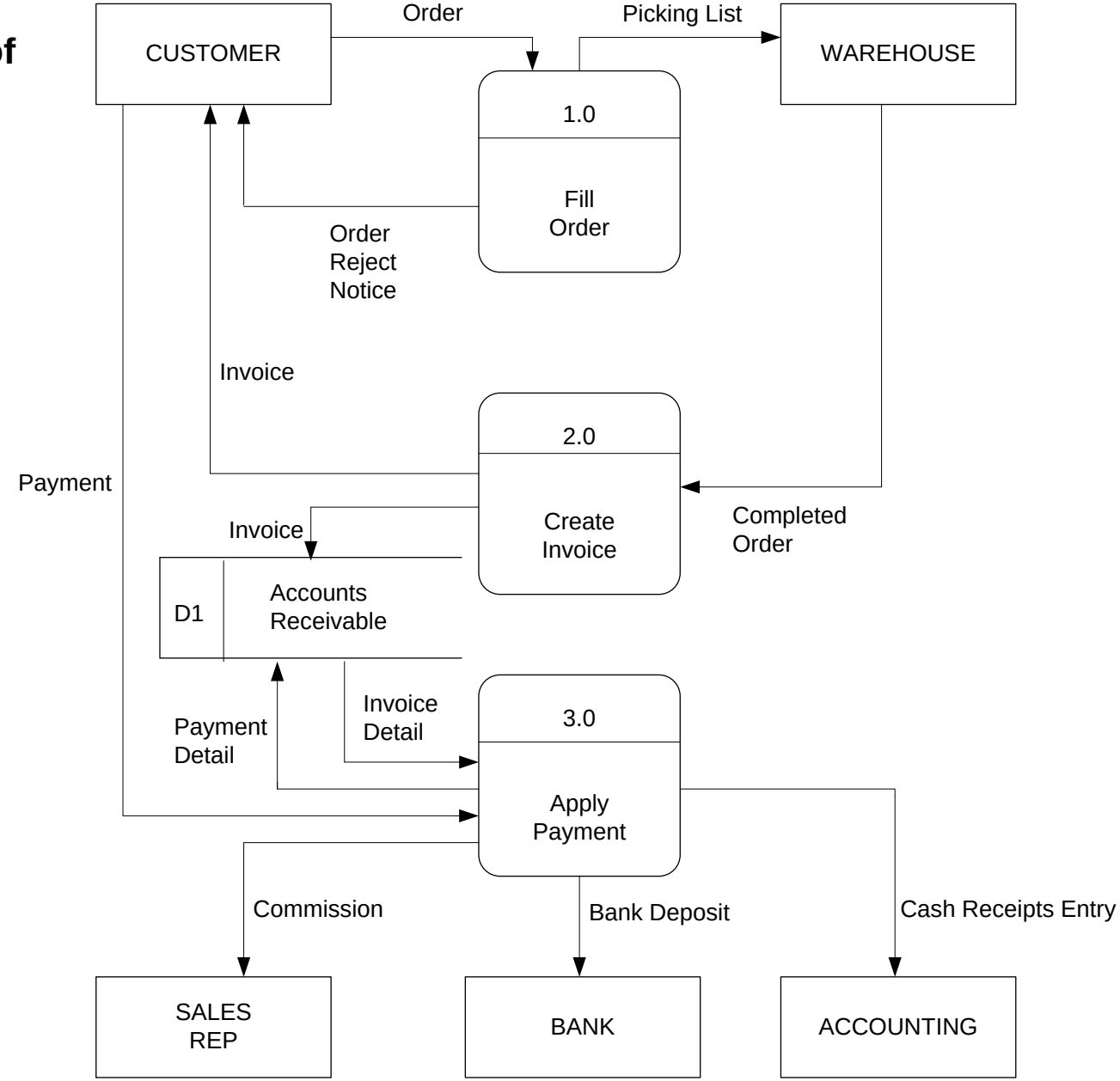
Level-0 DFD

- Shows the system’s major processes, data flows, and data stores at a high level of abstraction
- When the Context Diagram is expanded into DFD level-0, all the connections that flow into and out of process 0 needs to be retained.

Context Diagram of Order System



Level-0 DFD of Order System



Lower-Level Diagrams

- Functional Decomposition
  - An iterative process of breaking a system description down into finer and finer detail
  - Uses a series of increasingly detailed DFDs to describe an IS
- Balancing
  - The conservation of inputs and outputs to a data flow process when that process is decomposed to a lower level
  - Ensures that the input and output data flows of the parent DFD are maintained on the child DFD

Strategies for Developing DFDs

- Top-down strategy
  - Create the high-level diagrams (Context Diagram), then low-level diagrams (Level-0 diagram), and so on
- Bottom-up strategy
  - Create the low-level diagrams, then higher-level diagrams

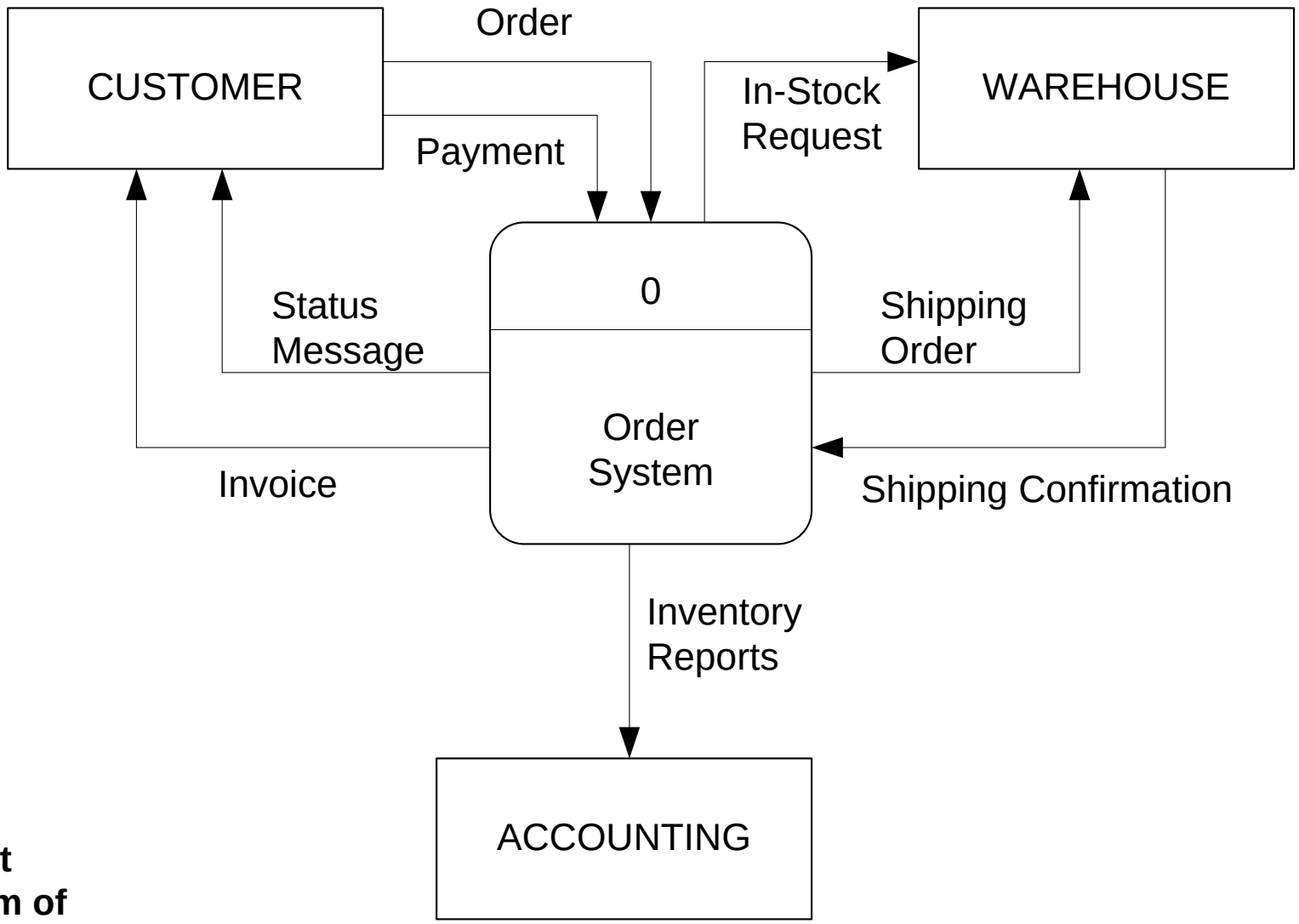
Exercise:

Precision Tools sells a line of high-quality woodworking tools. When customers place orders on the company's Web site, the system checks to see if the items are in stock, issues a status message to the customer, and generates a shipping order to the warehouse, which fills the order. When the order is shipped, the customer is billed. The system also produces various reports.

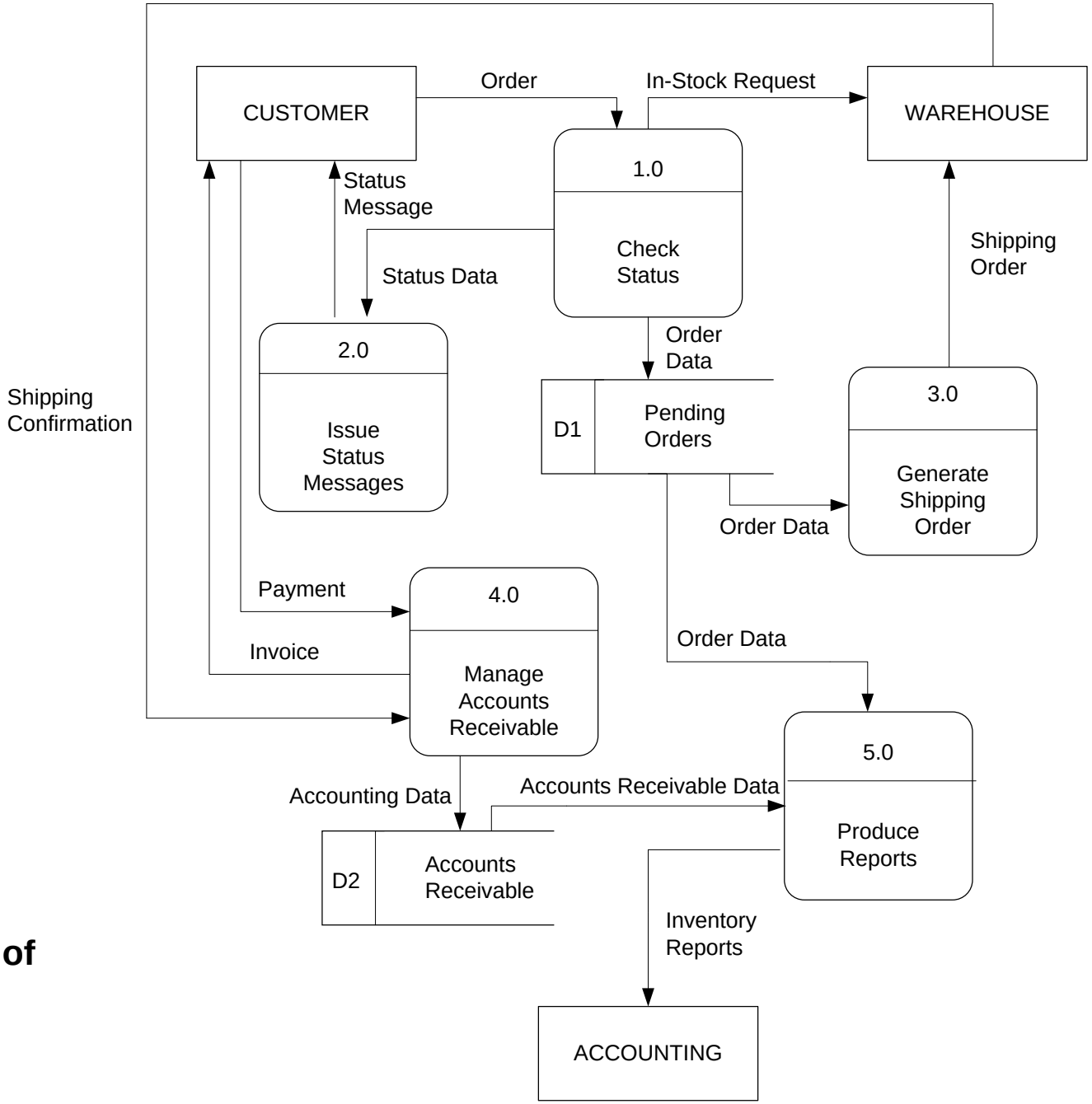
- Draw a context diagram for the order system
- Draw DFD diagram 0 for the order system

Identify Entities,Process,Data Stores & Data Flow

- Entities
  - Customer
  - Warehouse
  - Accounting
- Processes
  - 1.0 Check Status
  - 2.0 Issue Status Messages
  - 3.0 Generate Shipping Order
  - 4.0 Manage Accounts Receivable
  - 5.0 Produce Reports
- Data Stores
  - D1 Pending Orders
  - D2 Accounts Receivable
- Data Flows
  - Order
  - In-Stock Request
  - Order Data (1.0)
  - Status Data
  - Status Message (2.0)
  - Shipping Order
  - Order Data (3.0)
  - Invoice
  - Shipping Confirmation
  - Payment
  - Accounting Data (4.0)
  - Accounts Receivable Data
  - Order Data
  - Inventory Reports (5.0)



Context Diagram of Order System



Level-0 of Order System