Hierarchy Input Process Output Diagram (HIPO)

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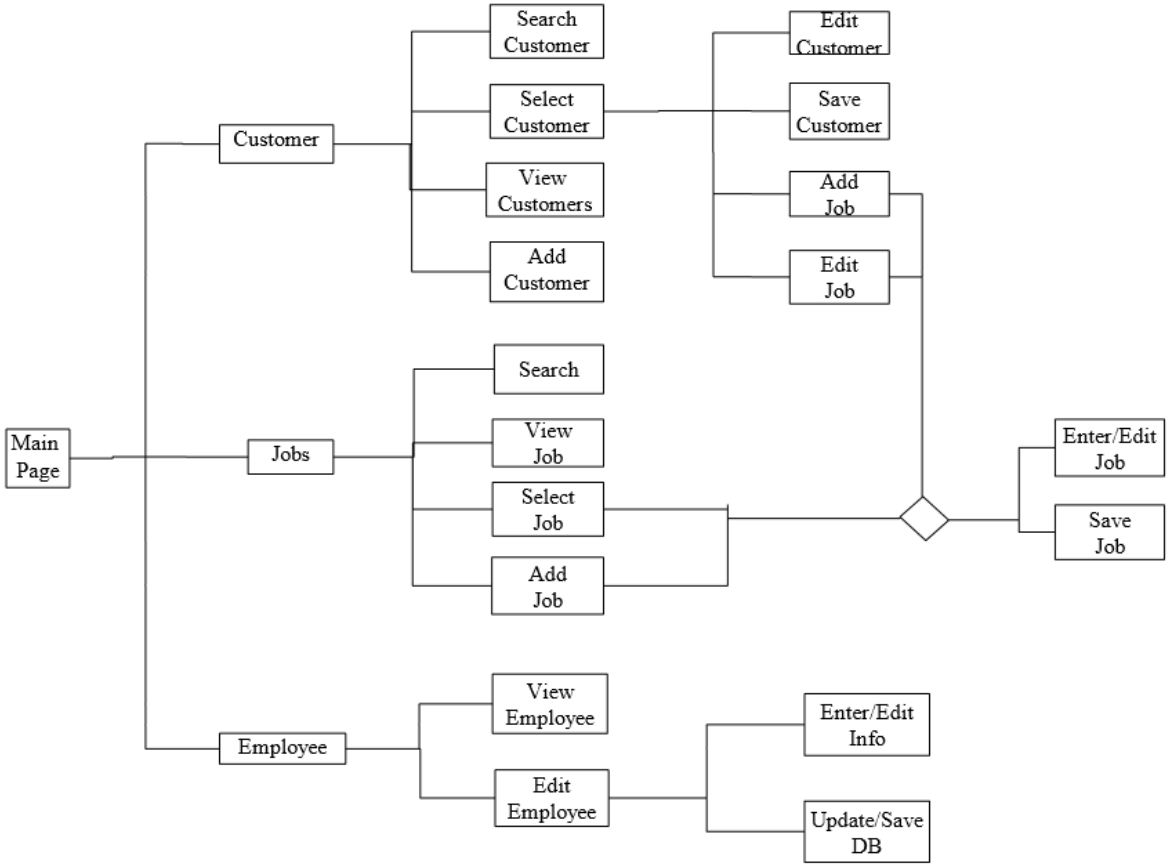
- Is a hierarchy chart that graphically represents the program's control structure and describes the functions (or processes) performed by each module on the system.

Hierarchy Input Process Output Diagram (HIPO)



Functions' Examples

Function: Add Customer
Inputs: @FName, @MInit, @LName, @PhNum1, @PhNum2, @Address, @Note
Outputs: None
Pseudocode:
Connect to the database
Query = INSERT INTO Customer(@Fname, @MInit, @Lname, @PhNum1, @PhNum2, @Address,
@Note);
Parse Query
Execute Query
Close connection to the database

Functions' Examples (Cont…)

Function: Edit Customer
Inputs: @FName, @Minit, @Lname
Outputs: None
Pseudocode:

```
Connect to the database
Query = UPDATE Customer
        SET "attribute"
        WHERE (FName = @FName) AND
              (MInit = @MInit) AND
              (LName = @LName);
Parse Query
Execute Query
Close connection to the database
```

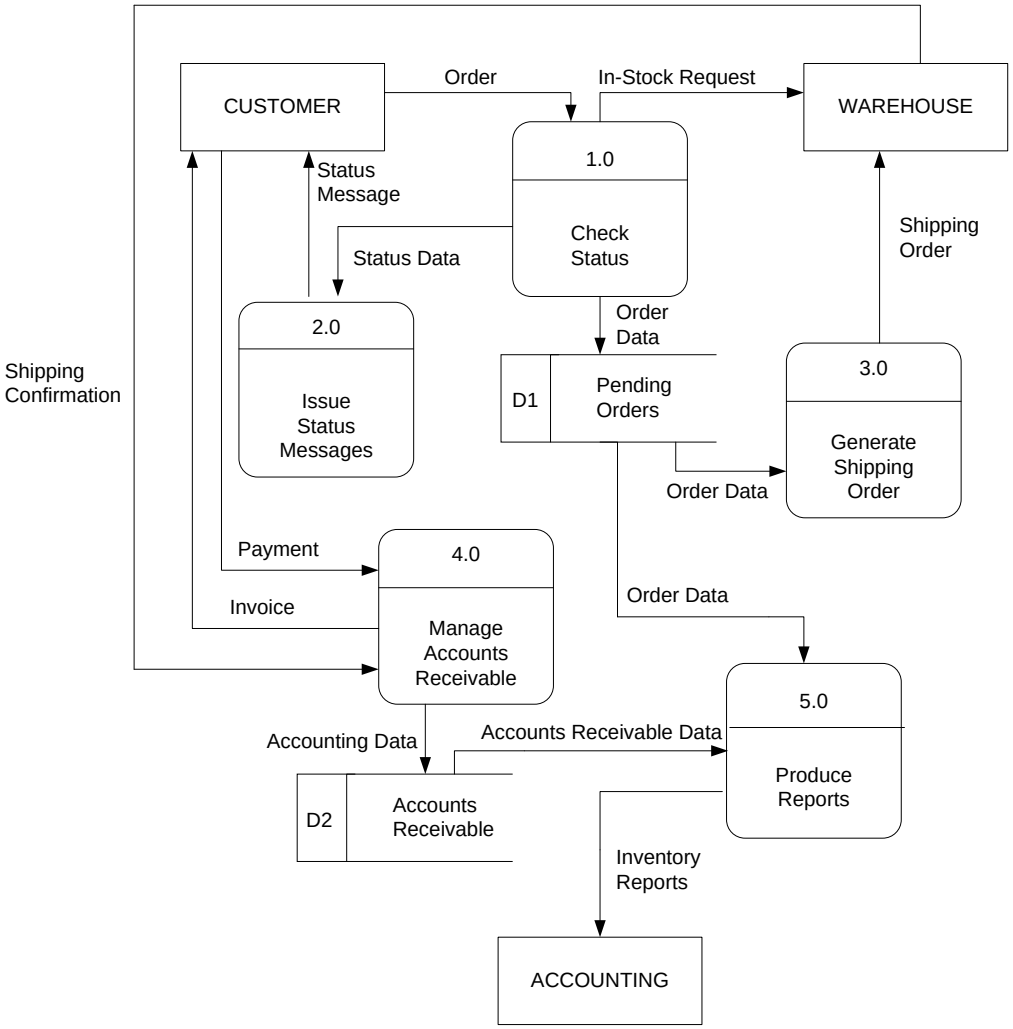
Functions' Examples (Cont…)

Function: Search/View Customers:
Inputs: @FName, @Lname, @Make, @Model, @Year, @MInit
Outputs: Fname, Minit, LName, Make, Model, Year
Pseudocode:
Connect to the database
Query = SELECT c.FName, c.MInit, c.LName, v.Make, v.Model, v.Year
FROM Vehicle as v, Customer as c
WHERE c.FName = @FName AND c.MInit = @MInit AND c.LName = @LName AND
v.Make = @Make AND v.Model = @Model AND v.Year = @Year
Parse Query
Execute Query
Close connection to the database

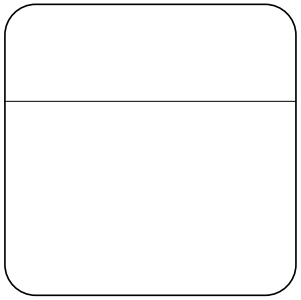
Data Flow Diagram (DFD)

Data Flow Diagrams (DFDs)

- Is a picture of the movement of data between external entities and the processes and data stores within a system

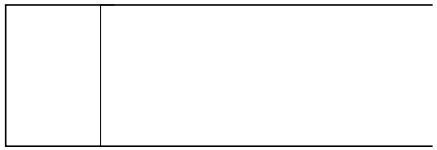


DFD Symbols (Gane & Sarson)



Process

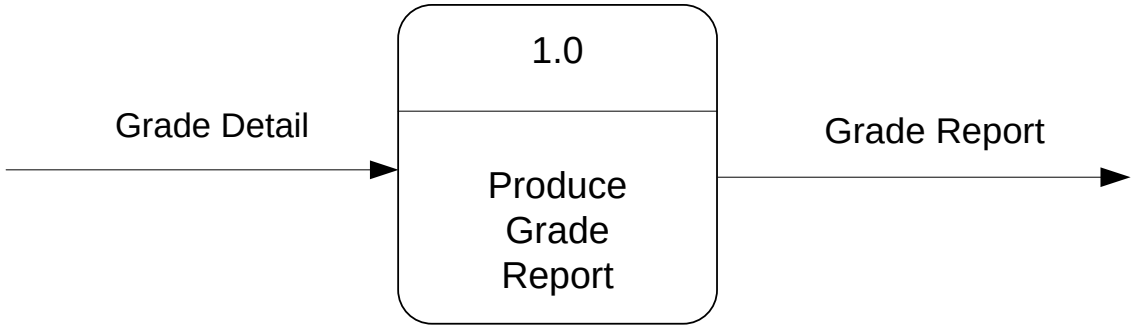
Data Flow



Data Store

Source/Sink (External Entity)

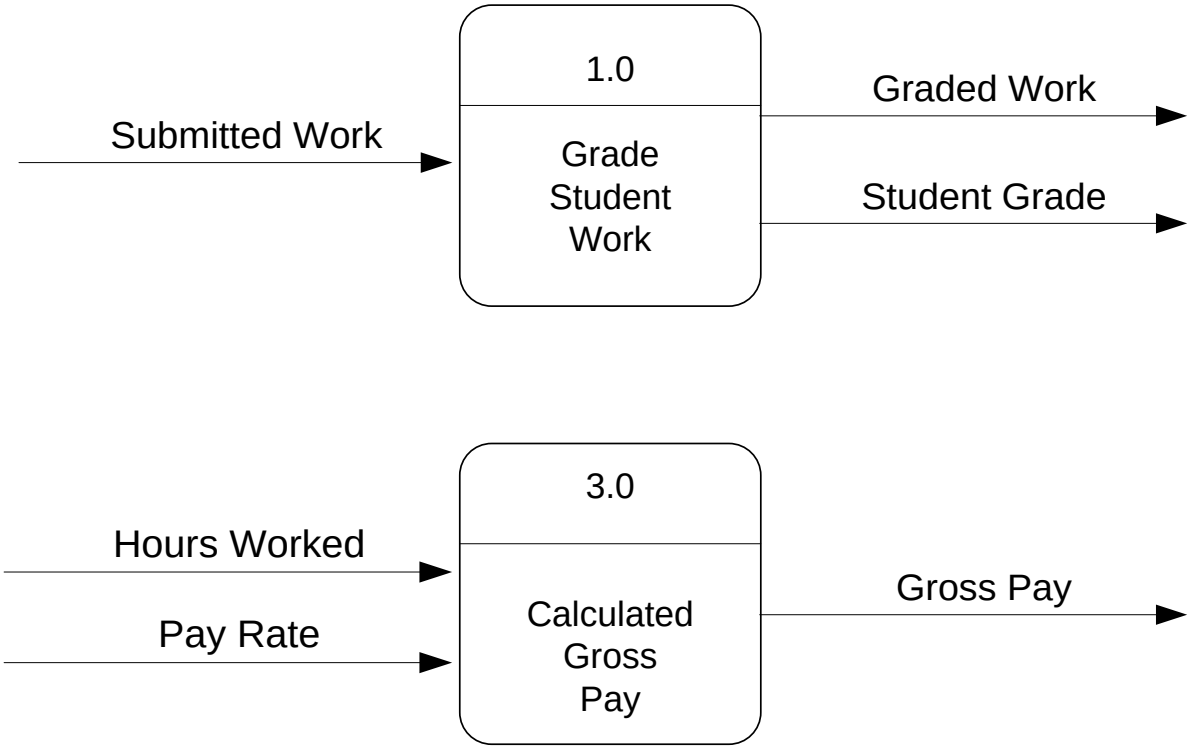
Process



- 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

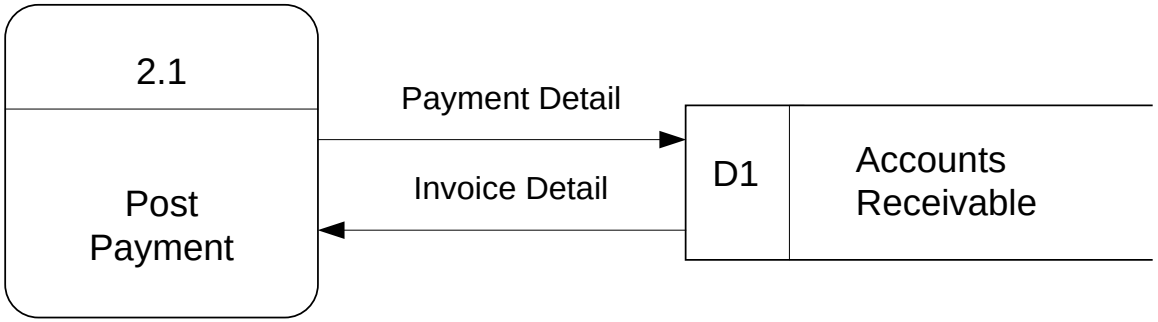


Rule 2: Process

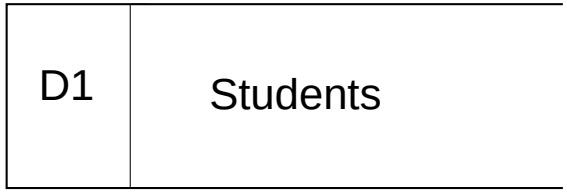
- Can connect to any other symbol (including another process symbol)

Data Flow

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



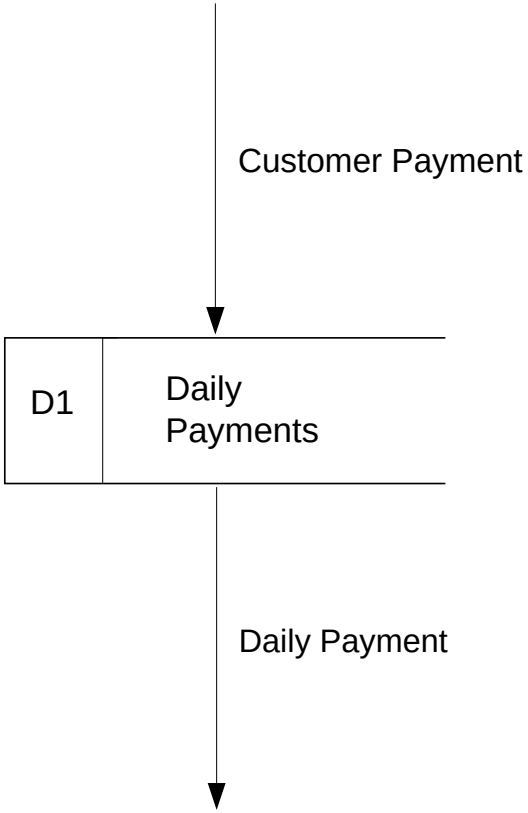
Data Store



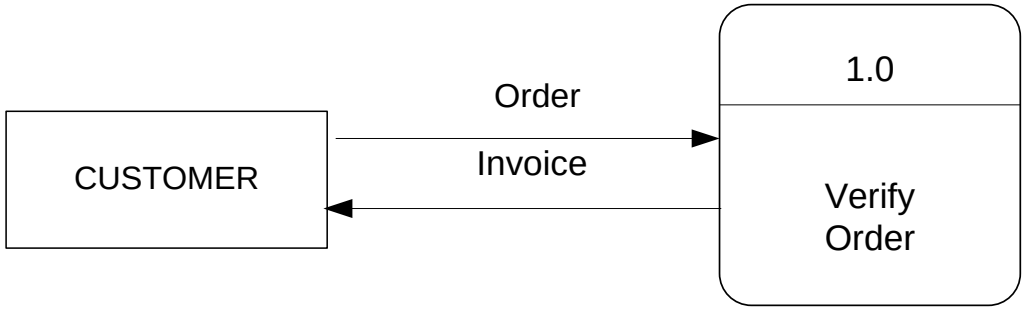
- Is used in a DFD to represent data that the system stores
- Labels should be noun phrases

Rule: Data Store

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



Source/Sink (External Entity)

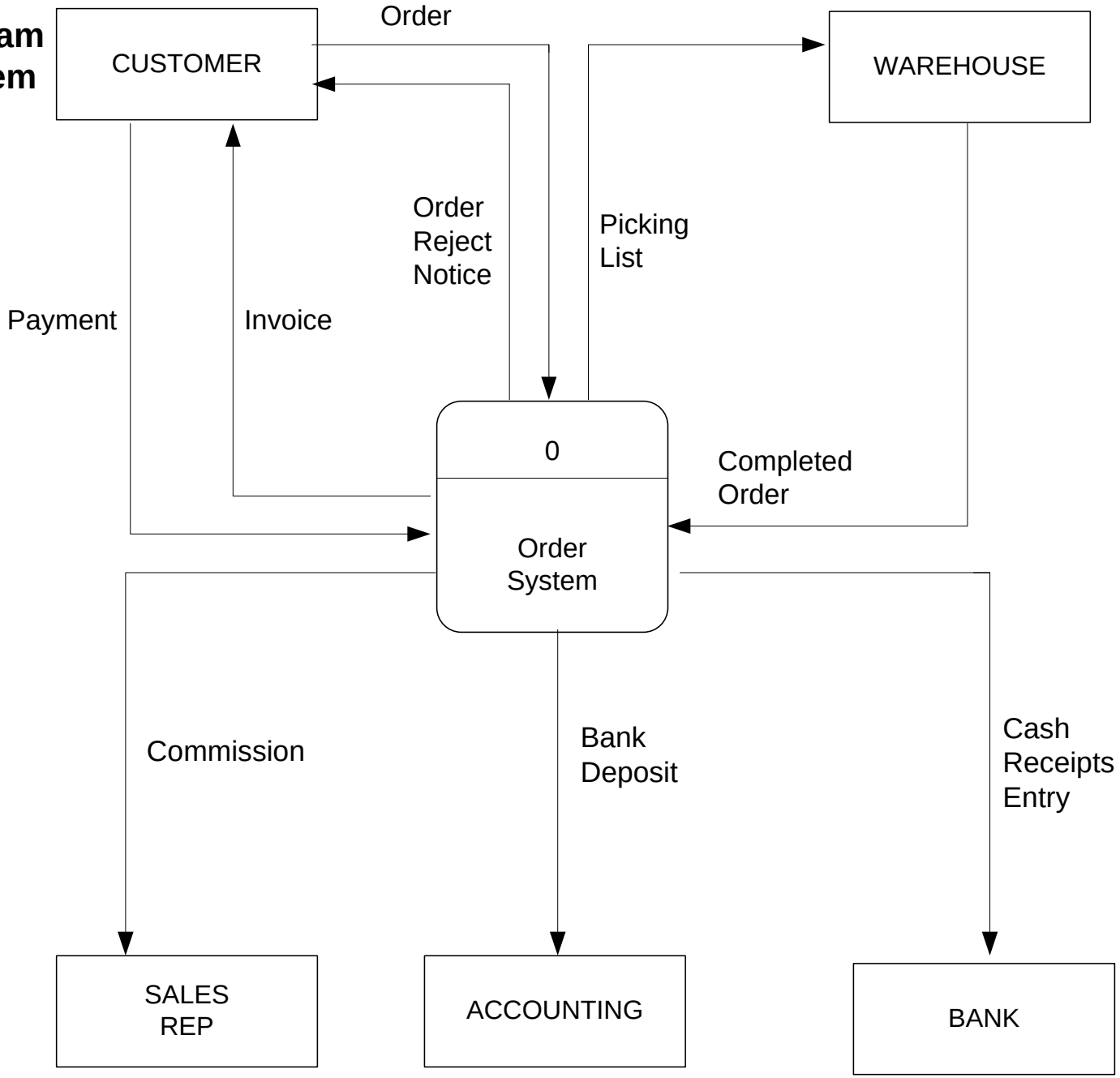


- External entity that is origin or destination of data (outside the system)
- Labels should be noun phrases
- Source – Entity that supplies data to the system
- Sink – Entity that receives data from the system

Context Diagram

- Top-level view
- Shows:
  - The system boundaries.
  - External entities that interact with the system.
  - 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

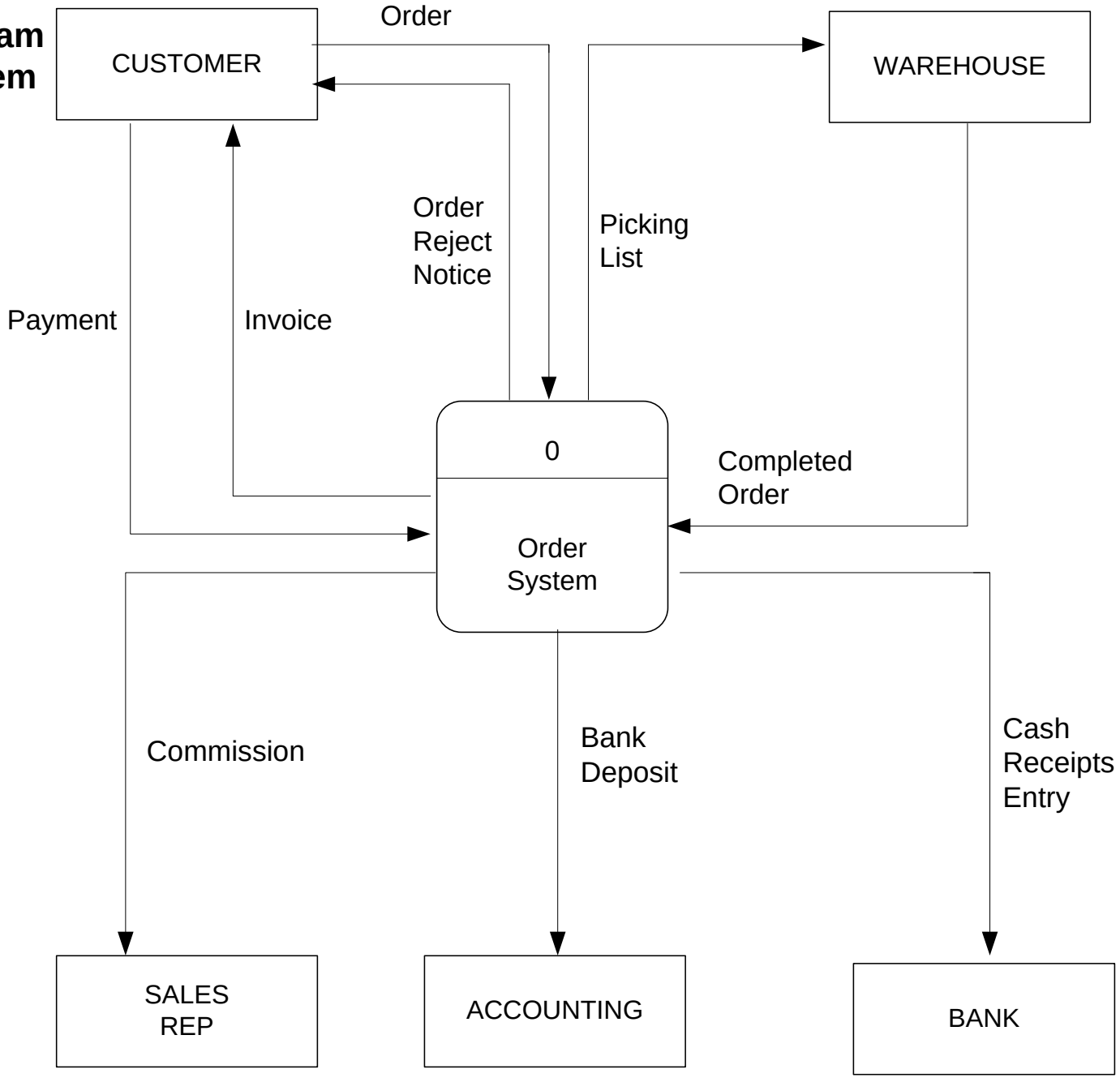
Context Diagram of Order System



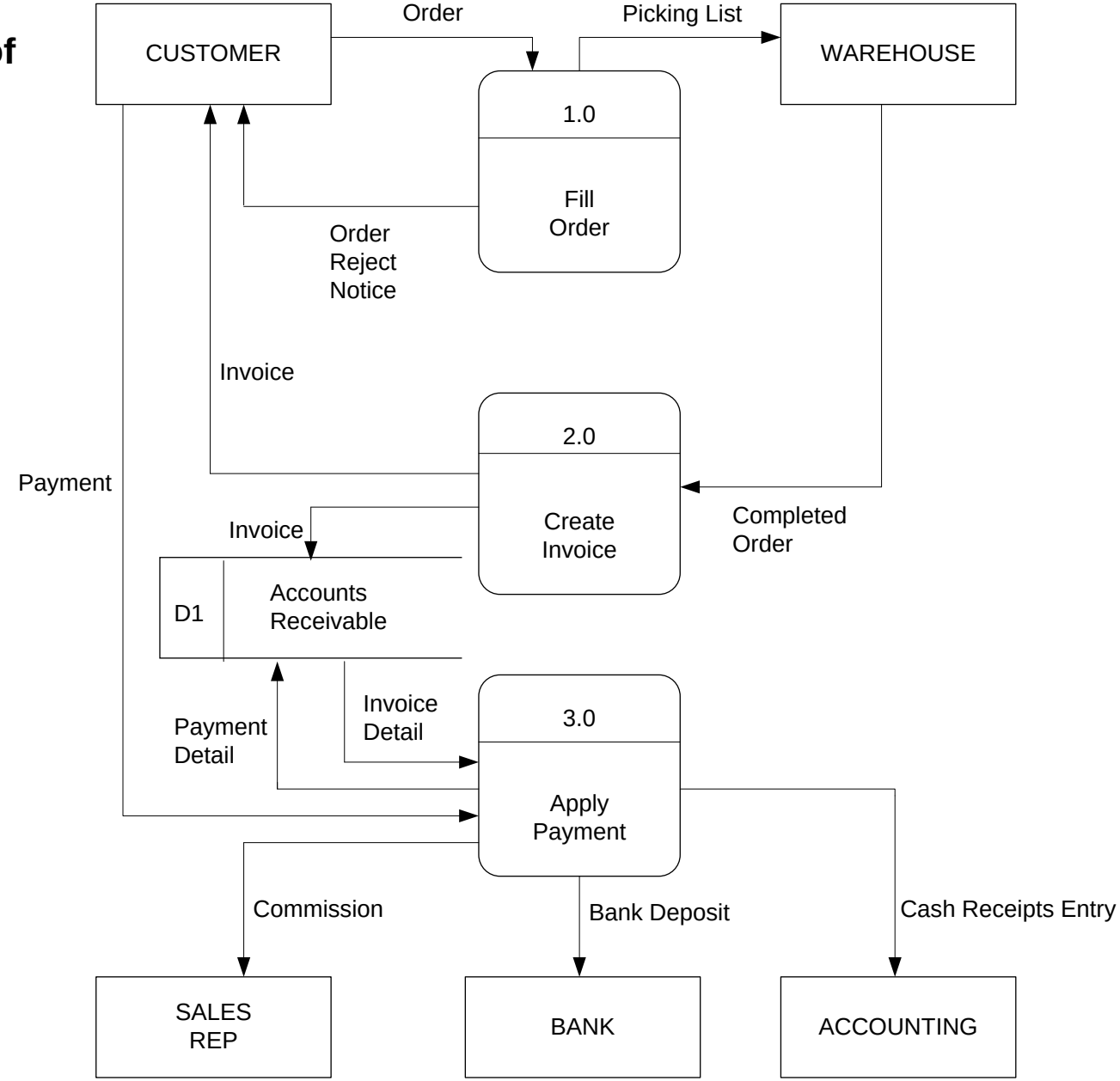
Level-0 DFD

- Shows:
  - The system’s major processes.
  - Data flows.
  - 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



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

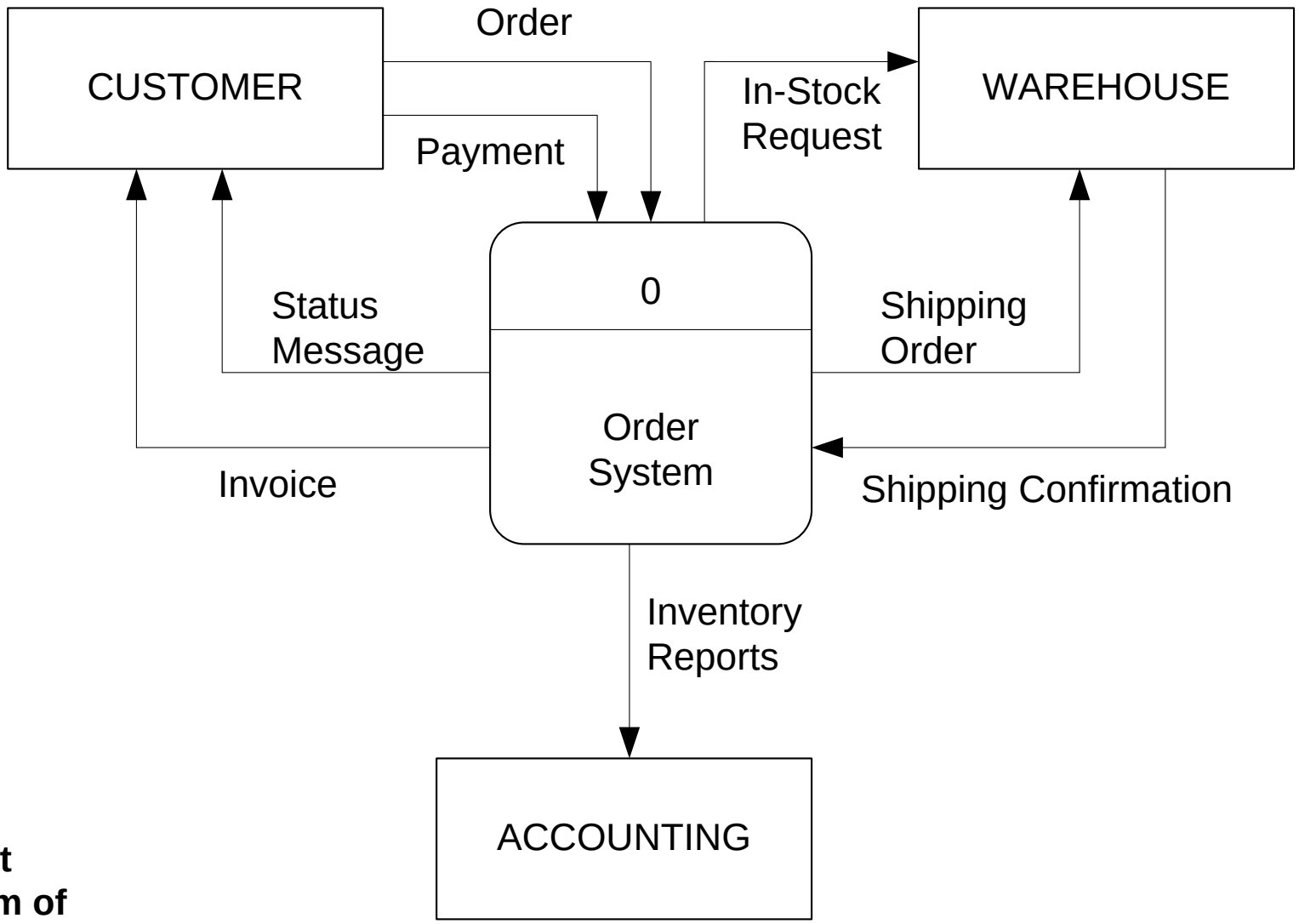
Exercise:

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.

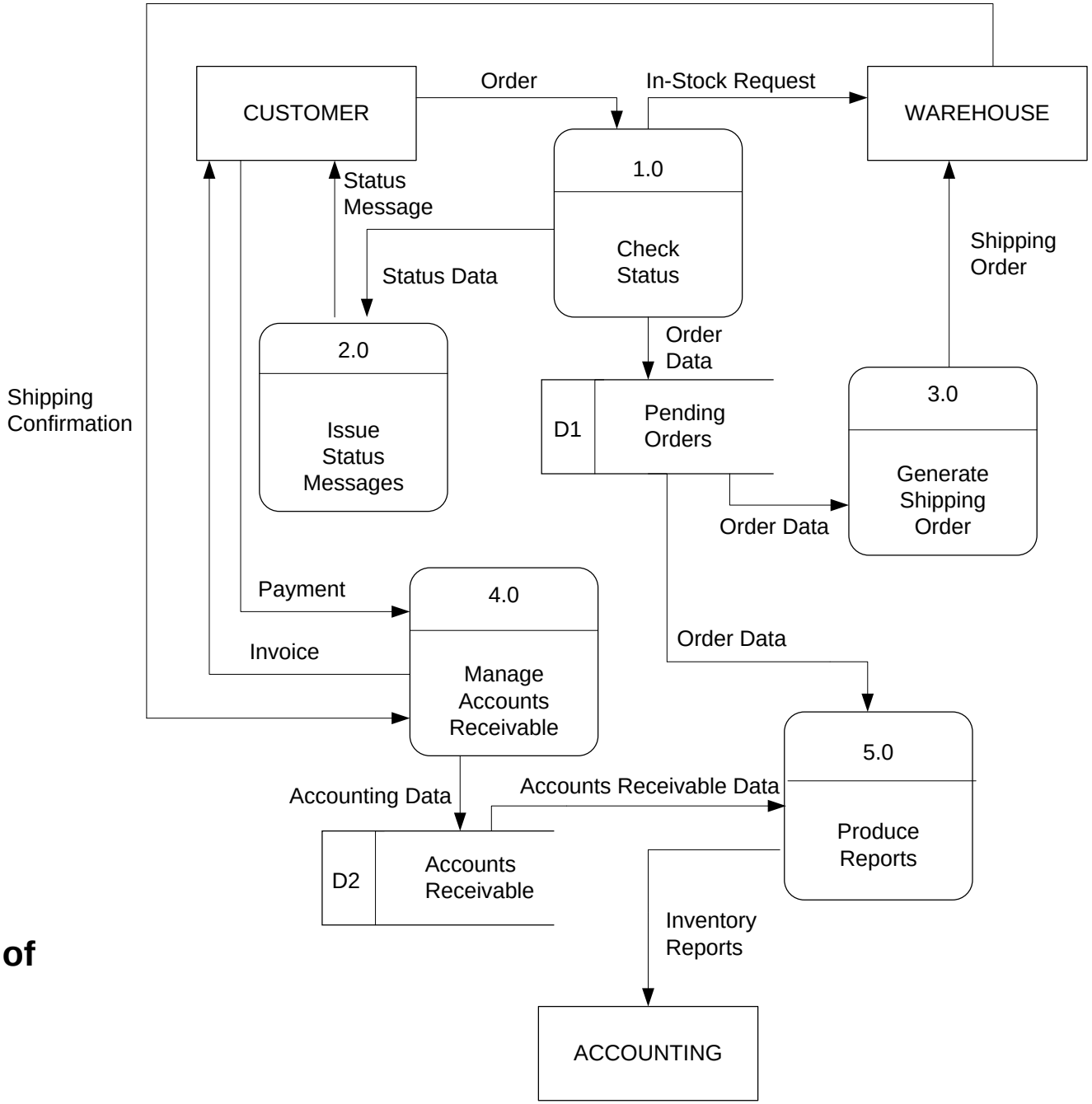
- Draw a context diagram for the order system
- Draw DFD diagram 0 for the order system

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