Systems Analysis and Design

Lecture 3: Data Flow Diagram

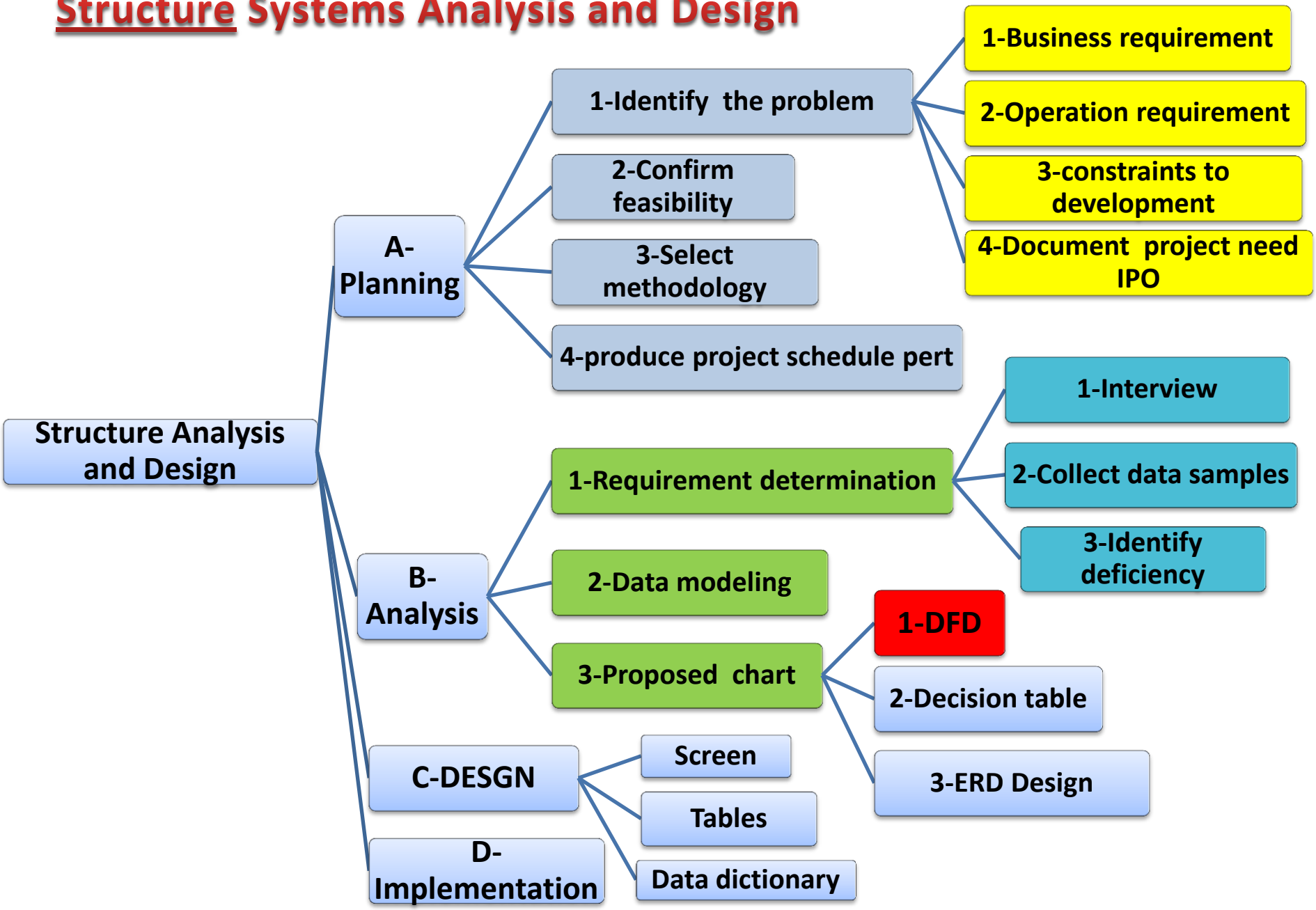
Context Diagram

DFD level 1

Alan Dennis, Barbara Haley , John Wiley & Sons, Inc. University of Northern Iowa

Slides: Hussein Omran, akhbar Elyom Academy, Egypt

Structure Systems Analysis and Design



Step 2- system Analysis phase

Analysis: refer to break whole into parts to understand function, and inter relationships to define requirement.

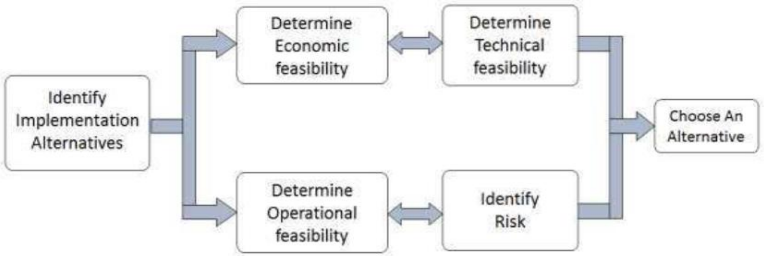
System analysis phase: determine function, *existing weakness,* and *requirements* to *choose best solution and methodology for new system by* representing it logically.

Analysis methodology approach should be applied

1) Agile and SDLC logically moves through system.
2) Agile and object-oriented allow subsystems to be built one at a time until entire system is complete.

What should do analyst in structure analysis?

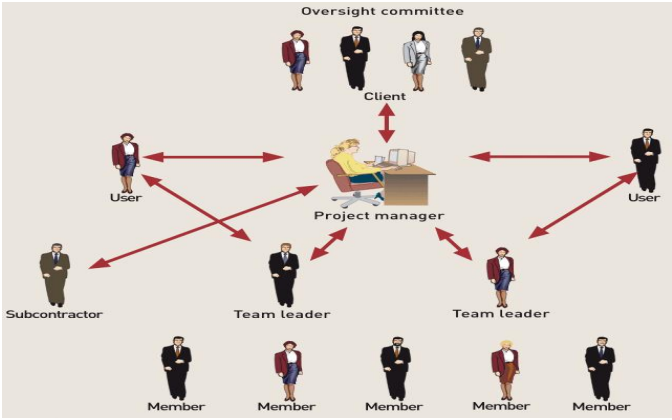
1. **Requirements Determination**: find out existing weakness
   1) To interview organizational members to gather data.
   2) Collect sample data from existing reports and how it transacted.
   3) Identify the deficiencies of current system and set goals.
2. Process **Data modeling**: describes processing of data DFD
3. To Define the requirements for solving the problem
4. To develop proposed system flowcharts to meet the goal.



1.1- Techniques for requirements determination

steps to make sure current and needs defined well

1. Interviews by Conduct: users, technical staff, clients
2. Document Review: report, form, procedure description
3. JAD (joint application design) meeting with 8-10 users
4. Research by Questionnaires : what opinion in current state, process of system, and its function



Questions to ask:

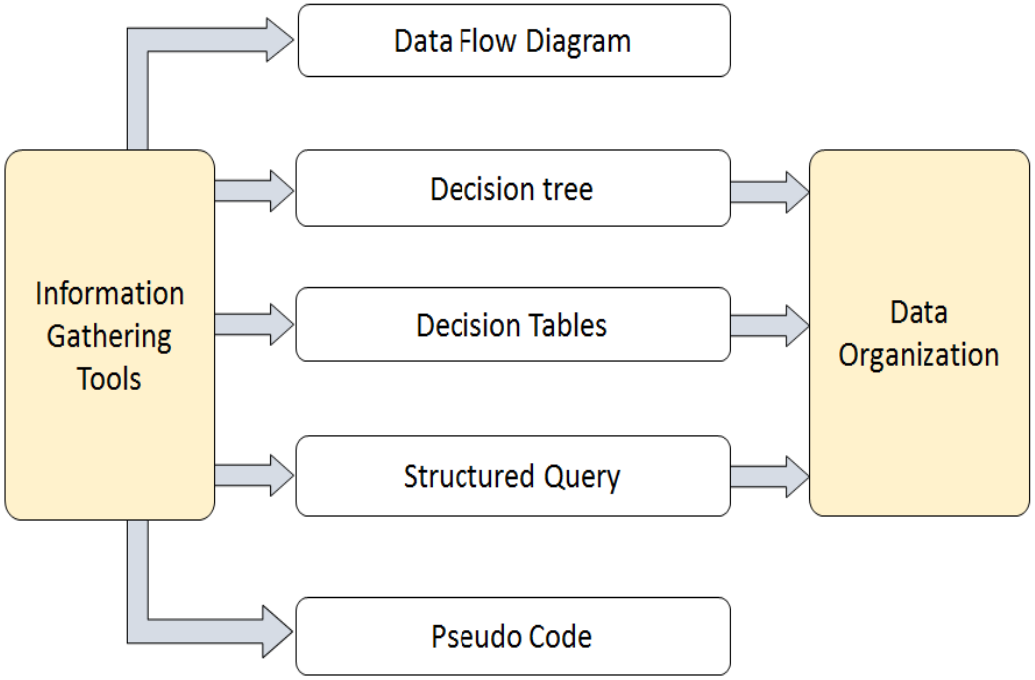
1) What are the objectives of your department?
2) how are they processed data?
3) What's your opinion of the current state?
4) What are common data entry errors?
5) Describe available online monitoring process .
6) What are the biggest frustrations during the transition?
7) Do you use the Web to provide information to vendors?
8) give an illustration of the security problems you are experiencing

2-Process Data modeling in Structured Analysis?

The systematic approach uses graphical tools to refine objectives of existing system and develop new system.

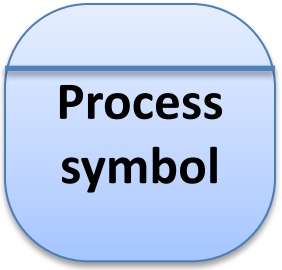
1.Tools and techniques used for system development are:

1) Data Flow Diagrams
2) Data Dictionary
3) Decision Trees
4) Decision Tables
5) Structured English
6) Pseudocode.

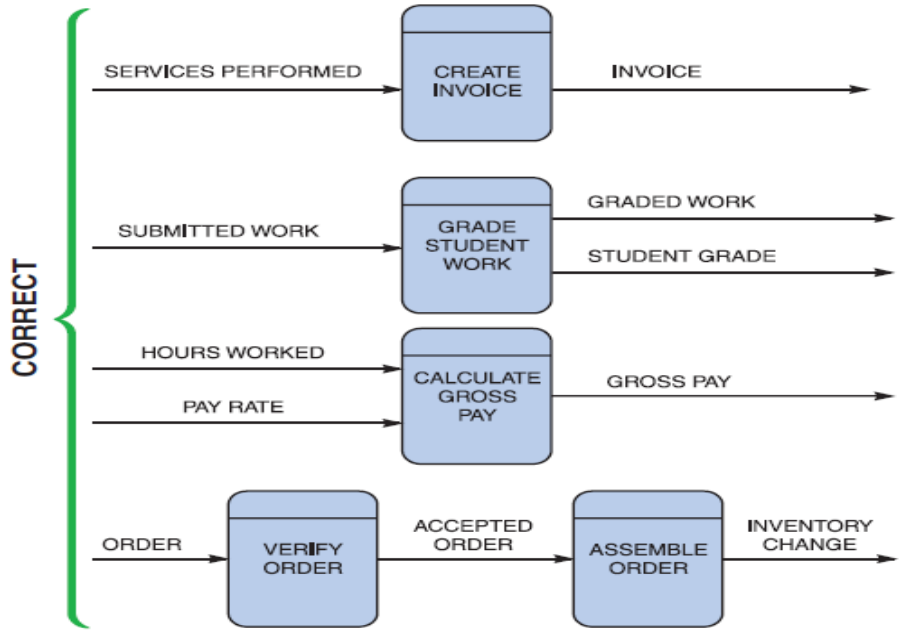


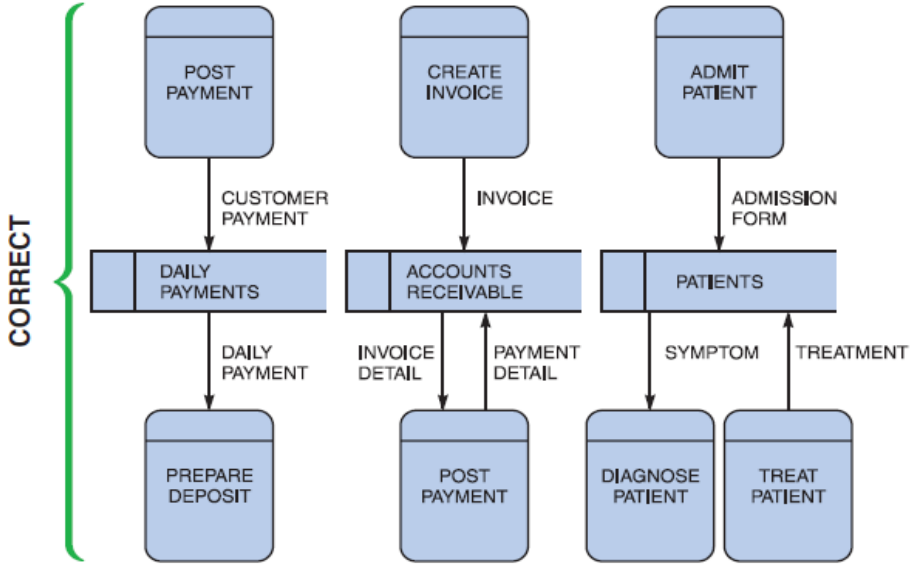
2-1:Modeling Data process Data Flow Diagram:

DFD describes how data flows through system **to perform functions,** It describes internal flow of data to show how data processed by logical flow representing activity of people in system by symbols. It uses following symbols|:

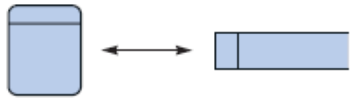
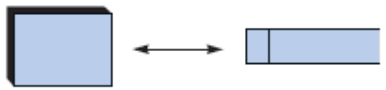
Entity Symbol name inside symbol to supply and receives data to system	
Process Symbol **: to process** received data and output required data. process name identifies specific function verb (PAYRATE)	
Data Flow Symbol path for data move from one part to other	
Data Store Symbol for data stores in processes	

Legal and illegal graphical representation





Correct and Incorrect Examples of Data Flows

	Process to Process	✓
	Process to External Entity	✓
	Process to Data Store	✓
	External Entity to External Entity	✗
	External Entity to Data Store	✗
	Data Store to Data Store	✗

Guidelines for Drawing DFDs:

Step 1: Draw a Context Diagram

First, place single process represents entire informationsystem,**process 0**. Then place system entities and data flows to connect entities to process. Data stores not shown in context diagram and remain hidden till detail diagrams are created.

Step 2: Draw Diagram level 0 DFD (1.0, 2.0, 3.0..)

To show detail inside black box, zooms into system and shows major internal processes, data flows, and data stores. repeats entities and data flows that appeared in context diagram. retain all connections flow into and out of process 0.

Step 3: Draw the Lower-Level Diagrams and leveling

To create lower-level diagrams, use leveling and balancing techniques. **Leveling** is the process of drawing series of increasingly detailed diagrams, till all functional primitive are identified. **Balancing** maintains consistency among set of DFDs by ensuring input and output data flows align properly.

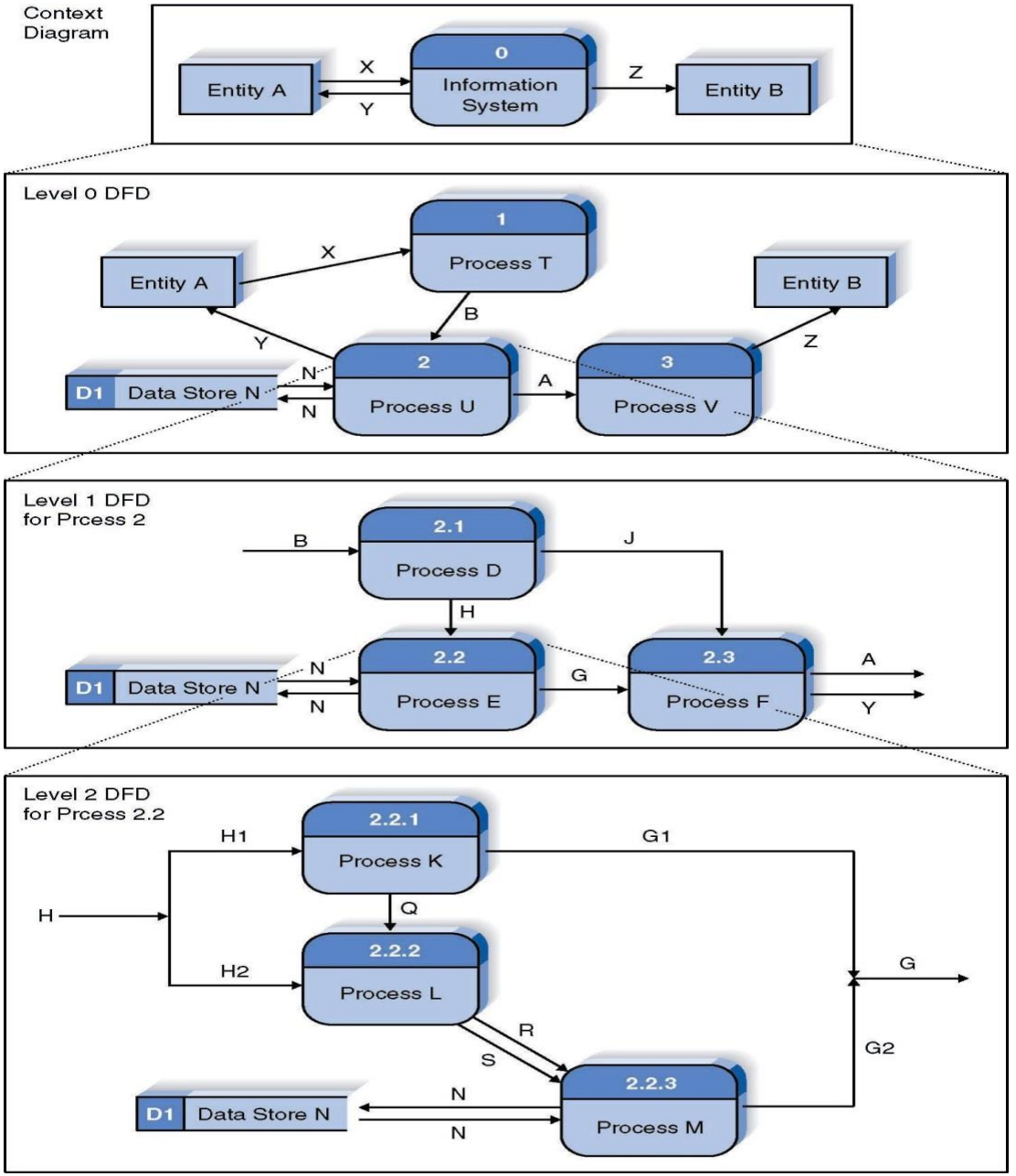
Relationship Among DFD levels

Context diagram

Level 0 diagram

Level 1 diagram

Level 2 diagram



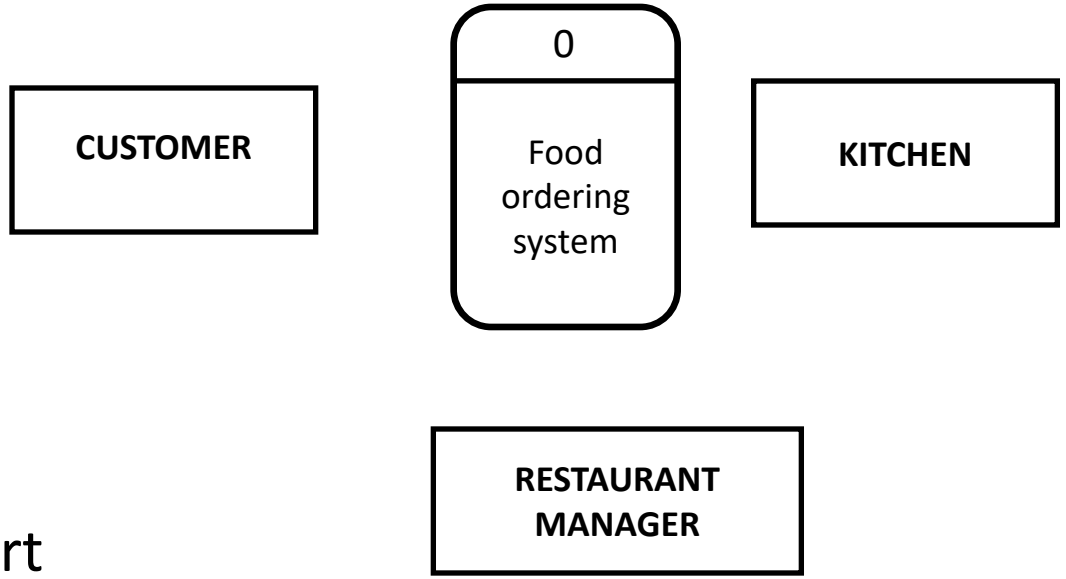
Example 1: fast food restaurant Information System

A customer wants to order some lunch. They walk to the counter and ask for the menu. They make their choice and ask the Restaurant waitress for a tuna roll. The waitresses write this down and passes the order to the chef. The kitchen chef gets the order and makes the roll. The roll is then passed back to the waitress. Whilst the chef makes the roll, the waitress gives the customer a paper bill produced from the till. This shows how much the customer owes. The customer pays their bill. When the food arrives from the chef, the waitress gives it to the customer. Finally report produced to manager

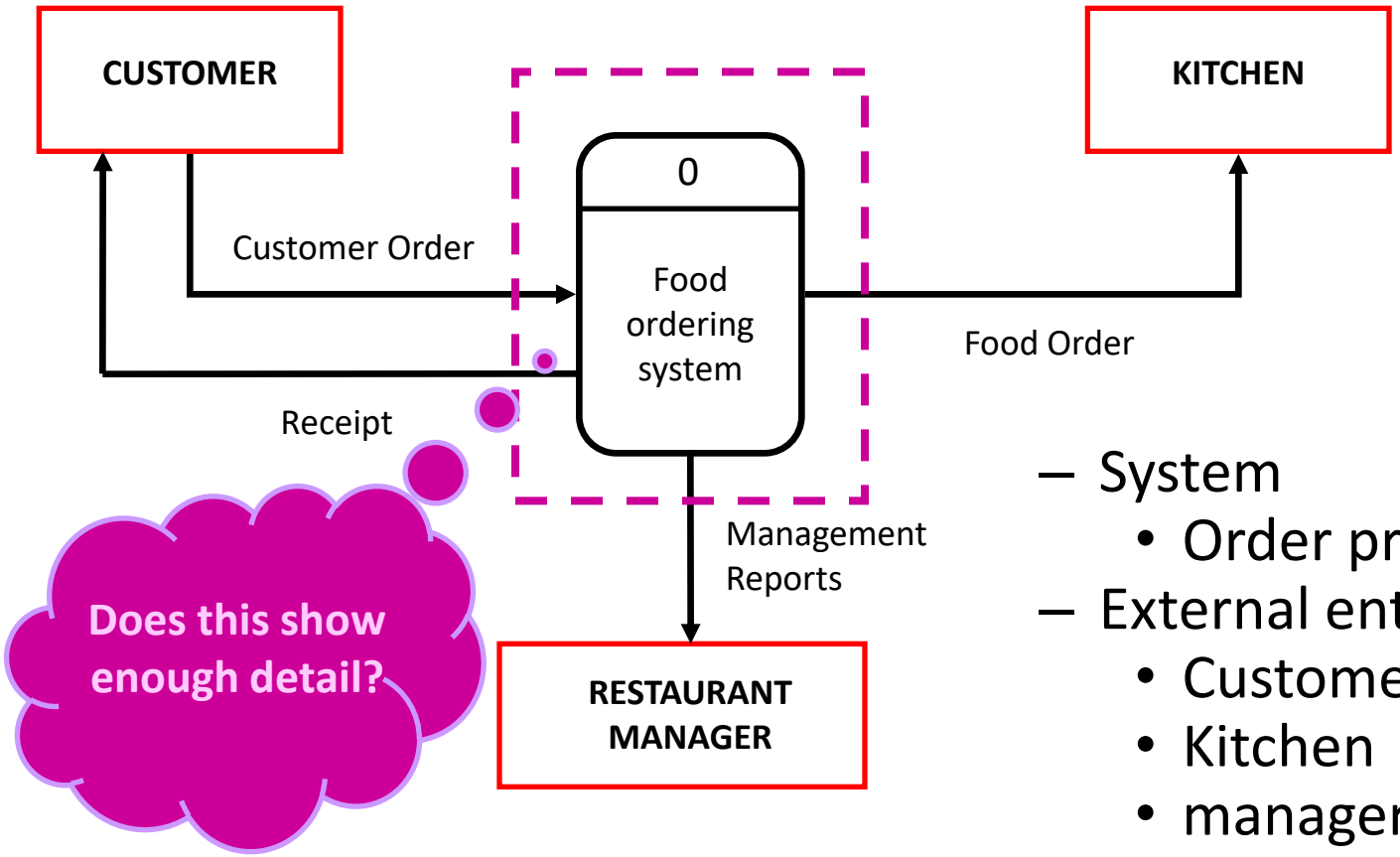
Each noun use square, for each process use under line

fast food restaurant Order Processing System context diagram

- System
  - Order processing system
- External entities
  - Customer
  - Kitchen
  - manager
- Processes
  - Customer order
  - Receipt
  - Food order
  - Management report



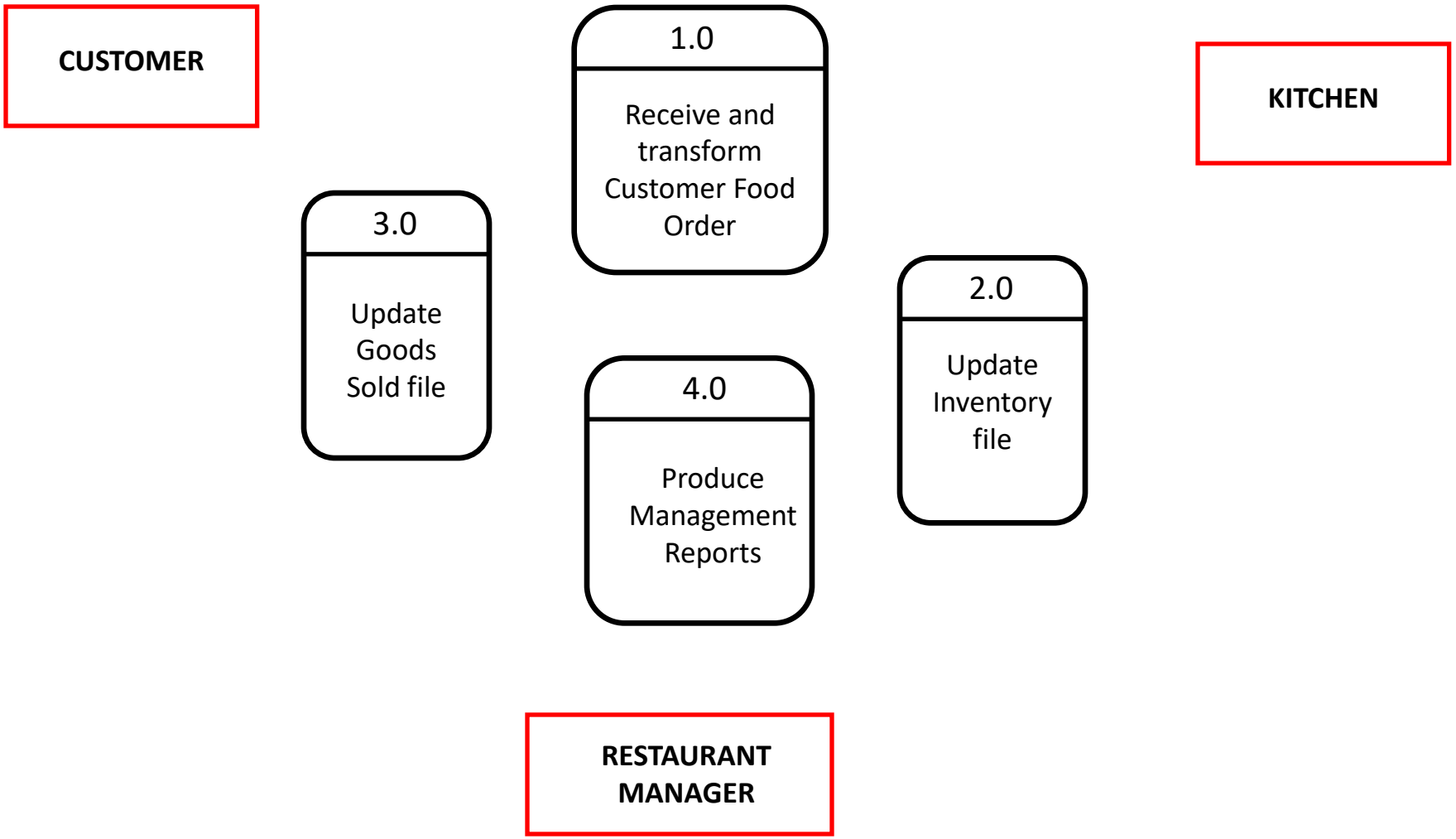
Context diagram



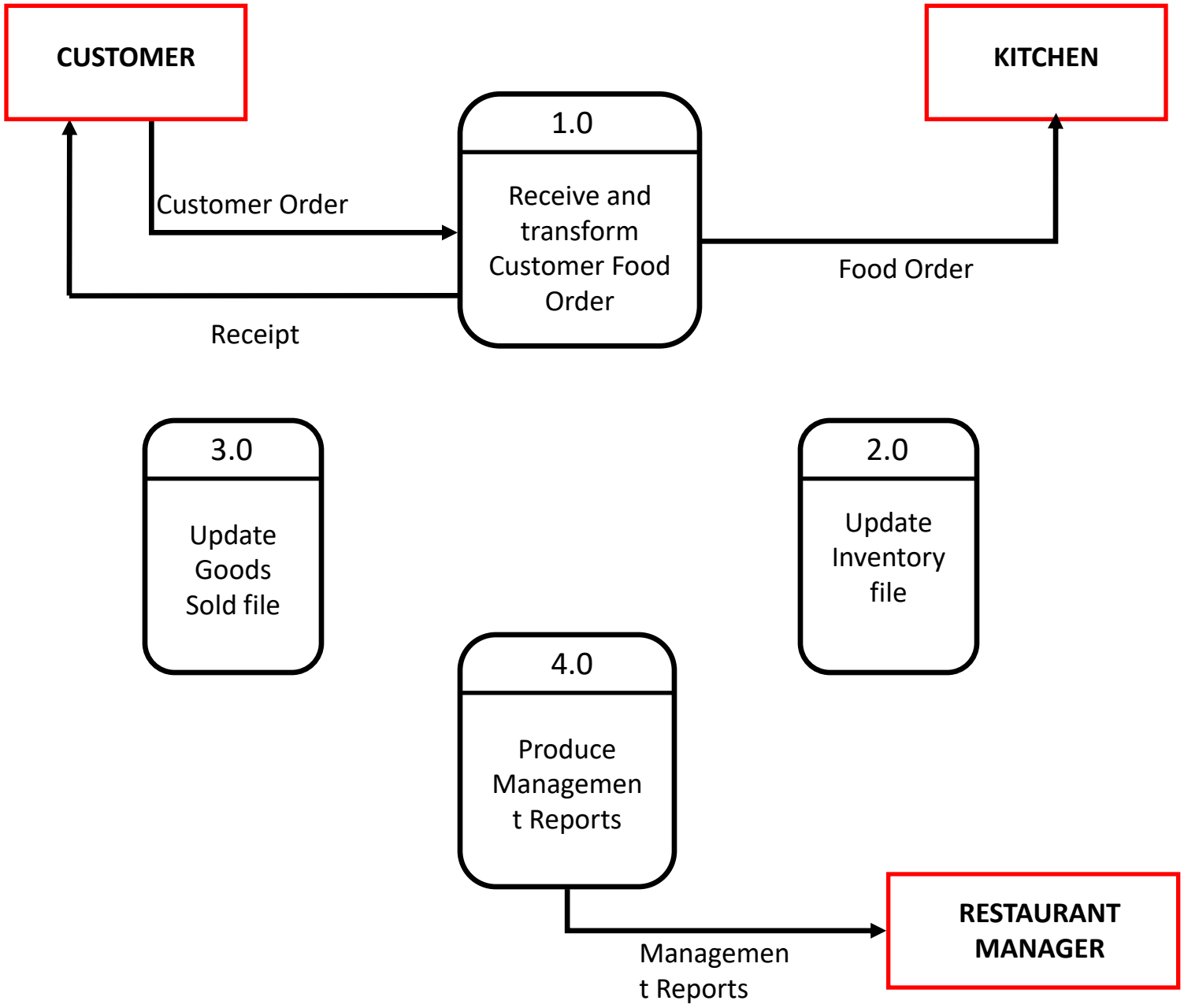
- System
  - Order processing system
- External entities
  - Customer
  - Kitchen
  - manager
- Processes
  - Customer order
  - Payment Receipt
  - Inventory Food order
  - report Management

Constructing a Level 0 diagram

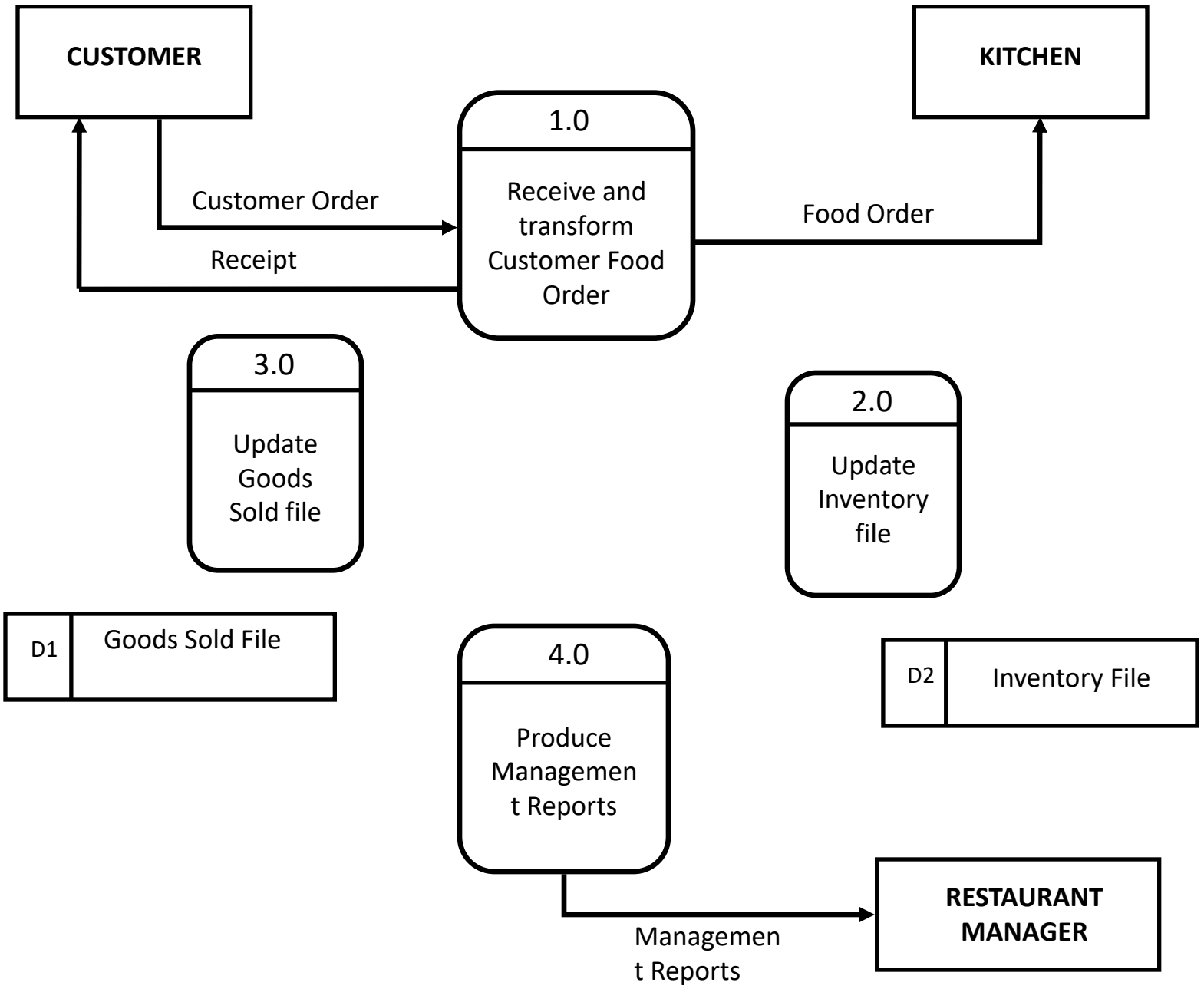
5-Producing and distributing data to different sinks



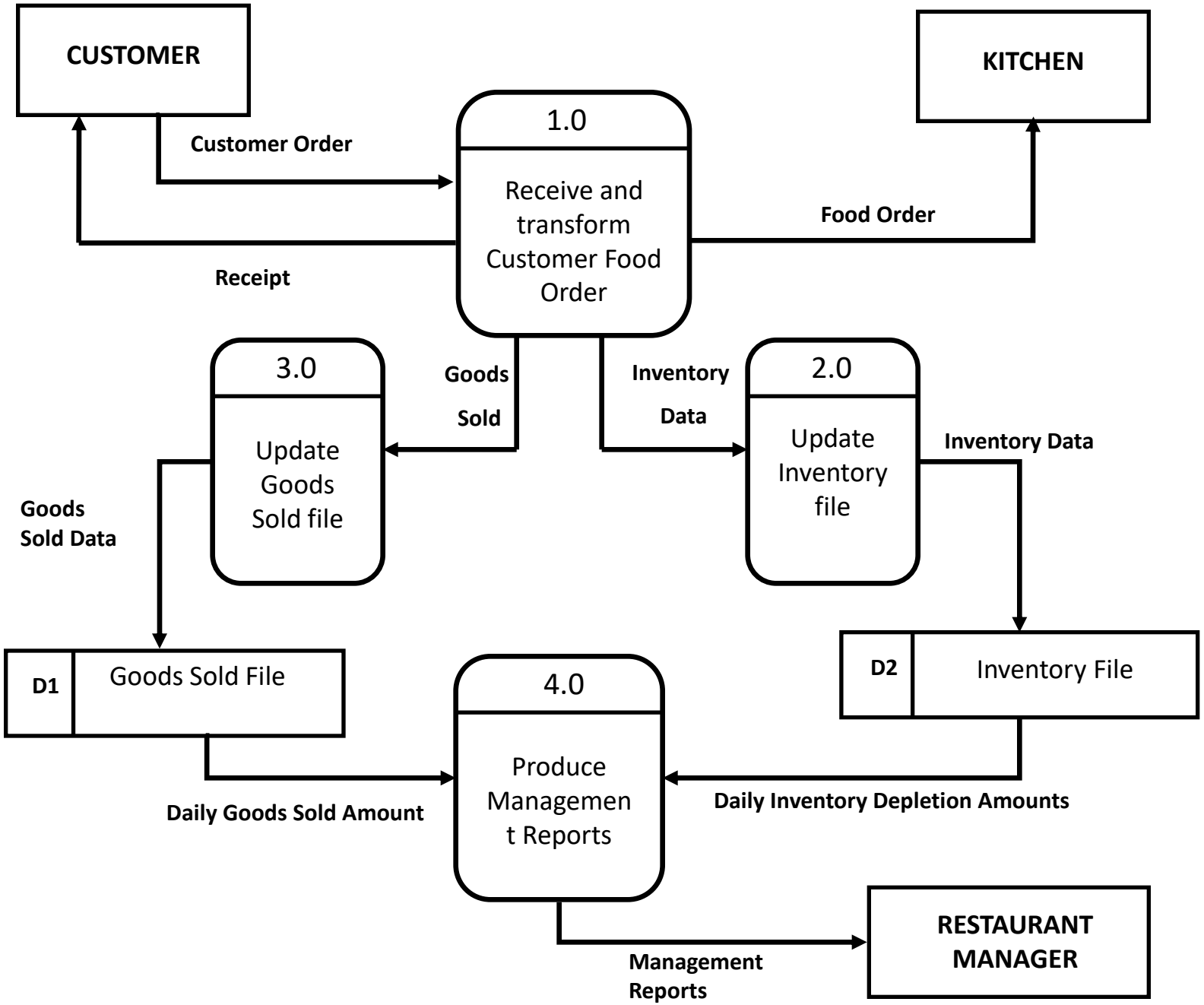
6-Lay out the sources/sinks and data flows from the Level 0 diagram



7-Draw in any data stores used in the process

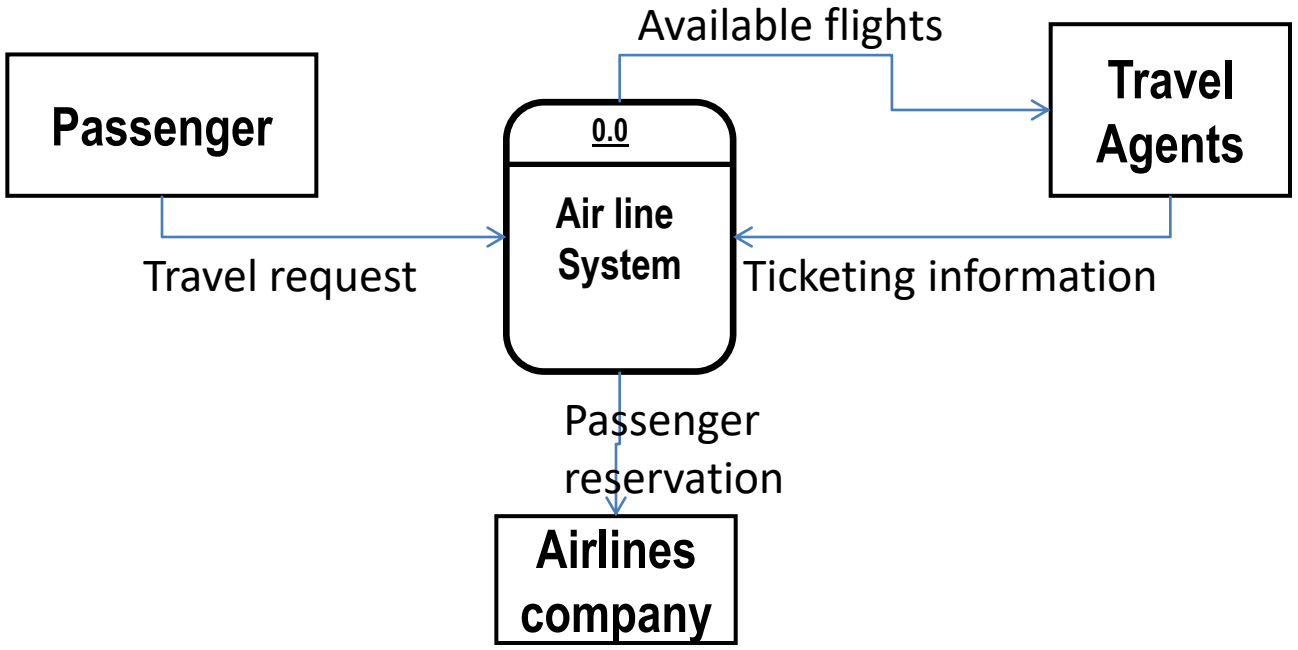


8-Link the new processes and data stores with named data links



Example 2: Airline reservation context diagram

If we would like to build an information system for a travel reservation, the passenger request for a ticket to travel from Cairo to Italy, the system look for all available airlines and select a travel agent then find ticket information of time and price, if the passenger accepts an reservation will be booked at the airline company



Example3 : Bus Garage Repairs

Buses come to garage for repairs. A mechanic and helper perform repair, record reason for repair and record total cost of all parts used on Shop Repair Order. Information on labor, parts and repair outcome is used for billing by the Accountant Department, parts monitoring by inventory management computer system and performance review by the supervisor.

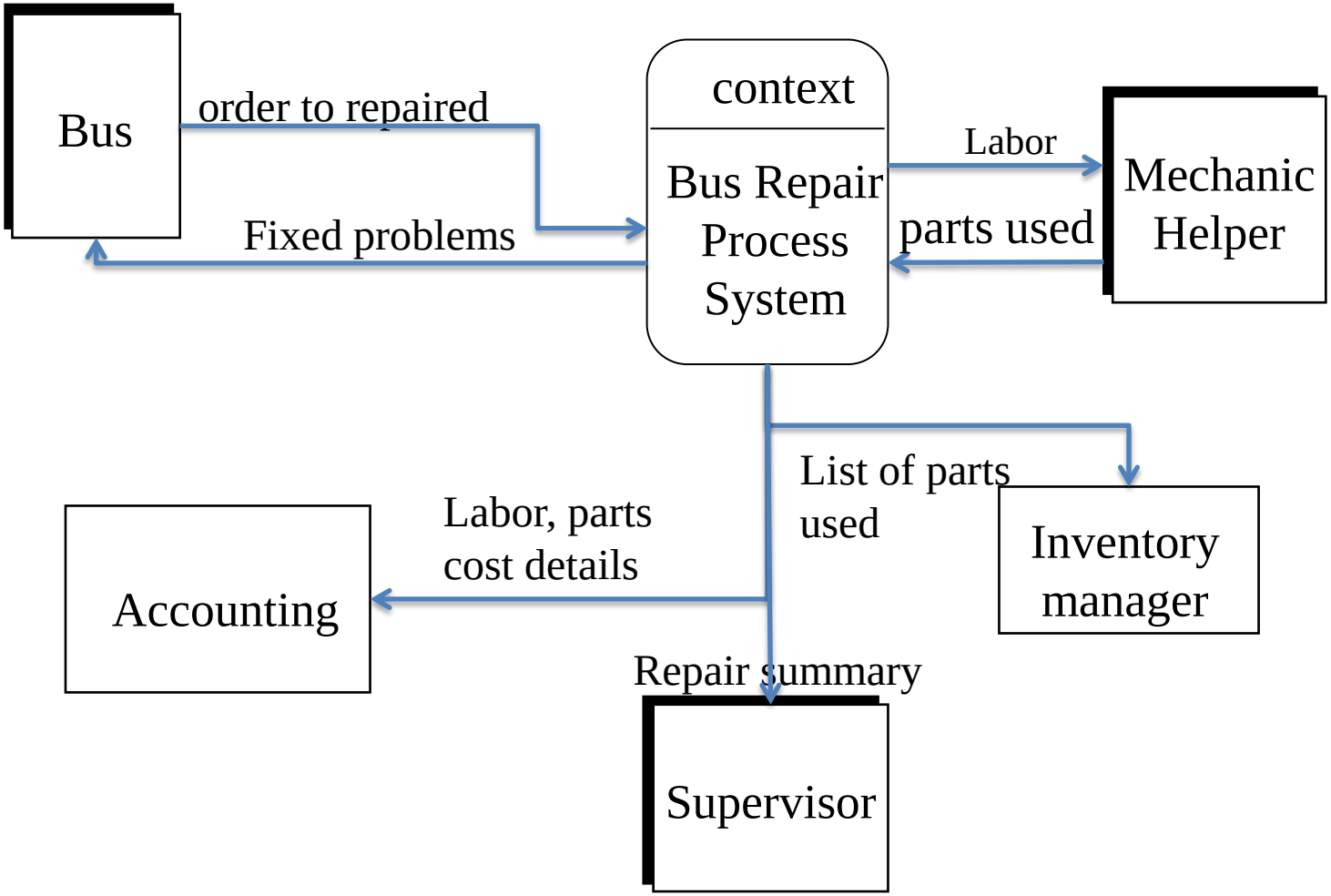
External Entity: Bus, Mechanic, helper, supervisor, Inventory, Accountant

- system: performing repairs, storing repairs information
- *Processes*:
  - Record Bus ID and reason for repair
  - Determine parts needed
  - Perform repaired report
  - Calculate parts used
  - Record labor hours, cost, and total cost
- *Data stores:* Personnel file, Repairs file, Bus master list, Parts list

- *Data flows*:

1. Repair order
2. Bus record
3. Parts record
4. Employee timecard
5. Invoices

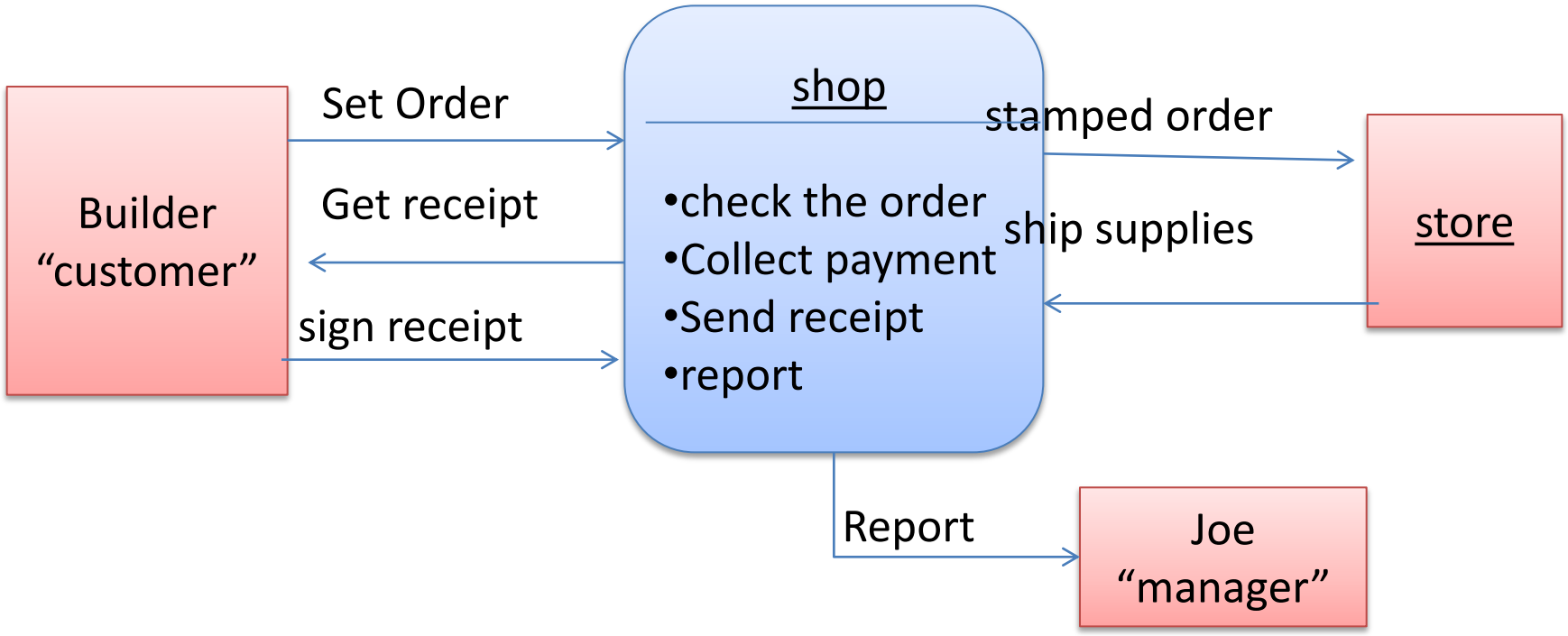
Bus Garage Context Diagram



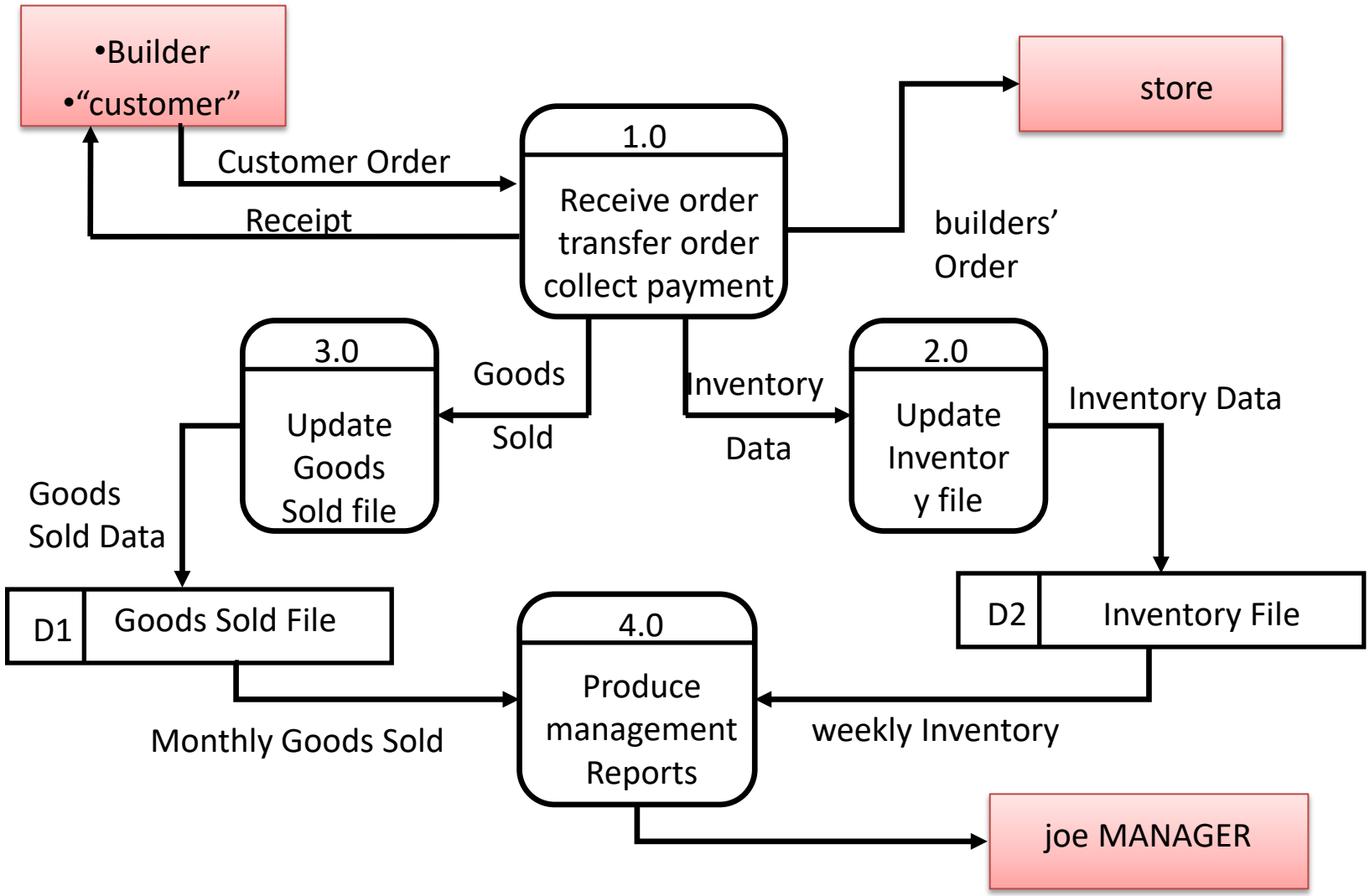
Example 4: builders' suppliers

Joe's builders' suppliers have a shop and store. His system is entirely manual. He has a stock list on the wall of his shop with prices. When a builder wants to buy supplies, he picks the stock items from the list then writes his order on duplicate bills and pays to Joe, who stamps the bill as paid. The builder takes the duplicate bills and goes to the store and hands it to foreman. The store foreman gets the ordered items from the shelves and gives them to the builder. The builder signs the duplicate bills and leaves one copy and takes one as a receipt. Every week, Joe looks around the store to see if any of stock is running low. He brings up the relevant suppliers and reorders stock and records the order in his order book. The store foreman takes delivery of the new stock and checks it against what has been ordered. He pays for it on delivery and staples the receipt into the order book. At the end of every month, Joe goes through all the dockets and the order book and produces a financial report for the shareholders .Solve each of the following with drawing?

Example: builders' suppliers context diagram



Example: builders' suppliers DFD diagram

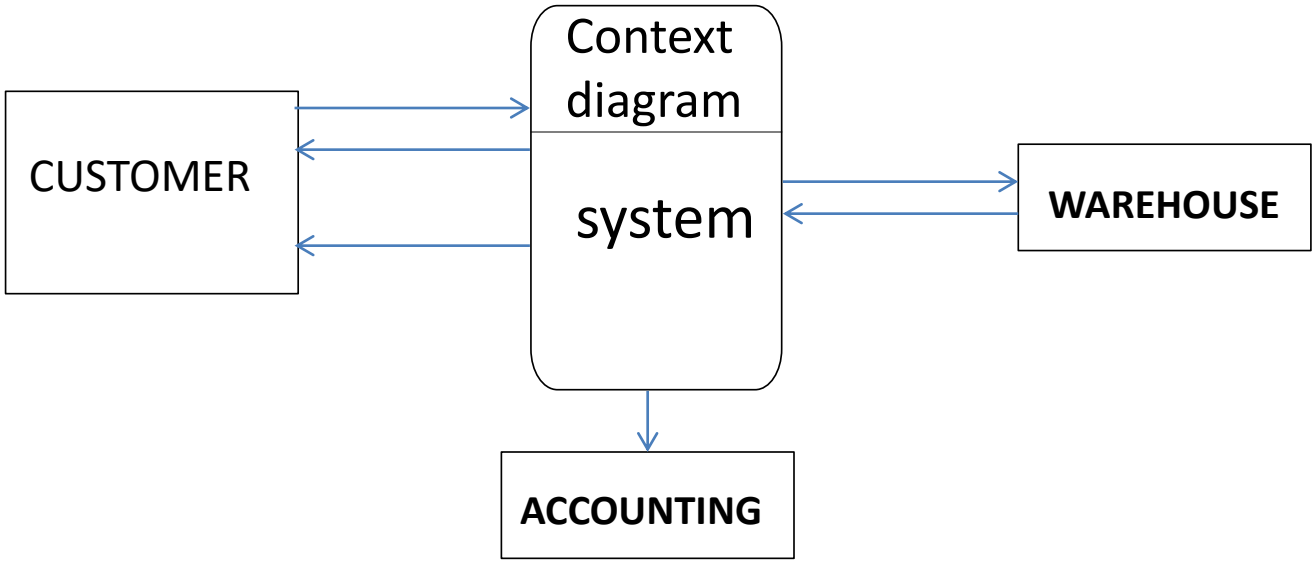


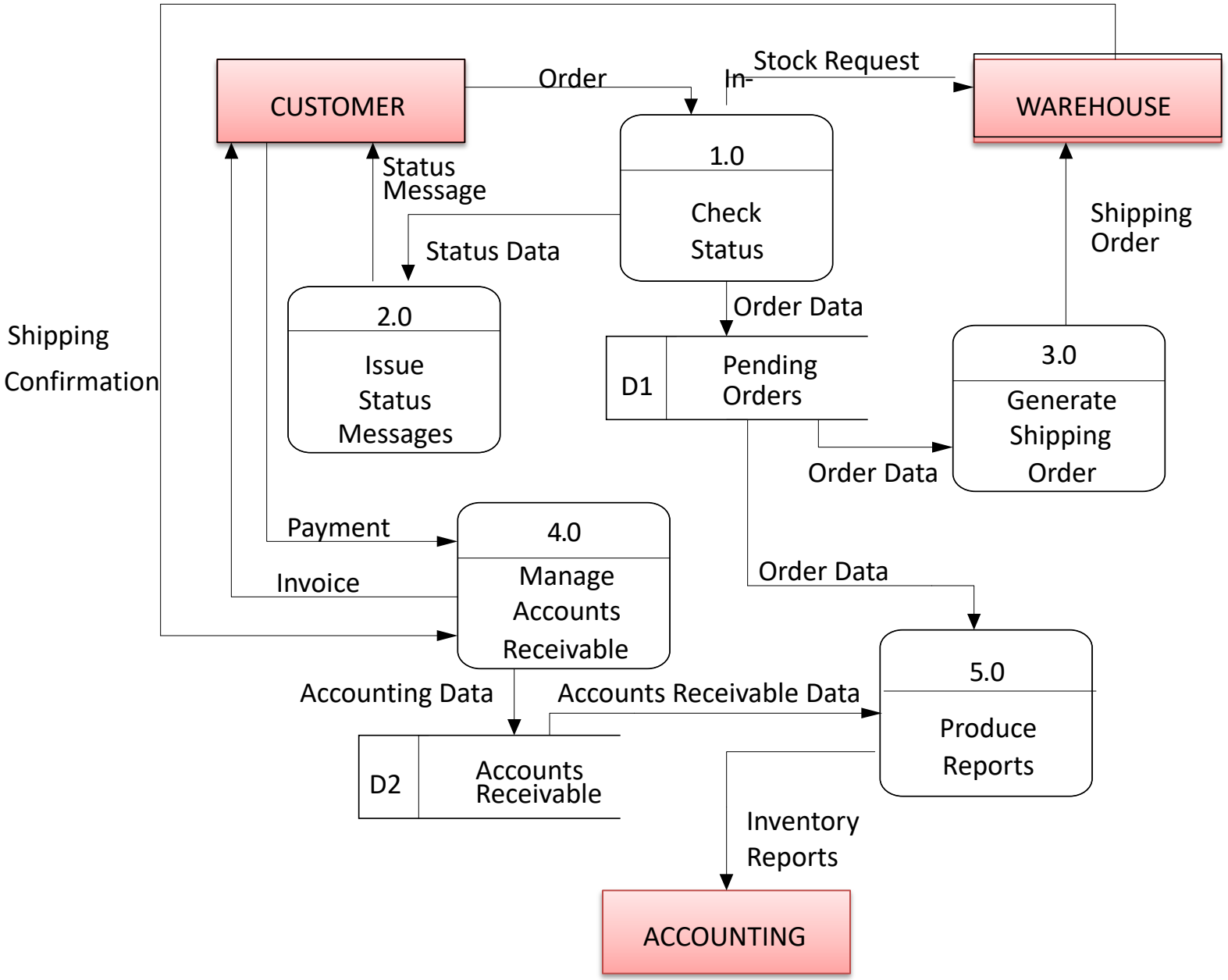
Example 5: for shop of Precision Tools

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. accounting

1. Draw a context diagram for the order system
2. Draw DFD diagram 0 for the order system

context diagram for the order system




CUSTOMER
Order
In-
Stock Request
WAREHOUSE
1.0
Check
Status
Status
Message
Status Data
Shipping
Order
2.0
Issue
Status
Messages
Order Data
Shipping
Confirmation
D1
Pending
Orders
3.0
Generate
Shipping
Order
Order Data
Payment
4.0
Manage
Accounts
Receivable
Invoice
Order Data
5.0
Produce
Reports
Accounting Data
Accounts Receivable Data
D2
Accounts
Receivable
Inventory
Reports
ACCOUNTING

Example 6: shop system

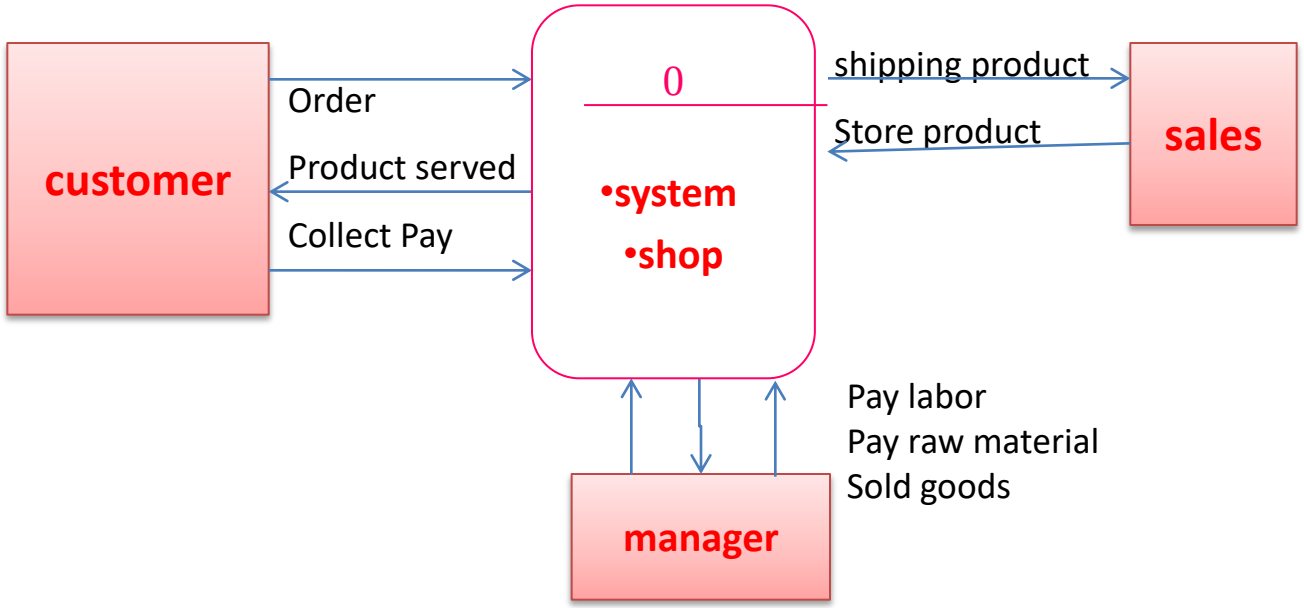
Create information system for shop in which a sales sells your products to customers, customer comes into shop, approaches the vendor to ask about shipping of order and gets answer if not available on store ask manufacture ,manager get reports?

1- determine: External entities, Data flows, Process, Data stores

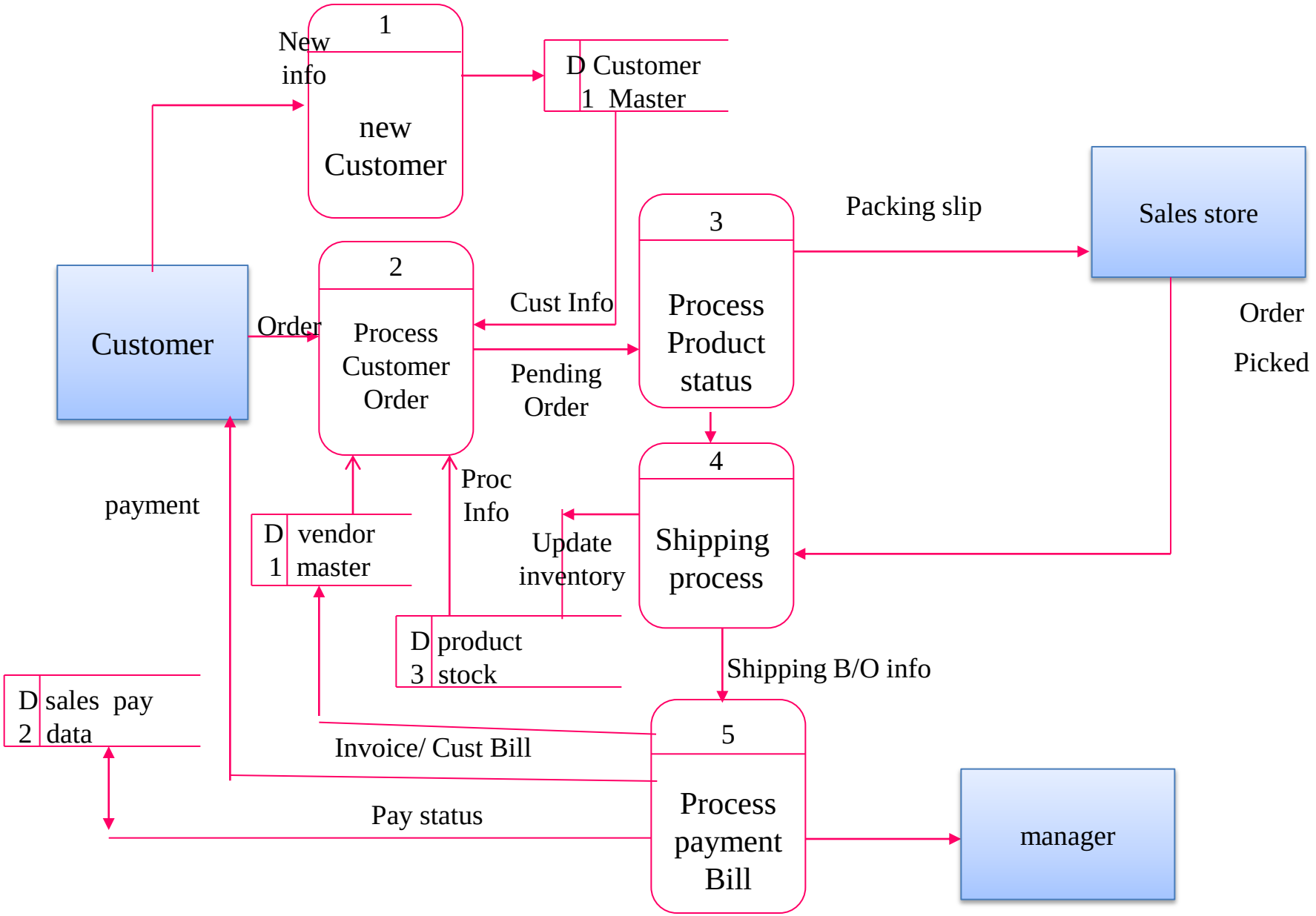
2- List all activates provided by entire system and process given to external entities by system to create context diagram

3- decompose to sublevels

1. Service customer
2. customer Order
3. Serve Product
4. Collect Payment
5. ship Product
6. Store Product
7. Order manufacture
8. Pay for manufacture
9. Pay for Labor



Level 0

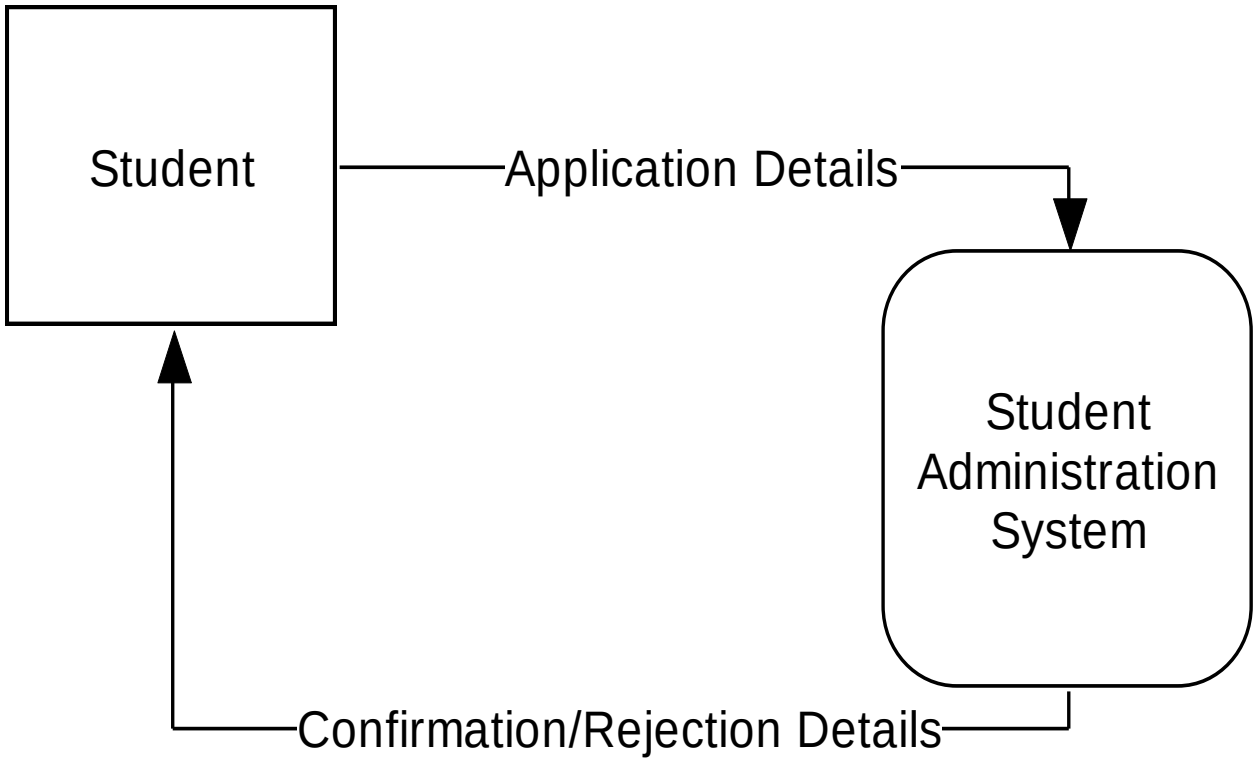

1
New info
new Customer
D 1 Customer Master
Customer
Order
2
Process Customer Order
Cust Info
Pending Order
3
Process Product status
Packing slip
Sales store
Order Picked
payment
D 1 vendor master
Proc Info
Update inventory
4
Shipping process
D 3 product stock
Shipping B/O info
D 2 sales pay data
Invoice/ Cust Bill
5
Process payment Bill
Pay status
manager

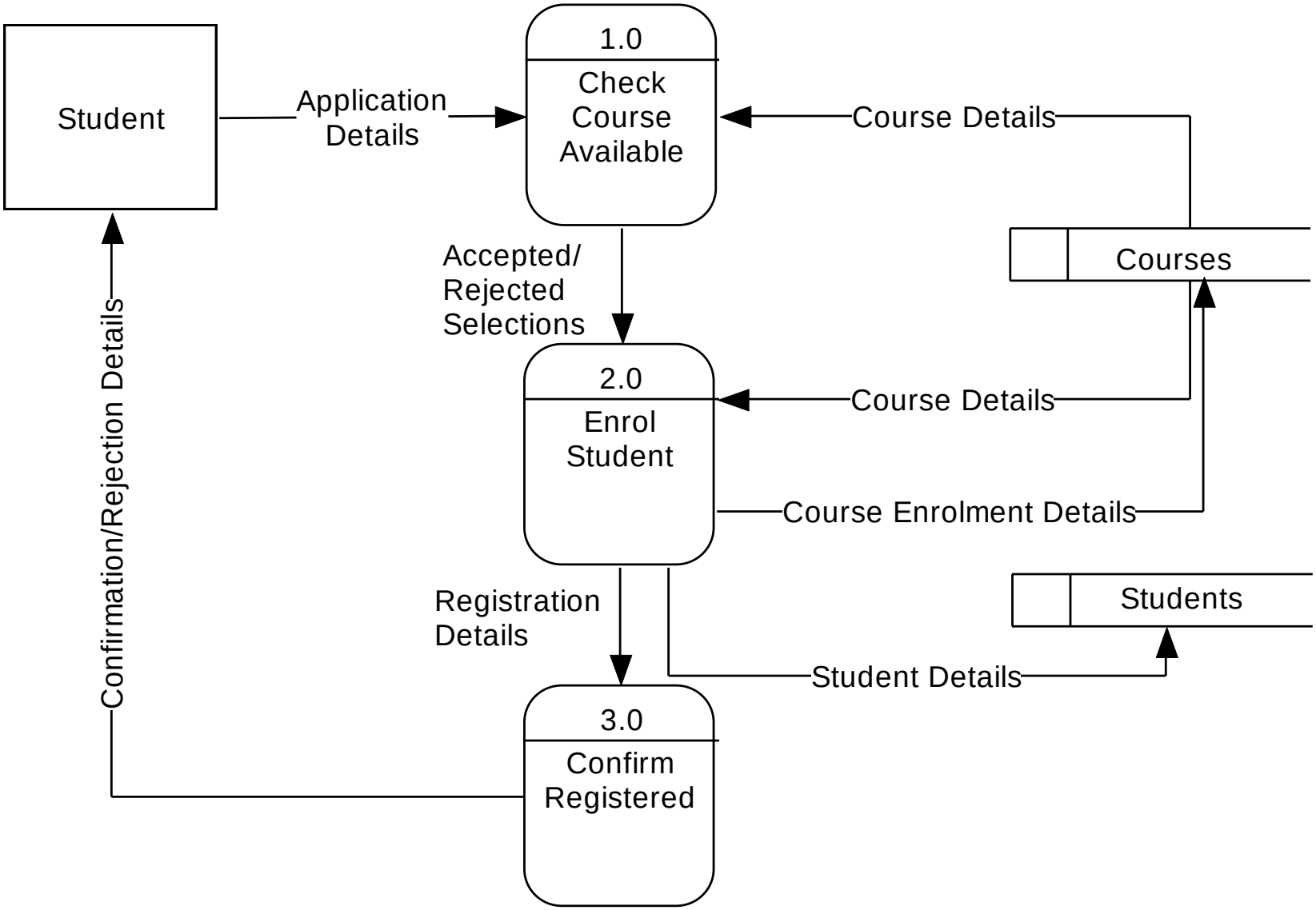
Example 6: Student registration

student (EE) sends application form (DF) contains personal details, and desired course, The university checks (P) that course is available If available student enrolled (P) in course, and university confirms (P) enrolment by confirmation letter (DF) that registered for course to student. Or if unavailable sent rejection letter (DF).

External entity: Student,

Processes - Check available, Enroll student, Confirm Registration

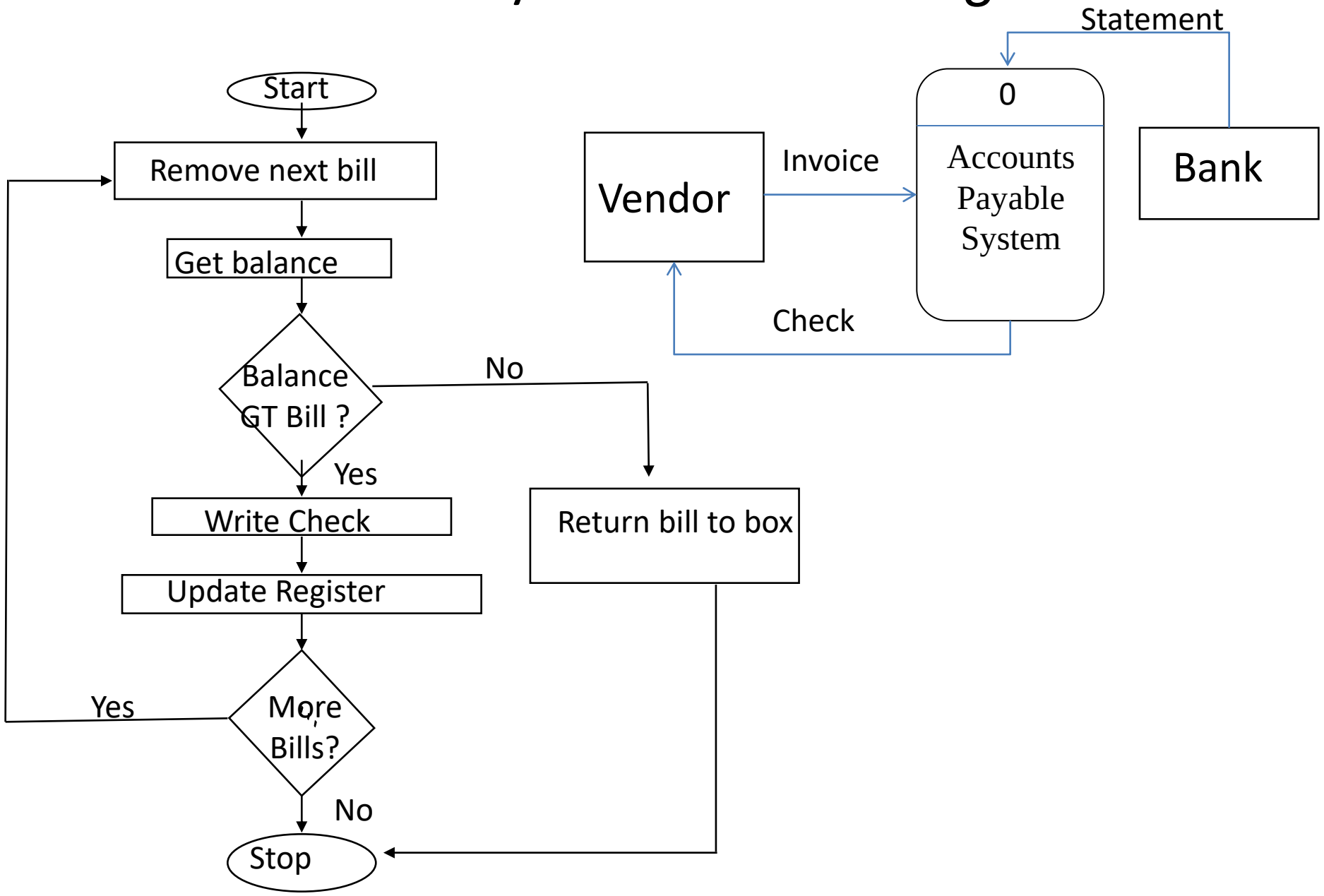



Student
Application Details
1.0
Check Course Available
Course Details
Courses
Accepted/ Rejected Selections
2.0
Enrol Student
Course Details
Course Enrolment Details
Confirmation/Rejection Details
Registration Details
Students
Student Details
3.0
Confirm Registered

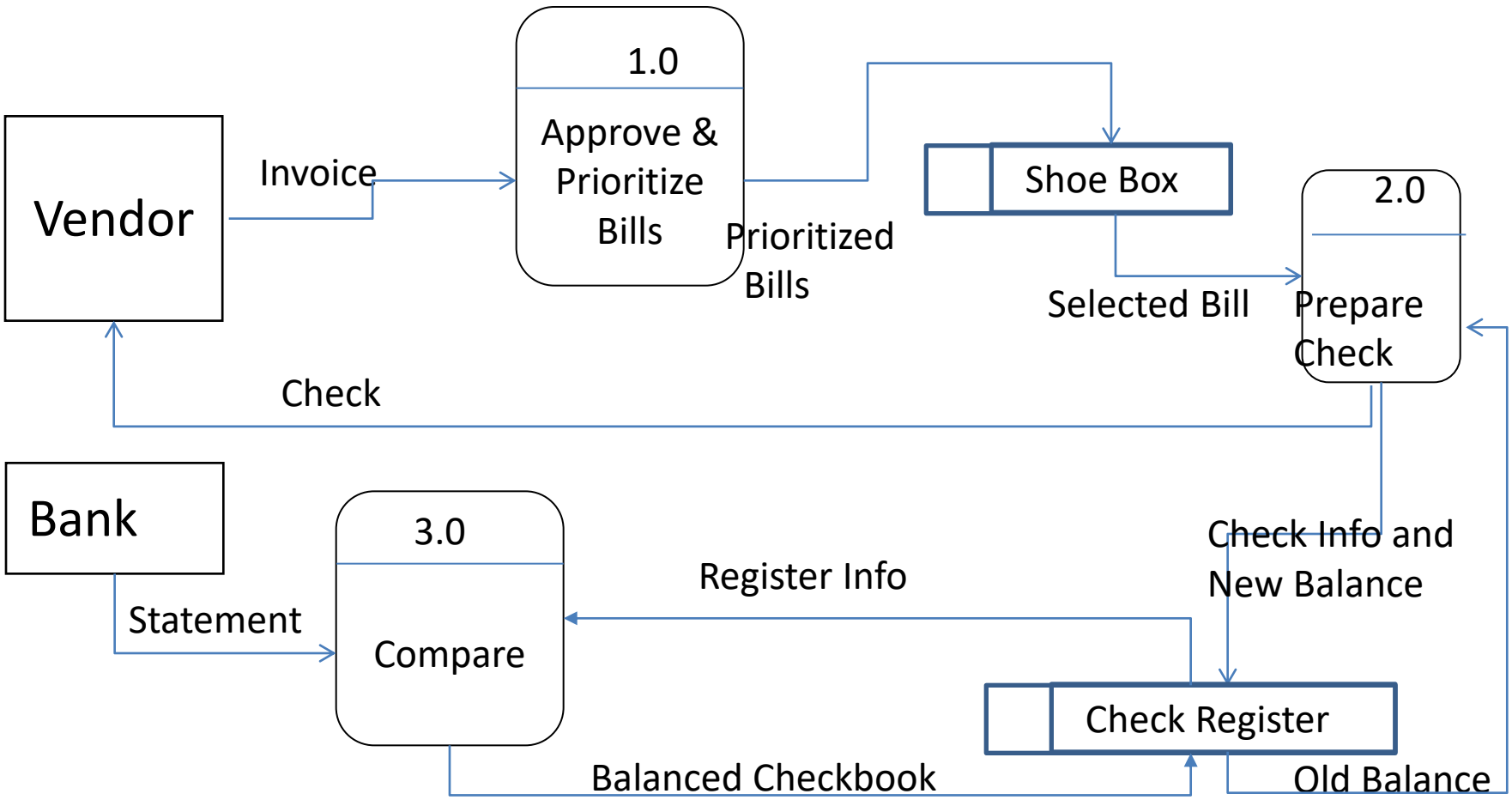
Example 7: Accounts Payable Problem

Each month you receive bills from various vendors (e.g., phone, auto insurance, credit cards, utilities) and periodically other billings (e.g., magazine subscriptions, university tuition and fees). Consider all of these billings as being examples of invoices from vendors. You don't pay your bills on same day that they are received but review each invoice and prioritize them in terms of which you will pay first. These prioritized invoices are then placed in a box until you decide you start paying some. You remove an invoice from the box and prepare a check to be mailed to the vendor. You check old balance and update register with the check information and compute new balance. You may do several times month At end of the month you receive statement from your bank that lists the checks that have cleared your account. You (should) take your check register and compare your list of checks and their amounts with the statement that you received from the bank. If everything is in balance then you place an appropriate mark in your check book else you enter a correcting entry (the bank never makes a mistake).

Accounts Payable *Context Diagram*



Accounts Payable *Context Diagram*

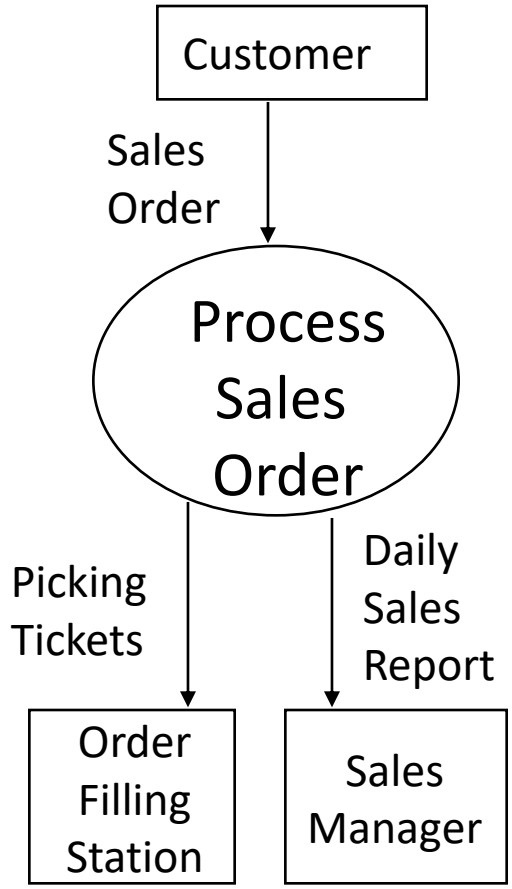


Example 8: Order Entry Problem

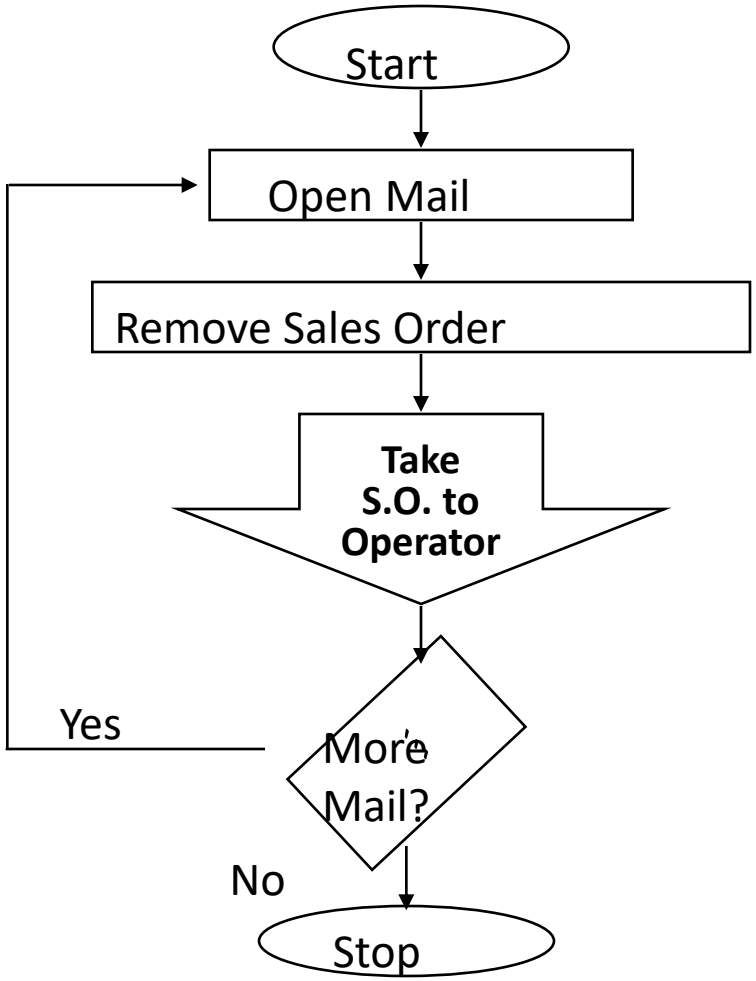
SAM's is a mail order catalogue store. A customer fills out the sales order form that is enclosed in the catalogue and mails it to their headquarters in the Bahamas (postage prepaid). Upon receipt, a clerk opens the envelopes and removes the sales order forms. The clerk gives the forms to a data entry operator, who keys the data onto a diskette using a microcomputer. After data entry, the sales orders are filed in a Sales Order History file. The diskette containing all of the sales order data is then read by a minicomputer. For each ordered item, the Inventory Master Record is retrieved from the Inventory master files and the balance on-hand is reduced by the ordered amount. The updated Inventory Master Record is written back to the file. The same program prints picking tickets and writes a Daily Sales Report file onto the system disk. The picking tickets are input to the order filling system where they are used by warehouse personnel in picking the merchandise from the shelves for shipment to the customers. Another minicomputer program reads the Daily Sales Report file and prepares a daily sales report that goes to the sales manager.

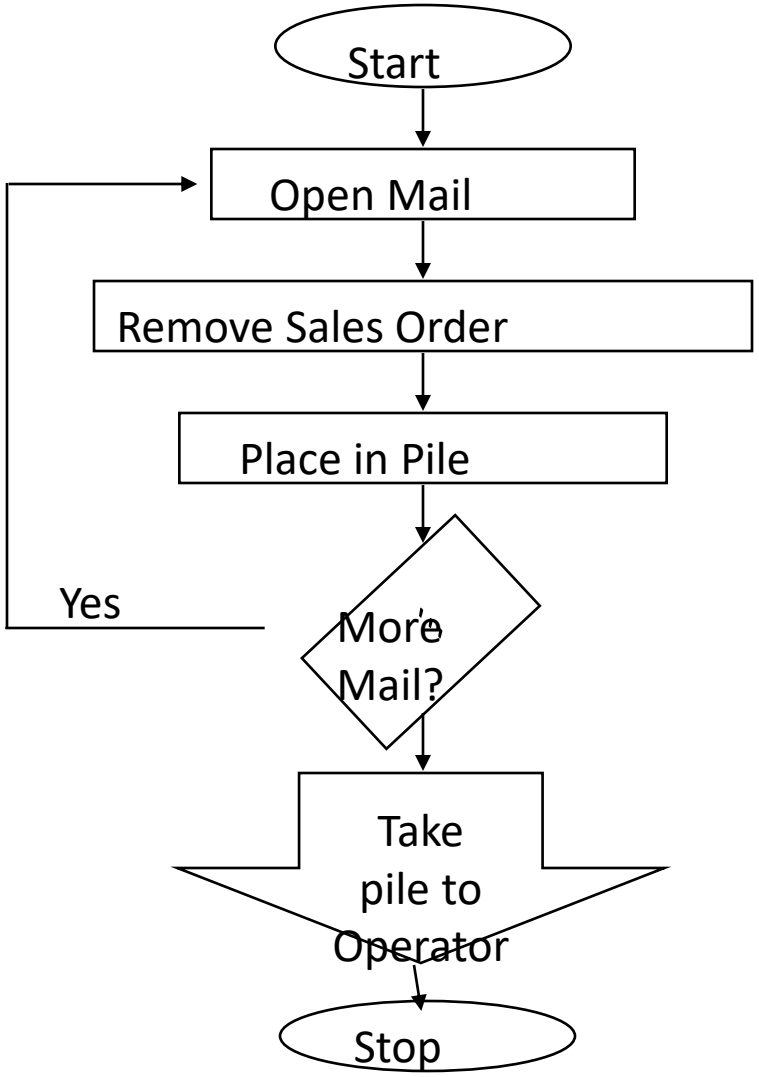
Sales Order (SO) DFD

Context Diagram



Open Mail Flowchart for SO 1.0





Sales Order (SO) DFD