

# DFD

## Unit 4

### Functional Analysis Using Dataflow Model

# 本單元目的

- 將資訊系統中的動作及各動作之間的資料流用資料流程圖 (Data Flow Diagram 簡稱 DFD) 描繪出
- 繪出的結果稱為 function schema, 是系統功能分析結果的圖形表現方式
  - 說明
    - DFD 是數種功能分析表達模型之一
    - 又稱為 Bubble chart

# Outline

- The components of a dataflow diagram.
- How to draw a simple dataflow diagram.
- Guidelines for drawing successful dataflow diagrams.
- How to draw leveled dataflow diagram.
- Qualities of a functional schema

# The components of a DFD

## ➤ The Process 處理程序

- 系統中產生、使用、操作或刪除資訊的動作。
- 每個處理程序必須給一個名稱, 最好由一個動詞加上一個受詞構成.

RECEIVE  
ORDER

or

RECEIVE  
ORDER

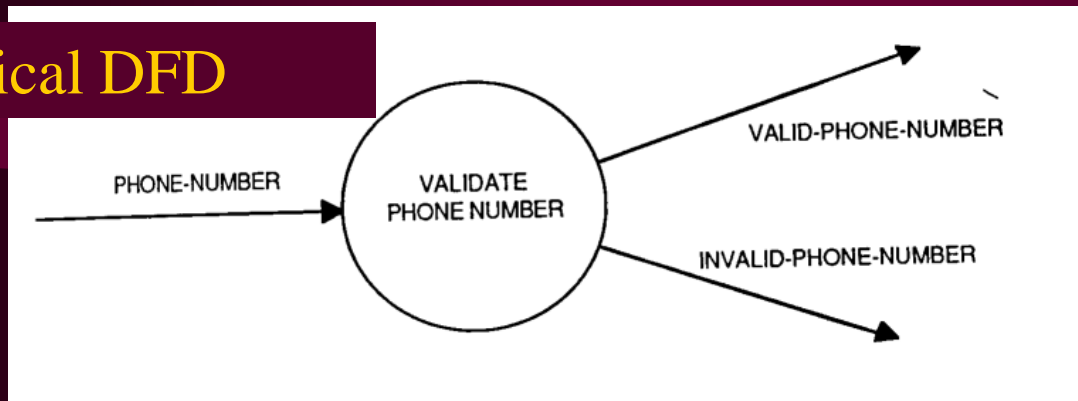
# The components of a DFD

## ➤ The Flow 資料流

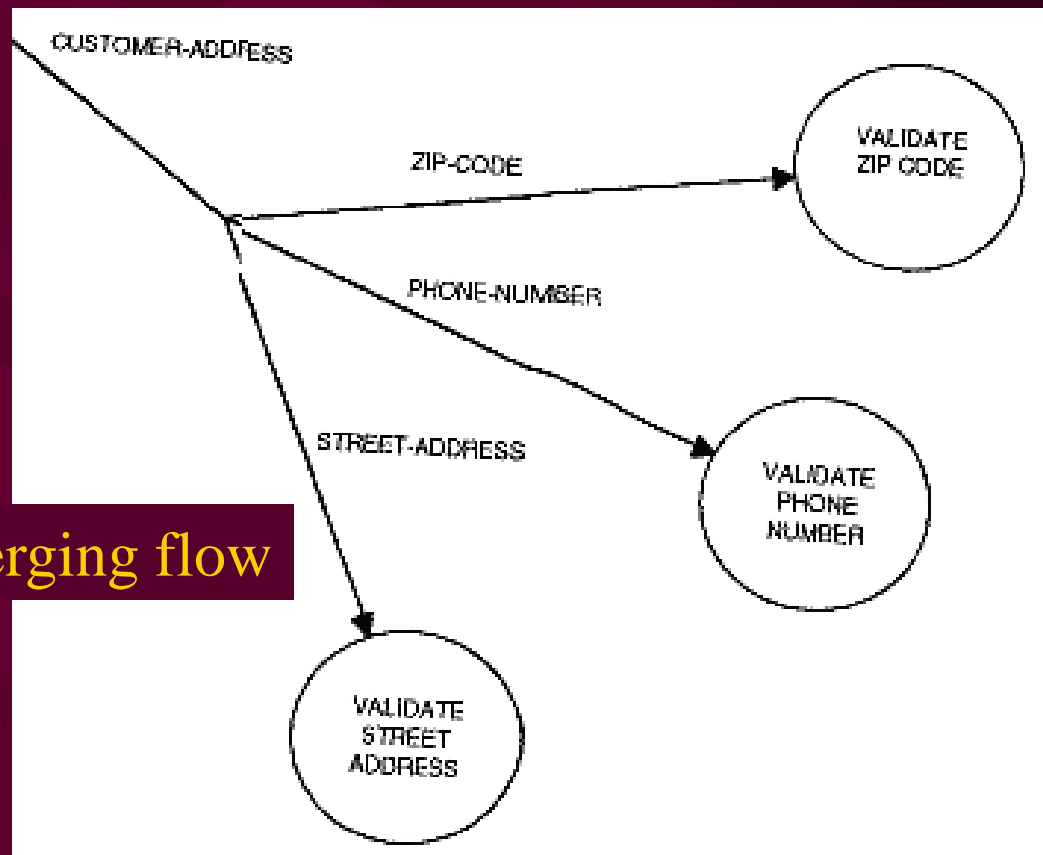
- 在 process 之間流動的資料(不是控制流)。
- 用箭頭表示資料流動的方向
- 線條上要註明資料名稱,名稱必須能代表整個資料流,不要用 data or information 等較空泛的詞.



## A typical DFD



## An example of a diverging flow



# The components of a DFD

- The Data Store 資料儲放處
  - 指檔案、表格等存放資料的媒體。

ORDERS

or

D1 | ORDERS

or

ORDERS

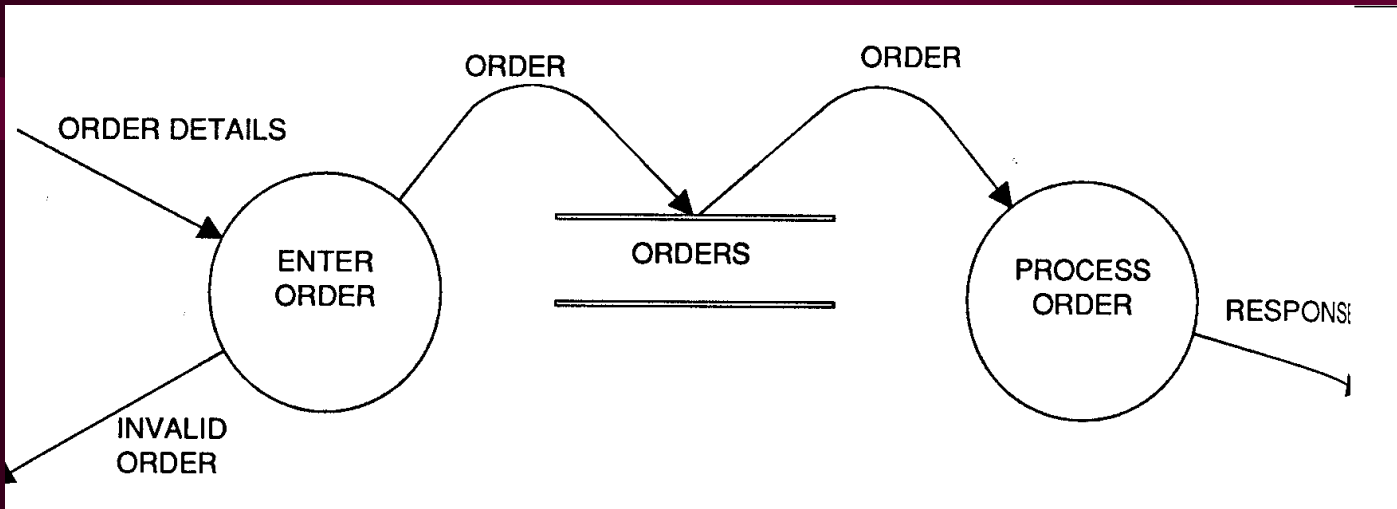


Figure 9.11(a): An "implementation" store

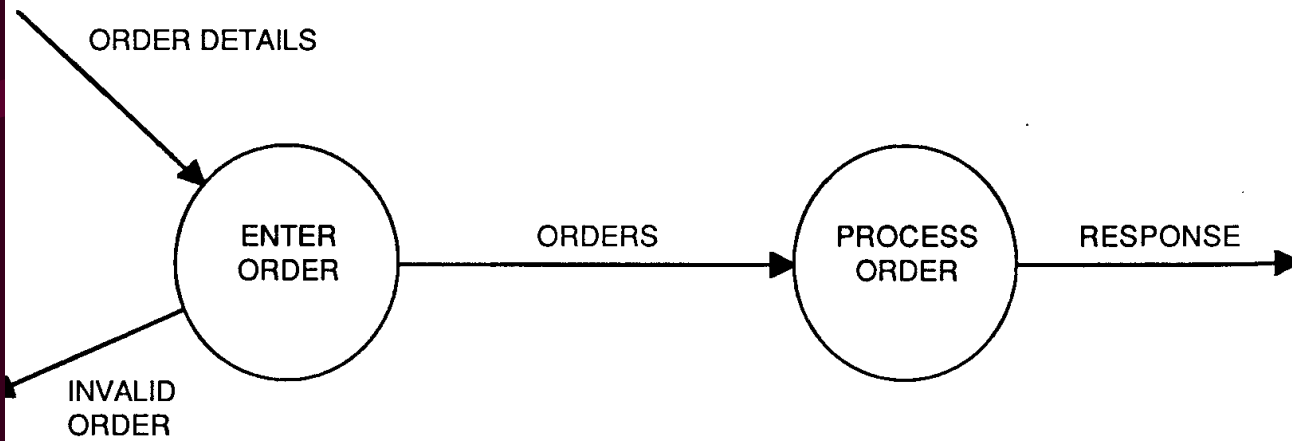


Figure 9.11(b): The implementation store removed



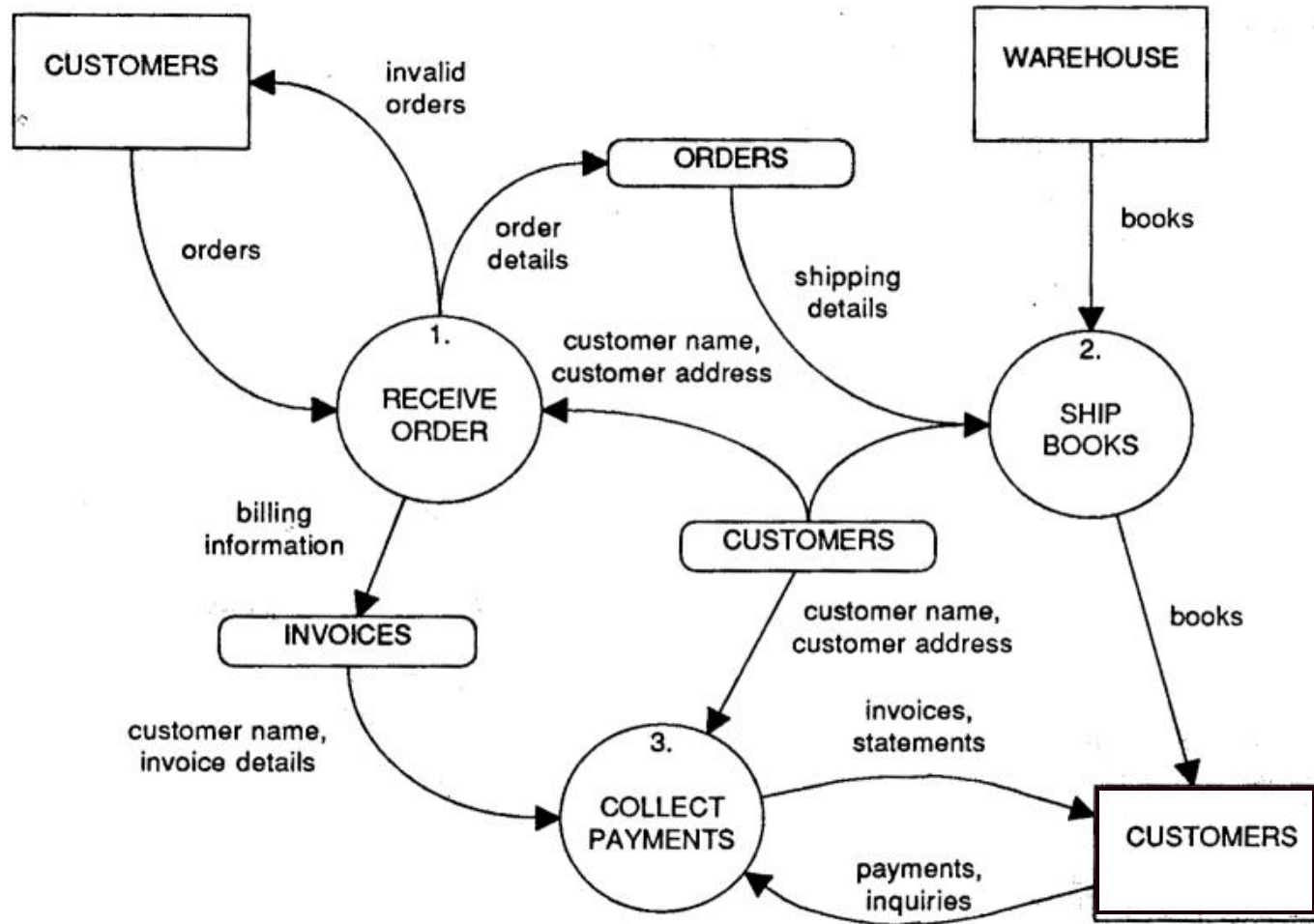
# The components of a DFD

## ➤ The Terminator 外部使用者

- 系統所使用的資料之源頭或是系統所產稱的資料之接收處。用矩形表示。
- Terminator 可以是一個人、一群系統使用者、一公司部門或是外部組織單位。

ACCOUNTING  
DEPARTMENT

# A typical DFD



# Guidelines for constructing DFDs

- Choose meaningful names for processes, flows, stores, and terminators.
- Number the processes.
- Redraw the DFD as many times as necessary.
- Avoid overly complex DFDs.
- Make sure the DFD is logically consistent.

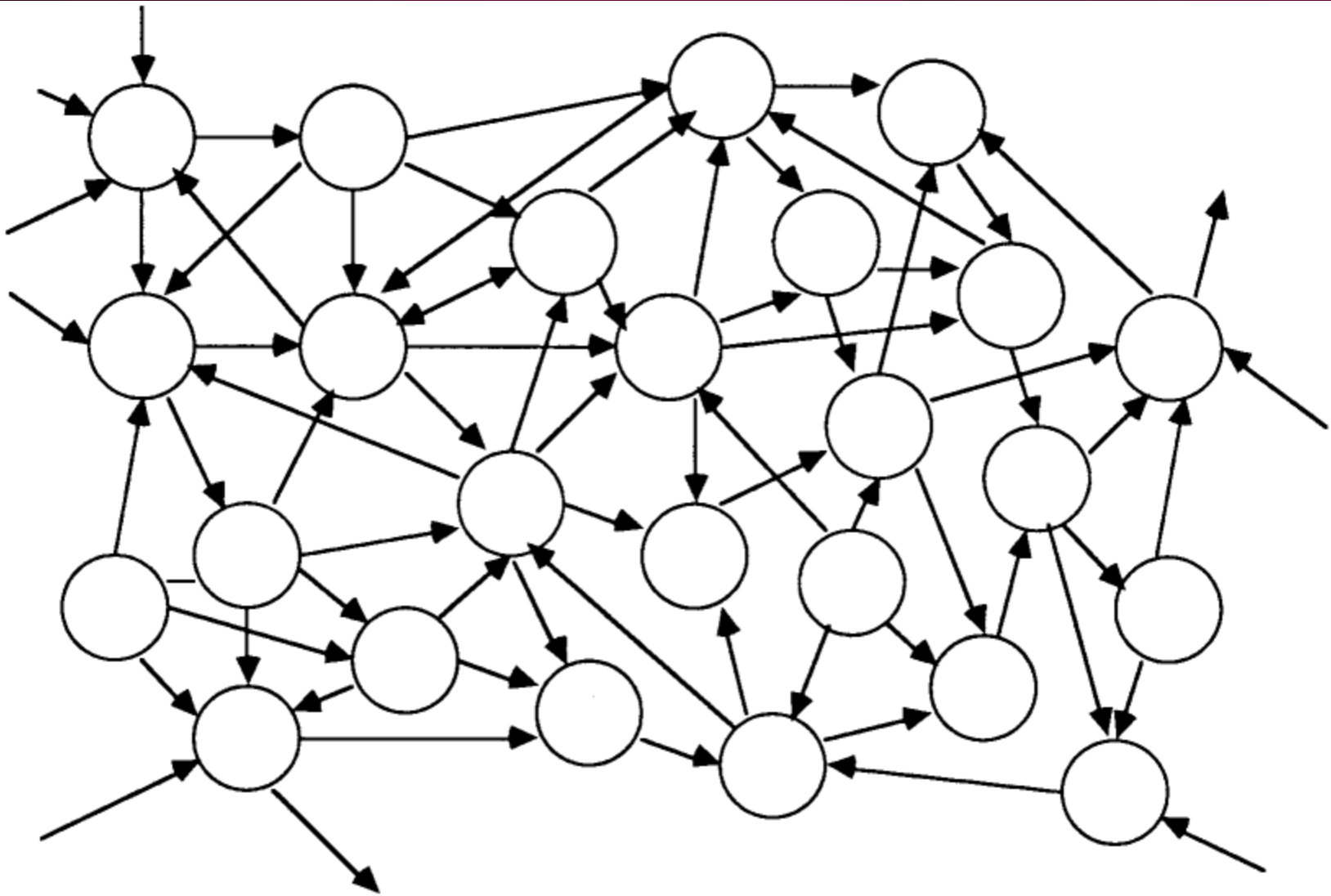
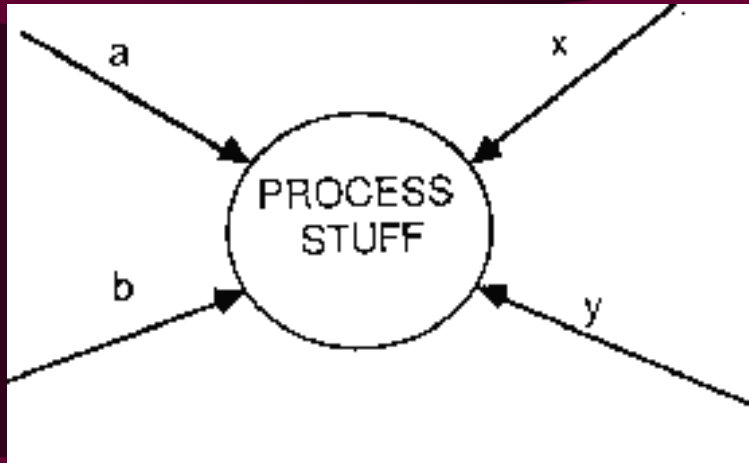
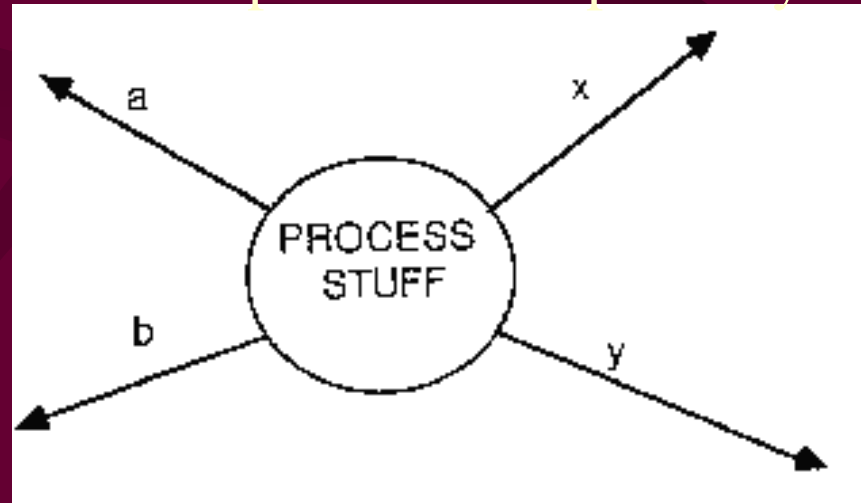


Figure 9.20: A complex DFD

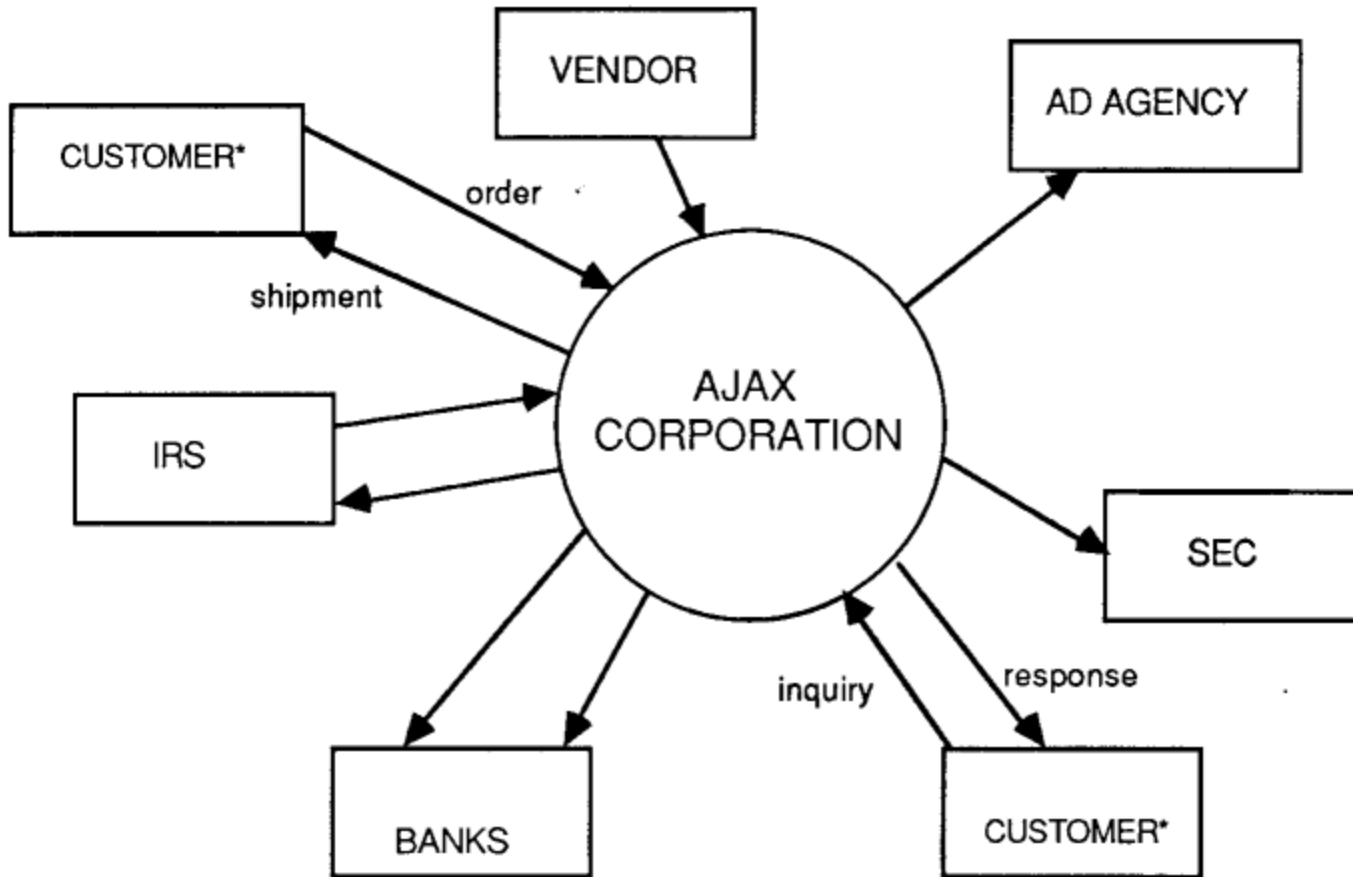
## An example of an infinite sink




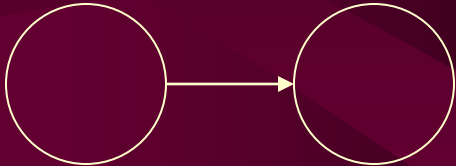

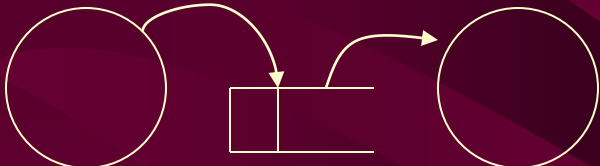


## An example of an output-only bubble






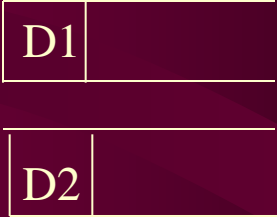

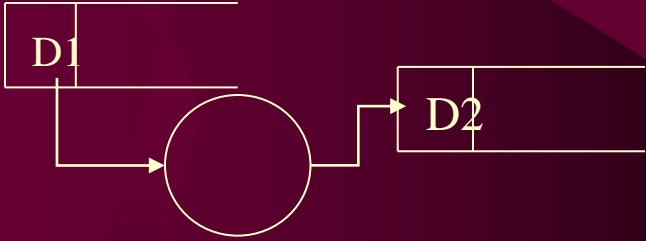


# Context Diagram



# Top-down primitives for DFDs

Starting Schema	Resulting Schema
	
	
	

Starting Schema	Resulting Schema
	
	
	
	



# Leveled DFDs

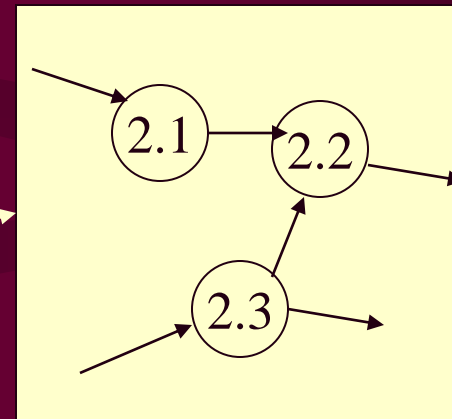
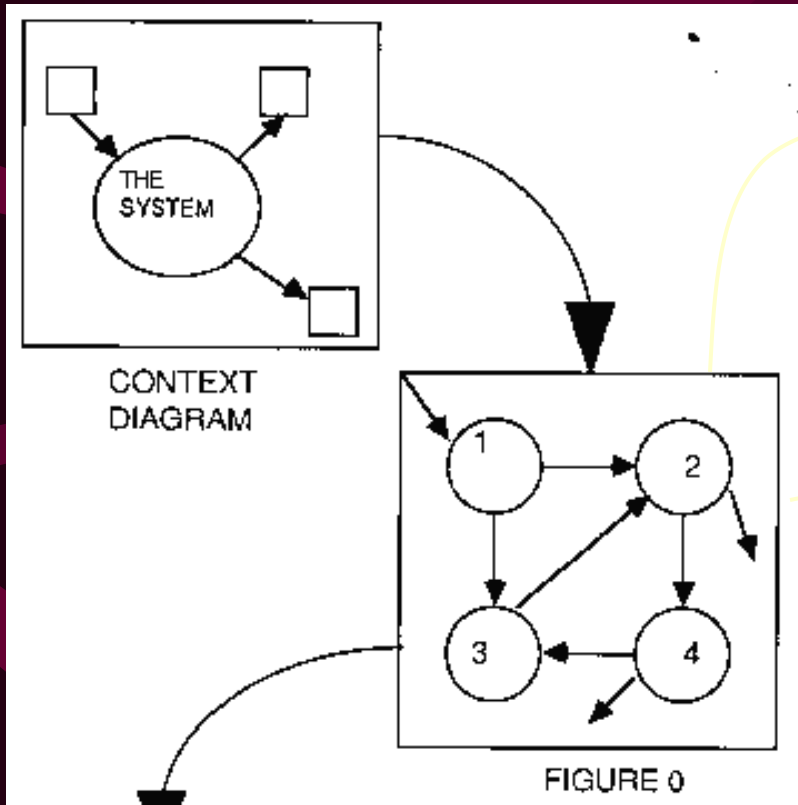


FIGURE 2

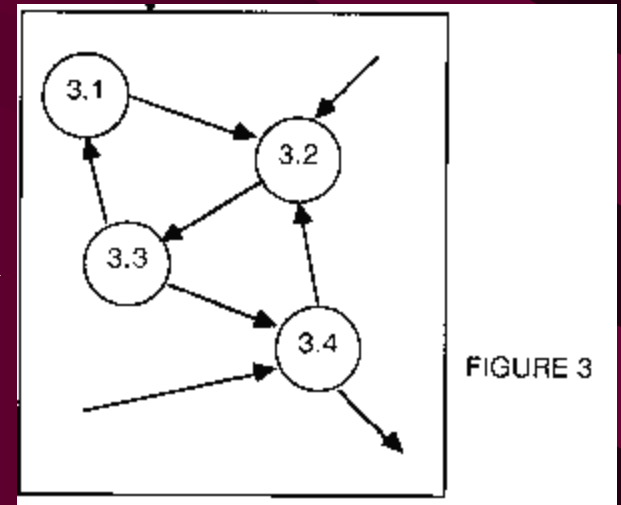
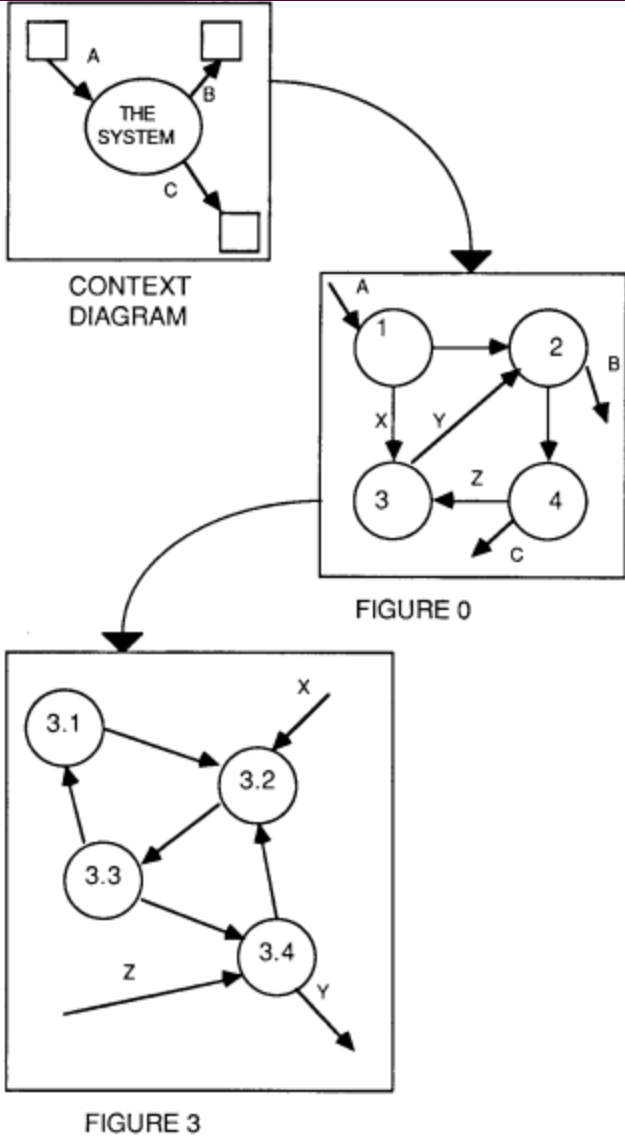
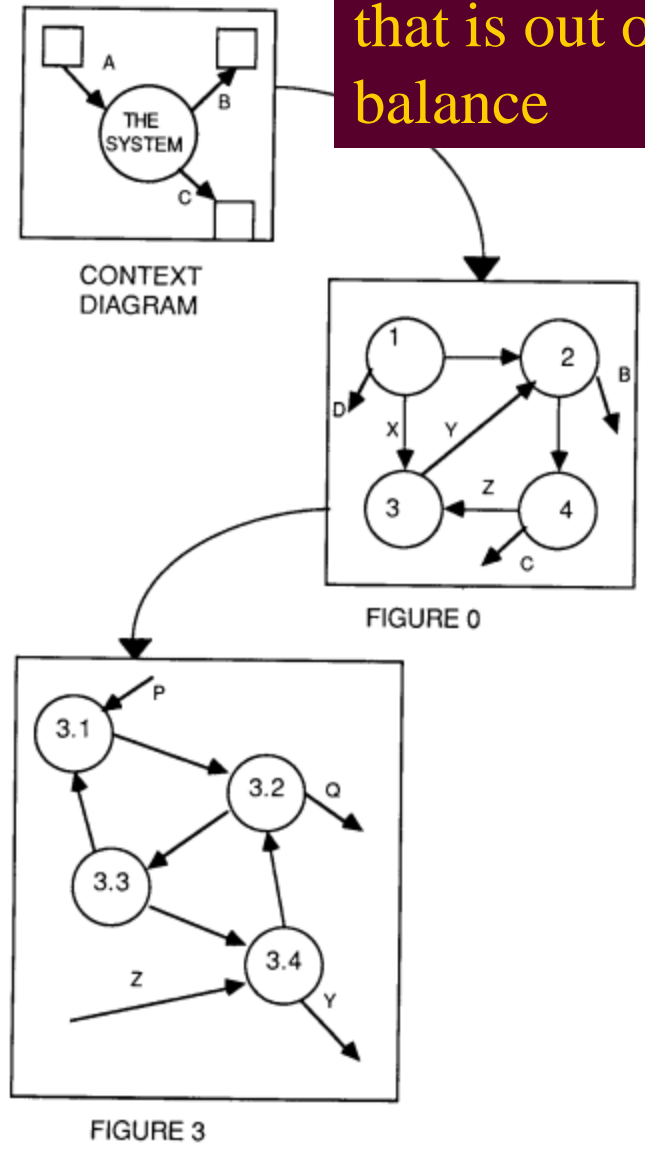


FIGURE 3

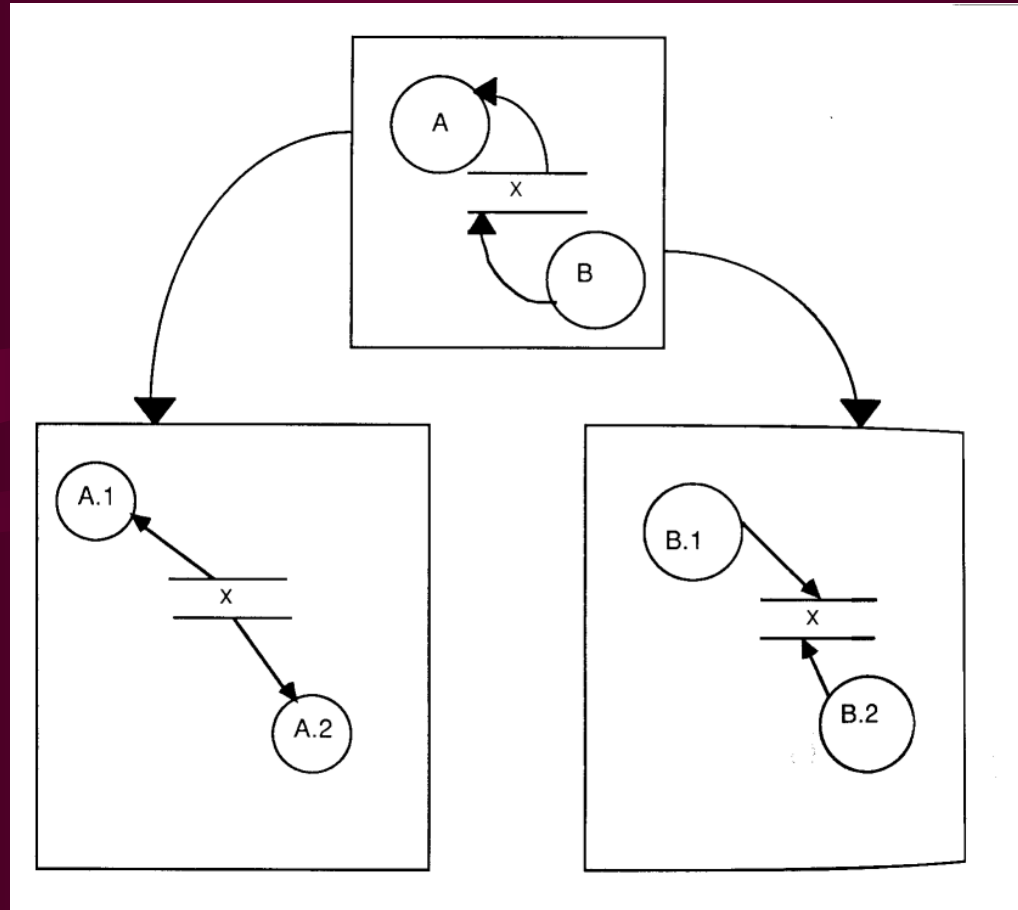
# A balanced DFD fragment



# A DFD fragment that is out of balance



# Showing stores at lower levels



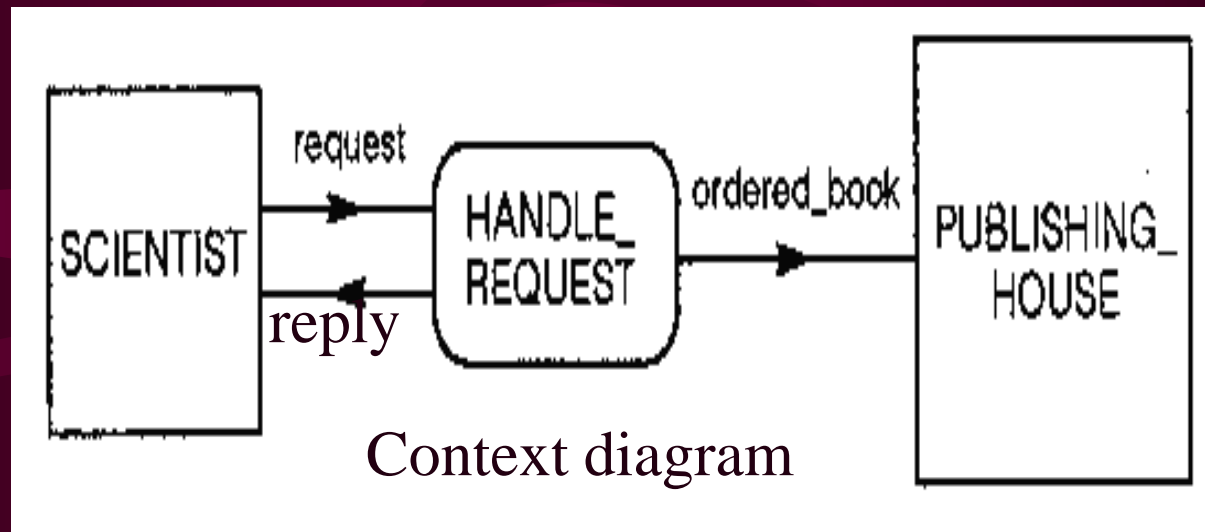
# An example of top-down strategy

## 圖書館圖書採購系統

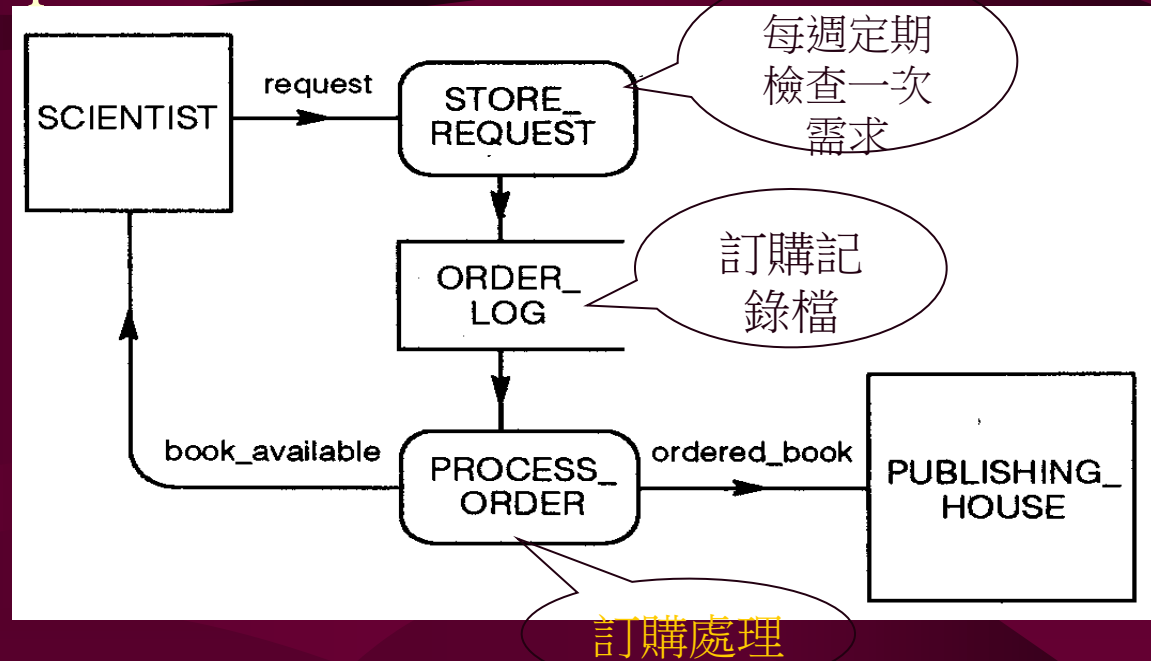
### ➤ Assumption

- Assume that the policy of the librarian is to collect book orders and process them periodically.
- Assume that order processing consists of checking the feasibility of purchase, followed by compiling an order.
- Finally, assume that the CHECK\_BOOK activity can be decomposed into the two parallel activities of checking whether a book is already available in the library and whether funds are available from grants to cover its cost.

Step 1:

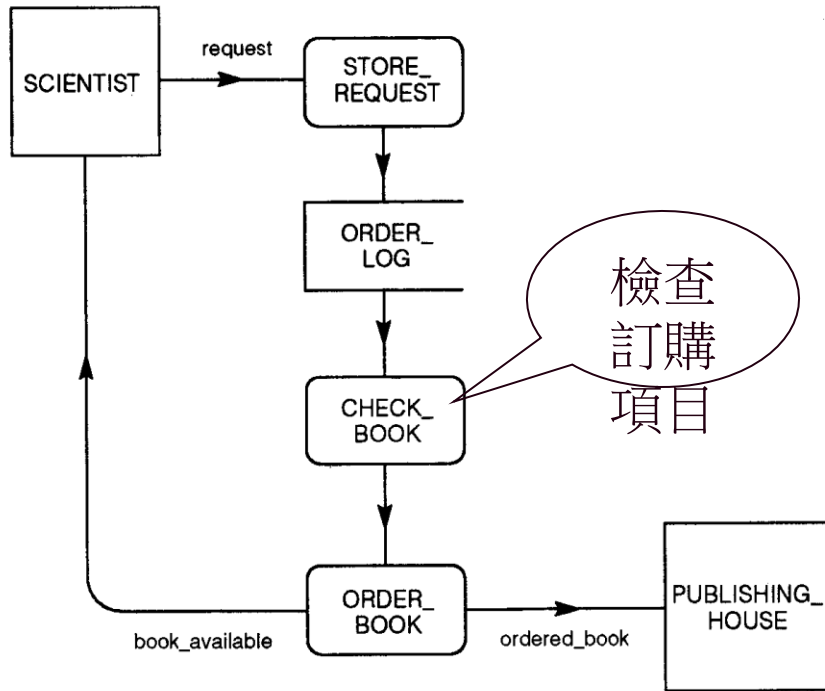


## Step 2:

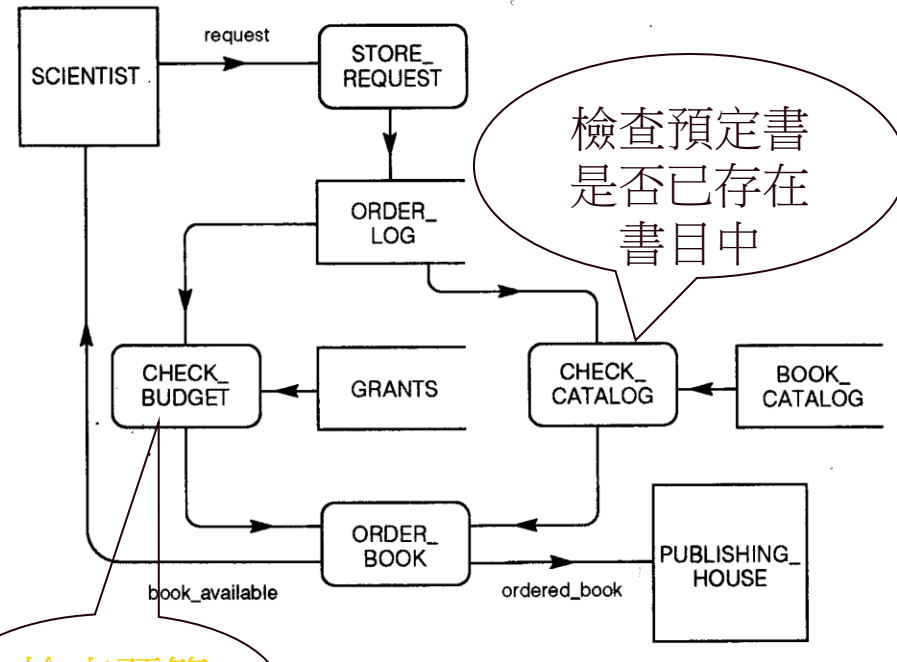


- The process HANDLE\_REQUEST models all the ordering and purchasing activities.
- The SCIENTIST orders a new book and is informed when the book becomes available.
- The PUBLISHING\_HOUSE receives the orders and sells the book to the library.

### Step 3:



### Step 4:



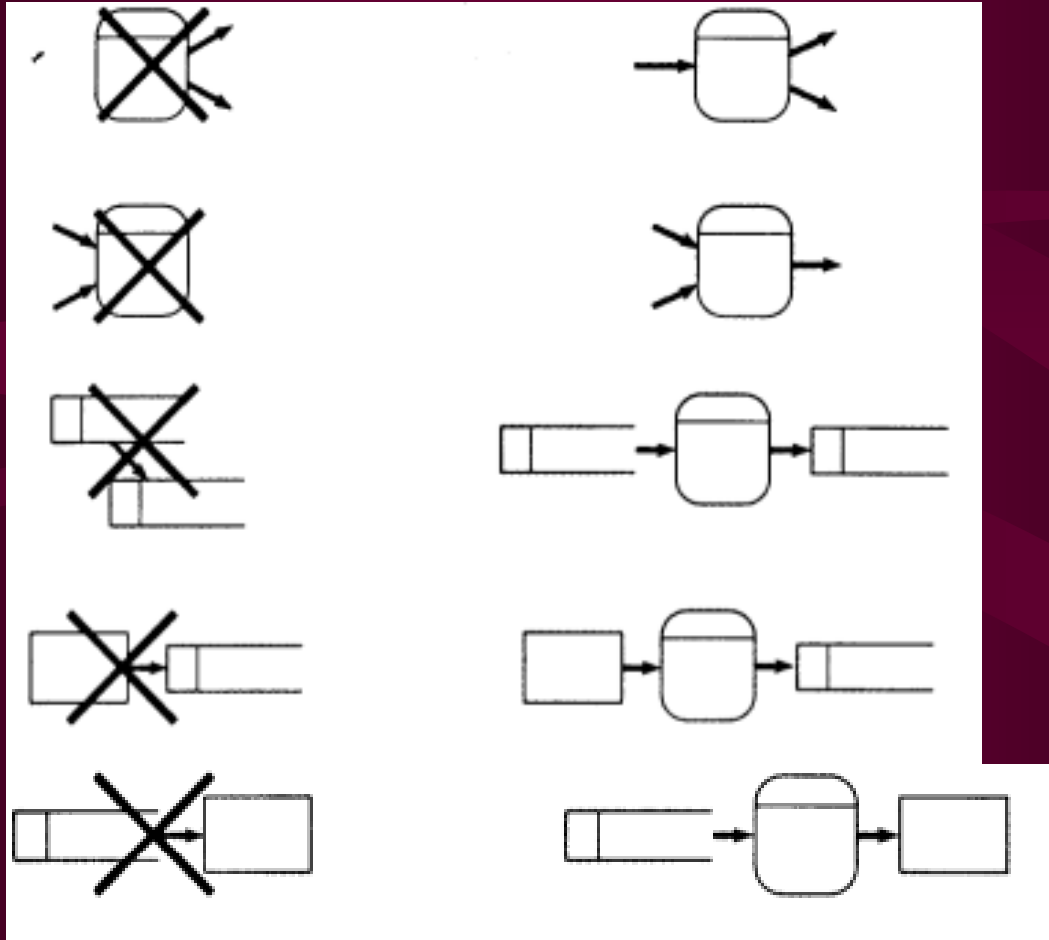
# Qualities of a Functional Schema

Functional independence	Each process can perform a substantial part of its functions independently.
Completeness	It can represent all features of the application domain at an appropriate level of detail.
Correctness	It properly uses the concepts of the dataflow model to represent requirements.
Readability	It can represent requirements in a natural way and can be easily understood without the need for further explanations.
Minimality	Every aspect of the requirements appears only once in the schema



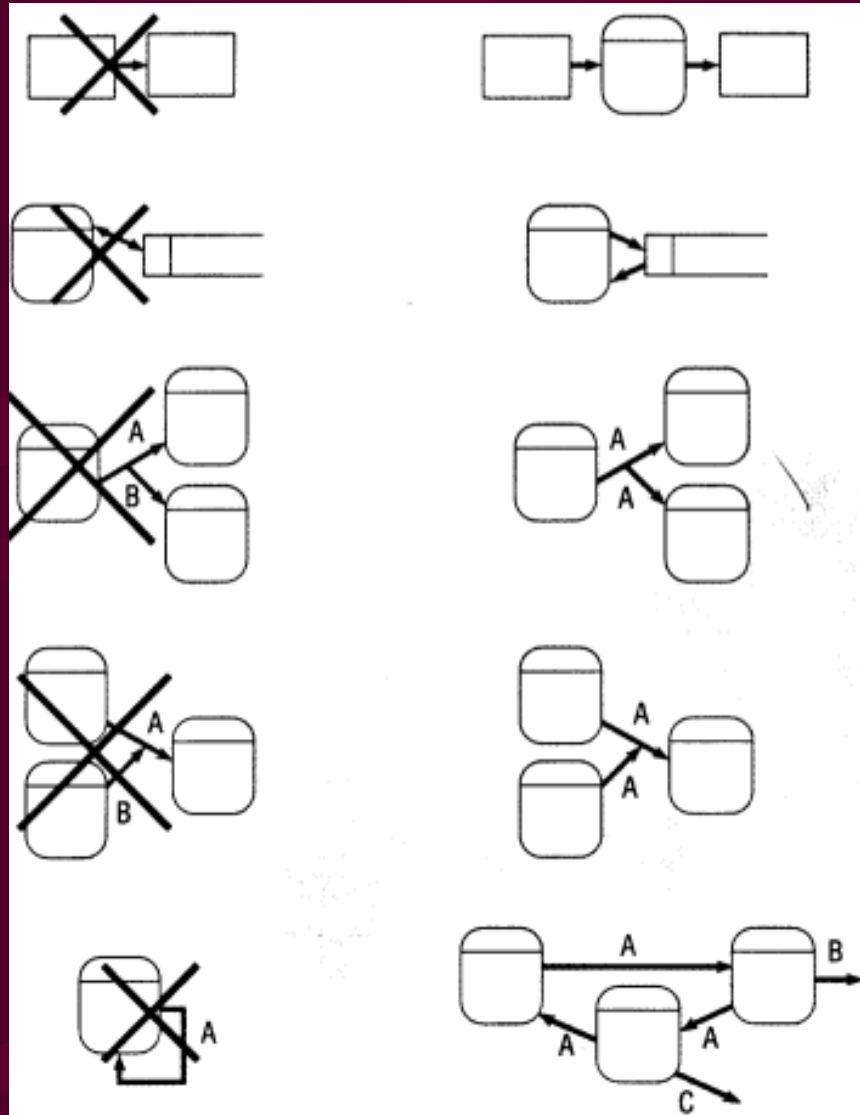
# Incorrect

# Correct



Incorrect

Correct



## Exercise

1. Prepare two data flow diagrams that describe the foregoing processes. The first DFD should be a context-level diagram. The second DFD should decompose the request repair process of the context diagram into its appropriate components.

Truck drivers for ACE trucking company are supposed to keep their trucks in good repair. If a truck driver detects a malfunction, he or she is required to request repairs from the company shop immediately. At the shop, a repair order is prepared and a mechanic is assigned according to availability status from the mechanic master file. The assigned mechanic diagnoses the problem, order parts, and performs the repairs. Parts information is stored on a parts master file. Parts come from parts inventory. After repairs are made, the mechanic submits charges to accounting and release the truck to the truck driver. Accounting sends charges to the appropriate division and notifies the truck driver of the amount of charges made to his truck.

## 2. Produce a functional schema for the functional requirements of a hospital database presented here.

The hospital information system has an admission process; patients are admitted to hospital after the recommendation of admitting physicians. Admission data of patients are recorded; then patients are sent to the appropriate department. Each department is notified of the arrival of new patients one hour ahead. Departments annotate on the patient's clinical record information about test, observations, treatments, and reactions. Before discharge, the assumed discharge date is communicated from physicians in the departments to admitting physicians, so that admission of new patients can be scheduled. On the day of discharge, after a careful examination, the patient is indeed discharged in most cases. Admitting physicians are informed when the patient has to remain in the hospital, with an indication of the new presumed discharge date.