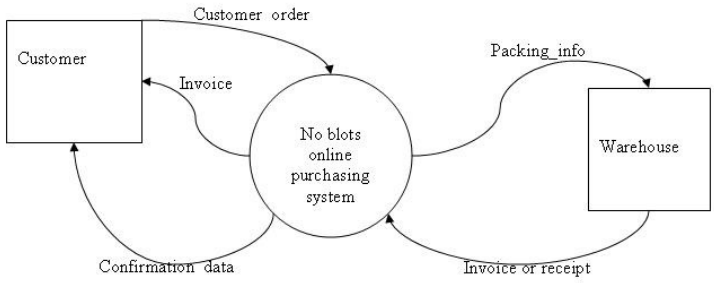
Context diagrams &
Data Flow Diagrams (DFD)

Context Diagram



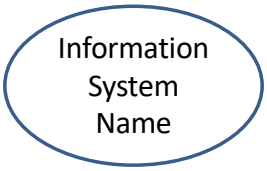
- Known as a **Level 0 Data Flow Diagram (DFD)**.
- Shows a system in relation to other external systems
- Does not show details **within** the system
- The simplest form of a **DFD**.

Context Diagram

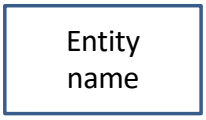
- Contains:
  - One **Process** – the whole system as a single shape
  - One or more **External Entities** – other systems with a data flow to the system being described.
  - Two or more **Data Flows**
  - No **Data Store**
- A context diagram is expanded into sub-processes, creating more detailed **Data Flow Diagrams**.

Context Diagram shapes

- **Information System**



- **External Entity**: sources or destinations of data



- **Data Flow**: movement of data.

Information System:

Context diagrams contain only ONE information system

External Entities:

- Can be duplicated on the diagram one or more times, to avoid line crossing.
- Are not part of the system being studied.
- May be part of the same organisation, but are *beyond the influence* of the system being described.
- Can represent another system or subsystem within the same organisation.
- Must receive data from or send data to the system being described.
- Are placed on the edges of the DFD

External Entities

Rule 1: In a context diagram do not show direct data flow from one external entity to another.

- They are irrelevant to the system being described because they are **external**.
- Like how a conversation between two people you don't know is irrelevant to **you**.

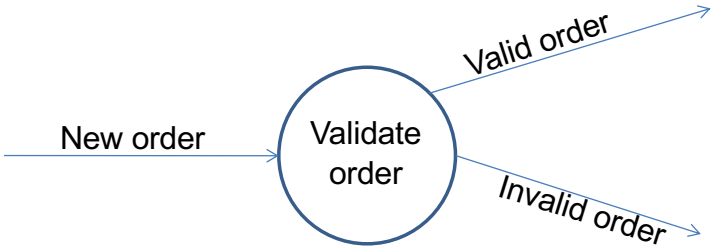
Data Flows:

Rule 2: Only represent **data**, not material goods like books, goods.

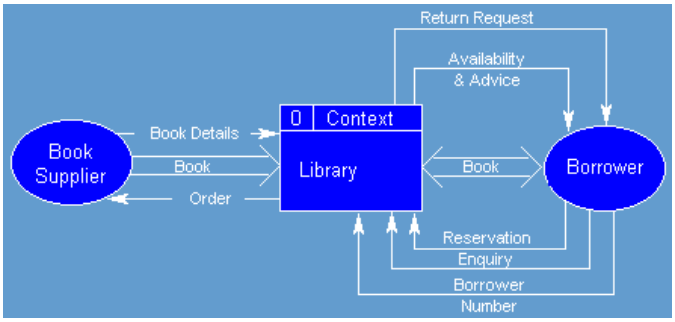
- Shown as **arrows** with labels.
- Must be named.

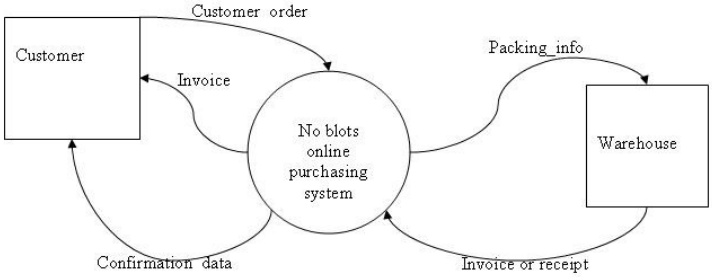
Rule 3: Only include one type of data per arrow. E.g. “Orders”, “Customer Data”

- Do not use arrows with heads on each end. Identify each flow separately.
- A fork in a data flow means that the same data goes to two destinations.
- The same data coming from several locations can also be joined.



Context Diagram Examples





Draw a context diagram from the following case study:

Case Study: Brindabella Bird Watching Club

Brindabella Bird Watching Club has hundreds of enthusiastic members. People can join the club by sending in a membership form along with $10. Members receive newsletters outlining the club's activities for the coming month. Members also receive reminder letters when their membership is due for renewal.

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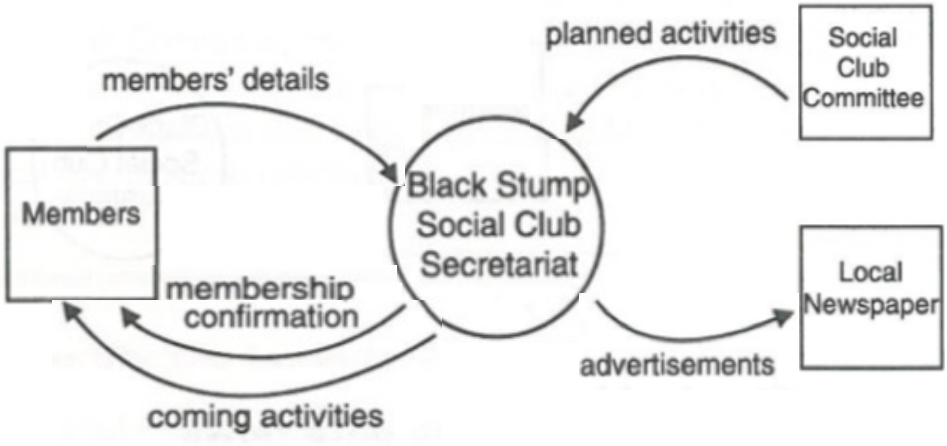
Case study: Black Stump Social Club

The Black Stump Social Club has an enthusiastic club secretary who has set up a system for keeping track of all the club's members as well as all the club's activities. New members' details are added to the members file and confirmation of membership letters are sent out.

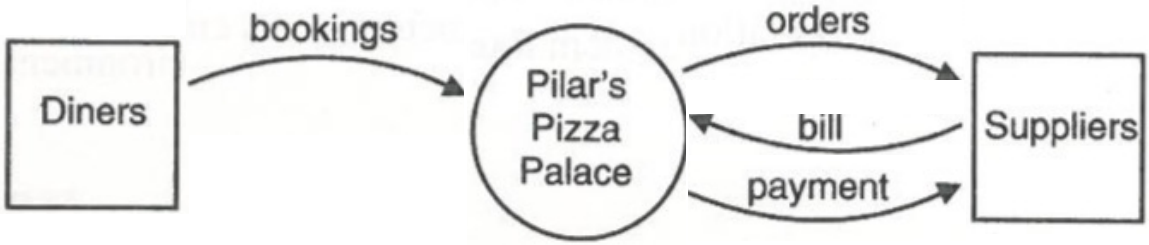
The Social Club Committee meets to plan activities and these are added by the secretary to the activities file. A monthly newsletter listing all coming activities is compiled and sent to each member. Advertisements are also sent to the local newspaper to inform the general public of the social club's coming activities.



Draw a context diagram from the following case study:

Case Study: Pilar's Pizza Palace

Pilar's Pizza Palace is situated in a busy harbourside shopping complex. It takes bookings from diners for lunch or dinner. Pilar does all the ordering and will only use the freshest of ingredients in her dishes. She uses a few chosen suppliers, orders daily over the phone and pays her accounts at the end of each month when her suppliers send her a bill.



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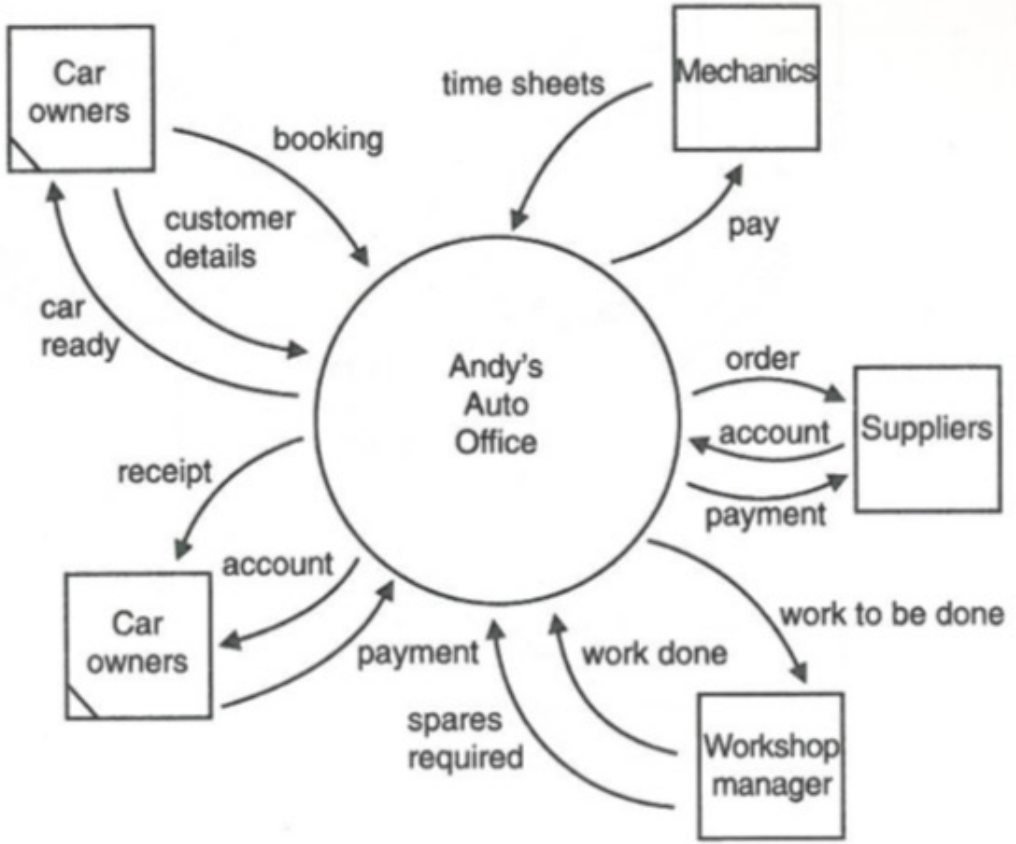
Draw a context diagram from the following case study:

Case study: Andy's Autos

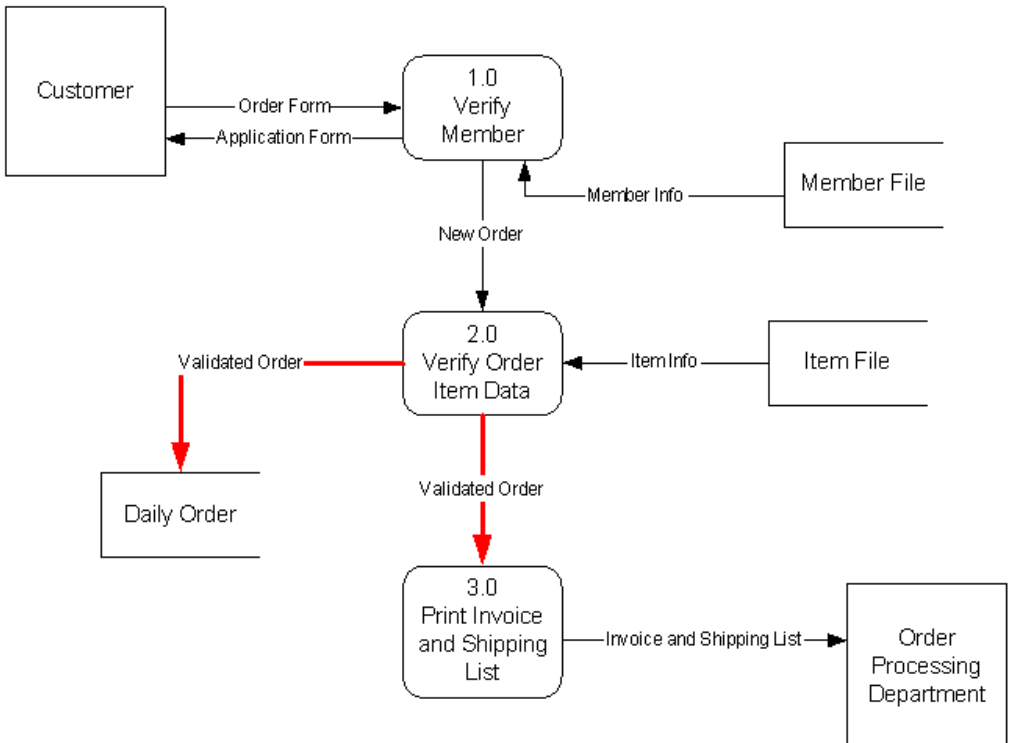
Andy's Autos is a growing business that has a workshop where cars are serviced and repaired. Andy's Autos employs six mechanics as well as Elaine, the office manager. Andy himself manages the workshop. Customers ring Andy's Autos and Elaine books their cars in at a convenient time. When the customer arrives with the car Elaine takes down the customer's details as she will need to ring them to let them know when their cars are ready to be picked up. Andy lets Elaine know when a car is ready to be picked up as well as what work was done on the car. When the customers arrive for their cars, Elaine has to make up the accounts, handle the customer's payment and issue a receipt.

Elaine also orders spare parts when requested to do so by the workshop. The spare parts suppliers send out monthly accounts and it is Elaine's job to see that these accounts get paid on time. As well as the monthly accounts Elaine is also responsible for the fortnightly payroll; the mechanics fill out time sheets and these are used to calculate their pays.

Andy's Autos context diagram:

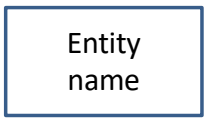


Data Flow Diagrams



DFD shapes

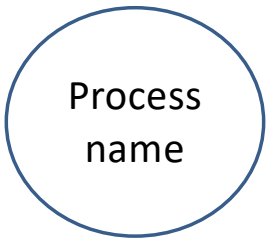
- External Entity: sources or destinations of data



- Data Flow: movement of data.

Process:

- an activity that transforms or manipulates the data (combines, reorders, converts, etc.).
- **Rule 4: Processes must have** at least one data flow in and one data flow out.
- Show data **transformation** or **change**
- Data coming into a process must be "worked on" in some way and then output.



- Are named with a **verb** and an object of the verb (the thing being processed)

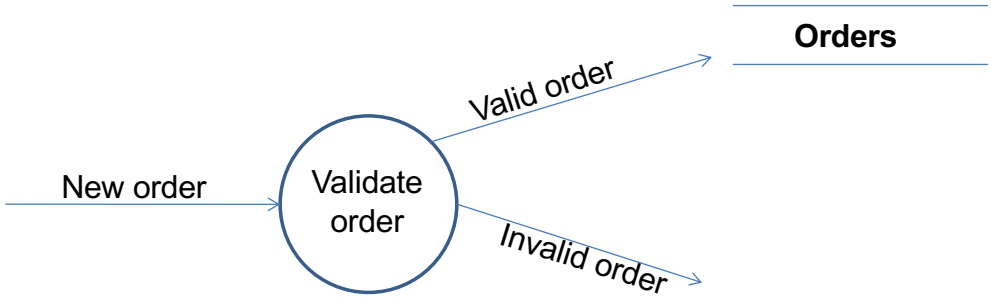
E.g. "**Calculate** (verb) **wages** (object)".

- Each process should represent only **one** function or action.
- An "**and**" in the name probably betrays the presence of more than one process.
- Rule 5: Processes have no **order of operation** stated or implied.

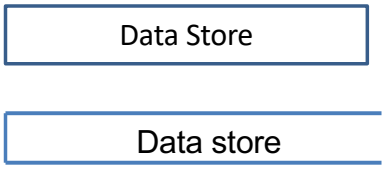
E.g. Just because one process to above or to the left of another process does not mean that process must take place **before** the other one.

Data Stores:

- Where data is stored
- They look the same whether stored electronically (e.g. Database) or manually (e.g. paper files)
- Must be named
- Name is usually the plural form of the data being flowed into it.
- E.g. An ‘order’ is stored in a datastore called ‘orders’



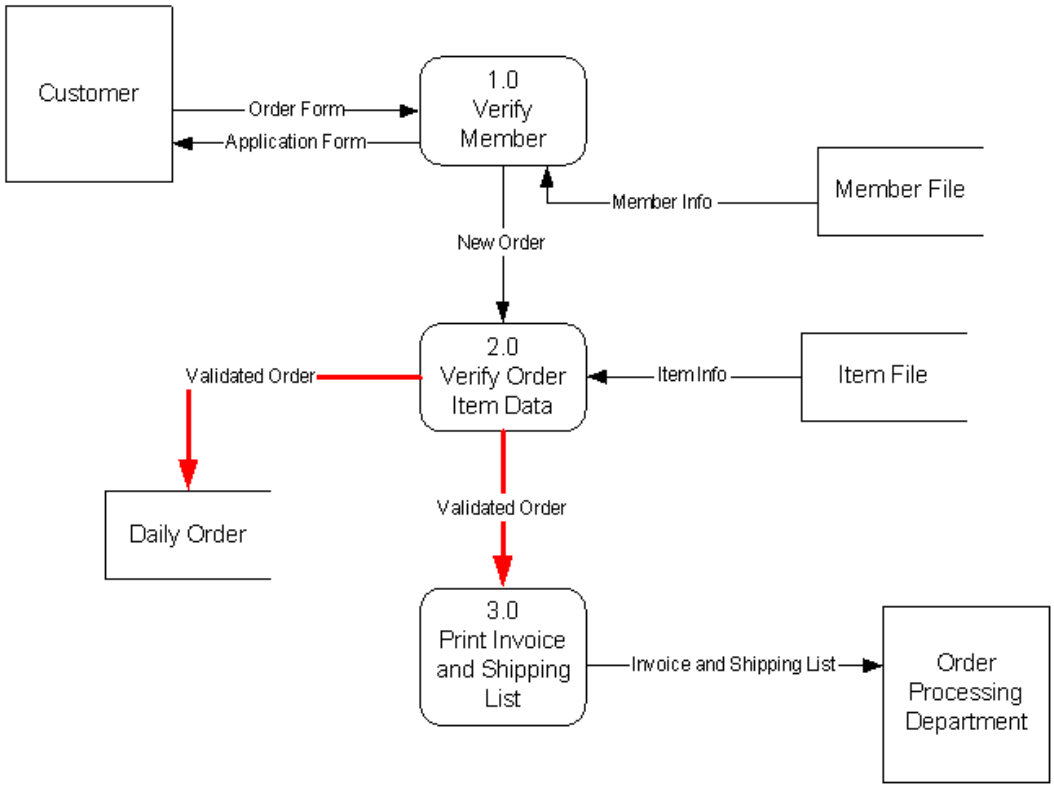
- Can be duplicated one or more times to avoid line crossing.
- Can be shared by two or more systems.
- Contents of datastore are detailed elsewhere in a data dictionary.
- Sometimes shown as



- Can also appear like this if it’s a duplicate

- Duplicates are used to avoid having data flow arrows crossing each other.
- The extra line in the bottom right corner reminds you that this data store already appears in the chart and is not a new store.

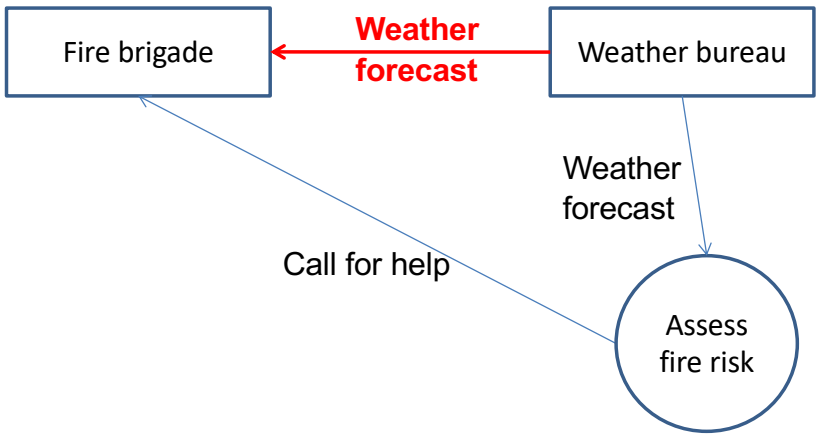
Sample DFD with 3 data stores



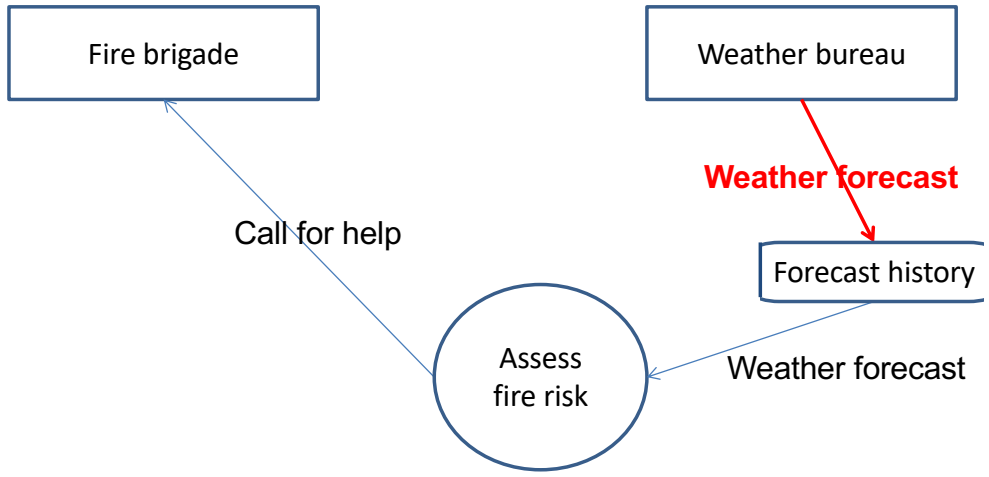
IT'S A **BAD** DFD

- Do not use direct data flows from one **data store** to another. There must be a process between the stores
- Do not use direct data flows from an **external entity** to a **data store** flows. Again, a process is needed between them.
- Do not show direct data flows between external entities.

Bad! **Flow between external entities**



Bad! **Flow direct to data store**



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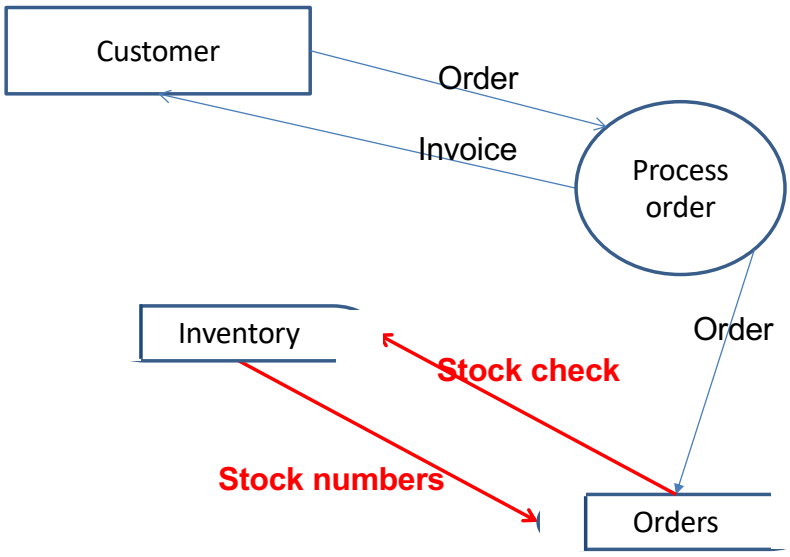


Creating a DFD

1. List the **external entities** that provide data or receive data from system being described;
2. List the **data** being sent to and from the entities;
3. Create a **context diagram** with the system in the middle of the external entities sending and receiving data flows;
4. List the **processing functions** carried out in the system;
4. Identify the **data connections** between these processing functions;
5. **Explode** each process and repeat above steps as needed.

DFD Tips

- Label your processes carefully. A process just labelled "Produce Report" and has the output of "Report" says little – what is the report **about**?
- If you have trouble labelling anything on the diagram, it may be because you don't fully understand what it does!
- Stick with it until a clear label is found.

Rule 6: Do not label processes as people (e.g. "Secretary").

- DFDs are not concerned with *who* does a process, but what the process **is**.
- Besides, the secretary might have several functions – tea maker, mail runner, receptionist. Identify the process, not the body.

Rule 7: Time and place are not important.

- It does not matter whether one data flow occurs before or after another data flow, or in which office it happens.
- Don't worry about **how** or **when** a process happens. It just *happens*!
- Data flows are pathways for **data**. Think about what **data** is needed to perform a process or update a data store.

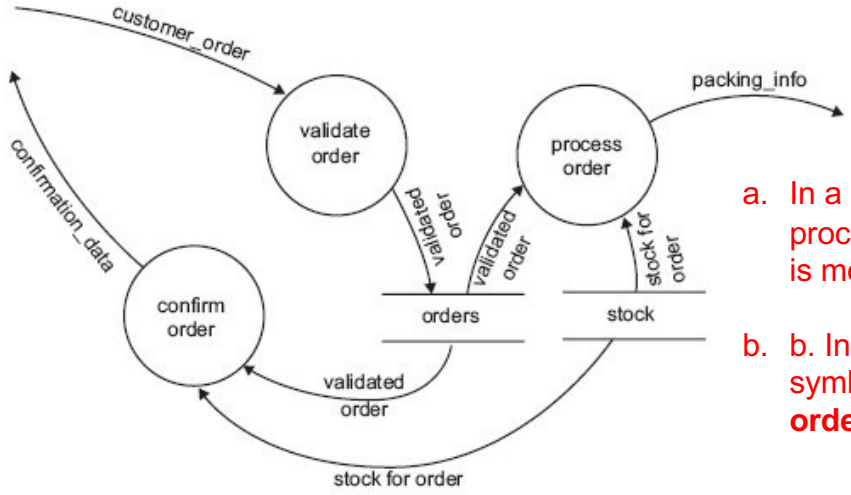
Rule 8: A DFD is not a flowchart and should not have loops or transfer of control.

Rule 9: Keep your DFD clear and easy to read – avoid crowding or crossed data flow lines.

- Do not try to put **everything you know** on the DFD.
- The DFD should serve as an index and outline.
- Details are **fleshed out in other places** such as the data dictionary, data structure diagrams, flowcharts etc.

EXAM DFD – SD 2006

A company, No Blots, supplies ink cartridges for printers which are sold only through the internet.
When customers place an order, the order is checked, a confirmation is sent back to the customer and the details of the order are sent to the warehouse.
The diagram below shows the data flow diagram (DFD) for the No Blots online purchasing system. The diagram does not show the data sources and destinations.



a. In a DFD a circle represents a process. Briefly explain what is meant by a process. (1)

b. b. In the DFD, what do the symbols labelled **stock** and **orders** represent? (1)

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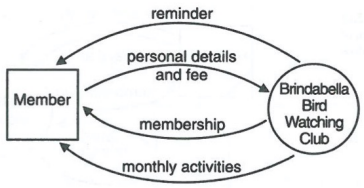

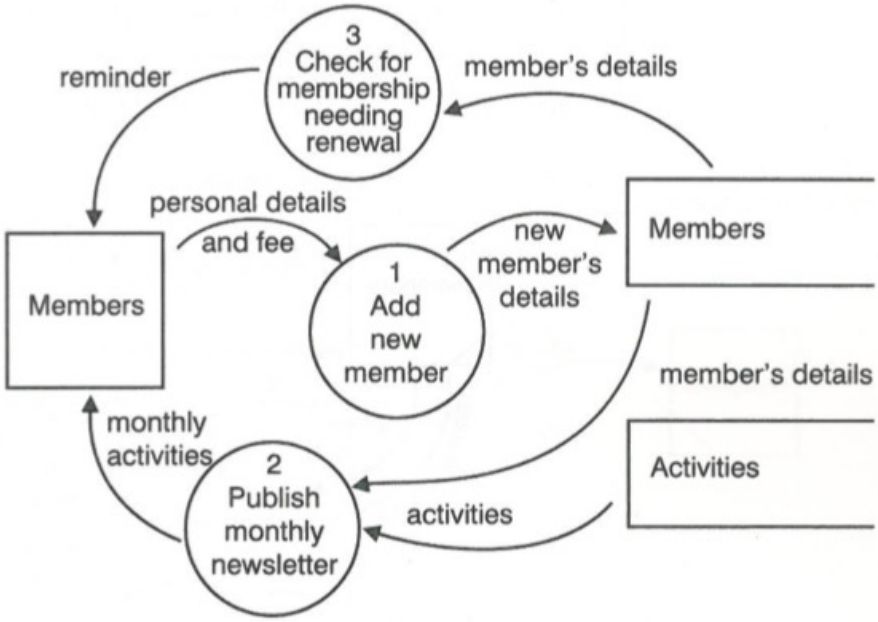

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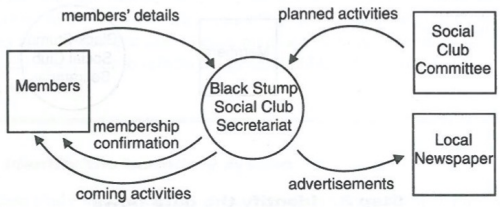

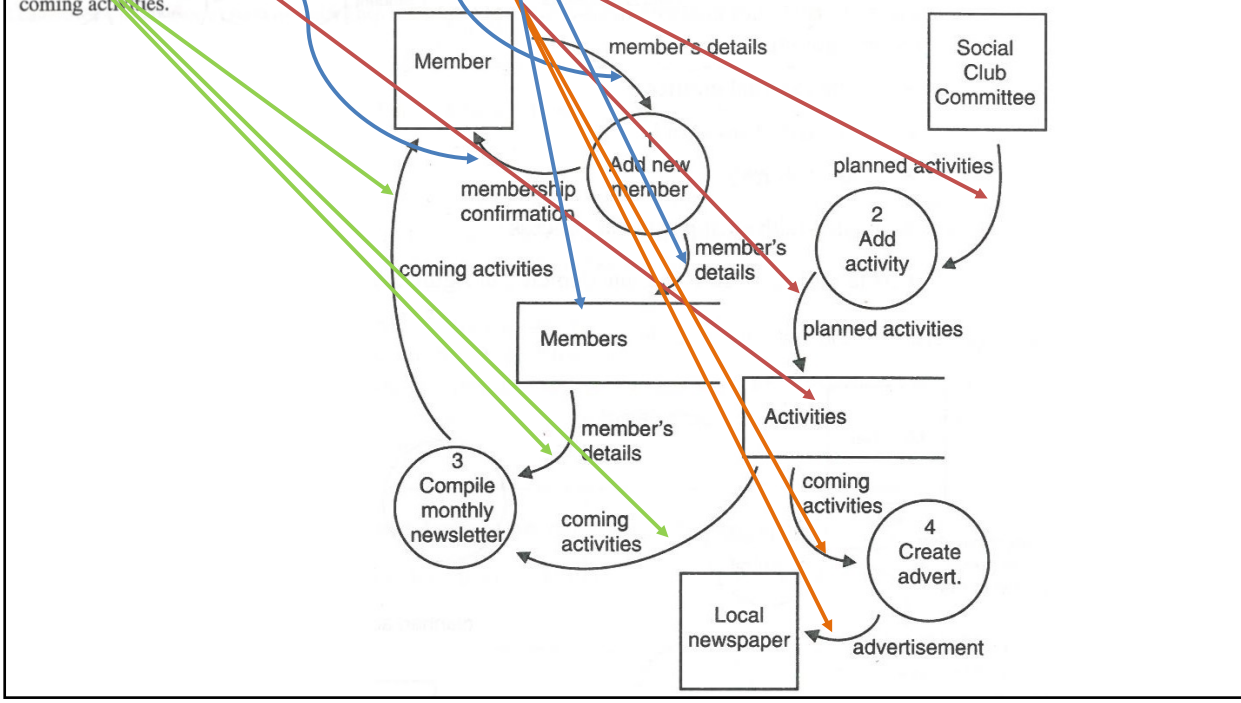

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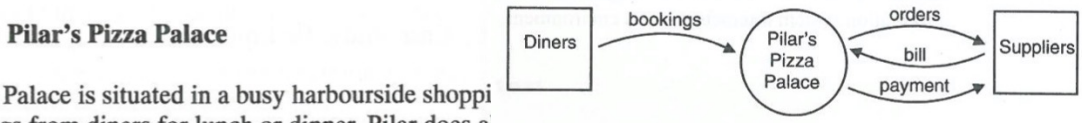

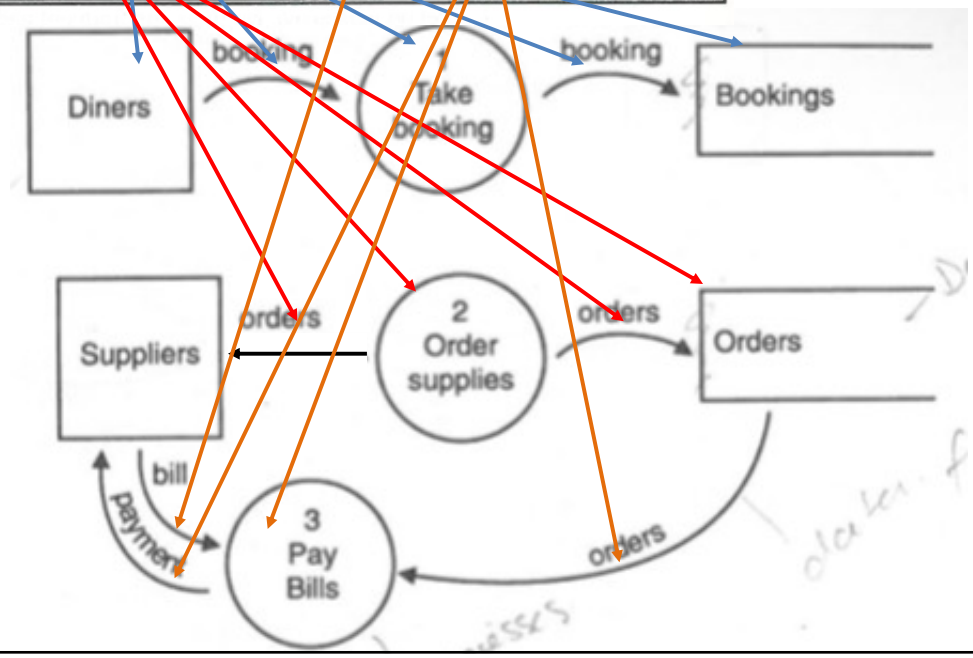

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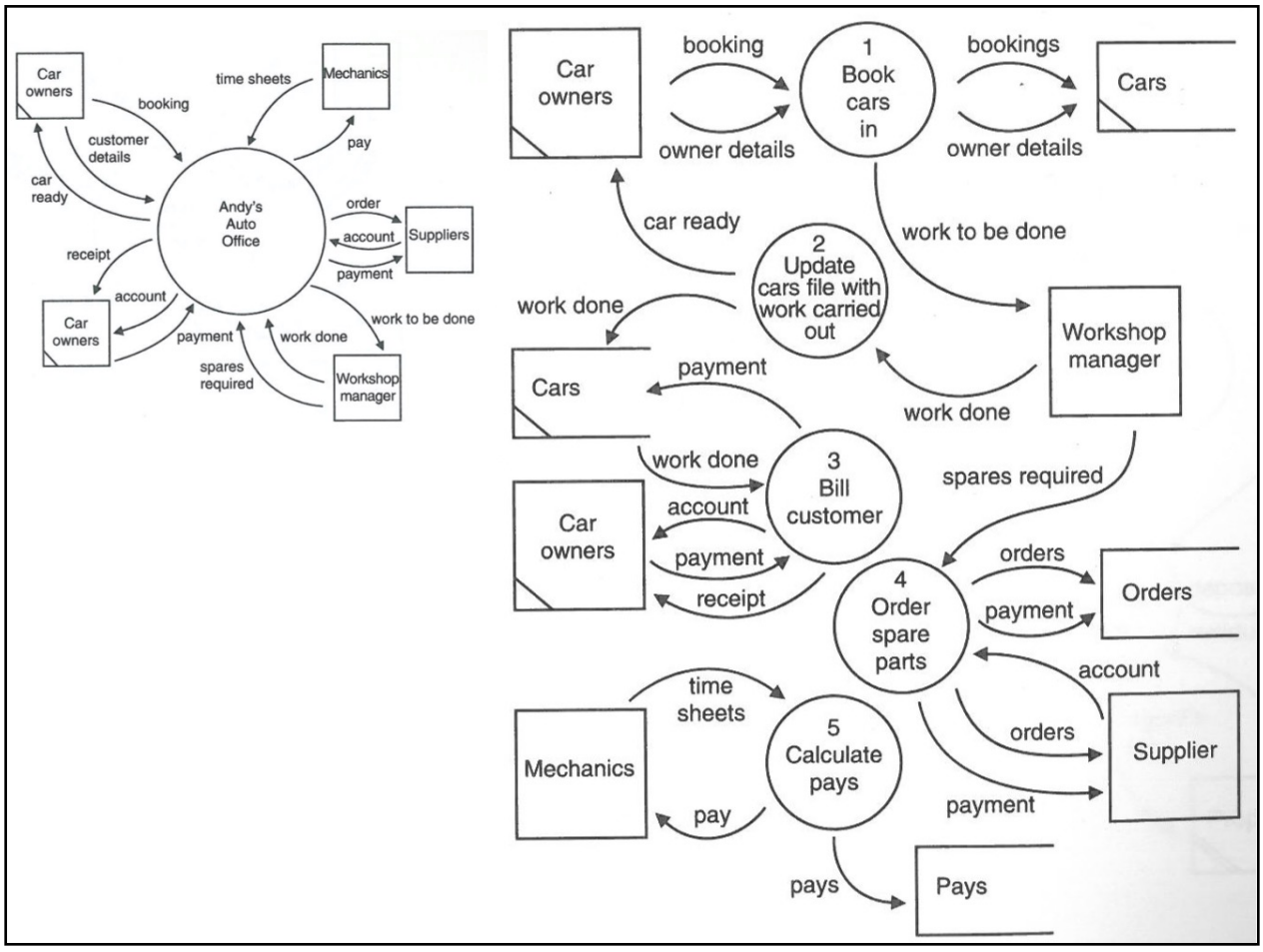
Car owners
booking
customer details
car ready
time sheets
Mechanics
pay
Andy's Auto Office
order
account
payment
Suppliers
receipt
account
payment
Car owners
work done
spares required
work to be done
Workshop manager
Car owners
booking
owner details
1 Book cars in
bookings
owner details
Cars
car ready
2 Update cars file with work carried out
work to be done
work done
Cars
payment
work done
Workshop manager
work done
3 Bill customer
spares required
Car owners
account
payment
receipt
4 Order spare parts
orders
payment
Orders
account
time sheets
Mechanics
5 Calculate pays
orders
payment
Supplier
pay
pays
Pays